

libdwarf

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<b>1 A Consumer Library Interface to DWARF</b>	<b>1</b>
1.1 Suggestions for improvement are welcome.	2
1.2 Introduction	2
1.3 Thread Safety	2
1.4 Error Handling in libdwarf	3
1.4.1 Error Handling at Initialization	3
1.4.2 Error Handling Everywhere	4
1.4.2.1 DW_DLV_OK	5
1.4.2.2 DW_DLV_NO_ENTRY	5
1.4.2.3 DW_DLV_ERROR	5
1.4.2.4 Slight Performance Enhancement	5
1.5 Extracting Data Per Compilation Unit	6
1.6 Line Table Registers	6
1.7 Reading Special Sections Independently	7
1.8 Special Frame Registers	7
1.9 .debug_pubnames etc DWARF2-DWARF4	8
1.10 Reading DWARF with no object file present	9
1.11 Section Groups: Split Dwarf, COMDAT groups	10
1.12 Details on separate DWARF object access	12
1.13 Linking against libdwarf.so (or dll or dylib)	13
1.14 Linking against libdwarf.a	13
1.15 Suppressing CRC calculation for debuglink	14
1.16 dwsec_mmap	14
1.17 Recent Changes	15
<b>2 JIT and special case DWARF</b>	<b>21</b>
2.1 Reading DWARF not in an object file	21
2.1.1 Describing the Interface	23
2.1.2 Describing A Section	23
2.1.3 Function Pointers	24
<b>3 dwarf.h</b>	<b>27</b>
<b>4 libdwarf.h</b>	<b>29</b>
<b>5 checkexamples.c</b>	<b>31</b>
<b>6 Topic Index</b>	<b>33</b>
6.1 Topics	33
<b>7 Data Structure Index</b>	<b>35</b>
7.1 Data Structures	35
<b>8 File Index</b>	<b>37</b>
8.1 File List	37

<b>9 Topic Documentation</b>	<b>39</b>
9.1 Basic Library Datatypes Group	39
9.1.1 Detailed Description	39
9.1.2 Typedef Documentation	39
9.1.2.1 Dwarf_Unsigned	39
9.1.2.2 Dwarf_Signed	39
9.1.2.3 Dwarf_Off	39
9.1.2.4 Dwarf_Addr	40
9.1.2.5 Dwarf_Bool	40
9.1.2.6 Dwarf_Half	40
9.1.2.7 Dwarf_Small	40
9.1.2.8 Dwarf_Ptr	40
9.2 Enumerators with various purposes	40
9.2.1 Detailed Description	41
9.2.2 Enumeration Type Documentation	41
9.2.2.1 Dwarf_Ranges_Entry_Type	41
9.2.2.2 Dwarf_Form_Class	41
9.3 Defined and Opaque Structs	42
9.3.1 Detailed Description	43
9.3.2 Typedef Documentation	43
9.3.2.1 Dwarf_Form_Data16	43
9.3.2.2 Dwarf_Sig8	43
9.3.2.3 Dwarf_Block	43
9.3.2.4 Dwarf_Locdesc_c	44
9.3.2.5 Dwarf_Loc_Head_c	44
9.3.2.6 Dwarf_Gnu_Index_Head	44
9.3.2.7 Dwarf_Dsc_Head	44
9.3.2.8 Dwarf_Frame_Instr_Head	44
9.3.2.9 dwarf_printf_callback_function_type	44
9.3.2.10 Dwarf_Str_Offsets_Table	45
9.3.2.11 Dwarf_Ranges	45
9.3.2.12 Dwarf_Regtable_Entry3	45
9.3.2.13 Dwarf_Regtable3	46
9.3.2.14 Dwarf_Error	46
9.3.2.15 Dwarf_Debug	47
9.3.2.16 Dwarf_Section	47
9.3.2.17 Dwarf_Die	47
9.3.2.18 Dwarf_Debug_Addr_Table	47
9.3.2.19 Dwarf_Line	47
9.3.2.20 Dwarf_Global	47
9.3.2.21 Dwarf_Type	47
9.3.2.22 Dwarf_Func	48

9.3.2.23 Dwarf_Var . . . . .	48
9.3.2.24 Dwarf_Weak . . . . .	48
9.3.2.25 Dwarf_Attribute . . . . .	48
9.3.2.26 Dwarf_Abbrev . . . . .	48
9.3.2.27 Dwarf_Fde . . . . .	48
9.3.2.28 Dwarf_Cie . . . . .	48
9.3.2.29 Dwarf_Arange . . . . .	49
9.3.2.30 Dwarf_Gdbindex . . . . .	49
9.3.2.31 Dwarf_Xu_Index_Header . . . . .	49
9.3.2.32 Dwarf_Line_Context . . . . .	49
9.3.2.33 Dwarf_Macro_Context . . . . .	49
9.3.2.34 Dwarf_Dnames_Head . . . . .	49
9.3.2.35 Dwarf_Handler . . . . .	49
9.3.2.36 Dwarf_Macro_Details . . . . .	50
9.3.2.37 Dwarf_Debug_Fission_Per_CU . . . . .	50
9.3.2.38 Dwarf_Obj_Access_Interface_a . . . . .	50
9.3.2.39 Dwarf_Obj_Access_Methods_a . . . . .	50
9.3.2.40 Dwarf_Obj_Access_Section_a . . . . .	50
9.3.2.41 Dwarf_Rnglists_Head . . . . .	50
9.3.3 Enumeration Type Documentation . . . . .	50
9.3.3.1 Dwarf_Sec_Alloc_Pref . . . . .	50
9.4 Default stack frame macros . . . . .	51
9.4.1 Detailed Description . . . . .	51
9.5 DW_DLA alloc/dealloc typename&number . . . . .	51
9.5.1 Detailed Description . . . . .	52
9.6 DW_DLE Dwarf_Error numbers . . . . .	52
9.6.1 Detailed Description . . . . .	61
9.6.2 Macro Definition Documentation . . . . .	61
9.6.2.1 DW_DLE_LAST . . . . .	61
9.7 Libdwarf Initialization Functions . . . . .	62
9.7.1 Detailed Description . . . . .	62
9.7.2 Initialization And Finish Operations . . . . .	62
9.7.3 Function Documentation . . . . .	63
9.7.3.1 dwarf_init_path() . . . . .	63
9.7.3.2 dwarf_init_path_a() . . . . .	64
9.7.3.3 dwarf_init_path_dl() . . . . .	64
9.7.3.4 dwarf_init_path_dl_a() . . . . .	65
9.7.3.5 dwarf_init_b() . . . . .	65
9.7.3.6 dwarf_finish() . . . . .	66
9.7.3.7 dwarf_object_init_b() . . . . .	66
9.7.3.8 dwarf_object_finish() . . . . .	67
9.7.3.9 dwarf_set_tied_dbg() . . . . .	67

9.7.3.10 dwarf_get_tied_dbg()	68
9.8 Compilation Unit (CU) Access	69
9.8.1 Detailed Description	69
9.8.2 Function Documentation	69
9.8.2.1 dwarf_next_cu_header_e()	69
9.8.2.2 dwarf_next_cu_header_d()	71
9.8.2.3 dwarf_siblingof_c()	71
9.8.2.4 dwarf_siblingof_b()	72
9.8.2.5 dwarf_cu_header_basics()	72
9.8.2.6 dwarf_child()	73
9.8.2.7 dwarf_dealloc_die()	74
9.8.2.8 dwarf_die_from_hash_signature()	74
9.8.2.9 dwarf_offdie_b()	74
9.8.2.10 dwarf_find_die_given_sig8()	75
9.8.2.11 dwarf_get_die_infotypes_flag()	75
9.9 Debugging Information Entry (DIE) content	76
9.9.1 Detailed Description	77
9.9.2 Function Documentation	77
9.9.2.1 dwarf_die_abbrev_global_offset()	77
9.9.2.2 dwarf_tag()	78
9.9.2.3 dwarf_dieoffset()	78
9.9.2.4 dwarf_debug_addr_index_to_addr()	79
9.9.2.5 dwarf_addr_form_is_indexed()	79
9.9.2.6 dwarf_CU_dieoffset_given_die()	79
9.9.2.7 dwarf_get_cu_die_offset_given_cu_header_offset_b()	80
9.9.2.8 dwarf_die_CU_offset()	80
9.9.2.9 dwarf_die_CU_offset_range()	81
9.9.2.10 dwarf_attr()	81
9.9.2.11 dwarf_die_text()	82
9.9.2.12 dwarf_diename()	82
9.9.2.13 dwarf_die_abbrev_code()	82
9.9.2.14 dwarf_die_abbrev_children_flag()	83
9.9.2.15 dwarf_validate_die_sibling()	83
9.9.2.16 dwarf_hasattr()	84
9.9.2.17 dwarf_offset_list()	84
9.9.2.18 dwarf_get_die_address_size()	85
9.9.2.19 dwarf_die_offsets()	85
9.9.2.20 dwarf_get_version_of_die()	86
9.9.2.21 dwarf_lowpc()	86
9.9.2.22 dwarf_highpc_b()	86
9.9.2.23 dwarf_dietype_offset()	87
9.9.2.24 dwarf_bytesize()	87

9.9.2.25 dwarf_bitsize()	88
9.9.2.26 dwarf_bitoffset()	88
9.9.2.27 dwarf_srclang()	89
9.9.2.28 dwarf_arrayorder()	89
9.10 DIE Attribute and Attribute-Form Details	89
9.10.1 Detailed Description	91
9.10.2 Function Documentation	91
9.10.2.1 dwarf_attrlist()	91
9.10.2.2 dwarf_hasform()	92
9.10.2.3 dwarf_whatform()	92
9.10.2.4 dwarf_whatform_direct()	93
9.10.2.5 dwarf_whatattr()	93
9.10.2.6 dwarf_formref()	93
9.10.2.7 dwarf_global_formref_b()	94
9.10.2.8 dwarf_global_formref()	94
9.10.2.9 dwarf_formsig8()	95
9.10.2.10 dwarf_formsig8_const()	95
9.10.2.11 dwarf_formaddr()	95
9.10.2.12 dwarf_get_debug_addr_index()	96
9.10.2.13 dwarf_formflag()	96
9.10.2.14 dwarf_formudata()	97
9.10.2.15 dwarf_formsddata()	97
9.10.2.16 dwarf_formdata16()	97
9.10.2.17 dwarf_formblock()	98
9.10.2.18 dwarf_formstring()	98
9.10.2.19 dwarf_get_debug_str_index()	100
9.10.2.20 dwarf_formexprloc()	100
9.10.2.21 dwarf_get_form_class()	101
9.10.2.22 dwarf_attr_offset()	101
9.10.2.23 dwarf_uncompress_integer_block_a()	101
9.10.2.24 dwarf_dealloc_uncompressed_block()	102
9.10.2.25 dwarf_convert_to_global_offset()	102
9.10.2.26 dwarf_dealloc_attribute()	102
9.10.2.27 dwarf_discr_list()	103
9.10.2.28 dwarf_discr_entry_u()	103
9.10.2.29 dwarf_discr_entry_s()	104
9.11 Line Table For a CU	104
9.11.1 Detailed Description	106
9.11.2 Function Documentation	106
9.11.2.1 dwarf_srcfiles()	106
9.11.2.2 dwarf_srclines_b()	107
9.11.2.3 dwarf_srclines_from_linecontext()	108

9.11.2.4 dwarf_srclines_two_level_from_linecontext()	108
9.11.2.5 dwarf_srclines_dealloc_b()	109
9.11.2.6 dwarf_srclines_table_offset()	109
9.11.2.7 dwarf_srclines_comp_dir()	109
9.11.2.8 dwarf_srclines_subprog_count()	110
9.11.2.9 dwarf_srclines_subprog_data()	110
9.11.2.10 dwarf_srclines_files_indexes()	111
9.11.2.11 dwarf_srclines_files_data_b()	111
9.11.2.12 dwarf_srclines_include_dir_count()	112
9.11.2.13 dwarf_srclines_include_dir_data()	112
9.11.2.14 dwarf_srclines_version()	113
9.11.2.15 dwarf_linebeginstatement()	114
9.11.2.16 dwarf_lineendsequence()	114
9.11.2.17 dwarf_lineno()	114
9.11.2.18 dwarf_line_srcfileno()	115
9.11.2.19 dwarf_line_is_addr_set()	115
9.11.2.20 dwarf_lineaddr()	116
9.11.2.21 dwarf_lineoff_b()	116
9.11.2.22 dwarf_linesrc()	116
9.11.2.23 dwarf_lineblock()	117
9.11.2.24 dwarf_prologue_end_etc()	117
9.11.2.25 dwarf_check_lineheader_b()	118
9.11.2.26 dwarf_print_lines()	118
9.11.2.27 dwarf_register_printf_callback()	119
9.12 Ranges: code addresses in DWARF3-4	120
9.12.1 Detailed Description	120
9.12.2 Function Documentation	120
9.12.2.1 dwarf_get_ranges_b()	120
9.12.2.2 dwarf_dealloc_ranges()	121
9.12.2.3 dwarf_get_ranges_baseaddress()	121
9.13 Rnglists: code addresses in DWARF5	122
9.13.1 Detailed Description	123
9.13.2 Function Documentation	123
9.13.2.1 dwarf_rnglists_get_rle_head()	123
9.13.2.2 dwarf_get_rnglists_entry_fields_a()	124
9.13.2.3 dwarf_dealloc_rnglists_head()	124
9.13.2.4 dwarf_load_rnglists()	125
9.13.2.5 dwarf_get_rnglist_offset_index_value()	125
9.13.2.6 dwarf_get_rnglist_head_basics()	126
9.13.2.7 dwarf_get_rnglist_context_basics()	126
9.13.2.8 dwarf_get_rnglist_rle()	127
9.14 Locations of data: DWARF2-DWARF5	127



9.14.1 Detailed Description	129
9.14.2 Function Documentation	129
9.14.2.1 dwarf_get_loclist_c()	129
9.14.2.2 dwarf_get_loclist_head_kind()	129
9.14.2.3 dwarf_get_locdesc_entry_d()	130
9.14.2.4 dwarf_get_locdesc_entry_e()	130
9.14.2.5 dwarf_get_location_op_value_c()	131
9.14.2.6 dwarf_loclist_from_expr_c()	132
9.14.2.7 dwarf_dealloc_loc_head_c()	132
9.14.2.8 dwarf_load_loclists()	133
9.14.2.9 dwarf_get_loclist_offset_index_value()	133
9.14.2.10 dwarf_get_loclist_head_basics()	134
9.14.2.11 dwarf_get_loclist_context_basics()	134
9.14.2.12 dwarf_get_loclist_lle()	135
9.15 .debug_addr access: DWARF5	135
9.15.1 Detailed Description	135
9.15.2 Function Documentation	135
9.15.2.1 dwarf_debug_addr_table()	135
9.15.2.2 dwarf_debug_addr_by_index()	136
9.15.2.3 dwarf_dealloc_debug_addr_table()	137
9.16 Macro Access: DWARF5	137
9.16.1 Detailed Description	138
9.16.2 Function Documentation	138
9.16.2.1 dwarf_get_macro_context()	138
9.16.2.2 dwarf_get_macro_context_by_offset()	139
9.16.2.3 dwarf_macro_context_total_length()	139
9.16.2.4 dwarf_dealloc_macro_context()	139
9.16.2.5 dwarf_macro_context_head()	140
9.16.2.6 dwarf_macro_operands_table()	140
9.16.2.7 dwarf_get_macro_op()	140
9.16.2.8 dwarf_get_macro_defundef()	141
9.16.2.9 dwarf_get_macro_startend_file()	142
9.16.2.10 dwarf_get_macro_import()	142
9.17 Macro Access: DWARF2-4	143
9.17.1 Detailed Description	143
9.17.2 Function Documentation	143
9.17.2.1 dwarf_find_macro_value_start()	143
9.17.2.2 dwarf_get_macro_details()	144
9.18 Stack Frame Access	144
9.18.1 Detailed Description	146
9.18.2 Function Documentation	147
9.18.2.1 dwarf_get_fde_list()	147

9.18.2.2 dwarf_get_fde_list_eh()	147
9.18.2.3 dwarf_dealloc_fde_cie_list()	148
9.18.2.4 dwarf_get_fde_range()	148
9.18.2.5 dwarf_get_fde_exception_info()	149
9.18.2.6 dwarf_get_cie_of_fde()	149
9.18.2.7 dwarf_get_cie_info_b()	149
9.18.2.8 dwarf_get_cie_index()	150
9.18.2.9 dwarf_get_fde_instr_bytes()	150
9.18.2.10 dwarf_get_fde_info_for_all_regs3_b()	151
9.18.2.11 dwarf_get_fde_info_for_all_regs3()	151
9.18.2.12 dwarf_get_fde_info_for_reg3_c()	152
9.18.2.13 dwarf_get_fde_info_for_reg3_b()	153
9.18.2.14 dwarf_get_fde_info_for_cfa_reg3_c()	153
9.18.2.15 dwarf_get_fde_info_for_cfa_reg3_b()	154
9.18.2.16 dwarf_get_fde_for_die()	154
9.18.2.17 dwarf_get_fde_n()	154
9.18.2.18 dwarf_get_fde_at_pc()	155
9.18.2.19 dwarf_get_cie_augmentation_data()	155
9.18.2.20 dwarf_get_fde_augmentation_data()	156
9.18.2.21 dwarf_expand_frame_instructions()	156
9.18.2.22 dwarf_get_frame_instruction()	157
9.18.2.23 dwarf_get_frame_instruction_a()	158
9.18.2.24 dwarf_dealloc_frame_instr_head()	158
9.18.2.25 dwarf_fde_section_offset()	159
9.18.2.26 dwarf_cie_section_offset()	159
9.18.2.27 dwarf_set_frame_rule_table_size()	159
9.18.2.28 dwarf_set_frame_rule_initial_value()	160
9.18.2.29 dwarf_set_frame_cfa_value()	160
9.18.2.30 dwarf_set_frame_same_value()	160
9.18.2.31 dwarf_set_frame_undefined_value()	161
9.19 Abbreviations Section Details	161
9.19.1 Detailed Description	162
9.19.2 Function Documentation	162
9.19.2.1 dwarf_get_abbrev()	162
9.19.2.2 dwarf_get_abbrev_tag()	163
9.19.2.3 dwarf_get_abbrev_code()	163
9.19.2.4 dwarf_get_abbrev_children_flag()	163
9.19.2.5 dwarf_get_abbrev_entry_b()	164
9.20 String Section .debug_str Details	164
9.20.1 Detailed Description	164
9.20.2 Function Documentation	165
9.20.2.1 dwarf_get_str()	165

9.21 Str_Offsets section details . . . . .	165
9.21.1 Detailed Description . . . . .	166
9.21.2 Function Documentation . . . . .	166
9.21.2.1 dwarf_open_str_offsets_table_access() . . . . .	166
9.21.2.2 dwarf_close_str_offsets_table_access() . . . . .	166
9.21.2.3 dwarf_next_str_offsets_table() . . . . .	167
9.21.2.4 dwarf_str_offsets_value_by_index() . . . . .	167
9.21.2.5 dwarf_str_offsets_statistics() . . . . .	168
9.22 Dwarf_Error Functions . . . . .	168
9.22.1 Detailed Description . . . . .	169
9.22.2 Function Documentation . . . . .	169
9.22.2.1 dwarf_errno() . . . . .	169
9.22.2.2 dwarf_errmsg() . . . . .	169
9.22.2.3 dwarf_errmsg_by_number() . . . . .	169
9.22.2.4 dwarf_error_creation() . . . . .	170
9.22.2.5 dwarf_dealloc_error() . . . . .	170
9.23 Generic dwarf_dealloc Function . . . . .	170
9.23.1 Detailed Description . . . . .	170
9.23.2 Function Documentation . . . . .	171
9.23.2.1 dwarf_dealloc() . . . . .	171
9.24 Access to Section .debug_sup . . . . .	171
9.24.1 Detailed Description . . . . .	172
9.24.2 Function Documentation . . . . .	172
9.24.2.1 dwarf_get_debug_sup() . . . . .	172
9.25 Fast Access to .debug_names DWARF5 . . . . .	172
9.25.1 Detailed Description . . . . .	173
9.25.2 Function Documentation . . . . .	173
9.25.2.1 dwarf_dnames_header() . . . . .	173
9.25.2.2 dwarf_dealloc_dnames() . . . . .	174
9.25.2.3 dwarf_dnames_abbrevtable() . . . . .	174
9.25.2.4 dwarf_dnames_sizes() . . . . .	175
9.25.2.5 dwarf_dnames_offsets() . . . . .	175
9.25.2.6 dwarf_dnames_cu_table() . . . . .	176
9.25.2.7 dwarf_dnames_bucket() . . . . .	176
9.25.2.8 dwarf_dnames_name() . . . . .	177
9.25.2.9 dwarf_dnames_entrypool() . . . . .	177
9.25.2.10 dwarf_dnames_entrypool_values() . . . . .	178
9.26 Fast Access to a CU given a code address . . . . .	179
9.26.1 Detailed Description . . . . .	180
9.26.2 Function Documentation . . . . .	180
9.26.2.1 dwarf_get_aranges() . . . . .	180
9.26.2.2 dwarf_get_arange() . . . . .	180

9.26.2.3 dwarf_get_cu_die_offset()	181
9.26.2.4 dwarf_get_arange_cu_header_offset()	181
9.26.2.5 dwarf_get_arange_info_b()	181
9.27 Fast Access to .debug_pubnames and more.	182
9.27.1 Detailed Description	183
9.27.2 Function Documentation	183
9.27.2.1 dwarf_get_globals()	183
9.27.2.2 dwarf_get_pubtypes()	184
9.27.2.3 dwarf_globals_by_type()	184
9.27.2.4 dwarf_globals_dealloc()	185
9.27.2.5 dwarf_globname()	185
9.27.2.6 dwarf_global_die_offset()	185
9.27.2.7 dwarf_global_cu_offset()	186
9.27.2.8 dwarf_global_name_offsets()	186
9.27.2.9 dwarf_global_tag_number()	186
9.27.2.10 dwarf_get_globals_header()	187
9.27.2.11 dwarf_return_empty_pubnames()	187
9.28 Fast Access to GNU .debug_gnu_pubnames	188
9.28.1 Detailed Description	188
9.28.2 Function Documentation	188
9.28.2.1 dwarf_get_gnu_index_head()	188
9.28.2.2 dwarf_gnu_index_dealloc()	189
9.28.2.3 dwarf_get_gnu_index_block()	189
9.28.2.4 dwarf_get_gnu_index_block_entry()	190
9.29 Fast Access to Gdb Index	190
9.29.1 Detailed Description	191
9.29.2 Function Documentation	192
9.29.2.1 dwarf_gdbindex_header()	192
9.29.2.2 dwarf_dealloc_gdbindex()	192
9.29.2.3 dwarf_gdbindex_culist_array()	193
9.29.2.4 dwarf_gdbindex_culist_entry()	193
9.29.2.5 dwarf_gdbindex_types_culist_array()	193
9.29.2.6 dwarf_gdbindex_types_culist_entry()	194
9.29.2.7 dwarf_gdbindex_addressarea()	194
9.29.2.8 dwarf_gdbindex_addressarea_entry()	195
9.29.2.9 dwarf_gdbindex_symboltable_array()	195
9.29.2.10 dwarf_gdbindex_symboltable_entry()	195
9.29.2.11 dwarf_gdbindex_cuvector_length()	196
9.29.2.12 dwarf_gdbindex_cuvector_inner_attributes()	196
9.29.2.13 dwarf_gdbindex_cuvector_instance_expand_value()	197
9.29.2.14 dwarf_gdbindex_string_by_offset()	197
9.30 Fast Access to Split Dwarf (Debug Fission)	198

9.30.1 Detailed Description	198
9.30.2 Function Documentation	198
9.30.2.1 dwarf_get_xu_index_header()	198
9.30.2.2 dwarf_dealloc_xu_header()	199
9.30.2.3 dwarf_get_xu_index_section_type()	199
9.30.2.4 dwarf_get_xu_hash_entry()	200
9.30.2.5 dwarf_get_xu_section_names()	200
9.30.2.6 dwarf_get_xu_section_offset()	201
9.30.2.7 dwarf_get_debugfission_for_die()	202
9.30.2.8 dwarf_get_debugfission_for_key()	202
9.31 Access GNU .gnu_debuglink, build-id.	202
9.31.1 Detailed Description	203
9.31.2 Function Documentation	203
9.31.2.1 dwarf_gnu_debuglink()	203
9.31.2.2 dwarf_suppress_debuglink_crc()	205
9.31.2.3 dwarf_add_debuglink_global_path()	206
9.31.2.4 dwarf_crc32()	206
9.31.2.5 dwarf_basic_crc32()	207
9.32 Harmless Error recording	207
9.32.1 Detailed Description	208
9.32.2 Function Documentation	208
9.32.2.1 dwarf_get_harmless_error_list()	208
9.32.2.2 dwarf_set_harmless_error_list_size()	208
9.32.2.3 dwarf_insert_harmless_error()	209
9.33 Names DW_TAG_member etc as strings	209
9.33.1 Detailed Description	211
9.33.2 Function Documentation	211
9.33.2.1 dwarf_get_GNUIKIND_name()	211
9.33.2.2 dwarf_get_EH_name()	211
9.33.2.3 dwarf_get_FRAME_name()	212
9.33.2.4 dwarf_get_GNUIVIS_name()	212
9.33.2.5 dwarf_get_LLEX_name()	212
9.33.2.6 dwarf_get_MACINFO_name()	212
9.33.2.7 dwarf_get_MACRO_name()	212
9.33.2.8 dwarf_get_FORM_CLASS_name()	212
9.34 Object Sections Data	213
9.34.1 Detailed Description	214
9.34.2 Function Documentation	214
9.34.2.1 dwarf_get_die_section_name()	214
9.34.2.2 dwarf_get_die_section_name_b()	215
9.34.2.3 dwarf_get_real_section_name()	215
9.34.2.4 dwarf_get_frame_section_name()	216

9.34.2.5 dwarf_get_frame_section_name_eh_gnu()	216
9.34.2.6 dwarf_get_offset_size()	216
9.34.2.7 dwarf_get_address_size()	216
9.34.2.8 dwarf_get_line_section_name_from_die()	216
9.34.2.9 dwarf_get_section_info_by_name_a()	217
9.34.2.10 dwarf_get_section_info_by_name()	218
9.34.2.11 dwarf_get_section_info_by_index_a()	218
9.34.2.12 dwarf_get_section_info_by_index()	219
9.34.2.13 dwarf_machine_architecture_a()	219
9.34.2.14 dwarf_machine_architecture()	220
9.34.2.15 dwarf_get_section_count()	220
9.34.2.16 dwarf_get_section_max_offsets_d()	221
9.35 Section Groups Objectfile Data	221
9.35.1 Detailed Description	222
9.35.2 Function Documentation	222
9.35.2.1 dwarf_sec_group_sizes()	222
9.35.2.2 dwarf_sec_group_map()	223
9.36 LEB Encode and Decode	223
9.36.1 Detailed Description	223
9.37 Miscellaneous Functions	224
9.37.1 Detailed Description	224
9.37.2 Function Documentation	224
9.37.2.1 dwarf_package_version()	224
9.37.2.2 dwarf_set_stringcheck()	224
9.37.2.3 dwarf_set_reloc_application()	225
9.37.2.4 dwarf_record_cmdline_options()	225
9.37.2.5 dwarf_set_de_alloc_flag()	225
9.37.2.6 dwarf_library_allow_dup_attr()	226
9.37.2.7 dwarf_set_default_address_size()	226
9.37.2.8 dwarf_get_universalbinary_count()	227
9.37.3 Variable Documentation	227
9.37.3.1 dwarf_get_endian_copy_function	227
9.38 Determine Object Type of a File	228
9.38.1 Detailed Description	228
9.39 Section allocation preference	228
9.39.1 Detailed Description	228
9.39.2 Function Documentation	229
9.39.2.1 dwarf_set_load_preference()	229
9.39.2.2 dwarf_get_mmap_count()	229
9.40 Using dwarf_init_path()	230
9.41 Using dwarf_init_path_dl()	231
9.42 Using dwarf_attrlist()	232

9.43 Attaching a tied dbg . . . . .	232
9.44 Detaching a tied dbg . . . . .	233
9.45 Examining Section Group data . . . . .	233
9.46 Using dwarf_siblingof_c() . . . . .	234
9.47 Using dwarf_siblingof_b() . . . . .	235
9.48 Using dwarf_child() . . . . .	235
9.49 using dwarf_validate_die_sibling . . . . .	236
9.50 Example walking CUs(e) . . . . .	237
9.51 Example walking CUs(d) . . . . .	239
9.52 Using dwarf_offdie_b() . . . . .	240
9.53 Using dwarf_offset_given_die() . . . . .	241
9.54 Using dwarf_attrlist() . . . . .	241
9.55 Using dwarf_offset_list() . . . . .	241
9.56 Documenting Form_Block . . . . .	242
9.57 Using dwarf_discr_list() . . . . .	243
9.58 Location/expression access . . . . .	244
9.59 Reading a location expression . . . . .	245
9.60 Using dwarf_srclines_b() . . . . .	246
9.61 Using dwarf_srclines_b() and linecontext . . . . .	248
9.62 Using dwarf_srcfiles() . . . . .	249
9.63 Using dwarf_get_globals() . . . . .	250
9.64 Using dwarf_globals_by_type() . . . . .	250
9.65 Reading .debug_weaknames (nonstandard) . . . . .	251
9.66 Reading .debug_funcnames (nonstandard) . . . . .	251
9.67 Reading .debug_types (nonstandard) . . . . .	251
9.68 Reading .debug_varnames data (nonstandard) . . . . .	252
9.69 Reading .debug_names data . . . . .	252
9.70 Reading .debug_macro data (DWARF5) . . . . .	255
9.71 Reading .debug_macinfo (DWARF2-4) . . . . .	257
9.72 Extracting fde, cie lists. . . . .	258
9.73 Reading the .eh_frame section . . . . .	258
9.74 Using dwarf_expand_frame_instructions . . . . .	259
9.75 Reading string offsets section data . . . . .	259
9.76 Reading an aranges section . . . . .	261
9.77 Example getting .debug_ranges data . . . . .	262
9.78 Reading gdbindex data . . . . .	263
9.79 Reading gdbindex addressarea . . . . .	264
9.80 Reading the gdbindex symbol table . . . . .	264
9.81 Reading cu and tu Debug Fission data . . . . .	265
9.82 Reading Split Dwarf (Debug Fission) hash slots . . . . .	266
9.83 Reading high pc from a DIE. . . . .	266
9.84 Reading Split Dwarf (Debug Fission) data . . . . .	266

9.85 Retrieving tag,attribute,etc names . . . . .	267
9.86 Using GNU debuglink data . . . . .	267
9.87 Accessing accessing raw rnglist . . . . .	268
9.88 Accessing rnglists section . . . . .	270
9.89 Demonstrating reading DWARF without a file. . . . .	270
9.90 A simple report on section groups. . . . .	276
<b>10 Data Structure Documentation</b>	<b>281</b>
10.1 Dwarf_Block_s Struct Reference . . . . .	281
10.2 Dwarf_Cmdline_Options_s Struct Reference . . . . .	281
10.2.1 Detailed Description . . . . .	281
10.3 Dwarf_Debug_Fission_Per_CU_s Struct Reference . . . . .	282
10.4 Dwarf_Form_Data16_s Struct Reference . . . . .	282
10.5 Dwarf_Macro_Details_s Struct Reference . . . . .	282
10.5.1 Detailed Description . . . . .	282
10.6 Dwarf_Obj_Access_Interface_a_s Struct Reference . . . . .	283
10.7 Dwarf_Obj_Access_Methods_a_s Struct Reference . . . . .	283
10.7.1 Detailed Description . . . . .	283
10.8 Dwarf_Obj_Access_Section_a_s Struct Reference . . . . .	284
10.9 Dwarf_Printf_Callback_Info_s Struct Reference . . . . .	284
10.9.1 Detailed Description . . . . .	284
10.10 Dwarf_Ranges_s Struct Reference . . . . .	285
10.11 Dwarf_Regtable3_s Struct Reference . . . . .	285
10.12 Dwarf_Regtable_Entry3_s Struct Reference . . . . .	285
10.13 Dwarf_Sig8_s Struct Reference . . . . .	285
<b>11 File Documentation</b>	<b>287</b>
<b>12 checkexamples.c</b>	<b>289</b>
12.1 /home/davea/dwarf/code/src/bin/dwarfexample/jitreader.c File Reference . . . . .	289
12.2 /home/davea/dwarf/code/src/bin/dwarfexample/showsectiongroups.c File Reference . . . . .	289
<b>13 dwarf.h</b>	<b>291</b>
13.1 dwarf.h . . . . .	291
<b>14 libdwarf.h</b>	<b>311</b>
14.1 libdwarf.h . . . . .	311
<b>Index</b>	<b>347</b>



# Chapter 1

## A Consumer Library Interface to DWARF

1.1 Suggestions for improvement are welcome. . . . .	2
1.2 Introduction . . . . .	2
1.3 Thread Safety . . . . .	2
1.4 Error Handling in libdwarf . . . . .	3
1.4.1 Error Handling at Initialization . . . . .	3
1.4.2 Error Handling Everywhere . . . . .	4
1.5 Extracting Data Per Compilation Unit . . . . .	6
1.6 Line Table Registers . . . . .	6
1.7 Reading Special Sections Independently . . . . .	7
1.8 Special Frame Registers . . . . .	7
1.9 .debug_pubnames etc DWARF2-DWARF4 . . . . .	8
1.10 Reading DWARF with no object file present . . . . .	9
1.11 Section Groups: Split Dwarf, COMDAT groups . . . . .	10
1.12 Details on separate DWARF object access . . . . .	12
1.13 Linking against libdwarf.so (or dll or dylib) . . . . .	13
1.14 Linking against libdwarf.a . . . . .	13
1.15 Suppressing CRC calculation for debuglink . . . . .	14
1.16 dwsec_mmap . . . . .	14
1.17 Recent Changes . . . . .	15

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### Date

2025-03-19 v0.12.0

## 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-list \(at\) prevanders](mailto:libdwarf-list@prevanders.org) with final characters .org ) Sorry about the simple obfuscation to keep bots away. It's actually a simple email address, not a list.

Thanks in advance for any suggestions.

## 1.2 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.

## 1.3 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.

## 1.4 Error Handling in libdwwarf

Essentially every *libdwwarf* 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 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.

### 1.4.1 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, &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 `@elibdwarf` 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.

## 1.4.2 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;
}
```

### 1.4.2.1 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.

### 1.4.2.2 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.

### 1.4.2.3 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()`.

### 1.4.2.4 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.

## 1.5 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.

## 1.6 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
```

## 1.7 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 *libdw* 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 *libdw* bug.

## 1.8 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
```

## 1.9 .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	<a href="#">Dwarf_Global</a>	DWARF2-DWARF4
.debug_pubtypes	<a href="#">Dwarf_Global</a>	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
```



## 1.10 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 *libdwarf*. 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 *libdwarf* about.

**as\_link:** Fill in zero.

**as\_info:** Fill in zero.

**as\_addralign:** Fill in zero.

**as\_entsize:** Fill in one(1).

**Dwarf\_Obj\_Access\_Methods\_a\_s:** The functions we need to access object data from *libdwarf* 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 *libdwarf* 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.

## 1.11 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 `libdwarf.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 *libdwarf* 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.

## 1.12 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.

## 1.13 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`

## 1.14 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

## 1.15 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](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.

## 1.16 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.

## 1.17 Recent Changes

We list these with newest first.

### Changes 0.11.1 to 0.12.0

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_DL_V_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.

### 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\_typenames 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* users. 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, Mac↔OS, 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\_DLV\_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_Sections_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_Sections_a_s
    Dwarf_Obj_Access_Sections_a;
struct Dwarf_Obj_Access_Sections_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 syntatic 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

Here is a list of all topics with brief descriptions:

Basic Library Datatypes Group . . . . .	39
Enumerators with various purposes . . . . .	40
Defined and Opaque Structs . . . . .	42
Default stack frame macros . . . . .	51
DW_DLA alloc/dealloc typename&number . . . . .	51
DW_DLE Dwarf_Error numbers . . . . .	52
Libdwarf Initialization Functions . . . . .	62
Compilation Unit (CU) Access . . . . .	69
Debugging Information Entry (DIE) content . . . . .	76
DIE Attribute and Attribute-Form Details . . . . .	89
Line Table For a CU . . . . .	104
Ranges: code addresses in DWARF3-4 . . . . .	120
Rnglists: code addresses in DWARF5 . . . . .	122
Locations of data: DWARF2-DWARF5 . . . . .	127
.debug_addr access: DWARF5 . . . . .	135
Macro Access: DWARF5 . . . . .	137
Macro Access: DWARF2-4 . . . . .	143
Stack Frame Access . . . . .	144
Abbreviations Section Details . . . . .	161
String Section .debug_str Details . . . . .	164
Str_Offsets section details . . . . .	165
Dwarf_Error Functions . . . . .	168
Generic dwarf_dealloc Function . . . . .	170
Access to Section .debug_sup . . . . .	171
Fast Access to .debug_names DWARF5 . . . . .	172
Fast Access to a CU given a code address . . . . .	179
Fast Access to .debug_pubnames and more. . . . .	182
Fast Access to GNU .debug_gnu_pubnames . . . . .	188
Fast Access to Gdb Index . . . . .	190
Fast Access to Split Dwarf (Debug Fission) . . . . .	198
Access GNU .gnu_debuglink, build-id. . . . .	202
Harmless Error recording . . . . .	207
Names DW_TAG_member etc as strings . . . . .	209
Object Sections Data . . . . .	213
Section Groups Objectfile Data . . . . .	221

LEB Encode and Decode . . . . .	223
Miscellaneous Functions . . . . .	224
Determine Object Type of a File . . . . .	228
Section allocation preference . . . . .	228
Using dwarf_init_path() . . . . .	230
Using dwarf_init_path_dl() . . . . .	231
Using dwarf_attrlist() . . . . .	232
Attaching a tied dbg . . . . .	232
Detaching a tied dbg . . . . .	233
Examining Section Group data . . . . .	233
Using dwarf_siblingof_c() . . . . .	234
Using dwarf_siblingof_b() . . . . .	235
Using dwarf_child() . . . . .	235
using dwarf_validate_die_sibling . . . . .	236
Example walking CUs(e) . . . . .	237
Example walking CUs(d) . . . . .	239
Using dwarf_offdie_b() . . . . .	240
Using dwarf_offset_given_die() . . . . .	241
Using dwarf_attrlist() . . . . .	241
Using dwarf_offset_list() . . . . .	241
Documenting Form_Block . . . . .	242
Using dwarf_discr_list() . . . . .	243
Location/expression access . . . . .	244
Reading a location expression . . . . .	245
Using dwarf_srclines_b() . . . . .	246
Using dwarf_srclines_b() and linecontext . . . . .	248
Using dwarf_srcfiles() . . . . .	249
Using dwarf_get_globals() . . . . .	250
Using dwarf_globals_by_type() . . . . .	250
Reading .debug_weaknames (nonstandard) . . . . .	251
Reading .debug_funcnames (nonstandard) . . . . .	251
Reading .debug_types (nonstandard) . . . . .	251
Reading .debug_varnames data (nonstandard) . . . . .	252
Reading .debug_names data . . . . .	252
Reading .debug_macro data (DWARF5) . . . . .	255
Reading .debug_macinfo (DWARF2-4) . . . . .	257
Extracting fde, cie lists. . . . .	258
Reading the .eh_frame section . . . . .	258
Using dwarf_expand_frame_instructions . . . . .	259
Reading string offsets section data . . . . .	259
Reading an aranges section . . . . .	261
Example getting .debug_ranges data . . . . .	262
Reading gdbindex data . . . . .	263
Reading gdbindex addressarea . . . . .	264
Reading the gdbindex symbol table . . . . .	264
Reading cu and tu Debug Fission data . . . . .	265
Reading Split Dwarf (Debug Fission) hash slots . . . . .	266
Reading high pc from a DIE. . . . .	266
Reading Split Dwarf (Debug Fission) data . . . . .	266
Retrieving tag,attribute,etc names . . . . .	267
Using GNU debuglink data . . . . .	267
Accessing accessing raw rnglist . . . . .	268
Accessing rnglists section . . . . .	270
Demonstrating reading DWARF without a file. . . . .	270
A simple report on section groups. . . . .	276

## Chapter 7

# Data Structure Index

### 7.1 Data Structures

Here are the data structures with brief descriptions:

<a href="#">Dwarf_Block_s</a>	281
<a href="#">Dwarf_Cmdline_Options_s</a>	281
<a href="#">Dwarf_Debug_Fission_Per_CU_s</a>	282
<a href="#">Dwarf_Form_Data16_s</a>	282
<a href="#">Dwarf_Macro_Details_s</a>	282
<a href="#">Dwarf_Obj_Access_Interface_a_s</a>	283
<a href="#">Dwarf_Obj_Access_Methods_a_s</a>	283
<a href="#">Dwarf_Obj_Access_Section_a_s</a>	284
<a href="#">Dwarf_Printf_Callback_Info_s</a>	284
<a href="#">Dwarf_Ranges_s</a>	285
<a href="#">Dwarf_Regtable3_s</a>	285
<a href="#">Dwarf_Regtable_Entry3_s</a>	285
<a href="#">Dwarf_Sig8_s</a>	285



# Chapter 8

## File Index

### 8.1 File List

Here is a list of all documented files with brief descriptions:

<a href="#">checkexamples.c</a>	289
/home/davea/dwarf/code/src/bin/dwarfexample/ <a href="#">jitreader.c</a>	289
/home/davea/dwarf/code/src/bin/dwarfexample/ <a href="#">showsectiongroups.c</a>	289
/home/davea/dwarf/code/src/lib/libdwarf/ <a href="#">dwarf.h</a>	291
/home/davea/dwarf/code/src/lib/libdwarf/ <a href="#">libdwarf.h</a>	311



# 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\_Unsigned

[Dwarf\\_Unsigned](#)

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

##### 9.1.2.2 Dwarf\_Signed

[Dwarf\\_Signed](#)

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

##### 9.1.2.3 Dwarf\_Off

[Dwarf\\_Off](#)

Used for offsets. It should be same size as Dwarf\_Unsigned.

#### 9.1.2.4 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.

#### 9.1.2.5 Dwarf\_Bool

`Dwarf_Bool`

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

#### 9.1.2.6 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).

#### 9.1.2.7 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\_Ptr

`Dwarf_Ptr`

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

## 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\_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).

### 9.2.2.2 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`.

## 9.3 Defined and Opaque Structs

### Data Structures

- 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\_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.

#### 9.3.2.2 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](#)

#### 9.3.2.3 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](#)

#### 9.3.2.4 Dwarf\_Locdesc\_c

[Dwarf\\_Locdesc\\_c](#)

Provides access to Dwarf\_Locdesc\_c, a single location description

#### 9.3.2.5 Dwarf\_Loc\_Head\_c

[Dwarf\\_Loc\\_Head\\_c](#)

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

#### 9.3.2.6 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

#### 9.3.2.7 Dwarf\_Dsc\_Head

[Dwarf\\_Dsc\\_Head](#)

Access to DW\_AT\_discr\_list array of discriminant values.

