

libdwarf

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Chapter 1

A Consumer Library Interface to DWARF

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Date

2025-10-08 v2.2.0

1.1 Suggestions for improvement are welcome.

Your thoughts on the document?

A) Are the section and subsection titles on Main Page meaningful to you?

B) Are the titles on the Modules page meaningful to you?

Anything else you find misleading or confusing? Send suggestions to (libdwarf (at) linuxmail with final characters .org). Sorry about the simple obfuscation to keep bots away.

Thanks in advance for any suggestions.

1.2 Downloading Libdwarf

Project page is at <https://github.com/davea42/libdwarf-code>

There is a Releases area on the project page, click Latest and you will be presented with options to download the source in three different forms.

For details on licensing, see COPYING in the files list.

README.md may be of interest (automatically shown on the project page on github..

Examples of using libdwarf are in [doc/checkexamples.c](#) and `src/bin/dwarfexamples`.

To download source, one can also do:

```
git clone https://github.com/davea42/libdwarf-code code
```

Some tests simply assume the project source base name is `code` which is why the above is as shown. This is a grave historical misfeature that needs to be fixed in the test scripts.

1.3 Introduction

This document describes an interface to *libdwarf*, a library of functions to provide access to DWARF debugging information records, DWARF line number information, DWARF address range and global names information, weak names information, DWARF frame description information, DWARF static function names, DWARF static variables, and DWARF type information. In addition the library provides access to several object sections (created by compiler writers and for debuggers) related to debugging but not mentioned in any DWARF standard.

The DWARF Standard has long mentioned the "Unix International Programming Languages Special Interest Group" (PLSIG), under whose auspices the DWARF committee was formed around 1991. "Unix International" was disbanded in the 1990s and no longer exists.

The DWARF committee published DWARF2 July 27, 1993, DWARF3 in 2005, DWARF4 in 2010, and DWARF5 in 2017.

In the mid 1990s this document and the library it describes (which the committee never endorsed, having decided not to endorse or approve any particular library interface) was made available on the internet by Silicon Graphics, Inc.

In 2005 the DWARF committee began an affiliation with FreeStandards.org. In 2007 FreeStandards.org merged with The Linux Foundation. The DWARF committee dropped its affiliation with FreeStandards.org in 2007 and established the dwarfstd.org website.

See also

<https://www.dwarfstd.org> for current information on standardization activities and a copy of the standard.

1.4 Thread Safety

Libdwarf can safely open multiple Dwarf_Debug pointers simultaneously but all such Dwarf_Debug pointers must be opened within the same thread. And all *libdwarf* calls must be made from within that single (same) thread.

1.5 Error Handling in libdwarf

Essentially every *libdwarf* call could involve dealing with an error (possibly data corruption in the object file). Here we explain the two main approaches the library provides (though we think only one of them is truly appropriate except in toy programs). In all cases where the library returns an error code (almost every library function does) the caller should check whether the returned integer is DW_DLV_OK, DW_DLV_ERROR, or DW_DLV_NO_ENTRY and then act accordingly.

A) The recommended approach is to define a Dwarf_Error and initialize it to 0.

```
Dwarf_Error error = 0;
```

Then, in every call where there is a Dwarf_Error argument pass its address. For example:

```
int res = dwarf_tag(die,DW_TAG_compile_unit,&error);
```

The possible return values to res are, in general:

```
DW_DLV_OK
DW_DLV_NO_ENTRY
DW_DLV_ERROR
```

If **DW_DLV_ERROR** is returned then error is set (by the library) to a pointer to important details about the error and the library will not pass back any data through other pointer arguments. If **DW_DLV_NO_ENTRY** is returned the error argument is ignored by the library and the library will not pass back any data through pointer arguments. If **DW_DLV_OK** is returned argument pointers that are defined as ways to return data to your code are used and values are set in your data by the library.

Some functions cannot possibly return some of these three values. As defined later for each function.

B) An alternative (not recommended) approach is to pass NULL to the error argument.

```
int res = dwarf_tag(die,DW_TAG_compile_unit,NULL);
```

If your initialization provided an 'errhand' function pointer argument (see below) the library will call errhand if an error is encountered. (Your errhand function could exit if you so choose.)

The the library will then return DW_DLV_ERROR, though you will have no way to identify what the error was. Could be a malloc fail or data corruption or an invalid argument to the call, or something else.

That is the whole picture. The library never calls exit() under any circumstances.

1.5.1 Error Handling at Initialization

Each initialization call (for example)

```
Dwarf_Debug dbg = 0;
const char *path = "myobjectfile";
char *true_path = 0;
unsigned int true_pathlen = 0;
Dwarf_Handler errhand = 0;
Dwarf_Ptr errarg = 0;
Dwarf_Error error = 0;
int res = 0;

res = dwarf_init_path(path,true_path,true_pathlen,
    DW_GROUPNUMBER_ANY,errhand,errarg,&dbg,&error);
```

has two arguments that appear nowhere else in the library.

```
Dwarf_Handler errhand
Dwarf_Ptr      errarg
```

For the **recommended A)** approach:

Just pass NULL to both those arguments. If the initialization call returns DW_DLV_ERROR you should then call `dwarf_dealloc_error` (dbg, error);

to free the Dwarf_Error data because `dwarf_finish()` does not clean up a dwarf-init error. This works even though `dbg` will be NULL.

For the **not recommended B)** approach:

Because `dw_errarg` is a general pointer one could create a struct with data of interest and use a pointer to the struct as the `dw_errarg`. Or one could use an integer or NULL, it just depends what you want to do in the Dwarf_Handler function you write.

If you wish to provide a `dw_errhand`, define a function (this first example is not a good choice as it terminates the application!).

```
void bad_dw_errhandler(Dwarf_Error error, Dwarf_Ptr ptr)
{
    printf("ERROR Exit on %lx due to error 0x%lx %s\n",
        (unsigned long)ptr,
        (unsigned long)dwarf_errno(error),
        dwarf_errmsg(error));
    exit(1)
}
```

and pass `bad_dw_errhandler` (as a function pointer, no parentheses).

The Dwarf_Ptr argument your error handler function receives is the value you passed in as `dw_errarg`, and can be anything, it allows you to associate the callback with a particular `dwarf_init*` call if you wish to make such an association.

By doing an `exit()` you guarantee that your application abruptly stops. This is only acceptable in toy or practice programs.

A better `dw_errhand` function is

```
void my_dw_errhandler(Dwarf_Error error, Dwarf_Ptr ptr)
{
    /* Clearly one could write to a log file or do
       whatever the application finds useful. */
    printf("ERROR on %lx due to error 0x%lx %s\n",
        (unsigned long)ptr,
        (unsigned long)dwarf_errno(error),
        dwarf_errmsg(error));
}
```

because it returns rather than exiting. It is not ideal. The DW_DLV_ERROR code is returned from *libdwarf* and your code can do what it likes with the error situation. The library will continue from the error and will return an error code on returning to your `@libdwarf` call ... but the calling function will not know what the error was.

```
Dwarf_Ptr x = address of some struct I want in the errhandler;
res = dwarf_init_path(..., my_dw_errhandler, x, ... );
if (res == ...)
```

If you do not wish to provide a `dw_errhand`, just pass both arguments as NULL.

1.5.2 Error Handling Everywhere

So let us examine a simple case where anything could happen. We are taking the **recommended A)** method of using a non-null Dwarf_Error*:

```
int func(Dwarf_Dbg dbg, Dwarf_Die die, Dwarf_Error* error) {
    Dwarf_Die newdie = 0;
    int res = 0;

    res = dwarf_siblingof_c(die, &newdie, error);
    if (res != DW_DLV_OK) {
        /* Whether DW_DLV_ERROR or DW_DLV_NO_ENTRY
           (the latter is actually impossible
           for this function) returning res is the
           appropriate default thing to do. */
        return res;
    }
    /* Do something with newdie. */
    dwarf_dealloc_die(newdie);
    newdie = 0; /* A good habit... */
    return DW_DLV_OK;
}
```

1.5.2.1 DW_DLV_OK

When `res == DW_DLV_OK` `newdie` is a valid pointer and when appropriate we should do `dwarf_dealloc_die(newdie)`. For other *libdwarf* calls the meaning depends on the function called, so read the description of the function you called for more information.

1.5.2.2 DW_DLV_NO_ENTRY

When `res == DW_DLV_NO_ENTRY` then `newdie` is not set and there is no error. It means `die` was the last of a siblinglist. For other *libdwarf* calls the meaning depends on the function called, so read the description of the function you called for more information.

1.5.2.3 DW_DLV_ERROR

When `res == DW_DLV_ERROR` Something bad happened. The only way to know what happened is to examine the `*error` as in

```
int ev = dwarf_errno(*error);
or
char * msg = dwarf_errmsg(*error);
```

or both and report that somehow.

The above three values are the only returns possible from the great majority of *libdwarf* functions, and for these functions the return type is always `int`.

If it is a decently large or long-running program then you want to free any local memory you allocated and return `res`. If it is a small or experimental program print something and exit (possibly leaking memory).

If you want to discard the error report from the `dwarf_siblingof_c()` call then possibly do

```
dwarf_dealloc_error(dbg, *error);
*error = 0;
return DW_DLV_OK;
```

Except in a special case involving function `dwarf_set_de_alloc_flag()` (which you will not usually call), any `dwarf_dealloc()` that is needed will happen automatically when you call `dwarf_finish()`.

1.5.2.4 Slight Performance Enhancement

Very long running library access programs using relevant appropriate `dwarf_dealloc` calls should consider calling `dwarf_set_de_alloc_flag(0)`. Using this one could get a performance enhancement of perhaps five percent in *libdwarf* CPU time and a reduction in memory use.

Be sure to test using `valgrind` or `-fsanitize` to ensure your code really does the extra `dwarf_dealloc` calls needed since when using `dwarf_set_de_alloc_flag(0)` `dwarf_finish()` does only limited cleanup.

1.6 Extracting Data Per Compilation Unit

The library is designed to run a single pass through the set of Compilation Units (CUs), via a sequence of calls to [dwarf_next_cu_header_e\(\)](#). ([dwarf_next_cu_header_d\(\)](#) is supported but its use requires that it be immediately followed by a call to [dwarf_siblingof_b\(\)](#). see [dwarf_next_cu_header_d\(\)](#).)

Within a CU opened with [dwarf_next_cu_header_e\(\)](#) do something (if desired) on the CU_DIE returned, and call [dwarf_child\(\)](#) on the CU_DIE to begin recursing through all DIEs. If you save the CU_DIE you can repeat passes beginning with [dwarf_child\(\)](#) on the CU_DIE, though it almost certainly faster to remember, in your data structures, what you need from the first pass.

The general plan:

create your local data structure(s)

- A. Check your local data structures to see **if** you have what you need
- B. If sufficient data present act on it, ensuring your data structures are kept **for** further use.
- C. Otherwise Read a CU, recording relevant data in your structures and loop back to A.

For an example (best approach)

See also

[Example walking CUs\(e\)](#) or (second-best approach)

[Example walking CUs\(d\)](#) Write your code to record relevant (to you) information from each CU as you go so your code has no need for a second pass through the CUs. This is much much faster than allowing multiple passes would be.

1.7 Line Table Registers

Line Table Registers

Please refer to the DWARF5 Standard for details. The line table registers are named in Section 6.2.2 State Machine Registers and are not much changed from DWARF2.

Certain functions on Dwarf_Line data return values for these 'registers' as these are the data available for debuggers and other tools to relate a code address to a source file name and possibly also to a line number and column-number within the source file.

```
address
op_index
file
line
column
is_stmt
basic_block
end_sequence
prologue_end
epilogue_begin
isa
discriminator
```

1.8 Reading Special Sections Independently

DWARF defines (in each version of DWARF) sections which have a somewhat special character. These are referenced from compilation units and other places and the Standard does not forbid blocks of random bytes at the start or end or between the areas referenced from elsewhere.

Sometimes compilers (or linkers) leave trash behind as a result of optimizations. If there is a lot of space wasted that way it is quality of implementation issue. But usually the wasted space, if any, is small.

Compiler writers or others may be interested in looking at these sections independently so *libdwarf* provides functions that allow reading the sections without reference to what references them.

[Abbreviations can be read independently](#)

[Strings can be read independently](#)

[String Offsets can be read independently](#)

[The addr table can be read independently](#)

Those functions allow starting at byte 0 of the section and provide a length so you can calculate the next section offset to call or refer to.

Usually that works fine. If there is some random data somewhere outside of referenced areas or the data format is a gcc extension of an early DWARF version the reader function may fail, returning `DW_DLV_ERROR`. Such an error is neither a compiler bug nor a *libdwarf* bug.

1.9 Special Frame Registers

In dealing with `.debug_frame` or `.eh_frame` there are five values that must be set unless one has relatively few registers in the target ABI (anything under 188 registers, see [dwarf.h](#) `DW_FRAME_LAST_REG_NUM` for this default).

The requirements stem from the design of the section. See the DWARF5 Standard for details. The `.debug_frame` section is basically the same from DWARF2 on. The `.eh_frame` section is similar to `.debug_frame` but is intended to support exception handling and has fields and data not present in `.debug_frame`.

Keep in mind that register values correspond to columns in the theoretical fully complete line table of a row per pc and a column per register.

There is no time or space penalty in setting **Undefined_Value**, **Same_Value**, and **CFA_Column** much larger than the **Table_Size**.

Here are the five values.

Table_Size: This sets the number of columns in the theoretical table. It starts at `DW_FRAME_LAST_REG_NUM` which defaults to 188. This is the only value you might need to change, given the defaults of the others are set reasonably large by default.

Undefined_Value: A register number that means the register value is undefined. For example due to a call clobbering the register. `DW_FRAME_UNDEFINED_VAL` defaults to 12288. There no such column in the table.

Same_Value: A register number that means the register value is the same as the value at the call. Nothing can have clobbered it. `DW_FRAME_SAME_VAL` defaults to 12289. There no such column in the table.

Initial_Value: The value must be either DW_FRAME_UNDEFINED_VAL or DW_FRAME_SAME_VAL to represent how most registers are to be thought of at a function call. This is a property of the ABI and instruction set. Specific frame instructions in the CIE or FDE will override this for registers not matching this value.

CFA_Column: A number for the CFA. Defined so we can use a register number to refer to it. DW_FRAME_CFA_COLUMN defaults to 12290. There no such column in the table. See [libdwarf.h](#) struct [Dwarf_Regtable3_s](#) member [rt3_cfa_rule](#) or function [dwarf_get_fde_info_for_cfa_reg3_b\(\)](#) or function [dwarf_get_fde_info_for_cfa_reg3_c\(\)](#) .

A set of functions allow these to be changed at runtime. The set should be called (if needed) immediately after initializing a Dwarf_Debug and before any other calls on that Dwarf_Debug. If just one value (for example, Table_Size) needs altering, then just call that single function.

For the library accessing frame data to work properly there are certain invariants that must be true once the set of functions have been called.

REQUIRED:

```
Table_Size      > the number of registers in the ABI.
Undefined_Value != Same_Value
CFA_Column      != Undefined_value
CFA_Column      != Same_value
Initial_Value   == Same_Value ||
                (Initial_Value == Undefined_value)
Undefined_Value > Table_Size
Same_Value      > Table_Size
CFA_Column      > Table_Size
```

1.10 .debug_pubnames etc DWARF2-DWARF4

Each section consists of a header for a specific compilation unit (CU) followed by an a set of tuples, each tuple consisting of an offset of a compilation unit followed by a null-terminated namestring. The tuple set is ended by a 0,0 pair. Then followed with the data for the next CU and so on.

The function set provided for each such section allows one to print all the section data as it literally appears in the section (with headers and tuples) or to treat it as a single array with CU data columns.

Each has a set of 6 functions.

Section	typename	Standard
.debug_pubnames	Dwarf_Global	DWARF2-DWARF4
.debug_pubtypes	Dwarf_Global	DWARF3, DWARF4

These sections are accessed calling [dwarf_globals_by_type\(\)](#) using type of DW_GL_GLOBALS or DW_GL_PUBTYPES. Or call [dwarf_get_pubtypes\(\)](#).

The following four were defined in SGI/IRIX compilers in the 1990s but were never part of the DWARF standard. These sections are accessed calling [dwarf_globals_by_type\(\)](#) using type of DW_GL_FUNCS, DW_GL_TYPES, DW_GL_VARS, or DW_GL_WEAKS.

It not likely you will encounter these four sections.

```
.debug_funcs
.debug_typenames
.debug_vars
.debug_weak
```

1.11 Reading DWARF with no object file present

This most commonly happens with just-in-time compilation, and someone working on the code wants to debug this on-the-fly code in a situation where nothing can be written to disc, but DWARF can be constructed in memory.

For a simple example of this

See also

[Demonstrating reading DWARF without a file.](#)

But the *libdwarf* feature can be used in a wide variety of ways.

For example, the DWARF data could be kept in simple files of bytes on the internet. Or on the local net. Or if files can be written locally each section could be kept in a simple stream of bytes in the local file system.

Another example is a non-standard file system, or file format, with the intent of obfuscating the file or the DWARF.

For this to work the code generator must generate standard DWARF.

Overall the idea is a simple one: You write a small handful of functions and supply function pointers and code implementing the functions. These are part of your application or library, not part of *libdwarf*.

You set up a little bit of data with that code (all described below) and then you have essentially written the dwarf↵_init_path equivalent and you can access compilation units, line tables etc and the standard *libdwarf* function calls work.

Data you need to create involves these types. What follows describes how to fill them in and how to make them work for you.

```
typedef struct Dwarf_Obj_Access_Interface_a_s
Dwarf_Obj_Access_Interface_a;
struct Dwarf_Obj_Access_Interface_a_s {
    void*          ai_object;
    const Dwarf_Obj_Access_Methods_a *ai_methods;
};

typedef struct Dwarf_Obj_Access_Methods_a_s
Dwarf_Obj_Access_Methods_a
struct Dwarf_Obj_Access_Methods_a_s {
    int (*om_get_section_info)(void* obj,
        Dwarf_Unsigned section_index,
        Dwarf_Obj_Access_Section_a* return_section,
        int* error);
    Dwarf_Small (*om_get_byte_order)(void* obj);
    Dwarf_Small (*om_get_length_size)(void* obj);
    Dwarf_Small (*om_get_pointer_size)(void* obj);
    Dwarf_Unsigned (*om_get_filesize)(void* obj);

    Dwarf_Unsigned (*om_get_section_count)(void* obj);
    int (*om_load_section)(void* obj,
        Dwarf_Unsigned section_index,
        Dwarf_Small** return_data, int* error);
    int (*om_relocate_a_section)(void* obj,
        Dwarf_Unsigned section_index,
        Dwarf_Debug dbg,
        int* error);
};

typedef struct Dwarf_Obj_Access_Section_a_s
Dwarf_Obj_Access_Section_a
struct Dwarf_Obj_Access_Section_a_s {
    const char* as_name;
    Dwarf_Unsigned as_type;
    Dwarf_Unsigned as_flags;
    Dwarf_Addr as_addr;
    Dwarf_Unsigned as_offset;
    Dwarf_Unsigned as_size;
    Dwarf_Unsigned as_link;
    Dwarf_Unsigned as_info;
    Dwarf_Unsigned as_addralign;
    Dwarf_Unsigned as_entrysize;
```

```
};
```

Dwarf_Obj_Access_Section_a: Your implementation of a `om_get_section_info` must fill in a few fields for *libdwf*. The fields here are standard Elf, but for most you can just use the value zero. We assume here you will not be doing relocations at runtime.

as_name: Here you set a section name via the pointer. The section names must be names as defined in the DWARF standard, so if such do not appear in your data you have to create the strings yourself.

as_type: Fill in zero.

as_flags: Fill in zero.

as_addr: Fill in the address, in local memory, where the bytes of the section are.

as_offset: Fill in zero.

as_size: Fill in the size, in bytes, of the section you are telling *libdwf* about.

as_link: Fill in zero.

as_info: Fill in zero.

as_addralign: Fill in zero.

as_entrysize: Fill in one(1).

Dwarf_Obj_Access_Methods_a_s: The functions we need to access object data from *libdwf* are declared here.

In these function pointer declarations 'void *obj' is intended to be a pointer (the object field in `Dwarf_Obj_Access_Interface_s`) that hides the library-specific and object-specific data that makes it possible to handle multiple object formats and multiple libraries. It is not required that one handles multiple such in a single *libdwf* archive/shared-library (but not ruled out either). See `dwarf_elf_object_access_internals_t` and `dwarf_elf_access.c` for an example.

Usually the struct `Dwarf_Obj_Access_Methods_a_s` is statically defined and the function pointers are set at compile time.

The `om_get_filesize` member is new September 4, 2021. Its position is NOT at the end of the list. The member names all now have `om_` prefix.

1.12 Section Groups: Split Dwarf, COMDAT groups

A typical executable or shared object is unlikely to have any section groups, and in that case what follows is irrelevant and unimportant.

COMDAT groups are defined by the Elf ABI and enable compilers and linkers to work together to eliminate blocks of duplicate DWARF and duplicate CODE.

Split Dwarf (sometimes referred to as Debug Fission) allows compilers and linkers to separate large amounts of DWARF from the executable, shrinking disk space needed in the executable while allowing full debugging (also applies to shared objects).

See the DWARF5 Standard, Section E.1 Using Compilation Units page 364.

To name COMDAT groups (defined later here) we add the following defines to `libdwf.h` (the DWARF standard does not specify how to do any of this).

```
/* These support opening DWARF5 split dwarf objects and
   Elf SHT_GROUP blocks of DWARF sections. */
#define DW_GROUPNUMBER_ANY 0
#define DW_GROUPNUMBER_BASE 1
#define DW_GROUPNUMBER_DWO 2
```

The `DW_GROUPNUMBER_` are used in *libdwf* functions `dwarf_init_path()`, `dwarf_init_path_dl()` and `dwarf_init_b()`. In all those cases unless you know there is any complexity in your object file, pass in `DW_GROUPNUMBER_ANY`.

To see section groups usage, see the example source:

See also

[A simple report on section groups.](#)
[Examining Section Group data](#)

The function interface declarations:

See also

[dwarf_sec_group_sizes](#)
[dwarf_sec_group_map](#)

If an object file has multiple groups *libdwarf* will not reveal contents of more than the single requested group with a given [dwarf_init_path\(\)](#) call. One must pass in another groupnumber to another [dwarf_init_path\(\)](#), meaning initialize a new Dwarf_Debug, to get *libdwarf* to access that group.

When opening a Dwarf_Debug the following applies:

If DW_GROUPNUMBER_ANY is passed in *libdwarf* will choose either of DW_GROUPNUMBER_BASE(1) or DW↔_GROUPNUMBER_DWO (2) depending on the object content. If both groups one and two are in the object *libdwarf* will chose DW_GROUPNUMBER_BASE.

If DW_GROUPNUMBER_BASE is passed in *libdwarf* will choose it if non-split DWARF is in the object, else the init call will return DW_DLV_NO_ENTRY.

If DW_GROUPNUMBER_DWO is passed in *libdwarf* will choose it if .dwo sections are in the object, else the init will call return DW_DLV_NO_ENTRY.

If a groupnumber greater than two is passed in *libdwarf* accepts it, whether any sections corresponding to that groupnumber exist or not. If the groupnumber is not an actual group the init will call return DW_DLV_NO_ENTRY.

For information on groups "dwarfdump -i" on an object file will show all section group information **unless** the object file is a simple standard object with no .dwo sections and no COMDAT groups (in which case the output will be silent on groups). Look for **Section Groups data** in the dwarfdump output. The groups information will be appearing very early in the dwarfdump output.

Sections that are part of an Elf COMDAT GROUP are assigned a group number > 2. There can be many such COMDAT groups in an object file (but none in an executable or shared object). Each such COMDAT group will have a small set of sections in it and each section in such a group will be assigned the same group number by *libdwarf*.

Sections that are in a .dwp .dwo object file are assigned to DW_GROUPNUMBER_DWO,

Sections not part of a .dwp package file or a.dwo section, or a COMDAT group are assigned DW↔_GROUPNUMBER_BASE.

At least one compiler relies on relocations to identify COMDAT groups, but the compiler authors do not publicly document how this works so we ignore such (these COMDAT groups will result in *libdwarf* returning DW↔_ERROR).

Popular compilers and tools are using such sections. There is no detailed documentation that we can find (so far) on how the COMDAT section groups are used, so *libdwarf* is based on observations of what compilers generate.

1.13 Details on separate DWARF object access

There are, at present, three distinct approaches in use to put DWARF information into separate objects to significantly shrink the size of the executable. All of them involve identifying a separate file.

Split Dwarf is one method. It defines the attribute **DW_AT_dwo_name** (if present) as having a file-system appropriate name of the split object with most of the DWARF.

The second is MacOS dSYM. It is a convention of placing the DWARF-containing object (separate from the object containing code) in a specific subdirectory tree.

The third involves GNU debuglink and GNU debug_id. These are two distinct ways (outside of DWARF) to provide names of alternative DWARF-containing objects elsewhere in a file system.

If one initializes a Dwarf_Debug object with `dwarf_init_path()` or `dwarf_init_path_dl()` appropriately *libdwarf* will automatically open the alternate dSYM or debuglink/debug_id object on the object with most of the DWARF.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

libdwarf provides means to automatically read the alternate object (in place of the one named in the init call) or to suppress that and read the named object file.

```
int dwarf_init_path(const char * dw_path,
char * dw_true_path_out_buffer,
unsigned int dw_true_path_bufferlen,
unsigned int dw_groupnumber,
Dwarf_Handler dw_errhand,
Dwarf_Ptr dw_errarg,
Dwarf_Debug* dw_dbg,
Dwarf_Error* dw_error);

int dwarf_init_path_dl(const char *dw_path,
char * true_path_out_buffer,
unsigned true_path_bufferlen,
unsigned groupnumber,
Dwarf_Handler errhand,
Dwarf_Ptr errarg,
Dwarf_Debug * ret_dbg,
char ** dl_path_array,
unsigned int dl_path_count,
unsigned char * path_source,
Dwarf_Error * error);
```

Case 1:

If `dw_true_path_out_buffer` or `dw_true_path_bufferlen` is passed in as zero then the library will not look for an alternative object.

Case 2:

If `dw_true_path_out_buffer` passes a pointer to space you provide and `dw_true_path_bufferlen` passes in the length, in bytes, of the buffer, *libdwarf* will look for alternate DWARF-containing objects. We advise that the caller zero all the bytes in `dw_true_path_out_buffer` before calling.

If the alternate object name (with its null-terminator) is too long to fit in the buffer the call will return `DW_DLV_ERROR` with `dw_error` providing error code `DW_DLE_PATH_SIZE_TOO_SMALL`.

If the alternate object name fits in the buffer *libdwarf* will open and use that alternate file in the returned `Dwarf_Dbg`.

It is up to callers to notice that `dw_true_path_out_buffer` now contains a string and callers will probably wish to do something with the string.

If the initial byte of `dw_true_path_out_buffer` is a non-null when the call returns then an alternative object was found and opened.

The second function, `dwarf_init_path_dl()`, is the same as `dwarf_init_path()` except the `_dl` version has three additional arguments, as follows:

Pass in `NULL` or `dw_dl_path_array`, an array of pointers to strings with alternate GNU debuglink paths you want searched. For most people, passing in `NULL` suffices.

Pass in `dw_dl_path_array_size`, the number of elements in `dw_dl_path_array`.

Pass in `dw_dl_path_source` as `NULL` or a pointer to `char`. If non-null `libdwarf` will set it to one of three values:

- `DW_PATHSOURCE_basic` which means the original input `dw_path` is the one opened in `dw_dbg`.
- `DW_PATHSOURCE_dsym` which means a MacOS dSYM object was found and is the one opened in `dw_dbg`. `dw_true_path_out_buffer` contains the dSYM object path.
- `DW_PATHSOURCE_debuglink` which means a GNU debuglink or GNU debug-id path was found and names the one opened in `dw_dbg`. `dw_true_path_out_buffer` contains the object path.

1.14 Linking against libdwarf.so (or dll or dylib)

If you wish to do the basic `libdwarf` tests and are linking against a shared library `libdwarf` you must do an install for the tests to succeed (in some environments it is not strictly necessary).

For example, if building with `configure`, do

```
make
make install
make check
```

You can install anywhere, there is no need to install in a system directory! Creating a temporary directory and installing there suffices. If installed in appropriate system directories that works too.

When compiling to link against a shared library `libdwarf` you **must not define** `LIBDWARF_STATIC`.

For examples of this for all three build systems read the project shell script
`scripts/allsimplebuilds.sh`

1.15 Linking against libdwarf.a

- If you are building an application
- And are linking your application against a static library `libdwarf.a`
- Then you must ensure that each source file compilation with an include of `libdwarf.h` has the macro `LIBDWARF_STATIC` defined to your source compilation.
- If `libdwarf` was built with `zlib` and `zstd` decompression library enabled you must add `-lz -lzstd` to the link line of the build of your application.

To pass `LIBDWARF_STATIC` to the preprocessor with Visual Studio:

- Right click on a project name
- In the contextual menu, click on **Properties** at the very bottom.
- In the new window, double click on **C/C++**
- On the right, click on **Preprocessor definitions**
- There is a small down arrow on the right, click on it then click on **Modify**
- Add `LIBDWARF_STATIC` to the values
- Click on **OK** to close the windows

1.16 Suppressing CRC calculation for debuglink

GNU Debuglink-specific issue:

If GNU debuglink is present and considered by `dwarf_init_path()` or `dwarf_init_path_dl()` the library may be required to compute a 32bit crc (Cyclic Redundancy Check) on the file found via GNU debuglink.

See also

https://en.wikipedia.org/wiki/Cyclic_redundancy_check

For people doing repeated builds of objects using such the crc check is a waste of time as they know the crc comparison will pass.

For such situations a special interface function lets the `dwarf_init_path()` or `dwarf_init_path_dl()` caller suppress the crc check without having any effect on anything else in *libdwarf*.

It might be used as follows (the same pattern applies to `dwarf_init_path_dl()`) for any program that might do multiple `dwarf_init_path()` or `dwarf_init_path_dl()` calls in a single program execution.

```
int res      = 0;
int crc_check = 0;

crc_check = dwarf_suppress_debuglink_crc(1);
res = dwarf_init_path(..usual arguments);
/* Reset the crc flag to previous value. */
dwarf_suppress_debuglink_crc(crc_check);
/* Now check res in the usual way. */
```

This pattern ensures the crc check is suppressed for this single `dwarf_init_path()` or `dwarf_init_path_dl()` call while leaving the setting unchanged for further `dwarf_init_path()` or `dwarf_init_path_dl()` calls in the running program.

1.17 dwsec_mmap

As of version 0.12.0 *libdwarf* allows callers to select mmap (instead of malloc/read) to access object section DWARF data. Even if mmap is selected it is possible *libdwarf* will chose to use malloc in specific cases.

If at library build time the required functions/header are not available the following will have no effect.

One way to select mmap is to call

```
dwarf_set_load_preference(Dwarf_Alloc_Mmap);
```

Another way to select mmap is with an environment variable

```
export DWARF_WHICH_ALLOC=mmap
```

so *libdwarf* will see the variable at runtime.

The environment variable overrides the function call.

Calling `dwarf_set_load_preference(0)` will return the current overall preference will return the current overall preference, an instance of

```
enum Dwarf_Sec_Alloc_Pref
```

The new function

```
dwarf_get_mmap_count(Dwarf_Debug dw_dbg)
```

returns the application count and size of allocations for DWARF sections from the open *Dwarf_Debug* pointer.

Each supported build environment has a new build option to prevent *libdwarf* from assuming that things in the build are always present.

1.18 Recent Changes

We list these with newest first.

Changes 2.1.0 to 2.2.0

Released 10 October 2025

Added functions [dwarf_lvn_name_direct\(\)](#) [dwarf_lvn_name\(\)](#) [dwarf_lvn_table_entry\(\)](#) enabling access to all the fields relevant in DWARF6 DW_AT_language_version attributes.

In builds using (for example) `cc -std=c99 gcc` will turn off visibility of `strdup()` in `string.h` leading to a build failure. So now we define `_GNU_SOURCE` in builds.

Corrected a bug in reading line table data that used DW_FORM_strx (and other strx forms).

Fixed various failures to handle corrupted (fuzzed) Apple Mach-o object files.

Changes 2.0.0 to 2.1.0

Released 20 July 2025

Corrected (and tested) use of DWARF6 attributes DW_AT_language_name and DW_AT_language_version. As of July 2025 we are not aware of a released compiler providing these attributes.

Added function [dwarf_srclanglname\(\)](#) so that DW_AT_language_name attribute values can be accessed. Added [dwarf_language_version_data\(\)](#) because [dwarf_language_version_string\(\)](#) is not an appropriate function name here. The old name still exists and works.

Added [dwarf_srclanglname_version\(\)](#) so that the data provided in DWARF6 DW_AT_language_version can be returned.

Fixed minor warnings from a compiler (dwarfgn) and from meson. No change to output.

Removed heuristic checks for decompress reasonableness as such proved to be ... unreasonable in certain real object files..

Corrected the cmake build of shared-library libdwarf/CMakeLists.txt

Given an unusual object using debuglink but with no sections with names starting with `.debug_` or `_eh_frame`, libdwarf would complain about not having any DWARF sections and ignore the debuglink data. See github issue 297 for details of the fix.

Changes 0.12.0 to 2.0.0

Released 20 May 2025.

Skipping all versions 1.x.x because before libdwarf used Semantic Versioning gcc built libdwarf.so.1.0.0 .

Fixed a longstanding bug in `configure.ac` which began to cause builds to fail with recent `autoconf`.

Fixed a problem in `test/CmakeLists.txt` that caused current builds to fail on Msys2 Mingw64. Had been working for many months.

Updated the error report (for `zlib`, `zstd`) when decompression exceeds a heuristic. Now reports the compressed-len and the uncompressed-len. Increased the heuristic multiple allowed from 16 to 32.

Changes 0.11.1 to 0.12.0

Released 02 April 2025

To optionally support mmap/munmap of object files sections we read we have added a function prototype for struct [Dwarf_Obj_Access_Methods_a_s](#) function `om_load_section()`. This will help when reading multi gigabyte object files. And we added a function prototype for destructing the object specific data while removing library internal public functions.

If an application does not call any of the functions which are new in v0.12.0 then it will work without recompilation.

Any application calling the new functions (for example, v0.12.0 `dwarfdump`) will only work with a v0.12.0 `libdwarf`.

If one is calling [dwarf_object_init_b\(\)](#) (almost no one ever calls this function) one is therefore instantiating struct [Dwarf_Obj_Access_Methods_a_s](#) oneself, you will surely find that your application will not work with `libdwarf 0.12.0`. Moreover, recompilation will fail unless you update your source to add the two new pointers to your instantiation (typically just add two zeros or NULLs in that struct instance).

Added new API function [dwarf_machine_architecture_a\(\)](#) which has an additional argument added to let `dwarfdump` create an better `.text` (etc) address-range for the object file being read for improved checking (fewer incorrect error reports) in `dwarfdump -k` output.

Up through December 2024 `libdwarf` could be made to be very very slow (Denial of Service) with calls with thousands of duplicate attributes in an abbreviation list of a specially constructed Compilation Unit.

Beginning 2025 by default that cannot happen as the library quickly notices and returns `DW_DLV_ERROR` with error details noted. Callers should check the return value and act appropriately, as always, when calling the library.

In case one has (and cannot fix) object files with duplicated attributes one can call a new API function [dwarf_library_allow_dup_attr\(\)](#). The library defaults to false (0) meaning the checks are done in `libdwarf` by default. Pass non-zero value to allow duplicate attributes in a Debugging Information Entry through to callers.

Added the ability to select, at runtime, whether `libdwarf` will use `malloc` to load section content from an object file being read (previously the only option) or will use `mmap` instead.

If the build determines `mmap` is unavailable then `malloc` will be used.

Added API function [dwarf_set_load_preference\(\)](#) giving callers the option to choose the default section load functions. `libdwarf` now recognizes the environment variable `DWARF_WHICH_ALLOC` to select whether the library uses `mmap` or `malloc/read` to load object section data, and the environment variable values `'DWARF_WHICH_ALLOC=mmap'` or `'DWARF_WHICH_ALLOC=malloc'` are the only values recognized. A recognized environment variable overrides [dwarf_set_load_preference\(\)](#) values. If the `libdwarf` build determines `mmap` is unavailable then only `malloc` will be used.

Added API function [dwarf_get_mmap_count\(\)](#) giving callers the ability to determine what section loads were used and the total amount of section data loaded.

Added API function `dwarf_get_LANGUAGE_name()` to be able to easily get a string for `DW_LNAME_Ada` etc.

Added API function [dwarf_language_version_string\(\)](#). This returns information defined by DWARF 6 and useful in interpreting DWARF6 language-version strings based on a name accessed from `DW_AT_language_name` attribute.

Changes 0.11.0 to 0.11.1

Corrected handling of DWARF5 `.debug_rnglists` and `.debug_loclists`. No API change, no incompatibilities.

Changes 0.10.1 to 0.11.0

Added function [dwarf_get_ranges_baseaddress\(\)](#) to the api to allow dwarfdump and other library callers to easily derive the (cooked) address from the raw data in the DWARF2, DWARF3, DWARF4 .debug_ranges section. An example of use is in [doc/checkexamples.c](#) (see examplev).

Changes 0.9.2 to 0.10.1

Released 01 July 2024 (Release 0.10.0 was missing a CMakeLists.txt file and is withdrawn).

Added API function [dwarf_get_locdesc_entry_e\(\)](#) to allow dwarfdump to report some data from .debug_loclists more completely – it reports a byte length of each loclist item. This is of little interest to anyone, surely. [dwarf_get_locdesc_entry_d\(\)](#) is still what you should be using.

[dwarf_debug_addr_table\(\)](#) now supports reading the DWARF4 GNU extension .debug_addr table.

A heuristic sanity check for PE object files was too conservative in limiting VirtualSize to 200MB. A library user has an exe with .debug_info size of over 200MB. Increased the limit to be 2000MB and changed the names of the errors for the three heuristic checks to include *HEURISTIC* so it is easier to know the kind of error/failure it is.

When doing a shared-library build with cmake we were not emitting the correct .so version names nor setting SONAME with the correct version name. This long-standing mistake is now fixed.

Changes 0.9.1 to 0.9.2

Version 0.9.2 released 2 April 2024

Vulnerabilities DW202402-001, DW202402-002, DW202402-003, and DW202403-001 could crash *libdwarf* given a carefully corrupted (fuzzed) DWARF object file. Now the library returns an error for these corruptions. DW_CFA↔_high_user (in [dwarf.h](#)) was a misspelling. Added the correct spelling DW_CFA_hi_user and a comment on the incorrect spelling.

Changes 0.9.0 to 0.9.1

Version 0.9.1 released 27 January 2024

The abbreviation code type returned by [dwarf_die_abbrev_code\(\)](#) changed from **int** to **Dwarf_Unsigned** as abbrev codes are not constrained by the DWARF Standard.

The section count returned by [dwarf_get_section_count\(\)](#) is now of type **Dwarf_Unsigned**. The previous type of **int** never made sense in *libdwarf*. Callers will, in practice, see the same value as before.

All type-warnings issued by MSVC have been fixed.

Problems reading Macho (Apple) relocatable object files have been fixed.

Each of the build systems available now has an option which eliminates *libdwarf* references to the object section decompression libraries. See the respective READMEs.

Changes 0.8.0 to 0.9.0

Version 0.9.0 released 8 December 2023

Adding functions (rarely needed) for callers with special requirements. Added [dwarf_get_section_info_by_name_a\(\)](#) and [dwarf_get_section_info_by_index_a\(\)](#) which add dw_section_flags pointer argument to return the object section file flags (whose meaning depends entirely on the object file format), and dw_section_offset pointer argument to return the object-relevant offset of the section (here too the meaning depends on the object format). Also added [dwarf_machine_architecture\(\)](#) which returns a few top level data items about the object *libdwarf* has opened, including the 'machine' and 'flags' from object headers (all supported object types).

This adds new library functions [dwarf_next_cu_header_e\(\)](#) and [dwarf_siblingof_c\(\)](#). Used exactly as documented [dwarf_next_cu_header_d\(\)](#) and [dwarf_siblingof_b\(\)](#) work fine and continue to be supported for the foreseeable future. However it would be easy to misuse as the requirement that [dwarf_siblingof_b\(\)](#) be called immediately after a successful call to [dwarf_next_cu_header_d\(\)](#) was never stated and that dependency was impossible to enforce. The dependency was an API mistake made in 1992.

So [dwarf_next_cu_header_e\(\)](#) now returns the compilation-unit DIE as well as header data and [dwarf_siblingof_c\(\)](#) is not needed except to traverse sibling DIEs. (the compilation-unit DIE by definition has no siblings).

Changes were required to support Mach-O (Apple) universal binaries, which were not readable by earlier versions of the library.

We have new library functions [dwarf_init_path_a\(\)](#), [dwarf_init_path_dl_a\(\)](#), and [dwarf_get_universalbinary_count\(\)](#).

The first two allow a caller to specify which (numbering from zero) object file to report on by adding a new argument `dw_universalnumber`. Passing zero as the `dw_universalnumber` argument is always safe.

The third lets callers retrieve the number being used.

These new calls do not replace anything so existing code will work fine.

Applying the previously existing calls [dwarf_init_path\(\)](#) [dwarf_init_path_dl\(\)](#) to a Mach-O universal binary works, but the library will return data on the first (index zero) as a default since there is no `dw_universalnumber` argument possible.

For improved performance in reading Fde data when iterating through all usable pc values we add [dwarf_get_fde_info_for_all_regs3_b\(\)](#), which returns the next pc value with actual frame data. We retain [dwarf_get_fde_info_for_all_regs3\(\)](#) so existing code need not change.

Changes 0.7.0 to 0.8.0

v0.8.0 released 2023-09-20

New functions [dwarf_get_fde_info_for_reg3_c\(\)](#), [dwarf_get_fde_info_for_cfa_reg3_c\(\)](#) are defined. The advantage of the new versions is they correctly type the `dw_offset` argument return value as `Dwarf_Signed` instead of the earlier and incorrect type `Dwarf_Unsigned`.

The original functions [dwarf_get_fde_info_for_reg3_b\(\)](#) and [dwarf_get_fde_info_for_cfa_reg3_b\(\)](#) continue to exist and work for compatibility with the previous release.

For all `open()` calls for which the `O_CLOEXEC` flag exists we now add that flag to the `open()` call.

Vulnerabilities involving reading corrupt object files (created by fuzzing) have been fixed: DW202308-001 (ossfuzz 59576), DW202307-001 (ossfuzz 60506), DW202306-011 (ossfuzz 59950), DW202306-009 (ossfuzz 59755), DW202306-006 (ossfuzz 59727), DW202306-005 (ossfuzz 59717), DW202306-004 (ossfuzz 59695), DW202306-002 (ossfuzz 59519), DW202306-001 (ossfuzz 59597). DW202305-010 (ossfuzz 59478). DW202305-009 (ossfuzz 56451). DW202305-008 (ossfuzz 56451), DW202305-007 (ossfuzz 56474), DW202305-006 (ossfuzz 56472), DW202305-005 (ossfuzz 56462), DW202305-004 (ossfuzz 56446).

Changes 0.6.0 to 0.7.0

v0.7.0 released 2023-05-20

Elf section counts can exceed 16 bits (on linux see **man 5 elf**) so some function prototype members of struct [Dwarf_Obj_Access_Methods_a_s](#) changed. Specifically, `om_get_section_info()` `om_load_section()`, and `om_relocate_a_section()` now pass section indexes as `Dwarf_Unsigned` instead of `Dwarf_Half`. Without this change executables/objects with more than 64K sections cannot be read by *libdwarf*. This is unlikely to affect your code since for most users *libdwarf* takes care of this and *dwarfdump* is aware of this change.

Two functions have been removed from [libdwarf.h](#) and the library: `dwarf_dnames_abbrev_by_code()` and `dwarf_dnames_abbrev_form_by_index()`.

`dwarf_dnames_abbrev_by_code()` is slow and pointless. Use either [dwarf_dnames_name\(\)](#) or [dwarf_dnames_abbrevtable\(\)](#) instead, depending on what you want to accomplish.

`dwarf_dnames_abbrev_form_by_index()` is not needed, was difficult to call due to argument list requirements, and never worked.

Changes 0.5.0 to 0.6.0

v0.6.0 released 2023-02-20 The dealloc required by [dwarf_offset_list\(\)](#) was wrong. The call could crash *libdwarf* on systems with 32bit pointers. The new and proper dealloc (for all pointer sizes) is `dwarf_dealloc(dbg, offsetlistptr, DW_DLA_UARRAY)`;

A memory leak from [dwarf_load_loclists\(\)](#) and [dwarf_load_rnglists\(\)](#) is fixed and the *libdwarf*-regressiontests error that hid the leak has also been fixed.

A **compatibility** change affects callers of [dwarf_dietype_offset\(\)](#), which on success returns the offset of the target of the DW_AT_type attribute (if such exists in the Dwarf_Die). Added a pointer argument so the function can (when appropriate) return a FALSE argument indicating the offset refers to DWARF4 .debug_types section, rather than TRUE value when .debug_info is the section the offset refers to. If anyone was using this function it would fail badly (while pretending success) with a DWARF4 DW_FORM_ref_sig8 on a DW_AT_type attribute from the Dwarf_Die argument. One will likely encounter DWARF4 content so a single correct function seemed necessary. New regression tests will ensure this will continue to work.

A **compatibility** change affects callers of [dwarf_get_pubtypes\(\)](#). If an application reads .debug_pubtypes there is a **compatibility break**. Such applications must be recompiled with latest *libdwarf*, change Dwarf_Type declarations to use Dwarf_Global, and can only use the latest *libdwarf*. We are correcting a 1993 library design mistake that created extra work and documentation for library users and inflated the *libdwarf* API and documentation for no good reason.

The changes are: the data type Dwarf_Type disappears as do dwarf_pubtypename(), dwarf_pubtype_die_offset(), dwarf_pubtype_cu_offset(), dwarf_pubtype_name_offsets() and dwarf_pubtypes_dealloc(). Instead the type is Dwarf_Global, the type and functions used for [dwarf_get_globals\(\)](#). The existing read/dealloc functions for Dwarf_Global apply to pubtypes data too.

No one should be referring to the 1990s SGI/IRIX sections .debug_weaknames, .debug_funcnames, .debug_varnames, or .debug_tynames as they are not emitted by any compiler except from SGI/IRIX/MIPS in that period. There is (revised) support in *libdwarf* to read these sections, but we will not mention details here.

Any use of DW_FORM_strx3 or DW_FORM_addrx3 in DWARF would, in 0.5.0 and earlier, result in *libdwarf* reporting erroneous data. A copy-paste error in *libdwarf*/dwarf_util.c was noticed and fixed 24 January 2023 for 0.6.0. Bug **DW202301-001**.

Changes 0.4.2 to 0.5.0

v0.5.0 released 2022-11-22 The handling of the .debug_abbrev data in *libdwarf* is now more cpu-efficient (measurably faster) so access to DIEs and attribute lists is faster. The changes are library-internal so are not visible in the API.

Corrects CU and TU indexes in the .debug_names (fast access) section to be zero-based. The code for that section was previously unusable as it did not follow the DWARF5 documentation.

[dwarf_get_globals\(\)](#) now returns a list of Dwarf_Global names and DIE offsets whether such are defined in the .debug_names or .debug_pubnames section or both. Previously it only read .debug_pubnames.

A new function, [dwarf_global_tag_number\(\)](#), returns the DW_TAG of any Dwarf_Global that was derived from the .debug_names section.

Three new functions enable printing of the `.debug_addr` table. `dwarf_debug_addr_table()`, `dwarf_debug_addr_by_index()`, and `dwarf_dealloc_debug_addr_table()`. Actual use of the table(s) in `.debug_addr` is handled for you when an attribute invoking such is encountered (see `DW_FORM_addrx`, `DW_FORM_addrx1` etc).

Added `doc/libdwarf.dox` to the distribution (left out by accident earlier).

Changes 0.4.1 to 0.4.2

0.4.2 released 2022-09-13. No API changes. No API additions. Corrected a bug in `dwarf_tsearchhash.c` where a delete request was accidentally assumed in all hash tree searches. It was invisible to *libdwarf* uses. Vulnerabilities DW202207-001 and DW202208-001 were fixed so error conditions when reading fuzzed object files can no longer crash *libdwarf* (the crash was possible but not certain before the fixes). In this release we believe neither *libdwarf* nor *dwarfdump* leak memory even when there are malloc failures. Any GNU debuglink or build-id section contents were not being properly freed (if malloced, meaning a compressed section) until 9 September 2022.

It is now possible to run the build sanity tests in all three build mechanisms (`configure`, `cmake`, `meson`) on linux, MacOS, FreeBSD, and Mingw `msys2` (windows). *libdwarf* `README.md` (or `README`) and `README.cmake` document how to do builds for each supported platform and build mechanism.

Changes 0.4.0 to 0.4.1

Reading a carefully corrupted DIE with form `DW_FORM_ref_sig8` could result in reading memory outside any section, possibly leading to a segmentation violation or other crash. Fixed.

See also

<https://www.prevanders.net/dwarfbug.xml> DW202206-001

Reading a carefully corrupted `.debug_pubnames/.debug_pubtypes` could lead to reading memory outside the section being read, possibly leading to a segmentation violation or other crash. Fixed.

See also

<https://www.prevanders.net/dwarfbug.xml> DW202205-001

libdwarf accepts `DW_AT_entry_pc` in a compilation unit DIE as a base address for location lists (though it will prefer `DW_AT_low_pc` if present, per DWARF3). A particular compiler emits `DW_AT_entry_pc` in a DWARF2 object, requiring this change.

libdwarf adds `dwarf_suppress_debuglink_crc()` so that library callers can suppress crc calculations. (useful to save the time of crc when building and testing the same thing(s) over and over; it just loses a little checking.) Additionally, *libdwarf* now properly handles objects with only GNU debug-id or only GNU debuglink.

dwarfdump adds `--show-args`, an option to print its arguments and version. Without that new option the version and arguments are not shown. The output of `-v` (`--version`) is a little more complete.

dwarfdump adds `--suppress-debuglink-crc`, an option to avoid crc calculations when rebuilding and rerunning tests depending on GNU `.note.gnu.buildid` or `.gnu_debuglink` sections. The help text and the *dwarfdump.1* man page are more specific documenting `--suppress-debuglink-crc` and `--no-follow-debuglink`

Changes 0.3.4 to 0.4.0

Removed the unused `Dwarf_Error` argument from `dwarf_return_empty_pubnames()` as the function can only return `DW_DLX_OK`. `dwarf_xu_header_free()` renamed to `dwarf_dealloc_xu_header()`. `dwarf_gdbindex_free()` renamed to `dwarf_dealloc_gdbindex()`. `dwarf_loc_head_c_dealloc` renamed to `dwarf_dealloc_loc_head_c()`.

`dwarf_get_location_op_value_d()` renamed to `dwarf_get_location_op_value_c()`, and 3 pointless arguments removed. The `dwarf_get_location_op_value_d` version and the three arguments were added for DWARF5 in libdwarf-20210528 but the change was a mistake. Now reverted to the previous version.

The `.debug_names` section interfaces have changed. Added `dwarf_dnames_offsets()` to provide details of facts useful in problems reading the section. `dwarf_dnames_name()` now does work and the interface was changed to make it easier to use.

Changes 0.3.3 to 0.3.4

Replaced the groff -mm based libdwarf.pdf with a libdwarf.pdf generated by doxygen and latex.

Added support for the meson build system.

Updated an include in libdwarfp source files. Improved doxygen documentation of *libdwarf*. Now 'make check -j8' and the like works correctly. Fixed a bug where reading a PE (Windows) object could fail for certain section virtual size values. Added initializers to two uninitialized local variables in dwarfdump source so a compiler warning cannot not kill a `--enable-wall` build.

Added `src/bin/dwarfexample/showsectiongroups.c` so it is easy to see what groups are present in an object without all the other dwarfdump output.

Changes 20210528 to 0.3.3 (28 January 2022)

There were major revisions in going from date versioning to Semantic Versioning. Many functions were deleted and various functions changed their list of arguments. Many many filenames changed. Include lists were simplified. Far too much changed to list here.

Chapter 2

JIT and special case DWARF

html 2

2.1 Reading DWARF not in an object file

If the DWARF you work with is in standard object files (Elf, PE, MacOS) then you can ignore this section entirely. All that this section describes is used, but it's already done for you in functions in the library:

See also

[dwarf_init_path](#) [dwarf_init_path_dl](#)
[dwarf_init_b](#) and
[dwarf_finish](#) .

This section describes how to use calls

See also

[dwarf_object_init_b](#)
[dwarf_object_finish](#) .

These functions are useful if someone is doing just-in-time compilation, and someone working on the code wants to debug this on-the-fly code in a situation where nothing can be written to disc, but DWARF can be constructed in memory.

For a simple example of this with DWARF in local arrays

See also

[Demonstrating reading DWARF without a file.](#)

But the *libdwarf* feature can be useful in a variety of circumstances.

For example, the DWARF data were kept in simple files of bytes on the internet. Or on the local net. Or if files can be written locally each section could be kept in a simple stream of bytes in the local file system.

Another example is a non-standard file system, or file format, with the intent of obfuscating the file or the DWARF.

For this to work the code generator must generate standard DWARF.

Overall the idea is a simple one: You write a small handful of functions and supply function pointers and code implementing the functions. These are part of your application or library, not part of *libdwarf*. Your code accesses the data in whatever way applies and you write code that provides the interfaces so standard *libdwarf* can access your DWARF content.

You set up a little bit of data with that code (described below) and then you have essentially written the dwarf_↵ init_path equivalent and you can access compilation units, line tables etc and the standard *libdwarf* function calls simply work.

Data you need to create involves the following types. What follows describes how to fill them in and how to make them work for you.

```
typedef struct Dwarf_Obj_Access_Interface_a_s
    Dwarf_Obj_Access_Interface_a;
struct Dwarf_Obj_Access_Interface_a_s {
    void                *ai_object;
    const Dwarf_Obj_Access_Methods_a *ai_methods;
};

typedef struct Dwarf_Obj_Access_Methods_a_s
    Dwarf_Obj_Access_Methods_a
struct Dwarf_Obj_Access_Methods_a_s {
    int                (*om_get_section_info)(void* obj,
        Dwarf_Half      section_index,
        Dwarf_Obj_Access_Section_a* return_section,
        int              * error);
    Dwarf_Small        (*om_get_byte_order)(void* obj);
    Dwarf_Small        (*om_get_length_size)(void* obj);
    Dwarf_Small        (*om_get_pointer_size)(void* obj);
    Dwarf_Unsigned     (*om_get_filesize)(void* obj);
    Dwarf_Unsigned     (*om_get_section_count)(void* obj);
    int                (*om_load_section)(void* obj,
        Dwarf_Half      section_index,
        Dwarf_Small** return_data,
        int              * error);
    int                (*om_relocate_a_section)(void* obj,
        Dwarf_Half      section_index,
        Dwarf_Debug      dbg,
        int              *error);
};

typedef struct Dwarf_Obj_Access_Section_a_s
    Dwarf_Obj_Access_Section_a
struct Dwarf_Obj_Access_Section_a_s {
    const char*        as_name;
    Dwarf_Unsigned     as_type;
    Dwarf_Unsigned     as_flags;
    Dwarf_Addr         as_addr;
    Dwarf_Unsigned     as_offset;
    Dwarf_Unsigned     as_size;
    Dwarf_Unsigned     as_link;
    Dwarf_Unsigned     as_info;
    Dwarf_Unsigned     as_addralign;
    Dwarf_Unsigned     as_entrysize;
};
```

2.1.1 Describing the Interface

struct struct Dwarf_Obj_Access_Interface_a_s

Your code must create and fill in this struct's two pointer members. Libdwarf needs these to access your DWARF data. You pass a pointer to this filled-in struct to **dwarf_object_init_b**. When it is time to conclude all access to the created Dwarf_Debug call **dwarf_object_finish**. Any allocations you made in setting these things up you must then free after calling **dwarf_object_finish**.

ai_object

Allocate a local struct (*libdwarf* will not touch this struct and will not know anything of its contents). You will need one of these for each Dwarf_Debug you open. Put a pointer to this into ai_object. Then fill in all the data you need to access information you will pass back via the ai_methods functions. In the description of the methods functions described later here, this pointer is named **obj**.

ai_methods

Usually you allocate a static structure and fill it in with function pointers (to functions you write). Then put a pointer to the static structure into this field.

2.1.2 Describing A Section

Dwarf_Obj_Access_Section_a:

The set of fields here is a set that is sufficient to describe a single object section to *libdwarf*. Your implementation of a **om_get_section_info** must simply fill in a few fields (leaving most zero) for *libdwarf* for the section indexed. The fields here are standard Elf, and for most you can just fill in the value zero. For section index zero as_name should be set to an empty string (see below about section index numbers).

as_name: Here you set a section name via the pointer. The section names must be names as defined in the DWARF standard, so if such do not appear in your data you have to create the strings yourself.

as_type: Just fill in zero.

as_flags: Just fill in zero.

as_addr: Fill in the address, in local memory, where the bytes of the section are.

as_offset: Just fill in zero.

as_size: Fill in the size, in bytes, of the section you are telling *libdwarf* about.

as_link: Just fill in zero.

as_info: Just fill in zero.

as_addralign: Just fill in zero.

as_entrysize: Just fill in one.

2.1.3 Function Pointers

struct Dwarf_Obj_Access_Methods_a_s:

The functions *libdwarf* needs to access object data are declared here. Usually the struct is statically defined and the function pointers are set at compile time. You must implement these functions based on your knowledge of how the actual data is represented and where to get it.

Each has a first-parameter of **obj** which is a struct you define to hold data you need to implement this set of functions. You refer to it When *libdwarf* calls your set of functions (these described now) it passes the *ai_object* pointer you provided to these functions as **obj** parameter .

This is the final part of your work for *libdwarf*. In the source file with your code you will be allocating data, making a provision for an array (real or conceptual) for per-section data, and returning values *libdwarf* needs. Note that the section array should include an index zero with all zero field values. That means interesting fields start with index one. This special case of index zero Elf is required and matches the standard Elf object format.

Notice that the **error** argument, where applicable, is an `int*` . Error codes passed back are DW_DLE codes and **dwarf_errmsg_by_number** may be used (by your code) to get the standard error string for that error.

om_get_section_info

Get address, size, and name info about a section.

```
Parameters
obj          - Your data
section_index - Zero-based index.
return_section - Pointer to a structure in which
                section info will be placed. Caller must
                provide a valid pointer to a structure area.
                The structure's contents will be overwritten
                by the call to get_section_info.
error        - A pointer to an integer in which an error
                code may be stored.

Return
DW_DLV_OK      - Everything ok.
DW_DLV_ERROR   - Error occurred. Use 'error' to determine the
                @e libdwarf defined error.
DW_DLV_NO_ENTRY - No such section.
```

om_get_byte_order

This retrieves data you put into your **ai_object** struct that you filled out.

Get from your @b *ai_object* whether the object file represented by this *interface* is big-endian (DW_END_big) or little endian (DW_END_little).

```
Parameters
obj - Your data

Return
Endianness of object, DW_END_big or DW_END_little.
```

om_get_length_size

This retrieves data you put into your **ai_object** struct that you filled out.

Get the size of a length field in the underlying object file.
@e *libdwarf* currently supports * 4 and 8 byte sizes, but may support larger in the future.
Perhaps the *return* type should be an enumeration?

```
Parameters
obj - Your data

Return
Size of length. Cannot fail.
```

om_get_pointer_size

This retrieves data you put into your **ai_object** struct that you filled out.

Get the size of a pointer field in the underlying object file.

@e libdwarf currently supports 4 and 8 byte sizes.
Perhaps the `return` type should be an enumeration?

Return
Size of pointer. Cannot fail. */

om_get_filesize

This retrieves data you put into your `ai_object` struct that you filled out.

Parameters
obj - Your data

Return
Must `return` a value at least as large as any section @e libdwarf might read. Returns a value that is a sanity check on offsets @e libdwarf reads `for this` DWARF set. It need not be a tight bound.

om_get_section_count

This retrieves data you put into your `ai_object` struct that you filled out.

Get the number of sections in the `object` file, including the index zero section with no content.

Parameters
obj - Your data

Return
Number of sections.

om_load_section

This retrieves data you put into your `ai_object` struct that you filled out.

Get a pointer to an array of bytes that are the section content.

Get a pointer to an array of bytes that represent the section.

Parameters
obj - Your data
section_index - Zero-based section index.
return_data - Place the address of `this` section content into `*return_data`.
error - Pointer to an integer `for` returning libdwarf-defined error numbers.

Return
DW_DLV_OK - No error.
DW_DLV_ERROR - Error. Use 'error' to indicate a libdwarf-defined error number.
DW_DLV_NO_ENTRY - No such section. */

om_relocate_a_section

Leave `this` pointer NULL.
If relocations are required it is probably simpler `for` you `do` to them yourself in your implementation of @b `om_load_section`.
Any relocations `this` function pointer is to use must be in standard Elf relocation (32 or 64 bit) form and must be in an appropriately named Elf relocation section.

Parameters
obj - Your data
section_index - Zero-based index of the section to be relocated.
error - Pointer to an integer `for` returning libdwarf-defined error numbers.

Return
DW_DLV_OK - No error.
DW_DLV_ERROR - Error. Use 'error' to indicate a libdwarf-defined error number.
DW_DLV_NO_ENTRY - No such section.

Chapter 3

dwarf.h

[dwarf.h](#) contains all the identifiers such as `DW_TAG_compile_unit` etc from the various versions of the DWARF Standard beginning with DWARF2 and containing all later Dwarf Standard identifiers.

In addition, it contains all user-defined identifiers that we have been able to find.

All identifiers here are C defines with the prefix `"DW_"`.

Chapter 4

libdwarf.h

[libdwarf.h](#) contains all the type declarations and function declarations needed to use the library. It is essential that coders include [dwarf.h](#) before including [libdwarf.h](#).

All identifiers here in the public namespace begin with DW_ or Dwarf_ or dwarf_ . All function argument names declared here begin with dw_ .

Chapter 5

checkexamples.c

[checkexamples.c](#) contains what user code should be. Hence the code typed in [checkexamples.c](#) is PUBLIC DOMAIN and may be copied, used, and altered without any restrictions.

[checkexamples.c](#) need not be compiled routinely nor should it ever be executed.

To verify syntactic correctness compile in the libdwarf-code/doc directory with:

```
cc -c -Wall -O0 -Wpointer-arith \
-Wdeclaration-after-statement \
-Wextra -Wcomment -Wformat -Wpedantic -Wuninitialized \
-Wno-long-long -Wshadow -Wbad-function-cast \
-Wmissing-parameter-type -Wnested-externs \
-I../src/lib/libdwarf checkexamples.c
```


Chapter 6

Topic Index

6.1 Topics

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Chapter 7

Class Index

7.1 Class List

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Chapter 8

File Index

8.1 File List

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Chapter 9

Topic Documentation

9.1 Basic Library Datatypes Group

Typedefs

- typedef unsigned long long [Dwarf_Unsigned](#)
- typedef signed long long [Dwarf_Signed](#)
- typedef unsigned long long [Dwarf_Off](#)
- typedef unsigned long long [Dwarf_Addr](#)
- typedef int [Dwarf_Bool](#)
- typedef unsigned short [Dwarf_Half](#)
- typedef unsigned char [Dwarf_Small](#)
- typedef void * [Dwarf_Ptr](#)

9.1.1 Detailed Description

9.1.2 Typedef Documentation

9.1.2.1 Dwarf_Addr

[Dwarf_Addr](#)

Used when a data item is a an address represented in DWARF. 64 bits. Must be as large as the largest object address size.

9.1.2.2 Dwarf_Bool

[Dwarf_Bool](#)

A TRUE(non-zero)/FALSE(zero) data item.

9.1.2.3 Dwarf_Half

`Dwarf_Half`

Many libdwarf values (attribute codes, for example) are defined by the standard to be 16 bits, and this datatype reflects that (the type must be at least 16 bits wide).

9.1.2.4 Dwarf_Off

`Dwarf_Off`

Used for offsets. It should be same size as Dwarf_Unsigned.

9.1.2.5 Dwarf_Ptr

`Dwarf_Ptr`

A generic pointer type. It uses void * so it cannot be added-to or subtracted-from.

9.1.2.6 Dwarf_Signed

`Dwarf_Signed`

The basic signed data type. Intended to be a signed 64bit value.

9.1.2.7 Dwarf_Small

`Dwarf_Small`

Used for small unsigned integers and used as Dwarf_Small* for pointers and it supports pointer addition and subtraction conveniently.

9.1.2.8 Dwarf_Unsigned

`Dwarf_Unsigned`

The basic unsigned data type. Intended to be an unsigned 64bit value.

9.2 Enumerators with various purposes

Enumerations

- enum `Dwarf_Ranges_Entry_Type` { `DW_RANGES_ENTRY` , `DW_RANGES_ADDRESS_SELECTION` , `DW_RANGES_END` }
- enum `Dwarf_Form_Class` {
`DW_FORM_CLASS_UNKNOWN` = 0 , `DW_FORM_CLASS_ADDRESS` = 1 , `DW_FORM_CLASS_BLOCK` = 2 , `DW_FORM_CLASS_CONSTANT` =3 ,
`DW_FORM_CLASS_EXPRLOC` = 4 , `DW_FORM_CLASS_FLAG` = 5 , `DW_FORM_CLASS_LINEPTR` = 6 ,
`DW_FORM_CLASS_LOCLISTPTR` =7 ,
`DW_FORM_CLASS_MACPTR` = 8 , `DW_FORM_CLASS_RANGELISTPTR` =9 , `DW_FORM_CLASS_↵`
`REFERENCE` =10 , `DW_FORM_CLASS_STRING` = 11 ,
`DW_FORM_CLASS_FRAMEPTR` = 12 , `DW_FORM_CLASS_MACROPTR` = 13 , `DW_FORM_CLASS_↵`
`ADDRPTR` = 14 , `DW_FORM_CLASS_LOCLIST` = 15 ,
`DW_FORM_CLASS_LOCLISTSPTR` =16 , `DW_FORM_CLASS_RNGLIST` =17 , `DW_FORM_CLASS_↵`
`RNGLISTSPTR` =18 , `DW_FORM_CLASS_STROFFSETSPTR` =19 }

9.2.1 Detailed Description

9.2.2 Enumeration Type Documentation

9.2.2.1 Dwarf_Form_Class

```
enum Dwarf_Form_Class
```

The dwarf specification separates FORMs into different classes. To do the separation properly requires 4 pieces of data as of DWARF4 (thus the function arguments listed here). The DWARF4 specification class definition suffices to describe all DWARF versions. See section 7.5.4, Attribute Encodings. A return of DW_FORM_CLASS_UNKNOWN means the library could not properly figure out what form-class it is.

DW_FORM_CLASS_FRAMEPTR is MIPS/IRIX only, and refers to the DW_AT_MIPS_fde attribute (a reference to the .debug_frame section).

DWARF5: DW_FORM_CLASS_LOCLISTSPTR is like DW_FORM_CLASS_LOCLIST except that LOCLISTSPTR is always a section offset, never an index, and LOCLISTSPTR is only referenced by DW_AT_loclists_base. Note DW_FORM_CLASS_LOCLISTSPTR spelling to distinguish from DW_FORM_CLASS_LOCLISTPTR.

DWARF5: DW_FORM_CLASS_RNGLISTSPTR is like DW_FORM_CLASS_RNGLIST except that RNGLISTSPTR is always a section offset, never an index. DW_FORM_CLASS_RNGLISTSPTR is only referenced by DW_AT_↔rnglists_base.

9.2.2.2 Dwarf_Ranges_Entry_Type

```
enum Dwarf_Ranges_Entry_Type
```

The dwr_addr1/addr2 data is either pair of offsets of a base pc address (DW_RANGES_ENTRY) or a base pc address (dwr_addr2 in DW_RANGES_ADDRESS_SELECTION) or both are zero(end of list, DW_RANGES_END) or both non-zero but identical (means an empty range, DW_RANGES_ENTRY). These are for use with DWARF 2,3,4.

DW_RANGES_ADDRESS_SELECTION should have been spelled DW_RANGES_BASE_ADDRESS. but it is not worth changing as it is widely used.

The DW_RANGES_ENTRY values are raw pc offset data recorded in the section, not addresses.

See also

[Example getting .debug_ranges data](#)

Dwarf_Ranges* apply to DWARF2,3, and 4. Not to DWARF5 (the data is different and in a new DWARF5 section).

9.3 Defined and Opaque Structs

Classes

- struct [Dwarf_Form_Data16_s](#)
- struct [Dwarf_Sig8_s](#)
- struct [Dwarf_Block_s](#)
- struct [Dwarf_Printf_Callback_Info_s](#)
- struct [Dwarf_Cmdline_Options_s](#)
- struct [Dwarf_Ranges_s](#)
- struct [Dwarf_Regtable_Entry3_s](#)
- struct [Dwarf_Regtable3_s](#)
- struct [Dwarf_Macro_Details_s](#)
- struct [Dwarf_Obj_Access_Section_a_s](#)
- struct [Dwarf_Obj_Access_Methods_a_s](#)
- struct [Dwarf_Obj_Access_Interface_a_s](#)
- struct [Dwarf_Debug_Fission_Per_CU_s](#)

Typedefs

- typedef struct [Dwarf_Form_Data16_s](#) Dwarf_Form_Data16
- typedef struct [Dwarf_Sig8_s](#) Dwarf_Sig8
- typedef struct [Dwarf_Block_s](#) Dwarf_Block
- typedef struct Dwarf_Locdesc_c_s * [Dwarf_Locdesc_c](#)
- typedef struct Dwarf_Loc_Head_c_s * [Dwarf_Loc_Head_c](#)
- typedef struct Dwarf_Gnu_Index_Head_s * [Dwarf_Gnu_Index_Head](#)
- typedef struct Dwarf_Dsc_Head_s * [Dwarf_Dsc_Head](#)
- typedef struct Dwarf_Frame_Instr_Head_s * [Dwarf_Frame_Instr_Head](#)
- typedef void(* [dwarf_printf_callback_function_type](#)) (void *dw_user_pointer, const char *dw_linecontent)
- typedef struct [Dwarf_Cmdline_Options_s](#) **Dwarf_Cmdline_Options**
- typedef struct Dwarf_Str_Offsets_Table_s * [Dwarf_Str_Offsets_Table](#)
- typedef struct [Dwarf_Ranges_s](#) Dwarf_Ranges
- typedef struct [Dwarf_Regtable_Entry3_s](#) Dwarf_Regtable_Entry3
- typedef struct [Dwarf_Regtable3_s](#) Dwarf_Regtable3
- typedef struct Dwarf_Error_s * [Dwarf_Error](#)
- typedef struct Dwarf_Debug_s * [Dwarf_Debug](#)
- typedef struct Dwarf_Section_s * [Dwarf_Section](#)
- typedef struct Dwarf_Die_s * [Dwarf_Die](#)
- typedef struct Dwarf_Debug_Addr_Table_s * [Dwarf_Debug_Addr_Table](#)
- typedef struct Dwarf_Line_s * [Dwarf_Line](#)
- typedef struct Dwarf_Global_s * [Dwarf_Global](#)
- typedef struct Dwarf_Type_s * [Dwarf_Type](#)
- typedef struct Dwarf_Func_s * [Dwarf_Func](#)
- typedef struct Dwarf_Var_s * [Dwarf_Var](#)
- typedef struct Dwarf_Weak_s * [Dwarf_Weak](#)
- typedef struct Dwarf_Attribute_s * [Dwarf_Attribute](#)
- typedef struct Dwarf_Abbrev_s * [Dwarf_Abbrev](#)
- typedef struct Dwarf_Fde_s * [Dwarf_Fde](#)
- typedef struct Dwarf_Cie_s * [Dwarf_Cie](#)
- typedef struct Dwarf_Arange_s * [Dwarf_Arange](#)
- typedef struct Dwarf_Gdbindex_s * [Dwarf_Gdbindex](#)
- typedef struct Dwarf_Xu_Index_Header_s * [Dwarf_Xu_Index_Header](#)
- typedef struct Dwarf_Line_Context_s * [Dwarf_Line_Context](#)
- typedef struct Dwarf_Macro_Context_s * [Dwarf_Macro_Context](#)
- typedef struct Dwarf_Dnames_Head_s * [Dwarf_Dnames_Head](#)
- typedef void(* [Dwarf_Handler](#)) (Dwarf_Error dw_error, Dwarf_Ptr dw_errarg)
- typedef struct [Dwarf_Macro_Details_s](#) Dwarf_Macro_Details
- typedef struct [Dwarf_Debug_Fission_Per_CU_s](#) Dwarf_Debug_Fission_Per_CU
- typedef struct [Dwarf_Obj_Access_Interface_a_s](#) Dwarf_Obj_Access_Interface_a
- typedef struct [Dwarf_Obj_Access_Methods_a_s](#) Dwarf_Obj_Access_Methods_a
- typedef struct [Dwarf_Obj_Access_Section_a_s](#) Dwarf_Obj_Access_Section_a
- typedef struct Dwarf_Rnglists_Head_s * [Dwarf_Rnglists_Head](#)

Enumerations

- enum [Dwarf_Sec_Alloc_Pref](#) { **Dwarf_Alloc_None** =0 , **Dwarf_Alloc_Malloc** =1 , **Dwarf_Alloc_Mmap** =2 }

9.3.1 Detailed Description

9.3.2 Typedef Documentation

9.3.2.1 Dwarf_Abbrev

[Dwarf_Abbrev](#)

Used to reference a Dwarf_Abbrev. Usually Dwarf_Abbrev are fully handled inside the library so one rarely needs to declare the type.

9.3.2.2 Dwarf_Arange

[Dwarf_Arange](#)

Used to reference a code address range in a section such as .debug_info.

9.3.2.3 Dwarf_Attribute

[Dwarf_Attribute](#)

Used to reference a Dwarf_Die attribute

9.3.2.4 Dwarf_Block

[Dwarf_Block](#)

Used to hold uninterpreted blocks of data. bl_data refers to on an uninterpreted block of data Used with certain location information functions, a frame expression function, expanded frame instructions, and DW_FORM_block functions.

See also

[dwarf_formblock](#)

[Documenting Form_Block](#)

9.3.2.5 Dwarf_Cie

[Dwarf_Cie](#)

Used to reference .debug_frame or .eh_frame CIE.

9.3.2.6 Dwarf_Debug

[Dwarf_Debug](#)

An open Dwarf_Debug points to data that libdwarf maintains to support libdwarf calls.

9.3.2.7 Dwarf_Debug_Addr_Table

[Dwarf_Debug_Addr_Table](#)

Used to reference a table in section .debug_addr

9.3.2.8 Dwarf_Debug_Fission_Per_CU

[Dwarf_Debug_Fission_Per_CU](#)

A handy short name for a [Dwarf_Debug_Fission_Per_CU_s](#) struct.

9.3.2.9 Dwarf_Die

[Dwarf_Die](#)

Used to reference a DWARF Debugging Information Entry.

9.3.2.10 Dwarf_Dnames_Head

[Dwarf_Dnames_Head](#)

Used as the general reference to the DWARF5 .debug_names section.

9.3.2.11 Dwarf_Dsc_Head

[Dwarf_Dsc_Head](#)

Access to DW_AT_discr_list array of discriminant values.

9.3.2.12 Dwarf_Error

```
Dwarf_Error  
Dwarf_Error error = 0;  
dres = dwarf_siblingof_c(in_die, &return_sib, &error);
```

&error is used in calls to return error details when the call returns DW_DLV_ERROR.

9.3.2.13 Dwarf_Fde

[Dwarf_Fde](#)

Used to reference .debug_frame or .eh_frame FDE.

9.3.2.14 Dwarf_Form_Data16

`Dwarf_Form_Data16`

a container for a DW_FORM_data16 data item. We have no integer types suitable so this special struct is used instead. It is up to consumers/producers to deal with the contents.

9.3.2.15 Dwarf_Frame_Instr_Head

`Dwarf_Frame_Instr_Head`

The basis for access to DWARF frame instructions (FDE or CIE) in full detail.

9.3.2.16 Dwarf_Func

`Dwarf_Func`

An SGI extension type which is no longer used at all. As of release 0.6.0 use Dwarf_Global instead.

9.3.2.17 Dwarf_Gdbindex

`Dwarf_Gdbindex`

Used to reference .gdb_index section data which is a fast-access section by and for gdb.

9.3.2.18 Dwarf_Global

`Dwarf_Global`

Used to reference a reference to an entry in the .debug_pubnames section.

9.3.2.19 Dwarf_Gnu_Index_Head

`Dwarf_Gnu_Index_Head`

A pointer to a struct Dwarf_Gnu_Index_Head_s for sections .debug_gnu_pubtypes or .debug_gnu_pubnames. These are not standard DWARF, and can appear with gcc -gdwarf-5

9.3.2.20 Dwarf_Handler

`Dwarf_Handler`

Used in rare cases (mainly tiny programs) with [dwarf_init_path\(\)](#) etc initialization calls to provide a pointer to a generic-error-handler function you write.

9.3.2.21 Dwarf_Line

[Dwarf_Line](#)

Used to reference a line reference from the .debug_line section.

9.3.2.22 Dwarf_Line_Context

[Dwarf_Line_Context](#)

Used as the general reference line data (.debug_line).

9.3.2.23 Dwarf_Loc_Head_c

[Dwarf_Loc_Head_c](#)

provides access to any sort of location description for DWARF2,3,4, or 5.

9.3.2.24 Dwarf_Locdesc_c

[Dwarf_Locdesc_c](#)

Provides access to Dwarf_Locdesc_c, a single location description

9.3.2.25 Dwarf_Macro_Context

[Dwarf_Macro_Context](#)

Used as the general reference to DWARF5 .debug_macro data.

9.3.2.26 Dwarf_Macro_Details

[Dwarf_Macro_Details](#)

A handy short name for a Dwarf_Macro_Details_S struct.

9.3.2.27 Dwarf_Obj_Access_Interface_a

[Dwarf_Obj_Access_Interface_a](#)

Used for access to and setting up special data allowing access to DWARF even with no object files present

9.3.2.28 Dwarf_Obj_Access_Methods_a

[Dwarf_Obj_Access_Methods_a](#)

Used for access to and setting up special data allowing access to DWARF even with no object files present

9.3.2.29 Dwarf_Obj_Access_Section_a

[Dwarf_Obj_Access_Section_a](#)

Used for access to and setting up special data allowing access to DWARF even with no object files present. The fields match up with Elf section headers, but for non-Elf many of the fields can be set to zero.

9.3.2.30 dwarf_printf_callback_function_type

[dwarf_printf_callback_function_type](#)

Used as a function pointer to a user-written callback function. This provides a detailed content of line table data.

The default contents of the callback data are all zero bytes. So no callbacks involving this data will be done.

See [dwarf_register_printf_callback\(\)](#)

Parameters

<i>dw_user_pointer</i>	Passes your callback a pointer to space you allocated as an identifier of some kind in calling dwarf_register_printf_callback..
<i>dw_linecontent</i>	Passes your callback null-terminated string with one line of detailed line table content.

9.3.2.31 Dwarf_Ranges

[Dwarf_Ranges](#)

Details of of non-contiguous address ranges of DIEs for DWARF2, DWARF3, and DWARF4. Sufficient for older dwarf.

dwr_addr1 and dwr_addr2 in the struct are offsets from a base address in the CU involved. To calculate actual range pc addresses see the example:

See also

[Example getting .debug_ranges data](#)

9.3.2.32 Dwarf_Regtable3

[Dwarf_Regtable3](#)

This structs provides a way for applications to select the number of frame registers and to select names for them.

rt3_rules and rt3_reg_table_size must be filled in before calling libdwf. Filled in with a pointer to an array (pointer and array set up by the calling application) of rt3_reg_table_size [Dwarf_Regtable_Entry3_s](#) structs. libdwf does not allocate or deallocate space for the rules, you must do so. libdwf will initialize the contents rules array, you do not need to do so (though if you choose to initialize the array somehow that is ok: libdwf will overwrite your initializations with its own).

Note that this definition can only deal correctly with register table size that fits in a 16 bit unsigned value.

9.3.2.33 Dwarf_Regtable_Entry3

Dwarf_Regtable_Entry3

For each index *i* (naming a hardware register with dwarf number *i*) the following is true and defines the value of that register:

```
If dw_regnum is Register DW_FRAME_UNDEFINED_VAL
    it is not DWARF register number but
    a place holder indicating the register
    has no defined value.
If dw_regnum is Register DW_FRAME_SAME_VAL
    it is not DWARF register number but
    a place holder indicating the register has the same
    value in the previous frame.

DW_FRAME_UNDEFINED_VAL, DW_FRAME_SAME_VAL and
DW_FRAME_CFA_COL are only present at libdwarf runtime.
Never on disk.
DW_FRAME_* Values present on disk are in dwarf.h
Because DW_FRAME_SAME_VAL and DW_FRAME_UNDEFINED_VAL
and DW_FRAME_CFA_COL are definable at runtime
consider the names symbolic in this comment,
not absolute.

Otherwise: the register number is a DWARF register number
(see ABI documents for how this translates to hardware/
software register numbers in the machine hardware)
and the following applies:

In a cfa-defining entry (rt3_cfa_rule) the regnum is the
CFA 'register number'. Which is some 'normal' register,
not DW_FRAME_CFA_COL, nor DW_FRAME_SAME_VAL, nor
DW_FRAME_UNDEFINED_VAL.

If dw_value_type == DW_EXPR_OFFSET (the only
possible case for dwarf2):
    If dw_offset_relevant is non-zero, then
        the value is stored at the address
        CFA+N where N (dw_offset) is a signed offset,
        (not unsigned) and must be cast to Dwarf_Signed
        before use.
        dw_regnum is the cfa register rule which means
        one ignores dw_regnum and uses the CFA appropriately.
        Rule: Offset(N)
    If dw_offset_relevant is zero, then the
        value of the register
        is the value of (DWARF) register number dw_regnum.
        Rule: register(R)
If dw_value_type == DW_EXPR_VAL_OFFSET
    the value of this register is CFA +N where
    N (dw_offset) is a signed offset (not unsigned)
    and must be cast to Dwarf_Signed before use.
    dw_regnum is the cfa register rule which means
    one ignores dw_regnum and uses the CFA appropriately.
    Rule: val_offset(N)
If dw_value_type == DW_EXPR_EXPRESSION
    The value of the register is the value at the address
    computed by evaluating the DWARF expression E.
    Rule: expression(E)
    The expression E byte stream is pointed to by
    block.bl_data.
    The expression length in bytes is given by
    block.bl_len.
If dw_value_type == DW_EXPR_VAL_EXPRESSION
    The value of the register is the value
    computed by evaluating the DWARF expression E.
    Rule: val_expression(E)
    The expression E byte stream is pointed to
    by block.bl_data.
```

The expression length in bytes is given by
block.bl_len.
Other values of dw_value_type are an error.

DWARF is showing what a debugger would act on to calculate actual register values. Libdwarf does not know any register values and cannot calculate any. If a caller wishes to actually do the proper calculations the caller must provide its own register data space and calculate new values and new register status in the caller's register data.

Note that this definition can only deal correctly with register numbers that fit in a 16 bit unsigned value. Removing this restriction would force an incompatible change to several functions in the libdwarf API.

9.3.2.34 Dwarf_Rnglists_Head

[Dwarf_Rnglists_Head](#)

Used for access to a set of DWARF5 debug_rnglists entries.

9.3.2.35 Dwarf_Section

[Dwarf_Section](#)

An open Dwarf_Section points to data that libdwarf maintains to record object section data.

9.3.2.36 Dwarf_Sig8

[Dwarf_Sig8](#)

Used for signatures where ever they appear. It is not a string, it is 8 bytes of a signature one would use to find a type unit.

See also

[dwarf_formsig8](#)

9.3.2.37 Dwarf_Str_Offsets_Table

[Dwarf_Str_Offsets_Table](#)

Provides an access to the .debug_str_offsets section independently of other DWARF sections. Mainly of use in examining the .debug_str_offsets section content for problems.

9.3.2.38 Dwarf_Type

[Dwarf_Type](#)

Before release 0.6.0 used to reference a reference to an entry in the .debug_pubtypes section (as well as the SGI-only extension .debug_types). However, we use Dwarf_Global instead now.

9.3.2.39 Dwarf_Var

[Dwarf_Var](#)

An SGI extension type which is no longer used at all. As of release 0.6.0 use Dwarf_Global instead.

9.3.2.40 Dwarf_Weak

[Dwarf_Weak](#)

An SGI extension type which is no longer used at all. As of release 0.6.0 use Dwarf_Global instead.

9.3.2.41 Dwarf_Xu_Index_Header

[Dwarf_Xu_Index_Header](#)

Used to reference .debug_cu_index or .debug_tu_index sections in a split-dwarf package file.

9.3.3 Enumeration Type Documentation

9.3.3.1 Dwarf_Sec_Alloc_Pref

enum [Dwarf_Sec_Alloc_Pref](#)

Since

{0.12.0}

This is part of the allowance of mmap for loading sections of an object file.

The option of using mmap() only applies to Elf object files in this release.

See also

[dwarf_set_load_preference\(\)](#)

9.4 Default stack frame macros

Macros

- #define DW_DLX_NO_EH_OFFSET (-1LL)
- #define DW_DLX_EH_OFFSET_UNAVAILABLE (-2LL)
- #define DW_CIE_AUGMENTER_STRING_V0 "z"
- #define DW_REG_TABLE_SIZE DW_FRAME_LAST_REG_NUM
- #define DW_FRAME_REG_INITIAL_VALUE DW_FRAME_SAME_VAL
- #define DW_EXPR_OFFSET 0 /* offset is from CFA reg */
- #define DW_EXPR_VAL_OFFSET 1
- #define DW_EXPR_EXPRESSION 2
- #define DW_EXPR_VAL_EXPRESSION 3

9.4.1 Detailed Description

9.5 DW_DLA alloc/dealloc typename&number

Macros

- `#define DW_DLA_STRING 0x01 /* char* */`
- `#define DW_DLA_LOC 0x02 /* Dwarf_Loc */`
- `#define DW_DLA_LOCDISC 0x03 /* Dwarf_Locdesc */`
- `#define DW_DLA_ELLIST 0x04 /* Dwarf_Ellist (not used) */`
- `#define DW_DLA_BOUNDS 0x05 /* Dwarf_Bounds (not used) */`
- `#define DW_DLA_BLOCK 0x06 /* Dwarf_Block */`
- `#define DW_DLA_DEBUG 0x07 /* Dwarf_Debug */`
- `#define DW_DLA_DIE 0x08 /* Dwarf_Die */`
- `#define DW_DLA_LINE 0x09 /* Dwarf_Line */`
- `#define DW_DLA_ATTR 0x0a /* Dwarf_Attribute */`
- `#define DW_DLA_TYPE 0x0b /* Dwarf_Type (not used) */`
- `#define DW_DLA_SUBSCR 0x0c /* Dwarf_Subscr (not used) */`
- `#define DW_DLA_GLOBAL 0x0d /* Dwarf_Global */`
- `#define DW_DLA_ERROR 0x0e /* Dwarf_Error */`
- `#define DW_DLA_LIST 0x0f /* a list */`
- `#define DW_DLA_LINEBUF 0x10 /* Dwarf_Line* (not used) */`
- `#define DW_DLA_ARANGE 0x11 /* Dwarf_Arange */`
- `#define DW_DLA_ABBREV 0x12 /* Dwarf_Abbrev */`
- `#define DW_DLA_FRAME_INSTR_HEAD 0x13 /* Dwarf_Frame_Instr_Head */`
- `#define DW_DLA_CIE 0x14 /* Dwarf_Cie */`
- `#define DW_DLA_FDE 0x15 /* Dwarf_Fde */`
- `#define DW_DLA_LOC_BLOCK 0x16 /* Dwarf_Loc */`
- `#define DW_DLA_FRAME_OP 0x17 /* Dwarf_Frame_Op (not used) */`
- `#define DW_DLA_FUNC 0x18 /* Dwarf_Func */`
- `#define DW_DLA_UARRAY 0x19 /* Array of Dwarf_Off:Jan2023 */`
- `#define DW_DLA_VAR 0x1a /* Dwarf_Var */`
- `#define DW_DLA_WEAK 0x1b /* Dwarf_Weak */`
- `#define DW_DLA_ADDR 0x1c /* Dwarf_Addr sized entries */`
- `#define DW_DLA_RANGES 0x1d /* Dwarf_Ranges */`
- `#define DW_DLA_GNU_INDEX_HEAD 0x35`
- `#define DW_DLA_RNGLISTS_HEAD 0x36 /* .debug_rnglists DW5 */`
- `#define DW_DLA_GDBINDEX 0x37 /* Dwarf_Gdbindex */`
- `#define DW_DLA_XU_INDEX 0x38 /* Dwarf_Xu_Index_Header */`
- `#define DW_DLA_LOC_BLOCK_C 0x39 /* Dwarf_Loc_c */`
- `#define DW_DLA_LOCDISC_C 0x3a /* Dwarf_Locdesc_c */`
- `#define DW_DLA_LOC_HEAD_C 0x3b /* Dwarf_Loc_Head_c */`
- `#define DW_DLA_MACRO_CONTEXT 0x3c /* Dwarf_Macro_Context */`
- `#define DW_DLA_DSC_HEAD 0x3e /* Dwarf_Dsc_Head */`
- `#define DW_DLA_DNAMES_HEAD 0x3f /* Dwarf_Dnames_Head */`
- `#define DW_DLA_STR_OFFSETS 0x40`
- `#define DW_DLA_DEBUG_ADDR 0x41`

9.5.1 Detailed Description

These identify the various allocate/dealloc types. The allocation happens within libdwf, and the deallocation is usually done by user code.

9.6 DW_DLE Dwarf_Error numbers

Macros

- `#define DW_DLE_NE 0 /* no error */`
- `#define DW_DLE_VMM 1 /* dwarf format/library version mismatch */`
- `#define DW_DLE_MAP 2 /* memory map failure */`
- `#define DW_DLE_LEE 3 /* libelf error */`
- `#define DW_DLE_NDS 4 /* no debug section */`
- `#define DW_DLE_NLS 5 /* no line section */`
- `#define DW_DLE_ID 6 /* invalid descriptor for query */`
- `#define DW_DLE_IOF 7 /* I/O failure */`
- `#define DW_DLE_MAF 8 /* memory allocation failure */`
- `#define DW_DLE_IA 9 /* invalid argument */`
- `#define DW_DLE_MDE 10 /* mangled debugging entry */`
- `#define DW_DLE_MLE 11 /* mangled line number entry */`
- `#define DW_DLE_FNO 12 /* file not open */`
- `#define DW_DLE_FNR 13 /* file not a regular file */`
- `#define DW_DLE_FWA 14 /* file open with wrong access */`
- `#define DW_DLE_NOB 15 /* not an object file */`
- `#define DW_DLE_MOF 16 /* mangled object file header */`
- `#define DW_DLE_EOLL 17 /* end of location list entries */`
- `#define DW_DLE_NOLL 18 /* no location list section */`
- `#define DW_DLE_BADOFF 19 /* Invalid offset */`
- `#define DW_DLE_EOS 20 /* end of section */`
- `#define DW_DLE_ATRUNC 21 /* abbreviations section appears truncated*/`
- `#define DW_DLE_BADBITC 22 /* Address size passed to dwarf bad,*/`
- `#define DW_DLE_DBG_ALLOC 23`
- `#define DW_DLE_FSTAT_ERROR 24`
- `#define DW_DLE_FSTAT_MODE_ERROR 25`
- `#define DW_DLE_INIT_ACCESS_WRONG 26`
- `#define DW_DLE_ELF_BEGIN_ERROR 27`
- `#define DW_DLE_ELF_GETEHDR_ERROR 28`
- `#define DW_DLE_ELF_GETSHDR_ERROR 29`
- `#define DW_DLE_ELF_STRPTR_ERROR 30`
- `#define DW_DLE_DEBUG_INFO_DUPLICATE 31`
- `#define DW_DLE_DEBUG_INFO_NULL 32`
- `#define DW_DLE_DEBUG_ABBREV_DUPLICATE 33`
- `#define DW_DLE_DEBUG_ABBREV_NULL 34`
- `#define DW_DLE_DEBUG_ARANGES_DUPLICATE 35`
- `#define DW_DLE_DEBUG_ARANGES_NULL 36`
- `#define DW_DLE_DEBUG_LINE_DUPLICATE 37`
- `#define DW_DLE_DEBUG_LINE_NULL 38`
- `#define DW_DLE_DEBUG_LOC_DUPLICATE 39`
- `#define DW_DLE_DEBUG_LOC_NULL 40`
- `#define DW_DLE_DEBUG_MACINFO_DUPLICATE 41`
- `#define DW_DLE_DEBUG_MACINFO_NULL 42`
- `#define DW_DLE_DEBUG_PUBNAMES_DUPLICATE 43`
- `#define DW_DLE_DEBUG_PUBNAMES_NULL 44`
- `#define DW_DLE_DEBUG_STR_DUPLICATE 45`
- `#define DW_DLE_DEBUG_STR_NULL 46`
- `#define DW_DLE_CU_LENGTH_ERROR 47`
- `#define DW_DLE_VERSION_STAMP_ERROR 48`
- `#define DW_DLE_ABBREV_OFFSET_ERROR 49`

- `#define DW_DLE_ADDRESS_SIZE_ERROR 50`
- `#define DW_DLE_DEBUG_INFO_PTR_NULL 51`
- `#define DW_DLE_DIE_NULL 52`
- `#define DW_DLE_STRING_OFFSET_BAD 53`
- `#define DW_DLE_DEBUG_LINE_LENGTH_BAD 54`
- `#define DW_DLE_LINE_PROLOG_LENGTH_BAD 55`
- `#define DW_DLE_LINE_NUM_OPERANDS_BAD 56`
- `#define DW_DLE_LINE_SET_ADDR_ERROR 57`
- `#define DW_DLE_LINE_EXT_OPCODE_BAD 58`
- `#define DW_DLE_DWARF_LINE_NULL 59`
- `#define DW_DLE_INCL_DIR_NUM_BAD 60`
- `#define DW_DLE_LINE_FILE_NUM_BAD 61`
- `#define DW_DLE_ALLOC_FAIL 62`
- `#define DW_DLE_NO_CALLBACK_FUNC 63`
- `#define DW_DLE_SECT_ALLOC 64`
- `#define DW_DLE_FILE_ENTRY_ALLOC 65`
- `#define DW_DLE_LINE_ALLOC 66`
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- `#define DW_DLE_RLE_ERROR` 506
- `#define DW_DLE_MACHO_SEGMENT_COUNT_HEURISTIC_FAIL` 507
- `#define DW_DLE_DUPLICATE_NOTE_GNU_BUILD_ID` 508
- `#define DW_DLE_SYSCONF_VALUE_UNUSABLE` 509
- `#define DW_DLE_LAST` 509
- `#define DW_DLE_LO_USER` 0x10000

9.6.1 Detailed Description

These identify the various error codes that have been used. Not all of them are still use. We do not recycle obsolete codes into new uses. The codes 1 through 22 are historic and it is unlikely they are used anywhere in the library.

9.6.2 Macro Definition Documentation

9.6.2.1 DW_DLE_LAST

```
#define DW_DLE_LAST 509
```

Note

DW_DLE_LAST MUST EQUAL LAST ERROR NUMBER

9.7 Libdwarf Initialization Functions

Functions

- DW_API int [dwarf_init_path](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_bufferlen, unsigned int dw_groupnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)
Initialization based on path, the most common initialization.
- DW_API int [dwarf_init_path_a](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_bufferlen, unsigned int dw_groupnumber, unsigned int dw_universalnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)

Initialization based on path.

- DW_API int [dwarf_init_path_dl](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_bufferlen, unsigned int dw_groupnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, char **dw_dl_path_array, unsigned int dw_dl_path_array_size, unsigned char *dw_dl_path_source, [Dwarf_Error](#) *dw_error)

Initialization following GNU debuglink section data.

- DW_API int [dwarf_init_path_dl_a](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_bufferlen, unsigned int dw_groupnumber, unsigned int dw_universalnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, char **dw_dl_path_array, unsigned int dw_dl_path_array_size, unsigned char *dw_dl_path_source, [Dwarf_Error](#) *dw_error)

Initialization based on path with debuglink.

- DW_API int [dwarf_init_b](#) (int dw_fd, unsigned int dw_groupnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)

Initialization based on Unix/Linux (etc) fd.

- DW_API int [dwarf_finish](#) ([Dwarf_Debug](#) dw_dbg)

Close the initialized dw_dbg and free all data libdwarf has for this dw_dbg.

- DW_API int [dwarf_object_init_b](#) ([Dwarf_Obj_Access_Interface_a](#) *dw_obj, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, unsigned int dw_groupnumber, [Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)

Used to access DWARF information in memory or in an object format unknown to libdwarf.

- DW_API int [dwarf_object_finish](#) ([Dwarf_Debug](#) dw_dbg)

Used to close the object_init dw_dbg.

- DW_API int [dwarf_set_tied_dbg](#) ([Dwarf_Debug](#) dw_split_dbg, [Dwarf_Debug](#) dw_tied_dbg, [Dwarf_Error](#) *dw_error)

Use with split dwarf.

- DW_API int [dwarf_get_tied_dbg](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Debug](#) *dw_tieddbg_out, [Dwarf_Error](#) *dw_error)

Use with split dwarf.

9.7.1 Detailed Description

9.7.2 Initialization And Finish Operations

Opening and closing libdwarf on object files.

9.7.3 Function Documentation

9.7.3.1 dwarf_finish()

```
DW_API int dwarf_finish (
    Dwarf_Debug dw_dbg )
```

Close the initialized dw_dbg and free all data libdwarf has for this dw_dbg.

Parameters

<i>dw_dbg</i>	Close the dbg.
---------------	----------------

Returns

May return DW_DLV_ERROR if something is very wrong: no further information is available.. May return DW_DLV_NO_ENTRY but no further information is available. Normally returns DW_DLV_OK.

There is nothing the caller can do with the return value except report it somehow. Most callers ignore the return value.

9.7.3.2 dwarf_get_tied_dbg()

```
DW_API int dwarf_get_tied_dbg (
    Dwarf_Debug dw_dbg,
    Dwarf_Debug * dw_tieddbg_out,
    Dwarf_Error * dw_error )
```

Use with split dwarf.

Given a main Dwarf_Debug this returns the tied Dwarf_Debug if there is one or else returns null(0).

Before v0.11.0 it was not defined what this returned if the tied-Dwarf_Debug was passed in, but it would have returned null(0) in that case. Unlikely anyone uses this call as callers had the tied and base dbg when calling dwarf_set_tied_dbg().

Parameters

<i>dw_dbg</i>	Pass in a non-null Dwarf_Debug which is either a main-Dwarf_Debug or a tied-Dwarf_Debug.
<i>dw_tieddbg_out</i>	On success returns the applicable tied-Dwarf_Debug through the pointer. If dw_dbg is a tied-Dwarf_Debug the function returns null(0) through the pointer. If there is no tied-Dwarf_Debug (meaning there is just a main-Dwarf_Debug) the function returns null (0) through the pointer.
<i>dw_error</i>	If the dw_dbg is invalid or damaged then the function returns DW_DLV_ERROR and dw_error is set to point to the error details.

Returns

DW_DLV_OK or DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.7.3.3 dwarf_init_b()

```
DW_API int dwarf_init_b (
    int dw_fd,
    unsigned int dw_groupnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

Initialization based on Unix/Linux (etc) fd.

In case DW_DLV_ERROR returned be sure to call dwarf_dealloc_error even though the returned Dwarf_Debug is NULL.

Parameters

<i>dw_fd</i>	An open Unix/Linux/etc fd on the object file.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in NULL unless one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the dw_error argument.
<i>dw_errarg</i>	If dw_errhand is non-null, then this value (a pointer or integer that means something to you) is passed to the dw_errhand function in case that is helpful to you.
<i>dw_dbg</i>	On success, *dw_dbg is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

9.7.3.4 dwarf_init_path()

```
DW_API int dwarf_init_path (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

Initialization based on path, the most common initialization.

On a Mach-O universal binary this function can only return information about the first (zero index) object in the universal binary.

Parameters

<i>dw_path</i>	Pass in the path to the object file to open.
<i>dw_true_path_out_buffer</i>	Pass in NULL or the name of a string buffer (The buffer should be initialized with an initial NUL byte) The returned string will be null-terminated. The path actually used is copied to true_path_out. If true_path_buffer len is zero or true_path_out_buffer is zero then the Special Macos processing will not occur, nor will the GNU_debuglink processing occur. In case GNU debuglink data was followed or Macos dSYM applies the true_path_out will not match path and the initial byte will be non-null. The value put in true_path_out is the actual file name.
<i>dw_true_path_bufferlen</i>	Pass in the length in bytes of the buffer.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in NULL unless one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the dw_error argument.
<i>dw_errarg</i>	If dw_errhand is non-null, then this value (a pointer or integer that means something to you) is passed to the dw_errhand function in case that is helpful to you.
<i>dw_dbg</i>	On success, *dw_dbg is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

[Details on separate DWARF object access](#)

See also

[dwarf_init_path_dl](#) [dwarf_init_b](#)

[Using dwarf_init_path\(\)](#)

9.7.3.5 dwarf_init_path_a()

```
DW_API int dwarf_init_path_a (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    unsigned int dw_universalnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

Initialization based on path.

This identical to [dwarf_init_path\(\)](#) except that it adds a new argument, `dw_universalnumber`, with which you can specify which object in a Mach-O universal binary you wish to open.

It is always safe and appropriate to pass zero as the `dw_universalnumber`. Elf and PE and (non-universal) Mach-O object files ignore the value of `dw_universalnumber`.

9.7.3.6 dwarf_init_path_dl()

```
DW_API int dwarf_init_path_dl (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    char ** dw_dl_path_array,
    unsigned int dw_dl_path_array_size,
    unsigned char * dw_dl_path_source,
    Dwarf_Error * dw_error )
```

Initialization following GNU debuglink section data.

Sets the true-path with DWARF if there is appropriate debuglink data available.

In case DW_DLV_ERROR returned be sure to call `dwarf_dealloc_error` even though the returned `Dwarf_Debug` is NULL.

Parameters

<i>dw_path</i>	Pass in the path to the object file to open.
<i>dw_true_path_out_buffer</i>	Pass in NULL or the name of a string buffer.
<i>dw_true_path_bufferlen</i>	Pass in the length in bytes of the buffer.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in NULL, normally. If non-null one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the <i>dw_error</i> argument.
<i>dw_errarg</i>	Pass in NULL, normally. If <i>dw_errhand</i> is non-null, then this value (a pointer or integer that means something to you) is passed to the <i>dw_errhand</i> function in case that is helpful to you.
<i>dw_dbg</i>	On success, <i>*dw_dbg</i> is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_dl_path_array</i>	debuglink processing allows a user-specified set of file paths and this argument allows one to specify these. Pass in a pointer to array of pointers to strings which you, the caller, have filled in. The strings should be alternate paths (see the GNU debuglink documentation.)
<i>dw_dl_path_array_size</i>	Specify the size of the <i>dw_dl_path_array</i> .
<i>dw_dl_path_source</i>	returns DW_PATHSOURCE_basic or other such value so the caller can know how the true-path was resolved.
<i>dw_error</i>	In case return is DW_DLV_ERROR <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc.

[Details on separate DWARF object access](#)

See also

[Using dwarf_init_path_dl\(\)](#)

9.7.3.7 dwarf_init_path_dl_a()

```
DW_API int dwarf_init_path_dl_a (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    unsigned int dw_universalnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    char ** dw_dl_path_array,
    unsigned int dw_dl_path_array_size,
    unsigned char * dw_dl_path_source,
    Dwarf_Error * dw_error )
```

Initialization based on path with debuglink.

This identical to [dwarf_init_path_dl\(\)](#) except that it adds a new argument, *dw_universalnumber*, with which you can specify which object in a Mach-O universal binary you wish to open.

It is always safe and appropriate to pass zero as the *dw_universalnumber*. Elf and PE and (non-universal) Mach-O object files ignore the value of *dw_universalnumber*.

Mach-O objects do not contain or use debuglink data.

9.7.3.8 dwarf_object_finish()

```
DW_API int dwarf_object_finish (
    Dwarf_Debug dw_dbg )
```

Used to close the object_init dw_dbg.

Close the dw_dbg opened by [dwarf_object_init_b\(\)](#).

Parameters

<i>dw_dbg</i>	Must be an open Dwarf_Debug opened by dwarf_object_init_b() . The init call dw_obj data is not freed by the call to dwarf_object_finish.
---------------	--

Returns

The return value DW_DLV_OK etc is useless, one could possibly report it somehow. Callers usually ignore the return value.

9.7.3.9 dwarf_object_init_b()

```
DW_API int dwarf_object_init_b (
    Dwarf_Obj_Access_Interface_a * dw_obj,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    unsigned int dw_groupnumber,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

Used to access DWARF information in memory or in an object format unknown to libdwarf.

