LDF Metadata Exchange Utilities Manual

Generic Query Language Interpreter
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1 Introduction

2 Utility Types

2.1 Mutex_Type

`struct Mutex_Type` is declared in ‘`nonwin.web`’.

2.1.1 Functions

`int Lock (void)` [Public functions]
`int Unlock (void)`

These functions currently return 0 immediately.

3 Global Variables

`Mutex_Type cerr_mutex` [Global variables]
`Mutex_Type cout_mutex`
`Mutex_Type time_mutex`
`Mutex_Type tex_mutex`

These variables are declared in ‘`main.web`’. They are used in the GNU/Linux version of Scantest.

`CMutex log_strm_mutex` [Global variables]
`CMutex cerr_mutex`
`CMutex cout_mutex`

These variables are declared in ‘`scantest.web`’. They are used in the Microsoft Windows of Scantest.

`unsigned short tex_file_ctr` [Global variable]

This variable is declared in ‘`main.web`’. It is used in the GNU/Linux version of Scantest.

`string tex_filename_str` [Global variable]

This variable is declared in ‘`main.web`’. It is used in the GNU/Linux version of Scantest.

`string copyright_tex_str` [Global variable]

This variable is declared in ‘`main.web`’. It is used in the GNU/Linux version of Scantest.

`ofstream tex_file_strm` [Global variable]

This variable is declared in ‘`main.web`’. It is used in the GNU/Linux version of Scantest.

`ifstream in_strm` [Global variables]
`ofstream log_strm`

These variables are declared ‘`scantest.web`’. They are used in the Microsoft Windows version of Scantest.

4 Global Functions

4.1 Main Function for GNU Linux

`int main (int argc, char* `*argv*`[])` [Function]

The *main function* used in the GNU/Linux version of Scantest. It is the *entry point* of the program.

4.2 Main function for Microsoft Windows

`int _tmain (int `*argc*`,` [Function]
`TCHAR* `*argv*`[],`
`TCHAR* `*envp*`[])`

The *main function* used in the Microsoft Windows version of Scantest. It is the *entry point* of the program.

4.3 Other Functions

`void yyerror (const char* `*s*`)` [Function]

5 Date_Time_Type

Class `Date_Time_Type` is declared in '`dttmtype.web`'. Ctangling '`dttmtype.web`' generates '`dttmtype.h`'. `Date_Time_Node` is a synonym for `Date_Time_Type*`. `class Query_Type` is a `friend` of `Date_Time_Type`.

5.1 Data Members

`short* year_range_begin` [Private variables]
`short* year_range_end`
`short* year`
`unsigned short* month`
`unsigned short* day`
`unsigned short* hour`
`unsigned short* minute`
`float* second`

5.2 Functions

5.2.1 Constructor and Destructor

`void Date_Time_Type (void)` [Constructor]

`void ~Date_Time_Type (void)` [Destructor]

5.2.2 Operators

`Date_Time_Node Date_Time_Type::operator= (const Date_Time_Type&)` [Assignment operator]

5.2.3 Showing

`int show (string)` [Member Function]

5.2.4 Output

`ostream& operator<< (ostream&, Date_Time_Type&)` [Output operator]

6 Datasource_Type

Class `Datasource_Type` is declared in ‘`dtsrctyp.web`’. Ctangling ‘`dtsrctyp.web`’ generates ‘`dtsrctyp.h`’. `Datasource_Node` is a synonym for `Datasource_Type*`.

6.1 Data Members

`unsigned short type` [Private variables]
`string name`
`void* value`
`Scanner_Node scanner_node`

`map<unsigned short, string> datasource_type_map` [Private static variable]

`unsigned short DATASOURCE_TYPE_NULL_TYPE` [Public static constants]
`unsigned short DBT_TYPE`
`unsigned short GBV_GVK_TYPE`
`unsigned short TIMMS_TYPE`
`unsigned short DATASOURCE_FILE_TYPE`

6.2 Functions

6.2.1 Constructors and Setting Functions

`void Datasource_Type (void)` [Constructor]

`int set (unsigned short` *datasource_type*, `Scanner_Node` *sscanner_node*`)` [Member Function]

6.2.2 Destructor

`void ~Datasource_Type (void)` [Destructor]

6.2.3 Operators

`Datasource_Node operator= (const Datasource_Type&)` [Assignment Operator]

6.2.4 Initializing Maps

`int initialize_type_maps (void)` [Static Function]

6.2.5 Showing

`int show (string, Scanner_Node)` [Function]
1

7 Id_Type

`struct Id_Type` is declared in '`idtype.web`'. Ctangling '`idtype.web`' generates '`idtype.h`'. `Id_Node` is a synonym for `Id_Type*`. `class Scanner_Type` is a `friend` of `Id_Type`.

