1. Introduction. [LDF 2006.10.18.]

2. Copyright and licenses. [LDF 2006.10.23.]

This document is part of the LDF Metadata Exchange Utilities, a package for metadata exchange. The LDF Metadata Exchange Utilities contain code from the the IWF Metadata Harvester, a package for metadata harvesting.

The states of the files used for creating this document as of January 31, 2007 are stored in the revisions of these files with the symbolic tag "`LAST_IWF`" in the CVS repository for the LDF Metadata Exchange Utilities:
`http://cvs.savannah.nongnu.org/viewcvs/iwf-mdh/?root=iwf-mdh`
If necessary, changes and additions after this date can be determined by comparing these revisions with later ones using the GNU diffutils:
`http://www.gnu.org/software/diffutils/diffutils.html`

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The LDF Metadata Exchange Utilities are available for downloading from the following FTP server:
`ftp://ftp.gwdg.de/pub/gnu2/iwfmdh/`

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3. Formatting commands. [LDF 2006.10.18.]
This section contains formatting commands. They don't appear in the TEX output of CWEAVE.

4. File Lists. [LDF 2006.10.18.]

5. Source Files. [LDF 2006.10.18.]

6. Logical and Hierarchical Order. [LDF 2006.10.18.]

7. Parser files. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this section.

8. Alphabetical Order. [LDF 2006.09.27.]

9. Non-Windows Code (`nonwin.web`). [LDF 2006.10.20.]

Log

[LDF 2006.10.20.] Created this file.

[LDF 2006.11.03.] Now including `unistd.h` in order to be be able to use *getopt*.

[LDF 2007.02.13.] Now including `pthread.h`.

⟨ `nonwin.web` 9 ⟩ ≡

```
static char id_string[] = "$Id: nonwin.web,v 1.6 2007/02/13 21:29:36 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 21.

10. Include files.

⟨ Include files 10 ⟩ ≡

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <cmath>
#include <bitset>
#include <ios>
#include <iomanip>
#include <iostream>
#include <iosfwd>
#include <fstream>
#include <sstream>
#if 0    /* 1 */
#include <strstream>
#endif
#include <new>
#include <ctype.h>
#include <string.h>
#include <map>
#include <stack>
#include <vector>
#include <pthread.h>
#include <sys/types.h>
#include <sys/wait.h>
#include <unistd.h>
#include <time.h>
```

See also sections 24, 30, 50, 125, 160, 189, 214, 250, 364, 382, 393, 679, 730, and 735.

This code is used in sections 20, 21, 28, 47, 122, 158, 186, 211, 247, 361, 379, 390, 676, 728, 733, and 750.

11. Type declarations. [LDF 2006.10.20.]

Log

[LDF 2006.10.20.] Added this section.

12. Mutex_Type. [LDF 2006.10.20.]

Log

[LDF 2006.10.20.] Added this type declaration.

⟨ **Mutex_Type** declaration 12 ⟩ ≡
```
struct Mutex_Type {
  pthread_mutex_t inner_mutex;
  Mutex_Type(void)
  {
    pthread_mutex_init(&inner_mutex, 0);
  }
  ;
  ⟨ Declare Mutex_Type functions 13 ⟩
};
```
This code is used in sections 20 and 21.

13. Lock. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this function.

⟨ Declare **Mutex_Type** functions 13 ⟩ ≡
```
int lock(void);
```
See also section 15.

This code is used in section 12.

14.

⟨ Define **Mutex_Type** functions 14 ⟩ ≡
```
int Mutex_Type::lock(void)
{
  return pthread_mutex_lock(&inner_mutex);
}
```
See also section 16.

This code is used in section 21.

15. Unlock. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this function.

⟨ Declare **Mutex_Type** functions 13 ⟩ +≡
```
int unlock(void);
```

16.

⟨ Define **Mutex_Type** functions 14 ⟩ +≡

```
int Mutex_Type::unlock(void)
{
  return pthread_mutex_unlock(&inner_mutex);
}
```

17. Forward declarations. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

⟨ Forward declarations 17 ⟩ ≡

```
class Query_Type;
typedef Query_Type *Query_Node;
class Scanner_Type;
typedef Scanner_Type *Scanner_Node;
```

See also sections 32, 52, 162, 191, 216, and 252.

This code is used in sections 20, 47, 48, 122, 123, 186, 187, 211, 212, 247, 248, 361, and 362.

18. extern declarations for global variables. [LDF 2006.10.19.]

Log

[LDF 2006.10.19.] Added this section.

[LDF 2006.11.23.] Added **extern** declarations of **ofstream** *tex_file_strm*, **Mutex_Type** *tex_mutex*, **unsigned short** *tex_file_ctr*, and **string** *tex_filename_str*.

[LDF 2006.11.30.] Added **extern** declaration of **const string** *copyright_tex_str*.

[LDF 2006.11.30.] Added **extern** declaration of **Mutex_Type** *time_mutex*.

⟨ **extern** declarations for global variables 18 ⟩ ≡

```
extern Mutex_Type cerr_mutex;
extern Mutex_Type cout_mutex;
extern Mutex_Type time_mutex;
extern ofstream tex_file_strm;
extern Mutex_Type tex_mutex;
extern unsigned short tex_file_ctr;
extern string tex_filename_str;
extern string copyright_tex_str;
extern int yydebug;
```

See also section 25.

This code is used in sections 20 and 28.

19. Putting Non-Win together. [LDF 2006.10.20.]

20. This is what's written to `nonwin.h`.

⟨ `nonwin.hh` 20 ⟩ ≡
⟨ Include files 10 ⟩
using namespace std;
⟨ **Mutex_Type** declaration 12 ⟩
⟨ Forward declarations 17 ⟩
⟨ **extern** declarations for global variables 18 ⟩

21. This is what's compiled. [LDF 2007.02.13.]

⟨ nonwin.web 9 ⟩
⟨ Include files 10 ⟩

```
using namespace std;
```

⟨ **Mutex_Type** declaration 12 ⟩
⟨ Define **Mutex_Type** functions 14 ⟩

22. stdafx (stdafx.web). [LDF 2006.10.17.]

Log

[LDF 2006.10.17.] Created this file.

⟨ stdafx.web 22 ⟩ ≡

```
static char id_string[] = "$Id: stdafx.web,v 1.4 2007/02/11 16:35:37 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.
This code is used in section 27.

23. Preprocessor macro calls. [LDF 2006.10.17.]

⟨ Preprocessor macro calls 23 ⟩ ≡

```
#ifdef WIN_LDF
#pragma once
#endif
```

See also sections 31, 51, 161, 190, 215, 251, and 680.
This code is used in sections 28, 48, 123, 187, 212, 248, and 362.

24. Include files in stdafx.h. [LDF 2006.10.17.]

⟨ Include files 10 ⟩ +≡

```
#include <iostream>
#include <tchar.h>
#define _ATL_CSTRING_EXPLICIT_CONSTRUCTORS      /* einige CString-Konstruktoren sind explizit */
#ifndef VC_EXTRALEAN
#define VC_EXTRALEAN      /* Selten verwendete Teile der Windows-Header nicht einbinden */
#endif
#include <afx.h>
#include <afxwin.h>      /* MFC-Kern- und Standardkomponenten */
#include <afxext.h>      /* MFC-Erweiterungen */
#include <afxdtctl.h>
    /* MFC-Untersttzung fr allgemeine Steuerelemente von Internet Explorer 4 */
#ifndef _AFX_NO_AFXCMN_SUPPORT
#include <afxcmn.h>      /* MFC-Untersttzung fr allgemeine Windows-Steuerelemente */
#endif      /* _AFX_NO_AFXCMN_SUPPORT */
#define _ATL_CSTRING_EXPLICIT_CONSTRUCTORS      /* einige CString-Konstruktoren sind explizit */
#include <atlbase.h>
#include <stdio.h>
#include <stdlib.h>
#include <ios>
#include <iomanip>
#include <fstream>
#include <sstream>
#include <strstream>
```

```
#include <new>
#include <ctype.h>
#include <string.h>
#include <map>
#include <stack>
#include <vector>
#include <time.h>
#include <afxmt.h>
#include "scanner.h"
```

25. extern declarations for global variables. [LDF 2006.10.19.]

Log

[LDF 2006.10.19.] Added this section.

⟨ **extern** declarations for global variables 18 ⟩ +≡

```
  extern ofstream log_strm;
  extern CMutex log_strm_mutex;
  extern CMutex cerr_mutex;
  extern CMutex cout_mutex;
  extern ifstream in_strm;
```

26. Putting stdafx.web together.

27. This is what's compiled. [LDF Undated.]

```
#include "stdafx.h"
  ⟨ stdafx.web 22 ⟩
```

28. This is what's written to `stdafx.h`.

⟨ `stdafx.hh` 28 ⟩ ≡
  ⟨ Preprocessor macro calls 23 ⟩
  ⟨ Include files 10 ⟩
  ⟨ **extern** declarations for global variables 18 ⟩

29. Date_Time_Type (`dttmtype.web`). [LDF 2006.10.17.]

Log

[LDF 2006.10.31.] Created this file.

⟨ `dttmtype.web` 29 ⟩ ≡
  static char *id_string*[] = "$Id: dttmtype.web,v 1.6 2007/02/13 20:38:51 lfinsto1 Exp $";
This code is cited in sections 6 and 8.
This code is used in section 47.

30. Include files.

⟨ Include files 10 ⟩ +≡
```
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
```

31. Preprocessor macro calls.

⟨ Preprocessor macro calls 23 ⟩ +≡
```
#ifdef WIN_LDF
#pragma once
#endif
```

32. Forward declarations. [LDF 2006.10.31.]

```
⟨ Forward declarations 17 ⟩ +≡
  class Query_Type;
  class Date_Time_Type;
  typedef Date_Time_Type *Date_Time_Node;
  namespace Scan_Parse {
    int datetime_assignment_func_0(void *v, Date_Time_Node &curr_date_time_node, int specifier, int
        op, void *val, int type);
    int datetime_assignment_func_1(void *v, Date_Time_Node &d, int op, void *&vec);
  };
```

33. class Date_Time_Type declaration. [LDF 2006.10.17.]

Log

!! BUG FIX: Made function declarations **public**.

[LDF 2006.12.18.] Added **friend** declaration for *yyparse*.

[LDF 2006.12.18.] Added **friend** declaration for **Scan_Parse**::*datetime_assignment_func_0*.

[LDF 2006.12.18.] Added **friend** declaration for **Scan_Parse**::*datetime_assignment_func_1*.

```
⟨ Declare class Date_Time_Type 33 ⟩ ≡
  class Date_Time_Type {
    friend class Query_Type;
    friend int Scan_Parse::datetime_assignment_func_0(void *v, Date_Time_Node
        &curr_date_time_node, int specifier, int op, void *val, int type);
    friend int Scan_Parse::datetime_assignment_func_1(void *v, Date_Time_Node &d, int op, void
        *&vec);
    friend int yyparse(void *);
    friend ostream&operator≪(ostream & o, Date_Time_Type &d);
    short *year_range_begin;
    short *year_range_end;
    short *year;
    unsigned short *month;
    unsigned short *day;
    unsigned short *hour;
    unsigned short *minute;
    float *second;
  public: ⟨ Declare Date_Time_Type functions 36 ⟩
  };
```

This code is used in sections 47 and 48.

34. Date_Time_Type functions. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

35. Constructors and setting functions. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

36. Default constructor. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function.

⟨ Declare **Date_Time_Type** functions 36 ⟩ ≡
```
Date_Time_Type(void);
```
See also sections 38, 40, and 44.

This code is used in section 33.

37.

⟨ Define **Date_Time_Type** functions 37 ⟩ ≡
```
Date_Time_Type::Date_Time_Type(void)
{
  year_range_begin = 0;
  year_range_end = 0;
  year = 0;
  month = 0;
  day = 0;
  hour = 0;
  minute = 0;
  second = 0;
  return;
}    /* End of the default Date_Time_Type constructor definition. */
```
See also sections 39, 41, and 45.

This code is used in section 47.

38. Destructor. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this function.

⟨ Declare **Date_Time_Type** functions 36 ⟩ +≡
```
~Date_Time_Type(void);
```

39.

```
⟨ Define Date_Time_Type functions 37 ⟩ +≡
  Date_Time_Type::~Date_Time_Type(void)
  {
    delete year_range_begin;
    delete year_range_end;
    delete year;
    delete month;
    delete day;
    delete hour;
    delete minute;
    delete second;
    return;
  }     /* End of the default Date_Time_Type destructor definition. */
```

40. Assignment. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this function.

```
⟨ Declare Date_Time_Type functions 36 ⟩ +≡
  Date_Time_Node operator=(const Date_Time_Type &d);
```

41.

```
⟨ Define Date_Time_Type functions 37 ⟩ +≡
  Date_Time_Node Date_Time_Type::operator=(const Date_Time_Type &d)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Entering␣‘Date_Time_Type’␣assignment␣operator." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    temp_strm.str("");
#endif
    if (this ≡ &d) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "In␣‘Date_Time_Type::operator=(const␣Date_Time_Type&)’:" ≪ endl ≪
          "Self-assignment.␣␣Returning␣‘this’." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      temp_strm.str("");
#endif
      return this;
    }
    if (year_range_begin ∧ d.year_range_begin) {
      *year_range_begin = *d.year_range_begin;
    }
    else if (year_range_begin ∧ ¬d.year_range_begin) {
      delete year_range_begin;
      year_range_begin = 0;
    }
    else if (¬year_range_begin ∧ d.year_range_begin) {
      year_range_begin = new short(*d.year_range_begin);
    }
    if (year_range_end ∧ d.year_range_end) {
      *year_range_end = *d.year_range_end;
    }
    else if (year_range_end ∧ ¬d.year_range_end) {
      delete year_range_end;
      year_range_end = 0;
    }
    else if (¬year_range_end ∧ d.year_range_end) {
      year_range_end = new short(*d.year_range_end);
    }
    if (year ∧ d.year) {
      *year = *d.year;
    }
    else if (year ∧ ¬d.year) {
```

```
    delete year;
    year = 0;
  }
  else if (¬year ∧ d.year) {
    year = new short(*d.year);
  }
  if (month ∧ d.month) {
    *month = *d.month;
  }
  else if (month ∧ ¬d.month) {
    delete month;
    month = 0;
  }
  else if (¬month ∧ d.month) {
    month = new unsigned short(*d.month);
  }
  if (day ∧ d.day) {
    *day = *d.day;
  }
  else if (day ∧ ¬d.day) {
    delete day;
    day = 0;
  }
  else if (¬day ∧ d.day) {
    day = new unsigned short(*d.day);
  }
  if (hour ∧ d.hour) {
    *hour = *d.hour;
  }
  else if (hour ∧ ¬d.hour) {
    delete hour;
    hour = 0;
  }
  else if (¬hour ∧ d.hour) {
    hour = new unsigned short(*d.hour);
  }
  if (minute ∧ d.minute) {
    *minute = *d.minute;
  }
  else if (minute ∧ ¬d.minute) {
    delete minute;
    minute = 0;
  }
  else if (¬minute ∧ d.minute) {
    minute = new unsigned short(*d.minute);
  }
  if (second ∧ d.second) {
    *second = *d.second;
  }
  else if (second ∧ ¬d.second) {
    delete second;
    second = 0;
```

```
    }
    else if (¬second ∧ d.second) {
      second = new float(*d.second);
    }
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Exiting␣'Date_Time_Type'␣assignment␣operator." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    temp_strm.str("");
#endif
    return this;
  }    /* End of the default Date_Time_Type assignment operator definition. */
```

42. Output operator. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this function.

⟨ Declare non-member functions for **Date_Time_Type** 42 ⟩ ≡

```
ostream & operator≪(ostream & o, Date_Time_Type &d);
```

This code is used in sections 47 and 48.

43.

```
⟨ Define non-member functions for Date_Time_Type 43 ⟩ ≡
  ostream & operator≪(ostream & o, Date_Time_Type &d)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Entering␣'Date_Time_Type'␣output␣operator." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    temp_strm.str("");
#endif
    o ≪ "year_range_begin␣==␣";
    if (d.year_range_begin) o ≪ *d.year_range_begin;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "year_range_end␣==␣";
    if (d.year_range_end) o ≪ *d.year_range_end;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "year␣==␣";
    if (d.year) o ≪ *d.year;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "month␣==␣";
    if (d.month) o ≪ *d.month;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "day␣==␣";
    if (d.day) o ≪ *d.day;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "hour␣==␣";
    if (d.hour) o ≪ *d.hour;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "minute␣==␣";
    if (d.minute) o ≪ *d.minute;
    else o ≪ "NULL";
    o ≪ endl;
    o ≪ "second␣==␣";
    if (d.second) o ≪ *d.second;
    else o ≪ "NULL";
    o ≪ endl;
    return o;
  }     /* End of operator≪ definition. */
```

This code is used in section 47.

44. Show. [LDF 2006.12.15.]

Log

[2006.12.15.] Added this function.

⟨ Declare **Date_Time_Type** functions 36 ⟩ +≡
```
int show(string s = "'Date_Time_Type:'");
```

45.

```
⟨ Define Date_Time_Type functions 37 ⟩ +≡
  int Date_Time_Type::show(string s)
  {
    stringstream temp_strm;
    temp_strm ≪ s ≪ endl ≪ "`year_range_begin'␣␣==␣";
    if (year_range_begin ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨short *⟩(year_range_begin);
    temp_strm ≪ endl;
    temp_strm ≪ "`year_range_end'␣␣==␣";
    if (year_range_end ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨short *⟩(year_range_end);
    temp_strm ≪ endl;
    temp_strm ≪ "`year'␣␣==␣";
    if (year ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨short *⟩(year);
    temp_strm ≪ endl;
    temp_strm ≪ "`month'␣␣==␣";
    if (month ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨unsigned short *⟩(month);
    temp_strm ≪ endl;
    temp_strm ≪ "`day'␣␣==␣";
    if (day ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨unsigned short *⟩(day);
    temp_strm ≪ endl;
    temp_strm ≪ "`hour'␣␣==␣";
    if (hour ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨unsigned short *⟩(hour);
    temp_strm ≪ endl;
    temp_strm ≪ "`minute'␣␣==␣";
    if (minute ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨unsigned short *⟩(minute);
    temp_strm ≪ endl;
    temp_strm ≪ "`second'␣␣==␣";
    if (second ≡ 0) temp_strm ≪ "NULL";
    else temp_strm ≪ *static_cast⟨float *⟩(second);
    temp_strm ≪ endl;
    cerr ≪ temp_strm.str( );
    temp_strm.str("");
    return 0;
  }     /* End of the default Date_Time_Type::show definition. */
```

46. Putting Date_Time_Type together. [LDF 2006.10.31.]

47. This is what's compiled.

⟨ Include files 10 ⟩
⟨ `dttmtype.web` 29 ⟩

using namespace std;

⟨ Forward declarations 17 ⟩
⟨ Declare **class Date_Time_Type** 33 ⟩
⟨ Declare non-member functions for **Date_Time_Type** 42 ⟩
⟨ Define **Date_Time_Type** functions 37 ⟩
⟨ Define non-member functions for **Date_Time_Type** 43 ⟩

48. This is what's written to `dttmtype.h`.

⟨ `dttmtype.hh` 48 ⟩ ≡
```
⟨ Preprocessor macro calls 23 ⟩
using namespace std;
⟨ Forward declarations 17 ⟩
⟨ Declare class Date_Time_Type 33 ⟩
⟨ Declare non-member functions for Date_Time_Type 42 ⟩
```

49. Query_Type (`querytyp.web`). [LDF 2006.10.17.]

Log

[LDF 2006.10.31.] Created this file.

⟨ `querytyp.web` 49 ⟩ ≡
```
static char id_string[] = "$Id: querytyp.web,v 1.7 2007/02/13 20:40:50 lfinsto1 Exp $";
```
This code is cited in sections 6 and 8.

This code is used in section 122.

50. Include files.

⟨ Include files 10 ⟩ +≡
```
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "idtype.h"
#include "scnrtype.h"
#include "scanner.h"
```

51. Preprocessor macro calls.

⟨ Preprocessor macro calls 23 ⟩ +≡
```
#ifdef WIN_LDF
#pragma once
#endif
```

52. Forward declarations. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

⟨ Forward declarations 17 ⟩ +≡
```
class Scanner_Type;
typedef Scanner_Type *Scanner_Node;
class Query_Type;
typedef Query_Type *Query_Node;
class Id_Type;
```

typedef Id_Type *Id_Node;

53. class Query_Type declaration. . [LDF 2006.10.17.]
The forward declaration of **Query_Type** is needed in order to be able to define **Query_Node** using **typedef**. [LDF 2006.10.31.]

Log

[LDF 2006.10.31.] Added **typedef Query_Type *Query_Node.**

[LDF 2006.10.31.] Working on this declaration.

[LDF 2006.11.13.] Removed **Query_Node** *next*. It was redundant, since *and_node* serves the same purpose.

[LDF 2006.11.13.] Added **vector⟨unsigned short⟩** *target_types* and **static map⟨unsigned short, string⟩** *target_type_map*.

[LDF 2006.11.13.] Added **unsigned short** *field_type* and **static map⟨unsigned short, string⟩** *field_type_map*.

[LDF 2006.11.21.] Added **string** *name* and **Id_Node** *id_node*.

[LDF 2006.11.22.] Added **unsigned short** *query_ctr*.

[LDF 2006.12.12.] Changed **unsigned short** array *match_values* to the non-array **unsigned short** *match_value*.

[LDF 2006.12.12.] Added **static map⟨unsigned short, string⟩** *match_value_map*.

⟨ Declare **class Query_Type** 53 ⟩ ≡
class Query_Type;
typedef Query_Type *Query_Node; class Query_Type { ⟨ **friend** declarations for **class Query_Type** 55 ⟩
private: unsigned short *query_type*;
unsigned short *field_type*;
unsigned short *value_type*;
vector⟨unsigned short⟩ *target_types*;
static map⟨unsigned short, string⟩ *query_type_map*;
static map⟨unsigned short, string⟩ *field_type_map*;
static map⟨unsigned short, string⟩ *value_type_map*;
static map⟨unsigned short, string⟩ *target_type_map*;
static map⟨unsigned short, string⟩ *match_value_map*;
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*;

See also section 54.

This code is used in sections 122 and 123.

54.

⟨ Declare **class Query_Type** 53 ⟩ +≡
  Scanner_Node *scanner_node*;
  unsigned short *query_ctr*;
public: ⟨ Declare **static Query_Type** constants 57 ⟩
  ⟨ Declare **static Query_Type** variables 78 ⟩
  ⟨ Declare **Query_Type** functions 86 ⟩
  } ;

55. friend declarations for class Query_Type. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

[LDF 2006.11.01.] Changed the name of **Scan_Parse** :: *start_local_query_func* to **Scan_Parse** :: *start_local_database_query_f*
and the name of **Scan_Parse** :: *end_local_query_func* to **Scan_Parse** :: *end_query_func*.

[LDF 2006.11.01.] Added the **friend** declaration of **Scan_Parse** :: *declare_variable_func*.

[LDF 2006.11.01.] Added the **char** ∗*name* argument to **Scan_Parse** :: *declare_variable_func*.

[LDF 2006.11.02.] Changed the return value of **Scan_Parse** :: *declare_variable_func* from **int** to **Id_Node**.

[LDF 2006.11.02.] Added the **friend** declaration of **Scan_Parse** :: *variable_func*.

[LDF 2006.11.02.] Added the **friend** declaration of **Scan_Parse** :: *query_assignment_func_0*.

[LDF 2006.11.14.] Added the **friend** declaration of *yyparse*.

[LDF 2006.12.15.] Added the **friend** declaration of **Scan_Parse** :: *datetime_assignment_func_0*.

[LDF 2006.12.18.] Added the **friend** declaration of **Scan_Parse** :: *datetime_assignment_func_1*.

[LDF 2006.12.19.] Added the **friend** declaration of **Scan_Parse** :: *query_assignment_func_1*.

⟨ **friend** declarations for **class Query_Type** 55 ⟩ ≡
  friend int *yyparse*(**void** ∗);
  friend void ∗**Scan_Parse** :: *variable_func*(**void** ∗*v*, **char** ∗*name*);
  friend Id_Node Scan_Parse :: *declare_variable_func*(**void** ∗*v*, **const unsigned short** *type*, **char** ∗*name*);
  friend void ∗**Scan_Parse** :: *query_assignment_func_0*(**void** ∗*v*, **void** ∗*object*, **unsigned int** *assignment_type*, **unsigned int** *arg_0*, **unsigned int** *arg_1*, **void** ∗*value*, **bool** *negate*);
  friend int Scan_Parse :: *query_assignment_func_1*(**Scanner_Node** *scanner_node*, **Id_Node** &*curr_id_node*, **void** ∗&*field_specifier*, **int** *assignment_operator*, **int** *negation_optional*, **int** *match_term_optional*, **void** ∗&*v*, **int** *type*);
  friend int Scan_Parse :: *start_local_database_query_func*(**void** ∗*v*);
  friend int Scan_Parse :: *end_query_func*(**void** ∗*v*);
  friend int Scan_Parse :: *datetime_assignment_func_0*(**void** ∗*v*, **Date_Time_Node** &*curr_date_time_node*, **int** *specifier*, **int** *op*, **void** ∗*val*, **int** *type*);
  friend int Scan_Parse :: *datetime_assignment_func_1*(**void** ∗*v*, **Date_Time_Node** &*d*, **int** *op*, **void** ∗&*vec*);
This code is used in section 53.

56. Declare static Query_Type constants and variables. [LDF 2006.10.31.]

57. Types for *value_type*, *field_type*, *query_type*, and *target_type*. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

⟨ Declare **static Query_Type** constants 57 ⟩ ≡
```
static const unsigned short QUERY_TYPE_NULL_TYPE;
```
See also sections 59, 62, 64, 65, 66, 73, 75, and 82.
This code is used in section 54.

58.

⟨ Initialize **static Query_Type** constants 58 ⟩ ≡
```
const unsigned short Query_Type::QUERY_TYPE_NULL_TYPE = 0;
```
See also sections 60, 67, 68, 70, 71, 72, 74, 76, and 83.
This code is used in section 122.

59. Types for *query_type*. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

[LDF 2006.11.13.] Added **static const unsigned short** TOP_TYPE.

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short TOP_TYPE;
static const unsigned short AND_TYPE;
static const unsigned short OR_TYPE;
static const unsigned short XOR_TYPE;
```

60.

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡
```
const unsigned short Query_Type::TOP_TYPE = 1;
const unsigned short Query_Type::AND_TYPE = 2;
const unsigned short Query_Type::OR_TYPE = 3;
const unsigned short Query_Type::XOR_TYPE = 4;
```

61. Types for *field_type*. [LDF 2006.11.13.]

Log

[LDF 2006.11.13.] Added this section with the declarations of AUTHOR_FIELD, CONTRIBUTOR_FIELD, TITLE_FIELD, and SUBJECT_FIELD.

[LDF 2006.12.05.] Added **static const unsigned short** CREATOR_FIELD.

[LDF 2006.12.07.] Added the **static const unsigned** *shorts* AUTHOR_SURNAME_FIELD, AUTHOR_GIVEN_NAME_FIELD, AUTHOR_PREFIX_FIELD, CONTRIBUTOR_SURNAME_FIELD, CONTRIBUTOR_GIVEN_NAME_FIELD, and CONTRIBUTOR_PREFIX_FI

[LDF 2006.12.12.] Added the **static const unsigned short** AUTHOR_SURNAME_FIELD,

[LDF 2006.12.12.] Added the **static const unsigned short** MAIN_CANONICAL_TITLE_FIELD.

[LDF 2006.12.12.] Added **static const unsigned** *shorts* to refer to additional tables from the OAI database (dc_test).

[LDF 2006.12.12.] Added **static const unsigned** *shorts* to refer to additional tables from the PICA database (PICA_DB).

62. Tables. [LDF 2006.12.13.]

⟨ Declare **static Query_Type** constants 57 ⟩ +≡

```
static const unsigned short ACCESS_NUMBER_FIELD;
static const unsigned short AUTHOR_FIELD;
static const unsigned short BIBLIOGRAPHIC_TYPE_FIELD;
static const unsigned short CALL_NUMBER_FIELD;
static const unsigned short CLASSIFICATION_FIELD;
static const unsigned short COMPANY_FIELD;
static const unsigned short CONTENT_SUMMARY_FIELD;
static const unsigned short CONTRIBUTOR_FIELD;
static const unsigned short CREATOR_FIELD;
static const unsigned short DATABASE_PROVIDER_FIELD;
static const unsigned short DESCRIPTION_FIELD;
static const unsigned short EXEMPLAR_PRODUCTION_NUMBER_FIELD;
static const unsigned short IDENTIFIER_FIELD;
static const unsigned short INSTITUTION_FIELD;
static const unsigned short LANGUAGE_FIELD;
static const unsigned short MAIN_CANONICAL_TITLE_FIELD;
static const unsigned short PERMUTATION_PATTERN_FIELD;
static const unsigned short PHYSICAL_DESCRIPTION_FIELD;
static const unsigned short PERSON_FIELD;
static const unsigned short PUBLISHER_FIELD;
static const unsigned short RECORD_FIELD;
static const unsigned short REMOTE_ACCESS_FIELD;
static const unsigned short RIGHTS_FIELD;
static const unsigned short SOURCE_FIELD;
static const unsigned short SUBJECT_FIELD;
static const unsigned short SUPERORDINATE_ENTITIES_FIELD;
static const unsigned short TITLE_FIELD;
static const unsigned short TYPE_FIELD;
```

63. Columns. [LDF 2006.12.13.]

64. Authors. [LDF 2006.12.13.]

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short AUTHOR_SURNAME_FIELD;
static const unsigned short AUTHOR_GIVEN_NAME_FIELD;
static const unsigned short AUTHOR_PREFIX_FIELD;
```

65. Contributors. [LDF 2006.12.14.]

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short CONTRIBUTOR_SURNAME_FIELD;
static const unsigned short CONTRIBUTOR_GIVEN_NAME_FIELD;
static const unsigned short CONTRIBUTOR_PREFIX_FIELD;
```

66. Records. [LDF 2006.12.14.]

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short RECORD_ID_FIELD;
static const unsigned short RECORD_ELN_ORIGINAL_ENTRY_FIELD;
static const unsigned short RECORD_ELN_MOST_RECENT_CHANGE_FIELD;
static const unsigned short RECORD_ELN_STATUS_CHANGE_FIELD;
static const unsigned short RECORD_IDENTIFICATION_NUMBER_FIELD;
static const unsigned short RECORD_DATE_ORIGINAL_ENTRY_FIELD;
static const unsigned short RECORD_DATE_MOST_RECENT_CHANGE_FIELD;
static const unsigned short RECORD_DATE_STATUS_CHANGE_FIELD;
static const unsigned short RECORD_SOURCE_ID_FIELD;
static const unsigned short RECORD_YEAR_APPEARANCE_BEGIN_FIELD;
static const unsigned short RECORD_YEAR_APPEARANCE_END_FIELD;
static const unsigned short RECORD_YEAR_APPEARANCE_RAK_WB_FIELD;
static const unsigned short RECORD_YEAR_APPEARANCE_ORIGINAL_FIELD;
```

67. Initialization. [LDF 2006.12.13.]

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡

68. Tables. [LDF 2006.12.13.]

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡

```
const unsigned short Query_Type::ACCESS_NUMBER_FIELD = 1;
const unsigned short Query_Type::AUTHOR_FIELD = 2;
const unsigned short Query_Type::BIBLIOGRAPHIC_TYPE_FIELD = 3;
const unsigned short Query_Type::CALL_NUMBER_FIELD = 4;
const unsigned short Query_Type::CLASSIFICATION_FIELD = 5;
const unsigned short Query_Type::COMPANY_FIELD = 6;
const unsigned short Query_Type::CONTENT_SUMMARY_FIELD = 7;
const unsigned short Query_Type::CONTRIBUTOR_FIELD = 8;
const unsigned short Query_Type::CREATOR_FIELD = 9;
const unsigned short Query_Type::DATABASE_PROVIDER_FIELD = 10;
const unsigned short Query_Type::DESCRIPTION_FIELD = 11;
const unsigned short Query_Type::EXEMPLAR_PRODUCTION_NUMBER_FIELD = 12;
const unsigned short Query_Type::IDENTIFIER_FIELD = 13;
const unsigned short Query_Type::INSTITUTION_FIELD = 14;
const unsigned short Query_Type::LANGUAGE_FIELD = 15;
const unsigned short Query_Type::MAIN_CANONICAL_TITLE_FIELD = 16;
const unsigned short Query_Type::PERMUTATION_PATTERN_FIELD = 17;
const unsigned short Query_Type::PERSON_FIELD = 18;
const unsigned short Query_Type::PHYSICAL_DESCRIPTION_FIELD = 19;
const unsigned short Query_Type::PUBLISHER_FIELD = 20;
const unsigned short Query_Type::RECORD_FIELD = 21;
const unsigned short Query_Type::REMOTE_ACCESS_FIELD = 22;
const unsigned short Query_Type::RIGHTS_FIELD = 23;
const unsigned short Query_Type::SOURCE_FIELD = 24;
const unsigned short Query_Type::SUPERORDINATE_ENTITIES_FIELD = 25;
const unsigned short Query_Type::TITLE_FIELD = 26;
const unsigned short Query_Type::SUBJECT_FIELD = 27;
const unsigned short Query_Type::TYPE_FIELD = 28;
```

69. Columns. [LDF 2006.12.13.]

70. Authors. [LDF 2006.12.13.]

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡

```
const unsigned short Query_Type::AUTHOR_SURNAME_FIELD = 200;
const unsigned short Query_Type::AUTHOR_GIVEN_NAME_FIELD = 201;
const unsigned short Query_Type::AUTHOR_PREFIX_FIELD = 202;
```

71. Contributors. [LDF 2006.12.13.]

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡

```
const unsigned short Query_Type::CONTRIBUTOR_SURNAME_FIELD = 203;
const unsigned short Query_Type::CONTRIBUTOR_GIVEN_NAME_FIELD = 204;
const unsigned short Query_Type::CONTRIBUTOR_PREFIX_FIELD = 205;
```

72. Records. [LDF 2006.12.14.]

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡
```
const unsigned short Query_Type::RECORD_ID_FIELD = 500;
const unsigned short Query_Type::RECORD_ELN_ORIGINAL_ENTRY_FIELD = 501;
const unsigned short Query_Type::RECORD_ELN_MOST_RECENT_CHANGE_FIELD = 502;
const unsigned short Query_Type::RECORD_ELN_STATUS_CHANGE_FIELD = 503;
const unsigned short Query_Type::RECORD_IDENTIFICATION_NUMBER_FIELD = 504;
const unsigned short Query_Type::RECORD_DATE_ORIGINAL_ENTRY_FIELD = 505;
const unsigned short Query_Type::RECORD_DATE_MOST_RECENT_CHANGE_FIELD = 506;
const unsigned short Query_Type::RECORD_DATE_STATUS_CHANGE_FIELD = 507;
const unsigned short Query_Type::RECORD_SOURCE_ID_FIELD = 508;
const unsigned short Query_Type::RECORD_YEAR_APPEARANCE_BEGIN_FIELD = 509;
const unsigned short Query_Type::RECORD_YEAR_APPEARANCE_END_FIELD = 510;
const unsigned short Query_Type::RECORD_YEAR_APPEARANCE_RAK_WB_FIELD = 501;
const unsigned short Query_Type::RECORD_YEAR_APPEARANCE_ORIGINAL_FIELD = 512;
```

73. Types for *value_type*. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short INT_TYPE;
static const unsigned short FLOAT_TYPE;
static const unsigned short QUERY_TYPE_STRING_TYPE;
static const unsigned short DATE_TIME_TYPE;
```

74.

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡
```
const unsigned short Query_Type::INT_TYPE = 1;
const unsigned short Query_Type::FLOAT_TYPE = 2;
const unsigned short Query_Type::QUERY_TYPE_STRING_TYPE = 3;
const unsigned short Query_Type::DATE_TIME_TYPE = 4;
```

75. Types for *target_types*. [LDF 2006.11.13.]

Log

[LDF 2006.11.13.] Added this section with the declarations of the **static const unsigned** *shorts* LOCAL_DATABASE_TARGET LOCAL_SERVER_TARGET, REMOTE_DATABASE_TARGET, and REMOTE_SERVER_TARGET.

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short LOCAL_DATABASE_TARGET;
static const unsigned short LOCAL_SERVER_TARGET;
static const unsigned short REMOTE_DATABASE_TARGET;
static const unsigned short REMOTE_SERVER_TARGET;
```

76.

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡

```
const unsigned short Query_Type::LOCAL_DATABASE_TARGET = 1;
const unsigned short Query_Type::LOCAL_SERVER_TARGET = 2;
const unsigned short Query_Type::REMOTE_DATABASE_TARGET = 3;
const unsigned short Query_Type::REMOTE_SERVER_TARGET = 4;
```

77. Flags. [LDF 2006.12.13.]

Log

[2006.12.13.] Added this section.

⟨ Preprocessor macro definitions 77 ⟩ ≡

```
#define QUERY_TYPE_BITSET_SIZE 96
```

See also section 365.

This code is used in sections 122, 123, and 379.

78.

⟨ Declare **static Query_Type** variables 78 ⟩ ≡

```
static bitset < QUERY_TYPE_BITSET_SIZE > NULL_BITSET;
```

See also section 79.

This code is used in section 54.

79. Tables. [LDF 2006.12.13.]

⟨ Declare **static Query_Type** variables 78 ⟩ +≡

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

80.

⟨ Initialize **static Query_Type** variables 80 ⟩ ≡

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

See also section 81.

This code is used in section 122.

81. Initialize static Query_Type variables. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

[LDF 2006.11.13.] Added declaration of *target_type_map*.

[LDF 2006.11.13.] Added declaration of *field_type_map*.

[LDF 2006.12.12.] Added declaration of *match_value_map*.

⟨ Initialize **static Query_Type** variables 80 ⟩ +≡
```
map⟨unsigned short, string⟩ Query_Type::query_type_map;
map⟨unsigned short, string⟩ Query_Type::field_type_map;
map⟨unsigned short, string⟩ Query_Type::value_type_map;
map⟨unsigned short, string⟩ Query_Type::target_type_map;
map⟨unsigned short, string⟩ Query_Type::match_value_map;
```

82. Constants for *match_value*. [LDF 2006.12.11.]

Log

[LDF 2006.12.11.] Added this section with the declarations of the **static const unsigned** *shorts* `LIKE_VALUE` and `FREETEXT_VALUE`.

[LDF 2006.12.12.] Added **unsigned short** `CONTAINS_VALUE`.

⟨ Declare **static Query_Type** constants 57 ⟩ +≡
```
static const unsigned short CONTAINS_VALUE;
static const unsigned short FREETEXT_VALUE;
static const unsigned short LIKE_VALUE;
```

83.

⟨ Initialize **static Query_Type** constants 58 ⟩ +≡
```
const unsigned short Query_Type::CONTAINS_VALUE = 1;
const unsigned short Query_Type::FREETEXT_VALUE = 2;
const unsigned short Query_Type::LIKE_VALUE = 3;
```

84. Query_Type functions. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

---

85. Constructor and setting functions. [LDF 2006.10.31.]

86. Default constructor. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function.

⟨ Declare **Query_Type** functions 86 ⟩ ≡
```
Query_Type(void);
```
See also sections 88, 90, 95, 99, 101, 105, 110, 114, and 115.

This code is used in section 54.

87.

⟨ Define **Query_Type** functions 87 ⟩ ≡
```
Query_Type::Query_Type(void)
{
  query_type = QUERY_TYPE_NULL_TYPE;
  field_type = QUERY_TYPE_NULL_TYPE;
  value_type = QUERY_TYPE_NULL_TYPE;
  negated = false;
  id_node = 0;
  value = 0;
  up = 0;
  and_node = 0;
  or_node = 0;
  xor_node = 0;
  query_ctr = 0;
  match_value = QUERY_TYPE_NULL_TYPE;
  scanner_node = 0;
  return;
}    /* End of default Query_Type constructor definition. */
```
See also sections 89, 91, 92, 93, 94, 96, 97, 98, 100, 102, 103, 104, 106, 107, 108, 111, 112, 113, 116, 117, 118, 119, 120, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, and 156.

This code is used in sections 122 and 158.

88. Set. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function.

[LDF 2006.11.13.] Added **unsigned short** *ffield* and *ttarget* arguments. Made all arguments optional, except the first one, i.e., *qquery_type*.

⟨ Declare **Query_Type** functions 86 ⟩ +≡
```
int set(unsigned short qquery_type, unsigned short ffield_type = 0, unsigned short
    vvalue_type = 0, unsigned short ttarget_type = 0, bool nnegated = false, void
    *vvalue = 0, Query_Node uup = 0, Query_Node aand_node = 0, Query_Node
    oor_node = 0, Query_Node xxor_node = 0, Scanner_Node sscanner_node = 0);
```

89.

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
int Query_Type::set(unsigned short qquery_type, 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)
{
  match_value = QUERY_TYPE_NULL_TYPE;
  return 0;
}    /* End of Query_Type::set definition. */
```

90. Destructor. [LDF 2006.10.31.]

To Do

[LDF 2006.12.12.] Change the way some *values* are handled, depending on the *field_type*. I've added dummy code for new fields that assumes that all of the associated values are pointers to **string**. This will probably not be the case.

Log

[2006.10.31.] Added this function.

[LDF 2006.11.14.] [LDF 2006.11.14.] !! BUG FIX: No longer writing debugging output to *scanner_node→log_strm*. This caused a "General Protection Fault" using GCC under Windows XP.

[LDF 2006.12.12.] Added code to account for additional **static const unsigned** *shorts* that refer to tables in the OAI database (dc_test).

[LDF 2006.12.12.] Added code to account for the tokens that refer to additional tables in the PICA database (PICA_DB).

⟨ Declare **Query_Type** functions 86 ⟩ +≡

```
~Query_Type(void);
```

91.

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
Query_Type::~Query_Type(void){
#if 0    /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm << "Entering ‘Query_Type’ destructor." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    temp_strm.str("");
#endif
```

92. Please note that the **Query_Node** *up* isn't deleted! [LDF 2006.11.03.]

To Do

[LDF 2006.11.03.] Cast *value* to correct type and delete it.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  up = 0;
  if (value ≠ 0) {
    if (field_type ≡ ACCESS_NUMBER_FIELD ∨ field_type ≡ AUTHOR_FIELD ∨ field_type ≡
          BIBLIOGRAPHIC_TYPE_FIELD ∨ field_type ≡ CALL_NUMBER_FIELD ∨ field_type ≡
          CLASSIFICATION_FIELD ∨ field_type ≡ COMPANY_FIELD ∨ field_type ≡
          CONTENT_SUMMARY_FIELD ∨ field_type ≡ CONTRIBUTOR_FIELD ∨ field_type ≡
          CREATOR_FIELD ∨ field_type ≡ DATABASE_PROVIDER_FIELD ∨ field_type ≡
          DESCRIPTION_FIELD ∨ field_type ≡ EXEMPLAR_PRODUCTION_NUMBER_FIELD ∨ field_type ≡
          IDENTIFIER_FIELD∨field_type ≡ INSTITUTION_FIELD∨field_type ≡ LANGUAGE_FIELD∨field_type ≡
          MAIN_CANONICAL_TITLE_FIELD ∨ field_type ≡ PERMUTATION_PATTERN_FIELD ∨ field_type ≡
          PERSON_FIELD ∨ field_type ≡ PHYSICAL_DESCRIPTION_FIELD ∨ field_type ≡
          PUBLISHER_FIELD∨field_type ≡ RECORD_FIELD∨field_type ≡ REMOTE_ACCESS_FIELD∨field_type ≡
          RIGHTS_FIELD ∨ field_type ≡ SOURCE_FIELD ∨ field_type ≡ SUBJECT_FIELD ∨ field_type ≡
          SUPERORDINATE_ENTITIES_FIELD ∨ field_type ≡ TITLE_FIELD ∨ field_type ≡
          TYPE_FIELD ∨ field_type ≡ AUTHOR_SURNAME_FIELD ∨ field_type ≡
          AUTHOR_GIVEN_NAME_FIELD ∨ field_type ≡ AUTHOR_PREFIX_FIELD ∨ field_type ≡
          CONTRIBUTOR_SURNAME_FIELD ∨ field_type ≡ CONTRIBUTOR_GIVEN_NAME_FIELD ∨ field_type ≡
          CONTRIBUTOR_PREFIX_FIELD ∨ field_type ≡ RECORD_IDENTIFICATION_NUMBER_FIELD) {
      delete static_cast⟨string *⟩(value);
    }
    else if (field_type ≡ RECORD_ID_FIELD∨field_type ≡ RECORD_ELN_ORIGINAL_ENTRY_FIELD∨field_type ≡
          RECORD_ELN_MOST_RECENT_CHANGE_FIELD ∨ field_type ≡
          RECORD_ELN_STATUS_CHANGE_FIELD ∨ field_type ≡ RECORD_SOURCE_ID_FIELD ∨ field_type ≡
          RECORD_YEAR_APPEARANCE_BEGIN_FIELD ∨ field_type ≡ RECORD_YEAR_APPEARANCE_END_FIELD ∨
          field_type ≡ RECORD_YEAR_APPEARANCE_RAK_WB_FIELD ∨ field_type ≡
          RECORD_YEAR_APPEARANCE_ORIGINAL_FIELD) {
      delete static_cast⟨int *⟩(value);
    }
    else if (field_type ≡ RECORD_DATE_ORIGINAL_ENTRY_FIELD ∨ field_type ≡
          RECORD_DATE_MOST_RECENT_CHANGE_FIELD ∨ field_type ≡ RECORD_DATE_STATUS_CHANGE_FIELD)
      {
      delete static_cast⟨Date_Time_Node⟩(value);
    }
  }     /* if (value ≠ 0) */
  value = 0;
  delete and_node;
  and_node = 0;
  delete or_node;
  or_node = 0;
  delete xor_node;
  xor_node = 0;
```

93.

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣‘Query_Type’␣destructor." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  temp_strm.str("");
#endif
```

94. DO NOT delete *scanner_node*! [LDF 2006.10.31.]

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
  scanner_node = 0;
  return; }      /* End of ~Query_Type definition. */
```

95. Assignment. [LDF 2006.11.15.]

Log

[2006.11.15.] Added this function.

⟨ Declare **Query_Type** functions 86 ⟩ +≡

```
  Query_Node operator=(const Query_Type &q);
```

96.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  Query_Node Query_Type::operator=(const Query_Type &q){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
      scanner_node = q.scanner_node;
      query_ctr = q.query_ctr;
#ifdef DEBUG_OUTPUT
      temp_strm << "Entering␣`Query_Type::operator=(const␣Query_Type)'." << endl;
      cerr_mutex.lock();
      cerr << temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node) scanner_node->log_strm << temp_strm.str();
      temp_strm.str("");
#endif
      if (this ≡ &q) {
#ifdef DEBUG_OUTPUT
        temp_strm << "In␣`Query_Type::operator=(const␣Query_Type)':" << endl <<
            "Self-assignment.␣␣Returning␣`this'." << endl;
        cerr_mutex.lock();
        cerr << temp_strm.str();
        cerr_mutex.unlock();
        if (scanner_node) scanner_node->log_strm << temp_strm.str();
        temp_strm.str("");
#endif
        return this;
      }
```

97.

Log

[LDF 2006.11.21.] Added this section. Now setting *name* to *q.name*.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  name = q.name;
  if (value ≠ 0 ∧ value_type ≠ q.value_type) {
    if (value_type ≡ Query_Type::QUERY_TYPE_STRING_TYPE) {
      delete static_cast⟨string *⟩(value);
    }
    else if (value_type ≡ Query_Type::INT_TYPE) {
      delete static_cast⟨int *⟩(value);
    }
    else if (value_type ≡ Query_Type::FLOAT_TYPE) {
      delete static_cast⟨float *⟩(value);
    }
    else if (value_type ≡ Query_Type::DATE_TIME_TYPE) {
      delete static_cast⟨Date_Time_Node⟩(value);
    }
    value = 0;
  }     /* if (value ≠ 0 ∧ value_type ≠ q.value_type) */
  query_type = q.query_type;
  field_type = q.field_type;
  value_type = q.value_type;
  negated = q.negated;
  target_types.clear( );
  for (vector⟨unsigned short⟩::const_iterator iter = q.target_types.begin( ); iter ≠ q.target_types.end( );
        ++iter) target_types.push_back(*iter);
  if (q.value ≠ 0 ∧ value_type ≡ QUERY_TYPE_STRING_TYPE) {
    if (value ≡ 0) value = static_cast⟨void *⟩(new string);
    *static_cast⟨string *⟩(value) = *static_cast⟨string *⟩(q.value);
  }     /* if */
  else if (q.value ≠ 0 ∧ value_type ≡ INT_TYPE) {
    if (value ≡ 0) value = static_cast⟨void *⟩(new int);
    *static_cast⟨int *⟩(value) = *static_cast⟨int *⟩(q.value);
  }
  else if (q.value ≠ 0 ∧ value_type ≡ FLOAT_TYPE) {
    if (value ≡ 0) value = static_cast⟨void *⟩(new float);
    *static_cast⟨float *⟩(value) = *static_cast⟨float *⟩(q.value);
  }
  else if (q.value ≠ 0 ∧ value_type ≡ DATE_TIME_TYPE) {
    if (value ≡ 0) value = static_cast⟨void *⟩(new Date_Time_Type);
    *static_cast⟨Date_Time_Node⟩(value) = *static_cast⟨Date_Time_Node⟩(q.value);
  }
  else {
    value_type = QUERY_TYPE_NULL_TYPE;
    value = 0;
  }
  scanner_node = q.scanner_node;
  delete and_node;
```

```
  and_node = 0;
  delete or_node;
  or_node = 0;
  delete xor_node;
  xor_node = 0;
  if (q.and_node) {
    and_node = new Query_Type;
    *and_node = *q.and_node;
    and_node->up = this;
  }
  if (q.or_node) {
    or_node = new Query_Type;
    *or_node = *q.or_node;
    or_node->up = this;
  }
  if (q.xor_node) {
    xor_node = new Query_Type;
    *xor_node = *q.xor_node;
    xor_node->up = this;
  }
#ifdef DEBUG_OUTPUT
  temp_strm << "Exiting `Query_Type::operator=(const Query_Type)'." << endl;
  cerr_mutex.lock();
  cerr << temp_strm.str();
  cerr_mutex.unlock();
  if (scanner_node) scanner_node->log_strm << temp_strm.str();
  temp_strm.str("");
#endif
```

98.