In case DW_DLV_ERROR returned be sure to call dwarf_dealloc_error even though the returned Dwarf_Debug is NULL.

See also

[Demonstrating reading DWARF without a file.](#)

and

See also

dw_noobject Reading DWARF not in object file

Parameters

<i>dw_obj</i>	A data structure filled out by the caller so libdwarf can access DWARF data not in a supported object file format.
<i>dw_errhand</i>	Pass in NULL normally.
<i>dw_errarg</i>	Pass in NULL normally.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group (quite unlikely for this interface).
<i>dw_dbg</i> Generated by Doxygen	On success, *dw_dbg is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.7.3.10 dwarf_set_tied_dbg()

```
DW_API int dwarf_set_tied_dbg (
    Dwarf_Debug dw_split_dbg,
    Dwarf_Debug dw_tied_dbg,
    Dwarf_Error * dw_error )
```

Use with split dwarf.

In libdwarf usage the object file being reported on [a] is opened with [dwarf_init_path\(\)](#) or the like. If that object file [a] is a split-dwarf object then important data needed to report all of what is in the object file [a] needs an open Dwarf_Debug on the base object file [b] (usually the base executable object). Here we call that executable object file [b] the *tied* object.

See DWARF5 Appendix F.

Parameters

<i>dw_split_dbg</i>	Pass in an open dbg, on a split-dwarf object file with (normally) lots of DWARF but no executable code.
<i>dw_tied_dbg</i>	Pass in an open dbg on an executable (we call it a <i>tied</i> dbg here) which has minimal DWARF (to save space in the executable).
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

See also

[Attaching a tied dbg](#)

[Detaching a tied dbg](#)

9.8 Compilation Unit (CU) Access

Functions

- DW_API int [dwarf_next_cu_header_e](#) (Dwarf_Debug dw_dbg, Dwarf_Bool dw_is_info, Dwarf_Die *dw_cu↵_die, Dwarf_Unsigned *dw_cu_header_length, Dwarf_Half *dw_version_stamp, Dwarf_Off *dw_abbrev↵_offset, Dwarf_Half *dw_address_size, Dwarf_Half *dw_length_size, Dwarf_Half *dw_extension_size, Dwarf_Sig8 *dw_type_signature, Dwarf_Unsigned *dw_typeoffset, Dwarf_Unsigned *dw_next_cu_header↵_offset, Dwarf_Half *dw_header_cu_type, Dwarf_Error *dw_error)
Return information on the next CU header(e).
- DW_API int [dwarf_next_cu_header_d](#) (Dwarf_Debug dw_dbg, Dwarf_Bool dw_is_info, Dwarf_Unsigned *dw_cu_header_length, Dwarf_Half *dw_version_stamp, Dwarf_Off *dw_abbrev_offset, Dwarf_Half *dw↵_address_size, Dwarf_Half *dw_length_size, Dwarf_Half *dw_extension_size, Dwarf_Sig8 *dw_type↵_signature, Dwarf_Unsigned *dw_typeoffset, Dwarf_Unsigned *dw_next_cu_header_offset, Dwarf_Half *dw_header_cu_type, Dwarf_Error *dw_error)

- Return information on the next CU header(d)*
- DW_API int `dwarf_siblingof_c` (Dwarf_Die dw_die, Dwarf_Die *dw_return_siblingdie, Dwarf_Error *dw_error)
Return the next sibling DIE.
 - DW_API int `dwarf_siblingof_b` (Dwarf_Debug dw_dbg, Dwarf_Die dw_die, Dwarf_Bool dw_is_info, Dwarf_Die *dw_return_siblingdie, Dwarf_Error *dw_error)
Return the first DIE or the next sibling DIE.
 - DW_API int `dwarf_cu_header_basics` (Dwarf_Die dw_die, Dwarf_Half *dw_version, Dwarf_Bool *dw_is_info, Dwarf_Bool *dw_is_dwo, Dwarf_Half *dw_offset_size, Dwarf_Half *dw_address_size, Dwarf_Half *dw_extension_size, Dwarf_Sig8 **dw_signature, Dwarf_Off *dw_offset_of_length, Dwarf_Unsigned *dw_total_byte_length, Dwarf_Error *dw_error)
Return some CU-relative facts.
 - DW_API int `dwarf_child` (Dwarf_Die dw_die, Dwarf_Die *dw_return_childdie, Dwarf_Error *dw_error)
Return the child DIE, if any. The child may be the first of a list of sibling DIEs.
 - DW_API void `dwarf_dealloc_die` (Dwarf_Die dw_die)
Deallocate (free) a DIE.
 - DW_API int `dwarf_die_from_hash_signature` (Dwarf_Debug dw_dbg, Dwarf_Sig8 *dw_hash_sig, const char *dw_sig_type, Dwarf_Die *dw_returned_CU_die, Dwarf_Error *dw_error)
Return a CU DIE given a has signature.
 - DW_API int `dwarf_offdie_b` (Dwarf_Debug dw_dbg, Dwarf_Off dw_offset, Dwarf_Bool dw_is_info, Dwarf_Die *dw_return_die, Dwarf_Error *dw_error)
Return DIE given global (not CU-relative) offset.
 - DW_API int `dwarf_find_die_given_sig8` (Dwarf_Debug dw_dbg, Dwarf_Sig8 *dw_ref, Dwarf_Die *dw_die_out, Dwarf_Bool *dw_is_info, Dwarf_Error *dw_error)
Return a DIE given a Dwarf_Sig8 hash.
 - DW_API Dwarf_Bool `dwarf_get_die_infotypes_flag` (Dwarf_Die dw_die)
Return the is_info flag.

9.8.1 Detailed Description

9.8.2 Function Documentation

9.8.2.1 dwarf_child()

```
DW_API int dwarf_child (
    Dwarf_Die dw_die,
    Dwarf_Die * dw_return_childdie,
    Dwarf_Error * dw_error )
```

Return the child DIE, if any. The child may be the first of a list of sibling DIEs.

Parameters

<i>dw_die</i>	We will return the first child of this DIE.
<i>dw_return_childdie</i>	Returns the first child through the pointer. For subsequent dies siblings of the first, use <code>dwarf_siblingof_c()</code> .
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

Returns DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if dw_die has no children.

See also

[Using dwarf_child\(\)](#)

9.8.2.2 dwarf_cu_header_basics()

```
DW_API int dwarf_cu_header_basics (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_version,
    Dwarf_Bool * dw_is_info,
    Dwarf_Bool * dw_is_dwo,
    Dwarf_Half * dw_offset_size,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_extension_size,
    Dwarf_Sig8 ** dw_signature,
    Dwarf_Off * dw_offset_of_length,
    Dwarf_Unsigned * dw_total_byte_length,
    Dwarf_Error * dw_error )
```

Return some CU-relative facts.

Any Dwarf_Die will work. The values returned through the pointers are about the CU for a DIE

Parameters

<i>dw_die</i>	Some open Dwarf_Die.
<i>dw_version</i>	Returns the DWARF version: 2,3,4, or 5
<i>dw_is_info</i>	Returns non-zero if the CU is .debug_info. Returns zero if the CU is .debug_types (DWARF4).
<i>dw_is_dwo</i>	Returns non-zero if the CU is a dwo/dwp object and zero if it is a standard object.
<i>dw_offset_size</i>	Returns offset size, 4 and 8 are possible.
<i>dw_address_size</i>	Almost always returns 4 or 8. Could be 2 in unusual circumstances.
<i>dw_extension_size</i>	The sum of <i>dw_offset_size</i> and <i>dw_extension_size</i> are the count of the initial bytes of the CU. Standard lengths are 4 and 12. For 1990's SGI objects the length could be 8.
<i>dw_signature</i>	Returns a pointer to an 8 byte signature.
<i>dw_offset_of_length</i>	Returns the section offset of the initial byte of the CU.
<i>dw_total_byte_length</i>	Returns the total length of the CU including the length field and the content of the CU.
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

Returns DW_DLV_OK etc.

9.8.2.3 dwarf_dealloc_die()

```
DW_API void dwarf_dealloc_die (
    Dwarf_Die dw_die )
```

Deallocate (free) a DIE.

Parameters

<i>dw_die</i>	Frees (deallocs) memory associated with this Dwarf_Die.
---------------	---

DIEs not freed explicitly will be freed by [dwarf_finish\(\)](#).

9.8.2.4 dwarf_die_from_hash_signature()

```
DW_API int dwarf_die_from_hash_signature (
    Dwarf_Debug dw_dbg,
    Dwarf_Sig8 * dw_hash_sig,
    const char * dw_sig_type,
    Dwarf_Die * dw_returned_CU_die,
    Dwarf_Error * dw_error )
```

Return a CU DIE given a has signature.

Parameters

<i>dw_dbg</i>	
<i>dw_hash_sig</i>	A pointer to an 8 byte signature to be looked up. in .debug_names.
<i>dw_sig_type</i>	Valid type requests are "cu" and "tu"
<i>dw_returned_CU_die</i>	Returns the found CU DIE if one is found.
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

DW_DLX_OK means *dw_returned_CU_die* was set. DW_DLX_NO_ENTRY means the signature could not be found.

9.8.2.5 dwarf_find_die_given_sig8()

```
DW_API int dwarf_find_die_given_sig8 (
    Dwarf_Debug dw_dbg,
    Dwarf_Sig8 * dw_ref,
    Dwarf_Die * dw_die_out,
    Dwarf_Bool * dw_is_info,
    Dwarf_Error * dw_error )
```

Return a DIE given a Dwarf_Sig8 hash.

Returns DIE and *is_info* flag if it finds the hash signature of a DIE. Often will be the CU DIE of DW_UT_split_type or DW_UT_type CU.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_ref</i>	A pointer to a Dwarf_Sig8 struct whose content defines what is being searched for.
<i>dw_die_out</i>	If found, this returns the found DIE itself.
<i>dw_is_info</i>	If found, this returns section (.debug_is_info or .debug_is_types).
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.8.2.6 dwarf_get_die_infotypes_flag()

```
DW_API Dwarf_Bool dwarf_get_die_infotypes_flag (
    Dwarf_Die dw_die )
```

Return the is_info flag.

So client software knows if a DIE is in debug_info or (DWARF4-only) debug_types.

Parameters

<i>dw_die</i>	The DIE being queried.
---------------	------------------------

Returns

If non-zero the flag means the DIE is in .debug_info. Otherwise it means the DIE is in .debug_types.

9.8.2.7 dwarf_next_cu_header_d()

```
DW_API int dwarf_next_cu_header_d (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_is_info,
    Dwarf_Unsigned * dw_cu_header_length,
    Dwarf_Half * dw_version_stamp,
    Dwarf_Off * dw_abbrev_offset,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_length_size,
    Dwarf_Half * dw_extension_size,
    Dwarf_Sig8 * dw_type_signature,
    Dwarf_Unsigned * dw_typeoffset,
    Dwarf_Unsigned * dw_next_cu_header_offset,
    Dwarf_Half * dw_header_cu_type,
    Dwarf_Error * dw_error )
```

Return information on the next CU header(d)

This is the version to use for linking against libdwarf v0.8.0 and earlier (and it also works for later versions).

Replace all uses of [dwarf_next_cu_header_d\(\)](#) and use dwarf_next_cu_header_e instead.

Assuming you continue to use [dwarf_next_cu_header_d\(\)](#) read the following carefully.

The library keeps track of where it is in the object file following a call to [dwarf_next_cu_header_d\(\)](#) and it knows (see next paragraph) how to interpret dwarf_siblingof_b(dw_dbg,NULL,dw_is_info, &cu_die,...).

In order to read the DIE tree of the CU this records information in the dw_dbg data and after a successful call to [dwarf_next_cu_header_d\(\)](#) only an immediate call to dwarf_siblingof_b(dw_dbg,NULL,dw_is_info, &cu_die,...) is guaranteed to return the correct DIE (a Compilation Unit DIE).

Avoid any call to libdwarf between a successful call to [dwarf_next_cu_header_d\(\)](#) and dwarf_siblingof_b(dw_dbg,↵, NULL,dw_is_info, &cu_die,...) to ensure the intended and correct Dwarf_Die is returned.

See also

[Example walking CUs\(d\)](#)

All arguments are the same as [dwarf_next_cu_header_e\(\)](#) except that there is no `dw_cu_die` argument in [dwarf_next_cu_header_d\(\)](#).

9.8.2.8 dwarf_next_cu_header_e()

```
DW_API int dwarf_next_cu_header_e (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_is_info,
    Dwarf_Die * dw_cu_die,
    Dwarf_Unsigned * dw_cu_header_length,
    Dwarf_Half * dw_version_stamp,
    Dwarf_Off * dw_abbrev_offset,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_length_size,
    Dwarf_Half * dw_extension_size,
    Dwarf_Sig8 * dw_type_signature,
    Dwarf_Unsigned * dw_typeoffset,
    Dwarf_Unsigned * dw_next_cu_header_offset,
    Dwarf_Half * dw_header_cu_type,
    Dwarf_Error * dw_error )
```

Return information on the next CU header(e).

New in v0.9.0 November 2023.

[dwarf_next_cu_header_e\(\)](#) is preferred over [dwarf_next_cu_header_d\(\)](#) as the latter requires a second (immediate) step to access the CU-DIE of the CU.

With the CU-DIE returned by [dwarf_next_cu_header_e\(\)](#) one calls [dwarf_child\(\)](#) first (the CU-DIE has no siblings) and then one calls [dwarf_siblingof_c\(\)](#) and [dwarf_child\(\)](#) appropriately to descend the tree of DIEs.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_is_info</i>	Pass in TRUE if reading through <code>.debug_info</code> Pass in FALSE if reading through DWARF4 <code>.debug_types</code> .
<i>dw_cu_die</i>	Pass in a pointer to a Dwarf_Die. the call sets the passed-in pointer to be a Compilation Unit Die for use with dwarf_child() or any other call requiring a Dwarf_Die argument.
<i>dw_cu_header_length</i>	Returns the length of the just-read CU header.
<i>dw_version_stamp</i>	Returns the version number (2 to 5) of the CU header just read.
<i>dw_abbrev_offset</i>	Returns the <code>.debug_abbrev</code> offset from the the CU header just read.
<i>dw_address_size</i>	Returns the address size specified for this CU, usually either 4 or 8.
<i>dw_length_size</i>	Returns the offset size (the length of the size field from the header) specified for this CU, either 4 or 4.
<i>dw_extension_size</i>	If the section is standard 64bit DWARF then this value is 4. Else the value is zero.
<i>dw_type_signature</i>	If the CU is DW_UT_skeleton DW_UT_split_compile, DW_UT_split_type or DW_UT_type this is the type signature from the CU_header compiled into this field.
<i>dw_typeoffset</i>	For DW_UT_split_type or DW_UT_type this is the type offset from the CU header.
<i>dw_next_cu_header_offset</i>	The offset in the section of the next CU (unless there is a compiler bug this is rarely of interest).
Generated by Doxygen	
<i>dw_header_cu_type</i>	Returns DW_UT_compile, or other DW_UT value.
<i>dw_error</i>	In case return is DW_DLV_ERROR <code>dw_error</code> is set to point to the error details.

Returns

Returns DW_DLV_OK on success. Returns DW_DLV_NO_ENTRY if all CUs have been read.

See also

[Example walking CUs\(e\)](#)

9.8.2.9 dwarf_offdie_b()

```
DW_API int dwarf_offdie_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_offset,
    Dwarf_Bool dw_is_info,
    Dwarf_Die * dw_return_die,
    Dwarf_Error * dw_error )
```

Return DIE given global (not CU-relative) offset.

This works whether or not the target section has had [dwarf_next_cu_header_d\(\)](#) applied, the CU the offset exists in has been seen at all, or the target offset is one libdwarf has seen before.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_offset</i>	The global offset of the DIE in the appropriate section.
<i>dw_is_info</i>	Pass TRUE if the target is .debug_info. Pass FALSE if the target is .debug_types.
<i>dw_return_die</i>	On success this returns a DIE pointer to the found DIE.
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

DW_DLV_OK means dw_returned_die was found DW_DLV_NO_ENTRY is only possible if the offset is to a null DIE, and that is very unusual. Otherwise expect DW_DLV_ERROR.

See also

[Using dwarf_offdie_b\(\)](#)

9.8.2.10 dwarf_siblingof_b()

```
DW_API int dwarf_siblingof_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_die,
    Dwarf_Bool dw_is_info,
    Dwarf_Die * dw_return_siblingdie,
    Dwarf_Error * dw_error )
```

Return the first DIE or the next sibling DIE.

This function follows [dwarf_next_cu_header_d\(\)](#) to return the CU-DIE that [dwarf_next_cu_header_d\(\)](#) implies but does not reveal.

Aside from the special case required use of [dwarf_siblingof_b\(\)](#) immediately following [dwarf_next_cu_header_d\(\)](#), [dwarf_siblingof_c\(\)](#) is the faster function.

This function will eventually be deprecated.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug one is operating on.
<i>dw_die</i>	Immediately after calling dwarf_next_cu_header_d pass in NULL to retrieve the CU DIE. Or pass in a known DIE and this will retrieve the next sibling in the chain.
<i>dw_is_info</i>	Pass TRUE or FALSE to match the applicable dwarf_next_cu_header_d call.
<i>dw_return_siblingdie</i>	The DIE returned through the pointer.
<i>dw_error</i>	The usual error information, if any.

Returns

Returns DW_DLV_OK etc.

See also

[example4](#)

[dwarf_get_die_infotypes](#)

9.8.2.11 dwarf_siblingof_c()

```
DW_API int dwarf_siblingof_c (
    Dwarf_Die dw_die,
    Dwarf_Die * dw_return_siblingdie,
    Dwarf_Error * dw_error )
```

Return the next sibling DIE.

Parameters

<i>dw_die</i>	Pass in a known DIE and this will retrieve the next sibling in the chain.
<i>dw_return_siblingdie</i>	The DIE returned through the pointer.
<i>dw_error</i>	The usual error information, if any.

Returns

Returns DW_DLV_OK etc.

See also

[example4](#)

[dwarf_get_die_infotypes](#)

9.9 Debugging Information Entry (DIE) content

Functions

- DW_API int [dwarf_die_abbrev_global_offset](#) (Dwarf_Die dw_die, Dwarf_Off *dw_abbrev_offset, Dwarf_Unsigned *dw_abbrev_count, Dwarf_Error *dw_error)
Return the abbrev section offset of a DIE's abbrevs.
- DW_API int [dwarf_tag](#) (Dwarf_Die dw_die, Dwarf_Half *dw_return_tag, Dwarf_Error *dw_error)
Get TAG value of DIE.
- DW_API int [dwarf_dieoffset](#) (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)
Return the global section offset of the DIE.
- DW_API int [dwarf_debug_addr_index_to_addr](#) (Dwarf_Die dw_die, Dwarf_Unsigned dw_index, Dwarf_Addr *dw_return_addr, Dwarf_Error *dw_error)
Extract address given address index. DWARF5.
- DW_API Dwarf_Bool [dwarf_addr_form_is_indexed](#) (int dw_form)
Informs if a DW_FORM is an indexed form.
- DW_API int [dwarf_CU_dieoffset_given_die](#) (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)
Return the CU DIE offset given any DIE.
- DW_API int [dwarf_get_cu_die_offset_given_cu_header_offset_b](#) (Dwarf_Debug dw_dbg, Dwarf_Off dw_in_cu_header_offset, Dwarf_Bool dw_is_info, Dwarf_Off *dw_out_cu_die_offset, Dwarf_Error *dw_error)
Return the CU DIE section offset given CU header offset.
- DW_API int [dwarf_die_CU_offset](#) (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)
returns the CU relative offset of the DIE.
- DW_API int [dwarf_die_CU_offset_range](#) (Dwarf_Die dw_die, Dwarf_Off *dw_return_CU_header_offset, Dwarf_Off *dw_return_CU_length_bytes, Dwarf_Error *dw_error)
Return the offset length of the entire CU of a DIE.
- DW_API int [dwarf_attr](#) (Dwarf_Die dw_die, Dwarf_Half dw_attrnum, Dwarf_Attribute *dw_returned_attr, Dwarf_Error *dw_error)
Given DIE and attribute number return a Dwarf_attribute.
- DW_API int [dwarf_die_text](#) (Dwarf_Die dw_die, Dwarf_Half dw_attrnum, char **dw_ret_name, Dwarf_Error *dw_error)
Given DIE and attribute number return a string.
- DW_API int [dwarf_diename](#) (Dwarf_Die dw_die, char **dw_diename, Dwarf_Error *dw_error)
Return the string from a DW_AT_name attribute.
- DW_API Dwarf_Unsigned [dwarf_die_abbrev_code](#) (Dwarf_Die dw_die)
Return the DIE abbrev code.
- DW_API int [dwarf_die_abbrev_children_flag](#) (Dwarf_Die dw_die, Dwarf_Half *dw_ab_has_child)
Return TRUE if the DIE has children.
- DW_API int [dwarf_validate_die_sibling](#) (Dwarf_Die dw_sibling, Dwarf_Off *dw_offset)
Validate a sibling DIE.
- DW_API int [dwarf_hasattr](#) (Dwarf_Die dw_die, Dwarf_Half dw_attrnum, Dwarf_Bool *dw_returned_bool, Dwarf_Error *dw_error)
Tells whether a DIE has a particular attribute.
- DW_API int [dwarf_offset_list](#) (Dwarf_Debug dw_dbg, Dwarf_Off dw_offset, Dwarf_Bool dw_is_info, Dwarf_Off **dw_offbuf, Dwarf_Unsigned *dw_offcount, Dwarf_Error *dw_error)
Return an array of DIE children offsets.
- DW_API int [dwarf_get_die_address_size](#) (Dwarf_Die dw_die, Dwarf_Half *dw_addr_size, Dwarf_Error *dw_error)
Get the address size applying to a DIE.
- DW_API int [dwarf_die_offsets](#) (Dwarf_Die dw_die, Dwarf_Off *dw_global_offset, Dwarf_Off *dw_local_offset, Dwarf_Error *dw_error)

- Return section and CU-local offsets of a DIE.*
- DW_API int `dwarf_get_version_of_die` (Dwarf_Die dw_die, Dwarf_Half *dw_version, Dwarf_Half *dw_offset_size)
Get the version and offset size.
 - DW_API int `dwarf_lowpc` (Dwarf_Die dw_die, Dwarf_Addr *dw_returned_addr, Dwarf_Error *dw_error)
Return the DW_AT_low_pc value.
 - DW_API int `dwarf_highpc_b` (Dwarf_Die dw_die, Dwarf_Addr *dw_return_addr, Dwarf_Half *dw_return_form, enum Dwarf_Form_Class *dw_return_class, Dwarf_Error *dw_error)
Return the DW_AT_highpc address value.
 - DW_API int `dwarf_dietype_offset` (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Bool *dw_is_info, Dwarf_Error *dw_error)
Return the offset from the DW_AT_type attribute.
 - DW_API int `dwarf_bytesize` (Dwarf_Die dw_die, Dwarf_Unsigned *dw_returned_size, Dwarf_Error *dw_error)
Return the value of the attribute DW_AT_byte_size.
 - DW_API int `dwarf_bitsize` (Dwarf_Die dw_die, Dwarf_Unsigned *dw_returned_size, Dwarf_Error *dw_error)
Return the value of the attribute DW_AT_bitsize.
 - DW_API int `dwarf_bitoffset` (Dwarf_Die dw_die, Dwarf_Half *dw_attrnum, Dwarf_Unsigned *dw_returned_offset, Dwarf_Error *dw_error)
Return the bit offset attribute of a DIE.
 - DW_API int `dwarf_srclang` (Dwarf_Die dw_die, Dwarf_Unsigned *dw_returned_lang, Dwarf_Error *dw_error)
Return the value of the DW_AT_language attribute.
 - DW_API int `dwarf_srclanglname` (Dwarf_Die dw_die, Dwarf_Unsigned *dw_returned_lname, Dwarf_Error *dw_error)
Return the value of the DW_AT_language_name attribute.
 - DW_API int `dwarf_srclanglname_version` (Dwarf_Die dw_die, const char *dw_returned_verstring, Dwarf_Error *dw_error)
Return the value of the DW_AT_language_version attribute.
 - DW_API int `dwarf_language_version_data` (Dwarf_Unsigned dw_lname_name, int *dw_default_lower_bound, const char **dw_version_string)
Return values associated with DW_AT_language_name.
 - DW_API int `dwarf_language_version_string` (Dwarf_Unsigned dw_lname_name, int *dw_default_lower_bound, const char **dw_version_string)
dwarf_language_version_string is obsolete.
 - DW_API int `dwarf_lvn_name_direct` (Dwarf_Unsigned dw_lv_lang, Dwarf_Unsigned dw_lv_ver, const char **dw_ret_version_name, const char **dw_ret_version_scheme)
Return language version name.
 - DW_API int `dwarf_lvn_name` (Dwarf_Die dw_die, const char **dw_ret_version_name, const char **dw_ret_version_scheme)
Return values associated with DW_AT_language_version.
 - DW_API int `dwarf_lvn_table_entry` (Dwarf_Unsigned dw_lvn_index, Dwarf_Unsigned *dw_lvn_language_name, Dwarf_Unsigned *dw_lvn_language_version, const char **dw_lvn_language_version_scheme, const char **dw_lvn_language_version_name)
Return values from the DWARF6 language version standard.
 - DW_API int `dwarf_arrayorder` (Dwarf_Die dw_die, Dwarf_Unsigned *dw_returned_order, Dwarf_Error *dw_error)
Return the value of the DW_AT_ordering attribute.

9.9.1 Detailed Description

This is the main interface to attributes of a DIE.

9.9.2 Function Documentation

9.9.2.1 dwarf_addr_form_is_indexed()

```
DW_API Dwarf_Bool dwarf_addr_form_is_indexed (
    int dw_form )
```

Informs if a DW_FORM is an indexed form.

Reading a CU DIE with DW_AT_low_pc an indexed value can be problematic as several different FORMs are indexed. Some in DWARF5 others being extensions to DWARF4 and DWARF5. Indexed forms interact with DW_AT_addr_base in a DIE making this a very relevant distinction.

9.9.2.2 dwarf_arrayorder()

```
DW_API int dwarf_arrayorder (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_order,
    Dwarf_Error * dw_error )
```

Return the value of the DW_AT_ordering attribute.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_order</i>	On success returns the ordering value. For example DW_ORD_row_major
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.3 dwarf_attr()

```
DW_API int dwarf_attr (
    Dwarf_Die dw_die,
    Dwarf_Half dw_attrnum,
    Dwarf_Attribute * dw_returned_attr,
    Dwarf_Error * dw_error )
```

Given DIE and attribute number return a Dwarf_attribute.

Returns DW_DLV_NO_ENTRY if the DIE has no attribute dw_attrnum.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	An attribute number, for example DW_AT_name.
<i>dw_returned_attr</i>	On success a Dwarf_Attribute pointer is returned and it should eventually be deallocated.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.4 dwarf_bitoffset()

```
DW_API int dwarf_bitoffset (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_attrnum,
    Dwarf_Unsigned * dw_returned_offset,
    Dwarf_Error * dw_error )
```

Return the bit offset attribute of a DIE.

If the attribute is DW_AT_data_bit_offset (DWARF4, DWARF5) the returned bit offset has one meaning. If the attribute is DW_AT_bit_offset (DWARF2, DWARF3) the meaning is quite different.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	If successful, returns the number of the attribute (DW_AT_data_bit_offset or DW_AT_bit_offset)
<i>dw_returned_offset</i>	If successful, returns the bit offset value.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.5 dwarf_bitsize()

```
DW_API int dwarf_bitsize (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_size,
    Dwarf_Error * dw_error )
```

Return the value of the attribute DW_AT_bitsize.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_size</i>	If successful, returns the size through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.6 dwarf_bytesize()

```
DW_API int dwarf_bytesize (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_size,
    Dwarf_Error * dw_error )
```

Return the value of the attribute DW_AT_byte_size.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_size</i>	If successful, returns the size through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.7 dwarf_CU_dieoffset_given_die()

```
DW_API int dwarf_CU_dieoffset_given_die (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Return the CU DIE offset given any DIE.

Returns the global debug_info section offset of the CU DIE in the CU containing the given_die (the passed in DIE can be any DIE).

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

See also

[dwarf_get_cu_die_offset_given_cu_header_offset_b](#)
[Using dwarf_offset_given_die\(\)](#)

Parameters

<i>dw_die</i>	The DIE being queried.
<i>dw_return_offset</i>	Returns the section offset of the CU DIE for dw_die.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.8 dwarf_debug_addr_index_to_addr()

```
DW_API int dwarf_debug_addr_index_to_addr (
    Dwarf_Die dw_die,
    Dwarf_Unsigned dw_index,
    Dwarf_Addr * dw_return_addr,
    Dwarf_Error * dw_error )
```

Extract address given address index. DWARF5.

Useful for checking for compiler/linker errors in the creation of DWARF5.

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_index</i>	An index into .debug_addr. This will look first for .debug_addr in the dbg object DIE and if not there will look in the tied object if that is available.
<i>dw_return_addr</i>	On success the address is returned through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.9 dwarf_die_abbrev_children_flag()

```
DW_API int dwarf_die_abbrev_children_flag (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_ab_has_child )
```

Return TRUE if the DIE has children.

Parameters

<i>dw_die</i>	A valid DIE pointer (not NULL).
<i>dw_ab_has_child</i>	Sets TRUE though the pointer if the DIE has children. Otherwise sets FALSE.

Returns

Returns TRUE if the DIE has a child DIE. Else returns FALSE.

9.9.2.10 dwarf_die_abbrev_code()

```
DW_API Dwarf_Unsigned dwarf_die_abbrev_code (
    Dwarf_Die dw_die )
```

Return the DIE abbrev code.

The Abbrev code for a DIE is a positive integer assigned by the compiler within a particular CU. For .debug_names abbreviations the situation is conceptually similar. The code values are arbitrary but compilers are motivated to make them small so the object size is as small as possible.

Returns the abbrev code of the die. Cannot fail.

Parameters

<i>dw_die</i>	The DIE of interest.
---------------	----------------------

Returns

The abbrev code. of the DIE.

9.9.2.11 dwarf_die_abbrev_global_offset()

```
DW_API int dwarf_die_abbrev_global_offset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_abbrev_offset,
    Dwarf_Unsigned * dw_abbrev_count,
    Dwarf_Error * dw_error )
```

Return the abbrev section offset of a DIE's abbrevs.

So we can associate a DIE's abbreviations with the contents the abbreviations section. Useful for detailed printing and analysis of abbreviations.

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_abbrev_offset</i>	On success is set to the global offset in the .debug_abbrev section of the abbreviations for the DIE.
<i>dw_abbrev_count</i>	On success is set to the count of abbreviations in the .debug_abbrev section of the abbreviations for the DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.12 dwarf_die_CU_offset()

```
DW_API int dwarf_die_CU_offset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

returns the CU relative offset of the DIE.

See also

[dwarf_CU_dieoffset_given_die](#)

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

Parameters

<i>dw_die</i>	The DIE being queried.
<i>dw_return_offset</i>	Returns the CU relative offset of this DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.13 dwarf_die_CU_offset_range()

```
DW_API int dwarf_die_CU_offset_range (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_CU_header_offset,
    Dwarf_Off * dw_return_CU_length_bytes,
    Dwarf_Error * dw_error )
```

Return the offset length of the entire CU of a DIE.

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

Parameters

<i>dw_die</i>	The DIE being queried.
<i>dw_return_CU_header_offset</i>	On success returns the section offset of the CU this DIE is in.
<i>dw_return_CU_length_bytes</i>	On success returns the CU length of the CU this DIE is in, including the CU length, header, and all DIEs.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.14 dwarf_die_offsets()

```
DW_API int dwarf_die_offsets (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_global_offset,
    Dwarf_Off * dw_local_offset,
    Dwarf_Error * dw_error )
```

Return section and CU-local offsets of a DIE.

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_global_offset</i>	On success returns the offset of the DIE in its section.
<i>dw_local_offset</i>	On success returns the offset of the DIE within its CU.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.15 dwarf_die_text()

```
DW_API int dwarf_die_text (
    Dwarf_Die dw_die,
    Dwarf_Half dw_attrnum,
    char ** dw_ret_name,
    Dwarf_Error * dw_error )
```

Given DIE and attribute number return a string.

Returns DW_DLV_NO_ENTRY if the DIE has no attribute dw_attrnum.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	An attribute number, for example DW_AT_name.
<i>dw_ret_name</i>	On success a pointer to the string is returned. Do not free the string. Many attributes allow various forms that directly or indirectly contain strings and this returns the string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.16 dwarf_diename()

```
DW_API int dwarf_diename (
    Dwarf_Die dw_die,
    char ** dw_diename,
    Dwarf_Error * dw_error )
```

Return the string from a DW_AT_name attribute.

Returns DW_DLV_NO_ENTRY if the DIE has no attribute DW_AT_name

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_diename</i>	On success a pointer to the string is returned. Do not free the string. Various forms directly or indirectly contain strings and this follows all of them to their string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.17 dwarf_dieoffset()

```
DW_API int dwarf_dieoffset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Return the global section offset of the DIE.

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_return_offset</i>	On success the offset refers to the section of the DIE itself, which may be .debug_offset or .debug_types.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.18 dwarf_dietype_offset()

```
DW_API int dwarf_dietype_offset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Bool * dw_is_info,
    Dwarf_Error * dw_error )
```

Return the offset from the DW_AT_type attribute.

The offset returned is a global offset from the DW_AT_type of the DIE passed in. If this CU is DWARF4 the offset could be in .debug_types, otherwise it is in .debug_info. Check the section of the DIE to know which it is, [dwarf_cu_header_basics\(\)](#) will return that.

Added pointer argument to return the section the offset applies to. December 2022.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_return_offset</i>	If successful, returns the offset through the pointer.
<i>dw_is_info</i>	If successful, set to TRUE if the dw_return_offset is in .debug_info and FALSE if the dw_return_offset is in .debug_types.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.19 dwarf_get_cu_die_offset_given_cu_header_offset_b()

```
DW_API int dwarf_get_cu_die_offset_given_cu_header_offset_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_in_cu_header_offset,
    Dwarf_Bool dw_is_info,
    Dwarf_Off * dw_out_cu_die_offset,
    Dwarf_Error * dw_error )
```

Return the CU DIE section offset given CU header offset.

Returns the CU DIE global offset if one knows the CU header global offset.

See also

[dwarf_CU_dieoffset_given_die](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_in_cu_header_offset</i>	The CU header offset.
<i>dw_is_info</i>	If TRUE the CU header offset is in .debug_info. Otherwise the CU header offset is in .debug_types.
<i>dw_out_cu_die_offset</i>	The CU DIE offset returned through this pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.20 dwarf_get_die_address_size()

```
DW_API int dwarf_get_die_address_size (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_addr_size,
    Dwarf_Error * dw_error )
```

Get the address size applying to a DIE.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_addr_size</i>	On success, returns the address size that applies to dw_die. Normally 4 or 8.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.21 dwarf_get_version_of_die()

```
DW_API int dwarf_get_version_of_die (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_version,
    Dwarf_Half * dw_offset_size )
```

Get the version and offset size.

The values returned apply to the CU this DIE belongs to. This is useful as preparation for calling dwarf_get_form↵_class

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_version</i>	Returns the version of the CU this DIE is contained in. Standard version numbers are 2 through 5.
<i>dw_offset_size</i>	Returns the offset_size (4 or 8) of the CU this DIE is contained in.

Returns

On success, returns DW_DLV_OK. If dw_die is null or its contents are corrupted returns DW_DLV_ERROR and there is nothing useful returned. Never returns DW_DLV_NO_ENTRY.

9.9.2.22 dwarf_hasattr()

```
DW_API int dwarf_hasattr (
    Dwarf_Die dw_die,
    Dwarf_Half dw_attrnum,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Tells whether a DIE has a particular attribute.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	The attribute number we are asking about, DW_AT_name for example.
<i>dw_returned_bool</i>	On success is set TRUE if dw_die has dw_attrnum and FALSE otherwise.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Never returns DW_DLV_NO_ENTRY. Returns DW_DLV_OK unless there is an error, in which case it returns DW_DLV_ERROR and sets dw_error to the error details.

9.9.2.23 dwarf_highpc_b()

```
DW_API int dwarf_highpc_b (
    Dwarf_Die dw_die,
    Dwarf_Addr * dw_return_addr,
    Dwarf_Half * dw_return_form,
    enum Dwarf_Form_Class * dw_return_class,
    Dwarf_Error * dw_error )
```

Return the DW_AT_highpc address value.

This is accessing the DW_AT_high_pc attribute. Calculating the high pc involves elements which we don't describe here, but which are shown in the example. See the DWARF5 standard.

See also

[Reading high pc from a DIE.](#)

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_return_addr</i>	On success returns the high-pc address for this DIE. If the high-pc is a not DW_FORM_addr and is a non-indexed constant form one must add the value of the DW_AT_low_pc to this to get the true high-pc value as the value returned is an unsigned offset of the associated low-pc value.
<i>dw_return_form</i>	On success returns the actual FORM for this attribute. Needed for certain cases to calculate the true dw_return_addr;
<i>dw_return_class</i>	On success returns the FORM CLASS for this attribute. Needed for certain cases to calculate the true dw_return_addr;
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.24 dwarf_language_version_data()

```
DW_API int dwarf_language_version_data (
    Dwarf_Unsigned dw_lname_name,
    int * dw_default_lower_bound,
    const char ** dw_version_string )
```

Return values associated with DW_AT_language_name.

Returns the value of a the default-lower-bound and a string defining the interpretation of the DWARF6 version from the DW_AT_language_version attribute. Replaces [dwarf_language_version_string\(\)](#).

Parameters

<i>dw_lname_name</i>	Pass in a DW_LNAME value, for example DW_LNAME_C (0x0003).
<i>dw_default_lower_bound.</i>	On success returns the language code (normally only found on a CU DIE). For example DW_LNAME_C has a default lower bound of zero (0) that will be returned through the pointer.

Parameters

<i>dw_version_scheme</i>	On success, return the version scheme, For DW_LNAME_C the string returned through the pointer would be "YYYYMM". If there is no version scheme defined, return a NULL through the pointer. Never dealloc or free() the string returned through dw_version_scheme as it is a static constant string.
--------------------------	---

Returns

Returns DW_DLV_OK or the dw_lang_name is unknown, returns DW_DLV_NO_ENTRY. Never returns DW_DLV_ERROR;

9.9.2.25 dwarf_language_version_string()

```
DW_API int dwarf_language_version_string (
    Dwarf_Unsigned dw_lname_name,
    int * dw_default_lower_bound,
    const char ** dw_version_string )
```

dwarf_language_version_string is obsolete.

OBSOLETE NAME. Do Not use [dwarf_language_version_string\(\)](#) use [dwarf_language_version_data\(\)](#).

9.9.2.26 dwarf_lowpc()

```
DW_API int dwarf_lowpc (
    Dwarf_Die dw_die,
    Dwarf_Addr * dw_returned_addr,
    Dwarf_Error * dw_error )
```

Return the DW_AT_low_pc value.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_addr</i>	On success returns, through the pointer, the address DW_AT_low_pc defines.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.27 dwarf_lvn_name()

```
DW_API int dwarf_lvn_name (
    Dwarf_Die dw_die,
    const char ** dw_ret_version_name,
    const char ** dw_ret_version_scheme )
```

Return values associated with DW_AT_language_version.

New in version 2.2.0 July 2025

Given any valid DIE for a Compilation Unit returns the value of a the CU_DIE name of the DWARF6 DW_AT_language_version as a string, as "C++98" for example. And the string defining the format of the language version, for example "YYYYMM" if DW_LNAME_C. Never free or dealloc the returned string, it is static memory @param dw_die Pass in any valid open Dwarf_Die for the compilation unit of interest. @param dw_reg_version_name On success returns the language version name string through the pointer. Never dealloc or free the string, it points to static memory. @param dw_ret_version_scheme On success, return the version scheme, For DW_LNAME_C the string returned through the pointer would be "YYYYMM". If there is no version scheme defined, return a NULL through the pointer. Never dealloc or free() the string returned through dw_version_scheme as it is a static constant string.

Returns

Returns DW_DLV_OK or the dw_lang_name is unknown, returns DW_DLV_NO_ENTRY. Never returns DW_DLV_ERROR;

9.9.2.28 dwarf_lvn_name_direct()

```
DW_API int dwarf_lvn_name_direct (
    Dwarf_Unsigned dw_lv_lang,
    Dwarf_Unsigned dw_lv_ver,
    const char ** dw_ret_version_name,
    const char ** dw_ret_version_scheme )
```

Return language version name.

New in version 2.2.0 July 2025

Returns the value of a the name of the DWARF6 DW_AT_language_version as a string, as "C++98" for example. And the string defining the format of the language version, for example "YYYYMM" if DW_LNAME_C. Never free or dealloc the returned string, it is static memory @param dw_lv_lang Pass in a DW_LNAME value, for example DW_LNAME_C (0x0003). @param Pass in the language version, for example 201103 (meaning C++ 11). @param dw_ret_version_name On success, return the name of the version, "C++11" for example. Never free or dealloc the string. @param dw_reg_version_scheme On success, returns For DW_LNAME_C the string returned through the pointer would be "YYYYMM". If there is no version scheme defined, return a NULL through the pointer. Never dealloc or free() the string returned through dw_version_scheme as it is a static constant string.

Returns

Returns DW_DLV_OK or the dw_lang_name is unknown, returns DW_DLV_NO_ENTRY. Never returns DW_DLV_ERROR;

9.9.2.29 dwarf_lvn_table_entry()

```
DW_API int dwarf_lvn_table_entry (
    Dwarf_Unsigned dw_lvn_index,
    Dwarf_Unsigned * dw_lvn_language_name,
    Dwarf_Unsigned * dw_lvn_language_version,
    const char ** dw_lvn_language_version_scheme,
    const char ** dw_lvn_language_version_name )
```

Return values from the DWARF6 language version standard.

New in version 2.2.0 July 2025

Primarily used by dwarfdump. This enables access to the instances of DWARF6 language version table known to this version of libdwarf. None of the strings returned through pointers should be dealloc-d or free-d, they are static strings.

Parameters

<i>dw_lvn_index</i>	To see all table entries, pass in the index of a table entry, beginning with 0, and call again with subsequent numbers untill the function returns DW_DLV_NO_ENTRY (meaning there are no more entries). The index has no intrinsic meaning.
<i>dw_lvn_language_name</i>	On success, the function returns the language name through the pointer. For example, a value like DW_LNAME_C.
<i>dw_lvn_language_version</i>	On success, the function returns the language version through the pointer. For example a number such as for C: 199901.
<i>dw_lvn_language_version_scheme</i>	On success, the function returns a pointer to a string identifying the format of the language version through the pointer. For example "YYYYMM" for C.
<i>dw_lvn_language_version_name</i>	On success, the function returns a pointer to a string for C. identifying the name of the language version through the pointer. For example: "C99".

Returns

9.9.2.30 dwarf_offset_list()

```
DW_API int dwarf_offset_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_offset,
    Dwarf_Bool dw_is_info,
    Dwarf_Off ** dw_offbuf,
    Dwarf_Unsigned * dw_offcount,
    Dwarf_Error * dw_error )
```

Return an array of DIE children offsets.

Given a DIE section offset and dw_is_info, returns an array of DIE global [section] offsets of the children of DIE.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_offset</i>	A DIE offset.
<i>dw_is_info</i>	If TRUE says to use the offset in .debug_info. Else use the offset in .debug_types.
<i>dw_offbuf</i>	A pointer to an array of children DIE global [section] offsets is returned through the pointer.
<i>dw_offcount</i>	The number of elements in dw_offbuf. If the DIE has no children it could be zero, in which case dw_offbuf and dw_offcount are not touched.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. DW_DLV_NO_ENTRY means there are no children of the DIE, hence no list of child offsets.

On successful return, use dwarf_dealloc(dbg, dw_offbuf, DW_DLA_UARRAY); to dealloc the allocated space.

See also

[Using dwarf_offset_list\(\)](#)

9.9.2.31 dwarf_srclang()

```
DW_API int dwarf_srclang (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_lang,
    Dwarf_Error * dw_error )
```

Return the value of the DW_AT_language attribute.

Returns DWARF5 DW_LANG language name. The DW_LANG value returned lets one access the LANG name as a string with [dwarf_get_LANG_name\(\)](#)

To access DW_LNAME names (in DWARF5 or later) see [dwarf_srclanglname\(\)](#). To get the DW_LNAME as a string, call [dwarf_get_LNAME_name\(\)](#).

DWARF5 and earlier

The DIE should be a CU DIE.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_lang</i>	On success returns the language code (normally only found on a CU DIE). For example DW_LANG_C (0x0002).
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.32 dwarf_srclanglname()

```
DW_API int dwarf_srclanglname (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_lname,
    Dwarf_Error * dw_error )
```

Return the value of the DW_AT_language_name attribute.

New in v2.1.0 July 2025.

Returns a DWARF6 DW_AT language_name name. The DW_LNAME value returned lets one access the LNAME name as a string with [dwarf_get_LNAME_name\(\)](#) Also see [dwarf_language_version_data\(\)](#) for valued based on DW_LNAME names.

To access DW_LANG names (in DWARF5 or earlier) see [dwarf_srclang\(\)](#).

Parameters

<i>dw_die</i>	The DIE of interest, normally a CU_DIE.
<i>dw_returned_lname</i>	On success returns the language name (code) (normally only found on a CU DIE). For example DW_LNAME_C (0x0003).
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.33 dwarf_srclanglname_version()

```
DW_API int dwarf_srclanglname_version (
    Dwarf_Die dw_die,
    const char * dw_returned_verstring,
    Dwarf_Error * dw_error )
```

Return the value of the DW_AT_language_version attribute.

New in v2.1.0 July 2025.

Finds the DW_AT_language_version of the DIE if one is present.

The DIE should be a CU DIE.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned</i>	verstring On success returns the language version string from a DW_AT_language_version attributes (normally only found on a CU DIE). For example DW_LNAME_C would return a pointer to "YYYYMM" Never free or dealloc the string returned through dw_returned_verstring, it is in static memory.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.34 dwarf_tag()

```
DW_API int dwarf_tag (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_return_tag,
    Dwarf_Error * dw_error )
```

Get TAG value of DIE.

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_return_tag</i>	On success, set to the DW_TAG value of the DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.35 dwarf_validate_die_sibling()

```
DW_API int dwarf_validate_die_sibling (
    Dwarf_Die dw_sibling,
    Dwarf_Off * dw_offset )
```

Validate a sibling DIE.

This is used by dwarfdump (when dwarfdump is checking for valid DWARF) to try to catch a corrupt DIE tree.

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

See also

[using dwarf_validate_die_sibling](#)

Parameters

<i>dw_sibling</i>	Pass in a DIE returned by dwarf_siblingof_b() .
<i>dw_offset</i>	Set to zero through the pointer.

Returns

Returns DW_DLV_OK if the sibling is at an appropriate place in the section. Otherwise it returns DW_DLV_↔ ERROR indicating the DIE tree is corrupt.

9.10 DIE Attribute and Attribute-Form Details

Functions

- DW_API int [dwarf_attrlist](#) ([Dwarf_Die](#) dw_die, [Dwarf_Attribute](#) **dw_attrbuf, [Dwarf_Signed](#) *dw_attrcount, [Dwarf_Error](#) *dw_error)
Gets the full list of attributes.
- DW_API int [dwarf_hasform](#) ([Dwarf_Attribute](#) dw_attr, [Dwarf_Half](#) dw_form, [Dwarf_Bool](#) *dw_returned_bool, [Dwarf_Error](#) *dw_error)
Sets TRUE if a Dwarf_Attribute has the indicated FORM.

- DW_API int `dwarf_whatform` (Dwarf_Attribute dw_attr, Dwarf_Half *dw_returned_final_form, Dwarf_Error *dw_error)
Return the form of the Dwarf_Attribute.
- DW_API int `dwarf_whatform_direct` (Dwarf_Attribute dw_attr, Dwarf_Half *dw_returned_initial_form, Dwarf_Error *dw_error)
Return the initial form of the Dwarf_Attribute.
- DW_API int `dwarf_whatattr` (Dwarf_Attribute dw_attr, Dwarf_Half *dw_returned_attrnum, Dwarf_Error *dw_error)
Return the attribute number of the Dwarf_Attribute.
- DW_API int `dwarf_formref` (Dwarf_Attribute dw_attr, Dwarf_Off *dw_return_offset, Dwarf_Bool *dw_is_info, Dwarf_Error *dw_error)
Retrieve the CU-relative offset of a reference.
- DW_API int `dwarf_global_formref_b` (Dwarf_Attribute dw_attr, Dwarf_Off *dw_return_offset, Dwarf_Bool *dw_offset_is_info, Dwarf_Error *dw_error)
Return the section-relative offset of a Dwarf_Attribute.
- DW_API int `dwarf_global_formref` (Dwarf_Attribute dw_attr, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)
Same as dwarf_global_formref_b except...
- DW_API int `dwarf_formsig8` (Dwarf_Attribute dw_attr, Dwarf_Sig8 *dw_returned_sig_bytes, Dwarf_Error *dw_error)
Return an 8 byte reference form for DW_FORM_ref_sig8.
- DW_API int `dwarf_formsig8_const` (Dwarf_Attribute dw_attr, Dwarf_Sig8 *dw_returned_sig_bytes, Dwarf_Error *dw_error)
Return an 8 byte reference form for DW_FORM_data8.
- DW_API int `dwarf_formaddr` (Dwarf_Attribute dw_attr, Dwarf_Addr *dw_returned_addr, Dwarf_Error *dw_error)
Return the address when the attribute has form address.
- DW_API int `dwarf_get_debug_addr_index` (Dwarf_Attribute dw_attr, Dwarf_Unsigned *dw_return_index, Dwarf_Error *dw_error)
Get the addr index of a Dwarf_Attribute.
- DW_API int `dwarf_formflag` (Dwarf_Attribute dw_attr, Dwarf_Bool *dw_returned_bool, Dwarf_Error *dw_error)
Return the flag value of a flag form.
- DW_API int `dwarf_formudata` (Dwarf_Attribute dw_attr, Dwarf_Unsigned *dw_returned_val, Dwarf_Error *dw_error)
Return an unsigned value.
- DW_API int `dwarf_formsdata` (Dwarf_Attribute dw_attr, Dwarf_Signed *dw_returned_val, Dwarf_Error *dw_error)
Return a signed value.
- DW_API int `dwarf_formdata16` (Dwarf_Attribute dw_attr, Dwarf_Form_Data16 *dw_returned_val, Dwarf_Error *dw_error)
Return a 16 byte Dwarf_Form_Data16 value.
- DW_API int `dwarf_formblock` (Dwarf_Attribute dw_attr, Dwarf_Block **dw_returned_block, Dwarf_Error *dw_error)
Return an allocated filled-in Form_Block.
- DW_API int `dwarf_formstring` (Dwarf_Attribute dw_attr, char **dw_returned_string, Dwarf_Error *dw_error)
Return a pointer to a string.
- DW_API int `dwarf_get_debug_str_index` (Dwarf_Attribute dw_attr, Dwarf_Unsigned *dw_return_index, Dwarf_Error *dw_error)
Return a string index.
- DW_API int `dwarf_formexprloc` (Dwarf_Attribute dw_attr, Dwarf_Unsigned *dw_return_exprlen, Dwarf_Ptr *dw_block_ptr, Dwarf_Error *dw_error)
Return a pointer-to and length-of a block of data.

- DW_API enum [Dwarf_Form_Class](#) [dwarf_get_form_class](#) ([Dwarf_Half](#) dw_version, [Dwarf_Half](#) dw_attrnum, [Dwarf_Half](#) dw_offset_size, [Dwarf_Half](#) dw_form)
Return the FORM_CLASS applicable. Four pieces of information are necessary to get the correct FORM_CLASS.
- DW_API int [dwarf_attr_offset](#) ([Dwarf_Die](#) dw_die, [Dwarf_Attribute](#) dw_attr, [Dwarf_Off](#) *dw_return_offset, [Dwarf_Error](#) *dw_error)
Return the offset of an attribute in its section.
- DW_API int [dwarf_uncompress_integer_block_a](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) dw_input_↵length_in_bytes, void *dw_input_block, [Dwarf_Unsigned](#) *dw_value_count, [Dwarf_Signed](#) **dw_value_↵array, [Dwarf_Error](#) *dw_error)
Uncompress a block of sleb numbers It's not much of a compression so not much of an uncompression. Developed by Sun Microsystems and it is unclear if it was ever used.
- DW_API void [dwarf_dealloc_uncompressed_block](#) ([Dwarf_Debug](#) dw_dbg, void *dw_value_array)
Dealloc what dwarf_uncompress_integer_block_a allocated.
- DW_API int [dwarf_convert_to_global_offset](#) ([Dwarf_Attribute](#) dw_attr, [Dwarf_Off](#) dw_offset, [Dwarf_Off](#) *dw_↵_return_offset, [Dwarf_Error](#) *dw_error)
Convert local offset to global offset.
- DW_API void [dwarf_dealloc_attribute](#) ([Dwarf_Attribute](#) dw_attr)
Dealloc a Dwarf_Attribute When this call returns the dw_attr is a stale pointer.
- DW_API int [dwarf_discr_list](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Small](#) *dw_blockpointer, [Dwarf_Unsigned](#) dw_↵_blocklen, [Dwarf_Dsc_Head](#) *dw_dsc_head_out, [Dwarf_Unsigned](#) *dw_dsc_array_length_out, [Dwarf_Error](#) *dw_error)
Return an array of discriminant values.
- DW_API int [dwarf_discr_entry_u](#) ([Dwarf_Dsc_Head](#) dw_dsc, [Dwarf_Unsigned](#) dw_entrynum, [Dwarf_Half](#) *dw_out_type, [Dwarf_Unsigned](#) *dw_out_discr_low, [Dwarf_Unsigned](#) *dw_out_discr_high, [Dwarf_Error](#) *dw_error)
Access a single unsigned discriminant list entry.
- DW_API int [dwarf_discr_entry_s](#) ([Dwarf_Dsc_Head](#) dw_dsc, [Dwarf_Unsigned](#) dw_entrynum, [Dwarf_Half](#) *dw_out_type, [Dwarf_Signed](#) *dw_out_discr_low, [Dwarf_Signed](#) *dw_out_discr_high, [Dwarf_Error](#) *dw_↵_error)
Access to a single signed discriminant list entry.

9.10.1 Detailed Description

Access to the details of DIEs

9.10.2 Function Documentation

9.10.2.1 dwarf_attr_offset()

```
DW_API int dwarf_attr_offset (
    Dwarf_Die dw_die,
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Return the offset of an attribute in its section.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attr</i>	A Dwarf_Attribute of interest in this DIE
<i>dw_return_offset</i>	The offset is in .debug_info if the DIE is there. The offset is in .debug_types if the DIE is there.
<i>dw_error</i>	The usual error pointer. Generated by Doxygen

Returns

DW_DLV_OK if it succeeds. DW_DLV_NO_ENTRY is impossible.

9.10.2.2 dwarf_attrlist()

```
DW_API int dwarf_attrlist (
    Dwarf_Die dw_die,
    Dwarf_Attribute ** dw_attrbuf,
    Dwarf_Signed * dw_attrcount,
    Dwarf_Error * dw_error )
```

Gets the full list of attributes.

Parameters

<i>dw_die</i>	The DIE from which to pull attributes.
<i>dw_attrbuf</i>	The pointer is set to point to an array of Dwarf_Attribute (pointers to attribute data). This array must eventually be deallocated.
<i>dw_attrcount</i>	The number of entries in the array of pointers. There is no null-pointer to terminate the list, use this count.
<i>dw_error</i>	A place to return error details.

Returns

If it returns DW_DLV_ERROR and dw_error is non-null it creates an Dwarf_Error and places it in this argument. Usually returns DW_DLV_OK.

See also

[Using dwarf_attrlist\(\)](#)

[Using dwarf_attrlist\(\)](#)

9.10.2.3 dwarf_convert_to_global_offset()

```
DW_API int dwarf_convert_to_global_offset (
    Dwarf_Attribute dw_attr,
    Dwarf_Off dw_offset,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Convert local offset to global offset.

Uses the DW_FORM of the attribute to determine if the dw_offset is local, and if so, adds the CU base offset to adjust dw_offset.

Parameters

<i>dw_attr</i>	The attribute the local offset was extracted from.
<i>dw_offset</i>	The global offset of the attribute.
<i>dw_return_offset</i>	The returned section (global) offset.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Returns DW_DLV_ERROR if the dw_attr form is not an offset form (for example, DW_FORM_ref_udata).

9.10.2.4 dwarf_dealloc_attribute()

```
DW_API void dwarf_dealloc_attribute (
    Dwarf_Attribute dw_attr )
```

Dealloc a Dwarf_Attribute When this call returns the dw_attr is a stale pointer.

Parameters

<i>dw_attr</i>	The attribute to dealloc.
----------------	---------------------------

9.10.2.5 dwarf_dealloc_uncompressed_block()

```
DW_API void dwarf_dealloc_uncompressed_block (
    Dwarf_Debug dw_dbg,
    void * dw_value_array )
```

Dealloc what dwarf_uncompress_integer_block_a allocated.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_value_array</i>	The array was called an array of Dwarf_Signed. We dealloc all of it without needing dw_value_count.

9.10.2.6 dwarf_discr_entry_s()

```
DW_API int dwarf_discr_entry_s (
    Dwarf_Dsc_Head dw_dsc,
    Dwarf_Unsigned dw_entrynum,
    Dwarf_Half * dw_out_type,
    Dwarf_Signed * dw_out_discr_low,
    Dwarf_Signed * dw_out_discr_high,
    Dwarf_Error * dw_error )
```

Access to a single signed discriminant list entry.

The same as dwarf_discr_entry_u except here the values are signed.

9.10.2.7 dwarf_discr_entry_u()

```
DW_API int dwarf_discr_entry_u (
    Dwarf_Dsc_Head dw_dsc,
```

```

Dwarf_Unsigned dw_etrynum,
Dwarf_Half * dw_out_type,
Dwarf_Unsigned * dw_out_discr_low,
Dwarf_Unsigned * dw_out_discr_high,
Dwarf_Error * dw_error )

```

Access a single unsigned discriminant list entry.

It is up to the caller to know whether the discriminant values are signed or unsigned (therefore to know whether this or `dwarf_discr_entry_s`. should be called)

Parameters

<i>dw_dsc</i>	The Dwarf_Dsc_Head applicable.
<i>dw_etrynum</i>	Valid values are zero to <code>dw_dsc_array_length_out-1</code>
<i>dw_out_type</i>	On success is set to either <code>DW_DSC_label</code> or <code>DW_DSC_range</code> through the pointer.
<i>dw_out_discr_low</i>	On success set to the lowest in this discriminant range
<i>dw_out_discr_high</i>	On success set to the highest in this discriminant range
<i>dw_error</i>	The usual error pointer.

Returns

`DW_DLV_OK` if it succeeds.

9.10.2.8 dwarf_discr_list()

```

DW_API int dwarf_discr_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Small * dw_blockpointer,
    Dwarf_Unsigned dw_blocklen,
    Dwarf_Dsc_Head * dw_dsc_head_out,
    Dwarf_Unsigned * dw_dsc_array_length_out,
    Dwarf_Error * dw_error )

```

Return an array of discriminant values.

This applies if a `DW_TAG_variant` has one of the `DW_FORM_block` forms.

See also

[dwarf_formblock](#)

For an example of use and dealloc:

See also

[Using dwarf_discr_list\(\)](#)

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_blockpointer</i>	The <code>bl_data</code> value from a Dwarf_Block.
<i>dw_blocklen</i>	The <code>bl_len</code> value from a Dwarf_Block.
<i>dw_dsc_head_out</i>	On success returns a pointer to an array of discriminant values in an opaque struct.
<i>dw_dsc_array_length_out</i>	On success returns the number of entries in the <code>dw_dsc_head_out</code> array.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.10.2.9 dwarf_formaddr()

```
DW_API int dwarf_formaddr (
    Dwarf_Attribute dw_attr,
    Dwarf_Addr * dw_returned_addr,
    Dwarf_Error * dw_error )
```

Return the address when the attribute has form address.

There are several address forms, some of them indexed.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_addr</i>	On success this set through the pointer to the address in the attribute.
<i>dw_error</i>	A place to return error details.

Returns

On success returns DW_DLV_OK sets dw_returned_addr . If attribute is passed in NULL or the attribute is badly broken or the address cannot be retrieved the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.10.2.10 dwarf_formblock()

```
DW_API int dwarf_formblock (
    Dwarf_Attribute dw_attr,
    Dwarf_Block ** dw_returned_block,
    Dwarf_Error * dw_error )
```

Return an allocated filled-in Form_Block.

It is an error if the DW_FORM in the attribute is not a block form. DW_FORM_block2 is an example of a block form.

See also

[Dwarf_Block](#)

[Using dwarf_discr_list\(\)](#)

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_block</i>	Allocates a Dwarf_Block and returns a pointer to the filled-in block.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.11 dwarf_formdata16()

```
DW_API int dwarf_formdata16 (
    Dwarf_Attribute dw_attr,
    Dwarf_Form_Data16 * dw_returned_val,
    Dwarf_Error * dw_error )
```

Return a 16 byte Dwarf_Form_Data16 value.

We just store the bytes in a struct, we have no 16 byte integer type. It is an error if the FORM is not DW_FORM_↔data16

See also

[Dwarf_Form_Data16](#)

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_val</i>	Copies the 16 byte value into the pointed to area.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.12 dwarf_formexprloc()

```
DW_API int dwarf_formexprloc (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_return_exprlen,
    Dwarf_Ptr * dw_block_ptr,
    Dwarf_Error * dw_error )
```

Return a pointer-to and length-of a block of data.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_exprlen</i>	Returns the length in bytes of the block if it succeeds.
<i>dw_block_ptr</i>	Returns a pointer to the first byte of the block of data if it succeeds.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. If the attribute form is not DW_FORM_exprloc it returns DW_DLV_ERROR and sets dw_error to point to the error details.

9.10.2.13 dwarf_formflag()

```
DW_API int dwarf_formflag (
    Dwarf_Attribute dw_attr,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Return the flag value of a flag form.

It is an error if the FORM is not a flag form.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_bool</i>	Returns either TRUE or FALSE through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.14 dwarf_formref()

```
DW_API int dwarf_formref (
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Bool * dw_is_info,
    Dwarf_Error * dw_error )
```

Retrieve the CU-relative offset of a reference.

The DW_FORM of the attribute must be one of a small set of local reference forms: DW_FORM_ref<n> or DW_FORM_ref_udata.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_offset</i>	Returns the CU-relative offset through the pointer.
<i>dw_is_info</i>	Returns a flag through the pointer. TRUE if the offset is in .debug_info, FALSE if it is in .debug_types
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_attrnum If attribute is passed in NULL or the attribute is badly broken or the FORM of this attribute is not one of the small set of local references the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.15 dwarf_formsdata()

```
DW_API int dwarf_formsdata (
    Dwarf_Attribute dw_attr,
    Dwarf_Signed * dw_returned_val,
    Dwarf_Error * dw_error )
```

Return a signed value.

The form must be a signed integral type. It is an error otherwise.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_val</i>	On success returns the signed value through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.16 dwarf_formsig8()

```
DW_API int dwarf_formsig8 (
    Dwarf_Attribute dw_attr,
    Dwarf_Sig8 * dw_returned_sig_bytes,
    Dwarf_Error * dw_error )
```

Return an 8 byte reference form for DW_FORM_ref_sig8.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_sig_bytes</i>	On success returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes.
<i>dw_error</i>	A place to return error details.

Returns

On success returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. If the dw_attr has a form other than DW_FORM_ref_sig8 the function returns DW_DLV_NO_ENTRY

9.10.2.17 dwarf_formsig8_const()

```
DW_API int dwarf_formsig8_const (
    Dwarf_Attribute dw_attr,
    Dwarf_Sig8 * dw_returned_sig_bytes,
    Dwarf_Error * dw_error )
```

Return an 8 byte reference form for DW_FORM_data8.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_sig_bytes</i>	On success Returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes.
<i>dw_error</i>	A place to return error details.

Returns

On success returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. If the dw_attr has a form other than DW_FORM_data8 the function returns DW_DLV_NO_ENTRY

9.10.2.18 dwarf_formstring()

```
DW_API int dwarf_formstring (
    Dwarf_Attribute dw_attr,
    char ** dw_returned_string,
    Dwarf_Error * dw_error )
```

Return a pointer to a string.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_string</i>	On success puts a pointer to a string existing in an appropriate DWARF section into dw_returned_string. Never free() or dealloc the returned string.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.10.2.19 dwarf_formudata()

```
DW_API int dwarf_formudata (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_returned_val,
    Dwarf_Error * dw_error )
```

Return an unsigned value.

The form can be an unsigned or signed integral type but if it is a signed type the value must be non-negative. It is an error otherwise.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_val</i>	On success returns the unsigned value through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.20 dwarf_get_debug_addr_index()

```
DW_API int dwarf_get_debug_addr_index (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_return_index,
    Dwarf_Error * dw_error )
```

Get the addr index of a Dwarf_Attribute.

So a consumer can get the index when the object with the actual .debug_addr section is elsewhere (Debug Fission). Or if the caller just wants the index. Only call it when you know it should have an index address FORM such as DW_FORM_addrx1 or one of the GNU address index forms.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_index</i>	If successful it returns the index through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.21 dwarf_get_debug_str_index()

```
DW_API int dwarf_get_debug_str_index (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_return_index,
    Dwarf_Error * dw_error )
```

Return a string index.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_index</i>	If the form is a string index form (for example DW_FORM_strx) the string index value is returned via the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. If the attribute form is not one of the string index forms it returns DW_DLV_↔ ERROR and sets dw_error to point to the error details.

9.10.2.22 dwarf_get_form_class()

```
DW_API enum Dwarf_Form_Class dwarf_get_form_class (
    Dwarf_Half dw_version,
    Dwarf_Half dw_attrnum,
    Dwarf_Half dw_offset_size,
    Dwarf_Half dw_form )
```

Return the FORM_CLASS applicable. Four pieces of information are necessary to get the correct FORM_CLASS.

Parameters

<i>dw_version</i>	The CU's DWARF version. Standard numbers are 2,3,4, or 5.
<i>dw_attrnum</i>	For example DW_AT_name
<i>dw_offset_size</i>	The offset size applicable to the compilation unit relevant to the attribute and form.
<i>dw_form</i>	The FORM number, for example DW_FORM_data4

Returns

Returns a form class, for example DW_FORM_CLASS_CONSTANT. The FORM_CLASS names are mentioned (for example as 'address' in Table 2.3 of DWARF5) but are not assigned formal names & numbers in the standard.

9.10.2.23 dwarf_global_formref()

```
DW_API int dwarf_global_formref (
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Same as dwarf_global_formref_b except...

See also

[dwarf_global_formref_b](#)

This is the same, except there is no dw_offset_is_info pointer so in the case of DWARF4 and DW_FORM_ref_sig8 it is not possible to determine which section the offset applies to!

9.10.2.24 dwarf_global_formref_b()

```
DW_API int dwarf_global_formref_b (
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Bool * dw_offset_is_info,
    Dwarf_Error * dw_error )
```

Return the section-relative offset of a Dwarf_Attribute.

The target section of the returned offset can be in various sections depending on the FORM. Only a DW_FORM_ref_sig8 can change the returned offset of a .debug_info DIE via a lookup into .debug_types by changing dw_offset_is_info to FALSE (DWARF4).

The caller must determine the target section from the FORM.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_offset</i>	Returns the CU-relative offset through the pointer.
<i>dw_offset_is_info</i>	For references to DIEs this informs whether the target DIE (the target the offset refers to) is in .debug_info or .debug_types. For non-DIE targets this field is not meaningful. Refer to the attribute FORM to determine the target section of the offset.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_return_offset and dw_offset_is_info. If attribute is passed in NULL or the attribute is badly broken or the FORM of this attribute is not one of the many reference types the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.25 dwarf_hasform()

```
DW_API int dwarf_hasform (
    Dwarf_Attribute dw_attr,
    Dwarf_Half dw_form,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Sets TRUE if a Dwarf_Attribute has the indicated FORM.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_form</i>	The DW_FORM you are asking about, DW_FORM_strp for example.
<i>dw_returned_bool</i>	The pointer passed in must be a valid non-null pointer to a Dwarf_Bool. On success, sets the value to TRUE or FALSE.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_bool. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.26 dwarf_uncompress_integer_block_a()

```
DW_API int dwarf_uncompress_integer_block_a (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_input_length_in_bytes,
    void * dw_input_block,
    Dwarf_Unsigned * dw_value_count,
    Dwarf_Signed ** dw_value_array,
    Dwarf_Error * dw_error )
```

Uncompress a block of sleb numbers It's not much of a compression so not much of an uncompression. Developed by Sun Microsystems and it is unclear if it was ever used.

See also

[dwarf_dealloc_uncompressed_block](#)

9.10.2.27 dwarf_whatattr()

```
DW_API int dwarf_whatattr (
    Dwarf_Attribute dw_attr,
    Dwarf_Half * dw_returned_attrnum,
    Dwarf_Error * dw_error )
```

Return the attribute number of the Dwarf_Attribute.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_attrnum</i>	The attribute number of the attribute is returned through the pointer. For example, DW_AT_name
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_attrnum If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.28 dwarf_whatform()

```
DW_API int dwarf_whatform (
    Dwarf_Attribute dw_attr,
    Dwarf_Half * dw_returned_final_form,
    Dwarf_Error * dw_error )
```

Return the form of the Dwarf_Attribute.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_final_form</i>	The form of the item is returned through the pointer. If the base form is DW_FORM_indirect the function resolves the final form and returns that final form.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets *dw_returned_final_form* If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.29 dwarf_whatform_direct()

```
DW_API int dwarf_whatform_direct (
    Dwarf_Attribute dw_attr,
    Dwarf_Half * dw_returned_initial_form,
    Dwarf_Error * dw_error )
```

Return the initial form of the Dwarf_Attribute.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_initial_form</i>	The form of the item is returned through the pointer. If the base form is DW_FORM_indirect the value set is DW_FORM_indirect.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets *dw_returned_initial_form*. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.11 Line Table For a CU

Functions

- DW_API int [dwarf_srcfiles](#) ([Dwarf_Die](#) dw_cu_die, char ***dw_srcfiles, [Dwarf_Signed](#) *dw_filecount, [Dwarf_Error](#) *dw_error)
The list of source files from the line table header.
- DW_API int [dwarf_srclines_b](#) ([Dwarf_Die](#) dw_cudie, [Dwarf_Unsigned](#) *dw_version_out, [Dwarf_Small](#) *dw_table_count, [Dwarf_Line_Context](#) *dw_linecontext, [Dwarf_Error](#) *dw_error)
Initialize Dwarf_Line_Context for line table access.
- DW_API int [dwarf_srclines_from_linecontext](#) ([Dwarf_Line_Context](#) dw_linecontext, [Dwarf_Line](#) **dw_linebuf, [Dwarf_Signed](#) *dw_linecount, [Dwarf_Error](#) *dw_error)
Access source lines from line context.
- DW_API int [dwarf_srclines_two_level_from_linecontext](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Line](#) **dw_linebuf, [Dwarf_Signed](#) *dw_linecount, [Dwarf_Line](#) **dw_linebuf_actuals, [Dwarf_Signed](#) *dw_linecount_actuals, [Dwarf_Error](#) *dw_error)

- Returns line table counts and data.*

 - DW_API void [dwarf_srclines_dealloc_b](#) ([Dwarf_Line_Context](#) dw_context)

Dealloc the memory allocated by dwarf_srclines_b.
- DW_API int [dwarf_srclines_table_offset](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Unsigned](#) *dw_offset, [Dwarf_Error](#) *dw_error)

Return the srclines table offset.
- DW_API int [dwarf_srclines_comp_dir](#) ([Dwarf_Line_Context](#) dw_context, const char **dw_compilation_↵ directory, [Dwarf_Error](#) *dw_error)

Compilation Directory name for the CU.
- DW_API int [dwarf_srclines_subprog_count](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) *dw_count, [Dwarf_Error](#) *dw_error)

Subprog count: Part of the two-level line table extension.
- DW_API int [dwarf_srclines_subprog_data](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) dw_index, const char **dw_name, [Dwarf_Unsigned](#) *dw_decl_file, [Dwarf_Unsigned](#) *dw_decl_line, [Dwarf_Error](#) *dw_error)

Retrieve data from the line table subprog array.
- DW_API int [dwarf_srclines_files_indexes](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) *dw_baseindex, [Dwarf_Signed](#) *dw_count, [Dwarf_Signed](#) *dw_endindex, [Dwarf_Error](#) *dw_error)

Return values easing indexing line table file numbers. Count is the real count of files array entries. Since DWARF 2,3,4 are zero origin indexes and DWARF5 and later are one origin, this function replaces dwarf_srclines_files_count().
- DW_API int [dwarf_srclines_files_data_b](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) dw_index_↵ in, const char **dw_name, [Dwarf_Unsigned](#) *dw_directory_index, [Dwarf_Unsigned](#) *dw_last_mod_time, [Dwarf_Unsigned](#) *dw_file_length, [Dwarf_Form_Data16](#) **dw_md5ptr, [Dwarf_Error](#) *dw_error)

Access data for each line table file.
- DW_API int [dwarf_srclines_include_dir_count](#) ([Dwarf_Line_Context](#) dw_line_context, [Dwarf_Signed](#) *dw_↵ count, [Dwarf_Error](#) *dw_error)

Return the number of include directories in the Line Table.
- DW_API int [dwarf_srclines_include_dir_data](#) ([Dwarf_Line_Context](#) dw_line_context, [Dwarf_Signed](#) dw_↵ index, const char **dw_name, [Dwarf_Error](#) *dw_error)

Return the include directories in the Line Table.
- DW_API int [dwarf_srclines_version](#) ([Dwarf_Line_Context](#) dw_line_context, [Dwarf_Unsigned](#) *dw_version, [Dwarf_Small](#) *dw_table_count, [Dwarf_Error](#) *dw_error)

The DWARF version number of this compile-unit.
- DW_API int [dwarf_linebeginstatement](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_returned_bool, [Dwarf_Error](#) *dw_error)

Read Line beginstatement register.
- DW_API int [dwarf_lineendsequence](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_returned_bool, [Dwarf_Error](#) *dw_error)

Read Line endsequence register flag.
- DW_API int [dwarf_lineno](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_linenum, [Dwarf_Error](#) *dw_↵ _error)

Read Line line register.
- DW_API int [dwarf_line_srcfileno](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_filenum, [Dwarf_Error](#) *dw_error)

Read Line file register.
- DW_API int [dwarf_line_is_addr_set](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_is_addr_set, [Dwarf_Error](#) *dw_↵ _error)

Is the Dwarf_Line address from DW_LNS_set_address? This is not a line register, but it is a flag set by the library in each Dwarf_Line, and it is derived from reading the line table.
- DW_API int [dwarf_lineaddr](#) ([Dwarf_Line](#) dw_line, [Dwarf_Addr](#) *dw_returned_addr, [Dwarf_Error](#) *dw_error)

Return the address of the Dwarf_Line.
- DW_API int [dwarf_lineoff_b](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_lineoffset, [Dwarf_Error](#) *dw_error)

Return a column number through the pointer.

- DW_API int [dwarf_linesrc](#) ([Dwarf_Line](#) dw_line, char **dw_returned_name, [Dwarf_Error](#) *dw_error)
Return the file name applicable to the Dwarf_Line.
- DW_API int [dwarf_lineblock](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_returned_bool, [Dwarf_Error](#) *dw_error)
Return the basic_block line register.
- DW_API int [dwarf_prologue_end_etc](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_prologue_end, [Dwarf_Bool](#) *dw_epilogue_begin, [Dwarf_Unsigned](#) *dw_isa, [Dwarf_Unsigned](#) *dw_discriminator, [Dwarf_Error](#) *dw_error)
Return various line table registers in one call.
- DW_API int [dwarf_linelogical](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_logical, [Dwarf_Error](#) *dw_error)
Experimental Two-level logical Row Number Experimental two level line tables. Not explained here. When reading from an actuals table, [dwarf_line_logical\(\)](#) returns the logical row number for the line.
- DW_API int [dwarf_linecontext](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_context, [Dwarf_Error](#) *dw_error)
Experimental Two-level line tables call contexts Experimental two level line tables. Not explained here. When reading from a logicals table, [dwarf_linecontext\(\)](#) returns the logical row number corresponding the the calling context for an inlined call.
- DW_API int [dwarf_line_subprogno](#) ([Dwarf_Line](#), [Dwarf_Unsigned](#) *, [Dwarf_Error](#) *)
Two-level line tables get subprogram number Experimental two level line tables. Not explained here. When reading from a logicals table, [dwarf_line_subprogno\(\)](#) returns the index in the subprograms table of the inlined subprogram. Currently this always returns zero through the pointer as the relevant field is never updated from the default of zero.
- DW_API int [dwarf_line_subprog](#) ([Dwarf_Line](#), char **, char **, [Dwarf_Unsigned](#) *, [Dwarf_Error](#) *)
Two-level line tables get subprog, file, line Experimental two level line tables. Not explained here. When reading from a logicals table, [dwarf_line_subprog\(\)](#) returns the name of the inlined subprogram, its declaration filename, and its declaration line number, if available.
- DW_API int [dwarf_check_lineheader_b](#) ([Dwarf_Die](#) dw_cu_die, int *dw_errcount_out, [Dwarf_Error](#) *dw_error)
Access to detailed line table header issues.
- DW_API int [dwarf_print_lines](#) ([Dwarf_Die](#) dw_cu_die, [Dwarf_Error](#) *dw_error, int *dw_errorcount_out)
Print line information in great detail.
- DW_API struct [Dwarf_Printf_Callback_Info_s](#) [dwarf_register_printf_callback](#) ([Dwarf_Debug](#) dw_dbg, struct [Dwarf_Printf_Callback_Info_s](#) *dw_callbackinfo)
For line details this records callback details.

9.11.1 Detailed Description

Access to all the line table details.

9.11.2 Function Documentation

9.11.2.1 dwarf_check_lineheader_b()

```
DW_API int dwarf_check_lineheader_b (
    Dwarf_Die dw_cu_die,
    int * dw_errcount_out,
    Dwarf_Error * dw_error )
```

Access to detailed line table header issues.

Lets the caller get detailed messages about some compiler errors we detect. Calls back, the caller should do something with the messages (likely just print them). The lines passed back already have newlines.

See also

[dwarf_check_lineheader\(b\)](#)
[Dwarf_Printf_Callback_Info_s](#)

Parameters

<i>dw_cu_die</i>	The CU DIE of interest
<i>dw_error</i>	If DW_DLV_ERROR this shows one error encountered.
<i>dw_errcount_out</i>	Returns the count of detected errors through the pointer.

Returns

DW_DLV_OK etc.

9.11.2.2 dwarf_line_is_addr_set()

```
DW_API int dwarf_line_is_addr_set (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_is_addr_set,
    Dwarf_Error * dw_error )
```

Is the Dwarf_Line address from DW_LNS_set_address? This is not a line register, but it is a flag set by the library in each Dwarf_Line, and it is derived from reading the line table.

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_is_addr_set</i>	On success it sets the flag to TRUE or FALSE.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.3 dwarf_line_srcfileno()

```
DW_API int dwarf_line_srcfileno (
    Dwarf_Line dw_line,
    Dwarf_Unsigned * dw_returned_filenum,
    Dwarf_Error * dw_error )
```

Read Line file register.

[Line Table Registers](#)

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_filenum</i>	On success it sets the value to the file number from the Dwarf_Line file register
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.4 dwarf_lineaddr()

```
DW_API int dwarf_lineaddr (
    Dwarf_Line dw_line,
    Dwarf_Addr * dw_returned_addr,
    Dwarf_Error * dw_error )
```

Return the address of the Dwarf_Line.

[Line Table Registers](#)**Parameters**

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_addr</i>	On success it sets the value to the value of the address register in the Dwarf_Line.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.5 dwarf_linebeginstatement()

```
DW_API int dwarf_linebeginstatement (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Read Line beginstatement register.

[Line Table Registers](#)**Parameters**

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_bool</i>	On success it sets the value TRUE (if the dw_line has the is_stmt register set) and FALSE if is_stmt is not set.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.6 dwarf_lineblock()

```
DW_API int dwarf_lineblock (
```

```
Dwarf_Line dw_line,
Dwarf_Bool * dw_returned_bool,
Dwarf_Error * dw_error )
```

Return the basic_block line register.

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_bool</i>	On success it sets the flag to TRUE or FALSE from the basic_block register in the line table.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.7 dwarf_lineendsequence()

```
DW_API int dwarf_lineendsequence (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Read Line endsequence register flag.

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_bool</i>	On success it sets the value TRUE (if the dw_line has the end_sequence register set) and FALSE if end_sequence is not set.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.8 dwarf_lineno()

```
DW_API int dwarf_lineno (
    Dwarf_Line dw_line,
    Dwarf_Unsigned * dw_returned_linenum,
    Dwarf_Error * dw_error )
```

Read Line line register.

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_linenum</i>	On success it sets the value to the line number from the Dwarf_Line line register
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.9 dwarf_lineoff_b()

```
DW_API int dwarf_lineoff_b (
    Dwarf_Line dw_line,
    Dwarf_Unsigned * dw_returned_lineoffset,
    Dwarf_Error * dw_error )
```

Return a column number through the pointer.

[Line Table Registers](#)

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_lineoffset</i>	On success it sets the value to the column register from the Dwarf_Line.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.10 dwarf_linesrc()

```
DW_API int dwarf_linesrc (
    Dwarf_Line dw_line,
    char ** dw_returned_name,
    Dwarf_Error * dw_error )
```

Return the file name applicable to the Dwarf_Line.

[Line Table Registers](#)

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_name</i>	On success it reads the file register and finds constructs a file name from a directory and filename there and and returns a pointer to that string through the pointer. It is necessary to deallocate the returned string with <code>dwarf_dealloc(dbg, lsrc_filename, DW_DLA_STRING)</code> ; (Older versions of this function incorrectly said not to free() or <code>dwarf_dealloc().</code>)
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[Using dwarf_srlines_b\(\) and linecontext](#)

9.11.2.11 dwarf_print_lines()

```
DW_API int dwarf_print_lines (
    Dwarf_Die dw_cu_die,
    Dwarf_Error * dw_error,
    int * dw_errorcount_out )
```

Print line information in great detail.

dwarf_print_lines lets the caller prints line information for a CU in great detail. Does not use printf. Instead it calls back to the application using a function pointer once per line-to-print. The lines passed back already have any needed newlines.

dwarfdump uses this function for verbose printing of line table data.

Failing to call the [dwarf_register_printf_callback\(\)](#) function will prevent the lines from being passed back but such omission is not an error. The same function, but focused on checking for errors is [dwarf_check_lineheader_b\(\)](#).

See also

[Dwarf_Printf_Callback_Info_s](#)

Parameters

<i>dw_cu_die</i>	The CU DIE of interest
<i>dw_error</i>	
<i>dw_errorcount_out</i>	

Returns

DW_DLV_OK etc.

9.11.2.12 dwarf_prologue_end_etc()

```
DW_API int dwarf_prologue_end_etc (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_prologue_end,
    Dwarf_Bool * dw_epilogue_begin,
    Dwarf_Unsigned * dw_isa,
    Dwarf_Unsigned * dw_discriminator,
    Dwarf_Error * dw_error )
```

Return various line table registers in one call.

[Line Table Registers](#)

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_prologue_end</i>	On success it sets the flag to TRUE or FALSE from the prologue_end register in the line table.
<i>dw_epilogue_begin</i>	On success it sets the flag to TRUE or FALSE from the epilogue_begin register in the line table.
<i>dw_isa</i>	On success it sets the value to the value of from the isa register in the line table.
<i>dw_discriminator</i>	On success it sets the value to the value of from the discriminator register in the line table.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLX_OK if it succeeds.

9.11.2.13 dwarf_register_printf_callback()

```
DW_API struct Dwarf_Printf_Callback_Info_s dwarf_register_printf_callback (
    Dwarf_Debug dw_dbg,
    struct Dwarf_Printf_Callback_Info_s * dw_callbackinfo )
```

For line details this records callback details.

Not usually needed. It is a way to check (while using the library) what callback data is in use or to update that callback data.

See also

[Dwarf_Printf_Callback_Info_s](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_callbackinfo</i>	If non-NULL pass in a pointer to your instance of struct Dwarf_Printf_Callback_Info_s with all the fields filled in.

Returns

If dw_callbackinfo NULL it returns a copy of the current [Dwarf_Printf_Callback_Info_s](#) for dw_dbg. Otherwise it returns the previous contents of the struct.

9.11.2.14 dwarf_srcfiles()

```
DW_API int dwarf_srcfiles (
    Dwarf_Die dw_cu_die,
    char *** dw_srcfiles,
    Dwarf_Signed * dw_filecount,
    Dwarf_Error * dw_error )
```

The list of source files from the line table header.

The array returned by this function applies to a single compilation unit (CU).

The returned array is indexed from 0 (zero) to `dw_filecount-1` when the function returns `DW_DLV_OK`.

In referencing the array via a file-number from a **DW_AT_decl_file** or **DW_AT_call_file** attribute one needs to know if the CU is DWARF5 or not.

Line Table Version numbers match compilation unit version numbers except that an experimental line table with line table version 0xfe06 has sometimes been used with DWARF4.

For DWARF5:

The file-number from a **DW_AT_decl_file** or **DW_AT_call_file** is the proper index into the array of string pointers.

For DWARF2,3,4, including experimental line table version 0xfe06 and a file-number from a **DW_AT_decl_file** or **DW_AT_call_file**:

1. If the file-number is zero there is no file name to find.
2. Otherwise subtract one(1) from the file-number and use the new value as the index into the array of string pointers.

The name strings returned are each assembled in the following way by `dwarf_srcfiles()`:

1. The file number denotes a name in the line table header.
2. If the name is not a full path (i.e. not starting with / in posix/linux/Macos) then prepend the appropriate directory string from the line table header.
3. If the name is still not a full path then prepend the content of the `DW_AT_comp_dir` attribute of the CU DIE.

To retrieve the line table version call `dwarf_srclines_b()` and `dwarf_srclines_version()`.

See also

[Using dwarf_srclines_b\(\)](#)

Parameters

<i>dw_cu_die</i>	The CU DIE in this CU.
<i>dw_srcfiles</i>	On success allocates an array of pointers to strings and for each such, computes the fullest path possible given the CU DIE data for each file name listed in the line table header.
<i>dw_filecount</i>	On success returns the number of entries in the array of pointers to strings. The number returned is non-negative.
<i>dw_error</i>	The usual error pointer.

Returns

`DW_DLV_OK` if it succeeds. If there is no `.debug_line[.dwo]` returns `DW_DLV_NO_ENTRY`.

See also

[Using dwarf_srcfiles\(\)](#)

9.11.2.15 dwarf_srclines_b()

```
DW_API int dwarf_srclines_b (
    Dwarf_Die dw_cudie,
    Dwarf_Unsigned * dw_version_out,
    Dwarf_Small * dw_table_count,
    Dwarf_Line_Context * dw_linecontext,
    Dwarf_Error * dw_error )
```

Initialize Dwarf_Line_Context for line table access.

Returns Dwarf_Line_Context pointer, needed for access to line table data. Returns the line table version number (needed to use [dwarf_srcfiles\(\)](#) properly).

See also

[Using dwarf_srclines_b\(\)](#)

[Using dwarf_srclines_b\(\) and linecontext](#)

Parameters

<i>dw_cudie</i>	The Compilation Unit (CU) DIE of interest.
<i>dw_version_out</i>	The DWARF Line Table version number (Standard: 2,3,4, or 5) Version 0xf006 is an experimental (two-level) line table.
<i>dw_table_count</i>	Zero or one means this is a normal DWARF line table. Two means this is an experimental two-level line table.
<i>dw_linecontext</i>	On success sets the pointer to point to an opaque structure usable for further queries.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.16 dwarf_srclines_comp_dir()

```
DW_API int dwarf_srclines_comp_dir (
    Dwarf_Line_Context dw_context,
    const char ** dw_compilation_directory,
    Dwarf_Error * dw_error )
```

Compilation Directory name for the CU.

Do not free() or dealloc the string, it is in a dwarf section.

Parameters

<i>dw_context</i>	The Line Context of interest.
<i>dw_compilation_directory</i> <small>Generated by Doxygen</small>	On success returns a pointer to a string identifying the compilation directory of the CU.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.17 dwarf_srclines_dealloc_b()

```
DW_API void dwarf_srclines_dealloc_b (
    Dwarf_Line_Context dw_context )
```

Dealloc the memory allocated by dwarf_srclines_b.

The way to deallocate (free) a Dwarf_Line_Context

Parameters

<i>dw_context</i>	The context to be deallocated (freed). On return the pointer passed in is stale and calling applications should zero the pointer.
-------------------	---

9.11.2.18 dwarf_srclines_files_data_b()

```
DW_API int dwarf_srclines_files_data_b (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed dw_index_in,
    const char ** dw_name,
    Dwarf_Unsigned * dw_directory_index,
    Dwarf_Unsigned * dw_last_mod_time,
    Dwarf_Unsigned * dw_file_length,
    Dwarf_Form_Data16 ** dw_md5ptr,
    Dwarf_Error * dw_error )
```

Access data for each line table file.

Has the md5ptr field so cases where DW_LNCT_MD5 is present can return pointer to the MD5 value. With DWARF 5 index starts with 0. [dwarf_srclines_files_indexes\(\)](#) makes indexing through the files easy.

See also

[dwarf_srclines_files_indexes](#)

[Using dwarf_srclines_b\(\)](#)

Parameters

<i>dw_context</i>	The line context of interest.
<i>dw_index_in</i>	The entry of interest. Callers should index as dw_baseindex through dw_endindex-1.
<i>dw_name</i>	If dw_name non-null on success returns The file name in the line table header through the pointer.
<i>dw_directory_index</i>	If dw_directory_index non-null on success returns the directory number in the line table header through the pointer.
<i>dw_last_mod_time</i>	If dw_last_mod_time non-null on success returns the directory last modification date/time through the pointer.
<i>dw_file_length</i>	If dw_file_length non-null on success returns the file length recorded in the line table through the pointer.
<i>dw_md5ptr</i>	If dw_md5ptr non-null on success returns a pointer to the 16byte MD5 hash of the file through the pointer. If there is no md5 value present it returns 0 through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.19 dwarf_srclines_files_indexes()

```
DW_API int dwarf_srclines_files_indexes (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed * dw_baseindex,
    Dwarf_Signed * dw_count,
    Dwarf_Signed * dw_endindex,
    Dwarf_Error * dw_error )
```

Return values easing indexing line table file numbers. Count is the real count of files array entries. Since DWARF 2,3,4 are zero origin indexes and DWARF5 and later are one origin, this function replaces dwarf_srclines_files_count().

Parameters

<i>dw_context</i>	The line context of interest.
<i>dw_baseindex</i>	On success returns the base index of valid file indexes. With DWARF2,3,4 the value is 1. With DWARF5 the value is 0.
<i>dw_count</i>	On success returns the real count of entries.
<i>dw_endindex</i>	On success returns value such that callers should index as dw_baseindex through dw_endindex-1.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[Using dwarf_srclines_b\(\)](#)

9.11.2.20 dwarf_srclines_from_linecontext()

```
DW_API int dwarf_srclines_from_linecontext (
    Dwarf_Line_Context dw_linecontext,
    Dwarf_Line ** dw_linebuf,
    Dwarf_Signed * dw_linecount,
    Dwarf_Error * dw_error )
```

Access source lines from line context.

Provides access to Dwarf_Line data from a Dwarf_Line_Context on a standard line table.

Parameters

<i>dw_linecontext</i>	The line context of interest.
<i>dw_linebuf</i>	On success returns an array of pointers to Dwarf_Line.
<i>dw_linecount</i>	On success returns the count of entries in dw_linebuf. If dw_linecount is returned as zero this
Generated by Doxygen	is a line table with no lines.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.21 dwarf_srclines_include_dir_count()

```
DW_API int dwarf_srclines_include_dir_count (
    Dwarf_Line_Context dw_line_context,
    Dwarf_Signed * dw_count,
    Dwarf_Error * dw_error )
```

Return the number of include directories in the Line Table.

Parameters

<i>dw_line_context</i>	The line context of interest.
<i>dw_count</i>	On success returns the count of directories. How to use this depends on the line table version number.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[dwarf_srclines_include_dir_data](#)

9.11.2.22 dwarf_srclines_include_dir_data()

```
DW_API int dwarf_srclines_include_dir_data (
    Dwarf_Line_Context dw_line_context,
    Dwarf_Signed dw_index,
    const char ** dw_name,
    Dwarf_Error * dw_error )
```

Return the include directories in the Line Table.

Parameters

<i>dw_line_context</i>	The line context of interest.
<i>dw_index</i>	Pass in an index to the line context list of include directories. If the line table is version 2,3, or 4, the valid indexes are 1 through dw_count. If the line table is version 5 the valid indexes are 0 through dw_count-1.
<i>dw_name</i>	On success it returns a pointer to a directory name. Do not free/deallocate the string.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[dwarf_srclines_include_dir_count](#)

9.11.2.23 dwarf_srclines_subprog_count()

```
DW_API int dwarf_srclines_subprog_count (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed * dw_count,
    Dwarf_Error * dw_error )
```

Subprog count: Part of the two-level line table extension.

A non-standard table. The actual meaning of subprog count left undefined here.

Parameters

<i>dw_context</i>	The Dwarf_Line_Context of interest.
<i>dw_count</i>	On success returns the two-level line table subprogram array size in this line context.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.24 dwarf_srclines_subprog_data()

```
DW_API int dwarf_srclines_subprog_data (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed dw_index,
    const char ** dw_name,
    Dwarf_Unsigned * dw_decl_file,
    Dwarf_Unsigned * dw_decl_line,
    Dwarf_Error * dw_error )
```

Retrieve data from the line table subprog array.

A non-standard table. Not defined here.

Parameters

<i>dw_context</i>	The Dwarf_Line_Context of interest.
<i>dw_index</i>	The item to retrieve. Valid indexes are 1 through dw_count.
<i>dw_name</i>	On success returns a pointer to the subprog name.
<i>dw_decl_file</i>	On success returns a file number through the pointer.
<i>dw_decl_line</i>	On success returns a line number through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.25 dwarf_srclines_table_offset()

```
DW_API int dwarf_srclines_table_offset (
    Dwarf_Line_Context dw_context,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Error * dw_error )
```

Return the srclines table offset.

The offset is in the relevant .debug_line or .debug_line.dwo section (and in a split dwarf package file includes the base line table offset).

Parameters

<i>dw_context</i>	
<i>dw_offset</i>	On success returns the section offset of the dw_context.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.26 dwarf_srclines_two_level_from_linecontext()

```
DW_API int dwarf_srclines_two_level_from_linecontext (
    Dwarf_Line_Context dw_context,
    Dwarf_Line ** dw_linebuf,
    Dwarf_Signed * dw_linecount,
    Dwarf_Line ** dw_linebuf_actuais,
    Dwarf_Signed * dw_linecount_actuais,
    Dwarf_Error * dw_error )
```

Returns line table counts and data.

Works for DWARF2,3,4,5 and for experimental two-level line tables. A single level table will have *linebuf_actuais and *linecount_actuais set to 0.

Two-level line tables are non-standard and not documented further. For standard (one-level) tables, it will return the single table through dw_linebuf, and the value returned through dw_linecount_actuais will be 0.

People not using these two-level tables should dwarf_srclines_from_linecontext instead.

9.11.2.27 dwarf_srclines_version()

```
DW_API int dwarf_srclines_version (
    Dwarf_Line_Context dw_line_context,
    Dwarf_Unsigned * dw_version,
    Dwarf_Small * dw_table_count,
    Dwarf_Error * dw_error )
```

The DWARF version number of this compile-unit.

The .debug_lines[.dwo] table count informs about the line table version and the type of line table involved.

Meaning of the value returned via dw_table_count:

- 0 The table is a header with no lines.
- 1 The table is a standard line table.
- 2 The table is an experimental line table.

Parameters

<i>dw_line_context</i>	The Line Context of interest.
<i>dw_version</i>	On success, returns the line table version through the pointer.
<i>dw_table_count</i>	On success, returns the tablecount through the pointer. If the table count is zero the line table is a header with no lines. If the table count is 1 this is a standard line table. If the table count is this is an experimental two-level line table.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLX_OK if it succeeds.

9.12 Ranges: code addresses in DWARF3-4

Functions

- DW_API int [dwarf_get_ranges_b](#) (Dwarf_Debug dw_dbg, Dwarf_Off dw_rangesoffset, Dwarf_Die dw_die, Dwarf_Off *dw_return_realoffset, Dwarf_Ranges **dw_rangesbuf, Dwarf_Signed *dw_rangecount, Dwarf_Unsigned *dw_bytecount, Dwarf_Error *dw_error)
Access to code ranges from a CU or just reading through the raw .debug_ranges section.
- DW_API void [dwarf_dealloc_ranges](#) (Dwarf_Debug dw_dbg, Dwarf_Ranges *dw_rangesbuf, Dwarf_Signed dw_rangecount)
Dealloc the array dw_rangesbuf.
- DW_API int [dwarf_get_ranges_baseaddress](#) (Dwarf_Debug dw_dbg, Dwarf_Die dw_die, Dwarf_Bool *dw_known_base, Dwarf_Unsigned *dw_baseaddress, Dwarf_Bool *dw_at_ranges_offset_present, Dwarf_Unsigned *dw_at_ranges_offset, Dwarf_Error *dw_error)
Find ranges base address.

9.12.1 Detailed Description

In DWARF3 and DWARF4 the DW_AT_ranges attribute provides an offset into the .debug_ranges section, which contains code address ranges.

See also

[Dwarf_Ranges](#)

DWARF3 and DWARF4. DW_AT_ranges with an unsigned constant FORM (DWARF3) or DW_FORM_sec_offset(↔ DWARF4).

9.12.2 Function Documentation

9.12.2.1 dwarf_dealloc_ranges()

```
DW_API void dwarf_dealloc_ranges (
    Dwarf_Debug dw_dbg,
    Dwarf_Ranges * dw_rangesbuf,
    Dwarf_Signed dw_rangecount )
```

Dealloc the array dw_rangesbuf.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_rangesbuf</i>	The dw_rangesbuf pointer returned by dwarf_get_ranges_b
<i>dw_rangecount</i>	The dw_rangecount returned by dwarf_get_ranges_b

9.12.2.2 dwarf_get_ranges_b()

```
DW_API int dwarf_get_ranges_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_rangesoffset,
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_realoffset,
    Dwarf_Ranges ** dw_rangesbuf,
    Dwarf_Signed * dw_rangecount,
    Dwarf_Unsigned * dw_bytecount,
    Dwarf_Error * dw_error )
```

Access to code ranges from a CU or just reading through the raw .debug_ranges section.

Adds return of the dw_realoffset to accommodate DWARF4 GNU split-dwarf, where the ranges could be in the tieddbg (meaning the real executable, a.out, not in a dwp). DWARF4 split-dwarf is an extension, not standard DWARF4.

If printing all entries in the section pass in an initial dw_rangesoffset of zero and dw_die of NULL. Then increment dw_rangesoffset by dw_bytecount and call again to get the next batch of ranges. With a specific option dwarfdump can do this. This not a normal thing to do!

See also

[Example getting .debug_ranges data](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_rangesoffset</i>	The offset to read from in the section.
<i>dw_die</i>	Pass in the DIE whose DW_AT_ranges brought us to ranges.
<i>dw_return_realoffset</i>	The actual offset in the section actually read. In a tieddbg dwp DWARF4 extension object the base offset is added to dw_rangesoffset and returned here.
<i>dw_rangesbuf</i>	A pointer to an array of structs is returned here. The struct contents are the raw values in the section.
<i>dw_rangecount</i>	The count of structs in the array is returned here.
<i>dw_bytecount</i>	The number of bytes in the .debug_ranges section applying to the returned array. This makes possible just marching through the section by offset.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.12.2.3 dwarf_get_ranges_baseaddress()