7.1 Data Members

`string name` [Public variables]
`void* value`
`unsigned short type`
`unsigned short subtype`
`Scanner_Node scanner_node`
`Id_Node up`
`Id_Node left`
`Id_Node right`

`static map<unsigned short, string> subtype_map` [Public static variable]

`unsigned short TEX_STRING_TYPE` [Public static constants]
`unsigned short SQL_STRING_TYPE`
`unsigned short PQF_STRING_TYPE`

7.2 Functions

7.2.1 Constructors

`void Id_Type (void)` [Constructor]

7.2.2 Destructor

`void ~Id_Type (void)` [Destructor]

7.2.3 Initialize Maps

`int initialize_subtype_map (Scanner_Node)` [Member Function]

7.2.4 Showing

`int show (string)` [Member Function]

8 Query_Type

Class `Query_Type` is declared in ‘`querytyp.web`’. Ctangling ‘`querytyp.web`’ generates ‘`querytyp.h`’. `Query_Node` is a synonym for `Query_Type*`.

8.1 Data Members

`unsigned short query_type` [Private Variables]
`unsigned short field_type`
`unsigned short value_type`
`vector<unsigned short> target_types`
`Id_Node id_node`
`bool negated`
`string name`
`void* value`
`Query_Node up`
`Query_Node and_node`
`Query_Node or_node`
`Query_Node xor_node`
`unsigned short match_value`
`Scanner_Node scanner_node`
`unsigned short` *query_ctr*

`map<unsigned short, string> query_type_map` [Private Static Variables]
`map<unsigned short, string> field_type_map`
`map<unsigned short, string> value_type_map`
`map<unsigned short, string> target_type_map`
`map<unsigned short, string> match_value_map`

`unsigned short QUERY_TYPE_NULL_TYPE` [Public Static Constants]
`unsigned short TOP_TYPE`
`unsigned short AND_TYPE`
`unsigned short OR_TYPE`
`unsigned short XOR_TYPE`
`unsigned short ACCESS_NUMBER_FIELD`
`unsigned short AUTHOR_FIELD`
`unsigned short BIBLIOGRAPHIC_TYPE_FIELD`
`unsigned short CALL_NUMBER_FIELD`
`unsigned short CLASSIFICATION_FIELD`
`unsigned short COMPANY_FIELD`
`unsigned short CONTENT_SUMMARY_FIELD`
`unsigned short CONTRIBUTOR_FIELD`
`unsigned short CREATOR_FIELD`
`unsigned short DATABASE_PROVIDER_FIELD`
`unsigned short DESCRIPTION_FIELD`
`unsigned short EXEMPLAR_PRODUCTION_NUMBER_FIELD`
`unsigned short IDENTIFIER_FIELD`
`unsigned short INSTITUTION_FIELD`

`unsigned short LANGUAGE_FIELD`
`unsigned short MAIN_CANONICAL_TITLE_FIELD`
`unsigned short PERMUTATION_PATTERN_FIELD`
`unsigned short PHYSICAL_DESCRIPTION_FIELD`
`unsigned short PERSON_FIELD`
`unsigned short PUBLISHER_FIELD`
`unsigned short RECORD_FIELD`
`unsigned short REMOTE_ACCESS_FIELD`
`unsigned short RIGHTS_FIELD`
`unsigned short SOURCE_FIELD`
`unsigned short SUBJECT_FIELD`
`unsigned short SUPERORDINATE_ENTITIES_FIELD`
`unsigned short TITLE_FIELD`
`unsigned short TYPE_FIELD`
`unsigned short AUTHOR_SURNAME_FIELD`
`unsigned short AUTHOR_GIVEN_NAME_FIELD`
`unsigned short AUTHOR_PREFIX_FIELD`
`unsigned short CONTRIBUTOR_SURNAME_FIELD`
`unsigned short CONTRIBUTOR_GIVEN_NAME_FIELD`
`unsigned short CONTRIBUTOR_PREFIX_FIELD`
`unsigned short RECORD_ID_FIELD`
`unsigned short RECORD_ELN_ORIGINAL_ENTRY_FIELD`
`unsigned short RECORD_ELN_MOST_RECENT_CHANGE_FIELD`
`unsigned short RECORD_ELN_STATUS_CHANGE_FIELD`
`unsigned short RECORD_IDENTIFICATION_NUMBER_FIELD`
`unsigned short RECORD_DATE_ORIGINAL_ENTRY_FIELD`
`unsigned short RECORD_DATE_MOST_RECENT_CHANGE_FIELD`
`unsigned short RECORD_DATE_STATUS_CHANGE_FIELD`
`unsigned short RECORD_SOURCE_ID_FIELD`
`unsigned short RECORD_YEAR_APPEARANCE_BEGIN_FIELD`
`unsigned short RECORD_YEAR_APPEARANCE_END_FIELD`
`unsigned short RECORD_YEAR_APPEARANCE_RAK_WB_FIELD`
`unsigned short RECORD_YEAR_APPEARANCE_ORIGINAL_FIELD`
`unsigned short INT_TYPE`
`unsigned short FLOAT_TYPE`
`unsigned short QUERY_TYPE_STRING_TYPE`
`unsigned short DATE_TIME_TYPE`
`unsigned short LOCAL_DATABASE_TARGET`
`unsigned short LOCAL_SERVER_TARGET`
`unsigned short REMOTE_DATABASE_TARGET`
`unsigned short REMOTE_SERVER_TARGET`
`unsigned short CONTAINS_VALUE`
`unsigned short FREETEXT_VALUE`
`unsigned short LIKE_VALUE`