#### 9.3.2.8 Dwarf\_Frame\_Instr\_Head

[Dwarf\\_Frame\\_Instr\\_Head](#)

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

#### 9.3.2.9 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.

### 9.3.2.10 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.

### 9.3.2.11 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](#)

### 9.3.2.12 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 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.

```

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.

### 9.3.2.13 Dwarf\_Regtable3

[Dwarf\\_Regtable3](#)

This struct 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 libdwarf. 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. libdwarf does not allocate or deallocate space for the rules, you must do so. libdwarf 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: libdwarf 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.

### 9.3.2.14 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.

#### 9.3.2.15 Dwarf\_Debug

`Dwarf_Debug`

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

#### 9.3.2.16 Dwarf\_Section

`Dwarf_Section`

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

#### 9.3.2.17 Dwarf\_Die

`Dwarf_Die`

Used to reference a DWARF Debugging Information Entry.

#### 9.3.2.18 Dwarf\_Debug\_Adr\_Table

`Dwarf_Debug_Adr_Table`

Used to reference a table in section `.debug_addr`

#### 9.3.2.19 Dwarf\_Line

`Dwarf_Line`

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

#### 9.3.2.20 Dwarf\_Global

`Dwarf_Global`

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

#### 9.3.2.21 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.

#### 9.3.2.22 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.

#### 9.3.2.23 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.

#### 9.3.2.24 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.

#### 9.3.2.25 Dwarf\_Attribute

`Dwarf_Attribute`

Used to reference a Dwarf\_Die attribute

#### 9.3.2.26 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.

#### 9.3.2.27 Dwarf\_Fde

`Dwarf_Fde`

Used to reference .debug\_frame or .eh\_frame FDE.

#### 9.3.2.28 Dwarf\_Cie

`Dwarf_Cie`

Used to reference .debug\_frame or .eh\_frame CIE.



#### 9.3.2.29 Dwarf\_Arange

`Dwarf_Arange`

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

#### 9.3.2.30 Dwarf\_Gdbindex

`Dwarf_Gdbindex`

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

#### 9.3.2.31 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.

#### 9.3.2.32 Dwarf\_Line\_Context

`Dwarf_Line_Context`

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

#### 9.3.2.33 Dwarf\_Macro\_Context

`Dwarf_Macro_Context`

Used as the general reference to DWARF5 `.debug_macro` data.

#### 9.3.2.34 Dwarf\_Dnames\_Head

`Dwarf_Dnames_Head`

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

#### 9.3.2.35 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.

#### 9.3.2.36 Dwarf\_Macro\_Details

[Dwarf\\_Macro\\_Details](#)

A handy short name for a Dwarf\_Macro\_Details\_S struct.

#### 9.3.2.37 Dwarf\_Debug\_Fission\_Per\_CU

[Dwarf\\_Debug\\_Fission\\_Per\\_CU](#)

A handy short name for a [Dwarf\\_Debug\\_Fission\\_Per\\_CU\\_s](#) struct.

#### 9.3.2.38 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

#### 9.3.2.39 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

#### 9.3.2.40 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.

#### 9.3.2.41 Dwarf\_Rnglists\_Head

[Dwarf\\_Rnglists\\_Head](#)

Used for access to a set of DWARF5 debug\_rnglists entries.

### 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.

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
- #define DW\_DLE\_FPGM\_ALLOC 67
- #define DW\_DLE\_INCDIR\_ALLOC 68
- #define DW\_DLE\_STRING\_ALLOC 69
- #define DW\_DLE\_CHUNK\_ALLOC 70
- #define DW\_DLE\_BYTEOFF\_ERR 71
- #define DW\_DLE\_CIE\_ALLOC 72
- #define DW\_DLE\_FDE\_ALLOC 73
- #define DW\_DLE\_REGNO\_OVFL 74
- #define DW\_DLE\_CIE\_OFFS\_ALLOC 75
- #define DW\_DLE\_WRONG\_ADDRESS 76
- #define DW\_DLE\_EXTRA\_NEIGHBORS 77
- #define DW\_DLE\_WRONG\_TAG 78
- #define DW\_DLE\_DIE\_ALLOC 79
- #define DW\_DLE\_PARENT\_EXISTS 80
- #define DW\_DLE\_DBG\_NULL 81
- #define DW\_DLE\_DEBUGLINE\_ERROR 82
- #define DW\_DLE\_DEBUGFRAME\_ERROR 83
- #define DW\_DLE\_DEBUGINFO\_ERROR 84
- #define DW\_DLE\_ATTR\_ALLOC 85
- #define DW\_DLE\_ABBREV\_ALLOC 86

- `#define DW_DLE_OFFSET_UFLW` 87
- `#define DW_DLE_ELF_SECT_ERR` 88
- `#define DW_DLE_DEBUG_FRAME_LENGTH_BAD` 89
- `#define DW_DLE_FRAME_VERSION_BAD` 90
- `#define DW_DLE_CIE_RET_ADDR_REG_ERROR` 91
- `#define DW_DLE_FDE_NULL` 92
- `#define DW_DLE_FDE_DBG_NULL` 93
- `#define DW_DLE_CIE_NULL` 94
- `#define DW_DLE_CIE_DBG_NULL` 95
- `#define DW_DLE_FRAME_TABLE_COL_BAD` 96
- `#define DW_DLE_PC_NOT_IN_FDE_RANGE` 97
- `#define DW_DLE_CIE_INSTR_EXEC_ERROR` 98
- `#define DW_DLE_FRAME_INSTR_EXEC_ERROR` 99
- `#define DW_DLE_FDE_PTR_NULL` 100
- `#define DW_DLE_RET_OP_LIST_NULL` 101
- `#define DW_DLE_LINE_CONTEXT_NULL` 102
- `#define DW_DLE_DBG_NO_CU_CONTEXT` 103
- `#define DW_DLE_DIE_NO_CU_CONTEXT` 104
- `#define DW_DLE_FIRST_DIE_NOT_CU` 105
- `#define DW_DLE_NEXT_DIE_PTR_NULL` 106
- `#define DW_DLE_DEBUG_FRAME_DUPLICATE` 107
- `#define DW_DLE_DEBUG_FRAME_NULL` 108
- `#define DW_DLE_ABBREV_DECODE_ERROR` 109
- `#define DW_DLE_DWARF_ABBREV_NULL` 110
- `#define DW_DLE_ATTR_NULL` 111
- `#define DW_DLE_DIE_BAD` 112
- `#define DW_DLE_DIE_ABBREV_BAD` 113
- `#define DW_DLE_ATTR_FORM_BAD` 114
- `#define DW_DLE_ATTR_NO_CU_CONTEXT` 115
- `#define DW_DLE_ATTR_FORM_SIZE_BAD` 116
- `#define DW_DLE_ATTR_DBG_NULL` 117
- `#define DW_DLE_BAD_REF_FORM` 118
- `#define DW_DLE_ATTR_FORM_OFFSET_BAD` 119
- `#define DW_DLE_LINE_OFFSET_BAD` 120
- `#define DW_DLE_DEBUG_STR_OFFSET_BAD` 121
- `#define DW_DLE_STRING_PTR_NULL` 122
- `#define DW_DLE_PUBNAMES_VERSION_ERROR` 123
- `#define DW_DLE_PUBNAMES_LENGTH_BAD` 124
- `#define DW_DLE_GLOBAL_NULL` 125
- `#define DW_DLE_GLOBAL_CONTEXT_NULL` 126
- `#define DW_DLE_DIR_INDEX_BAD` 127
- `#define DW_DLE_LOC_EXPR_BAD` 128
- `#define DW_DLE_DIE_LOC_EXPR_BAD` 129
- `#define DW_DLE_ADDR_ALLOC` 130
- `#define DW_DLE_OFFSET_BAD` 131
- `#define DW_DLE_MAKE_CU_CONTEXT_FAIL` 132
- `#define DW_DLE_REL_ALLOC` 133
- `#define DW_DLE_ARANGE_OFFSET_BAD` 134
- `#define DW_DLE_SEGMENT_SIZE_BAD` 135
- `#define DW_DLE_ARANGE_LENGTH_BAD` 136
- `#define DW_DLE_ARANGE_DECODE_ERROR` 137
- `#define DW_DLE_ARANGES_NULL` 138
- `#define DW_DLE_ARANGE_NULL` 139
- `#define DW_DLE_NO_FILE_NAME` 140
- `#define DW_DLE_NO_COMP_DIR` 141

- #define DW\_DLE\_CU\_ADDRESS\_SIZE\_BAD 142
- #define DW\_DLE\_INPUT\_ATTR\_BAD 143
- #define DW\_DLE\_EXPR\_NULL 144
- #define DW\_DLE\_BAD\_EXPR\_OPCODE 145
- #define DW\_DLE\_EXPR\_LENGTH\_BAD 146
- #define DW\_DLE\_MULTIPLE\_RELOC\_IN\_EXPR 147
- #define DW\_DLE\_ELF\_GETIDENT\_ERROR 148
- #define DW\_DLE\_NO\_AT\_MIPS\_FDE 149
- #define DW\_DLE\_NO\_CIE\_FOR\_FDE 150
- #define DW\_DLE\_DIE\_ABBREV\_LIST\_NULL 151
- #define DW\_DLE\_DEBUG\_FUNCNAMES\_DUPLICATE 152
- #define DW\_DLE\_DEBUG\_FUNCNAMES\_NULL 153
- #define DW\_DLE\_DEBUG\_FUNCNAMES\_VERSION\_ERROR 154
- #define DW\_DLE\_DEBUG\_FUNCNAMES\_LENGTH\_BAD 155
- #define DW\_DLE\_FUNC\_NULL 156
- #define DW\_DLE\_FUNC\_CONTEXT\_NULL 157
- #define DW\_DLE\_DEBUG\_TYPENAMES\_DUPLICATE 158
- #define DW\_DLE\_DEBUG\_TYPENAMES\_NULL 159
- #define DW\_DLE\_DEBUG\_TYPENAMES\_VERSION\_ERROR 160
- #define DW\_DLE\_DEBUG\_TYPENAMES\_LENGTH\_BAD 161
- #define DW\_DLE\_TYPE\_NULL 162
- #define DW\_DLE\_TYPE\_CONTEXT\_NULL 163
- #define DW\_DLE\_DEBUG\_VARNAMES\_DUPLICATE 164
- #define DW\_DLE\_DEBUG\_VARNAMES\_NULL 165
- #define DW\_DLE\_DEBUG\_VARNAMES\_VERSION\_ERROR 166
- #define DW\_DLE\_DEBUG\_VARNAMES\_LENGTH\_BAD 167
- #define DW\_DLE\_VAR\_NULL 168
- #define DW\_DLE\_VAR\_CONTEXT\_NULL 169
- #define DW\_DLE\_DEBUG\_WEAKNAMES\_DUPLICATE 170
- #define DW\_DLE\_DEBUG\_WEAKNAMES\_NULL 171
- #define DW\_DLE\_DEBUG\_WEAKNAMES\_VERSION\_ERROR 172
- #define DW\_DLE\_DEBUG\_WEAKNAMES\_LENGTH\_BAD 173
- #define DW\_DLE\_WEAK\_NULL 174
- #define DW\_DLE\_WEAK\_CONTEXT\_NULL 175
- #define DW\_DLE\_LOCDISC\_COUNT\_WRONG 176
- #define DW\_DLE\_MACINFO\_STRING\_NULL 177
- #define DW\_DLE\_MACINFO\_STRING\_EMPTY 178
- #define DW\_DLE\_MACINFO\_INTERNAL\_ERROR\_SPACE 179
- #define DW\_DLE\_MACINFO\_MALLOC\_FAIL 180
- #define DW\_DLE\_DEBUGMACINFO\_ERROR 181
- #define DW\_DLE\_DEBUG\_MACRO\_LENGTH\_BAD 182
- #define DW\_DLE\_DEBUG\_MACRO\_MAX\_BAD 183
- #define DW\_DLE\_DEBUG\_MACRO\_INTERNAL\_ERR 184
- #define DW\_DLE\_DEBUG\_MACRO\_MALLOC\_SPACE 185
- #define DW\_DLE\_DEBUG\_MACRO\_INCONSISTENT 186
- #define DW\_DLE\_DF\_NO\_CIE\_AUGMENTATION 187
- #define DW\_DLE\_DF\_REG\_NUM\_TOO\_HIGH 188
- #define DW\_DLE\_DF\_MAKE\_INSTR\_NO\_INIT 189
- #define DW\_DLE\_DF\_NEW\_LOC\_LESS\_OLD\_LOC 190
- #define DW\_DLE\_DF\_POP\_EMPTY\_STACK 191
- #define DW\_DLE\_DF\_ALLOC\_FAIL 192
- #define DW\_DLE\_DF\_FRAME\_DECODING\_ERROR 193
- #define DW\_DLE\_DEBUG\_LOC\_SECTION\_SHORT 194
- #define DW\_DLE\_FRAME\_AUGMENTATION\_UNKNOWN 195
- #define DW\_DLE\_PUBTYPE\_CONTEXT 196 /\* Unused. \*/

- `#define DW_DLE_DEBUG_PUBTYPES_LENGTH_BAD` 197
- `#define DW_DLE_DEBUG_PUBTYPES_VERSION_ERROR` 198
- `#define DW_DLE_DEBUG_PUBTYPES_DUPLICATE` 199
- `#define DW_DLE_FRAME_CIE_DECODE_ERROR` 200
- `#define DW_DLE_FRAME_REGISTER_UNREPRESENTABLE` 201
- `#define DW_DLE_FRAME_REGISTER_COUNT_MISMATCH` 202
- `#define DW_DLE_LINK_LOOP` 203
- `#define DW_DLE_STRP_OFFSET_BAD` 204
- `#define DW_DLE_DEBUG_RANGES_DUPLICATE` 205
- `#define DW_DLE_DEBUG_RANGES_OFFSET_BAD` 206
- `#define DW_DLE_DEBUG_RANGES_MISSING_END` 207
- `#define DW_DLE_DEBUG_RANGES_OUT_OF_MEM` 208
- `#define DW_DLE_DEBUG_SYMTAB_ERR` 209
- `#define DW_DLE_DEBUG_STRTAB_ERR` 210
- `#define DW_DLE_RELOC_MISMATCH_INDEX` 211
- `#define DW_DLE_RELOC_MISMATCH_RELOC_INDEX` 212
- `#define DW_DLE_RELOC_MISMATCH_STRTAB_INDEX` 213
- `#define DW_DLE_RELOC_SECTION_MISMATCH` 214
- `#define DW_DLE_RELOC_SECTION_MISSING_INDEX` 215
- `#define DW_DLE_RELOC_SECTION_LENGTH_ODD` 216
- `#define DW_DLE_RELOC_SECTION_PTR_NULL` 217
- `#define DW_DLE_RELOC_SECTION_MALLOC_FAIL` 218
- `#define DW_DLE_NO_ELF64_SUPPORT` 219
- `#define DW_DLE_MISSING_ELF64_SUPPORT` 220
- `#define DW_DLE_ORPHAN_FDE` 221
- `#define DW_DLE_DUPLICATE_INST_BLOCK` 222
- `#define DW_DLE_BAD_REF_SIG8_FORM` 223
- `#define DW_DLE_ATTR_EXPRLOC_FORM_BAD` 224
- `#define DW_DLE_FORM_SEC_OFFSET_LENGTH_BAD` 225
- `#define DW_DLE_NOT_REF_FORM` 226
- `#define DW_DLE_DEBUG_FRAME_LENGTH_NOT_MULTIPLE` 227
- `#define DW_DLE_REF_SIG8_NOT_HANDLED` 228
- `#define DW_DLE_DEBUG_FRAME_POSSIBLE_ADDRESS_BOTCH` 229
- `#define DW_DLE_LOC_BAD_TERMINATION` 230
- `#define DW_DLE_SYMTAB_SECTION_LENGTH_ODD` 231
- `#define DW_DLE_RELOC_SECTION_SYMBOL_INDEX_BAD` 232
- `#define DW_DLE_RELOC_SECTION_RELOC_TARGET_SIZE_UNKNOWN` 233
- `#define DW_DLE_SYMTAB_SECTION_ENTRYSIZE_ZERO` 234
- `#define DW_DLE_LINE_NUMBER_HEADER_ERROR` 235
- `#define DW_DLE_DEBUG_TYPES_NULL` 236
- `#define DW_DLE_DEBUG_TYPES_DUPLICATE` 237
- `#define DW_DLE_DEBUG_TYPES_ONLY_DWARF4` 238
- `#define DW_DLE_DEBUG_TYPEOFFSET_BAD` 239
- `#define DW_DLE_GNU_OPCODE_ERROR` 240
- `#define DW_DLE_DEBUGPUBTYPES_ERROR` 241
- `#define DW_DLE_AT_FIXUP_NULL` 242
- `#define DW_DLE_AT_FIXUP_DUP` 243
- `#define DW_DLE_BAD_ABINAME` 244
- `#define DW_DLE_TOO_MANY_DEBUG` 245
- `#define DW_DLE_DEBUG_STR_OFFSETS_DUPLICATE` 246
- `#define DW_DLE_SECTION_DUPLICATION` 247
- `#define DW_DLE_SECTION_ERROR` 248
- `#define DW_DLE_DEBUG_ADDR_DUPLICATE` 249
- `#define DW_DLE_DEBUG_CU_UNAVAILABLE_FOR_FORM` 250
- `#define DW_DLE_DEBUG_FORM_HANDLING_INCOMPLETE` 251



- `#define DW_DLE_NEXT_DIE_PAST_END` 252
- `#define DW_DLE_NEXT_DIE_WRONG_FORM` 253
- `#define DW_DLE_NEXT_DIE_NO_ABBREV_LIST` 254
- `#define DW_DLE_NESTED_FORM_INDIRECT_ERROR` 255
- `#define DW_DLE_CU_DIE_NO_ABBREV_LIST` 256
- `#define DW_DLE_MISSING_NEEDED_DEBUG_ADDR_SECTION` 257
- `#define DW_DLE_ATTR_FORM_NOT_ADDR_INDEX` 258
- `#define DW_DLE_ATTR_FORM_NOT_STR_INDEX` 259
- `#define DW_DLE_DUPLICATE_GDB_INDEX` 260
- `#define DW_DLE_ERRONEOUS_GDB_INDEX_SECTION` 261
- `#define DW_DLE_GDB_INDEX_COUNT_ERROR` 262
- `#define DW_DLE_GDB_INDEX_COUNT_ADDR_ERROR` 263
- `#define DW_DLE_GDB_INDEX_INDEX_ERROR` 264
- `#define DW_DLE_GDB_INDEX_CUVEC_ERROR` 265
- `#define DW_DLE_DUPLICATE_CU_INDEX` 266
- `#define DW_DLE_DUPLICATE_TU_INDEX` 267
- `#define DW_DLE_XU_TYPE_ARG_ERROR` 268
- `#define DW_DLE_XU_IMPOSSIBLE_ERROR` 269
- `#define DW_DLE_XU_NAME_COL_ERROR` 270
- `#define DW_DLE_XU_HASH_ROW_ERROR` 271
- `#define DW_DLE_XU_HASH_INDEX_ERROR` 272
- `#define DW_DLE_FAILSAFE_ERRVAL` 273
- `#define DW_DLE_ARANGE_ERROR` 274
- `#define DW_DLE_PUBNAMES_ERROR` 275
- `#define DW_DLE_FUNCNAMES_ERROR` 276
- `#define DW_DLE_TYPENAMES_ERROR` 277
- `#define DW_DLE_VARNAME_ERROR` 278
- `#define DW_DLE_WEAKNAMES_ERROR` 279
- `#define DW_DLE_RELOCS_ERROR` 280
- `#define DW_DLE_ATTR_OUTSIDE_SECTION` 281
- `#define DW_DLE_FFISSION_INDEX_WRONG` 282
- `#define DW_DLE_FFISSION_VERSION_ERROR` 283
- `#define DW_DLE_NEXT_DIE_LOW_ERROR` 284
- `#define DW_DLE_CU_UT_TYPE_ERROR` 285
- `#define DW_DLE_NO_SUCH_SIGNATURE_FOUND` 286
- `#define DW_DLE_SIGNATURE_SECTION_NUMBER_WRONG` 287
- `#define DW_DLE_ATTR_FORM_NOT_DATA8` 288
- `#define DW_DLE_SIG_TYPE_WRONG_STRING` 289
- `#define DW_DLE_MISSING_REQUIRED_TU_OFFSET_HASH` 290
- `#define DW_DLE_MISSING_REQUIRED_CU_OFFSET_HASH` 291
- `#define DW_DLE_DWP_MISSING_DWO_ID` 292
- `#define DW_DLE_DWP_SIBLING_ERROR` 293
- `#define DW_DLE_DEBUG_FFISSION_INCOMPLETE` 294
- `#define DW_DLE_FFISSION_SECTNUM_ERR` 295
- `#define DW_DLE_DEBUG_MACRO_DUPLICATE` 296
- `#define DW_DLE_DEBUG_NAMES_DUPLICATE` 297
- `#define DW_DLE_DEBUG_LINE_STR_DUPLICATE` 298
- `#define DW_DLE_DEBUG_SUP_DUPLICATE` 299
- `#define DW_DLE_NO_SIGNATURE_TO_LOOKUP` 300
- `#define DW_DLE_NO_TIED_ADDR_AVAILABLE` 301
- `#define DW_DLE_NO_TIED_SIG_AVAILABLE` 302
- `#define DW_DLE_STRING_NOT_TERMINATED` 303
- `#define DW_DLE_BAD_LINE_TABLE_OPERATION` 304
- `#define DW_DLE_LINE_CONTEXT_BOTCH` 305
- `#define DW_DLE_LINE_CONTEXT_INDEX_WRONG` 306

- `#define DW_DLE_NO_TIED_STRING_AVAILABLE` 307
- `#define DW_DLE_NO_TIED_FILE_AVAILABLE` 308
- `#define DW_DLE_CU_TYPE_MISSING` 309
- `#define DW_DLE_LLE_CODE_UNKNOWN` 310
- `#define DW_DLE_LOCLIST_INTERFACE_ERROR` 311
- `#define DW_DLE_LOCLIST_INDEX_ERROR` 312
- `#define DW_DLE_INTERFACE_NOT_SUPPORTED` 313
- `#define DW_DLE_ZDEBUG_REQUIRES_ZLIB` 314
- `#define DW_DLE_ZDEBUG_INPUT_FORMAT_ODD` 315
- `#define DW_DLE_ZLIB_BUF_ERROR` 316
- `#define DW_DLE_ZLIB_DATA_ERROR` 317
- `#define DW_DLE_MACRO_OFFSET_BAD` 318
- `#define DW_DLE_MACRO_OPCODE_BAD` 319
- `#define DW_DLE_MACRO_OPCODE_FORM_BAD` 320
- `#define DW_DLE_UNKNOWN_FORM` 321
- `#define DW_DLE_BAD_MACRO_HEADER_POINTER` 322
- `#define DW_DLE_BAD_MACRO_INDEX` 323
- `#define DW_DLE_MACRO_OP_UNHANDLED` 324
- `#define DW_DLE_MACRO_PAST_END` 325
- `#define DW_DLE_LINE_STRP_OFFSET_BAD` 326
- `#define DW_DLE_STRING_FORM_IMPROPER` 327
- `#define DW_DLE_ELF_FLAGS_NOT_AVAILABLE` 328
- `#define DW_DLE_LEB_IMPROPER` 329
- `#define DW_DLE_DEBUG_LINE_RANGE_ZERO` 330
- `#define DW_DLE_READ_LITTLEENDIAN_ERROR` 331
- `#define DW_DLE_READ_BIGENDIAN_ERROR` 332
- `#define DW_DLE_RELOC_INVALID` 333
- `#define DW_DLE_INFO_HEADER_ERROR` 334
- `#define DW_DLE_ARANGES_HEADER_ERROR` 335
- `#define DW_DLE_LINE_OFFSET_WRONG_FORM` 336
- `#define DW_DLE_FORM_BLOCK_LENGTH_ERROR` 337
- `#define DW_DLE_ZLIB_SECTION_SHORT` 338
- `#define DW_DLE_CIE_INSTR_PTR_ERROR` 339
- `#define DW_DLE_FDE_INSTR_PTR_ERROR` 340
- `#define DW_DLE_FISSION_ADDITION_ERROR` 341
- `#define DW_DLE_HEADER_LEN_BIGGER_THAN_SECSIZE` 342
- `#define DW_DLE_LOCEXPRESS_OFF_SECTION_END` 343
- `#define DW_DLE_POINTER_SECTION_UNKNOWN` 344
- `#define DW_DLE_ERRONEOUS_XU_INDEX_SECTION` 345
- `#define DW_DLE_DIRECTORY_FORMAT_COUNT_VS_DIRECTORIES_MISMATCH` 346
- `#define DW_DLE_COMPRESSED_EMPTY_SECTION` 347
- `#define DW_DLE_SIZE_WRAPAROUND` 348
- `#define DW_DLE_ILLOGICAL_TSEARCH` 349
- `#define DW_DLE_BAD_STRING_FORM` 350
- `#define DW_DLE_DEBUGSTR_ERROR` 351
- `#define DW_DLE_DEBUGSTR_UNEXPECTED_REL` 352
- `#define DW_DLE_DISCR_ARRAY_ERROR` 353
- `#define DW_DLE_LEB_OUT_ERROR` 354
- `#define DW_DLE_SIBLING_LIST_IMPROPER` 355
- `#define DW_DLE_LOCLIST_OFFSET_BAD` 356
- `#define DW_DLE_LINE_TABLE_BAD` 357
- `#define DW_DLE_DEBUG_LOCLISTS_DUPLICATE` 358
- `#define DW_DLE_DEBUG_RNGLISTS_DUPLICATE` 359
- `#define DW_DLE_ABBREV_OFF_END` 360
- `#define DW_DLE_FORM_STRING_BAD_STRING` 361

- `#define DW_DLE_AUGMENTATION_STRING_OFF_END` 362
- `#define DW_DLE_STRING_OFF_END_PUBNAMES_LIKE` 363
- `#define DW_DLE_LINE_STRING_BAD` 364
- `#define DW_DLE_DEFINE_FILE_STRING_BAD` 365
- `#define DW_DLE_MACRO_STRING_BAD` 366
- `#define DW_DLE_MACINFO_STRING_BAD` 367
- `#define DW_DLE_ZLIB_UNCOMPRESS_ERROR` 368
- `#define DW_DLE_IMPROPER_DWO_ID` 369
- `#define DW_DLE_GROUPNUMBER_ERROR` 370
- `#define DW_DLE_ADDRESS_SIZE_ZERO` 371
- `#define DW_DLE_DEBUG_NAMES_HEADER_ERROR` 372
- `#define DW_DLE_DEBUG_NAMES_AUG_STRING_ERROR` 373
- `#define DW_DLE_DEBUG_NAMES_PAD_NON_ZERO` 374
- `#define DW_DLE_DEBUG_NAMES_OFF_END` 375
- `#define DW_DLE_DEBUG_NAMES_ABBREV_OVERFLOW` 376
- `#define DW_DLE_DEBUG_NAMES_ABBREV_CORRUPTION` 377
- `#define DW_DLE_DEBUG_NAMES_NULL_POINTER` 378
- `#define DW_DLE_DEBUG_NAMES_BAD_INDEX_ARG` 379
- `#define DW_DLE_DEBUG_NAMES_ENTRYPOOL_OFFSET` 380
- `#define DW_DLE_DEBUG_NAMES_UNHANDLED_FORM` 381
- `#define DW_DLE_LNCT_CODE_UNKNOWN` 382
- `#define DW_DLE_LNCT_FORM_CODE_NOT_HANDLED` 383
- `#define DW_DLE_LINE_HEADER_LENGTH_BOTCH` 384
- `#define DW_DLE_STRING_HASHTAB_IDENTITY_ERROR` 385
- `#define DW_DLE_UNIT_TYPE_NOT_HANDLED` 386
- `#define DW_DLE_GROUP_MAP_ALLOC` 387
- `#define DW_DLE_GROUP_MAP_DUPLICATE` 388
- `#define DW_DLE_GROUP_COUNT_ERROR` 389
- `#define DW_DLE_GROUP_INTERNAL_ERROR` 390
- `#define DW_DLE_GROUP_LOAD_ERROR` 391
- `#define DW_DLE_GROUP_LOAD_READ_ERROR` 392
- `#define DW_DLE_AUG_DATA_LENGTH_BAD` 393
- `#define DW_DLE_ABBREV_MISSING` 394
- `#define DW_DLE_NO_TAG_FOR_DIE` 395
- `#define DW_DLE_LOWPC_WRONG_CLASS` 396
- `#define DW_DLE_HIGHPC_WRONG_FORM` 397
- `#define DW_DLE_STR_OFFSETS_BASE_WRONG_FORM` 398
- `#define DW_DLE_DATA16_OUTSIDE_SECTION` 399
- `#define DW_DLE_LNCT_MD5_WRONG_FORM` 400
- `#define DW_DLE_LINE_HEADER_CORRUPT` 401
- `#define DW_DLE_STR_OFFSETS_NULLARGUMENT` 402
- `#define DW_DLE_STR_OFFSETS_NULL_DBG` 403
- `#define DW_DLE_STR_OFFSETS_NO_MAGIC` 404
- `#define DW_DLE_STR_OFFSETS_ARRAY_SIZE` 405
- `#define DW_DLE_STR_OFFSETS_VERSION_WRONG` 406
- `#define DW_DLE_STR_OFFSETS_ARRAY_INDEX_WRONG` 407
- `#define DW_DLE_STR_OFFSETS_EXTRA_BYTES` 408
- `#define DW_DLE_DUP_ATTR_ON_DIE` 409
- `#define DW_DLE_SECTION_NAME_BIG` 410
- `#define DW_DLE_FILE_UNAVAILABLE` 411
- `#define DW_DLE_FILE_WRONG_TYPE` 412
- `#define DW_DLE_SIBLING_OFFSET_WRONG` 413
- `#define DW_DLE_OPEN_FAIL` 414
- `#define DW_DLE_OFFSET_SIZE` 415
- `#define DW_DLE_MACH_O_SEGOFFSET_BAD` 416

- `#define DW_DLE_FILE_OFFSET_BAD` 417
- `#define DW_DLE_SEEK_ERROR` 418
- `#define DW_DLE_READ_ERROR` 419
- `#define DW_DLE_ELF_CLASS_BAD` 420
- `#define DW_DLE_ELF_ENDIAN_BAD` 421
- `#define DW_DLE_ELF_VERSION_BAD` 422
- `#define DW_DLE_FILE_TOO_SMALL` 423
- `#define DW_DLE_PATH_SIZE_TOO_SMALL` 424
- `#define DW_DLE_BAD_TYPE_SIZE` 425
- `#define DW_DLE_PE_SIZE_SMALL` 426
- `#define DW_DLE_PE_OFFSET_BAD` 427
- `#define DW_DLE_PE_STRING_TOO_LONG` 428
- `#define DW_DLE_IMAGE_FILE_UNKNOWN_TYPE` 429
- `#define DW_DLE_LINE_TABLE_LINENO_ERROR` 430
- `#define DW_DLE_PRODUCER_CODE_NOT_AVAILABLE` 431
- `#define DW_DLE_NO_ELF_SUPPORT` 432
- `#define DW_DLE_NO_STREAM_RELOC_SUPPORT` 433
- `#define DW_DLE_RETURN_EMPTY_PUBNAMES_ERROR` 434
- `#define DW_DLE_SECTION_SIZE_ERROR` 435
- `#define DW_DLE_INTERNAL_NULL_POINTER` 436
- `#define DW_DLE_SECTION_STRING_OFFSET_BAD` 437
- `#define DW_DLE_SECTION_INDEX_BAD` 438
- `#define DW_DLE_INTEGER_TOO_SMALL` 439
- `#define DW_DLE_ELF_SECTION_LINK_ERROR` 440
- `#define DW_DLE_ELF_SECTION_GROUP_ERROR` 441
- `#define DW_DLE_ELF_SECTION_COUNT_MISMATCH` 442
- `#define DW_DLE_ELF_STRING_SECTION_MISSING` 443
- `#define DW_DLE_SEEK_OFF_END` 444
- `#define DW_DLE_READ_OFF_END` 445
- `#define DW_DLE_ELF_SECTION_ERROR` 446
- `#define DW_DLE_ELF_STRING_SECTION_ERROR` 447
- `#define DW_DLE_MIXING_SPLIT_DWARF_VERSIONS` 448
- `#define DW_DLE_TAG_CORRUPT` 449
- `#define DW_DLE_FORM_CORRUPT` 450
- `#define DW_DLE_ATTR_CORRUPT` 451
- `#define DW_DLE_ABBREV_ATTR_DUPLICATION` 452
- `#define DW_DLE_DWP_SIGNATURE_MISMATCH` 453
- `#define DW_DLE_CU_UT_TYPE_VALUE` 454
- `#define DW_DLE_DUPLICATE_GNU_DEBUGLINK` 455
- `#define DW_DLE_CORRUPT_GNU_DEBUGLINK` 456
- `#define DW_DLE_CORRUPT_NOTE_GNU_DEBUGID` 457
- `#define DW_DLE_CORRUPT_GNU_DEBUGID_SIZE` 458
- `#define DW_DLE_CORRUPT_GNU_DEBUGID_STRING` 459
- `#define DW_DLE_HEX_STRING_ERROR` 460
- `#define DW_DLE_DECIMAL_STRING_ERROR` 461
- `#define DW_DLE_PRO_INIT_EXTRAS_UNKNOWN` 462
- `#define DW_DLE_PRO_INIT_EXTRAS_ERR` 463
- `#define DW_DLE_NULL_ARGS_DWARF_ADD_PATH` 464
- `#define DW_DLE_DWARF_INIT_DBG_NULL` 465
- `#define DW_DLE_ELF_RELOC_SECTION_ERROR` 466
- `#define DW_DLE_USER_DECLARED_ERROR` 467
- `#define DW_DLE_RNGLISTS_ERROR` 468
- `#define DW_DLE_LOCLISTS_ERROR` 469
- `#define DW_DLE_SECTION_SIZE_OR_OFFSET_LARGE` 470
- `#define DW_DLE_GDBINDEX_STRING_ERROR` 471

- `#define DW_DLE_GNU_PUBNAMES_ERROR 472`
- `#define DW_DLE_GNU_PUBTYPES_ERROR 473`
- `#define DW_DLE_DUPLICATE_GNU_DEBUG_PUBNAMES 474`
- `#define DW_DLE_DUPLICATE_GNU_DEBUG_PUBTYPES 475`
- `#define DW_DLE_DEBUG_SUP_STRING_ERROR 476`
- `#define DW_DLE_DEBUG_SUP_ERROR 477`
- `#define DW_DLE_LOCATION_ERROR 478`
- `#define DW_DLE_DEBUGLINK_PATH_SHORT 479`
- `#define DW_DLE_SIGNATURE_MISMATCH 480`
- `#define DW_DLE_MACRO_VERSION_ERROR 481`
- `#define DW_DLE_NEGATIVE_SIZE 482`
- `#define DW_DLE_UDATA_VALUE_NEGATIVE 483`
- `#define DW_DLE_DEBUG_NAMES_ERROR 484`
- `#define DW_DLE_CFA_INSTRUCTION_ERROR 485`
- `#define DW_DLE_MACHO_CORRUPT_HEADER 486`
- `#define DW_DLE_MACHO_CORRUPT_COMMAND 487`
- `#define DW_DLE_MACHO_CORRUPT_SECTIONDETAILS 488`
- `#define DW_DLE_RELOCATION_SECTION_SIZE_ERROR 489`
- `#define DW_DLE_SYMBOL_SECTION_SIZE_ERROR 490`
- `#define DW_DLE_PE_SECTION_SIZE_ERROR 491`
- `#define DW_DLE_DEBUG_ADDR_ERROR 492`
- `#define DW_DLE_NO_SECT_STRINGS 493`
- `#define DW_DLE_TOO_FEW_SECTIONS 494`
- `#define DW_DLE_BUILD_ID_DESCRIPTION_SIZE 495`
- `#define DW_DLE_BAD_SECTION_FLAGS 496`
- `#define DW_DLE_IMPROPER_SECTION_ZERO 497`
- `#define DW_DLE_INVALID_NULL_ARGUMENT 498`
- `#define DW_DLE_LINE_INDEX_WRONG 499`
- `#define DW_DLE_LINE_COUNT_WRONG 500`
- `#define DW_DLE_ARITHMETIC_OVERFLOW 501`
- `#define DW_DLE_UNIVERSAL_BINARY_ERROR 502`
- `#define DW_DLE_UNIV_BIN_OFFSET_SIZE_ERROR 503`
- `#define DW_DLE_PE_SECTION_SIZE_HEURISTIC_FAIL 504`
- `#define DW_DLE_LLE_ERROR 505`
- `#define DW_DLE_RLE_ERROR 506`
- `#define DW_DLE_MACHO_SEGMENT_COUNT_HEURISTIC_FAIL 507`
- `#define DW_DLE_LAST 507`
- `#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 507
```

#### Note

DW\_DLE\_LAST MUST EQUAL LAST ERROR NUMBER

## 9.7 Libdwarf Initialization Functions

### Functions

- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- int [dwarf\\_finish](#) ([Dwarf\\_Debug](#) dw\_dbg)  
*Close the initialized dw\_dbg and free all data libdwarf has for this dw\_dbg.*
- 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.*
- int [dwarf\\_object\\_finish](#) ([Dwarf\\_Debug](#) dw\_dbg)  
*Used to close the object\_init dw\_dbg.*
- int [dwarf\\_set\\_tied\\_dbg](#) ([Dwarf\\_Debug](#) dw\_split\_dbg, [Dwarf\\_Debug](#) dw\_tied\_dbg, [Dwarf\\_Error](#) \*dw\_error)  
*Use with split dwarf.*
- 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\_init\_path()

```
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 )
```

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\(\)](#)

### 9.7.3.2 dwarf\_init\_path\_a()

```
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 )
```

This is 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`.

### 9.7.3.3 dwarf\_init\_path\_dl()

```
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 )
```

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 <code>NULL</code> 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 <code>DW_GROUPNUMBER_ANY</code> unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in <code>NULL</code> , normally. If non-null one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the <code>dw_error</code> argument.
<i>dw_errarg</i>	Pass in <code>NULL</code> , normally. If <code>dw_errhand</code> is non-null, then this value (a pointer or integer that means something to you) is passed to the <code>dw_errhand</code> function in case that is helpful to you.
<i>dw_dbg</i>	On success, <code>*dw_dbg</code> is set to a pointer to a new <code>Dwarf_Debug</code> structure to be used in calls to libdwarf functions.



## Parameters

<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\(\)](#)

## 9.7.3.4 dwarf\_init\_path\_dl\_a()

```
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 )
```

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.

## 9.7.3.5 dwarf\_init\_b()

```
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 )
```

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.

## 9.7.3.6 dwarf\_finish()

```
int dwarf_finish (
    Dwarf_Debug 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.

## 9.7.3.7 dwarf\_object\_init\_b()

```
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 )
```

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>	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.

#### 9.7.3.8 dwarf\_object\_finish()

```
int dwarf_object_finish (
    Dwarf_Debug 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 <a href="#">dwarf_object_init_b()</a> . 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\_set\_tied\_dbg()

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

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 <i>dw_error</i> is set to point to the error details.

#### Returns

DW\_DLV\_OK etc.

#### See also

[Attaching a tied dbg](#)

[Detaching a tied dbg](#)

### 9.7.3.10 dwarf\_get\_tied\_dbg()

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

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 <i>dw_dbg</i> 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 <i>dw_dbg</i> is invalid or damaged then the function returns DW_DLV_ERROR and <i>dw_error</i> is set to point to the error details.

#### Returns

DW\_DLV\_OK or DW\_DLV\_ERROR. Never returns DW\_DLV\_NO\_ENTRY.

## 9.8 Compilation Unit (CU) Access

### Functions

- `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).*
- `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).*
- `int dwarf_siblingof_c (Dwarf_Die dw_die, Dwarf_Die *dw_return_siblingdie, Dwarf_Error *dw_error)`  
*Return the next sibling DIE.*
- `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.*
- `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.*
- `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.*
- `void dwarf_dealloc_die (Dwarf_Die dw_die)`  
*Deallocate (free) a DIE.*
- `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.*
- `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.*
- `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.*
- `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\_next\_cu\_header\_e()

```
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 )

```

New in v0.9.0 November 2023.

The library keeps track of where it is in the object file and it knows where to find 'next'.

It returns the CU\_DIE pointer through `dw_cu_die`;

`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

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

### 9.8.2.2 dwarf\_next\_cu\_header\_d()

```
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 )
```

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

This version will eventually be deprecated.

The library keeps track of where it is in the object file and it knows where to find 'next'.

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 here.

### 9.8.2.3 dwarf\_siblingof\_c()

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

#### 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

**9.8.2.4 dwarf\_siblingof\_b()**

```
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 )
```

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

**9.8.2.5 dwarf\_cu\_header\_basics()**

```
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 )

```

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.

#### 9.8.2.6 dwarf\_child()

```

int dwarf_child (
    Dwarf_Die dw_die,
    Dwarf_Die * dw_return_chiddie,
    Dwarf_Error * dw_error )

```

#### Parameters

<i>dw_die</i>	We will return the first child of this DIE.
<i>dw_return_chiddie</i>	Returns the first child through the pointer. For subsequent dies siblings of the first, use <a href="#">dwarf_siblingof_c()</a> .
<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\(\)](#)

### 9.8.2.7 dwarf\_dealloc\_die()

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

Parameters

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

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

### 9.8.2.8 dwarf\_die\_from\_hash\_signature()

```
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 )
```

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\_DLV\_OK means *dw\_returned\_CU\_die* was set. DW\_DLV\_NO\_ENTRY means the signature could not be found.

### 9.8.2.9 dwarf\_offdie\_b()

```
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 )
```

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\_find\_die\_given\_sig8()

```
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 )
```

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_info or .debug_types).
<i>dw_error</i>	The usual error detail return pointer.

## Returns

Returns DW\_DLV\_OK etc.

## 9.8.2.11 dwarf\_get\_die\_infotypes\_flag()

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

So client software knows if a DIE is in debug\_info or (DWARF4-only) debug\_types.

## Parameters

<code>dw_die</code>	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`.

## 9.9 Debugging Information Entry (DIE) content

## Functions

- `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.
- `int dwarf_tag (Dwarf_Die dw_die, Dwarf_Half *dw_return_tag, Dwarf_Error *dw_error)`  
Get TAG value of DIE.
- `int dwarf_dieoffset (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)`  
Return the global section offset of the DIE.
- `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.
- `Dwarf_Bool dwarf_addr_form_is_indexed (int dw_form)`  
Informs if a DW\_FORM is an indexed form.
- `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.
- `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.
- `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.
- `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.
- `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.
- `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.
- `int dwarf_diename (Dwarf_Die dw_die, char **dw_diename, Dwarf_Error *dw_error)`  
Return the string from a DW\_AT\_name attribute.
- `Dwarf_Unsigned dwarf_die_abbrev_code (Dwarf_Die dw_die)`  
Return the DIE abbrev code.
- `int dwarf_die_abbrev_children_flag (Dwarf_Die dw_die, Dwarf_Half *dw_ab_has_child)`  
Return TRUE if the DIE has children.
- `int dwarf_validate_die_sibling (Dwarf_Die dw_sibling, Dwarf_Off *dw_offset)`  
Validate a sibling DIE.
- `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.*

- 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.*

- 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.*

- 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.*

- 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.*

- int `dwarf_lowpc` (`Dwarf_Die` dw\_die, `Dwarf_Addr` \*dw\_returned\_addr, `Dwarf_Error` \*dw\_error)

*Return the DW\_AT\_low\_pc value.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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\_die\_abbrev\_global\_offset()

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

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.

**9.9.2.2 dwarf\_tag()**

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

**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.

**9.9.2.3 dwarf\_dieoffset()**

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

**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.

#### 9.9.2.4 dwarf\_debug\_addr\_index\_to\_addr()

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

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.

#### 9.9.2.5 dwarf\_addr\_form\_is\_indexed()

```
Dwarf_Bool dwarf_addr_form_is_indexed (
    int dw_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.

#### 9.9.2.6 dwarf\_CU\_dieoffset\_given\_die()

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

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 <i>dw_die</i> .
<i>dw_error</i>	The usual error detail return pointer.

## Returns

Returns DW\_DLV\_OK etc.

**9.9.2.7 dwarf\_get\_cu\_die\_offset\_given\_cu\_header\_offset\_b()**

```
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 )
```

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.

**9.9.2.8 dwarf\_die\_CU\_offset()**

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

## 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.

## 9.9.2.9 dwarf\_die\_CU\_offset\_range()

```
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 )
```

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.

## 9.9.2.10 dwarf\_attr()

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

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.

**9.9.2.11 dwarf\_die\_text()**

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

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.

**9.9.2.12 dwarf\_diename()**

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

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.

**9.9.2.13 dwarf\_die\_abbrev\_code()**

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

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

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

#### Returns

The abbrev code. of the DIE.

#### 9.9.2.14 `dwarf_die_abbrev_children_flag()`

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

#### Parameters

<code>dw_die</code>	A valid DIE pointer (not NULL).
<code>dw_ab_has_child</code>	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.

#### 9.9.2.15 `dwarf_validate_die_sibling()`

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

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

<code>dw_sibling</code>	Pass in a DIE returned by <code>dwarf_siblingof_b()</code> .
<code>dw_offset</code>	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.

**9.9.2.16 dwarf\_hasattr()**

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

**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.

**9.9.2.17 dwarf\_offset\_list()**

```
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 )
```

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\(\)](#)

**9.9.2.18 dwarf\_get\_die\_address\_size()**

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

**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.

**9.9.2.19 dwarf\_die\_offsets()**

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

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.

### 9.9.2.20 dwarf\_get\_version\_of\_die()

```
int dwarf_get_version_of_die (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_version,
    Dwarf_Half * dw_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 <i>offset_size</i> (4 or 8) of the CU this DIE is contained in.

### 9.9.2.21 dwarf\_lowpc()

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

#### 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.

### 9.9.2.22 dwarf\_highpc\_b()

```
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 )
```

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.

## 9.9.2.23 dwarf\_dietype\_offset()

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

The offset returned is 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.

## 9.9.2.24 dwarf\_bytesize()

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

**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.

**9.9.2.25 dwarf\_bitsize()**

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

**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.

**9.9.2.26 dwarf\_bitoffset()**

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

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.

**9.9.2.27 dwarf\_srclang()**

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

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
<i>dw_error</i>	The usual error detail return pointer.

**Returns**

Returns DW\_DLV\_OK etc.

**9.9.2.28 dwarf\_arrayorder()**

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

**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.

**9.10 DIE Attribute and Attribute-Form Details****Functions**

- 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.*

- 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.*

- int `dwarf_whatform` (`Dwarf_Attribute` dw\_attr, `Dwarf_Half` \*dw\_returned\_final\_form, `Dwarf_Error` \*dw\_error)

*Return the form of the Dwarf\_Attribute.*

- 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.*

- int `dwarf_whatattr` (`Dwarf_Attribute` dw\_attr, `Dwarf_Half` \*dw\_returned\_attrnum, `Dwarf_Error` \*dw\_error)

*Return the attribute number of the Dwarf\_Attribute.*

- 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.*

- 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.*

- int `dwarf_global_formref` (`Dwarf_Attribute` dw\_attr, `Dwarf_Off` \*dw\_return\_offset, `Dwarf_Error` \*dw\_error)

*Same as dwarf\_global\_formref\_b except...*

- 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.*

- 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.*

- 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.*

- 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.*

- int `dwarf_formflag` (`Dwarf_Attribute` dw\_attr, `Dwarf_Bool` \*dw\_returned\_bool, `Dwarf_Error` \*dw\_error)

*Return the flag value of a flag form.*

- int `dwarf_formudata` (`Dwarf_Attribute` dw\_attr, `Dwarf_Unsigned` \*dw\_returned\_val, `Dwarf_Error` \*dw\_error)

*Return an unsigned value.*

- int `dwarf_formsdata` (`Dwarf_Attribute` dw\_attr, `Dwarf_Signed` \*dw\_returned\_val, `Dwarf_Error` \*dw\_error)

*Return a signed value.*

- 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.*

- int `dwarf_formblock` (`Dwarf_Attribute` dw\_attr, `Dwarf_Block` \*\*dw\_returned\_block, `Dwarf_Error` \*dw\_error)

*Return an allocated filled-in Form\_Block.*

- int `dwarf_formstring` (`Dwarf_Attribute` dw\_attr, char \*\*dw\_returned\_string, `Dwarf_Error` \*dw\_error)

*Return a pointer to a string.*

- int `dwarf_get_debug_str_index` (`Dwarf_Attribute` dw\_attr, `Dwarf_Unsigned` \*dw\_return\_index, `Dwarf_Error` \*dw\_error)

*Return a string index.*

- 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.*

- 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.*

- 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.*
- 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.*
- void `dwarf_dealloc_uncompressed_block` (`Dwarf_Debug` dw\_dbg, void \*dw\_value\_array)  
*Dealloc what dwarf\_uncompress\_integer\_block\_a allocated.*
- 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.*
- void `dwarf_dealloc_attribute` (`Dwarf_Attribute` dw\_attr)  
*Dealloc a Dwarf\_Attribute When this call returns the dw\_attr is a stale pointer.*
- 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.*
- 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.*
- 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\_attrlist()

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

##### 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\(\)](#)

**9.10.2.2 dwarf\_hasform()**

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

**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;

**9.10.2.3 dwarf\_whatform()**

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

**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;

### 9.10.2.4 dwarf\_whatform\_direct()

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

#### 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;

### 9.10.2.5 dwarf\_whatattr()

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

#### 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;

### 9.10.2.6 dwarf\_formref()

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

The DW\_FORM of the attribute must be one of a small set of local reference forms: DW\_FORM\_ref<n> or DW\_FORM\_uda.

## 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;

## 9.10.2.7 dwarf\_global\_formref\_b()

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

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;

## 9.10.2.8 dwarf\_global\_formref()

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

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!

### 9.10.2.9 dwarf\_formsig8()

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

#### 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 <code>dw_returned_sig_bytes</code> .
<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

### 9.10.2.10 dwarf\_formsig8\_const()

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

#### 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 <code>dw_returned_sig_bytes</code> .
<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

### 9.10.2.11 dwarf\_formaddr()

```
int dwarf_formaddr (
    Dwarf_Attribute dw_attr,
```

```
Dwarf_Addr * dw_returned_addr,
Dwarf_Error * dw_error )
```

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.

#### 9.10.2.12 dwarf\_get\_debug\_addr\_index()

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

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 does 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.

#### 9.10.2.13 dwarf\_formflag()

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

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\_formudata()**

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

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.

**9.10.2.15 dwarf\_formsdata()**

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

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\_formdata16()**

```
int dwarf_formdata16 (
    Dwarf_Attribute dw_attr,
```

```
Dwarf_Form_Data16 * dw_returned_val,
Dwarf_Error * dw_error )
```

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.

#### 9.10.2.17 dwarf\_formblock()

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

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.

#### 9.10.2.18 dwarf\_formstring()

```
int dwarf_formstring (
    Dwarf_Attribute dw_attr,
```

```
char ** dw_returned_string,  
Dwarf_Error * dw_error )
```

## 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 <i>dw_returned_string</i> . 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\_get\_debug\_str\_index()**

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

## 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.

**9.10.2.20 dwarf\_formexprloc()**

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

## 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.

**9.10.2.21 dwarf\_get\_form\_class()**

```
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 )
```

**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.

**9.10.2.22 dwarf\_attr\_offset()**

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

**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.

**Returns**

DW\_DLV\_OK if it succeeds. DW\_DLV\_NO\_ENTRY is impossible.

**9.10.2.23 dwarf\_uncompress\_integer\_block\_a()**

```
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 )

```

See also

[dwarf\\_dealloc\\_uncompressed\\_block](#)

#### 9.10.2.24 dwarf\_dealloc\_uncompressed\_block()

```

void dwarf_dealloc_uncompressed_block (
    Dwarf_Debug dw_dbg,
    void * dw_value_array )

```

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.

#### 9.10.2.25 dwarf\_convert\_to\_global\_offset()

```

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

```

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\_DLX\_OK if it succeeds. Returns DW\_DLX\_ERROR if the dw\_attr form is not an offset form (for example, DW\_FORM\_ref\_udata).

#### 9.10.2.26 dwarf\_dealloc\_attribute()

```

void dwarf_dealloc_attribute (
    Dwarf_Attribute dw_attr )

```

## Parameters

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

**9.10.2.27 dwarf\_discr\_list()**

```
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 )
```

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 bl_data value from a Dwarf_Block.
<i>dw_blocklen</i>	The bl_len 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 dw_dsc_head_out array.
<i>dw_error</i>	The usual error pointer.

## Returns

DW\_DLV\_OK if it succeeds.

**9.10.2.28 dwarf\_discr\_entry\_u()**

```
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 )
```

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_entrynum</i>	Valid values are zero to dw_dsc_array_length_out-1
<i>dw_out_type</i>	On success is set to either DW_DSC_label or DW_DSC_range 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.

## 9.10.2.29 dwarf\_discr\_entry\_s()

```
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 )
```

The same as dwarf\_discr\_entry\_u except here the values are signed.

## 9.11 Line Table For a CU

## Functions

- 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.*
- 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.*
- 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.*
- 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.*
- void [dwarf\\_srclines\\_dealloc\\_b](#) (Dwarf\_Line\_Context dw\_context)  
*Dealloc the memory allocated by dwarf\_srclines\_b.*
- int [dwarf\\_srclines\\_table\\_offset](#) (Dwarf\_Line\_Context dw\_context, Dwarf\_Unsigned \*dw\_offset, Dwarf\_Error \*dw\_error)  
*Return the srclines table offset.*
- 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.*

- 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.*

- 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.*

- 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().*

- 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.*

- 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.*

- 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.*

- 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.*

- int `dwarf_linebeginstatement` (Dwarf\_Line dw\_line, Dwarf\_Bool \*dw\_returned\_bool, Dwarf\_Error \*dw\_error)

*Read Line beginstatement register.*

- int `dwarf_lineendsequence` (Dwarf\_Line dw\_line, Dwarf\_Bool \*dw\_returned\_bool, Dwarf\_Error \*dw\_error)

*Read Line endsequence register flag.*

- int `dwarf_lineno` (Dwarf\_Line dw\_line, Dwarf\_Unsigned \*dw\_returned\_lineno, Dwarf\_Error \*dw\_error)

*Read Line line register.*

- int `dwarf_line_srcfileno` (Dwarf\_Line dw\_line, Dwarf\_Unsigned \*dw\_returned\_filenum, Dwarf\_Error \*dw\_error)

*Read Line file register.*

- 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.*

- int `dwarf_lineaddr` (Dwarf\_Line dw\_line, Dwarf\_Addr \*dw\_returned\_addr, Dwarf\_Error \*dw\_error)

*Return the address of the Dwarf\_Line.*

- int `dwarf_lineoff_b` (Dwarf\_Line dw\_line, Dwarf\_Unsigned \*dw\_returned\_lineoffset, Dwarf\_Error \*dw\_error)

*Return a column number through the pointer.*

- int `dwarf_linesrc` (Dwarf\_Line dw\_line, char \*\*dw\_returned\_name, Dwarf\_Error \*dw\_error)

*Return the file name applicable to the Dwarf\_Line.*

- int `dwarf_lineblock` (Dwarf\_Line dw\_line, Dwarf\_Bool \*dw\_returned\_bool, Dwarf\_Error \*dw\_error)

*Return the basic\_block line register.*

- 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.*

- 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.*

- 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.*

- 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.*
- 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.*
- 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.*
- int `dwarf_print_lines` (`Dwarf_Die` `dw_cu_die`, `Dwarf_Error *dw_error`, int `*dw_errorcount_out`)  
*Print line information in great detail.*
- 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_srcfiles()`

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

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\(\)](#)

#### 9.11.2.2 dwarf\_srclines\_b()

```
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 )
```

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.

## 9.11.2.3 dwarf\_srclines\_from\_linecontext()

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

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 is a line table with no lines.
<i>dw_error</i>	The usual error pointer.

## Returns

DW\_DLV\_OK if it succeeds.

## 9.11.2.4 dwarf\_srclines\_two\_level\_from\_linecontext()

```
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 )
```

Works for DWARF2,3,4,5 and for experimental two-level line tables. A single level table will have \*linebuf\_actuals and \*linecount\_actuals 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\_actuals will be 0.

People not using these two-level tables should dwarf\_srclines\_from\_linecontext instead.

### 9.11.2.5 dwarf\_srclines\_dealloc\_b()

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

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.
-------------------	---

### 9.11.2.6 dwarf\_srclines\_table\_offset()

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

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.

### 9.11.2.7 dwarf\_srclines\_comp\_dir()

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

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>	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.

**9.11.2.8 dwarf\_srclines\_subprog\_count()**

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

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.

**9.11.2.9 dwarf\_srclines\_subprog\_data()**

```
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 )
```

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.

**9.11.2.10 dwarf\_srclines\_files\_indexes()**

```
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 )
```

**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 <i>dw_baseindex</i> through <i>dw_endindex</i> -1.
<i>dw_error</i>	The usual error pointer.

**Returns**

DW\_DLV\_OK if it succeeds.

**See also**

[Using dwarf\\_srclines\\_b\(\)](#)

**9.11.2.11 dwarf\_srclines\_files\_data\_b()**

```
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 )
```

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 <i>dw_baseindex</i> through <i>dw_endindex</i> -1.

## Parameters

<i>dw_name</i>	If <i>dw_name</i> non-null on success returns The file name in the line table header through the pointer.
<i>dw_directory_index</i>	If <i>dw_directory_index</i> non-null on success returns the directory number in the line table header through the pointer.
<i>dw_last_mod_time</i>	If <i>dw_last_mod_time</i> non-null on success returns the directory last modification date/time through the pointer.
<i>dw_file_length</i>	If <i>dw_file_length</i> non-null on success returns the file length recorded in the line table through the pointer.
<i>dw_md5ptr</i>	If <i>dw_md5ptr</i> 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.