```
DW_API int dwarf_get_ranges_baseaddress (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_die,
    Dwarf_Bool * dw_known_base,
    Dwarf_Unsigned * dw_baseaddress,
    Dwarf_Bool * dw_at_ranges_offset_present,
    Dwarf_Unsigned * dw_at_ranges_offset,
    Dwarf_Error * dw_error )
```

Find ranges base address.

The function allows callers to calculate actual address from .debug_ranges data in a simple and efficient way by returning the CU DIE ranges baseaddress.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_die</i>	Pass in any non-null valid Dwarf_Die to find the applicable .debug_ranges base address. The dw_die need not be a CU-DIE. A null dw_die is allowed.
<i>dw_known_base</i>	if dw_die is non-null and there is a known base address for the CU DIE that (a DW_at_low_pc in the CU DIE) dw_known_base will be set TRUE, Otherwise the value FALSE will be returned through dw_known_base.
<i>dw_baseaddress</i>	if dw_known_base is returned as TRUE then dw_baseaddress will be set with the correct pc value. Otherwise zero will be set through dw_baseaddress.
<i>dw_at_ranges_offset_present</i>	Set to 1 (TRUE) if dw_die has the attribute DW_AT_ranges.
<i>dw_at_ranges_offset</i>	Set to the value of DW_AT_ranges attribute of dw_die if dw_at_ranges_offset_present was set to TRUE. The offset is of the beginning of the .debug_ranges section range lists applying to this DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK or DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.13 Rnglists: code addresses in DWARF5

Functions

- DW_API int [dwarf_rnglists_get_rle_head](#) (Dwarf_Attribute dw_attr, Dwarf_Half dw_theform, Dwarf_Unsigned dw_index_or_offset_value, Dwarf_Rnglists_Head *dw_head_out, Dwarf_Unsigned *dw_count_of_entries↵_in_head, Dwarf_Unsigned *dw_global_offset_of_rle_set, Dwarf_Error *dw_error)
Get Access to DWARF5 rnglists.
- DW_API int [dwarf_get_rnglists_entry_fields_a](#) (Dwarf_Rnglists_Head dw_head, Dwarf_Unsigned dw↵_entrynum, unsigned int *dw_entrylen, unsigned int *dw_rle_value_out, Dwarf_Unsigned *dw_raw1, Dwarf_Unsigned *dw_raw2, Dwarf_Bool *dw_debug_addr_unavailable, Dwarf_Unsigned *dw_cooked1, Dwarf_Unsigned *dw_cooked2, Dwarf_Error *dw_error)
Access rnglist entry details.
- DW_API void [dwarf_dealloc_rnglists_head](#) (Dwarf_Rnglists_Head dw_head)
Dealloc a Dwarf_Rnglists_Head.
- DW_API int [dwarf_load_rnglists](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_rnglists_count, Dwarf_Error *dw_error)
Loads all .debug_rnglists headers.
- DW_API int [dwarf_get_rnglist_offset_index_value](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_context↵_index, Dwarf_Unsigned dw_offsetentry_index, Dwarf_Unsigned *dw_offset_value_out, Dwarf_Unsigned *dw_global_offset_value_out, Dwarf_Error *dw_error)
Retrieve the section offset of a rnglist.
- DW_API int [dwarf_get_rnglist_head_basics](#) (Dwarf_Rnglists_Head dw_head, Dwarf_Unsigned *dw↵_rle_count, Dwarf_Unsigned *dw_rnglists_version, Dwarf_Unsigned *dw_rnglists_index_returned, Dwarf_Unsigned *dw_bytes_total_in_rle, Dwarf_Half *dw_offset_size, Dwarf_Half *dw_address↵_size, Dwarf_Half *dw_segment_selector_size, Dwarf_Unsigned *dw_overall_offset_of_this_context, Dwarf_Unsigned *dw_total_length_of_this_context, Dwarf_Unsigned *dw_offset_table_offset, Dwarf_Unsigned *dw_offset_table_entrycount, Dwarf_Bool *dw_rnglists_base_present, Dwarf_Unsigned *dw_rnglists↵_base, Dwarf_Bool *dw_rnglists_base_address_present, Dwarf_Unsigned *dw_rnglists_base_address, Dwarf_Bool *dw_rnglists_debug_addr_base_present, Dwarf_Unsigned *dw_rnglists_debug_addr_base, Dwarf_Error *dw_error)
Access to internal data on rngelists.
- DW_API int [dwarf_get_rnglist_context_basics](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_index, Dwarf_Unsigned *dw_header_offset, Dwarf_Small *dw_offset_size, Dwarf_Small *dw_extension_size, unsigned int *dw_version, Dwarf_Small *dw_address_size, Dwarf_Small *dw_segment_selector_size, Dwarf_Unsigned *dw_offset_entry_count, Dwarf_Unsigned *dw_offset_of_offset_array, Dwarf_Unsigned *dw_offset_of_first_rangeentry, Dwarf_Unsigned *dw_offset_past_last_rangeentry, Dwarf_Error *dw_error)
Access to rnglists header data.
- DW_API int [dwarf_get_rnglist_rle](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_contextnumber, Dwarf_Unsigned dw_entry_offset, Dwarf_Unsigned dw_endoffset, unsigned int *dw_entrylen, unsigned int *dw_entry_kind, Dwarf_Unsigned *dw_entry_operand1, Dwarf_Unsigned *dw_entry_operand2, Dwarf_Error *dw_error)
Access to raw rnglists range data.

9.13.1 Detailed Description

Used in DWARF5 to define valid address ranges for code.

DW_FORM_rnglistx or DW_AT_ranges with DW_FORM_sec_offset

9.13.2 Function Documentation

9.13.2.1 dwarf_dealloc_rnglists_head()

```
DW_API void dwarf_dealloc_rnglists_head (
    Dwarf_Rnglists_Head dw_head )
```

Dealloc a Dwarf_Rnglists_Head.

Parameters

<i>dw_head</i>	dealloc all the memory associated with dw_head. The caller should then immediately set the pointer to zero/NULL as it is stale.
----------------	---

9.13.2.2 dwarf_get_rnglist_context_basics()

```
DW_API int dwarf_get_rnglist_context_basics (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_index,
    Dwarf_Unsigned * dw_header_offset,
    Dwarf_Small * dw_offset_size,
    Dwarf_Small * dw_extension_size,
    unsigned int * dw_version,
    Dwarf_Small * dw_address_size,
    Dwarf_Small * dw_segment_selector_size,
    Dwarf_Unsigned * dw_offset_entry_count,
    Dwarf_Unsigned * dw_offset_of_offset_array,
    Dwarf_Unsigned * dw_offset_of_first_rangeentry,
    Dwarf_Unsigned * dw_offset_past_last_rangeentry,
    Dwarf_Error * dw_error )
```

Access to rnglists header data.

This returns, independent of any DIEs or CUs information on the .debug_rnglists headers present in the section.

We do not document the details here. See the DWARF5 standard.

Enables printing of details about the Range List Table Headers, one header per call. Index starting at 0. Returns DW_DLV_NO_ENTRY if index is too high for the table. A .debug_rnglists section may contain any number of Range List Table Headers with their details.

9.13.2.3 dwarf_get_rnglist_head_basics()

```
DW_API int dwarf_get_rnglist_head_basics (
    Dwarf_Rnglists_Head dw_head,
    Dwarf_Unsigned * dw_rle_count,
    Dwarf_Unsigned * dw_rnglists_version,
    Dwarf_Unsigned * dw_rnglists_index_returned,
    Dwarf_Unsigned * dw_bytes_total_in_rle,
    Dwarf_Half * dw_offset_size,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_segment_selector_size,
```

```

Dwarf_Unsigned * dw_overall_offset_of_this_context,
Dwarf_Unsigned * dw_total_length_of_this_context,
Dwarf_Unsigned * dw_offset_table_offset,
Dwarf_Unsigned * dw_offset_table_entrycount,
Dwarf_Bool * dw_rnglists_base_present,
Dwarf_Unsigned * dw_rnglists_base,
Dwarf_Bool * dw_rnglists_base_address_present,
Dwarf_Unsigned * dw_rnglists_base_address,
Dwarf_Bool * dw_rnglists_debug_addr_base_present,
Dwarf_Unsigned * dw_rnglists_debug_addr_base,
Dwarf_Error * dw_error )

```

Access to internal data on rangelists.

Returns detailed data from a Dwarf_Rnglists_Head Since this is primarily internal data we don't describe the details of the returned fields here.

9.13.2.4 dwarf_get_rnglist_offset_index_value()

```

DW_API int dwarf_get_rnglist_offset_index_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_context_index,
    Dwarf_Unsigned dw_offsetentry_index,
    Dwarf_Unsigned * dw_offset_value_out,
    Dwarf_Unsigned * dw_global_offset_value_out,
    Dwarf_Error * dw_error )

```

Retrieve the section offset of a rnglist.

Can be used to access raw rnglist data. Not used by most callers. See DWARF5 Section 7.28 Range List Table Page 242

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_context_index</i>	Begin this at zero.
<i>dw_offsetentry_index</i>	Begin this at zero.
<i>dw_offset_value_out</i>	On success returns the rangelist entry offset within the rangelist set.
<i>dw_global_offset_value_out</i>	On success returns the rangelist entry offset within rnglist section.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If there are no rnglists at all, or if one of the above index values is too high to be valid it returns DW_DLV_NO_ENTRY.

9.13.2.5 dwarf_get_rnglist_rle()

```

DW_API int dwarf_get_rnglist_rle (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_contextnumber,

```

```

Dwarf_Unsigned dw_entry_offset,
Dwarf_Unsigned dw_endoffset,
unsigned int * dw_entrylen,
unsigned int * dw_entry_kind,
Dwarf_Unsigned * dw_entry_operand1,
Dwarf_Unsigned * dw_entry_operand2,
Dwarf_Error * dw_error )

```

Access to raw rnglists range data.

Describes the actual raw data recorded in a particular range entry.

We do not describe all these fields for now, the raw values are mostly useful for people debugging compiler-generated DWARF.

9.13.2.6 dwarf_get_rnglists_entry_fields_a()

```

DW_API int dwarf_get_rnglists_entry_fields_a (
    Dwarf_Rnglists_Head dw_head,
    Dwarf_Unsigned dw_entrynum,
    unsigned int * dw_entrylen,
    unsigned int * dw_rle_value_out,
    Dwarf_Unsigned * dw_raw1,
    Dwarf_Unsigned * dw_raw2,
    Dwarf_Bool * dw_debug_addr_unavailable,
    Dwarf_Unsigned * dw_cooked1,
    Dwarf_Unsigned * dw_cooked2,
    Dwarf_Error * dw_error )

```

Access rnglist entry details.

See also

[Accessing rnglists section](#)

Parameters

<i>dw_head</i>	The Dwarf_Rnglists_Head of interest.
<i>dw_entrynum</i>	Valid values are 0 through dw_count_of_entries_in_head-1.
<i>dw_entrylen</i>	On success returns the length in bytes of this individual entry.
<i>dw_rle_value_out</i>	On success returns the RLE value of the entry, such as DW_RLE_startx_endx. This determines which of dw_raw1 and dw_raw2 contain meaningful data.
<i>dw_raw1</i>	On success returns a value directly recorded in the rangelist entry if that applies to this rle.
<i>dw_raw2</i>	On success returns a value directly recorded in the rangelist entry if that applies to this rle.
<i>dw_debug_addr_unavailable</i>	On success returns a flag. If the .debug_addr section is required but absent or unavailable the flag is set to TRUE. Otherwise sets the flag FALSE.
<i>dw_cooked1</i>	On success returns (if appropriate) the dw_raw1 value turned into a valid address.
<i>dw_cooked2</i>	On success returns (if appropriate) the dw_raw2 value turned into a valid address. Ignore the value if dw_debug_addr_unavailable is set.
<i>dw_error</i>	The usual error detail return pointer. Ignore the value if dw_debug_addr_unavailable is set.

Returns

Returns DW_DLV_OK etc.

9.13.2.7 dwarf_load_rnglists()

```
DW_API int dwarf_load_rnglists (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_rnglists_count,
    Dwarf_Error * dw_error )
```

Loads all .debug_rnglists headers.

Loads all the rnglists headers and returns DW_DLV_NO_ENTRY if the section is missing or empty. Intended to be done quite early. It is automatically done if anything needing CU or DIE information is called, so it is not necessary for you to call this in any normal situation.

See also

[Accessing accessing raw rnglist](#)

Doing it more than once is never necessary or harmful. There is no deallocation call made visible, deallocation happens when [dwarf_finish\(\)](#) is called.

Parameters

<i>dw_dbg</i>	
<i>dw_rnglists_count</i>	On success it returns the number of rnglists headers in the section through dw_rnglists_count.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the section does not exist the function returns DW_DLV_OK.

9.13.2.8 dwarf_rnglists_get_rle_head()

```
DW_API int dwarf_rnglists_get_rle_head (
    Dwarf_Attribute dw_attr,
    Dwarf_Half dw_theform,
    Dwarf_Unsigned dw_index_or_offset_value,
    Dwarf_Rnglists_Head * dw_head_out,
    Dwarf_Unsigned * dw_count_of_entries_in_head,
    Dwarf_Unsigned * dw_global_offset_of_rle_set,
    Dwarf_Error * dw_error )
```

Get Access to DWARF5 rnglists.

Opens a Dwarf_Rnglists_Head to access a set of DWARF5 rnglists .debug_rnglists DW_FORM_sec_offset DW_FORM_rnglistx (DW_AT_ranges in DWARF5).

See also

[Accessing rnglists section](#)

Parameters

<i>dw_attr</i>	The attribute referring to .debug_rnglists
<i>dw_theform</i>	The form number, DW_FORM_sec_offset or DW_FORM_rnglistx.
<i>dw_index_or_offset_value</i>	If the form is an index, pass it here. If the form is an offset, pass that here.
<i>dw_head_out</i>	On success creates a record owning the rnglists data for this attribute.
<i>dw_count_of_entries_in_head</i>	On success this is set to the number of entry in the rnglists for this attribute.
<i>dw_global_offset_of_rle_set</i>	On success set to the global offset of the rnglists in the rnglists section.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14 Locations of data: DWARF2-DWARF5

Macros

- `#define DW_LKIND_expression 0 /* DWARF2,3,4,5 */`
- `#define DW_LKIND_loclist 1 /* DWARF 2,3,4 */`
- `#define DW_LKIND_GNU_exp_list 2 /* GNU DWARF4 .dwo extension */`
- `#define DW_LKIND_loclists 5 /* DWARF5 loclists */`
- `#define DW_LKIND_unknown 99`

Functions

- DW_API int [dwarf_get_loclist_c](#) (Dwarf_Attribute dw_attr, Dwarf_Loc_Head_c *dw_loclist_head, Dwarf_Unsigned *dw_locentry_count, Dwarf_Error *dw_error)

Location Lists and Expressions.

- DW_API int [dwarf_get_loclist_head_kind](#) (Dwarf_Loc_Head_c dw_loclist_head, unsigned int *dw_lkind, Dwarf_Error *dw_error)

Know what kind of location data it is.

- DW_API int [dwarf_get_locdesc_entry_d](#) (Dwarf_Loc_Head_c dw_loclist_head, Dwarf_Unsigned dw_↵ index, Dwarf_Small *dw_lle_value_out, Dwarf_Unsigned *dw_rawlowpc, Dwarf_Unsigned *dw_rawhipc, Dwarf_Bool *dw_debug_addr_unavailable, Dwarf_Addr *dw_lowpc_cooked, Dwarf_Addr *dw_hipc_cooked, Dwarf_Unsigned *dw_locexpr_op_count_out, Dwarf_Locdesc_c *dw_locentry_out, Dwarf_Small *dw_↵ loclist_source_out, Dwarf_Unsigned *dw_expression_offset_out, Dwarf_Unsigned *dw_locdesc_offset_out, Dwarf_Error *dw_error)

Retrieve the details(_d) of a location expression.

- DW_API int [dwarf_get_locdesc_entry_e](#) (Dwarf_Loc_Head_c dw_loclist_head, Dwarf_Unsigned dw_↵ index, Dwarf_Small *dw_lle_value_out, Dwarf_Unsigned *dw_rawlowpc, Dwarf_Unsigned *dw_rawhipc, Dwarf_Bool *dw_debug_addr_unavailable, Dwarf_Addr *dw_lowpc_cooked, Dwarf_Addr *dw_hipc_cooked, Dwarf_Unsigned *dw_locexpr_op_count_out, Dwarf_Unsigned *dw_lle_bytecount, Dwarf_Locdesc_c *dw_locentry_out, Dwarf_Small *dw_loclist_source_out, Dwarf_Unsigned *dw_expression_offset_out, Dwarf_Unsigned *dw_locdesc_offset_out, Dwarf_Error *dw_error)

Retrieve the details(_e) of a location expression.

- DW_API int [dwarf_get_location_op_value_c](#) (Dwarf_Locdesc_c dw_locdesc, Dwarf_Unsigned dw_↵ index, Dwarf_Small *dw_operator_out, Dwarf_Unsigned *dw_operand1, Dwarf_Unsigned *dw_operand2, Dwarf_Unsigned *dw_operand3, Dwarf_Unsigned *dw_offset_for_branch, Dwarf_Error *dw_error)

Get the raw values from a single location operation.

- DW_API int `dwarf_loclist_from_expr_c` (Dwarf_Debug dw_dbg, Dwarf_Ptr dw_expression_in, Dwarf_Unsigned dw_expression_length, Dwarf_Half dw_address_size, Dwarf_Half dw_offset_size, Dwarf_Half dw_dwarf_version, Dwarf_Loc_Head_c *dw_loc_head, Dwarf_Unsigned *dw_listlen, Dwarf_Error *dw_error)
Generate a Dwarf_Loc_Head_c from an expression block.
- DW_API void `dwarf_dealloc_loc_head_c` (Dwarf_Loc_Head_c dw_head)
Dealloc (free) all memory allocated for Dwarf_Loc_Head_c.
- DW_API int `dwarf_load_loclists` (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_loclists_count, Dwarf_Error *dw_error)
Load Loclists.
- DW_API int `dwarf_get_loclist_offset_index_value` (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_context_index, Dwarf_Unsigned dw_offsetentry_index, Dwarf_Unsigned *dw_offset_value_out, Dwarf_Unsigned *dw_global_offset_value_out, Dwarf_Error *dw_error)
Return certain loclists offsets.
- DW_API int `dwarf_get_loclist_head_basics` (Dwarf_Loc_Head_c dw_head, Dwarf_Small *dw_lkind, Dwarf_Unsigned *dw_lle_count, Dwarf_Unsigned *dw_loclists_version, Dwarf_Unsigned *dw_loclists_index_returned, Dwarf_Unsigned *dw_bytes_total_in_rle, Dwarf_Half *dw_offset_size, Dwarf_Half *dw_address_size, Dwarf_Half *dw_segment_selector_size, Dwarf_Unsigned *dw_overall_offset_of_this_context, Dwarf_Unsigned *dw_total_length_of_this_context, Dwarf_Unsigned *dw_offset_table_offset, Dwarf_Unsigned *dw_offset_table_entrycount, Dwarf_Bool *dw_loclists_base_present, Dwarf_Unsigned *dw_loclists_base, Dwarf_Bool *dw_loclists_base_address_present, Dwarf_Unsigned *dw_loclists_base_address, Dwarf_Bool *dw_loclists_debug_addr_base_present, Dwarf_Unsigned *dw_loclists_debug_addr_base, Dwarf_Unsigned *dw_offset_this_lle_area, Dwarf_Error *dw_error)
Return basic data about a loclists head.
- DW_API int `dwarf_get_loclist_context_basics` (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_index, Dwarf_Unsigned *dw_header_offset, Dwarf_Small *dw_offset_size, Dwarf_Small *dw_extension_size, unsigned int *dw_version, Dwarf_Small *dw_address_size, Dwarf_Small *dw_segment_selector_size, Dwarf_Unsigned *dw_offset_entry_count, Dwarf_Unsigned *dw_offset_of_offset_array, Dwarf_Unsigned *dw_offset_of_first_locentry, Dwarf_Unsigned *dw_offset_past_last_locentry, Dwarf_Error *dw_error)
Return basic data about a loclists context.
- DW_API int `dwarf_get_loclist_lle` (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_contextnumber, Dwarf_Unsigned dw_entry_offset, Dwarf_Unsigned dw_endoffset, unsigned int *dw_entrylen, unsigned int *dw_entry_kind, Dwarf_Unsigned *dw_entry_operand1, Dwarf_Unsigned *dw_entry_operand2, Dwarf_Unsigned *dw_expr_ops_blocksize, Dwarf_Unsigned *dw_expr_ops_offset, Dwarf_Small **dw_expr_opsdata, Dwarf_Error *dw_error)
Return basic data about a loclists context entry.

9.14.1 Detailed Description

9.14.2 Function Documentation

9.14.2.1 dwarf_dealloc_loc_head_c()

```
DW_API void dwarf_dealloc_loc_head_c (
    Dwarf_Loc_Head_c dw_head )
```

Dealloc (free) all memory allocated for Dwarf_Loc_Head_c.

Parameters

<code>dw_head</code>	A head pointer.
----------------------	-----------------

The caller should zero the passed-in pointer on return as it is stale at that point.

9.14.2.2 dwarf_get_location_op_value_c()

```
DW_API int dwarf_get_location_op_value_c (
    Dwarf_Locdesc_c dw_locdesc,
    Dwarf_Unsigned dw_index,
    Dwarf_Small * dw_operator_out,
    Dwarf_Unsigned * dw_operand1,
    Dwarf_Unsigned * dw_operand2,
    Dwarf_Unsigned * dw_operand3,
    Dwarf_Unsigned * dw_offset_for_branch,
    Dwarf_Error * dw_error )
```

Get the raw values from a single location operation.

Parameters

<i>dw_locdesc</i>	Pass in a valid Dwarf_Locdesc_c.
<i>dw_index</i>	Pass in the operator index. zero through dw_locexpr_op_count_out-1.
<i>dw_operator_out</i>	On success returns the DW_OP operator, such as DW_OP_plus .
<i>dw_operand1</i>	On success returns the value of the operand or zero.
<i>dw_operand2</i>	On success returns the value of the operand or zero.
<i>dw_operand3</i>	On success returns the value of the operand or zero.
<i>dw_offset_for_branch</i>	On success returns The byte offset of the operator within the entire expression. Useful for checking the correctness of operators that branch..
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.3 dwarf_get_locdesc_entry_d()

```
DW_API int dwarf_get_locdesc_entry_d (
    Dwarf_Loc_Head_c dw_loclist_head,
    Dwarf_Unsigned dw_index,
    Dwarf_Small * dw_lle_value_out,
    Dwarf_Unsigned * dw_rawlowpc,
    Dwarf_Unsigned * dw_rawhipc,
    Dwarf_Bool * dw_debug_addr_unavailable,
    Dwarf_Addr * dw_lowpc_cooked,
    Dwarf_Addr * dw_hipc_cooked,
    Dwarf_Unsigned * dw_locexpr_op_count_out,
    Dwarf_Locdesc_c * dw_locentry_out,
    Dwarf_Small * dw_loclist_source_out,
    Dwarf_Unsigned * dw_expression_offset_out,
    Dwarf_Unsigned * dw_locdesc_offset_out,
    Dwarf_Error * dw_error )
```

Retrieve the details(_d) of a location expression.

Cooked value means the addresses from the location description after base values applied, so they are actual addresses. debug_addr_unavailable non-zero means the record from a Split Dwarf skeleton unit could not be accessed from the .dwo section or dwp object so the cooked values could not be calculated.

Parameters

<i>dw_loclist_head</i>	A loclist head pointer.
<i>dw_index</i>	Pass in an index value less than <i>dw_locentry_count</i> .
<i>dw_lle_value_out</i>	On success returns the DW_LLE value applicable, such as DW_LLE_start_end .
<i>dw_rawlowpc</i>	On success returns the first operand in the expression (if the expression has an operand).
<i>dw_rawhipc</i>	On success returns the second operand in the expression. (if the expression has a second operand).
<i>dw_debug_addr_unavailable</i>	On success returns FALSE if the data required to calculate <i>dw_lowpc_cooked</i> or <i>dw_hipc_cooked</i> was present or TRUE if some required data was missing (for example in split dwarf).
<i>dw_lowpc_cooked</i>	On success and if <i>dw_debug_addr_unavailable</i> FALSE returns the true low address.
<i>dw_hipc_cooked</i>	On success and if <i>dw_debug_addr_unavailable</i> FALSE returns the true high address.
<i>dw_locexpr_op_count_out</i>	On success returns the count of operations in the expression.
<i>dw_locentry_out</i>	On success returns a pointer to a specific location description.
<i>dw_loclist_source_out</i>	On success returns the applicable DW_LKIND value.
<i>dw_expression_offset_out</i>	On success returns the offset of the expression in the applicable section.
<i>dw_locdesc_offset_out</i>	On return sets the offset to the location description offset (if that is meaningful) or zero for simple location expressions.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.4 dwarf_get_locdesc_entry_e()

```
DW_API int dwarf_get_locdesc_entry_e (
    Dwarf_Loc_Head_c dw_loclist_head,
    Dwarf_Unsigned dw_index,
    Dwarf_Small * dw_lle_value_out,
    Dwarf_Unsigned * dw_rawlowpc,
    Dwarf_Unsigned * dw_rawhipc,
    Dwarf_Bool * dw_debug_addr_unavailable,
    Dwarf_Addr * dw_lowpc_cooked,
    Dwarf_Addr * dw_hipc_cooked,
    Dwarf_Unsigned * dw_locexpr_op_count_out,
    Dwarf_Unsigned * dw_lle_bytecount,
    Dwarf_Locdesc_c * dw_locentry_out,
    Dwarf_Small * dw_loclist_source_out,
    Dwarf_Unsigned * dw_expression_offset_out,
    Dwarf_Unsigned * dw_locdesc_offset_out,
    Dwarf_Error * dw_error )
```

Retrieve the details(_e) of a location expression.

Cooked value means the addresses from the location description after base values applied, so they are actual addresses. *debug_addr_unavailable* non-zero means the record from a Split Dwarf skeleton unit could not be accessed from the .dwo section or dwp object so the cooked values could not be calculated.

This is identical to *dwarf_get_locdesc_entry_d* except that it adds a pointer argument so the caller can know the size, in bytes, of the loclist DW_LLE operation itself.

It's used by *dwarfdump* but it is unlikely to be of interest to most callers..

9.14.2.5 dwarf_get_loclist_c()

```
DW_API int dwarf_get_loclist_c (
    Dwarf_Attribute dw_attr,
    Dwarf_Loc_Head_c * dw_loclist_head,
    Dwarf_Unsigned * dw_locentry_count,
    Dwarf_Error * dw_error )
```

Location Lists and Expressions.

This works on DWARF2 through DWARF5.

See also

[Location/expression access](#)

Parameters

<i>dw_attr</i>	The attribute must refer to a location expression or a location list, so must be DW_FORM_block, DW_FORM_exprloc, or a loclist reference form..
<i>dw_loclist_head</i>	On success returns a pointer to the created loclist head record.
<i>dw_locentry_count</i>	On success returns the count of records. For an expression it will be one.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.6 dwarf_get_loclist_context_basics()

```
DW_API int dwarf_get_loclist_context_basics (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_index,
    Dwarf_Unsigned * dw_header_offset,
    Dwarf_Small * dw_offset_size,
    Dwarf_Small * dw_extension_size,
    unsigned int * dw_version,
    Dwarf_Small * dw_address_size,
    Dwarf_Small * dw_segment_selector_size,
    Dwarf_Unsigned * dw_offset_entry_count,
    Dwarf_Unsigned * dw_offset_of_offset_array,
    Dwarf_Unsigned * dw_offset_of_first_locentry,
    Dwarf_Unsigned * dw_offset_past_last_locentry,
    Dwarf_Error * dw_error )
```

Return basic data about a loclists context.

Some of the same values as from dwarf_get_loclist_head_basics but here without any dependence on data derived from a CU context. Useful to print raw loclist data.

9.14.2.7 dwarf_get_loclist_head_basics()

```
DW_API int dwarf_get_loclist_head_basics (
    Dwarf_Loc_Head_c dw_head,
    Dwarf_Small * dw_lkind,
    Dwarf_Unsigned * dw_lle_count,
    Dwarf_Unsigned * dw_loclists_version,
    Dwarf_Unsigned * dw_loclists_index_returned,
    Dwarf_Unsigned * dw_bytes_total_in_rle,
    Dwarf_Half * dw_offset_size,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_segment_selector_size,
    Dwarf_Unsigned * dw_overall_offset_of_this_context,
    Dwarf_Unsigned * dw_total_length_of_this_context,
    Dwarf_Unsigned * dw_offset_table_offset,
    Dwarf_Unsigned * dw_offset_table_entrycount,
    Dwarf_Bool * dw_loclists_base_present,
    Dwarf_Unsigned * dw_loclists_base,
    Dwarf_Bool * dw_loclists_base_address_present,
    Dwarf_Unsigned * dw_loclists_base_address,
    Dwarf_Bool * dw_loclists_debug_addr_base_present,
    Dwarf_Unsigned * dw_loclists_debug_addr_base,
    Dwarf_Unsigned * dw_offset_this_lle_area,
    Dwarf_Error * dw_error )
```

Return basic data about a loclists head.

Used by dwarfdump to print basic data from the data generated to look at a specific loclist context as returned by dwarf_loclists_index_get_lle_head() or dwarf_loclists_offset_get_lle_head. Here we know there was a Dwarf_Loc_Attribute so additional things are known as compared to calling dwarf_get_loclist_context_basics See DWARF5 Section 7.20 Location List Table page 243.

9.14.2.8 dwarf_get_loclist_head_kind()

```
DW_API int dwarf_get_loclist_head_kind (
    Dwarf_Loc_Head_c dw_loclist_head,
    unsigned int * dw_lkind,
    Dwarf_Error * dw_error )
```

Know what kind of location data it is.

Parameters

<i>dw_loclist_head</i>	Pass in a loclist head pointer.
<i>dw_lkind</i>	On success returns the loclist kind through the pointer. For example DW_LKIND_expression.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.9 dwarf_get_loclist_lle()

```
DW_API int dwarf_get_loclist_lle (
```

```

Dwarf_Debug dw_dbg,
Dwarf_Unsigned dw_contextnumber,
Dwarf_Unsigned dw_entry_offset,
Dwarf_Unsigned dw_endoffset,
unsigned int * dw_entrylen,
unsigned int * dw_entry_kind,
Dwarf_Unsigned * dw_entry_operand1,
Dwarf_Unsigned * dw_entry_operand2,
Dwarf_Unsigned * dw_expr_ops_blocksize,
Dwarf_Unsigned * dw_expr_ops_offset,
Dwarf_Small ** dw_expr_opsdata,
Dwarf_Error * dw_error )

```

Return basic data about a loclists context entry.

Useful to print raw loclist data.

9.14.2.10 dwarf_get_loclist_offset_index_value()

```

DW_API int dwarf_get_loclist_offset_index_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_context_index,
    Dwarf_Unsigned dw_offsetentry_index,
    Dwarf_Unsigned * dw_offset_value_out,
    Dwarf_Unsigned * dw_global_offset_value_out,
    Dwarf_Error * dw_error )

```

Return certain loclists offsets.

Useful with the DWARF5 .debug_loclists section.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_context_index</i>	Pass in the loclists context index.
<i>dw_offsetentry_index</i>	Pass in the offset array index.
<i>dw_offset_value_out</i>	On success returns the offset value at offset table[<i>dw_offsetentry_index</i>], an offset local to this context.
<i>dw_global_offset_value_out</i>	On success returns the same offset value but with the offset of the table added in to form a section offset.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If one of the indexes passed in is out of range it returns DW_DLV_NO_ENTRY.

9.14.2.11 dwarf_load_loclists()

```

DW_API int dwarf_load_loclists (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_loclists_count,
    Dwarf_Error * dw_error )

```

Load Loclists.

This loads raw `.debug_loclists` (DWARF5). It is unlikely you have a reason to use this function. If CUs or DIES have been referenced in any way loading is already done. A duplicate loading attempt returns `DW_DLV_OK` immediately, returning `dw_loclists_count` filled in and does nothing else.

Doing it more than once is never necessary or harmful. There is no deallocation call made visible, deallocation happens when `dwarf_finish()` is called.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug.
<i>dw_loclists_count</i>	On success, returns the number of DWARF5 loclists contexts in the section, whether this is the first or a duplicate load.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns `DW_DLV_OK` if it loaded successfully or if it is a duplicate load. If no `.debug_loclists` present returns `DW_DLV_NO_ENTRY`.

9.14.2.12 dwarf_loclist_from_expr_c()

```
DW_API int dwarf_loclist_from_expr_c (
    Dwarf_Debug dw_dbg,
    Dwarf_Ptr dw_expression_in,
    Dwarf_Unsigned dw_expression_length,
    Dwarf_Half dw_address_size,
    Dwarf_Half dw_offset_size,
    Dwarf_Half dw_dwarf_version,
    Dwarf_Loc_Head_c * dw_loc_head,
    Dwarf_Unsigned * dw_listlen,
    Dwarf_Error * dw_error )
```

Generate a `Dwarf_Loc_Head_c` from an expression block.

Useful if you have an expression block (from somewhere), do not have a `Dwarf_Attribute` available, and wish to deal with the expression.

See also

[Reading a location expression](#)

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug	
<i>dw_expression_in</i>	Pass in a pointer to the expression bytes.	
<i>dw_expression_length</i>	Pass in the length, in bytes, of the expression.	
<i>dw_address_size</i>	Pass in the applicable address_size.	
<i>dw_offset_size</i>	Pass in the applicable offset size.	
<i>dw_dwarf_version</i>	Pass in the applicable dwarf version.	
<i>dw_loc_head</i>	On success returns a pointer to a dwarf location head record for use in getting to the details of the expression.	
<i>dw_listlen</i>	On success, sets the listlen to one.	Generated by Doxygen
<i>dw_error</i>	The usual error detail return pointer.	

Returns

Returns DW_DLV_OK etc.

9.15 .debug_addr access: DWARF5

Functions

- DW_API int `dwarf_debug_addr_table` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` dw_section_offset, `Dwarf_Debug_Addr_Table` *dw_table_header, `Dwarf_Unsigned` *dw_length, `Dwarf_Half` *dw_version, `Dwarf_Small` *dw_address_size, `Dwarf_Unsigned` *dw_at_addr_base, `Dwarf_Unsigned` *dw_entry_count, `Dwarf_Unsigned` *dw_next_table_offset, `Dwarf_Error` *dw_error)
Return a .debug_addr table.
- DW_API int `dwarf_debug_addr_by_index` (`Dwarf_Debug_Addr_Table` dw_dat, `Dwarf_Unsigned` dw_entry_index, `Dwarf_Unsigned` *dw_address, `Dwarf_Error` *dw_error)
Return .debug_addr address given table index.
- DW_API void `dwarf_dealloc_debug_addr_table` (`Dwarf_Debug_Addr_Table` dw_dat)
dealloc (free) a Dwarf_Attr_Table record.

9.15.1 Detailed Description

Reading just the .debug_addr section.

These functions solely useful for reading that section. It seems unlikely you would have a reason to call these. The functions getting attribute values use the section when appropriate without using these functions.

9.15.2 Function Documentation

9.15.2.1 dwarf_dealloc_debug_addr_table()

```
DW_API void dwarf_dealloc_debug_addr_table (
    Dwarf_Debug_Addr_Table dw_dat )
```

dealloc (free) a Dwarf_Attr_Table record.

Parameters

<code>dw_dat</code>	Pass in a valid Dwarf_Debug_Addr_Table pointer. Does nothing if the dw_dat field is NULL.
---------------------	---

9.15.2.2 dwarf_debug_addr_by_index()

```
DW_API int dwarf_debug_addr_by_index (
    Dwarf_Debug_Addr_Table dw_dat,
    Dwarf_Unsigned dw_entry_index,
    Dwarf_Unsigned * dw_address,
    Dwarf_Error * dw_error )
```

Return .debug_addr address given table index.

Parameters

<i>dw_dat</i>	Pass in a Dwarf_Debug_Addr_Table pointer.
<i>dw_entry_index</i>	Pass in a Dwarf_Debug_Addr_Table index to an address. If out of the valid range 0 through dw_entry_count-1 the function returns DW_DLV_NO_ENTRY.
<i>dw_address</i>	Returns an address in the program through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the dw_section_offset passed in is out of range it returns DW_DLV_NO_ENTRY. If it returns DW_DLV_ERROR only dw_error is set, dw_address is not set.

9.15.2.3 dwarf_debug_addr_table()

```
DW_API int dwarf_debug_addr_table (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_section_offset,
    Dwarf_Debug_Addr_Table * dw_table_header,
    Dwarf_Unsigned * dw_length,
    Dwarf_Half * dw_version,
    Dwarf_Small * dw_address_size,
    Dwarf_Unsigned * dw_at_addr_base,
    Dwarf_Unsigned * dw_entry_count,
    Dwarf_Unsigned * dw_next_table_offset,
    Dwarf_Error * dw_error )
```

Return a .debug_addr table.

Allocates and returns a pointer to a Dwarf_Debug_Addr_Table as well as the contents of the record.

Other than dw_debug and dw_error and dw_table_header a NULL passed in as a pointer argument means the return value will not be set through the pointer, so a caller can pass NULL for return values of no immediate interest.

It is only intended to enable printing of the simple DWARF5 .debug_addr section (by dwarfdump).

When emitting DWARF4, gcc may emit a GNU-specified .debug_addr format. If some CU has been opened then this call will work, but the single table will have all the entries for all CUs.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_section_offset</i>	Pass in the section offset of a table header. Start with zero. If the passed-in offset is past the last byte of the table the function returns DW_DLV_NO_ENTRY.
<i>dw_table_header</i>	On success Returns a pointer to a Dwarf_Debug_Addr_Table for use with dwarf_get_attr_by_index().
<i>dw_length</i>	On success Returns the length in bytes of this contribution to .debug_addr from the table header, including the table length field and the array of addresses.
<i>dw_version</i>	On success returns the version number, which should be 5.
<i>dw_address_size</i>	On success returns the address size of the address entries in this table.
<i>dw_at_addr_base</i>	On success returns the value that will appear in some DW_AT_addr_base attribute.
<i>dw_entry_count</i>	On success returns the number of table entries in this table instance.
<i>dw_next_table_offset</i>	On success returns the offset of the next table in the section. Use the offset returned in the next call to this function.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the dw_section_offset passed in is out of range it returns DW_DLV_NO_ENTRY. If it returns DW_DLV_ERROR only dw_error is set, none of the other return values are set through the pointers.

9.16 Macro Access: DWARF5

Functions

- DW_API int [dwarf_get_macro_context](#) (Dwarf_Die dw_die, Dwarf_Unsigned *dw_version_out, Dwarf_Macro_Context *dw_macro_context, Dwarf_Unsigned *dw_macro_unit_offset_out, Dwarf_Unsigned *dw_macro_ops_count_out, Dwarf_Unsigned *dw_macro_ops_data_length_out, Dwarf_Error *dw_error)
DWARF5 .debug_macro access via Dwarf_Die.
- DW_API int [dwarf_get_macro_context_by_offset](#) (Dwarf_Die dw_die, Dwarf_Unsigned dw_offset, Dwarf_Unsigned *dw_version_out, Dwarf_Macro_Context *dw_macro_context, Dwarf_Unsigned *dw_macro_ops_count_out, Dwarf_Unsigned *dw_macro_ops_data_length, Dwarf_Error *dw_error)
DWARF5 .debug_macro access via Dwarf_Die and an offset.
- DW_API int [dwarf_macro_context_total_length](#) (Dwarf_Macro_Context dw_context, Dwarf_Unsigned *dw_mac_total_len, Dwarf_Error *dw_error)
Return a macro context total length.
- DW_API void [dwarf_dealloc_macro_context](#) (Dwarf_Macro_Context dw_mc)
Dealloc a macro context.
- DW_API int [dwarf_macro_context_head](#) (Dwarf_Macro_Context dw_mc, Dwarf_Half *dw_version, Dwarf_Unsigned *dw_mac_offset, Dwarf_Unsigned *dw_mac_len, Dwarf_Unsigned *dw_mac_header_len, unsigned int *dw_flags, Dwarf_Bool *dw_has_line_offset, Dwarf_Unsigned *dw_line_offset, Dwarf_Bool *dw_has_offset_size_64, Dwarf_Bool *dw_has_operands_table, Dwarf_Half *dw_opcode_count, Dwarf_Error *dw_error)
Access the internal details of a Dwarf_Macro_Context.
- DW_API int [dwarf_macro_operands_table](#) (Dwarf_Macro_Context dw_mc, Dwarf_Half dw_index, Dwarf_Half *dw_opcode_number, Dwarf_Half *dw_operand_count, const Dwarf_Small **dw_operand_array, Dwarf_Error *dw_error)
Access to the details of the opcode operands table.
- DW_API int [dwarf_get_macro_op](#) (Dwarf_Macro_Context dw_macro_context, Dwarf_Unsigned dw_op_number, Dwarf_Unsigned *dw_op_start_section_offset, Dwarf_Half *dw_macro_operator, Dwarf_Half *dw_forms_count, const Dwarf_Small **dw_formcode_array, Dwarf_Error *dw_error)
Access macro operation details of a single operation.
- DW_API int [dwarf_get_macro_defundef](#) (Dwarf_Macro_Context dw_macro_context, Dwarf_Unsigned dw_op_number, Dwarf_Unsigned *dw_line_number, Dwarf_Unsigned *dw_index, Dwarf_Unsigned *dw_offset, Dwarf_Half *dw_forms_count, const char **dw_macro_string, Dwarf_Error *dw_error)
Get Macro defundef.
- DW_API int [dwarf_get_macro_startend_file](#) (Dwarf_Macro_Context dw_macro_context, Dwarf_Unsigned dw_op_number, Dwarf_Unsigned *dw_line_number, Dwarf_Unsigned *dw_name_index_to_line_tab, const char **dw_src_file_name, Dwarf_Error *dw_error)
Get Macro start end.
- DW_API int [dwarf_get_macro_import](#) (Dwarf_Macro_Context dw_macro_context, Dwarf_Unsigned dw_op_number, Dwarf_Unsigned *dw_target_offset, Dwarf_Error *dw_error)
Get Macro import.

9.16.1 Detailed Description

Reading the .debug_macro section.

See also

[Reading .debug_macro data \(DWARF5\)](#) An example reading .debug_macro

9.16.2 Function Documentation

9.16.2.1 dwarf_dealloc_macro_context()

```
DW_API void dwarf_dealloc_macro_context (
    Dwarf_Macro_Context dw_mc )
```

Dealloc a macro context.

Parameters

<i>dw_mc</i>	A pointer to the macro context of interest. On return the caller should zero the pointer as the pointer is then stale.
--------------	--

9.16.2.2 dwarf_get_macro_context()

```
DW_API int dwarf_get_macro_context (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_version_out,
    Dwarf_Macro_Context * dw_macro_context,
    Dwarf_Unsigned * dw_macro_unit_offset_out,
    Dwarf_Unsigned * dw_macro_ops_count_out,
    Dwarf_Unsigned * dw_macro_ops_data_length_out,
    Dwarf_Error * dw_error )
```

DWARF5 .debug_macro access via Dwarf_Die.

See also

[Reading .debug_macro data \(DWARF5\)](#)

Parameters

<i>dw_die</i>	The CU DIE of interest.
<i>dw_version_out</i>	On success returns the macro context version (5)
<i>dw_macro_context</i>	On success returns a pointer to a macro context which allows access to the context content.
<i>dw_macro_unit_offset_out</i>	On success returns the offset of the macro context.
<i>dw_macro_ops_count_out</i>	On success returns the number of macro operations in the context.
<i>dw_macro_ops_data_length_out</i>	On success returns the length in bytes of the operations in the context.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLX_OK etc. If no .debug_macro section exists for the CU it returns DW_DLX_NO_ENTRY.

9.16.2.3 dwarf_get_macro_context_by_offset()

```
DW_API int dwarf_get_macro_context_by_offset (
    Dwarf_Die dw_die,
```

```

Dwarf_Unsigned dw_offset,
Dwarf_Unsigned * dw_version_out,
Dwarf_Macro_Context * dw_macro_context,
Dwarf_Unsigned * dw_macro_ops_count_out,
Dwarf_Unsigned * dw_macro_ops_data_length,
Dwarf_Error * dw_error )

```

DWARF5 .debug_macro access via Dwarf_Die and an offset.

Parameters

<i>dw_die</i>	The CU DIE of interest.
<i>dw_offset</i>	The offset in the section to begin reading.
<i>dw_version_out</i>	On success returns the macro context version (5)
<i>dw_macro_context</i>	On success returns a pointer to a macro context which allows access to the context content.
<i>dw_macro_ops_count_out</i>	On success returns the number of macro operations in the context.
<i>dw_macro_ops_data_length</i>	On success returns the length in bytes of the macro context, starting at the offset of the first byte of the context.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If no .debug_macro section exists for the CU it returns DW_DLV_NO_ENTRY. If the dw_offset is outside the section it returns DW_DLV_ERROR.

9.16.2.4 dwarf_get_macro_defundef()

```

DW_API int dwarf_get_macro_defundef (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_line_number,
    Dwarf_Unsigned * dw_index,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Half * dw_forms_count,
    const char ** dw_macro_string,
    Dwarf_Error * dw_error )

```

Get Macro defundef.

To extract the value portion of a macro define:

See also

[dwarf_find_macro_value_start](#)

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	valid values are 0 through dw_macro_ops_count_out-1. The op number must be for a def/undef.
<i>dw_line_number</i>	The line number in the user source for this define/undef

Parameters

<i>dw_index</i>	On success if the macro is an strx form the value returned is the string index in the record, otherwise zero is returned.
<i>dw_offset</i>	On success if the macro is an strp or sup form the value returned is the string offset in the appropriate section, otherwise zero is returned.
<i>dw_forms_count</i>	On success the value 2 is returned.
<i>dw_macro_string</i>	On success a pointer to a null-terminated string is returned. Do not dealloc or free this string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. It is an error if operator dw_op_number is not a DW_MACRO_define, DW_MACRO_undef, DW_MACRO_define_strp, DW_MACRO_undef_strp, DW_MACRO_undef_sup, DW_MACRO_undef_strx, or DW_MACRO_define_strx,

9.16.2.5 dwarf_get_macro_import()

```
DW_API int dwarf_get_macro_import (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_target_offset,
    Dwarf_Error * dw_error )
```

Get Macro import.

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	Valid values are 0 through dw_macro_ops_count_out-1.
<i>dw_target_offset</i>	Returns the offset in the imported section.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. It is an error if the operator is not DW_MACRO_import or DW_MACRO_import_sup.

9.16.2.6 dwarf_get_macro_op()

```
DW_API int dwarf_get_macro_op (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_op_start_section_offset,
    Dwarf_Half * dw_macro_operator,
    Dwarf_Half * dw_forms_count,
    const Dwarf_Small ** dw_formcode_array,
    Dwarf_Error * dw_error )
```

Access macro operation details of a single operation.

Useful for printing basic data about the operation.

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	valid values are 0 through <i>dw_macro_ops_count_out</i> -1.
<i>dw_op_start_section_offset</i>	On success returns the section offset of this operator.
<i>dw_macro_operator</i>	On success returns the the macro operator itself, for example DW_MACRO_define.
<i>dw_forms_count</i>	On success returns the number of forms in the formcode array.
<i>dw_formcode_array</i>	On success returns a pointer to the formcode array of operand forms.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.16.2.7 dwarf_get_macro_startend_file()

```
DW_API int dwarf_get_macro_startend_file (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_line_number,
    Dwarf_Unsigned * dw_name_index_to_line_tab,
    const char ** dw_src_file_name,
    Dwarf_Error * dw_error )
```

Get Macro start end.

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	Valid values are 0 through <i>dw_macro_ops_count_out</i> -1. The op number must be for a start/end.
<i>dw_line_number</i>	If end_file nothing is returned here. If start_file on success returns the line number of the source line of the include directive.
<i>dw_name_index_to_line_tab</i>	If end_file nothing is returned here. If start_file on success returns the file name index in the line table file names table.
<i>dw_src_file_name</i>	If end_file nothing is returned here. If start_file on success returns a pointer to the null-terminated source file name. Do not free or dealloc this string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. It is an error if the operator is not DW_MACRO_start_file or DW_MACRO_end_file.

9.16.2.8 dwarf_macro_context_head()

```
DW_API int dwarf_macro_context_head (
    Dwarf_Macro_Context dw_mc,
    Dwarf_Half * dw_version,
    Dwarf_Unsigned * dw_mac_offset,
```

```

Dwarf_Unsigned * dw_mac_len,
Dwarf_Unsigned * dw_mac_header_len,
unsigned int * dw_flags,
Dwarf_Bool * dw_has_line_offset,
Dwarf_Unsigned * dw_line_offset,
Dwarf_Bool * dw_has_offset_size_64,
Dwarf_Bool * dw_has_operands_table,
Dwarf_Half * dw_opcode_count,
Dwarf_Error * dw_error )

```

Access the internal details of a Dwarf_Macro_Context.

Not described in detail here. See DWARF5 Standard Section 6.3.1 Macro Information Header page 166.

9.16.2.9 dwarf_macro_context_total_length()

```

DW_API int dwarf_macro_context_total_length (
    Dwarf_Macro_Context dw_context,
    Dwarf_Unsigned * dw_mac_total_len,
    Dwarf_Error * dw_error )

```

Return a macro context total length.

Parameters

<i>dw_context</i>	A pointer to the macro context of interest.
<i>dw_mac_total_len</i>	On success returns the length in bytes of the macro context.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.16.2.10 dwarf_macro_operands_table()

```

DW_API int dwarf_macro_operands_table (
    Dwarf_Macro_Context dw_mc,
    Dwarf_Half dw_index,
    Dwarf_Half * dw_opcode_number,
    Dwarf_Half * dw_operand_count,
    const Dwarf_Small ** dw_operand_array,
    Dwarf_Error * dw_error )

```

Access to the details of the opcode operands table.

Not of much interest to most libdwarf users.

Parameters

<i>dw_mc</i>	The macro context of interest.
<i>dw_index</i>	The opcode operands table index. 0 through dw_opcode_count-1.
<i>dw_opcode_number</i>	On success returns the opcode number in the table.
<i>dw_operand_count</i>	On success returns the number of forms for that dw_index.
<i>dw_operand_array</i>	On success returns the array of op operand forms
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.17 Macro Access: DWARF2-4

Functions

- DW_API char * [dwarf_find_macro_value_start](#) (char *dw_macro_string)
Return a pointer to the value part of a macro.
- DW_API int [dwarf_get_macro_details](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Off](#) dw_macro_offset, [Dwarf_Unsigned](#) dw_maximum_count, [Dwarf_Signed](#) *dw_entry_count, [Dwarf_Macro_Details](#) **dw_details, [Dwarf_Error](#) *dw_error)
Getting .debug_macinfo macro details.

9.17.1 Detailed Description

Reading the .debug_macinfo section.

The section is rarely used since it takes a lot of disk space. DWARF5 has much more compact macro data (in section .debug_macro).

For an example see

See also

[Reading .debug_macinfo \(DWARF2-4\)](#) An example reading .debug_macinfo

9.17.2 Function Documentation

9.17.2.1 dwarf_find_macro_value_start()

```
DW_API char * dwarf_find_macro_value_start (
    char * dw_macro_string )
```

Return a pointer to the value part of a macro.

This function Works for all versions, DWARF2-DWARF5

Parameters

<i>dw_macro_string</i>	The macro string passed in should be properly formatted with a name, a space, and then the value portion (whether a function-like macro or not function-like).
------------------------	--

Returns

On success it returns a pointer to the value portion of the macro. On failure it returns a pointer to a NUL byte (so a zero-length string).

9.17.2.2 dwarf_get_macro_details()

```
DW_API int dwarf_get_macro_details (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_macro_offset,
    Dwarf_Unsigned dw_maximum_count,
    Dwarf_Signed * dw_entry_count,
    Dwarf_Macro_Details ** dw_details,
    Dwarf_Error * dw_error )
```

Getting .debug_machinfo macro details.

[An example calling this function](#)

See also

[Reading .debug_machinfo \(DWARF2-4\)](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_macro_offset</i>	The offset in the section you wish to start from.
<i>dw_maximum_count</i>	Pass in a count to ensure we will not allocate an excessive amount (guarding against a
<i>dw_entry_count</i>	On success returns a count of the macro operations in a CU macro set.
<i>dw_details</i>	On success returns a pointer to an array of struct DW_Macro_Details_s .
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLX_OK etc.

9.18 Stack Frame Access

Functions

- DW_API int [dwarf_get_fde_list](#) (Dwarf_Debug dw_dbg, Dwarf_Cie **dw_cie_data, Dwarf_Signed *dw_cie↵_element_count, Dwarf_Fde **dw_fde_data, Dwarf_Signed *dw_fde_element_count, Dwarf_Error *dw_↵error)
Get lists of .debug_frame FDEs and CIEs.
- DW_API int [dwarf_get_fde_list_eh](#) (Dwarf_Debug dw_dbg, Dwarf_Cie **dw_cie_data, Dwarf_Signed *dw_↵_cie_element_count, Dwarf_Fde **dw_fde_data, Dwarf_Signed *dw_fde_element_count, Dwarf_Error *dw_error)
Get lists of .eh_frame FDEs and CIEs.
- DW_API void [dwarf_dealloc_fde_cie_list](#) (Dwarf_Debug dw_dbg, Dwarf_Cie *dw_cie_data, Dwarf_Signed dw_cie_element_count, Dwarf_Fde *dw_fde_data, Dwarf_Signed dw_fde_element_count)
Release storage associated with FDE and CIE arrays.
- DW_API int [dwarf_get_fde_range](#) (Dwarf_Fde dw_fde, Dwarf_Addr *dw_low_pc, Dwarf_Unsigned *dw_↵func_length, Dwarf_Small **dw_fde_bytes, Dwarf_Unsigned *dw_fde_byte_length, Dwarf_Off *dw_cie_↵offset, Dwarf_Signed *dw_cie_index, Dwarf_Off *dw_fde_offset, Dwarf_Error *dw_error)
Return the FDE data for a single FDE.

- DW_API int `dwarf_get_fde_exception_info` (Dwarf_Fde dw_fde, Dwarf_Signed *dw_offset_into_exception_↵_tables, Dwarf_Error *dw_error)
IRIX only access to C++ destructor tables.
- DW_API int `dwarf_get_cie_of_fde` (Dwarf_Fde dw_fde, Dwarf_Cie *dw_cie_returned, Dwarf_Error *dw_↵error)
Given FDE get CIE.
- DW_API int `dwarf_get_cie_info_b` (Dwarf_Cie dw_cie, Dwarf_Unsigned *dw_bytes_in_cie, Dwarf_Small *dw_version, char **dw_augmenter, Dwarf_Unsigned *dw_code_alignment_factor, Dwarf_Signed *dw_↵_data_alignment_factor, Dwarf_Half *dw_return_address_register_rule, Dwarf_Small **dw_initial_↵instructions, Dwarf_Unsigned *dw_initial_instructions_length, Dwarf_Half *dw_offset_size, Dwarf_Error *dw_error)
Given a CIE get access to its content.
- DW_API int `dwarf_get_cie_index` (Dwarf_Cie dw_cie, Dwarf_Signed *dw_index, Dwarf_Error *dw_error)
Return CIE index given CIE.
- DW_API int `dwarf_get_fde_instr_bytes` (Dwarf_Fde dw_fde, Dwarf_Small **dw_outinstrs, Dwarf_Unsigned *dw_outlen, Dwarf_Error *dw_error)
Return length and pointer to access frame instructions.
- DW_API int `dwarf_get_fde_info_for_all_regs3_b` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Regtable3 *dw_reg_table, Dwarf_Addr *dw_row_pc, Dwarf_Bool *dw_has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)
Return information on frame registers at a given pc value.
- DW_API int `dwarf_get_fde_info_for_all_regs3` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Regtable3 *dw_reg_table, Dwarf_Addr *dw_row_pc, Dwarf_Error *dw_error)
Return information on frame registers at a given pc value.
- DW_API int `dwarf_get_fde_info_for_reg3_c` (Dwarf_Fde dw_fde, Dwarf_Half dw_table_column, Dwarf_Addr dw_pc_requested, Dwarf_Small *dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_register, Dwarf_Signed *dw_offset, Dwarf_Block *dw_block_content, Dwarf_Addr *dw_row_pc_out, Dwarf_Bool *dw_has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)
Return details about a particular pc and register.
- DW_API int `dwarf_get_fde_info_for_reg3_b` (Dwarf_Fde dw_fde, Dwarf_Half dw_table_column, Dwarf_Addr dw_pc_requested, Dwarf_Small *dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_register, Dwarf_Unsigned *dw_offset, Dwarf_Block *dw_block_content, Dwarf_Addr *dw_row_pc_out, Dwarf_Bool *dw_has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)
Return details about a particular pc and register.
- DW_API int `dwarf_get_fde_info_for_cfa_reg3_c` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Small *dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_register, Dwarf_Signed *dw_offset, Dwarf_Block *dw_block, Dwarf_Addr *dw_row_pc_out, Dwarf_Bool *dw_↵has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)
Get the value of the CFA for a particular pc value.
- DW_API int `dwarf_get_fde_info_for_cfa_reg3_b` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Small *dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_register, Dwarf_Unsigned *dw_offset, Dwarf_Block *dw_block, Dwarf_Addr *dw_row_pc_out, Dwarf_Bool *dw_↵_has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)
Get the value of the CFA for a particular pc value.
- DW_API int `dwarf_get_fde_for_die` (Dwarf_Debug dw_dbg, Dwarf_Die dw_subr_die, Dwarf_Fde *dw_↵returned_fde, Dwarf_Error *dw_error)
Get the fde given DW_AT_MIPS_fde in a DIE.
- DW_API int `dwarf_get_fde_n` (Dwarf_Fde *dw_fde_data, Dwarf_Unsigned dw_fde_index, Dwarf_Fde *dw_↵returned_fde, Dwarf_Error *dw_error)
Retrieve an FDE from an FDE table.
- DW_API int `dwarf_get_fde_at_pc` (Dwarf_Fde *dw_fde_data, Dwarf_Addr dw_pc_of_interest, Dwarf_Fde *dw_returned_fde, Dwarf_Addr *dw_lopc, Dwarf_Addr *dw_hipc, Dwarf_Error *dw_error)
Retrieve an FDE given a pc.

- DW_API int [dwarf_get_cie_augmentation_data](#) (Dwarf_Cie dw_cie, Dwarf_Small **dw_augdata, Dwarf_Unsigned *dw_augdata_len, Dwarf_Error *dw_error)
Return .eh_frame CIE augmentation data.
- DW_API int [dwarf_get_fde_augmentation_data](#) (Dwarf_Fde dw_fde, Dwarf_Small **dw_augdata, Dwarf_Unsigned *dw_augdata_len, Dwarf_Error *dw_error)
Return .eh_frame FDE augmentation data.
- DW_API int [dwarf_expand_frame_instructions](#) (Dwarf_Cie dw_cie, Dwarf_Small *dw_instructionspointer, Dwarf_Unsigned dw_length_in_bytes, Dwarf_Frame_Instr_Head *dw_head, Dwarf_Unsigned *dw_instr_↵ count, Dwarf_Error *dw_error)
Expands CIE or FDE instructions for detailed examination. Called for CIE initial instructions and FDE instructions. Call [dwarf_get_fde_instr_bytes\(\)](#) or [dwarf_get_cie_info_b\(\)](#) to get the initial instruction bytes and instructions byte count you wish to expand.
- DW_API int [dwarf_get_frame_instruction](#) (Dwarf_Frame_Instr_Head dw_head, Dwarf_Unsigned dw_↵ instr_index, Dwarf_Unsigned *dw_instr_offset_in_instrs, Dwarf_Small *dw_cfa_operation, const char **dw_fields_description, Dwarf_Unsigned *dw_u0, Dwarf_Unsigned *dw_u1, Dwarf_Signed *dw_s0, Dwarf_Signed *dw_s1, Dwarf_Unsigned *dw_code_alignment_factor, Dwarf_Signed *dw_data_alignment_↵ _factor, Dwarf_Block *dw_expression_block, Dwarf_Error *dw_error)
Return information about a single instruction Fields_description means a sequence of up to three letters including u,s,r,c,d,b, terminated by NUL byte. It is a string but we test individual bytes instead of using string compares. Do not free any of the returned values.
- DW_API int [dwarf_get_frame_instruction_a](#) (Dwarf_Frame_Instr_Head dw_↵, Dwarf_Unsigned dw_↵ instr_index, Dwarf_Unsigned *dw_instr_offset_in_instrs, Dwarf_Small *dw_cfa_operation, const char **dw_fields_description, Dwarf_Unsigned *dw_u0, Dwarf_Unsigned *dw_u1, Dwarf_Unsigned *dw_u2, Dwarf_Signed *dw_s0, Dwarf_Signed *dw_s1, Dwarf_Unsigned *dw_code_alignment_factor, Dwarf_Signed *dw_data_alignment_factor, Dwarf_Block *dw_expression_block, Dwarf_Error *dw_error)
Expands CIE or FDE instructions for detailed examination. Called for CIE initial instructions and FDE instructions. This is the same as [dwarf_get_frame_instruction\(\)](#) except that it adds a dw_u2 field which contains an address-space identifier if the letter a appears in dw_fields_description. The dw_u2 field is non-standard and only applies to Heterogeneous Debugging frame instructions defined by LLVM (DW_CFA_LLVM_def_aspace_cfa and DW_CFA_↵ LLVM_def_aspace_cfa_sf)
- DW_API void [dwarf_dealloc_frame_instr_head](#) (Dwarf_Frame_Instr_Head dw_head)
Deallocates the frame instruction data in dw_head.
- DW_API int [dwarf_fde_section_offset](#) (Dwarf_Debug dw_dbg, Dwarf_Fde dw_in_fde, Dwarf_Off *dw_fde_off, Dwarf_Off *dw_cie_off, Dwarf_Error *dw_error)
Return FDE and CIE offsets from debugging info.
- DW_API int [dwarf_cie_section_offset](#) (Dwarf_Debug dw_dbg, Dwarf_Cie dw_in_cie, Dwarf_Off *dw_cie_off, Dwarf_Error *dw_error)
Use to print CIE offsets from debugging info.
- DW_API Dwarf_Half [dwarf_set_frame_rule_table_size](#) (Dwarf_Debug dw_dbg, Dwarf_Half dw_value)
Frame Rule Table Size [Invariants for setting frame registers](#) .
- DW_API Dwarf_Half [dwarf_set_frame_rule_initial_value](#) (Dwarf_Debug dw_dbg, Dwarf_Half dw_value)
Frame Rule Initial Value.
- DW_API Dwarf_Half [dwarf_set_frame_cfa_value](#) (Dwarf_Debug dw_dbg, Dwarf_Half dw_value)
Frame CFA Column [Invariants for setting frame registers](#) .
- DW_API Dwarf_Half [dwarf_set_frame_same_value](#) (Dwarf_Debug dw_dbg, Dwarf_Half dw_value)
Frame Same Value Default [Invariants for setting frame registers](#) .
- DW_API Dwarf_Half [dwarf_set_frame_undefined_value](#) (Dwarf_Debug dw_dbg, Dwarf_Half dw_value)
Frame Undefined Value Default [Invariants for setting frame registers](#) .

9.18.1 Detailed Description

Use to access DWARF2-5 .debug_frame and GNU .eh_frame sections. Does not evaluate frame instructions, but provides detailed data so it is possible do that yourself.

9.18.2 Function Documentation

9.18.2.1 dwarf_cie_section_offset()

```
DW_API int dwarf_cie_section_offset (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie dw_in_cie,
    Dwarf_Off * dw_cie_off,
    Dwarf_Error * dw_error )
```

Use to print CIE offsets from debugging info.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_in_cie</i>	Pass in the CIE of interest.
<i>dw_cie_off</i>	On success returns the section offset of the CIE.
<i>dw_error</i>	Error return details

Returns

Returns DW_DLV_OK etc.

9.18.2.2 dwarf_dealloc_fde_cie_list()

```
DW_API void dwarf_dealloc_fde_cie_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie * dw_cie_data,
    Dwarf_Signed dw_cie_element_count,
    Dwarf_Fde * dw_fde_data,
    Dwarf_Signed dw_fde_element_count )
```

Release storage associated with FDE and CIE arrays.

Applies to .eh_frame and .debug_frame lists.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug used in the list setup.
<i>dw_cie_data</i>	As returned from the list setup call.
<i>dw_cie_element_count</i>	
<i>dw_fde_data</i>	As returned from the list setup call.
<i>dw_fde_element_count</i>	As returned from the list setup call.

On return the pointers passed in *dw_cie_data* and *dw_fde_data* should be zeroed by the caller as they are then stale pointers.

9.18.2.3 dwarf_dealloc_frame_instr_head()

```
DW_API void dwarf_dealloc_frame_instr_head (
```

```
Dwarf_Frame_Instr_Head dw_head )
```

Deallocates the frame instruction data in `dw_head`.

Parameters

<i>dw_head</i>	A head pointer. Frees all data created by dwarf_expand_frame_instructions() and makes the head pointer stale. The caller should set to NULL.
----------------	--

9.18.2.4 dwarf_expand_frame_instructions()

```
DW_API int dwarf_expand_frame_instructions (
    Dwarf_Cie dw_cie,
    Dwarf_Small * dw_instructionspointer,
    Dwarf_Unsigned dw_length_in_bytes,
    Dwarf_Frame_Instr_Head * dw_head,
    Dwarf_Unsigned * dw_instr_count,
    Dwarf_Error * dw_error )
```

Expands CIE or FDE instructions for detailed examination. Called for CIE initial instructions and FDE instructions. Call [dwarf_get_fde_instr_bytes\(\)](#) or [dwarf_get_cie_info_b\(\)](#) to get the initial instruction bytes and instructions byte count you wish to expand.

Combined with [dwarf_get_frame_instruction\(\)](#) or [dwarf_get_frame_instruction_a\(\)](#) (the second is like the first but adds an argument for LLVM address space numbers) it enables detailed access to frame instruction fields for evaluation or printing.

Free allocated memory with [dwarf_dealloc_frame_instr_head\(\)](#).

See also

[Using dwarf_expand_frame_instructions](#)

Parameters

<i>dw_cie</i>	The cie relevant to the instructions.
<i>dw_instructionspointer</i>	points to the instructions
<i>dw_length_in_bytes</i>	byte length of the instruction sequence.
<i>dw_head</i>	The address of an allocated <code>dw_head</code>
<i>dw_instr_count</i>	Returns the number of instructions in the byte stream
<i>dw_error</i>	Error return details

Returns

On success returns `DW_DLV_OK`

9.18.2.5 dwarf_fde_section_offset()

```
DW_API int dwarf_fde_section_offset (
    Dwarf_Debug dw_dbg,
```

```

Dwarf_Fde dw_in_fde,
Dwarf_Off * dw_fde_off,
Dwarf_Off * dw_cie_off,
Dwarf_Error * dw_error )

```

Return FDE and CIE offsets from debugging info.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_in_fde</i>	Pass in the FDE of interest.
<i>dw_fde_off</i>	On success returns the section offset of the FDE.
<i>dw_cie_off</i>	On success returns the section offset of the CIE.
<i>dw_error</i>	Error return details

Returns

Returns DW_DLV_OK etc.

9.18.2.6 dwarf_get_cie_augmentation_data()

```

DW_API int dwarf_get_cie_augmentation_data (
    Dwarf_Cie dw_cie,
    Dwarf_Small ** dw_augdata,
    Dwarf_Unsigned * dw_augdata_len,
    Dwarf_Error * dw_error )

```

Return .eh_frame CIE augmentation data.

GNU .eh_frame CIE augmentation information. See Linux Standard Base Core Specification version 3.0 .

See also

<https://gcc.gnu.org/legacy-ml/gcc/2003-12/msg01168.html>

Parameters

<i>dw_cie</i>	The CIE of interest.
<i>dw_augdata</i>	On success returns a pointer to the augmentation data.
<i>dw_augdata_len</i>	On success returns the length in bytes of the augmentation data.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the augmentation data length is zero it returns DW_DLV_NO_ENTRY.

9.18.2.7 dwarf_get_cie_index()

```

DW_API int dwarf_get_cie_index (
    Dwarf_Cie dw_cie,

```

```
Dwarf_Signed * dw_index,
Dwarf_Error * dw_error )
```

Return CIE index given CIE.

Parameters

<i>dw_cie</i>	Pass in the CIE of interest.
<i>dw_index</i>	On success, returns the index (the position of the CIE in the CIE pointer array).
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.8 dwarf_get_cie_info_b()

```
DW_API int dwarf_get_cie_info_b (
    Dwarf_Cie dw_cie,
    Dwarf_Unsigned * dw_bytes_in_cie,
    Dwarf_Small * dw_version,
    char ** dw_augmenter,
    Dwarf_Unsigned * dw_code_alignment_factor,
    Dwarf_Signed * dw_data_alignment_factor,
    Dwarf_Half * dw_return_address_register_rule,
    Dwarf_Small ** dw_initial_instructions,
    Dwarf_Unsigned * dw_initial_instructions_length,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

Given a CIE get access to its content.

Parameters

<i>dw_cie</i>	Pass in the CIE of interest.
<i>dw_bytes_in_cie</i>	On success, returns the length of the CIE in bytes.
<i>dw_version</i>	On success, returns the CIE version number.
<i>dw_augmenter</i>	On success, returns a pointer to the augmentation string (which could be the empty string).
<i>dw_code_alignment_factor</i>	On success, returns a the code_alignment_factor used to interpret CIE/FDE operations.
<i>dw_data_alignment_factor</i>	On success, returns a the data_alignment_factor used to interpret CIE/FDE operations.
<i>dw_return_address_register_rule</i>	On success, returns a register number of the return address register.
<i>dw_initial_instructions</i>	On success, returns a pointer to the bytes of initial_instructions in the CIE.
<i>dw_initial_instructions_length</i>	On success, returns the length in bytes of the initial_instructions.
<i>dw_offset_size</i>	On success, returns the offset_size within this CIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.9 dwarf_get_cie_of_fde()

```
DW_API int dwarf_get_cie_of_fde (
    Dwarf_Fde dw_fde,
    Dwarf_Cie * dw_cie_returned,
    Dwarf_Error * dw_error )
```

Given FDE get CIE.

Parameters

<i>dw_fde</i>	The FDE of interest.
<i>dw_cie_returned</i>	On success returns a pointer to the applicable CIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.10 dwarf_get_fde_at_pc()

```
DW_API int dwarf_get_fde_at_pc (
    Dwarf_Fde * dw_fde_data,
    Dwarf_Addr dw_pc_of_interest,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Addr * dw_lopc,
    Dwarf_Addr * dw_hipc,
    Dwarf_Error * dw_error )
```

Retrieve an FDE given a pc.

Using binary search this finds the FDE that contains this *dw_pc_of_interest*. That works because libdwarf ensures the array of FDEs is sorted by the low-pc.

See also

[dwarf_get_fde_list](#)

Parameters

<i>dw_fde_data</i>	Pass in a pointer an array of fde pointers.
<i>dw_pc_of_interest</i>	The pc value of interest.
<i>dw_returned_fde</i>	On success a pointer to the applicable FDE is set through the pointer.
<i>dw_lopc</i>	On success a pointer to the low pc in <i>dw_returned_fde</i> is set through the pointer.
<i>dw_hipc</i>	On success a pointer to the high pc (one past the actual last byte address) in <i>dw_returned_fde</i> is set through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK if the dw_pc_of_interest found in some FDE in the array. If no FDE is found containing dw_pc_of_interest DW_DLV_NO_ENTRY is returned.

9.18.2.11 dwarf_get_fde_augmentation_data()

```
DW_API int dwarf_get_fde_augmentation_data (
    Dwarf_Fde dw_fde,
    Dwarf_Small ** dw_augdata,
    Dwarf_Unsigned * dw_augdata_len,
    Dwarf_Error * dw_error )
```

Return .eh_frame FDE augmentation data.

GNU .eh_frame FDE augmentation information. See Linux Standard Base Core Specification version 3.0 .

See also

<https://gcc.gnu.org/legacy-ml/gcc/2003-12/msg01168.html>

Parameters

<i>dw_fde</i>	The FDE of interest.
<i>dw_augdata</i>	On success returns a pointer to the augmentation data.
<i>dw_augdata_len</i>	On success returns the length in bytes of the augmentation data.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the augmentation data length is zero it returns DW_DLV_NO_ENTRY.

9.18.2.12 dwarf_get_fde_exception_info()

```
DW_API int dwarf_get_fde_exception_info (
    Dwarf_Fde dw_fde,
    Dwarf_Signed * dw_offset_into_exception_tables,
    Dwarf_Error * dw_error )
```

IRIX only access to C++ destructor tables.

This applies only to IRIX C++ destructor information which was never documented and is unlikely to be of interest.

9.18.2.13 dwarf_get_fde_for_die()

```
DW_API int dwarf_get_fde_for_die (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_subr_die,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Error * dw_error )
```

Get the fde given DW_AT_MIPS_fde in a DIE.

This is essentially useless as only SGI/MIPS compilers from the 1990's had DW_AT_MIPS_fde in DW_TAG_↵ subprogram DIEs and this relies on that attribute to work.

9.18.2.14 dwarf_get_fde_info_for_all_regs3()

```
DW_API int dwarf_get_fde_info_for_all_regs3 (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Regtable3 * dw_reg_table,
    Dwarf_Addr * dw_row_pc,
    Dwarf_Error * dw_error )
```

Return information on frame registers at a given pc value.

Identical to [dwarf_get_fde_info_for_all_regs3_b\(\)](#) except that this doesn't output dw_has_more_rows and dw_subsequent_pc.

If you need to iterate through all rows of the FDE, consider switching to [dwarf_get_fde_info_for_all_regs3_b\(\)](#) as it is more efficient.

9.18.2.15 dwarf_get_fde_info_for_all_regs3_b()

```
DW_API int dwarf_get_fde_info_for_all_regs3_b (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Regtable3 * dw_reg_table,
    Dwarf_Addr * dw_row_pc,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

Return information on frame registers at a given pc value.

An FDE at a given pc (code address) This function is new in October 2023 version 0.9.0.

Parameters

<i>dw_fde</i>	Pass in the FDE of interest.
<i>dw_pc_requested</i>	Pass in a pc (code) address inside that FDE.
<i>dw_reg_table</i>	On success, returns a pointer to a struct given the frame state.
<i>dw_row_pc</i>	On success returns the address of the row of frame data which may be a few counts off of the pc requested.
<i>dw_has_more_rows</i>	On success returns FALSE if there are no more rows, otherwise returns TRUE.
<i>dw_subsequent_pc</i>	On success this returns the address of the next pc for which there is a register row, making access to all the rows in sequence much more efficient than just adding 1 to a pc value.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK if the dw_pc_requested is in the FDE passed in and there is some applicable row in the table.

9.18.2.16 dwarf_get_fde_info_for_cfa_reg3_b()

```
DW_API int dwarf_get_fde_info_for_cfa_reg3_b (
```

```

Dwarf_Fde dw_fde,
Dwarf_Addr dw_pc_requested,
Dwarf_Small * dw_value_type,
Dwarf_Unsigned * dw_offset_relevant,
Dwarf_Unsigned * dw_register,
Dwarf_Unsigned * dw_offset,
Dwarf_Block * dw_block,
Dwarf_Addr * dw_row_pc_out,
Dwarf_Bool * dw_has_more_rows,
Dwarf_Addr * dw_subsequent_pc,
Dwarf_Error * dw_error )

```

Get the value of the CFA for a particular pc value.

See also

[dwarf_get_fde_info_for_cfa_reg3_c](#)

This is the earlier version that returns a `dw_offset` of type `Dwarf_Unsigned`, requiring you to cast to `Dwarf_Signed` to work with the value.

9.18.2.17 dwarf_get_fde_info_for_cfa_reg3_c()

```

DW_API int dwarf_get_fde_info_for_cfa_reg3_c (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Signed * dw_offset,
    Dwarf_Block * dw_block,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )

```

Get the value of the CFA for a particular pc value.

See also

[dwarf_get_fde_info_for_reg3_c\(\)](#) has essentially the same return values as [dwarf_get_fde_info_for_reg3_c](#) but it refers to the CFA (which is not part of the register table) so this function has no table column argument.

New in September 2023, release 0.8.0. [dwarf_get_fde_info_for_cfa_reg3_c\(\)](#) returns `dw_offset` as a signed type. [dwarf_get_fde_info_for_cfa_reg3_b\(\)](#) returns `dw_offset` as an unsigned type, requiring the caller to cast to `Dwarf_Signed` before using the value. Both versions exist and operate properly.

If `dw_value_type == DW_EXPR_EXPRESSION` or `DW_EXPR_VALUE_EXPRESSION` `dw_offset` is not set and the caller must evaluate the expression, which usually depends on runtime frame data which cannot be calculated without a stack frame including register values (etc).

9.18.2.18 dwarf_get_fde_info_for_reg3_b()

```
DW_API int dwarf_get_fde_info_for_reg3_b (
    Dwarf_Fde dw_fde,
    Dwarf_Half dw_table_column,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Block * dw_block_content,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

Return details about a particular pc and register.

Identical to [dwarf_get_fde_info_for_reg3_c\(\)](#) except that this returns dw_offset as a Dwarf_Unsigned, which was never appropriate, and required you to cast that value to Dwarf_Signed to use it properly..

Please switch to using [dwarf_get_fde_info_for_reg3_c\(\)](#)

9.18.2.19 dwarf_get_fde_info_for_reg3_c()

```
DW_API int dwarf_get_fde_info_for_reg3_c (
    Dwarf_Fde dw_fde,
    Dwarf_Half dw_table_column,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Signed * dw_offset,
    Dwarf_Block * dw_block_content,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

Return details about a particular pc and register.

It is efficient to iterate across all table_columns (registers) using this function ([dwarf_get_fde_info_for_reg3_c\(\)](#)). Or one could instead call [dwarf_get_fde_info_for_all_regs3\(\)](#) and index into the table it fills in.

If dw_value_type == DW_EXPR_EXPRESSION or DW_EXPR_VALUE_EXPRESSION dw_offset is not set and the caller must evaluate the expression, which usually depends on runtime frame data which cannot be calculated without a stack frame including registers (etc).

[dwarf_get_fde_info_for_reg3_c\(\)](#) is new in libdwarf 0.8.0. It corrects the incorrect type of the dw_offset argument in [dwarf_get_fde_info_for_reg3_b\(\)](#). Both versions operate correctly.

Parameters

<i>dw_fde</i>	Pass in the FDE of interest.
<i>dw_table_column</i>	Pass in the table_column, column numbers in the table are 0 through the number_of_registers-1.

Parameters

<i>dw_pc_requested</i>	Pass in the pc of interest within dw_fde.
<i>dw_value_type</i>	On success returns the value type, a DW_EXPR value. For example DW_EXPR_EXPRESSION
<i>dw_offset_relevant</i>	On success returns FALSE if the offset value is irrelevant, otherwise TRUE.
<i>dw_register</i>	On success returns a register number.
<i>dw_offset</i>	On success returns a signed register offset value when dw_value_type is DW_EXPR_OFFSET or DW_EXPR_VAL_OFFSET.
<i>dw_block_content</i>	On success returns a pointer to a block. For example, for DW_EXPR_EXPRESSION the block gives access to the expression bytes.
<i>dw_row_pc_out</i>	On success returns the address of the actual pc for this register at this pc.
<i>dw_has_more_rows</i>	On success returns FALSE if there are no more rows, otherwise returns TRUE.
<i>dw_subsequent_pc</i>	On success this returns the address of the next pc for which there is a register row, making access to all the rows in sequence much more efficient than just adding 1 to a pc value.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK if the dw_pc_requested is in the FDE passed in and there is a row for the pc in the table.

9.18.2.20 dwarf_get_fde_instr_bytes()

```
DW_API int dwarf_get_fde_instr_bytes (
    Dwarf_Fde dw_fde,
    Dwarf_Small ** dw_outinstrs,
    Dwarf_Unsigned * dw_outlen,
    Dwarf_Error * dw_error )
```

Return length and pointer to access frame instructions.

See also

[dwarf_expand_frame_instructions](#)

[Using dwarf_expand_frame_instructions](#)

Parameters

<i>dw_fde</i>	Pass in the FDE of interest.
<i>dw_outinstrs</i>	On success returns a pointer to the FDE instruction byte stream.
<i>dw_outlen</i>	On success returns the length of the dw_outinstrs byte stream.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.21 dwarf_get_fde_list()

```
DW_API int dwarf_get_fde_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie ** dw_cie_data,
    Dwarf_Signed * dw_cie_element_count,
    Dwarf_Fde ** dw_fde_data,
    Dwarf_Signed * dw_fde_element_count,
    Dwarf_Error * dw_error )
```

Get lists of .debug_frame FDEs and CIEs.

See DWARF5 Section 6.4 Call Frame Information, page 171.

See also

[Extracting fde, cie lists.](#)

The FDE array returned through dw_fde_data is sorted low-to-high by the lowest-pc in each FDE.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_cie_data</i>	On success returns a pointer to an array of pointers to CIE data.
<i>dw_cie_element_count</i>	On success returns a count of the number of elements in the dw_cie_data array.
<i>dw_fde_data</i>	On success returns a pointer to an array of pointers to FDE data.
<i>dw_fde_element_count</i>	On success returns a count of the number of elements in the dw_fde_data array. On success
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.22 dwarf_get_fde_list_eh()

```
DW_API int dwarf_get_fde_list_eh (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie ** dw_cie_data,
    Dwarf_Signed * dw_cie_element_count,
    Dwarf_Fde ** dw_fde_data,
    Dwarf_Signed * dw_fde_element_count,
    Dwarf_Error * dw_error )
```

Get lists of .eh_frame FDEs and CIEs.

The arguments are identical to the previous function, the difference is the section read. The GNU-defined .eh_frame section is very similar to .debug_frame but has unique features that matter when following a stack trace.

See also

[dwarf_get_fde_list](#)

9.18.2.23 dwarf_get_fde_n()

```
DW_API int dwarf_get_fde_n (
    Dwarf_Fde * dw_fde_data,
    Dwarf_Unsigned dw_fde_index,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Error * dw_error )
```

Retrieve an FDE from an FDE table.

This is just like indexing into the FDE array but with extra checking of the pointer and index.

See also

[dwarf_get_fde_list](#)

9.18.2.24 dwarf_get_fde_range()

```
DW_API int dwarf_get_fde_range (
    Dwarf_Fde dw_fde,
    Dwarf_Addr * dw_low_pc,
    Dwarf_Unsigned * dw_func_length,
    Dwarf_Small ** dw_fde_bytes,
    Dwarf_Unsigned * dw_fde_byte_length,
    Dwarf_Off * dw_cie_offset,
    Dwarf_Signed * dw_cie_index,
    Dwarf_Off * dw_fde_offset,
    Dwarf_Error * dw_error )
```

Return the FDE data for a single FDE.

Parameters

<i>dw_fde</i>	The FDE of interest.
<i>dw_low_pc</i>	On success returns the low pc value for the function involved.
<i>dw_func_length</i>	On success returns the length of the function code in bytes.
<i>dw_fde_bytes</i>	On success returns a pointer to the bytes of the FDE.
<i>dw_fde_byte_length</i>	On success returns the length of the <i>dw_fde_bytes</i> area.
<i>dw_cie_offset</i>	On success returns the section offset of the associated CIE.
<i>dw_cie_index</i>	On success returns the CIE index of the associated CIE.
<i>dw_fde_offset</i>	On success returns the section offset of this FDE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.25 dwarf_get_frame_instruction()

```
DW_API int dwarf_get_frame_instruction (
    Dwarf_Frame_Instr_Head dw_head,
```

```

Dwarf_Unsigned dw_instr_index,
Dwarf_Unsigned * dw_instr_offset_in_instrs,
Dwarf_Small * dw_cfa_operation,
const char ** dw_fields_description,
Dwarf_Unsigned * dw_u0,
Dwarf_Unsigned * dw_u1,
Dwarf_Signed * dw_s0,
Dwarf_Signed * dw_s1,
Dwarf_Unsigned * dw_code_alignment_factor,
Dwarf_Signed * dw_data_alignment_factor,
Dwarf_Block * dw_expression_block,
Dwarf_Error * dw_error )

```

Return information about a single instruction Fields_description means a sequence of up to three letters including u,s,r,c,d,b, terminated by NUL byte. It is a string but we test individual bytes instead of using string compares. Do not free any of the returned values.

See also

[Using dwarf_expand_frame_instructions](#)

Parameters

<i>dw_head</i>	A head record
<i>dw_instr_index</i>	index $0 < i < \text{instr_count}$
<i>dw_instr_offset_in_instrs</i>	Returns the byte offset of this instruction within instructions.
<i>dw_cfa_operation</i>	Returns a DW_CFA opcode.
<i>dw_fields_description</i>	Returns a string. Do not free.
<i>dw_u0</i>	May be set to an unsigned value
<i>dw_u1</i>	May be set to an unsigned value
<i>dw_s0</i>	May be set to a signed value
<i>dw_s1</i>	May be set to a signed value
<i>dw_code_alignment_factor</i>	May be set by the call
<i>dw_data_alignment_factor</i>	May be set by the call
<i>dw_expression_block</i>	Pass in a pointer to a block
<i>dw_error</i>	If DW_DLV_ERROR and the argument is non-NULL, returns details about the error.

Returns

On success returns DW_DLV_OK If there is no such instruction with that index it returns DW_DLV_NO_ENTRY
On error it returns DW_DLV_ERROR and if dw_error is NULL it pushes back a pointer to a Dwarf_Error to the caller.

Frame expressions have a variety of formats and content. The dw_fields parameter is set to a pointer to a short string with some set of the letters s,u,r,d,c,b,a which enables determining exactly which values the call sets. Some examples: A *s* in fields[0] means s0 is a signed number.

A *b* somewhere in fields means the expression block passed in has been filled in.

A *r* in fields[1] means u1 is set to a register number.

A *d* in fields means data_alignment_factor is set

A `c` in fields means `code_alignment_factor` is set

An `a` in fields means an LLVM address space value and only exists if calling `dwarf_get_frame_instruction_a()`.

The possible frame instruction formats are:

```
" " "b" "r" "rb" "rr" "rsd" "rsda" "ru" "rua" "rud"
"sd" "u" "uc"
```

are the possible frame instruction formats.

9.18.2.26 dwarf_get_frame_instruction_a()

```
DW_API int dwarf_get_frame_instruction_a (
    Dwarf_Frame_Instr_Head dw_,
    Dwarf_Unsigned dw_instr_index,
    Dwarf_Unsigned * dw_instr_offset_in_instrs,
    Dwarf_Small * dw_cfa_operation,
    const char ** dw_fields_description,
    Dwarf_Unsigned * dw_u0,
    Dwarf_Unsigned * dw_u1,
    Dwarf_Unsigned * dw_u2,
    Dwarf_Signed * dw_s0,
    Dwarf_Signed * dw_s1,
    Dwarf_Unsigned * dw_code_alignment_factor,
    Dwarf_Signed * dw_data_alignment_factor,
    Dwarf_Block * dw_expression_block,
    Dwarf_Error * dw_error )
```

Expands CIE or FDE instructions for detailed examination. Called for CIE initial instructions and FDE instructions. This is the same as `dwarf_get_frame_instruction()` except that it adds a `dw_u2` field which contains an address-space identifier if the letter `a` appears in `dw_fields_description`. The `dw_u2` field is non-standard and only applies to Heterogeneous Debugging frame instructions defined by LLVM (`DW_CFA_LLVM_def_aspace_cfa` and `DW_CFA_LLVM_def_aspace_cfa_sf`)

Where multiplication is called for (via `dw_code_alignment_factor` or `dw_data_alignment_factor`) to produce an offset there is no need to check for overflow as libdwarf has already verified there is no overflow.

The return values are the same except here we have: an `a` in `fields[2]` or `fields[3]` means `dw_u2` is an address-space identifier for the LLVM CFA instruction.

9.18.2.27 dwarf_set_frame_cfa_value()

```
DW_API Dwarf_Half dwarf_set_frame_cfa_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Frame CFA Column [Invariants for setting frame registers](#) .

Parameters

<code>dw_dbg</code>	The Dwarf_Debug of interest.
<code>dw_value</code>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.28 dwarf_set_frame_rule_initial_value()

```
DW_API Dwarf_Half dwarf_set_frame_rule_initial_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Frame Rule Initial Value.

[Invariants for setting frame registers](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.29 dwarf_set_frame_rule_table_size()

```
DW_API Dwarf_Half dwarf_set_frame_rule_table_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Frame Rule Table Size [Invariants for setting frame registers](#) .

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.30 dwarf_set_frame_same_value()

```
DW_API Dwarf_Half dwarf_set_frame_same_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Frame Same Value Default [Invariants for setting frame registers](#) .

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.31 dwarf_set_frame_undefined_value()

```
DW_API Dwarf_Half dwarf_set_frame_undefined_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Frame Undefined Value Default [Invariants for setting frame registers](#) .

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.19 Abbreviations Section Details**Functions**

- DW_API int [dwarf_get_abbrev](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_offset, Dwarf_Abbrev *dw_↵ returned_abbrev, Dwarf_Unsigned *dw_length, Dwarf_Unsigned *dw_attr_count, Dwarf_Error *dw_error)
Reading Abbreviation Data.
- DW_API int [dwarf_get_abbrev_tag](#) (Dwarf_Abbrev dw_abbrev, Dwarf_Half *dw_return_tag_number, Dwarf_Error *dw_error)
Get abbreviation tag.
- DW_API int [dwarf_get_abbrev_code](#) (Dwarf_Abbrev dw_abbrev, Dwarf_Unsigned *dw_return_code_number, Dwarf_Error *dw_error)
Get Abbreviation Code.
- DW_API int [dwarf_get_abbrev_children_flag](#) (Dwarf_Abbrev dw_abbrev, Dwarf_Signed *dw_return_flag, Dwarf_Error *dw_error)
Get Abbrev Children Flag.
- DW_API int [dwarf_get_abbrev_entry_b](#) (Dwarf_Abbrev dw_abbrev, Dwarf_Unsigned dw_indx, Dwarf_Bool dw_filter_outliers, Dwarf_Unsigned *dw_returned_attr_num, Dwarf_Unsigned *dw_returned_form, Dwarf_Signed *dw_returned_implicit_const, Dwarf_Off *dw_offset, Dwarf_Error *dw_error)
Get Abbrev Entry Details.

9.19.1 Detailed Description

Allows reading section `.debug_abbrev` independently of CUs or DIEs. Normally not done (libdwarf uses it as necessary to access DWARF DIEs and DWARF attributes) unless one is interested in the content of the section.

[About Reading Independently.](#)

9.19.2 Function Documentation

9.19.2.1 `dwarf_get_abbrev()`

```
DW_API int dwarf_get_abbrev (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_offset,
    Dwarf_Abbrev * dw_returned_abbrev,
    Dwarf_Unsigned * dw_length,
    Dwarf_Unsigned * dw_attr_count,
    Dwarf_Error * dw_error )
```

Reading Abbreviation Data.

Normally you never need to call these functions. Calls that involve DIEs do all this for you behind the scenes in the library.

This reads the data for a single abbrev code starting at `dw_offset`. Essentially, opening access to an abbreviation entry.

When libdwarf itself reads abbreviations to access DIEs the offset comes from the Compilation Unit Header `debug_abbrev_offset` field.

See also

[dwarf_next_cu_header_e](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_offset</i>	Pass in the offset where a Debug_Abbrev starts.
<i>dw_returned_abbrev</i>	On success, sets a pointer to a Dwarf_Abbrev through the pointer to allow further access.
<i>dw_length</i>	On success, returns the length of the entire abbreviation block (bytes), useful to calculate the next offset if reading the section independently of any compilation unit.
<i>dw_attr_count</i>	On success, returns the number of attributes in this abbreviation entry.
<i>dw_error</i>	On error <code>dw_error</code> is set to point to the error details.

Returns

The usual value: `DW_DLV_OK` etc. If the abbreviation is a single zero byte it is a null abbreviation. `DW_DLV_OK` is returned.

Close the abbrev by calling `dwarf_dealloc(dbg,*dw_returned_abbrev, DW_DLA_ABBREV)`

9.19.2.2 dwarf_get_abbrev_children_flag()

```
DW_API int dwarf_get_abbrev_children_flag (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Signed * dw_return_flag,
    Dwarf_Error * dw_error )
```

Get Abbrev Children Flag.

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_return_flag</i>	On success returns the flag TRUE (greater than zero) if the DIE referencing the abbreviation has children, else returns FALSE (zero).
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.19.2.3 dwarf_get_abbrev_code()

```
DW_API int dwarf_get_abbrev_code (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Unsigned * dw_return_code_number,
    Dwarf_Error * dw_error )
```

Get Abbreviation Code.

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_return_code_number</i>	Returns the code for this abbreviation, a number assigned to the abbreviation and unique within the applicable CU.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.19.2.4 dwarf_get_abbrev_entry_b()

```
DW_API int dwarf_get_abbrev_entry_b (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Unsigned dw_indx,
    Dwarf_Bool dw_filter_outliers,
    Dwarf_Unsigned * dw_returned_attr_num,
    Dwarf_Unsigned * dw_returned_form,
    Dwarf_Signed * dw_returned_implicit_const,
```

```
Dwarf_Off * dw_offset,
Dwarf_Error * dw_error )
```

Get Abbrev Entry Details.

Most will call with filter_outliers non-zero.

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_indx</i>	Valid dw_index values are 0 through dw_attr_count-1
<i>dw_filter_outliers</i>	Pass non-zero (TRUE) so the function will check for unreasonable abbreviation content and return DW_DLV_ERROR if such found. If zero (FALSE) passed in even a nonsensical attribute number and/or unknown DW_FORM are allowed (used by dwarfdump to report the issue(s)).
<i>dw_returned_attr_num</i>	On success returns the attribute number, such as DW_AT_name
<i>dw_returned_form</i>	On success returns the attribute FORM, such as DW_FORM_uda
<i>dw_returned_implicit_const</i>	On success, if the dw_returned_form is DW_FORM_implicit_const then dw_returned_implicit_const is the implicit const value, but if not implicit const the return value is zero..
<i>dw_offset</i>	On success returns the offset of the start of this attr/form pair in the abbreviation section.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. If the abbreviation code for this Dwarf_Abbrev is 0 it is a null abbreviation, the dw_indx is ignored, and the function returns DW_DLV_NO_ENTRY.

9.19.2.5 dwarf_get_abbrev_tag()

```
DW_API int dwarf_get_abbrev_tag (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Half * dw_return_tag_number,
    Dwarf_Error * dw_error )
```

Get abbreviation tag.

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_return_tag_number</i>	Returns the tag value, for example DW_TAG_compile_unit.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.20 String Section .debug_str Details

Functions

- DW_API int [dwarf_get_str](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Off](#) dw_offset, char **dw_string, [Dwarf_Signed](#) *dw_strlen_of_string, [Dwarf_Error](#) *dw_error)

Reading From a String Section.

9.20.1 Detailed Description

Shows just the section content in detail

9.20.2 Function Documentation

9.20.2.1 dwarf_get_str()

```
DW_API int dwarf_get_str (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_offset,
    char ** dw_string,
    Dwarf_Signed * dw_strlen_of_string,
    Dwarf_Error * dw_error )
```

Reading From a String Section.

[Reading The String Section](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug whose .debug_str section we want to access.
<i>dw_offset</i>	Pass in a string offset. Start at 0, and for the next call pass in dw_offset plus dw_strlen_of_string plus 1.
<i>dw_string</i>	The caller must pass in a valid pointer to a char *. On success returns a pointer to a string from offset dw_offset. Never dealloc or free this string.
<i>dw_strlen_of_string</i>	The caller must pass in a valid pointer to a Dwarf_Signed.

On success returns the strlen() of the string.

Parameters

<i>dw_error</i>	On error dw_error is set to point to the error details.
-----------------	---

Returns

The usual value: DW_DLV_OK etc. If there is no such section it returns DW_DLV_NO_ENTRY. If the `dw_offset` is greater than the section size, or `dw_string` passed in is NULL or `dw_strlen_of_string` is NULL the function returns DW_DLV_ERROR.

9.21 Str_Offsets section details

Functions

- DW_API int [dwarf_open_str_offsets_table_access](#) (Dwarf_Debug dw_dbg, Dwarf_Str_Offsets_Table *dw_table_data, Dwarf_Error *dw_error)
Creates access to a .debug_str_offsets table.
- DW_API int [dwarf_close_str_offsets_table_access](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Error *dw_error)
Close str_offsets access, free table_data.
- DW_API int [dwarf_next_str_offsets_table](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Unsigned *dw_unit_length, Dwarf_Unsigned *dw_unit_length_offset, Dwarf_Unsigned *dw_table_start_offset, Dwarf_Half *dw_entry_size, Dwarf_Half *dw_version, Dwarf_Half *dw_padding, Dwarf_Unsigned *dw_table_value_count, Dwarf_Error *dw_error)
Iterate through the offsets tables.
- DW_API int [dwarf_str_offsets_value_by_index](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Unsigned dw_index_to_entry, Dwarf_Unsigned *dw_entry_value, Dwarf_Error *dw_error)
Access to an individual str offsets table entry.
- DW_API int [dwarf_str_offsets_statistics](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Unsigned *dw_wasted_byte_count, Dwarf_Unsigned *dw_table_count, Dwarf_Error *dw_error)
Reports final wasted-bytes count.

9.21.1 Detailed Description

Shows just the section content in detail. Most library users will never call these, as references to this is handled by the code accessing some Dwarf_Attribute. [Reading The Str_Offsets](#)

9.21.2 Function Documentation

9.21.2.1 dwarf_close_str_offsets_table_access()

```
DW_API int dwarf_close_str_offsets_table_access (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Error * dw_error )
```

Close str_offsets access, free table_data.

See also

[Reading string offsets section data](#)

Parameters

<i>dw_table_data</i>	
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc. If there is no .debug_str_offsets section it returns DW_DLV_NO_ENTRY If it returns DW_DLV_ERROR there is nothing you can do except report the error and, optionally, call dwarf_dealloc_error to dealloc the error content (and then set the *dw_error* to NULL as after the dealloc the pointer is stale)..

9.21.2.2 dwarf_next_str_offsets_table()

```
DW_API int dwarf_next_str_offsets_table (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Unsigned * dw_unit_length,
    Dwarf_Unsigned * dw_unit_length_offset,
    Dwarf_Unsigned * dw_table_start_offset,
    Dwarf_Half * dw_entry_size,
    Dwarf_Half * dw_version,
    Dwarf_Half * dw_padding,
    Dwarf_Unsigned * dw_table_value_count,
    Dwarf_Error * dw_error )
```

Iterate through the offsets tables.

See also

[Reading string offsets section data](#)

Access to the tables starts at offset zero. The library progresses through the next table automatically, keeping track internally to know where it is.

Parameters

<i>dw_table_data</i>	Pass in an open Dwarf_Str_Offsets_Table.
<i>dw_unit_length</i>	On success returns a table unit_length field
<i>dw_unit_length_offset</i>	On success returns the section offset of the unit_length field.
<i>dw_table_start_offset</i>	On success returns the section offset of the array of table entries.
<i>dw_entry_size</i>	On success returns the entry size (4 or 8)
<i>dw_version</i>	On success returns the value in the version field 5.
<i>dw_padding</i>	On success returns the zero value in the padding field.
<i>dw_table_value_count</i>	On success returns the number of table entries, each of size <i>dw_entry_size</i> , in the table.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK Returns DW_DLV_NO_ENTRY if there are no more entries.

9.21.2.3 dwarf_open_str_offsets_table_access()

```
DW_API int dwarf_open_str_offsets_table_access (
    Dwarf_Debug dw_dbg,
    Dwarf_Str_Offsets_Table * dw_table_data,
    Dwarf_Error * dw_error )
```

Creates access to a .debug_str_offsets table.

See also

[Reading string offsets section data](#)

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_table_data</i>	On success returns a pointer to an opaque structure for use in further calls.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK etc. If there is no .debug_str_offsets section it returns DW_DLV_NO_ENTRY

9.21.2.4 dwarf_str_offsets_statistics()

```
DW_API int dwarf_str_offsets_statistics (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Unsigned * dw_wasted_byte_count,
    Dwarf_Unsigned * dw_table_count,
    Dwarf_Error * dw_error )
```

Reports final wasted-bytes count.

Reports the number of tables seen so far. Not very interesting.

Parameters

<i>dw_table_data</i>	Pass in the open table pointer.
<i>dw_wasted_byte_count</i>	Always returns 0 at present.
<i>dw_table_count</i>	On success returns the total number of tables seen so far in the section.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

9.21.2.5 dwarf_str_offsets_value_by_index()

```
DW_API int dwarf_str_offsets_value_by_index (
    Dwarf_Str_Offsets_Table dw_table_data,
```

```
Dwarf_Unsigned dw_index_to_entry,
Dwarf_Unsigned * dw_entry_value,
Dwarf_Error * dw_error )
```

Access to an individual str offsets table entry.

See also

[Reading string offsets section data](#)

Parameters

<i>dw_table_data</i>	Pass in the open table pointer.
<i>dw_index_to_entry</i>	Pass in the entry number, 0 through dw_table_value_count-1 for the active table
<i>dw_entry_value</i>	On success returns the value in that table entry, an offset into a string table.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLX_OK Returns DW_DLX_ERROR if dw_index_to_entry is out of the correct range.

9.22 Dwarf_Error Functions

Functions

- DW_API [Dwarf_Unsigned dwarf_errno](#) ([Dwarf_Error](#) dw_error)
What DW_DLE code does the error have?
- DW_API char * [dwarf_errmsg](#) ([Dwarf_Error](#) dw_error)
What message string is in the error?
- DW_API char * [dwarf_errmsg_by_number](#) ([Dwarf_Unsigned](#) dw_errnum)
What message string is associated with the error number.
- DW_API void [dwarf_error_creation](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Error](#) *dw_error, char *dw_errmsg)
Creating an error. This is very rarely helpful. It lets the library user create a Dwarf_Error and associate any string with that error. Your code could then return DW_DLX_ERROR to your caller when your intent is to let your caller clean up whatever seems wrong.
- DW_API void [dwarf_dealloc_error](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Error](#) dw_error)
Free (dealloc) an Dwarf_Error something created.

9.22.1 Detailed Description

These functions aid in understanding handling.

9.22.2 Function Documentation

9.22.2.1 dwarf_dealloc_error()

```
DW_API void dwarf_dealloc_error (
    Dwarf_Debug dw_dbg,
    Dwarf_Error dw_error )
```

Free (dealloc) an Dwarf_Error something created.

Parameters

<i>dw_dbg</i>	The relevant Dwarf_Debug pointer.
<i>dw_error</i>	A pointer to a Dwarf_Error. The pointer is then stale so you should immediately zero that pointer passed in.

9.22.2.2 dwarf_errmsg()

```
DW_API char * dwarf_errmsg (
    Dwarf_Error dw_error )
```

What message string is in the error?

Parameters

<i>dw_error</i>	The dw_error should be non-null and a valid Dwarf_Error.
-----------------	--

Returns

A string with a message related to the error.

9.22.2.3 dwarf_errmsg_by_number()

```
DW_API char * dwarf_errmsg_by_number (
    Dwarf_Unsigned dw_errornum )
```

What message string is associated with the error number.

Parameters

<i>dw_errornum</i>	The dw_error should be an integer from the DW_DLE set. For example, DW_DLE_DIE_NULL.
--------------------	--

Returns

The generic string describing that error number.

9.22.2.4 dwarf_errno()

```
DW_API Dwarf_Unsigned dwarf_errno (
    Dwarf_Error dw_error )
```

What DW_DLE code does the error have?

Parameters

<i>dw_error</i>	The dw_error should be non-null and a valid Dwarf_Error.
-----------------	--

Returns

A DW_DLE value of some kind. For example: DW_DLE_DIE_NULL.

9.22.2.5 dwarf_error_creation()

```
DW_API void dwarf_error_creation (
    Dwarf_Debug dw_dbg,
    Dwarf_Error * dw_error,
    char * dw_errmsg )
```

Creating an error. This is very rarely helpful. It lets the library user create a Dwarf_Error and associate any string with that error. Your code could then return DW_DLV_ERROR to your caller when your intent is to let your caller clean up whatever seems wrong.

Parameters

<i>dw_dbg</i>	The relevant Dwarf_Debug.
<i>dw_error</i>	a Dwarf_Error is returned through this pointer.
<i>dw_errmsg</i>	The message string you provide.

9.23 Generic dwarf_dealloc Function

Functions

- DW_API void [dwarf_dealloc](#) ([Dwarf_Debug](#) dw_dbg, void *dw_space, [Dwarf_Unsigned](#) dw_type)
The generic dealloc (free) function. It requires you know the correct DW_DLA value to pass in, and in a few cases such is not provided. The functions doing allocations tell you which dealloc to use.

9.23.1 Detailed Description

Works for most dealloc needed.

For easier to use versions see the following

See also

[dwarf_dealloc_attribute](#)
[dwarf_dealloc_die](#)
[dwarf_dealloc_dnames](#)
[dwarf_dealloc_error](#)
[dwarf_dealloc_fde_cie_list](#)
[dwarf_dealloc_frame_instr_head](#)
[dwarf_dealloc_macro_context](#)
[dwarf_dealloc_ranges](#)
[dwarf_dealloc_rnglists_head](#)
[dwarf_dealloc_uncompressed_block](#)
[dwarf_globals_dealloc](#)
[dwarf_gnu_index_dealloc](#)
[dwarf_loc_head_c_dealloc](#)
[dwarf_srclines_dealloc_b](#)

9.23.2 Function Documentation

9.23.2.1 dwarf_dealloc()

```
DW_API void dwarf_dealloc (
    Dwarf_Debug dw_dbg,
    void * dw_space,
    Dwarf_Unsigned dw_type )
```

The generic dealloc (free) function. It requires you know the correct DW_DLA value to pass in, and in a few cases such is not provided. The functions doing allocations tell you which dealloc to use.