`bitset<QUERY_TYPE_BITSET_SIZE> NULL_BITSET` [Public Static Variables]
`bitset<QUERY_TYPE_BITSET_SIZE> ACCESS_NUMBER_FLAG`

```
bitset<QUERY_TYPE_BITSET_SIZE> AUTHOR_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> AUTHOR_SURNAME_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> AUTHOR_GIVEN_NAME_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> AUTHOR_PREFIX_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> BIBLIOGRAPHIC_TYPE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CALL_NUMBER_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CLASSIFICATION_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> COMPANY_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CONTENT_SUMMARY_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CONTRIBUTOR_SURNAME_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CONTRIBUTOR_GIVEN_NAME_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CONTRIBUTOR_PREFIX_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CREATOR_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> CONTRIBUTOR_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> DATABASE_PROVIDER_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> DESCRIPTION_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> EXEMPLAR_PRODUCTION_NUMBER_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> IDENTIFIER_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> INSTITUTION_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> LANGUAGE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> MAIN_CANONICAL_TITLE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> PERMUTATION_PATTERN_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> PERSON_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> PHYSICAL_DESCRIPTION_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> PUBLISHER_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_ID_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_ELN_ORIGINAL_ENTRY_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_ELN_MOST_RECENT_CHANGE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_ELN_STATUS_CHANGE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_IDENTIFICATION_NUMBER_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_DATE_ORIGINAL_ENTRY_FLAG
bitset<QUERY_TYPE_BITSET_SIZE>
        RECORD_DATE_MOST_RECENT_CHANGE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_DATE_STATUS_CHANGE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_SOURCE_ID_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_YEAR_APPEARANCE_BEGIN_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_YEAR_APPEARANCE_END_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RECORD_YEAR_APPEARANCE_RAK_WB_FLAG
bitset<QUERY_TYPE_BITSET_SIZE>
        RECORD_YEAR_APPEARANCE_ORIGINAL_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> REMOTE_ACCESS_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> RIGHTS_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> SOURCE_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> SUBJECT_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> SUPERORDINATE_ENTITIES_FLAG
bitset<QUERY_TYPE_BITSET_SIZE> TITLE_FLAG
```

`bitset<QUERY_TYPE_BITSET_SIZE> TYPE_FLAG`

8.2 Functions

8.2.1 Constructors and Setting Functions

`void Query_Type (void)` [Constructor]

`int Query_Type::set (unsigned short` *qquery_type,* [Setting Function]
`unsigned short` *ffield_type,*
`unsigned short` *vvalue_type,*
`unsigned short` *target_type,*
`bool` *nnegated,*
`void*` *vvalue,*
`Query_Node` *uup,*
`Query_Node` *aand_node,*
`Query_Node` *oor_node,*
`Query_Node` *xxor_node,*
`Scanner_Node` *sscanner_node*)

8.2.2 Destructor

`void ~Query_Type (void)` [Destructor]

8.2.3 Operators

`Query_Node operator= (const Query_Type&)` [Assignment Operator]

8.2.4 Initializing and Flags Maps

`int initialize_type_maps (void)` [Static Member Function]

`int initialize_flags (void)` [Static Member Function]

8.2.5 Set Field Specifier

`int set_field_specifier (void*` *`v`*, [Member Function]
`bool` *`traverse`*,
`Scanner_Node sscanner_node)`

8.2.6 Generate Strings

`string generate_tex_string (Scanner_Node` [Member functions]
`scanner_node`,
`stringstream*` *`tex_strm`*)

```
int generate_sql_string (Scanner_Node scanner_node,
        int database_type,
        stringstream* sql_strm,
        stringstream* select_strm,
        stringstream* from_strm,
        stringstream* where_strm_0,
        stringstream* where_strm_1,
        bool* first_select,
        bool* first_from,
        bool* first_where,
        bitset<QUERY_TYPE_BITSET_SIZE>* field_flags,
        string* return_str)
```

8.2.7 Showing Query_Type

`int show (string, Scanner_Node)` [Member Function]

9 Token_Type

`struct Token_Type` is declared in ‘`scnrtype.web`’.

9.1 Data Members

`unsigned int type` [Public data members]
`YYSTYPE value`

9.2 Functions

9.2.0.1 Constructors

`void Token_Type (void)` [Default constructor]
`void Token_Type (unsigned int` *ttype*, `YYSTYPE` *vvalue*) [Constructor]

10 Scanner_Type

Class `Scanner_Type` is declared in ‘`scnrtype.web`’.