⟨ Define **Query_Type** functions 87 ⟩ +≡
```
  match_value = q.match_value;
  return this; }      /* End of Query_Type::operator=(const Query_Type q) definition. */
```

99. Initialize type maps. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function.

[LDF 2006.11.13.] Added code for initializing *target_type_map*.

[LDF 2006.11.13.] Added code for initializing *field_type_map*.

[LDF 2006.12.12.] Added code for `MAIN_CANONICAL_TITLE_FIELD`.

[LDF 2006.12.12.] Added code for initializing *match_value_map*.

[LDF 2006.12.12.] Added code for additional **static const unsigned** *shorts* that refer to tables in the OAI database (dc_test).

[LDF 2006.12.12.] Added code to account for for additional **static const unsigned** *shorts* that refer to tables in the PICA database (PICA_DB).

⟨ Declare **Query_Type** functions 86 ⟩ +≡
```
  static int initialize_type_maps(void);
```

100.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  int Query_Type::initialize_type_maps(void)
  {
    query_type_map[QUERY_TYPE_NULL_TYPE] = "QUERY_TYPE_NULL_TYPE";
    query_type_map[TOP_TYPE] = "TOP_TYPE";
    query_type_map[AND_TYPE] = "AND_TYPE";
    query_type_map[OR_TYPE] = "OR_TYPE";
    query_type_map[XOR_TYPE] = "XOR_TYPE";
    field_type_map[QUERY_TYPE_NULL_TYPE] = "QUERY_TYPE_NULL_TYPE";
    field_type_map[ACCESS_NUMBER_FIELD] = "ACCESS_NUMBER_FIELD";
    field_type_map[AUTHOR_FIELD] = "AUTHOR_FIELD";
    field_type_map[AUTHOR_SURNAME_FIELD] = "AUTHOR_SURNAME_FIELD";
    field_type_map[AUTHOR_GIVEN_NAME_FIELD] = "AUTHOR_GIVEN_NAME_FIELD";
    field_type_map[AUTHOR_PREFIX_FIELD] = "AUTHOR_PREFIX_FIELD";
    field_type_map[BIBLIOGRAPHIC_TYPE_FIELD] = "BIBLIOGRAPHIC_TYPE_FIELD";
    field_type_map[CALL_NUMBER_FIELD] = "CALL_NUMBER_FIELD";
    field_type_map[CLASSIFICATION_FIELD] = "CLASSIFICATION_FIELD";
    field_type_map[COMPANY_FIELD] = "COMPANY_FIELD";
    field_type_map[CONTENT_SUMMARY_FIELD] = "CONTENT_SUMMARY_FIELD";
    field_type_map[CONTRIBUTOR_FIELD] = "CONTRIBUTOR_FIELD";
    field_type_map[CONTRIBUTOR_SURNAME_FIELD] = "CONTRIBUTOR_SURNAME_FIELD";
    field_type_map[CONTRIBUTOR_GIVEN_NAME_FIELD] = "CONTRIBUTOR_GIVEN_NAME_FIELD";
    field_type_map[CONTRIBUTOR_PREFIX_FIELD] = "CONTRIBUTOR_PREFIX_FIELD";
    field_type_map[CREATOR_FIELD] = "CREATOR_FIELD";
    field_type_map[DATABASE_PROVIDER_FIELD] = "DATABASE_PROVIDER_FIELD";
    field_type_map[DESCRIPTION_FIELD] = "DESCRIPTION_FIELD";
    field_type_map[EXEMPLAR_PRODUCTION_NUMBER_FIELD] = "EXEMPLAR_PRODUCTION_NUMBER_FIELD";
    field_type_map[IDENTIFIER_FIELD] = "IDENTIFIER_FIELD";
    field_type_map[INSTITUTION_FIELD] = "INSTITUTION_FIELD";
    field_type_map[LANGUAGE_FIELD] = "LANGUAGE_FIELD";
    field_type_map[MAIN_CANONICAL_TITLE_FIELD] = "MAIN_CANONICAL_TITLE_FIELD";
    field_type_map[PERMUTATION_PATTERN_FIELD] = "PERMUTATION_PATTERN_FIELD";
    field_type_map[PERSON_FIELD] = "PERSON_FIELD";
    field_type_map[PHYSICAL_DESCRIPTION_FIELD] = "PHYSICAL_DESCRIPTION_FIELD";
    field_type_map[PUBLISHER_FIELD] = "PUBLISHER_FIELD";
    field_type_map[RECORD_FIELD] = "RECORD_FIELD";
    field_type_map[RECORD_IDENTIFICATION_NUMBER_FIELD] = "RECORD_IDENTIFICATION_NUMBER_FIELD";
    field_type_map[RECORD_DATE_MOST_RECENT_CHANGE_FIELD] =
        "RECORD_DATE_MOST_RECENT_CHANGE_FIELD";
    field_type_map[RECORD_DATE_ORIGINAL_ENTRY_FIELD] = "RECORD_DATE_ORIGINAL_ENTRY_FIELD";
    field_type_map[RECORD_DATE_STATUS_CHANGE_FIELD] = "RECORD_DATE_STATUS_CHANGE_FIELD";
    field_type_map[RECORD_ELN_STATUS_CHANGE_FIELD] = "RECORD_ELN_STATUS_CHANGE_FIELD";
    field_type_map[REMOTE_ACCESS_FIELD] = "REMOTE_ACCESS_FIELD";
    field_type_map[RIGHTS_FIELD] = "RIGHTS_FIELD";
    field_type_map[SOURCE_FIELD] = "SOURCE_FIELD";
    field_type_map[SUBJECT_FIELD] = "SUBJECT_FIELD";
    field_type_map[SUPERORDINATE_ENTITIES_FIELD] = "SUPERORDINATE_ENTITIES_FIELD";
    field_type_map[TITLE_FIELD] = "TITLE_FIELD";
    field_type_map[TYPE_FIELD] = "TYPE_FIELD";
    value_type_map[QUERY_TYPE_NULL_TYPE] = "QUERY_TYPE_NULL_TYPE";
    value_type_map[INT_TYPE] = "INT_TYPE";
```

```
    value_type_map[FLOAT_TYPE] = "FLOAT_TYPE";
    value_type_map[QUERY_TYPE_STRING_TYPE] = "QUERY_TYPE_STRING_TYPE";
    value_type_map[DATE_TIME_TYPE] = "DATE_TIME_TYPE";
    target_type_map[LOCAL_DATABASE_TARGET] = "LOCAL_DATABASE_TARGET";
    target_type_map[LOCAL_SERVER_TARGET] = "LOCAL_SERVER_TARGET";
    target_type_map[REMOTE_DATABASE_TARGET] = "REMOTE_DATABASE_TARGET";
    target_type_map[REMOTE_SERVER_TARGET] = "REMOTE_SERVER_TARGET";
    match_value_map[QUERY_TYPE_NULL_TYPE] = "QUERY_TYPE_NULL_TYPE";
    match_value_map[CONTAINS_VALUE] = "CONTAINS_VALUE";
    match_value_map[FREETEXT_VALUE] = "FREETEXT_VALUE";
    match_value_map[LIKE_VALUE] = "LIKE_VALUE";
    return 0;
  }    /* End of Query_Type::initialize_type_maps definition. */
```

101. Initialize flags. [LDF 2006.12.13.]

Log

[2006.12.13.] Added this function.

```
⟨ Declare Query_Type functions 86 ⟩ +≡
  static int initialize_flags(void);
```

102.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  int Query_Type::initialize_flags(void){ int shift_value = 0;
```

103.

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
ACCESS_NUMBER_FLAG = 1;
ACCESS_NUMBER_FLAG ≪= shift_value ++;
AUTHOR_FLAG = 1;
AUTHOR_FLAG ≪= shift_value ++;
AUTHOR_SURNAME_FLAG = 1;
AUTHOR_SURNAME_FLAG ≪= shift_value ++;
AUTHOR_GIVEN_NAME_FLAG = 1;
AUTHOR_GIVEN_NAME_FLAG ≪= shift_value ++;
AUTHOR_PREFIX_FLAG = 1;
AUTHOR_PREFIX_FLAG ≪= shift_value ++;
BIBLIOGRAPHIC_TYPE_FLAG = 1;
BIBLIOGRAPHIC_TYPE_FLAG ≪= shift_value ++;
CALL_NUMBER_FLAG = 1;
CALL_NUMBER_FLAG ≪= shift_value ++;
CLASSIFICATION_FLAG = 1;
CLASSIFICATION_FLAG ≪= shift_value ++;
COMPANY_FLAG = 1;
COMPANY_FLAG ≪= shift_value ++;
CONTENT_SUMMARY_FLAG = 1;
CONTENT_SUMMARY_FLAG ≪= shift_value ++;
CONTRIBUTOR_FLAG = 1;
CONTRIBUTOR_FLAG ≪= shift_value ++;
CONTRIBUTOR_SURNAME_FLAG = 1;
CONTRIBUTOR_SURNAME_FLAG ≪= shift_value ++;
CONTRIBUTOR_GIVEN_NAME_FLAG = 1;
CONTRIBUTOR_GIVEN_NAME_FLAG ≪= shift_value ++;
CONTRIBUTOR_PREFIX_FLAG = 1;
CONTRIBUTOR_PREFIX_FLAG ≪= shift_value ++;
CREATOR_FLAG = 1;
CREATOR_FLAG ≪= shift_value ++;
DATABASE_PROVIDER_FLAG = 1;
DATABASE_PROVIDER_FLAG ≪= shift_value ++;
DESCRIPTION_FLAG = 1;
DESCRIPTION_FLAG ≪= shift_value ++;
EXEMPLAR_PRODUCTION_NUMBER_FLAG = 1;
EXEMPLAR_PRODUCTION_NUMBER_FLAG ≪= shift_value ++;
IDENTIFIER_FLAG = 1;
IDENTIFIER_FLAG ≪= shift_value ++;
INSTITUTION_FLAG = 1;
INSTITUTION_FLAG ≪= shift_value ++;
LANGUAGE_FLAG = 1;
LANGUAGE_FLAG ≪= shift_value ++;
MAIN_CANONICAL_TITLE_FLAG = 1;
MAIN_CANONICAL_TITLE_FLAG ≪= shift_value ++;
PERMUTATION_PATTERN_FLAG = 1;
PERMUTATION_PATTERN_FLAG ≪= shift_value ++;
PERSON_FLAG = 1;
PERSON_FLAG ≪= shift_value ++;
PHYSICAL_DESCRIPTION_FLAG = 1;
PHYSICAL_DESCRIPTION_FLAG ≪= shift_value ++;
```

```
PUBLISHER_FLAG = 1;
PUBLISHER_FLAG ≪= shift_value++;
RECORD_FLAG = 1;
RECORD_FLAG ≪= shift_value++;
RECORD_ID_FLAG = 1;
RECORD_ID_FLAG ≪= shift_value++;
RECORD_ELN_ORIGINAL_ENTRY_FLAG = 1;
RECORD_ELN_ORIGINAL_ENTRY_FLAG ≪= shift_value++;
RECORD_ELN_MOST_RECENT_CHANGE_FLAG = 1;
RECORD_ELN_MOST_RECENT_CHANGE_FLAG ≪= shift_value++;
RECORD_ELN_STATUS_CHANGE_FLAG = 1;
RECORD_ELN_STATUS_CHANGE_FLAG ≪= shift_value++;
RECORD_IDENTIFICATION_NUMBER_FLAG = 1;
RECORD_IDENTIFICATION_NUMBER_FLAG ≪= shift_value++;
RECORD_DATE_ORIGINAL_ENTRY_FLAG = 1;
RECORD_DATE_ORIGINAL_ENTRY_FLAG ≪= shift_value++;
RECORD_DATE_MOST_RECENT_CHANGE_FLAG = 1;
RECORD_DATE_MOST_RECENT_CHANGE_FLAG ≪= shift_value++;
RECORD_DATE_STATUS_CHANGE_FLAG = 1;
RECORD_DATE_STATUS_CHANGE_FLAG ≪= shift_value++;
RECORD_SOURCE_ID_FLAG = 1;
RECORD_SOURCE_ID_FLAG ≪= shift_value++;
RECORD_YEAR_APPEARANCE_BEGIN_FLAG = 1;
RECORD_YEAR_APPEARANCE_BEGIN_FLAG ≪= shift_value++;
RECORD_YEAR_APPEARANCE_END_FLAG = 1;
RECORD_YEAR_APPEARANCE_END_FLAG ≪= shift_value++;
RECORD_YEAR_APPEARANCE_RAK_WB_FLAG = 1;
RECORD_YEAR_APPEARANCE_RAK_WB_FLAG ≪= shift_value++;
RECORD_YEAR_APPEARANCE_ORIGINAL_FLAG = 1;
RECORD_YEAR_APPEARANCE_ORIGINAL_FLAG ≪= shift_value++;
REMOTE_ACCESS_FLAG = 1;
REMOTE_ACCESS_FLAG ≪= shift_value++;
RIGHTS_FLAG = 1;
RIGHTS_FLAG ≪= shift_value++;
SOURCE_FLAG = 1;
SOURCE_FLAG ≪= shift_value++;
SUBJECT_FLAG = 1;
SUBJECT_FLAG ≪= shift_value++;
SUPERORDINATE_ENTITIES_FLAG = 1;
SUPERORDINATE_ENTITIES_FLAG ≪= shift_value++;
TITLE_FLAG = 1;
TITLE_FLAG ≪= shift_value++;
TYPE_FLAG = 1;
TYPE_FLAG ≪= shift_value++;
```

104. Error handling. `QUERY_TYPE_BITSET_SIZE` too small. [LDF 2006.12.13.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (shift_value > QUERY_TYPE_BITSET_SIZE) {
    cerr ≪ "ERROR!␣␣In␣'Query_Type::initialize_flags':" ≪ endl ≪
        "'shift_value'␣>␣'QUERY_TYPE_BITSET_SIZE'." ≪ endl ≪
        "Increase␣the␣size␣of␣'QUERY_TYPE_BITSET_SIZE'." ≪ endl ≪
        "Exiting␣function␣with␣return␣value␣1." ≪ endl ≪ "Type␣<RETURN>␣to␣continue:␣";
    getchar( );
    return 1;
  }    /* if (shift_value > QUERY_TYPE_BITSET_SIZE) */
  return 0; }    /* Query_Type::initialize_flags */
```

105. Set field specifier. [LDF 2006.11.15.]

Log

[2006.11.15.] Added this function.

[LDF 2006.12.12.] Added code for `MAIN_CANONICAL_TITLE_FIELD`.

[LDF 2006.12.12.] Added code for more **static const unsigned** *shorts* that refer to tables in the OAI database (dc_test).

[LDF 2006.12.12.] Added code for more **static const unsigned** *shorts* that refer to tables in the PICA database (PICA_DB).

[LDF 2006.12.13.] Changed the name of this function from *set_field_type* to *set_field_specifier*.

```
⟨ Declare Query_Type functions 86 ⟩ +≡
  int set_field_specifier(void *v, bool traverse = false, Scanner_Node sscanner_node = 0);
```

106.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  int Query_Type::set_field_specifier(void *v, bool traverse, Scanner_Node sscanner_node){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm; deque < int > *field_specifier = static_cast ⟨ deque < int >*> (v);
      unsigned int table = (*field_specifier)[0];
      unsigned int column;
      if (table ≡ ACCESS_NUMBER) field_type = ACCESS_NUMBER_FIELD;
      else if (table ≡ AUTHOR) {
        if (field_specifier→size( ) ≡ 1) field_type = AUTHOR_FIELD;
        else      /* field_specifier→size( ) ≠ 1 */
        {
          column = (*field_specifier)[1];
          if (column ≡ SURNAME) field_type = AUTHOR_SURNAME_FIELD;
          else if (column ≡ GIVEN_NAME) field_type = AUTHOR_GIVEN_NAME_FIELD;
          else if (column ≡ PREFIX) field_type = AUTHOR_PREFIX_FIELD;
        }     /* else (field_specifier→size( ) ≠ 1) */
      }     /* else if (table ≡ AUTHOR) */
      else if (table ≡ BIBLIOGRAPHIC_TYPE) field_type = BIBLIOGRAPHIC_TYPE_FIELD;
      else if (table ≡ CALL_NUMBER) field_type = CALL_NUMBER_FIELD;
      else if (table ≡ CLASSIFICATION) field_type = CLASSIFICATION_FIELD;
      else if (table ≡ COMPANY) field_type = COMPANY_FIELD;
      else if (table ≡ CONTENT_SUMMARY) field_type = CONTENT_SUMMARY_FIELD;
      else if (table ≡ CONTRIBUTOR) {
        if (field_specifier→size( ) ≡ 1) field_type = CONTRIBUTOR_FIELD;
        else      /* (field_specifier→size( ) ≠ 1) */
        {
          column = (*field_specifier)[1];
          if (column ≡ SURNAME) field_type = CONTRIBUTOR_SURNAME_FIELD;
          else if (column ≡ GIVEN_NAME) field_type = CONTRIBUTOR_GIVEN_NAME_FIELD;
          else if (column ≡ PREFIX) field_type = CONTRIBUTOR_PREFIX_FIELD;
        }     /* else ((field_specifier→size( ) ≠ 1)) */
      }     /* else if (table ≡ CONTRIBUTOR) */
      else if (table ≡ CREATOR) field_type = CREATOR_FIELD;
      else if (table ≡ DATABASE_PROVIDER) field_type = DATABASE_PROVIDER_FIELD;
      else if (table ≡ DESCRIPTION) field_type = DESCRIPTION_FIELD;
      else if (table ≡ EXEMPLAR_PRODUCTION_NUMBER)
        field_type = EXEMPLAR_PRODUCTION_NUMBER_FIELD;
      else if (table ≡ IDENTIFIER) field_type = IDENTIFIER_FIELD;
      else if (table ≡ INSTITUTION) field_type = INSTITUTION_FIELD;
      else if (table ≡ LANGUAGE) field_type = LANGUAGE_FIELD;
      else if (table ≡ MAIN_CANONICAL_TITLE) field_type = MAIN_CANONICAL_TITLE_FIELD;
      else if (table ≡ PERMUTATION_PATTERN) field_type = PERMUTATION_PATTERN_FIELD;
      else if (table ≡ PERSON) field_type = PERSON_FIELD;
      else if (table ≡ PHYSICAL_DESCRIPTION) field_type = PHYSICAL_DESCRIPTION_FIELD;
      else if (table ≡ PUBLISHER) field_type = PUBLISHER_FIELD;
```

107. *table* ≡ RECORD.

Log

[2006.12.14.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (table ≡ RECORD) {
      if (field_specifier→size( ) ≡ 1) field_type = RECORD_FIELD;
      else      /* (field_specifier→size( ) ≠ 1) */
      {
        column = (*field_specifier)[1];
        if (column ≡ ID) field_type = RECORD_ID_FIELD;
        else if (column ≡ ELN_ORIGINAL_ENTRY) field_type = RECORD_ELN_ORIGINAL_ENTRY_FIELD;
        else if (column ≡ ELN_MOST_RECENT_CHANGE)
          field_type = RECORD_ELN_MOST_RECENT_CHANGE_FIELD;
        else if (column ≡ ELN_STATUS_CHANGE) field_type = RECORD_ELN_STATUS_CHANGE_FIELD;
        else if (column ≡ IDENTIFICATION_NUMBER)
          field_type = RECORD_IDENTIFICATION_NUMBER_FIELD;
        else if (column ≡ DATE_ORIGINAL_ENTRY) field_type = RECORD_DATE_ORIGINAL_ENTRY_FIELD;
        else if (column ≡ DATE_MOST_RECENT_CHANGE)
          field_type = RECORD_DATE_MOST_RECENT_CHANGE_FIELD;
        else if (column ≡ DATE_STATUS_CHANGE) field_type = RECORD_DATE_STATUS_CHANGE_FIELD;
        else if (column ≡ SOURCE_ID) field_type = RECORD_SOURCE_ID_FIELD;
        else if (column ≡ YEAR_APPEARANCE_BEGIN)
          field_type = RECORD_YEAR_APPEARANCE_BEGIN_FIELD;
        else if (column ≡ YEAR_APPEARANCE_END) field_type = RECORD_YEAR_APPEARANCE_END_FIELD;
        else if (column ≡ YEAR_APPEARANCE_RAK_WB)
          field_type = RECORD_YEAR_APPEARANCE_RAK_WB_FIELD;
        else if (column ≡ YEAR_APPEARANCE_ORIGINAL)
          field_type = RECORD_YEAR_APPEARANCE_ORIGINAL_FIELD;
      }     /* else ((field_specifier→size( ) ≠ 1)) */
    }     /* else if (table ≡ RECORD) */
```

108.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (table ≡ REMOTE_ACCESS) field_type = REMOTE_ACCESS_FIELD;
    else if (table ≡ RIGHTS) field_type = RIGHTS_FIELD;
    else if (table ≡ SOURCE) field_type = SOURCE_FIELD;
    else if (table ≡ SUBJECT) field_type = SUBJECT_FIELD;
    else if (table ≡ SUPERORDINATE_ENTITIES) field_type = SUPERORDINATE_ENTITIES_FIELD;
    else if (table ≡ TITLE) field_type = TITLE_FIELD;
    else if (table ≡ TYPE) field_type = TYPE_FIELD;
    else if (table ≡ CONTRIBUTOR_SURNAME) field_type = CONTRIBUTOR_SURNAME_FIELD;
    else if (table ≡ CONTRIBUTOR_GIVEN_NAME) field_type = CONTRIBUTOR_GIVEN_NAME_FIELD;
    else if (table ≡ CONTRIBUTOR_PREFIX) field_type = CONTRIBUTOR_PREFIX_FIELD;
    else field_type = QUERY_TYPE_NULL_TYPE;
  if (traverse) {
    if (and_node) and_node→set_field_specifier(v, true, scanner_node);
    if (or_node) or_node→set_field_specifier(v, true, scanner_node);
    if (xor_node) xor_node→set_field_specifier(v, true, scanner_node);
  }
  return 0;
#undef DEBUG_OUTPUT
  }    /* End of Query_Type::set_field_specifier definition. */
```

109. Functions for generating strings. [LDF 2006.11.21.]

Log

[LDF 2006.11.21.] Added this section.

110. Generate TEX string. [LDF 2006.11.21.]

Log

[2006.11.21.] Added this function.

```
⟨ Declare Query_Type functions 86 ⟩ +≡
  string generate_tex_string(Scanner_Node scanner_node, stringstream *tex_strm);
```

111.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  string Query_Type::generate_tex_string(Scanner_Node scanner_node,stringstream *tex_strm){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
#ifdef DEBUG_OUTPUT
      temp_strm << "Entering `Query_Type::generate_tex_string'." << endl <<
          "`query_ctr' == " << query_ctr << endl;
      cerr_mutex.lock();
      cerr << temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node ≠ 0) scanner_node→log_strm << temp_strm.str();
      temp_strm.str("");
#endif
```

112.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (query_ctr ≡ 0) *tex_strm ≪ "\\setbox\\namebox=\\hbox{" ≪ name ≪ "}" ≪ endl;
  *tex_strm ≪ "\\setbox\\querytypebox=\\hbox{" ≪ query_type_map[query_type] ≪ "}" ≪ endl;
  *tex_strm ≪ "\\setbox\\fieldtypebox=\\hbox{" ≪ field_type_map[field_type] ≪ "}" ≪ endl;
  *tex_strm ≪ "\\setbox\\valuetypebox=\\hbox{" ≪ value_type_map[value_type] ≪ "}" ≪ endl;
  *tex_strm ≪ "\\setbox\\targettypesbox=\\hbox{";
  if (target_types.size( ) ≤ 0) *tex_strm ≪ "QUERY_TYPE_NULL_TYPE";
  else if (target_types.size( ) ≡ 1) {
    *tex_strm ≪ target_type_map[target_types[0]];
  }
  else {
    *tex_strm ≪ "\\vbox{";
    int i = 0;
    for (vector⟨unsigned short⟩::iterator iter = target_types.begin( ); iter ≠ target_types.end( );
        ++iter) {
      if (i++ > 0) *tex_strm ≪ "%" ≪ endl;
      *tex_strm ≪ "\\hbox{" ≪ target_type_map[*iter] ≪ "}";
    }    /* for */
    *tex_strm ≪ "}";
  }    /* else */
  *tex_strm ≪ "}" ≪ endl;
  if (value_type ≡ QUERY_TYPE_STRING_TYPE) {
    *tex_strm ≪ "\\setbox\\valuebox=\\hbox{" ≪ *static_cast⟨string *⟩(value) ≪ "}" ≪ endl;
  }
  else if (value_type ≡ INT_TYPE) {
    *tex_strm ≪ "\\setbox\\valuebox=\\hbox{" ≪ *static_cast⟨int *⟩(value) ≪ "}" ≪ endl;
  }
  else if (value_type ≡ FLOAT_TYPE) {
    *tex_strm ≪ "\\setbox\\valuebox=\\hbox{" ≪ *static_cast⟨float *⟩(value) ≪ "}" ≪ endl;
  }
  else if (value_type ≡ DATE_TIME_TYPE) { *tex_strm ≪ "\\setbox\\valuebox=\\hbox{" ≪
      "Date\\_Time" # if 0    /* 1 */
  *static_cast⟨Date_Time_Node⟩(value) # endif ≪ "}" ≪ endl; } *tex_strm ≪ "\\upctr=";
  if (up) *tex_strm ≪ up→query_ctr;
  else *tex_strm ≪ "0";
  *tex_strm ≪ endl;
  *tex_strm ≪ "\\andctr=";
  if (and_node) *tex_strm ≪ and_node→query_ctr;
  else *tex_strm ≪ "0";
  *tex_strm ≪ endl;
  *tex_strm ≪ "\\orctr=";
  if (or_node) *tex_strm ≪ or_node→query_ctr;
  else *tex_strm ≪ "0";
  *tex_strm ≪ endl;
  *tex_strm ≪ "\\xorctr=";
  if (or_node) *tex_strm ≪ xor_node→query_ctr;
  else *tex_strm ≪ "0";
  *tex_strm ≪ endl;
  *tex_strm ≪ "%" ≪ endl ≪ "\\chart{" ≪ query_ctr ≪ "}{" ≪ negated ≪ "}" ≪ endl ≪ "%" ≪ endl;
  if (and_node) {
```

```
    *tex_strm ≪ "\\vskip\\queryskip\n%\n";
    *tex_strm ≪ "\\vskip\\ht\\targettypesbox\n" ≪ "\\vskip\\dp\\targettypesbox\n" ≪ "%\n";
    and_node→generate_tex_string(scanner_node, tex_strm);
  }
  if (or_node) {
    *tex_strm ≪ "\\vskip\\queryskip\n%\n";
    *tex_strm ≪ "\\vskip\\ht\\targettypesbox\n" ≪ "\\vskip\\dp\\targettypesbox\n" ≪ "%\n";
    or_node→generate_tex_string(scanner_node, tex_strm);
  }
  if (xor_node) {
    *tex_strm ≪ "\\vskip\\queryskip\n%\n";
    *tex_strm ≪ "\\vskip\\ht\\targettypesbox\n" ≪ "\\vskip\\dp\\targettypesbox\n" ≪ "%\n";
    xor_node→generate_tex_string(scanner_node, tex_strm);
  }
```

113. Return string. [LDF 2006.11.21.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣`Query_Type::generate_tex_string'." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  return tex_strm→str( ); }      /* Query_Type::generate_tex_string */
```

114. Generate SQL string. [LDF 2006.12.01.]

Log

[LDF 2006.12.01.] Added this function.

[LDF 2006.12.12.] Added code for `MAIN_CANONICAL_TITLE_FLAG`.

[LDF 2006.12.12.] Added code to account for **static const unsigned** *shorts* that refer to additional tables in the OAI database (dc_test).

[LDF 2006.12.14.] Moved the definition of this function from this file (`querytyp.web`) to `qtgensql.web`.

⟨ Declare **Query_Type** functions 86 ⟩ +≡

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*);

115. Show. [LDF 2006.10.31.]

As well as simply showing the **Query_Type** object, this function is meant to serve as an example of traversing it. This is somewhat complicated, because of all of the **Query_Nodes** it contains, and the complex way in which they're linked. [LDF 2006.10.31.]

The **Scanner_Node** *scanner_node* data member of the **Query_Type** object may already be non-null. However, *show* has an optional **Scanner_Node** argument, just in case it doesn't. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function.

[LDF 2006.11.14.] Added the optional **int** *level_ctr* argument with default 0.

[LDF 2006.12.12.] Added code to account for additional fields that refer to tables in the PICA database (PICA_DB).

⟨ Declare **Query_Type** functions 86 ⟩ +≡

int *show*(**string** *s* = `"'Query_Type':\n"`, **Scanner_Node** *sscanner_node* = 0);

116.

⟨ Define **Query_Type** functions 87 ⟩ +≡

int **Query_Type**::*show*(**string** *s*, **Scanner_Node** *sscanner_node*){ **stringstream** *temp_strm*;

if (*scanner_node* ≡ 0 ∧ *sscanner_node* ≠ 0) *scanner_node* = *sscanner_node*;

117. *query_type*, *field_type*, *value_type*, and *target_type*. [LDF 2006.10.31.]

Log

[LDF 2006.11.13.] Added code for showing *target_types*.

[LDF 2006.11.21.] Now showing *name*.

[LDF 2006.12.12.] Added code to account for **static const unsigned** *shorts* that refer to additional tables in the OAI database (dc_test).

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
temp_strm ≪ "'name' == " ≪ name ≪ endl ≪ "'query_type' == " ≪ query_type_map[query_type] ≪
    endl ≪ "'field_type' == " ≪ field_type_map[field_type] ≪ endl ≪ "'value_type' == " ≪
    value_type_map[value_type] ≪ endl ≪ "'match_value' == " ≪ match_value_map[match_value] ≪
    endl;
int i = 0;
for (vector⟨unsigned short⟩::iterator iter = target_types.begin(); iter ≠ target_types.end(); ++iter)
  temp_strm ≪ "'target_types[" ≪ i++ ≪ "]' == " ≪ target_type_map[*iter] ≪ endl;
if (value ≠ 0) {
  if (field_type ≡ ACCESS_NUMBER_FIELD)
    temp_strm ≪ "Access_Number == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ AUTHOR_FIELD)
    temp_strm ≪ "Author == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ BIBLIOGRAPHIC_TYPE_FIELD)
    temp_strm ≪ "Bibliographic_Type == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ CALL_NUMBER_FIELD)
    temp_strm ≪ "Call_Number == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ CLASSIFICATION_FIELD)
    temp_strm ≪ "Classification == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ COMPANY_FIELD)
    temp_strm ≪ "Company == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ CONTENT_SUMMARY_FIELD)
    temp_strm ≪ "Content_Summary == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ CONTRIBUTOR_FIELD)
    temp_strm ≪ "Contributor == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ CREATOR_FIELD)
    temp_strm ≪ "Creator == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ DATABASE_PROVIDER_FIELD)
    temp_strm ≪ "Database_Provider == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ DESCRIPTION_FIELD)
    temp_strm ≪ "Description == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ EXEMPLAR_PRODUCTION_NUMBER_FIELD)
    temp_strm ≪ "Exemplar_Production_Number == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ IDENTIFIER_FIELD)
    temp_strm ≪ "Identifier == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ INSTITUTION_FIELD)
    temp_strm ≪ "Institution == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ LANGUAGE_FIELD)
    temp_strm ≪ "Language == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
  else if (field_type ≡ MAIN_CANONICAL_TITLE_FIELD)
    temp_strm ≪ "Main_Canonical_Title_ == " ≪ *static_cast⟨string *⟩(value) ≪ endl;
```

```
else if (field_type ≡ PERMUTATION_PATTERN_FIELD)
  temp_strm ≪ "Permutation_Pattern␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ PERSON_FIELD)
  temp_strm ≪ "Person␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ PHYSICAL_DESCRIPTION_FIELD)
  temp_strm ≪ "Physical_Description␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ PUBLISHER_FIELD)
  temp_strm ≪ "Publisher␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_FIELD)
  temp_strm ≪ "Record␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_ID_FIELD)
  temp_strm ≪ "Record␣ID␣==␣" ≪ *static_cast⟨int *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_ELN_ORIGINAL_ENTRY_FIELD)
  temp_strm ≪ "Record_Eln_Original_Entry_Field␣==␣" ≪ *static_cast⟨int *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_ELN_MOST_RECENT_CHANGE_FIELD)
  temp_strm ≪ "Record_Eln_Most_Recent_Change_Field␣==␣" ≪ *static_cast⟨int
      *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_ELN_STATUS_CHANGE_FIELD)
  temp_strm ≪ "Record_Eln_Status_Change_Field␣==␣" ≪ *static_cast⟨int *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_IDENTIFICATION_NUMBER_FIELD)
  temp_strm ≪ "Record_Identification_Number_Field␣==␣" ≪ *static_cast⟨string
      *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_SOURCE_ID_FIELD)
  temp_strm ≪ "Record_Source_Id_Field␣==␣" ≪ *static_cast⟨int *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_YEAR_APPEARANCE_BEGIN_FIELD)
  temp_strm ≪ "Record_Year_Appearance_Begin_Field␣==␣" ≪ *static_cast⟨int *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_YEAR_APPEARANCE_END_FIELD)
  temp_strm ≪ "Record_Year_Appearance_End_Field␣==␣" ≪ *static_cast⟨int *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_YEAR_APPEARANCE_RAK_WB_FIELD)
  temp_strm ≪ "Record_Year_Appearance_Rak_Wb_Field␣==␣" ≪ *static_cast⟨int
      *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_YEAR_APPEARANCE_ORIGINAL_FIELD)
  temp_strm ≪ "Record_Year_Appearance_Original_Field␣==␣" ≪ *static_cast⟨int
      *⟩(value) ≪ endl;
else if (field_type ≡ RECORD_DATE_STATUS_CHANGE_FIELD)
  temp_strm ≪ "Record_Date_Status_Change_Field:" ≪ endl ≪
      *static_cast⟨Date_Time_Node⟩(value) ≪ endl;
else if (field_type ≡ RECORD_DATE_ORIGINAL_ENTRY_FIELD)
  temp_strm ≪ "Record_Date_Original_Entry_Field:" ≪ endl ≪
      *static_cast⟨Date_Time_Node⟩(value) ≪ endl;
else if (field_type ≡ RECORD_DATE_MOST_RECENT_CHANGE_FIELD)
  temp_strm ≪ "Record_Date_Most_Recent_Change_Field␣==␣" ≪ endl ≪
      *static_cast⟨Date_Time_Node⟩(value) ≪ endl;
else if (field_type ≡ REMOTE_ACCESS_FIELD)
  temp_strm ≪ "Remote_Access␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ RIGHTS_FIELD)
  temp_strm ≪ "Rights␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ SOURCE_FIELD)
  temp_strm ≪ "Source␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
else if (field_type ≡ SUBJECT_FIELD)
  temp_strm ≪ "Subject␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
```

```
    else if (field_type ≡ SUPERORDINATE_ENTITIES_FIELD)
      temp_strm ≪ "Superordinate_Entities␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
    else if (field_type ≡ TITLE_FIELD)
      temp_strm ≪ "Title␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
    else if (field_type ≡ TYPE_FIELD)
      temp_strm ≪ "Type␣==␣" ≪ *static_cast⟨string *⟩(value) ≪ endl;
    else temp_strm ≪ "Can't␣show␣this␣field␣yet." ≪ endl;
  }    /* if (value ≠ 0) */
  else {
    temp_strm ≪ "`value'␣␣==␣0." ≪ endl;
  }
  if (up ∧ up→value ∧ up→value_type ≡ QUERY_TYPE_STRING_TYPE) {
    temp_strm ≪ "`up->value'␣==␣" ≪ *static_cast⟨string *⟩(up→value) ≪ endl;
  }
```

118. Output the contents of *temp_strm*. [LDF 2006.10.31.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  temp_strm.str("");
  if (scanner_node ≠ 0 ∧ scanner_node→log_strm.is_open( )) scanner_node→log_strm ≪ temp_strm;
```

119. Show subsidiary nodes recursively. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (and_node ≠ 0) {
    temp_strm ≪ "***␣'and_node'␣****" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    temp_strm.str("");
    if (scanner_node ≠ 0 ∧ scanner_node→log_strm.is_open( )) scanner_node→log_strm ≪ temp_strm;
    and_node→show("'and_node':", sscanner_node);
  }
  if (or_node ≠ 0) {
    temp_strm ≪ "***␣'or_node'␣****" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    temp_strm.str("");
    if (scanner_node ≠ 0 ∧ scanner_node→log_strm.is_open( )) scanner_node→log_strm ≪ temp_strm;
    or_node→show("'or_node':", sscanner_node);
  }
  if (xor_node ≠ 0) {
    temp_strm ≪ "***␣'xor_node'␣****" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    temp_strm.str("");
    if (scanner_node ≠ 0 ∧ scanner_node→log_strm.is_open( )) scanner_node→log_strm ≪ temp_strm;
    xor_node→show("'xor_node':", sscanner_node);
  }
  temp_strm ≪ "*******" ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  temp_strm.str("");
```

120.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  return 0; }      /* End of Query_Type::show definition. */
```

121. Putting Query_Type together. [LDF 2006.10.31.]

122. This is what's compiled.

⟨ Include files 10 ⟩
⟨ `querytyp.web` 49 ⟩

```
using namespace std;
using namespace Scan_Parse;
```

⟨ Preprocessor macro definitions 77 ⟩
⟨ Forward declarations 17 ⟩
⟨ Declare **class Query_Type** 53 ⟩
⟨ Initialize **static Query_Type** constants 58 ⟩
⟨ Initialize **static Query_Type** variables 80 ⟩
⟨ Define **Query_Type** functions 87 ⟩

123. This is what's written to `querytyp.h`.

```
⟨ querytyp.hh 123 ⟩ ≡
#ifndef QUERYTYP_KNOWN
#define QUERYTYP_KNOWN 1
  ⟨ Preprocessor macro definitions 77 ⟩
  ⟨ Preprocessor macro calls 23 ⟩
  using namespace std;
  ⟨ Forward declarations 17 ⟩
  ⟨ Declare class Query_Type 53 ⟩
#endif    /* QUERYTYP_KNOWN is defined. */
```

124. Query_Type::*generate_sql_string* definition (`qtgensql.web`). [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Created this file.

```
⟨ qtgensql.web 124 ⟩ ≡
  static char id_string[] = "$Id: qtgensql.web,v 1.6 2007/02/13 20:40:08 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 158.

125. Include files.

```
⟨ Include files 10 ⟩ +≡
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "idtype.h"
#include "scnrtype.h"
#include "scanner.h"
#include "querytyp.h"
```

126. Generate SQL string. [LDF 2006.12.01.]

Log

[LDF 2006.12.01.] Added this function.

[LDF 2006.12.12.] Added code for `MAIN_CANONICAL_TITLE_FLAG`.

[LDF 2006.12.12.] Added code to account for **static const unsigned** *shorts* that refer to additional tables in the OAI database (dc_test).

[LDF 2006.12.14.] Moved the definition of this function from `querytyp.web` to this file (`qtgensql.web`).

127.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  int Query_Type::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){
#if 0     /* 14g */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
      stringstream date_strm;
#ifdef DEBUG_OUTPUT
      temp_strm << "Entering␣`Query_Type::generate_sql_string'." << endl <<
          "`query_ctr'␣==␣" << query_ctr << endl << "`database_type'␣==␣" <<
          token_map[database_type] << endl << "`query_type'␣==␣" << query_type_map[query_type] <<
          endl << "`*first_select'␣==␣" << *first_select << endl << "`*first_where'␣==␣" <<
          *first_where << endl << "`*first_from␣==␣" << *first_from << endl << "`query_ctr'␣==␣" <<
          query_ctr << endl;
      cerr_mutex.lock();
      cerr << temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node ≠ 0) scanner_node→log_strm << temp_strm.str();
      temp_strm.str("");
      getchar();
#endif
```

128. Set match operator string. [LDF 2006.12.12.]

Log

[2006.12.12.] Added this declaration.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  string match_str;
  if (match_value ≡ QUERY_TYPE_NULL_TYPE) match_str = "=";
  else if (match_value ≡ CONTAINS_VALUE) match_str = "contains";
  else if (match_value ≡ FREETEXT_VALUE) match_str = "freetext";
  else if (match_value ≡ LIKE_VALUE) match_str = "like";
  else {
    temp_strm << "WARNING!␣␣In␣`Query_Type::generate_sql_string':" << endl <<
        "`match_value'␣has␣invalid␣value:␣␣" << match_value << endl <<
        "Will␣use␣`='␣as␣the␣match␣operator." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm << temp_strm.str();
    temp_strm.str("");
  }
```

129. Set *query_type_str*. [LDF 2006.12.06.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  string query_type_str;
```

130. Set parenthesis strings. [LDF 2006.12.14.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  string open_parenthesis_str;
  string close_parenthesis_str;
  if (and_node ∨ or_node ∨ xor_node) {
    open_parenthesis_str = "(";
    close_parenthesis_str = ")";
  }
  else {
    open_parenthesis_str = "";
    close_parenthesis_str = "";
  }
  if (query_type ≡ AND_TYPE) query_type_str = "and";
  else if (query_type ≡ OR_TYPE) query_type_str = "or";
  else if (query_type ≡ XOR_TYPE) {
    if (database_type ≡ OAI) {
      temp_strm ≪ "ERROR!␣␣In␣`Query_Type::generate_sql_string':" ≪ endl ≪
          "`query_type'␣==␣`XOR_TYPE'␣and␣`database_type'␣==␣`OAI'." ≪
          endl ≪ "This␣combination␣of␣types␣is␣not␣allowed." ≪ endl ≪
          "Exiting␣function␣unsuccessfully␣with␣return␣value␣1." ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
      *return_str = "";
      return 1;
    }     /* if (database_type ≡ OAI) */
    query_type_str = "xor";
  }     /* else if (query_type ≡ XOR_TYPE) */
  if (negated) query_type_str += "␣not";
```

131.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (query_ctr ≡ 0) *select_strm ≪ "select␣" ≪ endl;
#if 0     /* 1 */
  cerr ≪ "`field_type'␣==␣" ≪ field_type_map[field_type] ≪ endl;
#endif
```

132. AUTHOR_SURNAME_FIELD. Pica Only. [LDF 2006.12.06.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (field_type ≡ AUTHOR_SURNAME_FIELD ∧ database_type ≡ PICA) {
    if (*first_select) {
      *select_strm ≪ "RAUT.record_id";
      *first_select = false;
    }
    if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
      *select_strm ≪ ", AUT.author_id" ≪ endl;
    }
    if ((*field_flags & AUTHOR_SURNAME_FLAG) ≡ NULL_BITSET) {
      *select_strm ≪ ", AUT.author_surname" ≪ endl;
    }
    if (*first_from) *from_strm ≪ "from ";
    else if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
      *from_strm ≪ ", ";
    }
    *first_from = false;
    if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
      *from_strm ≪ "Authors as AUT, Records_Authors as RAUT" ≪ endl;
    }
    if (*first_where) *where_strm_0 ≪ "where " ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ " " ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "AUT.author_surname " ≪ match_str ≪ " '" ≪ *static_cast⟨string
        *⟩(value) ≪ "' ";
    if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
      *where_strm_1 ≪ "and RAUT.author_id = AUT.author_id" ≪ endl;
    }
    *field_flags |= AUTHOR_SURNAME_FLAG;
    *field_flags |= AUTHOR_FLAG;
  }     /* if (field_type ≡ AUTHOR_SURNAME_FIELD ∧ database_type ≡ PICA) */
```

133. AUTHOR_GIVEN_NAME_FIELD. Pica Only. [LDF 2006.12.13.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ AUTHOR_GIVEN_NAME_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "RAUT.record_id";
        *first_select = false;
      }
      if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ", AUT.author_id" ≪ endl;
      }
      if ((*field_flags & AUTHOR_GIVEN_NAME_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ", AUT.author_given_name" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from ";
      else if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ", ";
      }
      *first_from = false;
      if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Authors as AUT, Records_Authors as RAUT" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where " ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ " " ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "AUT.author_given_name " ≪ match_str ≪ " '" ≪ *static_cast⟨string
          *⟩(value) ≪ "' ";
      if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *where_strm_1 ≪ "and RAUT.author_id = AUT.author_id" ≪ endl;
      }
      *field_flags |= AUTHOR_GIVEN_NAME_FLAG;
      *field_flags |= AUTHOR_FLAG;
    }     /* else if (field_type ≡ AUTHOR_GIVEN_NAME_FIELD ∧ database_type ≡ PICA) */
```

134. AUTHOR_PREFIX_FIELD. Pica Only. [LDF 2006.12.13.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ AUTHOR_PREFIX_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "RAUT.record_id";
        *first_select = false;
      }
      if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ", AUT.author_id" ≪ endl;
      }
      if ((*field_flags & AUTHOR_PREFIX_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ", AUT.author_prefix" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from ";
      else if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ", ";
      }
      *first_from = false;
      if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Authors as AUT, Records_Authors as RAUT" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where " ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ " " ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "AUT.author_prefix " ≪ match_str ≪ " '" ≪ *static_cast⟨string
          *⟩(value) ≪ "' ";
      if ((*field_flags & AUTHOR_FLAG) ≡ NULL_BITSET) {
        *where_strm_1 ≪ "and RAUT.author_id = AUT.author_id" ≪ endl;
      }
      *field_flags |= AUTHOR_PREFIX_FLAG;
      *field_flags |= AUTHOR_FLAG;
    }     /* else if (field_type ≡ AUTHOR_PREFIX_FIELD ∧ database_type ≡ PICA) */
```

135. CONTRIBUTOR_SURNAME_FIELD. Pica Only. [LDF 2006.12.14.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (field_type ≡ CONTRIBUTOR_SURNAME_FIELD ∧ database_type ≡ PICA) {
    if (*first_select) {
      *select_strm ≪ "RCNTRB.record_id";
      *first_select = false;
    }
    if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
      *select_strm ≪ ",␣CNTRB.contributor_id" ≪ endl;
    }
    if ((*field_flags & CONTRIBUTOR_SURNAME_FLAG) ≡ NULL_BITSET) {
      *select_strm ≪ ",␣CNTRB.contributor_surname" ≪ endl;
    }
    if (*first_from) *from_strm ≪ "from␣";
    else if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
      *from_strm ≪ ",␣";
    }
    *first_from = false;
    if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
      *from_strm ≪ "Contributors␣as␣CNTRB,␣Records_Contributors␣as␣RCNTRB" ≪ endl;
    }
    if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "CNTRB.contributor_surname␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string
        *⟩(value) ≪ "'␣";
    if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
      *where_strm_1 ≪ "and␣RCNTRB.contributor_id␣=␣CNTRB.contributor_id" ≪ endl;
    }
    *field_flags |= CONTRIBUTOR_SURNAME_FLAG;
    *field_flags |= CONTRIBUTOR_FLAG;
  }     /* if (field_type ≡ CONTRIBUTOR_SURNAME_FIELD ∧ database_type ≡ PICA) */
```