Parameters

<i>dw_dbg</i>	Must be a valid open Dwarf_Debug. and must be the dw_dbg that the error was created on. If it is not the dealloc will do nothing.
<i>dw_space</i>	Must be an address returned directly by a libdwarf call that the call specifies as requiring dealloc/free. If it is not a segfault or address fault is possible.
<i>dw_type</i>	Must be a correct naming of the DW_DLA type. If it is not the dealloc will do nothing.

9.24 Access to Section .debug_sup

Functions

- DW_API int dwarf_get_debug_sup (Dwarf_Debug dw_dbg, Dwarf_Half *dw_version, Dwarf_Small *dw_is_supplementary, char **dw_filename, Dwarf_Unsigned *dw_checksum_len, Dwarf_Small **dw_checksum, Dwarf_Error *dw_error)

Return basic .debug_sup section header data.

9.24.1 Detailed Description

9.24.2 Function Documentation

9.24.2.1 dwarf_get_debug_sup()

```
DW_API int dwarf_get_debug_sup (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_version,
    Dwarf_Small * dw_is_supplementary,
    char ** dw_filename,
    Dwarf_Unsigned * dw_checksum_len,
    Dwarf_Small ** dw_checksum,
    Dwarf_Error * dw_error )
```

Return basic .debug_sup section header data.

This returns basic data from the header of a .debug_sup section. See DWARF5 Section 7.3.6, "DWARF Supplementary Object Files"

Other sections present should be normal DWARF5, so normal libdwarf calls should work. We have no existing examples on hand, so it is hard to know what really works.

If there is no such section it returns DW_DLV_NO_ENTRY.

9.25 Fast Access to .debug_names DWARF5

Functions

- DW_API int `dwarf_dnames_header` (`Dwarf_Debug` dw_dbg, `Dwarf_Off` dw_starting_offset, `Dwarf_Dnames_Head` *dw_dn, `Dwarf_Off` *dw_offset_of_next_table, `Dwarf_Error` *dw_error)
Open access to a .debug_names table.
- DW_API void `dwarf_dealloc_dnames` (`Dwarf_Dnames_Head` dw_dn)
Frees all the malloc data associated with dw_dn.
- DW_API int `dwarf_dnames_abbrevtable` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_index, `Dwarf_Unsigned` *dw_abbrev_offset, `Dwarf_Unsigned` *dw_abbrev_code, `Dwarf_Unsigned` *dw_abbrev_tag, `Dwarf_Unsigned` dw_array_size, `Dwarf_Half` *dw_idxattr_array, `Dwarf_Half` *dw_form_array, `Dwarf_Unsigned` *dw_idxattr_count)
Access to the abbrevs table content.
- DW_API int `dwarf_dnames_sizes` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` *dw_comp_unit_count, `Dwarf_Unsigned` *dw_local_type_unit_count, `Dwarf_Unsigned` *dw_foreign_type_unit_count, `Dwarf_Unsigned` *dw_bucket_count, `Dwarf_Unsigned` *dw_name_count, `Dwarf_Unsigned` *dw_abbrev_table_size, `Dwarf_Unsigned` *dw_entry_pool_size, `Dwarf_Unsigned` *dw_augmentation_string_size, char **dw_augmentation_string, `Dwarf_Unsigned` *dw_section_size, `Dwarf_Half` *dw_table_version, `Dwarf_Half` *dw_offset_size, `Dwarf_Error` *dw_error)
Sizes and counts from the debug names table.
- DW_API int `dwarf_dnames_offsets` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` *dw_header_offset, `Dwarf_Unsigned` *dw_cu_table_offset, `Dwarf_Unsigned` *dw_tu_local_offset, `Dwarf_Unsigned` *dw_foreign_tu_offset, `Dwarf_Unsigned` *dw_bucket_offset, `Dwarf_Unsigned` *dw_hashes_offset, `Dwarf_Unsigned` *dw_stringoffsets_offset, `Dwarf_Unsigned` *dw_entryoffsets_offset, `Dwarf_Unsigned` *dw_abbrev_table_offset, `Dwarf_Unsigned` *dw_entry_pool_offset, `Dwarf_Error` *dw_error)
Offsets from the debug names table.
- DW_API int `dwarf_dnames_cu_table` (`Dwarf_Dnames_Head` dw_dn, const char *dw_type, `Dwarf_Unsigned` dw_index_number, `Dwarf_Unsigned` *dw_offset, `Dwarf_Sig8` *dw_sig, `Dwarf_Error` *dw_error)
Each debug names cu list entry one at a time.
- DW_API int `dwarf_dnames_bucket` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_bucket_number, `Dwarf_Unsigned` *dw_index, `Dwarf_Unsigned` *dw_indexcount, `Dwarf_Error` *dw_error)
Access to bucket contents.
- DW_API int `dwarf_dnames_name` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_name_index, `Dwarf_Unsigned` *dw_bucket_number, `Dwarf_Unsigned` *dw_hash_value, `Dwarf_Unsigned` *dw_offset_to_debug_str, char **dw_ptrtostr, `Dwarf_Unsigned` *dw_offset_in_entrypool, `Dwarf_Unsigned` *dw_abbrev_number, `Dwarf_Half` *dw_abbrev_tag, `Dwarf_Unsigned` dw_array_size, `Dwarf_Half` *dw_idxattr_array, `Dwarf_Half` *dw_form_array, `Dwarf_Unsigned` *dw_idxattr_count, `Dwarf_Error` *dw_error)
Retrieve a name table entry.
- DW_API int `dwarf_dnames_entrypool` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_offset_in_entrypool, `Dwarf_Unsigned` *dw_abbrev_code, `Dwarf_Half` *dw_tag, `Dwarf_Unsigned` *dw_value_count, `Dwarf_Unsigned` *dw_index_of_abbrev, `Dwarf_Unsigned` *dw_offset_of_initial_value, `Dwarf_Error` *dw_error)
Return a the set of values from an entrypool entry.
- DW_API int `dwarf_dnames_entrypool_values` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_index_of_abbrev, `Dwarf_Unsigned` dw_offset_in_entrypool_of_values, `Dwarf_Unsigned` dw_arrays_length, `Dwarf_Half` *dw_array_idx_number, `Dwarf_Half` *dw_array_form, `Dwarf_Unsigned` *dw_array_of_offsets, `Dwarf_Sig8` *dw_array_of_signatures, `Dwarf_Bool` *dw_single_cu, `Dwarf_Unsigned` *dw_cu_offset, `Dwarf_Unsigned` *dw_offset_of_next_entrypool, `Dwarf_Error` *dw_error)
Return the value set defined by this entry.

9.25.1 Detailed Description

The section is new in DWARF5 and supersedes `.debug_pubnames` and `.debug_pubtypes` in DWARF2, DWARF3, and DWARF4.

The functions provide a detailed reporting of the content and structure of the table (so one can build one's own search table) but they are not particularly helpful for searching.

A new function (more than one?) would be needed for convenient searching.

9.25.2 Function Documentation

9.25.2.1 `dwarf_dealloc_dnames()`

```
DW_API void dwarf_dealloc_dnames (
    Dwarf_Dnames_Head dw_dn )
```

Frees all the malloc data associated with `dw_dn`.

Parameters

<code>dw_dn</code>	A <code>Dwarf_Dnames_Head</code> pointer. Callers should zero the pointer passed in as soon as possible after this returns as the pointer is then stale.
--------------------	--

9.25.2.2 `dwarf_dnames_abbrevtable()`

```
DW_API int dwarf_dnames_abbrevtable (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_index,
    Dwarf_Unsigned * dw_abbrev_offset,
    Dwarf_Unsigned * dw_abbrev_code,
    Dwarf_Unsigned * dw_abbrev_tag,
    Dwarf_Unsigned dw_array_size,
    Dwarf_Half * dw_idxattr_array,
    Dwarf_Half * dw_form_array,
    Dwarf_Unsigned * dw_idxattr_count )
```

Access to the abbrevs table content.

Of interest mainly to debugging issues with compilers or debuggers.

Parameters

<code>dw_dn</code>	A <code>Dwarf_Dnames_Head</code> pointer.
<code>dw_index</code>	An index (starting at zero) into a table constructed of abbrev data. These indexes are derived from abbrev data and are not in the abbrev data itself.
<code>dw_abbrev_offset</code>	Returns the offset of the abbrev table entry for this names table entry.
<code>dw_abbrev_code</code>	Returns the abbrev code for the abbrev at offset <code>dw_abbrev_offset</code> .
<code>dw_abbrev_tag</code>	Returns the tag for the abbrev at offset <code>dw_abbrev_offset</code> .
<code>dw_array_size</code>	The size you allocated in each of the following two arrays.

Parameters

<i>dw_idxattr_array</i>	Pass in an array you allocated where the function returns and array of index attributes (DW_IDX) for this dw_abbrev_code. The last attribute code in the array is zero.
<i>dw_form_array</i>	Pass in an array you allocated where the function returns and array of forms for this dw_abbrev_code (paralleled to dw_idxattr_array). The last form code in the array is zero.
<i>dw_idxattr_count</i>	Returns the actual idxattribute/form count (including the terminating 0,0 pair. If the array_size passed in is less than this value the array returned is incomplete. Array entries needed. Might be larger than dw_array_size, meaning not all entries could be returned in your arrays.

Returns

Returns DW_DLV_OK on success. If the offset does not refer to a known part of the abbrev table it returns DW_DLV_NO_ENTRY. Never returns DW_DLV_ERROR.

9.25.2.3 dwarf_dnames_bucket()

```
DW_API int dwarf_dnames_bucket (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_bucket_number,
    Dwarf_Unsigned * dw_index,
    Dwarf_Unsigned * dw_indexcount,
    Dwarf_Error * dw_error )
```

Access to bucket contents.

Parameters

<i>dw_dn</i>	The Dwarf_Dnames_Head of interest.
<i>dw_bucket_number</i>	Pass in a bucket number Bucket numbers start at 0.
<i>dw_index</i>	On success returns the index of the appropriate name entry. Name entry indexes start at one, a zero index means the bucket is unused.
<i>dw_indexcount</i>	On success returns the number of name entries in the bucket.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. An out of range dw_index_number gets a return if DW_DLV_NO_ENTRY

9.25.2.4 dwarf_dnames_cu_table()

```
DW_API int dwarf_dnames_cu_table (
    Dwarf_Dnames_Head dw_dn,
    const char * dw_type,
    Dwarf_Unsigned dw_index_number,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Sig8 * dw_sig,
    Dwarf_Error * dw_error )
```

Each debug names cu list entry one at a time.

Indexes to the cu/tu/ tables start at 0.

Some values in `dw_offset` are actually offsets, such as for `DW_IDX_die_offset`. `DW_IDX_compile_unit` and `DW_IDX_type_unit` are indexes into the table specified by `dw_type` and are returned through `dw_offset` field;

Parameters

<i>dw_dn</i>	The table of interest.
<i>dw_type</i>	Pass in the type, "cu" or "tu"
<i>dw_index_number</i>	For "cu" index range is 0 through K-1 For "tu" index range is 0 through T+F-1
<i>dw_offset</i>	Zero if it cannot be determined. (check the return value!).
<i>dw_sig</i>	the Dwarf_Sig8 is filled in with a signature if the TU index is T through T+F-1
<i>dw_error</i>	On error <code>dw_error</code> is set to point to the error details.

Returns

The usual value: `DW_DLV_OK` etc.

9.25.2.5 dwarf_dnames_entrpool()

```
DW_API int dwarf_dnames_entrpool (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_offset_in_entrpool,
    Dwarf_Unsigned * dw_abbrev_code,
    Dwarf_Half * dw_tag,
    Dwarf_Unsigned * dw_value_count,
    Dwarf_Unsigned * dw_index_of_abbrev,
    Dwarf_Unsigned * dw_offset_of_initial_value,
    Dwarf_Error * dw_error )
```

Return a the set of values from an entrpool entry.

Returns the basic data about an entrpool record and enables correct calling of `dwarf_dnames_entrpool_values` (see below). The two-stage approach makes it simple for callers to prepare for the number of values that will be returned by `dwarf_dnames_entrpool_values()`

Parameters

<i>dw_dn</i>	Pass in the debug names table of interest.
<i>dw_offset_in_entrpool</i>	The record offset (in the entry pool table) of the first record of IDX attributes. Starts at zero.
<i>dw_abbrev_code</i>	On success returns the abbrev code of the idx attributes for the pool entry.
<i>dw_tag</i>	On success returns the TAG of the DIE referred to by this entrpool entry.
<i>dw_value_count</i>	On success returns the number of distinct values imply by this entry.
<i>dw_index_of_abbrev</i>	On success returns the index of the abbrev index/form pairs in the abbreviation table.
<i>dw_offset_of_initial_value</i>	On success returns the entry pool offset of the sequence of bytes containing values, such as a CU index or a DIE offset.
<i>dw_error</i>	The usual error detail record

Returns

DW_DLV_OK is returned if the specified name entry exists. DW_DLV_NO_ENTRY is returned if the specified offset is outside the size of the table. DW_DLV_ERROR is returned in case of an internal error or corrupt section content.

9.25.2.6 dwarf_dnames_entrypool_values()

```
DW_API int dwarf_dnames_entrypool_values (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_index_of_abbrev,
    Dwarf_Unsigned dw_offset_in_entrypool_of_values,
    Dwarf_Unsigned dw_arrays_length,
    Dwarf_Half * dw_array_idx_number,
    Dwarf_Half * dw_array_form,
    Dwarf_Unsigned * dw_array_of_offsets,
    Dwarf_Sig8 * dw_array_of_signatures,
    Dwarf_Bool * dw_single_cu,
    Dwarf_Unsigned * dw_cu_offset,
    Dwarf_Unsigned * dw_offset_of_next_entrypool,
    Dwarf_Error * dw_error )
```

Return the value set defined by this entry.

Call here after calling dwarf_dnames_entrypool to provide data to call this function correctly.

This retrieves the index attribute values that identify a names table name.

The caller allocates a set of arrays and the function fills them in. If dw_array_idx_number[n] is DW_IDX_type_hash then dw_array_of_signatures[n] contains the hash. For other IDX values dw_array_of_offsets[n] contains the value being returned.

Parameters

<i>dw_dn</i>	Pass in the debug names table of interest.
<i>dw_index_of_abbrev</i>	Pass in the abbreviation index.
<i>dw_offset_in_entrypool_of_values</i>	Pass in the offset of the values returned by dw_offset_of_initial_value above.
<i>dw_arrays_length</i>	Pass in the array length of each of the following four fields. The dw_value_count returned above is what you need to use.
<i>dw_array_idx_number</i>	Create an array of Dwarf_Half values, dw_arrays_length long, and pass a pointer to the first entry here.
<i>dw_array_form</i>	Create an array of Dwarf_Half values, dw_arrays_length long, and pass a pointer to the first entry here.
<i>dw_array_of_offsets</i>	Create an array of Dwarf_Unsigned values, dw_arrays_length long, and pass a pointer to the first entry here.
<i>dw_array_of_signatures</i>	Create an array of Dwarf_Sig8 structs, dw_arrays_length long, and pass a pointer to the first entry here.
<i>dw_offset_of_next_entrypool</i>	On success returns the offset of the next entrypool. A value here is usable in the next call to dwarf_dnames_entrypool.
<i>dw_single_cu</i>	On success, if it is a single-cu name table there is likely no DW_IDX_compile_unit. So we return TRUE via this flag in such a case.
<i>dw_cu_offset</i>	On success, for a single-cu name table with no DW_IDX_compile_unit this is set to the CU offset from that single CU-table entry.
<i>dw_error</i>	The usual error detail record

Returns

DW_DLV_OK is returned if the specified name entry exists. DW_DLV_NO_ENTRY is returned if the specified offset is outside the size of the table. DW_DLV_ERROR is returned in case of an internal error or corrupt section content.

9.25.2.7 dwarf_dnames_header()

```
DW_API int dwarf_dnames_header (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_starting_offset,
    Dwarf_Dnames_Head * dw_dn,
    Dwarf_Off * dw_offset_of_next_table,
    Dwarf_Error * dw_error )
```

Open access to a .debug_names table.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_starting_offset</i>	Read this section starting at offset zero.
<i>dw_dn</i>	On success returns a pointer to a set of data allowing access to the table.
<i>dw_offset_of_next_table</i>	On success returns Offset just past the end of the the opened table.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. If there is no such table or if dw_starting_offset is past the end of the section it returns DW_DLV_NO_ENTRY.

9.25.2.8 dwarf_dnames_name()

```
DW_API int dwarf_dnames_name (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_name_index,
    Dwarf_Unsigned * dw_bucket_number,
    Dwarf_Unsigned * dw_hash_value,
    Dwarf_Unsigned * dw_offset_to_debug_str,
    char ** dw_ptrtostr,
    Dwarf_Unsigned * dw_offset_in_entrypool,
    Dwarf_Unsigned * dw_abbrev_number,
    Dwarf_Half * dw_abbrev_tag,
    Dwarf_Unsigned dw_array_size,
    Dwarf_Half * dw_idxattr_array,
    Dwarf_Half * dw_form_array,
    Dwarf_Unsigned * dw_idxattr_count,
    Dwarf_Error * dw_error )
```

Retrieve a name table entry.

Retrieve the name and other data from a single name table entry.

Parameters

<i>dw_dn</i>	The table of interest.
<i>dw_name_index</i>	Pass in the desired index, start at one.
<i>dw_bucket_number</i>	On success returns a bucket number, zero if no buckets present.
<i>dw_hash_value</i>	The hash value, all zeros if no hashes present
<i>dw_offset_to_debug_str</i>	The offset to the .debug_str section string.
<i>dw_ptrtostr</i>	if dw_ptrtostr non-null returns a pointer to the applicable string here.
<i>dw_offset_in_entrypool</i>	Returns the offset in the entrypool
<i>dw_abbrev_number</i>	Returned from entrypool.
<i>dw_abbrev_tag</i>	Returned from entrypool abbrev data.
<i>dw_array_size</i>	Size of array you provide to hold DW_IDX index attribute and form numbers. Possibly 10 suffices for practical purposes.
<i>dw_idxattr_array</i>	Array space you provide, for idx attribute numbers (function will initialize it). The final entry in the array will be 0.
<i>dw_form_array</i>	Array you provide, for form numbers (function will initialize it). The final entry in the array will be 0.
<i>dw_idxattr_count</i>	Array entries needed. Might be larger than dw_array_size, meaning not all entries could be returned in your array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. If the index passed in is outside the valid range returns DW_DLV_NO_ENTRY.

9.25.2.9 dwarf_dnames_offsets()

```
DW_API int dwarf_dnames_offsets (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned * dw_header_offset,
    Dwarf_Unsigned * dw_cu_table_offset,
    Dwarf_Unsigned * dw_tu_local_offset,
    Dwarf_Unsigned * dw_foreign_tu_offset,
    Dwarf_Unsigned * dw_bucket_offset,
    Dwarf_Unsigned * dw_hashes_offset,
    Dwarf_Unsigned * dw_stringoffsets_offset,
    Dwarf_Unsigned * dw_entryoffsets_offset,
    Dwarf_Unsigned * dw_abbrev_table_offset,
    Dwarf_Unsigned * dw_entry_pool_offset,
    Dwarf_Error * dw_error )
```

Offsets from the debug names table.

We do not describe these returned values, which refer to the .debug_names section.

The header offset is a section offset. The rest are offsets from the header.

See DWARF5 section 6.1.1 "Lookup By Name"

9.25.2.10 dwarf_dnames_sizes()

```
DW_API int dwarf_dnames_sizes (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned * dw_comp_unit_count,
    Dwarf_Unsigned * dw_local_type_unit_count,
    Dwarf_Unsigned * dw_foreign_type_unit_count,
    Dwarf_Unsigned * dw_bucket_count,
    Dwarf_Unsigned * dw_name_count,
    Dwarf_Unsigned * dw_abbrev_table_size,
    Dwarf_Unsigned * dw_entry_pool_size,
    Dwarf_Unsigned * dw_augmentation_string_size,
    char ** dw_augmentation_string,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Half * dw_table_version,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

Sizes and counts from the debug names table.

We do not describe these returned values. Other than for `dw_dn` and `dw_error` passing pointers you do not care about as NULL is fine. Of course no value can be returned through those passed as NULL.

Any program referencing a names table will need at least a few of these values.

See DWARF5 section 6.1.1 "Lookup By Name" particularly the graph page 139. `dw_comp_unit_count` is K(k), `dw_local_type_unit_count` is T(t), and `dw_foreign_type_unit_count` is F(f).

9.26 Fast Access to a CU given a code address

Functions

- DW_API int `dwarf_get_aranges` (Dwarf_Debug dw_dbg, Dwarf_Arange **dw_aranges, Dwarf_Signed *dw_range_count, Dwarf_Error *dw_error)
Get access to CUs given code addresses.
- DW_API int `dwarf_get_arange` (Dwarf_Arange *dw_aranges, Dwarf_Unsigned dw_range_count, Dwarf_Addr dw_address, Dwarf_Arange *dw_returned_arange, Dwarf_Error *dw_error)
Find a range given a code address.
- DW_API int `dwarf_get_cu_die_offset` (Dwarf_Arange dw_arange, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)
Given an arange return its CU DIE offset.
- DW_API int `dwarf_get_arange_cu_header_offset` (Dwarf_Arange dw_arange, Dwarf_Off *dw_return_cu_header_offset, Dwarf_Error *dw_error)
Given an arange return its CU header offset.
- DW_API int `dwarf_get_arange_info_b` (Dwarf_Arange dw_arange, Dwarf_Unsigned *dw_segment, Dwarf_Unsigned *dw_segment_entry_size, Dwarf_Addr *dw_start, Dwarf_Unsigned *dw_length, Dwarf_Off *dw_cu_die_offset, Dwarf_Error *dw_error)
Get the data in an arange entry.

9.26.1 Detailed Description

9.26.2 Function Documentation

9.26.2.1 dwarf_get_arange()

```
DW_API int dwarf_get_arange (
    Dwarf_Arange * dw_aranges,
    Dwarf_Unsigned dw_arange_count,
    Dwarf_Addr dw_address,
    Dwarf_Arange * dw_returned_arange,
    Dwarf_Error * dw_error )
```

Find a range given a code address.

Parameters

<i>dw_aranges</i>	Pass in a pointer to the first entry in the aranges array of pointers.
<i>dw_arange_count</i>	Pass in the <i>dw_arange_count</i> , the count for the array.
<i>dw_address</i>	Pass in the code address of interest.
<i>dw_returned_arange</i>	On success, returns the particular arange that holds that address.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if there is no such code address present in the section.

9.26.2.2 dwarf_get_arange_cu_header_offset()

```
DW_API int dwarf_get_arange_cu_header_offset (
    Dwarf_Arange dw_arange,
    Dwarf_Off * dw_return_cu_header_offset,
    Dwarf_Error * dw_error )
```

Given an arange return its CU header offset.

Parameters

<i>dw_arange</i>	The specific arange of interest.
<i>dw_return_cu_header_offset</i>	The CU header offset (in <i>.debug_info</i>) applicable to this arange.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.26.2.3 dwarf_get_arange_info_b()

```
DW_API int dwarf_get_arange_info_b (
    Dwarf_Arange dw_arange,
    Dwarf_Unsigned * dw_segment,
    Dwarf_Unsigned * dw_segment_entry_size,
    Dwarf_Addr * dw_start,
    Dwarf_Unsigned * dw_length,
    Dwarf_Off * dw_cu_die_offset,
    Dwarf_Error * dw_error )
```

Get the data in an arange entry.

Parameters

<i>dw_arange</i>	The specific arange of interest.
<i>dw_segment</i>	On success and if <i>segment_entry_size</i> is non-zero this returns the segment number from the arange.
<i>dw_segment_entry_size</i>	On success returns the segment entry size from the arange.
<i>dw_start</i>	On success returns the low address this arange refers to.
<i>dw_length</i>	On success returns the length, in bytes of the code area this arange refers to.
<i>dw_cu_die_offset</i>	On success returns the .debug_info section offset the arange refers to.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.26.2.4 dwarf_get_aranges()

```
DW_API int dwarf_get_aranges (
    Dwarf_Debug dw_dbg,
    Dwarf_Arange ** dw_aranges,
    Dwarf_Signed * dw_arange_count,
    Dwarf_Error * dw_error )
```

Get access to CUs given code addresses.

This intended as a fast-access to tie code addresses to CU dies. The data is in the .debug_aranges section. which may appear in DWARF2,3,4, or DWARF5.

See also

[Reading an aranges section](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_aranges</i>	On success returns a pointer to an array of Dwarf_Arange pointers.
<i>dw_arange_count</i>	On success returns a count of the length of the array.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if there is no such section.

9.26.2.5 dwarf_get_cu_die_offset()

```
DW_API int dwarf_get_cu_die_offset (
    Dwarf_Arange dw_arange,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Given an arange return its CU DIE offset.

Parameters

<i>dw_arange</i>	The specific arange of interest.
<i>dw_return_offset</i>	The CU DIE offset (in .debug_info) applicable to this arange..
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27 Fast Access to .debug_pubnames and more.**Macros**

- #define **DW_GL_GLOBALS** 0 /* .debug_pubnames and .debug_names */
- #define **DW_GL_PUBTYPES** 1 /* .debug_pubtypes */
- #define **DW_GL_FUNCS** 2 /* .debug_funcnames */
- #define **DW_GL_TYPES** 3 /* .debug_tynames */
- #define **DW_GL_VARS** 4 /* .debug_varnames */
- #define **DW_GL_WEAKS** 5 /* .debug_weaknames */

Functions

- DW_API int **dwarf_get_globals** (Dwarf_Debug dw_dbg, Dwarf_Global **dw_globals, Dwarf_Signed *dw_↔ number_of_globals, Dwarf_Error *dw_error)
Global name space operations, .debug_pubnames access.
- DW_API int **dwarf_get_pubtypes** (Dwarf_Debug dw_dbg, Dwarf_Global **dw_pubtypes, Dwarf_Signed *dw_number_of_pubtypes, Dwarf_Error *dw_error)
Global debug types access.
- DW_API int **dwarf_globals_by_type** (Dwarf_Debug dw_dbg, int dw_requested_section, Dwarf_Global **dw_↔ _contents, Dwarf_Signed *dw_count, Dwarf_Error *dw_error)
Allocate Any Fast Access DWARF2-DWARF4.
- DW_API void **dwarf_globals_dealloc** (Dwarf_Debug dw_dbg, Dwarf_Global *dw_global_like, Dwarf_Signed dw_count)
Dealloc the Dwarf_Global data.
- DW_API int **dwarf_globname** (Dwarf_Global dw_global, char **dw_returned_name, Dwarf_Error *dw_error)

Return the name of a global-like data item.

- DW_API int [dwarf_global_die_offset](#) (Dwarf_Global dw_global, Dwarf_Off *dw_die_offset, Dwarf_Error *dw_error)

Return the DIE offset of a global data item.

- DW_API int [dwarf_global_cu_offset](#) (Dwarf_Global dw_global, Dwarf_Off *dw_cu_header_offset, Dwarf_Error *dw_error)

Return the CU header data of a global data item.

- DW_API int [dwarf_global_name_offsets](#) (Dwarf_Global dw_global, char **dw_returned_name, Dwarf_Off *dw_die_offset, Dwarf_Off *dw_cu_die_offset, Dwarf_Error *dw_error)

Return the name and offsets of a global entry.

- DW_API Dwarf_Half [dwarf_global_tag_number](#) (Dwarf_Global dw_global)

Return the DW_TAG number of a global entry.

- DW_API int [dwarf_get_globals_header](#) (Dwarf_Global dw_global, int *dw_category, Dwarf_Off *dw_offset↵_pub_header, Dwarf_Unsigned *dw_length_size, Dwarf_Unsigned *dw_length_pub, Dwarf_Unsigned *dw↵_version, Dwarf_Unsigned *dw_header_info_offset, Dwarf_Unsigned *dw_info_length, Dwarf_Error *dw↵error)

For more complete globals printing.

- DW_API int [dwarf_return_empty_pubnames](#) (Dwarf_Debug dw_dbg, int dw_flag)

A flag for dwarfdump on pubnames, pubtypes etc.

9.27.1 Detailed Description

Pubnames and Pubtypes overview

These functions each read one of a set of sections designed for fast access by name, but they are not always emitted as they each have somewhat limited and inflexible capabilities. So you may not see many of these.

All have the same set of functions with a name reflecting the specific object section involved. Only the first, of type Dwarf_Global, is documented here in full detail as the others do the same jobs just each for their applicable object section..

9.27.2 Function Documentation

9.27.2.1 dwarf_get_globals()

```
DW_API int dwarf_get_globals (
    Dwarf_Debug dw_dbg,
    Dwarf_Global ** dw_globals,
    Dwarf_Signed * dw_number_of_globals,
    Dwarf_Error * dw_error )
```

Global name space operations, .debug_pubnames access.

This accesses .debug_pubnames and .debug_names sections. Section .debug_pubnames is defined in DWARF2, DWARF3, and DWARF4. Section .debug_names is defined in DWARF5 and contains lots of information, but only the part of the wealth of information that this interface allows can be retrieved here. See [dwarf_dnames_header\(\)](#) for access to all. debug_names data.

The code here, as of 0.4.3, September 3 2022, returns data from either section.

See also

[Using dwarf_get_globals\(\)](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_globals</i>	On success returns an array of pointers to opaque structs..
<i>dw_number_of_globals</i>	On success returns the number of entries in the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is not present.

9.27.2.2 dwarf_get_globals_header()

```
DW_API int dwarf_get_globals_header (
    Dwarf_Global dw_global,
    int * dw_category,
    Dwarf_Off * dw_offset_pub_header,
    Dwarf_Unsigned * dw_length_size,
    Dwarf_Unsigned * dw_length_pub,
    Dwarf_Unsigned * dw_version,
    Dwarf_Unsigned * dw_header_info_offset,
    Dwarf_Unsigned * dw_info_length,
    Dwarf_Error * dw_error )
```

For more complete globals printing.

For each CU represented in .debug_pubnames, etc, there is a .debug_pubnames header. For any given Dwarf_Global this returns the content of the applicable header. This does not include header information from any .debug_names headers.

The function declaration changed at version 0.6.0.

9.27.2.3 dwarf_get_pubtypes()

```
DW_API int dwarf_get_pubtypes (
    Dwarf_Debug dw_dbg,
    Dwarf_Global ** dw_pubtypes,
    Dwarf_Signed * dw_number_of_pubtypes,
    Dwarf_Error * dw_error )
```

Global debug_types access.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_pubtypes</i>	On success returns an array of pointers to opaque structs..
<i>dw_number_of_pubtypes</i>	On success returns the number of entries in the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is not present.

Same function name as 0.5.0 and earlier, but the data type changes to Dwarf_Global

[dwarf_get_pubtypes\(\)](#) is an alternate name for `dwarf_globals_by_type(...,DW_GL_PUBTYPES,...)`.

9.27.2.4 dwarf_global_cu_offset()

```
DW_API int dwarf_global_cu_offset (
    Dwarf_Global dw_global,
    Dwarf_Off * dw_cu_header_offset,
    Dwarf_Error * dw_error )
```

Return the CU header data of a global data item.

A CU header offset is rarely useful.

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_cu_header_offset</i>	On success a the section-global offset of a CU header is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.5 dwarf_global_die_offset()

```
DW_API int dwarf_global_die_offset (
    Dwarf_Global dw_global,
    Dwarf_Off * dw_die_offset,
    Dwarf_Error * dw_error )
```

Return the DIE offset of a global data item.

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_die_offset</i>	On success a the section-global DIE offset of a data item is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.6 dwarf_global_name_offsets()

```
DW_API int dwarf_global_name_offsets (
    Dwarf_Global dw_global,
    char ** dw_returned_name,
    Dwarf_Off * dw_die_offset,
    Dwarf_Off * dw_cu_die_offset,
    Dwarf_Error * dw_error )
```

Return the name and offsets of a global entry.

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_returned_name</i>	On success a pointer to the name (a null-terminated string) is returned.
<i>dw_die_offset</i>	On success a the section-global DIE offset of the global with the name.
<i>dw_cu_die_offset</i>	On success a the section-global offset of the relevant CU DIE is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.7 dwarf_global_tag_number()

```
DW_API Dwarf_Half dwarf_global_tag_number (
    Dwarf_Global dw_global )
```

Return the DW_TAG number of a global entry.

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
------------------	-------------------------------

Returns

If the Dwarf_Global refers to a global from the .debug_names section the return value is the DW_TAG for the DIE in the global entry, for example DW_TAG_subprogram. In case of error or if the section for this global was not .debug_names zero is returned.

9.27.2.8 dwarf_globals_by_type()

```
DW_API int dwarf_globals_by_type (
    Dwarf_Debug dw_dbg,
    int dw_requested_section,
    Dwarf_Global ** dw_contents,
    Dwarf_Signed * dw_count,
    Dwarf_Error * dw_error )
```

Allocate Any Fast Access DWARF2-DWARF4.

This interface new in 0.6.0. Simplifies access by replace dwarf_get_pubtypes, dwarf_get_funcs, dwarf_get_types, dwarfget_vars, and dwarf_get_weakes with a single set of types.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_requested_section</i>	Pass in one of the values DW_GL_GLOBALS through DW_GL_WEAKS to select the section to extract data from.
<i>dw_contents</i>	On success returns an array of pointers to opaque structs.
<i>dw_count</i>	On success returns the number of entries in the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is not present.

9.27.2.9 dwarf_globals_dealloc()

```
DW_API void dwarf_globals_dealloc (
    Dwarf_Debug dw_dbg,
    Dwarf_Global * dw_global_like,
    Dwarf_Signed dw_count )
```

Dealloc the Dwarf_Global data.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_global_like</i>	The array of globals/types/etc data to dealloc (free).
<i>dw_count</i>	The number of entries in the array.

9.27.2.10 dwarf_globname()

```
DW_API int dwarf_globname (
    Dwarf_Global dw_global,
    char ** dw_returned_name,
    Dwarf_Error * dw_error )
```

Return the name of a global-like data item.

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_returned_name</i>	On success a pointer to the name (a null-terminated string) is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.11 dwarf_return_empty_pubnames()

```
DW_API int dwarf_return_empty_pubnames (
    Dwarf_Debug dw_dbg,
    int dw_flag )
```

A flag for dwarfdump on pubnames, pubtypes etc.

Sets a flag in the dbg. Always returns DW_DLV_OK. Applies to all the sections of this kind: pubnames, pubtypes, funcs, typenames, vars, weaks. Ensures empty content (meaning no offset/name tuples, but with a header) for a CU shows up rather than being suppressed.

Primarily useful if one wants to note any pointless header data in the section.

Pubnames and Pubtypes overview

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_flag</i>	Must be the value one.

Returns

Returns DW_DLV_OK. Always.

9.28 Fast Access to GNU .debug_gnu_pubnames

Functions

- DW_API int [dwarf_get_gnu_index_head](#) (Dwarf_Debug dw_dbg, Dwarf_Bool dw_which_section, Dwarf_Gnu_Index_Head *dw_head, Dwarf_Unsigned *dw_index_block_count_out, Dwarf_Error *dw_error)

Access to .debug_gnu_pubnames or .debug_gnu_pubtypes.
- DW_API void [dwarf_gnu_index_dealloc](#) (Dwarf_Gnu_Index_Head dw_head)

Free resources of .debug_gnu_pubnames .debug_gnu_pubtypes.
- DW_API int [dwarf_get_gnu_index_block](#) (Dwarf_Gnu_Index_Head dw_head, Dwarf_Unsigned dw_number, Dwarf_Unsigned *dw_block_length, Dwarf_Half *dw_version, Dwarf_Unsigned *dw_offset_into_debug_info, Dwarf_Unsigned *dw_size_of_debug_info_area, Dwarf_Unsigned *dw_count_of_index_entries, Dwarf_Error *dw_error)

Access a particular block.
- DW_API int [dwarf_get_gnu_index_block_entry](#) (Dwarf_Gnu_Index_Head dw_head, Dwarf_Unsigned dw_blocknumber, Dwarf_Unsigned dw_entrynumber, Dwarf_Unsigned *dw_offset_in_debug_info, const char **dw_name_string, unsigned char *dw_flagbyte, unsigned char *dw_staticorglobal, unsigned char *dw_typeofentry, Dwarf_Error *dw_error)

Access a particular entry of a block.

9.28.1 Detailed Description

Section .debug_gnu_pubnames or .debug_gnu_pubtypes.

This is a section created for and used by the GNU gdb debugger to access DWARF information.

Not part of standard DWARF.

9.28.2 Function Documentation

9.28.2.1 dwarf_get_gnu_index_block()

```
DW_API int dwarf_get_gnu_index_block (
    Dwarf_Gnu_Index_Head dw_head,
    Dwarf_Unsigned dw_number,
    Dwarf_Unsigned * dw_block_length,
    Dwarf_Half * dw_version,
    Dwarf_Unsigned * dw_offset_into_debug_info,
    Dwarf_Unsigned * dw_size_of_debug_info_area,
    Dwarf_Unsigned * dw_count_of_index_entries,
    Dwarf_Error * dw_error )
```

Access a particular block.

Parameters

<i>dw_head</i>	Pass in the Dwarf_Gnu_Index_head interest.
<i>dw_number</i>	Pass in the block number of the block of interest. 0 through dw_index_block_count_out-1.
<i>dw_block_length</i>	On success set to the length of the data in this block, in bytes.
<i>dw_version</i>	On success set to the version number of the block.
<i>dw_offset_into_debug_info</i>	On success set to the offset, in .debug_info, of the data for this block. The returned offset may be outside the bounds of the actual .debug_info section, such a possibility does not cause the function to return DW_DLV_ERROR.
<i>dw_size_of_debug_info_area</i>	On success set to the size in bytes, in .debug_info, of the area this block refers to. The returned dw_dw_size_of_debug_info_area plus dw_offset_into_debug_info may be outside the bounds of the actual .debug_info section, such a possibility does not cause the function to return DW_DLV_ERROR. Use dwarf_get_section_max_offsets_d() to learn the size of .debug_info and optionally other sections as well.
<i>dw_count_of_index_entries</i>	On success set to the count of index entries in this particular block number.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

Returns DW_DLV_OK, DW_DLV_NO_ENTRY (if the section does not exist or is empty), or, in case of an error reading the section, DW_DLV_ERROR.

9.28.2.2 dwarf_get_gnu_index_block_entry()

```
DW_API int dwarf_get_gnu_index_block_entry (
    Dwarf_Gnu_Index_Head dw_head,
    Dwarf_Unsigned dw_blocknumber,
    Dwarf_Unsigned dw_entrynumber,
    Dwarf_Unsigned * dw_offset_in_debug_info,
    const char ** dw_name_string,
    unsigned char * dw_flagbyte,
    unsigned char * dw_staticorglobal,
    unsigned char * dw_typeofentry,
    Dwarf_Error * dw_error )
```

Access a particular entry of a block.

Access to a single entry in a block.

Parameters

<i>dw_head</i>	Pass in the Dwarf_Gnu_Index_head interest.
<i>dw_blocknumber</i>	Pass in the block number of the block of interest. 0 through dw_index_block_count_out-1.
<i>dw_entrynumber</i>	Pass in the entry number of the entry of interest. 0 through dw_count_of_index_entries-1.
<i>dw_offset_in_debug_info</i>	On success set to the offset in .debug_info relevant to this entry.
<i>dw_name_string</i>	On success set to the size in bytes, in .debug_info, of the area this block refersto.
<i>dw_flagbyte</i>	On success set to the entry flag byte content.
<i>dw_staticorglobal</i>	On success set to the entry static/global letter.
<i>dw_typeofentry</i>	On success set to the type of entry.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

Returns DW_DLV_OK, DW_DLV_NO_ENTRY (if the section does not exist or is empty), or, in case of an error reading the section, DW_DLV_ERROR.

9.28.2.3 dwarf_get_gnu_index_head()

```
DW_API int dwarf_get_gnu_index_head (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_which_section,
    Dwarf_Gnu_Index_Head * dw_head,
    Dwarf_Unsigned * dw_index_block_count_out,
    Dwarf_Error * dw_error )
```

Access to .debug_gnu_pubnames or .debug_gnu_pubtypes.

Call this to get access.

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_which_section</i>	Pass in TRUE to access .debug_gnu_pubnames. Pass in FALSE to access .debug_gnu_typednames.
<i>dw_head</i>	On success, set to a pointer to a head record allowing access to all the content of the section.
<i>dw_index_block_count_out</i>	On success, set to a count of the number of blocks of data available.
<i>dw_error</i>	

Returns

Returns DW_DLV_OK, DW_DLV_NO_ENTRY (if the section does not exist or is empty), or, in case of an error reading the section, DW_DLV_ERROR.

9.28.2.4 dwarf_gnu_index_dealloc()

```
DW_API void dwarf_gnu_index_dealloc (
    Dwarf_Gnu_Index_Head dw_head )
```

Free resources of `.debug_gnu_pubnames` `.debug_gnu_pubtypes`.

Call this to deallocate all memory used by `dw_head`.

Parameters

<code>dw_head</code>	Pass in the <code>Dwarf_Gnu_Index_head</code> whose data is to be deallocated.
----------------------	--

9.29 Fast Access to Gdb Index

Functions

- DW_API int `dwarf_gdbindex_header` (`Dwarf_Debug` dw_dbg, `Dwarf_Gdbindex` *dw_gdbindexptr, `Dwarf_Unsigned` *dw_version, `Dwarf_Unsigned` *dw_cu_list_offset, `Dwarf_Unsigned` *dw_types_↵
cu_list_offset, `Dwarf_Unsigned` *dw_address_area_offset, `Dwarf_Unsigned` *dw_symbol_table_offset, `Dwarf_Unsigned` *dw_constant_pool_offset, `Dwarf_Unsigned` *dw_section_size, const char **dw_section_↵
_name, `Dwarf_Error` *dw_error)
Open access to the .gdb_index section.
- DW_API void `dwarf_dealloc_gdbindex` (`Dwarf_Gdbindex` dw_gdbindexptr)
Free (dealloc) all allocated Dwarf_Gdbindex memory It should named dwarf_dealloc_gdbindex.
- DW_API int `dwarf_gdbindex_culist_array` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` *dw_list_↵
length, `Dwarf_Error` *dw_error)
Return the culist array length.
- DW_API int `dwarf_gdbindex_culist_entry` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` dw_↵
entryindex, `Dwarf_Unsigned` *dw_cu_offset, `Dwarf_Unsigned` *dw_cu_length, `Dwarf_Error` *dw_error)
For a CU entry in the list return the offset and length.
- DW_API int `dwarf_gdbindex_types_culist_array` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` *dw_↵
types_list_length, `Dwarf_Error` *dw_error)
Return the types culist array length.
- DW_API int `dwarf_gdbindex_types_culist_entry` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` dw_↵
types_entryindex, `Dwarf_Unsigned` *dw_cu_offset, `Dwarf_Unsigned` *dw_tu_offset, `Dwarf_Unsigned` *dw_↵
_type_signature, `Dwarf_Error` *dw_error)
For a types CU entry in the list returns the offset and length.
- DW_API int `dwarf_gdbindex_addressarea` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` *dw_↵
addressarea_list_length, `Dwarf_Error` *dw_error)
Get access to gdbindex address area.
- DW_API int `dwarf_gdbindex_addressarea_entry` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` dw_↵
_entryindex, `Dwarf_Unsigned` *dw_low_address, `Dwarf_Unsigned` *dw_high_address, `Dwarf_Unsigned`
*dw_cu_index, `Dwarf_Error` *dw_error)
Get an address area value.
- DW_API int `dwarf_gdbindex_symboltable_array` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` *dw_↵
syntab_list_length, `Dwarf_Error` *dw_error)
Get access to the symboltable array.
- DW_API int `dwarf_gdbindex_symboltable_entry` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` dw_↵
entryindex, `Dwarf_Unsigned` *dw_string_offset, `Dwarf_Unsigned` *dw_cu_vector_offset, `Dwarf_Error` *dw_↵
_error)
Access individual syntab entry.
- DW_API int `dwarf_gdbindex_cuvector_length` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` dw_↵
cuvector_offset, `Dwarf_Unsigned` *dw_innercount, `Dwarf_Error` *dw_error)
Get access to a cuvector.

- DW_API int [dwarf_gdbindex_cuvector_inner_attributes](#) ([Dwarf_Gdbindex](#) dw_gdbindexptr, [Dwarf_Unsigned](#) dw_cuvector_offset_in, [Dwarf_Unsigned](#) dw_innerindex, [Dwarf_Unsigned](#) *dw_field_value, [Dwarf_Error](#) *dw_error)

Get access to a cuvector.

- DW_API int [dwarf_gdbindex_cuvector_instance_expand_value](#) ([Dwarf_Gdbindex](#) dw_gdbindexptr, [Dwarf_Unsigned](#) dw_field_value, [Dwarf_Unsigned](#) *dw_cu_index, [Dwarf_Unsigned](#) *dw_symbol_kind, [Dwarf_Unsigned](#) *dw_is_static, [Dwarf_Error](#) *dw_error)

Expand the bit fields in a cuvector entry.

- DW_API int [dwarf_gdbindex_string_by_offset](#) ([Dwarf_Gdbindex](#) dw_gdbindexptr, [Dwarf_Unsigned](#) dw_stringoffset, const char **dw_string_ptr, [Dwarf_Error](#) *dw_error)

Retrieve a symbol name from the index data.

9.29.1 Detailed Description

Section .gdb_index

This is a section created for and used by the GNU gdb debugger to access DWARF information.

Not part of standard DWARF.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Index-Section-Format.html#Index-Section-Format>

Version 8 built by gdb, so type entries are ok as is. Version 7 built by the 'gold' linker and type index entries for a CU must be derived otherwise, the type index is not correct... Earlier versions cannot be read correctly by the functions here.

The functions here make it possible to print the section content in detail, there is no search function here.

9.29.2 Function Documentation

9.29.2.1 dwarf_dealloc_gdbindex()

```
DW_API void dwarf_dealloc_gdbindex (
    Dwarf_Gdbindex dw_gdbindexptr )
```

Free (dealloc) all allocated Dwarf_Gdbindex memory It should named dwarf_dealloc_gdbindex.

Parameters

<i>dw_gdbindexptr</i>	Pass in a valid dw_gdbindexptr and on return assign zero to dw_gdbindexptr as it is stale.
-----------------------	--

9.29.2.2 dwarf_gdbindex_addressarea()

```
DW_API int dwarf_gdbindex_addressarea (
    Dwarf_Gdbindex dw_gdbindexptr,
```

```
Dwarf_Unsigned * dw_addressarea_list_length,
Dwarf_Error * dw_error )
```

Get access to gdbindex address area.

See also

[Reading gdbindex addressarea](#)

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_addressarea_list_length</i>	On success returns the number of entries in the addressarea.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.3 dwarf_gdbindex_addressarea_entry()

```
DW_API int dwarf_gdbindex_addressarea_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_entryindex,
    Dwarf_Unsigned * dw_low_address,
    Dwarf_Unsigned * dw_high_address,
    Dwarf_Unsigned * dw_cu_index,
    Dwarf_Error * dw_error )
```

Get an address area value.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in an index, 0 through dw_addressarea_list_length-1. addressarea.
<i>dw_low_address</i>	On success returns the low address for the entry.
<i>dw_high_address</i>	On success returns the high address for the entry.
<i>dw_cu_index</i>	On success returns the index to the cu for the entry.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.4 dwarf_gdbindex_culist_array()

```
DW_API int dwarf_gdbindex_culist_array (
    Dwarf_Gdbindex dw_gdbindexptr,
```

```
Dwarf_Unsigned * dw_list_length,
Dwarf_Error * dw_error )
```

Return the culist array length.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_list_length</i>	On success returns the array length of the cu list.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.5 dwarf_gdbindex_culist_entry()

```
DW_API int dwarf_gdbindex_culist_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_entryindex,
    Dwarf_Unsigned * dw_cu_offset,
    Dwarf_Unsigned * dw_cu_length,
    Dwarf_Error * dw_error )
```

For a CU entry in the list return the offset and length.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in a number from 0 through dw_list_length-1. If dw_entryindex is too large for the array the function returns DW_DLV_NO_ENTRY.
<i>dw_cu_offset</i>	On success returns the CU offset for this list entry.
<i>dw_cu_length</i>	On success returns the CU length(in bytes) for this list entry.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.6 dwarf_gdbindex_cuvector_inner_attributes()

```
DW_API int dwarf_gdbindex_cuvector_inner_attributes (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_cuvector_offset_in,
    Dwarf_Unsigned dw_innerindex,
    Dwarf_Unsigned * dw_field_value,
    Dwarf_Error * dw_error )
```

Get access to a cuvector.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_cuvector_offset↔ _in</i>	Pass in the value of dw_cuvector_offset
<i>dw_innerindex</i>	Pass in the index of the CU vector in, from 0 through dw_innercount-1.
<i>dw_field_value</i>	On success returns a field of bits. To expand the bits call dwarf_gdbindex_cuvector_instance_expand_value.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.7 dwarf_gdbindex_cuvector_instance_expand_value()

```
DW_API int dwarf_gdbindex_cuvector_instance_expand_value (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_field_value,
    Dwarf_Unsigned * dw_cu_index,
    Dwarf_Unsigned * dw_symbol_kind,
    Dwarf_Unsigned * dw_is_static,
    Dwarf_Error * dw_error )
```

Expand the bit fields in a cuvector entry.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_field_value</i>	Pass in the dw_field_value returned by dwarf_gdbindex_cuvector_inner_attributes.
<i>dw_cu_index</i>	On success returns the CU index from the dw_field_value
<i>dw_symbol_kind</i>	On success returns the symbol kind (see the sourceware page. Kinds are TYPE, VARIABLE, or FUNCTION).
<i>dw_is_static</i>	On success returns non-zero if the entry is a static symbol (file-local, as in C or C++), otherwise it returns non-zero and the symbol is global.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.8 dwarf_gdbindex_cuvector_length()

```
DW_API int dwarf_gdbindex_cuvector_length (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_cuvector_offset,
    Dwarf_Unsigned * dw_innercount,
    Dwarf_Error * dw_error )
```

Get access to a cuvector.

See also

[Reading the gdbindex symbol table](#)

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_cuvector_offset</i>	Pass in the offset, dw_cu_vector_offset.
<i>dw_innercount</i>	On success returns the number of CUs in the cuvector instance array.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.9 dwarf_gdbindex_header()

```
DW_API int dwarf_gdbindex_header (
    Dwarf_Debug dw_dbg,
    Dwarf_Gdbindex * dw_gdbindexptr,
    Dwarf_Unsigned * dw_version,
    Dwarf_Unsigned * dw_cu_list_offset,
    Dwarf_Unsigned * dw_types_cu_list_offset,
    Dwarf_Unsigned * dw_address_area_offset,
    Dwarf_Unsigned * dw_symbol_table_offset,
    Dwarf_Unsigned * dw_constant_pool_offset,
    Dwarf_Unsigned * dw_section_size,
    const char ** dw_section_name,
    Dwarf_Error * dw_error )
```

Open access to the .gdb_index section.

The section is a single table one thinks.

See also

[Reading gdbindex data](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_gdbindexptr</i>	On success returns a pointer to make access to table details possible.
<i>dw_version</i>	On success returns the table version.
<i>dw_cu_list_offset</i>	On success returns the offset of the cu_list in the section.
<i>dw_types_cu_list_offset</i>	On success returns the offset of the types cu_list in the section.
<i>dw_address_area_offset</i>	On success returns the area pool offset.
<i>dw_symbol_table_offset</i>	On success returns the symbol table offset.
<i>dw_constant_pool_offset</i>	On success returns the constant pool offset.
<i>dw_section_size</i>	On success returns section size.
<i>dw_section_name</i>	On success returns section name.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is absent.

9.29.2.10 dwarf_gdbindex_string_by_offset()

```
DW_API int dwarf_gdbindex_string_by_offset (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_stringoffset,
    const char ** dw_string_ptr,
    Dwarf_Error * dw_error )
```

Retrieve a symbol name from the index data.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_stringoffset</i>	Pass in the string offset returned by dwarf_gdbindex_symboltable_entry
<i>dw_string_ptr</i>	On success returns a pointer to the null-terminated string.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.11 dwarf_gdbindex_symboltable_array()

```
DW_API int dwarf_gdbindex_symboltable_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_symtab_list_length,
    Dwarf_Error * dw_error )
```

Get access to the symboltable array.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_symtab_list_length</i>	On success returns the number of entries in the symbol table
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.12 dwarf_gdbindex_symboltable_entry()

```
DW_API int dwarf_gdbindex_symboltable_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
```

```

Dwarf_Unsigned dw_entryindex,
Dwarf_Unsigned * dw_string_offset,
Dwarf_Unsigned * dw_cu_vector_offset,
Dwarf_Error * dw_error )

```

Access individual symtab entry.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in a valid index in the range 0 through dw_symtab_list_length-1. If the value is greater than dw_symtab_list_length-1 the function returns DW_DLV_NO_ENTRY;
<i>dw_string_offset</i>	On success returns the string offset in the appropriate string section.
<i>dw_cu_vector_offset</i>	On success returns the CU vector offset.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.13 dwarf_gdbindex_types_culist_array()

```

DW_API int dwarf_gdbindex_types_culist_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_types_list_length,
    Dwarf_Error * dw_error )

```

Return the types culist array length.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_types_list_length</i>	On success returns the array length of the types cu list.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.14 dwarf_gdbindex_types_culist_entry()

```

DW_API int dwarf_gdbindex_types_culist_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_types_entryindex,
    Dwarf_Unsigned * dw_cu_offset,
    Dwarf_Unsigned * dw_tu_offset,
    Dwarf_Unsigned * dw_type_signature,
    Dwarf_Error * dw_error )

```

For a types CU entry in the list returns the offset and length.

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_types_entryindex</i>	Pass in a number from 0 through dw_list_length-1. If the value is greater than dw_list_length-1 the function returns DW_DLV_NO_ENTRY.
<i>dw_cu_offset</i>	On success returns the types CU offset for this list entry.
<i>dw_tu_offset</i>	On success returns the tu offset for this list entry.
<i>dw_type_signature</i>	On success returns the type unit offset for this entry if the type has a signature.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30 Fast Access to Split Dwarf (Debug Fission)

Functions

- DW_API int [dwarf_get_xu_index_header](#) (Dwarf_Debug dw_dbg, const char *dw_section_type, Dwarf_Xu_Index_Header *dw_xuhdr, Dwarf_Unsigned *dw_version_number, Dwarf_Unsigned *dw_section_count, Dwarf_Unsigned *dw_units_count, Dwarf_Unsigned *dw_hash_slots_count, const char **dw_sect_name, Dwarf_Error *dw_error)
Access a .debug_cu_index or dw_tu_index section.
- DW_API void [dwarf_dealloc_xu_header](#) (Dwarf_Xu_Index_Header dw_xuhdr)
Dealloc (free) memory associated with dw_xuhdr.
- DW_API int [dwarf_get_xu_index_section_type](#) (Dwarf_Xu_Index_Header dw_xuhdr, const char **dw_type_name, const char **dw_sectionname, Dwarf_Error *dw_error)
Return basic information about a Dwarf_Xu_Index_Header.
- DW_API int [dwarf_get_xu_hash_entry](#) (Dwarf_Xu_Index_Header dw_xuhdr, Dwarf_Unsigned dw_index, Dwarf_Sig8 *dw_hash_value, Dwarf_Unsigned *dw_index_to_sections, Dwarf_Error *dw_error)
Get a Hash Entry.
- DW_API int [dwarf_get_xu_section_names](#) (Dwarf_Xu_Index_Header dw_xuhdr, Dwarf_Unsigned dw_column_index, Dwarf_Unsigned *dw_SECT_number, const char **dw_SECT_name, Dwarf_Error *dw_error)
get DW_SECT value for a column.
- DW_API int [dwarf_get_xu_section_offset](#) (Dwarf_Xu_Index_Header dw_xuhdr, Dwarf_Unsigned dw_row_index, Dwarf_Unsigned dw_column_index, Dwarf_Unsigned *dw_sec_offset, Dwarf_Unsigned *dw_sec_size, Dwarf_Error *dw_error)
Get row data (section data) for a row and column.
- DW_API int [dwarf_get_debugfission_for_die](#) (Dwarf_Die dw_die, Dwarf_Debug_Fission_Per_CU *dw_percu_out, Dwarf_Error *dw_error)
Get debugfission data for a Dwarf_Die.
- DW_API int [dwarf_get_debugfission_for_key](#) (Dwarf_Debug dw_dbg, Dwarf_Sig8 *dw_hash_sig, const char *dw_cu_type, Dwarf_Debug_Fission_Per_CU *dw_percu_out, Dwarf_Error *dw_error)
Given a hash signature find per-cu Fission data.

9.30.1 Detailed Description

9.30.2 Function Documentation

9.30.2.1 dwarf_dealloc_xu_header()

```
DW_API void dwarf_dealloc_xu_header (
    Dwarf_Xu_Index_Header dw_xuhdr )
```

Dealloc (free) memory associated with dw_xuhdr.

Should be named dwarf_dealloc_xuhdr instead.

Parameters

<i>dw_xuhdr</i>	Dealloc (free) all associated memory. The caller should zero the passed in value on return as it is then a stale value.
-----------------	---

9.30.2.2 dwarf_get_debugfission_for_die()

```
DW_API int dwarf_get_debugfission_for_die (
    Dwarf_Die dw_die,
    Dwarf_Debug_Fission_Per_CU * dw_percu_out,
    Dwarf_Error * dw_error )
```

Get debugfission data for a Dwarf_Die.

For any Dwarf_Die in a compilation unit, return the debug fission table data through dw_percu_out. Usually applications will pass in the CU die. Calling code should zero all of the struct [Dwarf_Debug_Fission_Per_CU_s](#) before calling this. If there is no debugfission data this returns DW_DLV_NO_ENTRY (only .dwp objects have debugfission data)

Parameters

<i>dw_die</i>	Pass in a Dwarf_Die pointer, Usually pass in a CU DIE pointer.
<i>dw_percu_out</i>	Pass in a pointer to a zeroed structure. On success the function fills in the structure.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.3 dwarf_get_debugfission_for_key()

```
DW_API int dwarf_get_debugfission_for_key (
    Dwarf_Debug dw_dbg,
    Dwarf_Sig8 * dw_hash_sig,
    const char * dw_cu_type,
```

```
Dwarf_Debug_Fission_Per_CU * dw_percu_out,  
Dwarf_Error * dw_error )
```

Given a hash signature find per-cu Fission data.

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_hash_sig</i>	Pass in a pointer to a Dwarf_Sig8 containing a hash value of interest.
<i>dw_cu_type</i>	Pass in the type, a string. Either "cu" or "tu".
<i>dw_percu_out</i>	Pass in a pointer to a zeroed structure. On success the function fills in the structure.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.4 dwarf_get_xu_hash_entry()

```
DW_API int dwarf_get_xu_hash_entry (
    Dwarf_Xu_Index_Header dw_xuhdr,
    Dwarf_Unsigned dw_index,
    Dwarf_Sig8 * dw_hash_value,
    Dwarf_Unsigned * dw_index_to_sections,
    Dwarf_Error * dw_error )
```

Get a Hash Entry.

See also

[examplez/x](#)

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_index</i>	Pass in the index of the entry you wish. Valid index values are 0 through S-1 . If the <i>dw_index</i> passed in is outside the valid range the functionj
<i>dw_hash_value</i>	Pass in a pointer to a Dwarf_Sig8. On success the hash struct is filled in with the 8 byte hash value.
<i>dw_index_to_sections</i>	On success returns the offset/size table index for this hash entry.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK on success. If the *dw_index* passed in is outside the valid range the function it returns DW_DLV_NO_ENTRY (before version 0.7.0 it returned DW_DLV_ERROR, though nothing mentioned that). In case of error it returns DW_DLV_ERROR. If *dw_error* is non-null returns error details through *dw_error* (the usual error behavior).

9.30.2.5 dwarf_get_xu_index_header()

```
DW_API int dwarf_get_xu_index_header (
    Dwarf_Debug dw_dbg,
```

```

const char * dw_section_type,
Dwarf_Xu_Index_Header * dw_xuhdr,
Dwarf_Unsigned * dw_version_number,
Dwarf_Unsigned * dw_section_count,
Dwarf_Unsigned * dw_units_count,
Dwarf_Unsigned * dw_hash_slots_count,
const char ** dw_sect_name,
Dwarf_Error * dw_error )

```

Access a .debug_cu_index or dw_tu_index section.

These sections are in a DWARF5 package file, a file normally named with the .dwo or .dwp extension.. See DWARF5 section 7.3.5.3 Format of the CU and TU Index Sections.

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest
<i>dw_section_type</i>	Pass in a pointer to either "cu" or "tu".
<i>dw_xuhdr</i>	On success, returns a pointer usable in further calls.
<i>dw_version_number</i>	On success returns five.
<i>dw_section_count</i>	On success returns the number of entries in the table of section counts. Referred to as N .
<i>dw_units_count</i>	On success returns the number of compilation units or type units in the index. Referred to as U .
<i>dw_hash_slots_count</i>	On success returns the number of slots in the hash table. Referred to as S .
<i>dw_sect_name</i>	On success returns a pointer to the name of the section. Do not free/dealloc the returned pointer.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section requested is not present.

9.30.2.6 dwarf_get_xu_index_section_type()

```

DW_API int dwarf_get_xu_index_section_type (
    Dwarf_Xu_Index_Header dw_xuhdr,
    const char ** dw_typename,
    const char ** dw_sectionname,
    Dwarf_Error * dw_error )

```

Return basic information about a Dwarf_Xu_Index_Header.

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_typename</i>	On success returns a pointer to the immutable string "tu" or "cu". Do not free.
<i>dw_sectionname</i>	On success returns a pointer to the section name in the object file. Do not free.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.7 dwarf_get_xu_section_names()

```
DW_API int dwarf_get_xu_section_names (
    Dwarf_Xu_Index_Header dw_xuhdr,
    Dwarf_Unsigned dw_column_index,
    Dwarf_Unsigned * dw_SECT_number,
    const char ** dw_SECT_name,
    Dwarf_Error * dw_error )
```

get DW_SECT value for a column.

See also

[Reading Split Dwarf \(Debug Fission\) data](#)

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_column_index</i>	The section names are in row zero of the table so we do not mention the row number at all. Pass in the column of the entry you wish. Valid dw_column_index values are 0 through N-1 .
<i>dw_SECT_number</i>	On success returns DW_SECT_INFO or other section id as appears in dw_column_index.
<i>dw_SECT_name</i>	On success returns a pointer to the string with the section name.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.8 dwarf_get_xu_section_offset()

```
DW_API int dwarf_get_xu_section_offset (
    Dwarf_Xu_Index_Header dw_xuhdr,
    Dwarf_Unsigned dw_row_index,
    Dwarf_Unsigned dw_column_index,
    Dwarf_Unsigned * dw_sec_offset,
    Dwarf_Unsigned * dw_sec_size,
    Dwarf_Error * dw_error )
```

Get row data (section data) for a row and column.

The section offset represents a base offset for the section the row data refers to. DWARF6 Section 7.3.5.3 page 193.

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_row_index</i>	Pass in a row number , 1 through U
<i>dw_column_index</i>	Pass in a column number , 0 through N-1
<i>dw_sec_offset</i>	On success returns the section offset of the section whose name <code>dwarf_get_xu_section_names</code> returns.
<i>dw_sec_size</i>	On success returns the section size of the section whose name <code>dwarf_get_xu_section_names</code> returns. If the returned section size is zero then this column makes no contribution to the dwp object file and the <code>dw_sec_size</code> and <code>dw_sec_offset</code> should be ignored.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31 Access GNU .gnu_debuglink, build-id.

Functions

- DW_API int `dwarf_gnu_debuglink` (`Dwarf_Debug` dw_dbg, char **dw_debuglink_path_returned, unsigned char **dw_crc_returned, char **dw_debuglink_fullpath_returned, unsigned int *dw_debuglink_path_length_returned, unsigned int *dw_buildid_type_returned, char **dw_buildid_owner_name_returned, unsigned char **dw_buildid_returned, unsigned int *dw_buildid_length_returned, char ***dw_paths_returned, unsigned int *dw_paths_length_returned, `Dwarf_Error` *dw_error)

Find a separated DWARF object file.

- DW_API int `dwarf_suppress_debuglink_crc` (int dw_suppress)

Suppressing crc calculations.

- DW_API int `dwarf_add_debuglink_global_path` (`Dwarf_Debug` dw_dbg, const char *dw_pathname, `Dwarf_Error` *dw_error)

Adding debuglink global paths.

- DW_API int `dwarf_crc32` (`Dwarf_Debug` dw_dbg, unsigned char *dw_crcbuf, `Dwarf_Error` *dw_error)

Crc32 used for debuglink crc calculation.

- DW_API unsigned int `dwarf_basic_crc32` (const unsigned char *dw_buf, unsigned long dw_len, unsigned int dw_init)

Public interface to the real crc calculation.

9.31.1 Detailed Description

When DWARF sections are in a different object than the executable or a normal shared object. The special GNU section provides a way to name the object file with DWARF.

libdwarf will attempt to use this data to find the object file with DWARF.

Has nothing to do with split-dwarf/debug-fission.

9.31.2 Function Documentation

9.31.2.1 dwarf_add_debuglink_global_path()

```
DW_API int dwarf_add_debuglink_global_path (
    Dwarf_Debug dw_dbg,
    const char * dw_pathname,
    Dwarf_Error * dw_error )
```

Adding debuglink global paths.

Used inside src/bin/dwarfexample/dwdebuglink.c so we can show all that is going on. The following has the explanation for how debuglink and global paths interact:

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_pathname</i>	Pass in a pathname to add to the list of global paths used by debuglink.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31.2.2 dwarf_basic_crc32()

```
DW_API unsigned int dwarf_basic_crc32 (
    const unsigned char * dw_buf,
    unsigned long dw_len,
    unsigned int dw_init )
```

Public interface to the real crc calculation.

It is unlikely this is useful. The calculation will not produce a return matching that of Linux/Macos if the compiler implements unsigned int or signed int as 16 bits long.

The caller must guarantee that dw_buf is non-null and pointing to dw_len bytes of readable memory. If dw_buf is NULL then 0 is immediately returned and there is no indication of error.

Parameters

<i>dw_buf</i>	Pass in a pointer to some bytes on which the crc calculation as done in debuglink is to be done.
<i>dw_len</i>	Pass in the length in bytes of dw_buf.
<i>dw_init</i>	Pass in the initial 32 bit value, zero is the right choice.

Returns

Returns an int (assumed 32 bits int!) with the calculated crc.

9.31.2.3 dwarf_crc32()

```
DW_API int dwarf_crc32 (
    Dwarf_Debug dw_dbg,
    unsigned char * dw_crcbuf,
    Dwarf_Error * dw_error )
```

Crc32 used for debuglink crc calculation.

Caller passes pointer to array of 4 unsigned char provided by the caller and if this returns DW_DLV_OK that array is filled in.

Callers must guarantee dw_crcbuf points to at least 4 bytes of writable memory. Passing in a null dw_crcbuf results in an immediate return of DW_DLV_NO_ENTRY and the pointer is not used.

Parameters

<i>dw_dbg</i>	Pass in an open dw_dbg. When you attempted to open it, and it succeeded then pass the it via the Dwarf_Debug The function reads the file into memory and performs a crc calculation.
<i>dw_crcbuf</i>	Pass in a pointer to a 4 byte area to hold the returned crc, on success the function puts the 4 bytes there.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31.2.4 dwarf_gnu_debuglink()

```
DW_API int dwarf_gnu_debuglink (
    Dwarf_Debug dw_dbg,
    char ** dw_debuglink_path_returned,
    unsigned char ** dw_crc_returned,
    char ** dw_debuglink_fullpath_returned,
    unsigned int * dw_debuglink_path_length_returned,
    unsigned int * dw_buildid_type_returned,
    char ** dw_buildid_owner_name_returned,
    unsigned char ** dw_buildid_returned,
    unsigned int * dw_buildid_length_returned,
    char *** dw_paths_returned,
    unsigned int * dw_paths_length_returned,
    Dwarf_Error * dw_error )
```

Find a separated DWARF object file.

.gnu_debuglink and/or the section .note.gnu.build-id.

Unless something is odd and you want to know details of the two sections you will not need this function.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>
[Using GNU debuglink data](#)

If no debuglink then name_returned, crc_returned and debuglink_path_returned will get set 0 through the pointers.

If no .note.gnu.build-id then buildid_length_returned, and buildid_returned will be set 0 through the pointers.

In most cases output arguments can be passed as zero and the function will simply not return data through such arguments. Useful if you only care about some of the data potentially returned.

If dw_debuglink_fullpath_returned is set by the call the space allocated must be freed by the caller with free(dw_↵ debuglink_fullpath_returned).

if dw_debuglink_paths_returned is set by the call the space allocated must be free by the caller with free(dw_↵ debuglink_paths_returned).

[dwarf_finish\(\)](#) will not free strings dw_debuglink_fullpath_returned or dw_debuglink_paths_returned.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_debuglink_path_returned</i>	On success returns a pointer to a path in the debuglink section. Do not free!
<i>dw_crc_returned</i>	On success returns a pointer to a 4 byte area through the pointer.
<i>dw_debuglink_fullpath_returned</i>	On success returns a pointer to a full path computed from debuglink data of a correct path to a file with DWARF sections. Free this string when no longer of interest.
<i>dw_debuglink_path_length_returned</i>	On success returns the strlen() of dw_debuglink_fullpath_returned .
<i>dw_buildid_type_returned</i>	On success returns a pointer to integer with a type code. See the buildid definition.
<i>dw_buildid_owner_name_returned</i>	On success returns a pointer to the owner name from the buildid section. Do not free this.
<i>dw_buildid_returned</i>	On success returns a pointer to a sequence of bytes containing the buildid.
<i>dw_buildid_length_returned</i>	On success this is set to the length of the set of bytes pointed to by dw_buildid_returned .
<i>dw_paths_returned</i>	On success sets a pointer to an array of pointers to strings, each with a global path. These strings must be freed by the caller, dwarf_finish() will not free these strings. Call free(dw_paths_returned).
<i>dw_paths_length_returned</i>	On success returns the length of the array of string pointers dw_paths_returned points at.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31.2.5 dwarf_suppress_debuglink_crc()

```
DW_API int dwarf_suppress_debuglink_crc (
    int dw_suppress )
```

Suppressing crc calculations.

The `.gnu_debuglink` section contains a compilation-system created crc (4 byte) value. If `dwarf_init_path[_dl]()` is called such a section can result in the reader/consumer calculating the crc value of a different object file. Which on a large object file could seem slow. See https://en.wikipedia.org/wiki/Cyclic_redundancy_check

When one is confident that any `debug_link` file found is the appropriate one one can call `dwarf_suppress_debuglink_crc` with a non-zero argument and any `dwarf_init_path[_dl]` call will skip debuglink crc calculations and just assume the crc would match whenever it applies. This is a global flag, applies to all Dwarf_Debug opened after the call in the program execution.

Does not apply to the `.note.gnu.buildid` section as that section never implies the reader/consumer needs to do a crc calculation.

Parameters

<code>dw_suppress</code>	Pass in 1 to suppress future calculation of crc values to verify a debuglink target is correct. So use only when you know this is safe. Pass in 0 to ensure future <code>dwarf_init_path[_dl]</code> calls compute debuglink CRC values as required.
--------------------------	--

Returns

Returns the previous value of the global flag.

[Details on separate DWARF object access](#)

9.32 Harmless Error recording

Macros

- `#define DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE 4`
Default size of the libdwarf-internal circular list.

Functions

- DW_API int `dwarf_get_harmless_error_list` (Dwarf_Debug dw_dbg, unsigned int dw_count, const char **dw_errmsg_ptrs_array, unsigned int *dw_newerr_count)
Get the harmless error count and content.
- DW_API unsigned int `dwarf_set_harmless_error_list_size` (Dwarf_Debug dw_dbg, unsigned int dw_maxcount)
The size of the circular list of strings libdwarf holds internally may be set and reset as needed. If it is shortened excess messages are simply dropped. It returns the previous size. If zero passed in the size is unchanged and it simply returns the current size.
- DW_API void `dwarf_insert_harmless_error` (Dwarf_Debug dw_dbg, char *dw_newerror)
Harmless Error Insertion is only for testing.

9.32.1 Detailed Description

The harmless error list is a fixed size circular buffer of errors we note but which do not stop us from processing the object. Created so dwarfdump or other tools can report such inconsequential errors without causing anything to stop early.

You can change the list size from the default of DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE at any time for a Dwarf_Debug dbg.

Harmless error data is dealloc'd by `dwarf_finish()`.

9.32.2 Function Documentation

9.32.2.1 dwarf_get_harmless_error_list()

```
DW_API int dwarf_get_harmless_error_list (
    Dwarf_Debug dw_dbg,
    unsigned int dw_count,
    const char ** dw_errmsg_ptrs_array,
    unsigned int * dw_newerr_count )
```

Get the harmless error count and content.

User code supplies size of array of pointers `dw_errmsg_ptrs_array` in count and the array of pointers (the pointers themselves need not be initialized). The pointers returned in the array of pointers are invalidated by ANY call to libdwarf. Use them before making another libdwarf call! The array of string pointers passed in always has a final null pointer, so if there are N pointers and M actual strings, then MIN(M,N-1) pointers are set to point to error strings. The array of pointers to strings always terminates with a NULL pointer. Do not free the strings. Every string is null-terminated.

Each call empties the error list (discarding all current entries). and fills in your array

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug.
<i>dw_count</i>	The number of string buffers. If count is passed as zero no elements of the array are touched.
<i>dw_errmsg_ptrs_array</i>	A pointer to a user-created array of pointer to const char.
<i>dw_newerr_count</i>	If non-NULL the count of harmless errors pointers since the last call is returned through the pointer. If dw_count is greater than zero the first dw_count of the pointers in the user-created array point to null-terminated strings. Do not free the strings. print or copy the strings before any other libdwarf call.

Returns

Returns DW_DLV_NO_ENTRY if no harmless errors were noted so far. Returns DW_DLV_OK if there are harmless errors. Never returns DW_DLV_ERROR.

If DW_DLV_NO_ENTRY is returned none of the arguments other than `dw_dbg` are touched or used.

9.32.2.2 dwarf_insert_harmless_error()

```
DW_API void dwarf_insert_harmless_error (
    Dwarf_Debug dw_dbg,
    char * dw_newerror )
```

Harmless Error Insertion is only for testing.

Useful for testing the harmless error mechanism.

Parameters

<i>dw_dbg</i>	Pass in an open Dwarf_Debug
<i>dw_newerror</i>	Pass in a string whose content the function inserts as a harmless error (which dwarf_get_harmless_error_list will retrieve).

9.32.2.3 dwarf_set_harmless_error_list_size()

```
DW_API unsigned int dwarf_set_harmless_error_list_size (
    Dwarf_Debug dw_dbg,
    unsigned int dw_maxcount )
```

The size of the circular list of strings libdwarf holds internally may be set and reset as needed. If it is shortened excess messages are simply dropped. It returns the previous size. If zero passed in the size is unchanged and it simply returns the current size.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug.
<i>dw_maxcount</i>	Set the new internal buffer count to a number greater than zero.

Returns

returns the current size of the internal circular buffer if dw_maxcount is zero. If dw_maxcount is greater than zero the internal array is adjusted to hold that many and the previous number of harmless errors possible in the circular buffer is returned.

9.33 Names DW_TAG_member etc as strings

Functions

- DW_API int **dwarf_get_ACCESS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ACCESS_name
- DW_API int **dwarf_get_ADDR_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ADDR_name
- DW_API int **dwarf_get_AT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_AT_name
- DW_API int **dwarf_get_ATCF_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_AT_name

- DW_API int **dwarf_get_ATE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ATE_name
- DW_API int **dwarf_get_CC_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_CC_name
- DW_API int **dwarf_get_CFA_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_CFA_name
- DW_API int **dwarf_get_children_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_children_name - historic misspelling.
- DW_API int **dwarf_get_CHILDREN_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_CHILDREN_name
- DW_API int **dwarf_get_DEFAULTED_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_DEFAULTED_name
- DW_API int **dwarf_get_DS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_DS_name
- DW_API int **dwarf_get_DSC_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_DSC_name
- DW_API int **dwarf_get_GNUKIND_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_GNUKIND_name - libdwarf invention
- DW_API int **dwarf_get_EH_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_EH_name
- DW_API int **dwarf_get_END_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_END_name
- DW_API int **dwarf_get_FORM_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_FORM_name
- DW_API int **dwarf_get_FRAME_name** (unsigned int dw_val_in, const char **dw_s_out)
This is a set of register names.
- DW_API int **dwarf_get_GNUVIS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_GNUVIS_name - a libdwarf invention
- DW_API int **dwarf_get_ID_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ID_name
- DW_API int **dwarf_get_IDX_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_IDX_name
- DW_API int **dwarf_get_INL_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_INL_name
- DW_API int **dwarf_get_ISA_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ISA_name
- DW_API int **dwarf_get_LANG_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LANG_name
- DW_API int **dwarf_get_LLE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LLE_name
- DW_API int **dwarf_get_LLEX_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LLEX_name - a GNU extension.
- DW_API int **dwarf_get_LNAME_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNAME
- DW_API int **dwarf_get_LNCT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNCT_name
- DW_API int **dwarf_get_LNE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNE_name
- DW_API int **dwarf_get_LNS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNS_name
- DW_API int **dwarf_get_MACINFO_name** (unsigned int dw_val_in, const char **dw_s_out)

- dwarf_get_MACRO_name*
- DW_API int [dwarf_get_MACRO_name](#) (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_MACRO_name
- DW_API int **dwarf_get_OP_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_OP_name
- DW_API int **dwarf_get_ORD_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ORD_name
- DW_API int **dwarf_get_RLE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_RLE_name
- DW_API int **dwarf_get_SECT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_SECT_name
- DW_API int **dwarf_get_TAG_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_TAG_name
- DW_API int **dwarf_get_UT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_UT_name
- DW_API int **dwarf_get_VIRTUALITY_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_VIRTUALITY_name
- DW_API int **dwarf_get_VIS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_VIS_name
- DW_API int [dwarf_get_FORM_CLASS_name](#) (enum [Dwarf_Form_Class](#) dw_fc, const char **dw_s_out)
dwarf_get_FORM_CLASS_name is for a libdwarf extension. Not defined by the DWARF standard though the concept is defined in the standard. It seemed essential to invent it for libdwarf to report correctly.

9.33.1 Detailed Description

Given a value you know is one of a particular name category in DWARF2 or later, call the appropriate function and on finding the name it returns DW_DLV_OK and sets the identifier for the value through a pointer. On success these functions return the string corresponding to **dw_val_in** passed in through the pointer **dw_s_out** and the value returned is DW_DLV_OK.

The strings returned on success are in static storage and must not be freed.

These functions are generated from information in [dwarf.h](#), not hand coded functions.

If DW_DLV_NO_ENTRY is returned the **dw_val_in** is not known and ***s_out** is not set. This is unusual.

DW_DLV_ERROR is never returned.

The example referred to offers the suggested way to use functions like these.

See also

[Retrieving tag,attribute,etc names](#)

9.33.2 Function Documentation

9.33.2.1 dwarf_get_EH_name()

```
DW_API int dwarf_get_EH_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

[dwarf_get_EH_name](#)

So we can report this GNU extension sensibly.

9.33.2.2 dwarf_get_FORM_CLASS_name()

```
DW_API int dwarf_get_FORM_CLASS_name (
    enum Dwarf_Form_Class dw_fc,
    const char ** dw_s_out )
```

dwarf_get_FORM_CLASS_name is for a libdwarf extension. Not defined by the DWARF standard though the concept is defined in the standard. It seemed essential to invent it for libdwarf to report correctly.

See DWARF5 Table 2.3, Classes of Attribute Value page 23. Earlier DWARF versions have a similar table.

9.33.2.3 dwarf_get_FRAME_name()

```
DW_API int dwarf_get_FRAME_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

This is a set of register names.

The set of register names is unlikely to match your register set, but perhaps this is better than no name.

9.33.2.4 dwarf_get_GNUKIND_name()

```
DW_API int dwarf_get_GNUKIND_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

dwarf_get_GNUKIND_name - libdwarf invention

So we can report things GNU extensions sensibly.

9.33.2.5 dwarf_get_GNUVIS_name()

```
DW_API int dwarf_get_GNUVIS_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

dwarf_get_GNUVIS_name - a libdwarf invention

So we report a GNU extension sensibly.

9.33.2.6 dwarf_get_LLEX_name()

```
DW_API int dwarf_get_LLEX_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

dwarf_get_LLEX_name - a GNU extension.

The name is a libdwarf invention for the GNU extension. So we report a GNU extension sensibly.

9.33.2.7 dwarf_get_MACINFO_name()

```
DW_API int dwarf_get_MACINFO_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

dwarf_get_MACINFO_name

Used in DWARF2-DWARF4

9.33.2.8 dwarf_get_MACRO_name()

```
DW_API int dwarf_get_MACRO_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

dwarf_get_MACRO_name

Used in DWARF5

9.34 Object Sections Data

Functions

- DW_API int [dwarf_get_die_section_name](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Bool](#) dw_is_info, const char **dw_sec_name, [Dwarf_Error](#) *dw_error)
Get the real name a DIE section.
- DW_API int [dwarf_get_die_section_name_b](#) ([Dwarf_Die](#) dw_die, const char **dw_sec_name, [Dwarf_Error](#) *dw_error)
Get the real name of a DIE section.
- DW_API int **dwarf_get_macro_section_name** ([Dwarf_Debug](#) dw_dbg, const char **dw_sec_name_out, [Dwarf_Error](#) *dw_err)
Get the real name of a .debug_macro section.
- DW_API int [dwarf_get_real_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char *dw_std_section_name, const char **dw_actual_sec_name_out, [Dwarf_Small](#) *dw_marked_zcompressed, [Dwarf_Small](#) *dw_marked_↔zlib_compressed, [Dwarf_Small](#) *dw_marked_shf_compressed, [Dwarf_Unsigned](#) *dw_compressed_length, [Dwarf_Unsigned](#) *dw_uncompressed_length, [Dwarf_Error](#) *dw_error)
Get the real name of a section.
- DW_API int [dwarf_get_frame_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get .debug_frame section name.
- DW_API int [dwarf_get_frame_section_name_eh_gnu](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_↔name_out, [Dwarf_Error](#) *dw_error)
Get GNU .eh_frame section name.
- DW_API int **dwarf_get_aranges_section_name** ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_↔out, [Dwarf_Error](#) *dw_error)
Get .debug_aranges section name The usual arguments.
- DW_API int **dwarf_get_ranges_section_name** ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_↔out, [Dwarf_Error](#) *dw_error)
Get .debug_ranges section name The usual arguments and return values.

- DW_API int [dwarf_get_offset_size](#) (Dwarf_Debug dw_dbg, Dwarf_Half *dw_offset_size, Dwarf_Error *dw_error)
Get offset size as defined by the object.
- DW_API int [dwarf_get_address_size](#) (Dwarf_Debug dw_dbg, Dwarf_Half *dw_addr_size, Dwarf_Error *dw_error)
Get the address size as defined by the object.
- DW_API int [dwarf_get_string_section_name](#) (Dwarf_Debug dw_dbg, const char **dw_section_name_out, Dwarf_Error *dw_error)
Get the string table section name The usual arguments and return values.
- DW_API int [dwarf_get_line_section_name](#) (Dwarf_Debug dw_dbg, const char **dw_section_name_out, Dwarf_Error *dw_error)
Get the line table section name The usual arguments and return values.
- DW_API int [dwarf_get_line_section_name_from_die](#) (Dwarf_Die dw_die, const char **dw_section_name_out, Dwarf_Error *dw_error)
Get the line table section name.
- DW_API int [dwarf_get_section_info_by_name_a](#) (Dwarf_Debug dw_dbg, const char *dw_section_name, Dwarf_Addr *dw_section_addr, Dwarf_Unsigned *dw_section_size, Dwarf_Unsigned *dw_section_flags, Dwarf_Unsigned *dw_section_offset, Dwarf_Error *dw_error)
Given a section name, get its size, address, etc.
- DW_API int [dwarf_get_section_info_by_name](#) (Dwarf_Debug dw_dbg, const char *dw_section_name, Dwarf_Addr *dw_section_addr, Dwarf_Unsigned *dw_section_size, Dwarf_Error *dw_error)
Given a section name, get its size and address.
- DW_API int [dwarf_get_section_info_by_index_a](#) (Dwarf_Debug dw_dbg, int dw_section_index, const char **dw_section_name, Dwarf_Addr *dw_section_addr, Dwarf_Unsigned *dw_section_size, Dwarf_Unsigned *dw_section_flags, Dwarf_Unsigned *dw_section_offset, Dwarf_Error *dw_error)
Given a section index, get its size and address, etc.
- DW_API int [dwarf_get_section_info_by_index](#) (Dwarf_Debug dw_dbg, int dw_section_index, const char **dw_section_name, Dwarf_Addr *dw_section_addr, Dwarf_Unsigned *dw_section_size, Dwarf_Error *dw_error)
Given a section index, get its size and address.
- DW_API int [dwarf_machine_architecture_a](#) (Dwarf_Debug dw_dbg, Dwarf_Small *dw_ftype, Dwarf_Small *dw_obj_pointersize, Dwarf_Bool *dw_obj_is_big_endian, Dwarf_Unsigned *dw_obj_machine, Dwarf_Unsigned *dw_obj_type, Dwarf_Unsigned *dw_obj_flags, Dwarf_Small *dw_path_source, Dwarf_Unsigned *dw_ub_offset, Dwarf_Unsigned *dw_ub_count, Dwarf_Unsigned *dw_ub_index, Dwarf_Unsigned *dw_comdat_groupnumber)
Get basic object information from Dwarf_Debug.
- DW_API int [dwarf_machine_architecture](#) (Dwarf_Debug dw_dbg, Dwarf_Small *dw_ftype, Dwarf_Small *dw_obj_pointersize, Dwarf_Bool *dw_obj_is_big_endian, Dwarf_Unsigned *dw_obj_machine, Dwarf_Unsigned *dw_obj_flags, Dwarf_Small *dw_path_source, Dwarf_Unsigned *dw_ub_offset, Dwarf_Unsigned *dw_ub_count, Dwarf_Unsigned *dw_ub_index, Dwarf_Unsigned *dw_comdat_groupnumber)
Get basic object information original version.
- DW_API Dwarf_Unsigned [dwarf_get_section_count](#) (Dwarf_Debug dw_dbg)
Get section count (of object file sections).
- DW_API int [dwarf_get_section_max_offsets_d](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_debug_info_size, Dwarf_Unsigned *dw_debug_abbrev_size, Dwarf_Unsigned *dw_debug_line_size, Dwarf_Unsigned *dw_debug_loc_size, Dwarf_Unsigned *dw_debug_aranges_size, Dwarf_Unsigned *dw_debug_macinfo_size, Dwarf_Unsigned *dw_debug_pubnames_size, Dwarf_Unsigned *dw_debug_str_size, Dwarf_Unsigned *dw_debug_frame_size, Dwarf_Unsigned *dw_debug_ranges_size, Dwarf_Unsigned *dw_debug_pubtypes_size, Dwarf_Unsigned *dw_debug_types_size, Dwarf_Unsigned *dw_debug_macro_size, Dwarf_Unsigned *dw_debug_str_offsets_size, Dwarf_Unsigned *dw_debug_sup_size, Dwarf_Unsigned *dw_debug_cu_index_size, Dwarf_Unsigned *dw_debug_tu_index_size, Dwarf_Unsigned *dw_debug_names_size, Dwarf_Unsigned *dw_debug_loclists_size, Dwarf_Unsigned *dw_debug_rnglists_size)
Get section sizes for many sections.

9.34.1 Detailed Description

These functions are not often used. They give access to section- and objectfile-related information, and that sort of information is not generally needed to understand DWARF content..

Section name access. Because names sections such as `.debug_info` might end with `.dwo` or be `.zdebug` or might not.

String pointers returned via these functions must not be freed, the strings are statically declared.

For non-Elf the name reported will be as if it were Elf sections. For example, not the names MacOS puts in its object sections (which the MacOS reader translates).

These calls returning selected object header {machine architecture,flags) and section (offset, flags) data are not of interest to most library callers: [dwarf_machine_architecture\(\)](#), [dwarf_get_section_info_by_index_a\(\)](#), and [dwarf_get_section_info_by_name_a\(\)](#).

The simple calls will not be documented in full detail here.

9.34.2 Function Documentation

9.34.2.1 dwarf_get_address_size()

```
DW_API int dwarf_get_address_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_addr_size,
    Dwarf_Error * dw_error )
```

Get the address size as defined by the object.

This is not from DWARF information, it is from object file headers.

9.34.2.2 dwarf_get_die_section_name()

```
DW_API int dwarf_get_die_section_name (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_is_info,
    const char ** dw_sec_name,
    Dwarf_Error * dw_error )
```

Get the real name a DIE section.

dw_is_info

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_is_info</i>	We do not pass in a DIE, so we have to pass in TRUE for <code>.debug_info</code> , or if DWARF4 <code>.debug_types</code> pass in FALSE.
<i>dw_sec_name</i>	On success returns a pointer to the actual section name in the object file. Do not free the string.
<i>dw_error</i>	The usual error argument to report error details.

Returns

DW_DLV_OK etc.

9.34.2.3 dwarf_get_die_section_name_b()

```
DW_API int dwarf_get_die_section_name_b (
    Dwarf_Die dw_die,
    const char ** dw_sec_name,
    Dwarf_Error * dw_error )
```

Get the real name of a DIE section.

The same as **dwarf_get_die_section_name** except we have a DIE so do not need **dw_is_info** as a argument.

9.34.2.4 dwarf_get_frame_section_name()

```
DW_API int dwarf_get_frame_section_name (
    Dwarf_Debug dw_dbg,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

Get .debug_frame section name.

Returns

returns DW_DLV_OK if the .debug_frame exists

9.34.2.5 dwarf_get_frame_section_name_eh_gnu()

```
DW_API int dwarf_get_frame_section_name_eh_gnu (
    Dwarf_Debug dw_dbg,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

Get GNU .eh_frame section name.

Returns

Returns DW_DLV_OK if the .debug_frame is present Returns DW_DLV_NO_ENTRY if it is not present.

9.34.2.6 dwarf_get_line_section_name_from_die()

```
DW_API int dwarf_get_line_section_name_from_die (
    Dwarf_Die dw_die,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

Get the line table section name.

Parameters

<i>dw_die</i>	Pass in a Dwarf_Die pointer.
<i>dw_section_name_out</i>	On success returns the section name, usually some .debug_info* name but in DWARF4 could be a .debug_types* name.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

Returns DW_DLV_OK etc.