9.11.2.12 `dwarf_srclines_include_dir_count()`

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

## 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](#)

9.11.2.13 `dwarf_srclines_include_dir_data()`

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



## 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](#)

## 9.11.2.14 dwarf\_srclines\_version()

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

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\_DLV\_OK if it succeeds.

**9.11.2.15 dwarf\_linebeginstatement()**

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

[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.

**9.11.2.16 dwarf\_lineendsequence()**

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

[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.

**9.11.2.17 dwarf\_lineno()**

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

[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.

**9.11.2.18 dwarf\_line\_srcfileno()**

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

## 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.

**9.11.2.19 dwarf\_line\_is\_addr\_set()**

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

## 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.

### 9.11.2.20 dwarf\_lineaddr()

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

#### 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.

### 9.11.2.21 dwarf\_lineoff\_b()

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

#### 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.

### 9.11.2.22 dwarf\_linesrc()

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

#### 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\\_srclines\\_b\(\) and linecontext](#)

## 9.11.2.23 dwarf\_lineblock()

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

[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.

## 9.11.2.24 dwarf\_prologue\_end\_etc()

```
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 )
```

[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\_DLV\_OK if it succeeds.

## 9.11.2.25 dwarf\_check\_lineheader\_b()

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

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.

## 9.11.2.26 dwarf\_print\_lines()

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

`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.

#### 9.11.2.27 dwarf\_register\_printf\_callback()

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

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 <a href="#">Dwarf_Printf_Callback_Info_s</a> 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.

## 9.12 Ranges: code addresses in DWARF3-4

## Functions

- 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.*
- void [dwarf\\_dealloc\\_ranges](#) ([Dwarf\\_Debug](#) dw\_dbg, [Dwarf\\_Ranges](#) \*dw\_rangesbuf, [Dwarf\\_Signed](#) dw\_↵rangecount)  
*Dealloc the array dw\_rangesbuf.*
- 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\_get\_ranges\_b()

```
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 )
```

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.

## 9.12.2.2 dwarf\_dealloc\_ranges()

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

## 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

## 9.12.2.3 dwarf\_get\_ranges\_baseaddress()

```
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 )
```

The function allows callers to calculate actual address from .debug\_ranges data in a simple and efficient way.

## 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.

## Parameters

<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 the dw_die has the attribute DW_AT_ranges, otherwise set to zero (FALSE).
<i>dw_at_ranges_offset</i>	Set to the value of dw_die DW_AT_ranges attribute of dw_die if and only iff dw_at_ranges_offset_present was set to 1.
<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

- 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.*

- 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.*

- void [dwarf\\_dealloc\\_rnglists\\_head](#) (Dwarf\_Rnglists\_Head dw\_head)

*Dealloc a Dwarf\_Rnglists\_Head.*

- int [dwarf\\_load\\_rnglists](#) (Dwarf\_Debug dw\_dbg, Dwarf\_Unsigned \*dw\_rnglists\_count, Dwarf\_Error \*dw\_error)

*Loads all .debug\_rnglists headers.*

- 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.*

- 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.*

- 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.*

- 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\_rnglists\_get\_rle\_head()

```
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 )
```

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

<code>dw_attr</code>	The attribute referring to .debug_rnglists
<code>dw_theform</code>	The form number, DW_FORM_sec_offset or DW_FORM_rnglistx.
<code>dw_index_or_offset_value</code>	If the form is an index, pass it here. If the form is an offset, pass that here.
<code>dw_head_out</code>	On success creates a record owning the rnglists data for this attribute.
<code>dw_count_of_entries_in_head</code>	On success this is set to the number of entry in the rnglists for this attribute.
<code>dw_global_offset_of_rle_set</code>	On success set to the global offset of the rnglists in the rnglists section.
<code>dw_error</code>	The usual error detail return pointer.

**Returns**

Returns DW\_DLV\_OK etc.

**9.13.2.2 dwarf\_get\_rnglists\_entry\_fields\_a()**

```
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 )
```

**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.

**9.13.2.3 dwarf\_dealloc\_rnglists\_head()**

```
void dwarf_dealloc_rnglists_head (
    Dwarf_Rnglists_Head dw_head )
```

## Parameters

<i>dw_head</i>	dealloc all the memory associated with <i>dw_head</i> . The caller should then immediately set the pointer to zero/NULL as it is stale.
----------------	---

## 9.13.2.4 dwarf\_load\_rnglists()

```
int dwarf_load_rnglists (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_rnglists_count,
    Dwarf_Error * dw_error )
```

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 <i>dw_rnglists_count</i> .
<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.

## 9.13.2.5 dwarf\_get\_rnglist\_offset\_index\_value()

```
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 )
```

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.
---------------	------------------------------

## Parameters

<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.

## 9.13.2.6 dwarf\_get\_rnglist\_head\_basics()

```
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 )
```

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.

## 9.13.2.7 dwarf\_get\_rnglist\_context\_basics()

```
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 )
```

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.

### 9.13.2.8 dwarf\_get\_rnglist\_rle()

```
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 )
```

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.

## 9.14 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

- `int dwarf_get_loclist_c (Dwarf_Attribute dw_attr, Dwarf_Loc_Head_c *dw_loclist_head, Dwarf_Unsigned *dw_loclist_count, Dwarf_Error *dw_error)`  
*Location Lists and Expressions.*
- `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.*

- 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.*

- 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.*

- 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.*

- 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.*

- void `dwarf_dealloc_loc_head_c` (`Dwarf_Loc_Head_c` dw\_head)

*Dealloc (free) all memory allocated for Dwarf\_Loc\_Head\_c.*

- int `dwarf_load_loclists` (`Dwarf_Debug` dw\_dbg, `Dwarf_Unsigned` \*dw\_loclists\_count, `Dwarf_Error` \*dw\_error)

*Load Loclists.*

- 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.*

- 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.*

- 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.*

- 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\_get\_loclist\_c()

```
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 )
```

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.

#### 9.14.2.2 dwarf\_get\_loclist\_head\_kind()

```
int dwarf_get_loclist_head_kind (
    Dwarf_Loc_Head_c dw_loclist_head,
    unsigned int * dw_lkind,
    Dwarf_Error * dw_error )
```

#### 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.

### 9.14.2.3 dwarf\_get\_locdesc\_entry\_d()

```
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 )
```

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 <code>dw_locentry_count</code> .
<i>dw_lle_value_out</i>	On success returns the DW_LLE value applicable, such as <code>DW_LLE_start_end</code> .
<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 <code>dw_lowpc_cooked</code> or <code>dw_hipc_cooked</code> was present or TRUE if some required data was missing (for example in split dwarf).
<i>dw_lowpc_cooked</i>	On success and if <code>dw_debug_addr_unavailable</code> FALSE returns the true low address.
<i>dw_hipc_cooked</i>	On success and if <code>dw_debug_addr_unavailable</code> 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()

```
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 )

```

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\_location\_op\_value\_c()

```

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 )

```

##### Parameters

<i>dw_locdesc</i>	Pass in a valid <code>Dwarf_Locdesc_c</code> .
<i>dw_index</i>	Pass in the operator index. zero through <code>dw_locexpr_op_count_out-1</code> .
<i>dw_operator_out</i>	On success returns the <code>DW_OP</code> operator, such as <code>DW_OP_plus</code> .
<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.

### 9.14.2.6 dwarf\_loclist\_from\_expr\_c()

```
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 )
```

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.
<i>dw_error</i>	The usual error detail return pointer.

#### Returns

Returns DW\_DLV\_OK etc.

### 9.14.2.7 dwarf\_dealloc\_loc\_head\_c()

```
void dwarf_dealloc_loc_head_c (
    Dwarf_Loc_Head_c dw_head )
```

#### Parameters

<i>dw_head</i>	A head pointer.
----------------	-----------------

The caller should zero the passed-in pointer on return as it is stale at that point.

### 9.14.2.8 dwarf\_load\_loclists()

```
int dwarf_load_loclists (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_loclists_count,
    Dwarf_Error * dw_error )
```

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.

### 9.14.2.9 dwarf\_get\_loclist\_offset\_index\_value()

```
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 )
```

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[dw_offsetentry_index], 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.

#### 9.14.2.10 dwarf\_get\_loclist\_head\_basics()

```
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 )
```

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↵\_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.

#### 9.14.2.11 dwarf\_get\_loclist\_context\_basics()

```
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 )
```

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.

### 9.14.2.12 dwarf\_get\_loclist\_lle()

```
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 )
```

Useful to print raw loclist data.

## 9.15 .debug\_addr access: DWARF5

### Functions

- 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.*
- 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.*
- 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\_debug\_addr\_table()

```
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 )

```

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.

#### 9.15.2.2 dwarf\_debug\_addr\_by\_index()

```

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 )

```

#### 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\_dealloc\_debug\_addr\_table()

```
void dwarf_dealloc_debug_addr_table (
    Dwarf_Debug_Addr_Table dw_dat )
```

## Parameters

<i>dw_dat</i>	Pass in a valid Dwarf_Debug_Addr_Table pointer. Does nothing if the dw_dat field is NULL.
---------------	---

## 9.16 Macro Access: DWARF5

## Functions

- 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.*
- 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.*
- int `dwarf_macro_context_total_length` (`Dwarf_Macro_Context` dw\_context, `Dwarf_Unsigned` \*dw\_macro\_total\_len, `Dwarf_Error` \*dw\_error)  
*Return a macro context total length.*
- void `dwarf_dealloc_macro_context` (`Dwarf_Macro_Context` dw\_mc)  
*Dealloc a macro context.*
- int `dwarf_macro_context_head` (`Dwarf_Macro_Context` dw\_mc, `Dwarf_Half` \*dw\_version, `Dwarf_Unsigned` \*dw\_macro\_offset, `Dwarf_Unsigned` \*dw\_macro\_len, `Dwarf_Unsigned` \*dw\_macro\_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.*
- 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.*
- 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.*
- 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.*

- 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.*
- 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_get_macro_context()`

```
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 )
```

See also

[Reading .debug\\_macro data \(DWARF5\)](#)

#### Parameters

<code>dw_die</code>	The CU DIE of interest.
<code>dw_version_out</code>	On success returns the macro context version (5)
<code>dw_macro_context</code>	On success returns a pointer to a macro context which allows access to the context content.
<code>dw_macro_unit_offset_out</code>	On success returns the offset of the macro context.
<code>dw_macro_ops_count_out</code>	On success returns the number of macro operations in the context.
<code>dw_macro_ops_data_length_out</code>	On success returns the length in bytes of the operations in the context.
<code>dw_error</code>	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`.

### 9.16.2.2 dwarf\_get\_macro\_context\_by\_offset()

```
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 )
```

#### 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.

### 9.16.2.3 dwarf\_macro\_context\_total\_length()

```
int dwarf_macro_context_total_length (
    Dwarf_Macro_Context dw_context,
    Dwarf_Unsigned * dw_mac_total_len,
    Dwarf_Error * dw_error )
```

#### 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.

### 9.16.2.4 dwarf\_dealloc\_macro\_context()

```
void dwarf_dealloc_macro_context (
    Dwarf_Macro_Context dw_mc )
```

## 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.
--------------	--

**9.16.2.5 dwarf\_macro\_context\_head()**

```
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 )
```

Not described in detail here. See DWARF5 Standard Section 6.3.1 Macro Information Header page 166.

**9.16.2.6 dwarf\_macro\_operands\_table()**

```
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 )
```

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.

**9.16.2.7 dwarf\_get\_macro\_op()**

```
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 )

```

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.

#### 9.16.2.8 dwarf\_get\_macro\_defundef()

```

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 )

```

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 <i>dw_macro_ops_count_out</i> -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
<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\_sup, DW\_MACRO\_define\_strx, or DW\_MACRO\_undef\_strx,

**9.16.2.9 dwarf\_get\_macro\_startend\_file()**

```
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 )
```

**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 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.

**9.16.2.10 dwarf\_get\_macro\_import()**

```
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 )
```

**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.

## 9.17 Macro Access: DWARF2-4

**Functions**

- char \* [dwarf\\_find\\_macro\\_value\\_start](#) (char \*dw\_macro\_string)  
*Return a pointer to the value part of a macro.*
- 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()

```
char * dwarf_find_macro_value_start (
    char * dw_macro_string )
```

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()

```
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 )
```

An example calling this function

See also

[Reading .debug\\_macinfo \(DWARF2-4\)](#)

#### 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\_DLV\_OK etc.

## 9.18 Stack Frame Access

### Functions

- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- int [dwarf\\_get\\_cie\\_of\\_fde](#) (Dwarf\_Fde dw\_fde, Dwarf\_Cie \*dw\_cie\_returned, Dwarf\_Error \*dw\_error)



*Given FDE get CIE.*

- 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.*

- int `dwarf_get_cie_index` (Dwarf\_Cie dw\_cie, Dwarf\_Signed \*dw\_index, Dwarf\_Error \*dw\_error)

*Return CIE index given CIE.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*

- 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.*
- 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.*
- 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)*
- void `dwarf_dealloc_frame_instr_head` (`Dwarf_Frame_Instr_Head` dw\_head)  
*Deallocates the frame instruction data in dw\_head.*
- 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.*
- 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.*
- `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](#) .*
- `Dwarf_Half` `dwarf_set_frame_rule_initial_value` (`Dwarf_Debug` dw\_dbg, `Dwarf_Half` dw\_value)  
*Frame Rule Initial Value.*
- `Dwarf_Half` `dwarf_set_frame_cfa_value` (`Dwarf_Debug` dw\_dbg, `Dwarf_Half` dw\_value)  
*Frame CFA Column [Invariants for setting frame registers](#) .*
- `Dwarf_Half` `dwarf_set_frame_same_value` (`Dwarf_Debug` dw\_dbg, `Dwarf_Half` dw\_value)  
*Frame Same Value Default [Invariants for setting frame registers](#) .*
- `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\_get\_fde\_list()

```
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 )
```

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.

### 9.18.2.2 dwarf\_get\_fde\_list\_eh()

```
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 )
```

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](#)

### 9.18.2.3 dwarf\_dealloc\_fde\_cie\_list()

```
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 )
```

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.

### 9.18.2.4 dwarf\_get\_fde\_range()

```
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 )
```

#### 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.

### 9.18.2.5 dwarf\_get\_fde\_exception\_info()

```
int dwarf_get_fde_exception_info (
    Dwarf_Fde dw_fde,
    Dwarf_Signed * dw_offset_into_exception_tables,
    Dwarf_Error * dw_error )
```

This applies only to IRIX C++ destructor information which was never documented and is unlikely to be of interest.

### 9.18.2.6 dwarf\_get\_cie\_of\_fde()

```
int dwarf_get_cie_of_fde (
    Dwarf_Fde dw_fde,
    Dwarf_Cie * dw_cie_returned,
    Dwarf_Error * dw_error )
```

#### 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.

### 9.18.2.7 dwarf\_get\_cie\_info\_b()

```
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 )
```

#### 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.

## Parameters

<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.

## 9.18.2.8 dwarf\_get\_cie\_index()

```
int dwarf_get_cie_index (
    Dwarf_Cie dw_cie,
    Dwarf_Signed * dw_index,
    Dwarf_Error * dw_error )
```

## 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.

## 9.18.2.9 dwarf\_get\_fde\_instr\_bytes()

```
int dwarf_get_fde_instr_bytes (
    Dwarf_Fde dw_fde,
    Dwarf_Small ** dw_outinstrs,
    Dwarf_Unsigned * dw_outlen,
    Dwarf_Error * dw_error )
```

## 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.

**9.18.2.10 dwarf\_get\_fde\_info\_for\_all\_regs3\_b()**

```
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 )
```

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.

**9.18.2.11 dwarf\_get\_fde\_info\_for\_all\_regs3()**

```
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 )
```

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.

### 9.18.2.12 dwarf\_get\_fde\_info\_for\_reg3\_c()

```
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 )
```

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.
<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.



**9.18.2.13 dwarf\_get\_fde\_info\_for\_reg3\_b()**

```
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 )
```

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\(\)](#)

**9.18.2.14 dwarf\_get\_fde\_info\_for\_cfa\_reg3\_c()**

```
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 )
```

**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).

### 9.18.2.15 dwarf\_get\_fde\_info\_for\_cfa\_reg3\_b()

```
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 )
```

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.

### 9.18.2.16 dwarf\_get\_fde\_for\_die()

```
int dwarf_get_fde_for_die (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_subr_die,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Error * dw_error )
```

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.

### 9.18.2.17 dwarf\_get\_fde\_n()

```
int dwarf_get_fde_n (
    Dwarf_Fde * dw_fde_data,
    Dwarf_Unsigned dw_fde_index,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Error * dw_error )
```

This is just like indexing into the FDE array but with extra checking of the pointer and index.

See also

[dwarf\\_get\\_fde\\_list](#)

**9.18.2.18 dwarf\_get\_fde\_at\_pc()**

```
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 )
```

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 <code>dw_returned_fde</code> 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 <code>dw_returned_fde</code> 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.

**9.18.2.19 dwarf\_get\_cie\_augmentation\_data()**

```
int dwarf_get_cie_augmentation_data(
    Dwarf_Cie dw_cie,
    Dwarf_Small ** dw_augdata,
    Dwarf_Unsigned * dw_augdata_len,
    Dwarf_Error * dw_error )
```

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.

**9.18.2.20 dwarf\_get\_fde\_augmentation\_data()**

```
int dwarf_get_fde_augmentation_data (
    Dwarf_Fde dw_fde,
    Dwarf_Small ** dw_augdata,
    Dwarf_Unsigned * dw_augdata_len,
    Dwarf_Error * dw_error )
```

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.

**9.18.2.21 dwarf\_expand\_frame\_instructions()**

```
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 )
```

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 <i>dw_head</i>
<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

## 9.18.2.22 dwarf\_get\_frame\_instruction()

```
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 )
```

## 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.

#### 9.18.2.23 dwarf\_get\_frame\_instruction\_a()

```
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 )
```

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.

#### 9.18.2.24 dwarf\_dealloc\_frame\_instr\_head()

```
void dwarf_dealloc_frame_instr_head (
    Dwarf_Frame_Instr_Head dw_head )
```

## Parameters

<i>dw_head</i>	A head pointer. Frees all data created by <a href="#">dwarf_expand_frame_instructions()</a> and makes the head pointer stale. The caller should set to NULL.
----------------	--

**9.18.2.25 dwarf\_fde\_section\_offset()**

```
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 )
```

## 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.

**9.18.2.26 dwarf\_cie\_section\_offset()**

```
int dwarf_cie_section_offset (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie dw_in_cie,
    Dwarf_Off * dw_cie_off,
    Dwarf_Error * dw_error )
```

## 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.

**9.18.2.27 dwarf\_set\_frame\_rule\_table\_size()**

```
Dwarf_Half dwarf_set_frame_rule_table_size (
```

```
Dwarf_Debug dw_dbg,  
Dwarf_Half dw_value )
```

**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.

**9.18.2.28 dwarf\_set\_frame\_rule\_initial\_value()**

```
Dwarf_Half dwarf_set_frame_rule_initial_value (  
    Dwarf_Debug dw_dbg,  
    Dwarf_Half dw_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\_cfa\_value()**

```
Dwarf_Half dwarf_set_frame_cfa_value (  
    Dwarf_Debug dw_dbg,  
    Dwarf_Half dw_value )
```

**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()**

```
Dwarf_Half dwarf_set_frame_same_value (  
    Dwarf_Debug dw_dbg,  
    Dwarf_Half dw_value )
```



```
Dwarf_Debug dw_dbg,
Dwarf_Half dw_value )
```

**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()**

```
Dwarf_Half dwarf_set_frame_undefined_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

**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**

- 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.*
- int [dwarf\\_get\\_abbrev\\_tag](#) ([Dwarf\\_Abbrev](#) dw\_abbrev, [Dwarf\\_Half](#) \*dw\_return\_tag\_number, [Dwarf\\_Error](#)  
\*dw\_error)  
*Get abbreviation tag.*
- int [dwarf\\_get\\_abbrev\\_code](#) ([Dwarf\\_Abbrev](#) dw\_abbrev, [Dwarf\\_Unsigned](#) \*dw\_return\_code\_number,  
[Dwarf\\_Error](#) \*dw\_error)  
*Get Abbreviation Code.*
- int [dwarf\\_get\\_abbrev\\_children\\_flag](#) ([Dwarf\\_Abbrev](#) dw\_abbrev, [Dwarf\\_Signed](#) \*dw\_return\_flag, [Dwarf\\_Error](#)  
\*dw\_error)  
*Get Abbrev Children Flag.*
- 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 (libdwf 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()`

```
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 )
```

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 libdwf itself reads abbreviations to access DIES the offset comes from the Compilation Unit Header `debug_abbrev_offset` field.

See also

[dwarf\\_next\\_cu\\_header\\_d](#)

#### 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_DLX_OK` etc. If the abbreviation is a single zero byte it is a null abbreviation. `DW_DLX_OK` is returned.

Close the abbrev by calling `dwarf_dealloc(dbg,*dw_returned_abbrev, DW_DLA_ABBREV)`

### 9.19.2.2 dwarf\_get\_abbrev\_tag()

```
int dwarf_get_abbrev_tag (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Half * dw_return_tag_number,
    Dwarf_Error * dw_error )
```

#### 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.

### 9.19.2.3 dwarf\_get\_abbrev\_code()

```
int dwarf_get_abbrev_code (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Unsigned * dw_return_code_number,
    Dwarf_Error * dw_error )
```

#### 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\_children\_flag()

```
int dwarf_get_abbrev_children_flag (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Signed * dw_return_flag,
    Dwarf_Error * dw_error )
```

#### 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.

**9.19.2.5 dwarf\_get\_abbrev\_entry\_b()**

```
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 )
```

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.

**9.20 String Section .debug\_str Details****Functions**

- 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()

```
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 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

- 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.*
- 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.*
- 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.*
- 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.*

- 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\_open\_str\_offsets\_table\_access()

```
int dwarf_open_str_offsets_table_access (
    Dwarf_Debug dw_dbg,
    Dwarf_Str_Offsets_Table * dw_table_data,
    Dwarf_Error * dw_error )
```

See also

[Reading string offsets section data](#)

Parameters

<code>dw_dbg</code>	Pass in the Dwarf_Debug of interest.
<code>dw_table_data</code>	On success returns a pointer to an opaque structure for use in further calls.
<code>dw_error</code>	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

#### 9.21.2.2 dwarf\_close\_str\_offsets\_table\_access()

```
int dwarf_close_str_offsets_table_access (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Error * dw_error )
```

See also

[Reading string offsets section data](#)

Parameters

<code>dw_table_data</code>	
<code>dw_error</code>	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. If it returns DW\_DLV\_ERROR there is nothing you can do except report the error and, optionally, call dwarf\_dealloc\_error to deallocate the error content (and then set the dw\_error to NULL as after the deallocate the pointer is stale)..

**9.21.2.3 dwarf\_next\_str\_offsets\_table()**

```
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 )
```

**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 dw_entry_size, in the table.
<i>dw_error</i>	On error dw_error is set to point to the error details.

**Returns**

DW\_DLV\_OK Returns DW\_DLV\_NO\_ENTRY if there are no more entries.

**9.21.2.4 dwarf\_str\_offsets\_value\_by\_index()**

```
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 )
```

See also

[Reading string offsets section data](#)

#### Parameters

<code>dw_table_data</code>	Pass in the open table pointer.
<code>dw_index_to_entry</code>	Pass in the entry number, 0 through <code>dw_table_value_count-1</code> for the active table
<code>dw_entry_value</code>	On success returns the value in that table entry, an offset into a string table.
<code>dw_error</code>	On error <code>dw_error</code> is set to point to the error details.

#### Returns

DW\_DLV\_OK Returns DW\_DLV\_ERROR if `dw_index_to_entry` is out of the correct range.

#### 9.21.2.5 dwarf\_str\_offsets\_statistics()

```
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 the number of tables seen so far. Not very interesting.

#### Parameters

<code>dw_table_data</code>	Pass in the open table pointer.
<code>dw_wasted_byte_count</code>	Always returns 0 at present.
<code>dw_table_count</code>	On success returns the total number of tables seen so far in the section.
<code>dw_error</code>	On error <code>dw_error</code> is set to point to the error details.

#### Returns

DW\_DLV\_OK etc.

## 9.22 Dwarf\_Error Functions

#### Functions

- `Dwarf_Unsigned dwarf_errno (Dwarf_Error dw_error)`  
*What DW\_DLE code does the error have?*
- `char * dwarf_errmsg (Dwarf_Error dw_error)`  
*What message string is in the error?*
- `char * dwarf_errmsg_by_number (Dwarf_Unsigned dw_erronum)`  
*What message string is associated with the error number.*
- `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.*

- 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\_errno()

```
Dwarf_Unsigned dwarf_errno (
    Dwarf_Error dw_error )
```

#### Parameters

<code>dw_error</code>	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.

### 9.22.2.2 dwarf\_errmsg()

```
char * dwarf_errmsg (
    Dwarf_Error dw_error )
```

#### Parameters

<code>dw_error</code>	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()

```
char * dwarf_errmsg_by_number (
    Dwarf_Unsigned dw_errornum )
```

#### Parameters

<code>dw_errornum</code>	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\_error\_creation()**

```
void dwarf_error_creation (
    Dwarf_Debug dw_dbg,
    Dwarf_Error * dw_error,
    char * dw_errmsg )
```

**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.

**9.22.2.5 dwarf\_dealloc\_error()**

```
void dwarf_dealloc_error (
    Dwarf_Debug dw_dbg,
    Dwarf_Error dw_error )
```

**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.

**9.23 Generic dwarf\_dealloc Function****Functions**

- 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()

```
void dwarf_dealloc (
    Dwarf_Debug dw_dbg,
    void * dw_space,
    Dwarf_Unsigned dw_type )
```

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

- 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()

```
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 )
```

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

- 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.*
- void `dwarf_dealloc_dnames` (`Dwarf_Dnames_Head` dw\_dn)  
*Frees all the malloc data associated with dw\_dn.*
- 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.*
- 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.*
- 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.*
- 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.

- 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.

- 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\_entrpool, 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.

- 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.

- int dwarf\_dnames\_entrpool\_values (Dwarf\_Dnames\_Head dw\_dn, Dwarf\_Unsigned dw\_index\_of\_abbrev, Dwarf\_Unsigned dw\_offset\_in\_entrpool\_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\_entrpool, 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\_dnames\_header()

```
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 )
```

#### 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.

**9.25.2.2 dwarf\_dealloc\_dnames()**

```
void dwarf_dealloc_dnames (
    Dwarf_Dnames_Head dw_dn )
```

**Parameters**

<i>dw_dn</i>	A Dwarf_Dnames_Head pointer. Callers should zero the pointer passed in as soon as possible after this returns as the pointer is then stale.
--------------	---

**9.25.2.3 dwarf\_dnames\_abbrevtable()**

```
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 )
```

Of interest mainly to debugging issues with compilers or debuggers.

**Parameters**

<i>dw_dn</i>	A Dwarf_Dnames_Head pointer.
<i>dw_index</i>	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.
<i>dw_abbrev_offset</i>	Returns the offset of the abbrev table entry for this names table entry.
<i>dw_abbrev_code</i>	Returns the abbrev code for the abbrev at offset dw_abbrev_offset.
<i>dw_abbrev_tag</i>	Returns the tag for the abbrev at offset dw_abbrev_offset.
<i>dw_array_size</i>	The size you allocated in each of the following two arrays.
<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.

**9.25.2.4 dwarf\_dnames\_sizes()**

```
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 )
```

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).

**9.25.2.5 dwarf\_dnames\_offsets()**

```
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 )
```

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"

### 9.25.2.6 dwarf\_dnames\_cu\_table()

```
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 )
```

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 dw_error is set to point to the error details.

#### Returns

The usual value: DW\_DLV\_OK etc.

### 9.25.2.7 dwarf\_dnames\_bucket()

```
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 )
```

#### 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



## 9.25.2.8 dwarf\_dnames\_name()

```
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 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\_entrypool()

```
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 )

```

Returns the basic data about an entrypool record and enables correct calling of `dwarf_dnames_entrypool_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_entrypool_values()`

#### Parameters

<i>dw_dn</i>	Pass in the debug names table of interest.
<i>dw_offset_in_entrypool</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 entrypool 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.

#### 9.25.2.10 dwarf\_dnames\_entrypool\_values()

```

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 )

```

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 <i>dw_offset_of_initial_value</i> above.
<i>dw_arrays_length</i>	Pass in the array length of each of the following four fields. The <i>dw_value_count</i> returned above is what you need to use.
<i>dw_array_idx_number</i>	Create an array of Dwarf_Half values, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_array_form</i>	Create an array of Dwarf_Half values, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_array_of_offsets</i>	Create an array of Dwarf_Unsigned values, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_array_of_signatures</i>	Create an array of Dwarf_Sig8 structs, <i>dw_arrays_length</i> 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 <i>dwarf_dnames_entrypool</i> .
<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.

## 9.26 Fast Access to a CU given a code address

## Functions

- 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.*
- 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.*
- 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.*
- 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.*
- 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\_aranges()

```
int dwarf_get_aranges (
    Dwarf_Debug dw_dbg,
    Dwarf_Arange ** dw_aranges,
    Dwarf_Signed * dw_arange_count,
    Dwarf_Error * dw_error )
```

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 dw_error 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.

### 9.26.2.2 dwarf\_get\_arange()

```
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 )
```

#### 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 dw_arange_count, 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 dw_error 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.

**9.26.2.3 dwarf\_get\_cu\_die\_offset()**

```
int dwarf_get_cu_die_offset (
    Dwarf_Arange dw_arange,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

**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.

**9.26.2.4 dwarf\_get\_arange\_cu\_header\_offset()**

```
int dwarf_get_arange_cu_header_offset (
    Dwarf_Arange dw_arange,
    Dwarf_Off * dw_return_cu_header_offset,
    Dwarf_Error * dw_error )
```

**Parameters**

<i>dw_arange</i>	The specific arange of interest.
<i>dw_return_cu_header_offset</i>	The CU header 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.

**9.26.2.5 dwarf\_get\_arange\_info\_b()**

```
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 )
```

## 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 <i>.debug_info</i> 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.

## 9.27 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

- `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.*
- `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.*
- `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.*
- `void dwarf_globals_dealloc (Dwarf_Debug dw_dbg, Dwarf_Global *dw_global_like, Dwarf_Signed dw_count)`  
*Dealloc the Dwarf\_Global data.*
- `int dwarf_globname (Dwarf_Global dw_global, char **dw_returned_name, Dwarf_Error *dw_error)`  
*Return the name of a global-like data item.*
- `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.*
- `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.*
- `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.*

- [Dwarf\\_Half dwarf\\_global\\_tag\\_number](#) ([Dwarf\\_Global](#) dw\_global)  
*Return the DW\_TAG number of a global entry.*
- [int dwarf\\_get\\_globals\\_header](#) ([Dwarf\\_Global](#) dw\_global, [int](#) \*dw\_category, [Dwarf\\_Off](#) \*dw\_offset\_publication, [Dwarf\\_Unsigned](#) \*dw\_length\_size, [Dwarf\\_Unsigned](#) \*dw\_length\_publication, [Dwarf\\_Unsigned](#) \*dw\_version, [Dwarf\\_Unsigned](#) \*dw\_header\_info\_offset, [Dwarf\\_Unsigned](#) \*dw\_info\_length, [Dwarf\\_Error](#) \*dw\_error)  
*For more complete globals printing.*
- [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()

```
int dwarf_get_globals (
    Dwarf\_Debug dw_dbg,
    Dwarf\_Global ** dw_globals,
    Dwarf\_Signed * dw_number_of_globals,
    Dwarf\_Error * dw_error )
```

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 <a href="#">Dwarf_Debug</a> 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\_pubtypes()**

```
int dwarf_get_pubtypes (
    Dwarf_Debug dw_dbg,
    Dwarf_Global ** dw_pubtypes,
    Dwarf_Signed * dw_number_of_pubtypes,
    Dwarf_Error * dw_error )
```

**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\(...,DW\\_GL\\_PUBTYPES,...\)](#).

**9.27.2.3 dwarf\_globals\_by\_type()**

```
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 )
```

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.

**9.27.2.4 dwarf\_globals\_dealloc()**

```
void dwarf_globals_dealloc (
    Dwarf_Debug dw_dbg,
    Dwarf_Global * dw_global_like,
    Dwarf_Signed dw_count )
```

**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.

**9.27.2.5 dwarf\_globname()**

```
int dwarf_globname (
    Dwarf_Global dw_global,
    char ** dw_returned_name,
    Dwarf_Error * dw_error )
```

**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.

**9.27.2.6 dwarf\_global\_die\_offset()**

```
int dwarf_global_die_offset (
    Dwarf_Global dw_global,
    Dwarf_Off * dw_die_offset,
    Dwarf_Error * dw_error )
```

**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.

**9.27.2.7 dwarf\_global\_cu\_offset()**

```
int dwarf_global_cu_offset (
    Dwarf_Global dw_global,
    Dwarf_Off * dw_cu_header_offset,
    Dwarf_Error * dw_error )
```

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.

**9.27.2.8 dwarf\_global\_name\_offsets()**

```
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 )
```

**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.

**9.27.2.9 dwarf\_global\_tag\_number()**

```
Dwarf_Half dwarf_global_tag_number (
    Dwarf_Global dw_global )
```

## 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.

## 9.27.2.10 dwarf\_get\_globals\_header()

```
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 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.

## 9.27.2.11 dwarf\_return\_empty\_pubnames()

```
int dwarf_return_empty_pubnames (
    Dwarf_Debug dw_dbg,
    int dw_flag )
```

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

- 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.*
- void `dwarf_gnu_index_dealloc` (`Dwarf_Gnu_Index_Head` dw\_head)  
*Free resources of .debug\_gnu\_pubnames .debug\_gnu\_pubtypes.*
- 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.*
- 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\_head()

```
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 )
```

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.

**9.28.2.2 dwarf\_gnu\_index\_dealloc()**

```
void dwarf_gnu_index_dealloc (
    Dwarf_Gnu_Index_Head dw_head )
```

Call this to deallocate all memory used by dw\_head.

**Parameters**

<i>dw_head</i>	Pass in the Dwarf_Gnu_Index_head whose data is to be deallocated.
----------------	---

**9.28.2.3 dwarf\_get\_gnu\_index\_block()**

```
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 )
```

**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 <a href="#">dwarf_get_section_max_offsets_d()</a> 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.

### 9.28.2.4 dwarf\_get\_gnu\_index\_block\_entry()

```
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 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.

## 9.29 Fast Access to Gdb Index

### Functions

- 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.*
- void `dwarf_dealloc_gdbindex` (`Dwarf_Gdbindex` dw\_gdbindexptr)  
*Free (dealloc) all allocated Dwarf\_Gdbindex memory It should named dwarf\_dealloc\_gdbindex.*
- int `dwarf_gdbindex_culist_array` (`Dwarf_Gdbindex` dw\_gdbindexptr, `Dwarf_Unsigned` \*dw\_list\_length, `Dwarf_Error` \*dw\_error)  
*Return the culist array length.*
- 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.*

- 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.*
- 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.*
- int `dwarf_gdbindex_addressarea` (Dwarf\_Gdbindex dw\_gdbindexptr, Dwarf\_Unsigned \*dw\_addressarea\_↵list\_length, Dwarf\_Error \*dw\_error)  
*Get access to gdbindex address area.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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](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\_gdbindex\_header()

```
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 )
```

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.

### 9.29.2.2 dwarf\_dealloc\_gdbindex()

```
void dwarf_dealloc_gdbindex (
    Dwarf_Gdbindex dw_gdbindexptr )
```

#### Parameters

<i>dw_gdbindexptr</i>	Pass in a valid dw_gdbindexptr and on return assign zero to dw_gdbindexptr as it is stale.
-----------------------	--



**9.29.2.3 dwarf\_gdbindex\_culist\_array()**

```
int dwarf_gdbindex_culist_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_list_length,
    Dwarf_Error * dw_error )
```

**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.

**9.29.2.4 dwarf\_gdbindex\_culist\_entry()**

```
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 )
```

**Parameters**

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in a number from 0 through <i>dw_list_length</i> -1. If <i>dw_entryindex</i> 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.

**9.29.2.5 dwarf\_gdbindex\_types\_culist\_array()**

```
int dwarf_gdbindex_types_culist_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_types_list_length,
    Dwarf_Error * dw_error )
```

**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.

**9.29.2.6 dwarf\_gdbindex\_types\_culist\_entry()**

```
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 )
```

**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.

**9.29.2.7 dwarf\_gdbindex\_addressarea()**

```
int dwarf_gdbindex_addressarea (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_addressarea_list_length,
    Dwarf_Error * dw_error )
```

**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.

**9.29.2.8 dwarf\_gdbindex\_addressarea\_entry()**

```
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 )
```

**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.

**9.29.2.9 dwarf\_gdbindex\_symboltable\_array()**

```
int dwarf_gdbindex_symboltable_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_symtab_list_length,
    Dwarf_Error * dw_error )
```

**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.

**9.29.2.10 dwarf\_gdbindex\_symboltable\_entry()**

```
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 )
```

## 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_syntab_list_length-1. If the value is greater than dw_syntab_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.

**9.29.2.11 dwarf\_gdbindex\_cuvector\_length()**

```
int dwarf_gdbindex_cuvector_length (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_cuvector_offset,
    Dwarf_Unsigned * dw_innercount,
    Dwarf_Error * dw_error )
```

## 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.

**9.29.2.12 dwarf\_gdbindex\_cuvector\_inner\_attributes()**

```
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 )
```

## Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
-----------------------	---

## Parameters

<i>dw_cuvector_offset_in</i>	Pass in the value of <i>dw_cuvector_offset</i>
<i>dw_innerindex</i>	Pass in the index of the CU vector in, from 0 through <i>dw_innercount</i> -1.
<i>dw_field_value</i>	On success returns a field of bits. To expand the bits call <i>dwarf_gdbindex_cuvector_instance_expand_value</i> .
<i>dw_error</i>	The usual pointer to return error details.

## Returns

Returns DW\_DLV\_OK etc.

**9.29.2.13 dwarf\_gdbindex\_cuvector\_instance\_expand\_value()**

```
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 )
```

## Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_field_value</i>	Pass in the <i>dw_field_value</i> returned by <i>dwarf_gdbindex_cuvector_inner_attributes</i> .
<i>dw_cu_index</i>	On success returns the CU index from the <i>dw_field_value</i>
<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.

**9.29.2.14 dwarf\_gdbindex\_string\_by\_offset()**

```
int dwarf_gdbindex_string_by_offset (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_stringoffset,
    const char ** dw_string_ptr,
    Dwarf_Error * dw_error )
```

## Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
-----------------------	---

## Parameters

<i>dw_stringoffset</i>	Pass in the string offset returned by <code>dwarf_gdbindex_symboltable_entry</code>
<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.

## 9.30 Fast Access to Split Dwarf (Debug Fission)

## Functions

- 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.*
- void `dwarf_dealloc_xu_header` (`Dwarf_Xu_Index_Header` dw\_xuhdr)  
*Dealloc (free) memory associated with dw\_xuhdr.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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\_get\_xu\_index\_header()

```
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 )

```

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 <b>N</b> .
<i>dw_units_count</i>	On success returns the number of compilation units or type units in the index. Referred to as <b>U</b> .
<i>dw_hash_slots_count</i>	On success returns the number of slots in the hash table. Referred to as <b>S</b> .
<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.

#### 9.30.2.2 dwarf\_dealloc\_xu\_header()

```

void dwarf_dealloc_xu_header (
    Dwarf_Xu_Index_Header 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.
-----------------	---

#### 9.30.2.3 dwarf\_get\_xu\_index\_section\_type()

```

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 )

```

## 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.

## 9.30.2.4 dwarf\_get\_xu\_hash\_entry()

```
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 )
```

## 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 <b>S-1</b> . 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\_section\_names()

```
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 )
```



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 <i>dw_column_index</i> values are 0 through <b>N-1</b> .
<i>dw_SECT_number</i>	On success returns DW_SECT_INFO or other section id as appears in <i>dw_column_index</i> .
<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.

#### 9.30.2.6 dwarf\_get\_xu\_section\_offset()

```
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 )
```

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 <b>U</b>
<i>dw_column_index</i>	Pass in a column number , 0 through <b>N-1</b>
<i>dw_sec_offset</i>	On success returns the section offset of the section whose name <i>dwarf_get_xu_section_names</i> returns.
<i>dw_sec_size</i>	On success returns the section size of the section whose name <i>dwarf_get_xu_section_names</i> returns. If the returned section size is zero then this column makes no contribution to the dwp object file and the <i>dw_sec_size</i> and <i>dw_sec_offset</i> should be ignored.
<i>dw_error</i>	The usual pointer to return error details.

#### Returns

Returns DW\_DLV\_OK etc.

### 9.30.2.7 dwarf\_get\_debugfission\_for\_die()

```
int dwarf_get_debugfission_for_die (
    Dwarf_Die dw_die,
    Dwarf_Debug_Fission_Per_CU * dw_percu_out,
    Dwarf_Error * dw_error )
```

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.

### 9.30.2.8 dwarf\_get\_debugfission\_for\_key()

```
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 )
```

#### 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.

## 9.31 Access GNU .gnu\_debuglink, build-id.

### Functions

- 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.*

- int dwarf\_suppress\_debuglink\_crc (int dw\_suppress)

*Suppressing crc calculations.*

- int dwarf\_add\_debuglink\_global\_path (Dwarf\_Debug dw\_dbg, const char \*dw\_pathname, Dwarf\_Error \*dw\_error)

*Adding debuglink global paths.*

- int dwarf\_crc32 (Dwarf\_Debug dw\_dbg, unsigned char \*dw\_crcbuf, Dwarf\_Error \*dw\_error)

*Crc32 used for debuglink crc calculation.*

- 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.

libdwf 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\_gnu\_debuglink()

```
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 )
```

.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.

## 9.31.2.2 dwarf\_suppress\_debuglink\_crc()

```
int dwarf_suppress_debuglink_crc (
    int dw_suppress )
```

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](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

<i>dw_suppress</i>	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 dwarf_init_path_dl calls compute debuglink CRC values as required.
--------------------	---

**Returns**

Returns the previous value of the global flag.

[Details on separate DWARF object access](#)

**9.31.2.3 dwarf\_add\_debuglink\_global\_path()**

```
int dwarf_add_debuglink_global_path (
    Dwarf_Debug dw_dbg,
    const char * dw_pathname,
    Dwarf_Error * dw_error )
```

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.

**9.31.2.4 dwarf\_crc32()**

```
int dwarf_crc32 (
    Dwarf_Debug dw_dbg,
    unsigned char * dw_crcbuf,
    Dwarf_Error * dw_error )
```

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.

**9.31.2.5 dwarf\_basic\_crc32()**

```
unsigned int dwarf_basic_crc32 (
    const unsigned char * dw_buf,
    unsigned long dw_len,
    unsigned int dw_init )
```

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.

**9.32 Harmless Error recording****Macros**

- `#define DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE 4`  
*Default size of the libdwarf-internal circular list.*

**Functions**

- `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.*
- `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.*
- `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()

```
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 )
```

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\_set\_harmless\_error\_list\_size()

```
unsigned int dwarf_set_harmless_error_list_size (
    Dwarf_Debug dw_dbg,
    unsigned int dw_maxcount )
```



## 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.

## 9.32.2.3 dwarf\_insert\_harmless\_error()

```
void dwarf_insert_harmless_error (
    Dwarf_Debug dw_dbg,
    char * dw_newerror )
```

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).

## 9.33 Names DW\_TAG\_member etc as strings

## Functions

- int **dwarf\_get\_ACCESS\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_ACCESS\_name*
- int **dwarf\_get\_ADDR\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_ADDR\_name*
- int **dwarf\_get\_AT\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_AT\_name*
- int **dwarf\_get\_ATCF\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_AT\_name*
- int **dwarf\_get\_ATE\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_ATE\_name*
- int **dwarf\_get\_CC\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_CC\_name*
- int **dwarf\_get\_CFA\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_CFA\_name*
- int **dwarf\_get\_children\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_children\_name* - historic misspelling.
- int **dwarf\_get\_CHILDREN\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_CHILDREN\_name*

- int **dwarf\_get\_DEFAULTED\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_DEFAULTED\_name*
- int **dwarf\_get\_DS\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_DS\_name*
- int **dwarf\_get\_DSC\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_DSC\_name*
- int **dwarf\_get\_GNUKIND\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_GNUKIND\_name - libdwarf invention*
- int **dwarf\_get\_EH\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_EH\_name*
- int **dwarf\_get\_END\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_END\_name*
- int **dwarf\_get\_FORM\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_FORM\_name*
- int **dwarf\_get\_FRAME\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*This is a set of register names.*
- int **dwarf\_get\_GNUVIS\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_GNUVIS\_name - a libdwarf invention*
- int **dwarf\_get\_ID\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_ID\_name*
- int **dwarf\_get\_IDX\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_IDX\_name*
- int **dwarf\_get\_INL\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_INL\_name*
- int **dwarf\_get\_ISA\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_ISA\_name*
- int **dwarf\_get\_LANG\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_LANG\_name*
- int **dwarf\_get\_LLE\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_LLE\_name*
- int **dwarf\_get\_LLEX\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_LLEX\_name - a GNU extension.*
- int **dwarf\_get\_LNCT\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_LNCT\_name*
- int **dwarf\_get\_LNE\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_LNE\_name*
- int **dwarf\_get\_LNS\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_LNS\_name*
- int **dwarf\_get\_MACINFO\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_MACINFO\_name*
- int **dwarf\_get\_MACRO\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_MACRO\_name*
- int **dwarf\_get\_OP\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_OP\_name*
- int **dwarf\_get\_ORD\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_ORD\_name*
- int **dwarf\_get\_RLE\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_RLE\_name*
- int **dwarf\_get\_SECT\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_SECT\_name*
- int **dwarf\_get\_TAG\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)

- dwarf\_get\_TAG\_name*
- int **dwarf\_get\_UT\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_UT\_name*
- int **dwarf\_get\_VIRTUALITY\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_VIRTUALITY\_name*
- int **dwarf\_get\_VIS\_name** (unsigned int dw\_val\_in, const char \*\*dw\_s\_out)  
*dwarf\_get\_VIS\_name*
- 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\_GNUKIND\_name()

```
int dwarf_get_GNUKIND_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

So we can report things GNU extensions sensibly.

#### 9.33.2.2 dwarf\_get\_EH\_name()

```
int dwarf_get_EH_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

So we can report this GNU extension sensibly.

### 9.33.2.3 dwarf\_get\_FRAME\_name()

```
int dwarf_get_FRAME_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

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\_GNUIVIS\_name()

```
int dwarf_get_GNUIVIS_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

So we report a GNU extension sensibly.

### 9.33.2.5 dwarf\_get\_LLEX\_name()

```
int dwarf_get_LLEX_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

The name is a libdwarf invention for the GNU extension. So we report a GNU extension sensibly.

### 9.33.2.6 dwarf\_get\_MACINFO\_name()

```
int dwarf_get_MACINFO_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

Used in DWARF2-DWARF4

### 9.33.2.7 dwarf\_get\_MACRO\_name()

```
int dwarf_get_MACRO_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

Used in DWARF5

### 9.33.2.8 dwarf\_get\_FORM\_CLASS\_name()

```
int dwarf_get_FORM_CLASS_name (
    enum Dwarf_Form_Class dw_fc,
    const char ** dw_s_out )
```

See DWARF5 Table 2.3, Classes of Attribute Value page 23. Earlier DWARF versions have a similar table.

## 9.34 Object Sections Data

### Functions

- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*
- 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.*

- 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.*
- 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.*
- 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.*
- [Dwarf\\_Unsigned](#) [dwarf\\_get\\_section\\_count](#) ([Dwarf\\_Debug](#) dw\_dbg)  
*Get section count (of object file sections).*
- 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\_die\_section\_name()

```
int dwarf_get_die_section_name (
    Dwarf\_Debug dw_dbg,
    Dwarf\_Bool dw_is_info,
    const char ** dw_sec_name,
    Dwarf\_Error * dw_error )
```

[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 for .debug_info, or if DWARF4 .debug_types 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.

## 9.34.2.2 dwarf\_get\_die\_section\_name\_b()

```
int dwarf_get_die_section_name_b (
    Dwarf_Die dw_die,
    const char ** dw_sec_name,
    Dwarf_Error * dw_error )
```

The same as **dwarf\_get\_die\_section\_name** except we have a DIE so do not need **dw\_is\_info** as a argument.

## 9.34.2.3 dwarf\_get\_real\_section\_name()

```
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 )
```

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 error usual details.

**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

**9.34.2.4 dwarf\_get\_frame\_section\_name()**

```
int dwarf_get_frame_section_name (
    Dwarf_Debug dw_dbg,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

**Returns**

returns DW\_DLV\_OK if the .debug\_frame exists

**9.34.2.5 dwarf\_get\_frame\_section\_name\_eh\_gnu()**

```
int dwarf_get_frame_section_name_eh_gnu (
    Dwarf_Debug dw_dbg,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

**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\_offset\_size()**

```
int dwarf_get_offset_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

This is not from DWARF information, it is from object file headers.

**9.34.2.7 dwarf\_get\_address\_size()**

```
int dwarf_get_address_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_addr_size,
    Dwarf_Error * dw_error )
```

This is not from DWARF information, it is from object file headers.

**9.34.2.8 dwarf\_get\_line\_section\_name\_from\_die()**

```
int dwarf_get_line_section_name_from_die (
    Dwarf_Die dw_die,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```



## 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.

## 9.34.2.9 dwarf\_get\_section\_info\_by\_name\_a()

```
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 )
```

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 <b>Characteristics</b> .
<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.

### 9.34.2.10 dwarf\_get\_section\_info\_by\_name()

```
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 )
```

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.

### 9.34.2.11 dwarf\_get\_section\_info\_by\_index\_a()

```
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 )
```

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 <b>Characteristics</b> . 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\_index()**

```
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 )
```

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.

**9.34.2.13 dwarf\_machine\_architecture\_a()**

```
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 )
```

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`.

`dwarf_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 <a href="#">libdwarf.h</a> ).
<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 <code>e_type</code> ).

## Parameters

<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 <b>Characteristics</b> ).
<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.

## 9.34.2.14 dwarf\_machine\_architecture()

```
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 )
```

Identical to [dwarf\\_machine\\_architecture\\_a\(\)](#) except that this older version does not have the the dw\_obj\_type argument so it cannot return the Elf e\_type value..