136. CONTRIBUTOR_GIVEN_NAME_FIELD. Pica Only. [LDF 2006.12.14.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ CONTRIBUTOR_GIVEN_NAME_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "RCNTRB.record_id";
        *first_select = false;
      }
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣CNTRB.contributor_id" ≪ endl;
      }
      if ((*field_flags & CONTRIBUTOR_GIVEN_NAME_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣CNTRB.contributor_given_name" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Contributors␣as␣CNTRB,␣Records_Contributors␣as␣RCNTRB" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "CNTRB.contributor_given_name␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string
          *⟩(value) ≪ "'␣";
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *where_strm_1 ≪ "and␣RCNTRB.contributor_id␣=␣CNTRB.contributor_id" ≪ endl;
      }
      *field_flags |= CONTRIBUTOR_GIVEN_NAME_FLAG;
      *field_flags |= CONTRIBUTOR_FLAG;
    }     /* else if (field_type ≡ CONTRIBUTOR_GIVEN_NAME_FIELD ∧ database_type ≡ PICA) */
```

137. CONTRIBUTOR_PREFIX_FIELD. Pica Only. [LDF 2006.12.14.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ CONTRIBUTOR_PREFIX_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "RCNTRB.record_id";
        *first_select = false;
      }
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣CNTRB.contributor_id" ≪ endl;
      }
      if ((*field_flags & CONTRIBUTOR_PREFIX_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣CNTRB.contributor_prefix" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Contributors␣as␣CNTRB,␣Records_Contributors␣as␣RCNTRB" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "CNTRB.contributor_prefix␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string
          *⟩(value) ≪ "'␣";
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) {
        *where_strm_1 ≪ "and␣RCNTRB.contributor_id␣=␣CNTRB.contributor_id" ≪ endl;
      }
      *field_flags |= CONTRIBUTOR_PREFIX_FLAG;
      *field_flags |= CONTRIBUTOR_FLAG;
    }     /* else if (field_type ≡ CONTRIBUTOR_PREFIX_FIELD ∧ database_type ≡ PICA) */
```

138. OAI. [LDF 2006.12.06.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ CONTRIBUTOR_FIELD ∧ database_type ≡ OAI) {
      if (*first_select) {
        *select_strm ≪ "RCN.record_id";
        *first_select = false;
      }
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET)
        *select_strm ≪ ",␣CN.contributor_id,␣CN.dc_contributor" ≪ endl;
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET) *from_strm ≪ ",␣";
      *first_from = false;
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET)
        *from_strm ≪ "Contributors␣as␣CN,␣Records_Contributors␣as␣RCN" ≪ endl;
      if (*first_where) *where_strm_0 ≪ "where␣";
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "CN.dc_contributor␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string
          *⟩(value) ≪ "'␣";
      if ((*field_flags & CONTRIBUTOR_FLAG) ≡ NULL_BITSET)
        *where_strm_1 ≪ "and␣RCN.contributor_id␣=␣CN.contributor_id" ≪ endl;
      *field_flags |= CONTRIBUTOR_FLAG;
    }     /* else if (field_type ≡ CONTRIBUTOR_FIELD ∧ database_type ≡ OAI) */
```

139. Creator. OAI only. [LDF 2006.12.06.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
  if (field_type ≡ CREATOR_FIELD ∧ database_type ≡ OAI) {
    if (*first_select) {
      *select_strm ≪ "RC.record_id";
      *first_select = false;
    }
    if ((*field_flags & CREATOR_FLAG) ≡ NULL_BITSET)
      *select_strm ≪ ", C.creator_id, C.dc_creator" ≪ endl;
    if (*first_from) *from_strm ≪ "from ";
    else if ((*field_flags & CREATOR_FLAG) ≡ NULL_BITSET) *from_strm ≪ ", ";
    *first_from = false;
    if ((*field_flags & CREATOR_FLAG) ≡ NULL_BITSET)
      *from_strm ≪ "Creators as C, Records_Creators as RC" ≪ endl;
    if (*first_where) *where_strm_0 ≪ "where " ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ " " ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "C.dc_creator " ≪ match_str ≪ " '" ≪ *static_cast⟨string *⟩(value) ≪ "' ";
    if ((*field_flags & CREATOR_FLAG) ≡ NULL_BITSET)
      *where_strm_1 ≪ "and RC.creator_id = C.creator_id" ≪ endl;
    *field_flags |= CREATOR_FLAG;
  }     /* else if (field_type ≡ CREATOR_FIELD ∧ database_type ≡ OAI) */
  else if (field_type ≡ TITLE_FIELD) {
```

140. OAI. [LDF 2006.12.12.]

Log

[2006.12.11.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (database_type ≡ OAI) {
    if (*first_select) {
      *select_strm ≪ "T.record_id";
      *first_select = false;
    }
    if ((*field_flags & TITLE_FLAG) ≡ NULL_BITSET)
      *select_strm ≪ ",␣T.title_id,␣T.dc_title" ≪ endl;
    if (*first_from) *from_strm ≪ "from␣";
    else if ((*field_flags & TITLE_FLAG) ≡ NULL_BITSET) *from_strm ≪ ",␣";
    *first_from = false;
    if ((*field_flags & TITLE_FLAG) ≡ NULL_BITSET)
      *from_strm ≪ "Titles␣as␣T,␣Records␣as␣REC" ≪ endl;
    if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "T.dc_title␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string *⟩(value) ≪ "'␣";
    if ((*field_flags & TITLE_FLAG) ≡ NULL_BITSET)
      *where_strm_1 ≪ "and␣T.record_id␣=␣REC.record_id" ≪ endl;
    *field_flags |= TITLE_FLAG;
  }    /* if (database_type ≡ OAI) */
  }    /* else if (field_type ≡ TITLE_FIELD) */
```

141. Main canonical title (Pica). [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else if (field_type ≡ MAIN_CANONICAL_TITLE_FIELD) {
```

142. PICA. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (database_type ≡ PICA) {
    if (*first_select) {
      *select_strm ≪ "RMT.record_id";
      *first_select = false;
    }
    if ((*field_flags & MAIN_CANONICAL_TITLE_FLAG) ≡ NULL_BITSET)
      *select_strm ≪ ",␣MT.main_title_id,␣MT.main_canonical_title" ≪ endl;
    if (*first_from) *from_strm ≪ "from␣";
    else if ((*field_flags & MAIN_CANONICAL_TITLE_FLAG) ≡ NULL_BITSET) *from_strm ≪ ",␣";
    *first_from = false;
    if ((*field_flags & MAIN_CANONICAL_TITLE_FLAG) ≡ NULL_BITSET)
      *from_strm ≪ "Main_Titles␣as␣MT,␣Records_Main_Titles␣as␣RMT" ≪ endl;
    if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "MT.main_canonical_title␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string
        *⟩(value) ≪ "'␣";
    if ((*field_flags & MAIN_CANONICAL_TITLE_FLAG) ≡ NULL_BITSET)
      *where_strm_1 ≪ "and␣RMT.main_title_id␣=␣MT.main_title_id" ≪ endl;
    *field_flags |= MAIN_CANONICAL_TITLE_FLAG;
  }     /* if (database_type ≡ PICA) */
  }     /* else if (field_type ≡ MAIN_CANONICAL_TITLE_FIELD) */
```

143. Record. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

144. Record ID. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ RECORD_ID_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "REC.record_id" ≪ endl;
        *first_select = false;
      }
      else if ((*field_flags & RECORD_ID_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣REC.record_id" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Records␣as␣REC" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "REC.record_id␣" ≪ match_str ≪ "␣" ≪ *static_cast⟨int *⟩(value) ≪ "␣";
      *field_flags |= RECORD_ID_FLAG;
      *field_flags |= RECORD_FLAG;
    }     /* else if (field_type ≡ RECORD_ID_FIELD ∧ database_type ≡ PICA) */
```

145. Record ELN Original Entry. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ RECORD_ELN_ORIGINAL_ENTRY_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "REC.record_id";
        *first_select = false;
      }
      if ((*field_flags & RECORD_ELN_ORIGINAL_ENTRY_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣REC.eln_original_entry" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Records␣as␣REC" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "REC.eln_original_entry␣" ≪ match_str ≪ "␣" ≪ *static_cast⟨int
          *⟩(value) ≪ "␣";
      *field_flags |= RECORD_ELN_ORIGINAL_ENTRY_FLAG;
      *field_flags |= RECORD_FLAG;
    }     /* else if (field_type ≡ RECORD_ELN_ORIGINAL_ENTRY_FIELD ∧ database_type ≡ PICA) */
```

146. Record ELN Most Recent Change. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ RECORD_ELN_MOST_RECENT_CHANGE_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "REC.record_id";
        *first_select = false;
      }
      if ((*field_flags & RECORD_ELN_MOST_RECENT_CHANGE_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣REC.eln_most_recent_change" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Records␣as␣REC" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "REC.eln_most_recent_change␣" ≪ match_str ≪ "␣" ≪ *static_cast⟨int
          *⟩(value) ≪ "␣";
      *field_flags |= RECORD_ELN_MOST_RECENT_CHANGE_FLAG;
      *field_flags |= RECORD_FLAG;
    }     /* else if (field_type ≡ RECORD_ELN_MOST_RECENT_CHANGE_FIELD ∧ database_type ≡ PICA) */
```

147. Record ELN Status Change. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ RECORD_ELN_STATUS_CHANGE_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "REC.record_id";
        *first_select = false;
      }
      if ((*field_flags & RECORD_ELN_STATUS_CHANGE_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣REC.eln_status_change" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Records␣as␣REC" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "REC.eln_status_change␣" ≪ match_str ≪ "␣" ≪ *static_cast⟨int
          *⟩(value) ≪ "␣";
      *field_flags |= RECORD_ELN_STATUS_CHANGE_FLAG;
      *field_flags |= RECORD_FLAG;
    }     /* else if (field_type ≡ RECORD_ELN_STATUS_CHANGE_FIELD ∧ database_type ≡ PICA) */
```

148. Record Identification Number. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ RECORD_IDENTIFICATION_NUMBER_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "REC.record_id";
        *first_select = false;
      }
      if ((*field_flags & RECORD_IDENTIFICATION_NUMBER_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣REC.identification_number" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Records␣as␣REC" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      *where_strm_0 ≪ "REC.identification_number␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string
          *⟩(value) ≪ "'␣";
      *field_flags |= RECORD_IDENTIFICATION_NUMBER_FLAG;
      *field_flags |= RECORD_FLAG;
    }     /* else if (field_type ≡ RECORD_IDENTIFICATION_NUMBER_FIELD ∧ database_type ≡ PICA) */
```

149. Record Date Status Change. [LDF 2006.12.19.]

Log

[LDF 2006.12.19.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else
    if (field_type ≡ RECORD_DATE_STATUS_CHANGE_FIELD ∧ database_type ≡ PICA) {
      if (*first_select) {
        *select_strm ≪ "REC.record_id";
        *first_select = false;
      }
      if ((*field_flags & RECORD_DATE_STATUS_CHANGE_FLAG) ≡ NULL_BITSET) {
        *select_strm ≪ ",␣REC.date_status_change" ≪ endl;
      }
      if (*first_from) *from_strm ≪ "from␣";
      else if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ ",␣";
      }
      *first_from = false;
      if ((*field_flags & RECORD_FLAG) ≡ NULL_BITSET) {
        *from_strm ≪ "Records␣as␣REC" ≪ endl;
      }
      if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
      else {
        *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
      }
      *first_where = false;
      Date_Time_Node d = static_cast⟨Date_Time_Node⟩(value);
      date_strm.str("");
      *where_strm_0 ≪ "REC.date_status_change␣" ≪ match_str ≪ "␣convert(datetime,␣'";
      if (d→year) *where_strm_0 ≪ setfill('0') ≪ right ≪ setw(4) ≪ *d→year;
      else *where_strm_0 ≪ "0000";
      *where_strm_0 ≪ "-";
      if (d→month) *where_strm_0 ≪ setfill('0') ≪ right ≪ setw(2) ≪ *d→month;
      else *where_strm_0 ≪ "00";
      *where_strm_0 ≪ "-";
      if (d→day) *where_strm_0 ≪ setfill('0') ≪ right ≪ setw(2) ≪ *d→day;
      else *where_strm_0 ≪ "00";
      *where_strm_0 ≪ "␣";
      if (d→hour) *where_strm_0 ≪ setfill('0') ≪ right ≪ setw(2) ≪ *d→hour;
      else *where_strm_0 ≪ "00";
      *where_strm_0 ≪ ":";
      if (d→minute) *where_strm_0 ≪ setfill('0') ≪ right ≪ setw(2) ≪ *d→minute;
      else *where_strm_0 ≪ "00";
      *where_strm_0 ≪ ":";
      if (d→second) {
        if (*d→second < 10) *where_strm_0 ≪ "0";
        *where_strm_0 ≪ fixed ≪ setprecision(3) ≪ *d→second;
      }
      else *where_strm_0 ≪ "00.000";
```

```
    *where_strm_0 ≪ "',␣121)";
    *field_flags |= RECORD_DATE_STATUS_CHANGE_FLAG;
    *field_flags |= RECORD_FLAG;
  }    /* else if (field_type ≡ RECORD_DATE_STATUS_CHANGE_FIELD ∧ database_type ≡ PICA) */
```

150. Subject. [LDF Undated.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
  else if (field_type ≡ SUBJECT_FIELD) {
```

151.

Log

[2006.12.12.] Added this section.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (database_type ≡ PICA) {
    if (*first_select) {
      *select_strm ≪ "RS.record_id";
      *first_select = false;
    }
    if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET)
      *select_strm ≪ ",␣S.subject_id,␣S.subject" ≪ endl;
    if (*first_from) *from_strm ≪ "from␣";
    else if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET) *from_strm ≪ ",␣";
    *first_from = false;
    if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET)
      *from_strm ≪ "Subjects␣as␣S,␣Records_Subjects␣as␣RS" ≪ endl;
    if (*first_where) *where_strm_0 ≪ "where␣" ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ "␣" ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "S.subject␣" ≪ match_str ≪ "␣'" ≪ *static_cast⟨string *⟩(value) ≪ "'␣";
    if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET)
      *where_strm_1 ≪ "and␣RS.subject_id␣=␣S.subject_id" ≪ endl;
    *field_flags |= SUBJECT_FLAG;
  }    /* if (database_type ≡ PICA) */
```

152.

```
⟨ Define Query_Type functions 87 ⟩ +≡
  if (database_type ≡ OAI) {
    if (*first_select) {
      *select_strm ≪ "RS.record_id";
      *first_select = false;
    }
    if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET)
      *select_strm ≪ ", S.subject_id, S.dc_subject" ≪ endl;
    if (*first_from) *from_strm ≪ "from ";
    else if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET) *from_strm ≪ ", ";
    *first_from = false;
    if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET)
      *from_strm ≪ "Subjects as S, Records_Subjects as RS" ≪ endl;
    if (*first_where) *where_strm_0 ≪ "where " ≪ endl;
    else {
      *where_strm_0 ≪ query_type_str ≪ " " ≪ open_parenthesis_str;
    }
    *first_where = false;
    *where_strm_0 ≪ "S.dc_subject " ≪ match_str ≪ " '" ≪ *static_cast⟨string *⟩(value) ≪ "' ";
    if ((*field_flags & SUBJECT_FLAG) ≡ NULL_BITSET)
      *where_strm_1 ≪ "and RS.subject_id = S.subject_id" ≪ endl;
    *field_flags |= SUBJECT_FLAG;
  }    /* if (database_type ≡ OAI) */
  }    /* else if (field_type ≡ SUBJECT_FIELD) */
  temp_strm ≪ "`value_type' == " ≪ value_type_map[value_type] ≪ endl;
  temp_strm ≪ "`target_types' == ";
  if (target_types.size() ≤ 0) temp_strm ≪ "QUERY_TYPE_NULL_TYPE";
  else if (target_types.size() ≡ 1) {
    temp_strm ≪ target_type_map[target_types[0]];
  }
  else {
    int i = 0;
    for (vector⟨unsigned short⟩::iterator iter = target_types.begin(); iter ≠ target_types.end();
        ++iter) {
      if (i++ > 0) temp_strm ≪ endl ≪ "--" ≪ endl;
      temp_strm ≪ target_type_map[*iter];
    }    /* for */
  }    /* else */
  temp_strm ≪ endl;
  if (value_type ≡ QUERY_TYPE_STRING_TYPE) {
    temp_strm ≪ *static_cast⟨string *⟩(value) ≪ endl;
    if (value_type ≡ QUERY_TYPE_STRING_TYPE) ;
#if 0    /* 1 */
    *sql_strm ≪ *static_cast⟨string *⟩(value) ≪ " ";
#endif
  }
  if (up) temp_strm ≪ "`up' == " ≪ up→query_ctr;
  else temp_strm ≪ "`up' == 0";
  temp_strm ≪ endl;
  if (and_node) {
    temp_strm ≪ "`and' == " ≪ and_node→query_ctr;
```

```
  }
  else temp_strm ≪ "`and_node' == 0";
  temp_strm ≪ endl;
  if (or_node) {
    temp_strm ≪ "`or' == " ≪ or_node→query_ctr;
  }
  else temp_strm ≪ "`or_node' == 0";
  temp_strm ≪ endl;
  if (or_node) {
    temp_strm ≪ "`xor' == " ≪ xor_node→query_ctr;
  }
  else temp_strm ≪ "`xor_node' == 0";
  temp_strm ≪ endl;
  if (and_node) {
    temp_strm ≪ "`and_node' == " ≪ endl;
    *where_strm_0 ≪ endl;
    and_node→generate_sql_string(scanner_node, database_type, sql_strm, select_strm, from_strm,
        where_strm_0, where_strm_1, first_select, first_from, first_where, field_flags, return_str);
  }
  if (or_node) {
    temp_strm ≪ "`or_node' == " ≪ endl;
    *where_strm_0 ≪ endl;
    or_node→generate_sql_string(scanner_node, database_type, sql_strm, select_strm, from_strm,
        where_strm_0, where_strm_1, first_select, first_from, first_where, field_flags, return_str);
  }
  if (xor_node) {
    temp_strm ≪ "`xor_node' == " ≪ endl;
    *where_strm_0 ≪ endl;
    xor_node→generate_sql_string(scanner_node, database_type, sql_strm, select_strm, from_strm,
        where_strm_0, where_strm_1, first_select, first_from, first_where, field_flags, return_str);
  }
```

153.

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
  if (query_ctr > 0) *where_strm_0 ≪ close_parenthesis_str;
```

154. Write streams to **sql_strm*. [LDF 2006.12.05.]

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
  if (query_ctr ≡ 0) {
    *sql_strm ≪ select_strm→str( ) ≪ from_strm→str( ) ≪ where_strm_0→str( ) ≪ endl ≪
        where_strm_1→str( );
  }
```

155. Print debuggging output to terminal. [LDF 2006.12.05.]

⟨ Define **Query_Type** functions 87 ⟩ +≡

```
  if (query_ctr ≡ 0) temp_strm ≪ endl ≪ "`sql_strm->str()' = " ≪ endl ≪ sql_strm→str( ) ≪
        endl ≪ "Enter <RETURN> to continue: ";
```

156. Store string and return. [LDF 2006.12.01.]

```
⟨ Define Query_Type functions 87 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting‘Query_Type::generate_sql_string’." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  *return_str = sql_strm→str( );
  return 0; }      /* Query_Type::generate_sql_string */
```

157. Putting Query_Type::*generate_sql_string* together. [LDF 2006.10.31.]

158. This is what's compiled.

⟨ Include files 10 ⟩
⟨ qtgensql.web 124 ⟩

```
using namespace std;
using namespace Scan_Parse;
```

⟨ Define **Query_Type** functions 87 ⟩

159. datasource_type (dtsrctyp.web). [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Created this file.

⟨ dtsrctyp.web 159 ⟩ ≡

```
static char id_string[] = "$Id: dtsrctyp.web,v 1.7 2007/02/13 20:38:06 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 186.

160. Include files.

⟨ Include files 10 ⟩ +≡

```
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "idtype.h"
#include "scnrtype.h"
#include "scanner.h"
```

161. Preprocessor macro calls.

⟨ Preprocessor macro calls 23 ⟩ +≡

```
#ifdef WIN_LDF
#pragma once
#endif
```

162. Forward declarations. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this section.

⟨ Forward declarations 17 ⟩ +≡

```
class Scanner_Type;
typedef Scanner_Type *Scanner_Node;
class Datasource_Type;
typedef Datasource_Type *Datasource_Node;
class Id_Type;
typedef Id_Type *Id_Node;
```

163. class datasource_type declaration. . [LDF 2006.12.08.]
The forward declaration of **Datasource_Type** is needed in order to be able to define **Datasource_Node** using **typedef**. [LDF 2006.12.08.]

Log

Added this section.

⟨ Declare **class Datasource_Type** 163 ⟩ ≡
```
class Datasource_Type;
typedef Datasource_Type *Datasource_Node;
class Datasource_Type {
  ⟨ friend declarations for class Datasource_Type 164 ⟩
private: unsigned short type;
  static map⟨unsigned short, string⟩ datasource_type_map;
  string name;
  void *value;
  Scanner_Node scanner_node;
public: ⟨ Declare static Datasource_Type constants 165 ⟩
  ⟨ Declare Datasource_Type functions 171 ⟩
};
```
This code is used in sections 186 and 187.

164. friend declarations for class datasource_type. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this section.

⟨ friend declarations for **class Datasource_Type** 164 ⟩ ≡
```
friend int yyparse(void *);
```
This code is used in section 163.

165. Declare static datasource_type constants. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this section with the declaration of `DATASOURCE_TYPE_NULL_TYPE`.

[LDF 2006.12.08.] Added the declarations of `DBT_TYPE`, `GBV_GVK_TYPE`, `TIMMS_TYPE`, and `DATASOURCE_FILE_TYPE`.

⟨ Declare **static Datasource_Type** constants 165 ⟩ ≡
```
static const unsigned short DATASOURCE_TYPE_NULL_TYPE;
static const unsigned short DBT_TYPE;
static const unsigned short GBV_GVK_TYPE;
static const unsigned short TIMMS_TYPE;
static const unsigned short DATASOURCE_FILE_TYPE;
```
See also section 168.
This code is used in section 163.

166.

⟨ Initialize **static Datasource_Type** constants 166 ⟩ ≡
```
const unsigned short Datasource_Type::DATASOURCE_TYPE_NULL_TYPE = 0;
const unsigned short Datasource_Type::DBT_TYPE = 1;
const unsigned short Datasource_Type::GBV_GVK_TYPE = 2;
const unsigned short Datasource_Type::TIMMS_TYPE = 3;
const unsigned short Datasource_Type::DATASOURCE_FILE_TYPE = 4;
```
This code is used in section 186.

167. Initialize static Datasource_Type variables. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this section with the declaration of *datasource_type_map*.

⟨ Initialize **static Datasource_Type** variables 167 ⟩ ≡
```
map⟨unsigned short, string⟩ Datasource_Type::datasource_type_map;
```
This code is used in section 186.

168. Types for *datasource_type*. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this section.

[LDF 2006.11.13.] Added **static const unsigned short** TOP_TYPE.

⟨ Declare **static Datasource_Type** constants 165 ⟩ +≡

169. datasource_type functions. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this section.

170. Constructor and setting functions. [LDF 2006.12.08.]

171. Default constructor. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this function.

⟨ Declare **Datasource_Type** functions 171 ⟩ ≡
```
Datasource_Type(void);
```
See also sections 173, 175, 179, 181, and 183.
This code is used in section 163.

172.

```
⟨ Define Datasource_Type functions 172 ⟩ ≡
  Datasource_Type::Datasource_Type(void)
  {
    cerr ≪ "Entering␣‘Datasource_Type::Datasource_Type(void)’." ≪ endl;
    return;
  }     /* End of default Datasource_Type constructor definition. */
```

See also sections 174, 176, 177, 178, 180, 182, and 184.

This code is used in section 186.

173. Set. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this function.

```
⟨ Declare Datasource_Type functions 171 ⟩ +≡
  int set(unsigned short datasource_type, Scanner_Node sscanner_node = 0);
```

174.

```
⟨ Define Datasource_Type functions 172 ⟩ +≡
  int Datasource_Type::set(unsigned short datasource_type, Scanner_Node sscanner_node)
  {
    return 0;
  }     /* End of Datasource_Type::set definition. */
```

175. Destructor. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this function.

```
⟨ Declare Datasource_Type functions 171 ⟩ +≡
  ~Datasource_Type(void);
```

176.

```
⟨ Define Datasource_Type functions 172 ⟩ +≡
  Datasource_Type::~Datasource_Type(void){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Entering␣‘Datasource_Type’␣destructor." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      temp_strm.str("");
#endif
```

177.

⟨ Define **Datasource_Type** functions 172 ⟩ +≡

```
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣‘Datasource_Type’␣destructor." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  temp_strm.str("");
#endif
```

178. DO NOT delete *scanner_node*! [LDF 2006.12.08.]

⟨ Define **Datasource_Type** functions 172 ⟩ +≡

```
  scanner_node = 0;
  return; }      /* End of ~Datasource_Type definition. */
```

179. Assignment. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this function.

⟨ Declare **Datasource_Type** functions 171 ⟩ +≡

```
  Datasource_Node operator=(const Datasource_Type &d);
```

180.

```
⟨ Define Datasource_Type functions 172 ⟩ +≡
  Datasource_Node Datasource_Type::operator=(const Datasource_Type &d)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
    scanner_node = d.scanner_node;
#ifdef DEBUG_OUTPUT
    temp_strm << "Entering `Datasource_Type::operator=(const Datasource_Type)'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node) scanner_node->log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    if (this ≡ &d) {
#ifdef DEBUG_OUTPUT
      temp_strm << "In `Datasource_Type::operator=(const Datasource_Type)':" << endl <<
          "Self-assignment.  Returning `this'." << endl;
      cerr_mutex.lock();
      cerr << temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node) scanner_node->log_strm << temp_strm.str();
      temp_strm.str("");
#endif
      return this;
    }     /* if (this ≡ &d) */
    type = d.type;
#ifdef DEBUG_OUTPUT
    temp_strm << "Exiting `Datasource_Type::operator=(const Datasource_Type)'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node) scanner_node->log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    return this;
  }     /* End of Datasource_Type::operator=(const Datasource_Type d) definition. */
```

181. Initialize type maps. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this function.

[LDF 2006.12.08.] Added code for `DBT_TYPE`, `GBV_GVK_TYPE`, `TIMMS_TYPE`, and `DATASOURCE_FILE_TYPE`.

```
⟨ Declare Datasource_Type functions 171 ⟩ +≡
```

static int *initialize_type_maps*(**void**);

182.

⟨ Define **Datasource_Type** functions 172 ⟩ +≡
```
int Datasource_Type::initialize_type_maps(void)
{
  datasource_type_map[DATASOURCE_TYPE_NULL_TYPE] = "DATASOURCE_TYPE_NULL_TYPE";
  datasource_type_map[DBT_TYPE] = "DBT_TYPE";
  datasource_type_map[GBV_GVK_TYPE] = "GBV_GVK_TYPE";
  datasource_type_map[TIMMS_TYPE] = "TIMMS_TYPE";
  datasource_type_map[DATASOURCE_FILE_TYPE] = "DATASOURCE_FILE_TYPE";
  return 0;
}    /* End of Datasource_Type::initialize_type_maps definition. */
```

183. Show. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this function.

⟨ Declare **Datasource_Type** functions 171 ⟩ +≡
```
int show(string s = "'Datasource_Type':\n", Scanner_Node sscanner_node = 0);
```

184.

⟨ Define **Datasource_Type** functions 172 ⟩ +≡
```
int Datasource_Type::show(string s, Scanner_Node sscanner_node)
{
  stringstream temp_strm;
  if (scanner_node ≡ 0 ∧ sscanner_node ≠ 0) scanner_node = sscanner_node;
  temp_strm ≪ s ≪ endl ≪ "'type' == " ≪ datasource_type_map[type] ≪ " (" ≪ type ≪ ")" ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  temp_strm.str("");
  if (scanner_node ≠ 0 ∧ scanner_node→log_strm.is_open()) scanner_node→log_strm ≪ temp_strm;
  return 0;
}    /* End of Datasource_Type::show definition. */
```

185. Putting datasource_type together. [LDF 2006.12.08.]

186. This is what's compiled.

⟨ Include files 10 ⟩
⟨ dtsrctyp.web 159 ⟩
```
using namespace std;
using namespace Scan_Parse;
```
⟨ Forward declarations 17 ⟩
⟨ Declare **class Datasource_Type** 163 ⟩
⟨ Initialize **static Datasource_Type** constants 166 ⟩
⟨ Initialize **static Datasource_Type** variables 167 ⟩
⟨ Define **Datasource_Type** functions 172 ⟩

187. This is what's written to `dtsrctyp.h`.

```
⟨ dtsrctyp.hh 187 ⟩ ≡
#ifndef DTSRCTYP_KNOWN
#define DTSRCTYP_KNOWN 1
  ⟨ Preprocessor macro calls 23 ⟩
  using namespace std;
  ⟨ Forward declarations 17 ⟩
  ⟨ Declare class Datasource_Type 163 ⟩
#endif    /* DTSRCTYP_KNOWN is defined. */
```

188. id_type (`idtype.web`). [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Created this file.

```
⟨ idtype.web 188 ⟩ ≡
  static char id_string[] = "$Id: idtype.web,v 1.6 2007/02/13 20:39:05 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 211.

189. Include files.

```
⟨ Include files 10 ⟩ +≡
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "dttmtype.h"
#include "parser.hxx"
#include "scnrtype.h"
#include "querytyp.h"
```

190. Preprocessor macro calls.

```
⟨ Preprocessor macro calls 23 ⟩ +≡
#ifdef WIN_LDF
#pragma once
#endif
```

191. Forward declarations. [LDF 2006.10.31.]

```
⟨ Forward declarations 17 ⟩ +≡
  class Scanner_Type;
  typedef Scanner_Type *Scanner_Node;
  struct Id_Type;
  typedef Id_Type *Id_Node;
```

192. struct id_type declaration. [LDF 2006.10.17.]

Log

[LDF 2006.11.21.] Added **unsigned short** *subtype*. It's needed for *strings*.

[LDF 2006.12.01.] Added **static map⟨unsigned short, string⟩** *subtype_map*.

```
⟨ Declare struct Id_Type 192 ⟩ ≡
  struct Id_Type {
    friend class Scanner_Type;
    string name;
    void *value;
    unsigned short type;
    unsigned short subtype;
    Id_Node up;
    Id_Node left;
    Id_Node right;
    static map⟨unsigned short, string⟩ subtype_map;
    Scanner_Node scanner_node;
    ⟨ Declare Id_Type functions 199 ⟩
    ⟨ Declare static Id_Type constants 193 ⟩
  };
```

This code is used in sections 211 and 212.

193. static Id_Type constants.

Log

[2006.11.21.] Added this section with the declarations of the **static const unsigned** *shorts* `TEX_STRING_TYPE`, `SQL_STRING_TYPE`, and `PQF_STRING_TYPE`. These types must be declared in **struct Id_Type**, because the Standard C++ library type **string** is used to represent the **string** type in the Scantest language.

```
⟨ Declare static Id_Type constants 193 ⟩ ≡
  static const unsigned short TEX_STRING_TYPE;
  static const unsigned short SQL_STRING_TYPE;
  static const unsigned short PQF_STRING_TYPE;
```

This code is used in section 192.

194.

Log

[2006.11.21.] Added this section with the initializations of Added this section with the declarations of the **static const unsigned** *shorts* `TEX_STRING_TYPE`, `SQL_STRING_TYPE`, and `PQF_STRING_TYPE`.

⟨ Initialize **static Id_Type** constants 194 ⟩ ≡
```
const unsigned short Id_Type::TEX_STRING_TYPE = 1;
const unsigned short Id_Type::SQL_STRING_TYPE = 2;
const unsigned short Id_Type::PQF_STRING_TYPE = 3;
```
This code is used in section 211.

195. Declare **static Id_Type** variables. [LDF 2006.12.01.]
Id_Type :: *subtype_map* needs to be declared outside of the class declaration. It is initialized in the function *initialize_subtype_map*, which is called in *main*. [LDF 2006.12.01.]

Log

[2006.12.01.] Added this section.

⟨ Declare **static Id_Type** variables 195 ⟩ ≡
```
map⟨unsigned short, string⟩ Id_Type::subtype_map;
```
This code is used in section 211.

196. id_type functions. [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this section.

197. Constructors and setting functions. [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this section.

198. Default constructor. [LDF 2006.11.01.]

Log

[2006.10.31.] Added this function.

[LDF 2006.11.02.] Now setting **Scanner_Node** *scanner_node* = 0.

199.

⟨ Declare **Id_Type** functions 199 ⟩ ≡
```
Id_Type(void);
```
See also sections 202, 205, and 208.
This code is used in section 192.

200.

```
⟨ Define Id_Type functions 200 ⟩ ≡
  Id_Type::Id_Type(void)
  {
    name = "";
    value = 0;
    type = 0;
    subtype = 0;
    up = 0;
    left = 0;
    right = 0;
    scanner_node = 0;
    return;
  }     /* End of the default Id_Type constructor definition. */
```

See also sections 203, 206, and 209.

This code is used in section 211.

201. Destructor. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this function.

202.

```
⟨ Declare Id_Type functions 199 ⟩ +≡
  ~Id_Type(void);
```

203.

```
⟨ Define Id_Type functions 200 ⟩ +≡
  Id_Type::~Id_Type(void)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm << "Entering `~Id_Type'." << endl << "`name' == `" << name << "'" << endl <<
        "`type' == `" << Scan_Parse::token_map[type] << "'" << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    if (type ≡ QUERY_TYPE) {
      delete static_cast⟨Query_Node⟩(value);
      value = 0;
    }
    delete left;
    delete right;
#ifdef DEBUG_OUTPUT
    temp_strm << "Exiting `~Id_Type'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    return;
#undef DEBUG_OUTPUT
  }     /* End of ~Id_Type definition. */
```

204. Initialize *subtype_map*. [LDF 2006.12.01.]

Log

[LDF 2006.12.01.] Added this function.

205.

```
⟨ Declare Id_Type functions 199 ⟩ +≡
  static int initialize_subtype_map(Scanner_Node s = 0);
```

206.

```
⟨ Define Id_Type functions 200 ⟩ +≡
  int Id_Type::initialize_subtype_map(Scanner_Node s)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm << "Entering `Id_Type::initialize_subtype_map'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (s != 0) s->log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    Id_Type::subtype_map[TEX_STRING_TYPE] = "TEX_STRING_TYPE";
    Id_Type::subtype_map[SQL_STRING_TYPE] = "SQL_STRING_TYPE";
    Id_Type::subtype_map[PQF_STRING_TYPE] = "PQF_STRING_TYPE";
#ifdef DEBUG_OUTPUT
    temp_strm << "Exiting `Id_Type::initialize_subtype_map'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (s != 0) s->log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    return 0;
#undef DEBUG_OUTPUT
  }     /* End of Id_Type::initialize_subtype_map definition. */
```

207. Show. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this function.

208.

```
⟨ Declare Id_Type functions 199 ⟩ +≡
  int show(string = "");
```

209.

```
⟨ Define Id_Type functions 200 ⟩ +≡
  int Id_Type::show(string s)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
    if (s ≡ "") s = "`Id_Type:'";
    temp_strm ≪ s ≪ endl ≪ "`name' == `" ≪ name ≪ "'" ≪ endl ≪ "`type' == `" ≪
        Scan_Parse::token_map[type] ≪ "'" ≪ endl ≪ "`subtype' == " ≪ subtype_map[subtype] ≪
        endl;
    if (value ≡ 0) temp_strm ≪ "`value' == 0" ≪ endl;
    else temp_strm ≪ "`value' != 0" ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Exiting `Id_Type::show'." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    return 0;
#undef DEBUG_OUTPUT
  }     /* End of Id_Type::show definition. */
```

210. Putting id_type together. [LDF 2006.11.01.]

211. This is what's compiled.

```
⟨ Include files 10 ⟩
⟨ idtype.web 188 ⟩
using namespace std;
⟨ Forward declarations 17 ⟩
⟨ Declare struct Id_Type 192 ⟩
⟨ Initialize static Id_Type constants 194 ⟩
⟨ Declare static Id_Type variables 195 ⟩
⟨ Define Id_Type functions 200 ⟩
```

212. This is what's written to `idtype.h`.

⟨ `idtype.hh` 212 ⟩ ≡
```
⟨ Preprocessor macro calls 23 ⟩
using namespace std;
⟨ Forward declarations 17 ⟩
⟨ Declare struct Id_Type 192 ⟩
```

213. Scanner_Type (`scnrtype.web`). [LDF 2006.10.17.]

Log

[LDF 2006.10.31.] Created this file.

⟨ `scnrtype.web` 213 ⟩ ≡
```
static char id_string[] = "$Id: scnrtype.web,v 1.6 2007/02/13 20:41:41 lfinsto1 Exp $";
```
This code is cited in sections 6 and 8.

This code is used in section 247.

214. Include files.

⟨ Include files 10 ⟩ +≡
```
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "idtype.h"
#include "scanner.h"
#include "querytyp.h"
#include "dtsrctyp.h"
```

215. Preprocessor macro calls.

⟨ Preprocessor macro calls 23 ⟩ +≡
```
#ifdef WIN_LDF
#pragma once
#endif
```

216. Forward declarations. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

⟨ Forward declarations 17 ⟩ +≡
```
class Scanner_Type;
typedef Scanner_Type *Scanner_Node;
class Query_Type;
typedef Query_Type *Query_Node;
class Id_Type;
```

typedef Id_Type *Id_Node;

217. struct Token_Type declaration. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this declaration.

[LDF 2006.11.02.] Added constructor.

⟨ Declare **struct Token_Type** 217 ⟩ ≡

```
struct Token_Type {
  unsigned int type;
  YYSTYPE value;
  ⟨ Declare Token_Type functions 219 ⟩
};
```

This code is used in sections 247 and 248.

218. Token_Type functions. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

219. Default Constructor. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this function.

⟨ Declare **Token_Type** functions 219 ⟩ ≡

```
Token_Type(void);
```

See also section 221.

This code is used in section 217.

220.

⟨ Define **Token_Type** functions 220 ⟩ ≡

```
Token_Type::Token_Type(void)
{
  type = 0;
  value.int_value = 0;
  return;
}
```

See also section 222.

This code is used in section 247.

221. Non-Default Constructor. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this function.

⟨ Declare **Token_Type** functions 219 ⟩ +≡
Token_Type(**unsigned int** *ttype*, YYSTYPE *vvalue*);

222.

⟨ Define **Token_Type** functions 220 ⟩ +≡
```
Token_Type::Token_Type(unsigned int ttype, YYSTYPE vvalue): type(ttype), value(vvalue)
  {
    return;
  }
```

223. class Scanner_Type declaration. This is the type passed to the functions *yylex* and *yyparse* as a parameter. [LDF 2006.10.17.]

Log

[LDF 2006.10.31.] Added **typedef Scanner_Type *Scanner_Node**.

[LDF 2006.10.31.] Working on this declaration.

[LDF 2006.11.02.] Added **Query_Node** *curr_query*.

[LDF 2006.11.03.] Added **vector⟨float⟩** *float_vector*.

⟨ Declare **class Scanner_Type** 223 ⟩ ≡
```
  class Scanner_Type { ⟨ friend declarations for Scanner_Type 224 ⟩
  char in_filename[128];
  char log_filename[128];
  ifstream in_strm;
  map⟨string, Id_Type *⟩ id_map; stack < Token_Type > token_stack;
  vector⟨float⟩ float_vector;
public: ofstream log_strm;
  ⟨ Declare Scanner_Type functions 230 ⟩
  } ;
```
This code is used in sections 247 and 248.

224. friend declarations for Scanner_Type. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

⟨ **friend** declarations for **Scanner_Type** 224 ⟩ ≡
```
  friend int main(int, char *[]); friend int yylex ( YYSTYPE * , void * ) ;
  friend int yyparse(void *);
```
See also section 226.

This code is used in section 223.

225. friend declarations for parser rule functions. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

---

226. friend declarations for functions for group statements. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section with the **friend** declarations for **Scan_Parse** :: *start_local_query_func* and **Scan_Parse** :: *end_local_query_func*.

[LDF 2006.11.01.] Changed the name of **Scan_Parse** :: *start_local_query_func* to **Scan_Parse** :: *start_local_database_query_fu* and the name of **Scan_Parse** :: *end_local_query_func* to **Scan_Parse** :: *end_query_func*.

[LDF 2006.11.01.] Added the **friend** declaration of **Scan_Parse** :: *declare_variable_func*.

[LDF 2006.11.01.] Added the **char** **name* argument to **Scan_Parse** :: *declare_variable_func*.

[LDF 2006.11.02.] Changed the return value of **Scan_Parse** :: *declare_variable_func* from **int** to **void** *.

[LDF 2006.11.02.] Added the **friend** declaration of **Scan_Parse** :: *variable_func*.

[LDF 2006.11.02.] Added the **friend** declaration of **Scan_Parse** :: *query_assignment_func_0*.

[LDF 2006.12.15.] Added the **friend** declaration of **Scan_Parse** :: *datetime_assignment_func_0*.

[LDF 2006.12.18.] Added the **friend** declaration of **Scan_Parse** :: *datetime_assignment_func_1*.

[LDF 2006.12.19.] Added the **friend** declaration of **Scan_Parse** :: *query_assignment_func_1*.

⟨ **friend** declarations for **Scanner_Type** 224 ⟩ +≡

```
friend void *Scan_Parse::variable_func(void *v, char *name);
friend Id_Node Scan_Parse::declare_variable_func(void *v, const unsigned short type, char
    *name);
friend void *Scan_Parse::query_assignment_func_0(void *v, void *object, unsigned int
    assignment_type, unsigned int arg_0, unsigned int arg_1, void *value, bool negate);
friend int Scan_Parse::query_assignment_func_1(Scanner_Node scanner_node, Id_Node
    &curr_id_node, void *&field_specifier, int assignment_operator, int negation_optional, int
    match_term_optional, void *&v, int type);
friend int Scan_Parse::start_local_database_query_func(void *v);
friend int Scan_Parse::end_query_func(void *v);
friend int Scan_Parse::datetime_assignment_func_0(void *v, Date_Time_Node
    &curr_date_time_node, int specifier, int op, void *val, int type);
friend int Scan_Parse::datetime_assignment_func_1(void *v, Date_Time_Node &d, int op, void
    *&vec);
```

227. Scanner_Type functions. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

228. Constructors and setting functions. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

229. Default constructor. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function.

[LDF 2006.11.02.] Now initializing **Query_Node** *query_node* to 0.

230.

```
⟨ Declare Scanner_Type functions 230 ⟩ ≡
  Scanner_Type(void);
```

See also sections 232, 234, and 236.

This code is used in section 223.

231.

```
⟨ Define Scanner_Type functions 231 ⟩ ≡
  Scanner_Type::Scanner_Type(void)
  {
    return;
  }     /* End of the default Scanner_Type constructor definition. */
```

See also sections 233, 235, 237, 238, 239, 240, 241, 242, 243, 244, and 245.

This code is used in section 247.

232. Destructor. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this function.

```
⟨ Declare Scanner_Type functions 230 ⟩ +≡
  ~Scanner_Type(void);
```

233.

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  Scanner_Type::~Scanner_Type(void)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm << "Entering `~Scanner_Node'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (log_strm.is_open()) log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    for (map⟨string, Id_Type *⟩::iterator iter = id_map.begin(); iter ≠ id_map.end(); ++iter) {
      delete iter→second;
    }
    id_map.clear();
    in_strm.close();
#ifdef DEBUG_OUTPUT
    temp_strm << "Exiting `~Scanner_Node'." << endl;
    cerr_mutex.lock();
    cerr << temp_strm.str();
    cerr_mutex.unlock();
    if (log_strm.is_open()) log_strm << temp_strm.str();
    temp_strm.str("");
#endif
    log_strm.close();
    return;
#undef DEBUG_OUTPUT
  }     /* End of the ~Scanner_Type definition. */
```

234. Initialize *id_map*. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this function.

[LDF 2006.11.14.] Removed the code that declared a variable `"curr_query"` and set *this→curr_query* to point to it. I now plan to use *curr_query* for parsing subqueries.

```
⟨ Declare Scanner_Type functions 230 ⟩ +≡
  int initialize_id_map(void);
```

235.

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  int Scanner_Type::initialize_id_map(void)
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Entering␣`Scanner_Node::initialize_id_map'." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (log_strm.is_open()) log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Exiting␣`Scanner_Node::initialize_id_map'." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (log_strm.is_open()) log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    return 0;
#undef DEBUG_OUTPUT
  }     /* End of the Scanner_Type::initialize_id_map definition. */
```

236. Lookup. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this function.

```
⟨ Declare Scanner_Type functions 230 ⟩ +≡
  Id_Node lookup(char *name, bool create = false, unsigned int type = NULL_TYPE);
```

237.

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  Id_Node Scanner_Type::lookup(char *name, bool create, unsigned int type){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Entering ‘Scanner_Node::lookup’." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      Id_Node curr_id_node;
      map⟨string, Id_Node⟩::iterator iter = id_map.find(name);
      if (iter ≡ id_map.end()) {
        curr_id_node = 0;
      }
      else     /* iter ≠ id_map.end() */
      { curr_id_node = iter→second;
```

238. WARNING: *type* ≠ *curr_id_node→type*. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  if (type ≠ curr_id_node→type) {
    temp_strm ≪ "WARNING! In ‘Scanner_Node::lookup’:" ≪ endl ≪
        "‘type’ == ‘" ≪ Scan_Parse::token_map[type] ≪ "’ is not the same as " ≪
        "‘curr_id_node->type’ == ‘" ≪ Scan_Parse::token_map[curr_id_node→type] ≪ "’." ≪
        endl ≪ "Setting ‘type’ to ‘" ≪ Scan_Parse::token_map[curr_id_node→type] ≪
        "’ and continuing." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    log_strm ≪ temp_strm.str();
    temp_strm.str("");
    type = curr_id_node→type;
  }     /* if (type ≠ curr_id_node→type) */
```

239.

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  }     /* else (iter ≠ id_map.end()) */
```

240. *name* doesn't refer to an array. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  if (strchr(name, '¥') ≡ 0) {
    if (curr_id_node ≠ 0) return curr_id_node;
    else if (create ≡ true) {
      curr_id_node = new Id_Type;
      curr_id_node→name = name;
      curr_id_node→type = type;
      id_map[name] = curr_id_node;
      return curr_id_node;
    }
    else      /* curr_id_node ≡ 0 and create ≡ false */
    {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "In␣‘Scanner_Node::lookup’:" ≪ "‘name’␣not␣found␣in␣‘id_map’␣and␣‘creat\
          e’␣==␣0." ≪ endl ≪ "Exiting␣function␣with␣return␣value␣0.";
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      return 0;
    }     /* else (curr_id_node ≡ 0 and create ≡ false) */
  }     /* if (strchar(name, '¥') ≡ 0) */
```

241. *name* refers to an array. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  else      /* strchar(name, '¥') ≠ 0 */
  { stringstream curr_name_strm;
  string curr_name;
  {     /* Beginning of group */
    int j = 0;
    for (int i = 0; i < strlen(name); ++i) {
      if (name[i] ≡ '¥') curr_name_strm ≪ '[' ≪ float_vector[j++] ≪ ']';
      else curr_name_strm ≪ name[i];
    }     /* for */
  }     /* End of group */
  curr_name = curr_name_strm.str( );
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "‘curr_name’␣==␣" ≪ curr_name ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

242. No elements on array. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  if (curr_id_node→left ≡ 0) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "`" ≪ name ≪ "' refers to an empty array." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

243. *create* ≡ *false*. Return 0. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  if (create ≡ false) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "`create' == `false'.  Returning 0." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    return 0;
  }    /* if (create ≡ false) */
```

244. *create* ≡ *true*. Create array element. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  else    /* create ≡ true */
  {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Creating array element for `" ≪ curr_name ≪ "'." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    curr_id_node→left = new Id_Type;
    curr_id_node→left→name = curr_name;
    curr_id_node→left→type = type;
    curr_id_node→left→up = curr_id_node;
    return curr_id_node→left;
  }    /* else (create ≡ true) */
  }    /* if (curr_id_node→left ≡ 0) */
```

245. Array isn't empty. Traverse the tree. [LDF 2006.11.03.]