9.34.2.7 dwarf_get_offset_size()

```
DW_API int dwarf_get_offset_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

Get offset size as defined by the object.

This is not from DWARF information, it is from object file headers.

9.34.2.8 dwarf_get_real_section_name()

```
DW_API int dwarf_get_real_section_name (
    Dwarf_Debug dw_dbg,
    const char * dw_std_section_name,
    const char ** dw_actual_sec_name_out,
    Dwarf_Small * dw_marked_zcompressed,
    Dwarf_Small * dw_marked_zlib_compressed,
    Dwarf_Small * dw_marked_shf_compressed,
    Dwarf_Unsigned * dw_compressed_length,
    Dwarf_Unsigned * dw_uncompressed_length,
    Dwarf_Error * dw_error )
```

Get the real name of a section.

If the object has section groups only the sections in the group in dw_dbg will be found.

Whether .zdebug or ZLIB or SHF_COMPRESSED is the marker there is just one uncompress algorithm (zlib) for all three cases.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_std_section_name</i>	Pass in a standard section name, such as .debug_info or .debug_info.dwo .
<i>dw_actual_sec_name_out</i>	On success returns the actual section name from the object file.
<i>dw_marked_zcompressed</i>	On success returns TRUE if the original section name ends in .zdebug
<i>dw_marked_zlib_compressed</i>	On success returns TRUE if the section has the ZLIB string at the front of the section.
<i>dw_marked_shf_compressed</i>	On success returns TRUE if the section flag (Elf SHF_COMPRESSED) is marked as compressed.
<i>dw_compressed_length</i>	On success if the section was compressed it returns the original section length in the object file.
<i>dw_uncompressed_length</i>	On success if the section was compressed this returns the uncompressed length of the object section.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

The usual DW_DLV_OK etc. If the section is not relevant to this Dwarf_Debug or is not in the object file at all, returns DW_DLV_NO_ENTRY

9.34.2.9 dwarf_get_section_count()

```
DW_API Dwarf_Unsigned dwarf_get_section_count (
    Dwarf_Debug dw_dbg )
```

Get section count (of object file sections).

Return the section count. Returns 0 if the dw_dbg argument is improper in any way.

Parameters

<i>dw_dbg</i>	Pass in a valid Dwarf_Debug of interest.
---------------	--

Returns

Returns the count of sections in the object file or zero.

9.34.2.10 dwarf_get_section_info_by_index()

```
DW_API int dwarf_get_section_info_by_index (
    Dwarf_Debug dw_dbg,
    int dw_section_index,
    const char ** dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Error * dw_error )
```

Given a section index, get its size and address.

See [dwarf_get_section_info_by_index_a\(\)](#) for the newest version which returns additional values.

Fields and meanings in [dwarf_get_section_info_by_index\(\)](#) are the same as in [dwarf_get_section_info_by_index_a\(\)](#) except that the arguments dw_section_flags and dw_section_offset are missing here.

9.34.2.11 dwarf_get_section_info_by_index_a()

```
DW_API int dwarf_get_section_info_by_index_a (
    Dwarf_Debug dw_dbg,
    int dw_section_index,
    const char ** dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Unsigned * dw_section_flags,
    Dwarf_Unsigned * dw_section_offset,
    Dwarf_Error * dw_error )
```

Given a section index, get its size and address, etc.

See [dwarf_get_section_info_by_index\(\)](#) for the older and still current version.

Any of the pointers dw_section_addr, dw_section_size, dw_section_flags, and dw_section_offset may be passed in as zero and those will be ignored by the function.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_section_index</i>	Pass in an index, 0 through N-1 where N is the count returned from <code>dwarf_get_section_count</code> . As an index type <code>-int-</code> works in practice, but should really be <code>Dwarf_Unsigned</code> .
<i>dw_section_name</i>	On success returns a pointer to the section name as it appears in the object file.
<i>dw_section_addr</i>	On success returns the section address as defined by an object header.
<i>dw_section_size</i>	On success returns the section size as defined by an object header.
<i>dw_section_flags</i>	On success returns the section flags as defined by an object header. The flag meaning depends on which object format is being read and the meaning is defined by the object format. In PE object files this field is called Characteristics . We hope it is of some use.
<i>dw_section_offset</i>	On success returns the section offset as defined by an object header. The offset meaning is supposedly an object file offset but the meaning depends on the object file type(!). We hope it is of some use.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

Returns `DW_DLV_OK` etc.

9.34.2.12 `dwarf_get_section_info_by_name()`

```
DW_API int dwarf_get_section_info_by_name (
    Dwarf_Debug dw_dbg,
    const char * dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Error * dw_error )
```

Given a section name, get its size and address.

See [dwarf_get_section_info_by_name_a\(\)](#) for the newest version which returns additional values.

Fields and meanings in [dwarf_get_section_info_by_name\(\)](#) are the same as in [dwarf_get_section_info_by_name_a\(\)](#) except that the arguments `dw_section_flags` and `dw_section_offset` are missing here.

9.34.2.13 `dwarf_get_section_info_by_name_a()`

```
DW_API int dwarf_get_section_info_by_name_a (
    Dwarf_Debug dw_dbg,
    const char * dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Unsigned * dw_section_flags,
    Dwarf_Unsigned * dw_section_offset,
    Dwarf_Error * dw_error )
```

Given a section name, get its size, address, etc.

New in v0.9.0 November 2023.

This is not often used and is completely unnecessary for most to call.

See [dwarf_get_section_info_by_name\(\)](#) for the older and still current version.

Any of the pointers `dw_section_addr`, `dw_section_size`, `dw_section_flags`, and `dw_section_offset` may be passed in as zero and those will be ignored by the function.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_section_name</i>	Pass in a pointer to a section name. It must be an exact match to the real section name.
<i>dw_section_addr</i>	On success returns the section address as defined by an object header.
<i>dw_section_size</i>	On success returns the section size as defined by an object header.
<i>dw_section_flags</i>	On success returns the section flags as defined by an object header. The flag meaning depends on which object format is being read and the meaning is defined by the object format. We hope it is of some use. In PE object files this field is called Characteristics .
<i>dw_section_offset</i>	On success returns the section offset as defined by an object header. The offset meaning is supposedly an object file offset but the meaning depends on the object file type(!). We hope it is of some use.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

Returns DW_DLV_OK etc.

9.34.2.14 dwarf_get_section_max_offsets_d()

```
DW_API int dwarf_get_section_max_offsets_d (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_debug_info_size,
    Dwarf_Unsigned * dw_debug_abbrev_size,
    Dwarf_Unsigned * dw_debug_line_size,
    Dwarf_Unsigned * dw_debug_loc_size,
    Dwarf_Unsigned * dw_debug_aranges_size,
    Dwarf_Unsigned * dw_debug_macinfo_size,
    Dwarf_Unsigned * dw_debug_pubnames_size,
    Dwarf_Unsigned * dw_debug_str_size,
    Dwarf_Unsigned * dw_debug_frame_size,
    Dwarf_Unsigned * dw_debug_ranges_size,
    Dwarf_Unsigned * dw_debug_pubtypes_size,
    Dwarf_Unsigned * dw_debug_types_size,
    Dwarf_Unsigned * dw_debug_macro_size,
    Dwarf_Unsigned * dw_debug_str_offsets_size,
    Dwarf_Unsigned * dw_debug_sup_size,
    Dwarf_Unsigned * dw_debug_cu_index_size,
    Dwarf_Unsigned * dw_debug_tu_index_size,
    Dwarf_Unsigned * dw_debug_names_size,
    Dwarf_Unsigned * dw_debug_loclists_size,
    Dwarf_Unsigned * dw_debug_rnglists_size )
```

Get section sizes for many sections.

The list of sections is incomplete and the argument list is ... too long ... making this an unusual function

Originally a hack so clients could verify offsets. Added so that one can detect broken offsets (which happened in an IRIX executable larger than 2GB with MIPSpro 7.3.1.3 toolchain.).

Parameters

<i>dw_dbg</i>	Pass in a valid Dwarf_Debug of interest.
---------------	--

Returns

If the `dw_dbg` is non-null it returns `DW_DLV_OK`. If `dw_dbg` is NULL it returns `DW_DLV_NO_ENTRY`.

9.34.2.15 `dwarf_machine_architecture()`

```
DW_API int dwarf_machine_architecture (
    Dwarf_Debug dw_dbg,
    Dwarf_Small * dw_ftype,
    Dwarf_Small * dw_obj_pointersize,
    Dwarf_Bool * dw_obj_is_big_endian,
    Dwarf_Unsigned * dw_obj_machine,
    Dwarf_Unsigned * dw_obj_flags,
    Dwarf_Small * dw_path_source,
    Dwarf_Unsigned * dw_ub_offset,
    Dwarf_Unsigned * dw_ub_count,
    Dwarf_Unsigned * dw_ub_index,
    Dwarf_Unsigned * dw_comdat_groupnumber )
```

Get basic object information original version.

Identical to `dwarf_machine_architecture_a()` except that this older version does not have the `dw_obj_type` argument so it cannot return the Elf `e_type` value..

9.34.2.16 `dwarf_machine_architecture_a()`

```
DW_API int dwarf_machine_architecture_a (
    Dwarf_Debug dw_dbg,
    Dwarf_Small * dw_ftype,
    Dwarf_Small * dw_obj_pointersize,
    Dwarf_Bool * dw_obj_is_big_endian,
    Dwarf_Unsigned * dw_obj_machine,
    Dwarf_Unsigned * dw_obj_type,
    Dwarf_Unsigned * dw_obj_flags,
    Dwarf_Small * dw_path_source,
    Dwarf_Unsigned * dw_ub_offset,
    Dwarf_Unsigned * dw_ub_count,
    Dwarf_Unsigned * dw_ub_index,
    Dwarf_Unsigned * dw_comdat_groupnumber )
```

Get basic object information from `Dwarf_Debug`.

Not all the fields here are relevant for all object types, and the `dw_obj_machine` and `dw_obj_flags` have ABI-defined values which have nothing to do with DWARF.

This version added December 2024 with an additional argument: `dw_obj_type`.

`dw_ub_offset`, `dw_ub_count`, `dw_ub_index` only apply to `DW_FTYPE_APPLEUNIVERSAL`.

`dw_comdat_groupnumber` only applies to `DW_FTYPE_ELF`.

Other than `dw_dbg` one can pass in NULL for any pointer parameter whose value is not of interest.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_ftype</i>	Pass in a pointer. On success the value pointed to will be set to the applicable DW_FTYPE value (see libdwarf.h).
<i>dw_obj_pointersize</i>	Pass in a pointer. On success the value pointed to will be set to the applicable pointer size, which is almost always either 4 or 8.
<i>dw_obj_is_big_endian</i>	Pass in a pointer. On success the value pointed to will be set to either 1 (the object being read is big-endian) or 0 (the object being read is little-endian).
<i>dw_obj_machine</i>	Pass in a pointer. On success the value pointed to will be set to a value that the specific ABI uses for the machine-architecture the object file says it is for.
<i>dw_obj_type</i>	Pass in a pointer. On success the value pointed to will be set to a value that the specific ABI uses for the machine-architecture the object file says it is for (for ELF is elf header e_type).
<i>dw_obj_flags</i>	Pass in a pointer. On success the value pointed to will be set to a value that the specific ABI uses for a header record flags word (in a PE object the flags word is called Characteristics).
<i>dw_path_source</i>	Pass in a pointer. On success the value pointed to will be set to a value that libdwarf sets to a DW_PATHSOURCE value indicating what caused the file path.
<i>dw_ub_offset</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_APPLEUNIVERSAL the returned value will be set to the count (in all other cases, the value is set to 0)
<i>dw_ub_count</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_APPLEUNIVERSAL the returned value will be set to the number of object files in the binary (in all other cases, the value is set to 0)
<i>dw_ub_index</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_APPLEUNIVERSAL the returned value will be set to the number of the specific object from the universal-binary, usable values are 0 through dw_ub_count-1. (in all other cases, the value is set to 0)
<i>dw_comdat_groupnumber</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_ELF the returned value will be the comdat group being referenced. (in all other cases, the value is set to 0)

Returns

Returns DW_DLV_NO_ENTRY if the Dwarf_Debug passed in is null or stale. Otherwise returns DW_DLV_OK and non-null return-value pointers will have meaningful data.

9.35 Section Groups Objectfile Data

Functions

- DW_API int [dwarf_sec_group_sizes](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_section_count_out, Dwarf_Unsigned *dw_group_count_out, Dwarf_Unsigned *dw_selected_group_out, Dwarf_Unsigned *dw_map_entry_count_out, Dwarf_Error *dw_error)
Get Section Groups data counts.
- DW_API int [dwarf_sec_group_map](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned dw_map_entry_count, Dwarf_Unsigned *dw_group_numbers_array, Dwarf_Unsigned *dw_sec_numbers_array, const char **dw_sec_names_array, Dwarf_Error *dw_error)
Return a map between group numbers and section numbers.

9.35.1 Detailed Description

Section Groups are defined in the extended Elf ABI and are seen in relocatable Elf object files, not executables or shared objects.

[Section Groups Overview](#)

9.35.2 Function Documentation

9.35.2.1 dwarf_sec_group_map()

```
DW_API int dwarf_sec_group_map (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_map_entry_count,
    Dwarf_Unsigned * dw_group_numbers_array,
    Dwarf_Unsigned * dw_sec_numbers_array,
    const char ** dw_sec_names_array,
    Dwarf_Error * dw_error )
```

Return a map between group numbers and section numbers.

This map shows all the groups in the object file and shows which object sections go with which group.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_map_entry_count</i>	Pass in the dw_map_entry_count_out from dwarf_sec_group_sizes
<i>dw_group_numbers_array</i>	Pass in an array of Dwarf_Unsigned with dw_map_entry_count entries. Zero the data before the call here. On success returns a list of group numbers.
<i>dw_sec_numbers_array</i>	Pass in an array of Dwarf_Unsigned with dw_map_entry_count entries. Zero the data before the call here. On success returns a list of section numbers.
<i>dw_sec_names_array</i>	Pass in an array of const char * with dw_map_entry_count entries. Zero the data before the call here. On success returns a list of section names.
<i>dw_error</i>	The usual error details pointer.

Returns

On success returns DW_DLV_OK

9.35.2.2 dwarf_sec_group_sizes()

```
DW_API int dwarf_sec_group_sizes (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_section_count_out,
    Dwarf_Unsigned * dw_group_count_out,
    Dwarf_Unsigned * dw_selected_group_out,
    Dwarf_Unsigned * dw_map_entry_count_out,
    Dwarf_Error * dw_error )
```

Get Section Groups data counts.

Allows callers to find out what groups (dwo or COMDAT) are in the object and how much to allocate so one can get the group-section map data.

This is relevant for Debug Fission. If an object file has both .dwo sections and non-dwo sections or it has Elf COMDAT GROUP sections this becomes important.

Section Groups Overview

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_section_count_out</i>	On success returns the number of DWARF sections in the object file. Can sometimes be many more than are of interest.
<i>dw_group_count_out</i>	On success returns the number of groups. Though usually one, it can be much larger.
<i>dw_selected_group_out</i>	On success returns the groupnumber that applies to this specific open Dwarf_Debug.
<i>dw_map_entry_count_out</i>	On success returns the count of record allocations needed to call dwarf_sec_group_map successfully. dw_map_entry_count_out will be less than or equal to dw_section_count_out.
<i>dw_error</i>	The usual error details pointer.

Returns

On success returns DW_DLV_OK

9.36 LEB Encode and Decode

Functions

- DW_API int **dwarf_encode_leb128** ([Dwarf_Unsigned](#) dw_val, int *dw_nbytes, char *dw_space, int dw_splen)
- DW_API int **dwarf_encode_signed_leb128** ([Dwarf_Signed](#) dw_val, int *dw_nbytes, char *dw_space, int dw_splen)
- DW_API int **dwarf_decode_leb128** (char *dw_leb, [Dwarf_Unsigned](#) *dw_leblen, [Dwarf_Unsigned](#) *dw_outval, char *dw_endptr)
- DW_API int **dwarf_decode_signed_leb128** (char *dw_leb, [Dwarf_Unsigned](#) *dw_leblen, [Dwarf_Signed](#) *dw_outval, char *dw_endptr)

9.36.1 Detailed Description

These are LEB/ULEB reading and writing functions heavily used inside libdwarf.

While the DWARF Standard does not mention allowing extra insignificant trailing bytes in a ULEB these functions allow a few such for compilers using extras for alignment in DWARF.

9.37 Miscellaneous Functions

Functions

- DW_API const char * [dwarf_package_version](#) (void)
Return the version string in the library.
- DW_API int [dwarf_set_stringcheck](#) (int dw_stringcheck)
Turn off libdwarf checks of strings.
- DW_API int [dwarf_set_reloc_application](#) (int dw_apply)
*Set libdwarf response to *.rela relocations.*
- DW_API void [dwarf_record_cmdline_options](#) (Dwarf_Cmdline_Options dw_dd_options)
Tell libdwarf to add verbosity to Line Header errors By default the flag in the struct argument is zero. dwarfdump uses this when -v used on dwarfdump.
- DW_API int [dwarf_set_de_alloc_flag](#) (int dw_v)
Eliminate libdwarf tracking of allocations Independent of any Dwarf_Debug and applicable to all whenever the setting is changed. Defaults to non-zero.
- DW_API int [dwarf_library_allow_dup_attr](#) (int dw_v)
Eliminate libdwarf checking attribute duplication.
- DW_API Dwarf_Small [dwarf_set_default_address_size](#) (Dwarf_Debug dw_dbg, Dwarf_Small dw_value)
Set the address size on a Dwarf_Debug.
- DW_API int [dwarf_get_universalbinary_count](#) (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_current_index, Dwarf_Unsigned *dw_available_count)
Retrieve universal binary index.

Variables

- DW_API void(*) (void *, const void *, unsigned long) [dwarf_get_endian_copy_function](#) (Dwarf_Debug dw_dbg)
Get a pointer to the applicable swap/noswap function.
- DW_API Dwarf_Cmdline_Options [dwarf_cmdline_options](#)

9.37.1 Detailed Description

9.37.2 Function Documentation

9.37.2.1 dwarf_get_universalbinary_count()

```
DW_API int dwarf_get_universalbinary_count (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_current_index,
    Dwarf_Unsigned * dw_available_count )
```

Retrieve universal binary index.

For Mach-O universal binaries this returns relevant information.

For non-universal binaries (Mach-O, Elf, or PE) the values are not meaningful, so the function returns DW_DLV_NO_ENTRY..

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_current_index</i>	If <i>dw_current_index</i> is passed in non-null the function returns the universal-binary index of the current object (which came from a universal binary).
<i>dw_available_count</i>	If <i>dw_current_index</i> is passed in non-null the function returns the count of binaries in the universal binary.

Returns

Returns DW_DLV_NO_ENTRY if the object file is not from a Mach-O universal binary. Returns DW_DLV_↵ NO_ENTRY if *dw_dbg* is passed in NULL. Never returns DW_DLV_ERROR.

9.37.2.2 dwarf_library_allow_dup_attr()

```
DW_API int dwarf_library_allow_dup_attr (
    int dw_v )
```

Eliminate libdwf checking attribute duplication.

Independent of any Dwarf_Debug, this sets a global flag in libdwf and is applicable to all whenever the setting is changed. Defaults to zero so by default libdwf does check every set of abbreviations for duplicate attributes.

DWARF5 Sec 2.2 Attribute Types Each attribute value is characterized by an attribute name. No more than one attribute with a given name may appear in any debugging information entry. Essentially the same wording is in Sec 2.2 of DWARF2, DWARF3 and DWARF4.

Do not call this with non-zero *dw_v* unless you really want the library to avoid this basic DWARF-correctness check.

Since

{0.12.0}

Parameters

<i>dw_↵_v</i>	If non-zero passed in libdwf will avoid the checks and will not return errors for an abbreviation list with duplicate attributes.
---------------	---

Returns

Returns the previous version of the flag.

9.37.2.3 dwarf_package_version()

```
DW_API const char * dwarf_package_version (
    void )
```

Return the version string in the library.

An example: "0.3.0" which is a Semantic Version identifier. Before September 2021 the version string was a date, for example "20210528", which is in ISO date format. See DW_LIBDWARF_VERSION DW_LIBDWARF_VERSION_↵ _MAJOR DW_LIBDWARF_VERSION_MINOR DW_LIBDWARF_VERSION_MICRO

Returns

The Package Version built into libdwarf.so or libdwarf.a

9.37.2.4 dwarf_record_cmdline_options()

```
DW_API void dwarf_record_cmdline_options (
    Dwarf_Cmdline_Options dw_dd_options )
```

Tell libdwarf to add verbosity to Line Header errors By default the flag in the struct argument is zero. dwarfdump uses this when -v used on dwarfdump.

See also

[dwarf_register_printf_callback](#)

Parameters

<i>dw_dd_options</i>	The structure has one flag, and if the flag is nonzero and there is an error in reading a line table header the function passes back detail error messages via dwarf_register_printf_callback .
----------------------	---

9.37.2.5 dwarf_set_de_alloc_flag()

```
DW_API int dwarf_set_de_alloc_flag (
    int dw_v )
```

Eliminate libdwarf tracking of allocations Independent of any Dwarf_Debug and applicable to all whenever the setting is changed. Defaults to non-zero.

Parameters

<i>dw↔ _v</i>	If zero passed in libdwarf will run somewhat faster and library memory allocations will not all be tracked and dwarf_finish() will be unable to free/dealloc some things. User code can do the necessary deallocs (as documented), but the normal guarantee that libdwarf will clean up is revoked. If non-zero passed in libdwarf will resume or continue tracking allocations
-------------------	---

Returns

Returns the previous version of the flag.

9.37.2.6 dwarf_set_default_address_size()

```
DW_API Dwarf_Small dwarf_set_default_address_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Small dw_value )
```

Set the address size on a Dwarf_Debug.

DWARF information CUs and other section DWARF headers define a CU-specific address size, but this Dwarf_↔ Debug value is used when other address size information does not exist, for example in a DWARF2 CIE or FDE.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Sets the address size for the Dwarf_Debug to a non-zero value. The default address size is derived from headers in the object file. Values larger than the size of Dwarf_Addr are not set. If zero passed the default is not changed.

Returns

Returns the last set address size.

9.37.2.7 dwarf_set_reloc_application()

```
DW_API int dwarf_set_reloc_application (
    int dw_apply )
```

Set libdwarf response to *.rela relocations.

dw_apply defaults to 1 and means apply all '.rela' relocations on reading in a dwarf object section of such relocations. Best to just ignore this function It applies to all Dwarf_Debug open and all opened later in this library instance.

Parameters

<i>dw_apply</i>	Pass in a zero to turn off reading and applying of .rela relocations, which will likely break reading of .o object files but probably will not break reading executables or shared objects. Pass in non zero (it is really just an 8 bit value, so use a small value) to turn off inspecting .rela sections.
-----------------	--

Returns

Returns the previous value of the apply flag.

9.37.2.8 dwarf_set_stringcheck()

```
DW_API int dwarf_set_stringcheck (
    int dw_stringcheck )
```

Turn off libdwarf checks of strings.

Zero is the default and means do all string length validity checks. It applies to all Dwarf_Debug open and all opened later in this library instance.

Parameters

<i>dw_stringcheck</i>	Pass in a small non-zero value to turn off all libdwarf string validity checks. It speeds up libdwarf, but...is dangerous and voids all promises the library will not segfault.
-----------------------	---

Returns

Returns the previous value of this flag.

9.37.3 Variable Documentation**9.37.3.1 dwarf_get_endian_copy_function**

```
DW_API void(*) (void *, const void *, unsigned long) dwarf_get_endian_copy_function(Dwarf_Debug
dw_dbg) (
    Dwarf_Debug dw_dbg )
```

Get a pointer to the applicable swap/noswap function.

the function pointer returned enables libdwarf users to use the same 64bit/32bit/16bit word copy as libdwarf does internally for the Dwarf_Debug passed in. The function makes it possible for libdwarf to read either endianness.

Parameters

<i>dw_dbg</i>	Pass in a pointer to the applicable Dwarf_Debug.
---------------	--

Returns

a pointer to a copy function. If the object file referred to and the libdwarf reading that file are the same endianness the function returned will, when called, do a simple memcpy, effectively, while otherwise it would do a byte-swapping copy. It seems unlikely this will be useful to most library users. To call the copy function returned the first argument must be a pointer to the target word and the second must be a pointer to the input word. The third argument is the length to be copied and it must be 2,4,or 8.

9.38 Determine Object Type of a File**Functions**

- DW_API int **dwarf_object_detector_path_b** (const char *dw_path, char *dw_outpath_buffer, unsigned long dw_outpathlen, char **dw_gl_pathnames, unsigned int dw_gl_pathcount, unsigned int *dw_ftype, unsigned int *dw_endian, unsigned int *dw_offsetsize, Dwarf_Unsigned *dw_filesize, unsigned char *dw_pathsource, int *dw_errcode)
- DW_API int **dwarf_object_detector_path_dSYM** (const char *dw_path, char *dw_outpath, unsigned long dw_outpath_len, char **dw_gl_pathnames, unsigned int dw_gl_pathcount, unsigned int *dw_ftype, unsigned int *dw_endian, unsigned int *dw_offsetsize, Dwarf_Unsigned *dw_filesize, unsigned char *dw_pathsource, int *dw_errcode)
- DW_API int **dwarf_object_detector_fd** (int dw_fd, unsigned int *dw_ftype, unsigned int *dw_endian, unsigned int *dw_offsetsize, Dwarf_Unsigned *dw_filesize, int *dw_errcode)

9.38.1 Detailed Description

This group of functions are unlikely to be called by your code unless your code needs to know the basic data about an object file without actually opening a Dwarf_Debug.

These are crucial for libdwarf itself. The dw_ftype returned is one of DW_FTYPE_ELF, DW_FTYPE_PE, DW_FTYPE_MACH_O, or DW_FTYPE_APPLEUNIVERSAL.

These are not meant to deal with a specific binary inside a MacOS Universal Binary (DW_FTYPE_APPLEUNIVERSAL).

9.39 Section allocation: malloc or mmap

Functions

- DW_API enum [Dwarf_Sec_Alloc_Pref](#) [dwarf_set_load_preference](#) (enum [Dwarf_Sec_Alloc_Pref](#) dw_load_preference)
Set/Retrieve section allocation preference.
- DW_API int [dwarf_get_mmap_count](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) *dw_mmap_count, [Dwarf_Unsigned](#) *dw_mmap_size, [Dwarf_Unsigned](#) *dw_malloc_count, [Dwarf_Unsigned](#) *dw_malloc_size)
Retrieve count of mmap/malloc sections.

9.39.1 Detailed Description

Functions related to the choice of malloc/read or mmap for object section memory allocation.

The default allocation preference is malloc().

The shell environment variable DWARF_WHICH_ALLOC is also involved at runtime but it only applies to reading Elf object files.. If the value is 'malloc' then use of read/malloc is preferred. If the value is 'mmap' then use of mmap is preferred (Example: 'export DWARF_WHICH_ALLOC=mmap'). Otherwise, the environment value is checked and ignored.

If present and valid this environment variable takes precedence over [dwarf_set_load_preference\(\)](#).

9.39.2 Function Documentation

9.39.2.1 dwarf_get_mmap_count()

```
DW_API int dwarf_get_mmap_count (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_mmap_count,
    Dwarf_Unsigned * dw_mmap_size,
    Dwarf_Unsigned * dw_malloc_count,
    Dwarf_Unsigned * dw_malloc_size )
```

Retrieve count of mmap/malloc sections.

Since

{0.12.0}

Note that compressed section contents will be expanded into a malloc/read section in all cases.

Parameters

<i>dw_dbg</i>	A valid open Dwarf_Debug.
<i>dw_mmap_count</i>	On success the number of sections allocated with mmap is returned. If null passed in the argument is ignored.
<i>dw_mmap_size</i>	On success the size total in bytes of sections allocated with mmap is returned. If null passed in the argument is ignored.
<i>dw_malloc_count</i> Generated by Doxygen	On success the number of sections read/allocated with read/malloc is returned. If null passed in the argument is ignored. On success the number of sections allocated with malloc/read is returned.
<i>dw_malloc_size</i>	On success the total size in bytes of sections with malloc/read is returned. If null passed in the argument is ignored. On success the number of sections read/allocated with

Returns

On success returns DW_DLV_OK and sets the counts and total size through the respective non-null pointer arguments. If dw_dbg is invalid or NULL the function returns DW_DLV_ERROR. Never returns DW_DLV_↔NO_ENTRY.

9.39.2.2 dwarf_set_load_preference()

```
DW_API enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference (
    enum Dwarf_Sec_Alloc_Pref dw_load_preference )
```

Set/Retrieve section allocation preference.

Since

{0.12.0}

By default object file sections are loaded using malloc and read (Dwarf_Alloc_Malloc). This works everywhere and works well on all but gigantic object files.

The preference of Dwarf_Alloc_Mmap does not guarantee mmap will be used for object section data, but does cause mmap() to be used when possible.

In 0.12.0 mmap() is only usable on Elf object files.

dw_load_preference is one of Dwarf_Alloc_Malloc (1) Dwarf_Alloc_Mmap (2)

Must be called before calling a dwarf_init*() to be effective in a dwarf_init*(). The value is remembered for subsequent dwarf_init*() in the library runtime being executed.

Parameters

<i>dw_load_preference</i>	If passed in Dwarf_Alloc_Mmap then future calls to any dwarf_init*() function will use mmap to load object sections if possible. If passed in Dwarf_Alloc_Malloc then future calls to any dwarf_init*() function will use mmap to load sections. Any other value passed in dw_load_preference is ignored.
---------------------------	---

Returns

Always returns the value before dw_load_preference applied, of this runtime global preference.

9.40 Using dwarf_init_path()

Example of a libdwarf initialization call.

Example of a libdwarf initialization call.

An example calling [dwarf_init_path\(\)](#) and [dwarf_finish\(\)](#)

Parameters

<i>path</i>	Path to an object we wish to open.
<i>groupnumber</i>	Desired groupnumber. Use DW_DW_GROUPNUMBER_ANY unless you have reason to do otherwise.

Returns

Returns the applicable result. DW_DLV_OK etc.

```

*/
int exampleinit(const char *path, unsigned groupnumber)
{
    static char true_pathbuf[FILENAME_MAX];
    unsigned tpathlen = FILENAME_MAX;
    Dwarf_Handler errhand = 0;
    Dwarf_Ptr errarg = 0;
    Dwarf_Error error = 0;
    Dwarf_Debug dbg = 0;
    int res = 0;

    res = dwarf_init_path(path, true_pathbuf,
        tpathlen, groupnumber, errhand,
        errarg, &dbg, &error);
    if (res == DW_DLV_ERROR) {
        /* Necessary call even though dbg is null!
           This avoids a memory leak. */
        dwarf_dealloc_error(dbg, error);
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        /* Nothing we can do */
        return res;
    }
    printf("The file we actually opened is %s\n",
        true_pathbuf);
    /* Call libdwarf functions here */
    dwarf_finish(dbg);
    return DW_DLV_OK;
}

```

9.41 Using dwarf_init_path_dl()

Example focused on GNU debuglink data.

Example focused on GNU debuglink data.

In case GNU debuglink data is followed the true_pathbuf content will not match path. The path actually used is copied to true_path_out.

In the case of MacOS dSYM the true_path_out may not match path.

If debuglink data is missing from the Elf executable or shared-object (ie, it is a normal object!) or unusable by libdwarf or true_path_buffer len is zero or true_path_out_buffer is zero libdwarf accepts the path given as the object to report on, no debuglink or dSYM processing will be used.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

An example calling `dwarf_init_path_dl()` and `dwarf_finish()`

Parameters

<i>path</i>	Path to an object we wish to open.
<i>groupnumber</i>	Desired groupnumber. Use DW_DW_GROUPNUMBER_ANY unless you have reason to do otherwise.
<i>error</i>	A pointer we can use to record error details.

Returns

Returns the applicable result. DW_DLV_OK etc.

```

*/
int exampleinit_dl(const char *path, unsigned groupnumber,
    Dwarf_Error *error)
{
    static char true_pathbuf[FILENAME_MAX];
    static const char *glpath[3] = {
        "/usr/local/debug",
        "/usr/local/private/debug",
        "/usr/local/libdwarf/debug"
    };
    unsigned tpathlen = FILENAME_MAX;
    Dwarf_Handler errhand = 0;
    Dwarf_Ptr errarg = 0;
    Dwarf_Debug dbg = 0;
    int res = 0;
    unsigned char path_source = 0;

    res = dwarf_init_path_dl(path, true_pathbuf,
        tpathlen, groupnumber, errhand,
        errarg, &dbg,
        (char **)glpath,
        3,
        &path_source,
        error);
    if (res == DW_DLV_ERROR) {
        /* We are not returning dbg, so we must do:
           dwarf_dealloc_error(dbg, *error);
           here to free the error details. */
        dwarf_dealloc_error(dbg, *error);
        *error = 0;
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        return res;
    }
    printf("The file we actually opened is %s\n",
        true_pathbuf);
    /* Call libdwarf functions here */
    dwarf_finish(dbg);
    return res;
}

```

9.42 Using dwarf_attrlist()

Example showing [dwarf_attrlist\(\)](#)

Example showing [dwarf_attrlist\(\)](#)

Parameters

<i>somedie</i>	Pass in any valid relevant DIE pointer.
<i>error</i>	An error pointer we can use.

Returns

Return DW_DLV_OK (etc).

```

*/
int example1(Dwarf_Die somedie, Dwarf_Error *error)
{
    Dwarf_Debug dbg = 0;
    Dwarf_Signed atcount;
    Dwarf_Attribute *atlist;
    Dwarf_Signed i = 0;
    int errv;

    errv = dwarf_attrlist(somedie, &atlist, &atcount, error);
    if (errv != DW_DLV_OK) {
        return errv;
    }
    for (i = 0; i < atcount; ++i) {
        Dwarf_Half attrnum = 0;
        const char *attrname = 0;

        /* use atlist[i], likely calling
           libdwarf functions and likely
           returning DW_DLV_ERROR if
           what you call gets DW_DLV_ERROR */
        errv = dwarf_whatattr(atlist[i], &attrnum, error);
        if (errv != DW_DLV_OK) {
            /* Something really bad happened. */
            return errv;
        }
        dwarf_get_AT_name(attrnum, &attrname);
        printf("Attribute[%ld], value %u name %s\n",
              (long int)i, attrnum, attrname);
        dwarf_dealloc_attribute(atlist[i]);
        atlist[i] = 0;
    }
    dwarf_dealloc(dbg, atlist, DW_DLA_LIST);
    return DW_DLV_OK;
}

```

9.43 Attaching a tied dbg

Example attaching base dbg to a split-DWARF object.

Example attaching base dbg to a split-DWARF object.

See DWARF5 Appendix F on Split-DWARF.

By libdwarf convention, open the split Dwarf_Debug using a dwarf_init call. Then open the executable as the tied object. Then call [dwarf_set_tied_dbg\(\)](#) so the library can look for relevant data in the tied-dbg (the executable).

With split dwarf your libdwarf calls after the the initial open are done against the split Dwarf_Dbg and libdwarf automatically looks in the tied dbg when and as appropriate. the tied_dbg can be detached too, see [example3](#) link, though you must call [dwarf_finish\(\)](#) on the detached dw_tied_dbg, the library will not do that for you.

Parameters

<i>split_dbg</i>	
<i>tied_dbg</i>	
<i>error</i>	

Returns

Returns DW_DLV_OK or DW_DLV_ERROR or DW_DLV_NO_ENTRY to the caller.

```

*/
int example2(Dwarf_Debug split_dbg, Dwarf_Debug tied_dbg,
             Dwarf_Error *error)

```

```

{
    int res = 0;

    /* The caller should have opened dbg
       on the split-dwarf object/dwp,
       an object with DWARF, but no executable
       code.
       And it should have opened tieddbg on the
       runnable shared object or executable. */
    res = dwarf_set_tied_dbg(split_dbg,tied_dbg,error);
    /* Let the caller (who initialized the dbg
       values) deal with doing dwarf_finish()
       /
    return res;
}

```

9.44 Detaching a tied dbg

Example detaching a tied (executable) dbg.

Example detaching a tied (executable) dbg.

See DWARF5 Appendix F on Split-DWARF.

With split dwarf your libdwarf calls after than the initial open are done against the split Dwarf_Dbg and libdwarf automatically looks in the open tied dbg when and as appropriate. the tied-dbg can be detached too, see example3 link, though you must call [dwarf_finish\(\)](#) on the detached dw_tied_dbg, the library will not do that for you..

```

*/
int example3(Dwarf_Debug split_dbg,Dwarf_Error *error)
{
    int res = 0;
    res = dwarf_set_tied_dbg(split_dbg,NULL,error);
    if (res != DW_DLV_OK) {
        /* Something went wrong*/
        return res;
    }
    return res;
}

```

9.45 Examining Section Group data

Example accessing Section Group data.

Example accessing Section Group data.

With split dwarf your libdwarf calls after than the initial open are done against the base Dwarf_Dbg and libdwarf automatically looks in the open tied dbg when and as appropriate. the tied-dbg can be detached too, see example3 link, though you must call [dwarf_finish\(\)](#) on the detached dw_tied_dbg, the library will not do that for you..

Section groups apply to Elf COMDAT groups too.

```

*/
void examplesecgroup(Dwarf_Debug dbg)
{
    int res = 0;
    Dwarf_Unsigned section_count = 0;
    Dwarf_Unsigned group_count;
    Dwarf_Unsigned selected_group = 0;
    Dwarf_Unsigned group_map_entry_count = 0;
    Dwarf_Unsigned *sec_nums = 0;
    Dwarf_Unsigned *group_nums = 0;
    const char ** sec_names = 0;
    Dwarf_Error error = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_sec_group_sizes(dbg,&section_count,
        &group_count,&selected_group, &group_map_entry_count,
        &error);
    if (res != DW_DLV_OK) {

```

```

        /* Something is badly wrong*/
        return;
    }
    /* In an object without split-dwarf sections
    or COMDAT sections we now have
    selected_group == 1. */
    sec_nums = calloc(group_map_entry_count, sizeof(Dwarf_Unsigned));
    if (!sec_nums) {
        /* FAIL. out of memory */
        return;
    }
    group_nums = calloc(group_map_entry_count, sizeof(Dwarf_Unsigned));
    if (!group_nums) {
        free(group_nums);
        /* FAIL. out of memory */
        return;
    }
    sec_names = calloc(group_map_entry_count, sizeof(char*));
    if (!sec_names) {
        free(group_nums);
        free(sec_nums);
        /* FAIL. out of memory */
        return;
    }

    res = dwarf_sec_group_map(dbg, group_map_entry_count,
                             group_nums, sec_nums, sec_names, &error);
    if (res != DW_DLV_OK) {
        /* FAIL. Something badly wrong. */
        free(sec_names);
        free(group_nums);
        free(sec_nums);
    }
    for (i = 0; i < group_map_entry_count; ++i) {
        /* Now do something with
        group_nums[i], sec_nums[i], sec_names[i] */
    }
    /* The strings are in Elf data.
    Do not free() the strings themselves.*/
    free(sec_names);
    free(group_nums);
    free(sec_nums);
}

```

9.46 Using dwarf_siblingof_c()

Example accessing a DIE sibling.

Example accessing a DIE sibling.

Access to each DIE on a sibling list. This is the preferred form as it is slightly more efficient than [dwarf_siblingof_b\(\)](#).

```

*/
int example4c(Dwarf_Die in_die,
             Dwarf_Error *error)
{
    Dwarf_Die return_sib = 0;
    int res = 0;

    /* in_die must be a valid Dwarf_Die */
    res = dwarf_siblingof_c(in_die, &return_sib, error);
    if (res == DW_DLV_OK) {
        /* Use return_sib here. */
        dwarf_dealloc_die(return_sib);
        /* return_sib is no longer usable for anything, we
        ensure we do not use it accidentally with: */
        return_sib = 0;
        return res;
    }
    return res;
}

```

9.47 Using dwarf_siblingof_b()

Example accessing a DIE sibling.

Example accessing a DIE sibling.

Access to each DIE on a sibling list This is the older form, required after [dwarf_next_cu_header_d\(\)](#).

Better to use [dwarf_next_cu_header_e\(\)](#) and [dwarf_siblingof_c\(\)](#).

```

*/
int example4b(Dwarf_Debug dbg, Dwarf_Die in_die,
             Dwarf_Bool is_info,
             Dwarf_Error *error)
{
    Dwarf_Die return_sib = 0;
    int res = 0;

    /* in_die might be NULL following a call
       to dwarf_next_cu_header_d()
       or a valid Dwarf_Die */
    res = dwarf_siblingof_b(dbg, in_die, is_info, &return_sib, error);
    if (res == DW_DLV_OK) {
        /* Use return_sib here. */
        dwarf_dealloc_die(return_sib);
        /* return_sib is no longer usable for anything, we
           ensure we do not use it accidentally with: */
        return_sib = 0;
        return res;
    }
    return res;
}

```

9.48 Using dwarf_child()

Example accessing a DIE child.

Example accessing a DIE child.

If the DIE has children (for example inner scopes in a function or members of a struct) this retrieves the DIE which appears first. The child itself may have its own sibling chain.

```

*/
void example5(Dwarf_Die in_die)
{
    Dwarf_Die return_kid = 0;
    Dwarf_Error error = 0;
    int res = 0;

    res = dwarf_child(in_die, &return_kid, &error);
    if (res == DW_DLV_OK) {
        /* Use return_kid here. */
        dwarf_dealloc_die(return_kid);
        /* The original form of dealloc still works
           dwarf_dealloc(dbg, return_kid, DW_DLA_DIE);
           /
        /* return_kid is no longer usable for anything, we
           ensure we do not use it accidentally with: */
        return_kid = 0;
    }
}

```

9.49 using dwarf_validate_die_sibling

Example of a DIE tree validation.

Example of a DIE tree validation.

Here we show how one uses [dwarf_validate_die_sibling\(\)](#). DwarfDump uses this function as a part of its validation of DIE trees.

It is not something you need to use. But one must use it in a specific pattern for it to work properly.

`dwarf_validate_die_sibling()` depends on data set by `dwarf_child()` preceeding `dwarf_siblingof_b()` . `dwarf_child()` records a little bit of information invisibly in the Dwarf_Debug data.

```

*/
int example_sibvalid(Dwarf_Debug dbg,
    Dwarf_Die in_die,
    Dwarf_Error*error)
{
    int      cres = DW_DLV_OK;
    int      sibres = DW_DLV_OK;
    Dwarf_Die die = 0;
    Dwarf_Die sibdie = 0;
    Dwarf_Die child = 0;
    Dwarf_Bool is_info = dwarf_get_die_infotypes_flag(die);

    die = in_die;
    for ( ; die ; die = sibdie) {
        int vres = 0;
        Dwarf_Unsigned offset = 0;

        /* Maybe print something you extract from the DIE */
        cres = dwarf_child(die,&child,error);
        if (cres == DW_DLV_ERROR) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            printf("dwarf_child ERROR\n");
            return DW_DLV_ERROR;
        }
        if (cres == DW_DLV_OK) {
            int lres = 0;

            child = 0;
            lres = example_sibvalid(dbg,child,error);
            if (lres == DW_DLV_ERROR) {
                if (die != in_die) {
                    dwarf_dealloc_die(die);
                }
                dwarf_dealloc_die(child);
                printf("example_sibvalid ERROR\n");
                return lres;
            }
        }
        sibdie = 0;
        sibres = dwarf_siblingof_b(dbg,die,is_info,
            &sibdie,error);
        if (sibres == DW_DLV_ERROR) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            if (child) {
                dwarf_dealloc_die(child);
            }
            printf("dwarf_siblingof_b ERROR\n");
            return DW_DLV_ERROR;
        }
        if (sibres == DW_DLV_NO_ENTRY) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            if (child) {
                dwarf_dealloc_die(child);
            }
            return DW_DLV_OK;
        }
        vres = dwarf_validate_die_sibling(sibdie,&offset);
        if (vres == DW_DLV_ERROR) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            if (child) {
                dwarf_dealloc_die(child);
            }
            dwarf_dealloc_die(sibdie);
            printf("Invalid sibling DIE\n");
            return DW_DLV_ERROR;
        }
        /* loop again */
        if (die != in_die) {
            dwarf_dealloc_die(die);
        }
        die = 0;
    }
    return DW_DLV_OK;
}

```

9.50 Example walking CUs(e)

Example examining CUs looking for specific items(e).

Example examining CUs looking for specific items(e).

Loops through as many CUs as needed, stops and returns once a CU provides the desired data.

Assumes certain functions you write to remember the aspect of CUs that matter to you so once found in a cu my_needed_data_exists() or some other function of yours can identify the correct record.

Depending on your goals in examining the DIE tree it may be helpful to maintain a DIE stack of active DIEs, pushing and popping as you make your way through the DIE levels.

We assume that on a serious error we will give up (for simplicity here).

We assume the caller to examplecuhdre() will know what to retrieve (when we return DW_DLV_OK from examplecuhdree() and that myrecords points to a record with all the data needed by my_needed_data_exists() and recorded by myrecord_data_for_die().

```

*/

struct myrecords_struct *myrecords;
void myrecord_data_for_die(struct myrecords_struct *myrecords_data,
    Dwarf_Die d)
{
    /* do something */
    /* avoid compiler warnings */
    (void)myrecords_data;
    (void)d;
}

int my_needed_data_exists(struct myrecords_struct *myrecords_data)
{
    /* do something */
    /* avoid compiler warnings */
    (void)myrecords_data;
    return DW_DLV_OK;
}

/* Loop on DIE tree. */
static void
record_die_and_siblings_e(Dwarf_Debug dbg, Dwarf_Die in_die,
    int is_info, int in_level,
    struct myrecords_struct *myrec,
    Dwarf_Error *error)
{
    int res = DW_DLV_OK;
    Dwarf_Die cur_die=in_die;
    Dwarf_Die child = 0;

    myrecord_data_for_die(myrec,in_die);

    /* Loop on a list of siblings */
    for (;;) {
        Dwarf_Die sib_die = 0;

        /* Depending on your goals, the in_level,
        and the DW_TAG of cur_die, you may want
        to skip the dwarf_child call. We descend
        the DWARF-standard way of depth-first. */
        res = dwarf_child(cur_die,&child,error);
        if (res == DW_DLV_ERROR) {
            printf("Error in dwarf_child , level %d \n",in_level);
            exit(EXIT_FAILURE);
        }
        if (res == DW_DLV_OK) {
            record_die_and_siblings_e(dbg,child,is_info,
                in_level+1,myrec,error);
            /* No longer need 'child' die. */
            dwarf_dealloc(dbg,child,DW_DLA_DIE);
            child = 0;
        }
        /* res == DW_DLV_NO_ENTRY or DW_DLV_OK */
        res = dwarf_siblingof_c(cur_die,&sib_die,error);
        if (res == DW_DLV_ERROR) {
            exit(EXIT_FAILURE);
        }
        if (res == DW_DLV_NO_ENTRY) {

```

```

        /* Done at this level. */
        break;
    }
    /* res == DW_DLV_OK */
    if (cur_die != in_die) {
        dwarf_dealloc(dbg, cur_die, DW_DLA_DIE);
        cur_die = 0;
    }
    cur_die = sib_die;
    myrecord_data_for_die(myrec, sib_die);
}
return;
}

/* Assuming records properly initialized for your use. */
int examplecuhdre(Dwarf_Debug dbg,
    struct myrecords_struct *myrec,
    Dwarf_Error *error)
{
    Dwarf_Unsigned abbrev_offset = 0;
    Dwarf_Half address_size = 0;
    Dwarf_Half version_stamp = 0;
    Dwarf_Half offset_size = 0;
    Dwarf_Half extension_size = 0;
    Dwarf_Sig8 signature;
    Dwarf_Unsigned typeoffset = 0;
    Dwarf_Unsigned next_cu_header = 0;
    Dwarf_Half header_cu_type = 0;
    Dwarf_Bool is_info = TRUE;
    int res = 0;

    while(!my_needed_data_exists(myrec)) {
        Dwarf_Die cu_die = 0;
        Dwarf_Unsigned cu_header_length = 0;

        memset(&signature, 0, sizeof(signature));
        res = dwarf_next_cu_header_e(dbg, is_info,
            &cu_die,
            &cu_header_length,
            &version_stamp, &abbrev_offset,
            &address_size, &offset_size,
            &extension_size, &signature,
            &typeoffset, &next_cu_header,
            &header_cu_type, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            if (is_info == TRUE) {
                /* Done with .debug_info, now check for
                 * .debug_types. */
                is_info = FALSE;
                continue;
            }
            /* No more CUs to read! Never found
             * what we were looking for in either
             * .debug_info or .debug_types. */
            return res;
        }
        /* We have the cu_die .
         * New in v0.9.0 because the connection of
         * the CU_DIE to the CU header is clear
         * in the argument list.
         */
        record_die_and_siblings_e(dbg, cu_die, is_info,
            0, myrec, error);
        dwarf_dealloc_die(cu_die);
    }
    /* Found what we looked for */
    return DW_DLV_OK;
}

```

9.51 Example walking CUs(d)

Example accessing all CUs looking for specific items(d).

Example accessing all CUs looking for specific items(d).

Loops through as many CUs as needed, stops and returns once a CU provides the desired data.

Assumes certain functions you write to remember the aspect of CUs that matter to you so once found in a cu my_↔ needed_data_exists() or some other function of yours can identify the correct record. (Possibly a DIE global offset. Remember to note if each DIE has is_info TRUE or FALSE so libdwarf can find the DIE properly.)

Depending on your goals in examining the DIE tree it may be helpful to maintain a DIE stack of active DIEs, pushing and popping as you make your way through the DIE levels.

We assume that on a serious error we will give up (for simplicity here).

We assume the caller to examplecuhdrd() will know what to retrieve (when we return DW_DLV_OK from examplecuhdrd() and that myrecords points to a record with all the data needed by my_needed_data_exists() and recorded by myrecord_data_for_die().

```

*/
struct myrecords_struct *myrecords;
void myrecord_data_for_die(struct myrecords_struct *myrecords,
    Dwarf_Die d);
int my_needed_data_exists(struct myrecords_struct *myrecords);

/* Loop on DIE tree. */
static void
record_die_and_siblingsd(Dwarf_Debug dbg, Dwarf_Die in_die,
    int is_info, int in_level,
    struct myrecords_struct *myrec,
    Dwarf_Error *error)
{
    int res = DW_DLV_OK;
    Dwarf_Die cur_die=in_die;
    Dwarf_Die child = 0;

    myrecord_data_for_die(myrec,in_die);

    /* Loop on a list of siblings */
    for (;;) {
        Dwarf_Die sib_die = 0;

        /* Depending on your goals, the in_level,
           and the DW_TAG of cur_die, you may want
           to skip the dwarf_child call. */
        res = dwarf_child(cur_die,&child,error);
        if (res == DW_DLV_ERROR) {
            printf("Error in dwarf_child , level %d \n",in_level);
            exit(EXIT_FAILURE);
        }
        if (res == DW_DLV_OK) {
            record_die_and_siblingsd(dbg,child,is_info,
                in_level+1,myrec,error);
            /* No longer need 'child' die. */
            dwarf_dealloc(dbg,child,DW_DLA_DIE);
            child = 0;
        }
        /* res == DW_DLV_NO_ENTRY or DW_DLV_OK */
        res = dwarf_siblingof_b(dbg,cur_die,is_info,&sib_die,error);
        if (res == DW_DLV_ERROR) {
            exit(EXIT_FAILURE);
        }
        if (res == DW_DLV_NO_ENTRY) {
            /* Done at this level. */
            break;
        }
        /* res == DW_DLV_OK */
        if (cur_die != in_die) {
            dwarf_dealloc(dbg,cur_die,DW_DLA_DIE);
            cur_die = 0;
        }
        cur_die = sib_die;
        myrecord_data_for_die(myrec,sib_die);
    }
    return;
}

/* Assuming records properly initialized for your use. */
int examplecuhdrd(Dwarf_Debug dbg,
    struct myrecords_struct *myrec,
    Dwarf_Error *error)
{
    Dwarf_Unsigned abbrev_offset = 0;
    Dwarf_Half address_size = 0;
    Dwarf_Half version_stamp = 0;
    Dwarf_Half offset_size = 0;
    Dwarf_Half extension_size = 0;
    Dwarf_Sig8 signature;
    Dwarf_Unsigned typeoffset = 0;

```

```

Dwarf_Unsigned next_cu_header = 0;
Dwarf_Half     header_cu_type = 0;
Dwarf_Bool     is_info = TRUE;
int            res = 0;

while(!my_needed_data_exists(myrec)) {
    Dwarf_Die no_die = 0;
    Dwarf_Die cu_die = 0;
    Dwarf_Unsigned cu_header_length = 0;

    memset(&signature, 0, sizeof(signature));
    res = dwarf_next_cu_header_d(dbg, is_info, &cu_header_length,
                                &version_stamp, &abbrev_offset,
                                &address_size, &offset_size,
                                &extension_size, &signature,
                                &typeoffset, &next_cu_header,
                                &header_cu_type, error);
    if (res == DW_DLV_ERROR) {
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        if (is_info == TRUE) {
            /* Done with .debug_info, now check for
             * .debug_types. */
            is_info = FALSE;
            continue;
        }
        /* No more CUs to read! Never found
         * what we were looking for in either
         * .debug_info or .debug_types. */
        return res;
    }
    /* The CU will have a single sibling, a cu_die.
     * It is essential to call this right after
     * a call to dwarf_next_cu_header_d() because
     * there is no explicit connection provided to
     * dwarf_siblingof_b(), which returns a DIE
     * from whatever CU was last accessed by
     * dwarf_next_cu_header_d()!
     * The lack of explicit connection was a
     * design mistake in the API (made in 1992). */

    res = dwarf_siblingof_b(dbg, no_die, is_info,
                            &cu_die, error);
    if (res == DW_DLV_ERROR) {
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        /* Impossible */
        exit(EXIT_FAILURE);
    }
    record_die_and_siblingsd(dbg, cu_die, is_info,
                             0, myrec, error);
    dwarf_dealloc_die(cu_die);
}
/* Found what we looked for */
return DW_DLV_OK;
}

```

9.52 Using dwarf_offdie_b()

Example accessing a DIE by its offset.

Example accessing a DIE by its offset.

```

/*
int example6(Dwarf_Debug dbg, Dwarf_Off die_offset,
             Dwarf_Bool is_info,
             Dwarf_Error *error)
{
    Dwarf_Die return_die = 0;
    int res = 0;

    res = dwarf_offdie_b(dbg, die_offset, is_info, &return_die, error);
    if (res != DW_DLV_OK) {
        /* res could be NO ENTRY or ERROR, so no
         * dealloc necessary. */
        return res;
    }
    /* Use return_die here. */
    dwarf_dealloc_die(return_die);
}

```

```

    /* return_die is no longer usable for anything, we
       ensure we do not use it accidentally
       though a bit silly here given the return_die
       goes out of scope... */
    return_die = 0;
    return res;
}

```

9.53 Using dwarf_offset_given_die()

Example finding the section offset of a DIE.

Example finding the section offset of a DIE.

Here finding the offset of a CU-DIE.

```

/*
int example7(Dwarf_Debug dbg, Dwarf_Die in_die,
             Dwarf_Bool is_info,
             Dwarf_Error * error)
{
    int res = 0;
    Dwarf_Off cudieoff = 0;
    Dwarf_Die cudie = 0;

    res = dwarf_CU_dieoffset_given_die(in_die, &cudieoff, error);
    if (res != DW_DLV_OK) {
        /* FAIL */
        return res;
    }
    res = dwarf_offdie_b(dbg, cudieoff, is_info, &cudie, error);
    if (res != DW_DLV_OK) {
        /* FAIL */
        return res;
    }
    /* do something with cu_die */
    dwarf_dealloc_die(cudie);
    return res;
}

```

9.54 Using dwarf_attrlist()

Example Calling dwarf_attrlist()

Example Calling dwarf_attrlist()

```

/*
int example8(Dwarf_Debug dbg, Dwarf_Die somedie, Dwarf_Error *error)
{
    Dwarf_Signed atcount = 0;
    Dwarf_Attribute *atlist = 0;
    int errv = 0;
    Dwarf_Signed i = 0;

    errv = dwarf_attrlist(somedie, &atlist, &atcount, error);
    if (errv != DW_DLV_OK) {
        return errv;
    }
    for (i = 0; i < atcount; ++i) {
        /* use atlist[i] */
        dwarf_dealloc_attribute(atlist[i]);
        atlist[i] = 0;
    }
    dwarf_dealloc(dbg, atlist, DW_DLA_LIST);
    return DW_DLV_OK;
}

```

9.55 Using dwarf_offset_list()

Example using dwarf_offset_list.

Example using dwarf_offset_list.

An example calling dwarf_offset_list

Parameters

<i>dbg</i>	the Dwarf_Debug of interest
<i>dieoffset</i>	The section offset of a Dwarf_Die
<i>is_info</i>	Pass in TRUE if the dieoffset is for the .debug_info section, else pass in FALSE meaning the dieoffset is for the DWARF4 .debug_types section.
<i>error</i>	The usual error detail return.

Returns

Returns DW_DLV_OK etc

```

/*
int exampleoffset_list(Dwarf_Debug dbg, Dwarf_Off dieoffset,
    Dwarf_Bool is_info, Dwarf_Error * error)
{
    Dwarf_Unsigned offcnt = 0;
    Dwarf_Off *offbuf = 0;
    int errv = 0;
    Dwarf_Unsigned i = 0;

    errv = dwarf_offset_list(dbg, dieoffset, is_info,
        &offbuf, &offcnt, error);
    if (errv != DW_DLV_OK) {
        return errv;
    }
    for (i = 0; i < offcnt; ++i) {
        /* use offbuf[i] */
        /* No need to free the offbuf entry, it
           is just an offset value. */
    }
    dwarf_dealloc(dbg, offbuf, DW_DLA_LIST);
    return DW_DLV_OK;
}

```

9.56 Documenting Form_Block

Example documents Form_Block content.

Example documents Form_Block content.

Used with certain location information functions, a frame expression function, expanded frame instructions, and DW_FORM_block<> functions and more.

See also

[dwarf_formblock](#)

[Dwarf_Block_s](#)

```

struct Dwarf_Block_s fields {
    Dwarf_Unsigned bl_len;
        Length of block bl_data points at

    Dwarf_Ptr      bl_data;
        Uninterpreted data bytes

    Dwarf_Small     bl_from_loclist;
        See libdwarf.h DW_LKIND, defaults to
        DW_LKIND_expression and except in certain
        location expressions the field is ignored.

    Dwarf_Unsigned bl_section_offset;
        Section offset of what bl_data points to

```

9.57 Using dwarf_discr_list()

Example using dwarf_discr_list, dwarf_formblock.

Example using dwarf_discr_list, dwarf_formblock.

An example calling dwarf_get_form_class, dwarf_discr_list, and dwarf_formblock. and the dwarf_deallocs applicable.

See also

[dwarf_discr_list](#)

[dwarf_get_form_class](#)

[dwarf_formblock](#)

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_die</i>	The applicable Dwarf_Die
<i>dw_attr</i>	The applicable Dwarf_Attribute
<i>dw_attrnum, The</i>	attribute number passed in to shorten this example a bit.
<i>dw_isunsigned, The</i>	attribute number passed in to shorten this example a bit.
<i>dw_theform, The</i>	form number passed in to shorten this example a bit.
<i>dw_error</i>	The usual error pointer.

Returns

Returns DW_DLV_OK etc

```

/*
int example_discr_list(Dwarf_Debug dbg,
    Dwarf_Die die,
    Dwarf_Attribute attr,
    Dwarf_Half attrnum,
    Dwarf_Bool isunsigned,
    Dwarf_Half theform,
    Dwarf_Error *error)
{
    /* The example here assumes that
       attribute attr is a DW_AT_discr_list.
       isunsigned should be set from the signedness
       of the parent of 'die' per DWARF rules for
       DW_AT_discr_list. */
    enum Dwarf_Form_Class fc = DW_FORM_CLASS_UNKNOWN;
    Dwarf_Half version = 0;
    Dwarf_Half offset_size = 0;
    int wres = 0;

    wres = dwarf_get_version_of_die(die, &version, &offset_size);
    if (wres != DW_DLV_OK) {
        /* FAIL */
        return wres;
    }
    fc = dwarf_get_form_class(version, attrnum, offset_size, theform);
    if (fc == DW_FORM_CLASS_BLOCK) {
        int fres = 0;
        Dwarf_Block *tempb = 0;
        fres = dwarf_formblock(attr, &tempb, error);
        if (fres == DW_DLV_OK) {
            Dwarf_Disc_Head h = 0;
            Dwarf_Unsigned u = 0;
            Dwarf_Unsigned arraycount = 0;
            int sres = 0;

            sres = dwarf_discr_list(dbg,
                (Dwarf_Small *)tempb->bl_data,
                tempb->bl_len,

```

```

        &h,&arraycount,error);
    if (sres == DW_DLV_NO_ENTRY) {
        /* Nothing here. */
        dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
        return sres;
    }
    if (sres == DW_DLV_ERROR) {
        /* FAIL . */
        dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
        return sres ;
    }
    for (u = 0; u < arraycount; u++) {
        int u2res = 0;
        Dwarf_Half dtype = 0;
        Dwarf_Signed dlow = 0;
        Dwarf_Signed dhigh = 0;
        Dwarf_Unsigned ulow = 0;
        Dwarf_Unsigned uhigh = 0;

        if (isunsigned) {
            u2res = dwarf_discr_entry_u(h,u,
                &dtype,&ulow,&uhigh,error);
        } else {
            u2res = dwarf_discr_entry_s(h,u,
                &dtype,&dlow,&dhigh,error);
        }
        if (u2res == DW_DLV_ERROR) {
            /* Something wrong */
            dwarf_dealloc(dbg,h,DW_DLA_DSC_HEAD);
            dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
            return u2res ;
        }
        if (u2res == DW_DLV_NO_ENTRY) {
            /* Impossible. u < arraycount. */
            dwarf_dealloc(dbg,h,DW_DLA_DSC_HEAD);
            dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
            return u2res;
        }
        /* Do something with dtype, and whichever
           of ulow, uhigh,dlow,dhigh got set.
           Probably save the values somewhere.
           Simple casting of dlow to ulow (or vice versa)
           will not get the right value due to the nature
           of LEB values. Similarly for uhigh, dhigh.
           One must use the right call.  */
    }
    dwarf_dealloc(dbg,h,DW_DLA_DSC_HEAD);
    dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
}
return DW_DLV_OK;
}

```

9.58 Location/expression access

Example using DWARF2-5 loclists and loc-expressions.

Example using DWARF2-5 loclists and loc-expressions.

Valid for DWARF2 and later DWARF.

This example simply *assumes* the attribute has a form which relates to location lists or location expressions. Use [dwarf_get_form_class\(\)](#) to determine if this attribute fits. Use [dwarf_get_version_of_die\(\)](#) to help get the data you need.

See also

[dwarf_get_form_class](#)

[dwarf_get_version_of_die](#)

[Reading a location expression](#)

```

*/
int example_loclistcv5(Dwarf_Attribute someattr,
    Dwarf_Error *error)
{
    Dwarf_Unsigned lcount = 0;
    Dwarf_Loc_Head_c loclist_head = 0;
    int lres = 0;

    lres = dwarf_get_loclist_c(someattr, &loclist_head,
        &lcount, error);
    if (lres == DW_DLV_OK) {
        Dwarf_Unsigned i = 0;

        /* Before any return remember to call
           dwarf_loc_head_c_dealloc(loclist_head); */
        for (i = 0; i < lcount; ++i) {
            Dwarf_Small loclist_lkind = 0;
            Dwarf_Small lle_value = 0;
            Dwarf_Unsigned rawval1 = 0;
            Dwarf_Unsigned rawval2 = 0;
            Dwarf_Bool debug_addr_unavailable = FALSE;
            Dwarf_Addr lopc = 0;
            Dwarf_Addr hipc = 0;
            Dwarf_Unsigned loclist_expr_op_count = 0;
            Dwarf_Locdesc_c locdesc_entry = 0;
            Dwarf_Unsigned expression_offset = 0;
            Dwarf_Unsigned locdesc_offset = 0;

            lres = dwarf_get_locdesc_entry_d(loclist_head,
                i,
                &lle_value,
                &rawval1, &rawval2,
                &debug_addr_unavailable,
                &lopc, &hipc,
                &loclist_expr_op_count,
                &locdesc_entry,
                &loclist_lkind,
                &expression_offset,
                &locdesc_offset,
                error);
            if (lres == DW_DLV_OK) {
                Dwarf_Unsigned j = 0;
                int opres = 0;
                Dwarf_Small op = 0;

                for (j = 0; j < loclist_expr_op_count; ++j) {
                    Dwarf_Unsigned opd1 = 0;
                    Dwarf_Unsigned opd2 = 0;
                    Dwarf_Unsigned opd3 = 0;
                    Dwarf_Unsigned offsetforbranch = 0;

                    opres = dwarf_get_location_op_value_c(
                        locdesc_entry, j, &op,
                        &opd1, &opd2, &opd3,
                        &offsetforbranch,
                        error);
                    if (opres == DW_DLV_OK) {
                        /* Do something with the operators.
                           Usually you want to use opd1,2,3
                           as appropriate. Calculations
                           involving base addresses etc
                           have already been incorporated
                           in opd1,2,3. */
                    } else {
                        dwarf_dealloc_loc_head_c(loclist_head);
                        /*Something is wrong. */
                        return opres;
                    }
                }
            } else {
                /* Something is wrong. Do something. */
                dwarf_dealloc_loc_head_c(loclist_head);
                return lres;
            }
        }
    }
    /* Always call dwarf_loc_head_c_dealloc()
       to free all the memory associated with loclist_head. */
    dwarf_dealloc_loc_head_c(loclist_head);
    loclist_head = 0;
    return lres;
}

```

9.59 Reading a location expression

Example getting details of a location expression.

Example getting details of a location expression.

See also

[Location/expression access](#)

```

*/
int example_locexpr(Dwarf_Debug dbg, Dwarf_Ptr expr_bytes,
    Dwarf_Unsigned expr_len,
    Dwarf_Half addr_size,
    Dwarf_Half offset_size,
    Dwarf_Half version,
    Dwarf_Error*error)
{
    Dwarf_Loc_Head_c head = 0;
    Dwarf_Locdesc_c locentry = 0;
    int res2 = 0;
    Dwarf_Unsigned rawlopc = 0;
    Dwarf_Unsigned rawhipc = 0;
    Dwarf_Bool debug_addr_unavail = FALSE;
    Dwarf_Unsigned lopc = 0;
    Dwarf_Unsigned hipc = 0;
    Dwarf_Unsigned ulistlen = 0;
    Dwarf_Unsigned ulocentry_count = 0;
    Dwarf_Unsigned section_offset = 0;
    Dwarf_Unsigned locdesc_offset = 0;
    Dwarf_Small lle_value = 0;
    Dwarf_Small loclist_source = 0;
    Dwarf_Unsigned i = 0;

    res2 = dwarf_loclist_from_expr_c(dbg,
        expr_bytes, expr_len,
        addr_size,
        offset_size,
        version,
        &head,
        &ulistlen,
        error);
    if (res2 != DW_DLV_OK) {
        return res2;
    }
    /* These are a location expression, not loclist.
       So we just need the 0th entry. */
    res2 = dwarf_get_locdesc_entry_d(head,
        0, /* Data from 0th because it is a loc expr,
           there is no list */
        &lle_value,
        &rawlopc, &rawhipc, &debug_addr_unavail, &lopc, &hipc,
        &ulocentry_count, &locentry,
        &loclist_source, &section_offset, &locdesc_offset,
        error);
    if (res2 == DW_DLV_ERROR) {
        dwarf_dealloc_loc_head_c(head);
        return res2;
    } else if (res2 == DW_DLV_NO_ENTRY) {
        dwarf_dealloc_loc_head_c(head);
        return res2;
    }
    /* ASSERT: ulistlen == 1 */
    for (i = 0; i < ulocentry_count; ++i) {
        Dwarf_Small op = 0;
        Dwarf_Unsigned opd1 = 0;
        Dwarf_Unsigned opd2 = 0;
        Dwarf_Unsigned opd3 = 0;
        Dwarf_Unsigned offsetforbranch = 0;

        res2 = dwarf_get_location_op_value_c(locentry,
            i, &op, &opd1, &opd2, &opd3,
            &offsetforbranch,
            error);
        /* Do something with the expression operator and operands */
        if (res2 != DW_DLV_OK) {
            dwarf_dealloc_loc_head_c(head);
            return res2;
        }
    }
    dwarf_dealloc_loc_head_c(head);
    return DW_DLV_OK;
}

```

9.60 Using dwarf_srclines_b()

Example using [dwarf_srclines_b\(\)](#)

Example using [dwarf_srclines_b\(\)](#)

An example calling dwarf_srclines_b

dwarf_srclines_dealloc_b dwarf_srclines_from_linecontext dwarf_srclines_files_indexes dwarf_srclines_files_↔
data_b dwarf_srclines_two_level_from_linecontext

Parameters

<i>path</i>	Path to an object we wish to open.
<i>error</i>	Allows passing back error details to the caller.

Returns

Return DW_DLV_OK etc.

```

*/
int examplec(Dwarf_Die cu_die, Dwarf_Error *error)
{
    /* EXAMPLE: DWARF2-DWARF5 access. */
    Dwarf_Line *linebuf = 0;
    Dwarf_Signed linecount = 0;
    Dwarf_Line *linebuf_actuall = 0;
    Dwarf_Signed linecount_actuall = 0;
    Dwarf_Line_Context line_context = 0;
    Dwarf_Small table_count = 0;
    Dwarf_Unsigned lineversion = 0;
    int sres = 0;
    /* ... */
    /* we use 'return' here to signify we can do nothing more
       at this point in the code. */
    sres = dwarf_srclines_b(cu_die, &lineversion,
        &table_count, &line_context, error);
    if (sres != DW_DLV_OK) {
        /* Handle the DW_DLV_NO_ENTRY or DW_DLV_ERROR
           No memory was allocated so there nothing
           to dealloc here. */
        return sres;
    }
    if (table_count == 0) {
        /* A line table with no actual lines. */
        /*...do something, see dwarf_srclines_files_count()
           etc below. */

        dwarf_srclines_dealloc_b(line_context);
        /* All the memory is released, the line_context
           and linebuf zeroed now
           as a reminder they are stale. */
        linebuf = 0;
        line_context = 0;
    } else if (table_count == 1) {
        Dwarf_Signed i = 0;
        Dwarf_Signed baseindex = 0;
        Dwarf_Signed file_count = 0;
        Dwarf_Signed endindex = 0;
        /* Standard dwarf 2,3,4, or 5 line table */
        /* Do something. */

        /* First let us index through all the files listed
           in the line table header. */
        sres = dwarf_srclines_files_indexes(line_context,
            &baseindex, &file_count, &endindex, error);
        if (sres != DW_DLV_OK) {
            /* Something badly wrong! */
            return sres;
        }
        /* Works for DWARF2,3,4 (one-based index)
           and DWARF5 (zero-based index) */
        for (i = baseindex; i < endindex; i++) {
            Dwarf_Unsigned dirindex = 0;

```

```

Dwarf_Unsigned modtime = 0;
Dwarf_Unsigned flength = 0;
Dwarf_Form_Data16 *md5data = 0;
int vres = 0;
const char *name = 0;

vres = dwarf_srclines_files_data_b(line_context, i,
    &name, &dirindex, &modtime, &flength,
    &md5data, error);
if (vres != DW_DLV_OK) {
    /* something very wrong. */
    return vres;
}
/* do something */
}

/* For this case where we have a line table we will likely
   wish to get the line details: */
sres = dwarf_srclines_from_linecontext(line_context,
    &linebuf, &linecount,
    error);
if (sres != DW_DLV_OK) {
    /* Error. Clean up the context information. */
    dwarf_srclines_dealloc_b(line_context);
    return sres;
}
/* The lines are normal line table lines. */
for (i = 0; i < linecount; ++i) {
    /* use linebuf[i] */
}
dwarf_srclines_dealloc_b(line_context);
/* All the memory is released, the line_context
   and linebuf zeroed now as a reminder they are stale */
linebuf = 0;
line_context = 0;
linecount = 0;
} else {
    Dwarf_Signed i = 0;
    /* ASSERT: table_count == 2,
       Experimental two-level line table. Version 0xf006
       We do not define the meaning of this non-standard
       set of tables here. */

    /* For 'something C' (two-level line tables)
       one codes something like this
       Note that we do not define the meaning or
       use of two-level line
       tables as these are experimental, not standard DWARF. */
    sres = dwarf_srclines_two_level_from_linecontext(line_context,
        &linebuf, &linecount,
        &linebuf_actuals, &linecount_actuals,
        error);
    if (sres == DW_DLV_OK) {
        for (i = 0; i < linecount; ++i) {
            /* use linebuf[i], these are the 'logicals'
               entries. */
        }
        for (i = 0; i < linecount_actuals; ++i) {
            /* use linebuf_actuals[i], these are the
               actuals entries */
        }
        dwarf_srclines_dealloc_b(line_context);
        line_context = 0;
        linebuf = 0;
        linecount = 0;
        linebuf_actuals = 0;
        linecount_actuals = 0;
    } else if (sres == DW_DLV_NO_ENTRY) {
        /* This should be impossible, but do something. */
        /* Then Free the line_context */
        dwarf_srclines_dealloc_b(line_context);
        line_context = 0;
        linebuf = 0;
        linecount = 0;
        linebuf_actuals = 0;
        linecount_actuals = 0;
    } else {
        /* ERROR, show the error or something.
           Free the line_context. */
        dwarf_srclines_dealloc_b(line_context);
        line_context = 0;
        linebuf = 0;
        linecount = 0;
        linebuf_actuals = 0;
        linecount_actuals = 0;
    }
}
}

```

```

    return DW_DLV_OK;
}

```

9.61 Using dwarf_srclines_b() and linecontext

Example two using [dwarf_srclines_b\(\)](#), [dwarf_linesrc\(\)](#).

Example two using [dwarf_srclines_b\(\)](#), [dwarf_linesrc\(\)](#).

See also

[dwarf_srclines_b](#)

[dwarf_srclines_from_linecontext](#)

[dwarf_srclines_dealloc_b](#)

```

*/
int exempld(Dwarf_Debug dbg, Dwarf_Die somedie, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Line_Context context = 0;
    Dwarf_Line *linebuf = 0;
    Dwarf_Signed i = 0;
    Dwarf_Line *line;
    Dwarf_Small table_count = 0;
    Dwarf_Unsigned version = 0;
    int sres = 0;

    sres = dwarf_srclines_b(somedie,
        &version, &table_count, &context, error);
    if (sres != DW_DLV_OK) {
        return sres;
    }
    sres = dwarf_srclines_from_linecontext(context,
        &linebuf, &count, error);
    if (sres != DW_DLV_OK) {
        dwarf_srclines_dealloc_b(context);
        return sres;
    }
    line = linebuf;
    for (i = 0; i < count; ++line, ++i) {
        char * filename = 0;
        int lres = 0;
        Dwarf_Line dline = linebuf[i];

        lres = dwarf_linesrc(dline, &filename, error);
        if (lres != DW_DLV_OK) {
            dwarf_srclines_dealloc_b(context);
            return lres;
        }
        /* use filename */
        dwarf_dealloc(dbg, filename, DW_DLA_STRING);
    }
    dwarf_srclines_dealloc_b(context);
    return DW_DLV_OK;
}

```

9.62 Using dwarf_srcfiles()

Example getting source file names given a DIE.

Example getting source file names given a DIE.

```

*/
int examplee(Dwarf_Debug dbg, Dwarf_Die somedie, Dwarf_Error *error)
{
    /* It is an annoying historical mistake in libdwarf
       that the count is a signed value. */
    Dwarf_Signed count = 0;
    char **srcfiles = 0;
    Dwarf_Signed i = 0;

```

```

int                res = 0;
Dwarf_Line_Context line_context = 0;
Dwarf_Small        table_count = 0;
Dwarf_Unsigned     lineversion = 0;

res = dwarf_srclines_b(somedie,&lineversion,
    &table_count,&line_context,error);
if (res != DW_DLV_OK) {
    /* dwarf_finish() will dealloc srcfiles, not doing
       that here. */
    return res;
}
res = dwarf_srcfiles(somedie, &srcfiles,&count,error);
if (res != DW_DLV_OK) {
    dwarf_srclines_dealloc_b(line_context);
    return res;
}

for (i = 0; i < count; ++i) {
    Dwarf_Signed propernumber = 0;

    /* Use srcfiles[i] If you wish to print 'i'
       mostusefully
       you should reflect the numbering that
       a DW_AT_decl_file attribute would report in
       this CU. */
    if (lineversion == 5) {
        propernumber = i;
    } else {
        propernumber = i+1;
    }
    printf("File %4ld %s\n", (unsigned long)propernumber,
        srcfiles[i]);
    dwarf_dealloc(dbg, srcfiles[i], DW_DLA_STRING);
    srcfiles[i] = 0;
}
/* We could leave all dealloc to dwarf_finish() to
   handle, but this tidies up sooner. */
dwarf_dealloc(dbg, srcfiles, DW_DLA_LIST);
dwarf_srclines_dealloc_b(line_context);
return DW_DLV_OK;
}

```

9.63 Using dwarf_get_globals()

Example using global symbol names.

Example using global symbol names.

For 0.4.2 and earlier this returned .debug_pubnames content. As of version 0.5.0 (October 2022) this returns .debug_pubnames (if it exists) and the relevant portion of .debug_names (if .debug_names exists) data.

```

*/
int examplef(Dwarf_Debug dbg,Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *globs = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_get_globals(dbg, &globs,&count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use globs[i] */
        char *name = 0;
        res = dwarf_globname(globs[i],&name,error);
        if (res != DW_DLV_OK) {
            dwarf_globals_dealloc(dbg,globs,count);
            return res;
        }
    }
    dwarf_globals_dealloc(dbg, globs, count);
    return DW_DLV_OK;
}

```

9.64 Using dwarf_globals_by_type()

Example reading .debug_pubtypes.

Example reading .debug_pubtypes.

The .debug_pubtypes section was in DWARF4, it could appear as an extension in other DWARF versions.. In libdwarf 0.5.0 and earlier the function `dwarf_get_pubtypes()` was used instead.

```

*/
int exampleg(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *types = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_PUBTYPES,
                              &types, &count, error);
    /* Alternatively the 0.5.0 and earlier call:
       res=dwarf_get_pubtypes(dbg, &types, &count, error); */
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use types[i] */
    }
    dwarf_globals_dealloc(dbg, types, count);
    return DW_DLV_OK;
}

```

9.65 Reading .debug_weaknames (nonstandard)

Example. weaknames was IRIX/MIPS only.

Example. weaknames was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

*/
int exampleh(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *weak = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_WEAKS,
                              &weak, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use weak[i] */
    }
    dwarf_globals_dealloc(dbg, weak, count);
    return DW_DLV_OK;
}

```

9.66 Reading .debug_funcnames (nonstandard)

Example. funcnames was IRIX/MIPS only.

Example. funcnames was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

*/
int examplej(Dwarf_Debug dbg, Dwarf_Error *error)
{

```

```

Dwarf_Signed count = 0;
Dwarf_Global *funcs = 0;
Dwarf_Signed i = 0;
int fres = 0;

fres = dwarf_globals_by_type(dbg, DW_GL_FUNCS,
    &funcs, &count, error);
if (fres != DW_DLV_OK) {
    return fres;
}
for (i = 0; i < count; ++i) {
    /* use funcs[i] */
}
dwarf_globals_dealloc(dbg, funcs, count);
return DW_DLV_OK;
}

```

9.67 Reading .debug_types (nonstandard)

Example .debug_types was IRIX/MIPS only.

Example .debug_types was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int example1(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *types = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_TYPES,
        &types, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use types[i] */
    }
    dwarf_globals_dealloc(dbg, types, count);
    return DW_DLV_OK;
}

```

9.68 Reading .debug_varnames data (nonstandard)

Example .debug_varnames was IRIX/MIPS only.

Example .debug_varnames was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int examplen(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *vars = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_VARS,
        &vars, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use vars[i] */
    }
    dwarf_globals_dealloc(dbg, vars, count);
    return DW_DLV_OK;
}

```

9.69 Reading .debug_names data

Example access to .debug_names.

Example access to .debug_names.

This is accessing DWARF5 .debug_names, a section intended to provide fast access to DIEs.

It bears a strong resemblance to what libdwarf does in dwarf_global.c.

Making this a single (long) function here, though that is not how libdwarf or dwarfdump are written.

That is just one possible sort of access. There are many, and we would love to hear suggestions for specific new API functions in the library.

There is a wealth of information in .debug_names and the following is all taken care of for you by [dwarf_get_globals\(\)](#).

```

*/
#define MAXPAIRS 8 /* The standard defines 5.*/
int exampledebugnames(Dwarf_Debug dbg,
    Dwarf_Unsigned *dnentrycount,
    Dwarf_Error *error)
{
    int res = DW_DLV_OK;
    Dwarf_Unsigned offset = 0;
    Dwarf_Dnames_Head dn = 0;
    Dwarf_Unsigned new_offset = 0;

    for ( ; res == DW_DLV_OK; offset = new_offset) {
        Dwarf_Unsigned comp_unit_count = 0;
        Dwarf_Unsigned local_type_unit_count = 0;
        Dwarf_Unsigned foreign_type_unit_count = 0;
        Dwarf_Unsigned bucket_count = 0;
        Dwarf_Unsigned name_count = 0;
        Dwarf_Unsigned abbrev_table_size = 0;
        Dwarf_Unsigned entry_pool_size = 0;
        Dwarf_Unsigned augmentation_string_size = 0;
        char *aug_string = 0;
        Dwarf_Unsigned section_size = 0;
        Dwarf_Half table_version = 0;
        Dwarf_Half offset_size = 0;
        Dwarf_Unsigned i = 0;

        res = dwarf_dnames_header(dbg, offset, &dn,
            &new_offset, error);
        if (res == DW_DLV_ERROR) {
            /* Something wrong. */
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            /* Done. Normal end of the .debug_names section. */
            break;
        }
        *dnentrycount += 1;

        res = dwarf_dnames_sizes(dn, &comp_unit_count,
            &local_type_unit_count,
            &foreign_type_unit_count,
            &bucket_count,
            &name_count, &abbrev_table_size,
            &entry_pool_size, &augmentation_string_size,
            &aug_string,
            &section_size, &table_version,
            &offset_size,
            error);
        if (res != DW_DLV_OK) {
            /* Something wrong. */
            return res;
        }
        /* name indexes start with one */
        for (i = 1 ; i <= name_count; ++i) {
            Dwarf_Unsigned j = 0;
            /* dnames_name data */
            Dwarf_Unsigned bucketnum = 0;
            Dwarf_Unsigned hashvalunsign = 0;
            Dwarf_Unsigned offset_to_debug_str = 0;
            char *ptrtostr = 0;
            Dwarf_Unsigned offset_in_entrypool = 0;

```

```

Dwarf_Unsigned abbrev_code = 0;
Dwarf_Half abbrev_tag = 0;
Dwarf_Half nt_idxattr_array[MAXPAIRS];
Dwarf_Half nt_form_array[MAXPAIRS];
Dwarf_Unsigned attr_count = 0;

/* dnames_entrypool data */
Dwarf_Half tag = 0;
Dwarf_Bool single_cu_case = 0;
Dwarf_Unsigned single_cu_offset = 0;
Dwarf_Unsigned value_count = 0;
Dwarf_Unsigned index_of_abbrev = 0;
Dwarf_Unsigned offset_of_initial_value = 0;
Dwarf_Unsigned offset_next_entry_pool = 0;
Dwarf_Half idx_array[MAXPAIRS];
Dwarf_Half form_array[MAXPAIRS];
Dwarf_Unsigned offsets_array[MAXPAIRS];
Dwarf_Sig8 signatures_array[MAXPAIRS];

Dwarf_Unsigned cu_table_index = 0;
Dwarf_Unsigned tu_table_index = 0;
Dwarf_Unsigned local_die_offset = 0;
Dwarf_Unsigned parent_index = 0;
Dwarf_Sig8 parenthash;

(void)parent_index; /* avoids warning */
(void)local_die_offset; /* avoids warning */
(void)tu_table_index; /* avoids warning */
(void)cu_table_index; /* avoids warning */

memset(&parenthash, 0, sizeof(parenthash));
/* This gets us the entry pool offset we need.
   we provide idxattr and nt_form arrays (need
   not be initialized) and on return
   attr_count of those arrays are filled in.
   if attr_count < array_size then array_size
   is too small and things will not go well!
   See the count of DW_IDX entries in dwarf.h
   and make the arrays (say) 2 or more larger
   ensuring against future new DW_IDX index
   attributes..

   ptrtostring is the name in the Names Table. */
res = dwarf_dnames_name(dn, i,
&bucketnum, &hashvalunsign,
&offset_to_debug_str, &ptrtostr,
&offset_in_entrypool, &abbrev_code,
&abbrev_tag,
MAXPAIRS,
nt_idxattr_array, nt_form_array,
&attr_count, error);
if (res == DW_DLV_NO_ENTRY) {
    /* past end. Normal. */
    break;
}
if (res == DW_DLV_ERROR) {
    dwarf_dealloc_dnames(dn);
    return res;
}

/* Check attr_count < MAXPAIRS ! */
/* Now check the value of TAG to ensure it
   is something of interest as data or function.
   Plausible choices: */
switch (abbrev_tag) {
case DW_TAG_subprogram:
case DW_TAG_variable:
case DW_TAG_label:
case DW_TAG_member:
case DW_TAG_common_block:
case DW_TAG_enumerator:
case DW_TAG_namelist:
case DW_TAG_module:
    break;
default:
    /* Not data or variable DIE involved.
       Loop on the next i */
    continue;
}

/* We need the number of values for this name
   from this call. tag will match abbrev_tag. */
res = dwarf_dnames_entrypool(dn,
offset_in_entrypool,
&abbrev_code, &tag, &value_count, &index_of_abbrev,
&offset_of_initial_value,
error);

```

```

    if (res != DW_DLV_OK) {
        dwarf_dealloc_dnames(dn);
        return res;
    }

    /* This gets us an actual array of values
       as the library combines abbreviations,
       IDX attributes and values. We use
       the idx_array and form_array data
       created above. */

    res = dwarf_dnames_entrypool_values(dn,
        index_of_abbrev,
        offset_of_initial_value,
        value_count,
        idx_array,
        form_array,
        offsets_array,
        signatures_array,
        &single_cu_case, &single_cu_offset,
        &offset_next_entry_pool,
        error);
    if (res != DW_DLV_OK) {
        dwarf_dealloc_dnames(dn);
        return res;
    }
    for (j = 0; j < value_count; ++j) {
        Dwarf_Half idx = idx_array[j];

        switch(idx) {
            case DW_IDX_compile_unit:
                cu_table_index = offsets_array[j];
                break;
            case DW_IDX_die_offset:
                local_die_offset = offsets_array[j];
                break;
            /* The following are not meaningful when
               reading globals. */
            case DW_IDX_type_unit:
                tu_table_index = offsets_array[j];
                break;
            case DW_IDX_parent:
                parent_index = offsets_array[j];
                break;
            case DW_IDX_type_hash:
                parenthash = signatures_array[j];
                break;
            default:
                /* Not handled DW_IDX_GNU... */
                break;
        }
    }
    /* Now do something with the data aggregated */

}
dwarf_dealloc_dnames(dn);
}
return DW_DLV_OK;
}

```

9.70 Reading .debug_macro data (DWARF5)

Example reading DWARF5 macro data.

Example reading DWARF5 macro data.

This builds an list or some other data structure (not defined) to give an import somewhere to list the import offset and then later to enquire if the list has unexamined offsets. The code compiles but is not yet tested.

This example does not actually do the import at the correct time as this is just checking import offsets, not creating a proper full list (in the proper order) of the macros with the imports inserted. Here we find the macro context for a DIE, report those macro entries, noting any macro_import in a list loop extracting unchecked macro offsets from the list note any import in a list Of course some functions are not implemented here...

```

*/
int has_unchecked_import_in_list(void)
{

```

```

    /* Do something */
    return DW_DLV_OK;
}
Dwarf_Unsigned get_next_import_from_list(void)
{
    /* Do something */
    return 22;
}
void mark_this_offset_as_examined(
    Dwarf_Unsigned macro_unit_offset)
{
    /* do something */
    /* avoid compiler warnings. */
    (void)macro_unit_offset;
}
void add_offset_to_list(Dwarf_Unsigned offset)
{
    /* do something */
    /* avoid compiler warnings. */
    (void)offset;;
}
int examplep5(Dwarf_Die cu_die, Dwarf_Error *error)
{
    int lres = 0;
    Dwarf_Unsigned k = 0;
    Dwarf_Unsigned version = 0;
    Dwarf_Macro_Context macro_context = 0;
    Dwarf_Unsigned macro_unit_offset = 0;
    Dwarf_Unsigned number_of_ops = 0;
    Dwarf_Unsigned ops_total_byte_len = 0;
    Dwarf_Bool is_primary = TRUE;

    /* Just call once each way to test both.
       Really the second is just for imported units.*/
    for ( ; ; ) {
        if (is_primary) {
            lres = dwarf_get_macro_context(cu_die,
                &version, &macro_context,
                &macro_unit_offset,
                &number_of_ops,
                &ops_total_byte_len,
                error);
            is_primary = FALSE;
        } else {
            if (has_unchecked_import_in_list()) {
                macro_unit_offset = get_next_import_from_list();
            } else {
                /* We are done */
                break;
            }
            lres = dwarf_get_macro_context_by_offset(cu_die,
                macro_unit_offset,
                &version,
                &macro_context,
                &number_of_ops,
                &ops_total_byte_len,
                error);
            mark_this_offset_as_examined(macro_unit_offset);
        }

        if (lres == DW_DLV_ERROR) {
            /* Something is wrong. */
            return lres;
        }
        if (lres == DW_DLV_NO_ENTRY) {
            /* We are done. */
            break;
        }
        /* lres == DW_DLV_OK */
        for (k = 0; k < number_of_ops; ++k) {
            Dwarf_Unsigned section_offset = 0;
            Dwarf_Half macro_operator = 0;
            Dwarf_Half forms_count = 0;
            const Dwarf_Small *formcode_array = 0;
            Dwarf_Unsigned line_number = 0;
            Dwarf_Unsigned index = 0;
            Dwarf_Unsigned offset = 0;
            const char * macro_string = 0;
            int lres2 = 0;

            lres2 = dwarf_get_macro_op(macro_context,
                k, &section_offset, &macro_operator,
                &forms_count, &formcode_array, error);
            if (lres2 != DW_DLV_OK) {
                /* Some error. Deal with it */
                dwarf_dealloc_macro_context(macro_context);
                return lres2;
            }
        }
    }
}

```

```

    }
    switch(macro_operator) {
    case 0:
        /* Nothing to do. */
        break;
    case DW_MACRO_end_file:
        /* Do something */
        break;
    case DW_MACRO_define:
    case DW_MACRO_undef:
    case DW_MACRO_define_strp:
    case DW_MACRO_undef_strp:
    case DW_MACRO_define_strx:
    case DW_MACRO_undef_strx:
    case DW_MACRO_define_sup:
    case DW_MACRO_undef_sup: {
        lres2 = dwarf_get_macro_defundef(macro_context,
            k,
            &line_number,
            &index,
            &offset,
            &forms_count,
            &macro_string,
            error);
        if (lres2 != DW_DLV_OK) {
            /* Some error. Deal with it */
            dwarf_dealloc_macro_context(macro_context);
            return lres2;
        }
        /* do something */
    }
    break;
    case DW_MACRO_start_file: {
        lres2 = dwarf_get_macro_startend_file(macro_context,
            k,&line_number,
            &index,
            &macro_string,error);
        if (lres2 != DW_DLV_OK) {
            /* Some error. Deal with it */
            dwarf_dealloc_macro_context(macro_context);
            return lres2;
        }
        /* do something */
    }
    break;
    case DW_MACRO_import: {
        lres2 = dwarf_get_macro_import(macro_context,
            k,&offset,error);
        if (lres2 != DW_DLV_OK) {
            /* Some error. Deal with it */
            dwarf_dealloc_macro_context(macro_context);
            return lres2;
        }
        add_offset_to_list(offset);
    }
    break;
    case DW_MACRO_import_sup: {
        lres2 = dwarf_get_macro_import(macro_context,
            k,&offset,error);
        if (lres2 != DW_DLV_OK) {
            /* Some error. Deal with it */
            dwarf_dealloc_macro_context(macro_context);
            return lres2;
        }
        /* do something */
    }
    break;
    default:
        /* This is an error or an omission
        in the code here. We do not
        know what to do.
        Do something appropriate, print something?. */
        break;
    }
}
dwarf_dealloc_macro_context(macro_context);
macro_context = 0;
}
return DW_DLV_OK;
}
/*

```

9.71 Reading .debug_macinfo (DWARF2-4)

Example reading .debug_macinfo, DWARF2-4.

Example reading .debug_macinfo, DWARF2-4.

```

*/

void functionusingsigned(Dwarf_Signed s) {
    /* Do something */
    /* Avoid compiler warnings. */
    (void)s;
}

int examplep2(Dwarf_Debug dbg, Dwarf_Off cur_off,
Dwarf_Error*error)
{
    Dwarf_Signed count = 0;
    Dwarf_Macro_Details *maclist = 0;
    Dwarf_Signed i = 0;
    Dwarf_Unsigned max = 500000; /* sanity limit */
    int errv = 0;

    /* This is for DWARF2,DWARF3, and DWARF4
    .debug_macinfo section only.*/
    /* Given an offset from a compilation unit,
    start at that offset (from DW_AT_macroinfo)
    and get its macro details. */
    errv = dwarf_get_macro_details(dbg, cur_off,max,
    &count,&maclist,error);
    if (errv == DW_DLV_OK) {
        for (i = 0; i < count; ++i) {
            Dwarf_Macro_Details * mentry = maclist +i;
            /* example of use */
            Dwarf_Signed lineno = mentry->dmd_lineno;
            functionusingsigned(lineno);
        }
        dwarf_dealloc(dbg, maclist, DW_DLA_STRING);
    }
    /* Loop through all the compilation units macro info from zero.
    This is not guaranteed to work because DWARF does not
    guarantee every byte in the section is meaningful:
    there can be garbage between the macro info
    for CUs. But this loop will sometimes work.
    /
    cur_off = 0;
    while((errv = dwarf_get_macro_details(dbg, cur_off,max,
    &count,&maclist,error))!= DW_DLV_OK) {
        for (i = 0; i < count; ++i) {
            Dwarf_Macro_Details * mentry = maclist +i;
            /* example of use */
            Dwarf_Signed lineno = mentry->dmd_lineno;
            functionusingsigned(lineno);
        }
        cur_off = maclist[count-1].dmd_offset + 1;
        dwarf_dealloc(dbg, maclist, DW_DLA_STRING);
    }
    return DW_DLV_OK;
}

```

9.72 Extracting fde, cie lists.

Example Opening FDE and CIE lists.

Example Opening FDE and CIE lists.

```

*/
int exampleq(Dwarf_Debug dbg,Dwarf_Error *error)
{
    Dwarf_Cie *cie_data = 0;
    Dwarf_Signed cie_count = 0;
    Dwarf_Fde *fde_data = 0;
    Dwarf_Signed fde_count = 0;
    int fres = 0;

    fres = dwarf_get_fde_list(dbg,&cie_data,&cie_count,
    &fde_data,&fde_count,error);
    if (fres != DW_DLV_OK) {
        return fres;
    }
}

```

```

    }
    /* Do something with the lists*/
    dwarf_dealloc_fde_cie_list(dbg, cie_data, cie_count,
        fde_data, fde_count);
    return fres;
}

```

9.73 Reading the .eh_frame section

Example access to .eh_frame.

Example access to .eh_frame.

```

*/
int exemplar(Dwarf_Debug dbg, Dwarf_Addr mypcval, Dwarf_Error *error)
{
    /* Given a pc value
    for a function find the FDE and CIE data for
    the function.
    Example shows basic access to FDE/CIE plus
    one way to access details given a PC value.
    dwarf_get_fde_n() allows accessing all FDE/CIE
    data so one could build up an application-specific
    table of information if that is more useful. */
    Dwarf_Cie *cie_data = 0;
    Dwarf_Signed cie_count = 0;
    Dwarf_Fde *fde_data = 0;
    Dwarf_Signed fde_count = 0;
    int fres = 0;

    fres = dwarf_get_fde_list_eh(dbg, &cie_data, &cie_count,
        &fde_data, &fde_count, error);
    if (fres == DW_DLV_OK) {
        Dwarf_Fde myfde = 0;
        Dwarf_Addr low_pc = 0;
        Dwarf_Addr high_pc = 0;

        fres = dwarf_get_fde_at_pc(fde_data, mypcval,
            &myfde, &low_pc, &high_pc,
            error);
        if (fres == DW_DLV_OK) {
            Dwarf_Cie mycie = 0;
            fres = dwarf_get_cie_of_fde(myfde, &mycie, error);
            if (fres == DW_DLV_ERROR) {
                return fres;
            }
            if (fres == DW_DLV_OK) {
                /* Now we can access a range of information
                about the fde and cie applicable. */
            }
        }
        dwarf_dealloc_fde_cie_list(dbg, cie_data, cie_count,
            fde_data, fde_count);
        return fres;
    }
}

```

9.74 Using dwarf_expand_frame_instructions

Example using dwarf_expand_frame_instructions.

Example using dwarf_expand_frame_instructions.

```

*/
int examples(Dwarf_Cie cie,
    Dwarf_Ptr instruction, Dwarf_Unsigned len,
    Dwarf_Error *error)
{
    Dwarf_Frame_Instr_Head head = 0;
    Dwarf_Unsigned count = 0;
    int res = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_expand_frame_instructions(cie, instruction, len,

```

```

        &head,&count, error);
    if (res != DW_DLV_OK) {
        return res;
    }

    for (i = 0; i < count; ++i) {
        Dwarf_Unsigned instr_offset_in_instrs = 0;
        Dwarf_Small cfa_operation = 0;
        const char *fields_description = 0;
        Dwarf_Unsigned u0 = 0;
        Dwarf_Unsigned u1 = 0;
        Dwarf_Signed s0 = 0;
        Dwarf_Signed s1 = 0;
        Dwarf_Unsigned code_alignment_factor = 0;
        Dwarf_Signed data_alignment_factor = 0;
        Dwarf_Block expression_block;
        const char * op_name = 0;

        memset(&expression_block,0,sizeof(expression_block));
        res = dwarf_get_frame_instruction(head,i,
            &instr_offset_in_instrs,&cfa_operation,
            &fields_description,&u0,&u1,
            &s0,&s1,
            &code_alignment_factor,
            &data_alignment_factor,
            &expression_block,error);
        if (res == DW_DLV_ERROR) {
            dwarf_dealloc_frame_instr_head(head);
            return res;
        }
        if (res == DW_DLV_OK) {
            res = dwarf_get_CFA_name(cfa_operation,
                &op_name);
            if (res != DW_DLV_OK) {
                op_name = "unknown op";
            }
            printf("Instr %2lu %-22s %s\n",
                (unsigned long)i,
                op_name,
                fields_description);
            /* Do something with the various data
               as guided by the fields_description. */
        }
    }
    dwarf_dealloc_frame_instr_head(head);
    return DW_DLV_OK;
}

```

9.75 Reading string offsets section data

Example accessing the string offsets section.

Example accessing the string offsets section.

An example accessing the string offsets section

Parameters

<i>dbg</i>	The Dwarf_Debug of interest.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc.

```

*/
int examplestrngoffsets(Dwarf_Debug dbg,Dwarf_Error *error)
{
    int res = 0;
    Dwarf_Str_Offsets_Table sot = 0;
    Dwarf_Unsigned wasted_byte_count = 0;
    Dwarf_Unsigned table_count = 0;

```

```

Dwarf_Error          closeerror = 0;

res = dwarf_open_str_offsets_table_access(dbg, &sot,error);
if (res == DW_DLV_NO_ENTRY) {
    /* No such table */
    return res;
}
if (res == DW_DLV_ERROR) {
    /* Something is very wrong. Print the error? */
    return res;
}
for (;;) {
    Dwarf_Unsigned unit_length = 0;
    Dwarf_Unsigned unit_length_offset = 0;
    Dwarf_Unsigned table_start_offset = 0;
    Dwarf_Half      entry_size = 0;
    Dwarf_Half      version = 0;
    Dwarf_Half      padding = 0;
    Dwarf_Unsigned table_value_count = 0;
    Dwarf_Unsigned i = 0;
    Dwarf_Unsigned table_entry_value = 0;

    res = dwarf_next_str_offsets_table(sot,
        &unit_length, &unit_length_offset,
        &table_start_offset,
        &entry_size, &version, &padding,
        &table_value_count, error);
    if (res == DW_DLV_NO_ENTRY) {
        /* We have dealt with all tables */

        break;
    }
    if (res == DW_DLV_ERROR) {
        /* Something badly wrong. Do something. */
        dwarf_close_str_offsets_table_access(sot, &closeerror);
        dwarf_dealloc_error(dbg, closeerror);
        return res;
    }
    /* One could call dwarf_str_offsets_statistics to
       get the wasted bytes so far, but we do not do that
       in this example. */
    /* Possibly print the various table-related values
       returned just above. */
    for (i=0; i < table_value_count; ++i) {
        res = dwarf_str_offsets_value_by_index(sot, i,
            &table_entry_value, error);
        if (res != DW_DLV_OK) {
            /* Something is badly wrong. Do something. */
            dwarf_close_str_offsets_table_access(sot, &closeerror);
            dwarf_dealloc_error(dbg, closeerror);
            return res;
        }
        /* Do something with the table_entry_value
           at this index. Maybe just print it.
           It is an offset in .debug_str. */
    }
}
res = dwarf_str_offsets_statistics(sot, &wasted_byte_count,
    &table_count, error);
if (res != DW_DLV_OK) {
    dwarf_close_str_offsets_table_access(sot, &closeerror);
    dwarf_dealloc_error(dbg, closeerror);
    return res;
}
res = dwarf_close_str_offsets_table_access(sot, error);
/* little can be done about any error. */
sot = 0;
return res;
}
/*

```

9.76 Reading an aranges section

Example reading .debug_aranges.

Example reading .debug_aranges.

An example accessing the .debug_aranges section. Looking all the aranges entries. This example is not searching for anything.

Parameters

<i>dbg</i>	The Dwarf_Debug of interest.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

```

*/
static void cleanupbadarange(Dwarf_Debug dbg,
    Dwarf_Arange *arange, Dwarf_Signed i, Dwarf_Signed count)
{
    Dwarf_Signed k = i;

    for ( ; k < count; ++k) {
        dwarf_dealloc(dbg, arange[k], DW_DLA_ARANGE);
        arange[k] = 0;
    }
}

int exampleu(Dwarf_Debug dbg, Dwarf_Error *error)
{
    /* It is a historical accident that the count is signed.
       No negative count is possible. */
    Dwarf_Signed count = 0;
    Dwarf_Arange *arange = 0;
    int res = 0;

    res = dwarf_get_aranges(dbg, &arange, &count, error);
    if (res == DW_DLV_OK) {
        Dwarf_Signed i = 0;

        for (i = 0; i < count; ++i) {
            Dwarf_Arange ara = arange[i];
            Dwarf_Unsigned segment = 0;
            Dwarf_Unsigned segment_entry_size = 0;
            Dwarf_Addr start = 0;
            Dwarf_Unsigned length = 0;
            Dwarf_Off cu_die_offset = 0;

            res = dwarf_get_arange_info_b(ara,
                &segment, &segment_entry_size,
                &start, &length,
                &cu_die_offset, error);
            if (res != DW_DLV_OK) {
                cleanupbadarange(dbg, arange, i, count);
                dwarf_dealloc(dbg, arange, DW_DLA_LIST);
                return res;
            }
            /* Do something with ara */
            dwarf_dealloc(dbg, ara, DW_DLA_ARANGE);
            arange[i] = 0;
        }
        dwarf_dealloc(dbg, arange, DW_DLA_LIST);
    }
    return res;
}

```

9.77 Example getting .debug_ranges data

Example accessing ranges data.

Example accessing ranges data.

If have_base_addr is false there is no die (as in reading the raw .debug_ranges section) or there is some serious data corruption somewhere.

```

*/
static
void functionusingrange(Dwarf_Signed i, Dwarf_Ranges *r,
    Dwarf_Bool *have_base_addr,
    Dwarf_Unsigned *baseaddr)
{

```

```

Dwarf_Unsigned base = *baseaddr;

printf("[%4ld] ", (signed long)i);
switch(r->dwr_type) {
case DW_RANGES_ENTRY:
    printf(
        "DW_RANGES_ENTRY: raw      addr1 " PRX
        " addr2 " PRX,
        r->dwr_addr1, r->dwr_addr2);
    if (r->dwr_addr1 == r->dwr_addr2) {
        printf(" (empty range)");
    }
    printf("\n");
    if (*have_base_addr) {
        printf("      "
            "DW_RANGES_ENTRY: cooked addr1 0x%08llx"
            " addr2 " PRX "\n",
            r->dwr_addr1+base, r->dwr_addr2+base);
    }
    break;
case DW_RANGES_ADDRESS_SELECTION:
    printf(
        "Base Address      : " PRX "\n",
        r->dwr_addr2);
    *have_base_addr = TRUE;
    *baseaddr = r->dwr_addr2;
    break;
case DW_RANGES_END:
    printf(
        "DW_RANGES_END : 0,0\n");
    *have_base_addr = FALSE;
    *baseaddr = 0;
    break;
default:
    printf(
        "ERROR              : incorrect dwr_type is 0x%lx\n",
        (unsigned long)r->dwr_type);
}
}

/* On call the rangesoffset is a default zero. */
int examplev(Dwarf_Debug dbg, Dwarf_Off rangesoffset_in,
    Dwarf_Die die, Dwarf_Error*error)
{
    Dwarf_Signed    count = 0;
    Dwarf_Off       realoffset = 0;
    Dwarf_Ranges    *rangesbuf = 0;
    Dwarf_Unsigned  bytewidth = 0;
    int             res = 0;
    Dwarf_Unsigned  base_address = 0;
    Dwarf_Bool      have_base_addr = FALSE;
    Dwarf_Bool      have_rangesoffset = FALSE;
    Dwarf_Unsigned  rangesoffset = (Dwarf_Unsigned)rangesoffset_in;

    (void)have_rangesoffset;
    if (die) {
        /* Find the ranges for a specific DIE */
        res = dwarf_get_ranges_baseaddress(dbg, die, &have_base_addr,
            &base_address, &have_rangesoffset, &rangesoffset, error);
        if (res == DW_DLV_ERROR) {
            /* Just pretend not an error. */
            dwarf_dealloc_error(dbg, *error);
            *error = 0;
        }
    }
    else {
        /* To test getting all ranges and no knowledge
           of the base address (so cooked values
           cannot be definitely known unless
           the base is in the .debug_ranges entries
           themselves */
    }
    res = dwarf_get_ranges_b(dbg, rangesoffset, die,
        &realoffset,
        &rangesbuf, &count, &bytewidth, error);
    if (res != DW_DLV_OK) {
        if (res == DW_DLV_ERROR) {
            printf("ERROR dwarf_get_ranges_b %s\n",
                dwarf_errmsg(*error));
        }
        else {
            printf("NO_ENTRY dwarf_get_ranges_b\n");
        }
    }
    return res;
}
{
    Dwarf_Signed i = 0;
    printf("Range group base address: " PRX

```

```

        ", offset in .debug_ranges:"
        " 0x%08llx\n",
        base_address, rangesoffset);
    for ( i = 0; i < count; ++i ) {
        Dwarf_Ranges *cur = rangesbuf+i;
        /* Use cur. */
        functionusingrange(i, cur, &have_base_addr, &base_address);
    }
    dwarf_dealloc_ranges(dbg, rangesbuf, count);
}
return DW_DLV_OK;
}

```

9.78 Reading gdbindex data

Example accessing gdbindex section data.

Example accessing gdbindex section data.

```

/*
int examplew(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Gdbindex gindexptr = 0;
    Dwarf_Unsigned version = 0;
    Dwarf_Unsigned cu_list_offset = 0;
    Dwarf_Unsigned types_cu_list_offset = 0;
    Dwarf_Unsigned address_area_offset = 0;
    Dwarf_Unsigned symbol_table_offset = 0;
    Dwarf_Unsigned constant_pool_offset = 0;
    Dwarf_Unsigned section_size = 0;
    const char * section_name = 0;
    int res = 0;

    res = dwarf_gdbindex_header(dbg, &gindexptr,
        &version, &cu_list_offset, &types_cu_list_offset,
        &address_area_offset, &symbol_table_offset,
        &constant_pool_offset, &section_size,
        &section_name, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    {
        /* do something with the data */
        Dwarf_Unsigned length = 0;
        Dwarf_Unsigned typeslength = 0;
        Dwarf_Unsigned i = 0;
        res = dwarf_gdbindex_culist_array(gindexptr,
            &length, error);
        /* Example actions. */
        if (res != DW_DLV_OK) {
            dwarf_dealloc_gdbindex(gindexptr);
            return res;
        }
        for (i = 0; i < length; ++i) {
            Dwarf_Unsigned cuoffset = 0;
            Dwarf_Unsigned culength = 0;
            res = dwarf_gdbindex_culist_entry(gindexptr,
                i, &cuoffset, &culength, error);
            if (res != DW_DLV_OK) {
                return res;
            }
            /* Do something with cuoffset, culength */
        }
        res = dwarf_gdbindex_types_culist_array(gindexptr,
            &typeslength, error);
        if (res != DW_DLV_OK) {
            dwarf_dealloc_gdbindex(gindexptr);
            return res;
        }
        for (i = 0; i < typeslength; ++i) {
            Dwarf_Unsigned cuoffset = 0;
            Dwarf_Unsigned tuoffset = 0;
            Dwarf_Unsigned type_signature = 0;
            res = dwarf_gdbindex_types_culist_entry(gindexptr,
                i, &cuoffset, &tuoffset, &type_signature, error);
            if (res != DW_DLV_OK) {
                dwarf_dealloc_gdbindex(gindexptr);
                return res;
            }
            /* Do something with cuoffset etc. */
        }
    }
}

```

```

        dwarf_dealloc_gdbindex(gindexptr);
    }
    return DW_DLV_OK;
}

```

9.79 Reading gdbindex addressarea

Example accessing gdbindex addressarea data.

Example accessing gdbindex addressarea data.

```

/*
int examplewgdindex(Dwarf_Gdbindex gdbindex,
    Dwarf_Error *error)
{
    Dwarf_Unsigned list_len = 0;
    Dwarf_Unsigned i = 0;
    int res = 0;

    res = dwarf_gdbindex_addressarea(gdbindex, &list_len,error);
    if (res != DW_DLV_OK) {
        /* Something wrong, ignore the addressarea */
        return res;
    }
    /* Iterate through the address area. */
    for (i = 0; i < list_len; i++) {
        Dwarf_Unsigned lowpc = 0;
        Dwarf_Unsigned highpc = 0;
        Dwarf_Unsigned cu_index = 0;

        res = dwarf_gdbindex_addressarea_entry(gdbindex,i,
            &lowpc,&highpc,
            &cu_index,
            error);
        if (res != DW_DLV_OK) {
            /* Something wrong, ignore the addressarea */
            return res;
        }
        /* We have a valid address area entry, do something
           with it. */
    }
    return DW_DLV_OK;
}

```

9.80 Reading the gdbindex symbol table

Example accessing gdbindex symbol table data.

Example accessing gdbindex symbol table data.

```

/*
int examplex(Dwarf_Gdbindex gdbindex,Dwarf_Error*error)
{
    Dwarf_Unsigned symtab_list_length = 0;
    Dwarf_Unsigned i = 0;
    int res = 0;

    res = dwarf_gdbindex_symboltable_array(gdbindex,
        &symtab_list_length,error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < symtab_list_length; i++) {
        Dwarf_Unsigned symnameoffset = 0;
        Dwarf_Unsigned cuvecoffset = 0;
        Dwarf_Unsigned cuvec_len = 0;
        Dwarf_Unsigned ii = 0;
        const char *name = 0;
        int res1 = 0;

        res1 = dwarf_gdbindex_symboltable_entry(gdbindex,i,
            &symnameoffset,&cuvecoffset,
            error);
        if (res1 != DW_DLV_OK) {
            return res1;
        }
    }
}

```

```

    }
    res1 = dwarf_gdbindex_string_by_offset(gdbindex,
        symnameoffset, &name, error);
    if (res1 != DW_DLV_OK) {
        return res1;
    }
    res1 = dwarf_gdbindex_cuvector_length(gdbindex,
        cuvecoffset, &cuvec_len, error);
    if (res1 != DW_DLV_OK) {
        return res1;
    }
    for (ii = 0; ii < cuvec_len; ++ii) {
        Dwarf_Unsigned attributes = 0;
        Dwarf_Unsigned cu_index = 0;
        Dwarf_Unsigned symbol_kind = 0;
        Dwarf_Unsigned is_static = 0;
        int res2 = 0;

        res2 = dwarf_gdbindex_cuvector_inner_attributes(
            gdbindex, cuvecoffset, ii,
            &attributes, error);
        if (res2 != DW_DLV_OK) {
            return res2;
        }
        /* 'attributes' is a value with various internal
           fields so we expand the fields. */
        res2 = dwarf_gdbindex_cuvector_instance_expand_value(
            gdbindex, attributes, &cu_index,
            &symbol_kind, &is_static,
            error);
        if (res2 != DW_DLV_OK) {
            return res2;
        }
        /* Do something with the attributes. */
    }
}
return DW_DLV_OK;
}

```

9.81 Reading cu and tu Debug Fission data

Example using `dwarf_get_xu_index_header`.

Example using `dwarf_get_xu_index_header`.

Debug Fission is an older name for Split Dwarf.

```

/*
int exampley(Dwarf_Debug dbg, const char *type,
    Dwarf_Error *error)
{
    /* type is "tu" or "cu" */
    int res = 0;
    Dwarf_Xu_Index_Header xuhdr = 0;
    Dwarf_Unsigned version_number = 0;
    Dwarf_Unsigned offsets_count = 0; /*L */
    Dwarf_Unsigned units_count = 0; /* M */
    Dwarf_Unsigned hash_slots_count = 0; /* N */
    const char *section_name = 0;

    res = dwarf_get_xu_index_header(dbg,
        type,
        &xuhdr,
        &version_number,
        &offsets_count,
        &units_count,
        &hash_slots_count,
        &section_name,
        error);
    if (res != DW_DLV_OK) {
        return res;
    }
    /* Do something with the xuhdr here . */
    dwarf_dealloc_xu_header(xuhdr);
    return DW_DLV_OK;
}

```

9.82 Reading Split Dwarf (Debug Fission) hash slots

Example using `dwarf_get_xu_hash_entry()`

Example using `dwarf_get_xu_hash_entry()`

```

/*
int examplez( Dwarf_Xu_Index_Header xuhdr,
    Dwarf_Unsigned hash_slots_count,
    Dwarf_Error *error)
{
    /* hash_slots_count returned by
       dwarf_get_xu_index_header() */
    static Dwarf_Sig8 zerohashval;
    Dwarf_Unsigned h = 0;

    for (h = 0; h < hash_slots_count; h++) {
        Dwarf_Sig8 hashval;
        Dwarf_Unsigned index = 0;
        int res = 0;

        res = dwarf_get_xu_hash_entry(xuhdr,h,
            &hashval,&index,error);
        if (res != DW_DLV_OK) {
            return res;
        }
        if (!memcmp(&hashval,&zerohashval,
            sizeof(Dwarf_Sig8)) && index == 0 ) {
            /* An unused hash slot */
            continue;
        }
        /* Here, hashval and index (a row index into
           offsets and lengths) are valid. Do
           something with them */
    }
    return DW_DLV_OK;
}

```

9.83 Reading high pc from a DIE.

Example get high-pc from a DIE.

Example get high-pc from a DIE.