## 9.34.2.15 dwarf\_get\_section\_count()

```
Dwarf_Unsigned dwarf_get_section_count (
    Dwarf_Debug dw_dbg )
```

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.

## 9.34.2.16 dwarf\_get\_section\_max\_offsets\_d()

```
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 )
```

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.

## 9.35 Section Groups Objectfile Data

## Functions

- 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.*

- 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\_sizes()

```
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 )
```

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

### 9.35.2.2 dwarf\_sec\_group\_map()

```
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 )
```

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

## 9.36 LEB Encode and Decode

### Functions

- int **dwarf\_encode\_leb128** (Dwarf\_Unsigned dw\_val, int \*dw\_nbytes, char \*dw\_space, int dw\_splen)
- int **dwarf\_encode\_signed\_leb128** (Dwarf\_Signed dw\_val, int \*dw\_nbytes, char \*dw\_space, int dw\_splen)
- int **dwarf\_decode\_leb128** (char \*dw\_leb, Dwarf\_Unsigned \*dw\_leblen, Dwarf\_Unsigned \*dw\_outval, char \*dw\_endptr)
- 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

- `const char * dwarf_package_version` (void)  
*Return the version string in the library.*
- `int dwarf_set_stringcheck` (int `dw_stringcheck`)  
*Turn off libdwarf checks of strings.*
- `int dwarf_set_reloc_application` (int `dw_apply`)  
*Set libdwarf response to \*.rela relocations.*
- `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.*
- `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.*
- `int dwarf_library_allow_dup_attr` (int `dw_v`)  
*Eliminate libdwarf checking attribute duplication.*
- `Dwarf_Small dwarf_set_default_address_size` (Dwarf\_Debug `dw_dbg`, Dwarf\_Small `dw_value`)  
*Set the address size on a Dwarf\_Debug.*
- `int dwarf_get_universalbinary_count` (Dwarf\_Debug `dw_dbg`, Dwarf\_Unsigned `*dw_current_index`, Dwarf\_Unsigned `*dw_available_count`)  
*Retrieve universal binary index.*

### Variables

- `void(*) (void *, const void *, unsigned long) dwarf_get_endian_copy_function` (Dwarf\_Debug `dw_dbg`)  
*Get a pointer to the applicable swap/noswap function.*
- Dwarf\_Cmdline\_Options `dwarf_cmdline_options`

### 9.37.1 Detailed Description

### 9.37.2 Function Documentation

#### 9.37.2.1 dwarf\_package\_version()

```
const char * dwarf_package_version (
    void )
```

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

#### 9.37.2.2 dwarf\_set\_stringcheck()

```
int dwarf_set_stringcheck (
    int dw_stringcheck )
```

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.

**9.37.2.3 dwarf\_set\_reloc\_application()**

```
int dwarf_set_reloc_application (
    int dw_apply )
```

*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.

**9.37.2.4 dwarf\_record\_cmdline\_options()**

```
void dwarf_record_cmdline_options (
    Dwarf_Cmdline_Options dw_dd_options )
```

## 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 <a href="#">dwarf_register_printf_callback</a> .
----------------------	---

**9.37.2.5 dwarf\_set\_de\_alloc\_flag()**

```
int dwarf_set_de_alloc_flag (
    int dw_v )
```

## Parameters

<code>dw↔ _v</code>	If zero passed in libdwarf will run somewhat faster and library memory allocations will not all be tracked and <code>dwarf_finish()</code> 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\_library\_allow\_dup\_attr()**

```
int dwarf_library_allow_dup_attr (
    int dw_v )
```

Independent of any Dwarf\_Debug, this is sets a global flag in libdwarf and is applicable to all whenever the setting is changed. Defaults to zero so by default libdwarf 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

{0.11.2}

## Parameters

<code>dw↔ _v</code>	If non-zero passed in libdwarf will avoid the checks and will not return errors for an abbreviation list with duplicate attributes.
-------------------------	---

## Returns

Returns the previous version of the flag.

**9.37.2.7 dwarf\_set\_default\_address\_size()**

```
Dwarf_Small dwarf_set_default_address_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Small dw_value )
```

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.

## 9.37.2.8 dwarf\_get\_universalbinary\_count()

```
int dwarf_get_universalbinary_count (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_current_index,
    Dwarf_Unsigned * dw_available_count )
```

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 dw_current_index 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 dw_current_index 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.

## 9.37.3 Variable Documentation

## 9.37.3.1 dwarf\_get\_endian\_copy\_function

```
void(*) (void *, const void *, unsigned long) dwarf_get_endian_copy_function(Dwarf_Debug dw_dbg)
(
    Dwarf_Debug dw_dbg )
```

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**

- 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)
- 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)
- 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.

## 9.39 Section allocation preference

**Functions**

- enum Dwarf\_Sec\_Alloc\_Pref dwarf\_set\_load\_preference (enum Dwarf\_Sec\_Alloc\_Pref dw\_load\_preference)  
*Set/Retrieve section allocation preference.*
- 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 mmap.

The environment variable DWARF\_WHICH\_ALLOC is also involved at runtime. If the value is 'malloc' then use of read/malloc is preferred. If the value is 'mmap' then use of mmap is preferred.

If present and valid this environment variable takes precedence over dwarf\_set\_load\_preference().

## 9.39.2 Function Documentation

### 9.39.2.1 dwarf\_set\_load\_preference()

```
enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference (
    enum Dwarf_Sec_Alloc_Pref dw_load_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.

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.

### 9.39.2.2 dwarf\_get\_mmap\_count()

```
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 )
```

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.
---------------	---------------------------

## Parameters

<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>	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 read/malloc is returned.

## 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.

## 9.40 Using dwarf\_init\_path()

Example of a libdwwarf 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 libdwwarf functions here */
}

```

```

    dwarf_finish (dbg) ;
    return DW_DLV_OK;
}

```

## 9.41 Using dwarf\_init\_path\_dl()

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\(\)](#)

### 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.

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.

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.

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.

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.

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.

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.

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).

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).

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.

```

/*
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.

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()

```

/*
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.

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.

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.

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.

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.

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\(\)](#)

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_actuals = 0;
    Dwarf_Signed linecount_actuals = 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()`.



See also

[dwarf\\_srclines\\_b](#)

[dwarf\\_srclines\\_from\\_linecontext](#)

[dwarf\\_srclines\\_dealloc\\_b](#)

```

*/
int exampled(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.

```

*/
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.

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.

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.

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 *weakns = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_WEAKNS,
        &weakns, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use weakns[i] */
    }
    dwarf_globals_dealloc(dbg, weakns, count);
    return DW_DLV_OK;
}

```

## 9.66 Reading .debug\_funcnames (nonstandard)

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.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int examplel(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.

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.

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_DLX_OK;
}

```

## 9.70 Reading .debug\_macro data (DWARF5)

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_DLX_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\_macroinfo (DWARF2-4)

Example reading .debug\_macroinfo, 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_macroinfo 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.

```

*/
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.

```

*/
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;
}
return fres;
}

```

## 9.74 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.

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.

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.

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, &bytecount, 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.

```

*/
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.

```

/*
int examplew gdbindex(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.

```

/*
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`.

Debug Fission is an older name for Split Dwarf.

```

/*
int example(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()`

```

/*
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.

```

/*
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.

```

*/
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.

```

*/
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(). */
}

```

## 9.86 Using GNU debuglink data

Example showing dwarf\_add\_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 < 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.

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.

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.

```

/*
#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, 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,
    gptrsize,
    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.

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

## Data Structure Documentation

### 10.1 Dwarf\_Block\_s Struct Reference

#### Data Fields

- [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>
```

#### Data Fields

- [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

### Data Fields

- const char \* **pcu\_type**
- Dwarf\_Unsigned **pcu\_index**
- Dwarf\_Sig8 **pcu\_hash**
- Dwarf\_Unsigned **pcu\_offset** [12]
- Dwarf\_Unsigned **pcu\_size** [12]
- 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

### Data Fields

- 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>
```

### Data Fields

- 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

### Data Fields

- 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>
```

### Data Fields

- 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

### Data Fields

- 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>
```

### Data Fields

- 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

### Data Fields

- [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

### Data Fields

- 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

### Data Fields

- [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

### Data Fields

- 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
00007 and/or modify it under the terms of version 2.1 of the
00008 GNU Lesser General Public License as published by the Free
00009 Software Foundation.
00010
00011 This program is distributed in the hope that it would be
00012 useful, but WITHOUT ANY WARRANTY; without even the implied
00013 warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR
00014 PURPOSE.
00015
00016 Further, this software is distributed without any warranty
00017 that it is free of the rightful claim of any third person
00018 regarding infringement or the like. Any license provided
00019 herein, whether implied or otherwise, applies only to this
00020 software file. Patent licenses, if any, provided herein
00021 do not apply to combinations of this program with other
00022 software, or any other product whatsoever.
00023
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
```

```

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*/

```

```

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_function_template 0x4102 /* GNU. For C++ */
00177 #define DW_TAG_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 */

```

```

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_loclistx                  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

```

```
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 */
```

```

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 */

```



```
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. */
```

```

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.*/

```

```
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 0x3ff0
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
```

```
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
```

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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_floatpintel              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 /* The following 2 are not yet formally approved October 2010, but
01169    it seems extremely likely they will be approved as the committee
01170    chair agrees these should be ok and no one on the committee
01171    has objected. */
01172 #define DW_LANG_OpenCL            0x0015 /* DWARF5 */
01173 #define DW_LANG_Go                 0x0016 /* DWARF5 */
01174 #define DW_LANG_Modula3           0x0017 /* DWARF5 */
01175 #define DW_LANG_Haskell           0x0018 /* DWARF5 */
01176 #define DW_LANG_C_plus_plus_03    0x0019 /* DWARF5 */
01177 #define DW_LANG_C_plus_plus_11    0x001a /* DWARF5 */
01178 #define DW_LANG_OCaml             0x001b /* DWARF5 */
01179 #define DW_LANG_Rust              0x001c /* DWARF5 */
01180 #define DW_LANG_C11               0x001d /* DWARF5 */
01181 #define DW_LANG_Swift             0x001e /* DWARF5 */
01182 #define DW_LANG_Julia             0x001f /* DWARF5 */
01183 #define DW_LANG_Dylan             0x0020 /* DWARF5 */
01184 #define DW_LANG_C_plus_plus_14    0x0021 /* DWARF5 */
01185 #define DW_LANG_Fortran03         0x0022 /* DWARF5 */
01186 #define DW_LANG_Fortran08         0x0023 /* DWARF5 */
01187 #define DW_LANG_RenderScript      0x0024 /* DWARF5 */

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01188 #define DW_LANG_BLISS                0x0025 /* DWARF5 */
01189 #define DW_LANG_Kotlin                0x0026 /* DWARF6 */
01190 #define DW_LANG_Zig                   0x0027 /* DWARF6 */
01191 #define DW_LANG_Crystal               0x0028 /* DWARF6 */
01192 #define DW_LANG_C_plus_plus_17       0x002a /* DWARF6 */
01193 #define DW_LANG_C_plus_plus_20       0x002b /* DWARF6 */
01194 #define DW_LANG_C17                   0x002c /* DWARF6 */
01195 #define DW_LANG_Fortran18             0x002d /* DWARF6 */
01196 #define DW_LANG_Ada2005               0x002e /* DWARF6 */
01197 #define DW_LANG_Ada2012               0x002f /* DWARF6 */
01198 #define DW_LANG_HIIP                  0x0030 /* DWARF6 */
01199 #define DW_LANG_Assembly              0x0031 /* DWARF6 */
01200 #define DW_LANG_C_sharp               0x0032 /* DWARF6 */
01201 #define DW_LANG_Mojo                  0x0033 /* DWARF6 */
01202 #define DW_LANG_GLSL                  0x0034 /* DWARF6 */
01203 #define DW_LANG_GLSL_ES               0x0035 /* DWARF6 */
01204 #define DW_LANG_HLSL                  0x0036 /* DWARF6 */
01205 #define DW_LANG_OpenCL_CPP            0x0037 /* DWARF6 */
01206 #define DW_LANG_CPP_for_OpenCL        0x0038 /* DWARF6 */
01207 #define DW_LANG_SYCL                  0x0039 /* DWARF6 */
01208 #define DW_LANG_Ruby                  0x0040 /* DWARF6 */
01209 #define DW_LANG_Move                   0x0041 /* DWARF6 */
01210 #define DW_LANG_Hylo                  0x0042 /* DWARF6 */
01211
01212 #define DW_LANG_lo_user                0x8000
01213 #define DW_LANG_Mips_Assembler         0x8001 /* MIPS */
01214 #define DW_LANG_Upc                   0x8765 /* UPC, use
01215 DW_LANG_UPC instead. */
01216 #define DW_LANG_GOOGLE_RenderScript   0x8e57
01217 #define DW_LANG_ALTIUM_Assembler       0x9101
01218 #define DW_LANG_BORLAND_Delphi         0xb000
01219
01220 /* Sun extensions */
01221 #define DW_LANG_SUN_Assembler           0x9001 /* SUN */
01222
01223 #define DW_LANG_hi_user                0xffff
01224
01225 /* Identifier case name. */
01226 #define DW_ID_case_sensitive            0x00
01227 #define DW_ID_up_case                   0x01
01228 #define DW_ID_down_case                 0x02
01229 #define DW_ID_case_insensitive          0x03
01230
01231 /* Calling Convention Name. */
01232 #define DW_CC_normal                    0x01
01233 #define DW_CC_program                   0x02
01234 #define DW_CC_nocall                   0x03
01235 #define DW_CC_pass_by_reference         0x04 /* DWARF5 */
01236 #define DW_CC_pass_by_value             0x05 /* DWARF5 */
01237
01238 #define DW_CC_GNU_renesas_sh             0x40 /* GNU */
01239 #define DW_CC_lo_user                   0x40
01240 #define DW_CC_GNU_borland_fastcall_i386 0x41 /* GNU */
01241
01242 /* ALTIUM extensions. */
01243 /* Function is an interrupt handler,
01244    return address on system stack. */
01245 #define DW_CC_ALTIUM_interrupt           0x65 /* ALTIUM */
01246
01247 /* Near function model, return address on system stack. */
01248 #define DW_CC_ALTIUM_near_system_stack   0x66 /* ALTIUM */
01249
01250 /* Near function model, return address on user stack. */
01251 #define DW_CC_ALTIUM_near_user_stack     0x67 /* ALTIUM */
01252
01253 /* Huge function model, return address on user stack. */
01254 #define DW_CC_ALTIUM_huge_user_stack     0x68 /* ALTIUM */
01255
01256 #define DW_CC_GNU_BORLAND_safecall       0xb0
01257 #define DW_CC_GNU_BORLAND_stdcall        0xb1
01258 #define DW_CC_GNU_BORLAND_pascal         0xb2
01259 #define DW_CC_GNU_BORLAND_msfastcall     0xb3
01260 #define DW_CC_GNU_BORLAND_msreturn       0xb4
01261 #define DW_CC_GNU_BORLAND_thiscall       0xb5
01262 #define DW_CC_GNU_BORLAND_fastcall       0xb6
01263
01264 #define DW_CC_LLVM_vectorcall             0xc0
01265 #define DW_CC_LLVM_Win64                  0xc1
01266 #define DW_CC_LLVM_X86_64SysV             0xc2
01267 #define DW_CC_LLVM_AAPCS                  0xc3
01268 #define DW_CC_LLVM_AAPCS_VFP              0xc4
01269 #define DW_CC_LLVM_IntelOclBicc           0xc5
01270 #define DW_CC_LLVM_SpirFunction           0xc6
01271 #define DW_CC_LLVM_OpenCLKernel           0xc7
01272 #define DW_CC_LLVM_Swift                  0xc8
01273 #define DW_CC_LLVM_PreserveMost           0xc9
01274 #define DW_CC_LLVM_PreserveAll            0xca

```

```

01275 #define DW_CC_LLVM_X86RegCall      0xcb
01276 #define DW_CC_GDB_IBM_OpenCL      0xff
01277
01278 #define DW_CC_hi_user              0xff
01279
01280 /* Inline Code Name. */
01281 #define DW_INL_not_inlined          0x00
01282 #define DW_INL_inlined              0x01
01283 #define DW_INL_declared_not_inlined 0x02
01284 #define DW_INL_declared_inlined     0x03
01285
01286 /* Ordering Name. */
01287 #define DW_ORD_row_major            0x00
01288 #define DW_ORD_col_major            0x01
01289
01290 /* Discriminant Descriptor Name. */
01291 #define DW_DSC_label                0x00
01292 #define DW_DSC_range                0x01
01293
01294 /* Line number header entry format encodings. DWARF5 */
01295 #define DW_LNCT_path                0x1 /* DWARF5 */
01296 #define DW_LNCT_directory_index     0x2 /* DWARF5 */
01297 #define DW_LNCT_timestamp            0x3 /* DWARF5 */
01298 #define DW_LNCT_size                0x4 /* DWARF5 */
01299 #define DW_LNCT_MD5                 0x5 /* DWARF5 */
01300 /* Experimental two-level line tables. Non standard */
01301 #define DW_LNCT_GNU_subprogram_name 0x6
01302 #define DW_LNCT_GNU_decl_file       0x7
01303 #define DW_LNCT_GNU_decl_line       0x8
01304 #define DW_LNCT_lo_user              0x2000 /* DWARF5 */
01305 #define DW_LNCT_LLVM_source          0x2001
01306 #define DW_LNCT_LLVM_is_MD5         0x2002
01307 #define DW_LNCT_hi_user              0x3fff /* DWARF5 */
01308
01309 /* Line number standard opcode name. */
01310 #define DW_LNS_copy                  0x01
01311 #define DW_LNS_advance_pc            0x02
01312 #define DW_LNS_advance_line         0x03
01313 #define DW_LNS_set_file              0x04
01314 #define DW_LNS_set_column            0x05
01315 #define DW_LNS_negate_stmt           0x06
01316 #define DW_LNS_set_basic_block       0x07
01317 #define DW_LNS_const_add_pc         0x08
01318 #define DW_LNS_fixed_advance_pc      0x09
01319 #define DW_LNS_set_prologue_end      0x0a /* DWARF3 */
01320 #define DW_LNS_set_epilogue_begin    0x0b /* DWARF3 */
01321 #define DW_LNS_set_isa               0x0c /* DWARF3 */
01322
01323 /* Experimental two-level line tables. NOT STD DWARF5 */
01324 /* Not saying GNU or anything. There are no
01325    DW_LNS_lo_user or DW_LNS_hi_user values though.
01326    DW_LNS_set_address_from_logical and
01327    DW_LNS_set_subprogram being both 0xd
01328    to avoid using up more space in the special opcode table.
01329    EXPERIMENTAL DW_LNS follow.
01330 */
01331 #define DW_LNS_set_address_from_logical 0x0d /* Actuals table only */
01332 #define DW_LNS_set_subprogram           0x0d /* Logicals table only */
01333 #define DW_LNS_inlined_call             0x0e /* Logicals table only */
01334 #define DW_LNS_pop_context              0x0f /* Logicals table only */
01335
01336 /* Line number extended opcode name. */
01337 #define DW_LNE_end_sequence            0x01
01338 #define DW_LNE_set_address             0x02
01339 #define DW_LNE_define_file             0x03 /* DWARF4 and earlier only */
01340 #define DW_LNE_set_discriminator       0x04 /* DWARF4 */
01341
01342 /* HP extensions. */
01343 #define DW_LNE_HP_negate_is_UV_update  0x11 /* 17 HP */
01344 #define DW_LNE_HP_push_context         0x12 /* 18 HP */
01345 #define DW_LNE_HP_pop_context          0x13 /* 19 HP */
01346 #define DW_LNE_HP_set_file_line_column 0x14 /* 20 HP */
01347 #define DW_LNE_HP_set_routine_name     0x15 /* 21 HP */
01348 #define DW_LNE_HP_set_sequence        0x16 /* 22 HP */
01349 #define DW_LNE_HP_negate_post_semantics 0x17 /* 23 HP */
01350 #define DW_LNE_HP_negate_function_exit 0x18 /* 24 HP */
01351 #define DW_LNE_HP_negate_front_end_logical 0x19 /* 25 HP */
01352 #define DW_LNE_HP_define_proc          0x20 /* 32 HP */
01353
01354 #define DW_LNE_HP_source_file_correlation 0x80 /* HP */
01355 #define DW_LNE_lo_user                  0x80 /* DWARF3 */
01356 #define DW_LNE_hi_user                  0xff /* DWARF3 */
01357
01358 /* These are known values for DW_LNS_set_isa. */
01359 /* These identifiers are not defined by any DWARF standard. */
01360 #define DW_ISA_UNKNOWN 0
01361 /* The following two are ARM specific. */

```

```

01362 #define DW_ISA_ARM_thumb 1 /* ARM ISA */
01363 #define DW_ISA_ARM_arm 2 /* ARM ISA */
01364
01365 /* Macro information, DWARF5 */
01366 #define DW_MACRO_define 0x01 /* DWARF5 */
01367 #define DW_MACRO_undef 0x02 /* DWARF5 */
01368 #define DW_MACRO_start_file 0x03 /* DWARF5 */
01369 #define DW_MACRO_end_file 0x04 /* DWARF5 */
01370 #define DW_MACRO_define_strp 0x05 /* DWARF5 */
01371 #define DW_MACRO_undef_strp 0x06 /* DWARF5 */
01372 #define DW_MACRO_import 0x07 /* DWARF5 */
01373 #define DW_MACRO_define_sup 0x08 /* DWARF5 */
01374 #define DW_MACRO_undef_sup 0x09 /* DWARF5 */
01375 #define DW_MACRO_import_sup 0x0a /* DWARF5 */
01376 #define DW_MACRO_define_strx 0x0b /* DWARF5 */
01377 #define DW_MACRO_undef_strx 0x0c /* DWARF5 */
01378 #define DW_MACRO_lo_user 0xe0
01379 #define DW_MACRO_hi_user 0xff
01380
01381 /* Macro information, DWARF2-DWARF4. */
01382 #define DW_MACINFO_define 0x01
01383 #define DW_MACINFO_undef 0x02
01384 #define DW_MACINFO_start_file 0x03
01385 #define DW_MACINFO_end_file 0x04
01386 #define DW_MACINFO_vendor_ext 0xff
01387
01388 /* CFA operator compaction (a space saving measure, see
01389 the DWARF standard) means DW_CFA_extended and DW_CFA_nop
01390 have the same value here. */
01391 #define DW_CFA_advance_loc 0x40
01392 #define DW_CFA_offset 0x80
01393 #define DW_CFA_restore 0xc0
01394 #define DW_CFA_nop 0x00
01395 #define DW_CFA_extended 0
01396 #define DW_CFA_set_loc 0x01
01397 #define DW_CFA_advance_loc1 0x02
01398 #define DW_CFA_advance_loc2 0x03
01399 #define DW_CFA_advance_loc4 0x04
01400 #define DW_CFA_offset_extended 0x05
01401 #define DW_CFA_restore_extended 0x06
01402 #define DW_CFA_undefined 0x07
01403 #define DW_CFA_same_value 0x08
01404 #define DW_CFA_register 0x09
01405 #define DW_CFA_remember_state 0x0a
01406 #define DW_CFA_restore_state 0x0b
01407 #define DW_CFA_def_cfa 0x0c
01408 #define DW_CFA_def_cfa_register 0x0d
01409 #define DW_CFA_def_cfa_offset 0x0e
01410 #define DW_CFA_def_cfa_expression 0x0f /* DWARF3 */
01411 #define DW_CFA_expression 0x10 /* DWARF3 */
01412 #define DW_CFA_offset_extended_sf 0x11 /* DWARF3 */
01413 #define DW_CFA_def_cfa_sf 0x12 /* DWARF3 */
01414 #define DW_CFA_def_cfa_offset_sf 0x13 /* DWARF3 */
01415 #define DW_CFA_val_offset 0x14 /* DWARF3f */
01416 #define DW_CFA_val_offset_sf 0x15 /* DWARF3f */
01417 #define DW_CFA_val_expression 0x16 /* DWARF3f */
01418 #define DW_CFA_TI_soffset_extended 0x1c /* TI */
01419 #define DW_CFA_lo_user 0x1c
01420 #define DW_CFA_low_user 0x1c /* Incorrect spelling, do not use. */
01421
01422 /* SGI/MIPS extension. */
01423 #define DW_CFA_MIPS_advance_loc8 0x1d /* MIPS */
01424 #define DW_CFA_TI_def_cfa_soffset 0x1d /* TI */
01425
01426 /* GNU extensions. */
01427 #define DW_CFA_GNU_window_save 0x2d /* GNU */
01428 #define DW_CFA_AARCH64_negate_ra_state 0x2d
01429 #define DW_CFA_GNU_args_size 0x2e /* GNU */
01430 #define DW_CFA_GNU_negative_offset_extended 0x2f /* GNU */
01431 #define DW_CFA_LLVM_def_aspace_cfa 0x30
01432 #define DW_CFA_LLVM_def_aspace_cfa_sf 0x31
01433
01434 /* Metaware if HC is augmentation, apparently meaning High C
01435 and the op has a single uleb operand.
01436 See http://sourceforge.net/p/elftoolchain/tickets/397/ */
01437 #define DW_CFA_METAWARE_info 0x34
01438
01439 #define DW_CFA_hi_user 0x3f
01440 #define DW_CFA_high_user 0x3f /* Misspelled. Do not use. */
01441
01442 /* GNU exception header encoding. See the Generic
01443 Elf Specification of the Linux Standard Base (LSB).
01444 http://refspecs.freestandards.org/LSB\_3.0.0/\
01445 LSB-Core-generic/LSB-Core-generic/dwarfext.html
01446 The upper 4 bits indicate how the value is to be applied.
01447 The lower 4 bits indicate the format of the data.
01448 These identifiers are not defined by any DWARFn standard.

```

```

01449 */
01450 #define DW_EH_PE_abbrev 0x00 /* GNU */
01451 #define DW_EH_PE_uleb128 0x01 /* GNU */
01452 #define DW_EH_PE_udata2 0x02 /* GNU */
01453 #define DW_EH_PE_udata4 0x03 /* GNU */
01454 #define DW_EH_PE_udata8 0x04 /* GNU */
01455 #define DW_EH_PE_sleb128 0x09 /* GNU */
01456 #define DW_EH_PE_sdata2 0x0A /* GNU */
01457 #define DW_EH_PE_sdata4 0x0B /* GNU */
01458 #define DW_EH_PE_sdata8 0x0C /* GNU */
01459
01460 #define DW_EH_PE_pcrel 0x10 /* GNU */
01461 #define DW_EH_PE_textrel 0x20 /* GNU */
01462 #define DW_EH_PE_datarel 0x30 /* GNU */
01463 #define DW_EH_PE_funcrel 0x40 /* GNU */
01464 #define DW_EH_PE_aligned 0x50 /* GNU */
01465
01466 #define DW_EH_PE_omit 0xff /* GNU. Means no value present. */
01467
01468 /* Mapping from machine registers and pseudo-regs into the
01469 .debug_frame table. DW_FRAME entries are machine specific.
01470 These describe MIPS/SGI R3000, R4K, R4400 and all later
01471 MIPS/SGI IRIX machines. They describe a mapping from
01472 hardware register number to the number used in the table
01473 to identify that register.
01474
01475 The CFA (Canonical Frame Address) described in DWARF is
01476 called the Virtual Frame Pointer on MIPS/SGI machines.
01477
01478 The DW_FRAME* names here are MIPS/SGI specific.
01479 Libdwarf interfaces defined in 2008 make the
01480 frame definitions here (and the fixed table sizes
01481 they imply) obsolete. They are left here for compatibility.
01482 */
01483 /* These identifiers are not defined by any DWARF standard. */
01484
01485 #define DW_FRAME_REG1 1 /* integer reg 1 */
01486 #define DW_FRAME_REG2 2 /* integer reg 2 */
01487 #define DW_FRAME_REG3 3 /* integer reg 3 */
01488 #define DW_FRAME_REG4 4 /* integer reg 4 */
01489 #define DW_FRAME_REG5 5 /* integer reg 5 */
01490 #define DW_FRAME_REG6 6 /* integer reg 6 */
01491 #define DW_FRAME_REG7 7 /* integer reg 7 */
01492 #define DW_FRAME_REG8 8 /* integer reg 8 */
01493 #define DW_FRAME_REG9 9 /* integer reg 9 */
01494 #define DW_FRAME_REG10 10 /* integer reg 10 */
01495 #define DW_FRAME_REG11 11 /* integer reg 11 */
01496 #define DW_FRAME_REG12 12 /* integer reg 12 */
01497 #define DW_FRAME_REG13 13 /* integer reg 13 */
01498 #define DW_FRAME_REG14 14 /* integer reg 14 */
01499 #define DW_FRAME_REG15 15 /* integer reg 15 */
01500 #define DW_FRAME_REG16 16 /* integer reg 16 */
01501 #define DW_FRAME_REG17 17 /* integer reg 17 */
01502 #define DW_FRAME_REG18 18 /* integer reg 18 */
01503 #define DW_FRAME_REG19 19 /* integer reg 19 */
01504 #define DW_FRAME_REG20 20 /* integer reg 20 */
01505 #define DW_FRAME_REG21 21 /* integer reg 21 */
01506 #define DW_FRAME_REG22 22 /* integer reg 22 */
01507 #define DW_FRAME_REG23 23 /* integer reg 23 */
01508 #define DW_FRAME_REG24 24 /* integer reg 24 */
01509 #define DW_FRAME_REG25 25 /* integer reg 25 */
01510 #define DW_FRAME_REG26 26 /* integer reg 26 */
01511 #define DW_FRAME_REG27 27 /* integer reg 27 */
01512 #define DW_FRAME_REG28 28 /* integer reg 28 */
01513 #define DW_FRAME_REG29 29 /* integer reg 29 */
01514 #define DW_FRAME_REG30 30 /* integer reg 30 */
01515 #define DW_FRAME_REG31 31 /* integer reg 31, aka ra */
01516
01517 /* MIPS1,2 have only some of these 64-bit registers.
01518 ** MIPS1 save/restore takes 2 instructions per 64-bit reg, and
01519 ** in that case, the register is considered stored after
01520 ** the second swcl. */
01521 #define DW_FRAME_FREG0 32 /* 64-bit floating point reg 0 */
01522 #define DW_FRAME_FREG1 33 /* 64-bit floating point reg 1 */
01523 #define DW_FRAME_FREG2 34 /* 64-bit floating point reg 2 */
01524 #define DW_FRAME_FREG3 35 /* 64-bit floating point reg 3 */
01525 #define DW_FRAME_FREG4 36 /* 64-bit floating point reg 4 */
01526 #define DW_FRAME_FREG5 37 /* 64-bit floating point reg 5 */
01527 #define DW_FRAME_FREG6 38 /* 64-bit floating point reg 6 */
01528 #define DW_FRAME_FREG7 39 /* 64-bit floating point reg 7 */
01529 #define DW_FRAME_FREG8 40 /* 64-bit floating point reg 8 */
01530 #define DW_FRAME_FREG9 41 /* 64-bit floating point reg 9 */
01531 #define DW_FRAME_FREG10 42 /* 64-bit floating point reg 10 */
01532 #define DW_FRAME_FREG11 43 /* 64-bit floating point reg 11 */
01533 #define DW_FRAME_FREG12 44 /* 64-bit floating point reg 12 */
01534 #define DW_FRAME_FREG13 45 /* 64-bit floating point reg 13 */
01535 #define DW_FRAME_FREG14 46 /* 64-bit floating point reg 14 */

```

```

01536 #define DW_FRAME_FREG15 47 /* 64-bit floating point reg 15 */
01537 #define DW_FRAME_FREG16 48 /* 64-bit floating point reg 16 */
01538 #define DW_FRAME_FREG17 49 /* 64-bit floating point reg 17 */
01539 #define DW_FRAME_FREG18 50 /* 64-bit floating point reg 18 */
01540 #define DW_FRAME_FREG19 51 /* 64-bit floating point reg 19 */
01541 #define DW_FRAME_FREG20 52 /* 64-bit floating point reg 20 */
01542 #define DW_FRAME_FREG21 53 /* 64-bit floating point reg 21 */
01543 #define DW_FRAME_FREG22 54 /* 64-bit floating point reg 22 */
01544 #define DW_FRAME_FREG23 55 /* 64-bit floating point reg 23 */
01545 #define DW_FRAME_FREG24 56 /* 64-bit floating point reg 24 */
01546 #define DW_FRAME_FREG25 57 /* 64-bit floating point reg 25 */
01547 #define DW_FRAME_FREG26 58 /* 64-bit floating point reg 26 */
01548 #define DW_FRAME_FREG27 59 /* 64-bit floating point reg 27 */
01549 #define DW_FRAME_FREG28 60 /* 64-bit floating point reg 28 */
01550 #define DW_FRAME_FREG29 61 /* 64-bit floating point reg 29 */
01551 #define DW_FRAME_FREG30 62 /* 64-bit floating point reg 30 */
01552 #define DW_FRAME_FREG31 63 /* 64-bit floating point reg 31 */
01553
01554 #define DW_FRAME_FREG32 64 /* 64-bit floating point reg 32 */
01555 #define DW_FRAME_FREG33 65 /* 64-bit floating point reg 33 */
01556 #define DW_FRAME_FREG34 66 /* 64-bit floating point reg 34 */
01557 #define DW_FRAME_FREG35 67 /* 64-bit floating point reg 35 */
01558 #define DW_FRAME_FREG36 68 /* 64-bit floating point reg 36 */
01559 #define DW_FRAME_FREG37 69 /* 64-bit floating point reg 37 */
01560 #define DW_FRAME_FREG38 70 /* 64-bit floating point reg 38 */
01561 #define DW_FRAME_FREG39 71 /* 64-bit floating point reg 39 */
01562 #define DW_FRAME_FREG40 72 /* 64-bit floating point reg 40 */
01563 #define DW_FRAME_FREG41 73 /* 64-bit floating point reg 41 */
01564 #define DW_FRAME_FREG42 74 /* 64-bit floating point reg 42 */
01565 #define DW_FRAME_FREG43 75 /* 64-bit floating point reg 43 */
01566 #define DW_FRAME_FREG44 76 /* 64-bit floating point reg 44 */
01567 #define DW_FRAME_FREG45 77 /* 64-bit floating point reg 45 */
01568 #define DW_FRAME_FREG46 78 /* 64-bit floating point reg 46 */
01569 #define DW_FRAME_FREG47 79 /* 64-bit floating point reg 47 */
01570 #define DW_FRAME_FREG48 80 /* 64-bit floating point reg 48 */
01571 #define DW_FRAME_FREG49 81 /* 64-bit floating point reg 49 */
01572 #define DW_FRAME_FREG50 82 /* 64-bit floating point reg 50 */
01573 #define DW_FRAME_FREG51 83 /* 64-bit floating point reg 51 */
01574 #define DW_FRAME_FREG52 84 /* 64-bit floating point reg 52 */
01575 #define DW_FRAME_FREG53 85 /* 64-bit floating point reg 53 */
01576 #define DW_FRAME_FREG54 86 /* 64-bit floating point reg 54 */
01577 #define DW_FRAME_FREG55 87 /* 64-bit floating point reg 55 */
01578 #define DW_FRAME_FREG56 88 /* 64-bit floating point reg 56 */
01579 #define DW_FRAME_FREG57 89 /* 64-bit floating point reg 57 */
01580 #define DW_FRAME_FREG58 90 /* 64-bit floating point reg 58 */
01581 #define DW_FRAME_FREG59 91 /* 64-bit floating point reg 59 */
01582 #define DW_FRAME_FREG60 92 /* 64-bit floating point reg 60 */
01583 #define DW_FRAME_FREG61 93 /* 64-bit floating point reg 61 */
01584 #define DW_FRAME_FREG62 94 /* 64-bit floating point reg 62 */
01585 #define DW_FRAME_FREG63 95 /* 64-bit floating point reg 63 */
01586 #define DW_FRAME_FREG64 96 /* 64-bit floating point reg 64 */
01587 #define DW_FRAME_FREG65 97 /* 64-bit floating point reg 65 */
01588 #define DW_FRAME_FREG66 98 /* 64-bit floating point reg 66 */
01589 #define DW_FRAME_FREG67 99 /* 64-bit floating point reg 67 */
01590 #define DW_FRAME_FREG68 100 /* 64-bit floating point reg 68 */
01591 #define DW_FRAME_FREG69 101 /* 64-bit floating point reg 69 */
01592 #define DW_FRAME_FREG70 102 /* 64-bit floating point reg 70 */
01593 #define DW_FRAME_FREG71 103 /* 64-bit floating point reg 71 */
01594 #define DW_FRAME_FREG72 104 /* 64-bit floating point reg 72 */
01595 #define DW_FRAME_FREG73 105 /* 64-bit floating point reg 73 */
01596 #define DW_FRAME_FREG74 106 /* 64-bit floating point reg 74 */
01597 #define DW_FRAME_FREG75 107 /* 64-bit floating point reg 75 */
01598 #define DW_FRAME_FREG76 108 /* 64-bit floating point reg 76 */
01599
01600 /* Having DW_FRAME_HIGHEST_NORMAL_REGISTER be higher than
01601    is strictly needed ... is safe.
01602    These values can be changed at runtime by libdwarf.
01603 */
01604 #ifndef DW_FRAME_HIGHEST_NORMAL_REGISTER
01605 #define DW_FRAME_HIGHEST_NORMAL_REGISTER 188
01606 #endif
01607 /* This is the number of columns in the Frame Table.
01608 */
01609 #ifndef DW_FRAME_LAST_REG_NUM
01610 #define DW_FRAME_LAST_REG_NUM (DW_FRAME_HIGHEST_NORMAL_REGISTER + 1)
01611 #endif
01612
01613 #define DW_CHILDREN_no 0x00
01614 #define DW_CHILDREN_yes 0x01
01615
01616 #define DW_ADDR_none 0
01617 #define DW_ADDR_TI_PTR8 0x0008 /* TI */
01618 #define DW_ADDR_TI_PTR16 0x0010 /* TI */
01619 #define DW_ADDR_TI_PTR22 0x0016 /* TI */
01620 #define DW_ADDR_TI_PTR23 0x0017 /* TI */
01621 #define DW_ADDR_TI_PTR24 0x0018 /* TI */
01622 #define DW_ADDR_TI_PTR32 0x0020 /* TI */

```

```
01623
01624 #ifdef __cplusplus
01625 }
01626 #endif
01627 #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 /*
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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 "0.12.0"
00103 #define DW_LIBDWARF_VERSION_MAJOR 0
00104 #define DW_LIBDWARF_VERSION_MINOR 12
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 typedef struct Dwarf_Form_Data16_s {
00207 unsigned char fd_data[16];
00208 } Dwarf_Form_Data16;
00209
00210 typedef struct Dwarf_Sig8_s {
00211 char signature[8];
00212 } Dwarf_Sig8;
00213
00214 typedef struct Dwarf_Block_s {
00215 Dwarf_Unsigned bl_len;
00216 Dwarf_Ptr bl_data;
00217 Dwarf_Small bl_from_loclist;
00218 Dwarf_Unsigned bl_section_offset;
00219 } Dwarf_Block;
00220
00221 typedef struct Dwarf_Locdesc_c_s * Dwarf_Locdesc_c;
00222 typedef struct Dwarf_Loc_Head_c_s * Dwarf_Loc_Head_c;
00223
00224 typedef struct Dwarf_Gnu_Index_Head_s * Dwarf_Gnu_Index_Head;
00225
00226 typedef struct Dwarf_Dsc_Head_s * Dwarf_Dsc_Head;
00227
00228 typedef struct Dwarf_Frame_Instr_Head_s * Dwarf_Frame_Instr_Head;
00229
00230 typedef void (* dwarf_printf_callback_function_type)
00231 (void * dw_user_pointer, const char * dw_linecontent);
00232
00233 struct Dwarf_Printf_Callback_Info_s {
00234 void * dp_user_pointer;
00235 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
00553 typedef struct Dwarf_Regtable_Entry3_s {
00554     Dwarf_Small dw_offset_relevant;
00555     Dwarf_Small dw_value_type;
00556     Dwarf_Half dw_regnum;
00557     Dwarf_Unsigned dw_offset; /* Should be Dwarf_Signed */
00558     Dwarf_Unsigned dw_args_size; /* Always zero. */
00559     Dwarf_Block dw_block;
00560 } Dwarf_Regtable_Entry3;
00561
00581 typedef struct Dwarf_Regtable3_s {
00582     struct Dwarf_Regtable_Entry3_s rt3_cfa_rule;
00583     Dwarf_Half rt3_reg_table_size;
00584     struct Dwarf_Regtable_Entry3_s * rt3_rules;
00585 } Dwarf_Regtable3;
00586
00587 /* Opaque types for Consumer Library. */
00597 typedef struct Dwarf_Error_s* Dwarf_Error;
00598
00603 typedef struct Dwarf_Debug_s* Dwarf_Debug;
00608 typedef struct Dwarf_Section_s* Dwarf_Section;
00609
00613 typedef struct Dwarf_Die_s* Dwarf_Die;
00614
00618 typedef struct Dwarf_Debug_Addr_Table_s* Dwarf_Debug_Addr_Table;
00619
00624 typedef struct Dwarf_Line_s* Dwarf_Line;
00625
00630 typedef struct Dwarf_Global_s* Dwarf_Global;
00631
00639 typedef struct Dwarf_Type_s* Dwarf_Type;
00640
00646 typedef struct Dwarf_Func_s* Dwarf_Func;
00652 typedef struct Dwarf_Var_s* Dwarf_Var;
00658 typedef struct Dwarf_Weak_s* Dwarf_Weak;
00659
00663 typedef struct Dwarf_Attribute_s* Dwarf_Attribute;
00664
00670 typedef struct Dwarf_Abbrev_s* Dwarf_Abbrev;
00671
00676 typedef struct Dwarf_Fde_s* Dwarf_Fde;
00681 typedef struct Dwarf_Cie_s* Dwarf_Cie;
00682
00687 typedef struct Dwarf_Arange_s* Dwarf_Arange;
00692 typedef struct Dwarf_Gdbindex_s* Dwarf_Gdbindex;
00698 typedef struct Dwarf_Xu_Index_Header_s *Dwarf_Xu_Index_Header;
00702 typedef struct Dwarf_Line_Context_s *Dwarf_Line_Context;
00703
00707 typedef struct Dwarf_Macro_Context_s *Dwarf_Macro_Context;
00708
00714 typedef struct Dwarf_Dnames_Head_s *Dwarf_Dnames_Head;
00715
00723 typedef void (*Dwarf_Handler)(Dwarf_Error dw_error,
00724     Dwarf_Ptr dw_errarg);
00725
00733 struct Dwarf_Macro_Details_s {
00734     Dwarf_Off dmd_offset; /* offset, in the section,
00735         of this macro info */
00736     Dwarf_Small dmd_type; /* the type, DW_MACINFO_define etc*/
00737     Dwarf_Signed dmd_lineno; /* the source line number where
00738         applicable and vend_def number if
00739         vendor_extension op */
00740     Dwarf_Signed dmd_fileindex; /* the source file index */
00741     char * dmd_macro; /* macro name string */
00742 };
00747 typedef struct Dwarf_Macro_Details_s Dwarf_Macro_Details;
00748
00753 typedef struct Dwarf_Debug_Fission_Per_CU_s
00754     Dwarf_Debug_Fission_Per_CU;

```

```

00755
00756 /* ===== BEGIN Obj_Access data ===== */
00762 typedef struct Dwarf_Obj_Access_Interface_a_s
00763     Dwarf_Obj_Access_Interface_a;
00764
00770 typedef struct Dwarf_Obj_Access_Methods_a_s
00771     Dwarf_Obj_Access_Methods_a;
00772
00781 typedef struct Dwarf_Obj_Access_Section_a_s
00782     Dwarf_Obj_Access_Section_a;
00783 struct Dwarf_Obj_Access_Section_a_s {
00784     const char*    as_name;
00785     Dwarf_Unsigned as_type;
00786     Dwarf_Unsigned as_flags;
00787     Dwarf_Addr     as_addr;
00788     Dwarf_Unsigned as_offset;
00789     Dwarf_Unsigned as_size;
00790     Dwarf_Unsigned as_link;
00791     Dwarf_Unsigned as_info;
00792     Dwarf_Unsigned as_addralign;
00793     Dwarf_Unsigned as_entsize;
00794 };
00795
00805 enum Dwarf_Sec_Alloc_Pref {
00806     /* No dynamic allocation */
00807     Dwarf_Alloc_None=0,
00808     /* alternative allocations */
00809     Dwarf_Alloc_Malloc=1,
00810     Dwarf_Alloc_Mmap=2};
00811
00833 struct Dwarf_Obj_Access_Methods_a_s {
00834     int (*om_get_section_info)(void* obj,
00835         Dwarf_Unsigned section_index,
00836         Dwarf_Obj_Access_Section_a* return_section,
00837         int * error);
00838     Dwarf_Small (*om_get_byte_order)(void* obj);
00839     Dwarf_Small (*om_get_length_size)(void* obj);
00840     Dwarf_Small (*om_get_pointer_size)(void* obj);
00841     Dwarf_Unsigned (*om_get_filesizes)(void* obj);
00842     Dwarf_Unsigned (*om_get_section_count)(void* obj);
00843     /* Always uses malloc/read */
00844     int (*om_load_section)(void* obj,
00845         Dwarf_Unsigned dw_section_index,
00846         Dwarf_Small **dw_return_data,
00847         int *dw_error);
00848     int (*om_relocate_a_section)(void* obj,
00849         Dwarf_Unsigned section_index,
00850         Dwarf_Debug dbg,
00851         int * error);
00852     /* Added in 0.12.0 to allow mmap in section loading.
00853     If you are just using malloc for section loading
00854     and referring to this struct in your code
00855     you should leave this function pointer NULL (zero). */
00856     int (*om_load_section_a)(void* obj,
00857         Dwarf_Unsigned dw_section_index,
00858         /* dw_alloc_pref is input preference and also
00859         output with the actual allocated type */
00860         enum Dwarf_Sec_Alloc_Pref *dw_alloc_pref,
00861         Dwarf_Small **dw_return_data_ptr,
00862         Dwarf_Unsigned *dw_return_data_len,
00863         Dwarf_Small **dw_return_mmap_base_ptr,
00864         Dwarf_Unsigned *dw_return_mmap_offset,
00865         Dwarf_Unsigned *dw_return_mmap_len,
00866         int *dw_error);
00867     void (*om_finish)(void * obj);
00868 };
00869 struct Dwarf_Obj_Access_Interface_a_s {
00870     void* ai_object;
00871     const Dwarf_Obj_Access_Methods_a *ai_methods;
00872 };
00873 /* ===== END Obj_Access data ===== */
00874
00875 /* User code must allocate this struct, zero it,
00876 and pass a pointer to it
00877 into dwarf_get_debugfission_for_cu . */
00878 struct Dwarf_Debug_Fission_Per_CU_s {
00879     /* Do not free the string. It contains "cu" or "tu". */
00880     /* If this is not set (ie, not a CU/TU in DWP Package File)
00881     then pcu_type will be NULL. */
00882     const char * pcu_type;
00883     /* pcu_index is the index (range 1 to N )
00884     into the tu/cu table of offsets and the table
00885     of sizes. 1 to N as the zero index is reserved
00886     for special purposes. Not a value one
00887     actually needs. */
00888     Dwarf_Unsigned pcu_index;
00889     Dwarf_Sig8 pcu_hash; /* 8 byte */

```

```

00890     /* [0] has offset and size 0.
00891     [1]-[8] are DW_SECT_* indexes and the
00892     values are the offset and size
00893     of the respective section contribution
00894     of a single .dwo object. When pcu_size[n] is
00895     zero the corresponding section is not present. */
00896     Dwarf_Unsigned pcu_offset[DW_FISSION_SECT_COUNT];
00897     Dwarf_Unsigned pcu_size[DW_FISSION_SECT_COUNT];
00898     Dwarf_Unsigned unused1;
00899     Dwarf_Unsigned unused2;
00900 };
00901
00906 typedef struct Dwarf_Rnglists_Head_s * Dwarf_Rnglists_Head;
00907
00913 /* Special values for offset_into_exception_table field
00914 of dwarf fde's
00915 The following value indicates that there is no
00916 Exception table offset
00917 associated with a dwarf frame.
00918 */
00919 #define DW_DLX_NO_EH_OFFSET (-1LL)
00920 /* The following value indicates that the producer
00921 was unable to analyze the
00922 source file to generate Exception tables for this function.
00923 */
00924 #define DW_DLX_EH_OFFSET_UNAVAILABLE (-2LL)
00925
00926 /* The augmenter string for CIE */
00927 #define DW_CIE_AUGMENTER_STRING_V0 "z"
00928
00929 /* ***IMPORTANT NOTE, TARGET DEPENDENCY ***
00930 DW_REG_TABLE_SIZE must be at least as large as
00931 the number of registers
00932 DW_FRAME_LAST_REG_NUM as defined in dwarf.h
00933 */
00934 #ifndef DW_REG_TABLE_SIZE
00935 #define DW_REG_TABLE_SIZE DW_FRAME_LAST_REG_NUM
00936 #endif
00937
00938 /* For MIPS, DW_FRAME_SAME_VAL is the correct default value
00939 for a frame register value. For other CPUs another value
00940 may be better, such as DW_FRAME_UNDEFINED_VAL.
00941 See dwarf_set_frame_rule_table_size
00942 */
00943 #ifndef DW_FRAME_REG_INITIAL_VALUE
00944 #define DW_FRAME_REG_INITIAL_VALUE DW_FRAME_SAME_VAL
00945 #endif
00946
00947 /* The following are all needed to evaluate DWARF3 register rules.
00948 These have nothing to do simply printing
00949 frame instructions.
00950 */
00951 #define DW_EXPR_OFFSET 0 /* offset is from CFA reg */
00952 #define DW_EXPR_VAL_OFFSET 1
00953 #define DW_EXPR_EXPRESSION 2
00954 #define DW_EXPR_VAL_EXPRESSION 3
00955 #define DW_DLA_STRING 0x01 /* char* */
00956 #define DW_DLA_LOC 0x02 /* Dwarf_Loc */
00957 #define DW_DLA_LOCDISC 0x03 /* Dwarf_Locdesc */
00958 #define DW_DLA_ELLIST 0x04 /* Dwarf_Ellist (not used) */
00959 #define DW_DLA_BOUNDS 0x05 /* Dwarf_Bounds (not used) */
00960 #define DW_DLA_BLOCK 0x06 /* Dwarf_Block */
00961 #define DW_DLA_DEBUG 0x07 /* Dwarf_Debug */
00962 #define DW_DLA_DIE 0x08 /* Dwarf_Die */
00963 #define DW_DLA_LINE 0x09 /* Dwarf_Line */
00964 #define DW_DLA_ATTR 0x0a /* Dwarf_Attribute */
00965 #define DW_DLA_TYPE 0x0b /* Dwarf_Type (not used) */
00966 #define DW_DLA_SUBSCR 0x0c /* Dwarf_Subscr (not used) */
00967 #define DW_DLA_GLOBAL 0x0d /* Dwarf_Global */
00968 #define DW_DLA_ERROR 0x0e /* Dwarf_Error */
00969 #define DW_DLA_LIST 0x0f /* a list */
00970 #define DW_DLA_LINEBUF 0x10 /* Dwarf_Line* (not used) */
00971 #define DW_DLA_ARANGE 0x11 /* Dwarf_Arange */
00972 #define DW_DLA_ABBREV 0x12 /* Dwarf_Abbrev */
00973 #define DW_DLA_FRAME_INSTR_HEAD 0x13 /* Dwarf_Frame_Instr_Head */
00974 #define DW_DLA_CIE 0x14 /* Dwarf_Cie */
00975 #define DW_DLA_FDE 0x15 /* Dwarf_Fde */
00976 #define DW_DLA_LOC_BLOCK 0x16 /* Dwarf_Loc */
00977
00978 #define DW_DLA_FRAME_OP 0x17 /* Dwarf_Frame_Op (not used) */
00979 #define DW_DLA_FUNC 0x18 /* Dwarf_Func */
00980 #define DW_DLA_UARRAY 0x19 /* Array of Dwarf_Off:Jan2023 */
00981 #define DW_DLA_VAR 0x1a /* Dwarf_Var */
00982 #define DW_DLA_WEAK 0x1b /* Dwarf_Weak */
00983 #define DW_DLA_ADDR 0x1c /* Dwarf_Addr sized entries */
00984 #define DW_DLA_RANGES 0x1d /* Dwarf_Ranges */
00985
00986 /* 0x1e (30) to 0x34 (52) reserved for internal to libdwarf types. */

```