```
⟨ Define Scanner_Type functions 231 ⟩ +≡
  else      /* curr_id_node→left ≠ 0 */
  {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "`" ≪ name ≪ "' array isn't empty.  " ≪ "Traversing." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    curr_id_node = curr_id_node→left;
    for ( ; ; ) {
      if (curr_name ≡ curr_id_node→name) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "`" ≪ curr_name ≪ "' exists.  Returning it." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return curr_id_node;
      }     /* if (curr_name ≡ curr_id_node→name) */
      else if (curr_name.compare(curr_id_node→name) < 0) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "`" ≪ curr_name ≪ "' < `" ≪ curr_id_node→name ≪ "'.  " ≪
            "Traversing the tree leftwards." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        if (curr_id_node→left ≠ 0) {
#ifdef DEBUG_OUTPUT
          temp_strm ≪ "`" ≪ curr_id_node→name ≪ "->left' exists.  " ≪ "Continuing." ≪ endl;
          cerr_mutex.lock();
          cerr ≪ temp_strm.str();
          cerr_mutex.unlock();
          log_strm ≪ temp_strm.str();
          temp_strm.str("");
#endif
          curr_id_node = curr_id_node→left;
          continue;
        }
        else      /* curr_id_node→left ≡ 0 */
        {
#ifdef DEBUG_OUTPUT
          temp_strm ≪ "`" ≪ curr_id_node→name ≪ "->left' doesn't exist." ≪ endl;
          cerr_mutex.lock();
```

```
            cerr ≪ temp_strm.str( );
            cerr_mutex.unlock( );
            log_strm ≪ temp_strm.str( );
            temp_strm.str("");
#endif
          if (create ≡ true) {
#ifdef DEBUG_OUTPUT
            temp_strm ≪ "Creating␣new␣‘Id_Node’␣for␣‘" ≪ curr_name ≪ "’." ≪ endl;
            cerr_mutex.lock( );
            cerr ≪ temp_strm.str( );
            cerr_mutex.unlock( );
            log_strm ≪ temp_strm.str( );
            temp_strm.str("");
#endif
            curr_id_node→left = new Id_Type;
            curr_id_node→left→name = curr_name;
            curr_id_node→left→type = type;
            curr_id_node→left→up = curr_id_node;
            return curr_id_node→left;
          }     /* if (create ≡ true) */
          else      /* create ≡ false */
          {
#ifdef DEBUG_OUTPUT
            temp_strm ≪ "‘create’␣==␣‘false’.␣␣" ≪ "Not␣creating␣new␣‘Id_Node’␣for␣‘" ≪
                curr_name ≪ "’.␣␣Returning␣0." ≪ endl;
            cerr_mutex.lock( );
            cerr ≪ temp_strm.str( );
            cerr_mutex.unlock( );
            log_strm ≪ temp_strm.str( );
            temp_strm.str("");
#endif
            return 0;
          }     /* else (create ≡ false) */
        }     /* else (curr_id_node→left ≡ 0) */
      }     /* else if (curr_name.compare(curr_id_node→name) < 0) */
      else if (curr_name.compare(curr_id_node→name) > 0) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "‘" ≪ curr_name ≪ "’␣>␣‘" ≪ curr_id_node→name ≪ "’.␣␣" ≪
            "Traversing␣the␣tree␣rightwards." ≪ endl;
        cerr_mutex.lock( );
        cerr ≪ temp_strm.str( );
        cerr_mutex.unlock( );
        log_strm ≪ temp_strm.str( );
        temp_strm.str("");
#endif
        if (curr_id_node→right ≠ 0) {
#ifdef DEBUG_OUTPUT
          temp_strm ≪ "‘" ≪ curr_id_node→name ≪ "->right’␣exists.␣␣" ≪ "Continuing." ≪ endl;
          cerr_mutex.lock( );
          cerr ≪ temp_strm.str( );
          cerr_mutex.unlock( );
          log_strm ≪ temp_strm.str( );
```

```
        temp_strm.str("");
#endif
        curr_id_node = curr_id_node→right;
        continue;
      }     /* if (curr_id_node→right ≠ 0) */
      else      /* curr_id_node→right ≡ 0 */
      {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "`" ≪ curr_id_node→name ≪ "->right' doesn't exist." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        if (create ≡ true) {
#ifdef DEBUG_OUTPUT
          temp_strm ≪ "Creating new `Id_Node' for `" ≪ curr_name ≪ "'." ≪ endl;
          cerr_mutex.lock();
          cerr ≪ temp_strm.str();
          cerr_mutex.unlock();
          log_strm ≪ temp_strm.str();
          temp_strm.str("");
#endif
          curr_id_node→right = new Id_Type;
          curr_id_node→right→name = curr_name;
          curr_id_node→right→type = type;
          curr_id_node→right→up = curr_id_node;
          return curr_id_node→right;
        }     /* if (create ≡ true) */
        else      /* create ≡ false */
        {
#ifdef DEBUG_OUTPUT
          temp_strm ≪ "`create' == `false'.  " ≪ "Not creating new `Id_Node' for `" ≪
              curr_name ≪ "'.  Returning 0." ≪ endl;
          cerr_mutex.lock();
          cerr ≪ temp_strm.str();
          cerr_mutex.unlock();
          log_strm ≪ temp_strm.str();
          temp_strm.str("");
#endif
          return 0;
        }     /* else (create ≡ false) */
      }     /* else (curr_id_node→right ≡ 0) */
    }     /* else if (curr_name.compare(curr_id_node→name) > 0) */
  }     /* for */
}     /* else (curr_id_node→left ≠ 0) */
}     /* else (strchar(name, '¥') ≠ 0) */
#ifdef DEBUG_OUTPUT
temp_strm ≪ "Exiting `Scanner_Node::lookup'." ≪ endl;
cerr_mutex.lock();
cerr ≪ temp_strm.str();
```

```
  cerr_mutex.unlock( );
  log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  return 0;
#undef DEBUG_OUTPUT
  }     /* End of Scanner_Type::lookup definition. */
```

246. Putting Scanner_Type together. [LDF 2006.10.31.]

247. This is what's compiled.

```
⟨ Include files 10 ⟩
⟨ scnrtype.web 213 ⟩
using namespace std;
⟨ Forward declarations 17 ⟩
⟨ Declare struct Token_Type 217 ⟩
⟨ Declare class Scanner_Type 223 ⟩
⟨ Define Token_Type functions 220 ⟩
⟨ Define Scanner_Type functions 231 ⟩
```

248. This is what's written to `scnrtype.h`.

```
⟨ scnrtype.hh 248 ⟩ ≡
#ifndef SCNRTYPE_KNOWN
#define SCNRTYPE_KNOWN 1
  ⟨ Preprocessor macro calls 23 ⟩
  using namespace std;
#include "scanner.h"
  using namespace Scan_Parse;
  ⟨ Forward declarations 17 ⟩
  ⟨ Declare struct Token_Type 217 ⟩
  ⟨ Declare class Scanner_Type 223 ⟩
#endif    /* SCNRTYPE_KNOWN is defined. */
```

249. Scanning (`scanner.web`). [LDF 2006.10.17.]

Log

[LDF 2006.10.17.] Created this file.

```
⟨ scanner.web 249 ⟩ ≡
  static char id_string[] = "$Id: scanner.web,v 1.6 2007/02/13 20:41:04 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 361.

250. Include files.

```
⟨ Include files 10 ⟩ +≡
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "idtype.h"
#include "scnrtype.h"
```

251. Preprocessor macro calls.

```
⟨ Preprocessor macro calls 23 ⟩ +≡
#ifdef WIN_LDF
#pragma once
#endif
```

252. Forward declarations. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

```
⟨ Forward declarations 17 ⟩ +≡
  class Scanner_Type;
```

```
typedef Scanner_Type *Scanner_Node;
class Query_Type;
typedef Query_Type *Query_Node;
class Id_Type;
typedef Id_Type *Id_Node;
class Date_Time_Type;
typedef Date_Time_Type *Date_Time_Node;
```

253. Type declarations for the scanner. [LDF 2006.10.17.]

254. Declare namespace Scan_Parse. [LDF 2006.10.17.]

255. Declaration with initializations for compiliation. [LDF 2006.10.19.]

Log

[LDF 2006.10.19.] Added this section.

[LDF 2006.11.01.] Removed **const unsigned int** `COLLECTING_ARGUMENT`. Changed **const unsigned int** `COLLECTING_KEYWORD` to `COLLECTING_ID`.

[LDF 2006.11.02.] Added **extern const unsigned int** `COLLECTING_INTEGER` and **extern const unsigned int** `COLLECTING_FLOAT`.

⟨ Declare namespace **Scan_Parse** 255 ⟩ ≡

```
namespace Scan_Parse {
  extern const unsigned int NULL_STATE = 0;
  extern const unsigned int COLLECTING_ID = 1;
  extern const unsigned int COLLECTING_STRING = 2;
  extern const unsigned int COLLECTING_INTEGER = 3;
  extern const unsigned int COLLECTING_FLOAT = 4;
  ⟨ Declare struct Keyword_Type 261 ⟩
  ⟨ Declare keyword_map 263 ⟩
  ⟨ Declare token_map 266 ⟩
  ⟨ Declare Scan_Parse functions 268 ⟩
}   /* End of namespace Scan_Parse declaration. */
```

This code is used in section 361.

256. extern declaration of namespace Scan_Parse. [LDF 2006.10.19.]

⟨ **extern** declaration of namespace **Scan_Parse** 256 ⟩ ≡

```
namespace Scan_Parse {
```

See also sections 258 and 259.

This code is used in section 362.

257. Constants. [LDF 2006.10.19.]

258. Scanner state ("start conditions"). [LDF 2006.10.19.]

```
⟨ extern declaration of namespace Scan_Parse 256 ⟩ +≡
  extern const unsigned int NULL_STATE;
  extern const unsigned int COLLECTING_ID;
  extern const unsigned int COLLECTING_STRING;
  extern const unsigned int COLLECTING_INTEGER;
  extern const unsigned int COLLECTING_FLOAT;
```

259.

```
⟨ extern declaration of namespace Scan_Parse 256 ⟩ +≡
  struct Keyword_Type;
  ⟨ extern keyword_map declaration 264 ⟩
  ⟨ extern token_map declaration 267 ⟩
  ⟨ Declare Scan_Parse functions 268 ⟩
  }     /* End of extern declaration of namespace Scan_Parse. */
```

260. Keywords. [LDF 2006.10.19.]

261. Declare struct Keyword_Type. [LDF Undated.]

Log

[LDF 2006.11.01.] Tried to change **Keyword_Type** from a **struct** to a **class**, but it didn't work.

```
⟨ Declare struct Keyword_Type 261 ⟩ ≡
  struct Keyword_Type {
    string name;
    int value;
    string value_name;
  };
```

This code is used in section 255.

262. Keyword map. [LDF 2006.10.19.]

Log

[LDF 2006.10.19.] Added this section.

263. Declare *keyword_map*. [LDF 2006.10.19.]

```
⟨ Declare keyword_map 263 ⟩ ≡
  map⟨string, Keyword_Type *⟩ keyword_map;
```

This code is used in section 255.

264. **extern** declaration of *keyword_map* for the header file. [LDF 2006.10.19.]

⟨ **extern** *keyword_map* declaration 264 ⟩ ≡
  extern map⟨string, Keyword_Type ∗⟩ *keyword_map*;
This code is used in section 259.

265. **Token map.** [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this section.

266. **Declare** *token_map*. [LDF 2006.11.01.]

⟨ Declare *token_map* 266 ⟩ ≡
  map⟨unsigned int, string⟩ *token_map*;
This code is used in section 255.

267. **extern** declaration of *token_map* for the header file. [LDF 2006.11.01.]

⟨ **extern** *token_map* declaration 267 ⟩ ≡
  extern map⟨unsigned int, string⟩ *token_map*;
This code is used in section 259.

268. **Initialize** *keyword_map* **and** *token_map*. [LDF 2006.10.19.]

Log

[LDF 2006.11.03.] Added code for `NULL_TYPE`.

[LDF 2006.12.07.] Added code for `HYPHEN`.

[LDF 2006.12.12.] Added code for `AT_SYMBOL`.

[LDF 2006.12.14.] Added code for `PERCENT`.

⟨ Declare **Scan_Parse** functions 268 ⟩ ≡
  int *initialize_maps*(**void**);
See also sections 291, 295, 296, 298, 299, 300, 301, 303, and 304.
This code is used in sections 255 and 259.

269.

⟨ Define **Scan_Parse** functions 269 ⟩ ≡
  int Scan_Parse::*initialize_maps*(**void**){ **Keyword_Type** ∗*curr_keyword*;
See also sections 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 283, 284, 285, 286, 287, 288, 289, and 292.
This code is used in section 361.

270. Punctuation. [LDF 2006.10.19.]

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "AT_SYMBOL";
  curr_keyword→value = AT_SYMBOL;
  curr_keyword→value_name = "AT_SYMBOL";
  keyword_map["@"] = curr_keyword;
  token_map[AT_SYMBOL] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "COMMA";
  curr_keyword→value = COMMA;
  curr_keyword→value_name = "COMMA";
  keyword_map[","] = curr_keyword;
  token_map[COMMA] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "PERCENT";
  curr_keyword→value = PERCENT;
  curr_keyword→value_name = "PERCENT";
  keyword_map[","] = curr_keyword;
  token_map[PERCENT] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "COLON";
  curr_keyword→value = COLON;
  curr_keyword→value_name = "COLON";
  keyword_map[":"] = curr_keyword;
  token_map[COLON] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "PERIOD";
  curr_keyword→value = PERIOD;
  curr_keyword→value_name = "PERIOD";
  keyword_map["."] = curr_keyword;
  token_map[PERIOD] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "HYPHEN";
  curr_keyword→value = HYPHEN;
  curr_keyword→value_name = "HYPHEN";
  keyword_map["-"] = curr_keyword;
  token_map[HYPHEN] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "SEMI_COLON";
  curr_keyword→value = SEMI_COLON;
  curr_keyword→value_name = "SEMI_COLON";
  keyword_map[";"] = curr_keyword;
  token_map[SEMI_COLON] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "OPEN_PARENTHESIS";
  curr_keyword→value = OPEN_PARENTHESIS;
  curr_keyword→value_name = "OPEN_PARENTHESIS";
  keyword_map["("] = curr_keyword;
  token_map[OPEN_PARENTHESIS] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "CLOSE_PARENTHESIS";
```

```
curr_keyword→value = CLOSE_PARENTHESIS;
curr_keyword→value_name = "CLOSE_PARENTHESIS";
keyword_map[")"] = curr_keyword;
token_map[CLOSE_PARENTHESIS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "OPEN_BRACKET";
curr_keyword→value = OPEN_BRACKET;
curr_keyword→value_name = "OPEN_BRACKET";
keyword_map["["] = curr_keyword;
token_map[OPEN_BRACKET] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "CLOSE_BRACKET";
curr_keyword→value = CLOSE_BRACKET;
curr_keyword→value_name = "CLOSE_BRACKET";
keyword_map["]"] = curr_keyword;
token_map[CLOSE_BRACKET] = curr_keyword→value_name;
```

271. Assignment. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section with code for the following keywords: `ASSIGN`, `PLUS_ASSIGN`, `MINUS_ASSIGN`, `TIMES_ASSIGN`, and `DIVIDE_ASSIGN`.

[LDF 2006.11.14.] Added code for `AND_ASSIGN`, `OR_ASSIGN`, `XOR_ASSIGN`, and `NOT_ASSIGN`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "ASSIGN";
curr_keyword→value = ASSIGN;
curr_keyword→value_name = "ASSIGN";
keyword_map["="] = curr_keyword;
token_map[ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "PLUS_ASSIGN";
curr_keyword→value = PLUS_ASSIGN;
curr_keyword→value_name = "PLUS_ASSIGN";
keyword_map["+="] = curr_keyword;
token_map[PLUS_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "MINUS_ASSIGN";
curr_keyword→value = MINUS_ASSIGN;
curr_keyword→value_name = "MINUS_ASSIGN";
keyword_map["-="] = curr_keyword;
token_map[MINUS_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "TIMES_ASSIGN";
curr_keyword→value = TIMES_ASSIGN;
curr_keyword→value_name = "TIMES_ASSIGN";
keyword_map["*="] = curr_keyword;
token_map[TIMES_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "DIVIDE_ASSIGN";
curr_keyword→value = DIVIDE_ASSIGN;
curr_keyword→value_name = "DIVIDE_ASSIGN";
keyword_map["/="] = curr_keyword;
token_map[DIVIDE_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "AND_ASSIGN";
curr_keyword→value = AND_ASSIGN;
curr_keyword→value_name = "AND_ASSIGN";
keyword_map["&="] = curr_keyword;
token_map[AND_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "OR_ASSIGN";
curr_keyword→value = OR_ASSIGN;
curr_keyword→value_name = "OR_ASSIGN";
keyword_map["|="] = curr_keyword;
token_map[OR_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
```

```
curr_keyword→name = "XOR_ASSIGN";
curr_keyword→value = XOR_ASSIGN;
curr_keyword→value_name = "XOR_ASSIGN";
keyword_map["^="] = curr_keyword;
token_map[XOR_ASSIGN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "NOT_ASSIGN";
curr_keyword→value = NOT_ASSIGN;
curr_keyword→value_name = "NOT_ASSIGN";
keyword_map["!="] = curr_keyword;
token_map[NOT_ASSIGN] = curr_keyword→value_name;
```

272. Arithmetical Operations. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this section with code for `PLUS`, `MINUS`, `TIMES`, and `DIVIDE`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "PLUS";
curr_keyword→value = PLUS;
curr_keyword→value_name = "PLUS";
keyword_map["+"] = curr_keyword;
token_map[PLUS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "MINUS";
curr_keyword→value = MINUS;
curr_keyword→value_name = "MINUS";
keyword_map["-"] = curr_keyword;
token_map[MINUS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "TIMES";
curr_keyword→value = TIMES;
curr_keyword→value_name = "TIMES";
keyword_map["*"] = curr_keyword;
token_map[TIMES] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "DIVIDE";
curr_keyword→value = DIVIDE;
curr_keyword→value_name = "DIVIDE";
keyword_map["/"] = curr_keyword;
token_map[DIVIDE] = curr_keyword→value_name;
```

273. Types with values. [LDF 2006.10.19.]

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "STRING";
  curr_keyword→value = STRING;
  curr_keyword→value_name = "STRING";
  keyword_map["STRING"] = curr_keyword;
  token_map[STRING] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "INTEGER";
  curr_keyword→value = INTEGER;
  curr_keyword→value_name = "INTEGER";
  keyword_map["INTEGER"] = curr_keyword;
  token_map[INTEGER] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "FLOAT";
  curr_keyword→value = FLOAT;
  curr_keyword→value_name = "FLOAT";
  keyword_map["FLOAT"] = curr_keyword;
  token_map[FLOAT] = curr_keyword→value_name;
```

274. Control. [LDF 2006.10.19.]

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "start";
  curr_keyword→value = START;
  curr_keyword→value_name = "START";
  keyword_map["start"] = curr_keyword;
  token_map[START] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "end";
  curr_keyword→value = END;
  curr_keyword→value_name = "END";
  keyword_map["end"] = curr_keyword;
  token_map[END] = curr_keyword→value_name;
```

275. Queries. [LDF 2006.10.19.]

Log

[2006.11.16.] Added code for `STRING_DECLARATOR`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "query";
curr_keyword→value = QUERY_DECLARATOR;
curr_keyword→value_name = "QUERY_DECLARATOR";
keyword_map["query"] = curr_keyword;
token_map[QUERY_DECLARATOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "local";
curr_keyword→value = LOCAL;
curr_keyword→value_name = "LOCAL";
keyword_map["local"] = curr_keyword;
token_map[LOCAL] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "remote";
curr_keyword→value = REMOTE;
curr_keyword→value_name = "REMOTE";
keyword_map["remote"] = curr_keyword;
token_map[REMOTE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "database";
curr_keyword→value = DATABASE;
curr_keyword→value_name = "DATABASE";
keyword_map["database"] = curr_keyword;
token_map[DATABASE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "server";
curr_keyword→value = SERVER;
curr_keyword→value_name = "SERVER";
keyword_map["server"] = curr_keyword;
token_map[SERVER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "string";
curr_keyword→value = STRING_DECLARATOR;
curr_keyword→value_name = "STRING_DECLARATOR";
keyword_map["string"] = curr_keyword;
token_map[STRING_DECLARATOR] = curr_keyword→value_name;
```

276. Match types. [LDF 2006.12.11.]

Log

[2006.12.11.] Added this section with code for `LIKE` and `FREETEXT`.

[LDF 2006.12.12.] Added code for `CONTAINS`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "contains";
curr_keyword→value = CONTAINS;
curr_keyword→value_name = "CONTAINS";
keyword_map["contains"] = curr_keyword;
token_map[CONTAINS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "freetext";
curr_keyword→value = FREETEXT;
curr_keyword→value_name = "FREETEXT";
keyword_map["freetext"] = curr_keyword;
token_map[FREETEXT] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "like";
curr_keyword→value = LIKE;
curr_keyword→value_name = "LIKE";
keyword_map["like"] = curr_keyword;
token_map[LIKE] = curr_keyword→value_name;
```

277. Datasources. [LDF 2006.12.08.]

Log

[2006.11.16.] Added this section with code for `DATASOURCE_DECLARATOR`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡
```
curr_keyword = new Keyword_Type;
curr_keyword→name = "datasource";
curr_keyword→value = DATASOURCE_DECLARATOR;
curr_keyword→value_name = "DATASOURCE_DECLARATOR";
keyword_map["datasource"] = curr_keyword;
token_map[DATASOURCE_DECLARATOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "dbt";
curr_keyword→value = DBT;
curr_keyword→value_name = "DBT";
keyword_map["dbt"] = curr_keyword;
token_map[DBT] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "gbv_gvk";
curr_keyword→value = GBV_GVK;
curr_keyword→value_name = "GBV_GVK";
keyword_map["gbv_gvk"] = curr_keyword;
token_map[GBV_GVK] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "timms";
curr_keyword→value = TIMMS;
curr_keyword→value_name = "TIMMS";
keyword_map["timms"] = curr_keyword;
token_map[TIMMS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "file";
curr_keyword→value = DATASOURCE_FILE;
curr_keyword→value_name = "DATASOURCE_FILE";
keyword_map["file"] = curr_keyword;
token_map[DATASOURCE_FILE] = curr_keyword→value_name;
```

278. Datetime. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this section with code for `DATETIME_DECLARATOR`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡
```
curr_keyword = new Keyword_Type;
curr_keyword→name = "datetime";
curr_keyword→value = DATETIME_DECLARATOR;
curr_keyword→value_name = "DATETIME_DECLARATOR";
keyword_map["datetime"] = curr_keyword;
token_map[DATETIME_DECLARATOR] = curr_keyword→value_name;
```

279. Datetimes. [LDF 2006.12.15.]

Log

[2006.12.15.] Added code for `DAY`, `MONTH`, `YEAR`, `HOUR`, `MINUTE`, and `SECOND`.

[LDF 2006.12.18.] Added code for `YEAR_RANGE_BEGIN` and `YEAR_RANGE_END`.

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "year_range_begin";
  curr_keyword→value = YEAR_RANGE_BEGIN;
  curr_keyword→value_name = "YEAR_RANGE_BEGIN";
  keyword_map["year_range_begin"] = curr_keyword;
  token_map[YEAR_RANGE_BEGIN] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "year_range_end";
  curr_keyword→value = YEAR_RANGE_END;
  curr_keyword→value_name = "YEAR_RANGE_END";
  keyword_map["year_range_end"] = curr_keyword;
  token_map[YEAR_RANGE_END] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "year";
  curr_keyword→value = YEAR;
  curr_keyword→value_name = "YEAR";
  keyword_map["year"] = curr_keyword;
  token_map[YEAR] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "month";
  curr_keyword→value = MONTH;
  curr_keyword→value_name = "MONTH";
  keyword_map["month"] = curr_keyword;
  token_map[MONTH] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "day";
  curr_keyword→value = DAY;
  curr_keyword→value_name = "DAY";
  keyword_map["day"] = curr_keyword;
  token_map[DAY] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "hour";
  curr_keyword→value = HOUR;
  curr_keyword→value_name = "HOUR";
  keyword_map["hour"] = curr_keyword;
  token_map[HOUR] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "minute";
  curr_keyword→value = MINUTE;
  curr_keyword→value_name = "MINUTE";
  keyword_map["minute"] = curr_keyword;
  token_map[MINUTE] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "second";
```

```
curr_keyword→value = SECOND;
curr_keyword→value_name = "SECOND";
keyword_map["second"] = curr_keyword;
token_map[SECOND] = curr_keyword→value_name;
```

280. Predicates and Control Structures. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this section with code for `IF`, `ELSE`, `ELIF`, `FI`, `FOR`, `DO`, `WHILE`, `AND`, `OR`, `XOR`, `NOT`, `AND_NOT`, `OR_NOT`, and `XOR_NOT`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "if";
curr_keyword→value = IF;
curr_keyword→value_name = "IF";
keyword_map["if"] = curr_keyword;
token_map[IF] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "else";
curr_keyword→value = ELSE;
curr_keyword→value_name = "ELSE";
keyword_map["else"] = curr_keyword;
token_map[ELSE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "elif";
curr_keyword→value = ELIF;
curr_keyword→value_name = "ELIF";
keyword_map["elif"] = curr_keyword;
token_map[ELIF] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "fi";
curr_keyword→value = FI;
curr_keyword→value_name = "FI";
keyword_map["fi"] = curr_keyword;
token_map[FI] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "for";
curr_keyword→value = FOR;
curr_keyword→value_name = "FOR";
keyword_map["for"] = curr_keyword;
token_map[FOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "do";
curr_keyword→value = DO;
curr_keyword→value_name = "DO";
keyword_map["do"] = curr_keyword;
token_map[DO] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "while";
curr_keyword→value = WHILE;
curr_keyword→value_name = "WHILE";
keyword_map["while"] = curr_keyword;
token_map[WHILE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "and";
```

```
curr_keyword→value = AND;
curr_keyword→value_name = "AND";
keyword_map["and"] = curr_keyword;
keyword_map["&"] = curr_keyword;
token_map[AND] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "or";
curr_keyword→value = OR;
curr_keyword→value_name = "OR";
keyword_map["or"] = curr_keyword;
keyword_map["|"] = curr_keyword;
token_map[OR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "xor";
curr_keyword→value = XOR;
curr_keyword→value_name = "XOR";
keyword_map["xor"] = curr_keyword;
keyword_map["^"] = curr_keyword;
token_map[XOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "not";
curr_keyword→value = NOT;
curr_keyword→value_name = "NOT";
keyword_map["!"] = curr_keyword;
token_map[NOT] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "AND_NOT";
curr_keyword→value = AND_NOT;
curr_keyword→value_name = "AND_NOT";
keyword_map["&!"] = curr_keyword;
token_map[AND_NOT] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "OR_NOT";
curr_keyword→value = OR_NOT;
curr_keyword→value_name = "OR_NOT";
keyword_map["|!"] = curr_keyword;
token_map[OR_NOT] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "XOR_NOT";
curr_keyword→value = XOR_NOT;
curr_keyword→value_name = "XOR_NOT";
keyword_map["^!"] = curr_keyword;
token_map[XOR_NOT] = curr_keyword→value_name;
```

281. Fields. [LDF 2006.10.19.]

Log

[LDF 2006.12.05.] Added code for CREATOR.

[LDF 2006.12.12.] Added code for MAIN_CANONICAL_TITLE.

[LDF 2006.12.12.] Added code to account for the tokens that refer to additional tables in the OAI database (dc_test).

[LDF 2006.12.12.] Added code to account for the tokens that refer to additional tables in the PICA database (PICA_DB).

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "access_number";
curr_keyword→value = ACCESS_NUMBER;
curr_keyword→value_name = "ACCESS_NUMBER";
keyword_map["access_number"] = curr_keyword;
token_map[ACCESS_NUMBER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "author";
curr_keyword→value = AUTHOR;
curr_keyword→value_name = "AUTHOR";
keyword_map["author"] = curr_keyword;
token_map[AUTHOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "bibliographic_type";
curr_keyword→value = BIBLIOGRAPHIC_TYPE;
curr_keyword→value_name = "BIBLIOGRAPHIC_TYPE";
keyword_map["bibliographic_type"] = curr_keyword;
token_map[BIBLIOGRAPHIC_TYPE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "call_number";
curr_keyword→value = CALL_NUMBER;
curr_keyword→value_name = "CALL_NUMBER";
keyword_map["call_number"] = curr_keyword;
token_map[CALL_NUMBER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "classification";
curr_keyword→value = CLASSIFICATION;
curr_keyword→value_name = "CLASSIFICATION";
keyword_map["classification"] = curr_keyword;
token_map[CLASSIFICATION] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "company";
curr_keyword→value = COMPANY;
curr_keyword→value_name = "COMPANY";
keyword_map["company"] = curr_keyword;
token_map[COMPANY] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "content_summary";
curr_keyword→value = CONTENT_SUMMARY;
```

```
curr_keyword→value_name = "CONTENT_SUMMARY";
keyword_map["content_summary"] = curr_keyword;
token_map[CONTENT_SUMMARY] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "contributor";
curr_keyword→value = CONTRIBUTOR;
curr_keyword→value_name = "CONTRIBUTOR";
keyword_map["contributor"] = curr_keyword;
token_map[CONTRIBUTOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "creator";
curr_keyword→value = CREATOR;
curr_keyword→value_name = "CREATOR";
keyword_map["creator"] = curr_keyword;
token_map[CREATOR] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "database_provider";
curr_keyword→value = DATABASE_PROVIDER;
curr_keyword→value_name = "DATABASE_PROVIDER";
keyword_map["database_provider"] = curr_keyword;
token_map[DATABASE_PROVIDER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "description";
curr_keyword→value = DESCRIPTION;
curr_keyword→value_name = "DESCRIPTION";
keyword_map["description"] = curr_keyword;
token_map[DESCRIPTION] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "exemplar_production_number";
curr_keyword→value = EXEMPLAR_PRODUCTION_NUMBER;
curr_keyword→value_name = "EXEMPLAR_PRODUCTION_NUMBER";
keyword_map["exemplar_production_number"] = curr_keyword;
token_map[EXEMPLAR_PRODUCTION_NUMBER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "identifier";
curr_keyword→value = IDENTIFIER;
curr_keyword→value_name = "IDENTIFIER";
keyword_map["identifier"] = curr_keyword;
token_map[IDENTIFIER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "institution";
curr_keyword→value = INSTITUTION;
curr_keyword→value_name = "INSTITUTION";
keyword_map["institution"] = curr_keyword;
token_map[INSTITUTION] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "language";
curr_keyword→value = LANGUAGE;
curr_keyword→value_name = "LANGUAGE";
keyword_map["language"] = curr_keyword;
token_map[LANGUAGE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
```

```
curr_keyword→name = "main_canonical_title";
curr_keyword→value = MAIN_CANONICAL_TITLE;
curr_keyword→value_name = "MAIN_CANONICAL_TITLE";
keyword_map["main_canonical_title"] = curr_keyword;
token_map[MAIN_CANONICAL_TITLE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "permutation_pattern";
curr_keyword→value = PERMUTATION_PATTERN;
curr_keyword→value_name = "PERMUTATION_PATTERN";
keyword_map["permutation_pattern"] = curr_keyword;
token_map[PERMUTATION_PATTERN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "person";
curr_keyword→value = PERSON;
curr_keyword→value_name = "PERSON";
keyword_map["person"] = curr_keyword;
token_map[PERSON] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "physical_description";
curr_keyword→value = PHYSICAL_DESCRIPTION;
curr_keyword→value_name = "PHYSICAL_DESCRIPTION";
keyword_map["physical_description"] = curr_keyword;
token_map[PHYSICAL_DESCRIPTION] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "publisher";
curr_keyword→value = PUBLISHER;
curr_keyword→value_name = "PUBLISHER";
keyword_map["publisher"] = curr_keyword;
token_map[PUBLISHER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "record";
curr_keyword→value = RECORD;
curr_keyword→value_name = "RECORD";
keyword_map["record"] = curr_keyword;
token_map[RECORD] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "remote_access";
curr_keyword→value = REMOTE_ACCESS;
curr_keyword→value_name = "REMOTE_ACCESS";
keyword_map["remote_access"] = curr_keyword;
token_map[REMOTE_ACCESS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "rights";
curr_keyword→value = RIGHTS;
curr_keyword→value_name = "RIGHTS";
keyword_map["rights"] = curr_keyword;
token_map[RIGHTS] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "source";
curr_keyword→value = SOURCE;
curr_keyword→value_name = "SOURCE";
keyword_map["source"] = curr_keyword;
```

```
token_map[SOURCE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "subject";
curr_keyword→value = SUBJECT;
curr_keyword→value_name = "SUBJECT";
keyword_map["subject"] = curr_keyword;
token_map[SUBJECT] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "superordinate_entities";
curr_keyword→value = SUPERORDINATE_ENTITIES;
curr_keyword→value_name = "SUPERORDINATE_ENTITIES";
keyword_map["superordinate_entities"] = curr_keyword;
token_map[SUPERORDINATE_ENTITIES] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "title";
curr_keyword→value = TITLE;
curr_keyword→value_name = "TITLE";
keyword_map["title"] = curr_keyword;
token_map[TITLE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "type";
curr_keyword→value = TYPE;
curr_keyword→value_name = "TYPE";
keyword_map["type"] = curr_keyword;
token_map[TYPE] = curr_keyword→value_name;
```

282. Keywords for database table columns. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

283. Generic. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "id";
curr_keyword→value = ID;
curr_keyword→value_name = "ID";
keyword_map["id"] = curr_keyword;
token_map[ID] = curr_keyword→value_name;
```

284. Names. [2006.12.07.]

Log

[2006.12.07.] Added this section with code for `GIVEN_NAME`, `PREFIX`, and `SURNAME`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "given_name";
curr_keyword→value = GIVEN_NAME;
curr_keyword→value_name = "GIVEN_NAME";
keyword_map["given_name"] = curr_keyword;
token_map[GIVEN_NAME] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "prefix";
curr_keyword→value = PREFIX;
curr_keyword→value_name = "PREFIX";
keyword_map["prefix"] = curr_keyword;
token_map[PREFIX] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "surname";
curr_keyword→value = SURNAME;
curr_keyword→value_name = "SURNAME";
keyword_map["surname"] = curr_keyword;
token_map[SURNAME] = curr_keyword→value_name;
```

285. Records. [2006.12.07.]

Log

[2006.12.14.] Added this section.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "eln_original_entry";
curr_keyword→value = ELN_ORIGINAL_ENTRY;
curr_keyword→value_name = "ELN_ORIGINAL_ENTRY";
keyword_map["eln_original_entry"] = curr_keyword;
token_map[ELN_ORIGINAL_ENTRY] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "eln_most_recent_change";
curr_keyword→value = ELN_MOST_RECENT_CHANGE;
curr_keyword→value_name = "ELN_MOST_RECENT_CHANGE";
keyword_map["eln_most_recent_change"] = curr_keyword;
token_map[ELN_MOST_RECENT_CHANGE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "eln_status_change";
curr_keyword→value = ELN_STATUS_CHANGE;
curr_keyword→value_name = "ELN_STATUS_CHANGE";
keyword_map["eln_status_change"] = curr_keyword;
token_map[ELN_STATUS_CHANGE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "identification_number";
curr_keyword→value = IDENTIFICATION_NUMBER;
curr_keyword→value_name = "IDENTIFICATION_NUMBER";
keyword_map["identification_number"] = curr_keyword;
token_map[IDENTIFICATION_NUMBER] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "date_original_entry";
curr_keyword→value = DATE_ORIGINAL_ENTRY;
curr_keyword→value_name = "DATE_ORIGINAL_ENTRY";
keyword_map["date_original_entry"] = curr_keyword;
token_map[DATE_ORIGINAL_ENTRY] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "date_most_recent_change";
curr_keyword→value = DATE_MOST_RECENT_CHANGE;
curr_keyword→value_name = "DATE_MOST_RECENT_CHANGE";
keyword_map["date_most_recent_change"] = curr_keyword;
token_map[DATE_MOST_RECENT_CHANGE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "date_status_change";
curr_keyword→value = DATE_STATUS_CHANGE;
curr_keyword→value_name = "DATE_STATUS_CHANGE";
keyword_map["date_status_change"] = curr_keyword;
token_map[DATE_STATUS_CHANGE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "source_id";
curr_keyword→value = SOURCE_ID;
```

```
curr_keyword→value_name = "SOURCE_ID";
keyword_map["source_id"] = curr_keyword;
token_map[SOURCE_ID] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "year_appearance_begin";
curr_keyword→value = YEAR_APPEARANCE_BEGIN;
curr_keyword→value_name = "YEAR_APPEARANCE_BEGIN";
keyword_map["year_appearance_begin"] = curr_keyword;
token_map[YEAR_APPEARANCE_BEGIN] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "year_appearance_end";
curr_keyword→value = YEAR_APPEARANCE_END;
curr_keyword→value_name = "YEAR_APPEARANCE_END";
keyword_map["year_appearance_end"] = curr_keyword;
token_map[YEAR_APPEARANCE_END] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "year_appearance_rak_wb";
curr_keyword→value = YEAR_APPEARANCE_RAK_WB;
curr_keyword→value_name = "YEAR_APPEARANCE_RAK_WB";
keyword_map["year_appearance_rak_wb"] = curr_keyword;
token_map[YEAR_APPEARANCE_RAK_WB] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "year_appearance_original";
curr_keyword→value = YEAR_APPEARANCE_ORIGINAL;
curr_keyword→value_name = "YEAR_APPEARANCE_ORIGINAL";
keyword_map["year_appearance_original"] = curr_keyword;
token_map[YEAR_APPEARANCE_ORIGINAL] = curr_keyword→value_name;
```

286. Variables. [LDF Undated.]

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "VARIABLE";
curr_keyword→value = VARIABLE;
curr_keyword→value_name = "VARIABLE";
keyword_map["VARIABLE"] = curr_keyword;
token_map[VARIABLE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "VARIABLE_TEXT_SEGMENT";
curr_keyword→value = VARIABLE_TEXT_SEGMENT;
curr_keyword→value_name = "VARIABLE_TEXT_SEGMENT";
keyword_map["VARIABLE_TEXT_SEGMENT"] = curr_keyword;
token_map[VARIABLE_TEXT_SEGMENT] = curr_keyword→value_name;
```

287.

Log

[LDF 2006.11.16.] Added code for `STRING_TYPE`.

[LDF 2006.12.08.] Added code for `DATASOURCE_TYPE`.

[LDF 2006.12.15.] Added code for `DATETIME_TYPE`.

⟨ Define **Scan_Parse** functions 269 ⟩ +≡

```
curr_keyword = new Keyword_Type;
curr_keyword→name = "NULL_TYPE";
curr_keyword→value = NULL_TYPE;
curr_keyword→value_name = "NULL_TYPE";
keyword_map["NULL_TYPE"] = curr_keyword;
token_map[NULL_TYPE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "DATASOURCE_TYPE";
curr_keyword→value = DATASOURCE_TYPE;
curr_keyword→value_name = "DATASOURCE_TYPE";
keyword_map["DATASOURCE_TYPE"] = curr_keyword;
token_map[DATASOURCE_TYPE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "DATETIME_TYPE";
curr_keyword→value = DATETIME_TYPE;
curr_keyword→value_name = "DATETIME_TYPE";
keyword_map["DATETIME_TYPE"] = curr_keyword;
token_map[DATETIME_TYPE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "QUERY_TYPE";
curr_keyword→value = QUERY_TYPE;
curr_keyword→value_name = "QUERY_TYPE";
keyword_map["QUERY_TYPE"] = curr_keyword;
token_map[QUERY_TYPE] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "STRING_TYPE";
curr_keyword→value = STRING_TYPE;
curr_keyword→value_name = "STRING_TYPE";
keyword_map["STRING_TYPE"] = curr_keyword;
token_map[STRING_TYPE] = curr_keyword→value_name;
```

288. Commands. [LDF 2006.11.13.]
[LDF 2006.10.19.]

Log

[LDF 2006.11.13.] Added code for `CLEAR` and `SHOW`.

[LDF 2006.11.13.] Added code for `CLEAR` and `SHOW`.

[LDF 2006.11.13.] Added code for `MESSAGE`, `ERRMESSAGE`, and `PAUSE`.

[LDF 2006.11.16.] Added code for `TEX`, `SQL`, `OAI`, and `PICA`.

[LDF 2006.11.23.] Added code for `OUTPUT`.

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "clear";
  curr_keyword→value = CLEAR;
  curr_keyword→value_name = "CLEAR";
  keyword_map["clear"] = curr_keyword;
  token_map[CLEAR] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "errmessage";
  curr_keyword→value = ERRMESSAGE;
  curr_keyword→value_name = "ERRMESSAGE";
  keyword_map["errmessage"] = curr_keyword;
  token_map[ERRMESSAGE] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "message";
  curr_keyword→value = MESSAGE;
  curr_keyword→value_name = "MESSAGE";
  keyword_map["message"] = curr_keyword;
  token_map[MESSAGE] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "pause";
  curr_keyword→value = PAUSE;
  curr_keyword→value_name = "PAUSE";
  keyword_map["pause"] = curr_keyword;
  token_map[PAUSE] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "show";
  curr_keyword→value = SHOW;
  curr_keyword→value_name = "SHOW";
  keyword_map["show"] = curr_keyword;
  token_map[SHOW] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "tex";
  curr_keyword→value = TEX;
  curr_keyword→value_name = "TEX";
  keyword_map["tex"] = curr_keyword;
  token_map[TEX] = curr_keyword→value_name;
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "sql";
  curr_keyword→value = SQL;
```

```
curr_keyword→value_name = "SQL";
keyword_map["sql"] = curr_keyword;
token_map[SQL] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "oai";
curr_keyword→value = OAI;
curr_keyword→value_name = "OAI";
keyword_map["oai"] = curr_keyword;
token_map[OAI] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "pica";
curr_keyword→value = PICA;
curr_keyword→value_name = "PICA";
keyword_map["pica"] = curr_keyword;
token_map[PICA] = curr_keyword→value_name;
curr_keyword = new Keyword_Type;
curr_keyword→name = "output";
curr_keyword→value = OUTPUT;
curr_keyword→value_name = "OUTPUT";
keyword_map["output"] = curr_keyword;
token_map[OUTPUT] = curr_keyword→value_name;
```

289. Control. [LDF 2006.10.19.]

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  curr_keyword = new Keyword_Type;
  curr_keyword→name = "terminate";
  curr_keyword→value = TERMINATE;
  curr_keyword→value_name = "TERMINATE";
  keyword_map["terminate"] = curr_keyword;
  token_map[TERMINATE] = curr_keyword→value_name;
  return 0; }      /* End of Scan_Parse::initialize_maps definition. */
```

290. **Show** *keyword_map*. [LDF 2006.10.19.]

291.

```
⟨ Declare Scan_Parse functions 268 ⟩ +≡
  int show_keyword_map(Scanner_Type *scanner_node);
```

292.

```
⟨ Define Scan_Parse functions 269 ⟩ +≡
  int Scan_Parse::show_keyword_map(Scanner_Type *scanner_node)
  {
    stringstream temp_strm;
    temp_strm ≪ "Showing␣‘keyword_map’:" ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node) scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    for (map⟨string, Keyword_Type *⟩::const_iterator iter = keyword_map.begin();
        iter ≠ keyword_map.end(); ++iter) {
      temp_strm ≪ "name:␣␣" ≪ iter→second→name ≪ ",␣value:␣␣" ≪ token_map[iter→second→value] ≪
          "␣(" ≪ iter→second→value ≪ ")␣" ≪ ",␣constant␣name:␣␣" ≪ iter→second→value_name ≪
          endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node) scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
    }    /* for */
    return 0;
  }    /* End of Scan_Parse::show_keyword_map definition. */
```

293. Parser rule functions. [LDF 2006.10.31.]
These functions are used in the parser rules. They are defined in other files. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

294. Functions for variables. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

295. *variable_func.* [LDF 2006.11.02.]

Log

[2006.11.02.] Added this declaration.

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
void ∗*variable_func*(**void** ∗*v*, **char** ∗*name*);

296. Functions for declarations. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this declaration.

[LDF 2006.11.01.] Added the **char** ∗*name* argument.

[LDF 2006.11.02.] Changed the return value from **int** to **void** ∗.

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
Id_Node *declare_variable_func*(**void** ∗*v*, **const unsigned short** *type*, **char** ∗*name*);

297. Functions for assignments. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this section.

298. *query_assignment_func_0.* [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this declaration.

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
void ∗*query_assignment_func_0* (**void** ∗*v*, **void** ∗*object*, **unsigned int** *assignment_type*, **unsigned int** *arg_0*, **unsigned int** *arg_1*, **void** ∗*value*, **bool** *negate*);

299. *query_assignment_func_1.* [LDF 2006.12.19.]

Log

[LDF 2006.12.19.] Added this declaration.

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
int *query_assignment_func_1* (**Scanner_Node** *scanner_node*, **Id_Node** &*curr_id_node*, **void** ∗&*field_specifier*, **int** *assignment_operator*, **int** *negation_optional*, **int** *match_term_optional*, **void** ∗&*v*, **int** *type*);

300. *datetime_assignment_func_0.* [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this declaration.

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
int *datetime_assignment_func_0*(**void** *v, **Date_Time_Node** &*curr_date_time_node*, **int** *specifier*, **int** *op*, **void** *val*, **int** *type*);

301. *datetime_assignment_func_1.* [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this declaration.

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
int *datetime_assignment_func_1*(**void** *v, **Date_Time_Node** &*d*, **int** *op*, **void** *&*vec*);

302. Functions for Group Statements. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

303. Start local database query function. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function declaration.

[LDF 2006.11.01.] Changed the name of this function from **Scan_Parse** :: *start_local_query_func* to **Scan_Parse** :: *start_loca*

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
int *start_local_database_query_func*(**void** *);

304. End query function. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this function declaration.

[LDF 2006.11.01.] Changed the name of this function from **Scan_Parse** :: *end_local_query_func* to **Scan_Parse** :: *end_query_*

⟨ Declare **Scan_Parse** functions 268 ⟩ +≡
  int *end_query_func*(**void** ∗);

305. The scanning function *yylex*. [LDF 2006.10.17.]

Log

[LDF 2006.11.13.] Added code for handling `'+'`.

⟨ Declare *yylex* 305 ⟩ ≡
  int *yylex*(YYSTYPE ∗ *value*, **void** ∗*parameter*);

See also section 394.

This code is used in sections 362 and 676.

306.

⟨ Define *yylex* 306 ⟩ ≡

```
  int yylex(YYSTYPE * value, void *parameter){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      using namespace Scan_Parse;
      stringstream temp_strm; stack < unsigned short > state_stack;
      unsigned short state = NULL_STATE;
      Scanner_Type *scanner_node = static_cast⟨Scanner_Type *⟩(parameter);
```

See also sections 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, and 354.

This code is used in section 361.

307. "Fake" a token. If *scanner_node→token_stack* isn't empty, extract the token to be returned and its semantic value from the **Token_Type** object at the top of the stack, pop it from the stack, and return immediately, without reading anything from the input stream. This will happen repeatedly, until *scanner_node→token_stack* is empty. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  if (scanner_node→token_stack.size() > 0) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "In␣‘yylex’:␣␣‘scanner_node->token_stack.size()␣==␣" ≪
        scanner_node→token_stack.size() ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Token_Type curr_token = scanner_node→token_stack.top();
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "‘curr_token.type’␣==␣" ≪ token_map[curr_token.type] ≪ "␣(" ≪ curr_token.type ≪
        ")." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    if (curr_token.type ≡ STRING) strcpy(value→string_value, curr_token.value.string_value);
    else if (curr_token.type ≡ INTEGER) value→int_value = curr_token.value.int_value;
    else if (curr_token.type ≡ FLOAT) value→float_value = curr_token.value.float_value;
    else {
      value→pointer_value = curr_token.value.pointer_value;
      curr_token.value.pointer_value = 0;
    }
    scanner_node→token_stack.pop();
    return curr_token.type;
  }    /* if (scanner_node→token_stack.size() > 0) */
  else {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "In␣‘yylex’:␣␣‘scanner_node->token_stack.size()␣==␣0." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
  }
```

308. Open input file. [LDF 2006.10.17.]

```
⟨ Define yylex 306 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Entering␣‘yylex’." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
#if 0    /* 1 */
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "‘scanner_node->in_filename’␣==␣" ≪ scanner_node→in_filename ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
#endif
```

309. Main loop. [LDF 2006.10.17.]

Log

[LDF 2006.11.01.] Changed **string** *curr_keyword* to *curr_id*.

[LDF 2006.11.13.] Added *next_char*.