10.1 Data Members

`char in_filename[128]` [Private variables]
`char log_filename[128]`
`ifstream in_strm`
`map<string, Id_Type*> id_map`
`stack<Token_Type> token_stack`
`vector<float> float_vector`

`ofstream log_strm` [Public variables]

10.2 Functions

10.2.1 Constructor

`void Scanner_Type` (*void*) [Default constructor]

10.2.2 Destructor

`void ~Scanner_Type` (*void*) [Destructor]

10.2.2.1 Initializing Maps

`int initialize_id_map (void)` [Function]

10.3 Other functions

`Id_Node lookup` (`char*` *name*, [Function]
`bool` *create*,
`unsigned int` *type*)

11 Namespace Scan_Parse

`namespace Scan_Parse` is declared in '`scanner.web`'. Ctangling '`scanner.web`' generates '`scanner.h`'.

Unless otherwise stated, the variables and datatypes described in this chapter are all declared within the namespace `Scan_Parse`.

11.1 Keyword_Type

`struct Keyword_Type` is declared in '`scanner.web`'.

`string name` [Member variables]
`int value`
`string value_name`

11.2 Constants

`unsigned int NULL_STATE` [extern constants]
`unsigned int COLLECTING_ID`
`unsigned int COLLECTING_STRING`
`unsigned int COLLECTING_INTEGER`
`unsigned int COLLECTING_FLOAT`

11.3 Variables

`map<string, Keyword_Type*> keyword_map` [Variables]
`map<unsigned int, string> token_map`

11.4 Functions

11.4.1 Map Functions

`int initialize_maps (void)` [Function]

`int show_keyword_map (Scanner_Type*)` [Function]

11.4.2 Parser Rule Functions

The functions described in this section are defined in '`prsrfncs.web`'.

11.4.2.1 Functions for Variables

`void* variable_func (void*` *v*, `char*` *name*`)` [Function]

11.4.2.2 Functions for Declarations

`Id_Node declare_variable_func (void*` *v*, [Function]
`const unsigned short` *type*,
`char*` *name*`)`

11.4.2.3 Functions for Assignments

`void* query_assignment_func_0 (void*` *v*, [Function]
`void*` *object*,
`unsigned int` *assignment_type*,
`unsigned int` *arg_0*,
`unsigned int` *arg_1*,
`void*` *value*,
`bool` *negate*)

`int query_assignment_func_1 (Scanner_Node` *scanner_node*, [Function]
`Id_Node&` *curr_id_node*,
`void*&` *field_specifier*,
`int` *assignment_operator*,
`int` *negation_optional*,
`int` *match_term_optional*,
`void*&` *v*,
`int` *type*)

`int datetime_assignment_func_0 (void*` *v*, [Function]
`Date_Time_Node&` *curr_date_time_node*,
`int` *specifier*,
`int` *op*,
`void*` *val*,
`int` *type*)

`int datetime_assignment_func_1 (void*` *v*, [Function]
`Date_Time_Node&` *d*,
`int` *op*,
`void*&` *vec*)

11.4.2.4 Functions for Queries Scan_Parse

`int start_local_database_query_func (void*)` [Function]

`int end_query_func (void*)` [Function]

11.4.3 The Scanning Function `yylex`

`yylex` is the *scanner* or *scanning function* that reads code in the Scantest language from plain-text *input files* and passes *tokens* to the *parser* or *parsing function* `yyparse`. See Chapter 12 [Parser], page 17.

`int yylex (YYSTYPE*` *value*, `void*` *parameter*) [Global function]

12 Parser

Tokens are also known as *terminal symbols*. They are the basic building blocks of the Scantest language. Tokens are returned to the function `yyparse` by the function `yylex`. See Section 11.4.3 [The Scanning Function `yylex`], page 16.

`int yyparse (void* YYPARSE_PARAM)` [Global function]

This function is generated by GNU Bison from the *parser input files*:

Main parser file (‘`parser.w`’)

Variables (‘`variabls.w`’)

Declarations (‘`declrtns.w`’)

Assignments (‘`assign.w`’)

`datasource` expressions (‘`dtsrcexp.w`’)

`datetime` expressions (‘`dttmexp.w`’)

`query` expressions (‘`queryexp.w`’)

`string` expressions (‘`strings.w`’)

Commands (‘`commands.w`’)

`int int_value` [Union declaration for YYSTYPE]
`float float_value`
`char string_value[2048]`
`void* pointer_value`

`YYSTYPE` is the type of the *semantic value* associated with a symbol or a rule. `YYSTYPE` can be a simple type or a *union*. In Scantest, it is a `union`. Each of the tokens and non-terminal symbols described below has a semantic value whose type is one of the members of this `union`.

12.1 Punctuation

`int_value AT_SYMBOL` [Tokens]
`int_value COMMA`
`int_value COLON`
`int_value HYPHEN`
`int_value UNDERLINE`
`int_value PERCENT`
`int_value PERIOD`
`int_value SEMI_COLON`
`int_value OPEN_PARENTHESIS`
`int_value CLOSE_PARENTHESIS`
`int_value OPEN_BRACKET`
`int_value CLOSE_BRACKET`

12.2 General

`int_value CLEAR` [Token]

`No semantic value EMPTY` [Pseudo-Token]

`EMPTY` is a pseudo-token that represents the absence of a symbol on the right-hand side of a parser rule.