```

00996 /* .debug_gnu_typenames/pubnames, 2020 */
00997 #define DW_DLA_GNU_INDEX_HEAD 0x35
00998
00999 #define DW_DLA_RNGLISTS_HEAD 0x36 /* .debug_rnglists DW5 */
01000 #define DW_DLA_GDBINDEX 0x37 /* Dwarf_Gdbindex */
01001 #define DW_DLA_XU_INDEX 0x38 /* Dwarf_Xu_Index_Header */
01002 #define DW_DLA_LOC_BLOCK_C 0x39 /* Dwarf_Loc_c */
01003 #define DW_DLA_LOCDISC_C 0x3a /* Dwarf_Locdesc_c */
01004 #define DW_DLA_LOC_HEAD_C 0x3b /* Dwarf_Loc_Head_c */
01005 #define DW_DLA_MACRO_CONTEXT 0x3c /* Dwarf_Macro_Context */
01006 /* 0x3d (61) is for libdwarf internal use. */
01007 #define DW_DLA_DSC_HEAD 0x3e /* Dwarf_Dsc_Head */
01008 #define DW_DLA_DNAMES_HEAD 0x3f /* Dwarf_Dnames_Head */
01009
01010 /* struct Dwarf_Str_Offsets_Table_s */
01011 #define DW_DLA_STR_OFFSETS 0x40
01012 /* struct Dwarf_Debug_Addr_Table_s */
01013 #define DW_DLA_DEBUG_ADDR 0x41
01014
01015 /* libdwarf error numbers */
01016 #define DW_DLE_NE 0 /* no error */
01017 #define DW_DLE_VMM 1 /* dwarf format/library version mismatch */
01018 #define DW_DLE_MAP 2 /* memory map failure */
01019 #define DW_DLE_LEE 3 /* libelf error */
01020 #define DW_DLE_NDS 4 /* no debug section */
01021 #define DW_DLE_NLS 5 /* no line section */
01022 #define DW_DLE_ID 6 /* invalid descriptor for query */
01023 #define DW_DLE_IOF 7 /* I/O failure */
01024 #define DW_DLE_MAF 8 /* memory allocation failure */
01025 #define DW_DLE_IA 9 /* invalid argument */
01026 #define DW_DLE_MDE 10 /* mangled debugging entry */
01027 #define DW_DLE_MLE 11 /* mangled line number entry */
01028 #define DW_DLE_FNO 12 /* file not open */
01029 #define DW_DLE_FNR 13 /* file not a regular file */
01030 #define DW_DLE_FWA 14 /* file open with wrong access */
01031 #define DW_DLE_NOB 15 /* not an object file */
01032 #define DW_DLE_MOF 16 /* mangled object file header */
01033 #define DW_DLE_EOLL 17 /* end of location list entries */
01034 #define DW_DLE_NOLL 18 /* no location list section */
01035 #define DW_DLE_BADOFF 19 /* Invalid offset */
01036 #define DW_DLE_EOS 20 /* end of section */
01037 #define DW_DLE_ATRUNC 21 /* abbreviations section appears truncated */
01038 #define DW_DLE_BADBITC 22 /* Address size passed to dwarf bad */
01039 /* It is not an allowed size (64 or 32) */
01040 /* Error codes defined by the current Libdwarf Implementation. */
01041 #define DW_DLE_DBG_ALLOC 23
01042 #define DW_DLE_FSTAT_ERROR 24
01043 #define DW_DLE_FSTAT_MODE_ERROR 25
01044 #define DW_DLE_INIT_ACCESS_WRONG 26
01045 #define DW_DLE_ELF_BEGIN_ERROR 27
01046 #define DW_DLE_ELF_GETEHDR_ERROR 28
01047 #define DW_DLE_ELF_GETSHDR_ERROR 29
01048 #define DW_DLE_ELF_STRPTR_ERROR 30
01049 #define DW_DLE_DEBUG_INFO_DUPLICATE 31
01050 #define DW_DLE_DEBUG_INFO_NULL 32
01051 #define DW_DLE_DEBUG_ABBREV_DUPLICATE 33
01052 #define DW_DLE_DEBUG_ABBREV_NULL 34
01053 #define DW_DLE_DEBUG_ARANGES_DUPLICATE 35
01054 #define DW_DLE_DEBUG_ARANGES_NULL 36
01055 #define DW_DLE_DEBUG_LINE_DUPLICATE 37
01056 #define DW_DLE_DEBUG_LINE_NULL 38
01057 #define DW_DLE_DEBUG_LOC_DUPLICATE 39
01058 #define DW_DLE_DEBUG_LOC_NULL 40
01059 #define DW_DLE_DEBUG_MACINFO_DUPLICATE 41
01060 #define DW_DLE_DEBUG_MACINFO_NULL 42
01061 #define DW_DLE_DEBUG_PUBNAMES_DUPLICATE 43
01062 #define DW_DLE_DEBUG_PUBNAMES_NULL 44
01063 #define DW_DLE_DEBUG_STR_DUPLICATE 45
01064 #define DW_DLE_DEBUG_STR_NULL 46
01065 #define DW_DLE_CU_LENGTH_ERROR 47
01066 #define DW_DLE_VERSION_STAMP_ERROR 48
01067 #define DW_DLE_ABBREV_OFFSET_ERROR 49
01068 #define DW_DLE_ADDRESS_SIZE_ERROR 50
01069 #define DW_DLE_DEBUG_INFO_PTR_NULL 51
01070 #define DW_DLE_DIE_NULL 52
01071 #define DW_DLE_STRING_OFFSET_BAD 53
01072 #define DW_DLE_DEBUG_LINE_LENGTH_BAD 54
01073 #define DW_DLE_LINE_PROLOG_LENGTH_BAD 55
01074 #define DW_DLE_LINE_NUM_OPERANDS_BAD 56
01075 #define DW_DLE_LINE_SET_ADDR_ERROR 57
01076 #define DW_DLE_LINE_EXT_OPCODE_BAD 58
01077 #define DW_DLE_DWARF_LINE_NULL 59
01078 #define DW_DLE_INCL_DIR_NUM_BAD 60
01079 #define DW_DLE_LINE_FILE_NUM_BAD 61
01080 #define DW_DLE_ALLOC_FAIL 62
01081 #define DW_DLE_NO_CALLBACK_FUNC 63
01082 #define DW_DLE_SECT_ALLOC 64
01083 #define DW_DLE_FILE_ENTRY_ALLOC 65

```

```
01094 #define DW_DLE_LINE_ALLOC 66
01095 #define DW_DLE_FPGM_ALLOC 67
01096 #define DW_DLE_INCDIR_ALLOC 68
01097 #define DW_DLE_STRING_ALLOC 69
01098 #define DW_DLE_CHUNK_ALLOC 70
01099 #define DW_DLE_BYTEOFF_ERR 71
01100 #define DW_DLE_CIE_ALLOC 72
01101 #define DW_DLE_FDE_ALLOC 73
01102 #define DW_DLE_REGNO_OVFL 74
01103 #define DW_DLE_CIE_OFFS_ALLOC 75
01104 #define DW_DLE_WRONG_ADDRESS 76
01105 #define DW_DLE_EXTRA_NEIGHBORS 77
01106 #define DW_DLE_WRONG_TAG 78
01107 #define DW_DLE_DIE_ALLOC 79
01108 #define DW_DLE_PARENT_EXISTS 80
01109 #define DW_DLE_DBG_NULL 81
01110 #define DW_DLE_DEBUGLINE_ERROR 82
01111 #define DW_DLE_DEBUGFRAME_ERROR 83
01112 #define DW_DLE_DEBUGINFO_ERROR 84
01113 #define DW_DLE_ATTR_ALLOC 85
01114 #define DW_DLE_ABBREV_ALLOC 86
01115 #define DW_DLE_OFFSET_UFLW 87
01116 #define DW_DLE_ELF_SECT_ERR 88
01117 #define DW_DLE_DEBUG_FRAME_LENGTH_BAD 89
01118 #define DW_DLE_FRAME_VERSION_BAD 90
01119 #define DW_DLE_CIE_RET_ADDR_REG_ERROR 91
01120 #define DW_DLE_FDE_NULL 92
01121 #define DW_DLE_FDE_DBG_NULL 93
01122 #define DW_DLE_CIE_NULL 94
01123 #define DW_DLE_CIE_DBG_NULL 95
01124 #define DW_DLE_FRAME_TABLE_COL_BAD 96
01125 #define DW_DLE_PC_NOT_IN_FDE_RANGE 97
01126 #define DW_DLE_CIE_INSTR_EXEC_ERROR 98
01127 #define DW_DLE_FRAME_INSTR_EXEC_ERROR 99
01128 #define DW_DLE_FDE_PTR_NULL 100
01129 #define DW_DLE_RET_OP_LIST_NULL 101
01130 #define DW_DLE_LINE_CONTEXT_NULL 102
01131 #define DW_DLE_DBG_NO_CU_CONTEXT 103
01132 #define DW_DLE_DIE_NO_CU_CONTEXT 104
01133 #define DW_DLE_FIRST_DIE_NOT_CU 105
01134 #define DW_DLE_NEXT_DIE_PTR_NULL 106
01135 #define DW_DLE_DEBUG_FRAME_DUPLICATE 107
01136 #define DW_DLE_DEBUG_FRAME_NULL 108
01137 #define DW_DLE_ABBREV_DECODE_ERROR 109
01138 #define DW_DLE_DWARF_ABBREV_NULL 110
01139 #define DW_DLE_ATTR_NULL 111
01140 #define DW_DLE_DIE_BAD 112
01141 #define DW_DLE_DIE_ABBREV_BAD 113
01142 #define DW_DLE_ATTR_FORM_BAD 114
01143 #define DW_DLE_ATTR_NO_CU_CONTEXT 115
01144 #define DW_DLE_ATTR_FORM_SIZE_BAD 116
01145 #define DW_DLE_ATTR_DBG_NULL 117
01146 #define DW_DLE_BAD_REF_FORM 118
01147 #define DW_DLE_ATTR_FORM_OFFSET_BAD 119
01148 #define DW_DLE_LINE_OFFSET_BAD 120
01149 #define DW_DLE_DEBUG_STR_OFFSET_BAD 121
01150 #define DW_DLE_STRING_PTR_NULL 122
01151 #define DW_DLE_PUBNAMES_VERSION_ERROR 123
01152 #define DW_DLE_PUBNAMES_LENGTH_BAD 124
01153 #define DW_DLE_GLOBAL_NULL 125
01154 #define DW_DLE_GLOBAL_CONTEXT_NULL 126
01155 #define DW_DLE_DIR_INDEX_BAD 127
01156 #define DW_DLE_LOC_EXPR_BAD 128
01157 #define DW_DLE_DIE_LOC_EXPR_BAD 129
01158 #define DW_DLE_ADDR_ALLOC 130
01159 #define DW_DLE_OFFSET_BAD 131
01160 #define DW_DLE_MAKE_CU_CONTEXT_FAIL 132
01161 #define DW_DLE_REL_ALLOC 133
01162 #define DW_DLE_ARANGE_OFFSET_BAD 134
01163 #define DW_DLE_SEGMENT_SIZE_BAD 135
01164 #define DW_DLE_ARANGE_LENGTH_BAD 136
01165 #define DW_DLE_ARANGE_DECODE_ERROR 137
01166 #define DW_DLE_ARANGES_NULL 138
01167 #define DW_DLE_ARANGE_NULL 139
01168 #define DW_DLE_NO_FILE_NAME 140
01169 #define DW_DLE_NO_COMP_DIR 141
01170 #define DW_DLE_CU_ADDRESS_SIZE_BAD 142
01171 #define DW_DLE_INPUT_ATTR_BAD 143
01172 #define DW_DLE_EXPR_NULL 144
01173 #define DW_DLE_BAD_EXPR_OPCODE 145
01174 #define DW_DLE_EXPR_LENGTH_BAD 146
01175 #define DW_DLE_MULTIPLE_RELOC_IN_EXPR 147
01176 #define DW_DLE_ELF_GETIDENT_ERROR 148
01177 #define DW_DLE_NO_AT_MIPS_FDE 149
01178 #define DW_DLE_NO_CIE_FOR_FDE 150
01179 #define DW_DLE_DIE_ABBREV_LIST_NULL 151
01180 #define DW_DLE_DEBUG_FUNCNAMES_DUPLICATE 152
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01181 #define DW_DLE_DEBUG_FUNCNAMES_NULL 153
01182 #define DW_DLE_DEBUG_FUNCNAMES_VERSION_ERROR 154
01183 #define DW_DLE_DEBUG_FUNCNAMES_LENGTH_BAD 155
01184 #define DW_DLE_FUNC_NULL 156
01185 #define DW_DLE_FUNC_CONTEXT_NULL 157
01186 #define DW_DLE_DEBUG_TYPENAMES_DUPLICATE 158
01187 #define DW_DLE_DEBUG_TYPENAMES_NULL 159
01188 #define DW_DLE_DEBUG_TYPENAMES_VERSION_ERROR 160
01189 #define DW_DLE_DEBUG_TYPENAMES_LENGTH_BAD 161
01190 #define DW_DLE_TYPE_NULL 162
01191 #define DW_DLE_TYPE_CONTEXT_NULL 163
01192 #define DW_DLE_DEBUG_VARNAMES_DUPLICATE 164
01193 #define DW_DLE_DEBUG_VARNAMES_NULL 165
01194 #define DW_DLE_DEBUG_VARNAMES_VERSION_ERROR 166
01195 #define DW_DLE_DEBUG_VARNAMES_LENGTH_BAD 167
01196 #define DW_DLE_VAR_NULL 168
01197 #define DW_DLE_VAR_CONTEXT_NULL 169
01198 #define DW_DLE_DEBUG_WEAKNAMES_DUPLICATE 170
01199 #define DW_DLE_DEBUG_WEAKNAMES_NULL 171
01200 #define DW_DLE_DEBUG_WEAKNAMES_VERSION_ERROR 172
01201 #define DW_DLE_DEBUG_WEAKNAMES_LENGTH_BAD 173
01202 #define DW_DLE_WEAK_NULL 174
01203 #define DW_DLE_WEAK_CONTEXT_NULL 175
01204 #define DW_DLE_LOCDESC_COUNT_WRONG 176
01205 #define DW_DLE_MACINFO_STRING_NULL 177
01206 #define DW_DLE_MACINFO_STRING_EMPTY 178
01207 #define DW_DLE_MACINFO_INTERNAL_ERROR_SPACE 179
01208 #define DW_DLE_MACINFO_MALLOC_FAIL 180
01209 #define DW_DLE_DEBUGMACINFO_ERROR 181
01210 #define DW_DLE_DEBUG_MACRO_LENGTH_BAD 182
01211 #define DW_DLE_DEBUG_MACRO_MAX_BAD 183
01212 #define DW_DLE_DEBUG_MACRO_INTERNAL_ERR 184
01213 #define DW_DLE_DEBUG_MACRO_MALLOC_SPACE 185
01214 #define DW_DLE_DEBUG_MACRO_INCONSISTENT 186
01215 #define DW_DLE_DF_NO_CIE_AUGMENTATION 187
01216 #define DW_DLE_DF_REG_NUM_TOO_HIGH 188
01217 #define DW_DLE_DF_MAKE_INSTR_NO_INIT 189
01218 #define DW_DLE_DF_NEW_LOC_LESS_OLD_LOC 190
01219 #define DW_DLE_DF_POP_EMPTY_STACK 191
01220 #define DW_DLE_DF_ALLOC_FAIL 192
01221 #define DW_DLE_DF_FRAME_DECODING_ERROR 193
01222 #define DW_DLE_DEBUG_LOC_SECTION_SHORT 194
01223 #define DW_DLE_FRAME_AUGMENTATION_UNKNOWN 195
01224 #define DW_DLE_PUBTYPE_CONTEXT 196 /* Unused. */
01225 #define DW_DLE_DEBUG_PUBTYPES_LENGTH_BAD 197
01226 #define DW_DLE_DEBUG_PUBTYPES_VERSION_ERROR 198
01227 #define DW_DLE_DEBUG_PUBTYPES_DUPLICATE 199
01228 #define DW_DLE_FRAME_CIE_DECODE_ERROR 200
01229 #define DW_DLE_FRAME_REGISTER_UNREPRESENTABLE 201
01230 #define DW_DLE_FRAME_REGISTER_COUNT_MISMATCH 202
01231 #define DW_DLE_LINK_LOOP 203
01232 #define DW_DLE_STRP_OFFSET_BAD 204
01233 #define DW_DLE_DEBUG_RANGES_DUPLICATE 205
01234 #define DW_DLE_DEBUG_RANGES_OFFSET_BAD 206
01235 #define DW_DLE_DEBUG_RANGES_MISSING_END 207
01236 #define DW_DLE_DEBUG_RANGES_OUT_OF_MEM 208
01237 #define DW_DLE_DEBUG_SYMTAB_ERR 209
01238 #define DW_DLE_DEBUG_STRTAB_ERR 210
01239 #define DW_DLE_RELOC_MISMATCH_INDEX 211
01240 #define DW_DLE_RELOC_MISMATCH_RELOC_INDEX 212
01241 #define DW_DLE_RELOC_MISMATCH_STRTAB_INDEX 213
01242 #define DW_DLE_RELOC_SECTION_MISMATCH 214
01243 #define DW_DLE_RELOC_SECTION_MISSING_INDEX 215
01244 #define DW_DLE_RELOC_SECTION_LENGTH_ODD 216
01245 #define DW_DLE_RELOC_SECTION_PTR_NULL 217
01246 #define DW_DLE_RELOC_SECTION_MALLOC_FAIL 218
01247 #define DW_DLE_NO_ELF64_SUPPORT 219
01248 #define DW_DLE_MISSING_ELF64_SUPPORT 220
01249 #define DW_DLE_ORPHAN_FDE 221
01250 #define DW_DLE_DUPLICATE_INST_BLOCK 222
01251 #define DW_DLE_BAD_REF_SIG8_FORM 223
01252 #define DW_DLE_ATTR_EXPRLOC_FORM_BAD 224
01253 #define DW_DLE_FORM_SEC_OFFSET_LENGTH_BAD 225
01254 #define DW_DLE_NOT_REF_FORM 226
01255 #define DW_DLE_DEBUG_FRAME_LENGTH_NOT_MULTIPLE 227
01256 #define DW_DLE_REF_SIG8_NOT_HANDLED 228
01257 #define DW_DLE_DEBUG_FRAME_POSSIBLE_ADDRESS_BOTCH 229
01258 #define DW_DLE_LOC_BAD_TERMINATION 230
01259 #define DW_DLE_SYMTAB_SECTION_LENGTH_ODD 231
01260 #define DW_DLE_RELOC_SECTION_SYMBOL_INDEX_BAD 232
01261 #define DW_DLE_RELOC_SECTION_RELOC_TARGET_SIZE_UNKNOWN 233
01262 #define DW_DLE_SYMTAB_SECTION_ENTRY_SIZE_ZERO 234
01263 #define DW_DLE_LINE_NUMBER_HEADER_ERROR 235
01264 #define DW_DLE_DEBUG_TYPES_NULL 236
01265 #define DW_DLE_DEBUG_TYPES_DUPLICATE 237
01266 #define DW_DLE_DEBUG_TYPES_ONLY_DWARF4 238
01267 #define DW_DLE_DEBUG_TYPEOFFSET_BAD 239

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01268 #define DW_DLE_GNU_OPCODE_ERROR 240
01269 #define DW_DLE_DEBUGPUPTYPES_ERROR 241
01270 #define DW_DLE_AT_FIXUP_NULL 242
01271 #define DW_DLE_AT_FIXUP_DUP 243
01272 #define DW_DLE_BAD_ABINAME 244
01273 #define DW_DLE_TOO_MANY_DEBUG 245
01274 #define DW_DLE_DEBUG_STR_OFFSETS_DUPLICATE 246
01275 #define DW_DLE_SECTION_DUPLICATION 247
01276 #define DW_DLE_SECTION_ERROR 248
01277 #define DW_DLE_DEBUG_ADDR_DUPLICATE 249
01278 #define DW_DLE_DEBUG_CU_UNAVAILABLE_FOR_FORM 250
01279 #define DW_DLE_DEBUG_FORM_HANDLING_INCOMPLETE 251
01280 #define DW_DLE_NEXT_DIE_PAST_END 252
01281 #define DW_DLE_NEXT_DIE_WRONG_FORM 253
01282 #define DW_DLE_NEXT_DIE_NO_ABBREV_LIST 254
01283 #define DW_DLE_NESTED_FORM_INDIRECT_ERROR 255
01284 #define DW_DLE_CU_DIE_NO_ABBREV_LIST 256
01285 #define DW_DLE_MISSING_NEEDED_DEBUG_ADDR_SECTION 257
01286 #define DW_DLE_ATTR_FORM_NOT_ADDR_INDEX 258
01287 #define DW_DLE_ATTR_FORM_NOT_STR_INDEX 259
01288 #define DW_DLE_DUPLICATE_GDB_INDEX 260
01289 #define DW_DLE_ERRONEOUS_GDB_INDEX_SECTION 261
01290 #define DW_DLE_GDB_INDEX_COUNT_ERROR 262
01291 #define DW_DLE_GDB_INDEX_COUNT_ADDR_ERROR 263
01292 #define DW_DLE_GDB_INDEX_INDEX_ERROR 264
01293 #define DW_DLE_GDB_INDEX_CUVEC_ERROR 265
01294 #define DW_DLE_DUPLICATE_CU_INDEX 266
01295 #define DW_DLE_DUPLICATE_TU_INDEX 267
01296 #define DW_DLE_XU_TYPE_ARG_ERROR 268
01297 #define DW_DLE_XU_IMPOSSIBLE_ERROR 269
01298 #define DW_DLE_XU_NAME_COL_ERROR 270
01299 #define DW_DLE_XU_HASH_ROW_ERROR 271
01300 #define DW_DLE_XU_HASH_INDEX_ERROR 272
01301 /* ..._FAILSAFE_ERRVAL is an aid when out of memory. */
01302 #define DW_DLE_FAILSAFE_ERRVAL 273
01303 #define DW_DLE_ARANGE_ERROR 274
01304 #define DW_DLE_PUBNAMES_ERROR 275
01305 #define DW_DLE_FUNCNAMES_ERROR 276
01306 #define DW_DLE_TYPENAMES_ERROR 277
01307 #define DW_DLE_VARNAMES_ERROR 278
01308 #define DW_DLE_WEAKNAMES_ERROR 279
01309 #define DW_DLE_RELOCS_ERROR 280
01310 #define DW_DLE_ATTR_OUTSIDE_SECTION 281
01311 #define DW_DLE_FFISSION_INDEX_WRONG 282
01312 #define DW_DLE_FFISSION_VERSION_ERROR 283
01313 #define DW_DLE_NEXT_DIE_LOW_ERROR 284
01314 #define DW_DLE_CU_UT_TYPE_ERROR 285
01315 #define DW_DLE_NO_SUCH_SIGNATURE_FOUND 286
01316 #define DW_DLE_SIGNATURE_SECTION_NUMBER_WRONG 287
01317 #define DW_DLE_ATTR_FORM_NOT_DATA8 288
01318 #define DW_DLE_SIG_TYPE_WRONG_STRING 289
01319 #define DW_DLE_MISSING_REQUIRED_TU_OFFSET_HASH 290
01320 #define DW_DLE_MISSING_REQUIRED_CU_OFFSET_HASH 291
01321 #define DW_DLE_DWP_MISSING_DWO_ID 292
01322 #define DW_DLE_DWP_SIBLING_ERROR 293
01323 #define DW_DLE_DEBUG_FFISSION_INCOMPLETE 294
01324 #define DW_DLE_FFISSION_SECNUM_ERR 295
01325 #define DW_DLE_DEBUG_MACRO_DUPLICATE 296
01326 #define DW_DLE_DEBUG_NAMES_DUPLICATE 297
01327 #define DW_DLE_DEBUG_LINE_STR_DUPLICATE 298
01328 #define DW_DLE_DEBUG_SUP_DUPLICATE 299
01329 #define DW_DLE_NO_SIGNATURE_TO_LOOKUP 300
01330 #define DW_DLE_NO_TIED_ADDR_AVAILABLE 301
01331 #define DW_DLE_NO_TIED_SIG_AVAILABLE 302
01332 #define DW_DLE_STRING_NOT_TERMINATED 303
01333 #define DW_DLE_BAD_LINE_TABLE_OPERATION 304
01334 #define DW_DLE_LINE_CONTEXT_BOTCH 305
01335 #define DW_DLE_LINE_CONTEXT_INDEX_WRONG 306
01336 #define DW_DLE_NO_TIED_STRING_AVAILABLE 307
01337 #define DW_DLE_NO_TIED_FILE_AVAILABLE 308
01338 #define DW_DLE_CU_TYPE_MISSING 309
01339 #define DW_DLE_LLE_CODE_UNKNOWN 310
01340 #define DW_DLE_LOCLIST_INTERFACE_ERROR 311
01341 #define DW_DLE_LOCLIST_INDEX_ERROR 312
01342 #define DW_DLE_INTERFACE_NOT_SUPPORTED 313
01343 #define DW_DLE_ZDEBUG_REQUIRES_ZLIB 314
01344 #define DW_DLE_ZDEBUG_INPUT_FORMAT_ODD 315
01345 #define DW_DLE_ZLIB_BUF_ERROR 316
01346 #define DW_DLE_ZLIB_DATA_ERROR 317
01347 #define DW_DLE_MACRO_OFFSET_BAD 318
01348 #define DW_DLE_MACRO_OPCODE_BAD 319
01349 #define DW_DLE_MACRO_OPCODE_FORM_BAD 320
01350 #define DW_DLE_UNKNOWN_FORM 321
01351 #define DW_DLE_BAD_MACRO_HEADER_POINTER 322
01352 #define DW_DLE_BAD_MACRO_INDEX 323
01353 #define DW_DLE_MACRO_OP_UNHANDLED 324
01354 #define DW_DLE_MACRO_PAST_END 325
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01355 #define DW_DLE_LINE_STRP_OFFSET_BAD 326
01356 #define DW_DLE_STRING_FORM_IMPROPER 327
01357 #define DW_DLE_ELF_FLAGS_NOT_AVAILABLE 328
01358 #define DW_DLE_LEB_IMPROPER 329
01359 #define DW_DLE_DEBUG_LINE_RANGE_ZERO 330
01360 #define DW_DLE_READ_LITTLEENDIAN_ERROR 331
01361 #define DW_DLE_READ_BIGENDIAN_ERROR 332
01362 #define DW_DLE_RELOC_INVALID 333
01363 #define DW_DLE_INFO_HEADER_ERROR 334
01364 #define DW_DLE_ARANGES_HEADER_ERROR 335
01365 #define DW_DLE_LINE_OFFSET_WRONG_FORM 336
01366 #define DW_DLE_FORM_BLOCK_LENGTH_ERROR 337
01367 #define DW_DLE_ZLIB_SECTION_SHORT 338
01368 #define DW_DLE_CIE_INSTR_PTR_ERROR 339
01369 #define DW_DLE_FDE_INSTR_PTR_ERROR 340
01370 #define DW_DLE_FISSION_ADDITION_ERROR 341
01371 #define DW_DLE_HEADER_LEN_BIGGER_THAN_SECSIZE 342
01372 #define DW_DLE_LOCEXPRESS_OFF_SECTION_END 343
01373 #define DW_DLE_POINTER_SECTION_UNKNOWN 344
01374 #define DW_DLE_ERRONEOUS_XU_INDEX_SECTION 345
01375 #define DW_DLE_DIRECTORY_FORMAT_COUNT_VS_DIRECTORIES_MISMATCH 346
01376 #define DW_DLE_COMPRESSED_EMPTY_SECTION 347
01377 #define DW_DLE_SIZE_WRAPAROUND 348
01378 #define DW_DLE_ILLOGICAL_TSEARCH 349
01379 #define DW_DLE_BAD_STRING_FORM 350
01380 #define DW_DLE_DEBUGSTR_ERROR 351
01381 #define DW_DLE_DEBUGSTR_UNEXPECTED_REL 352
01382 #define DW_DLE_DISCR_ARRAY_ERROR 353
01383 #define DW_DLE_LEB_OUT_ERROR 354
01384 #define DW_DLE_SIBLING_LIST_IMPROPER 355
01385 #define DW_DLE_LOCLIST_OFFSET_BAD 356
01386 #define DW_DLE_LINE_TABLE_BAD 357
01387 #define DW_DLE_DEBUG_LOCLISTS_DUPLICATE 358
01388 #define DW_DLE_DEBUG_RNGLISTS_DUPLICATE 359
01389 #define DW_DLE_ABBREVE_OFF_END 360
01390 #define DW_DLE_FORM_STRING_BAD_STRING 361
01391 #define DW_DLE_AUGMENTATION_STRING_OFF_END 362
01392 #define DW_DLE_STRING_OFF_END_PUBNAMES_LIKE 363
01393 #define DW_DLE_LINE_STRING_BAD 364
01394 #define DW_DLE_DEFINE_FILE_STRING_BAD 365
01395 #define DW_DLE_MACRO_STRING_BAD 366
01396 #define DW_DLE_MACINFO_STRING_BAD 367
01397 #define DW_DLE_ZLIB_UNCOMPRESS_ERROR 368
01398 #define DW_DLE_IMPROPER_DWO_ID 369
01399 #define DW_DLE_GROUPNUMBER_ERROR 370
01400 #define DW_DLE_ADDRESS_SIZE_ZERO 371
01401 #define DW_DLE_DEBUG_NAMES_HEADER_ERROR 372
01402 #define DW_DLE_DEBUG_NAMES_AUG_STRING_ERROR 373
01403 #define DW_DLE_DEBUG_NAMES_PAD_NON_ZERO 374
01404 #define DW_DLE_DEBUG_NAMES_OFF_END 375
01405 #define DW_DLE_DEBUG_NAMES_ABBREVE_OVERFLOW 376
01406 #define DW_DLE_DEBUG_NAMES_ABBREVE_CORRUPTION 377
01407 #define DW_DLE_DEBUG_NAMES_NULL_POINTER 378
01408 #define DW_DLE_DEBUG_NAMES_BAD_INDEX_ARG 379
01409 #define DW_DLE_DEBUG_NAMES_ENTRYPOOL_OFFSET 380
01410 #define DW_DLE_DEBUG_NAMES_UNHANDLED_FORM 381
01411 #define DW_DLE_LNCT_CODE_UNKNOWN 382
01412 #define DW_DLE_LNCT_FORM_CODE_NOT_HANDLED 383
01413 #define DW_DLE_LINE_HEADER_LENGTH_BOTCH 384
01414 #define DW_DLE_STRING_HASHTAB_IDENTITY_ERROR 385
01415 #define DW_DLE_UNIT_TYPE_NOT_HANDLED 386
01416 #define DW_DLE_GROUP_MAP_ALLOC 387
01417 #define DW_DLE_GROUP_MAP_DUPLICATE 388
01418 #define DW_DLE_GROUP_COUNT_ERROR 389
01419 #define DW_DLE_GROUP_INTERNAL_ERROR 390
01420 #define DW_DLE_GROUP_LOAD_ERROR 391
01421 #define DW_DLE_GROUP_LOAD_READ_ERROR 392
01422 #define DW_DLE_AUG_DATA_LENGTH_BAD 393
01423 #define DW_DLE_ABBREVE_MISSING 394
01424 #define DW_DLE_NO_TAG_FOR_DIE 395
01425 #define DW_DLE_LOWPC_WRONG_CLASS 396
01426 #define DW_DLE_HIGHPC_WRONG_FORM 397
01427 #define DW_DLE_STR_OFFSETS_BASE_WRONG_FORM 398
01428 #define DW_DLE_DATA16_OUTSIDE_SECTION 399
01429 #define DW_DLE_LNCT_MD5_WRONG_FORM 400
01430 #define DW_DLE_LINE_HEADER_CORRUPT 401
01431 #define DW_DLE_STR_OFFSETS_NULLARGUMENT 402
01432 #define DW_DLE_STR_OFFSETS_NULL_DBG 403
01433 #define DW_DLE_STR_OFFSETS_NO_MAGIC 404
01434 #define DW_DLE_STR_OFFSETS_ARRAY_SIZE 405
01435 #define DW_DLE_STR_OFFSETS_VERSION_WRONG 406
01436 #define DW_DLE_STR_OFFSETS_ARRAY_INDEX_WRONG 407
01437 #define DW_DLE_STR_OFFSETS_EXTRA_BYTES 408
01438 #define DW_DLE_DUP_ATTR_ON_DIE 409
01439 #define DW_DLE_SECTION_NAME_BIG 410
01440 #define DW_DLE_FILE_UNAVAILABLE 411
01441 #define DW_DLE_FILE_WRONG_TYPE 412
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01442 #define DW_DLE_SIBLING_OFFSET_WRONG 413
01443 #define DW_DLE_OPEN_FAIL 414
01444 #define DW_DLE_OFFSET_SIZE 415
01445 #define DW_DLE_MACH_O_SEGOFFSET_BAD 416
01446 #define DW_DLE_FILE_OFFSET_BAD 417
01447 #define DW_DLE_SEEK_ERROR 418
01448 #define DW_DLE_READ_ERROR 419
01449 #define DW_DLE_ELF_CLASS_BAD 420
01450 #define DW_DLE_ELF_ENDIAN_BAD 421
01451 #define DW_DLE_ELF_VERSION_BAD 422
01452 #define DW_DLE_FILE_TOO_SMALL 423
01453 #define DW_DLE_PATH_SIZE_TOO_SMALL 424
01454 #define DW_DLE_BAD_TYPE_SIZE 425
01455 #define DW_DLE_PE_SIZE_SMALL 426
01456 #define DW_DLE_PE_OFFSET_BAD 427
01457 #define DW_DLE_PE_STRING_TOO_LONG 428
01458 #define DW_DLE_IMAGE_FILE_UNKNOWN_TYPE 429
01459 #define DW_DLE_LINE_TABLE_LINENO_ERROR 430
01460 #define DW_DLE_PRODUCER_CODE_NOT_AVAILABLE 431
01461 #define DW_DLE_NO_ELF_SUPPORT 432
01462 #define DW_DLE_NO_STREAM_RELOC_SUPPORT 433
01463 #define DW_DLE_RETURN_EMPTY_PUBNAMES_ERROR 434
01464 #define DW_DLE_SECTION_SIZE_ERROR 435
01465 #define DW_DLE_INTERNAL_NULL_POINTER 436
01466 #define DW_DLE_SECTION_STRING_OFFSET_BAD 437
01467 #define DW_DLE_SECTION_INDEX_BAD 438
01468 #define DW_DLE_INTEGER_TOO_SMALL 439
01469 #define DW_DLE_ELF_SECTION_LINK_ERROR 440
01470 #define DW_DLE_ELF_SECTION_GROUP_ERROR 441
01471 #define DW_DLE_ELF_SECTION_COUNT_MISMATCH 442
01472 #define DW_DLE_ELF_STRING_SECTION_MISSING 443
01473 #define DW_DLE_SEEK_OFF_END 444
01474 #define DW_DLE_READ_OFF_END 445
01475 #define DW_DLE_ELF_SECTION_ERROR 446
01476 #define DW_DLE_ELF_STRING_SECTION_ERROR 447
01477 #define DW_DLE_MIXING_SPLIT_DWARF_VERSIONS 448
01478 #define DW_DLE_TAG_CORRUPT 449
01479 #define DW_DLE_FORM_CORRUPT 450
01480 #define DW_DLE_ATTR_CORRUPT 451
01481 #define DW_DLE_ABBREV_ATTR_DUPLICATION 452
01482 #define DW_DLE_DWP_SIGNATURE_MISMATCH 453
01483 #define DW_DLE_CU_UT_TYPE_VALUE 454
01484 #define DW_DLE_DUPLICATE_GNU_DEBUGLINK 455
01485 #define DW_DLE_CORRUPT_GNU_DEBUGLINK 456
01486 #define DW_DLE_CORRUPT_NOTE_GNU_DEBUGID 457
01487 #define DW_DLE_CORRUPT_GNU_DEBUGID_SIZE 458
01488 #define DW_DLE_CORRUPT_GNU_DEBUGID_STRING 459
01489 #define DW_DLE_HEX_STRING_ERROR 460
01490 #define DW_DLE_DECIMAL_STRING_ERROR 461
01491 #define DW_DLE_PRO_INIT_EXTRAS_UNKNOWN 462
01492 #define DW_DLE_PRO_INIT_EXTRAS_ERR 463
01493 #define DW_DLE_NULL_ARGS_DWARF_ADD_PATH 464
01494 #define DW_DLE_DWARF_INIT_DBG_NULL 465
01495 #define DW_DLE_ELF_RELOC_SECTION_ERROR 466
01496 #define DW_DLE_USER_DECLARED_ERROR 467
01497 #define DW_DLE_RNGLISTS_ERROR 468
01498 #define DW_DLE_LOCLISTS_ERROR 469
01499 #define DW_DLE_SECTION_SIZE_OR_OFFSET_LARGE 470
01500 #define DW_DLE_GDBINDEX_STRING_ERROR 471
01501 #define DW_DLE_GNU_PUBNAMES_ERROR 472
01502 #define DW_DLE_GNU_PUBTYPES_ERROR 473
01503 #define DW_DLE_DUPLICATE_GNU_DEBUG_PUBNAMES 474
01504 #define DW_DLE_DUPLICATE_GNU_DEBUG_PUBTYPES 475
01505 #define DW_DLE_DEBUG_SUP_STRING_ERROR 476
01506 #define DW_DLE_DEBUG_SUP_ERROR 477
01507 #define DW_DLE_LOCATION_ERROR 478
01508 #define DW_DLE_DEBUGLINK_PATH_SHORT 479
01509 #define DW_DLE_SIGNATURE_MISMATCH 480
01510 #define DW_DLE_MACRO_VERSION_ERROR 481
01511 #define DW_DLE_NEGATIVE_SIZE 482
01512 #define DW_DLE_UDATA_VALUE_NEGATIVE 483
01513 #define DW_DLE_DEBUG_NAMES_ERROR 484
01514 #define DW_DLE_CFA_INSTRUCTION_ERROR 485
01515 #define DW_DLE_MACHO_CORRUPT_HEADER 486
01516 #define DW_DLE_MACHO_CORRUPT_COMMAND 487
01517 #define DW_DLE_MACHO_CORRUPT_SECTIONDETAILS 488
01518 #define DW_DLE_RELOCATION_SECTION_SIZE_ERROR 489
01519 #define DW_DLE_SYMBOL_SECTION_SIZE_ERROR 490
01520 #define DW_DLE_PE_SECTION_SIZE_ERROR 491
01521 #define DW_DLE_DEBUG_ADDR_ERROR 492
01522 #define DW_DLE_NO_SECT_STRINGS 493
01523 #define DW_DLE_TOO_FEW_SECTIONS 494
01524 #define DW_DLE_BUILD_ID_DESCRIPTION_SIZE 495
01525 #define DW_DLE_BAD_SECTION_FLAGS 496
01526 #define DW_DLE_IMPROPER_SECTION_ZERO 497
01527 #define DW_DLE_INVALID_NULL_ARGUMENT 498
01528 #define DW_DLE_LINE_INDEX_WRONG 499
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01529 #define DW_DLE_LINE_COUNT_WRONG 500
01530 #define DW_DLE_ARITHMETIC_OVERFLOW 501
01531 #define DW_DLE_UNIVERSAL_BINARY_ERROR 502
01532 #define DW_DLE_UNIV_BIN_OFFSET_SIZE_ERROR 503
01533 #define DW_DLE_PE_SECTION_SIZE_HEURISTIC_FAIL 504
01534 #define DW_DLE_LLE_ERROR 505
01535 #define DW_DLE_RLE_ERROR 506
01536 #define DW_DLE_MACHO_SEGMENT_COUNT_HEURISTIC_FAIL 507
01537
01539 #define DW_DLE_LAST 507
01540 #define DW_DLE_LO_USER 0x10000
01605 DW_API int dwarf_init_path(const char * dw_path,
01606     char * dw_true_path_out_buffer,
01607     unsigned int dw_true_path_bufferlen,
01608     unsigned int dw_groupnumber,
01609     Dwarf_Handler dw_errhand,
01610     Dwarf_Ptr dw_errarg,
01611     Dwarf_Debug* dw_dbg,
01612     Dwarf_Error* dw_error);
01613
01626 DW_API int dwarf_init_path_a(const char * dw_path,
01627     char * dw_true_path_out_buffer,
01628     unsigned int dw_true_path_bufferlen,
01629     unsigned int dw_groupnumber,
01630     unsigned int dw_universalnumber,
01631     Dwarf_Handler dw_errhand,
01632     Dwarf_Ptr dw_errarg,
01633     Dwarf_Debug* dw_dbg,
01634     Dwarf_Error* dw_error);
01635
01692 DW_API int dwarf_init_path_dl(const char * dw_path,
01693     char * dw_true_path_out_buffer,
01694     unsigned int dw_true_path_bufferlen,
01695     unsigned int dw_groupnumber,
01696     Dwarf_Handler dw_errhand,
01697     Dwarf_Ptr dw_errarg,
01698     Dwarf_Debug* dw_dbg,
01699     char ** dw_dl_path_array,
01700     unsigned int dw_dl_path_array_size,
01701     unsigned char * dw_dl_path_source,
01702     Dwarf_Error* dw_error);
01703
01720 DW_API int dwarf_init_path_dl_a(const char * dw_path,
01721     char * dw_true_path_out_buffer,
01722     unsigned int dw_true_path_bufferlen,
01723     unsigned int dw_groupnumber,
01724     unsigned int dw_universalnumber,
01725     Dwarf_Handler dw_errhand,
01726     Dwarf_Ptr dw_errarg,
01727     Dwarf_Debug* dw_dbg,
01728     char ** dw_dl_path_array,
01729     unsigned int dw_dl_path_array_size,
01730     unsigned char * dw_dl_path_source,
01731     Dwarf_Error* dw_error);
01732
01766 DW_API int dwarf_init_b(int dw_fd,
01767     unsigned int dw_groupnumber,
01768     Dwarf_Handler dw_errhand,
01769     Dwarf_Ptr dw_errarg,
01770     Dwarf_Debug* dw_dbg,
01771     Dwarf_Error* dw_error);
01772
01788 DW_API int dwarf_finish(Dwarf_Debug dw_dbg);
01789
01823 DW_API int dwarf_object_init_b(Dwarf_Obj_Access_Interface_a* dw_obj,
01824     Dwarf_Handler dw_errhand,
01825     Dwarf_Ptr dw_errarg,
01826     unsigned int dw_groupnumber,
01827     Dwarf_Debug* dw_dbg,
01828     Dwarf_Error* dw_error);
01829
01844 DW_API int dwarf_object_finish(Dwarf_Debug dw_dbg);
01845
01876 DW_API int dwarf_set_tied_dbg(Dwarf_Debug dw_split_dbg,
01877     Dwarf_Debug dw_tied_dbg,
01878     Dwarf_Error* dw_error);
01879
01913 DW_API int dwarf_get_tied_dbg(Dwarf_Debug dw_dbg,
01914     Dwarf_Debug * dw_tieddbg_out,
01915     Dwarf_Error * dw_error);
01996 DW_API int dwarf_next_cu_header_e(Dwarf_Debug dw_dbg,
01997     Dwarf_Bool dw_is_info,
01998     Dwarf_Die *dw_cu_die,
01999     Dwarf_Unsigned *dw_cu_header_length,
02000     Dwarf_Half *dw_version_stamp,
02001     Dwarf_Off *dw_abbrev_offset,
02002     Dwarf_Half *dw_address_size,

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02003     Dwarf_Half      *dw_length_size,
02004     Dwarf_Half      *dw_extension_size,
02005     Dwarf_Sig8       *dw_type_signature,
02006     Dwarf_Unsigned   *dw_typeoffset,
02007     Dwarf_Unsigned   *dw_next_cu_header_offset,
02008     Dwarf_Half       *dw_header_cu_type,
02009     Dwarf_Error      *dw_error);
02010
02041 DW_API int dwarf_next_cu_header_d(Dwarf_Debug dw_dbg,
02042     Dwarf_Bool      dw_is_info,
02043     Dwarf_Unsigned   *dw_cu_header_length,
02044     Dwarf_Half       *dw_version_stamp,
02045     Dwarf_Off        *dw_abbrev_offset,
02046     Dwarf_Half       *dw_address_size,
02047     Dwarf_Half       *dw_length_size,
02048     Dwarf_Half       *dw_extension_size,
02049     Dwarf_Sig8       *dw_type_signature,
02050     Dwarf_Unsigned   *dw_typeoffset,
02051     Dwarf_Unsigned   *dw_next_cu_header_offset,
02052     Dwarf_Half       *dw_header_cu_type,
02053     Dwarf_Error      *dw_error);
02054
02070 DW_API int dwarf_siblingof_c(Dwarf_Die dw_die,
02071     Dwarf_Die      *dw_return_siblingdie,
02072     Dwarf_Error     *dw_error);
02073
02108 DW_API int dwarf_siblingof_b(Dwarf_Debug dw_dbg,
02109     Dwarf_Die      dw_die,
02110     Dwarf_Bool      dw_is_info,
02111     Dwarf_Die      *dw_return_siblingdie,
02112     Dwarf_Error     *dw_error);
02113
02154 DW_API int dwarf_cu_header_basics(Dwarf_Die dw_die,
02155     Dwarf_Half      *dw_version,
02156     Dwarf_Bool      *dw_is_info,
02157     Dwarf_Bool      *dw_is_dwo,
02158     Dwarf_Half      *dw_offset_size,
02159     Dwarf_Half      *dw_address_size,
02160     Dwarf_Half      *dw_extension_size,
02161     Dwarf_Sig8      **dw_signature,
02162     Dwarf_Off        *dw_offset_of_length,
02163     Dwarf_Unsigned   *dw_total_byte_length,
02164     Dwarf_Error      *dw_error);
02165
02185 DW_API int dwarf_child(Dwarf_Die dw_die,
02186     Dwarf_Die*      dw_return_childdie,
02187     Dwarf_Error*     dw_error);
02188
02196 DW_API void dwarf_dealloc_die(Dwarf_Die dw_die);
02197
02215 DW_API int dwarf_die_from_hash_signature(Dwarf_Debug dw_dbg,
02216     Dwarf_Sig8 * dw_hash_sig,
02217     const char * dw_sig_type,
02218     Dwarf_Die* dw_returned_CU_die,
02219     Dwarf_Error* dw_error);
02220
02251 DW_API int dwarf_offdie_b(Dwarf_Debug dw_dbg,
02252     Dwarf_Off      dw_offset,
02253     Dwarf_Bool      dw_is_info,
02254     Dwarf_Die*      dw_return_die,
02255     Dwarf_Error*     dw_error);
02256
02278 DW_API int dwarf_find_die_given_sig8(Dwarf_Debug dw_dbg,
02279     Dwarf_Sig8      *dw_ref,
02280     Dwarf_Die        *dw_die_out,
02281     Dwarf_Bool        *dw_is_info,
02282     Dwarf_Error       *dw_error);
02283
02294 DW_API Dwarf_Bool dwarf_get_die_infotypes_flag(Dwarf_Die dw_die);
02324 DW_API int dwarf_die_abbrev_global_offset(Dwarf_Die dw_die,
02325     Dwarf_Off      * dw_abbrev_offset,
02326     Dwarf_Unsigned * dw_abbrev_count,
02327     Dwarf_Error*     dw_error);
02328
02339 DW_API int dwarf_tag(Dwarf_Die dw_die,
02340     Dwarf_Half*      dw_return_tag,
02341     Dwarf_Error*     dw_error);
02342
02355 DW_API int dwarf_dieoffset(Dwarf_Die dw_die,
02356     Dwarf_Off*      dw_return_offset,
02357     Dwarf_Error*     dw_error);
02358
02377 DW_API int dwarf_debug_addr_index_to_addr(Dwarf_Die dw_die,
02378     Dwarf_Unsigned   dw_index,
02379     Dwarf_Addr        * dw_return_addr,
02380     Dwarf_Error       * dw_error);
02381