```
⟨ Define yylex 306 ⟩ +≡
  char curr_char = 0;
  char next_char = 0;
  string curr_string = "";
  string curr_id = "";
  int curr_value = 0;
  string curr_integer_str = "";
  string curr_float_str = ""; while (curr_char ≠ EOF) { curr_char = scanner_node→in_strm.get( );
#ifdef DEBUG_OUTPUT
  temp_strm ≪ curr_char;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

310. Comments. `'#'`. Discard characters until end of line. `#` can occur in strings, however. [LDF 2006.10.17.] ∎

Log

[LDF 2006.10.31.] Changed comment character from `%` to `#`.

```
⟨ Define yylex 306 ⟩ +≡
  if (curr_char ≡ '#' ∧ (state ≡ NULL_STATE ∨ state ≡ COLLECTING_ID ∨ state ≡
      COLLECTING_INTEGER ∨ state ≡ COLLECTING_FLOAT)) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Discarding␣comment.␣␣***" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    while (¬(curr_char ≡ '\n' ∨ curr_char ≡ EOF)) {
      curr_char = scanner_node→in_strm.get( );
      if (curr_char ≡ EOF) goto FINISH;
    }    /* Inner while */
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Finished␣discarding␣comment.␣␣***" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
```

```
#endif
  }     /* if (curr_char ≡ '#') (Discarding comment) */
```

311. Double-quote symbol. `'"'`. [LDF 2006.10.17.]

```
⟨ Define yylex 306 ⟩ +≡
  else if (curr_char ≡ '"') {
```

312. *state* ≡ `COLLECTING_STRING` [LDF 2006.10.17.]

```
⟨ Define yylex 306 ⟩ +≡
  if (state ≡ COLLECTING_STRING) {
    state = state_stack.top( );
    state_stack.pop( );
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Finished␣collecting␣string." ≪ endl ≪ "'curr_string'␣==␣" ≪
        curr_string.c_str( ) ≪ endl ≪ "Exiting␣'yylex'␣successfully␣with␣return␣value␣" ≪
        keyword_map["STRING"]→value_name ≪ "␣(" ≪ keyword_map["STRING"]→value ≪ ")" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    strcpy(value→string_value, curr_string.c_str( ));
    curr_string = "";
    return STRING;
  }     /* if (state ≡ COLLECTING_STRING) */
```

313. *state* ≡ NULL_STATE. Start collecting string. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else
  if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Starting␣to␣collect␣string.␣␣***" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    state_stack.push(state);
    state = COLLECTING_STRING;
    curr_string = "";
  }
  else if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣keyword.␣␣" ≪ "‘curr_id’␣==␣" ≪ curr_id ≪
      endl ≪ "***" ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

314. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Define yylex 306 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }    /* else if (state ≡ COLLECTING_ID) */
```

315. *state* ≡ COLLECTING_INTEGER. [LDF 2006.11.02.]

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣integer.␣␣" ≪ "‘curr_integer_str’␣==␣" ≪
          curr_integer_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      value→int_value = atoi(curr_integer_str.c_str( ));
      scanner_node→in_strm.unget( );
      return INTEGER;
    }    /* else if (state ≡ COLLECTING_INTEGER) */
```

316. *state* ≡ COLLECTING_FLOAT. [LDF 2006.11.02.]

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "‘curr_float_str’␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str());
      scanner_node→in_strm.unget();
      return FLOAT;
    }    /* else if (state ≡ COLLECTING_FLOAT) */
```

317. Any other state (shouldn't occur.) [LDF 2006.11.02.]

```
⟨ Define yylex 306 ⟩ +≡
  else {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Starting␣to␣collect␣string.␣␣***" ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    state_stack.push(state);
    state = COLLECTING_STRING;
    curr_string = "";
  }
  }    /* else if (curr_char ≡ '"') */
```

318. Alphabetical characters and underline character. [LDF 2006.10.18.]

Log

[LDF 2006.12.08.] Now treating underline character like an alphabetical character.

[LDF 2006.12.11.] Added code for common accented characters.

```
⟨ Define yylex 306 ⟩ +≡
  else if (isalpha(curr_char) ∨ curr_char ≡ '_' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡
      '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '' ∨ curr_char ≡ '') {
```

319. *state* ≡ NULL_STATE. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Read␣an␣alphabetical␣character␣" ≪
        "or␣the␣underline␣character␣in␣'NULL_STATE':" ≪ endl ≪
        "Entering␣state␣'COLLECTING_ID'.␣***" ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    state = COLLECTING_ID;
    curr_id = "";
    curr_id += curr_char;
  }    /* if (state ≡ NULL_STATE) */
```

320. *state* ≡ COLLECTING_ID. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (state ≡ COLLECTING_ID) {
      curr_id += curr_char;
    }     /* if (state ≡ COLLECTING_ID) */
    else if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣integer.␣␣" ≪ "‘curr_integer_str’␣==␣" ≪
          curr_integer_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      value→int_value = atoi(curr_integer_str.c_str( ));
      scanner_node→in_strm.unget( );
      return INTEGER;
    }     /* else if (state ≡ COLLECTING_INTEGER) */
    else if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "‘curr_float_str’␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str( ));
      scanner_node→in_strm.unget( );
      return FLOAT;
    }     /* else if (state ≡ COLLECTING_FLOAT) */
```

321. *state* ≡ COLLECTING_STRING. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (state ≡ COLLECTING_STRING) {
      curr_string += curr_char;
    }     /* if (state ≡ COLLECTING_STRING) */
  }     /* else if (isalpha(curr_char) ∨ curr_char ≡ '_') */
```

322. Digits. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else if (isdigit(curr_char)) {
  if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "***␣Read␣a␣digit␣in␣'NULL_STATE'.␣␣" ≪
        "Entering␣state␣'COLLECTING_INTEGER'." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    curr_integer_str += curr_char;
    state = COLLECTING_INTEGER;
    continue;
  }     /* if (state ≡ NULL_STATE) */
```

323. *state* ≡ COLLECTING_ID. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣keyword.␣␣" ≪ "'curr_id'␣==␣" ≪ curr_id ≪
      endl ≪ "***" ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
#endif
```

324. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Define yylex 306 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }    /* else if (state ≡ COLLECTING_ID) */
  else
    if (state ≡ COLLECTING_INTEGER) {
      curr_integer_str += curr_char;
    }
    else if (state ≡ COLLECTING_FLOAT) {
      curr_float_str += curr_char;
    }
    else if (state ≡ COLLECTING_STRING) {
      curr_string += curr_char;
    }
  }    /* else if (isdigit(curr_char)) */
```

325. Escaped characters. '\. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else if (curr_char ≡ '\\') {
```

326. *state* ≡ COLLECTING_ID. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣keyword.␣␣" ≪ "`curr_id'␣==␣" ≪ curr_id ≪
      endl ≪ "***" ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node¬log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

327. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Define yylex 306 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }    /* if (state ≡ COLLECTING_ID) */
  else
    if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣integer.␣␣" ≪ "‘curr_integer_str’␣==␣" ≪
          curr_integer_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→int_value = atoi(curr_integer_str.c_str());
      scanner_node→in_strm.unget();
      return INTEGER;
    }    /* else if (state ≡ COLLECTING_INTEGER) */
    else if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "‘curr_float_str’␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str());
      scanner_node→in_strm.unget();
      return FLOAT;
    }    /* else if (state ≡ COLLECTING_FLOAT) */
```

328. *state* ≡ COLLECTING_STRING. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  if (state ≡ COLLECTING_STRING) {
    curr_char = scanner_node→in_strm.get();
    curr_string += curr_char;
    continue;
  }    /* if (state ≡ COLLECTING_STRING) */
```

329.

```
⟨ Define yylex 306 ⟩ +≡
  }    /* else if (curr_char ≡ '\\') */
```

330. Punctuation. [LDF 2006.10.31.]

Log

[LDF 2006.10.31.] Added this section.

331. `'='` (Equals sign). [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else if (curr_char ≡ '=') {
  if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "In␣‘yylex’:␣␣" ≪ "Got␣‘=’.␣␣Returning␣‘ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    return ASSIGN;
  }
  else if (state ≡ COLLECTING_STRING) {
    curr_string += curr_char;
  }
  else if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣keyword.␣␣" ≪ "‘curr_id’␣==␣" ≪ curr_id ≪
      endl ≪ "***" ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
#endif
```

332. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Define yylex 306 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }    /* else if (state ≡ COLLECTING_ID) */
  else
    if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣integer.␣␣" ≪ "‘curr_integer_str’␣==␣" ≪
          curr_integer_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→int_value = atoi(curr_integer_str.c_str());
      scanner_node→in_strm.unget();
      return INTEGER;
    }    /* else if (state ≡ COLLECTING_INTEGER) */
    else if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "‘curr_float_str’␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str());
      scanner_node→in_strm.unget();
      return FLOAT;
    }    /* else if (state ≡ COLLECTING_FLOAT) */
  }    /* else if (curr_char ≡ '=') */
```

333. '+' (Plus sign). [LDF 2006.11.13.]

Log

[LDF 2006.11.13.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '+') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣`yylex':␣␣" ≪ "Got␣`+'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        next_char = scanner_node→in_strm.peek();
        if (next_char ≡ '=') {
          scanner_node→in_strm.get();
          return PLUS_ASSIGN;
        }
        else return PLUS;
      }    /* if (state ≡ NULL_STATE) */
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '+') */
```

334. `'&'` (Ampersand). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '&') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣‘yylex’:␣␣" ≪ "Got␣‘&’." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        next_char = scanner_node→in_strm.peek();
        if (next_char ≡ '=') {
          scanner_node→in_strm.get();
          return AND_ASSIGN;
        }
        else if (next_char ≡ '!') {
          scanner_node→in_strm.get();
          return AND_NOT;
        }
        else return AND;
      }    /* if (state ≡ NULL_STATE) */
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '&') */
```

335. '|' (Vertical line). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '|') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣`yylex':␣␣" ≪ "Got␣`|'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        next_char = scanner_node→in_strm.peek();
        if (next_char ≡ '=') {
          scanner_node→in_strm.get();
          return OR_ASSIGN;
        }
        else if (next_char ≡ '!') {
          scanner_node→in_strm.get();
          return OR_NOT;
        }
        else return OR;
      }    /* if (state ≡ NULL_STATE) */
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '|') */
```

336. '^' (Circumflex accent). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '^') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣`yylex':␣␣" ≪ "Got␣`^'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        next_char = scanner_node→in_strm.peek();
        if (next_char ≡ '=') {
          scanner_node→in_strm.get();
          return XOR_ASSIGN;
        }
        else if (next_char ≡ '!') {
          scanner_node→in_strm.get();
          return XOR_NOT;
        }
        else return XOR;
      }    /* if (state ≡ NULL_STATE) */
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '^') */
```

337. `'!'` (Exclamation mark). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '!') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣'!'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        next_char = scanner_node→in_strm.peek();
        if (next_char ≡ '=') {
          scanner_node→in_strm.get();
          return NOT_ASSIGN;
        }
        else return NOT;
      }    /* if (state ≡ NULL_STATE) */
      else goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '!') */
```

338. `':'` (Colon). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ ':') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣':'.␣␣Returning␣'COLON'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return COLON;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ ':') */
```

339. ';' (Semi-colon). [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ ';') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣';'.␣␣Returning␣'SEMI_COLON'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return SEMI_COLON;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ ';') */
```

340. ',' (Comma). [LDF 2006.12.06.]

Log

[LDF 2006.12.06.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ ',') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex',␣␣" ≪ "Got␣',''.␣␣Returning␣'COMMA'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return COMMA;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ ',') */
```

341. '%' (Percent). [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '%') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣`yylex',␣␣" ≪ "Got␣`%'.␣␣Returning␣`PERCENT'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return PERCENT;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '%') */
```

342. '-' (Hyphen). [LDF 2006.12.07.]

Log

[LDF 2006.12.07.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '-') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣`yylex',␣␣" ≪ "Got␣`,'.␣␣Returning␣`HYPHEN'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return HYPHEN;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '-') */
```

343. '.' (Period). [LDF 2006.11.02.]
Please note: ⟨ Common code for punctuation 355 ⟩ cannot be used for period! It must be handled in a special way, because periods are used to distinguish integers and floats. [LDF 2006.11.14.]

Log

[LDF 2006.11.02.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else if (curr_char ≡ '.') {
  if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣'.'.␣␣Returning␣'PERIOD'." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    return PERIOD;
  }
  else if (state ≡ COLLECTING_STRING) {
    curr_string += curr_char;
  }
  else if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣id.␣␣" ≪ "'curr_id'␣==␣" ≪ curr_id ≪ endl ≪
      "***" ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
#endif
```

344. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Define yylex 306 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }    /* else if (state ≡ COLLECTING_ID) */
  else
    if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "***␣Read␣'.'␣while␣collecting␣integer.␣␣" ≪
          "Changing␣state␣to␣'COLLECTING_FLOAT'." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      curr_float_str = curr_integer_str + curr_char;
      curr_integer_str = "";
      state = COLLECTING_FLOAT;
      continue;
    }    /* else if (state ≡ COLLECTING_INTEGER) */
    else if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "'curr_float_str'␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str());
      scanner_node→in_strm.unget();
      return FLOAT;
    }    /* else if (state ≡ COLLECTING_FLOAT) */
  }    /* else if (curr_char ≡ '.') */
```

345. `'@'` (At-symbol). [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '@') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣‘yylex’@␣␣" ≪ "Got␣‘@’.␣␣Returning␣‘AT_SYMBOL’." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return AT_SYMBOL;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '@') */
```

346. `'('` (Open parenthesis). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '(') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣‘yylex’:␣␣" ≪ "Got␣‘(’.␣␣Returning␣‘OPEN_PARENTHESIS’." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return OPEN_PARENTHESIS;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '(') */
```

347. `')'` (Close parenthesis). [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ ')') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣')'.␣␣Returning␣'CLOSE_PARENTHESIS'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return CLOSE_PARENTHESIS;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ ')') */
```

348. `'['` (Open bracket). [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ '[') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣'['.␣␣Returning␣'OPEN_BRACKET'." ≪ endl;
        cerr_mutex.lock();
        cerr ≪ temp_strm.str();
        cerr_mutex.unlock();
        scanner_node→log_strm ≪ temp_strm.str();
        temp_strm.str("");
#endif
        return OPEN_BRACKET;
      }
      goto COMMON_PUNCTUATION;
    }    /* else if (curr_char ≡ '[') */
```

349. `']'` (Close bracket). [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this section.

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (curr_char ≡ ']') {
      if (state ≡ NULL_STATE) {
#ifdef DEBUG_OUTPUT
        temp_strm ≪ "In␣'yylex':␣␣" ≪ "Got␣']'.␣␣Returning␣'CLOSE_BRACKET'." ≪ endl;
        cerr_mutex.lock( );
        cerr ≪ temp_strm.str( );
        cerr_mutex.unlock( );
        scanner_node→log_strm ≪ temp_strm.str( );
        temp_strm.str("");
#endif
        return CLOSE_BRACKET;
      }
      goto COMMON_PUNCTUATION;
    }     /* else if (curr_char ≡ ']') */
```

350. Space characters. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else if (isspace(curr_char)) {
```

351. *state* ≡ NULL_STATE. Skip whitespace. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  if (state ≡ NULL_STATE) {
    continue;
  }     /* if (state ≡ NULL_STATE) */
  else if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣keyword.␣␣" ≪ "'curr_id'␣==␣" ≪ curr_id ≪
      endl ≪ "***" ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

352. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Define yylex 306 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }     /* else if (state ≡ COLLECTING_ID) */
```

353. *state* ≡ COLLECTING_STRING. [LDF 2006.10.18.]

```
⟨ Define yylex 306 ⟩ +≡
  else
    if (state ≡ COLLECTING_STRING) {
      curr_string += curr_char;
    }
    else if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣integer.␣␣" ≪ "‘curr_integer_str’␣==␣" ≪
          curr_integer_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      value→int_value = atoi(curr_integer_str.c_str( ));
      scanner_node→in_strm.unget( );
      return INTEGER;
    }     /* else if (state ≡ COLLECTING_INTEGER) */
    else if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "‘curr_float_str’␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str( ));
      scanner_node→in_strm.unget( );
      return FLOAT;
    }     /* else if (state ≡ COLLECTING_FLOAT) */
  }     /* else if (isspace(curr_char)) */
MAIN_LOOP_END: ; }      /* while (End of main loop) */
FINISH:
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "End␣of␣main␣loop." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

354. Close input file and exit successfully with return value 0. [LDF 2006.10.17.]

```
⟨ Define yylex 306 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣‘yylex’." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
#undef DEBUG_OUTPUT
  return 0;
COMMON_PUNCTUATION: ⟨ Common code for punctuation 355 ⟩
  }    /* End of yylex definition. */
```

355. Common code for punctuation. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this declaration.

```
⟨ Common code for punctuation 355 ⟩ ≡
  if (state ≡ COLLECTING_STRING) {
    curr_string += curr_char;
    goto MAIN_LOOP_END;
  }
  else if (state ≡ COLLECTING_ID) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "***␣Finished␣collecting␣keyword.␣␣" ≪ "‘curr_id’␣==␣" ≪ curr_id ≪
      endl ≪ "***" ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
```

See also section 356.

This code is cited in section 343.

This code is used in section 354.

356. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.10.19.]

```
⟨ Common code for punctuation 355 ⟩ +≡
  ⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩
  }    /* else if (state ≡ COLLECTING_ID) */
  else
    if (state ≡ COLLECTING_INTEGER) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣integer.␣␣" ≪ "'curr_integer_str'␣==␣" ≪
          curr_integer_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→int_value = atoi(curr_integer_str.c_str());
      scanner_node→in_strm.unget();
      return INTEGER;
    }    /* else if (state ≡ COLLECTING_INTEGER) */
    else if (state ≡ COLLECTING_FLOAT) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ endl ≪ "***␣Finished␣collecting␣float.␣␣" ≪ "'curr_float_str'␣==␣" ≪
          curr_float_str ≪ "␣␣***" ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
      value→float_value = atof(curr_float_str.c_str());
      scanner_node→in_strm.unget();
      return FLOAT;
    }    /* else if (state ≡ COLLECTING_FLOAT) */
```

357. Look up *curr_id*. Look up *curr_id* in *keyword_map* and possibly *id_map*. [LDF 2006.11.01.]

A consequence of looking up *curr_id* in *keyword_map* first, and then looking it up in *id_map*, is that it's not possible for variables declared by users to shadow keywords. I could change this, if it were desirable. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this section. It's included in *yylex*.

```
⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩ ≡
  map⟨string, Keyword_Type *⟩::iterator keyword_iter = keyword_map.find(curr_id); if
      (keyword_iter ≡ keyword_map.end()) {
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "In␣'yylex':␣␣" ≪ "'" ≪ curr_id ≪ "'␣not␣found␣in␣'keyword_map'." ≪
      endl ≪ "Will␣search␣in␣'scanner_node->id_map'." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
```

```
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  map⟨string, Id_Type *⟩::iterator id_iter = scanner_node→id_map.find(curr_id);
```

See also sections 358 and 359.

This code is used in sections 314, 324, 327, 332, 344, 352, and 356.

358. *curr_id* not found in *scanner_node→id_map*. [LDF 2006.11.01.]

```
⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩ +≡
  if (id_iter ≡ scanner_node→id_map.end( )) {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "In␣‘yylex’:␣␣‘" ≪ curr_id ≪ "’␣not␣found␣in␣" ≪
        "‘scanner_node->id_map’.␣␣Returning␣‘VARIABLE_TEXT_SEGMENT’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str( );
#endif
    strcpy(value→string_value, curr_id.c_str( ));
    curr_id = "";
    scanner_node→in_strm.unget( );
    return VARIABLE_TEXT_SEGMENT;
  }    /* if (id_iter ≡ scanner_node→id_map.end( )) (curr_id not found in scanner_node→id_map) */
```

359. *curr_id* found in *scanner_node→id_map*. [LDF 2006.11.01.]

```
⟨ Look up curr_id in keyword_map and possibly id_map 357 ⟩ +≡
  else      /* id_iter ≠ scanner_node→id_map.end( ) */
  {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "In␣‘yylex’:␣␣‘" ≪ curr_id ≪ "’␣found␣in␣" ≪ "‘scanner_node->id_map’." ≪
        endl ≪ "Pushing␣‘Token_Type’␣object␣onto␣‘scanner_node->token_stack’␣" ≪
        "and␣returning␣‘VARIABLE’␣(" ≪ VARIABLE ≪ ")." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str( );
#endif
    Token_Type curr_token;
    curr_token.value.pointer_value = scanner_node→id_map[curr_id];
    curr_token.type = scanner_node→id_map[curr_id]→type;
    scanner_node→token_stack.push(curr_token);
    scanner_node→in_strm.unget( );
    curr_id = "";
    value→int_value = 0;
    return VARIABLE;
  }     /* else (id_iter ≠ scanner_node→id_map.end( )) */
  }     /* if (keyword_iter ≡ keyword_map.end( )) (curr_id not found in keyword_map) */
  else      /* keyword_iter ≠ keyword_map.end( ) (Keyword found) */
  {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Keyword␣‘" ≪ curr_id ≪ "’␣found." ≪ endl ≪
        "Exiting␣function␣successfully␣with␣return␣value␣" ≪ keyword_iter→second→value_name ≪
        "␣(" ≪ keyword_iter→second→value ≪ ")" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    scanner_node→in_strm.unget( );
    return keyword_iter→second→value;
  }     /* else (keyword_iter ≠ keyword_map.end( )) (Keyword found) */
```

360. Putting the scanner together.

361. This is what's compiled.

```
⟨ Include files 10 ⟩
⟨ scanner.web 249 ⟩
using namespace std;
⟨ Forward declarations 17 ⟩
⟨ Declare namespace Scan_Parse 255 ⟩
⟨ Define Scan_Parse functions 269 ⟩
⟨ Define yylex 306 ⟩
```

362. This is what's written to `scanner.h`.

⟨ `scanner.hh` 362 ⟩ ≡
```
⟨ Preprocessor macro calls 23 ⟩
using namespace std;
⟨ Forward declarations 17 ⟩
⟨ extern declaration of namespace Scan_Parse 256 ⟩
⟨ Declare yylex 305 ⟩
```

363. Dublin Core Parser (`dbcrprsr.w`). [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this file.

⟨ `dbcrprsr.w` 363 ⟩ ≡
```
static char dbcrprsr_id_string[] = "$Id: dbcrprsr.w,v 1.6 2007/02/13 20:08:02 lfinsto1 Exp $";
```
This code is cited in sections 6 and 8.

This code is used in section 379.

364. Include files. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Include files 10 ⟩ +≡
```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <ios>
#include <iomanip>
#include <iostream>
#include <iosfwd>
#include <fstream>
#include <sstream>
#include <new>
#include <ctype.h>
#include <string.h>
#include "dbcrprsr.hxx"
#include "dbcrscan.hxx"
```

365. Preprocessor macro definitions. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Preprocessor macro definitions 77 ⟩ +≡
```
#define YYPARSE_PARAM parameter
#define YYLEX_PARAM parameter
```

366. Declare xxerror. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Declare Dublin Core parser functions 366 ⟩ ≡
```
void xxerror(const char *s);
```
This code is used in section 379.

367. Bison options. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Bison options 367 ⟩ ≡
```
%debug
%defines
%locations
%name-prefix="xx"
%output="dbcrprsr.cxx"
%pure_parser
%verbose
```
This code is used in section 379.

368. union declaration for `YYSTYPE`. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ **union** declaration for `YYSTYPE` 368 ⟩ ≡
```
%union␣{
    int int_value;
    float float_value;
    char string_value[2048];
    void *pointer_value; }
```
See also section 396.

This code is used in sections 379 and 676.

369. Token and type declarations. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

370. Record. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Token and type declarations 370 ⟩ ≡

```
%token<int_value> DATESTAMP_START_TAG
%token<int_value> DATESTAMP_END_TAG
%token<int_value> HEADER_START_TAG
%token<int_value> HEADER_END_TAG
%token<int_value> IDENTIFIER_START_TAG
%token<int_value> IDENTIFIER_END_TAG
%token<int_value> METADATA_START_TAG
%token<int_value> METADATA_END_TAG
%token<int_value> OAI_DC_DC_START_TAG
%token<int_value> OAI_DC_DC_END_TAG
%token<int_value> RECORD_START_TAG
%token<int_value> RECORD_END_TAG
```

See also sections 371, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 415, 416, 417, and 418.

This code is used in sections 379 and 676.

371. Dublin Core Namespace. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Token and type declarations 370 ⟩ +≡

```
%token<int_value> DC_CREATOR_START_TAG
%token<int_value> DC_CREATOR_END_TAG
%token<int_value> DC_CONTRIBUTOR_START_TAG
%token<int_value> DC_CONTRIBUTOR_END_TAG
%token<int_value> DC_DESCRIPTION_START_TAG
%token<int_value> DC_DESCRIPTION_END_TAG
%token<int_value> DC_DATE_START_TAG
%token<int_value> DC_DATE_END_TAG
%token<int_value> DC_IDENTIFIER_START_TAG
%token<int_value> DC_IDENTIFIER_END_TAG
%token<int_value> DC_LANGUAGE_START_TAG
%token<int_value> DC_LANGUAGE_END_TAG
%token<int_value> DC_RIGHTS_START_TAG
%token<int_value> DC_RIGHTS_END_TAG
%token<int_value> DC_SUBJECT_START_TAG
%token<int_value> DC_SUBJECT_END_TAG
%token<int_value> DC_TYPE_START_TAG
%token<int_value> DC_TYPE_END_TAG
%token<int_value> END_OAI
```

372. Dublin Core parser rules. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

373. ⟨program⟩ **(Start symbol).** [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

⟨ Dublin Core parser rules 373 ⟩ ≡

```
program:␣statement_list␣END_OAI
{
  cerr ≪ "'program:␣statement_list␣END_OAI'" ≪ endl;
  return 0;
}
;
```

See also sections 375, 376, and 378.

This code is used in section 379.

374. ⟨statement list⟩. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

375. ⟨statement list⟩ ⟶ `Empty`. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

⟨ Dublin Core parser rules 373 ⟩ +≡

```
statement_list:␣/*␣Empty␣␣*/
{
  cerr ≪ "'statement_list␣EMPTY'" ≪ endl;
}
;
```

376. ⟨statement list⟩ ⟶ ⟨statement list⟩ ⟨statement⟩. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

⟨ Dublin Core parser rules 373 ⟩ +≡

```
statement_list:␣statement_list␣statement
{
  cerr ≪ "‘statement_list:␣statement_list␣statement’" ≪ endl;
}
;
```

377. ⟨statement⟩.

Log

[LDF 2007.02.13.] Added this section.

378. ⟨statement list⟩ ⟶ . . .. ⟨statement list⟩ ⟶ RECORD_START_TAG RECORD_END_TAG. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

⟨ Dublin Core parser rules 373 ⟩ +≡

```
statement:␣RECORD_START_TAG␣RECORD_END_TAG
{
  cerr ≪ "‘statement:␣RECORD_START_TAG␣RECORD_END_TAG’" ≪ endl;
}
;
```

379. Putting the Dublin Core parser together. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ dbcrprsr.yxx 379 ⟩ ≡

```
%{
⟨ Include files 10 ⟩
using namespace std;
⟨ Preprocessor macro definitions 77 ⟩
⟨ Declare Dublin Core parser functions 366 ⟩
⟨ dbcrprsr.w 363 ⟩
%}
⟨ union declaration for YYSTYPE 368 ⟩
⟨ Bison options 367 ⟩
⟨ Token and type declarations 370 ⟩
%%
⟨ Dublin Core parser rules 373 ⟩
```

380. Empty C section. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

```
/* Empty */
```

381. Dublin Core (XML) Scanner.

⟨ dbcrscan.web 381 ⟩ ≡
```
static char id_string[] = "$Id: dbcrscan.web,v 1.12 2007/02/13 20:36:55 lfinsto1 Exp $";
```
This code is cited in sections 6 and 8.
This code is used in section 390.

382. Include files. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Include files 10 ⟩ +≡
```
#include "nonwin.h"
#include "dbcrprsr.hxx"
```

383. Flex Options. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Flex options 383 ⟩ ≡
```
%option bison-bridge
%option bison-locations
%option debug
%option case-insensitive
%option header-file="dbcrscan.hxx"
%option noyywrap
%option prefix="xx"
%option reentrant
%option stack
```
This code is used in section 390.

384. Start conditions for the Dublin Core scanner. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ Start conditions for the Dublin Core scanner 384 ⟩ ≡
```
%s RECORD_SC
```

This code is used in section 390.

385. Dublin Core scanner rules. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

386. ⟨record⟩ start tag. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

```
⟨ Dublin Core scanner rules 386 ⟩ ≡
  "<record>"␣{␣
#if 1     /* 0 */
#define DEBUG_COMPILE  1
#else
#undef DEBUG_COMPILE
#endif
#ifdef DEBUG_COMPILE
  cerr ≪ "In␣`xxlex':␣␣" ≪ yytext ≪ endl ≪ "Returning␣`RECORD_START_TAG'." ≪ endl;
#endif
  yylval→int_value = RECORD_START_TAG;
  return RECORD_START_TAG; }
```

See also sections 387, 388, and 389.

This code is used in section 390.

387. ⟨/record⟩ end tag. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

```
⟨ Dublin Core scanner rules 386 ⟩ +≡
  "</record>"␣{␣
#if 1     /* 0 */
#define DEBUG_COMPILE  1
#else
#undef DEBUG_COMPILE
#endif
#ifdef DEBUG_COMPILE
  cerr ≪ "In␣`xxlex':␣␣" ≪ yytext ≪ endl ≪ "Returning␣`RECORD_END_TAG'." ≪ endl;
#endif
  yylval→int_value = RECORD_END_TAG;
  return RECORD_END_TAG; }
```

388. End-of-file (`EOF`). [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

⟨ Dublin Core scanner rules 386 ⟩ +≡

```
<<EOF>>␣{␣
#if 1     /* 0 */
#define DEBUG_COMPILE  1
#else
#undef DEBUG_COMPILE
#endif
#ifdef DEBUG_COMPILE
  cerr ≪ "In␣‘xxlex’:␣␣EOF" ≪ endl ≪ "Returning␣‘END_OAI’." ≪ endl;
#endif     /* DEBUG_COMPILE */
  yylval→int_value = END_OAI;
  return END_OAI; }
```

389. Whitespace. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this rule.

⟨ Dublin Core scanner rules 386 ⟩ +≡

```
  [[:blank:]\n]*␣{␣
#if 1     /* 0 */
#define DEBUG_COMPILE  1
#else
#undef DEBUG_COMPILE
#endif
#ifdef DEBUG_COMPILE
    /* START HERE!! Change Mutex_Type so that it uses the pthreads type. LDF 2007.02.13. */
  cerr_mutex.lock( );
  cerr ≪ "In␣‘xxlex’:␣␣Whitespace" ≪ endl ≪ "Skipping." ≪ endl;
  cerr_mutex.unlock( );
#endif     /* DEBUG_COMPILE */
  }
```

390. Putting the Dublin Core scanner together. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

⟨ dbcrscan.lxx 390 ⟩ ≡

```
     /* Definitions */
  ⟨ Flex options 383 ⟩
  ⟨ Start conditions for the Dublin Core scanner 384 ⟩
  %{
  ⟨ Include files 10 ⟩
  using namespace std;
  ⟨ dbcrscan.web 381 ⟩
  %}
  %%
  ⟨ Dublin Core scanner rules 386 ⟩
```

391. Empty C section. [LDF 2007.02.13.]

Log

[LDF 2007.02.13.] Added this section.

```
/* Empty */
```

392. Parser (`parser.w`). [LDF 2006.10.20.]

Log

[LDF 2006.10.20.] Added this file.

[LDF 2006.10.31.] Renamed this file. Old name: `parser.web`. New name: `parser.w`.

⟨ `parser.w` 392 ⟩ ≡
```
static char parser_id_string[] = "$Id: parser.w,v 1.7 2007/02/13 19:22:07 lfinsto1 Exp $";
```
This code is cited in sections 6, 7, 8, and 677.
This code is used in section 675.

393. Include files. [LDF 2006.10.20.]

⟨ Include files 10 ⟩ +≡
```
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "scnrtype.h"
#include "scanner.h"
#include "querytyp.h"
#include "dtsrctyp.h"
#include "idtype.h"
```

394. Declare *yylex*. [LDF 2006.10.20.]

⟨ Declare *yylex* 305 ⟩ +≡
```
int yylex(YYSTYPE * lvalp, void *parameter);
```

395. Declare *yyerror*. [LDF 2006.10.20.]

⟨ Declare *yyerror* 395 ⟩ ≡
```
void yyerror(const char *s);
```
This code is used in section 676.

396. union declaration for `YYSTYPE`.

⟨ **union** declaration for `YYSTYPE` 368 ⟩ +≡
```
%union {
    int int_value;
    float float_value;
    char string_value[2048];
```

void ∗*pointer_value*; }

397. Bison declarations. [LDF 2006.10.20.]

⟨ Bison declarations 397 ⟩ ≡

```
%pure_parser
%debug
```

This code is used in section 676.

398. Token and Type Declarations. [LDF 2006.10.20.]

399. Punctuation. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

[LDF 2006.12.07.] Added token declaration for HYPHEN.

[LDF 2006.12.08.] Added token declaration for UNDERLINE.

[LDF 2006.12.12.] Added token declaration for AT_SYMBOL.

[LDF 2006.12.14.] Added token declaration for PERCENT.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣AT_SYMBOL
%token␣<int_value>␣COMMA
%token␣<int_value>␣COLON
%token␣<int_value>␣HYPHEN
%token␣<int_value>␣UNDERLINE
%token␣<int_value>␣PERCENT
%token␣<int_value>␣PERIOD
%token␣<int_value>␣SEMI_COLON
%token␣<int_value>␣OPEN_PARENTHESIS
%token␣<int_value>␣CLOSE_PARENTHESIS
%token␣<int_value>␣OPEN_BRACKET
%token␣<int_value>␣CLOSE_BRACKET
```

400. Assignments. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section with the declarations of `ASSIGN`, `PLUS_ASSIGN`, `MINUS_ASSIGN`, `TIMES_ASSIGN`, and `DIVIDE_ASSIGN`.

[LDF 2006.11.14.] Added the declarations of `AND_ASSIGN`, `OR_ASSIGN`, `XOR_ASSIGN`, and `NOT_ASSIGN`.

[LDF 2006.12.11.] Added the declarations of `LIKE` and `FREETEXT`.

[LDF 2006.12.12.] Added the declaration of `CONTAINS`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣ASSIGN
%token␣<int_value>␣PLUS_ASSIGN
%token␣<int_value>␣MINUS_ASSIGN
%token␣<int_value>␣TIMES_ASSIGN
%token␣<int_value>␣DIVIDE_ASSIGN
%token␣<int_value>␣AND_ASSIGN
%token␣<int_value>␣OR_ASSIGN
%token␣<int_value>␣XOR_ASSIGN
%token␣<int_value>␣NOT_ASSIGN
%token␣<int_value>␣CONTAINS
%token␣<int_value>␣FREETEXT
%token␣<int_value>␣LIKE
```

401. Arithmetical Operations. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this section with the token declarations of `PLUS`, `MINUS`, `TIMES`, and `DIVIDE`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣PLUS
%token␣<int_value>␣MINUS
%token␣<int_value>␣TIMES
%token␣<int_value>␣DIVIDE
```

402. Types with values. [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<string_value>␣STRING
%token␣<int_value>␣␣␣␣INTEGER
%token␣<float_value>␣␣FLOAT
```

403. Control. [LDF 2006.10.20.]

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣START
%token␣<int_value>␣END
%token␣<int_value>␣TERMINATE
```

404. Declarators. [LDF 2006.12.15.]

Log

[LDF 2006.11.16.] Added token declaration for `STRING_DECLARATOR`.

[LDF 2006.12.08.] Added token declaration for `DATASOURCE_DECLARATOR`.

[LDF 2006.12.15.] Added token declaration for `DATETIME_DECLARATOR`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣DATASOURCE_DECLARATOR
%token␣<int_value>␣DATETIME_DECLARATOR
%token␣<int_value>␣STRING_DECLARATOR
%token␣<int_value>␣QUERY_DECLARATOR
```

405. Queries. [LDF 2006.10.20.]

Log

[LDF 2006.10.31.] Added token declarations for `DATABASE` and `SERVER`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣LOCAL
%token␣<int_value>␣REMOTE
%token␣<int_value>␣DATABASE
%token␣<int_value>␣SERVER
```

406. Datasources. [LDF 2006.12.08.]

Log

[2006.12.08.] Added this section with the token declarations for `DBT`, `GBV_GVK`, `TIMMS`, and `DATASOURCE_FILE`. `LOCAL`, `DATABASE`, and `SERVER` have already been defined, as they are used for queries.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣DBT
%token␣<int_value>␣GBV_GVK
%token␣<int_value>␣TIMMS
%token␣<int_value>␣DATASOURCE_FILE
```

407. Datetimes. [LDF 2006.12.15.]

Log

[2006.12.15.] Added this section with the token declarations for `DAY`, `MONTH`, `YEAR`, `HOUR`, `MINUTE`, and `SECOND`.
[LDF 2006.12.18.] Added token declaration for `YEAR_RANGE_BEGIN` and `YEAR_RANGE_END`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣␣␣YEAR_RANGE_BEGIN
%token␣<int_value>␣␣␣YEAR_RANGE_END
%token␣<int_value>␣␣␣YEAR
%token␣<int_value>␣␣␣MONTH
%token␣<int_value>␣␣␣DAY
%token␣<int_value>␣␣␣HOUR
%token␣<int_value>␣␣␣MINUTE
%token␣<int_value>␣␣␣SECOND
```

408. Predicates and Control Structures. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this section with the token declarations for `IF`, `ELSE`, `ELIF`, `FI`, `FOR`, `DO`, `WHILE`, `AND`, `OR`, `XOR`, `NOT`, `AND_NOT`, `OR_NOT`, and `XOR_NOT`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣IF
%token␣<int_value>␣ELSE
%token␣<int_value>␣ELIF
%token␣<int_value>␣FI
%token␣<int_value>␣FOR
%token␣<int_value>␣DO
%token␣<int_value>␣WHILE
%token␣<int_value>␣AND
%token␣<int_value>␣OR
%token␣<int_value>␣XOR
%token␣<int_value>␣NOT
%token␣<int_value>␣AND_NOT
%token␣<int_value>␣OR_NOT
%token␣<int_value>␣XOR_NOT
```

409. Database tables (Field designators). [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section with token declarations for AUTHOR, CONTRIBUTOR, TITLE, and SUBJECT.

[LDF 2006.12.05.] Added the token declaration for CREATOR.

[LDF 2006.12.12.] Added the token declaration for MAIN_CANONICAL_TITLE.

[LDF 2006.12.12.] Added token declarations for additional tables from the OAI database (dc_test).

[LDF 2006.12.12.] Added token declarations for additional tables from the PICA database (PICA_DB).

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣ACCESS_NUMBER
%token␣<int_value>␣AUTHOR
%token␣<int_value>␣BIBLIOGRAPHIC_TYPE
%token␣<int_value>␣CALL_NUMBER
%token␣<int_value>␣CLASSIFICATION
%token␣<int_value>␣COMPANY
%token␣<int_value>␣CONTENT_SUMMARY
%token␣<int_value>␣CONTRIBUTOR
%token␣<int_value>␣CREATOR
%token␣<int_value>␣DATABASE_PROVIDER
%token␣<int_value>␣DESCRIPTION
%token␣<int_value>␣EXEMPLAR_PRODUCTION_NUMBER
%token␣<int_value>␣IDENTIFIER
%token␣<int_value>␣INSTITUTION
%token␣<int_value>␣LANGUAGE
%token␣<int_value>␣MAIN_CANONICAL_TITLE
%token␣<int_value>␣PERMUTATION_PATTERN
%token␣<int_value>␣PERSON
%token␣<int_value>␣PHYSICAL_DESCRIPTION
%token␣<int_value>␣PUBLISHER
%token␣<int_value>␣RECORD
%token␣<int_value>␣REMOTE_ACCESS
%token␣<int_value>␣RIGHTS
%token␣<int_value>␣SOURCE
%token␣<int_value>␣SUBJECT
%token␣<int_value>␣SUPERORDINATE_ENTITIES
%token␣<int_value>␣TITLE
%token␣<int_value>␣TYPE
```

410. Database table columns (field qualifiers). [LDF 2006.12.13.]

Log

[2006.12.13.] Added this section.

⟨ Token and type declarations 370 ⟩ +≡

411. Generic columns. [LDF 2006.12.13.]

Log

[2006.12.13.] Added this section.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣ID
```

412. Names. [LDF 2006.12.07.]

Log

[LDF 2006.12.07.] Added this section with token declarations for `GIVEN_NAME`, `PREFIX`, and `SURNAME`.

[LDF 2006.12.07.] Added token declarations for `AUTHOR_GIVEN_NAME`, `AUTHOR_PREFIX`, `AUTHOR_SURNAME`, `CONTRIBUTOR_GIVEN_NAME`, `CONTRIBUTOR_PREFIX`, and `CONTRIBUTOR_SURNAME`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣GIVEN_NAME
%token␣<int_value>␣PREFIX
%token␣<int_value>␣SURNAME
%token␣<int_value>␣AUTHOR_GIVEN_NAME
%token␣<int_value>␣AUTHOR_PREFIX
%token␣<int_value>␣AUTHOR_SURNAME
%token␣<int_value>␣CONTRIBUTOR_GIVEN_NAME
%token␣<int_value>␣CONTRIBUTOR_PREFIX
%token␣<int_value>␣CONTRIBUTOR_SURNAME
```

413. Columns of individual tables. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

414. Pica. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

415. Records. [LDF 2006.12.14.]
ID in "Generic" section. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

⟨ Token and type declarations 370 ⟩ +≡
```
%token␣<int_value>␣ELN_ORIGINAL_ENTRY
%token␣<int_value>␣ELN_MOST_RECENT_CHANGE
%token␣<int_value>␣ELN_STATUS_CHANGE
%token␣<int_value>␣IDENTIFICATION_NUMBER
%token␣<int_value>␣DATE_ORIGINAL_ENTRY
%token␣<int_value>␣DATE_MOST_RECENT_CHANGE
%token␣<int_value>␣DATE_STATUS_CHANGE
%token␣<int_value>␣SOURCE_ID
%token␣<int_value>␣YEAR_APPEARANCE_BEGIN
%token␣<int_value>␣YEAR_APPEARANCE_END
%token␣<int_value>␣YEAR_APPEARANCE_RAK_WB
%token␣<int_value>␣YEAR_APPEARANCE_ORIGINAL
```

416. Variables. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this section.

⟨ Token and type declarations 370 ⟩ +≡
```
%token␣<int_value>␣VARIABLE
%token␣<string_value>␣VARIABLE_TEXT_SEGMENT
```

417. Data Types. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section with the token declaration of QUERY_TYPE.

[LDF 2006.11.03.] Added the token declaration of NULL_TYPE.

[LDF 2006.11.16.] Added the token declaration of STRING_TYPE.

[LDF 2006.12.08.] Added the token declaration of DATASOURCE_TYPE.

[LDF 2006.12.15.] Added the token declaration of DATETIME_TYPE.

⟨ Token and type declarations 370 ⟩ +≡
```
%token␣<pointer_value>␣NULL_TYPE
%token␣<pointer_value>␣DATASOURCE_TYPE
%token␣<pointer_value>␣DATETIME_TYPE
%token␣<pointer_value>␣QUERY_TYPE
%token␣<pointer_value>␣STRING_TYPE
```

418. Commands. [LDF 2006.11.13.]

Log

[LDF 2006.11.13.] Added this section with the token declarations of `SHOW` and `CLEAR`.

[LDF 2006.11.13.] Added the token declarations of `MESSAGE`, `ERRMESSAGE`, and `PAUSE`.

[LDF 2006.11.16.] Added the token declarations of `TEX`, `SQL`, `OAI`, and `PICA`.

[LDF 2006.11.23.] Added the token declaration of `OUTPUT`.

⟨ Token and type declarations 370 ⟩ +≡

```
%token␣<int_value>␣CLEAR
%token␣<int_value>␣ERRMESSAGE
%token␣<int_value>␣MESSAGE
%token␣<int_value>␣PAUSE
%token␣<int_value>␣SHOW
%token␣<int_value>␣TEX
%token␣<int_value>␣SQL
%token␣<int_value>␣OAI
%token␣<int_value>␣PICA
%token␣<int_value>␣OUTPUT
```

419. Parser rules. [LDF 2006.10.20.]

420. Program. [LDF 2006.10.31.]

421. ⟨program⟩ ⟶ ⟨statement list⟩ `TERMINATE.` [LDF 2006.10.31.]

⟨ Parser rules 421 ⟩ ≡

```
program:␣statement_list␣TERMINATE
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘statement_list:␣TERMINATE’." ≪ endl;
  cerr ≪ temp_strm.str( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
  return 0;
}
;
```

See also sections 423, 424, 427, 428, 429, 436, 437, 438, 439, 442, 443, 444, 445, 447, 449, 451, 453, 457, 459, 460, 461, 463, 464, 465, 466, 468, 469, 471, 472, 474, 475, 477, 478, 482, 483, 485, 486, 487, 488, 490, 491, 493, 494, 495, 496, 497, 498, 499, 500, 502, 503, 505, 506, 507, 508, 510, 511, 512, 513, 514, 515, 517, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 548, 549, 552, 554, 555, 556, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 572, 573, 574, 575, 576, 578, 579, 580, 581, 582, 583, 584, 586, 587, 588, 590, 591, 592, 593, 594, 595, 596, 597, 602, 603, 604, 605, 606, 607, 608, 609, 610, 614, 615, 616, 617, 618, 620, 621, 623, 624, 626, 627, 629, 630, 631, 632, 633, 634, 638, 639, 641, 643, 645, 648, 649, 650, 652, 654, 656, 660, 661, 662, 664, 666, 668, 670, 671, 672, and 673.

This code is used in section 676.

422. Statement list. [LDF 2006.10.31.]

423. ⟨statement list⟩ ⟶ `EMPTY.` [LDF 2006.10.31.]

⟨ Parser rules 421 ⟩ +≡

```
statement_list:␣/*␣empty␣*/ ;
```

424. ⟨statement list⟩ ⟶ ⟨statement list⟩ ⟨statement⟩. [LDF 2006.10.31.]

⟨ Parser rules 421 ⟩ +≡

```
statement_list:␣statement_list␣statement ;
```

425. Statement. [LDF 2006.10.31.]

426. ⟨statement⟩ ⟶ ⟨group statement⟩ `SEMI_COLON.` [LDF 2006.10.31.]

Log

[2006.10.31.] Added this rule.

[LDF 2006.11.13.] Commented-out this rule.

⟨ Garbage 426 ⟩ ≡

```
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘statement:␣group_statement␣SEMI_COLON’." ≪ endl;
  cerr ≪ temp_strm.str( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
}
;
```

This code is used in section 677.

427. ⟨statement⟩ ⟶ ⟨declaration⟩ `SEMI_COLON.` [LDF 2006.11.01.]

Log

[2006.11.01.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
statement:␣declaration␣SEMI_COLON
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘statement:␣declaration␣SEMI_COLON’." ≪ endl;
  cerr ≪ temp_strm.str( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
}
;
```

428. ⟨statement⟩ ⟶ ⟨assignment⟩ `SEMI_COLON`. [LDF 2006.10.31.]

```
⟨ Parser rules 421 ⟩ +≡
  statement:␣assignment␣SEMI_COLON
  {
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘statement:␣assignment␣SEMI_COLON’." ≪ endl;
    cerr ≪ temp_strm.str( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
  }
  ;
```

429. ⟨statement⟩ ⟶ ⟨command⟩ `SEMI_COLON`. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  statement:␣command␣SEMI_COLON
  {
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘statement:␣command␣SEMI_COLON’." ≪ endl;
    cerr ≪ temp_strm.str( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
  }
  ;
```

430. Group Statement (`grpstmnt.w`). [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

[LDF 2006.11.13.] Removed the rules from this file and commented-out the type declaration of *group_statement*.

431.

```
⟨ grpstmnt.w 431 ⟩ ≡
  static char grpstmnt_id_string[ ] = "$Id:␣grpstmnt.w,v␣1.4␣2007/02/11␣16:31:45␣lfinsto1␣Exp␣$";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

432.

⟨ Type declarations for non-terminal symbols 432 ⟩ ≡

See also sections 435, 440, 441, 446, 448, 450, 452, 456, 458, 462, 467, 470, 473, 476, 480, 481, 484, 489, 492, 501, 516, 518, 547, 550, 571, 577, 585, 589, 599, 601, 613, 619, 622, 625, 628, 637, 640, 642, 644, 647, 651, 653, 655, 659, 663, 665, 667, and 669.

This code is used in section 676.

433. Declarations (declrtns.w). [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this file.

434.

⟨ declrtns.w 434 ⟩ ≡

```
static char declrtns_id_string[] = "$Id: declrtns.w,v 1.6 2007/02/13 20:37:24 lfinsto1 Exp $";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

435.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <int_value> declaration
```

436. ⟨declaration⟩ ⟶ ⟨query declaration⟩. [LDF 2006.11.01.]