12.3 Grouping

`int_value START` [Tokens]
`int_value END`

12.4 Operators

12.4.1 Arithmetical Operators

`int_value PLUS` [Tokens]
`int_value MINUS`
`int_value TIMES`
`int_value DIVIDE`

12.4.2 Boolean Operators

`int_value XOR` [Tokens]
`int_value NOT`
`int_value AND_NOT`
`int_value OR_NOT`
`int_value XOR_NOT`

`int_value and_or_and_not` [Non-terminal Symbols]
`int_value or_or_or_not`
`int_value xor_or_xor_not`

12.5 Control

12.5.1 Termination

`int_value TERMINATE` [Tokens]

12.5.2 Conditionals

`int_value IF` [Tokens]
`int_value ELSE`
`int_value ELIF`
`int_value FI`

12.5.3 Loops

`int_value FOR` [Tokens]
`int_value DO`

`int_value` `WHILE`
`int_value` `AND`
`int_value` `OR`

12.6 Start Symbol

⟨program⟩ ⟶ ⟨statement list⟩ `TERMINATE`

12.7 Statements

(No semantic value) `statement_list` [Non-terminal Symbols]
(No semantic value) `statement`

⟨statement list⟩ ⟶ `EMPTY`
| ⟨statement list⟩ ⟨statement⟩
⟨statement⟩ ⟶ <declaration> `SEMI_COLON`
| <assignment> `SEMI_COLON`
| <command> `SEMI_COLON`

12.8 Data Types

`string_value` `STRING` [Tokens]
`int_value` `INTEGER`
`float_value` `FLOAT`

12.9 Variables

`int_value` `VARIABLE` [Tokens]
`string_value` `VARIABLE_TEXT_SEGMENT`
`pointer_value` `NULL_TYPE`
`pointer_value` `DATASOURCE_TYPE`
`pointer_value` `DATETIME_TYPE`
`pointer_value` `QUERY_TYPE`
`pointer_value` `STRING_TYPE`

`pointer_value` `variable_name` [Non-terminal Symbols]
`string_value` `variable_segment_list`
`float_value` `subscript`
`pointer_value` `query_variable`
`pointer_value` `datasource_variable`
`pointer_value` `string_variable`
`pointer_value` `datetime_variable`

⟨variable name⟩ ⟶ ⟨variable segment list⟩
⟨variable segment list⟩ ⟶ `VARIABLE_TEXT_SEGMENT`
| ⟨variable segment list⟩ `VARIABLE_TEXT_SEGMENT`

| ⟨variable segment list⟩ ⟨subscript⟩
⟨subscript⟩ ⟶ `INTEGER`
| `FLOAT`
| `OPEN_BRACKET INTEGER CLOSE_BRACKET`
| `OPEN_BRACKET FLOAT CLOSE_BRACKET`

⟨query variable⟩ ⟶ `VARIABLE QUERY_TYPE`
| ⟨variable name⟩ `QUERY_TYPE`
⟨datasource variable⟩ ⟶ `VARIABLE DATASOURCE_TYPE`
| ⟨variable name⟩ `DATASOURCE_TYPE`
⟨string variable⟩ ⟶ `VARIABLE STRING_TYPE`
| ⟨variable name⟩ `STRING_TYPE`
⟨datetime variable⟩ ⟶ `VARIABLE DATETIME_TYPE`
| ⟨variable name⟩ `DATETIME_TYPE`

12.10 Declarations

`int_value` **`DATASOURCE_DECLARATOR`** [Tokens]
`int_value` **`DATETIME_DECLARATOR`**
`int_value` **`STRING_DECLARATOR`**
`int_value` **`QUERY_DECLARATOR`**

`int_value` **`declaration`** [Non-terminal Symbols]
`int_value` **`query_declaration`**
`int_value` **`datasource_declaration`**
`int_value` **`string_declaration`**
`int_value` **`datetime_declaration`**
`string_value` **`variable_declaration_segment_list`**
`int_value` **`subscript_placeholder`**

⟨declaration⟩ ⟶ ⟨query declaration⟩
| ⟨string declaration⟩
| ⟨datasource declaration⟩
| ⟨datetime declaration⟩

⟨variable declaration segment list⟩ ⟶ `VARIABLE_TEXT_SEGMENT`
| ⟨variable declaration segment list⟩ `VARIABLE_TEXT_SEGMENT`
| ⟨variable declaration segment list⟩ ⟨subscript placeholder⟩

⟨subscript placeholder⟩ ⟶ `OPEN_BRACKET CLOSE_BRACKET`

⟨query declaration⟩ ⟶ `QUERY_DECLARATOR` ⟨variable declaration segment list⟩
⟨datasource declaration⟩ ⟶ `DATASOURCE_DECLARATOR` ⟨variable declaration segment list⟩
⟨string declaration⟩ ⟶ `STRING_DECLARATOR` ⟨variable declaration segment list⟩
⟨datetime declaration⟩ ⟶ `DATETIME_DECLARATOR` ⟨variable declaration segment list⟩