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02390 DW_API Dwarf_Bool dwarf_addr_form_is_indexed(int dw_form);
02391
02415 DW_API int dwarf_CU_dieoffset_given_die(Dwarf_Die dw_die,
02416     Dwarf_Off* dw_return_offset,
02417     Dwarf_Error* dw_error);
02418
02439 DW_API int dwarf_get_cu_die_offset_given_cu_header_offset_b(
02440     Dwarf_Debug dw_dbg,
02441     Dwarf_Off dw_in_cu_header_offset,
02442     Dwarf_Bool dw_is_info,
02443     Dwarf_Off * dw_out_cu_die_offset,
02444     Dwarf_Error *dw_error);
02445
02463 DW_API int dwarf_die_CU_offset(Dwarf_Die dw_die,
02464     Dwarf_Off* dw_return_offset,
02465     Dwarf_Error* dw_error);
02466
02487 DW_API int dwarf_die_CU_offset_range(Dwarf_Die dw_die,
02488     Dwarf_Off* dw_return_CU_header_offset,
02489     Dwarf_Off* dw_return_CU_length_bytes,
02490     Dwarf_Error* dw_error);
02491
02509 DW_API int dwarf_attr(Dwarf_Die dw_die,
02510     Dwarf_Half dw_attrnum,
02511     Dwarf_Attribute * dw_returned_attr,
02512     Dwarf_Error* dw_error);
02513
02535 DW_API int dwarf_die_text(Dwarf_Die dw_die,
02536     Dwarf_Half dw_attrnum,
02537     char ** dw_ret_name,
02538     Dwarf_Error * dw_error);
02539
02559 DW_API int dwarf_diename(Dwarf_Die dw_die,
02560     char ** dw_diename,
02561     Dwarf_Error* dw_error);
02562
02580 DW_API Dwarf_Unsigned dwarf_die_abbrev_code(Dwarf_Die dw_die);
02581
02595 DW_API int dwarf_die_abbrev_children_flag(Dwarf_Die dw_die,
02596     Dwarf_Half * dw_ab_has_child);
02597
02621 DW_API int dwarf_validate_die_sibling(Dwarf_Die dw_sibling,
02622     Dwarf_Off* dw_offset);
02623
02624 /* convenience functions, alternative to using dwarf_attrlist */
02625
02644 DW_API int dwarf_hasattr(Dwarf_Die dw_die,
02645     Dwarf_Half dw_attrnum,
02646     Dwarf_Bool * dw_returned_bool,
02647     Dwarf_Error* dw_error);
02648
02684 DW_API int dwarf_offset_list(Dwarf_Debug dw_dbg,
02685     Dwarf_Off dw_offset,
02686     Dwarf_Bool dw_is_info,
02687     Dwarf_Off ** dw_offbuf,
02688     Dwarf_Unsigned * dw_offcount,
02689     Dwarf_Error * dw_error);
02690
02703 DW_API int dwarf_get_die_address_size(Dwarf_Die dw_die,
02704     Dwarf_Half * dw_addr_size,
02705     Dwarf_Error * dw_error);
02706
02707 /* Get both offsets (local and global) */
02727 DW_API int dwarf_die_offsets(Dwarf_Die dw_die,
02728     Dwarf_Off* dw_global_offset,
02729     Dwarf_Off* dw_local_offset,
02730     Dwarf_Error* dw_error);
02731
02748 DW_API int dwarf_get_version_of_die(Dwarf_Die dw_die,
02749     Dwarf_Half * dw_version,
02750     Dwarf_Half * dw_offset_size);
02751
02765 DW_API int dwarf_lowpc(Dwarf_Die dw_die,
02766     Dwarf_Addr * dw_returned_addr,
02767     Dwarf_Error* dw_error);
02768
02800 DW_API int dwarf_highpc_b(Dwarf_Die dw_die,
02801     Dwarf_Addr * dw_return_addr,
02802     Dwarf_Half * dw_return_form,
02803     enum Dwarf_Form_Class * dw_return_class,
02804     Dwarf_Error * dw_error);
02805
02831 DW_API int dwarf_dietype_offset(Dwarf_Die dw_die,
02832     Dwarf_Off * dw_return_offset,
02833     Dwarf_Bool * dw_is_info,
02834     Dwarf_Error * dw_error);
02835

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02847 DW_API int dwarf_bytesize(Dwarf_Die dw_die,
02848     Dwarf_Unsigned * dw_returned_size,
02849     Dwarf_Error*    dw_error);
02850
02862 DW_API int dwarf_bitsize(Dwarf_Die dw_die,
02863     Dwarf_Unsigned * dw_returned_size,
02864     Dwarf_Error*    dw_error);
02865
02886 DW_API int dwarf_bitoffset(Dwarf_Die dw_die,
02887     Dwarf_Half * dw_attrnum,
02888     Dwarf_Unsigned * dw_returned_offset,
02889     Dwarf_Error*    dw_error);
02890
02904 DW_API int dwarf_srclang(Dwarf_Die dw_die,
02905     Dwarf_Unsigned * dw_returned_lang,
02906     Dwarf_Error * dw_error);
02907
02920 DW_API int dwarf_arrayorder(Dwarf_Die dw_die,
02921     Dwarf_Unsigned * dw_returned_order,
02922     Dwarf_Error*    dw_error);
02952 DW_API int dwarf_attrlist(Dwarf_Die dw_die,
02953     Dwarf_Attribute** dw_attrbuf,
02954     Dwarf_Signed * dw_attrcount,
02955     Dwarf_Error*    dw_error);
02956
02975 DW_API int dwarf_hasform(Dwarf_Attribute dw_attr,
02976     Dwarf_Half dw_form,
02977     Dwarf_Bool * dw_returned_bool,
02978     Dwarf_Error* dw_error);
02979
02998 DW_API int dwarf_whatform(Dwarf_Attribute dw_attr,
02999     Dwarf_Half * dw_returned_final_form,
03000     Dwarf_Error* dw_error);
03001
03018 DW_API int dwarf_whatform_direct(Dwarf_Attribute dw_attr,
03019     Dwarf_Half * dw_returned_initial_form,
03020     Dwarf_Error* dw_error);
03021
03037 DW_API int dwarf_whatattr(Dwarf_Attribute dw_attr,
03038     Dwarf_Half * dw_returned_attrnum,
03039     Dwarf_Error* dw_error);
03040
03065 DW_API int dwarf_formref(Dwarf_Attribute dw_attr,
03066     Dwarf_Off* dw_return_offset,
03067     Dwarf_Bool *dw_is_info,
03068     Dwarf_Error *dw_error);
03069
03102 DW_API int dwarf_global_formref_b(Dwarf_Attribute dw_attr,
03103     Dwarf_Off *dw_return_offset,
03104     Dwarf_Bool *dw_offset_is_info,
03105     Dwarf_Error *dw_error);
03106
03117 DW_API int dwarf_global_formref(Dwarf_Attribute dw_attr,
03118     Dwarf_Off* dw_return_offset,
03119     Dwarf_Error* dw_error);
03120
03139 DW_API int dwarf_formsig8(Dwarf_Attribute dw_attr,
03140     Dwarf_Sig8 * dw_returned_sig_bytes,
03141     Dwarf_Error* dw_error);
03142
03161 DW_API int dwarf_formsig8_const(Dwarf_Attribute dw_attr,
03162     Dwarf_Sig8 * dw_returned_sig_bytes,
03163     Dwarf_Error* dw_error);
03164
03184 DW_API int dwarf_formaddr(Dwarf_Attribute dw_attr,
03185     Dwarf_Addr * dw_returned_addr,
03186     Dwarf_Error* dw_error);
03187
03207 DW_API int dwarf_get_debug_addr_index(Dwarf_Attribute dw_attr,
03208     Dwarf_Unsigned * dw_return_index,
03209     Dwarf_Error * dw_error);
03210
03224 DW_API int dwarf_formflag(Dwarf_Attribute dw_attr,
03225     Dwarf_Bool * dw_returned_bool,
03226     Dwarf_Error* dw_error);
03227
03243 DW_API int dwarf_formudata(Dwarf_Attribute dw_attr,
03244     Dwarf_Unsigned * dw_returned_val,
03245     Dwarf_Error*    dw_error);
03246
03261 DW_API int dwarf_formsdata(Dwarf_Attribute dw_attr,
03262     Dwarf_Signed * dw_returned_val,
03263     Dwarf_Error*    dw_error);
03264
03282 DW_API int dwarf_formdata16(Dwarf_Attribute dw_attr,
03283     Dwarf_Form_Data16 * dw_returned_val,
03284     Dwarf_Error*    dw_error);
```

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03285
03304 DW_API int dwarf_formblock(Dwarf_Attribute dw_attr,
03305     Dwarf_Block ** dw_returned_block,
03306     Dwarf_Error*   dw_error);
03307
03322 DW_API int dwarf_formstring(Dwarf_Attribute dw_attr,
03323     char ** dw_returned_string,
03324     Dwarf_Error*   dw_error);
03325
03341 DW_API int dwarf_get_debug_str_index(Dwarf_Attribute dw_attr,
03342     Dwarf_Unsigned * dw_return_index,
03343     Dwarf_Error *   dw_error);
03344
03363 DW_API int dwarf_formexprloc(Dwarf_Attribute dw_attr,
03364     Dwarf_Unsigned * dw_return_exprlen,
03365     Dwarf_Ptr      * dw_block_ptr,
03366     Dwarf_Error    * dw_error);
03367
03387 DW_API enum Dwarf_Form_Class dwarf_get_form_class(
03388     Dwarf_Half dw_version,
03389     Dwarf_Half dw_attrnum,
03390     Dwarf_Half dw_offset_size,
03391     Dwarf_Half dw_form);
03392
03408 DW_API int dwarf_attr_offset(Dwarf_Die dw_die,
03409     Dwarf_Attribute dw_attr,
03410     Dwarf_Off * dw_return_offset,
03411     Dwarf_Error * dw_error);
03412
03420 DW_API int dwarf_uncompress_integer_block_a(Dwarf_Debug dw_dbg,
03421     Dwarf_Unsigned dw_input_length_in_bytes,
03422     void * dw_input_block,
03423     Dwarf_Unsigned * dw_value_count,
03424     Dwarf_Signed ** dw_value_array,
03425     Dwarf_Error * dw_error);
03426
03434 DW_API void dwarf_dealloc_uncompressed_block(Dwarf_Debug dw_dbg,
03435     void *dw_value_array);
03436
03456 DW_API int dwarf_convert_to_global_offset(Dwarf_Attribute dw_attr,
03457     Dwarf_Off dw_offset,
03458     Dwarf_Off* dw_return_offset,
03459     Dwarf_Error* dw_error);
03460
03466 DW_API void dwarf_dealloc_attribute(Dwarf_Attribute dw_attr);
03467
03494 DW_API int dwarf_discr_list(Dwarf_Debug dw_dbg,
03495     Dwarf_Small * dw_blockpointer,
03496     Dwarf_Unsigned dw_blocklen,
03497     Dwarf_Dsc_Head * dw_dsc_head_out,
03498     Dwarf_Unsigned * dw_dsc_array_length_out,
03499     Dwarf_Error * dw_error);
03500
03526 DW_API int dwarf_discr_entry_u(Dwarf_Dsc_Head dw_dsc,
03527     Dwarf_Unsigned dw_entrynum,
03528     Dwarf_Half * dw_out_type,
03529     Dwarf_Unsigned * dw_out_discr_low,
03530     Dwarf_Unsigned * dw_out_discr_high,
03531     Dwarf_Error * dw_error);
03532
03538 DW_API int dwarf_discr_entry_s(Dwarf_Dsc_Head dw_dsc,
03539     Dwarf_Unsigned dw_entrynum,
03540     Dwarf_Half * dw_out_type,
03541     Dwarf_Signed * dw_out_discr_low,
03542     Dwarf_Signed * dw_out_discr_high,
03543     Dwarf_Error * dw_error);
03544
03622 DW_API int dwarf_srcfiles(Dwarf_Die dw_cu_die,
03623     char *** dw_srcfiles,
03624     Dwarf_Signed * dw_filecount,
03625     Dwarf_Error * dw_error);
03626
03653 DW_API int dwarf_srclines_b(Dwarf_Die dw_cudie,
03654     Dwarf_Unsigned * dw_version_out,
03655     Dwarf_Small * dw_table_count,
03656     Dwarf_Line_Context * dw_linecontext,
03657     Dwarf_Error * dw_error);
03658
03679 DW_API int dwarf_srclines_from_linecontext(
03680     Dwarf_Line_Context dw_linecontext,
03681     Dwarf_Line ** dw_linebuf,
03682     Dwarf_Signed * dw_linecount,
03683     Dwarf_Error * dw_error);
03684
03701 DW_API int dwarf_srclines_two_level_from_linecontext(
03702     Dwarf_Line_Context dw_context,
03703     Dwarf_Line ** dw_linebuf ,

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03704     Dwarf_Signed *   dw_linecount,
03705     Dwarf_Line **   dw_linebuf_actuais,
03706     Dwarf_Signed *   dw_linecount_actuais,
03707     Dwarf_Error *   dw_error);
03708
03718 DW_API void dwarf_srclines_dealloc_b(Dwarf_Line_Context dw_context);
03719
03735 DW_API int dwarf_srclines_table_offset(Dwarf_Line_Context dw_context,
03736     Dwarf_Unsigned * dw_offset,
03737     Dwarf_Error * dw_error);
03738
03754 DW_API int dwarf_srclines_comp_dir(Dwarf_Line_Context dw_context,
03755     const char ** dw_compilation_directory,
03756     Dwarf_Error * dw_error);
03757
03773 DW_API int dwarf_srclines_subprog_count(Dwarf_Line_Context dw_context,
03774     Dwarf_Signed * dw_count,
03775     Dwarf_Error * dw_error);
03776
03795 DW_API int dwarf_srclines_subprog_data(Dwarf_Line_Context dw_context,
03796     Dwarf_Signed dw_index,
03797     const char ** dw_name,
03798     Dwarf_Unsigned * dw_decl_file,
03799     Dwarf_Unsigned * dw_decl_line,
03800     Dwarf_Error * dw_error);
03801
03826 DW_API int dwarf_srclines_files_indexes(
03827     Dwarf_Line_Context dw_context,
03828     Dwarf_Signed * dw_baseindex,
03829     Dwarf_Signed * dw_count,
03830     Dwarf_Signed * dw_endindex,
03831     Dwarf_Error * dw_error);
03832
03884 DW_API int dwarf_srclines_files_data_b(
03885     Dwarf_Line_Context dw_context,
03886     Dwarf_Signed dw_index_in,
03887     const char ** dw_name,
03888     Dwarf_Unsigned * dw_directory_index,
03889     Dwarf_Unsigned * dw_last_mod_time,
03890     Dwarf_Unsigned * dw_file_length,
03891     Dwarf_Form_Data16 ** dw_md5ptr,
03892     Dwarf_Error * dw_error);
03893
03908 DW_API int dwarf_srclines_include_dir_count(
03909     Dwarf_Line_Context dw_line_context,
03910     Dwarf_Signed * dw_count,
03911     Dwarf_Error * dw_error);
03912
03935 DW_API int dwarf_srclines_include_dir_data(
03936     Dwarf_Line_Context dw_line_context,
03937     Dwarf_Signed dw_index,
03938     const char ** dw_name,
03939     Dwarf_Error * dw_error);
03940
03969 DW_API int dwarf_srclines_version(Dwarf_Line_Context dw_line_context,
03970     Dwarf_Unsigned * dw_version,
03971     Dwarf_Small * dw_table_count,
03972     Dwarf_Error * dw_error);
03973
03989 DW_API int dwarf_linebeginstatement(Dwarf_Line dw_line,
03990     Dwarf_Bool * dw_returned_bool,
03991     Dwarf_Error * dw_error);
03992
04008 DW_API int dwarf_lineendsequence(Dwarf_Line dw_line,
04009     Dwarf_Bool * dw_returned_bool,
04010     Dwarf_Error * dw_error);
04011
04026 DW_API int dwarf_lineno(Dwarf_Line dw_line,
04027     Dwarf_Unsigned * dw_returned_lineno,
04028     Dwarf_Error * dw_error);
04029
04044 DW_API int dwarf_line_srcfileno(Dwarf_Line dw_line,
04045     Dwarf_Unsigned * dw_returned_filenum,
04046     Dwarf_Error * dw_error);
04047
04061 DW_API int dwarf_line_is_addr_set(Dwarf_Line dw_line,
04062     Dwarf_Bool * dw_is_addr_set,
04063     Dwarf_Error * dw_error);
04064
04079 DW_API int dwarf_lineaddr(Dwarf_Line dw_line,
04080     Dwarf_Addr * dw_returned_addr,
04081     Dwarf_Error* dw_error);
04082
04097 DW_API int dwarf_lineoff_b(Dwarf_Line dw_line,
04098     Dwarf_Unsigned * dw_returned_lineoffset,
04099     Dwarf_Error* dw_error);
04100

```



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04125 DW_API int dwarf_linesrc(Dwarf_Line dw_line,
04126     char ** dw_returned_name,
04127     Dwarf_Error* dw_error);
04128
04143 DW_API int dwarf_lineblock(Dwarf_Line dw_line,
04144     Dwarf_Bool * dw_returned_bool,
04145     Dwarf_Error* dw_error);
04146
04147 /* We gather these into one call as it's likely one
04148     will want all or none of them. */
04172 DW_API int dwarf_prologue_end_etc(Dwarf_Line dw_line,
04173     Dwarf_Bool * dw_prologue_end,
04174     Dwarf_Bool * dw_epilogue_begin,
04175     Dwarf_Unsigned * dw_isa,
04176     Dwarf_Unsigned * dw_discriminator,
04177     Dwarf_Error * dw_error);
04178 /* End line table operations */
04179
04185 DW_API int dwarf_linelogical(Dwarf_Line dw_line,
04186     Dwarf_Unsigned * dw_returned_logical,
04187     Dwarf_Error* dw_error);
04188
04195 DW_API int dwarf_linecontext(Dwarf_Line dw_line,
04196     Dwarf_Unsigned * dw_returned_context,
04197     Dwarf_Error* dw_error);
04198
04207 DW_API int dwarf_line_subprogno(Dwarf_Line /*line*/,
04208     Dwarf_Unsigned * /*ret_subprogno*/,
04209     Dwarf_Error * /*error*/);
04210
04217 DW_API int dwarf_line_subprog(Dwarf_Line /*line*/,
04218     char ** /*returned_subprog_name*/,
04219     char ** /*returned_filename*/,
04220     Dwarf_Unsigned * /*returned_lineno*/,
04221     Dwarf_Error * /*error*/);
04222
04243 DW_API int dwarf_check_lineheader_b(Dwarf_Die dw_cu_die,
04244     int * dw_errcount_out,
04245     Dwarf_Error * dw_error);
04246
04276 DW_API int dwarf_print_lines(Dwarf_Die dw_cu_die,
04277     Dwarf_Error * dw_error,
04278     int * dw_errorcount_out);
04279
04300 DW_API struct Dwarf_Printf_Callback_Info_s
04301     dwarf_register_printf_callback(Dwarf_Debug dw_dbg,
04302     struct Dwarf_Printf_Callback_Info_s * dw_callbackinfo);
04303
04363 DW_API int dwarf_get_ranges_b(Dwarf_Debug dw_dbg,
04364     Dwarf_Off dw_rangesoffset,
04365     Dwarf_Die dw_die,
04366     Dwarf_Off * dw_return_realoffset,
04367     Dwarf_Ranges ** dw_rangesbuf,
04368     Dwarf_Signed * dw_rangecount,
04369     Dwarf_Unsigned * dw_bytecount,
04370     Dwarf_Error * dw_error);
04371
04381 DW_API void dwarf_dealloc_ranges(Dwarf_Debug dw_dbg,
04382     Dwarf_Ranges * dw_rangesbuf,
04383     Dwarf_Signed dw_rangecount);
04384
04424 DW_API int dwarf_get_ranges_baseaddress(Dwarf_Debug dw_dbg,
04425     Dwarf_Die dw_die,
04426     Dwarf_Bool *dw_known_base,
04427     Dwarf_Unsigned *dw_baseaddress,
04428     Dwarf_Bool *dw_at_ranges_offset_present,
04429     Dwarf_Unsigned *dw_at_ranges_offset,
04430     Dwarf_Error *dw_error);
04431
04477 DW_API int dwarf_rnglists_get_rle_head(Dwarf_Attribute dw_attr,
04478     Dwarf_Half dw_theform,
04479     Dwarf_Unsigned dw_index_or_offset_value,
04480     Dwarf_Rnglists_Head * dw_head_out,
04481     Dwarf_Unsigned * dw_count_of_entries_in_head,
04482     Dwarf_Unsigned * dw_global_offset_of_rle_set,
04483     Dwarf_Error * dw_error);
04484
04527 DW_API int dwarf_get_rnglists_entry_fields_a(
04528     Dwarf_Rnglists_Head dw_head,
04529     Dwarf_Unsigned dw_entrynum,
04530     unsigned int * dw_entrylen,
04531     unsigned int * dw_rle_value_out,
04532     Dwarf_Unsigned * dw_raw1,
04533     Dwarf_Unsigned * dw_raw2,
04534     Dwarf_Bool * dw_debug_addr_unavailable,
04535     Dwarf_Unsigned * dw_cooked1,
04536     Dwarf_Unsigned * dw_cooked2,

```

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04537     Dwarf_Error *    dw_error);
04538
04546 DW_API void dwarf_dealloc_rnglists_head(Dwarf_Rnglists_Head dw_head);
04547
04578 DW_API int dwarf_load_rnglists(Dwarf_Debug dw_dbg,
04579     Dwarf_Unsigned * dw_rnglists_count,
04580     Dwarf_Error * dw_error);
04581
04608 DW_API int dwarf_get_rnglist_offset_index_value(Dwarf_Debug dw_dbg,
04609     Dwarf_Unsigned dw_context_index,
04610     Dwarf_Unsigned dw_offsetentry_index,
04611     Dwarf_Unsigned * dw_offset_value_out,
04612     Dwarf_Unsigned * dw_global_offset_value_out,
04613     Dwarf_Error * dw_error);
04614
04621 DW_API int dwarf_get_rnglist_head_basics(Dwarf_Rnglists_Head dw_head,
04622     Dwarf_Unsigned * dw_rle_count,
04623     Dwarf_Unsigned * dw_rnglists_version,
04624     Dwarf_Unsigned * dw_rnglists_index_returned,
04625     Dwarf_Unsigned * dw_bytes_total_in_rle,
04626     Dwarf_Half * dw_offset_size,
04627     Dwarf_Half * dw_address_size,
04628     Dwarf_Half * dw_segment_selector_size,
04629     Dwarf_Unsigned * dw_overall_offset_of_this_context,
04630     Dwarf_Unsigned * dw_total_length_of_this_context,
04631     Dwarf_Unsigned * dw_offset_table_offset,
04632     Dwarf_Unsigned * dw_offset_table_entrycount,
04633     Dwarf_Bool * dw_rnglists_base_present,
04634     Dwarf_Unsigned * dw_rnglists_base,
04635     Dwarf_Bool * dw_rnglists_base_address_present,
04636     Dwarf_Unsigned * dw_rnglists_base_address,
04637     Dwarf_Bool * dw_rnglists_debug_addr_base_present,
04638     Dwarf_Unsigned * dw_rnglists_debug_addr_base,
04639     Dwarf_Error * dw_error);
04640
04656 DW_API int dwarf_get_rnglist_context_basics(Dwarf_Debug dw_dbg,
04657     Dwarf_Unsigned dw_index,
04658     Dwarf_Unsigned * dw_header_offset,
04659     Dwarf_Small * dw_offset_size,
04660     Dwarf_Small * dw_extension_size,
04661     unsigned int * dw_version,
04662     Dwarf_Small * dw_address_size,
04663     Dwarf_Small * dw_segment_selector_size,
04664     Dwarf_Unsigned * dw_offset_entry_count,
04665     Dwarf_Unsigned * dw_offset_of_offset_array,
04666     Dwarf_Unsigned * dw_offset_of_first_rangeentry,
04667     Dwarf_Unsigned * dw_offset_past_last_rangeentry,
04668     Dwarf_Error * dw_error);
04669
04679 DW_API int dwarf_get_rnglist_rle(Dwarf_Debug dw_dbg,
04680     Dwarf_Unsigned dw_contextnumber,
04681     Dwarf_Unsigned dw_entry_offset,
04682     Dwarf_Unsigned dw_endoffset,
04683     unsigned int * dw_entrylen,
04684     unsigned int * dw_entry_kind,
04685     Dwarf_Unsigned * dw_entry_operand1,
04686     Dwarf_Unsigned * dw_entry_operand2,
04687     Dwarf_Error * dw_error);
04713 DW_API int dwarf_get_loclist_c(Dwarf_Attribute dw_attr,
04714     Dwarf_Loc_Head_c * dw_loclist_head,
04715     Dwarf_Unsigned * dw_locentry_count,
04716     Dwarf_Error * dw_error);
04717
04718 #define DW_LKIND_expression 0 /* DWARF2,3,4,5 */
04719 #define DW_LKIND_loclist 1 /* DWARF 2,3,4 */
04720 #define DW_LKIND_GNU_exp_list 2 /* GNU DWARF4 .dwo extension */
04721 #define DW_LKIND_loclists 5 /* DWARF5 loclists */
04722 #define DW_LKIND_unknown 99
04723
04736 DW_API int dwarf_get_loclist_head_kind(
04737     Dwarf_Loc_Head_c dw_loclist_head,
04738     unsigned int * dw_lkind,
04739     Dwarf_Error * dw_error);
04740
04795 DW_API int dwarf_get_locdesc_entry_d(Dwarf_Loc_Head_c dw_loclist_head,
04796     Dwarf_Unsigned dw_index,
04797     Dwarf_Small * dw_lle_value_out,
04798     Dwarf_Unsigned * dw_rawlowpc,
04799     Dwarf_Unsigned * dw_rawhipc,
04800     Dwarf_Bool * dw_debug_addr_unavailable,
04801     Dwarf_Addr * dw_lowpc_cooked,
04802     Dwarf_Addr * dw_hipc_cooked,
04803     Dwarf_Unsigned * dw_locexpr_op_count_out,
04804     Dwarf_Locdesc_c * dw_locentry_out,
04805     Dwarf_Small * dw_loclist_source_out,
04806     Dwarf_Unsigned * dw_expression_offset_out,
04807     Dwarf_Unsigned * dw_locdesc_offset_out,

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04808     Dwarf_Error * dw_error);
04809
04829 DW_API int dwarf_get_locdesc_entry_e(Dwarf_Loc_Head_c dw_loclist_head,
04830     Dwarf_Unsigned dw_index,
04831     Dwarf_Small * dw_lle_value_out,
04832     Dwarf_Unsigned * dw_rawlowpc,
04833     Dwarf_Unsigned * dw_rawhipc,
04834     Dwarf_Bool * dw_debug_addr_unavailable,
04835     Dwarf_Addr * dw_lowpc_cooked,
04836     Dwarf_Addr * dw_hipc_cooked,
04837     Dwarf_Unsigned * dw_locexpr_op_count_out,
04838     Dwarf_Unsigned * dw_lle_bytecount,
04839     Dwarf_Locdesc_c * dw_locentry_out,
04840     Dwarf_Small * dw_loclist_source_out,
04841     Dwarf_Unsigned * dw_expression_offset_out,
04842     Dwarf_Unsigned * dw_locdesc_offset_out,
04843     Dwarf_Error * dw_error);
04844
04870 DW_API int dwarf_get_location_op_value_c(Dwarf_Locdesc_c dw_locdesc,
04871     Dwarf_Unsigned dw_index,
04872     Dwarf_Small * dw_operator_out,
04873     Dwarf_Unsigned * dw_operand1,
04874     Dwarf_Unsigned * dw_operand2,
04875     Dwarf_Unsigned * dw_operand3,
04876     Dwarf_Unsigned * dw_offset_for_branch,
04877     Dwarf_Error * dw_error);
04909 DW_API int dwarf_loclist_from_expr_c(Dwarf_Debug dw_dbg,
04910     Dwarf_Ptr dw_expression_in,
04911     Dwarf_Unsigned dw_expression_length,
04912     Dwarf_Half dw_address_size,
04913     Dwarf_Half dw_offset_size,
04914     Dwarf_Half dw_dwarf_version,
04915     Dwarf_Loc_Head_c * dw_loc_head,
04916     Dwarf_Unsigned * dw_listlen,
04917     Dwarf_Error * dw_error);
04918
04926 DW_API void dwarf_dealloc_loc_head_c(Dwarf_Loc_Head_c dw_head);
04927
04928 /* These interfaces allow reading the .debug_loclists
04929 section. Independently of DIEs.
04930 Normal use of .debug_loclists uses
04931 dwarf_get_loclist_c() to open access to any kind of location
04932 or loclist and uses dwarf_loc_head_c_dealloc() to
04933 deallocate that memory once one is finished with
04934 that data. So for most purposes you do not need
04935 to use these functions
04936 See dwarf_get_loclist_c() to open a Dwarf_Loc_Head_c
04937 on any type of location list or expression. */
04938
04939 /* Loads all the loclists headers and
04940 returns DW_DLV_NO_ENTRY if the section
04941 is missing or empty.
04942 Intended to be done quite early and
04943 it is automatically
04944 done if .debug_info is loaded.
04945 Doing it more than once is never necessary
04946 or harmful. There is no deallocation call
04947 made visible, deallocation happens
04948 when dwarf_finish() is called.
04949 With DW_DLV_OK it returns the number of
04950 loclists headers in the section through
04951 loclists_count. */
04981 DW_API int dwarf_load_loclists(Dwarf_Debug dw_dbg,
04982     Dwarf_Unsigned * dw_loclists_count,
04983     Dwarf_Error * dw_error);
04984
05010 DW_API int dwarf_get_loclist_offset_index_value(Dwarf_Debug dw_dbg,
05011     Dwarf_Unsigned dw_context_index,
05012     Dwarf_Unsigned dw_offsetentry_index,
05013     Dwarf_Unsigned * dw_offset_value_out,
05014     Dwarf_Unsigned * dw_global_offset_value_out,
05015     Dwarf_Error * dw_error);
05016
05031 DW_API int dwarf_get_loclist_head_basics(Dwarf_Loc_Head_c dw_head,
05032     Dwarf_Small * dw_lkind,
05033     Dwarf_Unsigned * dw_lle_count,
05034     Dwarf_Unsigned * dw_loclists_version,
05035     Dwarf_Unsigned * dw_loclists_index_returned,
05036     Dwarf_Unsigned * dw_bytes_total_in_rle,
05037     Dwarf_Half * dw_offset_size,
05038     Dwarf_Half * dw_address_size,
05039     Dwarf_Half * dw_segment_selector_size,
05040     Dwarf_Unsigned * dw_overall_offset_of_this_context,
05041     Dwarf_Unsigned * dw_total_length_of_this_context,
05042     Dwarf_Unsigned * dw_offset_table_offset,
05043     Dwarf_Unsigned * dw_offset_table_entrycount,
05044     Dwarf_Bool * dw_loclists_base_present,

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05045 Dwarf_Unsigned * dw_loclists_base,
05046 Dwarf_Bool * dw_loclists_base_address_present,
05047 Dwarf_Unsigned * dw_loclists_base_address,
05048 Dwarf_Bool * dw_loclists_debug_addr_base_present,
05049 Dwarf_Unsigned * dw_loclists_debug_addr_base,
05050 Dwarf_Unsigned * dw_offset_this_lle_area,
05051 Dwarf_Error * dw_error);
05052
05061 DW_API int dwarf_get_loclist_context_basics(Dwarf_Debug dw_dbg,
05062 Dwarf_Unsigned dw_index,
05063 Dwarf_Unsigned * dw_header_offset,
05064 Dwarf_Small * dw_offset_size,
05065 Dwarf_Small * dw_extension_size,
05066 unsigned int * dw_version,
05067 Dwarf_Small * dw_address_size,
05068 Dwarf_Small * dw_segment_selector_size,
05069 Dwarf_Unsigned * dw_offset_entry_count,
05070 Dwarf_Unsigned * dw_offset_of_offset_array,
05071 Dwarf_Unsigned * dw_offset_of_first_locentry,
05072 Dwarf_Unsigned * dw_offset_past_last_locentry,
05073 Dwarf_Error * dw_error);
05074
05079 DW_API int dwarf_get_loclist_lle(Dwarf_Debug dw_dbg,
05080 Dwarf_Unsigned dw_contextnumber,
05081 Dwarf_Unsigned dw_entry_offset,
05082 Dwarf_Unsigned dw_endoffset,
05083 unsigned int * dw_entrylen,
05084 unsigned int * dw_entry_kind,
05085 Dwarf_Unsigned * dw_entry_operand1,
05086 Dwarf_Unsigned * dw_entry_operand2,
05087 Dwarf_Unsigned * dw_expr_ops_blocksize,
05088 Dwarf_Unsigned * dw_expr_ops_offset,
05089 Dwarf_Small ** dw_expr_opsdata,
05090 Dwarf_Error * dw_error);
05170 DW_API int dwarf_debug_addr_table(Dwarf_Debug dw_dbg,
05171 Dwarf_Unsigned dw_section_offset,
05172 Dwarf_Debug_Addr_Table *dw_table_header,
05173 Dwarf_Unsigned *dw_length,
05174 Dwarf_Half *dw_version,
05175 Dwarf_Small *dw_address_size,
05176 Dwarf_Unsigned *dw_at_addr_base,
05177 Dwarf_Unsigned *dw_entry_count,
05178 Dwarf_Unsigned *dw_next_table_offset,
05179 Dwarf_Error *dw_error);
05180
05203 DW_API int dwarf_debug_addr_by_index(Dwarf_Debug_Addr_Table dw_dat,
05204 Dwarf_Unsigned dw_entry_index,
05205 Dwarf_Unsigned *dw_address,
05206 Dwarf_Error *dw_error);
05207
05215 DW_API void dwarf_dealloc_debug_addr_table(
05216 Dwarf_Debug_Addr_Table dw_dat);
05217
05254 DW_API int dwarf_get_macro_context(Dwarf_Die dw_die,
05255 Dwarf_Unsigned * dw_version_out,
05256 Dwarf_Macro_Context * dw_macro_context,
05257 Dwarf_Unsigned * dw_macro_unit_offset_out,
05258 Dwarf_Unsigned * dw_macro_ops_count_out,
05259 Dwarf_Unsigned * dw_macro_ops_data_length_out,
05260 Dwarf_Error * dw_error);
05261
05289 DW_API int dwarf_get_macro_context_by_offset(Dwarf_Die dw_die,
05290 Dwarf_Unsigned dw_offset,
05291 Dwarf_Unsigned * dw_version_out,
05292 Dwarf_Macro_Context * dw_macro_context,
05293 Dwarf_Unsigned * dw_macro_ops_count_out,
05294 Dwarf_Unsigned * dw_macro_ops_data_length,
05295 Dwarf_Error * dw_error);
05296
05297 /* New December 2020. libdwarf 0.1.0
05298 Sometimes its necessary to know
05299 a context total length including macro 5 header */
05312 DW_API int dwarf_macro_context_total_length(
05313 Dwarf_Macro_Context dw_context,
05314 Dwarf_Unsigned * dw_mac_total_len,
05315 Dwarf_Error * dw_error);
05316
05324 DW_API void dwarf_dealloc_macro_context(Dwarf_Macro_Context dw_mc);
05325
05331 DW_API int dwarf_macro_context_head(Dwarf_Macro_Context dw_mc,
05332 Dwarf_Half * dw_version,
05333 Dwarf_Unsigned * dw_mac_offset,
05334 Dwarf_Unsigned * dw_mac_len,
05335 Dwarf_Unsigned * dw_mac_header_len,
05336 unsigned int * dw_flags,
05337 Dwarf_Bool * dw_has_line_offset,
05338 Dwarf_Unsigned * dw_line_offset,

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05339     Dwarf_Bool      * dw_has_offset_size_64,
05340     Dwarf_Bool      * dw_has_operands_table,
05341     Dwarf_Half      * dw_opcode_count,
05342     Dwarf_Error      * dw_error);
05343
05366 DW_API int dwarf_macro_operands_table(Dwarf_Macro_Context dw_mc,
05367     Dwarf_Half      dw_index, /* 0 to opcode_count -1 */
05368     Dwarf_Half      * dw_opcode_number,
05369     Dwarf_Half      * dw_operand_count,
05370     const Dwarf_Small ** dw_operand_array,
05371     Dwarf_Error      * dw_error);
05372
05397 DW_API int dwarf_get_macro_op(Dwarf_Macro_Context dw_macro_context,
05398     Dwarf_Unsigned   dw_op_number,
05399     Dwarf_Unsigned   * dw_op_start_section_offset,
05400     Dwarf_Half      * dw_macro_operator,
05401     Dwarf_Half      * dw_forms_count,
05402     const Dwarf_Small ** dw_formcode_array,
05403     Dwarf_Error      * dw_error);
05404
05442 DW_API int dwarf_get_macro_defundef(
05443     Dwarf_Macro_Context dw_macro_context,
05444     Dwarf_Unsigned   dw_op_number,
05445     Dwarf_Unsigned   * dw_line_number,
05446     Dwarf_Unsigned   * dw_index,
05447     Dwarf_Unsigned   * dw_offset,
05448     Dwarf_Half      * dw_forms_count,
05449     const char      ** dw_macro_string,
05450     Dwarf_Error      * dw_error);
05451
05479 DW_API int dwarf_get_macro_startend_file(
05480     Dwarf_Macro_Context dw_macro_context,
05481     Dwarf_Unsigned   dw_op_number,
05482     Dwarf_Unsigned   * dw_line_number,
05483     Dwarf_Unsigned   * dw_name_index_to_line_tab,
05484     const char      ** dw_src_file_name,
05485     Dwarf_Error      * dw_error);
05486
05502 DW_API int dwarf_get_macro_import(
05503     Dwarf_Macro_Context dw_macro_context,
05504     Dwarf_Unsigned   dw_op_number,
05505     Dwarf_Unsigned   * dw_target_offset,
05506     Dwarf_Error      * dw_error);
05535 DW_API char* dwarf_find_macro_value_start(char * dw_macro_string);
05536
05562 DW_API int dwarf_get_macro_details(Dwarf_Debug dw_dbg,
05563     Dwarf_Off      dw_macro_offset,
05564     Dwarf_Unsigned   dw_maximum_count,
05565     Dwarf_Signed     * dw_entry_count,
05566     Dwarf_Macro_Details ** dw_details,
05567     Dwarf_Error      * dw_error);
05568
05611 DW_API int dwarf_get_fde_list(Dwarf_Debug dw_dbg,
05612     Dwarf_Cie**     dw_cie_data,
05613     Dwarf_Signed*    dw_cie_element_count,
05614     Dwarf_Fde**     dw_fde_data,
05615     Dwarf_Signed*    dw_fde_element_count,
05616     Dwarf_Error*     dw_error);
05626 DW_API int dwarf_get_fde_list_eh(Dwarf_Debug dw_dbg,
05627     Dwarf_Cie**     dw_cie_data,
05628     Dwarf_Signed*    dw_cie_element_count,
05629     Dwarf_Fde**     dw_fde_data,
05630     Dwarf_Signed*    dw_fde_element_count,
05631     Dwarf_Error*     dw_error);
05632
05652 DW_API void dwarf_dealloc_fde_cie_list(Dwarf_Debug dw_dbg,
05653     Dwarf_Cie * dw_cie_data,
05654     Dwarf_Signed dw_cie_element_count,
05655     Dwarf_Fde * dw_fde_data,
05656     Dwarf_Signed dw_fde_element_count);
05657
05685 DW_API int dwarf_get_fde_range(Dwarf_Fde dw_fde,
05686     Dwarf_Addr*     dw_low_pc,
05687     Dwarf_Unsigned* dw_func_length,
05688     Dwarf_Small     **dw_fde_bytes,
05689     Dwarf_Unsigned* dw_fde_byte_length,
05690     Dwarf_Off*      dw_cie_offset,
05691     Dwarf_Signed*    dw_cie_index,
05692     Dwarf_Off*      dw_fde_offset,
05693     Dwarf_Error*     dw_error);
05694
05700 DW_API int dwarf_get_fde_exception_info(Dwarf_Fde dw_fde,
05701     Dwarf_Signed*    dw_offset_into_exception_tables,
05702     Dwarf_Error*     dw_error);
05703
05715 DW_API int dwarf_get_cie_of_fde(Dwarf_Fde dw_fde,
05716     Dwarf_Cie * dw_cie_returned,

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05717     Dwarf_Error*      dw_error);
05718
05752 DW_API int dwarf_get_cie_info_b(Dwarf_Cie dw_cie,
05753     Dwarf_Unsigned * dw_bytes_in_cie,
05754     Dwarf_Small*    dw_version,
05755     char            ** dw_augmenter,
05756     Dwarf_Unsigned* dw_code_alignment_factor,
05757     Dwarf_Signed*   dw_data_alignment_factor,
05758     Dwarf_Half*     dw_return_address_register_rule,
05759     Dwarf_Small     ** dw_initial_instructions,
05760     Dwarf_Unsigned* dw_initial_instructions_length,
05761     Dwarf_Half*     dw_offset_size,
05762     Dwarf_Error*    dw_error);
05763
05776 DW_API int dwarf_get_cie_index(Dwarf_Cie dw_cie,
05777     Dwarf_Signed* dw_index,
05778     Dwarf_Error * dw_error);
05779
05798 DW_API int dwarf_get_fde_instr_bytes(Dwarf_Fde dw_fde,
05799     Dwarf_Small ** dw_outinstrs,
05800     Dwarf_Unsigned * dw_outlen,
05801     Dwarf_Error * dw_error);
05802
05835 DW_API int dwarf_get_fde_info_for_all_reg3_b(Dwarf_Fde dw_fde,
05836     Dwarf_Addr      dw_pc_requested,
05837     Dwarf_Regtable3* dw_reg_table,
05838     Dwarf_Addr*     dw_row_pc,
05839     Dwarf_Bool*     dw_has_more_rows,
05840     Dwarf_Addr*     dw_subsequent_pc,
05841     Dwarf_Error*    dw_error);
05842
05852 DW_API int dwarf_get_fde_info_for_all_reg3(Dwarf_Fde dw_fde,
05853     Dwarf_Addr      dw_pc_requested,
05854     Dwarf_Regtable3* dw_reg_table,
05855     Dwarf_Addr*     dw_row_pc,
05856     Dwarf_Error*    dw_error);
05857
05858 /* See discussion of dw_value_type, libdwarf.h. */
05918 DW_API int dwarf_get_fde_info_for_reg3_c(Dwarf_Fde dw_fde,
05919     Dwarf_Half      dw_table_column,
05920     Dwarf_Addr      dw_pc_requested,
05921     Dwarf_Small     * dw_value_type,
05922     Dwarf_Unsigned * dw_offset_relevant,
05923     Dwarf_Unsigned * dw_register,
05924     Dwarf_Signed    * dw_offset,
05925     Dwarf_Block     * dw_block_content,
05926     Dwarf_Addr      * dw_row_pc_out,
05927     Dwarf_Bool      * dw_has_more_rows,
05928     Dwarf_Addr      * dw_subsequent_pc,
05929     Dwarf_Error     * dw_error);
05930
05940 DW_API int dwarf_get_fde_info_for_reg3_b(Dwarf_Fde dw_fde,
05941     Dwarf_Half      dw_table_column,
05942     Dwarf_Addr      dw_pc_requested,
05943     Dwarf_Small     * dw_value_type,
05944     Dwarf_Unsigned * dw_offset_relevant,
05945     Dwarf_Unsigned * dw_register,
05946     Dwarf_Unsigned * dw_offset,
05947     Dwarf_Block     * dw_block_content,
05948     Dwarf_Addr      * dw_row_pc_out,
05949     Dwarf_Bool      * dw_has_more_rows,
05950     Dwarf_Addr      * dw_subsequent_pc,
05951     Dwarf_Error     * dw_error);
05952
05976 DW_API int dwarf_get_fde_info_for_cfa_reg3_c(Dwarf_Fde dw_fde,
05977     Dwarf_Addr      dw_pc_requested,
05978     Dwarf_Small     * dw_value_type,
05979     Dwarf_Unsigned* dw_offset_relevant,
05980     Dwarf_Unsigned* dw_register,
05981     Dwarf_Signed    * dw_offset,
05982     Dwarf_Block     * dw_block,
05983     Dwarf_Addr      * dw_row_pc_out,
05984     Dwarf_Bool      * dw_has_more_rows,
05985     Dwarf_Addr      * dw_subsequent_pc,
05986     Dwarf_Error     * dw_error);
05996 DW_API int dwarf_get_fde_info_for_cfa_reg3_b(Dwarf_Fde dw_fde,
05997     Dwarf_Addr      dw_pc_requested,
05998     Dwarf_Small     * dw_value_type,
05999     Dwarf_Unsigned* dw_offset_relevant,
06000     Dwarf_Unsigned* dw_register,
06001     Dwarf_Unsigned* dw_offset,
06002     Dwarf_Block     * dw_block,
06003     Dwarf_Addr      * dw_row_pc_out,
06004     Dwarf_Bool      * dw_has_more_rows,
06005     Dwarf_Addr      * dw_subsequent_pc,
06006     Dwarf_Error     * dw_error);
06007

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06016 DW_API int dwarf_get_fde_for_die(Dwarf_Debug dw_dbg,
06017     Dwarf_Die      dw_subr_die,
06018     Dwarf_Fde *    dw_returned_fde,
06019     Dwarf_Error*   dw_error);
06020
06028 DW_API int dwarf_get_fde_n(Dwarf_Fde* dw_fde_data,
06029     Dwarf_Unsigned dw_fde_index,
06030     Dwarf_Fde *    dw_returned_fde,
06031     Dwarf_Error *  dw_error);
06032
06063 DW_API int dwarf_get_fde_at_pc(Dwarf_Fde* dw_fde_data,
06064     Dwarf_Addr dw_pc_of_interest,
06065     Dwarf_Fde * dw_returned_fde,
06066     Dwarf_Addr * dw_lopc,
06067     Dwarf_Addr * dw_hipc,
06068     Dwarf_Error* dw_error);
06069
06089 DW_API int dwarf_get_cie_augmentation_data(Dwarf_Cie dw_cie,
06090     Dwarf_Small ** dw_augdata,
06091     Dwarf_Unsigned * dw_augdata_len,
06092     Dwarf_Error*   dw_error);
06093
06113 DW_API int dwarf_get_fde_augmentation_data(Dwarf_Fde dw_fde,
06114     Dwarf_Small ** dw_augdata,
06115     Dwarf_Unsigned * dw_augdata_len,
06116     Dwarf_Error*   dw_error);
06117
06151 DW_API int dwarf_expand_frame_instructions(Dwarf_Cie dw_cie,
06152     Dwarf_Small * dw_instructionspointer,
06153     Dwarf_Unsigned dw_length_in_bytes,
06154     Dwarf_Frame_Instr_Head * dw_head,
06155     Dwarf_Unsigned * dw_instr_count,
06156     Dwarf_Error * dw_error);
06157
06230 DW_API int dwarf_get_frame_instruction(
06231     Dwarf_Frame_Instr_Head dw_head,
06232     Dwarf_Unsigned dw_instr_index,
06233     Dwarf_Unsigned * dw_instr_offset_in_instrs,
06234     Dwarf_Small * dw_cfa_operation,
06235     const char ** dw_fields_description,
06236     Dwarf_Unsigned * dw_u0,
06237     Dwarf_Unsigned * dw_u1,
06238     Dwarf_Signed * dw_s0,
06239     Dwarf_Signed * dw_s1,
06240     Dwarf_Unsigned * dw_code_alignment_factor,
06241     Dwarf_Signed * dw_data_alignment_factor,
06242     Dwarf_Block * dw_expression_block,
06243     Dwarf_Error * dw_error);
06244
06266 DW_API int dwarf_get_frame_instruction_a(
06267     Dwarf_Frame_Instr_Head dw_/* head*/,
06268     Dwarf_Unsigned dw_instr_index,
06269     Dwarf_Unsigned * dw_instr_offset_in_instrs,
06270     Dwarf_Small * dw_cfa_operation,
06271     const char ** dw_fields_description,
06272     Dwarf_Unsigned * dw_u0,
06273     Dwarf_Unsigned * dw_u1,
06274     Dwarf_Unsigned * dw_u2,
06275     Dwarf_Signed * dw_s0,
06276     Dwarf_Signed * dw_s1,
06277     Dwarf_Unsigned * dw_code_alignment_factor,
06278     Dwarf_Signed * dw_data_alignment_factor,
06279     Dwarf_Block * dw_expression_block,
06280     Dwarf_Error * dw_error);
06281
06290 DW_API void dwarf_dealloc_frame_instr_head(Dwarf_Frame_Instr_Head
06291     dw_head);
06292
06309 DW_API int dwarf_fde_section_offset(Dwarf_Debug dw_dbg,
06310     Dwarf_Fde dw_in_fde,
06311     Dwarf_Off * dw_fde_off,
06312     Dwarf_Off * dw_cie_off,
06313     Dwarf_Error * dw_error);
06314
06329 DW_API int dwarf_cie_section_offset(Dwarf_Debug dw_dbg,
06330     Dwarf_Cie dw_in_cie,
06331     Dwarf_Off * dw_cie_off,
06332     Dwarf_Error * dw_error);
06333
06343 DW_API Dwarf_Half dwarf_set_frame_rule_table_size(
06344     Dwarf_Debug dw_dbg,
06345     Dwarf_Half dw_value);
06357 DW_API Dwarf_Half dwarf_set_frame_rule_initial_value(
06358     Dwarf_Debug dw_dbg,
06359     Dwarf_Half dw_value);
06369 DW_API Dwarf_Half dwarf_set_frame_cfa_value(
06370     Dwarf_Debug dw_dbg,

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06371     Dwarf_Half  dw_value);
06372
06382 DW_API Dwarf_Half dwarf_set_frame_same_value(
06383     Dwarf_Debug dw_dbg,
06384     Dwarf_Half dw_value);
06394 DW_API Dwarf_Half dwarf_set_frame_undefined_value(
06395     Dwarf_Debug dw_dbg,
06396     Dwarf_Half dw_value);
06450 DW_API int dwarf_get_abbrev(Dwarf_Debug dw_dbg,
06451     Dwarf_Unsigned dw_offset,
06452     Dwarf_Abbrev * dw_returned_abbrev,
06453     Dwarf_Unsigned* dw_length,
06454     Dwarf_Unsigned* dw_attr_count,
06455     Dwarf_Error* dw_error);
06456
06468 DW_API int dwarf_get_abbrev_tag(Dwarf_Abbrev dw_abbrev,
06469     Dwarf_Half* dw_return_tag_number,
06470     Dwarf_Error* dw_error);
06471
06485 DW_API int dwarf_get_abbrev_code(Dwarf_Abbrev dw_abbrev,
06486     Dwarf_Unsigned* dw_return_code_number,
06487     Dwarf_Error* dw_error);
06488
06502 DW_API int dwarf_get_abbrev_children_flag(Dwarf_Abbrev dw_abbrev,
06503     Dwarf_Signed* dw_return_flag,
06504     Dwarf_Error* dw_error);
06505
06539 DW_API int dwarf_get_abbrev_entry_b(Dwarf_Abbrev dw_abbrev,
06540     Dwarf_Unsigned dw_indx,
06541     Dwarf_Bool dw_filter_outliers,
06542     Dwarf_Unsigned * dw_returned_attr_num,
06543     Dwarf_Unsigned * dw_returned_form,
06544     Dwarf_Signed * dw_returned_implicit_const,
06545     Dwarf_Off * dw_offset,
06546     Dwarf_Error * dw_error);
06547
06581 DW_API int dwarf_get_str(Dwarf_Debug dw_dbg,
06582     Dwarf_Off dw_offset,
06583     char** dw_string,
06584     Dwarf_Signed * dw_strlen_of_string,
06585     Dwarf_Error* dw_error);
06586
06597 /* Allows applications to print the .debug_str_offsets
06598    section.
06599    Beginning at starting_offset zero,
06600    returns data about the first table found.
06601    The value *next_table_offset is the value
06602    of the next table (if any), one byte past
06603    the end of the table whose data is returned..
06604    Returns DW_DLV_NO_ENTRY if the starting offset
06605    is past the end of valid data.
06606
06607    There is no guarantee that there are no non-0 nonsense
06608    bytes in the section outside of useful tables,
06609    so this can fail and return nonsense or
06610    DW_DLV_ERROR if such garbage exists.
06611 */
06612
06629 DW_API int dwarf_open_str_offsets_table_access(Dwarf_Debug dw_dbg,
06630     Dwarf_Str_Offsets_Table * dw_table_data,
06631     Dwarf_Error * dw_error);
06632
06650 DW_API int dwarf_close_str_offsets_table_access(
06651     Dwarf_Str_Offsets_Table dw_table_data,
06652     Dwarf_Error * dw_error);
06653
06687 DW_API int dwarf_next_str_offsets_table(
06688     Dwarf_Str_Offsets_Table dw_table_data,
06689     Dwarf_Unsigned * dw_unit_length,
06690     Dwarf_Unsigned * dw_unit_length_offset,
06691     Dwarf_Unsigned * dw_table_start_offset,
06692     Dwarf_Half * dw_entry_size,
06693     Dwarf_Half * dw_version,
06694     Dwarf_Half * dw_padding,
06695     Dwarf_Unsigned * dw_table_value_count,
06696     Dwarf_Error * dw_error);
06697
06717 DW_API int dwarf_str_offsets_value_by_index(
06718     Dwarf_Str_Offsets_Table dw_table_data,
06719     Dwarf_Unsigned dw_index_to_entry,
06720     Dwarf_Unsigned * dw_entry_value,
06721     Dwarf_Error * dw_error);
06722
06740 DW_API int dwarf_str_offsets_statistics(
06741     Dwarf_Str_Offsets_Table dw_table_data,
06742     Dwarf_Unsigned * dw_wasted_byte_count,
06743     Dwarf_Unsigned * dw_table_count,

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06744     Dwarf_Error      * dw_error);
06745
06757 DW_API Dwarf_Unsigned dwarf_errno(Dwarf_Error dw_error);
06764 DW_API char* dwarf_errmsg(Dwarf_Error dw_error);
06772 DW_API char* dwarf_errmsg_by_number(Dwarf_Unsigned dw_errnum);
06773
06787 DW_API void dwarf_error_creation(Dwarf_Debug dw_dbg ,
06788     Dwarf_Error * dw_error, char * dw_errmsg);
06789
06798 DW_API void dwarf_dealloc_error(Dwarf_Debug dw_dbg,
06799     Dwarf_Error dw_error);
06841 DW_API void dwarf_dealloc(Dwarf_Debug dw_dbg,
06842     void* dw_space, Dwarf_Unsigned dw_type);
06862 DW_API int dwarf_get_debug_sup(Dwarf_Debug dw_dbg,
06863     Dwarf_Half      * dw_version,
06864     Dwarf_Small     * dw_is_supplementary,
06865     char            ** dw_filename,
06866     Dwarf_Unsigned  * dw_checksum_len,
06867     Dwarf_Small     ** dw_checksum,
06868     Dwarf_Error     * dw_error);
06904 DW_API int dwarf_dnames_header(Dwarf_Debug dw_dbg,
06905     Dwarf_Off      dw_starting_offset,
06906     Dwarf_Dnames_Head * dw_dn,
06907     Dwarf_Off      * dw_offset_of_next_table,
06908     Dwarf_Error    * dw_error);
06909
06917 DW_API void dwarf_dealloc_dnames(Dwarf_Dnames_Head dw_dn);
06918
06963 DW_API int dwarf_dnames_abbrevtable(Dwarf_Dnames_Head dw_dn,
06964     Dwarf_Unsigned dw_index,
06965     Dwarf_Unsigned *dw_abbrev_offset,
06966     Dwarf_Unsigned *dw_abbrev_code,
06967     Dwarf_Unsigned *dw_abbrev_tag,
06968     Dwarf_Unsigned dw_array_size,
06969     Dwarf_Half     *dw_idxattr_array,
06970     Dwarf_Half     *dw_form_array,
06971     Dwarf_Unsigned *dw_idxattr_count);
06972
06990 DW_API int dwarf_dnames_sizes(Dwarf_Dnames_Head dw_dn,
06991     Dwarf_Unsigned * dw_comp_unit_count,
06992     Dwarf_Unsigned * dw_local_type_unit_count,
06993     Dwarf_Unsigned * dw_foreign_type_unit_count,
06994     Dwarf_Unsigned * dw_bucket_count,
06995     Dwarf_Unsigned * dw_name_count,
06996     /* The following are counted in bytes */
06997     Dwarf_Unsigned * dw_abbrev_table_size,
06998     Dwarf_Unsigned * dw_entry_pool_size,
06999     Dwarf_Unsigned * dw_augmentation_string_size,
07000     char          ** dw_augmentation_string,
07001     Dwarf_Unsigned * dw_section_size,
07002     Dwarf_Half     * dw_table_version,
07003     Dwarf_Half     * dw_offset_size,
07004     Dwarf_Error    * dw_error);
07005
07016 DW_API int dwarf_dnames_offsets(Dwarf_Dnames_Head dw_dn,
07017     Dwarf_Unsigned * dw_header_offset,
07018     Dwarf_Unsigned * dw_cu_table_offset,
07019     Dwarf_Unsigned * dw_tu_local_offset,
07020     Dwarf_Unsigned * dw_foreign_tu_offset,
07021     Dwarf_Unsigned * dw_bucket_offset,
07022     Dwarf_Unsigned * dw_hashes_offset,
07023     Dwarf_Unsigned * dw_stringoffsets_offset,
07024     Dwarf_Unsigned * dw_entryoffsets_offset,
07025     Dwarf_Unsigned * dw_abbrev_table_offset,
07026     Dwarf_Unsigned * dw_entry_pool_offset,
07027     Dwarf_Error    * dw_error);
07028
07057 DW_API int dwarf_dnames_cu_table(Dwarf_Dnames_Head dw_dn,
07058     const char      * dw_type,
07059     Dwarf_Unsigned   dw_index_number,
07060     Dwarf_Unsigned   * dw_offset,
07061     Dwarf_Sig8       * dw_sig,
07062     Dwarf_Error      * dw_error);
07063
07085 DW_API int dwarf_dnames_bucket(Dwarf_Dnames_Head dw_dn,
07086     Dwarf_Unsigned   dw_bucket_number,
07087     Dwarf_Unsigned   * dw_index,
07088     Dwarf_Unsigned   * dw_indexcount,
07089     Dwarf_Error      * dw_error);
07090
07140 DW_API int dwarf_dnames_name(Dwarf_Dnames_Head dw_dn,
07141     Dwarf_Unsigned   dw_name_index,
07142     Dwarf_Unsigned   * dw_bucket_number,
07143     Dwarf_Unsigned   * dw_hash_value,
07144     Dwarf_Unsigned   * dw_offset_to_debug_str,
07145     char             * dw_ptrtostr,
07146     Dwarf_Unsigned   * dw_offset_in_entrypool,

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07147 Dwarf_Unsigned * dw_abbrev_number,
07148 Dwarf_Half * dw_abbrev_tag,
07149 Dwarf_Unsigned dw_array_size,
07150 Dwarf_Half * dw_idxattr_array,
07151 Dwarf_Half * dw_form_array,
07152 Dwarf_Unsigned * dw_idxattr_count,
07153 Dwarf_Error * dw_error);
07154
07196 DW_API int dwarf_dnames_entrypool(Dwarf_Dnames_Head dw_dn,
07197 Dwarf_Unsigned dw_offset_in_entrypool,
07198 Dwarf_Unsigned * dw_abbrev_code,
07199 Dwarf_Half * dw_tag,
07200 Dwarf_Unsigned * dw_value_count,
07201 Dwarf_Unsigned * dw_index_of_abbrev,
07202 Dwarf_Unsigned * dw_offset_of_initial_value,
07203 Dwarf_Error * dw_error);
07204
07264 DW_API int dwarf_dnames_entrypool_values(Dwarf_Dnames_Head dw_dn,
07265 Dwarf_Unsigned dw_index_of_abbrev,
07266 Dwarf_Unsigned dw_offset_in_entrypool_of_values,
07267 Dwarf_Unsigned dw_arrays_length,
07268 Dwarf_Half *dw_array_idx_number,
07269 Dwarf_Half *dw_array_form,
07270 Dwarf_Unsigned *dw_array_of_offsets,
07271 Dwarf_Sig8 *dw_array_of_signatures,
07272 Dwarf_Bool *dw_single_cu,
07273 Dwarf_Unsigned *dw_cu_offset,
07274 Dwarf_Unsigned *dw_offset_of_next_entrypool,
07275 Dwarf_Error *dw_error);
07276
07303 DW_API int dwarf_get_aranges(Dwarf_Debug dw_dbg,
07304 Dwarf_Arange** dw_aranges,
07305 Dwarf_Signed * dw_arange_count,
07306 Dwarf_Error* dw_error);
07307
07327 DW_API int dwarf_get_arange(Dwarf_Arange* dw_aranges,
07328 Dwarf_Unsigned dw_arange_count,
07329 Dwarf_Addr dw_address,
07330 Dwarf_Arange * dw_returned_arange,
07331 Dwarf_Error* dw_error);
07332
07345 DW_API int dwarf_get_cu_die_offset(Dwarf_Arange dw_arange,
07346 Dwarf_Off * dw_return_offset,
07347 Dwarf_Error* dw_error);
07348
07361 DW_API int dwarf_get_arange_cu_header_offset(Dwarf_Arange dw_arange,
07362 Dwarf_Off * dw_return_cu_header_offset,
07363 Dwarf_Error* dw_error);
07364
07390 DW_API int dwarf_get_arange_info_b(Dwarf_Arange dw_arange,
07391 Dwarf_Unsigned* dw_segment,
07392 Dwarf_Unsigned* dw_segment_entry_size,
07393 Dwarf_Addr * dw_start,
07394 Dwarf_Unsigned* dw_length,
07395 Dwarf_Off * dw_cu_die_offset,
07396 Dwarf_Error * dw_error );
07446 DW_API int dwarf_get_globals(Dwarf_Debug dw_dbg,
07447 Dwarf_Global** dw_globals,
07448 Dwarf_Signed * dw_number_of_globals,
07449 Dwarf_Error * dw_error);
07450
07451 #define DW_GL_GLOBALS 0 /* .debug_pubnames and .debug_names */
07452 #define DW_GL_PUBTYPES 1 /* .debug_pubtypes */
07453 /* the following are IRIX ONLY */
07454 #define DW_GL_FUNCNS 2 /* .debug_funcnames */
07455 #define DW_GL_TYPES 3 /* .debug_typenames */
07456 #define DW_GL_VARS 4 /* .debug_varnames */
07457 #define DW_GL_WEAKS 5 /* .debug_weaknames */
07480 DW_API int dwarf_get_pubtypes(Dwarf_Debug dw_dbg,
07481 Dwarf_Global** dw_pubtypes,
07482 Dwarf_Signed * dw_number_of_pubtypes,
07483 Dwarf_Error * dw_error);
07484
07510 DW_API int dwarf_globals_by_type(Dwarf_Debug dw_dbg,
07511 int dw_requested_section,
07512 Dwarf_Global **dw_contents,
07513 Dwarf_Signed *dw_count,
07514 Dwarf_Error *dw_error);
07515
07526 DW_API void dwarf_globals_dealloc(Dwarf_Debug dw_dbg,
07527 Dwarf_Global* dw_global_like,
07528 Dwarf_Signed dw_count);
07529
07542 DW_API int dwarf_globname(Dwarf_Global dw_global,
07543 char ** dw_returned_name,
07544 Dwarf_Error* dw_error);
07545

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07558 DW_API int dwarf_global_die_offset(Dwarf_Global dw_global,
07559     Dwarf_Off * dw_die_offset,
07560     Dwarf_Error * dw_error);
07561
07576 DW_API int dwarf_global_cu_offset(Dwarf_Global dw_global,
07577     Dwarf_Off* dw_cu_header_offset,
07578     Dwarf_Error* dw_error);
07579
07598 DW_API int dwarf_global_name_offsets(Dwarf_Global dw_global,
07599     char ** dw_returned_name,
07600     Dwarf_Off* dw_die_offset,
07601     Dwarf_Off* dw_cu_die_offset,
07602     Dwarf_Error* dw_error);
07603
07616 DW_API Dwarf_Half dwarf_global_tag_number(Dwarf_Global dw_global);
07617
07628 DW_API int dwarf_get_globals_header(Dwarf_Global dw_global,
07629     int * dw_category, /* DW_GL_GLOBAL for example */
07630     Dwarf_Off * dw_offset_pub_header,
07631     Dwarf_Unsigned * dw_length_size,
07632     Dwarf_Unsigned * dw_length_pub,
07633     Dwarf_Unsigned * dw_version,
07634     Dwarf_Unsigned * dw_header_info_offset,
07635     Dwarf_Unsigned * dw_info_length,
07636     Dwarf_Error * dw_error);
07637
07660 DW_API int dwarf_return_empty_pubnames(Dwarf_Debug dw_dbg,
07661     int dw_flag);
07662
07696 DW_API int dwarf_get_gnu_index_head(Dwarf_Debug dw_dbg,
07697     Dwarf_Bool dw_which_section,
07698     Dwarf_Gnu_Index_Head *dw_head,
07699     Dwarf_Unsigned *dw_index_block_count_out,
07700     Dwarf_Error *dw_error);
07708 DW_API void dwarf_gnu_index_dealloc(Dwarf_Gnu_Index_Head dw_head);
07747 DW_API int dwarf_get_gnu_index_block(Dwarf_Gnu_Index_Head dw_head,
07748     Dwarf_Unsigned dw_number,
07749     Dwarf_Unsigned *dw_block_length,
07750     Dwarf_Half *dw_version,
07751     Dwarf_Unsigned *dw_offset_into_debug_info,
07752     Dwarf_Unsigned *dw_size_of_debug_info_area,
07753     Dwarf_Unsigned *dw_count_of_index_entries,
07754     Dwarf_Error *dw_error);
07755
07787 DW_API int dwarf_get_gnu_index_block_entry(
07788     Dwarf_Gnu_Index_Head dw_head,
07789     Dwarf_Unsigned dw_blocknumber,
07790     Dwarf_Unsigned dw_entrynumber,
07791     Dwarf_Unsigned *dw_offset_in_debug_info,
07792     const char **dw_name_string,
07793     unsigned char *dw_flagbyte,
07794     unsigned char *dw_staticorglobal,
07795     unsigned char *dw_typeofentry,
07796     Dwarf_Error *dw_error);
07797
07858 DW_API int dwarf_gdbindex_header(Dwarf_Debug dw_dbg,
07859     Dwarf_Gdbindex * dw_gdbindexptr,
07860     Dwarf_Unsigned * dw_version,
07861     Dwarf_Unsigned * dw_cu_list_offset,
07862     Dwarf_Unsigned * dw_types_cu_list_offset,
07863     Dwarf_Unsigned * dw_address_area_offset,
07864     Dwarf_Unsigned * dw_symbol_table_offset,
07865     Dwarf_Unsigned * dw_constant_pool_offset,
07866     Dwarf_Unsigned * dw_section_size,
07867     const char ** dw_section_name,
07868     Dwarf_Error * dw_error);
07869
07877 DW_API void dwarf_dealloc_gdbindex(Dwarf_Gdbindex dw_gdbindexptr);
07878
07889 DW_API int dwarf_gdbindex_culist_array(
07890     Dwarf_Gdbindex dw_gdbindexptr,
07891     Dwarf_Unsigned * dw_list_length,
07892     Dwarf_Error * dw_error);
07893
07911 DW_API int dwarf_gdbindex_culist_entry(
07912     Dwarf_Gdbindex dw_gdbindexptr,
07913     Dwarf_Unsigned dw_entryindex,
07914     Dwarf_Unsigned * dw_cu_offset,
07915     Dwarf_Unsigned * dw_cu_length,
07916     Dwarf_Error * dw_error);
07917
07929 DW_API int dwarf_gdbindex_types_culist_array(
07930     Dwarf_Gdbindex dw_gdbindexptr,
07931     Dwarf_Unsigned * dw_types_list_length,
07932     Dwarf_Error * dw_error);
07933
07934 /* entryindex: 0 to types_list_length -1 */

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07956 DW_API int dwarf_gdbindex_types_culist_entry(
07957     Dwarf_Gdbindex dw_gdbindexptr,
07958     Dwarf_Unsigned dw_types_entryindex,
07959     Dwarf_Unsigned * dw_cu_offset,
07960     Dwarf_Unsigned * dw_tu_offset,
07961     Dwarf_Unsigned * dw_type_signature,
07962     Dwarf_Error * dw_error);
07963
07978 DW_API int dwarf_gdbindex_addressarea(
07979     Dwarf_Gdbindex dw_gdbindexptr,
07980     Dwarf_Unsigned * dw_addressarea_list_length,
07981     Dwarf_Error * dw_error);
07982
08001 DW_API int dwarf_gdbindex_addressarea_entry(
08002     Dwarf_Gdbindex dw_gdbindexptr,
08003     Dwarf_Unsigned dw_entryindex,
08004     Dwarf_Unsigned * dw_low_address,
08005     Dwarf_Unsigned * dw_high_address,
08006     Dwarf_Unsigned * dw_cu_index,
08007     Dwarf_Error * dw_error);
08008
08021 DW_API int dwarf_gdbindex_symboltable_array(
08022     Dwarf_Gdbindex dw_gdbindexptr,
08023     Dwarf_Unsigned * dw_syntab_list_length,
08024     Dwarf_Error * dw_error);
08025
08045 DW_API int dwarf_gdbindex_symboltable_entry(
08046     Dwarf_Gdbindex dw_gdbindexptr,
08047     Dwarf_Unsigned dw_entryindex,
08048     Dwarf_Unsigned * dw_string_offset,
08049     Dwarf_Unsigned * dw_cu_vector_offset,
08050     Dwarf_Error * dw_error);
08051
08069 DW_API int dwarf_gdbindex_cuvector_length(
08070     Dwarf_Gdbindex dw_gdbindexptr,
08071     Dwarf_Unsigned dw_cuvector_offset,
08072     Dwarf_Unsigned * dw_innercount,
08073     Dwarf_Error * dw_error);
08074
08091 DW_API int dwarf_gdbindex_cuvector_inner_attributes(
08092     Dwarf_Gdbindex dw_gdbindexptr,
08093     Dwarf_Unsigned dw_cuvector_offset_in,
08094     Dwarf_Unsigned dw_innerindex,
08095     Dwarf_Unsigned * dw_field_value,
08096     Dwarf_Error * dw_error);
08097
08120 DW_API int dwarf_gdbindex_cuvector_instance_expand_value(
08121     Dwarf_Gdbindex dw_gdbindexptr,
08122     Dwarf_Unsigned dw_field_value,
08123     Dwarf_Unsigned * dw_cu_index,
08124     Dwarf_Unsigned * dw_symbol_kind,
08125     Dwarf_Unsigned * dw_is_static,
08126     Dwarf_Error * dw_error);
08127
08143 DW_API int dwarf_gdbindex_string_by_offset(
08144     Dwarf_Gdbindex dw_gdbindexptr,
08145     Dwarf_Unsigned dw_stringoffset,
08146     const char ** dw_string_ptr,
08147     Dwarf_Error * dw_error);
08188 DW_API int dwarf_get_xu_index_header(Dwarf_Debug dw_dbg,
08189     const char * dw_section_type, /* "tu" or "cu" */
08190     Dwarf_Xu_Index_Header * dw_xuhdr,
08191     Dwarf_Unsigned * dw_version_number,
08192     Dwarf_Unsigned * dw_section_count,
08193     Dwarf_Unsigned * dw_units_count,
08194     Dwarf_Unsigned * dw_hash_slots_count,
08195     const char ** dw_sect_name,
08196     Dwarf_Error * dw_error);
08197
08206 DW_API void dwarf_dealloc_xu_header(Dwarf_Xu_Index_Header dw_xuhdr);
08207
08222 DW_API int dwarf_get_xu_index_section_type(
08223     Dwarf_Xu_Index_Header dw_xuhdr,
08224     const char ** dw_typename,
08225     const char ** dw_sectionname,
08226     Dwarf_Error * dw_error);
08227
08259 DW_API int dwarf_get_xu_hash_entry(Dwarf_Xu_Index_Header dw_xuhdr,
08260     Dwarf_Unsigned dw_index,
08261     Dwarf_Sig8 * dw_hash_value,
08262     Dwarf_Unsigned * dw_index_to_sections,
08263     Dwarf_Error * dw_error);
08264
08265 /* Columns 0 to L-1, valid. */
08288 DW_API int dwarf_get_xu_section_names(Dwarf_Xu_Index_Header dw_xuhdr,
08289     Dwarf_Unsigned dw_column_index,
08290     Dwarf_Unsigned* dw_SECT_number,