```

/*
int examplehighpc(Dwarf_Die die,
    Dwarf_Addr *highpc,
    Dwarf_Error *error)
{
    int res = 0;
    Dwarf_Addr localhighpc = 0;
    Dwarf_Half form = 0;
    enum Dwarf_Form_Class formclass = DW_FORM_CLASS_UNKNOWN;

    res = dwarf_highpc_b(die,&localhighpc,
        &form,&formclass, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    if (form != DW_FORM_addr &&
        !dwarf_addr_form_is_indexed(form)) {
        Dwarf_Addr low_pc = 0;

        /* The localhighpc is an offset from
           DW_AT_low_pc. */
        res = dwarf_lowpc(die,&low_pc,error);
        if (res != DW_DLV_OK) {
            return res;
        } else {
            localhighpc += low_pc;
        }
    }
    *highpc = localhighpc;
    return DW_DLV_OK;
}

```

9.84 Reading Split Dwarf (Debug Fission) data

Example getting cu/tu name, offset.

Example getting cu/tu name, offset.

```

/*
int exampleza(Dwarf_Xu_Index_Header xuhdr,
    Dwarf_Unsigned offsets_count,
    Dwarf_Unsigned index,
    Dwarf_Error *error)
{
    Dwarf_Unsigned col = 0;

    /* We use 'offsets_count' returned by
       a dwarf_get_xu_index_header() call.
       We use 'index' returned by a
       dwarf_get_xu_hash_entry() call. */
    for (col = 0; col < offsets_count; col++) {
        Dwarf_Unsigned off = 0;
        Dwarf_Unsigned len = 0;
        const char *name = 0;
        Dwarf_Unsigned num = 0;
        int res = 0;

        res = dwarf_get_xu_section_names(xuhdr,
            col, &num, &name, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            break;
        }
        res = dwarf_get_xu_section_offset(xuhdr,
            index, col, &off, &len, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            break;
        }
        /* Here we have the DW_SECT_ name and number
           and the base offset and length of the
           section data applicable to the hash
           that got us here.
           Use the values.*/
    }
    return DW_DLV_OK;
}

```

9.85 Retrieving tag,attribute,etc names

Example getting tag,attribute,etc names as strings.

Example getting tag,attribute,etc names as strings.

```

/*
void examplezb(void)
{
    const char * out = "unknown something";
    int res = 0;

    /* The following is wrong, do not do it!
       Confusing TAG with ACCESS! */
    res = dwarf_get_ACCESS_name(DW_TAG_entry_point, &out);
    /* Nothing one does here with 'res' or 'out'
       is meaningful. */

    out = "<unknown TAG>"; /* Not a malloc'd string! */
    /* The following is meaningful.*/
    res = dwarf_get_TAG_name(DW_TAG_entry_point, &out);
    (void)res; /* avoids unused var compiler warning */
    /* If res == DW_DLV_ERROR or DW_DLV_NO_ENTRY
       out will be the locally assigned static string.
       If res == DW_DLV_OK it will be a usable
       TAG name string.
       In no case should a returned string be free()d. */
}

```

9.86 Using GNU debuglink data

Example showing dwarf_add_debuglink_global_path.

Example showing dwarf_gnu_debuglink_global_path.

An example using both dwarf_add_debuglink_global_path and dwarf_gnu_debuglink .

```

*/
int exampledebuglink(Dwarf_Debug dbg, Dwarf_Error* error)
{
    int res = 0;
    char *debuglink_path = 0;
    unsigned char *crc = 0;
    char *debuglink_fullpath = 0;
    unsigned debuglink_fullpath_strlen = 0;
    unsigned buildid_type = 0;
    char * buildidowner_name = 0;
    unsigned char *buildid_itself = 0;
    unsigned buildid_length = 0;
    char ** paths = 0;
    unsigned paths_count = 0;
    unsigned i = 0;

    /* This is just an example if one knows
       of another place full-DWARF objects
       may be. "/usr/lib/debug" is automatically
       set. */
    res = dwarf_add_debuglink_global_path(dbg,
        "/some/path/debug", error);
    if (res != DW_DLV_OK) {
        /* Something is wrong*/
        return res;
    }
    res = dwarf_gnu_debuglink(dbg,
        &debuglink_path,
        &crc,
        &debuglink_fullpath,
        &debuglink_fullpath_strlen,
        &buildid_type,
        &buildidowner_name,
        &buildid_itself,
        &buildid_length,
        &paths,
        &paths_count,
        error);
    if (res == DW_DLV_ERROR) {
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        /* No such sections as .note.gnu.build-id
           or .gnu_debuglink */
        return res;
    }
    if (debuglink_fullpath_strlen) {
        printf("debuglink path: %s\n", debuglink_path);
        printf("crc length : %u crc: ", 4);
        for (i = 0; i < 4; ++i) {
            printf("%02x", crc[i]);
        }
        printf("\n");
        printf("debuglink fullpath: %s\n", debuglink_fullpath);
    }
    if (buildid_length) {
        printf("buildid type : %u\n", buildid_type);
        printf("Buildid owner : %s\n", buildidowner_name);
        printf("buildid byte count: %u\n", buildid_length);
        printf(" ");
        /* buildid_length should be 20. */
        for (i = 0; i < buildid_length; ++i) {
            printf("%02x", buildid_itself[i]);
        }
        printf("\n");
    }
    printf("Possible paths count %u\n", paths_count);
    for (i = 0; i < paths_count; ++i) {
        printf("%2u: %s\n", i, paths[i]);
    }
    free(debuglink_fullpath);
    free(paths);
    return DW_DLV_OK;
}

```

9.87 Accessing accessing raw rnglist

Example showing access to rnglist.

Example showing access to rnglist.

This is accessing DWARF5 .debug_rnglists.

```

*/
int example_raw_rnglist(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Unsigned count = 0;
    int res = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_load_rnglists(dbg, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        Dwarf_Unsigned header_offset = 0;
        Dwarf_Small offset_size = 0;
        Dwarf_Small extension_size = 0;
        unsigned version = 0; /* 5 */
        Dwarf_Small address_size = 0;
        Dwarf_Small segment_selector_size = 0;
        Dwarf_Unsigned offset_entry_count = 0;
        Dwarf_Unsigned offset_of_offset_array = 0;
        Dwarf_Unsigned offset_of_first_rangeentry = 0;
        Dwarf_Unsigned offset_past_last_rangeentry = 0;

        res = dwarf_get_rnglist_context_basics(dbg, i,
            &header_offset, &offset_size, &extension_size,
            &version, &address_size, &segment_selector_size,
            &offset_entry_count, &offset_of_offset_array,
            &offset_of_first_rangeentry,
            &offset_past_last_rangeentry, error);
        if (res != DW_DLV_OK) {
            return res;
        }
        {
            Dwarf_Unsigned e = 0;
            unsigned colmax = 4;
            unsigned col = 0;
            Dwarf_Unsigned global_offset_of_value = 0;

            for (; e < offset_entry_count; ++e) {
                Dwarf_Unsigned value = 0;
                int resc = 0;

                resc = dwarf_get_rnglist_offset_index_value(dbg,
                    i, e, &value,
                    &global_offset_of_value, error);
                if (resc != DW_DLV_OK) {
                    return resc;
                }
                /* Do something */
                col++;
                if (col == colmax) {
                    col = 0;
                }
            }
        }
        {
            Dwarf_Unsigned curoffset = offset_of_first_rangeentry;
            Dwarf_Unsigned endoffset = offset_past_last_rangeentry;
            int rese = 0;
            Dwarf_Unsigned ct = 0;

            for (; curoffset < endoffset; ++ct) {
                unsigned entrylen = 0;
                unsigned code = 0;
                Dwarf_Unsigned v1 = 0;
                Dwarf_Unsigned v2 = 0;
                rese = dwarf_get_rnglist_rle(dbg, i,
                    curoffset, endoffset,
                    &entrylen,
                    &code, &v1, &v2, error);
                if (rese != DW_DLV_OK) {
                    return rese;
                }
                /* Do something with the values */
                curoffset += entrylen;
                if (curoffset > endoffset) {

```

```

        return DW_DLV_ERROR;
    }
}
}
return DW_DLV_OK;
}

```

9.88 Accessing rnglists section

Example showing access to rnglists on an Attribute.

Example showing access to rnglists on an Attribute.

This is accessing DWARF5 .debug_rnglists. The section first appears in DWARF5.

```

/*
int example_rnglist_for_attribute(Dwarf_Attribute attr,
    Dwarf_Unsigned attrvalue, Dwarf_Error *error)
{
    /* attrvalue must be the DW_AT_ranges
       DW_FORM_rnglistx or DW_FORM_sec_offset value
       extracted from attr. */
    int res = 0;
    Dwarf_Half theform = 0;
    Dwarf_Unsigned entries_count;
    Dwarf_Unsigned global_offset_of_rle_set;
    Dwarf_Rnglists_Head rnglhead = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_rnglists_get_rle_head(attr,
        theform,
        attrvalue,
        &rnglhead,
        &entries_count,
        &global_offset_of_rle_set,
        error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < entries_count; ++i) {
        unsigned entrylen = 0;
        unsigned code = 0;
        Dwarf_Unsigned rawlowpc = 0;
        Dwarf_Unsigned rawhighpc = 0;
        Dwarf_Bool debug_addr_unavailable = FALSE;
        Dwarf_Unsigned lowpc = 0;
        Dwarf_Unsigned highpc = 0;

        /* Actual addresses are most likely what one
           wants to know, not the lengths/offsets
           recorded in .debug_rnglists. */
        res = dwarf_get_rnglists_entry_fields_a(rnglhead,
            i, &entrylen, &code,
            &rawlowpc, &rawhighpc,
            &debug_addr_unavailable,
            &lowpc, &highpc, error);
        if (res != DW_DLV_OK) {
            dwarf_dealloc_rnglists_head(rnglhead);
            return res;
        }
        if (code == DW_RLE_end_of_list) {
            /* we are done */
            break;
        }
        if (code == DW_RLE_base_addressx ||
            code == DW_RLE_base_address) {
            /* We do not need to use these, they
               have been accounted for already. */
            continue;
        }
        if (debug_addr_unavailable) {
            /* lowpc and highpc are not real addresses */
            continue;
        }
        /* Here do something with lowpc and highpc, these
           are real addresses */
    }
    dwarf_dealloc_rnglists_head(rnglhead);
    return DW_DLV_OK;
}

```

9.89 Demonstrating reading DWARF without a file.

How to read DWARF2 and later from memory.

How to read DWARF2 and later from memory.

```

*/

#include <config.h>

#include <stddef.h> /* NULL */
#include <stdio.h> /* printf() */
#include <stdlib.h> /* exit() */
#include <string.h> /* strcmp() */

#include "dwarf.h"
#include "libdwarf.h"
#include "libdwarf_private.h"

/*
   This demonstrates processing DWARF
   from in_memory data. For simplicity
   in this example we are using static arrays.
   The C source is src/bin/dwarfexample/jitreader.c

   The motivation is from JIT compiling, where
   at runtime of some application, it generates
   code on the file and DWARF information for it too.

   This gives an example of enabling all of libdwarf's
   functions without actually having the DWARF information
   in a file. (If you have a file in some odd format
   you can use this approach to have libdwarf access
   the format for DWARF data and work normally without
   ever exposing the format to libdwarf.)

   None of the structures defined here in this source
   (or any source using this feature)
   are ever known to libdwarf. They are totally
   private to your code.
   The code you write (like this example) you compile
   separate from libdwarf. You never place your code
   into libdwarf, you just link your code into
   your application and link against libdwarf.
*/

/* Some valid DWARF2 data */
static Dwarf_Small abbrevbytes[] = {
0x01, 0x11, 0x01, 0x25, 0x0e, 0x13, 0x0b, 0x03, 0x08, 0x1b,
0x0e, 0x11, 0x01, 0x12, 0x01, 0x10, 0x06, 0x00, 0x00, 0x02,
0x2e, 0x01, 0x3f, 0x0c, 0x03, 0x08, 0x3a, 0x0b, 0x3b, 0x0b,
0x39, 0x0b, 0x27, 0x0c, 0x11, 0x01, 0x12, 0x01, 0x40, 0x06,
0x97, 0x42, 0x0c, 0x01, 0x13, 0x00, 0x00, 0x03, 0x34, 0x00,
0x03, 0x08, 0x3a, 0x0b, 0x3b, 0x0b, 0x39, 0x0b, 0x49, 0x13,
0x02, 0x0a, 0x00, 0x00, 0x04, 0x24, 0x00, 0x0b, 0x0b, 0x3e,
0x0b, 0x03, 0x08, 0x00, 0x00, 0x00, 0x00, };
static Dwarf_Small infobytes[] = {
0x60, 0x00, 0x00, 0x00, 0x02, 0x00, 0x00, 0x00, 0x00, 0x00,
0x08, 0x01, 0x00, 0x00, 0x00, 0x00, 0x0c, 0x74, 0x2e, 0x63,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x02, 0x01, 0x66, 0x00, 0x01,
0x02, 0x06, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x01, 0x5c, 0x00, 0x00, 0x00, 0x03, 0x69,
0x00, 0x01, 0x03, 0x08, 0x5c, 0x00, 0x00, 0x00, 0x02, 0x91,
0x6c, 0x00, 0x04, 0x04, 0x05, 0x69, 0x6e, 0x74, 0x00, 0x00, };
static Dwarf_Small strbytes[] = {
0x47, 0x4e, 0x55, 0x20, 0x43, 0x31, 0x37, 0x20, 0x39, 0x2e,
0x33, 0x2e, 0x30, 0x20, 0x2d, 0x6d, 0x74, 0x75, 0x6e, 0x65,
0x3d, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x69, 0x63, 0x20, 0x2d,
0x6d, 0x61, 0x72, 0x63, 0x68, 0x3d, 0x78, 0x38, 0x36, 0x2d,
0x36, 0x34, 0x20, 0x2d, 0x67, 0x64, 0x77, 0x61, 0x72, 0x66,
0x2d, 0x32, 0x20, 0x2d, 0x4f, 0x30, 0x20, 0x2d, 0x66, 0x61,
0x73, 0x79, 0x6e, 0x63, 0x68, 0x72, 0x6f, 0x6e, 0x6f, 0x75,
0x73, 0x2d, 0x75, 0x6e, 0x77, 0x69, 0x6e, 0x64, 0x2d, 0x74,
0x61, 0x62, 0x6c, 0x65, 0x73, 0x20, 0x2d, 0x66, 0x73, 0x74,
0x61, 0x63, 0x6b, 0x2d, 0x70, 0x72, 0x6f, 0x74, 0x65, 0x63,
0x74, 0x6f, 0x72, 0x2d, 0x73, 0x74, 0x72, 0x6f, 0x6e, 0x67,
0x20, 0x2d, 0x66, 0x73, 0x74, 0x61, 0x63, 0x6b, 0x2d, 0x63,
0x6c, 0x61, 0x73, 0x68, 0x2d, 0x70, 0x72, 0x6f, 0x74, 0x65,
0x63, 0x74, 0x69, 0x6f, 0x6e, 0x20, 0x2d, 0x66, 0x63, 0x66,
0x2d, 0x70, 0x72, 0x6f, 0x74, 0x65, 0x63, 0x74, 0x69, 0x6f,
0x6e, 0x00, 0x2f, 0x76, 0x61, 0x72, 0x2f, 0x74, 0x6d, 0x70,
0x2f, 0x74, 0x69, 0x6e, 0x79, 0x64, 0x77, 0x61, 0x72, 0x66,

```

```

0x00, };

/* An internals_t , data used elsewhere but
   not directly visible elsewhere. One needs to have one
   of these but maybe the content here too little
   or useless, this is just an example of sorts. */
#define SECCOUNT 4
struct sectiondata_s {
    unsigned int    sd_addr;
    unsigned int    sd_objoffsetlen;
    unsigned int    sd_objpointersize;
    Dwarf_Unsigned  sd_sectionsize;
    const char      * sd_secname;
    Dwarf_Small     * sd_content;
};

/* The secname must not be 0 , pass "" if
   there is no name. */
static struct sectiondata_s sectiondata[SECCOUNT] = {
    {0,0,0,0,"",0},
    {0,32,32,sizeof(abbrevbytes),".debug_abbrev",abbrevbytes},
    {0,32,32,sizeof(infobytes),".debug_info",infobytes},
    {0,32,32,sizeof(strbytes),".debug_str",strbytes}
};

typedef struct special_filedata_s {
    int            f_is_64bit;
    Dwarf_Small    f_object_endian;
    unsigned       f_pointersize;
    unsigned       f_offsetsize;
    Dwarf_Unsigned f_filesize;
    Dwarf_Unsigned f_sectioncount;
    struct sectiondata_s * f_sectarray;
} special_filedata_internals_t;

/* Use DW_END_little.
   Libdwarf finally sets the file-format-specific
   f_object_endianness field to a DW_END_little or
   DW_END_big (see dwarf.h).
   Here we must do that ourselves. */
static special_filedata_internals_t base_internals =
{ FALSE,DW_END_little,32,32,200,SECCOUNT, sectiondata };

static
int gsinfo(void* obj,
    Dwarf_Unsigned section_index,
    Dwarf_Obj_Access_Section_a* return_section,
    int* error )
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    struct sectiondata_s *finfo = 0;

    *error = 0; /* No error. Avoids unused arg */
    if (section_index >= SECCOUNT) {
        return DW_DLV_NO_ENTRY;
    }
    finfo = internals->f_sectarray + section_index;
    return_section->as_name      = finfo->sd_secname;
    return_section->as_type      = 0;
    return_section->as_flags     = 0;
    return_section->as_addr      = finfo->sd_addr;
    return_section->as_offset    = 0;
    return_section->as_size      = finfo->sd_sectionsize;
    return_section->as_link      = 0;
    return_section->as_info      = 0;
    return_section->as_addralign = 0;
    return_section->as_entrysize = 1;
    return DW_DLV_OK;
}

static Dwarf_Small
gborder(void * obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_object_endian;
}

static
Dwarf_Small glensize(void * obj)
{
    /* offset size */
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_offsetsize/8;
}

static
Dwarf_Small gptrsize(void * obj)

```

```

{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_pointersize/8;
}
static
Dwarf_Unsigned gfilesize(void * obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_filesize;
}
static
Dwarf_Unsigned gseccount(void* obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_sectioncount;
}
static
int gloadsec(void * obj,
    Dwarf_Unsigned secindex,
    Dwarf_Small**rdata,
    int *error)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    struct sectiondata_s *secp = 0;

    *error = 0; /* No Error, avoids compiler warning */
    if (secindex >= internals->f_sectioncount) {
        return DW_DLV_NO_ENTRY;
    }
    secp = secindex + internals->f_sectarray;
    *rdata = secp->sd_content;
    return DW_DLV_OK;
}

const Dwarf_Obj_Access_Methods_a methods = {
    gsinfo,
    gborder,
    glensize,
    gpysize,
    gfilesize,
    gseccount,
    gloadsec,
    0 /* no relocating anything */,
    0 /* no file with DWARF here, so mmap impossible */,
    0 /* no destructor appropriate */
};

struct Dwarf_Obj_Access_Interface_a_s dw_interface =
{ &base_internals,&methods };

static const Dwarf_Sig8 zerosignature;
static int
isformstring(Dwarf_Half form)
{
    /* Not handling every form string, just the
       ones used in simple cases. */
    switch(form) {
    case DW_FORM_string:      return TRUE;
    case DW_FORM_GNU_strp_alt: return TRUE;
    case DW_FORM_GNU_str_index: return TRUE;
    case DW_FORM_strx:       return TRUE;
    case DW_FORM_strx1:      return TRUE;
    case DW_FORM_strx2:      return TRUE;
    case DW_FORM_strx3:      return TRUE;
    case DW_FORM_strx4:      return TRUE;
    case DW_FORM_strp:       return TRUE;
    default: break;
    };
    return FALSE;
}

static int
print_attr(Dwarf_Attribute atr,
    Dwarf_Signed anumber, Dwarf_Error *error)
{
    int res = 0;
    char *str = 0;
    const char *attrname = 0;
    const char *formname = 0;
    Dwarf_Half form = 0;
    Dwarf_Half attrnum = 0;
    res = dwarf_whatform(atr,&form,error);
    if (res != DW_DLV_OK) {

```

```

        printf("dwarf_whatform failed! res %d\n",res);
        return res;
    }
    res = dwarf_whatattr(atr,&attrnum,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_whatattr failed! res %d\n",res);
        return res;
    }
    res = dwarf_get_AT_name(attrnum,&attrname);
    if (res == DW_DLV_NO_ENTRY) {
        printf("Bogus attrnum 0x%x\n",attrnum);
        attrname = "<internal error ?>";
    }
    res = dwarf_get_FORM_name(form,&formname);
    if (res == DW_DLV_NO_ENTRY) {
        printf("Bogus form 0x%x\n",attrnum);
        attrname = "<internal error ?>";
    }
    if (!isformstring(form)) {
        printf(" [%2d] Attr: %-15s Form: %-15s\n",
            (int)anumber,attrname,formname);
        return DW_DLV_OK;
    }
    res = dwarf_formstring(atr,&str,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_formstring failed! res %d\n",res);
        return res;
    }
    printf(" [%2d] Attr: %-15s Form: %-15s %s\n",
        (int)anumber,attrname,formname,str);
    return DW_DLV_OK;
}

static void
dealloc_list(Dwarf_Debug dbg,
    Dwarf_Attribute *attrbuf,
    Dwarf_Signed attrcount,
    Dwarf_Signed i)
{
    for ( ; i < attrcount; ++i) {
        dwarf_dealloc_attribute(attrbuf[i]);
    }
    dwarf_dealloc(dbg,attrbuf,DW_DLA_LIST);
}

static int
print_one_die(Dwarf_Debug dbg,Dwarf_Die in_die,int level,
    Dwarf_Error *error)
{
    Dwarf_Attribute *attrbuf = 0;
    Dwarf_Signed attrcount = 0;
    Dwarf_Half tag = 0;
    const char * tagname = 0;
    int res = 0;
    Dwarf_Signed i = 0;

    res = dwarf_tag(in_die,&tag,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_tag failed! res %d\n",res);
        return res;
    }
    res = dwarf_get_TAG_name(tag,&tagname);
    if (res != DW_DLV_OK) {
        tagname = "<bogus tag>";
    }
    printf("%3d: Die: %s\n",level,tagname);
    res = dwarf_attrlist(in_die,&attrbuf,&attrcount,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_attrlist failed! res %d\n",res);
        return res;
    }
    for (i = 0; i < attrcount; ++i) {
        res = print_attr(attrbuf[i],i,error);
        if (res != DW_DLV_OK) {
            dealloc_list(dbg,attrbuf,attrcount,0);
            printf("dwarf_attr print failed! res %d\n",res);
            return res;
        }
    }
    dealloc_list(dbg,attrbuf,attrcount,0);
    return DW_DLV_OK;
}

static int
print_object_info(Dwarf_Debug dbg,Dwarf_Error *error)
{
    Dwarf_Bool is_info = TRUE; /* our data is not DWARF4

```

```

        .debug_types. */
Dwarf_Unsigned cu_header_length = 0;
Dwarf_Half     version_stamp = 0;
Dwarf_Off      abbrev_offset = 0;
Dwarf_Half     address_size  = 0;
Dwarf_Half     length_size   = 0;
Dwarf_Half     extension_size = 0;
Dwarf_Sig8     type_signature;
Dwarf_Unsigned typeoffset    = 0;
Dwarf_Unsigned next_cu_header_offset = 0;
Dwarf_Half     header_cu_type = 0;

int res = 0;
Dwarf_Die cu_die = 0;
int level = 0;

type_signature = zerosignature;
res = dwarf_next_cu_header_d(dbg,
    is_info,
    &cu_header_length,
    &version_stamp,
    &abbrev_offset,
    &address_size,
    &length_size,
    &extension_size,
    &type_signature,
    &typeoffset,
    &next_cu_header_offset,
    &header_cu_type,
    error);
if (res != DW_DLV_OK) {
    printf("Next cu header result %d. "
        "Something is wrong FAIL, line %d\n", res, __LINE__);
    if (res == DW_DLV_ERROR) {
        printf("Error is: %s\n", dwarf_errmsg(*error));
    }
    exit(EXIT_FAILURE);
}
printf("CU header length.....0x%lx\n",
    (unsigned long)cu_header_length);
printf("Version stamp.....%d\n", version_stamp);
printf("Address size .....%d\n", address_size);
printf("Offset size.....%d\n", length_size);
printf("Next cu header offset....0x%lx\n",
    (unsigned long)next_cu_header_offset);

res = dwarf_siblingof_b(dbg, NULL, is_info, &cu_die, error);
if (res != DW_DLV_OK) {
    /* There is no CU die, which should be impossible. */
    if (res == DW_DLV_ERROR) {
        printf("ERROR: dwarf_siblingof_b failed, no CU die\n");
        printf("Error is: %s\n", dwarf_errmsg(*error));
        return res;
    } else {
        printf("ERROR: dwarf_siblingof_b got NO_ENTRY, "
            "no CU die\n");
        return res;
    }
}
res = print_one_die(dbg, cu_die, level, error);
if (res != DW_DLV_OK) {
    dwarf_dealloc_die(cu_die);
    printf("print_one_die failed! %d\n", res);
    return res;
}
dwarf_dealloc_die(cu_die);
return DW_DLV_OK;
}

/* testing interfaces useful for embedding
libdwarf inside another program or library. */
int main(int argc, char **argv)
{
    int res = 0;
    Dwarf_Debug dbg = 0;
    Dwarf_Error error = 0;
    int fail = FALSE;
    int i = 1;

    if (i >= argc) {
        /* OK */
    } else {
        if (!strcmp(argv[i], "--suppress-de-alloc-tree")) {
            /* Do nothing, ignore the argument */
            ++i;
        }
    }
}
/* Fill in interface before this call.

```

```

        We are using a static area, see above. */
    res = dwarf_object_init_b(&dw_interface,
        0,0,DW_GROUPNUMBER_ANY,&dbg,
        &error);
    if (res == DW_DLV_NO_ENTRY) {
        printf("FAIL Cannot dwarf_object_init_b() NO ENTRY. \n");
        exit(EXIT_FAILURE);
    } else if (res == DW_DLV_ERROR) {
        printf("FAIL Cannot dwarf_object_init_b(). \n");
        printf("msg: %s\n",dwarf_errmsg(error));
        dwarf_dealloc_error(dbg,error);
        exit(EXIT_FAILURE);
    }
    res = print_object_info(dbg,&error);
    if (res != DW_DLV_OK) {
        if (res == DW_DLV_ERROR) {
            dwarf_dealloc_error(dbg,error);
        }
        printf("FAIL printing, res %d line %d\n",res,__LINE__);
        exit(EXIT_FAILURE);
    }
    dwarf_object_finish(dbg);
    if (fail) {
        printf("FAIL objectaccess.c\n");
        exit(EXIT_FAILURE);
    }
    return 0;
}

```

9.90 A simple report on section groups.

Section groups are for Split DWARF.

Section groups are for Split DWARF.

The C source is `src/bin/dwarfexample/showsectiongroups.c`

```

*/
#include <config.h>

#include <stdio.h> /* printf() */
#include <stdlib.h> /* calloc() exit() free() */
#include <string.h> /* strcmp() */

#include "dwarf.h"
#include "libdwarf.h"
#define FALSE 0

char trueoutpath[2000];

static int
one_file_show_groups(char *path_in,
    char *shortpath,
    int chosengroup)
{
    int res = 0;
    Dwarf_Debug dbg = 0;
    Dwarf_Error error = 0;
    char * path = 0;
    Dwarf_Unsigned section_count = 0;
    Dwarf_Unsigned group_count = 0;
    Dwarf_Unsigned selected_group = 0;
    Dwarf_Unsigned map_entry_count = 0;
    Dwarf_Unsigned * group_numbers_array = 0;
    Dwarf_Unsigned * sec_numbers_array = 0;
    const char ** sec_names_array = 0;
    Dwarf_Unsigned i = 0;
    const char *grpname = 0;

    switch(chosengroup) {
    case DW_GROUPNUMBER_ANY:
        grpname="DW_GROUPNUMBER_ANY";
        break;
    case DW_GROUPNUMBER_BASE:
        grpname="DW_GROUPNUMBER_BASE";
        break;
    case DW_GROUPNUMBER_DWO:
        grpname="DW_GROUPNUMBER_DWO";
        break;
    default:
        grpname = "";
    }
}

```

```

}
path = path_in;
res = dwarf_init_path(path,
    0,0,
    chosengroup,
    0,0, &dbg, &error);
if (res == DW_DLV_ERROR) {
    printf("Error from libdwarf opening \"%s\": %s\n",
        shortpath, dwarf_errmsg(error));
    dwarf_dealloc_error(dbg,error);
    error = 0;
    return res;
}
if (res == DW_DLV_NO_ENTRY) {
    printf("There is no such file as \"%s\" "
        "or the selected group %d (%s) does "
        "not appear in the file\n",
        shortpath,chosengroup,grpname);
    return DW_DLV_NO_ENTRY;
}

res = dwarf_sec_group_sizes(dbg, &section_count,
    &group_count, &selected_group, &map_entry_count,
    &error);
if (res == DW_DLV_ERROR) {
    printf("Error from libdwarf getting group "
        "sizes \"%s\": %s\n",
        shortpath, dwarf_errmsg(error));
    dwarf_dealloc_error(dbg,error);
    error = 0;
    dwarf_finish(dbg);
    return res;
}
if (res == DW_DLV_NO_ENTRY) {
    printf("Impossible. libdwarf claims no groups from %s\n",
        shortpath);
    dwarf_finish(dbg);
    return res;
}
printf("Group Map data sizes\n");
printf(" requested group : %4lu\n",
    (unsigned long)chosengroup);
printf(" section count   : %4lu\n",
    (unsigned long)section_count);
printf(" group count      : %4lu\n",
    (unsigned long)group_count);
printf(" selected group    : %4lu\n",
    (unsigned long)selected_group);
printf(" map entry count   : %4lu\n",
    (unsigned long)map_entry_count);

group_numbers_array = (Dwarf_Unsigned *)calloc(map_entry_count,
    sizeof(Dwarf_Unsigned));
if (!group_numbers_array) {
    printf("Error calloc fail, group count %lu\n",
        (unsigned long)group_count);
    dwarf_finish(dbg);
    return DW_DLV_ERROR;
}
sec_numbers_array = (Dwarf_Unsigned *)calloc(map_entry_count,
    sizeof(Dwarf_Unsigned));
if (!sec_numbers_array) {
    free(group_numbers_array);
    printf("Error calloc fail sec numbers, section count %lu\n",
        (unsigned long)section_count);
    dwarf_finish(dbg);
    return DW_DLV_ERROR;
}
sec_names_array = (const char **)calloc(map_entry_count,
    sizeof(const char *));
if (!sec_names_array) {
    free(sec_numbers_array);
    free(group_numbers_array);
    printf("Error calloc fail on names, section count %lu\n",
        (unsigned long)section_count);
    dwarf_finish(dbg);
    return DW_DLV_ERROR;
}
res = dwarf_sec_group_map(dbg,map_entry_count,
    group_numbers_array,
    sec_numbers_array, sec_names_array,&error);
if (res == DW_DLV_ERROR) {
    free(sec_names_array);
    free(sec_numbers_array);
    free(group_numbers_array);
    printf("Error from libdwarf getting group details "
        "sizes \"%s\": %s\n",

```

```

        shortpath, dwarf_errmsg(error));
dwarf_dealloc_error(dbg,error);
error = 0;
dwarf_finish(dbg);
return res;
}
if (res == DW_DLV_NO_ENTRY) {
    free(sec_names_array);
    free(sec_numbers_array);
    free(group_numbers_array);
    printf("Impossible. libdwarf claims details from %s\n",
        shortpath);
    dwarf_finish(dbg);
    return res;
}
printf(" [index] group section \n");
for (i = 0; i < map_entry_count; ++i) {
    printf(" [%5lu] %4lu %4lu %s\n",
        (unsigned long)i,
        (unsigned long)group_numbers_array[i],
        (unsigned long)sec_numbers_array[i],
        sec_names_array[i]);
}
free(sec_names_array);
free(sec_numbers_array);
free(group_numbers_array);
dwarf_finish(dbg);
return DW_DLV_OK;
}

/* Does not return */
static void
usage(void)
{
    printf("Usage: showsectiongroups [-group <n>] "
        "<objectfile> ...\n");
    printf("Usage: group defaults to zero (DW_GROUPNUMBER ANY)\n");
    exit(EXIT_FAILURE);
}

/* This trimming of the file path makes libdwarf regression
testing easier by arranging baseline output
not show the full path. */
static void
trimpathprefix(char *out,unsigned int outlen, char *in)
{
    char *cpo = out;
    char *cpi = in;
    char *suffix = 0;
    unsigned int lencopied = 0;
    for ( ; *cpi ; ++cpi) {
        if (*cpi == '/') {
            suffix= cpi+1;
        }
    }
    if (suffix) {
        cpi = suffix;
    }
    lencopied = 0;
    for ( ; lencopied < outlen; ++cpo,++cpi)
    {
        *cpo = *cpi;
        if (! *cpi) {
            return;
        }
        ++lencopied;
    }
    printf("FAIL copy file name: not terminated \n");
    exit(EXIT_FAILURE);
}

int
main(int argc, char **argv)
{
    int res = 0;
    int i = 1;
    int chosengroup = DW_GROUPNUMBER_ANY;
    static char reportingpath[16000];

    if (argc < 2) {
        usage();
        return 0;
    }
    for ( ; i < argc; ++i) {
        char *arg = argv[i];
        if (!strcmp(arg,"-group")) {
            i++;

```

```
    if (i >= argc) {
        usage();
    }
    arg = argv[i];
    chosengroup = atoi(arg);
    /* We are ignoring errors to simplify
       this source. Use strtol, carefully,
       in real code. */
    continue;
}
if (!strcmp(argv[i], "--suppress-de-alloc-tree")) {
    /* Do nothing, ignore the argument */
    continue;
}
trimpathprefix(reportingpath, sizeof(reportingpath), arg);
res = one_file_show_groups(arg,
    reportingpath, chosengroup);
printf("====done with %s, status %s\n", reportingpath,
    (res == DW_DLV_OK) ? "DW_DLV_OK":
    (res == DW_DLV_ERROR) ? "DW_DLV_ERROR":
    "DW_DLV_NO_ENTRY");
printf("\n");
}
return 0;
}
```


Chapter 10

Class Documentation

10.1 Dwarf_Block_s Struct Reference

Public Attributes

- [Dwarf_Unsigned](#) **bl_len**
- [Dwarf_Ptr](#) **bl_data**
- [Dwarf_Small](#) **bl_from_loclist**
- [Dwarf_Unsigned](#) **bl_section_offset**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.2 Dwarf_Cmdline_Options_s Struct Reference

```
#include <libdwarf.h>
```

Public Attributes

- [Dwarf_Bool](#) **check_verbose_mode**

10.2.1 Detailed Description

`check_verbose_mode` defaults to `FALSE`. If a `libdwarf`-calling program sets this `TRUE` it means some errors in Line Table headers get a much more detailed description of the error which is reported the caller via `printf()`↵`_callback()` function (the caller can do something with the message). Or the `libdwarf` calling code can call [`dwarf_record_cmdline_options\(\)`](#) to set the new value.

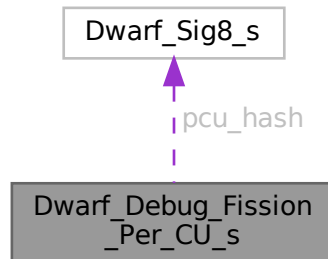
For convenience the type name for the struct is `Dwarf_Cmdline_Options`.

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.3 Dwarf_Debug_Fission_Per_CU_s Struct Reference

Collaboration diagram for Dwarf_Debug_Fission_Per_CU_s:



Public Attributes

- const char * **pcu_type**
- Dwarf_Unsigned **pcu_index**
- Dwarf_Sig8 **pcu_hash**
- Dwarf_Unsigned **pcu_offset** [DW_FFISSION_SECT_COUNT]
- Dwarf_Unsigned **pcu_size** [DW_FFISSION_SECT_COUNT]
- Dwarf_Unsigned **unused1**
- Dwarf_Unsigned **unused2**

The documentation for this struct was generated from the following file:

- </home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h>

10.4 Dwarf_Form_Data16_s Struct Reference

Public Attributes

- unsigned char **fd_data** [16]

The documentation for this struct was generated from the following file:

- </home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h>

10.5 Dwarf_Macro_Details_s Struct Reference

```
#include <libdwarf.h>
```

Public Attributes

- [Dwarf_Off](#) **dmd_offset**
- [Dwarf_Small](#) **dmd_type**
- [Dwarf_Signed](#) **dmd_lineno**
- [Dwarf_Signed](#) **dmd_fileindex**
- `char *` **dmd_macro**

10.5.1 Detailed Description

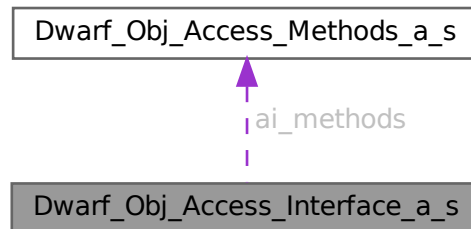
This applies to DWARF2, DWARF3, and DWARF4 compilation units. DWARF5 `.debug_macro` has its own function interface which does not use this struct.

The documentation for this struct was generated from the following file:

- `/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h`

10.6 Dwarf_Obj_Access_Interface_a_s Struct Reference

Collaboration diagram for Dwarf_Obj_Access_Interface_a_s:

**Public Attributes**

- `void *` **ai_object**
- `const` [Dwarf_Obj_Access_Methods_a](#) * **ai_methods**

The documentation for this struct was generated from the following file:

- `/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h`

10.7 Dwarf_Obj_Access_Methods_a_s Struct Reference

```
#include <libdwarf.h>
```

Public Attributes

- `int(* om_get_section_info)(void *obj, Dwarf_Unsigned section_index, Dwarf_Obj_Access_Section_a *return_section, int *error)`
- `Dwarf_Small(* om_get_byte_order)(void *obj)`
- `Dwarf_Small(* om_get_length_size)(void *obj)`
- `Dwarf_Small(* om_get_pointer_size)(void *obj)`
- `Dwarf_Unsigned(* om_get_filesize)(void *obj)`
- `Dwarf_Unsigned(* om_get_section_count)(void *obj)`
- `int(* om_load_section)(void *obj, Dwarf_Unsigned dw_section_index, Dwarf_Small **dw_return_data, int *dw_error)`
- `int(* om_relocate_a_section)(void *obj, Dwarf_Unsigned section_index, Dwarf_Debug dbg, int *error)`
- `int(* om_load_section_a)(void *obj, Dwarf_Unsigned dw_section_index, enum Dwarf_Sec_Alloc_Pref *dw_alloc_pref, Dwarf_Small **dw_return_data_ptr, Dwarf_Unsigned *dw_return_data_len, Dwarf_Small **dw_return_mmap_base_ptr, Dwarf_Unsigned *dw_return_mmap_offset, Dwarf_Unsigned *dw_return_mmap_len, int *dw_error)`
- `void(* om_finish)(void *obj)`

10.7.1 Detailed Description

The functions we need to access object data from libdwarf are declared here.

Unless you are reading object sections with your own code (as in [src/bin/dwarfexample/jitreader.c](#)) you will not need to fill in or use the struct.

`om_relocate_a_section` uses `malloc/read` to get section contents and returns a pointer to the malloc space through `dw_return_data`, which is recorded in the applicable section data.

`om_load_section_a` uses either `malloc/read` or `mmap` and consequently returns more data as needed for eventual `free()` or `munmap()`.

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.8 Dwarf_Obj_Access_Section_a_s Struct Reference

Public Attributes

- `const char * as_name`
- `Dwarf_Unsigned as_type`
- `Dwarf_Unsigned as_flags`
- `Dwarf_Addr as_addr`
- `Dwarf_Unsigned as_offset`
- `Dwarf_Unsigned as_size`
- `Dwarf_Unsigned as_link`
- `Dwarf_Unsigned as_info`
- `Dwarf_Unsigned as_addralign`
- `Dwarf_Unsigned as_entsize`

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.9 Dwarf_Printf_Callback_Info_s Struct Reference

```
#include <libdwarf.h>
```

Public Attributes

- void * **dp_user_pointer**
- [dwarf_printf_callback_function_type](#) **dp_fptr**
- char * **dp_buffer**
- unsigned int **dp_buffer_len**
- int **dp_buffer_user_provided**
- void * **dp_reserved**

10.9.1 Detailed Description

If one wishes to print detailed line table information one creates an instance of this struct and fills in the fields and passes the struct to the relevant init, for example, [dwarf_init_path\(\)](#).

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.10 Dwarf_Ranges_s Struct Reference

Public Attributes

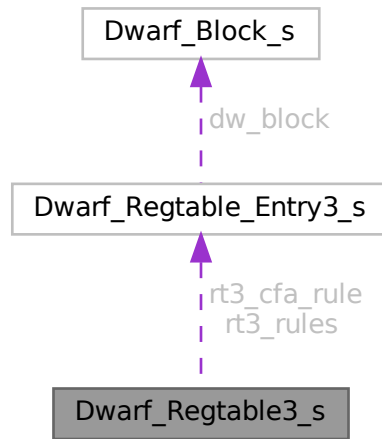
- [Dwarf_Addr](#) **dwr_addr1**
- [Dwarf_Addr](#) **dwr_addr2**
- enum [Dwarf_Ranges_Entry_Type](#) **dwr_type**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.11 Dwarf_Regtable3_s Struct Reference

Collaboration diagram for Dwarf_Regtable3_s:



Public Attributes

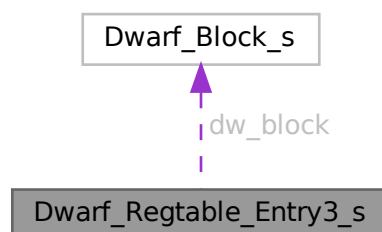
- struct [Dwarf_Regtable_Entry3_s](#) `rt3_cfa_rule`
- [Dwarf_Half](#) `rt3_reg_table_size`
- struct [Dwarf_Regtable_Entry3_s](#) * `rt3_rules`

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.12 Dwarf_Regtable_Entry3_s Struct Reference

Collaboration diagram for Dwarf_Regtable_Entry3_s:



Public Attributes

- [Dwarf_Small](#) **dw_offset_relevant**
- [Dwarf_Small](#) **dw_value_type**
- [Dwarf_Half](#) **dw_regnum**
- [Dwarf_Unsigned](#) **dw_offset**
- [Dwarf_Unsigned](#) **dw_args_size**
- [Dwarf_Block](#) **dw_block**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.13 Dwarf_Sig8_s Struct Reference

Public Attributes

- char **signature** [8]

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

Chapter 11

File Documentation

Chapter 12

checkexamples.c

[checkexamples.c](#) contains what user code should be. Hence the code typed in [checkexamples.c](#) is PUBLIC DOMAIN and may be copied, used, and altered without any restrictions.

[checkexamples.c](#) need not be compiled routinely nor should it ever be executed.

To verify syntactic correctness compile in the libdwarf-code/doc directory with:

```
cc -c -Wall -O0 -Wpointer-arith \
-Wdeclaration-after-statement \
-Wextra -Wcomment -Wformat -Wpedantic -Wuninitialized \
-Wno-long-long -Wshadow -Wbad-function-cast \
-Wmissing-parameter-type -Wnested-externs \
-I../src/lib/libdwarf checkexamples.c
```

12.1 /home/davea/dwarf/code/src/bin/dwarfexample/jitreader.c File Reference

12.2 /home/davea/dwarf/code/src/bin/dwarfexample/showsectiongroups.c File Reference

Chapter 13

dwarf.h

[dwarf.h](#) contains all the identifiers such as DW_TAG_compile_unit etc from the various versions of the DWARF Standard beginning with DWARF2 and containing all later Dwarf Standard identifiers.

In addition, it contains all user-defined identifiers that we have been able to find.

All identifiers here are C defines with the prefix "DW_" .

13.1 dwarf.h

[Go to the documentation of this file.](#)

```
00001 /*
00002 Copyright (C) 2000-2006 Silicon Graphics, Inc. All Rights Reserved.
00003 Portions Copyright 2002-2010 Sun Microsystems, Inc. All rights reserved.
00004 Portions Copyright 2007-2023 David Anderson. All rights reserved.
00005
00006 This program is free software; you can redistribute it
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00008 GNU Lesser General Public License as published by the Free
00009 Software Foundation.
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00011 This program is distributed in the hope that it would be
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00021 do not apply to combinations of this program with other
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00024 You should have received a copy of the GNU Lesser General
00025 Public License along with this program; if not, write the
00026 Free Software Foundation, Inc., 51 Franklin Street - Fifth
00027 Floor, Boston MA 02110-1301, USA.
00028 */
00029
00044 #ifndef __DWARF_H
00045 #define __DWARF_H
00046 #ifdef __cplusplus
00047 extern "C" {
00048 #endif
00049
00050 /*
00051 dwarf.h DWARF debugging information values
00052 $Revision: 1.41 $ $Date: 2006/04/17 00:09:56 $
00053
00054 The comment "DWARF3" appears where there are
00055 new entries from DWARF3 as of 2004, "DWARF3f"
00056 where there are new entries as of the November 2005
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00057     public review document and other comments apply
00058     where extension entries appear.
00059
00060     Extensions part of DWARF4 are marked DWARF4.
00061
00062     A few extension names have omitted the 'vendor id'
00063     (See chapter 7, "Vendor Extensibility"). Please
00064     always use a 'vendor id' string in extension names.
00065
00066     Vendors should use a vendor string in names and
00067     wherever possible avoid duplicating values used by
00068     other vendor extensions
00069
00070     The DWARF1 comments indicate values unused in
00071     DWARF2 and later but used or reserved in DWARF1.
00072 */
00073
00074 #define DW_TAG_array_type                0x01
00075 #define DW_TAG_class_type                0x02
00076 #define DW_TAG_entry_point                0x03
00077 #define DW_TAG_enumeration_type          0x04
00078 #define DW_TAG_formal_parameter          0x05
00079 /* TAG_global_subroutine                0x06 DWARF1 only */
00080 /* TAG_global_variable                  0x07 DWARF1 only */
00081 #define DW_TAG_imported_declaration       0x08
00082 /* reserved by DWARF1                    0x09 DWARF1 only */
00083 #define DW_TAG_label                      0x0a
00084 #define DW_TAG_lexical_block              0x0b
00085 /* TAG_local_variable                    0x0c DWARF1 only. */
00086 #define DW_TAG_member                     0x0d
00087 /* reserved by DWARF1                    0x0e DWARF1 only */
00088 #define DW_TAG_pointer_type                0x0f
00089 #define DW_TAG_reference_type             0x10
00090 #define DW_TAG_compile_unit               0x11
00091 #define DW_TAG_string_type                 0x12
00092 #define DW_TAG_structure_type              0x13
00093 /* TAG_subroutine                        0x14 DWARF1 only */
00094 #define DW_TAG_subroutine_type             0x15
00095 #define DW_TAG_typedef                     0x16
00096 #define DW_TAG_union_type                  0x17
00097 #define DW_TAG_unspecified_parameters     0x18
00098 #define DW_TAG_variant                     0x19
00099 #define DW_TAG_common_block                0x1a
00100 #define DW_TAG_common_inclusion              0x1b
00101 #define DW_TAG_inheritance                 0x1c
00102 #define DW_TAG_inlined_subroutine          0x1d
00103 #define DW_TAG_module                      0x1e
00104 #define DW_TAG_ptr_to_member_type          0x1f
00105 #define DW_TAG_set_type                    0x20
00106 #define DW_TAG_subrange_type                0x21
00107 #define DW_TAG_with_stmt                    0x22
00108 #define DW_TAG_access_declaration          0x23
00109 #define DW_TAG_base_type                    0x24
00110 #define DW_TAG_catch_block                  0x25
00111 #define DW_TAG_const_type                   0x26
00112 #define DW_TAG_constant                     0x27
00113 #define DW_TAG_enumerator                   0x28
00114 #define DW_TAG_file_type                    0x29
00115 #define DW_TAG_friend                       0x2a
00116 #define DW_TAG_namelist                     0x2b
00117 /* Early releases of this header had the following
00118     misspelled with a trailing 's' */
00119 #define DW_TAG_namelist_item                0x2c /* DWARF2 spelling*/
00120 #define DW_TAG_namelist_items                0x2c /* SGI misspelling/typo*/
00121 #define DW_TAG_packed_type                  0x2d
00122 #define DW_TAG_subprogram                    0x2e
00123 /* The DWARF2 document had two spellings of the following
00124     two TAGs, DWARF3 specifies the longer spelling. */
00125 #define DW_TAG_template_type_parameter      0x2f /* DWARF3-5 spelling*/
00126 #define DW_TAG_template_type_param          0x2f /* DWARF2 inconsistent*/
00127 #define DW_TAG_template_value_parameter     0x30 /* DWARF all versions*/
00128 #define DW_TAG_template_value_param         0x30 /* SGI misspelling/typo*/
00129 #define DW_TAG_thrown_type                   0x31
00130 #define DW_TAG_try_block                     0x32
00131 #define DW_TAG_variant_part                  0x33
00132 #define DW_TAG_variable                     0x34
00133 #define DW_TAG_volatile_type                 0x35
00134 #define DW_TAG_dwarf_procedure               0x36 /* DWARF3 */
00135 #define DW_TAG_restrict_type                 0x37 /* DWARF3 */
00136 #define DW_TAG_interface_type               0x38 /* DWARF3 */
00137 #define DW_TAG_namespace                    0x39 /* DWARF3 */
00138 #define DW_TAG_imported_module               0x3a /* DWARF3 */
00139 #define DW_TAG_unspecified_type              0x3b /* DWARF3 */
00140 #define DW_TAG_partial_unit                  0x3c /* DWARF3 */
00141 #define DW_TAG_imported_unit                 0x3d /* DWARF3 */
00142 /* Do not use DW_TAG_mutable_type */
00143 #define DW_TAG_mutable_type                 0x3e /*Withdrawn from DWARF3 by DWARF3f*/

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00144 #define DW_TAG_condition 0x3f /* DWARF3f */
00145 #define DW_TAG_shared_type 0x40 /* DWARF3f */
00146 #define DW_TAG_type_unit 0x41 /* DWARF4 */
00147 #define DW_TAG_rvalue_reference_type 0x42 /* DWARF4 */
00148 #define DW_TAG_template_alias 0x43 /* DWARF4 */
00149 #define DW_TAG_coarray_type 0x44 /* DWARF5 */
00150 #define DW_TAG_generic_subrange 0x45 /* DWARF5 */
00151 #define DW_TAG_dynamic_type 0x46 /* DWARF5 */
00152 #define DW_TAG_atomic_type 0x47 /* DWARF5 */
00153 #define DW_TAG_call_site 0x48 /* DWARF5 */
00154 #define DW_TAG_call_site_parameter 0x49 /* DWARF5 */
00155 #define DW_TAG_skeleton_unit 0x4a /* DWARF5 */
00156 #define DW_TAG_immutable_type 0x4b /* DWARF5 */
00157
00158 /* TI = Texas Instruments, for DWARF in COFF */
00159 /* https://www.ti.com/lit/an/spraab5/spraab5.pdf?ts=1705994928599 */
00160
00161 #define DW_TAG_TI_far_type 0x4080 /* TI */
00162 #define DW_TAG_lo_user 0x4080 /* TI */
00163 #define DW_TAG_MIPS_loop 0x4081
00164 #define DW_TAG_TI_near_type 0x4081 /* TI */
00165 #define DW_TAG_TI_assign_register 0x4082 /* TI */
00166 #define DW_TAG_TI_ioport_type 0x4083 /* TI */
00167 #define DW_TAG_TI_restrict_type 0x4084 /* TI */
00168 #define DW_TAG_TI_onchip_type 0x4085 /* TI */
00169
00170 /* HP extensions: ftp://ftp.hp.com/pub/lang/tools/\
00171 WDB/wdb-4.0.tar.gz */
00172 #define DW_TAG_HP_array_descriptor 0x4090 /* HP */
00173
00174 /* GNU extensions. The first 3 missing the GNU_ */
00175 #define DW_TAG_format_label 0x4101 /* GNU. Fortran. */
00176 #define DW_TAG_GNU_function_template 0x4102 /* GNU. For C++ */
00177 #define DW_TAG_GNU_class_template 0x4103 /* GNU. For C++ */
00178 #define DW_TAG_GNU_BINCL 0x4104 /* GNU */
00179 #define DW_TAG_GNU_EINCL 0x4105 /* GNU */
00180
00181 /* GNU extension. http://gcc.gnu.org/wiki/TemplateParmsDwarf */
00182 #define DW_TAG_GNU_template_template_parameter 0x4106 /* GNU */
00183 #define DW_TAG_GNU_template_template_param 0x4106 /* GNU */
00184 #define DW_TAG_GNU_template_parameter_pack 0x4107 /* GNU */
00185 #define DW_TAG_GNU_formal_parameter_pack 0x4108 /* GNU */
00186
00187 #define DW_TAG_GNU_call_site 0x4109 /* GNU */
00188 #define DW_TAG_GNU_call_site_parameter 0x410a /* GNU */
00189
00190 /* The following are SUN extensions */
00191 #define DW_TAG_SUN_function_template 0x4201 /* SUN */
00192 #define DW_TAG_SUN_class_template 0x4202 /* SUN */
00193 #define DW_TAG_SUN_struct_template 0x4203 /* SUN */
00194 #define DW_TAG_SUN_union_template 0x4204 /* SUN */
00195 #define DW_TAG_SUN_indirect_inheritance 0x4205 /* SUN */
00196 #define DW_TAG_SUN_codeflags 0x4206 /* SUN */
00197 #define DW_TAG_SUN_memop_info 0x4207 /* SUN */
00198 #define DW_TAG_SUN_omp_child_func 0x4208 /* SUN */
00199 #define DW_TAG_SUN_rtti_descriptor 0x4209 /* SUN */
00200 #define DW_TAG_SUN_dtor_info 0x420a /* SUN */
00201 #define DW_TAG_SUN_dtor 0x420b /* SUN */
00202 #define DW_TAG_SUN_f90_interface 0x420c /* SUN */
00203 #define DW_TAG_SUN_fortran_vax_structure 0x420d /* SUN */
00204 #define DW_TAG_SUN_hi 0x42ff /* SUN */
00205
00206 /* ALTIUM extensions */
00207 /* DSP-C/Starcore __circ qualifier */
00208 #define DW_TAG_ALTIUM_circ_type 0x5101 /* ALTIUM */
00209 /* Starcore __mwa_circ qualifier */
00210 #define DW_TAG_ALTIUM_mwa_circ_type 0x5102 /* ALTIUM */
00211 /* Starcore __rev_carry qualifier */
00212 #define DW_TAG_ALTIUM_rev_carry_type 0x5103 /* ALTIUM */
00213 /* M16 __rom qualifier */
00214 #define DW_TAG_ALTIUM_rom 0x5111 /* ALTIUM */
00215
00216 #define DW_TAG_LLVM_annotation 0x6000 /* September 2021*/
00217
00218 /* GHS C */
00219 #define DW_TAG_ghs_namespace 0x8004
00220 #define DW_TAG_ghs_using_namespace 0x8005
00221 #define DW_TAG_ghs_using_declaration 0x8006
00222 #define DW_TAG_ghs_template_template_param 0x8007
00223
00224 /* The following 3 are extensions to support UPC */
00225 #define DW_TAG_upc_shared_type 0x8765 /* UPC */
00226 #define DW_TAG_upc_strict_type 0x8766 /* UPC */
00227 #define DW_TAG_upc_relaxed_type 0x8767 /* UPC */
00228
00229 /* PGI (STMicroelectronics) extensions. */
00230 #define DW_TAG_PGI_kanji_type 0xa000 /* PGI */

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00231 #define DW_TAG_PGI_interface_block      0xa020 /* PGI */
00232
00233 #define DW_TAG_BORLAND_property          0xb000
00234 #define DW_TAG_BORLAND_Delphi_string     0xb001
00235 #define DW_TAG_BORLAND_Delphi_dynamic_array 0xb002
00236 #define DW_TAG_BORLAND_Delphi_set       0xb003
00237 #define DW_TAG_BORLAND_Delphi_variant    0xb004
00238
00239 #define DW_TAG_hi_user                    0xffff
00240
00241 /* The following two are non-standard. Use DW_CHILDREN_yes
00242    and DW_CHILDREN_no instead. These could
00243    probably be deleted, but someone might be using them,
00244    so they remain. */
00245 #define DW_children_no                    0
00246 #define DW_children_yes                  1
00247
00248 #define DW_FORM_addr                     0x01
00249 /* FORM_REF                             0x02 DWARF1 only */
00250 #define DW_FORM_block2                   0x03
00251 #define DW_FORM_block4                   0x04
00252 #define DW_FORM_data2                     0x05
00253 #define DW_FORM_data4                     0x06
00254 #define DW_FORM_data8                     0x07
00255 #define DW_FORM_string                     0x08
00256 #define DW_FORM_block                     0x09
00257 #define DW_FORM_block1                     0x0a
00258 #define DW_FORM_data1                     0x0b
00259 #define DW_FORM_flag                       0x0c
00260 #define DW_FORM_sdata                     0x0d
00261 #define DW_FORM_strp                       0x0e
00262 #define DW_FORM_uda                       0x0f
00263 #define DW_FORM_ref_addr                   0x10
00264 #define DW_FORM_ref1                       0x11
00265 #define DW_FORM_ref2                       0x12
00266 #define DW_FORM_ref4                       0x13
00267 #define DW_FORM_ref8                       0x14
00268 #define DW_FORM_ref_uda                     0x15
00269 #define DW_FORM_indirect                   0x16
00270 #define DW_FORM_sec_offset                 0x17 /* DWARF4 */
00271 #define DW_FORM_exprloc                     0x18 /* DWARF4 */
00272 #define DW_FORM_flag_present               0x19 /* DWARF4 */
00273 #define DW_FORM_strx                       0x1a /* DWARF5 */
00274 #define DW_FORM_addrx                       0x1b /* DWARF5 */
00275 #define DW_FORM_ref_sup4                     0x1c /* DWARF5 */
00276 #define DW_FORM_strp_sup                     0x1d /* DWARF5 */
00277 #define DW_FORM_data16                     0x1e /* DWARF5 */
00278 #define DW_FORM_line_strp                   0x1f /* DWARF5 */
00279 #define DW_FORM_ref_sig8                   0x20 /* DWARF4 */
00280 #define DW_FORM_implicit_const             0x21 /* DWARF5 */
00281 #define DW_FORM_loclistsx                   0x22 /* DWARF5 */
00282 #define DW_FORM_rnglistx                   0x23 /* DWARF5 */
00283 #define DW_FORM_ref_sup8                   0x24 /* DWARF5 */
00284 #define DW_FORM_strx1                       0x25 /* DWARF5 */
00285 #define DW_FORM_strx2                       0x26 /* DWARF5 */
00286 #define DW_FORM_strx3                       0x27 /* DWARF5 */
00287 #define DW_FORM_strx4                       0x28 /* DWARF5 */
00288 #define DW_FORM_addrx1                       0x29 /* DWARF5 */
00289 #define DW_FORM_addrx2                       0x2a /* DWARF5 */
00290 #define DW_FORM_addrx3                       0x2b /* DWARF5 */
00291 #define DW_FORM_addrx4                       0x2c /* DWARF5 */
00292
00293 /* Extensions http://gcc.gnu.org/wiki/DebugFission. */
00294 #define DW_FORM_GNU_addr_index 0x1f01 /* GNU, debug_info.dwo.*/
00295
00296 /* GNU, somewhat like DW_FORM_strp */
00297 #define DW_FORM_GNU_str_index 0x1f02
00298
00299 #define DW_FORM_GNU_ref_alt 0x1f20 /* GNU, Offset in .debug_info. */
00300
00301 /* GNU extension. Offset in .debug_str of another object file. */
00302 #define DW_FORM_GNU_strp_alt 0x1f21
00303
00304 #define DW_FORM_LLVM_addrx_offset          0x2001
00305
00306 #define DW_AT_sibling                       0x01
00307 #define DW_AT_location                     0x02
00308 #define DW_AT_name                           0x03
00309 /* reserved DWARF1                          0x04, DWARF1 only */
00310 /* AT_fund_type                             0x05, DWARF1 only */
00311 /* AT_mod_fund_type                         0x06, DWARF1 only */
00312 /* AT_user_def_type                         0x07, DWARF1 only */
00313 /* AT_mod_u_d_type                         0x08, DWARF1 only */
00314 #define DW_AT_ordering                       0x09
00315 #define DW_AT_subscr_data                     0x0a
00316 #define DW_AT_byte_size                       0x0b
00317 #define DW_AT_bit_offset                     0x0c

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00318 #define DW_AT_bit_size                0x0d
00319 /* reserved DWARF1                    0x0d, DWARF1 only */
00320 #define DW_AT_element_list             0x0f
00321 #define DW_AT_stmt_list                0x10
00322 #define DW_AT_low_pc                   0x11
00323 #define DW_AT_high_pc                  0x12
00324 #define DW_AT_language                 0x13
00325 #define DW_AT_member                   0x14
00326 #define DW_AT_discr                    0x15
00327 #define DW_AT_discr_value              0x16
00328 #define DW_AT_visibility               0x17
00329 #define DW_AT_import                   0x18
00330 #define DW_AT_string_length            0x19
00331 #define DW_AT_common_reference         0x1a
00332 #define DW_AT_comp_dir                 0x1b
00333 #define DW_AT_const_value              0x1c
00334 #define DW_AT_containing_type          0x1d
00335 #define DW_AT_default_value            0x1e
00336 /* reserved                            0x1f */
00337 #define DW_AT_inline                    0x20
00338 #define DW_AT_is_optional               0x21
00339 #define DW_AT_lower_bound               0x22
00340 /* reserved                            0x23 */
00341 /* reserved                            0x24 */
00342 #define DW_AT_producer                  0x25
00343 /* reserved                            0x26 */
00344 #define DW_AT_prototyped                0x27
00345 /* reserved                            0x28 */
00346 /* reserved                            0x29 */
00347 #define DW_AT_return_addr               0x2a
00348 /* reserved                            0x2b */
00349 #define DW_AT_start_scope               0x2c
00350 /* reserved                            0x2d */
00351 #define DW_AT_bit_stride                0x2e /* DWARF3 name */
00352 #define DW_AT_stride_size                0x2e /* DWARF2 name */
00353 #define DW_AT_upper_bound               0x2f
00354 /* AT_virtual                          0x30, DWARF1 only */
00355 #define DW_AT_abstract_origin           0x31
00356 #define DW_AT_accessibility             0x32
00357 #define DW_AT_address_class             0x33
00358 #define DW_AT_artificial                0x34
00359 #define DW_AT_base_types                0x35
00360 #define DW_AT_calling_convention        0x36
00361 #define DW_AT_count                     0x37
00362 #define DW_AT_data_member_location      0x38
00363 #define DW_AT_decl_column               0x39
00364 #define DW_AT_decl_file                 0x3a
00365 #define DW_AT_decl_line                 0x3b
00366 #define DW_AT_declaration                0x3c
00367 #define DW_AT_discr_list                0x3d /* DWARF2 */
00368 #define DW_AT_encoding                   0x3e
00369 #define DW_AT_external                  0x3f
00370 #define DW_AT_frame_base                0x40
00371 #define DW_AT_friend                    0x41
00372 #define DW_AT_identifier_case            0x42
00373 #define DW_AT_macro_info                 0x43 /* DWARF{234} not DWARF5 */
00374 #define DW_AT_namelist_item             0x44
00375 #define DW_AT_priority                   0x45
00376 #define DW_AT_segment                   0x46
00377 #define DW_AT_specification              0x47
00378 #define DW_AT_static_link                0x48
00379 #define DW_AT_type                       0x49
00380 #define DW_AT_use_location               0x4a
00381 #define DW_AT_variable_parameter        0x4b
00382 #define DW_AT_virtuality                 0x4c
00383 #define DW_AT_vtable_elem_location      0x4d
00384 #define DW_AT_allocated                  0x4e /* DWARF3 */
00385 #define DW_AT_associated                  0x4f /* DWARF3 */
00386 #define DW_AT_data_location              0x50 /* DWARF3 */
00387 #define DW_AT_byte_stride                 0x51 /* DWARF3f */
00388 #define DW_AT_stride                      0x51 /* DWARF3 (do not use) */
00389 #define DW_AT_entry_pc                   0x52 /* DWARF3 */
00390 #define DW_AT_use_UTF8                   0x53 /* DWARF3 */
00391 #define DW_AT_extension                  0x54 /* DWARF3 */
00392 #define DW_AT_ranges                     0x55 /* DWARF3 */
00393 #define DW_AT_trampoline                 0x56 /* DWARF3 */
00394 #define DW_AT_call_column                0x57 /* DWARF3 */
00395 #define DW_AT_call_file                  0x58 /* DWARF3 */
00396 #define DW_AT_call_line                  0x59 /* DWARF3 */
00397 #define DW_AT_description                 0x5a /* DWARF3 */
00398 #define DW_AT_binary_scale                0x5b /* DWARF3f */
00399 #define DW_AT_decimal_scale              0x5c /* DWARF3f */
00400 #define DW_AT_small                      0x5d /* DWARF3f */
00401 #define DW_AT_decimal_sign                0x5e /* DWARF3f */
00402 #define DW_AT_digit_count                0x5f /* DWARF3f */
00403 #define DW_AT_picture_string              0x60 /* DWARF3f */
00404 #define DW_AT_mutable                    0x61 /* DWARF3f */

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00405 #define DW_AT_threads_scaled 0x62 /* DWARF3f */
00406 #define DW_AT_explicit 0x63 /* DWARF3f */
00407 #define DW_AT_object_pointer 0x64 /* DWARF3f */
00408 #define DW_AT_endianity 0x65 /* DWARF3f */
00409 #define DW_AT_elemental 0x66 /* DWARF3f */
00410 #define DW_AT_pure 0x67 /* DWARF3f */
00411 #define DW_AT_recursive 0x68 /* DWARF3f */
00412 #define DW_AT_signature 0x69 /* DWARF4 */
00413 #define DW_AT_main_subprogram 0x6a /* DWARF4 */
00414 #define DW_AT_data_bit_offset 0x6b /* DWARF4 */
00415 #define DW_AT_const_expr 0x6c /* DWARF4 */
00416 #define DW_AT_enum_class 0x6d /* DWARF4 */
00417 #define DW_AT_linkage_name 0x6e /* DWARF4 */
00418 #define DW_AT_string_length_bit_size 0x6f /* DWARF5 */
00419 #define DW_AT_string_length_byte_size 0x70 /* DWARF5 */
00420 #define DW_AT_rank 0x71 /* DWARF5 */
00421 #define DW_AT_str_offsets_base 0x72 /* DWARF5 */
00422 #define DW_AT_addr_base 0x73 /* DWARF5 */
00423 /* Use DW_AT_rnglists_base, DW_AT_ranges_base is obsolete as */
00424 /* it was only used in some DWARF5 drafts, not the final DWARF5. */
00425 #define DW_AT_rnglists_base 0x74 /* DWARF5 */
00426 /* DW_AT_dwo_id, an experiment in some DWARF4+. Not DWARF5! */
00427 #define DW_AT_dwo_id 0x75 /* DWARF4! */
00428 #define DW_AT_dwo_name 0x76 /* DWARF5 */
00429 #define DW_AT_reference 0x77 /* DWARF5 */
00430 #define DW_AT_rvalue_reference 0x78 /* DWARF5 */
00431 #define DW_AT_macros 0x79 /* DWARF5 */
00432 #define DW_AT_call_all_calls 0x7a /* DWARF5 */
00433 #define DW_AT_call_all_source_calls 0x7b /* DWARF5 */
00434 #define DW_AT_call_all_tail_calls 0x7c /* DWARF5 */
00435 #define DW_AT_call_return_pc 0x7d /* DWARF5 */
00436 #define DW_AT_call_value 0x7e /* DWARF5 */
00437 #define DW_AT_call_origin 0x7f /* DWARF5 */
00438 #define DW_AT_call_parameter 0x80 /* DWARF5 */
00439 #define DW_AT_call_pc 0x81 /* DWARF5 */
00440 #define DW_AT_call_tail_call 0x82 /* DWARF5 */
00441 #define DW_AT_call_target 0x83 /* DWARF5 */
00442 #define DW_AT_call_target_clobbered 0x84 /* DWARF5 */
00443 #define DW_AT_call_data_location 0x85 /* DWARF5 */
00444 #define DW_AT_call_data_value 0x86 /* DWARF5 */
00445 #define DW_AT_noreturn 0x87 /* DWARF5 */
00446 #define DW_AT_alignment 0x88 /* DWARF5 */
00447 #define DW_AT_export_symbols 0x89 /* DWARF5 */
00448 #define DW_AT_deleted 0x8a /* DWARF5 */
00449 #define DW_AT_defaulted 0x8b /* DWARF5 */
00450 #define DW_AT_loclists_base 0x8c /* DWARF5 */
00451 /* As of 6 January 2025 the DWARF committee promises
00452 not to change the name or the assigned number of
00453 the following two attributes. So
00454 compilers are free to use these now with DWARF 5
00455 or earlier. The applicable FORMs of are
00456 of form class constant (See DWARF5 Section 7.5.5 Classes
00457 and Forms). */
00458 #define DW_AT_language_name 0x90 /* DWARF6 */
00459 #define DW_AT_language_version 0x91 /* DWARF6 */
00460
00461 /* GreenHills, ghs.com GHS C */
00462 #define DW_AT_ghs_namespace_alias 0x806
00463 #define DW_AT_ghs_using_namespace 0x807
00464 #define DW_AT_ghs_using_declaration 0x808
00465
00466 /* In extensions, we attempt to include the vendor extension
00467 in the name even when the vendor leaves it out. */
00468 #define DW_AT_HP_block_index 0x2000 /* HP */
00469 /* 0x2000 follows extension so dwarfdump prints the
00470 most-likely-useful name. */
00471 #define DW_AT_lo_user 0x2000
00472
00473 #define DW_AT_TI_veneer 0x2000 /* TI */
00474
00475 #define DW_AT_MIPS_fde 0x2001 /* MIPS/SGI */
00476 #define DW_AT_TI_symbol_name 0x2001 /* TI */
00477 #define DW_AT_MIPS_loop_begin 0x2002 /* MIPS/SGI */
00478 #define DW_AT_MIPS_tail_loop_begin 0x2003 /* MIPS/SGI */
00479 #define DW_AT_MIPS_epilog_begin 0x2004 /* MIPS/SGI */
00480 #define DW_AT_MIPS_loop_unroll_factor 0x2005 /* MIPS/SGI */
00481 #define DW_AT_MIPS_software_pipeline_depth 0x2006 /* MIPS/SGI */
00482 #define DW_AT_MIPS_linkage_name 0x2007 /* MIPS/SGI, GNU, and others. */
00483 #define DW_AT_MIPS_stride 0x2008 /* MIPS/SGI */
00484 #define DW_AT_MIPS_abstract_name 0x2009 /* MIPS/SGI */
00485 #define DW_AT_MIPS_clone_origin 0x200a /* MIPS/SGI */
00486 #define DW_AT_MIPS_has_inlines 0x200b /* MIPS/SGI */
00487 #define DW_AT_TI_version 0x200b /* TI */
00488 #define DW_AT_MIPS_stride_byte 0x200c /* MIPS/SGI */
00489 #define DW_AT_TI_asm 0x200c /* TI */
00490 #define DW_AT_MIPS_stride_elem 0x200d /* MIPS/SGI */
00491 #define DW_AT_MIPS_ptr_dopetype 0x200e /* MIPS/SGI */

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00492 #define DW_AT_TI_skeletal 0x200e /* TI */
00493 #define DW_AT_MIPS_allocatable_dopetype 0x200f /* MIPS/SGI */
00494 #define DW_AT_MIPS_assumed_shape_dopetype 0x2010 /* MIPS/SGI */
00495 #define DW_AT_MIPS_assumed_size 0x2011 /* MIPS/SGI */
00496 #define DW_AT_TT_interrupt 0x2011 /* TI */
00497
00498 /* HP extensions. */
00499 #define DW_AT_HP_unmodifiable 0x2001 /* conflict: MIPS */
00500 #define DW_AT_HP_prologue 0x2005 /* conflict: MIPS */
00501 #define DW_AT_HP_epilogue 0x2008 /* conflict: MIPS */
00502 #define DW_AT_HP_actuals_stmt_list 0x2010 /* conflict: MIPS */
00503 #define DW_AT_HP_proc_per_section 0x2011 /* conflict: MIPS */
00504 #define DW_AT_HP_raw_data_ptr 0x2012 /* HP */
00505 #define DW_AT_HP_pass_by_reference 0x2013 /* HP */
00506 #define DW_AT_HP_opt_level 0x2014 /* HP */
00507 #define DW_AT_HP_prof_version_id 0x2015 /* HP */
00508 #define DW_AT_HP_opt_flags 0x2016 /* HP */
00509 #define DW_AT_HP_cold_region_low_pc 0x2017 /* HP */
00510 #define DW_AT_HP_cold_region_high_pc 0x2018 /* HP */
00511 #define DW_AT_HP_all_variables_modifiable 0x2019 /* HP */
00512 #define DW_AT_HP_linkage_name 0x201a /* HP */
00513 #define DW_AT_HP_prof_flags 0x201b /* HP */
00514 #define DW_AT_HP_unit_name 0x201f /* HP */
00515 #define DW_AT_HP_unit_size 0x2020 /* HP */
00516 #define DW_AT_HP_widened_byte_size 0x2021 /* HP */
00517 #define DW_AT_HP_definition_points 0x2022 /* HP */
00518 #define DW_AT_HP_default_location 0x2023 /* HP */
00519 #define DW_AT_HP_is_result_param 0x2029 /* HP */
00520
00521 #define DW_AT_CPQ_discontig_ranges 0x2001 /* COMPAQ/HP */
00522 #define DW_AT_CPQ_semantic_events 0x2002 /* COMPAQ/HP */
00523 #define DW_AT_CPQ_split_lifetimes_var 0x2003 /* COMPAQ/HP */
00524 #define DW_AT_CPQ_split_lifetimes_rtn 0x2004 /* COMPAQ/HP */
00525 #define DW_AT_CPQ_prologue_length 0x2005 /* COMPAQ/HP */
00526
00527 /* From GHS C GreenHills ghs.com */
00528 #define DW_AT_ghs_mangled 0x2007 /* conflict MIPS */
00529 #define DW_AT_ghs_rsm 0x2083
00530 #define DW_AT_ghs_frsm 0x2085
00531 #define DW_AT_ghs_frames 0x2086
00532 #define DW_AT_ghs_rso 0x2087
00533 #define DW_AT_ghs_subcpu 0x2092
00534 #define DW_AT_ghs_lbrace_line 0x2093
00535
00536 #define DW_AT_INTEL_other_endian 0x2026 /* Intel, 1 if byte swapped.*/
00537
00538 /* GNU extensions. */
00539 #define DW_AT_sf_names 0x2101 /* GNU */
00540 #define DW_AT_src_info 0x2102 /* GNU */
00541 #define DW_AT_mac_info 0x2103 /* GNU */
00542 #define DW_AT_src_coords 0x2104 /* GNU */
00543 #define DW_AT_body_begin 0x2105 /* GNU */
00544 #define DW_AT_body_end 0x2106 /* GNU */
00545 #define DW_AT_GNU_vector 0x2107 /* GNU */
00546
00547 /* Thread safety, see
00548 http://gcc.gnu.org/wiki/ThreadSafetyAnnotation . */
00549 /* The values here are from gcc-4.6.2 include/dwarf2.h. The
00550 values are not given on the web page at all, nor on web pages
00551 it refers to. */
00552 #define DW_AT_GNU_guarded_by 0x2108 /* GNU */
00553 #define DW_AT_GNU_pt_guarded_by 0x2109 /* GNU */
00554 #define DW_AT_GNU_guarded 0x210a /* GNU */
00555 #define DW_AT_GNU_pt_guarded 0x210b /* GNU */
00556 #define DW_AT_GNU_locks_excluded 0x210c /* GNU */
00557 #define DW_AT_GNU_exclusive_locks_required 0x210d /* GNU */
00558 #define DW_AT_GNU_shared_locks_required 0x210e /* GNU */
00559
00560 /* See http://gcc.gnu.org/wiki/DwarfSeparateTypeInfo */
00561 #define DW_AT_GNU_odr_signature 0x210f /* GNU */
00562
00563 /* See http://gcc.gnu.org/wiki/TemplateParmsDwarf */
00564 /* The value here is from gcc-4.6.2 include/dwarf2.h. The value is
00565 not consistent with the web page as of December 2011. */
00566 #define DW_AT_GNU_template_name 0x2110 /* GNU */
00567 /* The GNU call site extension.
00568 See http://www.dwarfstd.org/ShowIssue.php?issue=100909.2&type=open . */
00569 #define DW_AT_GNU_call_site_value 0x2111 /* GNU */
00570 #define DW_AT_GNU_call_site_data_value 0x2112 /* GNU */
00571 #define DW_AT_GNU_call_site_target 0x2113 /* GNU */
00572 #define DW_AT_GNU_call_site_target_clobbered 0x2114 /* GNU */
00573 #define DW_AT_GNU_tail_call 0x2115 /* GNU */
00574 #define DW_AT_GNU_all_tail_call_sites 0x2116 /* GNU */
00575 #define DW_AT_GNU_all_call_sites 0x2117 /* GNU */
00576 #define DW_AT_GNU_all_source_call_sites 0x2118 /* GNU */
00577
00578 /* Section offset to .debug_macro section. */

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```

00579 #define DW_AT_GNU_macros 0x2119 /* GNU */
00580 #define DW_AT_GNU_deleted 0x211a /* GNU */
00581 /* The GNU DebugFission project:
00582 http://gcc.gnu.org/wiki/DebugFission */
00583 #define DW_AT_GNU_dwo_name 0x2130 /* GNU */
00584 #define DW_AT_GNU_dwo_id 0x2131 /* GNU */
00585
00586 #define DW_AT_GNU_ranges_base 0x2132 /* GNU */
00587 #define DW_AT_GNU_addr_base 0x2133 /* GNU */
00588 #define DW_AT_GNU_pubnames 0x2134 /* GNU */
00589 #define DW_AT_GNU_pubtypes 0x2135 /* GNU */
00590
00591 /* To distinguish distinct basic blocks in a single source line. */
00592 #define DW_AT_GNU_discriminator 0x2136 /* GNU */
00593 #define DW_AT_GNU_locviews 0x2137 /* GNU */
00594 #define DW_AT_GNU_entry_view 0x2138 /* GNU */
00595
00596 /* Sun extensions */
00597 #define DW_AT_SUN_template 0x2201 /* SUN */
00598 #define DW_AT_VMS_rtnbeg_pd_address 0x2201 /* VMS */
00599 #define DW_AT_SUN_alignment 0x2202 /* SUN */
00600 #define DW_AT_SUN_vtable 0x2203 /* SUN */
00601 #define DW_AT_SUN_count_guarantee 0x2204 /* SUN */
00602 #define DW_AT_SUN_command_line 0x2205 /* SUN */
00603 #define DW_AT_SUN_vbase 0x2206 /* SUN */
00604 #define DW_AT_SUN_compile_options 0x2207 /* SUN */
00605 #define DW_AT_SUN_language 0x2208 /* SUN */
00606 #define DW_AT_SUN_browser_file 0x2209 /* SUN */
00607 #define DW_AT_SUN_vtable_abi 0x2210 /* SUN */
00608 #define DW_AT_SUN_func_offsets 0x2211 /* SUN */
00609 #define DW_AT_SUN_cf_kind 0x2212 /* SUN */
00610 #define DW_AT_SUN_vtable_index 0x2213 /* SUN */
00611 #define DW_AT_SUN_omp_tpriv_addr 0x2214 /* SUN */
00612 #define DW_AT_SUN_omp_child_func 0x2215 /* SUN */
00613 #define DW_AT_SUN_func_offset 0x2216 /* SUN */
00614 #define DW_AT_SUN_memop_type_ref 0x2217 /* SUN */
00615 #define DW_AT_SUN_profile_id 0x2218 /* SUN */
00616 #define DW_AT_SUN_memop_signature 0x2219 /* SUN */
00617 #define DW_AT_SUN_obj_dir 0x2220 /* SUN */
00618 #define DW_AT_SUN_obj_file 0x2221 /* SUN */
00619 #define DW_AT_SUN_original_name 0x2222 /* SUN */
00620 #define DW_AT_SUN_hwcprof_signature 0x2223 /* SUN */
00621 #define DW_AT_SUN_amd64_parmdump 0x2224 /* SUN */
00622 #define DW_AT_SUN_part_link_name 0x2225 /* SUN */
00623 #define DW_AT_SUN_link_name 0x2226 /* SUN */
00624 #define DW_AT_SUN_pass_with_const 0x2227 /* SUN */
00625 #define DW_AT_SUN_return_with_const 0x2228 /* SUN */
00626 #define DW_AT_SUN_import_by_name 0x2229 /* SUN */
00627 #define DW_AT_SUN_f90_pointer 0x222a /* SUN */
00628 #define DW_AT_SUN_pass_by_ref 0x222b /* SUN */
00629 #define DW_AT_SUN_f90_allocatable 0x222c /* SUN */
00630 #define DW_AT_SUN_f90_assumed_shape_array 0x222d /* SUN */
00631 #define DW_AT_SUN_c_vla 0x222e /* SUN */
00632 #define DW_AT_SUN_return_value_ptr 0x2230 /* SUN */
00633 #define DW_AT_SUN_dtor_start 0x2231 /* SUN */
00634 #define DW_AT_SUN_dtor_length 0x2232 /* SUN */
00635 #define DW_AT_SUN_dtor_state_initial 0x2233 /* SUN */
00636 #define DW_AT_SUN_dtor_state_final 0x2234 /* SUN */
00637 #define DW_AT_SUN_dtor_state_deltas 0x2235 /* SUN */
00638 #define DW_AT_SUN_import_by_lname 0x2236 /* SUN */
00639 #define DW_AT_SUN_f90_use_only 0x2237 /* SUN */
00640 #define DW_AT_SUN_namelist_spec 0x2238 /* SUN */
00641 #define DW_AT_SUN_is_omp_child_func 0x2239 /* SUN */
00642 #define DW_AT_SUN_fortran_main_alias 0x223a /* SUN */
00643 #define DW_AT_SUN_fortran_based 0x223b /* SUN */
00644
00645 /* ALTIUM extension: ALTIUM Compliant location lists (flag) */
00646 #define DW_AT_ALTIUM_loclist 0x2300 /* ALTIUM */
00647 /* Ada GNAT gcc attributes, constant integer forms. */
00648 /* See http://gcc.gnu.org/wiki/DW_AT_GNAT_descriptive_type . */
00649 #define DW_AT_use_GNAT_descriptive_type 0x2301
00650 #define DW_AT_GNAT_descriptive_type 0x2302
00651 #define DW_AT_GNU_numerator 0x2303 /* GNU */
00652 #define DW_AT_GNU_denominator 0x2304 /* GNU */
00653 /* See https://gcc.gnu.org/wiki/DW_AT_GNU_bias */
00654 #define DW_AT_GNU_bias 0x2305 /* GNU */
00655
00656 /* Go-specific type attributes
00657 Naming as lower-case go instead of GO is a small mistake
00658 by the Go language folks, it seems. This is the
00659 common spelling for these. */
00660 #define DW_AT_go_kind 0x2900
00661 #define DW_AT_go_key 0x2901
00662 #define DW_AT_go_elem 0x2902
00663
00664 /* Attribute for DW_TAG_member of a struct type.
00665 Nonzero value indicates the struct field is an embedded field.*/

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00666 #define DW_AT_go_embedded_field 0x2903
00667
00668 #define DW_AT_go_runtime_type 0x2904
00669
00670 /* UPC extension. */
00671 #define DW_AT_upc_threads_scaled 0x3210 /* UPC */
00672
00673 #define DW_AT_IBM_wsa_addr 0x393e
00674 #define DW_AT_IBM_home_location 0x393f
00675 #define DW_AT_IBM_alt_srcview 0x3940
00676
00677 /* PGI (STMicroelectronics) extensions. */
00678 /* PGI. Block, constant, reference. This attribute is an ASTPLAB
00679 extension used to describe the array local base. */
00680 #define DW_AT_PGI_lbase 0x3a00
00681
00682 /* PGI. Block, constant, reference. ASTPLAB adds this attribute
00683 to describe the section offset, or the offset to the
00684 first element in the dimension. */
00685 #define DW_AT_PGI_soffset 0x3a01
00686
00687 /* PGI. Block, constant, reference. ASTPLAB adds this
00688 attribute to describe the linear stride or the distance
00689 between elements in the dimension. */
00690 #define DW_AT_PGI_lstride 0x3a02
00691
00692 #define DW_AT_BORLAND_property_read 0x3b11
00693 #define DW_AT_BORLAND_property_write 0x3b12
00694 #define DW_AT_BORLAND_property_implements 0x3b13
00695 #define DW_AT_BORLAND_property_index 0x3b14
00696 #define DW_AT_BORLAND_property_default 0x3b15
00697 #define DW_AT_BORLAND_Delphi_unit 0x3b20
00698 #define DW_AT_BORLAND_Delphi_class 0x3b21
00699 #define DW_AT_BORLAND_Delphi_record 0x3b22
00700 #define DW_AT_BORLAND_Delphi_metaclass 0x3b23
00701 #define DW_AT_BORLAND_Delphi_constructor 0x3b24
00702 #define DW_AT_BORLAND_Delphi_destructor 0x3b25
00703 #define DW_AT_BORLAND_Delphi_anonymous_method 0x3b26
00704 #define DW_AT_BORLAND_Delphi_interface 0x3b27
00705 #define DW_AT_BORLAND_Delphi_ABI 0x3b28
00706 #define DW_AT_BORLAND_Delphi_frameptr 0x3b30
00707 #define DW_AT_BORLAND_closure 0x3b31
00708
00709 #define DW_AT_LLVM_include_path 0x3e00
00710 #define DW_AT_LLVM_config_macros 0x3e01
00711 #define DW_AT_LLVM_sysroot 0x3e02
00712 #define DW_AT_LLVM_tag_offset 0x3e03
00713 /* LLVM intends to use 0x3e04 - 0x3e06 */
00714 #define DW_AT_LLVM_apinotes 0x3e07
00715 /* Next 6 are for Heterogeneous debugging */
00716 #define DW_AT_LLVM_active_lane 0x3e08
00717 #define DW_AT_LLVM_augmentation 0x3e09
00718 #define DW_AT_LLVM_lanes 0x3e0a
00719 #define DW_AT_LLVM_lane_pc 0x3e0b
00720 #define DW_AT_LLVM_vector_size 0x3e0c
00721
00722 #define DW_AT_APPLE_optimized 0x3fe1
00723 #define DW_AT_APPLE_flags 0x3fe2
00724 #define DW_AT_APPLE_isa 0x3fe3
00725 /* 0x3fe4 Also known as DW_AT_APPLE_closure, block preferred. */
00726 #define DW_AT_APPLE_block 0x3fe4
00727 /* The rest of APPLE here are in support of Objective C */
00728 #define DW_AT_APPLE_major_runtime_vers 0x3fe5
00729 #define DW_AT_APPLE_runtime_class 0x3fe6
00730 #define DW_AT_APPLE_omit_frame_ptr 0x3fe7
00731 #define DW_AT_APPLE_property_name 0x3fe8
00732 #define DW_AT_APPLE_property_getter 0x3fe9
00733 #define DW_AT_APPLE_property_setter 0x3fea
00734 #define DW_AT_APPLE_property_attribute 0x3feb
00735 #define DW_AT_APPLE_objc_complete_type 0x3fec
00736 #define DW_AT_APPLE_property 0x3fed
00737 #define DW_AT_APPLE_objc_direct 0x3fee
00738 #define DW_AT_APPLE_sdk 0x3fef
00739 #define DW_AT_APPLE_origin 0x3fff
00740
00741 #define DW_AT_hi_user 0x3fff
00742
00743 /* OP values 0x01,0x02,0x04,0x05,0x07 are DWARF1 only */
00744 #define DW_OP_addr 0x03
00745 #define DW_OP_deref 0x06
00746 #define DW_OP_const1u 0x08
00747 #define DW_OP_const1s 0x09
00748 #define DW_OP_const2u 0x0a
00749 #define DW_OP_const2s 0x0b
00750 #define DW_OP_const4u 0x0c
00751 #define DW_OP_const4s 0x0d
00752 #define DW_OP_const8u 0x0e

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```
00753 #define DW_OP_const8s      0x0f
00754 #define DW_OP_constu        0x10
00755 #define DW_OP_consts        0x11
00756 #define DW_OP_dup           0x12
00757 #define DW_OP_drop          0x13
00758 #define DW_OP_over          0x14
00759 #define DW_OP_pick           0x15
00760 #define DW_OP_swap          0x16
00761 #define DW_OP_rot            0x17
00762 #define DW_OP_xderef        0x18
00763 #define DW_OP_abs            0x19
00764 #define DW_OP_and            0x1a
00765 #define DW_OP_div            0x1b
00766 #define DW_OP_minus          0x1c
00767 #define DW_OP_mod            0x1d
00768 #define DW_OP_mul            0x1e
00769 #define DW_OP_neg            0x1f
00770 #define DW_OP_not            0x20
00771 #define DW_OP_or             0x21
00772 #define DW_OP_plus           0x22
00773 #define DW_OP_plus_uconst    0x23
00774 #define DW_OP_shl            0x24
00775 #define DW_OP_shr            0x25
00776 #define DW_OP_shra           0x26
00777 #define DW_OP_xor            0x27
00778 #define DW_OP_bra            0x28
00779 #define DW_OP_eq             0x29
00780 #define DW_OP_ge             0x2a
00781 #define DW_OP_gt             0x2b
00782 #define DW_OP_le             0x2c
00783 #define DW_OP_lt             0x2d
00784 #define DW_OP_ne             0x2e
00785 #define DW_OP_skip           0x2f
00786 #define DW_OP_lit0           0x30
00787 #define DW_OP_lit1           0x31
00788 #define DW_OP_lit2           0x32
00789 #define DW_OP_lit3           0x33
00790 #define DW_OP_lit4           0x34
00791 #define DW_OP_lit5           0x35
00792 #define DW_OP_lit6           0x36
00793 #define DW_OP_lit7           0x37
00794 #define DW_OP_lit8           0x38
00795 #define DW_OP_lit9           0x39
00796 #define DW_OP_lit10          0x3a
00797 #define DW_OP_lit11          0x3b
00798 #define DW_OP_lit12          0x3c
00799 #define DW_OP_lit13          0x3d
00800 #define DW_OP_lit14          0x3e
00801 #define DW_OP_lit15          0x3f
00802 #define DW_OP_lit16          0x40
00803 #define DW_OP_lit17          0x41
00804 #define DW_OP_lit18          0x42
00805 #define DW_OP_lit19          0x43
00806 #define DW_OP_lit20          0x44
00807 #define DW_OP_lit21          0x45
00808 #define DW_OP_lit22          0x46
00809 #define DW_OP_lit23          0x47
00810 #define DW_OP_lit24          0x48
00811 #define DW_OP_lit25          0x49
00812 #define DW_OP_lit26          0x4a
00813 #define DW_OP_lit27          0x4b
00814 #define DW_OP_lit28          0x4c
00815 #define DW_OP_lit29          0x4d
00816 #define DW_OP_lit30          0x4e
00817 #define DW_OP_lit31          0x4f
00818 #define DW_OP_reg0           0x50
00819 #define DW_OP_reg1           0x51
00820 #define DW_OP_reg2           0x52
00821 #define DW_OP_reg3           0x53
00822 #define DW_OP_reg4           0x54
00823 #define DW_OP_reg5           0x55
00824 #define DW_OP_reg6           0x56
00825 #define DW_OP_reg7           0x57
00826 #define DW_OP_reg8           0x58
00827 #define DW_OP_reg9           0x59
00828 #define DW_OP_reg10          0x5a
00829 #define DW_OP_reg11          0x5b
00830 #define DW_OP_reg12          0x5c
00831 #define DW_OP_reg13          0x5d
00832 #define DW_OP_reg14          0x5e
00833 #define DW_OP_reg15          0x5f
00834 #define DW_OP_reg16          0x60
00835 #define DW_OP_reg17          0x61
00836 #define DW_OP_reg18          0x62
00837 #define DW_OP_reg19          0x63
00838 #define DW_OP_reg20          0x64
00839 #define DW_OP_reg21          0x65
```

```

00840 #define DW_OP_reg22          0x66
00841 #define DW_OP_reg23          0x67
00842 #define DW_OP_reg24          0x68
00843 #define DW_OP_reg25          0x69
00844 #define DW_OP_reg26          0x6a
00845 #define DW_OP_reg27          0x6b
00846 #define DW_OP_reg28          0x6c
00847 #define DW_OP_reg29          0x6d
00848 #define DW_OP_reg30          0x6e
00849 #define DW_OP_reg31          0x6f
00850 #define DW_OP_breg0          0x70
00851 #define DW_OP_breg1          0x71
00852 #define DW_OP_breg2          0x72
00853 #define DW_OP_breg3          0x73
00854 #define DW_OP_breg4          0x74
00855 #define DW_OP_breg5          0x75
00856 #define DW_OP_breg6          0x76
00857 #define DW_OP_breg7          0x77
00858 #define DW_OP_breg8          0x78
00859 #define DW_OP_breg9          0x79
00860 #define DW_OP_breg10         0x7a
00861 #define DW_OP_breg11         0x7b
00862 #define DW_OP_breg12         0x7c
00863 #define DW_OP_breg13         0x7d
00864 #define DW_OP_breg14         0x7e
00865 #define DW_OP_breg15         0x7f
00866 #define DW_OP_breg16         0x80
00867 #define DW_OP_breg17         0x81
00868 #define DW_OP_breg18         0x82
00869 #define DW_OP_breg19         0x83
00870 #define DW_OP_breg20         0x84
00871 #define DW_OP_breg21         0x85
00872 #define DW_OP_breg22         0x86
00873 #define DW_OP_breg23         0x87
00874 #define DW_OP_breg24         0x88
00875 #define DW_OP_breg25         0x89
00876 #define DW_OP_breg26         0x8a
00877 #define DW_OP_breg27         0x8b
00878 #define DW_OP_breg28         0x8c
00879 #define DW_OP_breg29         0x8d
00880 #define DW_OP_breg30         0x8e
00881 #define DW_OP_breg31         0x8f
00882 #define DW_OP_regx           0x90
00883 #define DW_OP_fbreg           0x91
00884 #define DW_OP_bregx           0x92
00885 #define DW_OP_piece           0x93
00886 #define DW_OP_deref_size     0x94
00887 #define DW_OP_xderef_size    0x95
00888 #define DW_OP_nop             0x96
00889 #define DW_OP_push_object_address 0x97 /* DWARF3 */
00890 #define DW_OP_call2           0x98 /* DWARF3 */
00891 #define DW_OP_call4           0x99 /* DWARF3 */
00892 #define DW_OP_call_ref        0x9a /* DWARF3 */
00893 #define DW_OP_form_tls_address 0x9b /* DWARF3f */
00894 #define DW_OP_call_frame_cfa  0x9c /* DWARF3f */
00895 #define DW_OP_bit_piece       0x9d /* DWARF3f */
00896 #define DW_OP_implicit_value  0x9e /* DWARF4 */
00897 #define DW_OP_stack_value     0x9f /* DWARF4 */
00898 #define DW_OP_implicit_pointer 0xa0 /* DWARF5 */
00899 #define DW_OP_addrx           0xa1 /* DWARF5 */
00900 #define DW_OP_constx          0xa2 /* DWARF5 */
00901 #define DW_OP_entry_value     0xa3 /* DWARF5 */
00902 #define DW_OP_const_type      0xa4 /* DWARF5 */
00903 #define DW_OP_regval_type     0xa5 /* DWARF5 */
00904 #define DW_OP_deref_type      0xa6 /* DWARF5 */
00905 #define DW_OP_xderef_type     0xa7 /* DWARF5 */
00906 #define DW_OP_convert         0xa8 /* DWARF5 */
00907 #define DW_OP_reinterpret     0xa9 /* DWARF5 */
00908
00909 #define DW_OP_GNU_push_tls_address 0xe0 /* GNU */
00910 #define DW_OP_WASM_location     0xed
00911 #define DW_OP_WASM_location_int 0xee
00912
00913 /* Follows extension so dwarfdump prints the
00914 most-likely-useful name. */
00915 #define DW_OP_lo_user           0xe0
00916
00917 /* LLVM extensions. */
00918 #define DW_OP_LLVM_form_aspace_address 0xe1
00919 #define DW_OP_LLVM_push_lane 0xe2
00920 #define DW_OP_LLVM_offset 0xe3
00921 #define DW_OP_LLVM_offset_uconst 0xe4
00922 #define DW_OP_LLVM_bit_offset 0xe5
00923 #define DW_OP_LLVM_call_frame_entry_reg 0xe6
00924 #define DW_OP_LLVM_undefined 0xe7
00925 #define DW_OP_LLVM_aspace_bregx 0xe8
00926 #define DW_OP_LLVM_aspace_implicit_pointer 0xe9

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00927 #define DW_OP_LLVM_piece_end          0xea
00928 #define DW_OP_LLVM_extend              0xeb
00929 #define DW_OP_LLVM_select_bit_piece    0xec
00930 /* HP extensions. */
00931 #define DW_OP_HP_unknown                0xe0 /* HP conflict: GNU */
00932 #define DW_OP_HP_is_value              0xe1 /* HP */
00933 #define DW_OP_HPfltconst4              0xe2 /* HP */
00934 #define DW_OP_HPfltconst8              0xe3 /* HP */
00935 #define DW_OP_HP_mod_range              0xe4 /* HP */
00936 #define DW_OP_HP_unmod_range            0xe5 /* HP */
00937 #define DW_OP_HP_tls                    0xe6 /* HP */
00938
00939 /* Intel: made obsolete by DW_OP_bit_piece above. */
00940 #define DW_OP_INTEL_bit_piece           0xe8
00941
00942 /* Apple extension. */
00943 #define DW_OP_GNU_uninit                0xf0 /* GNU */
00944 #define DW_OP_APPLE_uninit              0xf0 /* Apple */
00945 #define DW_OP_GNU_encoded_addr          0xf1 /* GNU */
00946 #define DW_OP_GNU_implicit_pointer      0xf2 /* GNU */
00947 #define DW_OP_GNU_entry_value           0xf3 /* GNU */
00948 #define DW_OP_GNU_const_type            0xf4 /* GNU */
00949 #define DW_OP_GNU_regval_type            0xf5 /* GNU */
00950 #define DW_OP_GNU_deref_type            0xf6 /* GNU */
00951 #define DW_OP_GNU_convert               0xf7 /* GNU */
00952 #define DW_OP_GNU_reinterpret            0xf9 /* GNU */
00953 #define DW_OP_GNU_parameter_ref         0xfa /* GNU */
00954 #define DW_OP_GNU_addr_index            0xfb /* GNU Fission */
00955 #define DW_OP_GNU_const_index           0xfc /* GNU Fission */
00956 #define DW_OP_GNU_variable_value        0xfd /* GNU 2017 */
00957 #define DW_OP_PGI_omp_thread_num         0xf8 /* PGI (STMicroelectronics) */
00958
00959 #define DW_OP_hi_user                    0xff
00960
00961 #define DW_ATE_address                   0x01
00962 #define DW_ATE_boolean                   0x02
00963 #define DW_ATE_complex_float             0x03
00964 #define DW_ATE_float                     0x04
00965 #define DW_ATE_signed                     0x05
00966 #define DW_ATE_signed_char               0x06
00967 #define DW_ATE_unsigned                   0x07
00968 #define DW_ATE_unsigned_char             0x08
00969 #define DW_ATE_imaginary_float           0x09 /* DWARF3 */
00970 #define DW_ATE_packed_decimal             0x0a /* DWARF3f */
00971 #define DW_ATE_numeric_string             0x0b /* DWARF3f */
00972 #define DW_ATE_edited                     0x0c /* DWARF3f */
00973 #define DW_ATE_signed_fixed               0x0d /* DWARF3f */
00974 #define DW_ATE_unsigned_fixed             0x0e /* DWARF3f */
00975 #define DW_ATE_decimal_float             0x0f /* DWARF3f */
00976 #define DW_ATE_UTF                       0x10 /* DWARF4 */
00977 #define DW_ATE_UCS                       0x11 /* DWARF5 */
00978 #define DW_ATE_ASCII                     0x12 /* DWARF5 */
00979
00980 /* ALTIUM extensions. x80, x81 */
00981 #define DW_ATE_ALTIUM_fract               0x80 /* ALTIUM __fract type */
00982
00983 /* Follows extension so dwarfdump prints
00984    the most-likely-useful name. */
00985 #define DW_ATE_lo_user                    0x80
00986
00987 /* Shown here to help dwarfdump build script. */
00988 #define DW_ATE_ALTIUM_accum               0x81 /* ALTIUM __accum type */
00989
00990 /* HP extensions. */
00991 #define DW_ATE_HP_float80                 0x80 /* (80 bit). HP */
00992 #define DW_ATE_HP_complex_float80         0x81 /* Complex (80 bit). HP */
00993 #define DW_ATE_HP_float128                0x82 /* (128 bit). HP */
00994 #define DW_ATE_HP_complex_float128        0x83 /* Complex (128 bit). HP */
00995 #define DW_ATE_HP_float128pintel          0x84 /* (82 bit IA64). HP */
00996 #define DW_ATE_HP_imaginary_float80       0x85 /* HP */
00997 #define DW_ATE_HP_imaginary_float128      0x86 /* HP */
00998 #define DW_ATE_HP_VAX_float               0x88 /* F or G floating. */
00999 #define DW_ATE_HP_VAX_float_d             0x89 /* D floating. */
01000 #define DW_ATE_HP_packed_decimal          0x8a /* Cobol. */
01001 #define DW_ATE_HP_zoned_decimal           0x8b /* Cobol. */
01002 #define DW_ATE_HP_edited                   0x8c /* Cobol. */
01003 #define DW_ATE_HP_signed_fixed             0x8d /* Cobol. */
01004 #define DW_ATE_HP_unsigned_fixed          0x8e /* Cobol. */
01005 #define DW_ATE_HP_VAX_complex_float       0x8f /* ForG floating complex. */
01006 #define DW_ATE_HP_VAX_complex_float_d     0x90 /* D floating complex. */
01007
01008 /* Sun extensions */
01009 #define DW_ATE_SUN_interval_float          0x91
01010
01011 /* Obsolete: See DW_ATE_imaginary_float */
01012 #define DW_ATE_SUN_imaginary_float         0x92 /* Really SUN 0x86 ? */
01013

