ODBC Programming 2

Database (Spring 2023)

ODBC Programming: Create Example Tables

```
SQLQuery1.sql -..OMPANY (KIM (77))* ** X

CREATE TABLE DEPARTMENT(
DEPTNO INT NOT NULL,
DEPTNAME CHAR(20),
FLOOR INT,
PRIMARY KEY(DEPTNO)
);

INSERT INTO DEPARTMENT VALUES(1, 'SALES', 8);
INSERT INTO DEPARTMENT VALUES(2, 'PLANNING', 10);
INSERT INTO DEPARTMENT VALUES(3, 'DEVELOPMENT', 9);
INSERT INTO DEPARTMENT VALUES(4, 'GENERAL AFFAIRS', 7);
INSERT INTO DEPARTMENT VALUES(5, 'RESEARCH', 11);
```

Create the DEPARTMENT table

ODBC Programming: Create Example Tables

```
SQLQuery1.sql -...OMPANY (KIM (77))* - X
   □ CREATE TABLE EMPLOYEE(
     EMPNO INTEGER NOT NULL,
    EMPNAME CHAR(10) UNIQUE,
    TITLE CHAR(20) DEFAULT 'STAFF',
    MANAGER INTEGER,
     SALARY INTEGER CHECK(SALARY<6000000),
    DNO INTEGER CHECK(DNO IN(1,2,3,4)) DEFAULT 1,
     PRIMARY KEY(EMPNO).
     FOREIGN KEY(MANAGER) REFERENCES EMPLOYEE(EMPNO),
     FOREIGN KEY(DNO) REFERENCES DEPARTMENT(DEPTNO)
    INSERT INTO EMPLOYEE VALUES(4377, 'L.LEE', 'PRESIDENT', NULL, 5000000, 2);
    INSERT INTO EMPLOYEE VALUES(3426, 'Y.PARK', 'MANAGER', 4377, 3000000, 1);
    INSERT INTO EMPLOYEE VALUES(3011, 'S.LEE', 'GENERAL MANAGER', 4377, 4000000, 3);
    INSERT INTO EMPLOYEE VALUES(3427, 'J.CHOI', 'STAFF', 3011, 1500000, 3);
     INSERT INTO EMPLOYEE VALUES(1003, 'M.CHO', 'MANAGER', 4377, 3000000, 2);
    INSERT INTO EMPLOYEE VALUES(2106, 'C.KIM', 'ASSISTANT MANAGER', 1003, 2500000, 2);
    INSERT INTO EMPLOYEE VALUES(1365, 'S.KIM', 'STAFF', 3426, 1500000, 1);
     INSERT INTO EMPLOYEE VALUES(1782, 'S. JEROME', 'STAFF', 3426, 3500000, 3);
```

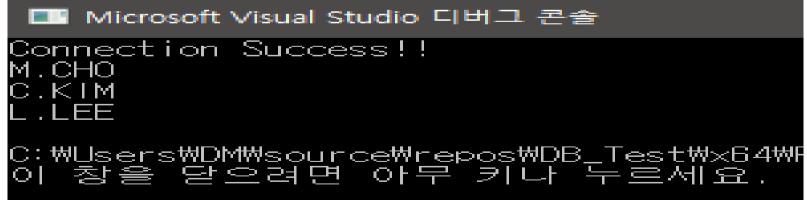
Create the EMPLOYEE table

ODBC Programming: SELECT Example 1

```
□int main(int argc, char *argv[])
           if (db_connect())
               printf("Connected to %s!\n\n", dataSourceName);
60
               SQLHSTMT hStmt; // Statement Handle
               SQLCHAR query[101];
64
               if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
                   sprintf_s((char *)query, 101, "SELECT EMPNAME FROM EMPLOYEE WHERE DNO = 2");
67
                   SQLExecDirect(hStmt, query, SQL_NTS);
                   SQLCHAR empName[11];
70
                   SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 11, NULL);
                   while (SQLFetch(hStmt) != SQL_NO_DATA)
                       printf("%s\n", empName);
77
                   SQLCloseCursor(hStmt);
                   SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
80
81
82
               db_disconnect();
           return 0;
```

ODBC Programming: SELECT Example 1

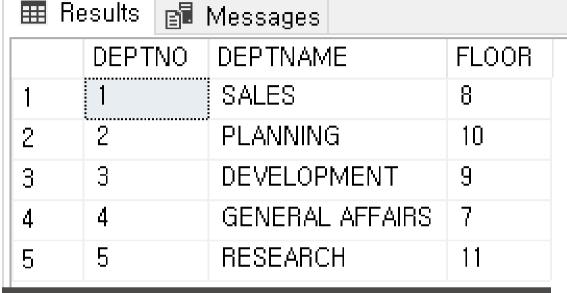
Ⅲ R	esults 📴	Messages				
	EMPNO	EMPNAME	TITLE	MANAGER	SALARY	DNO
1	1003	M,CHO	MANAGER	4377	3000000	2
2	1365	S,KIM	STAFF	3426	1500000	1
3	1782	S,JEROME	STAFF	3426	3500000	3
4	2106	C,KIM	ASSISTANT MANAGER	1003	2500000	2
5	3011	S,LEE	GENERAL MANAGER	4377	4000000	3
6	3426	Y,PARK	MANAGER	4377	3000000	1
7	3427	J, CHOI	STAFF	3011	1500000	3
8	4377	L,LEE	PRESIDENT	NULL	5000000	2