12.11 Assignments

`int_value ASSIGN` [Tokens]
`int_value PLUS_ASSIGN`
`int_value MINUS_ASSIGN`
`int_value TIMES_ASSIGN`
`int_value DIVIDE_ASSIGN`
`int_value AND_ASSIGN`
`int_value OR_ASSIGN`
`int_value XOR_ASSIGN`
`int_value NOT_ASSIGN`

`int_value assignment` [Non-terminal Symbols]
`int_value negation_optional`
`int_value assign_or_plus_assign`
`int_value assignment_operator`
`pointer_value query_assignment`
`pointer_value datasource_assignment`
`string_value string_assignment`
`pointer_value datetime_assignment`

$\langle$negation optional$\rangle$ ⟶ `EMPTY`
| `NOT`

$\langle$match term optional$\rangle$ ⟶ `EMPTY`
| `CONTAINS`
| `FREETEXT`
| `LIKE`

$\langle$assign or plus assign$\rangle$ ⟶ `ASSIGN`
| `PLUS_ASSIGN`

$\langle$assignment operator$\rangle$ ⟶ `ASSIGN`
| `PLUS_ASSIGN`
| `OR_ASSIGN`
| `XOR_ASSIGN`
| `NOT_ASSIGN`

$\langle$assignment$\rangle$ ⟶ $\langle$query assignment$\rangle$
| $\langle$datasource assignment$\rangle$
| $\langle$string assignment$\rangle$
| $\langle$datetime assignment$\rangle$

```
⟨field specifier⟩ ⟶ ⟨field designator⟩ ⟨field qualifier list⟩

⟨field designator⟩ ⟶ ACCESS_NUMBER
      | AUTHOR
      | BIBLIOGRAPHIC_TYPE
      | CALL_NUMBER
      | CLASSIFICATION
      | COMPANY
      | CONTENT_SUMMARY
      | CONTRIBUTOR
      | CREATOR
      | DATABASE_PROVIDER
      | DESCRIPTION
      | EXEMPLAR_PRODUCTION_NUMBER
      | IDENTIFIER
      | INSTITUTION
      | LANGUAGE
      | MAIN_CANONICAL_TITLE
      | PERMUTATION_PATTERN
      | PERSON
      | PHYSICAL_DESCRIPTION
      | PUBLISHER
      | RECORD
      | REMOTE_ACCESS
      | RIGHTS
      | SOURCE
      | SUBJECT
      | SUPERORDINATE_ENTITIES
      | TITLE
      | TYPE
⟨field qualifier list⟩ ⟶ EMPTY
⟨field qualifier list⟩ ⟶ ⟨field qualifier list⟩ PERIOD ⟨field qualifier⟩
⟨field qualifier⟩ ⟶ ID
      | SURNAME
      | GIVEN_NAME
      | PREFIX
      | ELN_ORIGINAL_ENTRY
      | ELN_MOST_RECENT_CHANGE
      | ELN_STATUS_CHANGE
      | IDENTIFICATION_NUMBER
      | DATE_ORIGINAL_ENTRY
      | DATE_MOST_RECENT_CHANGE
      | DATE_STATUS_CHANGE
      | SOURCE_ID
```

| YEAR_APPEARANCE_BEGIN
| YEAR_APPEARANCE_END
| YEAR_APPEARANCE_RAK_WB
| YEAR_APPEARANCE_ORIGINAL

⟨datasource assignment⟩ ⟶ ⟨datasource variable⟩ ASSIGN ⟨datasource expression⟩
| ⟨datasource variable⟩ ASSIGN DBT
| ⟨datasource variable⟩ ASSIGN GBV_GVK
| ⟨datasource variable⟩ ASSIGN TIMMS
| ⟨datasource variable⟩ ASSIGN DATASOURCE_FILE

⟨string assignment⟩ ⟶ ⟨string variable⟩ ASSIGN ⟨string expression⟩
| ⟨string variable⟩ ASSIGN TEX ⟨query expression⟩
| ⟨string variable⟩ ASSIGN SQL OAI ⟨query expression⟩
| ⟨string variable⟩ ASSIGN SQL PICA ⟨query expression⟩

⟨datetime assignment⟩ ⟶ ⟨datetime variable⟩ ASSIGN ⟨datetime expression⟩
| ⟨datetime variable⟩ COLON ⟨datetime specifier⟩ ⟨assignment operator⟩ INTEGER
| ⟨datetime variable⟩ COLON ⟨datetime specifier⟩ ⟨assignment operator⟩ FLOAT

⟨datetime specifier⟩ ⟶ YEAR_RANGE_BEGIN
| YEAR_RANGE_END
| YEAR
| MONTH
| DAY
| HOUR
| MINUTE
| SECOND