⟨ Parser rules 421 ⟩ +≡

```
declaration: query_declaration
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule 'declaration: query_declaration'." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
}
;
```

437. ⟨declaration⟩ —→ ⟨string declaration⟩. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
declaration:␣string_declaration
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘declaration:␣string_declaration’." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
}
;
```

438. ⟨declaration⟩ —→ ⟨datasource declaration⟩. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
declaration:␣datasource_declaration
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘declaration:␣datasource_declaration’." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
}
;
```

439. ⟨declaration⟩ —→ ⟨datetime declaration⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
declaration: datetime_declaration
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘declaration: datetime_declaration’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
  }
  ;
```

440. ⟨variable declaration segment list⟩. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <string_value> variable_declaration_segment_list
```

441. ⟨subscript placeholder⟩. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <int_value> subscript_placeholder
```

442. ⟨variable declaration segment list⟩ ⟶ `VARIABLE_TEXT_SEGMENT`. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
variable_declaration_segment_list: VARIABLE_TEXT_SEGMENT
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  strcpy( $$ , $1 );
  temp_strm ≪ endl ≪ "Rule ‘variable_declaration_segment_list: VARIABLE_TEXT_SEGMENT’." ≪
      endl ≪ "‘$$’ == " ≪ $$ ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
}
;
```

443. ⟨variable declaration segment list⟩ ⟶ **(etc.).** ⟨variable declaration segment list⟩ ⟶ ⟨variable declaration segment list⟩ `VARIABLE_TEXT_SEGMENT`. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
variable_declaration_segment_list: variable_declaration_segment_list  VARIABLE_TEXT_SEGMEN
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  strcat( $$ , $2 );
  temp_strm ≪ endl ≪ "Rule ‘variable_declaration_segment_list: " ≪
      "variable_declaration_segment_list " ≪ "VARIABLE_TEXT_SEGMENT’." ≪ endl ≪
      "‘$$’ == " ≪ $$ ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
}
;
```

444. ⟨variable declaration segment list⟩ ⟶ **(etc.).** ⟨variable declaration segment list⟩ ⟶ ⟨variable declaration segment list⟩ ⟨subscript placeholder⟩. [LDF 2006.11.01.]

The "Yen" symbol "¥" (#A5) is added to the semantic value of the
⟨variable declaration segment list⟩ as a placeholder. This string will be used as the name of a top-level **Id_Type** object in *scanner_node→id_map*. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
variable_declaration_segment_list: variable_declaration_segment_list subscript_placeholde
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  strcat( $$ , "¥");
  temp_strm ≪ endl ≪ "Rule ‘variable_declaration_segment_list: variable_declarati\
      on_segment_list " ≪ "subscript_placeholder’." ≪ endl ≪ "‘$$’ == " ≪ $$ ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
}
;
```

445. ⟨subscript placeholder⟩ ⟶ `OPEN_BRACKET CLOSE_BRACKET`. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
subscript_placeholder: OPEN_BRACKET CLOSE_BRACKET
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule ‘subscript_placeholder: OPEN_BRACKET CLOSE_BRACKET’." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
}
;
```

446. ⟨query declaration⟩. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡
```
%type␣<int_value>␣query_declaration
```

447. ⟨query declaration⟩ ⟶ **(etc.).** ⟨query declaration⟩ ⟶ `QUERY_DECLARATOR` ⟨variable declaration segment list⟩. [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this rule.

[LDF 2006.11.02.] No longer setting `$$` to the return value of **Scan_Parse** :: *declare_variable_func*, because I've changed its return value from **int** to **Id_Node**.

⟨ Parser rules 421 ⟩ +≡
```
query_declaration:␣QUERY_DECLARATOR␣variable_declaration_segment_list
{
  Scan_Parse :: declare_variable_func(parameter, QUERY_TYPE, $2);
  $$ = 0;
}
;
```

448. ⟨datasource declaration⟩. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡
```
%type␣<int_value>␣datasource_declaration
```

449. ⟨datasource declaration⟩ ⟶ **(etc.).** ⟨datasource declaration⟩ ⟶ `DATASOURCE_DECLARATOR` ⟨variable declaration segment list⟩. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡
```
datasource_declaration:␣DATASOURCE_DECLARATOR␣variable_declaration_segment_list
{
  Scan_Parse :: declare_variable_func(parameter, DATASOURCE_TYPE, $2);
  $$ = 0;
}
;
```

450. ⟨string declaration⟩**.** [LDF 2006.11.01.]

Log

[2006.11.01.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣string_declaration
```

451. ⟨string declaration⟩ −→ **(etc.).** ⟨string declaration⟩ −→ `STRING_DECLARATOR` ⟨variable declaration segment list⟩. [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this rule.

[LDF 2006.11.02.] No longer setting `$$` to the return value of **Scan_Parse** :: *declare_variable_func*, because I've changed its return value from **int** to **Id_Node**.

⟨ Parser rules 421 ⟩ +≡

```
string_declaration:␣STRING_DECLARATOR␣variable_declaration_segment_list
{
  Scan_Parse :: declare_variable_func(parameter, STRING_TYPE, $2);
  $$ = 0;
}
;
```

452. ⟨datetime declaration⟩**.** [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣datetime_declaration
```

453. ⟨datetime declaration⟩ ⟶ **(etc.).** ⟨datetime declaration⟩ ⟶ `DATETIME_DECLARATOR` ⟨variable declaration segment list⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_declaration: DATETIME_DECLARATOR variable_declaration_segment_list
{
  Scan_Parse::declare_variable_func(parameter, DATETIME_TYPE, $2);
  $$ = 0;
}
;
```

454. Variables (`variabls.w`). [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this file.

455.

⟨ `variabls.w` 455 ⟩ ≡

```
static char variabls_id_string[] = "$Id: variabls.w,v 1.5 2007/02/13 20:42:15 lfinsto1 Exp $";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

456. ⟨variable name⟩. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> variable_name
```

457. ⟨variable name⟩ ⟶ ⟨variable segment list⟩. [LDF 2006.11.02.]

```
⟨ Parser rules 421 ⟩ +≡
  variable_name:␣variable_segment_list
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘variable_name:␣variable_segment_list’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
#if 0     /* 1 */
    Token_Type curr_token;
    curr_token.type = yychar;
    curr_token.value = yylval;
#endif
    scanner_node→token_stack.push(Token_Type(yychar, yylval));
    $$ = Scan_Parse::variable_func(parameter, $1);
    yyclearin;
#undef DEBUG_OUTPUT
  }
  ;
```

458. ⟨variable segment list⟩. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this type declaration.

```
⟨ Type declarations for non-terminal symbols 432 ⟩ +≡
  %type␣<string_value>␣variable_segment_list
```

459. ⟨variable segment list⟩ ⟶ `VARIABLE_TEXT_SEGMENT`. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
variable_segment_list: VARIABLE_TEXT_SEGMENT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    scanner_node→float_vector.clear( );
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘variable_segment_list: VARIABLE_TEXT_SEGMENT’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    strcpy( $$ , $1 );
#undef DEBUG_OUTPUT
  }
  ;
```

460. ⟨variable segment list⟩ —→ **(etc.).** ⟨variable segment list⟩ —→ ⟨variable segment list⟩ `VARIABLE_TEXT_SEGMENT`.
[LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
variable_segment_list: variable_segment_list VARIABLE_TEXT_SEGMENT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘variable_segment_list: variable_segment_list "
        "VARIABLE_TEXT_SEGMENT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    strcpy( $$ , $1 );
    strcat( $$ , $2 );
#undef DEBUG_OUTPUT
  }
  ;
```

461. ⟨variable segment list⟩ ⟶ **(etc.).** ⟨variable segment list⟩ ⟶ ⟨variable segment list⟩ ⟨subscript⟩. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
variable_segment_list:␣variable_segment_list␣subscript
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    scanner_node→float_vector.push_back( $2 );
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘variable_segment_list:␣variable_segment_list␣" ≪
        "subscript’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    strcat( $$ ,"¥");
#undef DEBUG_OUTPUT
  }
  ;
```

462. ⟨subscript⟩. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<float_value>␣subscript
```

463. ⟨subscript⟩ ⟶ `INTEGER`. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  subscript: INTEGER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘subscript: INTEGER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = static_cast⟨float⟩( $1 );
#undef DEBUG_OUTPUT
  }
  ;
```

464. ⟨subscript⟩ ⟶ `FLOAT`. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  subscript:␣FLOAT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘subscript:␣FLOAT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
#undef DEBUG_OUTPUT
  }
  ;
```

465. ⟨subscript⟩ ⟶ OPEN_BRACKET INTEGER CLOSE_BRACKET. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
subscript: OPEN_BRACKET INTEGER CLOSE_BRACKET
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘subscript: OPEN_BRACKET INTEGER CLOSE_BRACKET’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = static_cast⟨float⟩( $2 );
#undef DEBUG_OUTPUT
  }
  ;
```

466. ⟨subscript⟩ ⟶ OPEN_BRACKET FLOAT CLOSE_BRACKET. [LDF 2006.11.03.]

Log

[LDF 2006.11.03.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
subscript: OPEN_BRACKET FLOAT CLOSE_BRACKET
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘subscript: OPEN_BRACKET FLOAT CLOSE_BRACKET’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

467. ⟨query variable⟩. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> query_variable
```

468. ⟨query variable⟩ ⟶ `VARIABLE QUERY TYPE`. [LDF 2006.11.02.]
The semantic value of the `QUERY_TYPE` token is the **Id_Type** object associated with the name specified by the semantic value of the `VARIABLE` token, or 0, if there is no **Id_Type** object. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_variable:␣VARIABLE␣QUERY_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_variable:␣VARIABLE␣QUERY_TYPE’." ≪ endl;
    if ($2 ≡ 0) {
      temp_strm ≪ "The␣semantic␣value␣of␣‘QUERY_TYPE’␣==␣0.␣␣Not␣showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    if ($2 ≠ 0) {
      static_cast⟨Id_Node⟩($2)→show("‘QUERY_TYPE’:");
    }
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

469. ⟨query variable⟩ ⟶ ⟨variable name⟩ `QUERY TYPE.` [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
query_variable: variable_name QUERY_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_variable: variable_name QUERY_TYPE’." ≪ endl;
    if ($2 ≡ 0) {
      temp_strm ≪ "The semantic value of ‘QUERY_TYPE’ == 0.  Not showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#if 0     /* 1 */
    if ($2 ≠ 0) {
      static_cast⟨Id_Node⟩($2)→show("‘QUERY_TYPE’:");
    }
#endif
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

470. ⟨datasource variable⟩**.** [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datasource_variable
```

471. ⟨datasource variable⟩ ⟶ `VARIABLE DATASOURCE TYPE`. [LDF 2006.12.08.]
The semantic value of the `DATASOURCE_TYPE` token is the **Id_Type** object associated with the name specified by the semantic value of the `VARIABLE` token, or 0, if there is no **Id_Type** object. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_variable: VARIABLE DATASOURCE_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_variable: VARIABLE DATASOURCE_TYPE’." ≪ endl;
    if ($2 ≡ 0) {
      temp_strm ≪ "The semantic value of ‘DATASOURCE_TYPE’ == 0.  Not showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    if ($2 ≠ 0) {
      static_cast⟨Id_Node⟩($2)→show("‘DATASOURCE_TYPE’:");
    }
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

472. ⟨datasource variable⟩ ⟶ ⟨variable name⟩ `DATASOURCE TYPE.` [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_variable: variable_name DATASOURCE_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_variable: variable_name DATASOURCE_TYPE’." ≪ endl;
    if ($2 ≡ 0) {
      temp_strm ≪ "The semantic value of ‘DATASOURCE_TYPE’ == 0.  Not showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    if ($2 ≠ 0) {
      static_cast⟨Id_Node⟩($2)→show("‘DATASOURCE_TYPE’:");
    }
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

473. ⟨string variable⟩**.** [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> string_variable
```

474. ⟨string variable⟩ ⟶ `VARIABLE STRING TYPE`. [LDF 2006.11.16.]
The semantic value of the `STRING_TYPE` token is the **Id_Type** object associated with the name specified by the semantic value of the `VARIABLE` token, or 0, if there is no **Id_Type** object. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  string_variable: VARIABLE STRING_TYPE
  {
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘string_variable: VARIABLE STRING_TYPE’." ≪ endl;
    if (§2 ≡ 0) {
      temp_strm ≪ "The semantic value of ‘STRING_TYPE’ == 0.  Not showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    if (§2 ≠ 0) {
      static_cast⟨Id_Node⟩(§2)→show("‘STRING_TYPE’:");
    }
#endif
    §$ = §2;
#undef DEBUG_OUTPUT
  }
  ;
```

475. ⟨string variable⟩ ⟶ ⟨variable name⟩ `STRING TYPE`. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
string_variable: variable_name STRING_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘string_variable: variable_name STRING_TYPE’." ≪ endl;
    if ($2 ≡ 0) {
      temp_strm ≪ "The semantic value of ‘STRING_TYPE’ == 0.  Not showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    if ($2 ≠ 0) {
      static_cast⟨Id_Node⟩($2)→show("‘STRING_TYPE’:");
    }
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

476. ⟨datetime variable⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datetime_variable
```

477. ⟨datetime variable⟩ ⟶ `VARIABLE DATETIME TYPE`. [LDF 2006.11.02.]

The semantic value of the `DATETIME_TYPE` token is the **Id_Type** object associated with the name specified by the semantic value of the `VARIABLE` token, or 0, if there is no **Id_Type** object. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_variable:␣VARIABLE␣DATETIME_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_variable:␣VARIABLE␣DATETIME_TYPE’." ≪ endl;
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

478. ⟨datetime variable⟩ ⟶ ⟨variable name⟩ `DATETIME TYPE.` [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_variable:␣variable_name␣DATETIME_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_variable:␣variable_name␣DATETIME_TYPE’." ≪ endl;
    if ($2 ≡ 0) {
      temp_strm ≪ "The␣semantic␣value␣of␣‘DATETIME_TYPE’␣=␣0.␣␣Not␣showing." ≪ endl;
    }
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#if 0     /* 1 */
    if ($2 ≠ 0) {
      static_cast⟨Id_Node⟩($2)→show("‘DATETIME_TYPE’:");
    }
#endif
#endif
    $$ = $2;
#undef DEBUG_OUTPUT
  }
  ;
```

479. Assignment (`assign.w`). [LDF 2006.10.31.]

Log

[2006.10.31.] Added this section.

Renamed this file. Old name: `passign.w`. New name: `assign.w`.

```
⟨ assign.w 479 ⟩ ≡
  static char assign_id_string[] = "$Id:␣assign.w,v␣1.7␣2007/02/13␣20:34:10␣lfinsto1␣Exp␣$";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

480.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣assignment
```

481. ⟨negation optional⟩. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this section.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣negation_optional
```

482. ⟨negation optional⟩ ⟶ `EMPTY`. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
negation_optional:␣/*␣Empty␣␣*/
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘negation_optional:␣/*␣Empty␣␣*/’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = 0;
  }
  ;
```

483. ⟨negation optional⟩ ⟶ `NOT`. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
negation_optional: NOT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘negation_optional: NOT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = 1;
  }
  ;
```

484. ⟨match term optional⟩. [LDF 2006.12.11.]

Log

[LDF 2006.12.11.] Added this section.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <int_value> match_term_optional
```

485. ⟨match term optional⟩ ⟶ `EMPTY`. [LDF 2006.12.11.]

Log

[LDF 2006.12.11.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  match_term_optional:␣/*␣Empty␣␣*/
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘match_term_optional:␣/*␣Empty␣␣*/’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = Query_Type::QUERY_TYPE_NULL_TYPE;
  }
  ;
```

486. ⟨match term optional⟩ —→ CONTAINS. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
match_term_optional:␣CONTAINS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘match_term_optional:␣CONTAINS’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = Query_Type::CONTAINS_VALUE;
  }
  ;
```

487. ⟨match term optional⟩ —→ FREETEXT. [LDF 2006.12.11.]

Log

[LDF 2006.12.11.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  match_term_optional:␣FREETEXT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘match_term_optional:␣FREETEXT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = Query_Type::FREETEXT_VALUE;
  }
  ;
```

488. ⟨match term optional⟩ ⟶ `LIKE`. [LDF 2006.12.11.]

Log

[LDF 2006.12.11.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
match_term_optional:␣LIKE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘match_term_optional:␣LIKE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = Query_Type::LIKE_VALUE;
  }
  ;
```

489. ⟨assign or plus-assign⟩. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣assign_or_plus_assign
```

490. ⟨assign or plus-assign⟩ ⟶ ASSIGN. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  assign_or_plus_assign:␣ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assign_or_plus_assign:␣ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ASSIGN;
  }
  ;
```

491. ⟨assign or plus-assign⟩ —→ `PLUS_ASSIGN`. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
assign_or_plus_assign: PLUS_ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘assign_or_plus_assign: PLUS_ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PLUS_ASSIGN;
  }
  ;
```

492. ⟨assignment operator⟩. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <int_value> assignment_operator
```

493. ⟨assignment operator⟩ ⟶ ASSIGN. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  assignment_operator:␣ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment_operator:␣ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ASSIGN;
  }
  ;
```

494. ⟨assignment operator⟩ ⟶ `PLUS_ASSIGN`. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  assignment_operator:␣PLUS_ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment_operator:␣PLUS_ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PLUS_ASSIGN;
  }
  ;
```

495. ⟨assignment operator⟩ ⟶ OR_ASSIGN. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  assignment_operator:␣OR_ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment_operator:␣OR_ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = OR_ASSIGN;
  }
  ;
```

496. ⟨assignment operator⟩ ⟶ `XOR_ASSIGN`. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  assignment_operator:␣XOR_ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment_operator:␣XOR_ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = XOR_ASSIGN;
  }
  ;
```

497. ⟨assignment operator⟩ ⟶ `NOT_ASSIGN`. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  assignment_operator:␣NOT_ASSIGN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment_operator:␣NOT_ASSIGN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = NOT_ASSIGN;
  }
  ;
```

498. ⟨assignment⟩ ⟶ ⟨query assignment⟩. [LDF 2006.11.02.]

```
⟨ Parser rules 421 ⟩ +≡
  assignment:␣query_assignment
  {
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment:␣query_assignment’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
  }
  ;
```

499. ⟨assignment⟩ ⟶ ⟨datasource assignment⟩. [LDF 2006.12.08.]

Log

[2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
assignment:␣datasource_assignment
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘assignment:␣datasource_assignment’." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
}
;
```

500. ⟨assignment⟩ ⟶ ⟨string assignment⟩. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
assignment:␣string_assignment
{
  Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
  temp_strm ≪ endl ≪ "Rule␣‘assignment:␣string_assignment’." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
}
;
```

501. ⟨query assignment⟩.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<pointer_value>␣query_assignment
```

502. ⟨query assignment⟩ ⟶ ⟨query variable⟩ ASSIGN ⟨query expression⟩. [LDF 2006.11.17.]

Log

[2006.11.17.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
query_assignment:␣query_variable␣ASSIGN␣query_expression
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_assignment:␣query_variable␣ASSIGN␣query_expression’." ≪
        endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩($1);
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≠ 0) delete static_cast⟨Query_Node⟩(id_node→value);
      id_node→value = $3;
      $$ = $3;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

503. ⟨assignment⟩ ⟶ ⟨datetime assignment⟩**.** [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
assignment:␣datetime_assignment
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘assignment:␣datetime_assignment’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
  }
  ;
```

504. Targets. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this section.

505. ⟨query assignment⟩ —→ **(etc.).** ⟨query assignment⟩ —→ ⟨query variable⟩ ⟨assign or plus-assign⟩ `LOCAL DATABASE`. [LDF 2006.11.02.]

Log

[LDF 2006.11.13.] Changed this rule from ⟨query assignment⟩ —→ ⟨query variable⟩ `ASSIGN LOCAL` to ⟨query assignment⟩ —→ ⟨query variable⟩ `ASSIGN LOCAL DATABASE`.

[LDF 2006.11.13.] Changed `ASSIGN` to ⟨assign or plus-assign⟩.

⟨ Parser rules 421 ⟩ +≡

```
query_assignment:␣query_variable␣assign_or_plus_assign␣LOCAL␣DATABASE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_assignment:␣query_variable␣assign_or_plus_assig\
        n␣LOCAL␣DATABASE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = query_assignment_func_0(parameter, $1, $2, LOCAL, DATABASE, 0, 0);
#undef DEBUG_OUTPUT
  }
  ;
```

506. ⟨query assignment⟩ ⟶ **(etc.).** ⟨query assignment⟩ ⟶ ⟨query variable⟩ ⟨assign or plus-assign⟩ `LOCAL SERVER`. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

[LDF 2006.11.13.] Changed `ASSIGN` to ⟨assign or plus-assign⟩.

⟨ Parser rules 421 ⟩ +≡

```
query_assignment: query_variable assign_or_plus_assign LOCAL SERVER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_assignment: query_variable assign_or_plus_assig\
      n LOCAL SERVER’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = query_assignment_func_0(parameter, $1, $2, LOCAL, SERVER, 0, 0);
#undef DEBUG_OUTPUT
  }
  ;
```

507. ⟨query assignment⟩ —→ **(etc.).** ⟨query assignment⟩ —→ ⟨query variable⟩ ⟨assign or plus-assign⟩ `REMOTE DATABASE`. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

[LDF 2006.11.13.] Changed `ASSIGN` to ⟨assign or plus-assign⟩.

⟨ Parser rules 421 ⟩ +≡

```
query_assignment: query_variable assign_or_plus_assign REMOTE DATABASE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_assignment: query_variable assign_or_plus_assig\
      n REMOTE DATABASE’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = query_assignment_func_0(parameter, $1, ASSIGN, REMOTE, DATABASE, 0, 0);
#undef DEBUG_OUTPUT
  }
  ;
```

508. ⟨query assignment⟩ ⟶ **(etc.).** ⟨query assignment⟩ ⟶ ⟨query variable⟩ ⟨assign or plus-assign⟩ `REMOTE SERVER`. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

[LDF 2006.11.13.] Changed `ASSIGN` to ⟨assign or plus-assign⟩.

⟨ Parser rules 421 ⟩ +≡

```
query_assignment:␣query_variable␣assign_or_plus_assign␣REMOTE␣SERVER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_assignment:␣query_variable␣assign_or_plus_assig\
        n␣REMOTE␣SERVER’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = query_assignment_func_0(parameter, $1, $2, REMOTE, SERVER, 0, 0);
#undef DEBUG_OUTPUT
  }
  ;
```

509. Fields. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this section.

510. ⟨query assignment⟩ —→ **(etc.).** ⟨query assignment⟩ —→ ⟨query variable⟩ `COLON` ⟨field specifier⟩ ⟨assignment operator⟩ ⟨negation optional⟩ ⟨match term optional⟩ ⟨query expression⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

[LDF 2006.11.21.] Now setting *curr_id_node→value→id_node* and *curr_id_node→value→name*.

[LDF 2006.12.19.] Removed code from this rule. Now calling **Scan_Parse** :: *query_assignment_func_1*.

```
⟨ Parser rules 421 ⟩ +≡
  query_assignment:␣query_variable␣COLON␣field_specifier␣ assignment_operator␣negation_optional␣mat
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
# # undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘query_assignment:␣query_variable␣COLON␣field_specifier␣" ≪
        "assignment_operator␣negation_optional␣match_term_optional␣" ≪
        "query_expression’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩( $1 );
    int status = query_assignment_func_1 (scanner_node, curr_id_node, $3, $4, $5, $6, $7,
        QUERY_TYPE);
    $$ = static_cast⟨void *⟩(curr_id_node);
```

511. If **Scan_Parse**::*query_assignment_func_1* fails, *curr_id_node* will be 0 anyway, so it's not really necessary to check the value of *status*. It's only done for the sake of debugging output, which is conditionally compiled. [LDF 2006.12.19.]

```
⟨ Parser rules 421 ⟩ +≡
#ifdef DEBUG_OUTPUT
  if (status ≠ 0) {
    temp_strm ≪ "ERROR!␣␣In␣`yyparse'," ≪ endl ≪
        "rule␣`query_assignment:␣query_variable␣COLON␣field_specifier␣" ≪
        endl ≪ "assignment_operator␣negation_optional␣match_term_optional␣" ≪
        "query_expression':" ≪ endl ≪ "`Scan_Parse::query_assignment_func_1'␣f\
        ailed,␣returning␣" ≪ status ≪ "." ≪ endl ≪ "Setting␣`query_assignment'␣to␣0." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
    $$ = 0;
  }    /* status ≠ 0 */
#endif
```

512.

```
⟨ Parser rules 421 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "Exiting␣rule␣`query_assignment:␣query_variable␣COLON␣field_\
      specifier␣" ≪ "assignment_operator␣negation_optional␣match_term_optional␣" ≪
      "query_expression'." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
#undef DEBUG_OUTPUT
  } ;
```

513. ⟨query assignment⟩ —→ **(etc.).** ⟨query assignment⟩ —→ ⟨query variable⟩ `COLON` ⟨field specifier⟩ ⟨assignment operator⟩ ⟨negation optional⟩ ⟨match term optional⟩ ⟨query expression⟩. [LDF 2006.12.19.]

Log

[LDF 2006.12.19.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_assignment:␣query_variable␣COLON␣field_specifier␣ assignment_operator␣negation_optional␣mat
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
# # undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘query_assignment:␣query_variable␣COLON␣field_specifier␣" ≪
        "assignment_operator␣negation_optional␣match_term_optional␣" ≪
        "datetime_expression’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩( $1 );
    int status = query_assignment_func_1 (scanner_node, curr_id_node, $3, $4, $5, $6, $7,
        DATETIME_TYPE);
    $$ = static_cast⟨void *⟩(curr_id_node);
```

514. If **Scan_Parse**::*query_assignment_func_1* fails, *curr_id_node* will be 0 anyway, so it's not really necessary to check the value of *status*. It's only done for the sake of debugging output, which is conditionally compiled. [LDF 2006.12.19.]

```
⟨ Parser rules 421 ⟩ +≡
#ifdef DEBUG_OUTPUT
  if (status ≠ 0) {
    temp_strm ≪ "ERROR!␣␣In␣‘yyparse’," ≪ endl ≪
        "rule␣‘query_assignment:␣query_variable␣COLON␣field_specifier␣" ≪
        endl ≪ "assignment_operator␣negation_optional␣match_term_optional␣" ≪
        "datetime_expression’:" ≪ endl ≪ "‘Scan_Parse::query_assignment_func_1’␣f\
        ailed,␣returning␣" ≪ status ≪ "." ≪ endl ≪ "Setting␣‘query_assignment’␣to␣0." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
    $$ = 0;
  }    /* status ≠ 0 */
#endif
```

515.

```
⟨ Parser rules 421 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "Exiting␣rule␣‘query_assignment:␣query_variable␣COLON␣field_\
      specifier␣" ≪ "assignment_operator␣negation_optional␣match_term_optional␣" ≪
      "datetime_expression’." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
#undef DEBUG_OUTPUT
  } ;
```

516. ⟨field specifier⟩. [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this type declaration.

```
⟨ Type declarations for non-terminal symbols 432 ⟩ +≡
  %type␣<pointer_value>␣field_specifier
```

517. ⟨field specifier⟩ ⟶ ⟨field designator⟩ ⟨field qualifier list⟩. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_specifier:␣field_designator␣field_qualifier_list {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
      temp_strm ≪ endl ≪ "Rule␣‘field_specifier:␣field_designator␣field_qualifier_list’." ≪
          endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      deque < int > *d = ( $2 ≡ 0) ? new deque < int > : static_cast ⟨ deque < int >*> ( $2 );
      d→push_front( $1 );
      $$ = static_cast⟨void *⟩(d); } ;
```

518. ⟨field designator⟩**.** [LDF 2006.11.14.]

Log

[2006.11.14.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣field_designator
```

519. ⟨field designator⟩ ⟶ `ACCESS_NUMBER`**.** [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_designator:␣ACCESS_NUMBER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣ACCESS_NUMBER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ACCESS_NUMBER;
  }
  ;
```

520. ⟨field designator⟩ —→ AUTHOR. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣AUTHOR
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣AUTHOR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = AUTHOR;
  }
  ;
```

521. ⟨field designator⟩ ⟶ BIBLIOGRAPHIC_TYPE. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣BIBLIOGRAPHIC_TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣BIBLIOGRAPHIC_TYPE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = BIBLIOGRAPHIC_TYPE;
  }
  ;
```

522. ⟨field designator⟩ —→ CALL_NUMBER. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_designator:␣CALL_NUMBER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣CALL_NUMBER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = CALL_NUMBER;
  }
  ;
```

523. ⟨field designator⟩ —→ CLASSIFICATION. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣CLASSIFICATION
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣CLASSIFICATION’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = CLASSIFICATION;
  }
  ;
```

524. ⟨field designator⟩ —→ `COMPANY.` [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣COMPANY
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣COMPANY’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = COMPANY;
  }
  ;
```

525. ⟨field designator⟩ —→ CONTENT_SUMMARY. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣CONTENT_SUMMARY
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣CONTENT_SUMMARY’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = CONTENT_SUMMARY;
  }
  ;
```

526. ⟨field designator⟩ —→ CONTRIBUTOR. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣CONTRIBUTOR
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣CONTRIBUTOR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = CONTRIBUTOR;
  }
  ;
```

527. ⟨field designator⟩ ⟶ `CREATOR`. [LDF 2006.12.05.]

Log

[LDF 2006.12.05.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣CREATOR
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣CREATOR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = CREATOR;
  }
  ;
```

528. ⟨field designator⟩ —→ DATABASE_PROVIDER. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣DATABASE_PROVIDER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣DATABASE_PROVIDER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = DATABASE_PROVIDER;
  }
  ;
```

529. ⟨field designator⟩ —→ DESCRIPTION. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣DESCRIPTION
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣DESCRIPTION’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = DESCRIPTION;
  }
  ;
```

530. ⟨field designator⟩ —→ EXEMPLAR_PRODUCTION_NUMBER. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣EXEMPLAR_PRODUCTION_NUMBER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣EXEMPLAR_PRODUCTION_NUMBER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = EXEMPLAR_PRODUCTION_NUMBER;
  }
  ;
```

531. ⟨field designator⟩ —→ IDENTIFIER. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣IDENTIFIER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣IDENTIFIER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = IDENTIFIER;
  }
  ;
```

532. ⟨field designator⟩ ⟶ `INSTITUTION`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣INSTITUTION
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣INSTITUTION’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = INSTITUTION;
  }
  ;
```

533. ⟨field designator⟩ —→ `LANGUAGE`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣LANGUAGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣LANGUAGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = LANGUAGE;
  }
  ;
```

534. ⟨field designator⟩ —→ MAIN_CANONICAL_TITLE. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_designator:␣MAIN_CANONICAL_TITLE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣MAIN_CANONICAL_TITLE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = MAIN_CANONICAL_TITLE;
  }
  ;
```

535. ⟨field designator⟩ ⟶ `PERMUTATION_PATTERN`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣PERMUTATION_PATTERN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣PERMUTATION_PATTERN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PERMUTATION_PATTERN;
  }
  ;
```

536. ⟨field designator⟩ —→ `PERSON`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
  field_designator:␣PERSON
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣PERSON’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PERSON;
  }
  ;
```

537. ⟨field designator⟩ ⟶ PHYSICAL_DESCRIPTION. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_designator:␣PHYSICAL_DESCRIPTION
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣PHYSICAL_DESCRIPTION’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PHYSICAL_DESCRIPTION;
  }
  ;
```

538. ⟨field designator⟩ —→ PUBLISHER. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣PUBLISHER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣PUBLISHER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PUBLISHER;
  }
  ;
```

539. ⟨field designator⟩ ⟶ `RECORD`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣RECORD
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣RECORD’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = RECORD;
  }
  ;
```

540. ⟨field designator⟩ —→ `REMOTE_ACCESS`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_designator:␣REMOTE_ACCESS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣REMOTE_ACCESS’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = REMOTE_ACCESS;
  }
  ;
```

541. ⟨field designator⟩ ⟶ `RIGHTS`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣RIGHTS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣RIGHTS’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = RIGHTS;
  }
  ;
```

542. ⟨field designator⟩ —→ `SOURCE`. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣SOURCE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣SOURCE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = SOURCE;
  }
  ;
```

543. ⟨field designator⟩ ⟶ `SUBJECT`. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣SUBJECT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣SUBJECT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = SUBJECT;
  }
  ;
```

544. ⟨field designator⟩ —→ SUPERORDINATE_ENTITIES. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣SUPERORDINATE_ENTITIES
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣SUPERORDINATE_ENTITIES’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = SUPERORDINATE_ENTITIES;
  }
  ;
```

545. ⟨field designator⟩ ⟶ `TITLE`. [LDF 2006.11.14.]

Log

[2006.11.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_designator:␣TITLE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣TITLE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = TITLE;
  }
  ;
```

546. ⟨field designator⟩ ⟶ TYPE. [LDF 2006.12.12.]

Log

[LDF 2006.12.12.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_designator:␣TYPE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_designator:␣TYPE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = TYPE;
  }
  ;
```

547. ⟨field qualifier⟩. [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<pointer_value>␣field_qualifier_list
```

548. ⟨field qualifier list⟩ ⟶ `EMPTY`. [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier_list:␣/*␣Empty␣␣*/ {
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
      temp_strm ≪ endl ≪ "Rule␣'field_qualifier:␣EMPTY'." ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      deque < int > *d = new deque < int > ;
      $$ = static_cast⟨void *⟩(d); } ;
```

549. ⟨field qualifier list⟩ ⟶ ⟨field qualifier list⟩ `PERIOD` ⟨field qualifier⟩. [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier_list:␣field_qualifier_list␣PERIOD␣field_qualifier {
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
      temp_strm ≪ endl ≪ "Rule␣'field_qualifier:␣field_qualifier_list␣PERIOD␣field_qu\
          alifier'." ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
      deque < int > *d = static_cast ⟨ deque < int >*> ( $1 );
      d→push_back( $3 );
      $$ = static_cast⟨void *⟩(d); } ;
```

550. ⟨field qualifier⟩**.** [LDF 2006.12.07.]

Log

[LDF 2006.12.07.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣field_qualifier
```

551. Generic. [LDF 2006.12.13.]

Log

[2006.12.13.] Added this section.

552. ⟨field qualifier⟩ −→ `ID`**.** [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier:␣ID
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_qualifier:␣ID’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ID;
  }
  ;
```

553. Names. [LDF 2006.12.13.]

Log

[2006.12.13.] Added this section.

554. ⟨field qualifier⟩ ⟶ SURNAME. [LDF 2006.12.07.]

Log

[LDF 2006.12.07.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier: SURNAME
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: SURNAME’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = SURNAME;
  }
  ;
```

555. ⟨field qualifier⟩ —→ GIVEN_NAME. [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier: GIVEN_NAME
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: GIVEN_NAME’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = GIVEN_NAME;
  }
  ;
```

556. ⟨field qualifier⟩ ⟶ `PREFIX`. [LDF 2006.12.13.]

Log

[LDF 2006.12.13.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier: PREFIX
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: PREFIX’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = PREFIX;
  }
  ;
```

557. Field qualifiers for database table columns. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

558. Records. [LDF 2006.12.14.]

Log

[2006.12.14.] Added this section.

559. ⟨field qualifier⟩ —→ `ELN_ORIGINAL_ENTRY`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier: ELN_ORIGINAL_ENTRY
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: ELN_ORIGINAL_ENTRY’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ELN_ORIGINAL_ENTRY;
  }
  ;
```

560. ⟨field qualifier⟩ ⟶ `ELN_MOST_RECENT_CHANGE`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier: ELN_MOST_RECENT_CHANGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: ELN_MOST_RECENT_CHANGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ELN_MOST_RECENT_CHANGE;
  }
  ;
```

561. ⟨field qualifier⟩ —→ `ELN_STATUS_CHANGE`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier: ELN_STATUS_CHANGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: ELN_STATUS_CHANGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ELN_STATUS_CHANGE;
  }
  ;
```

562. ⟨field qualifier⟩ ⟶ IDENTIFICATION_NUMBER. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier:␣IDENTIFICATION_NUMBER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_qualifier:␣IDENTIFICATION_NUMBER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = IDENTIFICATION_NUMBER;
  }
  ;
```

563. ⟨field qualifier⟩ —→ `DATE_ORIGINAL_ENTRY`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier: DATE_ORIGINAL_ENTRY
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: DATE_ORIGINAL_ENTRY’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = DATE_ORIGINAL_ENTRY;
  }
  ;
```

564. ⟨field qualifier⟩ ⟶ DATE_MOST_RECENT_CHANGE. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier:␣DATE_MOST_RECENT_CHANGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_qualifier:␣DATE_MOST_RECENT_CHANGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = DATE_MOST_RECENT_CHANGE;
  }
  ;
```

565. ⟨field qualifier⟩ —→ DATE_STATUS_CHANGE. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier:␣DATE_STATUS_CHANGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_qualifier:␣DATE_STATUS_CHANGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = DATE_STATUS_CHANGE;
  }
  ;
```

566. ⟨field qualifier⟩ ⟶ `SOURCE_ID`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier:␣SOURCE_ID
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_qualifier:␣SOURCE_ID’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = SOURCE_ID;
  }
  ;
```

567. ⟨field qualifier⟩ —→ YEAR_APPEARANCE_BEGIN. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  field_qualifier:␣YEAR_APPEARANCE_BEGIN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘field_qualifier:␣YEAR_APPEARANCE_BEGIN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = YEAR_APPEARANCE_BEGIN;
  }
  ;
```

568. ⟨field qualifier⟩ ⟶ `YEAR_APPEARANCE_END`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier: YEAR_APPEARANCE_END
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: YEAR_APPEARANCE_END’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = YEAR_APPEARANCE_END;
  }
  ;
```

569. ⟨field qualifier⟩ —→ YEAR_APPEARANCE_RAK_WB. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier: YEAR_APPEARANCE_RAK_WB
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: YEAR_APPEARANCE_RAK_WB’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = YEAR_APPEARANCE_RAK_WB;
  }
  ;
```

570. ⟨field qualifier⟩ ⟶ `YEAR_APPEARANCE_ORIGINAL`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
field_qualifier: YEAR_APPEARANCE_ORIGINAL
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘field_qualifier: YEAR_APPEARANCE_ORIGINAL’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = YEAR_APPEARANCE_ORIGINAL;
  }
  ;
```

571. ⟨datasource assignment⟩. [LDF 2006.12.08.]

Log

[2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datasource_assignment
```

284 ⟨DATASOURCE ASSIGNMENT⟩ ⟶ ⟨DATASOURCE VARIABLE⟩ `ASSIGN` ⟨DATASOURCE EXPRESSION⟩LD

572. ⟨datasource assignment⟩ ⟶ ⟨datasource variable⟩ `ASSIGN` ⟨datasource expression⟩. [LDF 2006.12.08.] ∎

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_assignment: datasource_variable ASSIGN datasource_expression
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_assignment: datasource_variable " ≪
        "ASSIGN datasource_expression’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩( $1 );
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≠ 0) delete static_cast⟨Datasource_Node⟩(id_node→value);
      id_node→value = $3;
      $$ = $3;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

573. ⟨datasource assignment⟩ ⟶ ⟨datasource variable⟩ `ASSIGN DBT`. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_assignment: datasource_variable ASSIGN DBT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_assignment: datasource_variable ASSIGN DBT’." ≪
        endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩($1);
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≡ 0) id_node→value = static_cast⟨void *⟩(new Datasource_Type);
      static_cast⟨Datasource_Node⟩(id_node→value)→type = Datasource_Type::DBT_TYPE;
      $$ = id_node→value;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

574. ⟨datasource assignment⟩ ⟶ ⟨datasource variable⟩ `ASSIGN GBV_GVK.` [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datasource_assignment:␣datasource_variable␣ASSIGN␣GBV_GVK
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datasource_assignment:␣datasource_variable␣ASSIGN␣GBV\
        _GVK’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩( $1 );
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≡ 0) id_node→value = static_cast⟨void *⟩(new Datasource_Type);
      static_cast⟨Datasource_Node⟩(id_node→value)→type = Datasource_Type::GBV_GVK_TYPE;
      $$ = id_node→value;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

575. ⟨datasource assignment⟩ ⟶ ⟨datasource variable⟩ `ASSIGN TIMMS.` [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_assignment: datasource_variable ASSIGN TIMMS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_assignment: datasource_variable ASSIGN TIMMS’." ≪
        endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩($1);
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≡ 0) id_node→value = static_cast⟨void *⟩(new Datasource_Type);
      static_cast⟨Datasource_Node⟩(id_node→value)→type = Datasource_Type::TIMMS_TYPE;
      $$ = id_node→value;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

576. ⟨datasource assignment⟩ ⟶ ⟨datasource variable⟩ ASSIGN DATASOURCE_FILE. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_assignment: datasource_variable ASSIGN DATASOURCE_FILE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_assignment: datasource_variable ASSIGN DAT\
        ASOURCE_FILE’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩( $1 );
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≡ 0) id_node→value = static_cast⟨void *⟩(new Datasource_Type);
      static_cast⟨Datasource_Node⟩(id_node→value)→type =
          Datasource_Type::DATASOURCE_FILE_TYPE;
      $$ = id_node→value;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

577. ⟨string assignment⟩. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <string_value> string_assignment
```

578. ⟨string assignment⟩ ⟶ ⟨string variable⟩ ASSIGN ⟨string expression⟩. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  string_assignment: string_variable ASSIGN string_expression
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘string_assignment:  string_variable " ≪
        "ASSIGN string_expression’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($1);
    if (curr_id_node ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule " ≪
          "‘string_assignment:  string_variable" ≪ endl ≪ "ASSIGN string_expression’:" ≪
          endl ≪ "‘string_variable’ = 0.  Can’t assign." ≪ endl ≪
          "Type <RETURN> to continue: ";
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      getchar();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      strcpy($$, $3);
    }
    else {
      if (curr_id_node→value ≡ 0) curr_id_node→value = new string;
      *static_cast⟨string *⟩(curr_id_node→value) = $3;
      strcpy($$, $3);
    }
#undef DEBUG_OUTPUT
  }
  ;
```

579. ⟨string assignment⟩ ⟶ ⟨string variable⟩ ASSIGN TEX ⟨query expression⟩. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this rule.

[LDF 2006.12.01.] !! BUG FIX: Added code for the case that *curr_id_node→value* ≠ 0.

```
⟨ Parser rules 421 ⟩ +≡
  string_assignment:␣string_variable␣ASSIGN␣TEX␣query_expression {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘string_assignment:␣string_variable␣ASSIGN␣TEX␣query_e\
      xpression" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩( $1 );
    Query_Node q = static_cast⟨Query_Node⟩( $4 );
    string *curr_string = 0;
    stringstream tex_strm;
    if (curr_id_node ≡ 0 ∨ q ≡ 0) {
      strcpy( $$ , "");
    }
    else     /* curr_id_node ≠ 0 */
    { curr_id_node→subtype = Id_Type::TEX_STRING_TYPE;
    if (curr_id_node→value ≡ 0) {
      curr_string = new string;
      curr_id_node→value = static_cast⟨void *⟩(curr_string);
    }
    else {
      *static_cast⟨string *⟩(curr_id_node→value) = "";
      curr_string = static_cast⟨string *⟩(curr_id_node→value);
    }
```

580.

```
⟨ Parser rules 421 ⟩ +≡
  stringstream *tex_strm = new stringstream;
  *curr_string = q→generate_tex_string(scanner_node, tex_strm);
  tex_strm→str("");
  strcpy( $$ , curr_string→c_str( )); }     /* else (curr_id_node ≠ 0) */
  } ;
```

581. ⟨string assignment⟩ ⟶ ⟨string variable⟩ `ASSIGN SQL OAI` ⟨query expression⟩. [LDF 2006.12.01.]

Log

[LDF 2006.12.01.] Added this rule.

[LDF 2006.12.06.] Changed this rule from ⟨string assignment⟩ ⟶ ⟨string variable⟩ `ASSIGN SQL` ⟨query expression⟩ to ⟨string assignment⟩ ⟶ ⟨string variable⟩ `ASSIGN SQL OAI` ⟨query expression⟩.

```
⟨ Parser rules 421 ⟩ +≡
  string_assignment:␣string_variable␣ASSIGN␣SQL␣OAI␣query_expression {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘string_assignment:␣string_variable␣ASSIGN␣" ≪
        "SQL␣OAI␣query_expression" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    stringstream tex_strm;
    stringstream select_strm;
    stringstream from_strm;
    stringstream where_strm_0;
    stringstream where_strm_1;
    Id_Node curr_id_node = static_cast⟨Id_Node⟩( $1 );
    Query_Node q = static_cast⟨Query_Node⟩( $5 );
    string *curr_string = 0;
    if (curr_id_node ≡ 0 ∨ q ≡ 0) {
      strcpy( $$ , "");
    }
    else     /* curr_id_node ≠ 0 */
    { curr_id_node→subtype = Id_Type::SQL_STRING_TYPE;
    if (curr_id_node→value ≡ 0) {
      curr_string = new string;
      curr_id_node→value = static_cast⟨void *⟩(curr_string);
    }
    else {
      *static_cast⟨string *⟩(curr_id_node→value) = "";
      curr_string = static_cast⟨string *⟩(curr_id_node→value);
    }
```

582.

```
⟨ Parser rules 421 ⟩ +≡
  bool first_select = true;
  bool first_from = true;
  bool first_where = true;
  bitset < QUERY_TYPE_BITSET_SIZE > field_flags(0L);
  int r = q→generate_sql_string(scanner_node, OAI, &tex_strm, &select_strm, &from_strm, &where_strm_0,
      &where_strm_1, &first_select, &first_from, &first_where, &field_flags, curr_string);
  tex_strm.str("");
  if (r ≡ 0) strcpy(⟨$$⟩, curr_string→c_str());
  else strcpy(⟨$$⟩, "");
  }     /* else (curr_id_node ≠ 0) */
  } ;
```

583. ⟨string assignment⟩ ⟶ ⟨string variable⟩ `ASSIGN SQL PICA` ⟨query expression⟩. [LDF 2006.12.01.]

Log

[LDF 2006.12.06.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
string_assignment: string_variable ASSIGN SQL PICA query_expression {
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘string_assignment: string_variable ASSIGN " ≪
        "SQL PICA query_expression" ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    stringstream tex_strm;
    stringstream select_strm;
    stringstream from_strm;
    stringstream where_strm_0;
    stringstream where_strm_1;
    Id_Node curr_id_node = static_cast⟨Id_Node⟩( $1 );
    Query_Node q = static_cast⟨Query_Node⟩( $5 );
    string *curr_string = 0;
    if (curr_id_node ≡ 0 ∨ q ≡ 0) {
      strcpy( $$ , "");
    }
    else    /* curr_id_node ≠ 0 */
    { curr_id_node→subtype = Id_Type::SQL_STRING_TYPE;
    if (curr_id_node→value ≡ 0) {
      curr_string = new string;
      curr_id_node→value = static_cast⟨void *⟩(curr_string);
    }
    else {
      *static_cast⟨string *⟩(curr_id_node→value) = "";
      curr_string = static_cast⟨string *⟩(curr_id_node→value);
    }
```

584.