```

```

08291     const char    ** dw_SECT_name,
08292     Dwarf_Error    * dw_error);
08293
08322 DW_API int dwarf_get_xu_section_offset(
08323     Dwarf_Xu_Index_Header dw_xuhdr,
08324     Dwarf_Unsigned dw_row_index,
08325     Dwarf_Unsigned dw_column_index,
08326     Dwarf_Unsigned* dw_sec_offset,
08327     Dwarf_Unsigned* dw_sec_size,
08328     Dwarf_Error    * dw_error);
08329
08351 DW_API int dwarf_get_debugfission_for_die(Dwarf_Die dw_die,
08352     Dwarf_Debug_Fission_Per_CU * dw_percu_out,
08353     Dwarf_Error    * dw_error);
08354
08372 DW_API int dwarf_get_debugfission_for_key(Dwarf_Debug dw_dbg,
08373     Dwarf_Sig8          * dw_hash_sig,
08374     const char          * dw_cu_type,
08375     Dwarf_Debug_Fission_Per_CU * dw_percu_out,
08376     Dwarf_Error          * dw_error);
08377
08378 /* END debugfission dwp .debug_cu_index
08379 and .debug_tu_index meaningful operations. */
08380
08474 DW_API int dwarf_gnu_debuglink(Dwarf_Debug dw_dbg,
08475     char          ** dw_debuglink_path_returned,
08476     unsigned char ** dw_crc_returned,
08477     char          ** dw_debuglink_fullpath_returned,
08478     unsigned int   * dw_debuglink_path_length_returned,
08479     unsigned int   * dw_buildid_type_returned,
08480     char          ** dw_buildid_owner_name_returned,
08481     unsigned char ** dw_buildid_returned,
08482     unsigned int   * dw_buildid_length_returned,
08483     char          *** dw_paths_returned,
08484     unsigned int   * dw_paths_length_returned,
08485     Dwarf_Error*    dw_error);
08486
08519 DW_API int dwarf_suppress_debuglink_crc(int dw_suppress);
08520
08539 DW_API int dwarf_add_debuglink_global_path(Dwarf_Debug dw_dbg,
08540     const char * dw_pathname,
08541     Dwarf_Error* dw_error);
08542
08570 DW_API int dwarf_crc32(Dwarf_Debug dw_dbg,
08571     unsigned char * dw_crcbuf,
08572     Dwarf_Error    * dw_error);
08573
08597 DW_API unsigned int dwarf_basic_crc32(const unsigned char * dw_buf,
08598     unsigned long dw_len,
08599     unsigned int dw_init);
08618 #define DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE 4
08619
08662 DW_API int dwarf_get_harmless_error_list(Dwarf_Debug dw_dbg,
08663     unsigned int dw_count,
08664     const char ** dw_errmsg_ptrs_array,
08665     unsigned int * dw_newerr_count);
08666
08687 DW_API unsigned int dwarf_set_harmless_error_list_size(
08688     Dwarf_Debug dw_dbg,
08689     unsigned int dw_maxcount);
08690
08702 DW_API void dwarf_insert_harmless_error(Dwarf_Debug dw_dbg,
08703     char * dw_newerror);
08739 DW_API int dwarf_get_ACCESS_name(unsigned int dw_val_in,
08740     const char ** dw_s_out);
08743 DW_API int dwarf_get_ADDR_name(unsigned int dw_val_in,
08744     const char ** dw_s_out);
08747 DW_API int dwarf_get_AT_name(unsigned int dw_val_in,
08748     const char ** dw_s_out);
08751 DW_API int dwarf_get_ATCF_name(unsigned int dw_val_in,
08752     const char ** dw_s_out);
08755 DW_API int dwarf_get_ATE_name(unsigned int dw_val_in,
08756     const char ** dw_s_out);
08759 DW_API int dwarf_get_CC_name(unsigned int dw_val_in,
08760     const char ** dw_s_out);
08763 DW_API int dwarf_get_CFA_name(unsigned int dw_val_in,
08764     const char ** dw_s_out);
08767 DW_API int dwarf_get_children_name(unsigned int dw_val_in,
08768     const char ** dw_s_out);
08771 DW_API int dwarf_get_CHILDREN_name(unsigned int dw_val_in,
08772     const char ** dw_s_out);
08775 DW_API int dwarf_get_DEFAULTED_name(unsigned int dw_val_in,
08776     const char ** dw_s_out);
08779 DW_API int dwarf_get_DS_name(unsigned int dw_val_in,
08780     const char ** dw_s_out);
08783 DW_API int dwarf_get_DSC_name(unsigned int dw_val_in,
08784     const char ** dw_s_out);

```

```
08789 DW_API int dwarf_get_GNUKIND_name(unsigned int dw_val_in,
08790     const char ** dw_s_out);
08795 DW_API int dwarf_get_EH_name(unsigned int dw_val_in,
08796     const char ** dw_s_out);
08799 DW_API int dwarf_get_END_name(unsigned int dw_val_in,
08800     const char ** dw_s_out);
08803 DW_API int dwarf_get_FORM_name(unsigned int dw_val_in,
08804     const char ** dw_s_out);
08811 DW_API int dwarf_get_FRAME_name(unsigned int dw_val_in,
08812     const char ** dw_s_out);
08817 DW_API int dwarf_get_GNUIVIS_name(unsigned int dw_val_in,
08818     const char ** dw_s_out);
08819
08822 DW_API int dwarf_get_ID_name(unsigned int dw_val_in,
08823     const char ** dw_s_out);
08826 DW_API int dwarf_get_IDX_name(unsigned int dw_val_in,
08827     const char ** dw_s_out);
08830 DW_API int dwarf_get_INL_name(unsigned int dw_val_in,
08831     const char ** dw_s_out);
08834 DW_API int dwarf_get_ISA_name(unsigned int dw_val_in,
08835     const char ** dw_s_out);
08838 DW_API int dwarf_get_LANG_name(unsigned int dw_val_in,
08839     const char ** dw_s_out);
08842 DW_API int dwarf_get_LLE_name(unsigned int dw_val_in,
08843     const char ** dw_s_out);
08849 DW_API int dwarf_get_LLEX_name(unsigned int dw_val_in,
08850     const char ** dw_s_out );
08851
08854 DW_API int dwarf_get_LNCT_name(unsigned int dw_val_in,
08855     const char ** dw_s_out);
08858 DW_API int dwarf_get_LNE_name(unsigned int dw_val_in,
08859     const char ** dw_s_out);
08862 DW_API int dwarf_get_LNS_name(unsigned int dw_val_in,
08863     const char ** dw_s_out);
08868 DW_API int dwarf_get_MACINFO_name(unsigned int dw_val_in,
08869     const char ** dw_s_out);
08874 DW_API int dwarf_get_MACRO_name(unsigned int dw_val_in,
08875     const char ** dw_s_out);
08878 DW_API int dwarf_get_OP_name(unsigned int dw_val_in,
08879     const char ** dw_s_out);
08882 DW_API int dwarf_get_ORD_name(unsigned int dw_val_in,
08883     const char ** dw_s_out);
08886 DW_API int dwarf_get_RLE_name(unsigned int dw_val_in,
08887     const char ** dw_s_out);
08890 DW_API int dwarf_get_SECT_name(unsigned int dw_val_in,
08891     const char ** dw_s_out);
08894 DW_API int dwarf_get_TAG_name(unsigned int dw_val_in,
08895     const char ** dw_s_out);
08898 DW_API int dwarf_get_UT_name(unsigned int dw_val_in,
08899     const char ** dw_s_out);
08902 DW_API int dwarf_get_VIRTUALITY_name(unsigned int dw_val_in,
08903     const char ** dw_s_out);
08906 DW_API int dwarf_get_VIS_name(unsigned int dw_val_in,
08907     const char ** dw_s_out);
08908
08919 DW_API int dwarf_get_FORM_CLASS_name(enum Dwarf_Form_Class dw_fc,
08920     const char ** dw_s_out);
08974 DW_API int dwarf_get_die_section_name(Dwarf_Debug dw_dbg,
08975     Dwarf_Bool dw_is_info,
08976     const char **dw_sec_name,
08977     Dwarf_Error *dw_error);
08978
08985 DW_API int dwarf_get_die_section_name_b(Dwarf_Die dw_die,
08986     const char ** dw_sec_name,
08987     Dwarf_Error * dw_error);
08988
08991 DW_API int dwarf_get_macro_section_name(Dwarf_Debug dw_dbg,
08992     const char ** dw_sec_name_out,
08993     Dwarf_Error * dw_err);
08994
09037 DW_API int dwarf_get_real_section_name(Dwarf_Debug dw_dbg,
09038     const char * dw_std_section_name,
09039     const char ** dw_actual_sec_name_out,
09040     Dwarf_Small * dw_marked_zcompressed,
09041     Dwarf_Small * dw_marked_zlib_compressed,
09042     Dwarf_Small * dw_marked_shf_compressed,
09043     Dwarf_Unsigned * dw_compressed_length,
09044     Dwarf_Unsigned * dw_uncompressed_length,
09045     Dwarf_Error * dw_error);
09046
09051 DW_API int dwarf_get_frame_section_name(Dwarf_Debug dw_dbg,
09052     const char ** dw_section_name_out,
09053     Dwarf_Error * dw_error);
09054
09060 DW_API int dwarf_get_frame_section_name_ghnu(Dwarf_Debug dw_dbg,
09061     const char ** dw_section_name_out,
09062     Dwarf_Error * dw_error);
```

```

09063
09067 DW_API int dwarf_get_aranges_section_name(Dwarf_Debug dw_dbg,
09068     const char ** dw_section_name_out,
09069     Dwarf_Error * dw_error);
09070
09074 DW_API int dwarf_get_ranges_section_name(Dwarf_Debug dw_dbg,
09075     const char ** dw_section_name_out,
09076     Dwarf_Error * dw_error);
09077
09078 /* These two get the offset or address size as defined
09079    by the object format (not by DWARF). */
09085 DW_API int dwarf_get_offset_size(Dwarf_Debug dw_dbg,
09086     Dwarf_Half * dw_offset_size,
09087     Dwarf_Error * dw_error);
09088
09094 DW_API int dwarf_get_address_size(Dwarf_Debug dw_dbg,
09095     Dwarf_Half * dw_addr_size,
09096     Dwarf_Error * dw_error);
09097
09101 DW_API int dwarf_get_string_section_name(Dwarf_Debug dw_dbg,
09102     const char ** dw_section_name_out,
09103     Dwarf_Error * dw_error);
09104
09108 DW_API int dwarf_get_line_section_name(Dwarf_Debug dw_dbg,
09109     const char ** dw_section_name_out,
09110     Dwarf_Error * dw_error);
09111
09125 DW_API int dwarf_get_line_section_name_from_die(Dwarf_Die dw_die,
09126     const char ** dw_section_name_out,
09127     Dwarf_Error * dw_error);
09128
09175 DW_API int dwarf_get_section_info_by_name_a(Dwarf_Debug dw_dbg,
09176     const char * dw_section_name,
09177     Dwarf_Addr * dw_section_addr,
09178     Dwarf_Unsigned* dw_section_size,
09179     Dwarf_Unsigned* dw_section_flags,
09180     Dwarf_Unsigned* dw_section_offset,
09181     Dwarf_Error * dw_error);
09182
09195 DW_API int dwarf_get_section_info_by_name(Dwarf_Debug dw_dbg,
09196     const char * dw_section_name,
09197     Dwarf_Addr * dw_section_addr,
09198     Dwarf_Unsigned* dw_section_size,
09199     Dwarf_Error * dw_error);
09200
09246 DW_API int dwarf_get_section_info_by_index_a(Dwarf_Debug dw_dbg,
09247     int dw_section_index,
09248     const char ** dw_section_name,
09249     Dwarf_Addr* dw_section_addr,
09250     Dwarf_Unsigned* dw_section_size,
09251     Dwarf_Unsigned* dw_section_flags,
09252     Dwarf_Unsigned* dw_section_offset,
09253     Dwarf_Error* dw_error);
09254
09267 DW_API int dwarf_get_section_info_by_index(Dwarf_Debug dw_dbg,
09268     int dw_section_index,
09269     const char ** dw_section_name,
09270     Dwarf_Addr* dw_section_addr,
09271     Dwarf_Unsigned* dw_section_size,
09272     Dwarf_Error* dw_error);
09273
09360 DW_API int dwarf_machine_architecture_a(Dwarf_Debug dw_dbg,
09361     Dwarf_Small *dw_ftype,
09362     Dwarf_Small *dw_obj_pointersize,
09363     Dwarf_Bool *dw_obj_is_big_endian,
09364     Dwarf_Unsigned *dw_obj_machine, /*Elf e_machine */
09365     Dwarf_Unsigned *dw_obj_type, /* Elf e_type */
09366     Dwarf_Unsigned *dw_obj_flags,
09367     Dwarf_Small *dw_path_source,
09368     Dwarf_Unsigned *dw_ub_offset,
09369     Dwarf_Unsigned *dw_ub_count,
09370     Dwarf_Unsigned *dw_ub_index,
09371     Dwarf_Unsigned *dw_comdat_groupnumber);
09372
09380 DW_API int dwarf_machine_architecture(Dwarf_Debug dw_dbg,
09381     Dwarf_Small *dw_ftype,
09382     Dwarf_Small *dw_obj_pointersize,
09383     Dwarf_Bool *dw_obj_is_big_endian,
09384     Dwarf_Unsigned *dw_obj_machine, /*architecture*/
09385     Dwarf_Unsigned *dw_obj_flags,
09386     Dwarf_Small *dw_path_source,
09387     Dwarf_Unsigned *dw_ub_offset,
09388     Dwarf_Unsigned *dw_ub_count,
09389     Dwarf_Unsigned *dw_ub_index,
09390     Dwarf_Unsigned *dw_comdat_groupnumber);
09391
09403 DW_API Dwarf_Unsigned dwarf_get_section_count(Dwarf_Debug dw_dbg);

```



```

09404
09423 DW_API int dwarf_get_section_max_offsets_d(Dwarf_Debug dw_dbg,
09424     Dwarf_Unsigned * dw_debug_info_size,
09425     Dwarf_Unsigned * dw_debug_abbrev_size,
09426     Dwarf_Unsigned * dw_debug_line_size,
09427     Dwarf_Unsigned * dw_debug_loc_size,
09428     Dwarf_Unsigned * dw_debug_aranges_size,
09429
09430     Dwarf_Unsigned * dw_debug_macinfo_size,
09431     Dwarf_Unsigned * dw_debug_pubnames_size,
09432     Dwarf_Unsigned * dw_debug_str_size,
09433     Dwarf_Unsigned * dw_debug_frame_size,
09434     Dwarf_Unsigned * dw_debug_ranges_size,
09435
09436     Dwarf_Unsigned * dw_debug_pubtypes_size,
09437     Dwarf_Unsigned * dw_debug_types_size,
09438     Dwarf_Unsigned * dw_debug_macro_size,
09439     Dwarf_Unsigned * dw_debug_str_offsets_size,
09440     Dwarf_Unsigned * dw_debug_sup_size,
09441
09442     Dwarf_Unsigned * dw_debug_cu_index_size,
09443     Dwarf_Unsigned * dw_debug_tu_index_size,
09444     Dwarf_Unsigned * dw_debug_names_size,
09445     Dwarf_Unsigned * dw_debug_loclists_size,
09446     Dwarf_Unsigned * dw_debug_rnglists_size);
09495 DW_API int dwarf_sec_group_sizes(Dwarf_Debug dw_dbg,
09496     Dwarf_Unsigned *dw_section_count_out,
09497     Dwarf_Unsigned *dw_group_count_out,
09498     Dwarf_Unsigned *dw_selected_group_out,
09499     Dwarf_Unsigned *dw_map_entry_count_out,
09500     Dwarf_Error *dw_error);
09501
09532 DW_API int dwarf_sec_group_map(Dwarf_Debug dw_dbg,
09533     Dwarf_Unsigned dw_map_entry_count,
09534     Dwarf_Unsigned *dw_group_numbers_array,
09535     Dwarf_Unsigned *dw_sec_numbers_array,
09536     const char **dw_sec_names_array,
09537     Dwarf_Error *dw_error);
09552 DW_API int dwarf_encode_leb128(Dwarf_Unsigned dw_val,
09553     int *dw_nbytes,
09554     char *dw_space,
09555     int dw_splen);
09556 DW_API int dwarf_encode_signed_leb128(Dwarf_Signed dw_val,
09557     int *dw_nbytes,
09558     char *dw_space,
09559     int dw_splen);
09560 /* Same for LEB decoding routines.
09561 caller sets endptr to an address one past the last valid
09562 address the library should be allowed to
09563 access. */
09564 DW_API int dwarf_decode_leb128(char *dw_leb,
09565     Dwarf_Unsigned *dw_leblen,
09566     Dwarf_Unsigned *dw_outval,
09567     char *dw_endptr);
09568 DW_API int dwarf_decode_signed_leb128(char *dw_leb,
09569     Dwarf_Unsigned *dw_leblen,
09570     Dwarf_Signed *dw_outval,
09571     char *dw_endptr);
09588 DW_API const char * dwarf_package_version(void);
09589
09605 DW_API int dwarf_set_stringcheck(int dw_stringcheck);
09606
09628 DW_API int dwarf_set_reloc_application(int dw_apply);
09629
09654 DW_API void (*dwarf_get_endian_copy_function(Dwarf_Debug dw_dbg))
09655     (void *, const void *, unsigned long);
09656
09657 /* A global flag in libdwarf. Applies to all Dwarf_Debug */
09658 DW_API extern Dwarf_Cmdline_Options dwarf_cmdline_options;
09659
09674 DW_API void dwarf_record_cmdline_options(
09675     Dwarf_Cmdline_Options dw_dd_options);
09676
09695 DW_API int dwarf_set_de_alloc_flag(int dw_v);
09696
09725 DW_API int dwarf_library_allow_dup_attr(int dw_v);
09726
09748 DW_API Dwarf_Small dwarf_set_default_address_size(
09749     Dwarf_Debug dw_dbg,
09750     Dwarf_Small dw_value);
09751
09777 DW_API int dwarf_get_universalbinary_count(
09778     Dwarf_Debug dw_dbg,
09779     Dwarf_Unsigned *dw_current_index,
09780     Dwarf_Unsigned *dw_available_count);
09781
09800 DW_API int dwarf_object_detector_path_b(const char * dw_path,

```



```
09801     char          *dw_outpath_buffer,
09802     unsigned long   dw_outpathlen,
09803     char **         dw_gl_pathnames,
09804     unsigned int     dw_gl_pathcount,
09805     unsigned int     *dw_ftype,
09806     unsigned int     *dw_endian,
09807     unsigned int     *dw_offsetsize,
09808     Dwarf_Unsigned   *dw_filesize,
09809     unsigned char    *dw_pathsource,
09810     int * dw_errcode);
09811
09812 /* Solely looks for dSYM */
09813 DW_API int dwarf_object_detector_path_dSYM(const char * dw_path,
09814     char *         dw_outpath,
09815     unsigned long   dw_outpath_len,
09816     char **         dw_gl_pathnames,
09817     unsigned int     dw_gl_pathcount,
09818     unsigned int     *dw_ftype,
09819     unsigned int     *dw_endian,
09820     unsigned int     *dw_offsetsize,
09821     Dwarf_Unsigned   *dw_filesize,
09822     unsigned char    *dw_pathsource,
09823     int * dw_errcode);
09824
09825 DW_API int dwarf_object_detector_fd(int dw_fd,
09826     unsigned int     *dw_ftype,
09827     unsigned int     *dw_endian,
09828     unsigned int     *dw_offsetsize,
09829     Dwarf_Unsigned   *dw_filesize,
09830     int * dw_errcode);
09890 DW_API enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference(
09891     enum Dwarf_Sec_Alloc_Pref dw_load_preference);
09892
09932 DW_API int dwarf_get_mmap_count(Dwarf_Debug dw_dbg,
09933     Dwarf_Unsigned *dw_mmap_count,
09934     Dwarf_Unsigned *dw_mmap_size,
09935     Dwarf_Unsigned *dw_malloc_count,
09936     Dwarf_Unsigned *dw_malloc_size);
09940 #ifdef __cplusplus
09941 }
09942 #endif /* __cplusplus */
09943 #endif /* _LIBDWARF_H */
```



# Index

- .debug\_addr access: DWARF5, [135](#)
  - dwarf\_dealloc\_debug\_addr\_table, [137](#)
  - dwarf\_debug\_addr\_by\_index, [136](#)
  - dwarf\_debug\_addr\_table, [135](#)
- /home/davea/dwarf/code/src/bin/dwarfexample/jitreader.c, [289](#)
- /home/davea/dwarf/code/src/bin/dwarfexample/showsectiongroups.c, [289](#)
- /home/davea/dwarf/code/src/lib/libdwarf/dwarf.h, [291](#)
- /home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h, [311](#)
- A Consumer Library Interface to DWARF, [1](#)
- A simple report on section groups., [276](#)
- Abbreviations Section Details, [161](#)
  - dwarf\_get\_abbrev, [162](#)
  - dwarf\_get\_abbrev\_children\_flag, [163](#)
  - dwarf\_get\_abbrev\_code, [163](#)
  - dwarf\_get\_abbrev\_entry\_b, [164](#)
  - dwarf\_get\_abbrev\_tag, [162](#)
- Access GNU .gnu\_debuglink, build-id., [202](#)
  - dwarf\_add\_debuglink\_global\_path, [206](#)
  - dwarf\_basic\_crc32, [207](#)
  - dwarf\_crc32, [206](#)
  - dwarf\_gnu\_debuglink, [203](#)
  - dwarf\_suppress\_debuglink\_crc, [205](#)
- Access to Section .debug\_sup, [171](#)
  - dwarf\_get\_debug\_sup, [172](#)
- Accessing accessing raw rnglist, [268](#)
- Accessing rnglists section, [270](#)
- Attaching a tied dbg, [232](#)
- Basic Library Datatypes Group, [39](#)
  - Dwarf\_Addr, [39](#)
  - Dwarf\_Bool, [40](#)
  - Dwarf\_Half, [40](#)
  - Dwarf\_Off, [39](#)
  - Dwarf\_Ptr, [40](#)
  - Dwarf\_Signed, [39](#)
  - Dwarf\_Small, [40](#)
  - Dwarf\_Unsigned, [39](#)
- checkexamples.c, [31](#), [289](#)
- Compilation Unit (CU) Access, [69](#)
  - dwarf\_child, [73](#)
  - dwarf\_cu\_header\_basics, [72](#)
  - dwarf\_dealloc\_die, [74](#)
  - dwarf\_die\_from\_hash\_signature, [74](#)
  - dwarf\_find\_die\_given\_sig8, [75](#)
  - dwarf\_get\_die\_infotypes\_flag, [75](#)
  - dwarf\_next\_cu\_header\_d, [71](#)
  - dwarf\_next\_cu\_header\_e, [69](#)
  - dwarf\_offdie\_b, [74](#)
  - dwarf\_siblingof\_b, [72](#)
  - dwarf\_siblingof\_c, [71](#)
- Debugging Information Entry (DIE) content, [76](#)
  - dwarf\_addr\_form\_is\_indexed, [79](#)
  - dwarf\_arrayorder, [89](#)
  - dwarf\_attr, [81](#)
  - dwarf\_bitoffset, [88](#)
  - dwarf\_bitsize, [88](#)
  - dwarf\_bytesize, [87](#)
  - dwarf\_CU\_dieoffset\_given\_die, [79](#)
  - dwarf\_debug\_addr\_index\_to\_addr, [78](#)
  - dwarf\_die\_abbrev\_children\_flag, [83](#)
  - dwarf\_die\_abbrev\_code, [82](#)
  - dwarf\_die\_abbrev\_global\_offset, [77](#)
  - dwarf\_die\_CU\_offset, [80](#)
  - dwarf\_die\_CU\_offset\_range, [81](#)
  - dwarf\_die\_offsets, [85](#)
  - dwarf\_die\_text, [82](#)
  - dwarf\_diename, [82](#)
  - dwarf\_dieoffset, [78](#)
  - dwarf\_dietype\_offset, [87](#)
  - dwarf\_get\_cu\_die\_offset\_given\_cu\_header\_offset\_b, [80](#)
  - dwarf\_get\_die\_address\_size, [85](#)
  - dwarf\_get\_version\_of\_die, [85](#)
  - dwarf\_hasattr, [84](#)
  - dwarf\_highpc\_b, [86](#)
  - dwarf\_lowpc, [86](#)
  - dwarf\_offset\_list, [84](#)
  - dwarf\_srclang, [89](#)
  - dwarf\_tag, [78](#)
  - dwarf\_validate\_die\_sibling, [83](#)
- Default stack frame macros, [51](#)
- Defined and Opaque Structs, [42](#)
  - Dwarf\_Abbrev, [48](#)
  - Dwarf\_Arange, [48](#)
  - Dwarf\_Attribute, [48](#)
  - Dwarf\_Block, [43](#)
  - Dwarf\_Cie, [48](#)
  - Dwarf\_Debug, [46](#)
  - Dwarf\_Debug\_Addr\_Table, [47](#)
  - Dwarf\_Debug\_Fission\_Per\_CU, [50](#)
  - Dwarf\_Die, [47](#)
  - Dwarf\_Dnames\_Head, [49](#)
  - Dwarf\_Dsc\_Head, [44](#)
  - Dwarf\_Error, [46](#)
  - Dwarf\_Fde, [48](#)

- Dwarf\_Form\_Data16, [43](#)
- Dwarf\_Frame\_Instr\_Head, [44](#)
- Dwarf\_Func, [47](#)
- Dwarf\_Gdbindex, [49](#)
- Dwarf\_Global, [47](#)
- Dwarf\_Gnu\_Index\_Head, [44](#)
- Dwarf\_Handler, [49](#)
- Dwarf\_Line, [47](#)
- Dwarf\_Line\_Context, [49](#)
- Dwarf\_Loc\_Head\_c, [44](#)
- Dwarf\_Locdesc\_c, [43](#)
- Dwarf\_Macro\_Context, [49](#)
- Dwarf\_Macro\_Details, [49](#)
- Dwarf\_Obj\_Access\_Interface\_a, [50](#)
- Dwarf\_Obj\_Access\_Methods\_a, [50](#)
- Dwarf\_Obj\_Access\_Section\_a, [50](#)
- dwarf\_printf\_callback\_function\_type, [44](#)
- Dwarf\_Ranges, [45](#)
- Dwarf\_Regtable3, [46](#)
- Dwarf\_Regtable\_Entry3, [45](#)
- Dwarf\_Rnglists\_Head, [50](#)
- Dwarf\_Sec\_Alloc\_Pref, [50](#)
- Dwarf\_Section, [47](#)
- Dwarf\_Sig8, [43](#)
- Dwarf\_Str\_Offsets\_Table, [44](#)
- Dwarf\_Type, [47](#)
- Dwarf\_Var, [48](#)
- Dwarf\_Weak, [48](#)
- Dwarf\_Xu\_Index\_Header, [49](#)
- Demonstrating reading DWARF without a file., [270](#)
- Detaching a tied dbg, [233](#)
- Determine Object Type of a File, [228](#)
- DIE Attribute and Attribute-Form Details, [89](#)
  - dwarf\_attr\_offset, [101](#)
  - dwarf\_attrlist, [91](#)
  - dwarf\_convert\_to\_global\_offset, [102](#)
  - dwarf\_dealloc\_attribute, [102](#)
  - dwarf\_dealloc\_uncompressed\_block, [102](#)
  - dwarf\_discr\_entry\_s, [104](#)
  - dwarf\_discr\_entry\_u, [103](#)
  - dwarf\_discr\_list, [103](#)
  - dwarf\_formaddr, [95](#)
  - dwarf\_formblock, [98](#)
  - dwarf\_formdata16, [97](#)
  - dwarf\_formexprloc, [100](#)
  - dwarf\_formflag, [96](#)
  - dwarf\_formref, [93](#)
  - dwarf\_formsdata, [97](#)
  - dwarf\_formsig8, [95](#)
  - dwarf\_formsig8\_const, [95](#)
  - dwarf\_formstring, [98](#)
  - dwarf\_formudata, [97](#)
  - dwarf\_get\_debug\_addr\_index, [96](#)
  - dwarf\_get\_debug\_str\_index, [100](#)
  - dwarf\_get\_form\_class, [101](#)
  - dwarf\_global\_formref, [94](#)
  - dwarf\_global\_formref\_b, [94](#)
  - dwarf\_hasform, [92](#)
  - dwarf\_uncompress\_integer\_block\_a, [101](#)
  - dwarf\_whatattr, [93](#)
  - dwarf\_whatform, [92](#)
  - dwarf\_whatform\_direct, [92](#)
- Documenting Form\_Block, [242](#)
- DW\_DLA alloc/dealloc typename&number, [51](#)
- DW\_DLE Dwarf\_Error numbers, [52](#)
  - DW\_DLE\_LAST, [61](#)
- DW\_DLE\_LAST
  - DW\_DLE Dwarf\_Error numbers, [61](#)
- dwarf.h, [27](#), [291](#)
- Dwarf\_Abbrev
  - Defined and Opaque Structs, [48](#)
- dwarf\_add\_debuglink\_global\_path
  - Access GNU .gnu\_debuglink, build-id., [206](#)
- Dwarf\_Addr
  - Basic Library Datatypes Group, [39](#)
- dwarf\_addr\_form\_is\_indexed
  - Debugging Information Entry (DIE) content, [79](#)
- Dwarf\_Arange
  - Defined and Opaque Structs, [48](#)
- dwarf\_arrayorder
  - Debugging Information Entry (DIE) content, [89](#)
- dwarf\_attr
  - Debugging Information Entry (DIE) content, [81](#)
- dwarf\_attr\_offset
  - DIE Attribute and Attribute-Form Details, [101](#)
- Dwarf\_Attribute
  - Defined and Opaque Structs, [48](#)
- dwarf\_attrlist
  - DIE Attribute and Attribute-Form Details, [91](#)
- dwarf\_basic\_crc32
  - Access GNU .gnu\_debuglink, build-id., [207](#)
- dwarf\_bitoffset
  - Debugging Information Entry (DIE) content, [88](#)
- dwarf\_bitsize
  - Debugging Information Entry (DIE) content, [88](#)
- Dwarf\_Block
  - Defined and Opaque Structs, [43](#)
- Dwarf\_Block\_s, [281](#)
- Dwarf\_Bool
  - Basic Library Datatypes Group, [40](#)
- dwarf\_bytesize
  - Debugging Information Entry (DIE) content, [87](#)
- dwarf\_check\_lineheader\_b
  - Line Table For a CU, [118](#)
- dwarf\_child
  - Compilation Unit (CU) Access, [73](#)
- Dwarf\_Cie
  - Defined and Opaque Structs, [48](#)
- dwarf\_cie\_section\_offset
  - Stack Frame Access, [159](#)
- dwarf\_close\_str\_offsets\_table\_access
  - Str\_Offsets section details, [166](#)
- Dwarf\_Cmdline\_Options\_s, [281](#)
- dwarf\_convert\_to\_global\_offset
  - DIE Attribute and Attribute-Form Details, [102](#)
- dwarf\_crc32