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01014 #define DW_ATE_hi_user                0xff
01015
01016 /* DWARF5 Defaulted Member Encodings. */
01017 #define DW_DEFAULTED_no                0x0    /* DWARF5 */
01018 #define DW_DEFAULTED_in_class          0x1    /* DWARF5 */
01019 #define DW_DEFAULTED_out_of_class      0x2    /* DWARF5 */
01020
01021 #define DW_IDX_compile_unit            0x1    /* DWARF5 */
01022 #define DW_IDX_type_unit               0x2    /* DWARF5 */
01023 #define DW_IDX_die_offset              0x3    /* DWARF5 */
01024 #define DW_IDX_parent                  0x4    /* DWARF5 */
01025 #define DW_IDX_type_hash               0x5    /* DWARF5 */
01026 #define DW_IDX_GNU_internal            0x2000
01027 #define DW_IDX_lo_user                 0x2000 /* DWARF5 */
01028 #define DW_IDX_GNU_external            0x2001
01029 #define DW_IDX_GNU_main                 0x2002
01030 #define DW_IDX_GNU_language            0x2003
01031 #define DW_IDX_GNU_linkage_name        0x2004
01032 #define DW_IDX_hi_user                  0x3fff /* DWARF5 */
01033
01034 /* These with not-quite-the-same-names were used in DWARF4
01035    We call then DW_LLEX.
01036    Never official and should not be used by anyone.*/
01037 #define DW_LLEX_end_of_list_entry      0x0
01038 #define DW_LLEX_base_address_selection_entry 0x01
01039 #define DW_LLEX_start_end_entry        0x02
01040 #define DW_LLEX_start_length_entry     0x03
01041 #define DW_LLEX_offset_pair_entry      0x04
01042
01043 /* DWARF5 Location List Entries in Split Objects */
01044 #define DW_LLE_end_of_list             0x0    /* DWARF5 */
01045 #define DW_LLE_base_addressx           0x01    /* DWARF5 */
01046 #define DW_LLE_startx_endx             0x02    /* DWARF5 */
01047 #define DW_LLE_startx_length           0x03    /* DWARF5 */
01048 #define DW_LLE_offset_pair             0x04    /* DWARF5 */
01049 #define DW_LLE_default_location        0x05    /* DWARF5 */
01050 #define DW_LLE_base_address            0x06    /* DWARF5 */
01051 #define DW_LLE_start_end               0x07    /* DWARF5 */
01052 #define DW_LLE_start_length            0x08    /* DWARF5 */
01053
01054 /* DWARF5 Range List Entries */
01055 #define DW_RLE_end_of_list             0x00    /* DWARF5 */
01056 #define DW_RLE_base_addressx           0x01    /* DWARF5 */
01057 #define DW_RLE_startx_endx             0x02    /* DWARF5 */
01058 #define DW_RLE_startx_length           0x03    /* DWARF5 */
01059 #define DW_RLE_offset_pair             0x04    /* DWARF5 */
01060 #define DW_RLE_base_address            0x05    /* DWARF5 */
01061 #define DW_RLE_start_end               0x06    /* DWARF5 */
01062 #define DW_RLE_start_length            0x07    /* DWARF5 */
01063
01064 /* GNUIndex encodings non-standard. New in 2020,
01065    used in .debug_gnu_pubnames .debug_gnu_pubtypes
01066    but no spellings provided in documentation. */
01067 #define DW_GNUIVIS_global              0
01068 #define DW_GNUIVIS_static               1
01069
01070 /* GNUIndex encodings non-standard. New in 2020,
01071    used in .debug_gnu_pubnames .debug_gnu_pubtypes
01072    but no spellings provided in documentation. */
01073 #define DW_GNUIKIND_none                0
01074 #define DW_GNUIKIND_type                1
01075 #define DW_GNUIKIND_variable            2
01076 #define DW_GNUIKIND_function            3
01077 #define DW_GNUIKIND_other               4
01078
01079 /* DWARF5 Unit header unit type encodings */
01080 #define DW_UT_compile                   0x01    /* DWARF5 */
01081 #define DW_UT_type                      0x02    /* DWARF5 */
01082 #define DW_UT_partial                   0x03    /* DWARF5 */
01083 #define DW_UT_skeleton                  0x04    /* DWARF5 */
01084 #define DW_UT_split_compile             0x05    /* DWARF5 */
01085 #define DW_UT_split_type                0x06    /* DWARF5 */
01086 #define DW_UT_lo_user                   0x80    /* DWARF5 */
01087 #define DW_UT_hi_user                   0xff    /* DWARF5 */
01088
01089 /* DWARF5 DebugFission object section id values
01090    for .dwp object section offsets hash table.
01091    0 is reserved, not used.
01092    2 is actually reserved, not used in DWARF5.
01093    But 2 may be seen in some DWARF4 objects.
01094 */
01095 #define DW_SECT_INFO                    1    /* .debug_info.dwo DWARF5 */
01096 #define DW_SECT_TYPES                    2    /* .debug_types.dwo pre-DWARF5 */
01097 #define DW_SECT_ABBREV                    3    /* .debug_abbrev.dwo DWARF5 */
01098 #define DW_SECT_LINE                      4    /* .debug_line.dwo DWARF5 */
01099 #define DW_SECT_LOCLISTS                  5    /* .debug_loclists.dwo DWARF5 */
01100 #define DW_SECT_STR_OFFSETS                6    /* .debug_str_offsets.dwo DWARF5 */

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01101 #define DW_SECT_MACRO          7 /* .debug_macro.dwo      DWARF5 */
01102 #define DW_SECT_RNGLISTS       8 /* .debug_rnglists.dwo  DWARF5 */
01103
01104 /* Decimal Sign codes. */
01105 #define DW_DS_unsigned          0x01 /* DWARF3f */
01106 #define DW_DS_leading_overpunch 0x02 /* DWARF3f */
01107 #define DW_DS_trailing_overpunch 0x03 /* DWARF3f */
01108 #define DW_DS_leading_separate  0x04 /* DWARF3f */
01109 #define DW_DS_trailing_separate  0x05 /* DWARF3f */
01110
01111 /* Endian code name. */
01112 #define DW_END_default          0x00 /* DWARF3f */
01113 #define DW_END_big              0x01 /* DWARF3f */
01114 #define DW_END_little           0x02 /* DWARF3f */
01115
01116 #define DW_END_lo_user          0x40 /* DWARF3f */
01117 #define DW_END_hi_user          0xff /* DWARF3f */
01118
01119 /* For use with DW_TAG_SUN_codeflags
01120    If DW_TAG_SUN_codeflags is accepted as a dwarf standard, then
01121    standard dwarf ATCF entries start at 0x01 */
01122 #define DW_ATCF_lo_user          0x40 /* SUN */
01123 #define DW_ATCF_SUN_mop_bitfield 0x41 /* SUN */
01124 #define DW_ATCF_SUN_mop_spill    0x42 /* SUN */
01125 #define DW_ATCF_SUN_mop_scopy    0x43 /* SUN */
01126 #define DW_ATCF_SUN_func_start   0x44 /* SUN */
01127 #define DW_ATCF_SUN_end_ctors    0x45 /* SUN */
01128 #define DW_ATCF_SUN_branch_target 0x46 /* SUN */
01129 #define DW_ATCF_SUN_mop_stack_probe 0x47 /* SUN */
01130 #define DW_ATCF_SUN_func_epilog  0x48 /* SUN */
01131 #define DW_ATCF_hi_user          0xff /* SUN */
01132
01133 /* Accessibility code name. */
01134 #define DW_ACCESS_public         0x01
01135 #define DW_ACCESS_protected      0x02
01136 #define DW_ACCESS_private        0x03
01137
01138 /* Visibility code name. */
01139 #define DW_VIS_local              0x01
01140 #define DW_VIS_exported          0x02
01141 #define DW_VIS_qualified         0x03
01142
01143 /* Virtuality code name. */
01144 #define DW_VIRTUALITY_none        0x00
01145 #define DW_VIRTUALITY_virtual     0x01
01146 #define DW_VIRTUALITY_pure_virtual 0x02
01147
01148 #define DW_LANG_C89                0x0001
01149 #define DW_LANG_C                  0x0002
01150 #define DW_LANG_Ada83              0x0003
01151 #define DW_LANG_C_plus_plus        0x0004
01152 #define DW_LANG_Cobol74            0x0005
01153 #define DW_LANG_Cobol85            0x0006
01154 #define DW_LANG_Fortran77          0x0007
01155 #define DW_LANG_Fortran90          0x0008
01156 #define DW_LANG_Pascal83           0x0009
01157 #define DW_LANG_Modula2            0x000a
01158 #define DW_LANG_Java                0x000b /* DWARF3 */
01159 #define DW_LANG_C99                 0x000c /* DWARF3 */
01160 #define DW_LANG_Ada95              0x000d /* DWARF3 */
01161 #define DW_LANG_Fortran95          0x000e /* DWARF3 */
01162 #define DW_LANG_PLI                 0x000f /* DWARF3 */
01163 #define DW_LANG_ObjC                0x0010 /* DWARF3f */
01164 #define DW_LANG_ObjC_plus_plus     0x0011 /* DWARF3f */
01165 #define DW_LANG_UPC                 0x0012 /* DWARF3f */
01166 #define DW_LANG_D                   0x0013 /* DWARF3f */
01167 #define DW_LANG_Python              0x0014 /* DWARF4 */
01168 #define DW_LANG_OpenCL              0x0015 /* DWARF5 */
01169 #define DW_LANG_Go                  0x0016 /* DWARF5 */
01170 #define DW_LANG_Modula3            0x0017 /* DWARF5 */
01171 #define DW_LANG_Haskel              0x0018 /* DWARF5 */
01172 #define DW_LANG_C_plus_plus_03     0x0019 /* DWARF5 */
01173 #define DW_LANG_C_plus_plus_11     0x001a /* DWARF5 */
01174 #define DW_LANG_OCaml              0x001b /* DWARF5 */
01175 #define DW_LANG_Rust                0x001c /* DWARF5 */
01176 #define DW_LANG_C11                 0x001d /* DWARF5 */
01177 #define DW_LANG_Swift               0x001e /* DWARF5 */
01178 #define DW_LANG_Julia               0x001f /* DWARF5 */
01179 #define DW_LANG_Dylan              0x0020 /* DWARF5 */
01180 #define DW_LANG_C_plus_plus_14     0x0021 /* DWARF5 */
01181 #define DW_LANG_Fortran03          0x0022 /* DWARF5 */
01182 #define DW_LANG_Fortran08          0x0023 /* DWARF5 */
01183 #define DW_LANG_RenderScript        0x0024 /* DWARF5 */
01184 #define DW_LANG_BLISS               0x0025 /* DWARF5 */
01185 /* The committee has, in
01186    https://dwarfstd.org/languages-v6.html
01187    specified that these language code, may be

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01188     used by compilers now, and promises these
01189     will not change. */
01190 #define DW_LANG_Kotlin           0x0026 /* DWARF6 */
01191 #define DW_LANG_Zig              0x0027 /* DWARF6 */
01192 #define DW_LANG_Crystal          0x0028 /* DWARF6 */
01193 #define DW_LANG_C_plus_plus_17  0x002a /* DWARF6 */
01194 #define DW_LANG_C_plus_plus_20  0x002b /* DWARF6 */
01195 #define DW_LANG_C17              0x002c /* DWARF6 */
01196 #define DW_LANG_Fortran18       0x002d /* DWARF6 */
01197 #define DW_LANG_Ada2005         0x002e /* DWARF6 */
01198 #define DW_LANG_Ada2012         0x002f /* DWARF6 */
01199 #define DW_LANG_HIP             0x0030 /* DWARF6 */
01200 #define DW_LANG_Assembly        0x0031 /* DWARF6 */
01201 #define DW_LANG_C_sharp         0x0032 /* DWARF6 */
01202 #define DW_LANG_Mojo            0x0033 /* DWARF6 */
01203 #define DW_LANG_GLSL            0x0034 /* DWARF6 */
01204 #define DW_LANG_GLSL_ES         0x0035 /* DWARF6 */
01205 #define DW_LANG_HLSL            0x0036 /* DWARF6 */
01206 #define DW_LANG_OpenCL_CPP      0x0037 /* DWARF6 */
01207 #define DW_LANG_CPP_for_OpenCL  0x0038 /* DWARF6 */
01208 #define DW_LANG_SYCL            0x0039 /* DWARF6 */
01209 #define DW_LANG_Ruby            0x0040 /* DWARF6 */
01210 #define DW_LANG_Move            0x0041 /* DWARF6 */
01211 #define DW_LANG_Hylo            0x0042 /* DWARF6 */
01212 #define DW_LANG_V               0x0043 /* DWARF6 */
01213 #define DW_LANG_Algo168         0x0044 /* DWARF6 */
01214
01215 #define DW_LANG_lo_user         0x8000
01216 #define DW_LANG_Mips_Assembler  0x8001 /* MIPS */
01217 #define DW_LANG_Upc            0x8765 /* UPC, use
01218     DW_LANG_UPC instead. */
01219 #define DW_LANG_GOOGLE_RenderScript 0x8e57
01220 #define DW_LANG_ALTIUM_Assembler  0x9101
01221 #define DW_LANG_BORLAND_Delphi    0xb000
01222
01223 /* Sun extensions */
01224 #define DW_LANG_SUN_Assembler      0x9001 /* SUN */
01225
01226 #define DW_LANG_hi_user           0xffff
01227
01228 /* The committee has, in
01229     https://dwarfstd.org/languages-v6.html
01230     specified that these language code, may be
01231     used by compilers now, and promises these
01232     will not change. */
01233 #define DW_LNAME_Ada             0x0001 /* DWARF6 */
01234 #define DW_LNAME_BLISS           0x0002 /* DWARF6 */
01235 #define DW_LNAME_C               0x0003 /* DWARF6 */
01236 #define DW_LNAME_C_plus_plus    0x0004 /* DWARF6 */
01237 #define DW_LNAME_Cobol           0x0005 /* DWARF6 */
01238 #define DW_LNAME_Crystal         0x0006 /* DWARF6 */
01239 #define DW_LNAME_D               0x0007 /* DWARF6 */
01240 #define DW_LNAME_Dylan           0x0008 /* DWARF6 */
01241 #define DW_LNAME_Fortran         0x0009 /* DWARF6 */
01242 #define DW_LNAME_Go              0x000a /* DWARF6 */
01243 #define DW_LNAME_Haskell         0x000b /* DWARF6 */
01244 #define DW_LNAME_Java            0x000c /* DWARF6 */
01245 #define DW_LNAME_Julia           0x000d /* DWARF6 */
01246 #define DW_LNAME_Kotlin          0x000e /* DWARF6 */
01247 #define DW_LNAME_Modula2         0x000f /* DWARF6 */
01248 #define DW_LNAME_Modula3         0x0010 /* DWARF6 */
01249 #define DW_LNAME_ObjC            0x0011 /* DWARF6 */
01250 #define DW_LNAME_ObjC_plus_plus  0x0012 /* DWARF6 */
01251 #define DW_LNAME_OCaml           0x0013 /* DWARF6 */
01252 #define DW_LNAME_OpenCL_C        0x0014 /* DWARF6 */
01253 #define DW_LNAME_Pascal          0x0015 /* DWARF6 */
01254 #define DW_LNAME_PLI             0x0016 /* DWARF6 */
01255 #define DW_LNAME_Python          0x0017 /* DWARF6 */
01256 #define DW_LNAME_RenderScript    0x0018 /* DWARF6 */
01257 #define DW_LNAME_Rust            0x0019 /* DWARF6 */
01258 #define DW_LNAME_Swift           0x001a /* DWARF6 */
01259 #define DW_LNAME_UPC             0x001b /* DWARF6 */
01260 #define DW_LNAME_Zig             0x001c /* DWARF6 */
01261 #define DW_LNAME_Assembly        0x001d /* DWARF6 */
01262 #define DW_LNAME_C_sharp         0x001e /* DWARF6 */
01263 #define DW_LNAME_Mojo            0x001f /* DWARF6 */
01264 #define DW_LNAME_GLSL            0x0020 /* DWARF6 */
01265 #define DW_LNAME_GLSLES          0x0021 /* DWARF6 */
01266 #define DW_LNAME_HLSL            0x0022 /* DWARF6 */
01267 #define DW_LNAME_OpenCL_CPP      0x0023 /* DWARF6 */
01268 #define DW_LNAME_CPP_for_OpenCL  0x0024 /* DWARF6 */
01269 #define DW_LNAME_SYCL            0x0025 /* DWARF6 */
01270 #define DW_LNAME_Ruby            0x0026 /* DWARF6 */
01271 #define DW_LNAME_Move            0x0027 /* DWARF6 */
01272 #define DW_LNAME_Hylo            0x0028 /* DWARF6 */
01273 #define DW_LNAME_HIP             0x0029 /* DWARF6 */
01274 #define DW_LNAME_Odin            0x002a /* DWARF6 */
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01275 #define DW_LNAME_P4                0x002b /* DWARF6 */
01276 #define DW_LNAME_Metal               0x002c /* DWARF6 */
01277 #define DW_LNAME_V                   0x002d /* DWARF6 */
01278 #define DW_LNAME_Algo168             0x002e /* DWARF6 */
01279 #define DW_LNAME_Nim                 0x002f /* DWARF6 */
01280
01281 /* Identifier case name. */
01282 #define DW_ID_case_sensitive          0x00
01283 #define DW_ID_up_case                 0x01
01284 #define DW_ID_down_case               0x02
01285 #define DW_ID_case_insensitive        0x03
01286
01287 /* Calling Convention Name. */
01288 #define DW_CC_normal                  0x01
01289 #define DW_CC_program                 0x02
01290 #define DW_CC_nocall                  0x03
01291 #define DW_CC_pass_by_reference        0x04 /* DWARF5 */
01292 #define DW_CC_pass_by_value            0x05 /* DWARF5 */
01293
01294 #define DW_CC_GNU_renesas_sh           0x40 /* GNU */
01295 #define DW_CC_lo_user                 0x40
01296 #define DW_CC_GNU_borland_fastcall_i386 0x41 /* GNU */
01297
01298 /* ALTIUM extensions. */
01299 /* Function is an interrupt handler,
01300    return address on system stack. */
01301 #define DW_CC_ALTIUM_interrupt         0x65 /* ALTIUM*/
01302
01303 /* Near function model, return address on system stack. */
01304 #define DW_CC_ALTIUM_near_system_stack 0x66 /*ALTIUM */
01305
01306 /* Near function model, return address on user stack. */
01307 #define DW_CC_ALTIUM_near_user_stack   0x67 /* ALTIUM */
01308
01309 /* Huge function model, return address on user stack. */
01310 #define DW_CC_ALTIUM_huge_user_stack   0x68 /* ALTIUM */
01311
01312 #define DW_CC_GNU_BORLAND_safecall     0xb0
01313 #define DW_CC_GNU_BORLAND_stdcall      0xb1
01314 #define DW_CC_GNU_BORLAND_pascal       0xb2
01315 #define DW_CC_GNU_BORLAND_msfastcall   0xb3
01316 #define DW_CC_GNU_BORLAND_msreturn     0xb4
01317 #define DW_CC_GNU_BORLAND_thiscall     0xb5
01318 #define DW_CC_GNU_BORLAND_fastcall     0xb6
01319
01320 #define DW_CC_LLVM_vectorcall           0xc0
01321 #define DW_CC_LLVM_Win64                0xc1
01322 #define DW_CC_LLVM_X86_64SysV           0xc2
01323 #define DW_CC_LLVM_AAPCS                0xc3
01324 #define DW_CC_LLVM_AAPCS_VFP            0xc4
01325 #define DW_CC_LLVM_IntelOclBicc         0xc5
01326 #define DW_CC_LLVM_SpirFunction          0xc6
01327 #define DW_CC_LLVM_OpenCLKernel         0xc7
01328 #define DW_CC_LLVM_Swift                 0xc8
01329 #define DW_CC_LLVM_PreserveMost         0xc9
01330 #define DW_CC_LLVM_PreserveAll           0xca
01331 #define DW_CC_LLVM_X86RegCall           0xcb
01332 #define DW_CC_GDB_IBM_OpenCL            0xff
01333
01334 #define DW_CC_hi_user                   0xff
01335
01336 /* Inline Code Name. */
01337 #define DW_INL_not_inlined              0x00
01338 #define DW_INL_inlined                  0x01
01339 #define DW_INL_declared_not_inlined     0x02
01340 #define DW_INL_declared_inlined         0x03
01341
01342 /* Ordering Name. */
01343 #define DW_ORD_row_major                0x00
01344 #define DW_ORD_col_major                0x01
01345
01346 /* Discriminant Descriptor Name. */
01347 #define DW_DSC_label                    0x00
01348 #define DW_DSC_range                    0x01
01349
01350 /* Line number header entry format encodings. DWARF5 */
01351 #define DW_LNCT_path                    0x1 /* DWARF5 */
01352 #define DW_LNCT_directory_index         0x2 /* DWARF5 */
01353 #define DW_LNCT_timestamp                0x3 /* DWARF5 */
01354 #define DW_LNCT_size                     0x4 /* DWARF5 */
01355 #define DW_LNCT_MD5                      0x5 /* DWARF5 */
01356 /* Experimental two-level line tables. Non standard */
01357 #define DW_LNCT_GNU_subprogram_name      0x6
01358 #define DW_LNCT_GNU_decl_file            0x7
01359 #define DW_LNCT_GNU_decl_line           0x8
01360 #define DW_LNCT_lo_user                  0x2000 /* DWARF5 */
01361 #define DW_LNCT_LLVM_source              0x2001

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```

01362 #define DW_LNCT_LLVM_is_MD5 0x2002
01363 #define DW_LNCT_hi_user 0x3fff /* DWARF5 */
01364
01365 /* Line number standard opcode name. */
01366 #define DW_LNS_copy 0x01
01367 #define DW_LNS_advance_pc 0x02
01368 #define DW_LNS_advance_line 0x03
01369 #define DW_LNS_set_file 0x04
01370 #define DW_LNS_set_column 0x05
01371 #define DW_LNS_negate_stmt 0x06
01372 #define DW_LNS_set_basic_block 0x07
01373 #define DW_LNS_const_add_pc 0x08
01374 #define DW_LNS_fixed_advance_pc 0x09
01375 #define DW_LNS_set_prologue_end 0x0a /* DWARF3 */
01376 #define DW_LNS_set_epilogue_begin 0x0b /* DWARF3 */
01377 #define DW_LNS_set_isa 0x0c /* DWARF3 */
01378
01379 /* Experimental two-level line tables. NOT STD DWARF5 */
01380 /* Not saying GNU or anything. There are no
01381 DW_LNS_lo_user or DW_LNS_hi_user values though.
01382 DW_LNS_set_address_from_logical and
01383 DW_LNS_set_subprogram being both 0xd
01384 to avoid using up more space in the special opcode table.
01385 EXPERIMENTAL DW_LNS follow.
01386 */
01387 #define DW_LNS_set_address_from_logical 0x0d /* Actuals table only */
01388 #define DW_LNS_set_subprogram 0x0d /* Logicals table only */
01389 #define DW_LNS_inlined_call 0x0e /* Logicals table only */
01390 #define DW_LNS_pop_context 0x0f /* Logicals table only */
01391
01392 /* Line number extended opcode name. */
01393 #define DW_LNE_end_sequence 0x01
01394 #define DW_LNE_set_address 0x02
01395 #define DW_LNE_define_file 0x03 /* DWARF4 and earlier only */
01396 #define DW_LNE_set_discriminator 0x04 /* DWARF4 */
01397
01398 /* HP extensions. */
01399 #define DW_LNE_HP_negate_is_UV_update 0x11 /* 17 HP */
01400 #define DW_LNE_HP_push_context 0x12 /* 18 HP */
01401 #define DW_LNE_HP_pop_context 0x13 /* 19 HP */
01402 #define DW_LNE_HP_set_file_line_column 0x14 /* 20 HP */
01403 #define DW_LNE_HP_set_routine_name 0x15 /* 21 HP */
01404 #define DW_LNE_HP_set_sequence 0x16 /* 22 HP */
01405 #define DW_LNE_HP_negate_post_semantics 0x17 /* 23 HP */
01406 #define DW_LNE_HP_negate_function_exit 0x18 /* 24 HP */
01407 #define DW_LNE_HP_negate_front_end_logical 0x19 /* 25 HP */
01408 #define DW_LNE_HP_define_proc 0x20 /* 32 HP */
01409
01410 #define DW_LNE_HP_source_file_correlation 0x80 /* HP */
01411 #define DW_LNE_lo_user 0x80 /* DWARF3 */
01412 #define DW_LNE_hi_user 0xff /* DWARF3 */
01413
01414 /* These are known values for DW_LNS_set_isa. */
01415 /* These identifiers are not defined by any DWARF standard. */
01416 #define DW_ISA_UNKNOWN 0
01417 /* The following two are ARM specific. */
01418 #define DW_ISA_ARM_thumb 1 /* ARM ISA */
01419 #define DW_ISA_ARM_arm 2 /* ARM ISA */
01420
01421 /* Macro information, DWARF5 */
01422 #define DW_MACRO_define 0x01 /* DWARF5 */
01423 #define DW_MACRO_undef 0x02 /* DWARF5 */
01424 #define DW_MACRO_start_file 0x03 /* DWARF5 */
01425 #define DW_MACRO_end_file 0x04 /* DWARF5 */
01426 #define DW_MACRO_define_strp 0x05 /* DWARF5 */
01427 #define DW_MACRO_undef_strp 0x06 /* DWARF5 */
01428 #define DW_MACRO_import 0x07 /* DWARF5 */
01429 #define DW_MACRO_define_sup 0x08 /* DWARF5 */
01430 #define DW_MACRO_undef_sup 0x09 /* DWARF5 */
01431 #define DW_MACRO_import_sup 0x0a /* DWARF5 */
01432 #define DW_MACRO_define_strx 0x0b /* DWARF5 */
01433 #define DW_MACRO_undef_strx 0x0c /* DWARF5 */
01434 #define DW_MACRO_lo_user 0xe0
01435 #define DW_MACRO_hi_user 0xff
01436
01437 /* Macro information, DWARF2-DWARF4. */
01438 #define DW_MACINFO_define 0x01
01439 #define DW_MACINFO_undef 0x02
01440 #define DW_MACINFO_start_file 0x03
01441 #define DW_MACINFO_end_file 0x04
01442 #define DW_MACINFO_vendor_ext 0xff
01443
01444 /* CFA operator compaction (a space saving measure, see
01445 the DWARF standard) means DW_CFA_extended and DW_CFA_nop
01446 have the same value here. */
01447 #define DW_CFA_advance_loc 0x40
01448 #define DW_CFA_offset 0x80

```

```

01449 #define DW_CFA_restore          0xc0
01450 #define DW_CFA_nop                0x00
01451 #define DW_CFA_extended           0
01452 #define DW_CFA_set_loc            0x01
01453 #define DW_CFA_advance_loc1       0x02
01454 #define DW_CFA_advance_loc2       0x03
01455 #define DW_CFA_advance_loc4       0x04
01456 #define DW_CFA_offset_extended     0x05
01457 #define DW_CFA_restore_extended   0x06
01458 #define DW_CFA_undefined           0x07
01459 #define DW_CFA_same_value          0x08
01460 #define DW_CFA_register           0x09
01461 #define DW_CFA_remember_state      0x0a
01462 #define DW_CFA_restore_state       0x0b
01463 #define DW_CFA_def_cfa             0x0c
01464 #define DW_CFA_def_cfa_register    0x0d
01465 #define DW_CFA_def_cfa_offset      0x0e
01466 #define DW_CFA_def_cfa_expression  0x0f /* DWARF3 */
01467 #define DW_CFA_expression           0x10 /* DWARF3 */
01468 #define DW_CFA_offset_extended_sf   0x11 /* DWARF3 */
01469 #define DW_CFA_def_cfa_sf           0x12 /* DWARF3 */
01470 #define DW_CFA_def_cfa_offset_sf    0x13 /* DWARF3 */
01471 #define DW_CFA_val_offset           0x14 /* DWARF3f */
01472 #define DW_CFA_val_offset_sf        0x15 /* DWARF3f */
01473 #define DW_CFA_val_expression       0x16 /* DWARF3f */
01474 #define DW_CFA_TL_soffset_extended  0x1c /* TI */
01475 #define DW_CFA_lo_user              0x1c
01476 #define DW_CFA_low_user             0x1c /* Incorrect spelling, do not use. */
01477
01478 /* SGI/MIPS extension. */
01479 #define DW_CFA_MIPS_advance_loc8     0x1d /* MIPS */
01480 #define DW_CFA_TL_def_cfa_soffset    0x1d /* TI */
01481
01482 /* GNU extensions. */
01483 #define DW_CFA_GNU_window_save        0x2d /* GNU */
01484 #define DW_CFA_AARCH64_negate_ra_state 0x2d
01485 #define DW_CFA_GNU_args_size          0x2e /* GNU */
01486 #define DW_CFA_GNU_negative_offset_extended 0x2f /* GNU */
01487 #define DW_CFA_LLVM_def_aspace_cfa     0x30
01488 #define DW_CFA_LLVM_def_aspace_cfa_sf  0x31
01489
01490 /* Metaware if HC is augmentation, apparently meaning High C
01491    and the op has a single uleb operand.
01492    See http://sourceforge.net/p/elftoolchain/tickets/397/ */
01493 #define DW_CFA_METAWARE_info           0x34
01494
01495 #define DW_CFA_hi_user                0x3f
01496 #define DW_CFA_high_user              0x3f /* Misspelled. Do not use. */
01497
01498 /* GNU exception header encoding. See the Generic
01499    Elf Specification of the Linux Standard Base (LSB).
01500    http://refspecs.freestdards.org/LSB\_3.0.0/\
01501    LSB-Core-generic/LSB-Core-generic/dwarfext.html
01502    The upper 4 bits indicate how the value is to be applied.
01503    The lower 4 bits indicate the format of the data.
01504    These identifiers are not defined by any DWARF standard.
01505 */
01506 #define DW_EH_PE_absptr              0x00 /* GNU */
01507 #define DW_EH_PE_uleb128             0x01 /* GNU */
01508 #define DW_EH_PE_udata2               0x02 /* GNU */
01509 #define DW_EH_PE_udata4               0x03 /* GNU */
01510 #define DW_EH_PE_udata8               0x04 /* GNU */
01511 #define DW_EH_PE_sleb128              0x09 /* GNU */
01512 #define DW_EH_PE_sdata2               0x0A /* GNU */
01513 #define DW_EH_PE_sdata4               0x0B /* GNU */
01514 #define DW_EH_PE_sdata8               0x0C /* GNU */
01515
01516 #define DW_EH_PE_pcrel                0x10 /* GNU */
01517 #define DW_EH_PE_textrel              0x20 /* GNU */
01518 #define DW_EH_PE_datarel              0x30 /* GNU */
01519 #define DW_EH_PE_funcrel              0x40 /* GNU */
01520 #define DW_EH_PE_aligned              0x50 /* GNU */
01521
01522 #define DW_EH_PE_omit                 0xff /* GNU. Means no value present. */
01523
01524 /* Mapping from machine registers and pseudo-regs into the
01525    .debug_frame table. DW_FRAME entries are machine specific.
01526    These describe MIPS/SGI R3000, R4K, R4400 and all later
01527    MIPS/SGI IRIX machines. They describe a mapping from
01528    hardware register number to the number used in the table
01529    to identify that register.
01530
01531    The CFA (Canonical Frame Address) described in DWARF is
01532    called the Virtual Frame Pointer on MIPS/SGI machines.
01533
01534    The DW_FRAME* names here are MIPS/SGI specific.
01535    Libdwarf interfaces defined in 2008 make the

```

```
01536     frame definitions here (and the fixed table sizes
01537     they imply) obsolete.  They are left here for compatibility.
01538 */
01539 /* These identifiers are not defined by any DWARF standard. */
01540
01541 #define DW_FRAME_REG1    1 /* integer reg 1 */
01542 #define DW_FRAME_REG2    2 /* integer reg 2 */
01543 #define DW_FRAME_REG3    3 /* integer reg 3 */
01544 #define DW_FRAME_REG4    4 /* integer reg 4 */
01545 #define DW_FRAME_REG5    5 /* integer reg 5 */
01546 #define DW_FRAME_REG6    6 /* integer reg 6 */
01547 #define DW_FRAME_REG7    7 /* integer reg 7 */
01548 #define DW_FRAME_REG8    8 /* integer reg 8 */
01549 #define DW_FRAME_REG9    9 /* integer reg 9 */
01550 #define DW_FRAME_REG10   10 /* integer reg 10 */
01551 #define DW_FRAME_REG11   11 /* integer reg 11 */
01552 #define DW_FRAME_REG12   12 /* integer reg 12 */
01553 #define DW_FRAME_REG13   13 /* integer reg 13 */
01554 #define DW_FRAME_REG14   14 /* integer reg 14 */
01555 #define DW_FRAME_REG15   15 /* integer reg 15 */
01556 #define DW_FRAME_REG16   16 /* integer reg 16 */
01557 #define DW_FRAME_REG17   17 /* integer reg 17 */
01558 #define DW_FRAME_REG18   18 /* integer reg 18 */
01559 #define DW_FRAME_REG19   19 /* integer reg 19 */
01560 #define DW_FRAME_REG20   20 /* integer reg 20 */
01561 #define DW_FRAME_REG21   21 /* integer reg 21 */
01562 #define DW_FRAME_REG22   22 /* integer reg 22 */
01563 #define DW_FRAME_REG23   23 /* integer reg 23 */
01564 #define DW_FRAME_REG24   24 /* integer reg 24 */
01565 #define DW_FRAME_REG25   25 /* integer reg 25 */
01566 #define DW_FRAME_REG26   26 /* integer reg 26 */
01567 #define DW_FRAME_REG27   27 /* integer reg 27 */
01568 #define DW_FRAME_REG28   28 /* integer reg 28 */
01569 #define DW_FRAME_REG29   29 /* integer reg 29 */
01570 #define DW_FRAME_REG30   30 /* integer reg 30 */
01571 #define DW_FRAME_REG31   31 /* integer reg 31, aka ra */
01572
01573 /* MIPS1,2 have only some of these 64-bit registers.
01574 ** MIPS1 save/restore takes 2 instructions per 64-bit reg, and
01575 ** in that case, the register is considered stored after
01576 ** the second swcl. */
01577 #define DW_FRAME_FREG0    32 /* 64-bit floating point reg 0 */
01578 #define DW_FRAME_FREG1    33 /* 64-bit floating point reg 1 */
01579 #define DW_FRAME_FREG2    34 /* 64-bit floating point reg 2 */
01580 #define DW_FRAME_FREG3    35 /* 64-bit floating point reg 3 */
01581 #define DW_FRAME_FREG4    36 /* 64-bit floating point reg 4 */
01582 #define DW_FRAME_FREG5    37 /* 64-bit floating point reg 5 */
01583 #define DW_FRAME_FREG6    38 /* 64-bit floating point reg 6 */
01584 #define DW_FRAME_FREG7    39 /* 64-bit floating point reg 7 */
01585 #define DW_FRAME_FREG8    40 /* 64-bit floating point reg 8 */
01586 #define DW_FRAME_FREG9    41 /* 64-bit floating point reg 9 */
01587 #define DW_FRAME_FREG10   42 /* 64-bit floating point reg 10 */
01588 #define DW_FRAME_FREG11   43 /* 64-bit floating point reg 11 */
01589 #define DW_FRAME_FREG12   44 /* 64-bit floating point reg 12 */
01590 #define DW_FRAME_FREG13   45 /* 64-bit floating point reg 13 */
01591 #define DW_FRAME_FREG14   46 /* 64-bit floating point reg 14 */
01592 #define DW_FRAME_FREG15   47 /* 64-bit floating point reg 15 */
01593 #define DW_FRAME_FREG16   48 /* 64-bit floating point reg 16 */
01594 #define DW_FRAME_FREG17   49 /* 64-bit floating point reg 17 */
01595 #define DW_FRAME_FREG18   50 /* 64-bit floating point reg 18 */
01596 #define DW_FRAME_FREG19   51 /* 64-bit floating point reg 19 */
01597 #define DW_FRAME_FREG20   52 /* 64-bit floating point reg 20 */
01598 #define DW_FRAME_FREG21   53 /* 64-bit floating point reg 21 */
01599 #define DW_FRAME_FREG22   54 /* 64-bit floating point reg 22 */
01600 #define DW_FRAME_FREG23   55 /* 64-bit floating point reg 23 */
01601 #define DW_FRAME_FREG24   56 /* 64-bit floating point reg 24 */
01602 #define DW_FRAME_FREG25   57 /* 64-bit floating point reg 25 */
01603 #define DW_FRAME_FREG26   58 /* 64-bit floating point reg 26 */
01604 #define DW_FRAME_FREG27   59 /* 64-bit floating point reg 27 */
01605 #define DW_FRAME_FREG28   60 /* 64-bit floating point reg 28 */
01606 #define DW_FRAME_FREG29   61 /* 64-bit floating point reg 29 */
01607 #define DW_FRAME_FREG30   62 /* 64-bit floating point reg 30 */
01608 #define DW_FRAME_FREG31   63 /* 64-bit floating point reg 31 */
01609
01610 #define DW_FRAME_FREG32   64 /* 64-bit floating point reg 32 */
01611 #define DW_FRAME_FREG33   65 /* 64-bit floating point reg 33 */
01612 #define DW_FRAME_FREG34   66 /* 64-bit floating point reg 34 */
01613 #define DW_FRAME_FREG35   67 /* 64-bit floating point reg 35 */
01614 #define DW_FRAME_FREG36   68 /* 64-bit floating point reg 36 */
01615 #define DW_FRAME_FREG37   69 /* 64-bit floating point reg 37 */
01616 #define DW_FRAME_FREG38   70 /* 64-bit floating point reg 38 */
01617 #define DW_FRAME_FREG39   71 /* 64-bit floating point reg 39 */
01618 #define DW_FRAME_FREG40   72 /* 64-bit floating point reg 40 */
01619 #define DW_FRAME_FREG41   73 /* 64-bit floating point reg 41 */
01620 #define DW_FRAME_FREG42   74 /* 64-bit floating point reg 42 */
01621 #define DW_FRAME_FREG43   75 /* 64-bit floating point reg 43 */
01622 #define DW_FRAME_FREG44   76 /* 64-bit floating point reg 44 */
```

```

01623 #define DW_FRAME_FREG45 77 /* 64-bit floating point reg 45 */
01624 #define DW_FRAME_FREG46 78 /* 64-bit floating point reg 46 */
01625 #define DW_FRAME_FREG47 79 /* 64-bit floating point reg 47 */
01626 #define DW_FRAME_FREG48 80 /* 64-bit floating point reg 48 */
01627 #define DW_FRAME_FREG49 81 /* 64-bit floating point reg 49 */
01628 #define DW_FRAME_FREG50 82 /* 64-bit floating point reg 50 */
01629 #define DW_FRAME_FREG51 83 /* 64-bit floating point reg 51 */
01630 #define DW_FRAME_FREG52 84 /* 64-bit floating point reg 52 */
01631 #define DW_FRAME_FREG53 85 /* 64-bit floating point reg 53 */
01632 #define DW_FRAME_FREG54 86 /* 64-bit floating point reg 54 */
01633 #define DW_FRAME_FREG55 87 /* 64-bit floating point reg 55 */
01634 #define DW_FRAME_FREG56 88 /* 64-bit floating point reg 56 */
01635 #define DW_FRAME_FREG57 89 /* 64-bit floating point reg 57 */
01636 #define DW_FRAME_FREG58 90 /* 64-bit floating point reg 58 */
01637 #define DW_FRAME_FREG59 91 /* 64-bit floating point reg 59 */
01638 #define DW_FRAME_FREG60 92 /* 64-bit floating point reg 60 */
01639 #define DW_FRAME_FREG61 93 /* 64-bit floating point reg 61 */
01640 #define DW_FRAME_FREG62 94 /* 64-bit floating point reg 62 */
01641 #define DW_FRAME_FREG63 95 /* 64-bit floating point reg 63 */
01642 #define DW_FRAME_FREG64 96 /* 64-bit floating point reg 64 */
01643 #define DW_FRAME_FREG65 97 /* 64-bit floating point reg 65 */
01644 #define DW_FRAME_FREG66 98 /* 64-bit floating point reg 66 */
01645 #define DW_FRAME_FREG67 99 /* 64-bit floating point reg 67 */
01646 #define DW_FRAME_FREG68 100 /* 64-bit floating point reg 68 */
01647 #define DW_FRAME_FREG69 101 /* 64-bit floating point reg 69 */
01648 #define DW_FRAME_FREG70 102 /* 64-bit floating point reg 70 */
01649 #define DW_FRAME_FREG71 103 /* 64-bit floating point reg 71 */
01650 #define DW_FRAME_FREG72 104 /* 64-bit floating point reg 72 */
01651 #define DW_FRAME_FREG73 105 /* 64-bit floating point reg 73 */
01652 #define DW_FRAME_FREG74 106 /* 64-bit floating point reg 74 */
01653 #define DW_FRAME_FREG75 107 /* 64-bit floating point reg 75 */
01654 #define DW_FRAME_FREG76 108 /* 64-bit floating point reg 76 */
01655
01656 /* Having DW_FRAME_HIGHEST_NORMAL_REGISTER be higher than
01657    is strictly needed ... is safe.
01658    These values can be changed at runtime by libdwarf.
01659 */
01660 #ifndef DW_FRAME_HIGHEST_NORMAL_REGISTER
01661 #define DW_FRAME_HIGHEST_NORMAL_REGISTER 188
01662 #endif
01663 /* This is the number of columns in the Frame Table.
01664 */
01665 #ifndef DW_FRAME_LAST_REG_NUM
01666 #define DW_FRAME_LAST_REG_NUM (DW_FRAME_HIGHEST_NORMAL_REGISTER + 1)
01667 #endif
01668
01669 #define DW_CHILDREN_no 0x00
01670 #define DW_CHILDREN_yes 0x01
01671
01672 #define DW_ADDR_none 0
01673 #define DW_ADDR_TI_PTR8 0x0008 /* TI */
01674 #define DW_ADDR_TI_PTR16 0x0010 /* TI */
01675 #define DW_ADDR_TI_PTR22 0x0016 /* TI */
01676 #define DW_ADDR_TI_PTR23 0x0017 /* TI */
01677 #define DW_ADDR_TI_PTR24 0x0018 /* TI */
01678 #define DW_ADDR_TI_PTR32 0x0020 /* TI */
01679
01680 #ifdef __cplusplus
01681 }
01682 #endif
01683 #endif /* __DWARF_H */

```

Chapter 14

libdwarf.h

[libdwarf.h](#) contains all the type declarations and function declarations needed to use the library. It is essential that coders include [dwarf.h](#) before including [libdwarf.h](#).

All identifiers here in the public namespace begin with DW_ or Dwarf_ or dwarf_ . All function argument names declared here begin with dw_ .

14.1 libdwarf.h

[Go to the documentation of this file.](#)

```
00001 /*
00002  Copyright (C) 2000-2010 Silicon Graphics, Inc. All Rights Reserved.
00003  Portions Copyright 2007-2010 Sun Microsystems, Inc. All rights reserved.
00004  Portions Copyright 2008-2024 David Anderson. All rights reserved.
00005  Portions Copyright 2008-2010 Arxan Technologies, Inc. All rights reserved.
00006  Portions Copyright 2010-2012 SN Systems Ltd. All rights reserved.
00007
00008  This program is free software; you can redistribute it
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00012
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00016  PURPOSE.
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00024  software, or any other product whatsoever.
00025
00026  You should have received a copy of the GNU Lesser General
00027  Public License along with this program; if not, write the
00028  Free Software Foundation, Inc., 51 Franklin Street - Fifth
00029  Floor, Boston MA 02110-1301, USA.
00030
00031 */
00046 #ifndef _LIBDWARF_H
00047 #define _LIBDWARF_H
00048
00049 #ifdef DW_API
00050 #undef DW_API
00051 #endif /* DW_API */
00052
00053 #ifndef LIBDWARF_STATIC
00054 # if defined(_WIN32) || defined(__CYGWIN__)
00055 #  ifdef LIBDWARF_BUILD
00056 #   define DW_API __declspec(dllexport)
00057 #  else /* !LIBDWARF_BUILD */
00058 #   define DW_API __declspec(dllimport)
```

```

00059 # endif /* LIBDWARF_BUILD */
00060 # elif (defined(__SUNPRO_C) || defined(__SUNPRO_CC))
00061 # if defined(PIC) || defined(__PIC__)
00062 # define DW_API __global
00063 # endif /* __PIC__ */
00064 # elif (defined(__GNUC__) && __GNUC__ >= 4) || \
00065 defined(__INTEL_COMPILER)
00066 # if defined(PIC) || defined(__PIC__)
00067 # define DW_API __attribute__((visibility("default")))
00068 # endif /* PIC */
00069 # endif /* WIN32 SUNPRO GNUC */
00070 #endif /* !LIBDWARF_STATIC */
00071
00072 #ifndef DW_API
00073 #define DW_API
00074 #endif /* DW_API */
00075
00076 #ifdef __cplusplus
00077 extern "C" {
00078 #endif /* __cplusplus */
00079
00080 /*
00081 libdwarf.h
00082 Revision: #9 Date: 2008/01/17
00083
00084 For libdwarf consumers (reading DWARF2 and later)
00085
00086 The interface is defined as having 8-byte signed and unsigned
00087 values so it can handle 64-or-32bit target on 64-or-32bit host.
00088 Dwarf_Ptr is the native size: it represents pointers on
00089 the host machine (not the target!).
00090
00091 This contains declarations for types and all producer
00092 and consumer functions.
00093
00094 Function declarations are written on a single line each here
00095 so one can use grep to each declaration in its entirety.
00096 The declarations are a little harder to read this way, but...
00097 */
00101 /* Semantic Version identity for this libdwarf.h */
00102 #define DW_LIBDWARF_VERSION "2.2.0"
00103 #define DW_LIBDWARF_VERSION_MAJOR 2
00104 #define DW_LIBDWARF_VERSION_MINOR 2
00105 #define DW_LIBDWARF_VERSION_MICRO 0
00106
00107 #define DW_PATHSOURCE_unspecified 0
00108 #define DW_PATHSOURCE_basic 1
00109 #define DW_PATHSOURCE_dsym 2 /* MacOS dSYM */
00110 #define DW_PATHSOURCE_debuglink 3 /* GNU debuglink */
00111
00112 #ifndef DW_FTYPE_UNKNOWN
00113 #define DW_FTYPE_UNKNOWN 0
00114 #define DW_FTYPE_ELF 1 /* Unix/Linux/etc */
00115 #define DW_FTYPE_MACH_O 2 /* MacOS. */
00116 #define DW_FTYPE_PE 3 /* Windows */
00117 #define DW_FTYPE_ARCHIVE 4 /* unix archive */
00118 #define DW_FTYPE_APPLEUNIVERSAL 5
00119 #endif /* DW_FTYPE_UNKNOWN */
00120 /* standard return values for functions */
00121 #define DW_DLV_NO_ENTRY -1
00122 #define DW_DLV_OK 0
00123 #define DW_DLV_ERROR 1
00124 /* These support opening DWARF5 split dwarf objects and
00125 Elf SHT_GROUP blocks of DWARF sections. */
00126 #define DW_GROUPNUMBER_ANY 0
00127 #define DW_GROUPNUMBER_BASE 1
00128 #define DW_GROUPNUMBER_DWO 2
00129
00130 /* FRAME special values */
00131 /* The following 3 are assigned numbers, but
00132 are only present at run time.
00133 Must not conflict with DW_FRAME values in dwarf.h */
00134 /* Taken as meaning 'undefined value', this is not
00135 a column or register number. */
00136 #ifndef DW_FRAME_UNDEFINED_VAL
00137 #define DW_FRAME_UNDEFINED_VAL 12288
00138 #endif
00139 /* Taken as meaning 'same value' as caller had,
00140 not a column or register number */
00141 #ifndef DW_FRAME_SAME_VAL
00142 #define DW_FRAME_SAME_VAL 12289
00143 #endif
00144 /* DW_FRAME_CFA_COL is assigned a virtual table position
00145 but is accessed via CFA specific calls. */
00146 #ifndef DW_FRAME_CFA_COL
00147 #define DW_FRAME_CFA_COL 12290
00148 #endif

```

```

00149 #define DW_FRAME_CFA_COL3 DW_FRAME_CFA_COL /*compatibility name*/
00150 /* END FRAME special values */
00151
00152 /* dwarf_pcline function, slide arguments
00153 */
00154 #define DW_DLS_BACKWARD -1 /* slide backward to find line */
00155 #define DW_DLS_NOSLIDE 0 /* match exactly without sliding */
00156 #define DW_DLS_FORWARD 1 /* slide forward to find line */
00157
00158 /* Defined larger than necessary.
00159 struct Dwarf_Debug_Fission_Per_CU_s,
00160 being visible, will be difficult to change:
00161 binary compatibility. The count is for arrays
00162 inside the struct, the struct itself is
00163 a single struct. */
00164 #define DW_FFISSION_SECT_COUNT 12
00165
00166 typedef unsigned long long Dwarf_Unsigned;
00167 typedef signed long long Dwarf_Signed;
00168 typedef unsigned long long Dwarf_Off;
00169 typedef unsigned long long Dwarf_Addr;
00170 /* Dwarf_Bool as int is wasteful, but for compatibility
00171 it must stay as int, not unsigned char. */
00172 typedef int Dwarf_Bool; /* boolean type */
00173 typedef unsigned short Dwarf_Half; /* 2 byte unsigned value */
00174 typedef unsigned char Dwarf_Small; /* 1 byte unsigned value */
00175 /* If sizeof(Dwarf_Half) is greater than 2
00176 we believe libdwarf still works properly. */
00177
00178 typedef void* Dwarf_Ptr; /* host machine pointer */
00179 enum Dwarf_Ranges_Entry_Type { DW_RANGES_ENTRY,
00180 DW_RANGES_ADDRESS_SELECTION,
00181 DW_RANGES_END
00182 };
00183
00184 enum Dwarf_Form_Class {
00185 DW_FORM_CLASS_UNKNOWN = 0,
00186 DW_FORM_CLASS_ADDRESS = 1,
00187 DW_FORM_CLASS_BLOCK = 2,
00188 DW_FORM_CLASS_CONSTANT = 3,
00189 DW_FORM_CLASS_EXPRLOC = 4,
00190 DW_FORM_CLASS_FLAG = 5,
00191 DW_FORM_CLASS_LINEPTR = 6,
00192 DW_FORM_CLASS_LOCLISTPTR = 7, /* DWARF2,3,4 only */
00193 DW_FORM_CLASS_MACPTR = 8, /* DWARF2,3,4 only */
00194 DW_FORM_CLASS_RANGELISTPTR = 9, /* DWARF2,3,4 only */
00195 DW_FORM_CLASS_REFERENCE = 10,
00196 DW_FORM_CLASS_STRING = 11,
00197 DW_FORM_CLASS_FRAMEPTR = 12, /* MIPS/IRIX DWARF2 only */
00198 DW_FORM_CLASS_MACROPTR = 13, /* DWARF5 */
00199 DW_FORM_CLASS_ADDRPTR = 14, /* DWARF5 */
00200 DW_FORM_CLASS_LOCLIST = 15, /* DWARF5 */
00201 DW_FORM_CLASS_LOCLISTSPTR = 16, /* DWARF5 */
00202 DW_FORM_CLASS_RNGLIST = 17, /* DWARF5 */
00203 DW_FORM_CLASS_RNGLISTSPTR = 18, /* DWARF5 */
00204 DW_FORM_CLASS_STROFFSETSPTR = 19 /* DWARF5 */
00205 };
00206
00207 typedef struct Dwarf_Form_Data16_s {
00208 unsigned char fd_data[16];
00209 } Dwarf_Form_Data16;
00210
00211 typedef struct Dwarf_Sig8_s {
00212 char signature[8];
00213 } Dwarf_Sig8;
00214
00215 typedef struct Dwarf_Block_s {
00216 Dwarf_Unsigned bl_len;
00217 Dwarf_Ptr bl_data;
00218 Dwarf_Small bl_from_loclist;
00219 Dwarf_Unsigned bl_section_offset;
00220 } Dwarf_Block;
00221
00222 typedef struct Dwarf_Locdesc_c_s * Dwarf_Locdesc_c;
00223 typedef struct Dwarf_Loc_Head_c_s * Dwarf_Loc_Head_c;
00224
00225 typedef struct Dwarf_Gnu_Index_Head_s * Dwarf_Gnu_Index_Head;
00226
00227 typedef struct Dwarf_Dsc_Head_s * Dwarf_Dsc_Head;
00228
00229 typedef struct Dwarf_Frame_Instr_Head_s * Dwarf_Frame_Instr_Head;
00230
00231 typedef void (* dwarf_printf_callback_function_type)
00232 (void * dw_user_pointer, const char * dw_linecontent);
00233
00234 struct Dwarf_Printf_Callback_Info_s {
00235 void * dp_user_pointer;
00236 dwarf_printf_callback_function_type dp_fptr;

```

```

00416     char *                dp_buffer;
00417     unsigned int          dp_buffer_len;
00418     int                  dp_buffer_user_provided;
00419     void *                dp_reserved;
00420 };
00421
00441 struct Dwarf_Cmdline_Options_s {
00442     Dwarf_Bool check_verbose_mode;
00443 };
00447 typedef struct Dwarf_Cmdline_Options_s Dwarf_Cmdline_Options;
00448
00455 typedef struct Dwarf_Str_Offsets_Table_s * Dwarf_Str_Offsets_Table;
00456
00469 typedef struct Dwarf_Ranges_s {
00470     Dwarf_Addr dwr_addr1;
00471     Dwarf_Addr dwr_addr2;
00472     enum Dwarf_Ranges_Entry_Type dwr_type;
00473 } Dwarf_Ranges;
00474
00561 typedef struct Dwarf_Regtable_Entry3_s {
00562     Dwarf_Small dw_offset_relevant;
00563     Dwarf_Small dw_value_type;
00564     Dwarf_Half dw_regnum;
00565     Dwarf_Unsigned dw_offset; /* Should be Dwarf_Signed */
00566     Dwarf_Unsigned dw_args_size; /* Always zero. */
00567     Dwarf_Block dw_block;
00568 } Dwarf_Regtable_Entry3;
00569
00589 typedef struct Dwarf_Regtable3_s {
00590     struct Dwarf_Regtable_Entry3_s rt3_cfa_rule;
00591     Dwarf_Half rt3_reg_table_size;
00592     struct Dwarf_Regtable_Entry3_s * rt3_rules;
00593 } Dwarf_Regtable3;
00594
00595 /* Opaque types for Consumer Library. */
00605 typedef struct Dwarf_Error_s* Dwarf_Error;
00606
00611 typedef struct Dwarf_Debug_s* Dwarf_Debug;
00616 typedef struct Dwarf_Section_s* Dwarf_Section;
00617
00621 typedef struct Dwarf_Die_s* Dwarf_Die;
00622
00626 typedef struct Dwarf_Debug_Addr_Table_s* Dwarf_Debug_Addr_Table;
00627
00632 typedef struct Dwarf_Line_s* Dwarf_Line;
00633
00638 typedef struct Dwarf_Global_s* Dwarf_Global;
00639
00647 typedef struct Dwarf_Type_s* Dwarf_Type;
00648
00654 typedef struct Dwarf_Func_s* Dwarf_Func;
00660 typedef struct Dwarf_Var_s* Dwarf_Var;
00666 typedef struct Dwarf_Weak_s* Dwarf_Weak;
00667
00671 typedef struct Dwarf_Attribute_s* Dwarf_Attribute;
00672
00678 typedef struct Dwarf_Abbrev_s* Dwarf_Abbrev;
00679
00684 typedef struct Dwarf_Fde_s* Dwarf_Fde;
00689 typedef struct Dwarf_Cie_s* Dwarf_Cie;
00690
00695 typedef struct Dwarf_Arange_s* Dwarf_Arange;
00700 typedef struct Dwarf_Gdbindex_s* Dwarf_Gdbindex;
00706 typedef struct Dwarf_Xu_Index_Header_s *Dwarf_Xu_Index_Header;
00710 typedef struct Dwarf_Line_Context_s *Dwarf_Line_Context;
00711
00715 typedef struct Dwarf_Macro_Context_s *Dwarf_Macro_Context;
00716
00722 typedef struct Dwarf_Dnames_Head_s *Dwarf_Dnames_Head;
00723
00731 typedef void (*Dwarf_Handler)(Dwarf_Error dw_error,
00732     Dwarf_Ptr dw_errarg);
00733
00741 struct Dwarf_Macro_Details_s {
00742     Dwarf_Off dmd_offset; /* offset, in the section,
00743         of this macro info */
00744     Dwarf_Small dmd_type; /* the type, DW_MACINFO_define etc*/
00745     Dwarf_Signed dmd_lineno; /* the source line number where
00746         applicable and vend_def number if
00747         vendor_extension op */
00748     Dwarf_Signed dmd_fileindex; /* the source file index */
00749     char * dmd_macro; /* macro name string */
00750 };
00755 typedef struct Dwarf_Macro_Details_s Dwarf_Macro_Details;
00756
00761 typedef struct Dwarf_Debug_Fission_Per_CU_s
00762     Dwarf_Debug_Fission_Per_CU;

```

```

00763
00764 /* ===== BEGIN Obj_Access data ===== */
00770 typedef struct Dwarf_Obj_Access_Interface_a_s
00771     Dwarf_Obj_Access_Interface_a;
00772
00778 typedef struct Dwarf_Obj_Access_Methods_a_s
00779     Dwarf_Obj_Access_Methods_a;
00780
00789 typedef struct Dwarf_Obj_Access_Section_a_s
00790     Dwarf_Obj_Access_Section_a;
00791 struct Dwarf_Obj_Access_Section_a_s {
00792     const char*    as_name;
00793     Dwarf_Unsigned as_type;
00794     Dwarf_Unsigned as_flags;
00795     Dwarf_Addr     as_addr;
00796     Dwarf_Unsigned as_offset;
00797     Dwarf_Unsigned as_size;
00798     Dwarf_Unsigned as_link;
00799     Dwarf_Unsigned as_info;
00800     Dwarf_Unsigned as_addralign;
00801     Dwarf_Unsigned as_entsize;
00802 };
00803
00816 enum Dwarf_Sec_Alloc_Pref {
00817     /* No dynamic allocation */
00818     Dwarf_Alloc_None=0,
00819     /* alternative allocations */
00820     Dwarf_Alloc_Malloc=1,
00821     Dwarf_Alloc_Mmap=2};
00822
00844 struct Dwarf_Obj_Access_Methods_a_s {
00845     int (*om_get_section_info)(void* obj,
00846         Dwarf_Unsigned section_index,
00847         Dwarf_Obj_Access_Section_a* return_section,
00848         int * error);
00849     Dwarf_Small (*om_get_byte_order)(void* obj);
00850     Dwarf_Small (*om_get_length_size)(void* obj);
00851     Dwarf_Small (*om_get_pointer_size)(void* obj);
00852     Dwarf_Unsigned (*om_get_filesizes)(void* obj);
00853     Dwarf_Unsigned (*om_get_section_count)(void* obj);
00854     /* Always uses malloc/read */
00855     int (*om_load_section)(void* obj,
00856         Dwarf_Unsigned dw_section_index,
00857         Dwarf_Small **dw_return_data,
00858         int *dw_error);
00859     int (*om_relocate_a_section)(void* obj,
00860         Dwarf_Unsigned section_index,
00861         Dwarf_Debug dbg,
00862         int * error);
00863     /* Added in 0.12.0 to allow mmap in section loading.
00864     If you are just using malloc for section loading
00865     and referring to this struct in your code
00866     you should leave this function pointer NULL (zero). */
00867     int (*om_load_section_a)(void* obj,
00868         Dwarf_Unsigned dw_section_index,
00869         /* dw_alloc_pref is input preference and also
00870         output with the actual allocated type */
00871         enum Dwarf_Sec_Alloc_Pref *dw_alloc_pref,
00872         Dwarf_Small **dw_return_data_ptr,
00873         Dwarf_Unsigned *dw_return_data_len,
00874         Dwarf_Small **dw_return_mmap_base_ptr,
00875         Dwarf_Unsigned *dw_return_mmap_offset,
00876         Dwarf_Unsigned *dw_return_mmap_len,
00877         int *dw_error);
00878     void (*om_finish)(void * obj);
00879 };
00880 struct Dwarf_Obj_Access_Interface_a_s {
00881     void* ai_object;
00882     const Dwarf_Obj_Access_Methods_a *ai_methods;
00883 };
00884 /* ===== END Obj_Access data ===== */
00885
00886 /* User code must allocate this struct, zero it,
00887 and pass a pointer to it
00888 into dwarf_get_debugfission_for_cu . */
00889 struct Dwarf_Debug_Fission_Per_CU_s {
00890     /* Do not free the string. It contains "cu" or "tu". */
00891     /* If this is not set (ie, not a CU/TU in DWP Package File)
00892     then pcu_type will be NULL. */
00893     const char * pcu_type;
00894     /* pcu_index is the index (range 1 to N )
00895     into the tu/cu table of offsets and the table
00896     of sizes. 1 to N as the zero index is reserved
00897     for special purposes. Not a value one
00898     actually needs. */
00899     Dwarf_Unsigned pcu_index;
00900     Dwarf_Sig8 pcu_hash; /* 8 byte */

```

```

00901     /* [0] has offset and size 0.
00902     [1]-[8] are DW_SECT_* indexes and the
00903     values are the offset and size
00904     of the respective section contribution
00905     of a single .dwo object. When pcu_size[n] is
00906     zero the corresponding section is not present. */
00907     Dwarf_Unsigned pcu_offset[DW_FISSION_SECT_COUNT];
00908     Dwarf_Unsigned pcu_size[DW_FISSION_SECT_COUNT];
00909     Dwarf_Unsigned unused1;
00910     Dwarf_Unsigned unused2;
00911 };
00912
00917 typedef struct Dwarf_Rnglists_Head_s * Dwarf_Rnglists_Head;
00918
00924 /* Special values for offset_into_exception_table field
00925 of dwarf fde's
00926 The following value indicates that there is no
00927 Exception table offset
00928 associated with a dwarf frame.
00929 */
00930 #define DW_DLX_NO_EH_OFFSET (-1LL)
00931 /* The following value indicates that the producer
00932 was unable to analyze the
00933 source file to generate Exception tables for this function.
00934 */
00935 #define DW_DLX_EH_OFFSET_UNAVAILABLE (-2LL)
00936
00937 /* The augmenter string for CIE */
00938 #define DW_CIE_AUGMENTER_STRING_V0 "z"
00939
00940 /* ***IMPORTANT NOTE, TARGET DEPENDENCY ***
00941 DW_REG_TABLE_SIZE must be at least as large as
00942 the number of registers
00943 DW_FRAME_LAST_REG_NUM as defined in dwarf.h
00944 */
00945 #ifndef DW_REG_TABLE_SIZE
00946 #define DW_REG_TABLE_SIZE DW_FRAME_LAST_REG_NUM
00947 #endif
00948
00949 /* For MIPS, DW_FRAME_SAME_VAL is the correct default value
00950 for a frame register value. For other CPUs another value
00951 may be better, such as DW_FRAME_UNDEFINED_VAL.
00952 See dwarf_set_frame_rule_table_size
00953 */
00954 #ifndef DW_FRAME_REG_INITIAL_VALUE
00955 #define DW_FRAME_REG_INITIAL_VALUE DW_FRAME_SAME_VAL
00956 #endif
00957
00958 /* The following are all needed to evaluate DWARF3 register rules.
00959 These have nothing to do simply printing
00960 frame instructions.
00961 */
00962 #define DW_EXPR_OFFSET 0 /* offset is from CFA reg */
00963 #define DW_EXPR_VAL_OFFSET 1
00964 #define DW_EXPR_EXPRESSION 2
00965 #define DW_EXPR_VAL_EXPRESSION 3
00966 #define DW_DLA_STRING 0x01 /* char* */
00967 #define DW_DLA_LOC 0x02 /* Dwarf_Loc */
00968 #define DW_DLA_LOCDISC 0x03 /* Dwarf_Locdesc */
00969 #define DW_DLA_ELLIST 0x04 /* Dwarf_Ellist (not used) */
00970 #define DW_DLA_BOUNDS 0x05 /* Dwarf_Bounds (not used) */
00971 #define DW_DLA_BLOCK 0x06 /* Dwarf_Block */
00972 #define DW_DLA_DEBUG 0x07 /* Dwarf_Debug */
00973 #define DW_DLA_DIE 0x08 /* Dwarf_Die */
00974 #define DW_DLA_LINE 0x09 /* Dwarf_Line */
00975 #define DW_DLA_ATTR 0x0a /* Dwarf_Attribute */
00976 #define DW_DLA_TYPE 0x0b /* Dwarf_Type (not used) */
00977 #define DW_DLA_SUBSCR 0x0c /* Dwarf_Subscr (not used) */
00978 #define DW_DLA_GLOBAL 0x0d /* Dwarf_Global */
00979 #define DW_DLA_ERROR 0x0e /* Dwarf_Error */
00980 #define DW_DLA_LIST 0x0f /* a list */
00981 #define DW_DLA_LINEBUF 0x10 /* Dwarf_Line* (not used) */
00982 #define DW_DLA_ARANGE 0x11 /* Dwarf_Arange */
00983 #define DW_DLA_ABBREV 0x12 /* Dwarf_Abbrev */
00984 #define DW_DLA_FRAME_INSTR_HEAD 0x13 /* Dwarf_Frame_Instr_Head */
00985 #define DW_DLA_CIE 0x14 /* Dwarf_Cie */
00986 #define DW_DLA_FDE 0x15 /* Dwarf_Fde */
00987 #define DW_DLA_LOC_BLOCK 0x16 /* Dwarf_Loc */
00988
00989 #define DW_DLA_FRAME_OP 0x17 /* Dwarf_Frame_Op (not used) */
00990 #define DW_DLA_FUNC 0x18 /* Dwarf_Func */
00991 #define DW_DLA_UARRAY 0x19 /* Array of Dwarf_Off:Jan2023 */
00992 #define DW_DLA_VAR 0x1a /* Dwarf_Var */
00993 #define DW_DLA_WEAK 0x1b /* Dwarf_Weak */
00994 #define DW_DLA_ADDR 0x1c /* Dwarf_Addr sized entries */
00995 #define DW_DLA_RANGES 0x1d /* Dwarf_Ranges */
01006 /* 0x1e (30) to 0x34 (52) reserved for internal to libdwarf types. */

```

```

01007 /* .debug_gnu_typenames/pubnames, 2020 */
01008 #define DW_DLA_GNU_INDEX_HEAD 0x35
01009
01010 #define DW_DLA_RNGLISTS_HEAD 0x36 /* .debug_rnglists DW5 */
01011 #define DW_DLA_GDBINDEX 0x37 /* Dwarf_Gdbindex */
01012 #define DW_DLA_XU_INDEX 0x38 /* Dwarf_Xu_Index_Header */
01013 #define DW_DLA_LOC_BLOCK_C 0x39 /* Dwarf_Loc_c */
01014 #define DW_DLA_LOCDISC_C 0x3a /* Dwarf_Locdesc_c */
01015 #define DW_DLA_LOC_HEAD_C 0x3b /* Dwarf_Loc_Head_c */
01016 #define DW_DLA_MACRO_CONTEXT 0x3c /* Dwarf_Macro_Context */
01017 /* 0x3d (61) is for libdwarf internal use. */
01018 #define DW_DLA_DSC_HEAD 0x3e /* Dwarf_Dsc_Head */
01019 #define DW_DLA_DNAMES_HEAD 0x3f /* Dwarf_Dnames_Head */
01020
01021 /* struct Dwarf_Str_Offsets_Table_s */
01022 #define DW_DLA_STR_OFFSETS 0x40
01023 /* struct Dwarf_Debug_Addr_Table_s */
01024 #define DW_DLA_DEBUG_ADDR 0x41
01036 /* libdwarf error numbers */
01037 #define DW_DLE_NE 0 /* no error */
01038 #define DW_DLE_VMM 1 /* dwarf format/library version mismatch */
01039 #define DW_DLE_MAP 2 /* memory map failure */
01040 #define DW_DLE_LEE 3 /* libelf error */
01041 #define DW_DLE_NDS 4 /* no debug section */
01042 #define DW_DLE_NLS 5 /* no line section */
01043 #define DW_DLE_ID 6 /* invalid descriptor for query */
01044 #define DW_DLE_IOF 7 /* I/O failure */
01045 #define DW_DLE_MAF 8 /* memory allocation failure */
01046 #define DW_DLE_IA 9 /* invalid argument */
01047 #define DW_DLE_MDE 10 /* mangled debugging entry */
01048 #define DW_DLE_MLE 11 /* mangled line number entry */
01049 #define DW_DLE_FNO 12 /* file not open */
01050 #define DW_DLE_FNR 13 /* file not a regular file */
01051 #define DW_DLE_FWA 14 /* file open with wrong access */
01052 #define DW_DLE_NOB 15 /* not an object file */
01053 #define DW_DLE_MOF 16 /* mangled object file header */
01054 #define DW_DLE_EOLL 17 /* end of location list entries */
01055 #define DW_DLE_NOLL 18 /* no location list section */
01056 #define DW_DLE_BADOFF 19 /* Invalid offset */
01057 #define DW_DLE_EOS 20 /* end of section */
01058 #define DW_DLE_ATRUNC 21 /* abbreviations section appears truncated */
01059 #define DW_DLE_BADBITC 22 /* Address size passed to dwarf bad */
01060 /* It is not an allowed size (64 or 32) */
01061 /* Error codes defined by the current Libdwarf Implementation. */
01062 #define DW_DLE_DBG_ALLOC 23
01063 #define DW_DLE_FSTAT_ERROR 24
01064 #define DW_DLE_FSTAT_MODE_ERROR 25
01065 #define DW_DLE_INIT_ACCESS_WRONG 26
01066 #define DW_DLE_ELF_BEGIN_ERROR 27
01067 #define DW_DLE_ELF_GETEHDR_ERROR 28
01068 #define DW_DLE_ELF_GETSHDR_ERROR 29
01069 #define DW_DLE_ELF_STRPTR_ERROR 30
01070 #define DW_DLE_DEBUG_INFO_DUPLICATE 31
01071 #define DW_DLE_DEBUG_INFO_NULL 32
01072 #define DW_DLE_DEBUG_ABBREV_DUPLICATE 33
01073 #define DW_DLE_DEBUG_ABBREV_NULL 34
01074 #define DW_DLE_DEBUG_ARANGES_DUPLICATE 35
01075 #define DW_DLE_DEBUG_ARANGES_NULL 36
01076 #define DW_DLE_DEBUG_LINE_DUPLICATE 37
01077 #define DW_DLE_DEBUG_LINE_NULL 38
01078 #define DW_DLE_DEBUG_LOC_DUPLICATE 39
01079 #define DW_DLE_DEBUG_LOC_NULL 40
01080 #define DW_DLE_DEBUG_MACINFO_DUPLICATE 41
01081 #define DW_DLE_DEBUG_MACINFO_NULL 42
01082 #define DW_DLE_DEBUG_PUBNAMES_DUPLICATE 43
01083 #define DW_DLE_DEBUG_PUBNAMES_NULL 44
01084 #define DW_DLE_DEBUG_STR_DUPLICATE 45
01085 #define DW_DLE_DEBUG_STR_NULL 46
01086 #define DW_DLE_CU_LENGTH_ERROR 47
01087 #define DW_DLE_VERSION_STAMP_ERROR 48
01088 #define DW_DLE_ABBREV_OFFSET_ERROR 49
01089 #define DW_DLE_ADDRESS_SIZE_ERROR 50
01090 #define DW_DLE_DEBUG_INFO_PTR_NULL 51
01091 #define DW_DLE_DIE_NULL 52
01092 #define DW_DLE_STRING_OFFSET_BAD 53
01093 #define DW_DLE_DEBUG_LINE_LENGTH_BAD 54
01094 #define DW_DLE_LINE_PROLOG_LENGTH_BAD 55
01095 #define DW_DLE_LINE_NUM_OPERANDS_BAD 56
01096 #define DW_DLE_LINE_SET_ADDR_ERROR 57
01097 #define DW_DLE_LINE_EXT_OPCODE_BAD 58
01098 #define DW_DLE_DWARF_LINE_NULL 59
01099 #define DW_DLE_INCL_DIR_NUM_BAD 60
01100 #define DW_DLE_LINE_FILE_NUM_BAD 61
01101 #define DW_DLE_ALLOC_FAIL 62
01102 #define DW_DLE_NO_CALLBACK_FUNC 63
01103 #define DW_DLE_SECT_ALLOC 64
01104 #define DW_DLE_FILE_ENTRY_ALLOC 65

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```

01105 #define DW_DLE_LINE_ALLOC 66
01106 #define DW_DLE_FPGM_ALLOC 67
01107 #define DW_DLE_INCDIR_ALLOC 68
01108 #define DW_DLE_STRING_ALLOC 69
01109 #define DW_DLE_CHUNK_ALLOC 70
01110 #define DW_DLE_BYTEOFF_ERR 71
01111 #define DW_DLE_CIE_ALLOC 72
01112 #define DW_DLE_FDE_ALLOC 73
01113 #define DW_DLE_REGNO_OVFL 74
01114 #define DW_DLE_CIE_OFFS_ALLOC 75
01115 #define DW_DLE_WRONG_ADDRESS 76
01116 #define DW_DLE_EXTRA_NEIGHBORS 77
01117 #define DW_DLE_WRONG_TAG 78
01118 #define DW_DLE_DIE_ALLOC 79
01119 #define DW_DLE_PARENT_EXISTS 80
01120 #define DW_DLE_DBG_NULL 81
01121 #define DW_DLE_DEBUGLINE_ERROR 82
01122 #define DW_DLE_DEBUGFRAME_ERROR 83
01123 #define DW_DLE_DEBUGINFO_ERROR 84
01124 #define DW_DLE_ATTR_ALLOC 85
01125 #define DW_DLE_ABBREV_ALLOC 86
01126 #define DW_DLE_OFFSET_UFLW 87
01127 #define DW_DLE_ELF_SECT_ERR 88
01128 #define DW_DLE_DEBUG_FRAME_LENGTH_BAD 89
01129 #define DW_DLE_FRAME_VERSION_BAD 90
01130 #define DW_DLE_CIE_RET_ADDR_REG_ERROR 91
01131 #define DW_DLE_FDE_NULL 92
01132 #define DW_DLE_FDE_DBG_NULL 93
01133 #define DW_DLE_CIE_NULL 94
01134 #define DW_DLE_CIE_DBG_NULL 95
01135 #define DW_DLE_FRAME_TABLE_COL_BAD 96
01136 #define DW_DLE_PC_NOT_IN_FDE_RANGE 97
01137 #define DW_DLE_CIE_INSTR_EXEC_ERROR 98
01138 #define DW_DLE_FRAME_INSTR_EXEC_ERROR 99
01139 #define DW_DLE_FDE_PTR_NULL 100
01140 #define DW_DLE_RET_OP_LIST_NULL 101
01141 #define DW_DLE_LINE_CONTEXT_NULL 102
01142 #define DW_DLE_DBG_NO_CU_CONTEXT 103
01143 #define DW_DLE_DIE_NO_CU_CONTEXT 104
01144 #define DW_DLE_FIRST_DIE_NOT_CU 105
01145 #define DW_DLE_NEXT_DIE_PTR_NULL 106
01146 #define DW_DLE_DEBUG_FRAME_DUPLICATE 107
01147 #define DW_DLE_DEBUG_FRAME_NULL 108
01148 #define DW_DLE_ABBREV_DECODE_ERROR 109
01149 #define DW_DLE_DWARF_ABBREV_NULL 110
01150 #define DW_DLE_ATTR_NULL 111
01151 #define DW_DLE_DIE_BAD 112
01152 #define DW_DLE_DIE_ABBREV_BAD 113
01153 #define DW_DLE_ATTR_FORM_BAD 114
01154 #define DW_DLE_ATTR_NO_CU_CONTEXT 115
01155 #define DW_DLE_ATTR_FORM_SIZE_BAD 116
01156 #define DW_DLE_ATTR_DBG_NULL 117
01157 #define DW_DLE_BAD_REF_FORM 118
01158 #define DW_DLE_ATTR_FORM_OFFSET_BAD 119
01159 #define DW_DLE_LINE_OFFSET_BAD 120
01160 #define DW_DLE_DEBUG_STR_OFFSET_BAD 121
01161 #define DW_DLE_STRING_PTR_NULL 122
01162 #define DW_DLE_PUBNAMES_VERSION_ERROR 123
01163 #define DW_DLE_PUBNAMES_LENGTH_BAD 124
01164 #define DW_DLE_GLOBAL_NULL 125
01165 #define DW_DLE_GLOBAL_CONTEXT_NULL 126
01166 #define DW_DLE_DIR_INDEX_BAD 127
01167 #define DW_DLE_LOC_EXPR_BAD 128
01168 #define DW_DLE_DIE_LOC_EXPR_BAD 129
01169 #define DW_DLE_ADDR_ALLOC 130
01170 #define DW_DLE_OFFSET_BAD 131
01171 #define DW_DLE_MAKE_CU_CONTEXT_FAIL 132
01172 #define DW_DLE_REL_ALLOC 133
01173 #define DW_DLE_ARANGE_OFFSET_BAD 134
01174 #define DW_DLE_SEGMENT_SIZE_BAD 135
01175 #define DW_DLE_ARANGE_LENGTH_BAD 136
01176 #define DW_DLE_ARANGE_DECODE_ERROR 137
01177 #define DW_DLE_ARANGES_NULL 138
01178 #define DW_DLE_ARANGE_NULL 139
01179 #define DW_DLE_NO_FILE_NAME 140
01180 #define DW_DLE_NO_COMP_DIR 141
01181 #define DW_DLE_CU_ADDRESS_SIZE_BAD 142
01182 #define DW_DLE_INPUT_ATTR_BAD 143
01183 #define DW_DLE_EXPR_NULL 144
01184 #define DW_DLE_BAD_EXPR_OPCODE 145
01185 #define DW_DLE_EXPR_LENGTH_BAD 146
01186 #define DW_DLE_MULTIPLE_RELOC_IN_EXPR 147
01187 #define DW_DLE_ELF_GETIDENT_ERROR 148
01188 #define DW_DLE_NO_AT_MIPS_FDE 149
01189 #define DW_DLE_NO_CIE_FOR_FDE 150
01190 #define DW_DLE_DIE_ABBREV_LIST_NULL 151
01191 #define DW_DLE_DEBUG_FUNCNAMES_DUPLICATE 152

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01192 #define DW_DLE_DEBUG_FUNCNAMES_NULL 153
01193 #define DW_DLE_DEBUG_FUNCNAMES_VERSION_ERROR 154
01194 #define DW_DLE_DEBUG_FUNCNAMES_LENGTH_BAD 155
01195 #define DW_DLE_FUNC_NULL 156
01196 #define DW_DLE_FUNC_CONTEXT_NULL 157
01197 #define DW_DLE_DEBUG_TYPENAMES_DUPLICATE 158
01198 #define DW_DLE_DEBUG_TYPENAMES_NULL 159
01199 #define DW_DLE_DEBUG_TYPENAMES_VERSION_ERROR 160
01200 #define DW_DLE_DEBUG_TYPENAMES_LENGTH_BAD 161
01201 #define DW_DLE_TYPE_NULL 162
01202 #define DW_DLE_TYPE_CONTEXT_NULL 163
01203 #define DW_DLE_DEBUG_VARNAMES_DUPLICATE 164
01204 #define DW_DLE_DEBUG_VARNAMES_NULL 165
01205 #define DW_DLE_DEBUG_VARNAMES_VERSION_ERROR 166
01206 #define DW_DLE_DEBUG_VARNAMES_LENGTH_BAD 167
01207 #define DW_DLE_VAR_NULL 168
01208 #define DW_DLE_VAR_CONTEXT_NULL 169
01209 #define DW_DLE_DEBUG_WEAKNAMES_DUPLICATE 170
01210 #define DW_DLE_DEBUG_WEAKNAMES_NULL 171
01211 #define DW_DLE_DEBUG_WEAKNAMES_VERSION_ERROR 172
01212 #define DW_DLE_DEBUG_WEAKNAMES_LENGTH_BAD 173
01213 #define DW_DLE_WEAK_NULL 174
01214 #define DW_DLE_WEAK_CONTEXT_NULL 175
01215 #define DW_DLE_LOCDISC_COUNT_WRONG 176
01216 #define DW_DLE_MACINFO_STRING_NULL 177
01217 #define DW_DLE_MACINFO_STRING_EMPTY 178
01218 #define DW_DLE_MACINFO_INTERNAL_ERROR_SPACE 179
01219 #define DW_DLE_MACINFO_MALLOC_FAIL 180
01220 #define DW_DLE_DEBUGMACINFO_ERROR 181
01221 #define DW_DLE_DEBUG_MACRO_LENGTH_BAD 182
01222 #define DW_DLE_DEBUG_MACRO_MAX_BAD 183
01223 #define DW_DLE_DEBUG_MACRO_INTERNAL_ERR 184
01224 #define DW_DLE_DEBUG_MACRO_MALLOC_SPACE 185
01225 #define DW_DLE_DEBUG_MACRO_INCONSISTENT 186
01226 #define DW_DLE_DF_NO_CIE_AUGMENTATION 187
01227 #define DW_DLE_DF_REG_NUM_TOO_HIGH 188
01228 #define DW_DLE_DF_MAKE_INSTR_NO_INIT 189
01229 #define DW_DLE_DF_NEW_LOC_LESS_OLD_LOC 190
01230 #define DW_DLE_DF_POP_EMPTY_STACK 191
01231 #define DW_DLE_DF_ALLOC_FAIL 192
01232 #define DW_DLE_DF_FRAME_DECODING_ERROR 193
01233 #define DW_DLE_DEBUG_LOC_SECTION_SHORT 194
01234 #define DW_DLE_FRAME_AUGMENTATION_UNKNOWN 195
01235 #define DW_DLE_PUBTYPE_CONTEXT 196 /* Unused. */
01236 #define DW_DLE_DEBUG_PUBTYPES_LENGTH_BAD 197
01237 #define DW_DLE_DEBUG_PUBTYPES_VERSION_ERROR 198
01238 #define DW_DLE_DEBUG_PUBTYPES_DUPLICATE 199
01239 #define DW_DLE_FRAME_CIE_DECODE_ERROR 200
01240 #define DW_DLE_FRAME_REGISTER_UNREPRESENTABLE 201
01241 #define DW_DLE_FRAME_REGISTER_COUNT_MISMATCH 202
01242 #define DW_DLE_LINK_LOOP 203
01243 #define DW_DLE_STRP_OFFSET_BAD 204
01244 #define DW_DLE_DEBUG_RANGES_DUPLICATE 205
01245 #define DW_DLE_DEBUG_RANGES_OFFSET_BAD 206
01246 #define DW_DLE_DEBUG_RANGES_MISSING_END 207
01247 #define DW_DLE_DEBUG_RANGES_OUT_OF_MEM 208
01248 #define DW_DLE_DEBUG_SYMTAB_ERR 209
01249 #define DW_DLE_DEBUG_STRTAB_ERR 210
01250 #define DW_DLE_RELOC_MISMATCH_INDEX 211
01251 #define DW_DLE_RELOC_MISMATCH_RELOC_INDEX 212
01252 #define DW_DLE_RELOC_MISMATCH_STRTAB_INDEX 213
01253 #define DW_DLE_RELOC_SECTION_MISMATCH 214
01254 #define DW_DLE_RELOC_SECTION_MISSING_INDEX 215
01255 #define DW_DLE_RELOC_SECTION_LENGTH_ODD 216
01256 #define DW_DLE_RELOC_SECTION_PTR_NULL 217
01257 #define DW_DLE_RELOC_SECTION_MALLOC_FAIL 218
01258 #define DW_DLE_NO_ELF64_SUPPORT 219
01259 #define DW_DLE_MISSING_ELF64_SUPPORT 220
01260 #define DW_DLE_ORPHAN_FDE 221
01261 #define DW_DLE_DUPLICATE_INST_BLOCK 222
01262 #define DW_DLE_BAD_REF_SIG8_FORM 223
01263 #define DW_DLE_ATTR_EXPRLOC_FORM_BAD 224
01264 #define DW_DLE_FORM_SEC_OFFSET_LENGTH_BAD 225
01265 #define DW_DLE_NOT_REF_FORM 226
01266 #define DW_DLE_DEBUG_FRAME_LENGTH_NOT_MULTIPLE 227
01267 #define DW_DLE_REF_SIG8_NOT_HANDLED 228
01268 #define DW_DLE_DEBUG_FRAME_POSSIBLE_ADDRESS_BOTCH 229
01269 #define DW_DLE_LOC_BAD_TERMINATION 230
01270 #define DW_DLE_SYMTAB_SECTION_LENGTH_ODD 231
01271 #define DW_DLE_RELOC_SECTION_SYMBOL_INDEX_BAD 232
01272 #define DW_DLE_RELOC_SECTION_RELOC_TARGET_SIZE_UNKNOWN 233
01273 #define DW_DLE_SYMTAB_SECTION_ENTRY_SIZE_ZERO 234
01274 #define DW_DLE_LINE_NUMBER_HEADER_ERROR 235
01275 #define DW_DLE_DEBUG_TYPES_NULL 236
01276 #define DW_DLE_DEBUG_TYPES_DUPLICATE 237
01277 #define DW_DLE_DEBUG_TYPES_ONLY_DWARF4 238
01278 #define DW_DLE_DEBUG_TYPEOFFSET_BAD 239

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01279 #define DW_DLE_GNU_OPCODE_ERROR 240
01280 #define DW_DLE_DEBUGPUPTYPES_ERROR 241
01281 #define DW_DLE_AT_FIXUP_NULL 242
01282 #define DW_DLE_AT_FIXUP_DUP 243
01283 #define DW_DLE_BAD_ABINAME 244
01284 #define DW_DLE_TOO_MANY_DEBUG 245
01285 #define DW_DLE_DEBUG_STR_OFFSETS_DUPLICATE 246
01286 #define DW_DLE_SECTION_DUPLICATION 247
01287 #define DW_DLE_SECTION_ERROR 248
01288 #define DW_DLE_DEBUG_ADDR_DUPLICATE 249
01289 #define DW_DLE_DEBUG_CU_UNAVAILABLE_FOR_FORM 250
01290 #define DW_DLE_DEBUG_FORM_HANDLING_INCOMPLETE 251
01291 #define DW_DLE_NEXT_DIE_PAST_END 252
01292 #define DW_DLE_NEXT_DIE_WRONG_FORM 253
01293 #define DW_DLE_NEXT_DIE_NO_ABBREV_LIST 254
01294 #define DW_DLE_NESTED_FORM_INDIRECT_ERROR 255
01295 #define DW_DLE_CU_DIE_NO_ABBREV_LIST 256
01296 #define DW_DLE_MISSING_NEEDED_DEBUG_ADDR_SECTION 257
01297 #define DW_DLE_ATTR_FORM_NOT_ADDR_INDEX 258
01298 #define DW_DLE_ATTR_FORM_NOT_STR_INDEX 259
01299 #define DW_DLE_DUPLICATE_GDB_INDEX 260
01300 #define DW_DLE_ERRONEOUS_GDB_INDEX_SECTION 261
01301 #define DW_DLE_GDB_INDEX_COUNT_ERROR 262
01302 #define DW_DLE_GDB_INDEX_COUNT_ADDR_ERROR 263
01303 #define DW_DLE_GDB_INDEX_INDEX_ERROR 264
01304 #define DW_DLE_GDB_INDEX_CUVEC_ERROR 265
01305 #define DW_DLE_DUPLICATE_CU_INDEX 266
01306 #define DW_DLE_DUPLICATE_TU_INDEX 267
01307 #define DW_DLE_XU_TYPE_ARG_ERROR 268
01308 #define DW_DLE_XU_IMPOSSIBLE_ERROR 269
01309 #define DW_DLE_XU_NAME_COL_ERROR 270
01310 #define DW_DLE_XU_HASH_ROW_ERROR 271
01311 #define DW_DLE_XU_HASH_INDEX_ERROR 272
01312 /* ..._FAILSAFE_ERRVAL is an aid when out of memory. */
01313 #define DW_DLE_FAILSAFE_ERRVAL 273
01314 #define DW_DLE_ARANGE_ERROR 274
01315 #define DW_DLE_PUBNAMES_ERROR 275
01316 #define DW_DLE_FUNCNAMES_ERROR 276
01317 #define DW_DLE_TYPENAMES_ERROR 277
01318 #define DW_DLE_VARNAMES_ERROR 278
01319 #define DW_DLE_WEAKNAMES_ERROR 279
01320 #define DW_DLE_RELOCS_ERROR 280
01321 #define DW_DLE_ATTR_OUTSIDE_SECTION 281
01322 #define DW_DLE_FFISSION_INDEX_WRONG 282
01323 #define DW_DLE_FFISSION_VERSION_ERROR 283
01324 #define DW_DLE_NEXT_DIE_LOW_ERROR 284
01325 #define DW_DLE_CU_UT_TYPE_ERROR 285
01326 #define DW_DLE_NO_SUCH_SIGNATURE_FOUND 286
01327 #define DW_DLE_SIGNATURE_SECTION_NUMBER_WRONG 287
01328 #define DW_DLE_ATTR_FORM_NOT_DATA8 288
01329 #define DW_DLE_SIG_TYPE_WRONG_STRING 289
01330 #define DW_DLE_MISSING_REQUIRED_TU_OFFSET_HASH 290
01331 #define DW_DLE_MISSING_REQUIRED_CU_OFFSET_HASH 291
01332 #define DW_DLE_DWP_MISSING_DWO_ID 292
01333 #define DW_DLE_DWP_SIBLING_ERROR 293
01334 #define DW_DLE_DEBUG_FFISSION_INCOMPLETE 294
01335 #define DW_DLE_FFISSION_SECNUM_ERR 295
01336 #define DW_DLE_DEBUG_MACRO_DUPLICATE 296
01337 #define DW_DLE_DEBUG_NAMES_DUPLICATE 297
01338 #define DW_DLE_DEBUG_LINE_STR_DUPLICATE 298
01339 #define DW_DLE_DEBUG_SUP_DUPLICATE 299
01340 #define DW_DLE_NO_SIGNATURE_TO_LOOKUP 300
01341 #define DW_DLE_NO_TIED_ADDR_AVAILABLE 301
01342 #define DW_DLE_NO_TIED_SIG_AVAILABLE 302
01343 #define DW_DLE_STRING_NOT_TERMINATED 303
01344 #define DW_DLE_BAD_LINE_TABLE_OPERATION 304
01345 #define DW_DLE_LINE_CONTEXT_BOTCH 305
01346 #define DW_DLE_LINE_CONTEXT_INDEX_WRONG 306
01347 #define DW_DLE_NO_TIED_STRING_AVAILABLE 307
01348 #define DW_DLE_NO_TIED_FILE_AVAILABLE 308
01349 #define DW_DLE_CU_TYPE_MISSING 309
01350 #define DW_DLE_LLE_CODE_UNKNOWN 310
01351 #define DW_DLE_LOCLIST_INTERFACE_ERROR 311
01352 #define DW_DLE_LOCLIST_INDEX_ERROR 312
01353 #define DW_DLE_INTERFACE_NOT_SUPPORTED 313
01354 #define DW_DLE_ZDEBUG_REQUIRES_ZLIB 314
01355 #define DW_DLE_ZDEBUG_INPUT_FORMAT_ODD 315
01356 #define DW_DLE_ZLIB_BUF_ERROR 316
01357 #define DW_DLE_ZLIB_DATA_ERROR 317
01358 #define DW_DLE_MACRO_OFFSET_BAD 318
01359 #define DW_DLE_MACRO_OPCODE_BAD 319
01360 #define DW_DLE_MACRO_OPCODE_FORM_BAD 320
01361 #define DW_DLE_UNKNOWN_FORM 321
01362 #define DW_DLE_BAD_MACRO_HEADER_POINTER 322
01363 #define DW_DLE_BAD_MACRO_INDEX 323
01364 #define DW_DLE_MACRO_OP_UNHANDLED 324
01365 #define DW_DLE_MACRO_PAST_END 325

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01366 #define DW_DLE_LINE_STRP_OFFSET_BAD 326
01367 #define DW_DLE_STRING_FORM_IMPROPER 327
01368 #define DW_DLE_ELF_FLAGS_NOT_AVAILABLE 328
01369 #define DW_DLE_LEB_IMPROPER 329
01370 #define DW_DLE_DEBUG_LINE_RANGE_ZERO 330
01371 #define DW_DLE_READ_LITTLEENDIAN_ERROR 331
01372 #define DW_DLE_READ_BIGENDIAN_ERROR 332
01373 #define DW_DLE_RELOC_INVALID 333
01374 #define DW_DLE_INFO_HEADER_ERROR 334
01375 #define DW_DLE_ARANGES_HEADER_ERROR 335
01376 #define DW_DLE_LINE_OFFSET_WRONG_FORM 336
01377 #define DW_DLE_FORM_BLOCK_LENGTH_ERROR 337
01378 #define DW_DLE_ZLIB_SECTION_SHORT 338
01379 #define DW_DLE_CIE_INSTR_PTR_ERROR 339
01380 #define DW_DLE_FDE_INSTR_PTR_ERROR 340
01381 #define DW_DLE_FISSION_ADDITION_ERROR 341
01382 #define DW_DLE_HEADER_LEN_BIGGER_THAN_SECSIZE 342
01383 #define DW_DLE_LOCEXPRESS_OFF_SECTION_END 343
01384 #define DW_DLE_POINTER_SECTION_UNKNOWN 344
01385 #define DW_DLE_ERRONEOUS_XU_INDEX_SECTION 345
01386 #define DW_DLE_DIRECTORY_FORMAT_COUNT_VS_DIRECTORIES_MISMATCH 346
01387 #define DW_DLE_COMPRESSED_EMPTY_SECTION 347
01388 #define DW_DLE_SIZE_WRAPAROUND 348
01389 #define DW_DLE_ILLOGICAL_TSEARCH 349
01390 #define DW_DLE_BAD_STRING_FORM 350
01391 #define DW_DLE_DEBUGSTR_ERROR 351
01392 #define DW_DLE_DEBUGSTR_UNEXPECTED_REL 352
01393 #define DW_DLE_DISCR_ARRAY_ERROR 353
01394 #define DW_DLE_LEB_OUT_ERROR 354
01395 #define DW_DLE_SIBLING_LIST_IMPROPER 355
01396 #define DW_DLE_LOCLIST_OFFSET_BAD 356
01397 #define DW_DLE_LINE_TABLE_BAD 357
01398 #define DW_DLE_DEBUG_LOCLISTS_DUPLICATE 358
01399 #define DW_DLE_DEBUG_RNGLISTS_DUPLICATE 359
01400 #define DW_DLE_ABBREVIATION_OFF_END 360
01401 #define DW_DLE_FORM_STRING_BAD_STRING 361
01402 #define DW_DLE_AUGMENTATION_STRING_OFF_END 362
01403 #define DW_DLE_STRING_OFF_END_PUBNAMES_LIKE 363
01404 #define DW_DLE_LINE_STRING_BAD 364
01405 #define DW_DLE_DEFINE_FILE_STRING_BAD 365
01406 #define DW_DLE_MACRO_STRING_BAD 366
01407 #define DW_DLE_MACINFO_STRING_BAD 367
01408 #define DW_DLE_ZLIB_UNCOMPRESS_ERROR 368
01409 #define DW_DLE_IMPROPER_DWO_ID 369
01410 #define DW_DLE_GROUPNUMBER_ERROR 370
01411 #define DW_DLE_ADDRESS_SIZE_ZERO 371
01412 #define DW_DLE_DEBUG_NAMES_HEADER_ERROR 372
01413 #define DW_DLE_DEBUG_NAMES_AUG_STRING_ERROR 373
01414 #define DW_DLE_DEBUG_NAMES_PAD_NON_ZERO 374
01415 #define DW_DLE_DEBUG_NAMES_OFF_END 375
01416 #define DW_DLE_DEBUG_NAMES_ABBREVIATION_OVERFLOW 376
01417 #define DW_DLE_DEBUG_NAMES_ABBREVIATION_CORRUPTION 377
01418 #define DW_DLE_DEBUG_NAMES_NULL_POINTER 378
01419 #define DW_DLE_DEBUG_NAMES_BAD_INDEX_ARG 379
01420 #define DW_DLE_DEBUG_NAMES_ENTRYPOOL_OFFSET 380
01421 #define DW_DLE_DEBUG_NAMES_UNHANDLED_FORM 381
01422 #define DW_DLE_LNCT_CODE_UNKNOWN 382
01423 #define DW_DLE_LNCT_FORM_CODE_NOT_HANDLED 383
01424 #define DW_DLE_LINE_HEADER_LENGTH_BOTCH 384
01425 #define DW_DLE_STRING_HASHTAB_IDENTITY_ERROR 385
01426 #define DW_DLE_UNIT_TYPE_NOT_HANDLED 386
01427 #define DW_DLE_GROUP_MAP_ALLOC 387
01428 #define DW_DLE_GROUP_MAP_DUPLICATE 388
01429 #define DW_DLE_GROUP_COUNT_ERROR 389
01430 #define DW_DLE_GROUP_INTERNAL_ERROR 390
01431 #define DW_DLE_GROUP_LOAD_ERROR 391
01432 #define DW_DLE_GROUP_LOAD_READ_ERROR 392
01433 #define DW_DLE_AUG_DATA_LENGTH_BAD 393
01434 #define DW_DLE_ABBREVIATION_MISSING 394
01435 #define DW_DLE_NO_TAG_FOR_DIE 395
01436 #define DW_DLE_LOWPC_WRONG_CLASS 396
01437 #define DW_DLE_HIGHPC_WRONG_FORM 397
01438 #define DW_DLE_STR_OFFSETS_BASE_WRONG_FORM 398
01439 #define DW_DLE_DATA16_OUTSIDE_SECTION 399
01440 #define DW_DLE_LNCT_MD5_WRONG_FORM 400
01441 #define DW_DLE_LINE_HEADER_CORRUPT 401
01442 #define DW_DLE_STR_OFFSETS_NULLARGUMENT 402
01443 #define DW_DLE_STR_OFFSETS_NULL_DBG 403
01444 #define DW_DLE_STR_OFFSETS_NO_MAGIC 404
01445 #define DW_DLE_STR_OFFSETS_ARRAY_SIZE 405
01446 #define DW_DLE_STR_OFFSETS_VERSION_WRONG 406
01447 #define DW_DLE_STR_OFFSETS_ARRAY_INDEX_WRONG 407
01448 #define DW_DLE_STR_OFFSETS_EXTRA_BYTES 408
01449 #define DW_DLE_DUP_ATTR_ON_DIE 409
01450 #define DW_DLE_SECTION_NAME_BIG 410
01451 #define DW_DLE_FILE_UNAVAILABLE 411
01452 #define DW_DLE_FILE_WRONG_TYPE 412
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01453 #define DW_DLE_SIBLING_OFFSET_WRONG 413
01454 #define DW_DLE_OPEN_FAIL 414
01455 #define DW_DLE_OFFSET_SIZE 415
01456 #define DW_DLE_MACH_O_SEGOFFSET_BAD 416
01457 #define DW_DLE_FILE_OFFSET_BAD 417
01458 #define DW_DLE_SEEK_ERROR 418
01459 #define DW_DLE_READ_ERROR 419
01460 #define DW_DLE_ELF_CLASS_BAD 420
01461 #define DW_DLE_ELF_ENDIAN_BAD 421
01462 #define DW_DLE_ELF_VERSION_BAD 422
01463 #define DW_DLE_FILE_TOO_SMALL 423
01464 #define DW_DLE_PATH_SIZE_TOO_SMALL 424
01465 #define DW_DLE_BAD_TYPE_SIZE 425
01466 #define DW_DLE_PE_SIZE_SMALL 426
01467 #define DW_DLE_PE_OFFSET_BAD 427
01468 #define DW_DLE_PE_STRING_TOO_LONG 428
01469 #define DW_DLE_IMAGE_FILE_UNKNOWN_TYPE 429
01470 #define DW_DLE_LINE_TABLE_LINENO_ERROR 430
01471 #define DW_DLE_PRODUCER_CODE_NOT_AVAILABLE 431
01472 #define DW_DLE_NO_ELF_SUPPORT 432
01473 #define DW_DLE_NO_STREAM_RELOC_SUPPORT 433
01474 #define DW_DLE_RETURN_EMPTY_PUBNAMES_ERROR 434
01475 #define DW_DLE_SECTION_SIZE_ERROR 435
01476 #define DW_DLE_INTERNAL_NULL_POINTER 436
01477 #define DW_DLE_SECTION_STRING_OFFSET_BAD 437
01478 #define DW_DLE_SECTION_INDEX_BAD 438
01479 #define DW_DLE_INTEGER_TOO_SMALL 439
01480 #define DW_DLE_ELF_SECTION_LINK_ERROR 440
01481 #define DW_DLE_ELF_SECTION_GROUP_ERROR 441
01482 #define DW_DLE_ELF_SECTION_COUNT_MISMATCH 442
01483 #define DW_DLE_ELF_STRING_SECTION_MISSING 443
01484 #define DW_DLE_SEEK_OFF_END 444
01485 #define DW_DLE_READ_OFF_END 445
01486 #define DW_DLE_ELF_SECTION_ERROR 446
01487 #define DW_DLE_ELF_STRING_SECTION_ERROR 447
01488 #define DW_DLE_MIXING_SPLIT_DWARF_VERSIONS 448
01489 #define DW_DLE_TAG_CORRUPT 449
01490 #define DW_DLE_FORM_CORRUPT 450
01491 #define DW_DLE_ATTR_CORRUPT 451
01492 #define DW_DLE_ABBREV_ATTR_DUPLICATION 452
01493 #define DW_DLE_DWP_SIGNATURE_MISMATCH 453
01494 #define DW_DLE_CU_UT_TYPE_VALUE 454
01495 #define DW_DLE_DUPLICATE_GNU_DEBUGLINK 455
01496 #define DW_DLE_CORRUPT_GNU_DEBUGLINK 456
01497 #define DW_DLE_CORRUPT_NOTE_GNU_DEBUGID 457
01498 #define DW_DLE_CORRUPT_GNU_DEBUGID_SIZE 458
01499 #define DW_DLE_CORRUPT_GNU_DEBUGID_STRING 459
01500 #define DW_DLE_HEX_STRING_ERROR 460
01501 #define DW_DLE_DECIMAL_STRING_ERROR 461
01502 #define DW_DLE_PRO_INIT_EXTRAS_UNKNOWN 462
01503 #define DW_DLE_PRO_INIT_EXTRAS_ERR 463
01504 #define DW_DLE_NULL_ARGS_DWARF_ADD_PATH 464
01505 #define DW_DLE_DWARF_INIT_DBG_NULL 465
01506 #define DW_DLE_ELF_RELOC_SECTION_ERROR 466
01507 #define DW_DLE_USER_DECLARED_ERROR 467
01508 #define DW_DLE_RNGLISTS_ERROR 468
01509 #define DW_DLE_LOCLISTS_ERROR 469
01510 #define DW_DLE_SECTION_SIZE_OR_OFFSET_LARGE 470
01511 #define DW_DLE_GDBINDEX_STRING_ERROR 471
01512 #define DW_DLE_GNU_PUBNAMES_ERROR 472
01513 #define DW_DLE_GNU_PUBTYPES_ERROR 473
01514 #define DW_DLE_DUPLICATE_GNU_DEBUG_PUBNAMES 474
01515 #define DW_DLE_DUPLICATE_GNU_DEBUG_PUBTYPES 475
01516 #define DW_DLE_DEBUG_SUP_STRING_ERROR 476
01517 #define DW_DLE_DEBUG_SUP_ERROR 477
01518 #define DW_DLE_LOCATION_ERROR 478
01519 #define DW_DLE_DEBUGLINK_PATH_SHORT 479
01520 #define DW_DLE_SIGNATURE_MISMATCH 480
01521 #define DW_DLE_MACRO_VERSION_ERROR 481
01522 #define DW_DLE_NEGATIVE_SIZE 482
01523 #define DW_DLE_UDATA_VALUE_NEGATIVE 483
01524 #define DW_DLE_DEBUG_NAMES_ERROR 484
01525 #define DW_DLE_CFA_INSTRUCTION_ERROR 485
01526 #define DW_DLE_MACHO_CORRUPT_HEADER 486
01527 #define DW_DLE_MACHO_CORRUPT_COMMAND 487
01528 #define DW_DLE_MACHO_CORRUPT_SECTIONDETAILS 488
01529 #define DW_DLE_RELOCATION_SECTION_SIZE_ERROR 489
01530 #define DW_DLE_SYMBOL_SECTION_SIZE_ERROR 490
01531 #define DW_DLE_PE_SECTION_SIZE_ERROR 491
01532 #define DW_DLE_DEBUG_ADDR_ERROR 492
01533 #define DW_DLE_NO_SECT_STRINGS 493
01534 #define DW_DLE_TOO_FEW_SECTIONS 494
01535 #define DW_DLE_BUILD_ID_DESCRIPTION_SIZE 495
01536 #define DW_DLE_BAD_SECTION_FLAGS 496
01537 #define DW_DLE_IMPROPER_SECTION_ZERO 497
01538 #define DW_DLE_INVALID_NULL_ARGUMENT 498
01539 #define DW_DLE_LINE_INDEX_WRONG 499
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01540 #define DW_DLE_LINE_COUNT_WRONG 500
01541 #define DW_DLE_ARITHMETIC_OVERFLOW 501
01542 #define DW_DLE_UNIVERSAL_BINARY_ERROR 502
01543 #define DW_DLE_UNIV_BIN_OFFSET_SIZE_ERROR 503
01544 #define DW_DLE_PE_SECTION_SIZE_HEURISTIC_FAIL 504
01545 #define DW_DLE_LLE_ERROR 505
01546 #define DW_DLE_RLE_ERROR 506
01547 #define DW_DLE_MACHO_SEGMENT_COUNT_HEURISTIC_FAIL 507
01548 #define DW_DLE_DUPLICATE_NOTE_GNU_BUILD_ID 508
01549 #define DW_DLE_SYSCONF_VALUE_UNUSABLE 509
01550
01552 #define DW_DLE_LAST 509
01553 #define DW_DLE_LO_USER 0x10000
01618 DW_API int dwarf_init_path(const char * dw_path,
01619 char * dw_true_path_out_buffer,
01620 unsigned int dw_true_path_bufferlen,
01621 unsigned int dw_groupnumber,
01622 Dwarf_Handler dw_errhand,
01623 Dwarf_Ptr dw_errarg,
01624 Dwarf_Debug* dw_dbg,
01625 Dwarf_Error* dw_error);
01626
01639 DW_API int dwarf_init_path_a(const char * dw_path,
01640 char * dw_true_path_out_buffer,
01641 unsigned int dw_true_path_bufferlen,
01642 unsigned int dw_groupnumber,
01643 unsigned int dw_universalnumber,
01644 Dwarf_Handler dw_errhand,
01645 Dwarf_Ptr dw_errarg,
01646 Dwarf_Debug* dw_dbg,
01647 Dwarf_Error* dw_error);
01648
01705 DW_API int dwarf_init_path_dl(const char * dw_path,
01706 char * dw_true_path_out_buffer,
01707 unsigned int dw_true_path_bufferlen,
01708 unsigned int dw_groupnumber,
01709 Dwarf_Handler dw_errhand,
01710 Dwarf_Ptr dw_errarg,
01711 Dwarf_Debug* dw_dbg,
01712 char ** dw_dl_path_array,
01713 unsigned int dw_dl_path_array_size,
01714 unsigned char * dw_dl_path_source,
01715 Dwarf_Error* dw_error);
01716
01733 DW_API int dwarf_init_path_dl_a(const char * dw_path,
01734 char * dw_true_path_out_buffer,
01735 unsigned int dw_true_path_bufferlen,
01736 unsigned int dw_groupnumber,
01737 unsigned int dw_universalnumber,
01738 Dwarf_Handler dw_errhand,
01739 Dwarf_Ptr dw_errarg,
01740 Dwarf_Debug* dw_dbg,
01741 char ** dw_dl_path_array,
01742 unsigned int dw_dl_path_array_size,
01743 unsigned char * dw_dl_path_source,
01744 Dwarf_Error* dw_error);
01745
01779 DW_API int dwarf_init_b(int dw_fd,
01780 unsigned int dw_groupnumber,
01781 Dwarf_Handler dw_errhand,
01782 Dwarf_Ptr dw_errarg,
01783 Dwarf_Debug* dw_dbg,
01784 Dwarf_Error* dw_error);
01785
01801 DW_API int dwarf_finish(Dwarf_Debug dw_dbg);
01802
01836 DW_API int dwarf_object_init_b(Dwarf_Obj_Access_Interface_a* dw_obj,
01837 Dwarf_Handler dw_errhand,
01838 Dwarf_Ptr dw_errarg,
01839 unsigned int dw_groupnumber,
01840 Dwarf_Debug* dw_dbg,
01841 Dwarf_Error* dw_error);
01842
01857 DW_API int dwarf_object_finish(Dwarf_Debug dw_dbg);
01858
01889 DW_API int dwarf_set_tied_dbg(Dwarf_Debug dw_split_dbg,
01890 Dwarf_Debug dw_tied_dbg,
01891 Dwarf_Error* dw_error);
01892
01926 DW_API int dwarf_get_tied_dbg(Dwarf_Debug dw_dbg,
01927 Dwarf_Debug * dw_tieddbg_out,
01928 Dwarf_Error * dw_error);
02004 DW_API int dwarf_next_cu_header_e(Dwarf_Debug dw_dbg,
02005 Dwarf_Bool dw_is_info,
02006 Dwarf_Die *dw_cu_die,
02007 Dwarf_Unsigned *dw_cu_header_length,
02008 Dwarf_Half *dw_version_stamp,