```
⟨ Parser rules 421 ⟩ +≡
  bool first_select = true;
  bool first_from = true;
  bool first_where = true;
  bitset < QUERY_TYPE_BITSET_SIZE > field_flags(0L);
  int r = q→generate_sql_string(scanner_node, PICA, &tex_strm, &select_strm, &from_strm, &where_strm_0,
      &where_strm_1, &first_select, &first_from, &first_where, &field_flags, curr_string);
  tex_strm.str("");
  if (r ≡ 0) strcpy( $$ , curr_string→c_str( ));
  else strcpy( $$ , "");
  }    /* else (curr_id_node ≠ 0) */
  } ;
```

585. ⟨datetime assignment⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

```
⟨ Type declarations for non-terminal symbols 432 ⟩ +≡
  %type␣<pointer_value>␣datetime_assignment
```

586. ⟨datetime assignment⟩ ⟶ ⟨datetime variable⟩ `ASSIGN` ⟨datetime expression⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_assignment:␣datetime_variable␣ASSIGN␣datetime_expression
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_assignment:␣datetime_variable␣ASSIGN␣datetim\
        e_expression’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩( $1 );
    if (¬id_node) $$ = 0;
    else {
      if (id_node→value ≠ 0) delete static_cast⟨Date_Time_Node⟩(id_node→value);
      id_node→value = $3;
      $$ = $3;
    }
#undef DEBUG_OUTPUT
  }
  ;
```

587. ⟨datetime assignment⟩ ⟶ ⟨datetime variable⟩ COLON ⟨datetime specifier⟩ **(etc.).** ⟨datetime assignment⟩ ⟶ ⟨datetime variable⟩ COLON ⟨datetime specifier⟩ ⟨assignment operator⟩ INTEGER. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_assignment:␣datetime_variable␣COLON␣datetime_specifier␣
  assignment_operator␣INTEGER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_assignment:␣datetime_variable␣COLON␣" ≪
        "datetime_specifier␣assignment_operator␣INTEGER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩($1);
    if (¬id_node) {
      temp_strm ≪ "ERROR!␣␣In␣‘yyparse’,␣rule" ≪ endl ≪
          "‘datetime_assignment:␣datetime_variable␣COLON␣" ≪ "datetime_specifier␣\
          assignment_operator␣INTEGER’:" ≪ endl ≪ "‘datetime_variable’␣==␣NULL.␣␣" ≪
          "Setting␣value␣of␣action␣(‘datetime_assignment’)␣" ≪ "to␣0." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      $$ = 0;
    }     /* if (¬id_node) */
    else      /* id_node ≠ 0 */
    {
      Date_Time_Node d = static_cast⟨Date_Time_Node⟩(id_node→value);
      int val = $5;
      datetime_assignment_func_0(scanner_node, d, $3, $4, static_cast⟨void *⟩(&val), INTEGER);
      id_node→value = static_cast⟨void *⟩(d);
      $$ = id_node→value;
    }     /* else (id_node ≠ 0) */
#undef DEBUG_OUTPUT
  }
  ;
```

588. ⟨datetime assignment⟩ ⟶ ⟨datetime variable⟩ COLON ⟨datetime specifier⟩ **(etc.).** ⟨datetime assignment⟩ ⟶ ⟨datetime variable⟩ COLON ⟨datetime specifier⟩ ⟨assignment operator⟩ FLOAT. [LDF 2006.12.18.]

Log

[2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
  datetime_assignment: datetime_variable COLON datetime_specifier
  assignment_operator FLOAT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_assignment: datetime_variable COLON "
        "datetime_specifier assignment_operator FLOAT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node id_node = static_cast⟨Id_Node⟩($1);
    if (¬id_node) {
      temp_strm ≪ "ERROR!  In ‘yyparse’, rule" ≪ endl ≪
          "‘datetime_assignment: datetime_variable COLON " ≪ "datetime_specifier \
          assignment_operator FLOAT’:" ≪ endl ≪ "‘datetime_variable’ == NULL.  " ≪
          "Setting value of action (‘datetime_assignment’) " ≪ "to 0." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      $$ = 0;
    }     /* if (¬id_node) */
    else      /* id_node ≠ 0 */
    {
      Date_Time_Node d = static_cast⟨Date_Time_Node⟩(id_node→value);
      float val = $5;
      datetime_assignment_func_0(scanner_node, d, $3, $4, static_cast⟨void *⟩(&val), FLOAT);
      id_node→value = static_cast⟨void *⟩(d);
      $$ = id_node→value;
    }     /* else (id_node ≠ 0) */
#undef DEBUG_OUTPUT
  }
  ;
```

589. Datetime specifier.

Log

[2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣datetime_specifier
```

590. ⟨datetime specifier⟩ ⟶ `YEAR_RANGE_BEGIN`. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_specifier:␣YEAR_RANGE_BEGIN
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_specifier:␣YEAR_RANGE_BEGIN’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = YEAR_RANGE_BEGIN;
  }
  ;
```

591. ⟨datetime specifier⟩ ⟶ `YEAR_RANGE_END`. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_specifier:␣YEAR_RANGE_END
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_specifier:␣YEAR_RANGE_END’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = YEAR_RANGE_END;
  }
  ;
```

592. ⟨datetime specifier⟩ ⟶ `YEAR`. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_specifier:␣YEAR
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_specifier:␣YEAR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = YEAR;
  }
  ;
```

593. ⟨datetime specifier⟩ ⟶ `MONTH`. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_specifier:␣MONTH
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_specifier:␣MONTH’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = MONTH;
  }
  ;
```

594. ⟨datetime specifier⟩ ⟶ `DAY`. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_specifier: DAY
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_specifier: DAY’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = DAY;
  }
  ;
```

595. ⟨datetime specifier⟩ ⟶ `HOUR`. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_specifier: HOUR
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_specifier: HOUR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = HOUR;
  }
  ;
```

596. ⟨datetime specifier⟩ ⟶ `MINUTE`. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_specifier: MINUTE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_specifier: MINUTE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = MINUTE;
  }
  ;
```

597. ⟨datetime specifier⟩ ⟶ `SECOND`. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_specifier: SECOND
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_specifier: SECOND’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = SECOND;
  }
  ;
```

598. Commands (`commands.w`). [LDF 2006.11.13.]

Log

[LDF 2006.11.13.] Added this file.

⟨ `commands.w` 598 ⟩ ≡

```
static char commands_id_string[ ] = "$Id: commands.w,v 1.6 2007/02/13 20:42:\
    40 lfinsto1 Exp $";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

599.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <int_value> command
```

600. Messages. [LDF 2006.11.15.]

Log

[2006.11.15.] Added this section.

601. ⟨message or errmessage⟩**.** [LDF 2006.11.15.]

Log

[2006.11.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣message_or_errmessage
```

602. ⟨message or errmessage⟩ ⟶ `MESSAGE`**.** [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
message_or_errmessage:␣MESSAGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘message_or_errmessage:␣MESSAGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = MESSAGE;
  }
  ;
```

603. ⟨message or errmessage⟩ ⟶ ERRMESSAGE. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  message_or_errmessage: ERRMESSAGE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘message_or_errmessage: ERRMESSAGE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = ERRMESSAGE;
  }
  ;
```

604. ⟨command⟩ —→ ⟨message or errmessage⟩**.** `STRING`. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
command: message_or_errmessage STRING
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘command: message_or_errmessage STRING’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    if ($1 ≡ ERRMESSAGE) temp_strm ≪ "ERROR!  ";
    temp_strm ≪ $2 ≪ endl;
    if ($1 ≡ ERRMESSAGE) temp_strm ≪ "Type <RETURN> to continue: ";
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    if ($1 ≡ ERRMESSAGE) getchar();
    cerr_mutex.unlock();
  }
  ;
```

605. ⟨command⟩ —→ PAUSE. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  command:␣PAUSE
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule␣‘command:␣PAUSE’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    temp_strm ≪ "Enter␣<RETURN>␣to␣continue:␣";
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    getchar();
    cerr_mutex.unlock();
  }
  ;
```

606. ⟨command⟩ —→ SHOW ⟨query variable⟩. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
command: SHOW query_variable
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘command: SHOW query_variable’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩( $2 );
    if (curr_id_node ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule ‘command: SHOW query_variable’:" ≪ endl ≪
          "‘query_variable’ is NULL.  Can’t show.  Continuing.";
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
      $$ = 1;
    }    /* if (curr_id_node ≡ 0) */
    else if (curr_id_node→value ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule ‘command: SHOW query_variable’:" ≪
          endl ≪ "The ‘value’ element of ‘query_variable’ is NULL.  " ≪
          "Can’t show.  Continuing.";
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
      $$ = 1;
    }    /* if (curr_id_node ≡ 0) */
    else if (curr_id_node ∧ curr_id_node→value) {
      Query_Node curr_query_node = static_cast⟨Query_Node⟩(curr_id_node→value);
      cerr_mutex.lock( );
      curr_query_node→show("Query_Type:");
      cerr_mutex.unlock( );
      $$ = 0;
```

```
    }
#undef DEBUG_OUTPUT
  }
  ;
```

607. ⟨command⟩ —→ SHOW ⟨datasource variable⟩. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
command: SHOW datasource_variable
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘command: SHOW datasource_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($2);
    if (curr_id_node ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule ‘command: SHOW datasource_variable’:" ≪
          endl ≪ "‘datasource_variable’ is NULL.  Can’t show.  Continuing.";
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      $$ = 1;
    }    /* if (curr_id_node ≡ 0) */
    else if (curr_id_node→value ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule ‘command: SHOW datasource_variable’:" ≪
          endl ≪ "The ‘value’ element of ‘datasource_variable’ is NULL.  " ≪
          "Can’t show.  Continuing.";
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      $$ = 1;
    }    /* if (curr_id_node ≡ 0) */
    else if (curr_id_node ∧ curr_id_node→value) {
      Datasource_Node curr_datasource_node = static_cast⟨Datasource_Node⟩(curr_id_node→value);
      cerr_mutex.lock();
      curr_datasource_node→show("Datasource_Type:");
      cerr_mutex.unlock();
      $$ = 0;
```

```
    }
#undef DEBUG_OUTPUT
  }
  ;
```

608. ⟨command⟩ —→ SHOW ⟨datetime variable⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  command: SHOW datetime_variable
  {
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘command: SHOW datetime_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($2);
    if (curr_id_node ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule ‘command: SHOW datetime_variable’:" ≪
          endl ≪ "‘datetime_variable’ is NULL.  Can’t show.  Continuing.";
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      $$ = 1;
    }    /* if (curr_id_node ≡ 0) */
    else if (curr_id_node→value ≡ 0) {
      temp_strm ≪ "WARNING!  In ‘yyparse’, rule ‘command: SHOW datetime_variable’:" ≪
          endl ≪ "The ‘value’ element of ‘datetime_variable’ is NULL.  " ≪
          "Can’t show.  Continuing.";
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
      $$ = 1;
    }    /* if (curr_id_node ≡ 0) */
    else if (curr_id_node ∧ curr_id_node→value) {
      Date_Time_Node curr_date_time_node = static_cast⟨Date_Time_Node⟩(curr_id_node→value);
      cerr_mutex.lock();
      curr_date_time_node→show("Date_Time_Type:");
      cerr_mutex.unlock();
      $$ = 0;
```

```
    }
#undef DEBUG_OUTPUT
  }
  ;
```

609. ⟨command⟩ —→ SHOW ⟨string expression⟩. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
  command: SHOW string_expression
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘command: SHOW string_expression’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    temp_strm ≪ "string == " ≪ $2 ≪ endl;
#undef DEBUG_OUTPUT
  }
  ;
```

610. ⟨command⟩ —→ OUTPUT TEX ⟨string expression⟩. [LDF 2006.11.23.]

Log

[LDF 2006.11.23.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
command: OUTPUT TEX string_expression
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Rule ‘command: OUTPUT TEX string_expression’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    stringstream temp_filename;
    tex_mutex.lock( );
    temp_filename ≪ tex_filename_str ≪ tex_file_ctr++ ≪ ".tex";
    tex_file_strm.open(temp_filename.str( ).c_str( ));
    tex_file_strm ≪ copyright_tex_str ≪ endl;
    time_t tp;
    time(&tp);
    time_mutex.lock( );
    tm *local_time = localtime(&tp);
    char *datestamp = asctime(local_time);
    time_mutex.unlock( );
    tex_file_strm ≪ "%% This file was generated by ‘Scantest’ on " ≪ datestamp ≪ "\n\n";
    tex_file_strm ≪ "\\input chrtbase.tex\n\n" ≪ $3 ≪ "\n\n\\bye\n";
    tex_file_strm.close( );
    tex_mutex.unlock( );
#undef DEBUG_OUTPUT
  }
  ;
```

611. Query expressions (queryexp.w). [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this file.

612.

⟨ queryexp.w 612 ⟩ ≡

```
static char queryexp_id_string[] = "$Id: queryexp.w,v 1.5 2007/02/13 20:40:23 lfinsto1 Exp $";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

613. query primary. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> query_primary
```

614. ⟨query primary⟩ ⟶ ⟨query variable⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_primary: query_variable
  {
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_primary: query_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($1);
    if (curr_id_node ∧ curr_id_node→value) {
      Query_Node curr_query_node = new Query_Type;
      *curr_query_node = *static_cast⟨Query_Node⟩(curr_id_node→value);
      $$ = static_cast⟨void *⟩(curr_query_node);
    }
    else $$ = 0;
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Exiting rule ‘query_primary: query_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
  }
  ;
```

615. ⟨query primary⟩ ⟶ (⟨query expression⟩). [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_primary: OPEN_PARENTHESIS query_expression CLOSE_PARENTHESIS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_primary: OPEN_PARENTHESIS query_expression CLOS\
        E_PARENTHESIS’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Query_Node q = static_cast⟨Query_Node⟩( $2 );
    $$ = $2;
  }
  ;
```

616. ⟨query primary⟩ ⟶ `STRING`. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_primary: STRING
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_primary: STRING’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Query_Node curr_query_node = new Query_Type;
    curr_query_node→value_type = Query_Type::QUERY_TYPE_STRING_TYPE;
    curr_query_node→value = static_cast⟨void *⟩(new string);
    *static_cast⟨string *⟩(curr_query_node→value) = $1;
    $$ = static_cast⟨void *⟩(curr_query_node);
  }
  ;
```

617. ⟨query primary⟩ ⟶ `INTEGER`. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_primary: INTEGER
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_primary: INTEGER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Query_Node curr_query_node = new Query_Type;
    curr_query_node→value_type = Query_Type::INT_TYPE;
    curr_query_node→value = static_cast⟨void *⟩(new int);
    *static_cast⟨int *⟩(curr_query_node→value) = $1;
    $$ = static_cast⟨void *⟩(curr_query_node);
  }
  ;
```

618. ⟨query primary⟩ ⟶ FLOAT. [LDF 2006.12.14.]

Log

[LDF 2006.12.14.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
query_primary: FLOAT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_primary: FLOAT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Query_Node curr_query_node = new Query_Type;
    curr_query_node→value_type = Query_Type::FLOAT_TYPE;
    curr_query_node→value = static_cast⟨void *⟩(new float);
    *static_cast⟨float *⟩(curr_query_node→value) = $1;
    $$ = static_cast⟨void *⟩(curr_query_node);
  }
  ;
```

619. **query secondary.** [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> query_secondary
```

620. ⟨query secondary⟩ ⟶ ⟨query primary⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_secondary:␣query_primary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_secondary:␣query_primary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

621. ⟨query secondary⟩ ⟶ ⟨query secondary⟩ ⟨and or and not⟩ ⟨query primary⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
query_secondary: query_secondary and_or_and_not query_primary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘query_secondary: query_secondary and_or_and_not query\
        _primary’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Query_Node secondary = static_cast⟨Query_Node⟩( $1 );
    Query_Node primary = static_cast⟨Query_Node⟩( $3 );
    primary→up = secondary;
    primary→query_type = Query_Type::AND_TYPE;
    primary→negated = ( $2 ≡ AND_NOT) ? true : false;
    while (secondary→and_node ≠ 0) secondary = secondary→and_node;
    secondary→and_node = primary;
    primary→query_ctr = secondary→query_ctr + 1;
    $$ = $1;
  }
  ;
```

622. **query tertiary.** [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> query_tertiary
```

623. ⟨query tertiary⟩ ⟶ ⟨query secondary⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_tertiary:␣query_secondary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_tertiary:␣query_secondary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

624. ⟨query tertiary⟩ ⟶ ⟨query tertiary⟩ ⟨xor or xor not⟩ ⟨query secondary⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
query_tertiary:␣query_tertiary␣xor_or_xor_not␣query_secondary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_tertiary:␣query_tertiary␣xor_or_xor_not␣query_s\
        econdary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Query_Node tertiary = static_cast⟨Query_Node⟩($1);
    Query_Node secondary = static_cast⟨Query_Node⟩($3);
    secondary→up = tertiary;
    secondary→query_type = Query_Type::XOR_TYPE;
    secondary→negated = ($2 ≡ XOR_NOT) ? true : false;
    while (tertiary→xor_node ≠ 0) tertiary = tertiary→xor_node;
    tertiary→xor_node = secondary;
    secondary→query_ctr = tertiary→query_ctr + 1;
    $$ = $1;
  }
  ;
```

625. query expression. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<pointer_value>␣query_expression
```

626. ⟨query expression⟩ ⟶ ⟨query tertiary⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  query_expression:␣query_tertiary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_expression:␣query_tertiary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

627. ⟨query expression⟩ —→ ⟨query expression⟩ ⟨or or or not⟩ ⟨query tertiary⟩. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
query_expression:␣query_expression␣or_or_or_not␣query_tertiary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘query_expression:␣query_expression␣or_or_or_not␣query\
        _tertiary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Query_Node expression = static_cast⟨Query_Node⟩($1);
    Query_Node tertiary = static_cast⟨Query_Node⟩($3);
    tertiary→up = expression;
    tertiary→query_type = Query_Type::OR_TYPE;
    while (expression→or_node ≠ 0) expression = expression→or_node;
    tertiary→negated = ($2 ≡ OR_NOT) ? true : false;
    expression→or_node = tertiary;
    tertiary→query_ctr = expression→query_ctr + 1;
    $$ = $1;
  }
  ;
```

628. Boolean operators. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this section with the type declarations of *and_or_and_not*, *or_or_or_not*, and *xor_or_xor_not*.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<int_value>␣and_or_and_not  %type␣<int_value>␣or_or_or_not  %type␣<int_value>␣xor_or_xor_no
```

629. ⟨and or and not⟩ ⟶ AND. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  and_or_and_not: AND
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘and_or_and_not: AND’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = AND;
  }
  ;
```

630. ⟨and or and not⟩ —→ AND_NOT. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  and_or_and_not: AND_NOT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘and_or_and_not: AND_NOT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = AND_NOT;
  }
  ;
```

631. ⟨or or or not⟩ ⟶ OR. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  or_or_or_not: OR
  {
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘or_or_or_not: OR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = OR;
  }
  ;
```

632. ⟨or or or not⟩ ⟶ `OR_NOT`. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  or_or_or_not: OR_NOT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘or_or_or_not: OR_NOT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = OR_NOT;
  }
  ;
```

633. ⟨xor or xor not⟩ ⟶ XOR. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  xor_or_xor_not:␣XOR
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘xor_or_xor_not:␣XOR’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = XOR;
  }
  ;
```

634. ⟨xor or xor not⟩ ⟶ XOR_NOT. [LDF 2006.11.15.]

Log

[LDF 2006.11.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
xor_or_xor_not: XOR_NOT
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘xor_or_xor_not: XOR_NOT’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = XOR_NOT;
  }
  ;
```

635. Datasource expressions (dtsrcexp.w). [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this file.

636.

⟨ dtsrcexp.w 636 ⟩ ≡

```
static char dtsrcexp_id_string[] = "$Id: dtsrcexp.w,v 1.6 2007/02/13 20:37:48 lfinsto1 Exp $";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

637. datasource primary. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datasource_primary
```

638. ⟨datasource primary⟩ ⟶ ⟨datasource variable⟩. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_primary: datasource_variable
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_primary: datasource_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($1);
    if (curr_id_node ∧ curr_id_node→value) {
      Datasource_Node curr_datasource_node = new Datasource_Type;
      *curr_datasource_node = *static_cast⟨Datasource_Node⟩(curr_id_node→value);
      $$ = static_cast⟨void *⟩(curr_datasource_node);
    }
    else $$ = 0;
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Exiting rule ‘datasource_primary: datasource_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
  }
  ;
```

639. ⟨datasource primary⟩ ⟶ (⟨datasource expression⟩). [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_primary: OPEN_PARENTHESIS datasource_expression CLOSE_PARENTHESIS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_primary: OPEN_PARENTHESIS datasource_expre\
        ssion " ≪ "CLOSE_PARENTHESIS’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    Datasource_Node q = static_cast⟨Datasource_Node⟩( $2 );
    $$ = $2;
  }
  ;
```

640. datasource secondary. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datasource_secondary
```

641. ⟨datasource secondary⟩ ⟶ ⟨datasource primary⟩**.** [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_secondary: datasource_primary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_secondary: datasource_primary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

642. datasource tertiary. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datasource_tertiary
```

643. ⟨datasource tertiary⟩ ⟶ ⟨datasource secondary⟩**.** [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_tertiary:␣datasource_secondary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datasource_tertiary:␣datasource_secondary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

644. datasource expression. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<pointer_value>␣datasource_expression
```

645. ⟨datasource expression⟩ —→ ⟨datasource tertiary⟩. [LDF 2006.12.08.]

Log

[LDF 2006.12.08.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datasource_expression: datasource_tertiary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datasource_expression: datasource_tertiary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

646. String expressions (`strings.w`). [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this file.

⟨ `strings.w` 646 ⟩ ≡

```
  static char strings_id_string[] = "$Id: strings.w,v 1.5 2007/02/13 20:41:57 lfinsto1 Exp $";
```

This code is used in section 675.

647. ⟨string primary⟩. [LDF 2006.11.16.]

Log

[2006.11.16.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <string_value> string_primary
```

648. ⟨string primary⟩ ⟶ ⟨string variable⟩. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  string_primary:␣string_variable
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘string_primary:␣string_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($1);
    if (curr_id_node ≡ 0 ∨ curr_id_node→value ≡ 0) strcpy($$, "");
    else {
      strcpy($$, static_cast⟨string *⟩(curr_id_node→value)→c_str());
    }
  }
  ;
```

649. ⟨string primary⟩: STRING. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  string_primary: STRING
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘string_primary: STRING’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    strcpy($$, $1);
  }
  ;
```

650. ⟨string primary⟩ ⟶ (⟨string expression⟩). [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
string_primary: OPEN_PARENTHESIS string_expression CLOSE_PARENTHESIS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘string_primary: OPEN_PARENTHESIS string_expression CL\
        OSE_PARENTHESIS’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    strcpy( $$, $2 );
  }
  ;
```

651. string secondary. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <string_value> string_secondary
```

652. ⟨string secondary⟩ ⟶ ⟨string primary⟩. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
string_secondary:␣string_primary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘string_secondary:␣string_primary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    strcpy($$, $1);
  }
  ;
```

653. string tertiary. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<string_value>␣string_tertiary
```

654. ⟨string tertiary⟩ ⟶ ⟨string secondary⟩. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
string_tertiary: string_secondary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘string_tertiary: string_secondary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    strcpy($$, $1);
  }
  ;
```

655. string expression. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <string_value> string_expression
```

656. ⟨string expression⟩ ⟶ ⟨string tertiary⟩. [LDF 2006.11.16.]

Log

[LDF 2006.11.16.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
string_expression:␣string_tertiary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘string_expression:␣string_tertiary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    strcpy($$, $1);
  }
  ;
```

657. Datetime expressions (dttmexp.w). [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this file.

658.

⟨ dttmexp.w 658 ⟩ ≡

```
static char dttmexp_id_string[] = "$Id:␣dttmexp.w,v␣1.5␣2007/02/13␣20:38:33␣lfinsto1␣Exp␣$";
```

This code is cited in sections 7 and 8.

This code is used in section 675.

659. datetime primary. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<pointer_value>␣datetime_primary
```

660. ⟨datetime primary⟩ —→ ⟨datetime variable⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_primary:␣datetime_variable
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_primary:␣datetime_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Id_Node curr_id_node = static_cast⟨Id_Node⟩($1);
    if (curr_id_node ∧ curr_id_node→value) {
      Date_Time_Node curr_datetime_node = new Date_Time_Type;
      *curr_datetime_node = *static_cast⟨Date_Time_Node⟩(curr_id_node→value);
      $$ = static_cast⟨void *⟩(curr_datetime_node);
    }
    else $$ = 0;
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Exiting␣rule␣‘datetime_primary:␣datetime_variable’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
  }
  ;
```

661. ⟨datetime primary⟩ ⟶ (⟨datetime expression⟩). [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_primary:␣OPEN_PARENTHESIS␣datetime_expression␣CLOSE_PARENTHESIS
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_primary:␣OPEN_PARENTHESIS␣" ≪
        "datetime_expression␣CLOSE_PARENTHESIS’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Date_Time_Node q = static_cast⟨Date_Time_Node⟩( $2 );
    $$ = $2;
  }
  ;
```

662. ⟨datetime primary⟩ ⟶ ⟨datetime element list⟩. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_primary:␣datetime_element_list
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_primary:␣datetime_element_list." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Date_Time_Node d = 0;
    datetime_assignment_func_1(scanner_node, d, ASSIGN, $1);
    $$ = static_cast⟨void *⟩(d);
  }
  ;
```

663. datetime secondary. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type␣<pointer_value>␣datetime_secondary
```

664. ⟨datetime secondary⟩ —→ ⟨datetime primary⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_secondary: datetime_primary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_secondary: datetime_primary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

665. datetime tertiary. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datetime_tertiary
```

666. ⟨datetime tertiary⟩ —→ ⟨datetime secondary⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_tertiary: datetime_secondary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_tertiary: datetime_secondary’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

667. datetime expression. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datetime_expression
```

668. ⟨datetime expression⟩ ⟶ ⟨datetime tertiary⟩. [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_expression: datetime_tertiary
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_expression: datetime_tertiary’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    $$ = $1;
  }
  ;
```

669. Datetime element list. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this type declaration.

⟨ Type declarations for non-terminal symbols 432 ⟩ +≡

```
%type <pointer_value> datetime_element_list
```

670. ⟨datetime element list⟩ ⟶ INTEGER COLON INTEGER. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_element_list: INTEGER COLON
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_element_list: INTEGER COLON INTEGER’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    vector⟨pair⟨int, void *⟩⟩ *v = new vector⟨pair⟨int, void *⟩⟩;
    int *i = new int( $1 );
    v→push_back(make_pair(INTEGER, static_cast⟨void *⟩(i)));
    $$ = static_cast⟨void *⟩(v);
  }
  ;
```

671. ⟨datetime element list⟩ —→ `FLOAT COLON.` [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

```
⟨ Parser rules 421 ⟩ +≡
  datetime_element_list: FLOAT COLON
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_element_list: FLOAT COLON’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    vector⟨pair⟨int, void *⟩⟩ *v = new vector⟨pair⟨int, void *⟩⟩;
    float *f = new float( $1 );
    v→push_back(make_pair(FLOAT, static_cast⟨void *⟩(f)));
    $$ = static_cast⟨void *⟩(v);
  }
  ;
```

672. ⟨datetime element list⟩ ⟶ ⟨datetime element list⟩ COLON INTEGER. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_element_list:␣datetime_element_list␣INTEGER␣COLON
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule␣‘datetime_element_list:␣datetime_element_list␣" ≪
        "INTEGER␣COLON’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    vector⟨pair⟨int, void *⟩⟩ *v = static_cast⟨vector⟨pair⟨int, void *⟩⟩ *⟩($1);
    int *i = new int($2);
    v→push_back(make_pair(INTEGER, static_cast⟨void *⟩(i)));
    $$ = static_cast⟨void *⟩(v);
  }
  ;
```

673. ⟨datetime element list⟩ ⟶ ⟨datetime element list⟩ `FLOAT COLON`. [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this rule.

⟨ Parser rules 421 ⟩ +≡

```
datetime_element_list: datetime_element_list FLOAT COLON
  {
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(parameter);
    temp_strm ≪ endl ≪ "Rule ‘datetime_element_list: datetime_element_list " ≪
        "FLOAT COLON’." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
#endif
    vector⟨pair⟨int, void *⟩⟩ *v = static_cast⟨vector⟨pair⟨int, void *⟩⟩ *⟩( $1 );
    float *f = new float( $2 );
    v→push_back(make_pair(FLOAT, static_cast⟨void *⟩(f)));
    $$ = static_cast⟨void *⟩(v);
  }
  ;
```

674. Putting the parser together.

675. Filename sections. These sections contain the CVS ID strings for the individual parser files. [LDF 2006.10.31.] ∎

Log

[2006.10.31.] Added this section.

⟨ Filename sections 675 ⟩ ≡

⟨ parser.w 392 ⟩
⟨ declrtns.w 434 ⟩
⟨ grpstmnt.w 431 ⟩
⟨ variabls.w 455 ⟩
⟨ assign.w 479 ⟩
⟨ queryexp.w 612 ⟩
⟨ dtsrcexp.w 636 ⟩
⟨ commands.w 598 ⟩
⟨ strings.w 646 ⟩
⟨ dttmexp.w 658 ⟩

This code is used in sections 676 and 677.

676. This is what's written to `parser.yyy`. [LDF 2006.10.20.]

⟨ `parser.yyy` 676 ⟩ ≡

```
%{
⟨ Include files 10 ⟩
⟨ Filename sections 675 ⟩
⟨ Declare yylex 305 ⟩
⟨ Declare yyerror 395 ⟩
#define YYPARSE_PARAM parameter
#define YYLEX_PARAM parameter
  stringstream temp_strm;
%}
⟨ union declaration for YYSTYPE 368 ⟩
⟨ Bison declarations 397 ⟩
⟨ Token and type declarations 370 ⟩
⟨ Type declarations for non-terminal symbols 432 ⟩
%%
⟨ Parser rules 421 ⟩
```

677. This is what *isn't* compiled. The file `parser.c` isn't compiled, but including ⟨ `parser.w` 392 ⟩ here prevents CWEAVE from issuing a warning. [LDF 2006.10.24.]

```
⟨ Filename sections 675 ⟩
#if 0    /* 1 */
⟨ Garbage 426 ⟩
#endif
```

678. Parser functions (`prsrfncs.web`). [LDF 2006.10.31.]

Log

[LDF 2006.10.31.] Created this file.

⟨ `prsrfncs.web` 678 ⟩ ≡

```
static char id_string[] = "$Id: prsrfncs.web,v 1.6 2007/02/13 20:39:45 lfinsto1 Exp $";
```

This code is used in section 728.

679. Include files.

⟨ Include files 10 ⟩ +≡

```
#include "localldf.h"
#ifdef NON_WIN_LDF
#include "nonwin.h"
#else
#include "stdafx.h"
#endif
#include "parser.hxx"
#include "dttmtype.h"
#include "idtype.h"
#include "scnrtype.h"
#include "scanner.h"
#include "querytyp.h"
#include "dtsrctyp.h"
```

680. Preprocessor macro calls.

⟨ Preprocessor macro calls 23 ⟩ +≡

```
#ifdef WIN_LDF
#pragma once
#endif
```

681. Parser function definitions. [LDF 2006.10.31.]

682. Functions for variables. [LDF 2006.11.02.]

Log

[2006.11.02.] Added this section.

683. *variable_func.* [LDF 2006.11.02.]

Log

[2006.11.02.] Added this function.

```
⟨ Define parser functions 683 ⟩ ≡
  void *Scan_Parse::variable_func(void *v, char *name){
#if 0     /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(v);
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Entering␣`Scan_Parse::variable_func'." ≪ endl ≪ "`name'␣==␣" ≪ name ≪
          endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
```

See also sections 684, 685, 686, 687, 688, 689, 691, 692, 693, 695, 696, 697, 698, 699, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, and 726.

This code is used in section 728.

684. Error handling: *scanner_node* ≡ 0. This shouldn't ever happen. If it does, we can't continue. [LDF 2006.11.01.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (scanner_node ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣`Scan_Parse::variable_func':" ≪
        "`scanner_node'␣==␣0.␣␣Can't␣continue." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣0." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    temp_strm.str("");
    return 0;
  }     /* if (scanner_node ≡ 0) */
  map⟨string, Id_Node⟩::iterator iter = scanner_node→id_map.find(name);
```

685. Error handling: *name* not found in *scanner_node→id_map*. [LDF 2006.11.03.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (iter ≡ scanner_node→id_map.end()) {
    temp_strm ≪ "ERROR!␣␣In␣‘Scan_Parse::variable_func’:" ≪ endl ≪
        "‘" ≪ name ≪ "’␣not␣found␣in␣‘scanner_node->id_map’." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣0." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    scanner_node→float_vector.clear();
    return 0;
  }     /* if (iter ≡ scanner_node→id_map.end()) */
```

686. *name* found in *scanner_node→id_map*. [LDF 2006.11.03.]

```
⟨ Define parser functions 683 ⟩ +≡
  else      /* iter ≠ scanner_node→id_map.end() */
  { Id_Node curr_id_node = 0;
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "In␣‘Scan_Parse::variable_func’:" ≪ endl ≪ "‘" ≪ name ≪
      "’␣found␣in␣‘scanner_node->id_map’." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
#endif
```

687. *name* doesn't refer to an array. [LDF 2006.11.03.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (strchr(name, '¥') ≡ 0) {
    curr_id_node = iter→second;
  }     /* if (strchr(name, '¥') ≡ 0) */
```

688. *name* refers to an array. [LDF 2006.11.03.]

```
⟨ Define parser functions 683 ⟩ +≡
  else      /* (strchr(name, '¥') ≠ 0) */
  {
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "'name' ('" ≪ name ≪ "') contains " ≪ scanner_node→float_vector.size() ≪
        " subscript placeholder";
    if (scanner_node→float_vector.size() > 1) temp_strm ≪ "s";
    temp_strm ≪ "." ≪ endl;
#endif
    int i = 0;
    for (vector⟨float⟩::const_iterator subscript_iter = scanner_node→float_vector.begin();
        subscript_iter ≠ scanner_node→float_vector.end(); ++subscript_iter) {
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Subscript " ≪ i++ ≪ " == " ≪ *subscript_iter ≪ endl;
#endif
    }     /* for */
#ifdef DEBUG_OUTPUT
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    curr_id_node = scanner_node→lookup(name, true, iter→second→type);
  }     /* else (strchr(name, '¥') ≠ 0) */
```

689. Push a **Token_Type** object onto *scanner_node→token_stack*. [LDF 2006.11.03.]

```
⟨ Define parser functions 683 ⟩ +≡
  YYSTYPE curr_value;
  curr_value.pointer_value = static_cast⟨void *⟩(curr_id_node);
  scanner_node→token_stack.push(Token_Type(curr_id_node→type, curr_value));
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣'Scan_Parse::variable_func'␣successfully␣" ≪
      "with␣return␣value␣'curr_id_node'␣(cast␣to␣'void*')." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  scanner_node→float_vector.clear( );
  return static_cast⟨void *⟩(curr_id_node); }      /* else (iter ≠ scanner_node→id_map.end( )) */
#undef DEBUG_OUTPUT
  }     /* End of Scan_Parse::variable_func definition. */
```

690. Functions for declarations. [LDF 2006.11.01.]

Log

[LDF 2006.11.01.] Added this section.

691. Declare variable function. [LDF 2006.11.01.]

Log

[2006.11.01.] Added this function.

[LDF 2006.11.01.] Added the **char** **name* argument.

[LDF 2006.11.02.] Changed the return value to **Id_Node**. Now returning *curr_id_node* if successful, or 0 if not.

```
⟨ Define parser functions 683 ⟩ +≡
  Id_Node Scan_Parse::declare_variable_func(void *v, const unsigned short type, char *name){
#if 0    /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
    stringstream temp_strm;
    Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(v);
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "Entering␣`Scan_Parse::declare_variable_func'." ≪ endl ≪ "`type'␣==␣`" ≪
        token_map[type] ≪ "'" ≪ endl ≪ "`name'␣==␣" ≪ name ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
```

692. Error handling: *scanner_node* ≡ 0. This shouldn't ever happen. If it does, we can't continue. [LDF 2006.11.01.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (scanner_node ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣`Scan_Parse::declare_variable_func':" ≪
        "`scanner_node'␣==␣0.␣␣Can't␣continue." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣0." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    temp_strm.str("");
    return 0;
  }    /* if (scanner_node ≡ 0) */
```

693.

Log

[LDF 2006.11.02.] Now setting *curr_id_node→scanner_node* = *scanner_node*.

⟨ Define parser functions 683 ⟩ +≡

```
  Id_Node curr_id_node = new Id_Type;
  curr_id_node→name = name;
  curr_id_node→type = type;
  curr_id_node→scanner_node = scanner_node;
  scanner_node→id_map[curr_id_node→name] = curr_id_node;
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "‘scanner_node->id_map[curr_id_node->name]->name’␣==␣" ≪
      scanner_node→id_map[curr_id_node→name]→name ≪ endl ≪
      "‘scanner_node->id_map[curr_id_node->name]->type’␣==␣‘" ≪
      token_map[scanner_node→id_map[curr_id_node→name]→type] ≪ "’" ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "Exiting␣‘Scan_Parse::declare_variable_func’." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  return curr_id_node;
#undef DEBUG_OUTPUT
  }    /* End of Scan_Parse::declare_variable_func definition. */
```

694. Functions for assignments. [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this section.

695. *query_assignment_func_0.* [LDF 2006.11.02.]

Log

[LDF 2006.11.02.] Added this function.

[LDF 2006.11.13.] Added the arguments **unsigned int** *arg_0*, **unsigned int** *arg_1*, and **void** ∗*value*.

```
⟨ Define parser functions 683 ⟩ +≡
  void ∗Scan_Parse::query_assignment_func_0(void ∗v, void ∗object, unsigned int
          assignment_type, unsigned int arg_0, unsigned int arg_1, void ∗value, bool negate){
#if 1     /∗ 0 ∗/
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(v);
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Entering␣‘Scan_Parse::query_assignment_func_0’." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
```

696. Error handling: *scanner_node* ≡ 0. This shouldn't ever happen. If it does, we can't continue. [LDF 2006.11.01.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (scanner_node ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣‘Scan_Parse::query_assignment_func_0’:" ≪
        "‘scanner_node’␣==␣0.␣␣Can’t␣continue." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣0." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    temp_strm.str("");
    return 0;
  }     /∗ if (scanner_node ≡ 0) ∗/
```

697.

```
⟨ Define parser functions 683 ⟩ +≡
  if (object ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣'Scan_Parse::query_assignment_func_0':" ≪
        endl ≪ "'object'␣==␣0.␣␣Can't␣perform␣assignment." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣0." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    return 0;
  }     /* if (object ≡ 0) */
```

698.

```
⟨ Define parser functions 683 ⟩ +≡
  Id_Node curr_id_node = static_cast⟨Id_Node⟩(object);
  Query_Node curr_query_node = 0;
  if (curr_id_node→value ≡ 0) {
    curr_query_node = new Query_Type;
    curr_query_node→query_type = Query_Type::TOP_TYPE;
    curr_query_node→id_node = curr_id_node;
    curr_query_node→name = curr_id_node→name;
    curr_query_node→scanner_node = scanner_node;
    curr_id_node→value = static_cast⟨void *⟩(curr_query_node);
  }     /* if (curr_id_node→value ≡ 0) */
  else {
    curr_query_node = static_cast⟨Query_Node⟩(curr_id_node→value);
  }
#if 0     /* 1 */
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "arg_0␣==␣" ≪ token_map[arg_0] ≪ endl ≪ "arg_1␣==␣" ≪ token_map[arg_1] ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
#endif
#endif
```

699. Targets. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this section.

```
⟨ Define parser functions 683 ⟩ +≡
  if (arg_0 ≡ LOCAL) {
    if (arg_1 ≡ DATABASE ∧ find(curr_query_node→target_types.begin( ), curr_query_node→target_types.end( ),
          Query_Type::LOCAL_DATABASE_TARGET) ≡ curr_query_node→target_types.end( ))
      curr_query_node→target_types.push_back(Query_Type::LOCAL_DATABASE_TARGET);
    else if (arg_1 ≡ SERVER∧find(curr_query_node→target_types.begin( ), curr_query_node→target_types.end( ),
          Query_Type::LOCAL_SERVER_TARGET) ≡ curr_query_node→target_types.end( ))
      curr_query_node→target_types.push_back(Query_Type::LOCAL_SERVER_TARGET);
  }    /* if (arg_0 ≡ LOCAL) */
  else if (arg_0 ≡ REMOTE) {
    if (arg_1 ≡ DATABASE ∧ find(curr_query_node→target_types.begin( ), curr_query_node→target_types.end( ),
          Query_Type::REMOTE_DATABASE_TARGET) ≡ curr_query_node→target_types.end( ))
      curr_query_node→target_types.push_back(Query_Type::REMOTE_DATABASE_TARGET);
    else if (arg_1 ≡ SERVER∧find(curr_query_node→target_types.begin( ), curr_query_node→target_types.end( ),
          Query_Type::REMOTE_SERVER_TARGET) ≡ curr_query_node→target_types.end( ))
      curr_query_node→target_types.push_back(Query_Type::REMOTE_SERVER_TARGET);
  }    /* else if (arg_0 ≡ REMOTE) */
```

700. Fields. [LDF 2006.11.13.]

Log

[2006.11.13.] Added this section.

701. Fields. [LDF 2006.11.14.]

Log

[LDF 2006.11.14.] Added this section.

[LDF 2006.12.05.] Added code for CREATOR.

[LDF 2006.12.12.] Added code for MAIN_CANONICAL_TITLE.

[LDF 2006.12.12.] Added code to account for tokens that refer to additional tables from the OAI database (dc_test).

[LDF 2006.12.12.] Added code to account for the tokens that refer to additional tables in the PICA database (PICA_DB).

⟨ Define parser functions 683 ⟩ +≡

```
if (arg_0 ≡ ACCESS_NUMBER ∨ arg_0 ≡ AUTHOR ∨ arg_0 ≡ BIBLIOGRAPHIC_TYPE ∨ arg_0 ≡
    CALL_NUMBER ∨ arg_0 ≡ CLASSIFICATION ∨ arg_0 ≡ COMPANY ∨ arg_0 ≡ CONTENT_SUMMARY ∨ arg_0 ≡
    CONTRIBUTOR ∨ arg_0 ≡ CREATOR ∨ arg_0 ≡ DATABASE_PROVIDER ∨ arg_0 ≡ DESCRIPTION ∨ arg_0 ≡
    EXEMPLAR_PRODUCTION_NUMBER ∨ arg_0 ≡ IDENTIFIER ∨ arg_0 ≡ INSTITUTION ∨ arg_0 ≡
    LANGUAGE ∨ arg_0 ≡ MAIN_CANONICAL_TITLE ∨ arg_0 ≡ PERMUTATION_PATTERN ∨ arg_0 ≡
    PERSON ∨ arg_0 ≡ PHYSICAL_DESCRIPTION ∨ arg_0 ≡ PUBLISHER ∨ arg_0 ≡ RECORD ∨ arg_0 ≡
    REMOTE_ACCESS ∨ arg_0 ≡ RIGHTS ∨ arg_0 ≡ SOURCE ∨ arg_0 ≡ SUBJECT ∨ arg_0 ≡
    SUPERORDINATE_ENTITIES ∨ arg_0 ≡ TITLE ∨ arg_0 ≡ TYPE) { unsigned int curr_field_type;
if (arg_0 ≡ ACCESS_NUMBER) curr_field_type = Query_Type::ACCESS_NUMBER_FIELD;
else if (arg_0 ≡ AUTHOR) curr_field_type = Query_Type::AUTHOR_FIELD;
else if (arg_0 ≡ BIBLIOGRAPHIC_TYPE) curr_field_type = Query_Type::BIBLIOGRAPHIC_TYPE_FIELD;
else if (arg_0 ≡ CALL_NUMBER) curr_field_type = Query_Type::CALL_NUMBER_FIELD;
else if (arg_0 ≡ CLASSIFICATION) curr_field_type = Query_Type::CLASSIFICATION_FIELD;
else if (arg_0 ≡ COMPANY) curr_field_type = Query_Type::COMPANY_FIELD;
else if (arg_0 ≡ CONTENT_SUMMARY) curr_field_type = Query_Type::CONTENT_SUMMARY_FIELD;
else if (arg_0 ≡ CONTRIBUTOR) curr_field_type = Query_Type::CONTRIBUTOR_FIELD;
else if (arg_0 ≡ CREATOR) curr_field_type = Query_Type::CREATOR_FIELD;
else if (arg_0 ≡ DATABASE_PROVIDER) curr_field_type = Query_Type::DATABASE_PROVIDER_FIELD;
else if (arg_0 ≡ DESCRIPTION) curr_field_type = Query_Type::DESCRIPTION_FIELD;
else if (arg_0 ≡ EXEMPLAR_PRODUCTION_NUMBER)
  curr_field_type = Query_Type::EXEMPLAR_PRODUCTION_NUMBER_FIELD;
else if (arg_0 ≡ IDENTIFIER) curr_field_type = Query_Type::IDENTIFIER_FIELD;
else if (arg_0 ≡ INSTITUTION) curr_field_type = Query_Type::INSTITUTION_FIELD;
else if (arg_0 ≡ LANGUAGE) curr_field_type = Query_Type::LANGUAGE_FIELD;
else if (arg_0 ≡ MAIN_CANONICAL_TITLE)
  curr_field_type = Query_Type::MAIN_CANONICAL_TITLE_FIELD;
else if (arg_0 ≡ PERMUTATION_PATTERN)
  curr_field_type = Query_Type::PERMUTATION_PATTERN_FIELD;
else if (arg_0 ≡ PERSON) curr_field_type = Query_Type::PERSON_FIELD;
else if (arg_0 ≡ PHYSICAL_DESCRIPTION)
  curr_field_type = Query_Type::PHYSICAL_DESCRIPTION_FIELD;
else if (arg_0 ≡ PUBLISHER) curr_field_type = Query_Type::PUBLISHER_FIELD;
else if (arg_0 ≡ RECORD) curr_field_type = Query_Type::RECORD_FIELD;
else if (arg_0 ≡ REMOTE_ACCESS) curr_field_type = Query_Type::REMOTE_ACCESS_FIELD;
else if (arg_0 ≡ RIGHTS) curr_field_type = Query_Type::RIGHTS_FIELD;
else if (arg_0 ≡ SOURCE) curr_field_type = Query_Type::SOURCE_FIELD;
else if (arg_0 ≡ SUBJECT) curr_field_type = Query_Type::SUBJECT_FIELD;
```

```
else if (arg_0 ≡ SUPERORDINATE_ENTITIES)
  curr_field_type = Query_Type::SUPERORDINATE_ENTITIES_FIELD;
else if (arg_0 ≡ TITLE) curr_field_type = Query_Type::TITLE_FIELD;
else if (arg_0 ≡ TYPE) curr_field_type = Query_Type::TYPE_FIELD;
while (curr_query_node→query_type ≠ Query_Type::TOP_TYPE)
  curr_query_node = curr_query_node→up;
if (curr_query_node→field_type ≡ Query_Type::QUERY_TYPE_NULL_TYPE ∧ curr_query_node→value ≡ 0) {
  curr_query_node→field_type = curr_field_type;
  string *curr_string = new string;
  *curr_string = static_cast⟨char *⟩(value);
  curr_query_node→value = static_cast⟨void *⟩(curr_string);
  curr_query_node→value_type = Query_Type::QUERY_TYPE_STRING_TYPE;
  curr_query_node→negated = negate;
}
```

702.

Log

[2006.11.14.] Added this section.

```
⟨ Define parser functions 683 ⟩ +≡
  else {
    if (assignment_type ≡ ASSIGN ∨ assignment_type ≡ PLUS_ASSIGN) {
      while (curr_query_node→and_node ≠ 0) curr_query_node = curr_query_node→and_node;
      curr_query_node→and_node = new Query_Type;
      curr_query_node→and_node→query_ctr = curr_query_node→query_ctr + 1;
      curr_query_node→and_node→id_node = curr_id_node;
      curr_query_node→and_node→name = curr_id_node→name;
    }
    else if (assignment_type ≡ OR_ASSIGN) {
      while (curr_query_node→or_node ≠ 0) curr_query_node = curr_query_node→or_node;
      curr_query_node→or_node = new Query_Type;
      curr_query_node→or_node→query_ctr = curr_query_node→query_ctr + 1;
      curr_query_node→or_node→id_node = curr_id_node;
      curr_query_node→or_node→name = curr_id_node→name;
    }
    else if (assignment_type ≡ XOR_ASSIGN) {
      while (curr_query_node→xor_node ≠ 0) curr_query_node = curr_query_node→xor_node;
      curr_query_node→xor_node = new Query_Type;
      curr_query_node→xor_node→query_ctr = curr_query_node→query_ctr + 1;
      curr_query_node→xor_node→id_node = curr_id_node;
      curr_query_node→xor_node→name = curr_id_node→name;
    }
    if (curr_query_node→query_type ≡ Query_Type::TOP_TYPE) {
      if (assignment_type ≡ ASSIGN ∨ assignment_type ≡ PLUS_ASSIGN) {
        curr_query_node→and_node→up = curr_query_node;
      }
      else if (assignment_type ≡ OR_ASSIGN) {
        curr_query_node→or_node→up = curr_query_node;
      }
      else if (assignment_type ≡ XOR_ASSIGN) {
        curr_query_node→xor_node→up = curr_query_node;
      }
    }    /* if */
    else {
      if (assignment_type ≡ ASSIGN ∨ assignment_type ≡ PLUS_ASSIGN) {
        curr_query_node→and_node→up = curr_query_node→up;
      }
      else if (assignment_type ≡ OR_ASSIGN) {
        curr_query_node→or_node→up = curr_query_node→up;
      }
      else if (assignment_type ≡ XOR_ASSIGN) {
        curr_query_node→xor_node→up = curr_query_node→up;
      }
    }    /* else */
    if (assignment_type ≡ ASSIGN ∨ assignment_type ≡ PLUS_ASSIGN) {
```

```
      curr_query_node = curr_query_node→and_node;
      curr_query_node→query_type = Query_Type::AND_TYPE;
      curr_query_node→field_type = curr_field_type;
    }
    else if (assignment_type ≡ OR_ASSIGN) {
      curr_query_node = curr_query_node→or_node;
      curr_query_node→query_type = Query_Type::OR_TYPE;
      curr_query_node→field_type = curr_field_type;
    }
    else if (assignment_type ≡ XOR_ASSIGN) {
      curr_query_node = curr_query_node→xor_node;
      curr_query_node→query_type = Query_Type::XOR_TYPE;
      curr_query_node→field_type = curr_field_type;
    }
    string *curr_string = new string;
    *curr_string = static_cast⟨char *⟩(value);
    curr_query_node→value = static_cast⟨void *⟩(curr_string);
    curr_query_node→value_type = Query_Type::QUERY_TYPE_STRING_TYPE;
    curr_query_node→negated = negate;
  }    /* else */
  }    /* if */
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣'Scan_Parse::query_assignment_func_0'␣successfully␣" ≪ endl ≪
      "with␣return␣value␣'curr_query_node',␣cast␣to␣'void*'." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  return static_cast⟨void *⟩(curr_query_node); }
    /* End of Scan_Parse::query_assignment_func_0 definition. */
```

703. *query_assignment_func_1.* [LDF 2006.12.19.]

Log

[LDF 2006.12.19.] Added this function.