- Access GNU .gnu\_debuglink, build-id., 206
- dwarf\_CU\_dieoffset\_given\_die
  - Debugging Information Entry (DIE) content, 79
- dwarf\_cu\_header\_basics
  - Compilation Unit (CU) Access, 72
- dwarf\_dealloc
  - Generic dwarf\_dealloc Function, 171
- dwarf\_dealloc\_attribute
  - DIE Attribute and Attribute-Form Details, 102
- dwarf\_dealloc\_debug\_addr\_table
  - .debug\_addr access: DWARF5, 137
- dwarf\_dealloc\_die
  - Compilation Unit (CU) Access, 74
- dwarf\_dealloc\_dnames
  - Fast Access to .debug\_names DWARF5, 174
- dwarf\_dealloc\_error
  - Dwarf\_Error Functions, 170
- dwarf\_dealloc\_fde\_cie\_list
  - Stack Frame Access, 147
- dwarf\_dealloc\_frame\_instr\_head
  - Stack Frame Access, 158
- dwarf\_dealloc\_gdbindex
  - Fast Access to Gdb Index, 192
- dwarf\_dealloc\_loc\_head\_c
  - Locations of data: DWARF2-DWARF5, 132
- dwarf\_dealloc\_macro\_context
  - Macro Access: DWARF5, 139
- dwarf\_dealloc\_ranges
  - Ranges: code addresses in DWARF3-4, 121
- dwarf\_dealloc\_rnglists\_head
  - Rnglists: code addresses in DWARF5, 124
- dwarf\_dealloc\_uncompressed\_block
  - DIE Attribute and Attribute-Form Details, 102
- dwarf\_dealloc\_xu\_header
  - Fast Access to Split Dwarf (Debug Fission), 199
- Dwarf\_Debug
  - Defined and Opaque Structs, 46
- dwarf\_debug\_addr\_by\_index
  - .debug\_addr access: DWARF5, 136
- dwarf\_debug\_addr\_index\_to\_addr
  - Debugging Information Entry (DIE) content, 78
- Dwarf\_Debug\_Addr\_Table
  - Defined and Opaque Structs, 47
- dwarf\_debug\_addr\_table
  - .debug\_addr access: DWARF5, 135
- Dwarf\_Debug\_Fission\_Per\_CU
  - Defined and Opaque Structs, 50
- Dwarf\_Debug\_Fission\_Per\_CU\_s, 282
- Dwarf\_Die
  - Defined and Opaque Structs, 47
- dwarf\_die\_abbrev\_children\_flag
  - Debugging Information Entry (DIE) content, 83
- dwarf\_die\_abbrev\_code
  - Debugging Information Entry (DIE) content, 82
- dwarf\_die\_abbrev\_global\_offset
  - Debugging Information Entry (DIE) content, 77
- dwarf\_die\_CU\_offset
  - Debugging Information Entry (DIE) content, 80
- dwarf\_die\_CU\_offset\_range
  - Debugging Information Entry (DIE) content, 81
- dwarf\_die\_from\_hash\_signature
  - Compilation Unit (CU) Access, 74
- dwarf\_die\_offsets
  - Debugging Information Entry (DIE) content, 85
- dwarf\_die\_text
  - Debugging Information Entry (DIE) content, 82
- dwarf\_diename
  - Debugging Information Entry (DIE) content, 82
- dwarf\_dieoffset
  - Debugging Information Entry (DIE) content, 78
- dwarf\_dietype\_offset
  - Debugging Information Entry (DIE) content, 87
- dwarf\_discr\_entry\_s
  - DIE Attribute and Attribute-Form Details, 104
- dwarf\_discr\_entry\_u
  - DIE Attribute and Attribute-Form Details, 103
- dwarf\_discr\_list
  - DIE Attribute and Attribute-Form Details, 103
- dwarf\_dnames\_abbrevtable
  - Fast Access to .debug\_names DWARF5, 174
- dwarf\_dnames\_bucket
  - Fast Access to .debug\_names DWARF5, 176
- dwarf\_dnames\_cu\_table
  - Fast Access to .debug\_names DWARF5, 175
- dwarf\_dnames\_entrpool
  - Fast Access to .debug\_names DWARF5, 177
- dwarf\_dnames\_entrpool\_values
  - Fast Access to .debug\_names DWARF5, 178
- Dwarf\_Dnames\_Head
  - Defined and Opaque Structs, 49
- dwarf\_dnames\_header
  - Fast Access to .debug\_names DWARF5, 173
- dwarf\_dnames\_name
  - Fast Access to .debug\_names DWARF5, 176
- dwarf\_dnames\_offsets
  - Fast Access to .debug\_names DWARF5, 175
- dwarf\_dnames\_sizes
  - Fast Access to .debug\_names DWARF5, 175
- Dwarf\_Dsc\_Head
  - Defined and Opaque Structs, 44
- dwarf\_errmsg
  - Dwarf\_Error Functions, 169
- dwarf\_errmsg\_by\_number
  - Dwarf\_Error Functions, 169
- dwarf\_errno
  - Dwarf\_Error Functions, 169
- Dwarf\_Error
  - Defined and Opaque Structs, 46
- Dwarf\_Error Functions, 168
  - dwarf\_dealloc\_error, 170
  - dwarf\_errmsg, 169
  - dwarf\_errmsg\_by\_number, 169
  - dwarf\_errno, 169
  - dwarf\_error\_creation, 170
- dwarf\_error\_creation
  - Dwarf\_Error Functions, 170

- dwarf\_expand\_frame\_instructions
  - Stack Frame Access, [156](#)
- Dwarf\_Fde
  - Defined and Opaque Structs, [48](#)
- dwarf\_fde\_section\_offset
  - Stack Frame Access, [159](#)
- dwarf\_find\_die\_given\_sig8
  - Compilation Unit (CU) Access, [75](#)
- dwarf\_find\_macro\_value\_start
  - Macro Access: DWARF2-4, [143](#)
- dwarf\_finish
  - Libdwarf Initialization Functions, [66](#)
- Dwarf\_Form\_Class
  - Enumerators with various purposes, [41](#)
- Dwarf\_Form\_Data16
  - Defined and Opaque Structs, [43](#)
- Dwarf\_Form\_Data16\_s, [282](#)
- dwarf\_formaddr
  - DIE Attribute and Attribute-Form Details, [95](#)
- dwarf\_formblock
  - DIE Attribute and Attribute-Form Details, [98](#)
- dwarf\_formdata16
  - DIE Attribute and Attribute-Form Details, [97](#)
- dwarf\_formexprloc
  - DIE Attribute and Attribute-Form Details, [100](#)
- dwarf\_formflag
  - DIE Attribute and Attribute-Form Details, [96](#)
- dwarf\_formref
  - DIE Attribute and Attribute-Form Details, [93](#)
- dwarf\_formsdata
  - DIE Attribute and Attribute-Form Details, [97](#)
- dwarf\_formsig8
  - DIE Attribute and Attribute-Form Details, [95](#)
- dwarf\_formsig8\_const
  - DIE Attribute and Attribute-Form Details, [95](#)
- dwarf\_formstring
  - DIE Attribute and Attribute-Form Details, [98](#)
- dwarf\_formudata
  - DIE Attribute and Attribute-Form Details, [97](#)
- Dwarf\_Frame\_Instr\_Head
  - Defined and Opaque Structs, [44](#)
- Dwarf\_Func
  - Defined and Opaque Structs, [47](#)
- Dwarf\_Gdbindex
  - Defined and Opaque Structs, [49](#)
- dwarf\_gdbindex\_addressarea
  - Fast Access to Gdb Index, [194](#)
- dwarf\_gdbindex\_addressarea\_entry
  - Fast Access to Gdb Index, [194](#)
- dwarf\_gdbindex\_culist\_array
  - Fast Access to Gdb Index, [192](#)
- dwarf\_gdbindex\_culist\_entry
  - Fast Access to Gdb Index, [193](#)
- dwarf\_gdbindex\_cuvector\_inner\_attributes
  - Fast Access to Gdb Index, [196](#)
- dwarf\_gdbindex\_cuvector\_instance\_expand\_value
  - Fast Access to Gdb Index, [197](#)
- dwarf\_gdbindex\_cuvector\_length
  - Fast Access to Gdb Index, [196](#)
- dwarf\_gdbindex\_header
  - Fast Access to Gdb Index, [192](#)
- dwarf\_gdbindex\_string\_by\_offset
  - Fast Access to Gdb Index, [197](#)
- dwarf\_gdbindex\_symboltable\_array
  - Fast Access to Gdb Index, [195](#)
- dwarf\_gdbindex\_symboltable\_entry
  - Fast Access to Gdb Index, [195](#)
- dwarf\_gdbindex\_types\_culist\_array
  - Fast Access to Gdb Index, [193](#)
- dwarf\_gdbindex\_types\_culist\_entry
  - Fast Access to Gdb Index, [194](#)
- dwarf\_get\_abbrev
  - Abbreviations Section Details, [162](#)
- dwarf\_get\_abbrev\_children\_flag
  - Abbreviations Section Details, [163](#)
- dwarf\_get\_abbrev\_code
  - Abbreviations Section Details, [163](#)
- dwarf\_get\_abbrev\_entry\_b
  - Abbreviations Section Details, [164](#)
- dwarf\_get\_abbrev\_tag
  - Abbreviations Section Details, [162](#)
- dwarf\_get\_address\_size
  - Object Sections Data, [216](#)
- dwarf\_get\_arange
  - Fast Access to a CU given a code address, [180](#)
- dwarf\_get\_arange\_cu\_header\_offset
  - Fast Access to a CU given a code address, [181](#)
- dwarf\_get\_arange\_info\_b
  - Fast Access to a CU given a code address, [181](#)
- dwarf\_get\_aranges
  - Fast Access to a CU given a code address, [180](#)
- dwarf\_get\_cie\_augmentation\_data
  - Stack Frame Access, [155](#)
- dwarf\_get\_cie\_index
  - Stack Frame Access, [150](#)
- dwarf\_get\_cie\_info\_b
  - Stack Frame Access, [149](#)
- dwarf\_get\_cie\_of\_fde
  - Stack Frame Access, [149](#)
- dwarf\_get\_cu\_die\_offset
  - Fast Access to a CU given a code address, [181](#)
- dwarf\_get\_cu\_die\_offset\_given\_cu\_header\_offset\_b
  - Debugging Information Entry (DIE) content, [80](#)
- dwarf\_get\_debug\_addr\_index
  - DIE Attribute and Attribute-Form Details, [96](#)
- dwarf\_get\_debug\_str\_index
  - DIE Attribute and Attribute-Form Details, [100](#)
- dwarf\_get\_debug\_sup
  - Access to Section .debug\_sup, [172](#)
- dwarf\_get\_debugfission\_for\_die
  - Fast Access to Split Dwarf (Debug Fission), [201](#)
- dwarf\_get\_debugfission\_for\_key
  - Fast Access to Split Dwarf (Debug Fission), [202](#)
- dwarf\_get\_die\_address\_size
  - Debugging Information Entry (DIE) content, [85](#)
- dwarf\_get\_die\_infotypes\_flag

- Compilation Unit (CU) Access, [75](#)
- `dwarf_get_die_section_name`
  - Object Sections Data, [214](#)
- `dwarf_get_die_section_name_b`
  - Object Sections Data, [215](#)
- `dwarf_get_EH_name`
  - Names DW\_TAG\_member etc as strings, [211](#)
- `dwarf_get_endian_copy_function`
  - Miscellaneous Functions, [227](#)
- `dwarf_get_fde_at_pc`
  - Stack Frame Access, [154](#)
- `dwarf_get_fde_augmentation_data`
  - Stack Frame Access, [156](#)
- `dwarf_get_fde_exception_info`
  - Stack Frame Access, [148](#)
- `dwarf_get_fde_for_die`
  - Stack Frame Access, [154](#)
- `dwarf_get_fde_info_for_all_regs3`
  - Stack Frame Access, [151](#)
- `dwarf_get_fde_info_for_all_regs3_b`
  - Stack Frame Access, [151](#)
- `dwarf_get_fde_info_for_cfa_reg3_b`
  - Stack Frame Access, [153](#)
- `dwarf_get_fde_info_for_cfa_reg3_c`
  - Stack Frame Access, [153](#)
- `dwarf_get_fde_info_for_reg3_b`
  - Stack Frame Access, [152](#)
- `dwarf_get_fde_info_for_reg3_c`
  - Stack Frame Access, [151](#)
- `dwarf_get_fde_instr_bytes`
  - Stack Frame Access, [150](#)
- `dwarf_get_fde_list`
  - Stack Frame Access, [147](#)
- `dwarf_get_fde_list_eh`
  - Stack Frame Access, [147](#)
- `dwarf_get_fde_n`
  - Stack Frame Access, [154](#)
- `dwarf_get_fde_range`
  - Stack Frame Access, [148](#)
- `dwarf_get_form_class`
  - DIE Attribute and Attribute-Form Details, [101](#)
- `dwarf_get_FORM_CLASS_name`
  - Names DW\_TAG\_member etc as strings, [212](#)
- `dwarf_get_frame_instruction`
  - Stack Frame Access, [157](#)
- `dwarf_get_frame_instruction_a`
  - Stack Frame Access, [158](#)
- `dwarf_get_FRAME_name`
  - Names DW\_TAG\_member etc as strings, [211](#)
- `dwarf_get_frame_section_name`
  - Object Sections Data, [216](#)
- `dwarf_get_frame_section_name_eh_gnu`
  - Object Sections Data, [216](#)
- `dwarf_get_globals`
  - Fast Access to .debug\_pubnames and more., [183](#)
- `dwarf_get_globals_header`
  - Fast Access to .debug\_pubnames and more., [187](#)
- `dwarf_get_gnu_index_block`
  - Fast Access to GNU .debug\_gnu\_pubnames, [189](#)
- `dwarf_get_gnu_index_block_entry`
  - Fast Access to GNU .debug\_gnu\_pubnames, [189](#)
- `dwarf_get_gnu_index_head`
  - Fast Access to GNU .debug\_gnu\_pubnames, [188](#)
- `dwarf_get_GNUKIND_name`
  - Names DW\_TAG\_member etc as strings, [211](#)
- `dwarf_get_GNUIVIS_name`
  - Names DW\_TAG\_member etc as strings, [212](#)
- `dwarf_get_harmless_error_list`
  - Harmless Error recording, [208](#)
- `dwarf_get_line_section_name_from_die`
  - Object Sections Data, [216](#)
- `dwarf_get_LLEX_name`
  - Names DW\_TAG\_member etc as strings, [212](#)
- `dwarf_get_location_op_value_c`
  - Locations of data: DWARF2-DWARF5, [131](#)
- `dwarf_get_locdesc_entry_d`
  - Locations of data: DWARF2-DWARF5, [129](#)
- `dwarf_get_locdesc_entry_e`
  - Locations of data: DWARF2-DWARF5, [130](#)
- `dwarf_get_loclist_c`
  - Locations of data: DWARF2-DWARF5, [129](#)
- `dwarf_get_loclist_context_basics`
  - Locations of data: DWARF2-DWARF5, [134](#)
- `dwarf_get_loclist_head_basics`
  - Locations of data: DWARF2-DWARF5, [134](#)
- `dwarf_get_loclist_head_kind`
  - Locations of data: DWARF2-DWARF5, [129](#)
- `dwarf_get_loclist_lle`
  - Locations of data: DWARF2-DWARF5, [134](#)
- `dwarf_get_loclist_offset_index_value`
  - Locations of data: DWARF2-DWARF5, [133](#)
- `dwarf_get_MACINFO_name`
  - Names DW\_TAG\_member etc as strings, [212](#)
- `dwarf_get_macro_context`
  - Macro Access: DWARF5, [138](#)
- `dwarf_get_macro_context_by_offset`
  - Macro Access: DWARF5, [138](#)
- `dwarf_get_macro_defundef`
  - Macro Access: DWARF5, [141](#)
- `dwarf_get_macro_details`
  - Macro Access: DWARF2-4, [143](#)
- `dwarf_get_macro_import`
  - Macro Access: DWARF5, [142](#)
- `dwarf_get_MACRO_name`
  - Names DW\_TAG\_member etc as strings, [212](#)
- `dwarf_get_macro_op`
  - Macro Access: DWARF5, [140](#)
- `dwarf_get_macro_startend_file`
  - Macro Access: DWARF5, [142](#)
- `dwarf_get_mmap_count`
  - Section allocation preference, [229](#)
- `dwarf_get_offset_size`
  - Object Sections Data, [216](#)
- `dwarf_get_pubtypes`
  - Fast Access to .debug\_pubnames and more., [184](#)
- `dwarf_get_ranges_b`



- Ranges: code addresses in DWARF3-4, [120](#)
- [dwarf\\_get\\_ranges\\_baseaddress](#)
  - Ranges: code addresses in DWARF3-4, [121](#)
- [dwarf\\_get\\_real\\_section\\_name](#)
  - Object Sections Data, [215](#)
- [dwarf\\_get\\_rnglist\\_context\\_basics](#)
  - Rnglists: code addresses in DWARF5, [126](#)
- [dwarf\\_get\\_rnglist\\_head\\_basics](#)
  - Rnglists: code addresses in DWARF5, [126](#)
- [dwarf\\_get\\_rnglist\\_offset\\_index\\_value](#)
  - Rnglists: code addresses in DWARF5, [125](#)
- [dwarf\\_get\\_rnglist\\_rle](#)
  - Rnglists: code addresses in DWARF5, [127](#)
- [dwarf\\_get\\_rnglists\\_entry\\_fields\\_a](#)
  - Rnglists: code addresses in DWARF5, [124](#)
- [dwarf\\_get\\_section\\_count](#)
  - Object Sections Data, [220](#)
- [dwarf\\_get\\_section\\_info\\_by\\_index](#)
  - Object Sections Data, [218](#)
- [dwarf\\_get\\_section\\_info\\_by\\_index\\_a](#)
  - Object Sections Data, [218](#)
- [dwarf\\_get\\_section\\_info\\_by\\_name](#)
  - Object Sections Data, [217](#)
- [dwarf\\_get\\_section\\_info\\_by\\_name\\_a](#)
  - Object Sections Data, [217](#)
- [dwarf\\_get\\_section\\_max\\_offsets\\_d](#)
  - Object Sections Data, [221](#)
- [dwarf\\_get\\_str](#)
  - String Section .debug\_str Details, [165](#)
- [dwarf\\_get\\_tied\\_dbg](#)
  - Libdwarf Initialization Functions, [68](#)
- [dwarf\\_get\\_universalbinary\\_count](#)
  - Miscellaneous Functions, [227](#)
- [dwarf\\_get\\_version\\_of\\_die](#)
  - Debugging Information Entry (DIE) content, [85](#)
- [dwarf\\_get\\_xu\\_hash\\_entry](#)
  - Fast Access to Split Dwarf (Debug Fission), [200](#)
- [dwarf\\_get\\_xu\\_index\\_header](#)
  - Fast Access to Split Dwarf (Debug Fission), [198](#)
- [dwarf\\_get\\_xu\\_index\\_section\\_type](#)
  - Fast Access to Split Dwarf (Debug Fission), [199](#)
- [dwarf\\_get\\_xu\\_section\\_names](#)
  - Fast Access to Split Dwarf (Debug Fission), [200](#)
- [dwarf\\_get\\_xu\\_section\\_offset](#)
  - Fast Access to Split Dwarf (Debug Fission), [201](#)
- [Dwarf\\_Global](#)
  - Defined and Opaque Structs, [47](#)
- [dwarf\\_global\\_cu\\_offset](#)
  - Fast Access to .debug\_pubnames and more., [186](#)
- [dwarf\\_global\\_die\\_offset](#)
  - Fast Access to .debug\_pubnames and more., [185](#)
- [dwarf\\_global\\_formref](#)
  - DIE Attribute and Attribute-Form Details, [94](#)
- [dwarf\\_global\\_formref\\_b](#)
  - DIE Attribute and Attribute-Form Details, [94](#)
- [dwarf\\_global\\_name\\_offsets](#)
  - Fast Access to .debug\_pubnames and more., [186](#)
- [dwarf\\_global\\_tag\\_number](#)
  - Fast Access to .debug\_pubnames and more., [186](#)
- [dwarf\\_globals\\_by\\_type](#)
  - Fast Access to .debug\_pubnames and more., [184](#)
- [dwarf\\_globals\\_dealloc](#)
  - Fast Access to .debug\_pubnames and more., [185](#)
- [dwarf\\_globname](#)
  - Fast Access to .debug\_pubnames and more., [185](#)
- [dwarf\\_gnu\\_debuglink](#)
  - Access GNU .gnu\_debuglink, build-id., [203](#)
- [dwarf\\_gnu\\_index\\_dealloc](#)
  - Fast Access to GNU .debug\_gnu\_pubnames, [189](#)
- [Dwarf\\_Gnu\\_Index\\_Head](#)
  - Defined and Opaque Structs, [44](#)
- [Dwarf\\_Half](#)
  - Basic Library Datatypes Group, [40](#)
- [Dwarf\\_Handler](#)
  - Defined and Opaque Structs, [49](#)
- [dwarf\\_hasattr](#)
  - Debugging Information Entry (DIE) content, [84](#)
- [dwarf\\_hasform](#)
  - DIE Attribute and Attribute-Form Details, [92](#)
- [dwarf\\_highpc\\_b](#)
  - Debugging Information Entry (DIE) content, [86](#)
- [dwarf\\_init\\_b](#)
  - Libdwarf Initialization Functions, [65](#)
- [dwarf\\_init\\_path](#)
  - Libdwarf Initialization Functions, [63](#)
- [dwarf\\_init\\_path\\_a](#)
  - Libdwarf Initialization Functions, [63](#)
- [dwarf\\_init\\_path\\_dl](#)
  - Libdwarf Initialization Functions, [64](#)
- [dwarf\\_init\\_path\\_dl\\_a](#)
  - Libdwarf Initialization Functions, [65](#)
- [dwarf\\_insert\\_harmless\\_error](#)
  - Harmless Error recording, [209](#)
- [dwarf\\_library\\_allow\\_dup\\_attr](#)
  - Miscellaneous Functions, [226](#)
- [Dwarf\\_Line](#)
  - Defined and Opaque Structs, [47](#)
- [Dwarf\\_Line\\_Context](#)
  - Defined and Opaque Structs, [49](#)
- [dwarf\\_line\\_is\\_addr\\_set](#)
  - Line Table For a CU, [115](#)
- [dwarf\\_line\\_srcfileno](#)
  - Line Table For a CU, [115](#)
- [dwarf\\_lineaddr](#)
  - Line Table For a CU, [115](#)
- [dwarf\\_linebeginstatement](#)
  - Line Table For a CU, [113](#)
- [dwarf\\_lineblock](#)
  - Line Table For a CU, [117](#)
- [dwarf\\_lineendsequence](#)
  - Line Table For a CU, [114](#)
- [dwarf\\_lineno](#)
  - Line Table For a CU, [114](#)
- [dwarf\\_lineoff\\_b](#)
  - Line Table For a CU, [116](#)
- [dwarf\\_linesrc](#)



- Line Table For a CU, [116](#)
- dwarf\_load\_loclists
  - Locations of data: DWARF2-DWARF5, [132](#)
- dwarf\_load\_rnglists
  - Rnglists: code addresses in DWARF5, [125](#)
- Dwarf\_Loc\_Head\_c
  - Defined and Opaque Structs, [44](#)
- Dwarf\_Locdesc\_c
  - Defined and Opaque Structs, [43](#)
- dwarf\_loclist\_from\_expr\_c
  - Locations of data: DWARF2-DWARF5, [131](#)
- dwarf\_lowpc
  - Debugging Information Entry (DIE) content, [86](#)
- dwarf\_machine\_architecture
  - Object Sections Data, [220](#)
- dwarf\_machine\_architecture\_a
  - Object Sections Data, [219](#)
- Dwarf\_Macro\_Context
  - Defined and Opaque Structs, [49](#)
- dwarf\_macro\_context\_head
  - Macro Access: DWARF5, [140](#)
- dwarf\_macro\_context\_total\_length
  - Macro Access: DWARF5, [139](#)
- Dwarf\_Macro\_Details
  - Defined and Opaque Structs, [49](#)
- Dwarf\_Macro\_Details\_s, [282](#)
- dwarf\_macro\_operands\_table
  - Macro Access: DWARF5, [140](#)
- dwarf\_next\_cu\_header\_d
  - Compilation Unit (CU) Access, [71](#)
- dwarf\_next\_cu\_header\_e
  - Compilation Unit (CU) Access, [69](#)
- dwarf\_next\_str\_offsets\_table
  - Str\_Offsets section details, [167](#)
- Dwarf\_Obj\_Access\_Interface\_a
  - Defined and Opaque Structs, [50](#)
- Dwarf\_Obj\_Access\_Interface\_a\_s, [283](#)
- Dwarf\_Obj\_Access\_Methods\_a
  - Defined and Opaque Structs, [50](#)
- Dwarf\_Obj\_Access\_Methods\_a\_s, [283](#)
- Dwarf\_Obj\_Access\_Section\_a
  - Defined and Opaque Structs, [50](#)
- Dwarf\_Obj\_Access\_Section\_a\_s, [284](#)
- dwarf\_object\_finish
  - Libdwarf Initialization Functions, [67](#)
- dwarf\_object\_init\_b
  - Libdwarf Initialization Functions, [66](#)
- Dwarf\_Off
  - Basic Library Datatypes Group, [39](#)
- dwarf\_offdie\_b
  - Compilation Unit (CU) Access, [74](#)
- dwarf\_offset\_list
  - Debugging Information Entry (DIE) content, [84](#)
- dwarf\_open\_str\_offsets\_table\_access
  - Str\_Offsets section details, [166](#)
- dwarf\_package\_version
  - Miscellaneous Functions, [224](#)
- dwarf\_print\_lines
  - Line Table For a CU, [118](#)
- dwarf\_printf\_callback\_function\_type
  - Defined and Opaque Structs, [44](#)
- Dwarf\_Printf\_Callback\_Info\_s, [284](#)
- dwarf\_prologue\_end\_etc
  - Line Table For a CU, [117](#)
- Dwarf\_Ptr
  - Basic Library Datatypes Group, [40](#)
- Dwarf\_Ranges
  - Defined and Opaque Structs, [45](#)
- Dwarf\_Ranges\_Entry\_Type
  - Enumerators with various purposes, [41](#)
- Dwarf\_Ranges\_s, [285](#)
- dwarf\_record\_cmdline\_options
  - Miscellaneous Functions, [225](#)
- dwarf\_register\_printf\_callback
  - Line Table For a CU, [119](#)
- Dwarf\_Regtable3
  - Defined and Opaque Structs, [46](#)
- Dwarf\_Regtable3\_s, [285](#)
- Dwarf\_Regtable\_Entry3
  - Defined and Opaque Structs, [45](#)
- Dwarf\_Regtable\_Entry3\_s, [285](#)
- dwarf\_return\_empty\_pubnames
  - Fast Access to .debug\_pubnames and more., [187](#)
- dwarf\_rnglists\_get\_rle\_head
  - Rnglists: code addresses in DWARF5, [123](#)
- Dwarf\_Rnglists\_Head
  - Defined and Opaque Structs, [50](#)
- Dwarf\_Sec\_Alloc\_Pref
  - Defined and Opaque Structs, [50](#)
- dwarf\_sec\_group\_map
  - Section Groups Objectfile Data, [222](#)
- dwarf\_sec\_group\_sizes
  - Section Groups Objectfile Data, [222](#)
- Dwarf\_Section
  - Defined and Opaque Structs, [47](#)
- dwarf\_set\_de\_alloc\_flag
  - Miscellaneous Functions, [225](#)
- dwarf\_set\_default\_address\_size
  - Miscellaneous Functions, [226](#)
- dwarf\_set\_frame\_cfa\_value
  - Stack Frame Access, [160](#)
- dwarf\_set\_frame\_rule\_initial\_value
  - Stack Frame Access, [160](#)
- dwarf\_set\_frame\_rule\_table\_size
  - Stack Frame Access, [159](#)
- dwarf\_set\_frame\_same\_value
  - Stack Frame Access, [160](#)
- dwarf\_set\_frame\_undefined\_value
  - Stack Frame Access, [161](#)
- dwarf\_set\_harmless\_error\_list\_size
  - Harmless Error recording, [208](#)
- dwarf\_set\_load\_preference
  - Section allocation preference, [229](#)
- dwarf\_set\_reloc\_application
  - Miscellaneous Functions, [225](#)
- dwarf\_set\_stringcheck

- Miscellaneous Functions, [224](#)
- `dwarf_set_tied_dbg`
  - Libdwarf Initialization Functions, [67](#)
- `dwarf_siblingof_b`
  - Compilation Unit (CU) Access, [72](#)
- `dwarf_siblingof_c`
  - Compilation Unit (CU) Access, [71](#)
- `Dwarf_Sig8`
  - Defined and Opaque Structs, [43](#)
- `Dwarf_Sig8_s`, [285](#)
- `Dwarf_Signed`
  - Basic Library Datatypes Group, [39](#)
- `Dwarf_Small`
  - Basic Library Datatypes Group, [40](#)
- `dwarf_srcfiles`
  - Line Table For a CU, [106](#)
- `dwarf_srclang`
  - Debugging Information Entry (DIE) content, [89](#)
- `dwarf_srclines_b`
  - Line Table For a CU, [107](#)
- `dwarf_srclines_comp_dir`
  - Line Table For a CU, [109](#)
- `dwarf_srclines_dealloc_b`
  - Line Table For a CU, [108](#)
- `dwarf_srclines_files_data_b`
  - Line Table For a CU, [111](#)
- `dwarf_srclines_files_indexes`
  - Line Table For a CU, [110](#)
- `dwarf_srclines_from_linecontext`
  - Line Table For a CU, [108](#)
- `dwarf_srclines_include_dir_count`
  - Line Table For a CU, [112](#)
- `dwarf_srclines_include_dir_data`
  - Line Table For a CU, [112](#)
- `dwarf_srclines_subprog_count`
  - Line Table For a CU, [110](#)
- `dwarf_srclines_subprog_data`
  - Line Table For a CU, [110](#)
- `dwarf_srclines_table_offset`
  - Line Table For a CU, [109](#)
- `dwarf_srclines_two_level_from_linecontext`
  - Line Table For a CU, [108](#)
- `dwarf_srclines_version`
  - Line Table For a CU, [113](#)
- `dwarf_str_offsets_statistics`
  - Str\_Offsets section details, [168](#)
- `Dwarf_Str_Offsets_Table`
  - Defined and Opaque Structs, [44](#)
- `dwarf_str_offsets_value_by_index`
  - Str\_Offsets section details, [167](#)
- `dwarf_suppress_debuglink_crc`
  - Access GNU .gnu\_debuglink, build-id., [205](#)
- `dwarf_tag`
  - Debugging Information Entry (DIE) content, [78](#)
- `Dwarf_Type`
  - Defined and Opaque Structs, [47](#)
- `dwarf_uncompress_integer_block_a`
  - DIE Attribute and Attribute-Form Details, [101](#)
- `Dwarf_Unsigned`
  - Basic Library Datatypes Group, [39](#)
- `dwarf_validate_die_sibling`
  - Debugging Information Entry (DIE) content, [83](#)
- `Dwarf_Var`
  - Defined and Opaque Structs, [48](#)
- `Dwarf_Weak`
  - Defined and Opaque Structs, [48](#)
- `dwarf_whatattr`
  - DIE Attribute and Attribute-Form Details, [93](#)
- `dwarf_whatform`
  - DIE Attribute and Attribute-Form Details, [92](#)
- `dwarf_whatform_direct`
  - DIE Attribute and Attribute-Form Details, [92](#)
- `Dwarf_Xu_Index_Header`
  - Defined and Opaque Structs, [49](#)
- Enumerators with various purposes, [40](#)
  - `Dwarf_Form_Class`, [41](#)
  - `Dwarf_Ranges_Entry_Type`, [41](#)
- Examining Section Group data, [233](#)
- Example getting .debug\_ranges data, [262](#)
- Example walking CUs(d), [239](#)
- Example walking CUs(e), [237](#)
- Extracting fde, cie lists., [258](#)
- Fast Access to .debug\_names DWARF5, [172](#)
  - `dwarf_dealloc_dnames`, [174](#)
  - `dwarf_dnames_abbrevtable`, [174](#)
  - `dwarf_dnames_bucket`, [176](#)
  - `dwarf_dnames_cu_table`, [175](#)
  - `dwarf_dnames_entrypool`, [177](#)
  - `dwarf_dnames_entrypool_values`, [178](#)
  - `dwarf_dnames_header`, [173](#)
  - `dwarf_dnames_name`, [176](#)
  - `dwarf_dnames_offsets`, [175](#)
  - `dwarf_dnames_sizes`, [175](#)
- Fast Access to .debug\_pubnames and more., [182](#)
  - `dwarf_get_globals`, [183](#)
  - `dwarf_get_globals_header`, [187](#)
  - `dwarf_get_pubtypes`, [184](#)
  - `dwarf_global_cu_offset`, [186](#)
  - `dwarf_global_die_offset`, [185](#)
  - `dwarf_global_name_offsets`, [186](#)
  - `dwarf_global_tag_number`, [186](#)
  - `dwarf_globals_by_type`, [184](#)
  - `dwarf_globals_dealloc`, [185](#)
  - `dwarf_globname`, [185](#)
  - `dwarf_return_empty_pubnames`, [187](#)
- Fast Access to a CU given a code address, [179](#)
  - `dwarf_get_arange`, [180](#)
  - `dwarf_get_arange_cu_header_offset`, [181](#)
  - `dwarf_get_arange_info_b`, [181](#)
  - `dwarf_get_aranges`, [180](#)
  - `dwarf_get_cu_die_offset`, [181](#)
- Fast Access to Gdb Index, [190](#)
  - `dwarf_dealloc_gdbindex`, [192](#)
  - `dwarf_gdbindex_addressarea`, [194](#)
  - `dwarf_gdbindex_addressarea_entry`, [194](#)

- dwarf\_gdbindex\_culist\_array, 192
- dwarf\_gdbindex\_culist\_entry, 193
- dwarf\_gdbindex\_cuvector\_inner\_attributes, 196
- dwarf\_gdbindex\_cuvector\_instance\_expand\_value, 197
- dwarf\_gdbindex\_cuvector\_length, 196
- dwarf\_gdbindex\_header, 192
- dwarf\_gdbindex\_string\_by\_offset, 197
- dwarf\_gdbindex\_symboltable\_array, 195
- dwarf\_gdbindex\_symboltable\_entry, 195
- dwarf\_gdbindex\_types\_culist\_array, 193
- dwarf\_gdbindex\_types\_culist\_entry, 194
- Fast Access to GNU .debug.gnu\_pubnames, 188
  - dwarf\_get\_gnu\_index\_block, 189
  - dwarf\_get\_gnu\_index\_block\_entry, 189
  - dwarf\_get\_gnu\_index\_head, 188
  - dwarf\_gnu\_index\_dealloc, 189
- Fast Access to Split Dwarf (Debug Fission), 198
  - dwarf\_dealloc\_xu\_header, 199
  - dwarf\_get\_debugfission\_for\_die, 201
  - dwarf\_get\_debugfission\_for\_key, 202
  - dwarf\_get\_xu\_hash\_entry, 200
  - dwarf\_get\_xu\_index\_header, 198
  - dwarf\_get\_xu\_index\_section\_type, 199
  - dwarf\_get\_xu\_section\_names, 200
  - dwarf\_get\_xu\_section\_offset, 201
- Generic dwarf\_dealloc Function, 170
  - dwarf\_dealloc, 171
- Harmless Error recording, 207
  - dwarf\_get\_harmless\_error\_list, 208
  - dwarf\_insert\_harmless\_error, 209
  - dwarf\_set\_harmless\_error\_list\_size, 208
- JIT and special case DWARF, 21
- LEB Encode and Decode, 223
- Libdwarf Initialization Functions, 62
  - dwarf\_finish, 66
  - dwarf\_get\_tied\_dbg, 68
  - dwarf\_init\_b, 65
  - dwarf\_init\_path, 63
  - dwarf\_init\_path\_a, 63
  - dwarf\_init\_path\_dl, 64
  - dwarf\_init\_path\_dl\_a, 65
  - dwarf\_object\_finish, 67
  - dwarf\_object\_init\_b, 66
  - dwarf\_set\_tied\_dbg, 67
- libdwarf.h, 29, 311
- Line Table For a CU, 104
  - dwarf\_check\_lineheader\_b, 118
  - dwarf\_line\_is\_addr\_set, 115
  - dwarf\_line\_srcfileno, 115
  - dwarf\_lineaddr, 115
  - dwarf\_linebeginstatement, 113
  - dwarf\_lineblock, 117
  - dwarf\_lineendsequence, 114
  - dwarf\_lineno, 114
  - dwarf\_lineoff\_b, 116
  - dwarf\_linesrc, 116
  - dwarf\_print\_lines, 118
  - dwarf\_prologue\_end\_etc, 117
  - dwarf\_register\_printf\_callback, 119
  - dwarf\_srcfiles, 106
  - dwarf\_srclines\_b, 107
  - dwarf\_srclines\_comp\_dir, 109
  - dwarf\_srclines\_dealloc\_b, 108
  - dwarf\_srclines\_files\_data\_b, 111
  - dwarf\_srclines\_files\_indexes, 110
  - dwarf\_srclines\_from\_linecontext, 108
  - dwarf\_srclines\_include\_dir\_count, 112
  - dwarf\_srclines\_include\_dir\_data, 112
  - dwarf\_srclines\_subprog\_count, 110
  - dwarf\_srclines\_subprog\_data, 110
  - dwarf\_srclines\_table\_offset, 109
  - dwarf\_srclines\_two\_level\_from\_linecontext, 108
  - dwarf\_srclines\_version, 113
- Location/expression access, 244
- Locations of data: DWARF2-DWARF5, 127
  - dwarf\_dealloc\_loc\_head\_c, 132
  - dwarf\_get\_location\_op\_value\_c, 131
  - dwarf\_get\_locdesc\_entry\_d, 129
  - dwarf\_get\_locdesc\_entry\_e, 130
  - dwarf\_get\_loclist\_c, 129
  - dwarf\_get\_loclist\_context\_basics, 134
  - dwarf\_get\_loclist\_head\_basics, 134
  - dwarf\_get\_loclist\_head\_kind, 129
  - dwarf\_get\_loclist\_lle, 134
  - dwarf\_get\_loclist\_offset\_index\_value, 133
  - dwarf\_load\_loclists, 132
  - dwarf\_loclist\_from\_expr\_c, 131
- Macro Access: DWARF2-4, 143
  - dwarf\_find\_macro\_value\_start, 143
  - dwarf\_get\_macro\_details, 143
- Macro Access: DWARF5, 137
  - dwarf\_dealloc\_macro\_context, 139
  - dwarf\_get\_macro\_context, 138
  - dwarf\_get\_macro\_context\_by\_offset, 138
  - dwarf\_get\_macro\_defundef, 141
  - dwarf\_get\_macro\_import, 142
  - dwarf\_get\_macro\_op, 140
  - dwarf\_get\_macro\_startend\_file, 142
  - dwarf\_macro\_context\_head, 140
  - dwarf\_macro\_context\_total\_length, 139
  - dwarf\_macro\_operands\_table, 140
- Miscellaneous Functions, 224
  - dwarf\_get\_endian\_copy\_function, 227
  - dwarf\_get\_universalbinary\_count, 227
  - dwarf\_library\_allow\_dup\_attr, 226
  - dwarf\_package\_version, 224
  - dwarf\_record\_cmdline\_options, 225
  - dwarf\_set\_de\_alloc\_flag, 225
  - dwarf\_set\_default\_address\_size, 226
  - dwarf\_set\_reloc\_application, 225
  - dwarf\_set\_stringcheck, 224

Names DW\_TAG\_member etc as strings, [209](#)

- [dwarf\\_get\\_EH\\_name](#), [211](#)
- [dwarf\\_get\\_FORM\\_CLASS\\_name](#), [212](#)
- [dwarf\\_get\\_FRAME\\_name](#), [211](#)
- [dwarf\\_get\\_GNUIKIND\\_name](#), [211](#)
- [dwarf\\_get\\_GNUIVIS\\_name](#), [212](#)
- [dwarf\\_get\\_LLEX\\_name](#), [212](#)
- [dwarf\\_get\\_MACINFO\\_name](#), [212](#)
- [dwarf\\_get\\_MACRO\\_name](#), [212](#)

Object Sections Data, [213](#)

- [dwarf\\_get\\_address\\_size](#), [216](#)
- [dwarf\\_get\\_die\\_section\\_name](#), [214](#)
- [dwarf\\_get\\_die\\_section\\_name\\_b](#), [215](#)
- [dwarf\\_get\\_frame\\_section\\_name](#), [216](#)
- [dwarf\\_get\\_frame\\_section\\_name\\_eh\\_gnu](#), [216](#)
- [dwarf\\_get\\_line\\_section\\_name\\_from\\_die](#), [216](#)
- [dwarf\\_get\\_offset\\_size](#), [216](#)
- [dwarf\\_get\\_real\\_section\\_name](#), [215](#)
- [dwarf\\_get\\_section\\_count](#), [220](#)
- [dwarf\\_get\\_section\\_info\\_by\\_index](#), [218](#)
- [dwarf\\_get\\_section\\_info\\_by\\_index\\_a](#), [218](#)
- [dwarf\\_get\\_section\\_info\\_by\\_name](#), [217](#)
- [dwarf\\_get\\_section\\_info\\_by\\_name\\_a](#), [217](#)
- [dwarf\\_get\\_section\\_max\\_offsets\\_d](#), [221](#)
- [dwarf\\_machine\\_architecture](#), [220](#)
- [dwarf\\_machine\\_architecture\\_a](#), [219](#)

Ranges: code addresses in DWARF3-4, [120](#)

- [dwarf\\_dealloc\\_ranges](#), [121](#)
- [dwarf\\_get\\_ranges\\_b](#), [120](#)
- [dwarf\\_get\\_ranges\\_baseaddress](#), [121](#)

Reading gdbindex addressarea, [264](#)

Reading .debug\_funcnames (nonstandard), [251](#)

Reading .debug\_macinfo (DWARF2-4), [257](#)

Reading .debug\_macro data (DWARF5), [255](#)

Reading .debug\_names data, [252](#)

Reading .debug\_types (nonstandard), [251](#)

Reading .debug\_varnames data (nonstandard), [252](#)

Reading .debug\_weaknames (nonstandard), [251](#)

Reading a location expression, [245](#)

Reading an aranges section, [261](#)

Reading cu and tu Debug Fission data, [265](#)

Reading gdbindex data, [263](#)

Reading high pc from a DIE., [266](#)

Reading Split Dwarf (Debug Fission) data, [266](#)

Reading Split Dwarf (Debug Fission) hash slots, [266](#)

Reading string offsets section data, [259](#)

Reading the .eh\_frame section, [258](#)

Reading the gdbindex symbol table, [264](#)

Retrieving tag,attribute,etc names, [267](#)

Rnglists: code addresses in DWARF5, [122](#)

- [dwarf\\_dealloc\\_rnglists\\_head](#), [124](#)
- [dwarf\\_get\\_rnglist\\_context\\_basics](#), [126](#)
- [dwarf\\_get\\_rnglist\\_head\\_basics](#), [126](#)
- [dwarf\\_get\\_rnglist\\_offset\\_index\\_value](#), [125](#)
- [dwarf\\_get\\_rnglist\\_rle](#), [127](#)
- [dwarf\\_get\\_rnglists\\_entry\\_fields\\_a](#), [124](#)
- [dwarf\\_load\\_rnglists](#), [125](#)

- [dwarf\\_rnglists\\_get\\_rle\\_head](#), [123](#)

Section allocation preference, [228](#)

- [dwarf\\_get\\_mmap\\_count](#), [229](#)

- [dwarf\\_set\\_load\\_preference](#), [229](#)

Section Groups Objectfile Data, [221](#)

- [dwarf\\_sec\\_group\\_map](#), [222](#)

- [dwarf\\_sec\\_group\\_sizes](#), [222](#)

Stack Frame Access, [144](#)

- [dwarf\\_cie\\_section\\_offset](#), [159](#)

- [dwarf\\_dealloc\\_fde\\_cie\\_list](#), [147](#)

- [dwarf\\_dealloc\\_frame\\_instr\\_head](#), [158](#)

- [dwarf\\_expand\\_frame\\_instructions](#), [156](#)

- [dwarf\\_fde\\_section\\_offset](#), [159](#)

- [dwarf\\_get\\_cie\\_augmentation\\_data](#), [155](#)

- [dwarf\\_get\\_cie\\_index](#), [150](#)

- [dwarf\\_get\\_cie\\_info\\_b](#), [149](#)

- [dwarf\\_get\\_cie\\_of\\_fde](#), [149](#)

- [dwarf\\_get\\_fde\\_at\\_pc](#), [154](#)

- [dwarf\\_get\\_fde\\_augmentation\\_data](#), [156](#)

- [dwarf\\_get\\_fde\\_exception\\_info](#), [148](#)

- [dwarf\\_get\\_fde\\_for\\_die](#), [154](#)

- [dwarf\\_get\\_fde\\_info\\_for\\_all\\_regs3](#), [151](#)

- [dwarf\\_get\\_fde\\_info\\_for\\_all\\_regs3\\_b](#), [151](#)

- [dwarf\\_get\\_fde\\_info\\_for\\_cfa\\_reg3\\_b](#), [153](#)

- [dwarf\\_get\\_fde\\_info\\_for\\_cfa\\_reg3\\_c](#), [153](#)

- [dwarf\\_get\\_fde\\_info\\_for\\_reg3\\_b](#), [152](#)

- [dwarf\\_get\\_fde\\_info\\_for\\_reg3\\_c](#), [151](#)

- [dwarf\\_get\\_fde\\_instr\\_bytes](#), [150](#)

- [dwarf\\_get\\_fde\\_list](#), [147](#)

- [dwarf\\_get\\_fde\\_list\\_eh](#), [147](#)

- [dwarf\\_get\\_fde\\_n](#), [154](#)

- [dwarf\\_get\\_fde\\_range](#), [148](#)

- [dwarf\\_get\\_frame\\_instruction](#), [157](#)

- [dwarf\\_get\\_frame\\_instruction\\_a](#), [158](#)

- [dwarf\\_set\\_frame\\_cfa\\_value](#), [160](#)

- [dwarf\\_set\\_frame\\_rule\\_initial\\_value](#), [160](#)

- [dwarf\\_set\\_frame\\_rule\\_table\\_size](#), [159](#)

- [dwarf\\_set\\_frame\\_same\\_value](#), [160](#)

- [dwarf\\_set\\_frame\\_undefined\\_value](#), [161](#)

Str\_Offsets section details, [165](#)

- [dwarf\\_close\\_str\\_offsets\\_table\\_access](#), [166](#)

- [dwarf\\_next\\_str\\_offsets\\_table](#), [167](#)

- [dwarf\\_open\\_str\\_offsets\\_table\\_access](#), [166](#)

- [dwarf\\_str\\_offsets\\_statistics](#), [168](#)

- [dwarf\\_str\\_offsets\\_value\\_by\\_index](#), [167](#)

String Section .debug\_str Details, [164](#)

- [dwarf\\_get\\_str](#), [165](#)

Using dwarf\_attrlist(), [241](#)

Using dwarf\_expand\_frame\_instructions, [259](#)

Using dwarf\_attrlist(), [232](#)

Using dwarf\_child(), [235](#)

Using dwarf\_discr\_list(), [243](#)

Using dwarf\_get\_globals(), [250](#)

Using dwarf\_globals\_by\_type(), [250](#)

Using dwarf\_init\_path(), [230](#)

Using dwarf\_init\_path\_dl(), [231](#)

Using dwarf\_offdie\_b(), [240](#)

Using dwarf\_offset\_given\_die(), [241](#)  
Using dwarf\_offset\_list(), [241](#)  
Using dwarf\_siblingof\_b(), [235](#)  
Using dwarf\_siblingof\_c(), [234](#)  
Using dwarf\_srcfiles(), [249](#)  
Using dwarf\_srclines\_b(), [246](#)  
Using dwarf\_srclines\_b() and linecontext, [248](#)  
using dwarf\_validate\_die\_sibling, [236](#)  
Using GNU debuglink data, [267](#)