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02009     Dwarf_Off      *dw_abbrev_offset,
02010     Dwarf_Half     *dw_address_size,
02011     Dwarf_Half     *dw_length_size,
02012     Dwarf_Half     *dw_extension_size,
02013     Dwarf_Sig8     *dw_type_signature,
02014     Dwarf_Unsigned *dw_typeoffset,
02015     Dwarf_Unsigned *dw_next_cu_header_offset,
02016     Dwarf_Half     *dw_header_cu_type,
02017     Dwarf_Error    *dw_error);
02018
02056 DW_API int dwarf_next_cu_header_d(Dwarf_Debug dw_dbg,
02057     Dwarf_Bool      dw_is_info,
02058     Dwarf_Unsigned *dw_cu_header_length,
02059     Dwarf_Half     *dw_version_stamp,
02060     Dwarf_Off      *dw_abbrev_offset,
02061     Dwarf_Half     *dw_address_size,
02062     Dwarf_Half     *dw_length_size,
02063     Dwarf_Half     *dw_extension_size,
02064     Dwarf_Sig8     *dw_type_signature,
02065     Dwarf_Unsigned *dw_typeoffset,
02066     Dwarf_Unsigned *dw_next_cu_header_offset,
02067     Dwarf_Half     *dw_header_cu_type,
02068     Dwarf_Error    *dw_error);
02069
02085 DW_API int dwarf_siblingof_c(Dwarf_Die dw_die,
02086     Dwarf_Die *dw_return_siblingdie,
02087     Dwarf_Error *dw_error);
02088
02123 DW_API int dwarf_siblingof_b(Dwarf_Debug dw_dbg,
02124     Dwarf_Die dw_die,
02125     Dwarf_Bool dw_is_info,
02126     Dwarf_Die *dw_return_siblingdie,
02127     Dwarf_Error *dw_error);
02128
02169 DW_API int dwarf_cu_header_basics(Dwarf_Die dw_die,
02170     Dwarf_Half *dw_version,
02171     Dwarf_Bool *dw_is_info,
02172     Dwarf_Bool *dw_is_dwo,
02173     Dwarf_Half *dw_offset_size,
02174     Dwarf_Half *dw_address_size,
02175     Dwarf_Half *dw_extension_size,
02176     Dwarf_Sig8 **dw_signature,
02177     Dwarf_Off *dw_offset_of_length,
02178     Dwarf_Unsigned *dw_total_byte_length,
02179     Dwarf_Error *dw_error);
02180
02200 DW_API int dwarf_child(Dwarf_Die dw_die,
02201     Dwarf_Die* dw_return_childdie,
02202     Dwarf_Error* dw_error);
02203
02211 DW_API void dwarf_dealloc_die( Dwarf_Die dw_die);
02212
02230 DW_API int dwarf_die_from_hash_signature(Dwarf_Debug dw_dbg,
02231     Dwarf_Sig8 * dw_hash_sig,
02232     const char * dw_sig_type,
02233     Dwarf_Die* dw_returned_CU_die,
02234     Dwarf_Error* dw_error);
02235
02266 DW_API int dwarf_offdie_b(Dwarf_Debug dw_dbg,
02267     Dwarf_Off      dw_offset,
02268     Dwarf_Bool      dw_is_info,
02269     Dwarf_Die*      dw_return_die,
02270     Dwarf_Error*    dw_error);
02271
02293 DW_API int dwarf_find_die_given_sig8(Dwarf_Debug dw_dbg,
02294     Dwarf_Sig8 *dw_ref,
02295     Dwarf_Die *dw_die_out,
02296     Dwarf_Bool *dw_is_info,
02297     Dwarf_Error *dw_error);
02298
02309 DW_API Dwarf_Bool dwarf_get_die_infotypes_flag(Dwarf_Die dw_die);
02339 DW_API int dwarf_die_abbrev_global_offset(Dwarf_Die dw_die,
02340     Dwarf_Off * dw_abbrev_offset,
02341     Dwarf_Unsigned * dw_abbrev_count,
02342     Dwarf_Error* dw_error);
02343
02354 DW_API int dwarf_tag(Dwarf_Die dw_die,
02355     Dwarf_Half* dw_return_tag,
02356     Dwarf_Error* dw_error);
02357
02370 DW_API int dwarf_dieoffset(Dwarf_Die dw_die,
02371     Dwarf_Off* dw_return_offset,
02372     Dwarf_Error* dw_error);
02373
02392 DW_API int dwarf_debug_addr_index_to_addr(Dwarf_Die dw_die,
02393     Dwarf_Unsigned dw_index,
02394     Dwarf_Addr * dw_return_addr,

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02395     Dwarf_Error * dw_error);
02396
02405 DW_API Dwarf_Bool dwarf_addr_form_is_indexed(int dw_form);
02406
02430 DW_API int dwarf_CU_dieoffset_given_die(Dwarf_Die dw_die,
02431     Dwarf_Off* dw_return_offset,
02432     Dwarf_Error* dw_error);
02433
02454 DW_API int dwarf_get_cu_die_offset_given_cu_header_offset_b(
02455     Dwarf_Debug dw_dbg,
02456     Dwarf_Off dw_in_cu_header_offset,
02457     Dwarf_Bool dw_is_info,
02458     Dwarf_Off * dw_out_cu_die_offset,
02459     Dwarf_Error *dw_error);
02460
02478 DW_API int dwarf_die_CU_offset(Dwarf_Die dw_die,
02479     Dwarf_Off* dw_return_offset,
02480     Dwarf_Error* dw_error);
02481
02502 DW_API int dwarf_die_CU_offset_range(Dwarf_Die dw_die,
02503     Dwarf_Off* dw_return_CU_header_offset,
02504     Dwarf_Off* dw_return_CU_length_bytes,
02505     Dwarf_Error* dw_error);
02506
02524 DW_API int dwarf_attr(Dwarf_Die dw_die,
02525     Dwarf_Half dw_attrnum,
02526     Dwarf_Attribute * dw_returned_attr,
02527     Dwarf_Error* dw_error);
02528
02550 DW_API int dwarf_die_text(Dwarf_Die dw_die,
02551     Dwarf_Half dw_attrnum,
02552     char ** dw_ret_name,
02553     Dwarf_Error * dw_error);
02554
02574 DW_API int dwarf_diename(Dwarf_Die dw_die,
02575     char ** dw_diename,
02576     Dwarf_Error* dw_error);
02577
02595 DW_API Dwarf_Unsigned dwarf_die_abbrev_code(Dwarf_Die dw_die);
02596
02610 DW_API int dwarf_die_abbrev_children_flag(Dwarf_Die dw_die,
02611     Dwarf_Half * dw_ab_has_child);
02612
02636 DW_API int dwarf_validate_die_sibling(Dwarf_Die dw_sibling,
02637     Dwarf_Off* dw_offset);
02638
02639 /* convenience functions, alternative to using dwarf_attrlist */
02640
02659 DW_API int dwarf_hasattr(Dwarf_Die dw_die,
02660     Dwarf_Half dw_attrnum,
02661     Dwarf_Bool * dw_returned_bool,
02662     Dwarf_Error* dw_error);
02663
02699 DW_API int dwarf_offset_list(Dwarf_Debug dw_dbg,
02700     Dwarf_Off dw_offset,
02701     Dwarf_Bool dw_is_info,
02702     Dwarf_Off ** dw_offbuf,
02703     Dwarf_Unsigned * dw_offcount,
02704     Dwarf_Error * dw_error);
02705
02718 DW_API int dwarf_get_die_address_size(Dwarf_Die dw_die,
02719     Dwarf_Half * dw_addr_size,
02720     Dwarf_Error * dw_error);
02721
02722 /* Get both offsets (local and global) */
02742 DW_API int dwarf_die_offsets(Dwarf_Die dw_die,
02743     Dwarf_Off* dw_global_offset,
02744     Dwarf_Off* dw_local_offset,
02745     Dwarf_Error* dw_error);
02746
02769 DW_API int dwarf_get_version_of_die(Dwarf_Die dw_die,
02770     Dwarf_Half * dw_version,
02771     Dwarf_Half * dw_offset_size);
02772
02786 DW_API int dwarf_lowpc(Dwarf_Die dw_die,
02787     Dwarf_Addr * dw_returned_addr,
02788     Dwarf_Error* dw_error);
02789
02821 DW_API int dwarf_highpc_b(Dwarf_Die dw_die,
02822     Dwarf_Addr * dw_return_addr,
02823     Dwarf_Half * dw_return_form,
02824     enum Dwarf_Form_Class * dw_return_class,
02825     Dwarf_Error * dw_error);
02826
02852 DW_API int dwarf_dietype_offset(Dwarf_Die dw_die,
02853     Dwarf_Off * dw_return_offset,
02854     Dwarf_Bool * dw_is_info,

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02855     Dwarf_Error * dw_error);
02856
02868 DW_API int dwarf_bytesize(Dwarf_Die dw_die,
02869     Dwarf_Unsigned * dw_returned_size,
02870     Dwarf_Error* dw_error);
02871
02883 DW_API int dwarf_bitsize(Dwarf_Die dw_die,
02884     Dwarf_Unsigned * dw_returned_size,
02885     Dwarf_Error* dw_error);
02886
02907 DW_API int dwarf_bitoffset(Dwarf_Die dw_die,
02908     Dwarf_Half * dw_attrnum,
02909     Dwarf_Unsigned * dw_returned_offset,
02910     Dwarf_Error* dw_error);
02911
02937 DW_API int dwarf_srclang(Dwarf_Die dw_die,
02938     Dwarf_Unsigned * dw_returned_lang,
02939     Dwarf_Error * dw_error);
02940
02965 DW_API int dwarf_srclanglname(Dwarf_Die dw_die,
02966     Dwarf_Unsigned *dw_returned_lname,
02967     Dwarf_Error *dw_error);
02968
02993 DW_API int dwarf_srclanglname_version(Dwarf_Die dw_die,
02994     const char *dw_returned_verstring,
02995     Dwarf_Error *dw_error);
02996
03025 DW_API int dwarf_language_version_data(
03026     Dwarf_Unsigned dw_lname_name,
03027     int *dw_default_lower_bound,
03028     const char **dw_version_string);
03029
03035 DW_API int dwarf_language_version_string(
03036     Dwarf_Unsigned dw_lname_name,
03037     int *dw_default_lower_bound,
03038     const char **dw_version_string);
03039
03071 DW_API int dwarf_lvn_name_direct(Dwarf_Unsigned dw_lv_lang,
03072     Dwarf_Unsigned dw_lv_ver,
03073     const char **dw_ret_version_name,
03074     const char **dw_ret_version_scheme);
03075
03108 DW_API int dwarf_lvn_name(Dwarf_Die dw_die,
03109     const char **dw_ret_version_name,
03110     const char **dw_ret_version_scheme);
03111
03149 DW_API int dwarf_lvn_table_entry(Dwarf_Unsigned dw_lvn_index,
03150     Dwarf_Unsigned *dw_lvn_language_name,
03151     Dwarf_Unsigned *dw_lvn_language_version,
03152     const char **dw_lvn_language_version_scheme,
03153     const char **dw_lvn_language_version_name);
03154
03167 DW_API int dwarf_arrayorder(Dwarf_Die dw_die,
03168     Dwarf_Unsigned * dw_returned_order,
03169     Dwarf_Error* dw_error);
03199 DW_API int dwarf_attrlist(Dwarf_Die dw_die,
03200     Dwarf_Attribute** dw_attrbuf,
03201     Dwarf_Signed * dw_attrcount,
03202     Dwarf_Error* dw_error);
03203
03222 DW_API int dwarf_hasform(Dwarf_Attribute dw_attr,
03223     Dwarf_Half dw_form,
03224     Dwarf_Bool * dw_returned_bool,
03225     Dwarf_Error* dw_error);
03226
03245 DW_API int dwarf_whatform(Dwarf_Attribute dw_attr,
03246     Dwarf_Half * dw_returned_final_form,
03247     Dwarf_Error* dw_error);
03248
03265 DW_API int dwarf_whatform_direct(Dwarf_Attribute dw_attr,
03266     Dwarf_Half * dw_returned_initial_form,
03267     Dwarf_Error* dw_error);
03268
03284 DW_API int dwarf_whatattr(Dwarf_Attribute dw_attr,
03285     Dwarf_Half * dw_returned_attrnum,
03286     Dwarf_Error* dw_error);
03287
03312 DW_API int dwarf_formref(Dwarf_Attribute dw_attr,
03313     Dwarf_Off* dw_return_offset,
03314     Dwarf_Bool *dw_is_info,
03315     Dwarf_Error *dw_error);
03316
03349 DW_API int dwarf_global_formref_b(Dwarf_Attribute dw_attr,
03350     Dwarf_Off *dw_return_offset,
03351     Dwarf_Bool *dw_offset_is_info,
03352     Dwarf_Error *dw_error);
03353

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03364 DW_API int dwarf_global_formref(Dwarf_Attribute dw_attr,
03365     Dwarf_Off* dw_return_offset,
03366     Dwarf_Error* dw_error);
03367
03386 DW_API int dwarf_formsig8(Dwarf_Attribute dw_attr,
03387     Dwarf_Sig8 * dw_returned_sig_bytes,
03388     Dwarf_Error* dw_error);
03389
03408 DW_API int dwarf_formsig8_const(Dwarf_Attribute dw_attr,
03409     Dwarf_Sig8 * dw_returned_sig_bytes,
03410     Dwarf_Error* dw_error);
03411
03431 DW_API int dwarf_formaddr(Dwarf_Attribute dw_attr,
03432     Dwarf_Addr * dw_returned_addr,
03433     Dwarf_Error* dw_error);
03434
03454 DW_API int dwarf_get_debug_addr_index(Dwarf_Attribute dw_attr,
03455     Dwarf_Unsigned * dw_return_index,
03456     Dwarf_Error * dw_error);
03457
03471 DW_API int dwarf_formflag(Dwarf_Attribute dw_attr,
03472     Dwarf_Bool * dw_returned_bool,
03473     Dwarf_Error* dw_error);
03474
03490 DW_API int dwarf_formudata(Dwarf_Attribute dw_attr,
03491     Dwarf_Unsigned * dw_returned_val,
03492     Dwarf_Error* dw_error);
03493
03508 DW_API int dwarf_formsdata(Dwarf_Attribute dw_attr,
03509     Dwarf_Signed * dw_returned_val,
03510     Dwarf_Error* dw_error);
03511
03529 DW_API int dwarf_formdata16(Dwarf_Attribute dw_attr,
03530     Dwarf_Form_Data16 * dw_returned_val,
03531     Dwarf_Error* dw_error);
03532
03551 DW_API int dwarf_formblock(Dwarf_Attribute dw_attr,
03552     Dwarf_Block ** dw_returned_block,
03553     Dwarf_Error* dw_error);
03554
03569 DW_API int dwarf_formstring(Dwarf_Attribute dw_attr,
03570     char ** dw_returned_string,
03571     Dwarf_Error* dw_error);
03572
03588 DW_API int dwarf_get_debug_str_index(Dwarf_Attribute dw_attr,
03589     Dwarf_Unsigned * dw_return_index,
03590     Dwarf_Error * dw_error);
03591
03610 DW_API int dwarf_formexprloc(Dwarf_Attribute dw_attr,
03611     Dwarf_Unsigned * dw_return_exprlen,
03612     Dwarf_Ptr * dw_block_ptr,
03613     Dwarf_Error * dw_error);
03614
03634 DW_API enum Dwarf_Form_Class dwarf_get_form_class(
03635     Dwarf_Half dw_version,
03636     Dwarf_Half dw_attrnum,
03637     Dwarf_Half dw_offset_size,
03638     Dwarf_Half dw_form);
03639
03655 DW_API int dwarf_attr_offset(Dwarf_Die dw_die,
03656     Dwarf_Attribute dw_attr,
03657     Dwarf_Off * dw_return_offset,
03658     Dwarf_Error * dw_error);
03659
03667 DW_API int dwarf_uncompress_integer_block_a(Dwarf_Debug dw_dbg,
03668     Dwarf_Unsigned dw_input_length_in_bytes,
03669     void * dw_input_block,
03670     Dwarf_Unsigned * dw_value_count,
03671     Dwarf_Signed ** dw_value_array,
03672     Dwarf_Error * dw_error);
03673
03681 DW_API void dwarf_dealloc_uncompressed_block(Dwarf_Debug dw_dbg,
03682     void *dw_value_array);
03683
03703 DW_API int dwarf_convert_to_global_offset(Dwarf_Attribute dw_attr,
03704     Dwarf_Off dw_offset,
03705     Dwarf_Off* dw_return_offset,
03706     Dwarf_Error* dw_error);
03707
03713 DW_API void dwarf_dealloc_attribute(Dwarf_Attribute dw_attr);
03714
03741 DW_API int dwarf_discr_list(Dwarf_Debug dw_dbg,
03742     Dwarf_Small * dw_blockpointer,
03743     Dwarf_Unsigned dw_blocklen,
03744     Dwarf_Dsc_Head * dw_dsc_head_out,
03745     Dwarf_Unsigned * dw_dsc_array_length_out,
03746     Dwarf_Error * dw_error);
```

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03747
03773 DW_API int dwarf_discr_entry_u(Dwarf_Disc_Head dw_dsc,
03774     Dwarf_Unsigned dw_entrynum,
03775     Dwarf_Half * dw_out_type,
03776     Dwarf_Unsigned * dw_out_discr_low,
03777     Dwarf_Unsigned * dw_out_discr_high,
03778     Dwarf_Error * dw_error);
03779
03785 DW_API int dwarf_discr_entry_s(Dwarf_Disc_Head dw_dsc,
03786     Dwarf_Unsigned dw_entrynum,
03787     Dwarf_Half * dw_out_type,
03788     Dwarf_Signed * dw_out_discr_low,
03789     Dwarf_Signed * dw_out_discr_high,
03790     Dwarf_Error * dw_error);
03791
03869 DW_API int dwarf_srcfiles(Dwarf_Die dw_cu_die,
03870     char *** dw_srcfiles,
03871     Dwarf_Signed * dw_filecount,
03872     Dwarf_Error * dw_error);
03873
03900 DW_API int dwarf_srclines_b(Dwarf_Die dw_cudie,
03901     Dwarf_Unsigned * dw_version_out,
03902     Dwarf_Small * dw_table_count,
03903     Dwarf_Line_Context * dw_linecontext,
03904     Dwarf_Error * dw_error);
03905
03926 DW_API int dwarf_srclines_from_linecontext(
03927     Dwarf_Line_Context dw_linecontext,
03928     Dwarf_Line ** dw_linebuf,
03929     Dwarf_Signed * dw_linecount,
03930     Dwarf_Error * dw_error);
03931
03948 DW_API int dwarf_srclines_two_level_from_linecontext(
03949     Dwarf_Line_Context dw_context,
03950     Dwarf_Line ** dw_linebuf,
03951     Dwarf_Signed * dw_linecount,
03952     Dwarf_Line ** dw_linebuf_actuais,
03953     Dwarf_Signed * dw_linecount_actuais,
03954     Dwarf_Error * dw_error);
03955
03965 DW_API void dwarf_srclines_dealloc_b(Dwarf_Line_Context dw_context);
03966
03982 DW_API int dwarf_srclines_table_offset(Dwarf_Line_Context dw_context,
03983     Dwarf_Unsigned * dw_offset,
03984     Dwarf_Error * dw_error);
03985
04001 DW_API int dwarf_srclines_comp_dir(Dwarf_Line_Context dw_context,
04002     const char ** dw_compilation_directory,
04003     Dwarf_Error * dw_error);
04004
04020 DW_API int dwarf_srclines_subprog_count(Dwarf_Line_Context dw_context,
04021     Dwarf_Signed * dw_count,
04022     Dwarf_Error * dw_error);
04023
04042 DW_API int dwarf_srclines_subprog_data(Dwarf_Line_Context dw_context,
04043     Dwarf_Signed dw_index,
04044     const char ** dw_name,
04045     Dwarf_Unsigned * dw_decl_file,
04046     Dwarf_Unsigned * dw_decl_line,
04047     Dwarf_Error * dw_error);
04048
04073 DW_API int dwarf_srclines_files_indexes(
04074     Dwarf_Line_Context dw_context,
04075     Dwarf_Signed * dw_baseindex,
04076     Dwarf_Signed * dw_count,
04077     Dwarf_Signed * dw_endindex,
04078     Dwarf_Error * dw_error);
04079
04131 DW_API int dwarf_srclines_files_data_b(
04132     Dwarf_Line_Context dw_context,
04133     Dwarf_Signed dw_index_in,
04134     const char ** dw_name,
04135     Dwarf_Unsigned * dw_directory_index,
04136     Dwarf_Unsigned * dw_last_mod_time,
04137     Dwarf_Unsigned * dw_file_length,
04138     Dwarf_Form_Data16 ** dw_md5ptr,
04139     Dwarf_Error * dw_error);
04140
04155 DW_API int dwarf_srclines_include_dir_count(
04156     Dwarf_Line_Context dw_line_context,
04157     Dwarf_Signed * dw_count,
04158     Dwarf_Error * dw_error);
04159
04182 DW_API int dwarf_srclines_include_dir_data(
04183     Dwarf_Line_Context dw_line_context,
04184     Dwarf_Signed dw_index,
04185     const char ** dw_name,

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04186     Dwarf_Error * dw_error);
04187
04216 DW_API int dwarf_srclines_version(Dwarf_Line_Context dw_line_context,
04217     Dwarf_Unsigned * dw_version,
04218     Dwarf_Small * dw_table_count,
04219     Dwarf_Error * dw_error);
04220
04236 DW_API int dwarf_linebeginstatement(Dwarf_Line dw_line,
04237     Dwarf_Bool * dw_returned_bool,
04238     Dwarf_Error * dw_error);
04239
04255 DW_API int dwarf_lineendsequence(Dwarf_Line dw_line,
04256     Dwarf_Bool * dw_returned_bool,
04257     Dwarf_Error * dw_error);
04258
04273 DW_API int dwarf_lineno(Dwarf_Line dw_line,
04274     Dwarf_Unsigned * dw_returned_lineno,
04275     Dwarf_Error * dw_error);
04276
04291 DW_API int dwarf_line_srcfileno(Dwarf_Line dw_line,
04292     Dwarf_Unsigned * dw_returned_fileno,
04293     Dwarf_Error * dw_error);
04294
04308 DW_API int dwarf_line_is_addr_set(Dwarf_Line dw_line,
04309     Dwarf_Bool * dw_is_addr_set,
04310     Dwarf_Error * dw_error);
04311
04326 DW_API int dwarf_lineaddr(Dwarf_Line dw_line,
04327     Dwarf_Addr * dw_returned_addr,
04328     Dwarf_Error * dw_error);
04329
04344 DW_API int dwarf_lineoff_b(Dwarf_Line dw_line,
04345     Dwarf_Unsigned * dw_returned_lineoffset,
04346     Dwarf_Error * dw_error);
04347
04372 DW_API int dwarf_linesrc(Dwarf_Line dw_line,
04373     char ** dw_returned_name,
04374     Dwarf_Error * dw_error);
04375
04390 DW_API int dwarf_lineblock(Dwarf_Line dw_line,
04391     Dwarf_Bool * dw_returned_bool,
04392     Dwarf_Error * dw_error);
04393
04394 /* We gather these into one call as it's likely one
04395    will want all or none of them. */
04419 DW_API int dwarf_prologue_end_etc(Dwarf_Line dw_line,
04420     Dwarf_Bool * dw_prologue_end,
04421     Dwarf_Bool * dw_epilogue_begin,
04422     Dwarf_Unsigned * dw_isa,
04423     Dwarf_Unsigned * dw_discriminator,
04424     Dwarf_Error * dw_error);
04425 /* End line table operations */
04426
04432 DW_API int dwarf_linelogical(Dwarf_Line dw_line,
04433     Dwarf_Unsigned * dw_returned_logical,
04434     Dwarf_Error * dw_error);
04435
04442 DW_API int dwarf_linecontext(Dwarf_Line dw_line,
04443     Dwarf_Unsigned * dw_returned_context,
04444     Dwarf_Error * dw_error);
04445
04454 DW_API int dwarf_line_subprogno(Dwarf_Line /*line*/,
04455     Dwarf_Unsigned * /*ret_subprogno*/,
04456     Dwarf_Error * /*error*/);
04457
04464 DW_API int dwarf_line_subprog(Dwarf_Line /*line*/,
04465     char ** /*returned_subprog_name*/,
04466     char ** /*returned_filename*/,
04467     Dwarf_Unsigned * /*returned_lineno*/,
04468     Dwarf_Error * /*error*/);
04469
04490 DW_API int dwarf_check_lineheader_b(Dwarf_Die dw_cu_die,
04491     int * dw_errcount_out,
04492     Dwarf_Error * dw_error);
04493
04523 DW_API int dwarf_print_lines(Dwarf_Die dw_cu_die,
04524     Dwarf_Error * dw_error,
04525     int * dw_errorcount_out);
04526
04547 DW_API struct Dwarf_Printf_Callback_Info_s
04548     dwarf_register_printf_callback(Dwarf_Debug dw_dbg,
04549     struct Dwarf_Printf_Callback_Info_s * dw_callbackinfo);
04550
04610 DW_API int dwarf_get_ranges_b(Dwarf_Debug dw_dbg,
04611     Dwarf_Off * dw_rangesoffset,
04612     Dwarf_Die dw_die,
04613     Dwarf_Off * dw_return_realoffset,

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04614     Dwarf_Ranges ** dw_rangesbuf,
04615     Dwarf_Signed * dw_rangecount,
04616     Dwarf_Unsigned * dw_bytecount,
04617     Dwarf_Error * dw_error);
04618
04628 DW_API void dwarf_dealloc_ranges(Dwarf_Debug dw_dbg,
04629     Dwarf_Ranges * dw_rangesbuf,
04630     Dwarf_Signed dw_rangecount);
04631
04672 DW_API int dwarf_get_ranges_baseaddress(Dwarf_Debug dw_dbg,
04673     Dwarf_Die dw_die,
04674     Dwarf_Bool *dw_known_base,
04675     Dwarf_Unsigned *dw_baseaddress,
04676     Dwarf_Bool *dw_at_ranges_offset_present,
04677     Dwarf_Unsigned *dw_at_ranges_offset,
04678     Dwarf_Error *dw_error);
04679
04725 DW_API int dwarf_rnglists_get_rle_head(Dwarf_Attribute dw_attr,
04726     Dwarf_Half dw_theform,
04727     Dwarf_Unsigned dw_index_or_offset_value,
04728     Dwarf_Rnglists_Head * dw_head_out,
04729     Dwarf_Unsigned * dw_count_of_entries_in_head,
04730     Dwarf_Unsigned * dw_global_offset_of_rle_set,
04731     Dwarf_Error * dw_error);
04732
04775 DW_API int dwarf_get_rnglists_entry_fields_a(
04776     Dwarf_Rnglists_Head dw_head,
04777     Dwarf_Unsigned dw_entrynum,
04778     unsigned int * dw_entrylen,
04779     unsigned int * dw_rle_value_out,
04780     Dwarf_Unsigned * dw_raw1,
04781     Dwarf_Unsigned * dw_raw2,
04782     Dwarf_Bool * dw_debug_addr_unavailable,
04783     Dwarf_Unsigned * dw_cooked1,
04784     Dwarf_Unsigned * dw_cooked2,
04785     Dwarf_Error * dw_error);
04786
04794 DW_API void dwarf_dealloc_rnglists_head(Dwarf_Rnglists_Head dw_head);
04795
04826 DW_API int dwarf_load_rnglists(Dwarf_Debug dw_dbg,
04827     Dwarf_Unsigned * dw_rnglists_count,
04828     Dwarf_Error * dw_error);
04829
04856 DW_API int dwarf_get_rnglist_offset_index_value(Dwarf_Debug dw_dbg,
04857     Dwarf_Unsigned dw_context_index,
04858     Dwarf_Unsigned dw_offsetentry_index,
04859     Dwarf_Unsigned * dw_offset_value_out,
04860     Dwarf_Unsigned * dw_global_offset_value_out,
04861     Dwarf_Error * dw_error);
04862
04869 DW_API int dwarf_get_rnglist_head_basics(Dwarf_Rnglists_Head dw_head,
04870     Dwarf_Unsigned * dw_rle_count,
04871     Dwarf_Unsigned * dw_rnglists_version,
04872     Dwarf_Unsigned * dw_rnglists_index_returned,
04873     Dwarf_Unsigned * dw_bytes_total_in_rle,
04874     Dwarf_Half * dw_offset_size,
04875     Dwarf_Half * dw_address_size,
04876     Dwarf_Half * dw_segment_selector_size,
04877     Dwarf_Unsigned * dw_overall_offset_of_this_context,
04878     Dwarf_Unsigned * dw_total_length_of_this_context,
04879     Dwarf_Unsigned * dw_offset_table_offset,
04880     Dwarf_Unsigned * dw_offset_table_entrycount,
04881     Dwarf_Bool * dw_rnglists_base_present,
04882     Dwarf_Unsigned * dw_rnglists_base,
04883     Dwarf_Bool * dw_rnglists_base_address_present,
04884     Dwarf_Unsigned * dw_rnglists_base_address,
04885     Dwarf_Bool * dw_rnglists_debug_addr_base_present,
04886     Dwarf_Unsigned * dw_rnglists_debug_addr_base,
04887     Dwarf_Error * dw_error);
04888
04904 DW_API int dwarf_get_rnglist_context_basics(Dwarf_Debug dw_dbg,
04905     Dwarf_Unsigned dw_index,
04906     Dwarf_Unsigned * dw_header_offset,
04907     Dwarf_Small * dw_offset_size,
04908     Dwarf_Small * dw_extension_size,
04909     unsigned int * dw_version,
04910     Dwarf_Small * dw_address_size,
04911     Dwarf_Small * dw_segment_selector_size,
04912     Dwarf_Unsigned * dw_offset_entry_count,
04913     Dwarf_Unsigned * dw_offset_of_offset_array,
04914     Dwarf_Unsigned * dw_offset_of_first_rangeentry,
04915     Dwarf_Unsigned * dw_offset_past_last_rangeentry,
04916     Dwarf_Error * dw_error);
04917
04927 DW_API int dwarf_get_rnglist_rle(Dwarf_Debug dw_dbg,
04928     Dwarf_Unsigned dw_contextnumber,
04929     Dwarf_Unsigned dw_entry_offset,

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04930     Dwarf_Unsigned dw_endoffset,
04931     unsigned int   * dw_entrylen,
04932     unsigned int   * dw_entry_kind,
04933     Dwarf_Unsigned * dw_entry_operand1,
04934     Dwarf_Unsigned * dw_entry_operand2,
04935     Dwarf_Error    * dw_error);
04962 DW_API int dwarf_get_loclist_c(Dwarf_Attribute dw_attr,
04963     Dwarf_Loc_Head_c * dw_loclist_head,
04964     Dwarf_Unsigned   * dw_locentry_count,
04965     Dwarf_Error      * dw_error);
04966
04967 #define DW_LKIND_expression 0 /* DWARF2,3,4,5 */
04968 #define DW_LKIND_loclist   1 /* DWARF 2,3,4 */
04969 #define DW_LKIND_GNU_exp_list 2 /* GNU DWARF4 .dwo extension */
04970 #define DW_LKIND_loclists  5 /* DWARF5 loclists */
04971 #define DW_LKIND_unknown   99
04972
04985 DW_API int dwarf_get_loclist_head_kind(
04986     Dwarf_Loc_Head_c dw_loclist_head,
04987     unsigned int      * dw_lkind,
04988     Dwarf_Error       * dw_error);
04989
05044 DW_API int dwarf_get_locdesc_entry_d(Dwarf_Loc_Head_c dw_loclist_head,
05045     Dwarf_Unsigned dw_index,
05046     Dwarf_Small    * dw_lle_value_out,
05047     Dwarf_Unsigned * dw_rawlowpc,
05048     Dwarf_Unsigned * dw_rawhipc,
05049     Dwarf_Bool     * dw_debug_addr_unavailable,
05050     Dwarf_Addr     * dw_lowpc_cooked,
05051     Dwarf_Addr     * dw_hipc_cooked,
05052     Dwarf_Unsigned * dw_locexpr_op_count_out,
05053     Dwarf_Locdesc_c * dw_locentry_out,
05054     Dwarf_Small    * dw_loclist_source_out,
05055     Dwarf_Unsigned * dw_expression_offset_out,
05056     Dwarf_Unsigned * dw_locdesc_offset_out,
05057     Dwarf_Error    * dw_error);
05058
05078 DW_API int dwarf_get_locdesc_entry_e(Dwarf_Loc_Head_c dw_loclist_head,
05079     Dwarf_Unsigned dw_index,
05080     Dwarf_Small    * dw_lle_value_out,
05081     Dwarf_Unsigned * dw_rawlowpc,
05082     Dwarf_Unsigned * dw_rawhipc,
05083     Dwarf_Bool     * dw_debug_addr_unavailable,
05084     Dwarf_Addr     * dw_lowpc_cooked,
05085     Dwarf_Addr     * dw_hipc_cooked,
05086     Dwarf_Unsigned * dw_locexpr_op_count_out,
05087     Dwarf_Unsigned * dw_lle_bytecount,
05088     Dwarf_Locdesc_c * dw_locentry_out,
05089     Dwarf_Small    * dw_loclist_source_out,
05090     Dwarf_Unsigned * dw_expression_offset_out,
05091     Dwarf_Unsigned * dw_locdesc_offset_out,
05092     Dwarf_Error    * dw_error);
05093
05119 DW_API int dwarf_get_location_op_value_c(Dwarf_Locdesc_c dw_locdesc,
05120     Dwarf_Unsigned dw_index,
05121     Dwarf_Small    * dw_operator_out,
05122     Dwarf_Unsigned * dw_operand1,
05123     Dwarf_Unsigned * dw_operand2,
05124     Dwarf_Unsigned * dw_operand3,
05125     Dwarf_Unsigned * dw_offset_for_branch,
05126     Dwarf_Error*    dw_error);
05158 DW_API int dwarf_loclist_from_expr_c(Dwarf_Debug dw_dbg,
05159     Dwarf_Ptr dw_expression_in,
05160     Dwarf_Unsigned dw_expression_length,
05161     Dwarf_Half dw_address_size,
05162     Dwarf_Half dw_offset_size,
05163     Dwarf_Half dw_dwarf_version,
05164     Dwarf_Loc_Head_c* dw_loc_head,
05165     Dwarf_Unsigned * dw_listlen,
05166     Dwarf_Error    * dw_error);
05167
05175 DW_API void dwarf_dealloc_loc_head_c(Dwarf_Loc_Head_c dw_head);
05176
05177 /* These interfaces allow reading the .debug_loclists
05178    section. Independently of DIEs.
05179    Normal use of .debug_loclists uses
05180    dwarf_get_loclist_c() to open access to any kind of location
05181    or loclist and uses dwarf_loc_head_c_dealloc() to
05182    deallocate that memory once one is finished with
05183    that data. So for most purposes you do not need
05184    to use these functions
05185    See dwarf_get_loclist_c() to open a Dwarf_Loc_Head_c
05186    on any type of location list or expression. */
05187
05188 /* Loads all the loclists headers and
05189    returns DW_DLV_NO_ENTRY if the section
05190    is missing or empty.

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05191     Intended to be done quite early and
05192     it is automatically
05193     done if .debug_info is loaded.
05194     Doing it more than once is never necessary
05195     or harmful. There is no deallocation call
05196     made visible, deallocation happens
05197     when dwarf_finish() is called.
05198     With DW_DLV_OK it returns the number of
05199     loclists headers in the section through
05200     loclists_count. */
05230 DW_API int dwarf_load_loclists(Dwarf_Debug dw_dbg,
05231     Dwarf_Unsigned * dw_loclists_count,
05232     Dwarf_Error * dw_error);
05233
05259 DW_API int dwarf_get_loclist_offset_index_value(Dwarf_Debug dw_dbg,
05260     Dwarf_Unsigned dw_context_index,
05261     Dwarf_Unsigned dw_offsetentry_index,
05262     Dwarf_Unsigned * dw_offset_value_out,
05263     Dwarf_Unsigned * dw_global_offset_value_out,
05264     Dwarf_Error * dw_error);
05265
05280 DW_API int dwarf_get_loclist_head_basics(Dwarf_Loc_Head_c dw_head,
05281     Dwarf_Small * dw_lkind,
05282     Dwarf_Unsigned * dw_lle_count,
05283     Dwarf_Unsigned * dw_loclists_version,
05284     Dwarf_Unsigned * dw_loclists_index_returned,
05285     Dwarf_Unsigned * dw_bytes_total_in_rle,
05286     Dwarf_Half * dw_offset_size,
05287     Dwarf_Half * dw_address_size,
05288     Dwarf_Half * dw_segment_selector_size,
05289     Dwarf_Unsigned * dw_overall_offset_of_this_context,
05290     Dwarf_Unsigned * dw_total_length_of_this_context,
05291     Dwarf_Unsigned * dw_offset_table_offset,
05292     Dwarf_Unsigned * dw_offset_table_entrycount,
05293     Dwarf_Bool * dw_loclists_base_present,
05294     Dwarf_Unsigned * dw_loclists_base,
05295     Dwarf_Bool * dw_loclists_base_address_present,
05296     Dwarf_Unsigned * dw_loclists_base_address,
05297     Dwarf_Bool * dw_loclists_debug_addr_base_present,
05298     Dwarf_Unsigned * dw_loclists_debug_addr_base,
05299     Dwarf_Unsigned * dw_offset_this_lle_area,
05300     Dwarf_Error * dw_error);
05301
05310 DW_API int dwarf_get_loclist_context_basics(Dwarf_Debug dw_dbg,
05311     Dwarf_Unsigned dw_index,
05312     Dwarf_Unsigned * dw_header_offset,
05313     Dwarf_Small * dw_offset_size,
05314     Dwarf_Small * dw_extension_size,
05315     unsigned int * dw_version,
05316     Dwarf_Small * dw_address_size,
05317     Dwarf_Small * dw_segment_selector_size,
05318     Dwarf_Unsigned * dw_offset_entry_count,
05319     Dwarf_Unsigned * dw_offset_of_offset_array,
05320     Dwarf_Unsigned * dw_offset_of_first_locentry,
05321     Dwarf_Unsigned * dw_offset_past_last_locentry,
05322     Dwarf_Error * dw_error);
05323
05328 DW_API int dwarf_get_loclist_lle(Dwarf_Debug dw_dbg,
05329     Dwarf_Unsigned dw_contextnumber,
05330     Dwarf_Unsigned dw_entry_offset,
05331     Dwarf_Unsigned dw_endoffset,
05332     unsigned int * dw_entrylen,
05333     unsigned int * dw_entry_kind,
05334     Dwarf_Unsigned * dw_entry_operand1,
05335     Dwarf_Unsigned * dw_entry_operand2,
05336     Dwarf_Unsigned * dw_expr_ops_blocksize,
05337     Dwarf_Unsigned * dw_expr_ops_offset,
05338     Dwarf_Small ** dw_expr_opsdata,
05339     Dwarf_Error * dw_error);
05419 DW_API int dwarf_debug_addr_table(Dwarf_Debug dw_dbg,
05420     Dwarf_Debug_Addr_Table *dw_table_header,
05421     Dwarf_Unsigned *dw_length,
05422     Dwarf_Half *dw_version,
05423     Dwarf_Small *dw_address_size,
05424     Dwarf_Unsigned *dw_at_addr_base,
05425     Dwarf_Unsigned *dw_entry_count,
05426     Dwarf_Unsigned *dw_next_table_offset,
05427     Dwarf_Error *dw_error);
05428
05452 DW_API int dwarf_debug_addr_by_index(Dwarf_Debug_Addr_Table dw_dat,
05453     Dwarf_Unsigned dw_entry_index,
05454     Dwarf_Unsigned *dw_address,
05455     Dwarf_Error *dw_error);
05456
05464 DW_API void dwarf_dealloc_debug_addr_table(
05465     Dwarf_Debug_Addr_Table dw_dat);

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05466
05503 DW_API int dwarf_get_macro_context(Dwarf_Die dw_die,
05504     Dwarf_Unsigned * dw_version_out,
05505     Dwarf_Macro_Context * dw_macro_context,
05506     Dwarf_Unsigned * dw_macro_unit_offset_out,
05507     Dwarf_Unsigned * dw_macro_ops_count_out,
05508     Dwarf_Unsigned * dw_macro_ops_data_length_out,
05509     Dwarf_Error * dw_error);
05510
05538 DW_API int dwarf_get_macro_context_by_offset(Dwarf_Die dw_die,
05539     Dwarf_Unsigned dw_offset,
05540     Dwarf_Unsigned * dw_version_out,
05541     Dwarf_Macro_Context * dw_macro_context,
05542     Dwarf_Unsigned * dw_macro_ops_count_out,
05543     Dwarf_Unsigned * dw_macro_ops_data_length,
05544     Dwarf_Error * dw_error);
05545
05546 /* New December 2020. libdwarf 0.1.0
05547    Sometimes its necessary to know
05548    a context total length including macro 5 header */
05561 DW_API int dwarf_macro_context_total_length(
05562     Dwarf_Macro_Context dw_context,
05563     Dwarf_Unsigned * dw_mac_total_len,
05564     Dwarf_Error * dw_error);
05565
05573 DW_API void dwarf_dealloc_macro_context(Dwarf_Macro_Context dw_mc);
05574
05580 DW_API int dwarf_macro_context_head(Dwarf_Macro_Context dw_mc,
05581     Dwarf_Half * dw_version,
05582     Dwarf_Unsigned * dw_mac_offset,
05583     Dwarf_Unsigned * dw_mac_len,
05584     Dwarf_Unsigned * dw_mac_header_len,
05585     unsigned int * dw_flags,
05586     Dwarf_Bool * dw_has_line_offset,
05587     Dwarf_Unsigned * dw_line_offset,
05588     Dwarf_Bool * dw_has_offset_size_64,
05589     Dwarf_Bool * dw_has_operands_table,
05590     Dwarf_Half * dw_opcode_count,
05591     Dwarf_Error * dw_error);
05592
05615 DW_API int dwarf_macro_operands_table(Dwarf_Macro_Context dw_mc,
05616     Dwarf_Half dw_index, /* 0 to opcode_count -1 */
05617     Dwarf_Half * dw_opcode_number,
05618     Dwarf_Half * dw_operand_count,
05619     const Dwarf_Small ** dw_operand_array,
05620     Dwarf_Error * dw_error);
05621
05646 DW_API int dwarf_get_macro_op(Dwarf_Macro_Context dw_macro_context,
05647     Dwarf_Unsigned dw_op_number,
05648     Dwarf_Unsigned * dw_op_start_section_offset,
05649     Dwarf_Half * dw_macro_operator,
05650     Dwarf_Half * dw_forms_count,
05651     const Dwarf_Small ** dw_formcode_array,
05652     Dwarf_Error * dw_error);
05653
05691 DW_API int dwarf_get_macro_defundef(
05692     Dwarf_Macro_Context dw_macro_context,
05693     Dwarf_Unsigned dw_op_number,
05694     Dwarf_Unsigned * dw_line_number,
05695     Dwarf_Unsigned * dw_index,
05696     Dwarf_Unsigned * dw_offset,
05697     Dwarf_Half * dw_forms_count,
05698     const char ** dw_macro_string,
05699     Dwarf_Error * dw_error);
05700
05728 DW_API int dwarf_get_macro_startend_file(
05729     Dwarf_Macro_Context dw_macro_context,
05730     Dwarf_Unsigned dw_op_number,
05731     Dwarf_Unsigned * dw_line_number,
05732     Dwarf_Unsigned * dw_name_index_to_line_tab,
05733     const char ** dw_src_file_name,
05734     Dwarf_Error * dw_error);
05735
05751 DW_API int dwarf_get_macro_import(
05752     Dwarf_Macro_Context dw_macro_context,
05753     Dwarf_Unsigned dw_op_number,
05754     Dwarf_Unsigned * dw_target_offset,
05755     Dwarf_Error * dw_error);
05784 DW_API char* dwarf_find_macro_value_start(char * dw_macro_string);
05785
05811 DW_API int dwarf_get_macro_details(Dwarf_Debug dw_dbg,
05812     Dwarf_Off dw_macro_offset,
05813     Dwarf_Unsigned dw_maximum_count,
05814     Dwarf_Signed * dw_entry_count,
05815     Dwarf_Macro_Details ** dw_details,
05816     Dwarf_Error * dw_error);
05817

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05860 DW_API int dwarf_get_fde_list(Dwarf_Debug dw_dbg,
05861     Dwarf_Cie** dw_cie_data,
05862     Dwarf_Signed* dw_cie_element_count,
05863     Dwarf_Fde** dw_fde_data,
05864     Dwarf_Signed* dw_fde_element_count,
05865     Dwarf_Error* dw_error);
05875 DW_API int dwarf_get_fde_list_eh(Dwarf_Debug dw_dbg,
05876     Dwarf_Cie** dw_cie_data,
05877     Dwarf_Signed* dw_cie_element_count,
05878     Dwarf_Fde** dw_fde_data,
05879     Dwarf_Signed* dw_fde_element_count,
05880     Dwarf_Error* dw_error);
05881
05901 DW_API void dwarf_dealloc_fde_cie_list(Dwarf_Debug dw_dbg,
05902     Dwarf_Cie * dw_cie_data,
05903     Dwarf_Signed dw_cie_element_count,
05904     Dwarf_Fde * dw_fde_data,
05905     Dwarf_Signed dw_fde_element_count);
05906
05934 DW_API int dwarf_get_fde_range(Dwarf_Fde dw_fde,
05935     Dwarf_Addr* dw_low_pc,
05936     Dwarf_Unsigned* dw_func_length,
05937     Dwarf_Small **dw_fde_bytes,
05938     Dwarf_Unsigned* dw_fde_byte_length,
05939     Dwarf_Off* dw_cie_offset,
05940     Dwarf_Signed* dw_cie_index,
05941     Dwarf_Off* dw_fde_offset,
05942     Dwarf_Error* dw_error);
05943
05949 DW_API int dwarf_get_fde_exception_info(Dwarf_Fde dw_fde,
05950     Dwarf_Signed* dw_offset_into_exception_tables,
05951     Dwarf_Error* dw_error);
05952
05964 DW_API int dwarf_get_cie_of_fde(Dwarf_Fde dw_fde,
05965     Dwarf_Cie * dw_cie_returned,
05966     Dwarf_Error* dw_error);
05967
06001 DW_API int dwarf_get_cie_info_b(Dwarf_Cie dw_cie,
06002     Dwarf_Unsigned * dw_bytes_in_cie,
06003     Dwarf_Small* dw_version,
06004     char ** dw_augmenter,
06005     Dwarf_Unsigned* dw_code_alignment_factor,
06006     Dwarf_Signed* dw_data_alignment_factor,
06007     Dwarf_Half* dw_return_address_register_rule,
06008     Dwarf_Small ** dw_initial_instructions,
06009     Dwarf_Unsigned* dw_initial_instructions_length,
06010     Dwarf_Half* dw_offset_size,
06011     Dwarf_Error* dw_error);
06012
06025 DW_API int dwarf_get_cie_index(Dwarf_Cie dw_cie,
06026     Dwarf_Signed* dw_index,
06027     Dwarf_Error * dw_error);
06028
06047 DW_API int dwarf_get_fde_instr_bytes(Dwarf_Fde dw_fde,
06048     Dwarf_Small ** dw_outinstrs,
06049     Dwarf_Unsigned * dw_outlen,
06050     Dwarf_Error * dw_error);
06051
06084 DW_API int dwarf_get_fde_info_for_all_reg3_b(Dwarf_Fde dw_fde,
06085     Dwarf_Addr dw_pc_requested,
06086     Dwarf_Regtable3* dw_reg_table,
06087     Dwarf_Addr* dw_row_pc,
06088     Dwarf_Bool* dw_has_more_rows,
06089     Dwarf_Addr* dw_subsequent_pc,
06090     Dwarf_Error* dw_error);
06091
06101 DW_API int dwarf_get_fde_info_for_all_reg3(Dwarf_Fde dw_fde,
06102     Dwarf_Addr dw_pc_requested,
06103     Dwarf_Regtable3* dw_reg_table,
06104     Dwarf_Addr* dw_row_pc,
06105     Dwarf_Error* dw_error);
06106
06107 /* See discussion of dw_value_type, libdwarf.h. */
06167 DW_API int dwarf_get_fde_info_for_reg3_c(Dwarf_Fde dw_fde,
06168     Dwarf_Half dw_table_column,
06169     Dwarf_Addr dw_pc_requested,
06170     Dwarf_Small * dw_value_type,
06171     Dwarf_Unsigned * dw_offset_relevant,
06172     Dwarf_Unsigned * dw_register,
06173     Dwarf_Signed * dw_offset,
06174     Dwarf_Block * dw_block_content,
06175     Dwarf_Addr * dw_row_pc_out,
06176     Dwarf_Bool * dw_has_more_rows,
06177     Dwarf_Addr * dw_subsequent_pc,
06178     Dwarf_Error * dw_error);
06179
06189 DW_API int dwarf_get_fde_info_for_reg3_b(Dwarf_Fde dw_fde,

```

```

06190 Dwarf_Half dw_table_column,
06191 Dwarf_Addr dw_pc_requested,
06192 Dwarf_Small * dw_value_type,
06193 Dwarf_Unsigned * dw_offset_relevant,
06194 Dwarf_Unsigned * dw_register,
06195 Dwarf_Unsigned * dw_offset,
06196 Dwarf_Block * dw_block_content,
06197 Dwarf_Addr * dw_row_pc_out,
06198 Dwarf_Bool * dw_has_more_rows,
06199 Dwarf_Addr * dw_subsequent_pc,
06200 Dwarf_Error * dw_error);
06201
06225 DW_API int dwarf_get_fde_info_for_cfa_reg3_c(Dwarf_Fde dw_fde,
06226 Dwarf_Addr dw_pc_requested,
06227 Dwarf_Small * dw_value_type,
06228 Dwarf_Unsigned* dw_offset_relevant,
06229 Dwarf_Unsigned* dw_register,
06230 Dwarf_Signed * dw_offset,
06231 Dwarf_Block * dw_block,
06232 Dwarf_Addr * dw_row_pc_out,
06233 Dwarf_Bool * dw_has_more_rows,
06234 Dwarf_Addr * dw_subsequent_pc,
06235 Dwarf_Error * dw_error);
06245 DW_API int dwarf_get_fde_info_for_cfa_reg3_b(Dwarf_Fde dw_fde,
06246 Dwarf_Addr dw_pc_requested,
06247 Dwarf_Small * dw_value_type,
06248 Dwarf_Unsigned* dw_offset_relevant,
06249 Dwarf_Unsigned* dw_register,
06250 Dwarf_Unsigned* dw_offset,
06251 Dwarf_Block * dw_block,
06252 Dwarf_Addr * dw_row_pc_out,
06253 Dwarf_Bool * dw_has_more_rows,
06254 Dwarf_Addr * dw_subsequent_pc,
06255 Dwarf_Error * dw_error);
06256
06265 DW_API int dwarf_get_fde_for_die(Dwarf_Debug dw_dbg,
06266 Dwarf_Die dw_subr_die,
06267 Dwarf_Fde * dw_returned_fde,
06268 Dwarf_Error* dw_error);
06269
06277 DW_API int dwarf_get_fde_n(Dwarf_Fde* dw_fde_data,
06278 Dwarf_Unsigned dw_fde_index,
06279 Dwarf_Fde * dw_returned_fde,
06280 Dwarf_Error * dw_error);
06281
06312 DW_API int dwarf_get_fde_at_pc(Dwarf_Fde* dw_fde_data,
06313 Dwarf_Addr dw_pc_of_interest,
06314 Dwarf_Fde * dw_returned_fde,
06315 Dwarf_Addr * dw_lopc,
06316 Dwarf_Addr * dw_hipc,
06317 Dwarf_Error* dw_error);
06318
06338 DW_API int dwarf_get_cie_augmentation_data(Dwarf_Cie dw_cie,
06339 Dwarf_Small ** dw_augdata,
06340 Dwarf_Unsigned * dw_augdata_len,
06341 Dwarf_Error* dw_error);
06342
06362 DW_API int dwarf_get_fde_augmentation_data(Dwarf_Fde dw_fde,
06363 Dwarf_Small ** dw_augdata,
06364 Dwarf_Unsigned * dw_augdata_len,
06365 Dwarf_Error* dw_error);
06366
06400 DW_API int dwarf_expand_frame_instructions(Dwarf_Cie dw_cie,
06401 Dwarf_Small * dw_instructionspointer,
06402 Dwarf_Unsigned dw_length_in_bytes,
06403 Dwarf_Frame_Instr_Head * dw_head,
06404 Dwarf_Unsigned * dw_instr_count,
06405 Dwarf_Error * dw_error);
06406
06479 DW_API int dwarf_get_frame_instruction(
06480 Dwarf_Frame_Instr_Head dw_head,
06481 Dwarf_Unsigned dw_instr_index,
06482 Dwarf_Unsigned * dw_instr_offset_in_instrs,
06483 Dwarf_Small * dw_cfa_operation,
06484 const char ** dw_fields_description,
06485 Dwarf_Unsigned * dw_u0,
06486 Dwarf_Unsigned * dw_u1,
06487 Dwarf_Signed * dw_s0,
06488 Dwarf_Signed * dw_s1,
06489 Dwarf_Unsigned * dw_code_alignment_factor,
06490 Dwarf_Signed * dw_data_alignment_factor,
06491 Dwarf_Block * dw_expression_block,
06492 Dwarf_Error * dw_error);
06493
06515 DW_API int dwarf_get_frame_instruction_a(
06516 Dwarf_Frame_Instr_Head dw_head/* head*/,
06517 Dwarf_Unsigned dw_instr_index,

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06518 Dwarf_Unsigned * dw_instr_offset_in_instrs,
06519 Dwarf_Small * dw_cfa_operation,
06520 const char ** dw_fields_description,
06521 Dwarf_Unsigned * dw_u0,
06522 Dwarf_Unsigned * dw_u1,
06523 Dwarf_Unsigned * dw_u2,
06524 Dwarf_Signed * dw_s0,
06525 Dwarf_Signed * dw_s1,
06526 Dwarf_Unsigned * dw_code_alignment_factor,
06527 Dwarf_Signed * dw_data_alignment_factor,
06528 Dwarf_Block * dw_expression_block,
06529 Dwarf_Error * dw_error);
06530
06539 DW_API void dwarf_dealloc_frame_instr_head(Dwarf_Frame_Instr_Head
06540 dw_head);
06541
06558 DW_API int dwarf_fde_section_offset(Dwarf_Debug dw_dbg,
06559 Dwarf_Fde dw_in_fde,
06560 Dwarf_Off * dw_fde_off,
06561 Dwarf_Off * dw_cie_off,
06562 Dwarf_Error * dw_error);
06563
06578 DW_API int dwarf_cie_section_offset(Dwarf_Debug dw_dbg,
06579 Dwarf_Cie dw_in_cie,
06580 Dwarf_Off * dw_cie_off,
06581 Dwarf_Error * dw_error);
06582
06592 DW_API Dwarf_Half dwarf_set_frame_rule_table_size(
06593 Dwarf_Debug dw_dbg,
06594 Dwarf_Half dw_value);
06606 DW_API Dwarf_Half dwarf_set_frame_rule_initial_value(
06607 Dwarf_Debug dw_dbg,
06608 Dwarf_Half dw_value);
06618 DW_API Dwarf_Half dwarf_set_frame_cfa_value(
06619 Dwarf_Debug dw_dbg,
06620 Dwarf_Half dw_value);
06621
06631 DW_API Dwarf_Half dwarf_set_frame_same_value(
06632 Dwarf_Debug dw_dbg,
06633 Dwarf_Half dw_value);
06643 DW_API Dwarf_Half dwarf_set_frame_undefined_value(
06644 Dwarf_Debug dw_dbg,
06645 Dwarf_Half dw_value);
06699 DW_API int dwarf_get_abbrev(Dwarf_Debug dw_dbg,
06700 Dwarf_Unsigned dw_offset,
06701 Dwarf_Abbrev * dw_returned_abbrev,
06702 Dwarf_Unsigned* dw_length,
06703 Dwarf_Unsigned* dw_attr_count,
06704 Dwarf_Error* dw_error);
06705
06717 DW_API int dwarf_get_abbrev_tag(Dwarf_Abbrev dw_abbrev,
06718 Dwarf_Half* dw_return_tag_number,
06719 Dwarf_Error* dw_error);
06720
06734 DW_API int dwarf_get_abbrev_code(Dwarf_Abbrev dw_abbrev,
06735 Dwarf_Unsigned* dw_return_code_number,
06736 Dwarf_Error* dw_error);
06737
06751 DW_API int dwarf_get_abbrev_children_flag(Dwarf_Abbrev dw_abbrev,
06752 Dwarf_Signed* dw_return_flag,
06753 Dwarf_Error* dw_error);
06754
06788 DW_API int dwarf_get_abbrev_entry_b(Dwarf_Abbrev dw_abbrev,
06789 Dwarf_Unsigned dw_indx,
06790 Dwarf_Bool dw_filter_outliers,
06791 Dwarf_Unsigned * dw_returned_attr_num,
06792 Dwarf_Unsigned * dw_returned_form,
06793 Dwarf_Signed * dw_returned_implicit_const,
06794 Dwarf_Off * dw_offset,
06795 Dwarf_Error * dw_error);
06796
06830 DW_API int dwarf_get_str(Dwarf_Debug dw_dbg,
06831 Dwarf_Off dw_offset,
06832 char** dw_string,
06833 Dwarf_Signed * dw_strlen_of_string,
06834 Dwarf_Error* dw_error);
06835
06846 /* Allows applications to print the .debug_str_offsets
06847 section.
06848 Beginning at starting_offset zero,
06849 returns data about the first table found.
06850 The value *next_table_offset is the value
06851 of the next table (if any), one byte past
06852 the end of the table whose data is returned..
06853 Returns DW_DLV_NO_ENTRY if the starting offset
06854 is past the end of valid data.
06855

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06856     There is no guarantee that there are no non-0 nonsense
06857     bytes in the section outside of useful tables,
06858     so this can fail and return nonsense or
06859     DW_DLV_ERROR if such garbage exists.
06860 */
06861
06878 DW_API int dwarf_open_str_offsets_table_access(Dwarf_Debug dw_dbg,
06879     Dwarf_Str_Offsets_Table * dw_table_data,
06880     Dwarf_Error * dw_error);
06881
06899 DW_API int dwarf_close_str_offsets_table_access(
06900     Dwarf_Str_Offsets_Table dw_table_data,
06901     Dwarf_Error * dw_error);
06902
06936 DW_API int dwarf_next_str_offsets_table(
06937     Dwarf_Str_Offsets_Table dw_table_data,
06938     Dwarf_Unsigned * dw_unit_length,
06939     Dwarf_Unsigned * dw_unit_length_offset,
06940     Dwarf_Unsigned * dw_table_start_offset,
06941     Dwarf_Half * dw_entry_size,
06942     Dwarf_Half * dw_version,
06943     Dwarf_Half * dw_padding,
06944     Dwarf_Unsigned * dw_table_value_count,
06945     Dwarf_Error * dw_error);
06946
06966 DW_API int dwarf_str_offsets_value_by_index(
06967     Dwarf_Str_Offsets_Table dw_table_data,
06968     Dwarf_Unsigned dw_index_to_entry,
06969     Dwarf_Unsigned * dw_entry_value,
06970     Dwarf_Error * dw_error);
06971
06989 DW_API int dwarf_str_offsets_statistics(
06990     Dwarf_Str_Offsets_Table dw_table_data,
06991     Dwarf_Unsigned * dw_wasted_byte_count,
06992     Dwarf_Unsigned * dw_table_count,
06993     Dwarf_Error * dw_error);
06994
07006 DW_API Dwarf_Unsigned dwarf_errno(Dwarf_Error dw_error);
07013 DW_API char* dwarf_errmsg(Dwarf_Error dw_error);
07021 DW_API char* dwarf_errmsg_by_number(Dwarf_Unsigned dw_errnum);
07022
07036 DW_API void dwarf_error_creation(Dwarf_Debug dw_dbg ,
07037     Dwarf_Error * dw_error, char * dw_errmsg);
07038
07047 DW_API void dwarf_dealloc_error(Dwarf_Debug dw_dbg,
07048     Dwarf_Error dw_error);
07090 DW_API void dwarf_dealloc(Dwarf_Debug dw_dbg,
07091     void* dw_space, Dwarf_Unsigned dw_type);
07111 DW_API int dwarf_get_debug_sup(Dwarf_Debug dw_dbg,
07112     Dwarf_Half * dw_version,
07113     Dwarf_Small * dw_is_supplementary,
07114     char ** dw_filename,
07115     Dwarf_Unsigned * dw_checksum_len,
07116     Dwarf_Small ** dw_checksum,
07117     Dwarf_Error * dw_error);
07153 DW_API int dwarf_dnames_header(Dwarf_Debug dw_dbg,
07154     Dwarf_Off dw_starting_offset,
07155     Dwarf_Dnames_Head * dw_dn,
07156     Dwarf_Off * dw_offset_of_next_table,
07157     Dwarf_Error * dw_error);
07158
07166 DW_API void dwarf_dealloc_dnames(Dwarf_Dnames_Head dw_dn);
07167
07212 DW_API int dwarf_dnames_abbrevtable(Dwarf_Dnames_Head dw_dn,
07213     Dwarf_Unsigned dw_index,
07214     Dwarf_Unsigned * dw_abbrev_offset,
07215     Dwarf_Unsigned * dw_abbrev_code,
07216     Dwarf_Unsigned * dw_abbrev_tag,
07217     Dwarf_Unsigned * dw_array_size,
07218     Dwarf_Half * dw_idxattr_array,
07219     Dwarf_Half * dw_form_array,
07220     Dwarf_Unsigned * dw_idxattr_count);
07221
07239 DW_API int dwarf_dnames_sizes(Dwarf_Dnames_Head dw_dn,
07240     Dwarf_Unsigned * dw_comp_unit_count,
07241     Dwarf_Unsigned * dw_local_type_unit_count,
07242     Dwarf_Unsigned * dw_foreign_type_unit_count,
07243     Dwarf_Unsigned * dw_bucket_count,
07244     Dwarf_Unsigned * dw_name_count,
07245     /* The following are counted in bytes */
07246     Dwarf_Unsigned * dw_abbrev_table_size,
07247     Dwarf_Unsigned * dw_entry_pool_size,
07248     Dwarf_Unsigned * dw_augmentation_string_size,
07249     char ** dw_augmentation_string,
07250     Dwarf_Unsigned * dw_section_size,
07251     Dwarf_Half * dw_table_version,
07252     Dwarf_Half * dw_offset_size,

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07253     Dwarf_Error *    dw_error);
07254
07265 DW_API int dwarf_dnames_offsets(Dwarf_Dnames_Head dw_dn,
07266     Dwarf_Unsigned * dw_header_offset,
07267     Dwarf_Unsigned * dw_cu_table_offset,
07268     Dwarf_Unsigned * dw_tu_local_offset,
07269     Dwarf_Unsigned * dw_foreign_tu_offset,
07270     Dwarf_Unsigned * dw_bucket_offset,
07271     Dwarf_Unsigned * dw_hashes_offset,
07272     Dwarf_Unsigned * dw_stringoffsets_offset,
07273     Dwarf_Unsigned * dw_entryoffsets_offset,
07274     Dwarf_Unsigned * dw_abbrev_table_offset,
07275     Dwarf_Unsigned * dw_entry_pool_offset,
07276     Dwarf_Error *    dw_error);
07277
07306 DW_API int dwarf_dnames_cu_table(Dwarf_Dnames_Head dw_dn,
07307     const char      * dw_type,
07308     Dwarf_Unsigned   dw_index_number,
07309     Dwarf_Unsigned   * dw_offset,
07310     Dwarf_Sig8       * dw_sig,
07311     Dwarf_Error      * dw_error);
07312
07334 DW_API int dwarf_dnames_bucket(Dwarf_Dnames_Head dw_dn,
07335     Dwarf_Unsigned   dw_bucket_number,
07336     Dwarf_Unsigned   * dw_index,
07337     Dwarf_Unsigned   * dw_indexcount,
07338     Dwarf_Error      * dw_error);
07339
07389 DW_API int dwarf_dnames_name(Dwarf_Dnames_Head dw_dn,
07390     Dwarf_Unsigned   dw_name_index,
07391     Dwarf_Unsigned   * dw_bucket_number,
07392     Dwarf_Unsigned   * dw_hash_value,
07393     Dwarf_Unsigned   * dw_offset_to_debug_str,
07394     char *           * dw_ptrtostr,
07395     Dwarf_Unsigned   * dw_offset_in_entrypool,
07396     Dwarf_Unsigned   * dw_abbrev_number,
07397     Dwarf_Half        * dw_abbrev_tag,
07398     Dwarf_Unsigned   dw_array_size,
07399     Dwarf_Half        * dw_idxattr_array,
07400     Dwarf_Half        * dw_form_array,
07401     Dwarf_Unsigned   * dw_idxattr_count,
07402     Dwarf_Error      * dw_error);
07403
07445 DW_API int dwarf_dnames_entrypool(Dwarf_Dnames_Head dw_dn,
07446     Dwarf_Unsigned   dw_offset_in_entrypool,
07447     Dwarf_Unsigned   * dw_abbrev_code,
07448     Dwarf_Half        * dw_tag,
07449     Dwarf_Unsigned   * dw_value_count,
07450     Dwarf_Unsigned   * dw_index_of_abbrev,
07451     Dwarf_Unsigned   * dw_offset_of_initial_value,
07452     Dwarf_Error      * dw_error);
07453
07513 DW_API int dwarf_dnames_entrypool_values(Dwarf_Dnames_Head dw_dn,
07514     Dwarf_Unsigned   dw_index_of_abbrev,
07515     Dwarf_Unsigned   dw_offset_in_entrypool_of_values,
07516     Dwarf_Unsigned   dw_arrays_length,
07517     Dwarf_Half        * dw_array_idx_number,
07518     Dwarf_Half        * dw_array_form,
07519     Dwarf_Unsigned   * dw_array_of_offsets,
07520     Dwarf_Sig8        * dw_array_of_signatures,
07521     Dwarf_Bool        * dw_single_cu,
07522     Dwarf_Unsigned   * dw_cu_offset,
07523     Dwarf_Unsigned   * dw_offset_of_next_entrypool,
07524     Dwarf_Error      * dw_error);
07525
07552 DW_API int dwarf_get_aranges(Dwarf_Debug dw_dbg,
07553     Dwarf_Arange** dw_aranges,
07554     Dwarf_Signed * dw_arange_count,
07555     Dwarf_Error* dw_error);
07556
07576 DW_API int dwarf_get_arange(Dwarf_Arange* dw_aranges,
07577     Dwarf_Unsigned dw_arange_count,
07578     Dwarf_Addr     dw_address,
07579     Dwarf_Arange * dw_returned_arange,
07580     Dwarf_Error* dw_error);
07581
07594 DW_API int dwarf_get_cu_die_offset(Dwarf_Arange dw_arange,
07595     Dwarf_Off * dw_return_offset,
07596     Dwarf_Error* dw_error);
07597
07610 DW_API int dwarf_get_arange_cu_header_offset(Dwarf_Arange dw_arange,
07611     Dwarf_Off * dw_return_cu_header_offset,
07612     Dwarf_Error* dw_error);
07613
07639 DW_API int dwarf_get_arange_info_b(Dwarf_Arange dw_arange,
07640     Dwarf_Unsigned* dw_segment,
07641     Dwarf_Unsigned* dw_segment_entry_size,

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07642     Dwarf_Addr      * dw_start,
07643     Dwarf_Unsigned* dw_length,
07644     Dwarf_Off       * dw_cu_die_offset,
07645     Dwarf_Error     * dw_error );
07694 DW_API int dwarf_get_globals(Dwarf_Debug dw_dbg,
07695     Dwarf_Global** dw_globals,
07696     Dwarf_Signed * dw_number_of_globals,
07697     Dwarf_Error * dw_error);
07698
07699 #define DW_GL_GLOBALS 0 /* .debug_pubnames and .debug_names */
07700 #define DW_GL_PUBTYPES 1 /* .debug_pubtypes */
07701 /* the following are IRIX ONLY */
07702 #define DW_GL_FUNCES 2 /* .debug_funcnames */
07703 #define DW_GL_TYPES 3 /* .debug_tynames */
07704 #define DW_GL_VARS 4 /* .debug_varnames */
07705 #define DW_GL_WEAKS 5 /* .debug_weaknames */
07728 DW_API int dwarf_get_pubtypes(Dwarf_Debug dw_dbg,
07729     Dwarf_Global** dw_pubtypes,
07730     Dwarf_Signed * dw_number_of_pubtypes,
07731     Dwarf_Error * dw_error);
07732
07758 DW_API int dwarf_globals_by_type(Dwarf_Debug dw_dbg,
07759     int dw_requested_section,
07760     Dwarf_Global **dw_contents,
07761     Dwarf_Signed *dw_count,
07762     Dwarf_Error *dw_error);
07763
07774 DW_API void dwarf_globals_dealloc(Dwarf_Debug dw_dbg,
07775     Dwarf_Global* dw_global_like,
07776     Dwarf_Signed dw_count);
07777
07790 DW_API int dwarf_globname(Dwarf_Global dw_global,
07791     char ** dw_returned_name,
07792     Dwarf_Error* dw_error);
07793
07806 DW_API int dwarf_global_die_offset(Dwarf_Global dw_global,
07807     Dwarf_Off * dw_die_offset,
07808     Dwarf_Error * dw_error);
07809
07824 DW_API int dwarf_global_cu_offset(Dwarf_Global dw_global,
07825     Dwarf_Off* dw_cu_header_offset,
07826     Dwarf_Error* dw_error);
07827
07846 DW_API int dwarf_global_name_offsets(Dwarf_Global dw_global,
07847     char ** dw_returned_name,
07848     Dwarf_Off* dw_die_offset,
07849     Dwarf_Off* dw_cu_die_offset,
07850     Dwarf_Error* dw_error);
07851
07864 DW_API Dwarf_Half dwarf_global_tag_number(Dwarf_Global dw_global);
07865
07876 DW_API int dwarf_get_globals_header(Dwarf_Global dw_global,
07877     int * dw_category, /* DW_GL_GLOBAL for example */
07878     Dwarf_Off * dw_offset_pub_header,
07879     Dwarf_Unsigned * dw_length_size,
07880     Dwarf_Unsigned * dw_length_pub,
07881     Dwarf_Unsigned * dw_version,
07882     Dwarf_Unsigned * dw_header_info_offset,
07883     Dwarf_Unsigned * dw_info_length,
07884     Dwarf_Error * dw_error);
07885
07908 DW_API int dwarf_return_empty_pubnames(Dwarf_Debug dw_dbg,
07909     int dw_flag);
07910
07944 DW_API int dwarf_get_gnu_index_head(Dwarf_Debug dw_dbg,
07945     Dwarf_Bool dw_which_section,
07946     Dwarf_Gnu_Index_Head *dw_head,
07947     Dwarf_Unsigned *dw_index_block_count_out,
07948     Dwarf_Error *dw_error);
07956 DW_API void dwarf_gnu_index_dealloc(Dwarf_Gnu_Index_Head dw_head);
07995 DW_API int dwarf_get_gnu_index_block(Dwarf_Gnu_Index_Head dw_head,
07996     Dwarf_Unsigned dw_number,
07997     Dwarf_Unsigned *dw_block_length,
07998     Dwarf_Half *dw_version,
07999     Dwarf_Unsigned *dw_offset_into_debug_info,
08000     Dwarf_Unsigned *dw_size_of_debug_info_area,
08001     Dwarf_Unsigned *dw_count_of_index_entries,
08002     Dwarf_Error *dw_error);
08003
08035 DW_API int dwarf_get_gnu_index_block_entry(
08036     Dwarf_Gnu_Index_Head dw_head,
08037     Dwarf_Unsigned dw_blocknumber,
08038     Dwarf_Unsigned dw_entrynumber,
08039     Dwarf_Unsigned *dw_offset_in_debug_info,
08040     const char **dw_name_string,
08041     unsigned char *dw_flagbyte,
08042     unsigned char *dw_staticorglobal,

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08043     unsigned char    *dw_typeofentry,
08044     Dwarf_Error      *dw_error);
08045
08106 DW_API int dwarf_gdbindex_header(Dwarf_Debug dw_dbg,
08107     Dwarf_Gdbindex * dw_gdbindexptr,
08108     Dwarf_Unsigned * dw_version,
08109     Dwarf_Unsigned * dw_cu_list_offset,
08110     Dwarf_Unsigned * dw_types_cu_list_offset,
08111     Dwarf_Unsigned * dw_address_area_offset,
08112     Dwarf_Unsigned * dw_symbol_table_offset,
08113     Dwarf_Unsigned * dw_constant_pool_offset,
08114     Dwarf_Unsigned * dw_section_size,
08115     const char     ** dw_section_name,
08116     Dwarf_Error      * dw_error);
08117
08125 DW_API void dwarf_dealloc_gdbindex(Dwarf_Gdbindex dw_gdbindexptr);
08126
08137 DW_API int dwarf_gdbindex_culist_array(
08138     Dwarf_Gdbindex dw_gdbindexptr,
08139     Dwarf_Unsigned * dw_list_length,
08140     Dwarf_Error      * dw_error);
08141
08159 DW_API int dwarf_gdbindex_culist_entry(
08160     Dwarf_Gdbindex dw_gdbindexptr,
08161     Dwarf_Unsigned dw_entryindex,
08162     Dwarf_Unsigned * dw_cu_offset,
08163     Dwarf_Unsigned * dw_cu_length,
08164     Dwarf_Error      * dw_error);
08165
08177 DW_API int dwarf_gdbindex_types_culist_array(
08178     Dwarf_Gdbindex dw_gdbindexptr,
08179     Dwarf_Unsigned * dw_types_list_length,
08180     Dwarf_Error      * dw_error);
08181
08182 /* entryindex: 0 to types_list_length -1 */
08204 DW_API int dwarf_gdbindex_types_culist_entry(
08205     Dwarf_Gdbindex dw_gdbindexptr,
08206     Dwarf_Unsigned dw_types_entryindex,
08207     Dwarf_Unsigned * dw_cu_offset,
08208     Dwarf_Unsigned * dw_tu_offset,
08209     Dwarf_Unsigned * dw_type_signature,
08210     Dwarf_Error      * dw_error);
08211
08226 DW_API int dwarf_gdbindex_addressarea(
08227     Dwarf_Gdbindex dw_gdbindexptr,
08228     Dwarf_Unsigned * dw_addressarea_list_length,
08229     Dwarf_Error      * dw_error);
08230
08249 DW_API int dwarf_gdbindex_addressarea_entry(
08250     Dwarf_Gdbindex dw_gdbindexptr,
08251     Dwarf_Unsigned dw_entryindex,
08252     Dwarf_Unsigned * dw_low_address,
08253     Dwarf_Unsigned * dw_high_address,
08254     Dwarf_Unsigned * dw_cu_index,
08255     Dwarf_Error      * dw_error);
08256
08269 DW_API int dwarf_gdbindex_symboltable_array(
08270     Dwarf_Gdbindex dw_gdbindexptr,
08271     Dwarf_Unsigned * dw_syntab_list_length,
08272     Dwarf_Error      * dw_error);
08273
08293 DW_API int dwarf_gdbindex_symboltable_entry(
08294     Dwarf_Gdbindex dw_gdbindexptr,
08295     Dwarf_Unsigned dw_entryindex,
08296     Dwarf_Unsigned * dw_string_offset,
08297     Dwarf_Unsigned * dw_cu_vector_offset,
08298     Dwarf_Error      * dw_error);
08299
08317 DW_API int dwarf_gdbindex_cuvector_length(
08318     Dwarf_Gdbindex dw_gdbindexptr,
08319     Dwarf_Unsigned * dw_cuvector_offset,
08320     Dwarf_Unsigned * dw_innercount,
08321     Dwarf_Error      * dw_error);
08322
08339 DW_API int dwarf_gdbindex_cuvector_inner_attributes(
08340     Dwarf_Gdbindex dw_gdbindexptr,
08341     Dwarf_Unsigned * dw_cuvector_offset_in,
08342     Dwarf_Unsigned * dw_innerindex,
08343     Dwarf_Unsigned * dw_field_value,
08344     Dwarf_Error      * dw_error);
08345
08368 DW_API int dwarf_gdbindex_cuvector_instance_expand_value(
08369     Dwarf_Gdbindex dw_gdbindexptr,
08370     Dwarf_Unsigned * dw_field_value,
08371     Dwarf_Unsigned * dw_cu_index,
08372     Dwarf_Unsigned * dw_symbol_kind,
08373     Dwarf_Unsigned * dw_is_static,

```

```

08374     Dwarf_Error      * dw_error);
08375
08391 DW_API int dwarf_gdbindex_string_by_offset(
08392     Dwarf_Gdbindex    dw_gdbindexptr,
08393     Dwarf_Unsigned     dw_stringoffset,
08394     const char         ** dw_string_ptr,
08395     Dwarf_Error        * dw_error);
08436 DW_API int dwarf_get_xu_index_header(Dwarf_Debug dw_dbg,
08437     const char * dw_section_type, /* "tu" or "cu" */
08438     Dwarf_Xu_Index_Header * dw_xuhdr,
08439     Dwarf_Unsigned      * dw_version_number,
08440     Dwarf_Unsigned      * dw_section_count,
08441     Dwarf_Unsigned      * dw_units_count,
08442     Dwarf_Unsigned      * dw_hash_slots_count,
08443     const char          ** dw_sect_name,
08444     Dwarf_Error          * dw_error);
08445
08454 DW_API void dwarf_dealloc_xu_header(Dwarf_Xu_Index_Header dw_xuhdr);
08455
08470 DW_API int dwarf_get_xu_index_section_type(
08471     Dwarf_Xu_Index_Header dw_xuhdr,
08472     const char ** dw_typename,
08473     const char ** dw_sectionname,
08474     Dwarf_Error * dw_error);
08475
08507 DW_API int dwarf_get_xu_hash_entry(Dwarf_Xu_Index_Header dw_xuhdr,
08508     Dwarf_Unsigned     dw_index,
08509     Dwarf_Sig8         * dw_hash_value,
08510     Dwarf_Unsigned     * dw_index_to_sections,
08511     Dwarf_Error        * dw_error);
08512
08513 /* Columns 0 to L-1, valid. */
08536 DW_API int dwarf_get_xu_section_names(Dwarf_Xu_Index_Header dw_xuhdr,
08537     Dwarf_Unsigned     dw_column_index,
08538     Dwarf_Unsigned* dw_SECT_number,
08539     const char         ** dw_SECT_name,
08540     Dwarf_Error        * dw_error);
08541
08570 DW_API int dwarf_get_xu_section_offset(
08571     Dwarf_Xu_Index_Header dw_xuhdr,
08572     Dwarf_Unsigned     dw_row_index,
08573     Dwarf_Unsigned     dw_column_index,
08574     Dwarf_Unsigned* dw_sec_offset,
08575     Dwarf_Unsigned* dw_sec_size,
08576     Dwarf_Error        * dw_error);
08577
08599 DW_API int dwarf_get_debugfission_for_die(Dwarf_Die dw_die,
08600     Dwarf_Debug_Fission_Per_CU * dw_percu_out,
08601     Dwarf_Error                * dw_error);
08602
08620 DW_API int dwarf_get_debugfission_for_key(Dwarf_Debug dw_dbg,
08621     Dwarf_Sig8                * dw_hash_sig,
08622     const char                * dw_cu_type,
08623     Dwarf_Debug_Fission_Per_CU * dw_percu_out,
08624     Dwarf_Error                * dw_error);
08625
08626 /* END debugfission dwp .debug_cu_index
08627 and .debug_tu_index meaningful operations. */
08628
08722 DW_API int dwarf_gnu_debuglink(Dwarf_Debug dw_dbg,
08723     char                ** dw_debuglink_path_returned,
08724     unsigned char        ** dw_crc_returned,
08725     char                ** dw_debuglink_fullpath_returned,
08726     unsigned int         * dw_debuglink_path_length_returned,
08727     unsigned int         * dw_buildid_type_returned,
08728     char                ** dw_buildid_owner_name_returned,
08729     unsigned char        ** dw_buildid_returned,
08730     unsigned int         * dw_buildid_length_returned,
08731     char                *** dw_paths_returned,
08732     unsigned int         * dw_paths_length_returned,
08733     Dwarf_Error*         dw_error);
08734
08767 DW_API int dwarf_suppress_debuglink_crc(int dw_suppress);
08768
08787 DW_API int dwarf_add_debuglink_global_path(Dwarf_Debug dw_dbg,
08788     const char * dw_pathname,
08789     Dwarf_Error* dw_error);
08790
08818 DW_API int dwarf_crc32(Dwarf_Debug dw_dbg,
08819     unsigned char * dw_crcbuf,
08820     Dwarf_Error    * dw_error);
08821
08845 DW_API unsigned int dwarf_basic_crc32(const unsigned char * dw_buf,
08846     unsigned long dw_len,
08847     unsigned int dw_init);
08866 #define DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE 4
08867

```

```
08910 DW_API int dwarf_get_harmless_error_list(Dwarf_Debug dw_dbg,
08911      unsigned int dw_count,
08912      const char ** dw_errmsg_ptrs_array,
08913      unsigned int * dw_newerrr_count);
08914
08935 DW_API unsigned int dwarf_set_harmless_error_list_size(
08936      Dwarf_Debug dw_dbg,
08937      unsigned int dw_maxcount);
08938
08950 DW_API void dwarf_insert_harmless_error(Dwarf_Debug dw_dbg,
08951      char * dw_newerror);
08987 DW_API int dwarf_get_ACCESS_name(unsigned int dw_val_in,
08988      const char ** dw_s_out);
08991 DW_API int dwarf_get_ADDR_name(unsigned int dw_val_in,
08992      const char ** dw_s_out);
08995 DW_API int dwarf_get_AT_name(unsigned int dw_val_in,
08996      const char ** dw_s_out);
08999 DW_API int dwarf_get_ATCF_name(unsigned int dw_val_in,
09000      const char ** dw_s_out);
09003 DW_API int dwarf_get_ATE_name(unsigned int dw_val_in,
09004      const char ** dw_s_out);
09007 DW_API int dwarf_get_CC_name(unsigned int dw_val_in,
09008      const char ** dw_s_out);
09011 DW_API int dwarf_get_CFA_name(unsigned int dw_val_in,
09012      const char ** dw_s_out);
09015 DW_API int dwarf_get_children_name(unsigned int dw_val_in,
09016      const char ** dw_s_out);
09019 DW_API int dwarf_get_CHILDREN_name(unsigned int dw_val_in,
09020      const char ** dw_s_out);
09023 DW_API int dwarf_get_DEFAULTED_name(unsigned int dw_val_in,
09024      const char ** dw_s_out);
09027 DW_API int dwarf_get_DS_name(unsigned int dw_val_in,
09028      const char ** dw_s_out);
09031 DW_API int dwarf_get_DSC_name(unsigned int dw_val_in,
09032      const char ** dw_s_out);
09037 DW_API int dwarf_get_GNUKIND_name(unsigned int dw_val_in,
09038      const char ** dw_s_out);
09043 DW_API int dwarf_get_EH_name(unsigned int dw_val_in,
09044      const char ** dw_s_out);
09047 DW_API int dwarf_get_END_name(unsigned int dw_val_in,
09048      const char ** dw_s_out);
09051 DW_API int dwarf_get_FORM_name(unsigned int dw_val_in,
09052      const char ** dw_s_out);
09059 DW_API int dwarf_get_FRAME_name(unsigned int dw_val_in,
09060      const char ** dw_s_out);
09065 DW_API int dwarf_get_GNUVIS_name(unsigned int dw_val_in,
09066      const char ** dw_s_out);
09067
09070 DW_API int dwarf_get_ID_name(unsigned int dw_val_in,
09071      const char ** dw_s_out);
09074 DW_API int dwarf_get_IDX_name(unsigned int dw_val_in,
09075      const char ** dw_s_out);
09078 DW_API int dwarf_get_INL_name(unsigned int dw_val_in,
09079      const char ** dw_s_out);
09082 DW_API int dwarf_get_ISA_name(unsigned int dw_val_in,
09083      const char ** dw_s_out);
09086 DW_API int dwarf_get_LANG_name(unsigned int dw_val_in,
09087      const char ** dw_s_out);
09090 DW_API int dwarf_get_LLE_name(unsigned int dw_val_in,
09091      const char ** dw_s_out);
09097 DW_API int dwarf_get_LLEX_name(unsigned int dw_val_in,
09098      const char ** dw_s_out );
09099
09102 DW_API int dwarf_get_LNAME_name(unsigned int dw_val_in,
09103      const char ** dw_s_out);
09106 DW_API int dwarf_get_LNCT_name(unsigned int dw_val_in,
09107      const char ** dw_s_out);
09110 DW_API int dwarf_get_LNE_name(unsigned int dw_val_in,
09111      const char ** dw_s_out);
09114 DW_API int dwarf_get_LNS_name(unsigned int dw_val_in,
09115      const char ** dw_s_out);
09120 DW_API int dwarf_get_MACINFO_name(unsigned int dw_val_in,
09121      const char ** dw_s_out);
09126 DW_API int dwarf_get_MACRO_name(unsigned int dw_val_in,
09127      const char ** dw_s_out);
09130 DW_API int dwarf_get_OP_name(unsigned int dw_val_in,
09131      const char ** dw_s_out);
09134 DW_API int dwarf_get_ORD_name(unsigned int dw_val_in,
09135      const char ** dw_s_out);
09138 DW_API int dwarf_get_RLE_name(unsigned int dw_val_in,
09139      const char ** dw_s_out);
09142 DW_API int dwarf_get_SECT_name(unsigned int dw_val_in,
09143      const char ** dw_s_out);
09146 DW_API int dwarf_get_TAG_name(unsigned int dw_val_in,
09147      const char ** dw_s_out);
09150 DW_API int dwarf_get_UT_name(unsigned int dw_val_in,
09151      const char ** dw_s_out);
```

```

09154 DW_API int dwarf_get_VIRTUALITY_name(unsigned int dw_val_in,
09155     const char ** dw_s_out);
09158 DW_API int dwarf_get_VIS_name(unsigned int dw_val_in,
09159     const char ** dw_s_out);
09160
09171 DW_API int dwarf_get_FORM_CLASS_name(enum Dwarf_Form_Class dw_fc,
09172     const char ** dw_s_out);
09226 DW_API int dwarf_get_die_section_name(Dwarf_Debug dw_dbg,
09227     Dwarf_Bool dw_is_info,
09228     const char **dw_sec_name,
09229     Dwarf_Error *dw_error);
09230
09237 DW_API int dwarf_get_die_section_name_b(Dwarf_Die dw_die,
09238     const char ** dw_sec_name,
09239     Dwarf_Error * dw_error);
09240
09243 DW_API int dwarf_get_macro_section_name(Dwarf_Debug dw_dbg,
09244     const char ** dw_sec_name_out,
09245     Dwarf_Error * dw_err);
09246
09289 DW_API int dwarf_get_real_section_name(Dwarf_Debug dw_dbg,
09290     const char * dw_std_section_name,
09291     const char ** dw_actual_sec_name_out,
09292     Dwarf_Small * dw_marked_zcompressed,
09293     Dwarf_Small * dw_marked_zlib_compressed,
09294     Dwarf_Small * dw_marked_shf_compressed,
09295     Dwarf_Unsigned * dw_compressed_length,
09296     Dwarf_Unsigned * dw_uncompressed_length,
09297     Dwarf_Error * dw_error);
09298
09303 DW_API int dwarf_get_frame_section_name(Dwarf_Debug dw_dbg,
09304     const char ** dw_section_name_out,
09305     Dwarf_Error * dw_error);
09306
09312 DW_API int dwarf_get_frame_section_name_ghnu(Dwarf_Debug dw_dbg,
09313     const char ** dw_section_name_out,
09314     Dwarf_Error * dw_error);
09315
09319 DW_API int dwarf_get_aranges_section_name(Dwarf_Debug dw_dbg,
09320     const char ** dw_section_name_out,
09321     Dwarf_Error * dw_error);
09322
09326 DW_API int dwarf_get_ranges_section_name(Dwarf_Debug dw_dbg,
09327     const char ** dw_section_name_out,
09328     Dwarf_Error * dw_error);
09329
09330 /* These two get the offset or address size as defined
09331    by the object format (not by DWARF). */
09337 DW_API int dwarf_get_offset_size(Dwarf_Debug dw_dbg,
09338     Dwarf_Half * dw_offset_size,
09339     Dwarf_Error * dw_error);
09340
09346 DW_API int dwarf_get_address_size(Dwarf_Debug dw_dbg,
09347     Dwarf_Half * dw_addr_size,
09348     Dwarf_Error * dw_error);
09349
09353 DW_API int dwarf_get_string_section_name(Dwarf_Debug dw_dbg,
09354     const char ** dw_section_name_out,
09355     Dwarf_Error * dw_error);
09356
09360 DW_API int dwarf_get_line_section_name(Dwarf_Debug dw_dbg,
09361     const char ** dw_section_name_out,
09362     Dwarf_Error * dw_error);
09363
09377 DW_API int dwarf_get_line_section_name_from_die(Dwarf_Die dw_die,
09378     const char ** dw_section_name_out,
09379     Dwarf_Error * dw_error);
09380
09427 DW_API int dwarf_get_section_info_by_name_a(Dwarf_Debug dw_dbg,
09428     const char * dw_section_name,
09429     Dwarf_Addr * dw_section_addr,
09430     Dwarf_Unsigned* dw_section_size,
09431     Dwarf_Unsigned* dw_section_flags,
09432     Dwarf_Unsigned* dw_section_offset,
09433     Dwarf_Error * dw_error);
09434
09447 DW_API int dwarf_get_section_info_by_name(Dwarf_Debug dw_dbg,
09448     const char * dw_section_name,
09449     Dwarf_Addr * dw_section_addr,
09450     Dwarf_Unsigned* dw_section_size,
09451     Dwarf_Error * dw_error);
09452
09498 DW_API int dwarf_get_section_info_by_index_a(Dwarf_Debug dw_dbg,
09499     int dw_section_index,
09500     const char ** dw_section_name,
09501     Dwarf_Addr* dw_section_addr,
09502     Dwarf_Unsigned* dw_section_size,

```

```

09503     Dwarf_Unsigned* dw_section_flags,
09504     Dwarf_Unsigned* dw_section_offset,
09505     Dwarf_Error*     dw_error);
09506
09519 DW_API int dwarf_get_section_info_by_index(Dwarf_Debug dw_dbg,
09520     int dw_section_index,
09521     const char ** dw_section_name,
09522     Dwarf_Addr* dw_section_addr,
09523     Dwarf_Unsigned* dw_section_size,
09524     Dwarf_Error* dw_error);
09525
09612 DW_API int dwarf_machine_architecture_a(Dwarf_Debug dw_dbg,
09613     Dwarf_Small *dw_ftype,
09614     Dwarf_Small *dw_obj_pointersize,
09615     Dwarf_Bool *dw_obj_is_big_endian,
09616     Dwarf_Unsigned *dw_obj_machine, /*Elf e_machine */
09617     Dwarf_Unsigned *dw_obj_type, /* Elf e_type */
09618     Dwarf_Unsigned *dw_obj_flags,
09619     Dwarf_Small *dw_path_source,
09620     Dwarf_Unsigned *dw_ub_offset,
09621     Dwarf_Unsigned *dw_ub_count,
09622     Dwarf_Unsigned *dw_ub_index,
09623     Dwarf_Unsigned *dw_comdat_groupnumber);
09624
09632 DW_API int dwarf_machine_architecture(Dwarf_Debug dw_dbg,
09633     Dwarf_Small *dw_ftype,
09634     Dwarf_Small *dw_obj_pointersize,
09635     Dwarf_Bool *dw_obj_is_big_endian,
09636     Dwarf_Unsigned *dw_obj_machine, /*architecture*/
09637     Dwarf_Unsigned *dw_obj_flags,
09638     Dwarf_Small *dw_path_source,
09639     Dwarf_Unsigned *dw_ub_offset,
09640     Dwarf_Unsigned *dw_ub_count,
09641     Dwarf_Unsigned *dw_ub_index,
09642     Dwarf_Unsigned *dw_comdat_groupnumber);
09643
09655 DW_API Dwarf_Unsigned dwarf_get_section_count(Dwarf_Debug dw_dbg);
09656
09675 DW_API int dwarf_get_section_max_offsets_d(Dwarf_Debug dw_dbg,
09676     Dwarf_Unsigned * dw_debug_info_size,
09677     Dwarf_Unsigned * dw_debug_abbrev_size,
09678     Dwarf_Unsigned * dw_debug_line_size,
09679     Dwarf_Unsigned * dw_debug_loc_size,
09680     Dwarf_Unsigned * dw_debug_aranges_size,
09681
09682     Dwarf_Unsigned * dw_debug_macinfo_size,
09683     Dwarf_Unsigned * dw_debug_pubnames_size,
09684     Dwarf_Unsigned * dw_debug_str_size,
09685     Dwarf_Unsigned * dw_debug_frame_size,
09686     Dwarf_Unsigned * dw_debug_ranges_size,
09687
09688     Dwarf_Unsigned * dw_debug_pubtypes_size,
09689     Dwarf_Unsigned * dw_debug_types_size,
09690     Dwarf_Unsigned * dw_debug_macro_size,
09691     Dwarf_Unsigned * dw_debug_str_offsets_size,
09692     Dwarf_Unsigned * dw_debug_sup_size,
09693
09694     Dwarf_Unsigned * dw_debug_cu_index_size,
09695     Dwarf_Unsigned * dw_debug_tu_index_size,
09696     Dwarf_Unsigned * dw_debug_names_size,
09697     Dwarf_Unsigned * dw_debug_loclists_size,
09698     Dwarf_Unsigned * dw_debug_rnglists_size);
09747 DW_API int dwarf_sec_group_sizes(Dwarf_Debug dw_dbg,
09748     Dwarf_Unsigned *dw_section_count_out,
09749     Dwarf_Unsigned *dw_group_count_out,
09750     Dwarf_Unsigned *dw_selected_group_out,
09751     Dwarf_Unsigned *dw_map_entry_count_out,
09752     Dwarf_Error *dw_error);
09753
09784 DW_API int dwarf_sec_group_map(Dwarf_Debug dw_dbg,
09785     Dwarf_Unsigned dw_map_entry_count,
09786     Dwarf_Unsigned *dw_group_numbers_array,
09787     Dwarf_Unsigned *dw_sec_numbers_array,
09788     const char **dw_sec_names_array,
09789     Dwarf_Error *dw_error);
09804 DW_API int dwarf_encode_leb128(Dwarf_Unsigned dw_val,
09805     int *dw_nbytes,
09806     char *dw_space,
09807     int dw_splen);
09808 DW_API int dwarf_encode_signed_leb128(Dwarf_Signed dw_val,
09809     int *dw_nbytes,
09810     char *dw_space,
09811     int dw_splen);
09812 /* Same for LEB decoding routines.
09813 caller sets endptr to an address one past the last valid
09814 address the library should be allowed to
09815 access. */

```

```

09816 DW_API int dwarf_decode_leb128(char *dw_leb,
09817     Dwarf_Unsigned *dw_leblen,
09818     Dwarf_Unsigned *dw_outval,
09819     char *dw_endptr);
09820 DW_API int dwarf_decode_signed_leb128(char *dw_leb,
09821     Dwarf_Unsigned *dw_leblen,
09822     Dwarf_Signed *dw_outval,
09823     char *dw_endptr);
09840 DW_API const char * dwarf_package_version(void);
09841
09857 DW_API int dwarf_set_stringcheck(int dw_stringcheck);
09858
09880 DW_API int dwarf_set_reloc_application(int dw_apply);
09881
09906 DW_API void (*dwarf_get_endian_copy_function(Dwarf_Debug dw_dbg))
09907     (void *, const void *, unsigned long);
09908
09909 /* A global flag in libdwarf. Applies to all Dwarf_Debug */
09910 DW_API extern Dwarf_Cmdline_Options dwarf_cmdline_options;
09911
09926 DW_API void dwarf_record_cmdline_options(
09927     Dwarf_Cmdline_Options dw_dd_options);
09928
09947 DW_API int dwarf_set_de_alloc_flag(int dw_v);
09948
09977 DW_API int dwarf_library_allow_dup_attr(int dw_v);
09978
10000 DW_API Dwarf_Small dwarf_set_default_address_size(
10001     Dwarf_Debug dw_dbg,
10002     Dwarf_Small dw_value);
10003
10029 DW_API int dwarf_get_universalbinary_count(
10030     Dwarf_Debug dw_dbg,
10031     Dwarf_Unsigned *dw_current_index,
10032     Dwarf_Unsigned *dw_available_count);
10033
10055 DW_API int dwarf_object_detector_path_b(const char * dw_path,
10056     char *dw_outpath_buffer,
10057     unsigned long dw_outpathlen,
10058     char ** dw_gl_pathnames,
10059     unsigned int dw_gl_pathcount,
10060     unsigned int *dw_ftype,
10061     unsigned int *dw_endian,
10062     unsigned int *dw_offsetsize,
10063     Dwarf_Unsigned *dw_filesize,
10064     unsigned char *dw_pathsource,
10065     int * dw_errcode);
10066
10067 /* Solely looks for dSYM */
10068 DW_API int dwarf_object_detector_path_dSYM(const char * dw_path,
10069     char * dw_outpath,
10070     unsigned long dw_outpath_len,
10071     char ** dw_gl_pathnames,
10072     unsigned int dw_gl_pathcount,
10073     unsigned int *dw_ftype,
10074     unsigned int *dw_endian,
10075     unsigned int *dw_offsetsize,
10076     Dwarf_Unsigned *dw_filesize,
10077     unsigned char *dw_pathsource,
10078     int * dw_errcode);
10079
10080 DW_API int dwarf_object_detector_fd(int dw_fd,
10081     unsigned int *dw_ftype,
10082     unsigned int *dw_endian,
10083     unsigned int *dw_offsetsize,
10084     Dwarf_Unsigned *dw_filesize,
10085     int *dw_errcode);
10148 DW_API enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference(
10149     enum Dwarf_Sec_Alloc_Pref dw_load_preference);
10150
10190 DW_API int dwarf_get_mmap_count(Dwarf_Debug dw_dbg,
10191     Dwarf_Unsigned *dw_mmap_count,
10192     Dwarf_Unsigned *dw_mmap_size,
10193     Dwarf_Unsigned *dw_malloc_count,
10194     Dwarf_Unsigned *dw_malloc_size);
10197 #ifdef __cplusplus
10198 }
10199 #endif /* __cplusplus */
10200 #endif /* _LIBDWARF_H */

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