```
⟨ Define parser functions 683 ⟩ +≡
  int Scan_Parse::query_assignment_func_1(Scanner_Node scanner_node, Id_Node &curr_id_node, void
        *&field_specifier, int assignment_operator, int negation_optional, int match_term_optional, void
        *&v, int type){ stringstream temp_strm;
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
# # undef DEBUG_OUTPUT
#endif
#ifdef DEBUG_OUTPUT
    temp_strm ≪ endl ≪ "Entering‘Scan_Parse::query_assignment_func_1’." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    Query_Node curr_query = 0;
    Query_Node traverse_query = 0;
    Query_Node temp_query = 0;
    if (assignment_operator ≡ ASSIGN ∨ assignment_operator ≡ PLUS_ASSIGN ∨ assignment_operator ≡
        AND_ASSIGN) {
      if (curr_id_node ∧ curr_id_node→value) {
        curr_query = static_cast⟨Query_Node⟩(curr_id_node→value);
        while (curr_query→and_node ≠ 0) curr_query = curr_query→and_node;
        if (type ≡ QUERY_TYPE) curr_query→and_node = static_cast⟨Query_Node⟩(v);
        else if (type ≡ DATETIME_TYPE) {
          temp_query = new Query_Type;
          temp_query→value_type = Query_Type::DATE_TIME_TYPE;
          temp_query→value = v;
          curr_query→and_node = temp_query;
        }
        curr_query→and_node→query_ctr = curr_query→query_ctr + 1;
        traverse_query = curr_query→or_node;
        while (traverse_query→or_node) traverse_query = traverse_query→or_node;
        if (traverse_query) curr_query→and_node→query_ctr += traverse_query→query_ctr;
        traverse_query = curr_query→xor_node;
        while (traverse_query→xor_node) traverse_query = traverse_query→xor_node;
        if (traverse_query) curr_query→and_node→query_ctr += traverse_query→query_ctr;
        curr_query→and_node→query_type = Query_Type::AND_TYPE;
        curr_query→and_node→up = curr_query;
        curr_query = curr_query→and_node;
        curr_query→set_field_specifier(field_specifier, true, scanner_node);
        curr_query→negated = (negation_optional);
      }    /* if */
      else if (curr_id_node) {
```

```
    if (type ≡ QUERY_TYPE) curr_id_node→value = v;
    else if (type ≡ DATETIME_TYPE) {
      temp_query = new Query_Type;
      temp_query→value_type = Query_Type::DATE_TIME_TYPE;
      temp_query→value = v;
      curr_id_node→value = static_cast⟨void *⟩(temp_query);
    }
    static_cast⟨Query_Node⟩(curr_id_node→value)→id_node = curr_id_node;
    static_cast⟨Query_Node⟩(curr_id_node→value)→name = curr_id_node→name;
    static_cast⟨Query_Node⟩(curr_id_node→value)→query_type = Query_Type::TOP_TYPE;
    static_cast⟨Query_Node⟩(curr_id_node→value)→query_ctr = 0;
    static_cast⟨Query_Node⟩(curr_id_node→value)→set_field_specifier(field_specifier, true,
        scanner_node);
    static_cast⟨Query_Node⟩(curr_id_node→value)→negated = (negation_optional);
    curr_query = static_cast⟨Query_Node⟩(curr_id_node→value);
  }    /* else */
  else {
    if (type ≡ QUERY_TYPE) {
      delete static_cast⟨Query_Node⟩(v);
    }
    else if (type ≡ DATETIME_TYPE) {
      delete static_cast⟨Date_Time_Node⟩(v);
    }
    v = 0;
    curr_query = 0;
  }
}    /* if (assignment_operator ≡ ASSIGN ∨ assignment_operator ≡
      PLUS_ASSIGN ∨ assignment_operator ≡ AND_ASSIGN) */
else if (assignment_operator ≡ OR_ASSIGN) {
  if (curr_id_node ∧ curr_id_node→value) {
    curr_query = static_cast⟨Query_Node⟩(curr_id_node→value);
    while (curr_query→or_node ≠ 0) curr_query = curr_query→or_node;
    if (type ≡ QUERY_TYPE) curr_query→or_node = static_cast⟨Query_Node⟩(v);
    else if (type ≡ DATETIME_TYPE) {
      temp_query = new Query_Type;
      temp_query→value_type = Query_Type::DATE_TIME_TYPE;
      temp_query→value = v;
      curr_query→or_node = temp_query;
    }
    curr_query→or_node→query_type = Query_Type::OR_TYPE;
    curr_query→or_node→query_ctr = curr_query→query_ctr + 1;
    traverse_query = curr_query→and_node;
    while (traverse_query→and_node) traverse_query = traverse_query→and_node;
    if (traverse_query) curr_query→or_node→query_ctr += traverse_query→query_ctr;
    traverse_query = curr_query→xor_node;
    while (traverse_query→xor_node) traverse_query = traverse_query→xor_node;
    if (traverse_query) curr_query→or_node→query_ctr += traverse_query→query_ctr;
    curr_query→or_node→up = curr_query;
    curr_query = curr_query→or_node;
    curr_query→set_field_specifier(field_specifier, true, scanner_node);
    curr_query→negated = (negation_optional);
  }    /* if */
```

```
    else if (curr_id_node) {
      if (type ≡ QUERY_TYPE) curr_id_node→value = v;
      else if (type ≡ DATETIME_TYPE) {
        temp_query = new Query_Type;
        temp_query→value_type = Query_Type::DATE_TIME_TYPE;
        temp_query→value = v;
        curr_id_node→value = static_cast⟨void *⟩(temp_query);
      }
      static_cast⟨Query_Node⟩(curr_id_node→value)→id_node = curr_id_node;
      static_cast⟨Query_Node⟩(curr_id_node→value)→name = curr_id_node→name;
      static_cast⟨Query_Node⟩(curr_id_node→value)→query_type = Query_Type::TOP_TYPE;
      static_cast⟨Query_Node⟩(curr_id_node→value)→set_field_specifier(field_specifier, true,
          scanner_node);
      static_cast⟨Query_Node⟩(curr_id_node→value)→query_ctr = 0;
      static_cast⟨Query_Node⟩(curr_id_node→value)→negated = (negation_optional);
      curr_query = static_cast⟨Query_Node⟩(curr_id_node→value);
    }    /* else */
    else {
      if (type ≡ QUERY_TYPE) {
        delete static_cast⟨Query_Node⟩(v);
      }
      else if (type ≡ DATETIME_TYPE) {
        delete static_cast⟨Date_Time_Node⟩(v);
      }
      v = 0;
      curr_query = 0;
      return 1;
    }
  }    /* if (assignment_operator ≡ OR_ASSIGN) */
  else if (assignment_operator ≡ XOR_ASSIGN) {
    if (curr_id_node ∧ curr_id_node→value) {
      curr_query = static_cast⟨Query_Node⟩(curr_id_node→value);
      while (curr_query→xor_node ≠ 0) curr_query = curr_query→xor_node;
      if (type ≡ QUERY_TYPE) curr_query→xor_node = static_cast⟨Query_Node⟩(v);
      else if (type ≡ DATETIME_TYPE) {
        temp_query = new Query_Type;
        temp_query→value_type = Query_Type::DATE_TIME_TYPE;
        temp_query→value = v;
        curr_query→xor_node = temp_query;
      }
      curr_query→xor_node→query_ctr = curr_query→query_ctr + 1;
      traverse_query = curr_query→and_node;
      while (traverse_query→and_node) traverse_query = traverse_query→and_node;
      if (traverse_query) curr_query→xor_node→query_ctr += traverse_query→query_ctr;
      traverse_query = curr_query→or_node;
      while (traverse_query→or_node) traverse_query = traverse_query→or_node;
      if (traverse_query) curr_query→xor_node→query_ctr += traverse_query→query_ctr;
      curr_query→xor_node→query_type = Query_Type::XOR_TYPE;
      curr_query→xor_node→up = curr_query;
      curr_query = curr_query→xor_node;
      curr_query→set_field_specifier(field_specifier, true, scanner_node);
      curr_query→negated = (negation_optional);
```

```
    }    /* if */
    else if (curr_id_node) {
      if (type ≡ QUERY_TYPE) curr_id_node→value = v;
      else if (type ≡ DATETIME_TYPE) {
        temp_query = new Query_Type;
        temp_query→value_type = Query_Type::DATE_TIME_TYPE;
        temp_query→value = v;
        curr_id_node→value = static_cast⟨void *⟩(temp_query);
      }
      static_cast⟨Query_Node⟩(curr_id_node→value)→id_node = curr_id_node;
      static_cast⟨Query_Node⟩(curr_id_node→value)→name = curr_id_node→name;
      static_cast⟨Query_Node⟩(curr_id_node→value)→query_type = Query_Type::TOP_TYPE;
      static_cast⟨Query_Node⟩(curr_id_node→value)→query_ctr = 0;
      static_cast⟨Query_Node⟩(curr_id_node→value)→set_field_specifier(field_specifier, true,
          scanner_node);
      static_cast⟨Query_Node⟩(curr_id_node→value)→negated = (negation_optional);
      curr_query = static_cast⟨Query_Node⟩(curr_id_node→value);
    }    /* else */
    else {
      if (type ≡ QUERY_TYPE) {
        delete static_cast⟨Query_Node⟩(v);
      }
      else if (type ≡ DATETIME_TYPE) {
        delete static_cast⟨Date_Time_Node⟩(v);
      }
      v = 0;
      curr_query = 0;
      return 1;
    }
  }    /* if (assignment_operator ≡ XOR_ASSIGN) */
```

704.

```
⟨ Define parser functions 683 ⟩ +≡
  else {
    curr_query = 0;
    return 1;
  }
```

705. Set *match_value*. [LDF 2006.12.12.]

Log

[2006.12.12.] Added this section.

```
⟨ Define parser functions 683 ⟩ +≡
  if (curr_query) {
    curr_query→match_value = match_term_optional;
  }    /* if (curr_query) */
```

706.

```
⟨ Define parser functions 683 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ endl ≪ "Exiting␣‘Scan_Parse::query_assignment_func_1’␣successfully␣" ≪
      "with␣return␣value␣0." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  return 0;
#undef DEBUG_OUTPUT
  }    /* End of Scan_Parse::query_assignment_func_1 definition. */
```

707. *datetime_assignment_func_0.* [LDF 2006.12.15.]

Log

[LDF 2006.12.15.] Added this function.

To Do

[LDF 2006.12.18.] Add range checking and code for other assignment operators.

```
⟨ Define parser functions 683 ⟩ +≡
  int Scan_Parse::datetime_assignment_func_0(void *v, Date_Time_Node &curr_date_time_node, int
        specifier, int op, void *val, int type){
#if 1    /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(v);
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Entering␣‘Scan_Parse::datetime_assignment_func_0’." ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "‘specifier’␣==␣" ≪ token_map[specifier] ≪ endl ≪ "‘op’␣==␣" ≪
          token_map[op] ≪ endl ≪ "‘type’␣==␣" ≪ token_map[type] ≪ endl;
      cerr_mutex.lock( );
      cerr ≪ temp_strm.str( );
      cerr_mutex.unlock( );
      scanner_node→log_strm ≪ temp_strm.str( );
      temp_strm.str("");
#endif
```

708. Error handling: $val \equiv 0$. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (val ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣'Scan_Parse::datetime_assignment_func_0':" ≪
        endl ≪ "'val'␣==␣0'.␣␣Can't␣assign." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣1." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    return 1;
  }     /* if (val ≡ 0) */
```

709.

```
⟨ Define parser functions 683 ⟩ +≡
  if (curr_date_time_node ≡ 0) {
    curr_date_time_node = new Date_Time_Type;
  }     /* if (curr_date_time_node ≡ 0) */
```

710.

```
⟨ Define parser functions 683 ⟩ +≡
  if (op ≡ ASSIGN) {
    if (specifier ≡ YEAR_RANGE_BEGIN) {
      if (curr_date_time_node→year_range_begin ≡ 0) curr_date_time_node→year_range_begin = new short;
      *curr_date_time_node→year_range_begin = *static_cast⟨short *⟩(val);
    }    /* if (specifier ≡ YEAR_RANGE_BEGIN) */
    if (specifier ≡ YEAR_RANGE_END) {
      if (curr_date_time_node→year_range_end ≡ 0) curr_date_time_node→year_range_end = new short;
      *curr_date_time_node→year_range_end = *static_cast⟨short *⟩(val);
    }    /* if (specifier ≡ YEAR_RANGE_END) */
    if (specifier ≡ YEAR) {
      if (curr_date_time_node→year ≡ 0) curr_date_time_node→year = new short;
      *curr_date_time_node→year = *static_cast⟨short *⟩(val);
    }    /* if (specifier ≡ YEAR) */
    else if (specifier ≡ MONTH) {
      if (curr_date_time_node→month ≡ 0) curr_date_time_node→month = new unsigned short;
      *curr_date_time_node→month = *static_cast⟨unsigned short *⟩(val);
    }    /* else if (specifier ≡ MONTH) */
    else if (specifier ≡ DAY) {
      if (curr_date_time_node→day ≡ 0) curr_date_time_node→day = new unsigned short;
      *curr_date_time_node→day = *static_cast⟨unsigned short *⟩(val);
    }    /* else if (specifier ≡ DAY) */
    else if (specifier ≡ HOUR) {
      if (curr_date_time_node→hour ≡ 0) curr_date_time_node→hour = new unsigned short;
      *curr_date_time_node→hour = *static_cast⟨unsigned short *⟩(val);
    }    /* else if (specifier ≡ HOUR) */
    else if (specifier ≡ MINUTE) {
      if (curr_date_time_node→minute ≡ 0) curr_date_time_node→minute = new unsigned short;
      *curr_date_time_node→minute = *static_cast⟨unsigned short *⟩(val);
    }    /* else if (specifier ≡ MINUTE) */
    else if (specifier ≡ SECOND) {
      if (curr_date_time_node→second ≡ 0) curr_date_time_node→second = new float;
      if (type ≡ FLOAT) *curr_date_time_node→second = *static_cast⟨float *⟩(val);
      else if (type ≡ INTEGER)
        *curr_date_time_node→second = static_cast⟨float⟩(*static_cast⟨int *⟩(val));
    }    /* else if (specifier ≡ SECOND) */
  }    /* if (op ≡ ASSIGN) */
```

711.

```
⟨ Define parser functions 683 ⟩ +≡
  else
    if (op ≡ PLUS_ASSIGN) {
      if (specifier ≡ YEAR_RANGE_BEGIN) {
        if (curr_date_time_node→year_range_begin ≡ 0)
          curr_date_time_node→year_range_begin = new short(0);
        *curr_date_time_node→year_range_begin += *static_cast⟨short *⟩(val);
      }     /* if (specifier ≡ YEAR_RANGE_BEGIN) */
      if (specifier ≡ YEAR_RANGE_END) {
        if (curr_date_time_node→year_range_end ≡ 0)
          curr_date_time_node→year_range_end = new short(0);
        *curr_date_time_node→year_range_end += *static_cast⟨short *⟩(val);
      }     /* if (specifier ≡ YEAR_RANGE_END) */
      if (specifier ≡ YEAR) {
        if (curr_date_time_node→year ≡ 0) curr_date_time_node→year = new short(0);
        *curr_date_time_node→year += *static_cast⟨short *⟩(val);
      }     /* if (specifier ≡ YEAR) */
      else if (specifier ≡ MONTH) {
        if (curr_date_time_node→month ≡ 0) curr_date_time_node→month = new unsigned short(0);
        *curr_date_time_node→month += *static_cast⟨unsigned short *⟩(val);
      }     /* else if (specifier ≡ MONTH) */
      else if (specifier ≡ DAY) {
        if (curr_date_time_node→day ≡ 0) curr_date_time_node→day = new unsigned short(0);
        *curr_date_time_node→day += *static_cast⟨unsigned short *⟩(val);
      }     /* else if (specifier ≡ DAY) */
      else if (specifier ≡ HOUR) {
        if (curr_date_time_node→hour ≡ 0) curr_date_time_node→hour = new unsigned short(0);
        *curr_date_time_node→hour += *static_cast⟨unsigned short *⟩(val);
      }     /* else if (specifier ≡ HOUR) */
      else if (specifier ≡ MINUTE) {
        if (curr_date_time_node→minute ≡ 0) curr_date_time_node→minute = new unsigned short(0);
        *curr_date_time_node→minute += *static_cast⟨unsigned short *⟩(val);
      }     /* else if (specifier ≡ MINUTE) */
      else if (specifier ≡ SECOND) {
        if (curr_date_time_node→second ≡ 0) curr_date_time_node→second = new float(0);
        if (type ≡ FLOAT) *curr_date_time_node→second += *static_cast⟨float *⟩(val);
        else if (type ≡ INTEGER)
          *curr_date_time_node→second += static_cast⟨float⟩(*static_cast⟨int *⟩(val));
      }     /* else if (specifier ≡ SECOND) */
    }     /* else if (op ≡ PLUS_ASSIGN) */
```

712.

```
⟨ Define parser functions 683 ⟩ +≡
  else
    if (op ≡ MINUS_ASSIGN) { }     /* else if (op ≡ MINUS_ASSIGN) */
```

713.

```
⟨ Define parser functions 683 ⟩ +≡
  else
    if (op ≡ TIMES_ASSIGN) { }     /* else if (op ≡ TIMES_ASSIGN) */
```

714.

```
⟨ Define parser functions 683 ⟩ +≡
  else
    if (op ≡ DIVIDE_ASSIGN) { }      /* else if (op ≡ DIVIDE_ASSIGN) */
```

715. Error handling: *op* has invalid value. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  else {
    temp_strm ≪ "ERROR!␣␣In␣'Scan_Parse::datetime_assignment_func_0':" ≪ endl ≪
        "'op'␣has␣invalid␣value:␣␣" ≪ token_map[op] ≪ "␣(" ≪ op ≪ ")" ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣1." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    return 1;
  }    /* else */
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣'Scan_Parse::datetime_assignment_func_0'␣" ≪
      "successfully␣with␣return␣value␣0." ≪ endl;
  cerr_mutex.lock();
  cerr ≪ temp_strm.str();
  cerr_mutex.unlock();
  if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
  temp_strm.str("");
  getchar();
#endif
  return 0; }      /* End of Scan_Parse::datetime_assignment_func_0 definition. */
```

716. *datetime_assignment_func_1.* [LDF 2006.12.18.]

Log

[LDF 2006.12.18.] Added this function.

To Do

[LDF 2006.12.18.] Add range checking and perhaps code for handling different assignment operators.

```
⟨ Define parser functions 683 ⟩ +≡
  int Scan_Parse::datetime_assignment_func_1(void *v, Date_Time_Node &d, int op, void *&w){
#if 1     /* 0 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      stringstream temp_strm;
      Scanner_Node scanner_node = static_cast⟨Scanner_Node⟩(v);
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "Entering␣‘Scan_Parse::datetime_assignment_func_1’." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str();
      temp_strm.str("");
#endif
```

717.

```
⟨ Define parser functions 683 ⟩ +≡
  vector⟨pair⟨int, void *⟩⟩ *vec = static_cast⟨vector⟨pair⟨int, void *⟩⟩ *⟩(w);
  if (vec ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣‘Scan_Parse::datetime_assignment_func_1’:" ≪
        endl ≪ "‘datetime_element_list’␣==␣NULL.␣␣" ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣1." ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
    return 1;
  }     /* if (vec ≡ 0) */
```

718.

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) ≡ 0) {
    temp_strm ≪ "ERROR!␣␣In␣'Scan_Parse::datetime_assignment_func_1':" ≪ endl ≪
        "'vec'␣is␣empty.␣␣" ≪ "Exiting␣function␣unsuccessfully␣with␣return␣value␣1." ≪
        endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
    delete vec;
    vec = 0;
    return 1;
  }     /* if (vec→size( ) ≡ 0) */
```

719.

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) > 0 ∧ vec→at(0).first ≠ INTEGER     /* year */
  ∨ vec→size( ) > 1 ∧ vec→at(1).first ≠ INTEGER     /* month */
  ∨ vec→size( ) > 2 ∧ vec→at(2).first ≠ INTEGER     /* day */
  ∨ vec→size( ) > 3 ∧ vec→at(3).first ≠ INTEGER     /* hour */
  ∨ vec→size( ) > 4 ∧ vec→at(4).first ≠ INTEGER     /* minute */
  ) {
    temp_strm ≪ "ERROR!␣␣In␣'Scan_Parse::datetime_assignment_func_1':" ≪
        endl ≪ "Invalid␣value␣in␣'vec'." ≪ endl ≪
        "Exiting␣function␣unsuccessfully␣with␣return␣value␣1." ≪ endl;
    cerr_mutex.lock( );
    cerr ≪ temp_strm.str( );
    cerr_mutex.unlock( );
    scanner_node→log_strm ≪ temp_strm.str( );
    temp_strm.str("");
    for (vector⟨pair⟨int, void *⟩⟩::iterator iter = vec→begin( ); iter ≠ vec→end( ); ++iter) {
      if (iter→first ≡ INTEGER) {
        delete static_cast⟨int *⟩(iter→second);
      }
      else if (iter→first ≡ FLOAT) {
        delete static_cast⟨float *⟩(iter→second);
      }
      iter→second = 0;
    }     /* for */
    vec→clear( );
    delete vec;
    vec = 0;
    return 1;
  }     /* if */
```

720. Year. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (d ≡ 0) d = new Date_Time_Type;
  d→year = static_cast⟨short *⟩(vec→at(0).second);
  vec→at(0).second = 0;
```

721. Month. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) > 1) {
    d→month = static_cast⟨unsigned short *⟩(vec→at(1).second);
    vec→at(1).second = 0;
  }
```

722. Day. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) > 2) {
    d→day = static_cast⟨unsigned short *⟩(vec→at(2).second);
    vec→at(2).second = 0;
  }
```

723. Hour. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) > 3) {
    d→hour = static_cast⟨unsigned short *⟩(vec→at(3).second);
    vec→at(3).second = 0;
  }
```

724. Minute. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) > 4) {
    d→minute = static_cast⟨unsigned short *⟩(vec→at(4).second);
    vec→at(4).second = 0;
  }
```

725. Second. [LDF 2006.12.18.]

```
⟨ Define parser functions 683 ⟩ +≡
  if (vec→size( ) > 5) {
    if (vec→at(5).first ≡ FLOAT) d→second = static_cast⟨float *⟩(vec→at(5).second);
    else {
      d→second = new float;
      *d→second = static_cast⟨float⟩(*static_cast⟨int *⟩(vec→at(5).second));
      delete static_cast⟨int *⟩(vec→at(5).second);
    }
    vec→at(5).second = 0;
  }
```

726.

```
⟨ Define parser functions 683 ⟩ +≡
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "Exiting␣‘Scan_Parse::datetime_assignment_func_1’␣" ≪
      "successfully␣with␣return␣value␣0." ≪ endl;
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  if (scanner_node ≠ 0) scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
#endif
  return 0; }      /* End of Scan_Parse::datetime_assignment_func_1 definition. */
```

727. Putting Parser Functions together. [LDF 2006.10.31.]

728. This is what's compiled.

```
⟨ Include files 10 ⟩
⟨ prsrfncs.web 678 ⟩
using namespace std;
using namespace Scan_Parse;
⟨ Define parser functions 683 ⟩
```

729. Scan Test (scantest.web). [LDF 2006.10.17.]

This file is used with Microsoft Visual Studio. It's not used when using The GNU Compiler Collection (GCC). [LDF 2006.10.24.]

Test application for the scanner *yylex* for ZTest. [LDF 2006.10.17.]

Log

[LDF 2006.10.17.] Created this file.

```
⟨ scantest.web 729 ⟩ ≡
  static char id_string[] = "$Id: scantest.web,v 1.5 2007/02/13 20:41:23 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 733.

730. Include files. [LDF 2006.10.17.]

```
⟨ Include files 10 ⟩ +≡
#include "stdafx.h"
#ifdef _DEBUG
#define new  DEBUG_NEW
#endif
```

731. Global variable declarations. [LDF 2006.10.19.]

Log

[LDF 2006.10.19.] Added this section.

```
⟨ Global variables 731 ⟩ ≡
  ofstream log_strm;
  CMutex log_strm_mutex;
  CMutex cerr_mutex;
  CMutex cout_mutex;
  ifstream in_strm;
```

See also section 736.

This code is used in sections 733 and 750.

732. Define _tmain. [LDF 2006.10.17.]

Log

[LDF 2006.10.17.] Added this function.

```
⟨ Define _tmain 732 ⟩ ≡
  CWinApp theApp;
```

```
  using namespace std;
  int _tmain(int argc, TCHAR * argv[], TCHAR * envp[])
  {
    int nRetCode = 0;      /* MFC initialisieren und drucken. Bei Fehlschlag Fehlermeldung aufrufen. */
    if (¬AfxWinInit(::GetModuleHandle(NULL), NULL, ::GetCommandLine(), 0)) {
        /* TODO: Passen Sie den Fehlercode an Ihre Anforderungen an */
      _tprintf(_T("Schwerwiegender␣Fehler:␣MFC-Initialisierung␣fehlgeschlagen\n"));
      nRetCode = 1;
    }
    else {
#define DEBUG_OUPUT
      using namespace Scan_Parse;
      int status;
      log_strm_mutex.lock();
      log_strm.open("log.txt");
      log_strm ≪ "%%␣log.txt\n\n" ≪ copyright_tex_str ≪ endl;
      log_strm_mutex.unlock();
      status = initialize_keyword_map();
      status = show_keyword_map();
      YYSTYPE * value = new YYSTYPE;
      YYLTYPE * location = 0;
      Scanner_Type *scanner_node = new Scanner_Type;
      strcpy(scanner_node→in_filename, "commands.txt");
      in_strm.open(scanner_node→in_filename);
      status = 0;
      while (status ≠ TERMINATE) status = yylex(value, location, static_cast⟨void *⟩(scanner_node));
#ifdef DEBUG_OUTPUT
      temp_strm ≪ "In␣'t_main':␣␣Finished␣scanning." ≪ endl;
      cerr_mutex.lock();
      cerr ≪ temp_strm.str();
      cerr_mutex.unlock();
      log_strm_mutex.lock();
      log_strm ≪ temp_strm.str();
      log_strm_mutex.unlock();
      temp_strm.str("");
#endif
      in_strm.close();
      log_strm_mutex.lock();
      log_strm.close();
      log_strm_mutex.unlock();
      delete scanner_node;
      scanner_node = 0;
      char c;
      cerr_mutex.lock();
      cerr ≪ "'yylex'␣returned␣" ≪ status ≪ endl ≪ "Enter␣a␣character␣to␣exit:␣";
      cerr_mutex.unlock();
      cin ≫ c;
      return 0;
#undef DEBUG_OUPUT
    }
```

```
  return nRetCode;
}    /* End of _tmain definition. */
```

This code is used in section 733.

733. Putting Scan Test together. [LDF 2006.10.17.]

```
⟨ Include files 10 ⟩
⟨ scantest.web 729 ⟩
using namespace std;
⟨ Global variables 731 ⟩
⟨ Define _tmain 732 ⟩
```

734. Main when using GCC (`main.web`). [LDF 2006.10.20.]

Log

[LDF 2006.10.20.] Created this file.

```
⟨ main.web 734 ⟩ ≡
  static char id_string[] = "$Id: main.web,v 1.12 2007/02/13 20:39:20 lfinsto1 Exp $";
```

This code is cited in sections 6 and 8.

This code is used in section 750.

735. Include files.

```
⟨ Include files 10 ⟩ +≡
#include "localldf.h"
#include "nonwin.h"
#include "parser.hxx"
#include "dttmtype.h"
#include "scanner.h"
#include "dtsrctyp.h"
#include "querytyp.h"
#include "idtype.h"
#include "scnrtype.h"
#include "dbcrprsr.hxx"
#include "dbcrscan.hxx"
```

736. Global variables. [LDF 2006.10.20.]

Log

[2006.10.20.] Added this section.

[LDF 2006.11.21.] Added **unsigned short** *tex_file_ctr*, **string** *tex_filename_str*, **ofstream** *tex_file_strm*, and **Mutex_Type** *tex_mutex*.

[LDF 2006.11.30.] Added **string** *copyright_tex_str*.

[LDF 2006.11.30.] Added **Mutex_Type** *time_mutex*.

```
⟨ Global variables 731 ⟩ +≡
  Mutex_Type cerr_mutex;
  Mutex_Type cout_mutex;
  Mutex_Type time_mutex;
```

```
ofstream tex_file_strm;
Mutex_Type tex_mutex;
unsigned short tex_file_ctr;
string tex_filename_str;
string copyright_tex_str;
```

737. Scanning and parsing input. [LDF Undated.]

738. *yyparse* declaration. [LDF Undated.]

```
⟨ Declare scanning and parsing functions 738 ⟩ ≡
  int yyparse(void *);
```

See also sections 739, 740, 742, and 743.

This code is used in section 750.

739. *yywrap*.

```
⟨ Declare scanning and parsing functions 738 ⟩ +≡
#if 0
  int yywrap(void);
#endif
```

740. *yyerror*. [LDF 2006.10.20.]

```
⟨ Declare scanning and parsing functions 738 ⟩ +≡
  void yyerror(const char *s);
```

741.

```
⟨ Define scanning and parsing functions 741 ⟩ ≡
  void yyerror(const char *s)
  {
    return;
  }
```

See also section 744.

This code is used in section 750.

742. *xxparse* declaration. [LDF 2007.02.13.]

```
⟨ Declare scanning and parsing functions 738 ⟩ +≡
  int xxparse(void *);
```

743. *xxerror*. [LDF 2007.02.13.]

```
⟨ Declare scanning and parsing functions 738 ⟩ +≡
  void xxerror(const char *s);
```

744.

```
⟨ Define scanning and parsing functions 741 ⟩ +≡
  void xxerror(const char *s)
  {
    return;
  }
```

745. Main itself. [LDF 2006.10.20.]

Log

[LDF 2006.10.20.] Added this function.

[LDF 2006.11.02.] No longer closing *scanner_node→in_strm* and *scanner_node→log_strm*. This is now done in the **Scanner_Node** destructor.

[LDF 2006.11.02.] Now calling *scanner_node→initialize_id_map*.

[LDF 2006.11.21.] Now initializing the global variable **unsigned short** *tex_file_ctr* to 0.

```
⟨ Define main 745 ⟩ ≡
  int main(int argc, char *argv[]){ FILE *fp = fopen("oai.xml", "r");
      yyscan_t scanner;
      xxlex_init(&scanner);
      xxset_in(fp, scanner);
      YYSTYPE *i = new YYSTYPE;
      xxparse(static_cast⟨void *⟩(scanner));
      xxlex_destroy(scanner);
      return 0;
#if 0    /* 1 */
      unsigned long long temp_val = 4096LL;
      bitset < 64 > b;
      b.flip( );
      cerr ≪ "'b' == " ≪ b ≪ endl ≪ "'temp_val' == " ≪ temp_val ≪ "b & temp_val == " ≪
          (b & temp_val) ≪ endl;
      getchar( );
      cerr ≪ "'sizeof(unsigned long long)' == " ≪ sizeof(unsigned long
          long) ≪ endl ≪ "'ULONG_LONG_MAX' == " ≪ ULONG_LONG_MAX ≪ endl;
      getchar( );
      for (int i = 27; i < 36; ++i) cerr ≪ (long long) pow((double) 2, i) ≪ "\n";
      getchar( );
#endif
#if 0    /* 1 */
#define DEBUG_OUTPUT
#else
#undef DEBUG_OUTPUT
#endif
      copyright_tex_str = "%% *(1) Copyright and License.\n\n";
      copyright_tex_str += "%% This file is part of the IWF Metadata Harvester, ";
      copyright_tex_str += "a package for metadata harvesting.\n";
      copyright_tex_str += "%% Copyright (C) 2006, 2007 IWF Wissen und Medien ";
      copyright_tex_str += "gGmbH\n\n";
      copyright_tex_str += "%% The author is Laurence D. Finston.\n\n";
```

```
copyright_tex_str += "%% The IWF Metadata Harvester is free software; ";
copyright_tex_str += "you can redistribute it and/or modify\n";
copyright_tex_str += "%% it under the terms of the GNU General Public License ";
copyright_tex_str += "as published by\n";
copyright_tex_str += "%% the Free Software Foundation; either version 2 of the ";
copyright_tex_str += "License, or\n";
copyright_tex_str += "%% (at your option) any later version.\n\n";
copyright_tex_str += "%% The IWF Metadata Harvester is distributed in ";
copyright_tex_str += "the hope that it will be useful,\n";
copyright_tex_str += "%% but WITHOUT ANY WARRANTY; without even the implied ";
copyright_tex_str += "warranty of\n";
copyright_tex_str += "%% MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  ";
copyright_tex_str += "See the\n";
copyright_tex_str += "%% GNU General Public License for more details.\n\n";
copyright_tex_str += "%% You should have received a copy of the GNU General ";
copyright_tex_str += "Public License\n";
copyright_tex_str += "%% along with the IWF Metadata Harvester; if not, ";
copyright_tex_str += "write to the Free Software\n";
copyright_tex_str += "%% Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA  ";
copyright_tex_str += "02110-1301  USA\n\n";
copyright_tex_str += "%% The IWF Metadata Harvester is available for downloading \
    from the\n";
copyright_tex_str += "%% following FTP server:\n";
copyright_tex_str += "%% ftp://ftp.gwdg.de/pub/gnu2/iwfmdh/\n\n";
copyright_tex_str += "%% Please send bug reports to lfinsto1@gwdg.de\n\n";
copyright_tex_str += "%% The author can be contacted at:\n\n";
copyright_tex_str += "%% Laurence D. Finston\n";
copyright_tex_str += "%% Kreuzbergring 41\n";
copyright_tex_str += "%% D-37075 Goettingen\n";
copyright_tex_str += "%% Germany\n\n";
copyright_tex_str += "%% lfinsto1@gwdg.de\n";
copyright_tex_str += "%% s246794@stud.uni-goettingen.de\n";
copyright_tex_str += "\n\n";
using namespace Scan_Parse;
stringstream temp_strm;
int status;
status = initialize_maps();
status = Query_Type::initialize_type_maps();
if ((status = Query_Type::initialize_flags()) != 0) {
  cerr << "ERROR! In 'main':" << endl << "'Query_Type::initialize_flags' returned\
      unsuccessfully, " << "with return value " << status << endl <<
      "Exiting 'main' unsuccessfully with return value 1." << endl;
  return 1;
}
status = Datasource_Type::initialize_type_maps();
tex_file_ctr = 0;
tex_filename_str = "scttex_";
Scanner_Type *scanner_node = new Scanner_Type;
status = Id_Type::initialize_subtype_map(scanner_node);
```

See also sections 746, 747, and 748.

This code is used in section 750.

746. Process command line options. [LDF 2006.11.03.]
Options:
`b` — Enable GNU Bison's tracing facilities.

Log

[2006.11.03.] Added this section.

```
⟨ Define main 745 ⟩ +≡
  for (int curr_opt = 0; curr_opt ≥ 0; ) {
    curr_opt = getopt(argc, argv, "b");
#ifdef DEBUG_OUTPUT
    temp_strm ≪ "‘curr_opt’␣␣==␣" ≪ curr_opt ≪ endl;
    cerr_mutex.lock();
    cerr ≪ temp_strm.str();
    cerr_mutex.unlock();
    scanner_node→log_strm ≪ temp_strm.str();
    temp_strm.str("");
#endif
    switch (curr_opt) {
    case 'b': yydebug = 1;
      break;
    default: break;
    }    /* switch */
  }    /* for */
```

747. Process filename argument. [LDF 2006.11.03.]

Log

[2006.11.03.] Added this section.

```
⟨ Define main 745 ⟩ +≡
#if 0    /* 1 */
#ifdef DEBUG_OUTPUT
  temp_strm ≪ "‘argc’␣==␣" ≪ argc ≪ ",␣‘optind’␣==␣" ≪ optind ≪ endl;
  if (argv[optind] ≡ 0) temp_strm ≪ "No␣filename␣argument.";
  else temp_strm ≪ "Filename␣argument␣=␣‘" ≪ argv[optind] ≪ "’";
  cerr_mutex.lock( );
  cerr ≪ temp_strm.str( );
  cerr_mutex.unlock( );
  scanner_node→log_strm ≪ temp_strm.str( );
  temp_strm.str("");
  getchar( );
#endif
#endif
  if (argc > optind) {
    strcpy(scanner_node→in_filename, argv[optind]);
  }
  else strcpy(scanner_node→in_filename, "commands.txt");
  scanner_node→in_strm.open(scanner_node→in_filename);
  strcpy(scanner_node→log_filename, "log_1.txt");
  scanner_node→log_strm.open(scanner_node→log_filename);
  scanner_node→log_strm ≪ "%%␣log_1.txt" ≪ endl ≪ endl ≪ copyright_tex_str ≪ endl;
```

748.

```
⟨ Define main 745 ⟩ +≡
  scanner_node→initialize_id_map( );
#ifdef DEBUG_OUTPUT
  status = show_keyword_map(scanner_node);
#endif
  status = yyparse(scanner_node);
  delete scanner_node;
  scanner_node = 0;
  return 0;
#undef DEBUG_OUTPUT
  }    /* End of main definition. */
```

749. Putting Main together.

750. This is what's compiled.

⟨ Include files 10 ⟩
⟨ `main.web` 734 ⟩

using namespace std;

⟨ Global variables 731 ⟩
⟨ Declare scanning and parsing functions 738 ⟩
⟨ Define *main* 745 ⟩
⟨ Define scanning and parsing functions 741 ⟩

751. GNU General Public License. [LDF 2006.10.23.]

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754. Index.

⟨ Bison declarations 397 ⟩ Used in section 676.
⟨ Bison options 367 ⟩ Used in section 379.
⟨ Common code for punctuation 355, 356 ⟩ Cited in section 343. Used in section 354.
⟨ Declare Dublin Core parser functions 366 ⟩ Used in section 379.
⟨ Declare namespace **Scan_Parse** 255 ⟩ Used in section 361.
⟨ Declare non-member functions for **Date_Time_Type** 42 ⟩ Used in sections 47 and 48.
⟨ Declare scanning and parsing functions 738, 739, 740, 742, 743 ⟩ Used in section 750.
⟨ Declare **Datasource_Type** functions 171, 173, 175, 179, 181, 183 ⟩ Used in section 163.
⟨ Declare **Date_Time_Type** functions 36, 38, 40, 44 ⟩ Used in section 33.
⟨ Declare **Id_Type** functions 199, 202, 205, 208 ⟩ Used in section 192.
⟨ Declare **Mutex_Type** functions 13, 15 ⟩ Used in section 12.
⟨ Declare **Query_Type** functions 86, 88, 90, 95, 99, 101, 105, 110, 114, 115 ⟩ Used in section 54.
⟨ Declare **Scan_Parse** functions 268, 291, 295, 296, 298, 299, 300, 301, 303, 304 ⟩ Used in sections 255 and 259.
⟨ Declare **Scanner_Type** functions 230, 232, 234, 236 ⟩ Used in section 223.
⟨ Declare **Token_Type** functions 219, 221 ⟩ Used in section 217.
⟨ Declare **class Datasource_Type** 163 ⟩ Used in sections 186 and 187.
⟨ Declare **class Date_Time_Type** 33 ⟩ Used in sections 47 and 48.
⟨ Declare **class Query_Type** 53, 54 ⟩ Used in sections 122 and 123.
⟨ Declare **class Scanner_Type** 223 ⟩ Used in sections 247 and 248.
⟨ Declare *keyword_map* 263 ⟩ Used in section 255.
⟨ Declare **static Datasource_Type** constants 165, 168 ⟩ Used in section 163.
⟨ Declare **static Id_Type** constants 193 ⟩ Used in section 192.
⟨ Declare **static Id_Type** variables 195 ⟩ Used in section 211.
⟨ Declare **static Query_Type** constants 57, 59, 62, 64, 65, 66, 73, 75, 82 ⟩ Used in section 54.
⟨ Declare **static Query_Type** variables 78, 79 ⟩ Used in section 54.
⟨ Declare **struct Id_Type** 192 ⟩ Used in sections 211 and 212.
⟨ Declare **struct Keyword_Type** 261 ⟩ Used in section 255.
⟨ Declare **struct Token_Type** 217 ⟩ Used in sections 247 and 248.
⟨ Declare *token_map* 266 ⟩ Used in section 255.
⟨ Declare *yyerror* 395 ⟩ Used in section 676.
⟨ Declare *yylex* 305, 394 ⟩ Used in sections 362 and 676.
⟨ Define non-member functions for **Date_Time_Type** 43 ⟩ Used in section 47.
⟨ Define parser functions 683, 684, 685, 686, 687, 688, 689, 691, 692, 693, 695, 696, 697, 698, 699, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726 ⟩ Used in section 728.
⟨ Define scanning and parsing functions 741, 744 ⟩ Used in section 750.
⟨ Define **Datasource_Type** functions 172, 174, 176, 177, 178, 180, 182, 184 ⟩ Used in section 186.
⟨ Define **Date_Time_Type** functions 37, 39, 41, 45 ⟩ Used in section 47.
⟨ Define **Id_Type** functions 200, 203, 206, 209 ⟩ Used in section 211.
⟨ Define **Mutex_Type** functions 14, 16 ⟩ Used in section 21.
⟨ Define **Query_Type** functions 87, 89, 91, 92, 93, 94, 96, 97, 98, 100, 102, 103, 104, 106, 107, 108, 111, 112, 113, 116, 117, 118, 119, 120, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156 ⟩ Used in sections 122 and 158.
⟨ Define **Scan_Parse** functions 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 283, 284, 285, 286, 287, 288, 289, 292 ⟩ Used in section 361.
⟨ Define **Scanner_Type** functions 231, 233, 235, 237, 238, 239, 240, 241, 242, 243, 244, 245 ⟩ Used in section 247.
⟨ Define **Token_Type** functions 220, 222 ⟩ Used in section 247.
⟨ Define *_tmain* 732 ⟩ Used in section 733.
⟨ Define *main* 745, 746, 747, 748 ⟩ Used in section 750.
⟨ Define *yylex* 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354 ⟩ Used in section 361.

⟨ Dublin Core parser rules 373, 375, 376, 378 ⟩ Used in section 379.
⟨ Dublin Core scanner rules 386, 387, 388, 389 ⟩ Used in section 390.
⟨ Filename sections 675 ⟩ Used in sections 676 and 677.
⟨ Flex options 383 ⟩ Used in section 390.
⟨ Forward declarations 17, 32, 52, 162, 191, 216, 252 ⟩ Used in sections 20, 47, 48, 122, 123, 186, 187, 211, 212, 247, 248, 361, and 362.
⟨ GNU Free Documentation License 752 ⟩ Cited in section 2. Used in section 753.
⟨ GNU General Public License 751 ⟩ Cited in section 2. Used in section 753.
⟨ Garbage 426 ⟩ Used in section 677.
⟨ Global variables 731, 736 ⟩ Used in sections 733 and 750.
⟨ Include files 10, 24, 30, 50, 125, 160, 189, 214, 250, 364, 382, 393, 679, 730, 735 ⟩ Used in sections 20, 21, 28, 47, 122, 158, 186, 211, 247, 361, 379, 390, 676, 728, 733, and 750.
⟨ Initialize **static Datasource_Type** constants 166 ⟩ Used in section 186.
⟨ Initialize **static Datasource_Type** variables 167 ⟩ Used in section 186.
⟨ Initialize **static Id_Type** constants 194 ⟩ Used in section 211.
⟨ Initialize **static Query_Type** constants 58, 60, 67, 68, 70, 71, 72, 74, 76, 83 ⟩ Used in section 122.
⟨ Initialize **static Query_Type** variables 80, 81 ⟩ Used in section 122.
⟨ Look up *curr_id* in *keyword_map* and possibly *id_map* 357, 358, 359 ⟩ Used in sections 314, 324, 327, 332, 344, 352, and 356.
⟨ Parser rules 421, 423, 424, 427, 428, 429, 436, 437, 438, 439, 442, 443, 444, 445, 447, 449, 451, 453, 457, 459, 460, 461, 463, 464, 465, 466, 468, 469, 471, 472, 474, 475, 477, 478, 482, 483, 485, 486, 487, 488, 490, 491, 493, 494, 495, 496, 497, 498, 499, 500, 502, 503, 505, 506, 507, 508, 510, 511, 512, 513, 514, 515, 517, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 548, 549, 552, 554, 555, 556, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 572, 573, 574, 575, 576, 578, 579, 580, 581, 582, 583, 584, 586, 587, 588, 590, 591, 592, 593, 594, 595, 596, 597, 602, 603, 604, 605, 606, 607, 608, 609, 610, 614, 615, 616, 617, 618, 620, 621, 623, 624, 626, 627, 629, 630, 631, 632, 633, 634, 638, 639, 641, 643, 645, 648, 649, 650, 652, 654, 656, 660, 661, 662, 664, 666, 668, 670, 671, 672, 673 ⟩ Used in section 676.
⟨ Preprocessor macro calls 23, 31, 51, 161, 190, 215, 251, 680 ⟩ Used in sections 28, 48, 123, 187, 212, 248, and 362.
⟨ Preprocessor macro definitions 77, 365 ⟩ Used in sections 122, 123, and 379.
⟨ Start conditions for the Dublin Core scanner 384 ⟩ Used in section 390.
⟨ Token and type declarations 370, 371, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 415, 416, 417, 418 ⟩ Used in sections 379 and 676.
⟨ Type declarations for non-terminal symbols 432, 435, 440, 441, 446, 448, 450, 452, 456, 458, 462, 467, 470, 473, 476, 480, 481, 484, 489, 492, 501, 516, 518, 547, 550, 571, 577, 585, 589, 599, 601, 613, 619, 622, 625, 628, 637, 640, 642, 644, 647, 651, 653, 655, 659, 663, 665, 667, 669 ⟩ Used in section 676.
⟨ `assign.w` 479 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ `commands.w` 598 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ `dbcrprsr.w` 363 ⟩ Cited in sections 6 and 8. Used in section 379.
⟨ `dbcrscan.web` 381 ⟩ Cited in sections 6 and 8. Used in section 390.
⟨ `declrtns.w` 434 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ `dtsrcexp.w` 636 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ `dtsrctyp.web` 159 ⟩ Cited in sections 6 and 8. Used in section 186.
⟨ `dttmexp.w` 658 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ `dttmtype.web` 29 ⟩ Cited in sections 6 and 8. Used in section 47.
⟨ `grpstmnt.w` 431 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ `idtype.web` 188 ⟩ Cited in sections 6 and 8. Used in section 211.
⟨ `main.web` 734 ⟩ Cited in sections 6 and 8. Used in section 750.
⟨ `nonwin.web` 9 ⟩ Cited in sections 6 and 8. Used in section 21.
⟨ `parser.w` 392 ⟩ Cited in sections 6, 7, 8, and 677. Used in section 675.
⟨ `prsrfncs.web` 678 ⟩ Used in section 728.
⟨ `qtgensql.web` 124 ⟩ Cited in sections 6 and 8. Used in section 158.
⟨ `queryexp.w` 612 ⟩ Cited in sections 7 and 8. Used in section 675.

⟨ querytyp.web 49 ⟩ Cited in sections 6 and 8. Used in section 122.
⟨ scanner.web 249 ⟩ Cited in sections 6 and 8. Used in section 361.
⟨ scantest.web 729 ⟩ Cited in sections 6 and 8. Used in section 733.
⟨ scnrtype.web 213 ⟩ Cited in sections 6 and 8. Used in section 247.
⟨ stdafx.web 22 ⟩ Cited in sections 6 and 8. Used in section 27.
⟨ strings.w 646 ⟩ Used in section 675.
⟨ variabls.w 455 ⟩ Cited in sections 7 and 8. Used in section 675.
⟨ dbcrprsr.yxx 379 ⟩
⟨ dbcrscan.lxx 390 ⟩
⟨ dtsrctyp.hh 187 ⟩
⟨ dttmtype.hh 48 ⟩
⟨ idtype.hh 212 ⟩
⟨ nonwin.hh 20 ⟩
⟨ parser.yyy 676 ⟩
⟨ querytyp.hh 123 ⟩
⟨ scanner.hh 362 ⟩
⟨ scnrtype.hh 248 ⟩
⟨ stdafx.hh 28 ⟩
⟨ **Mutex_Type** declaration 12 ⟩ Used in sections 20 and 21.
⟨ **extern** declaration of namespace **Scan_Parse** 256, 258, 259 ⟩ Used in section 362.
⟨ **extern** declarations for global variables 18, 25 ⟩ Used in sections 20 and 28.
⟨ **extern** *keyword_map* declaration 264 ⟩ Used in section 259.
⟨ **extern** *token_map* declaration 267 ⟩ Used in section 259.
⟨ **friend** declarations for **Scanner_Type** 224, 226 ⟩ Used in section 223.
⟨ **friend** declarations for **class Datasource_Type** 164 ⟩ Used in section 163.
⟨ **friend** declarations for **class Query_Type** 55 ⟩ Used in section 53.
⟨ **union** declaration for YYSTYPE 368, 396 ⟩ Used in sections 379 and 676.

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