⟨query assignment⟩ ⟶ ⟨query variable⟩ ASSIGN ⟨query expression⟩
| ⟨query variable⟩ ⟨assign or plus assign⟩ LOCAL DATABASE
| ⟨query variable⟩ ⟨assign or plus assign⟩ LOCAL SERVER
| ⟨query variable⟩ ⟨assign or plus assign⟩ REMOTE DATABASE
| ⟨query variable⟩ ⟨assign or plus assign⟩ REMOTE SERVER
| ⟨query variable⟩ COLON ⟨field specifier⟩ ⟨assignment operator⟩
⟨negation optional⟩ ⟨match term optional⟩ ⟨query expression⟩
| ⟨query variable⟩ COLON ⟨field specifier⟩ ⟨assignment operator⟩

⟨negation optional⟩ ⟨match term optional⟩ ⟨datetime expression⟩
| ⟨query variable⟩ `COLON` ⟨field specifier⟩ ⟨assignment operator⟩
⟨negation optional⟩ ⟨match term optional⟩ ⟨query expression⟩
| ⟨query variable⟩ `COLON` ⟨field specifier⟩ ⟨assignment operator⟩
⟨negation optional⟩ ⟨match term optional⟩ ⟨datetime expression⟩

12.12 Commands

`int_value command` [Non-terminal Symbols]

⟨message or errmessage⟩ ⟶ `MESSAGE`
| `ERRMESSAGE`

⟨command⟩ ⟶ ⟨message or errmessage⟩ `STRING`
| `PAUSE`
| `SHOW` ⟨query variable⟩
| `SHOW` ⟨datasource variable⟩
| `SHOW` ⟨datetime variable⟩
| `SHOW` ⟨string expression⟩
| `OUTPUT TEX` ⟨string expression⟩

12.13 Datasource Expressions

`int_value DATASOURCE_FILE` [Tokens]
`int_value LOCAL`
`int_value REMOTE`
`int_value DATABASE`
`int_value SERVER`
`int_value DBT`
`int_value GBV_GVK`
`int_value TIMMS`

`pointer_value datasource_primary` [Non-terminal Symbols]
`pointer_value datasource_secondary`
`pointer_value datasource_tertiary`
`pointer_value datasource_expression`

⟨datasource primary⟩ ⟶ ⟨datasource variable⟩
| `OPEN_PARENTHESIS` datasource_expression `CLOSE_PARENTHESIS`
⟨datasource secondary⟩ ⟶ datasource_primary
⟨datasource tertiary⟩ ⟶ ⟨datasource secondary⟩
⟨datasource expression⟩ ⟶ ⟨datasource tertiary⟩

12.14 Datetime Expressions

int_value YEAR_RANGE_BEGIN [Tokens]
int_value YEAR_RANGE_END
int_value YEAR
int_value MONTH
int_value DAY
int_value HOUR
int_value MINUTE
int_value SECOND

int_value datetime_specifier [Non-terminal Symbols]
pointer_value datetime_primary
pointer_value datetime_secondary
pointer_value datetime_tertiary
pointer_value datetime_expression
pointer_value datetime_element_list

⟨datetime primary⟩ ⟶ ⟨datetime variable⟩
  | OPEN_PARENTHESIS ⟨datetime expression⟩ CLOSE_PARENTHESIS
  | ⟨datetime element list⟩
⟨datetime secondary⟩ ⟶ ⟨datetime primary⟩
⟨datetime tertiary⟩ ⟶ ⟨datetime secondary⟩
⟨datetime expression⟩ ⟶ ⟨datetime tertiary⟩

⟨datetime element list⟩ ⟶ INTEGER COLON
  | FLOAT COLON
  | ⟨datetime element list⟩ INTEGER COLON
  | ⟨datetime element list⟩ FLOAT COLON

12.15 Query Expressions

int_value CONTAINS [Tokens]
int_value FREETEXT
int_value LIKE

int_value match_term_optional [Non-terminal Symbols]
pointer_value query_primary
pointer_value query_secondary
pointer_value query_tertiary
pointer_value query_expression

⟨query primary⟩ ⟶ ⟨query variable⟩
  | OPEN_PARENTHESIS ⟨query expression⟩ CLOSE_PARENTHESIS
  | STRING

| `INTEGER`
| `FLOAT`
⟨query secondary⟩ ⟶ ⟨query primary⟩
| ⟨query secondary⟩ ⟨and or and not⟩ ⟨query primary⟩
⟨query tertiary⟩ ⟶ ⟨query secondary⟩
| ⟨query tertiary⟩ ⟨xor or xor not⟩ ⟨query secondary⟩
⟨query expression⟩ ⟶ ⟨query tertiary⟩
| ⟨query expression⟩ ⟨or or or not⟩ ⟨query tertiary⟩

⟨and or and not⟩ ⟶ `AND`
| `AND_NOT`
⟨or or or not⟩ ⟶ `OR`
| `OR_NOT`
⟨xor or xor not⟩ ⟶ `XOR`
| ⟶ `XOR_NOT`

12.16 String Expressions

`int_value OAI` [Tokens]
`int_value PICA`
`int_value TEX`
`int_value SQL`

`string_value string_primary` [Non-terminal Symbols]
`string_value string_secondary`
`string_value string_tertiary`
`string_value string_expression`

⟨string primary⟩ ⟶ ⟨string variable⟩
| `STRING`
| `OPEN_PARENTHESIS` ⟨string expression⟩ `CLOSE_PARENTHESIS`
⟨string secondary⟩ ⟶ ⟨string primary⟩
⟨string tertiary⟩ ⟶ ⟨string secondary⟩
⟨string expression⟩ ⟶ ⟨string tertiary⟩

12.17 Output

`int_value OUTPUT` [Tokens]
`int_value MESSAGE`
`int_value ERRMESSAGE`
`int_value PAUSE`
`int_value SHOW`

`int_value message_or_errmessage` [Non-terminal Symbols]

12.18 Database Tables and Columns

12.18.1 General

`int_value ID` [Tokens]
`int_value ELN_ORIGINAL_ENTRY`
`int_value ELN_MOST_RECENT_CHANGE`
`int_value ELN_STATUS_CHANGE`
`int_value IDENTIFICATION_NUMBER`
`int_value DATE_ORIGINAL_ENTRY`
`int_value DATE_MOST_RECENT_CHANGE`
`int_value DATE_STATUS_CHANGE`
`int_value SOURCE_ID`
`int_value YEAR_APPEARANCE_BEGIN`
`int_value YEAR_APPEARANCE_END`
`int_value YEAR_APPEARANCE_RAK_WB`
`int_value YEAR_APPEARANCE_ORIGINAL`

`pointer_value field_specifier` [Non-terminal Symbols]
`int_value field_designator`
`pointer_value field_qualifier_list`
`int_value field_qualifier`

12.18.2 Names

`int_value GIVEN_NAME` [Tokens]
`int_value PREFIX`
`int_value SURNAME`

12.18.3 Access_Number

`int_value ACCESS_NUMBER` [Tokens]

12.18.4 Author

`int_value AUTHOR` [Tokens]
`int_value AUTHOR_GIVEN_NAME`
`int_value AUTHOR_PREFIX`
`int_value AUTHOR_SURNAME`

12.18.5 Bibliographic_Type

`int_value BIBLIOGRAPHIC_TYPE` [Tokens]

12.18.6 Call_Number

`int_value CALL_NUMBER` [Tokens]

12.18.7 Classification

`int_value CLASSIFICATION` [Tokens]

12.18.8 Company

`int_value COMPANY` [Tokens]

12.18.9 Content_Summary

`int_value CONTENT_SUMMARY` [Tokens]

12.18.10 Contributor

`int_value CONTRIBUTOR` [Tokens]
`int_value CONTRIBUTOR_GIVEN_NAME`
`int_value CONTRIBUTOR_PREFIX`
`int_value CONTRIBUTOR_SURNAME`

12.18.11 Creator

`int_value CREATOR` [Tokens]

12.18.12 Database_Provider

`int_value DATABASE_PROVIDER` [Tokens]

12.18.13 Description

`int_value DESCRIPTION` [Tokens]

12.18.14 Exemplar_Production_Number

`int_value EXEMPLAR_PRODUCTION_NUMBER` [Tokens]

12.18.15 Identifier

`int_value IDENTIFIER` [Tokens]

12.18.16 Institution

`int_value INSTITUTION` [Tokens]

12.18.17 Language

`int_value LANGUAGE` [Tokens]

12.18.18 Main_Canonical_Title

`int_value MAIN_CANONICAL_TITLE` [Tokens]

12.18.19 Permutation_Pattern

`int_value PERMUTATION_PATTERN` [Tokens]

12.18.20 Person

`int_value PERSON` [Tokens]

12.18.21 Physical_Description

`int_value PHYSICAL_DESCRIPTION` [Tokens]

12.18.22 Publisher

`int_value PUBLISHER` [Tokens]

12.18.23 Records

`int_value RECORD` [Tokens]

12.18.24 Remote_Access

`int_value REMOTE_ACCESS` [Tokens]

12.18.25 Rights

`int_value RIGHTS` [Tokens]

12.18.26 Source

`int_value SOURCE` [Tokens]

12.18.27 Subject

`int_value SUBJECT` [Tokens]

12.18.28 Superordinate_Entities

`int_value SUPERORDINATE_ENTITIES` [Tokens]

12.18.29 Title

`int_value TITLE` [Tokens]

12.18.30 Type

`int_value TYPE` [Tokens]

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Programs

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
one line to give the program's name and a brief idea of what it does.
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along with this program; if not, write to the Free Software
Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA  02110-1301, USA.
```

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type 'show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type 'show c' for details.
```

The hypothetical commands '`show w`' and '`show c`' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than '`show w`' and '`show c`'; they could even be mouse-clicks or menu items—whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
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'Gnomovision' (which makes passes at compilers) written by James Hacker.

signature of Ty Coon, 1 April 1989
Ty Coon, President of Vice
```

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