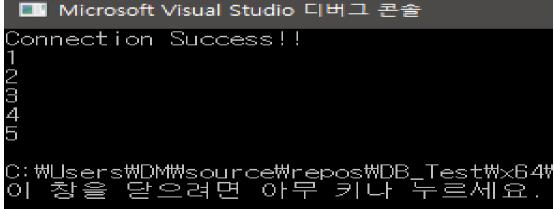


ODBC Programming: SELECT Example 2-1

```
□int main(int argc, char *argv[])
           if (db_connect())
               printf("Connected to %s!\n\n", dataSourceName);
60
62
               SQLHSTMT hStmt; // Statement Handle
               SQLCHAR query[101];
               if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
                   sprintf_s((char *)query, 101, "SELECT * FROM DEPARTMENT");
67
                   SQLExecDirect(hStmt, query, SQL_NTS);
68
69
                   SQLCHAR empName[11];
70
                   SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 11, NULL);
72
                   while (SQLFetch(hStmt) != SQL_NO_DATA)
74
                       printf("%s\n", empName);
76
77
                   SQLCloseCursor(hStmt);
78
                   SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
80
81
               db_disconnect();
82
84
           return 0;
```

ODBC Programming: SELECT Example 2-1





SELECT * FROM DEPARTMENT

But only prints DEPTNO.

WHY?

ODBC Programming: SELECT Example 2-2

```
□int main(int argc, char *argv[])
     if (db_connect())
         printf("Connected to %s!\n\n", dataSourceName);
         SQLHSTMT hStmt; // Statement Handle
         SQLCHAR query[101];
         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
             sprintf_s((char *)query, 101, "SELECT * FROM DEPARTMENT");
             SQLExecDirect(hStmt, query, SQL_NTS);
             SOLCHAR deptNo[20]:
             SQLCHAR deptName[20];
             SQLCHAR floor[30];
             SQLBindCol(hStmt, 1, SQL_C_CHAR, deptNo, 20, NULL);
             SQLBindCol(hStmt, 2, SQL_C_CHAR, deptName, 20, NULL);
             SQLBindCol(hStmt, 3, SQL_C_CHAR, floor, 30, NULL);
             while (SQLFetch(hStmt) != SQL_NO_DATA)
                 printf("%-5s", deptNo);
                 printf("%10s", deptName);
                 printf("%6s\n", floor);
             SOLCloseCursor(hStmt);
             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
         db_disconnect();
     return 0;
```

```
™ Microsoft Visual Studio 디버그 콘솔

Connection Success!!

1 SALES 8

2 PLANNING 10

3 DEVELOPMENT 9

4 GENERAL AFFAIRS 7

5 RESEARCH 11

C:₩Users₩DM₩source₩repos₩DB_Test₩x64₩
이 창을 닫으려면 아무 키나 누르세요.
```

ODBC Programming: SELECT Example 3

```
□int main(int argc, char *argv[])
     if (db connect())
         printf("Connected to %s!\n\n", dataSourceName);
         SQLHSTMT hStmt; // Statement Handle
         SQLCHAR query[101];
         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
             sprintf_s((char *)query, 101, "SELECT EMPNO, EMPNAME, TITLE FROM EMPLOYEE");
             SQLExecDirect(hStmt, query, SQL_NTS);
             SQLCHAR empNo[20];
             SQLCHAR deptName[20];
             SQLCHAR title[30];
             SQLBindCol(hStmt, 1, SQL_C_CHAR, empNo, 20, NULL);
             SQLBindCol(hStmt, 2, SQL_C_CHAR, deptName, 20, NULL);
             SQLBindCol(hStmt, 3, SQL_C_CHAR, title, 30, NULL);
             while (SQLFetch(hStmt) != SQL_NO_DATA)
                 printf("%-8s", empNo);
                 printf("%10s", deptName);
                 printf("%6s\n", title);
             SQLCloseCursor(hStmt);
             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
         db_disconnect();
     return 0;
```

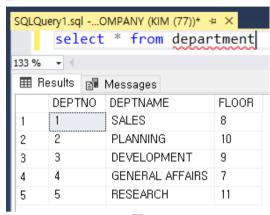
```
Microsoft Visual Studio 디버그 콘솔
Connection Success!!
1003
       M.CHO
                  MANAGER
1365
        S.KIM
                  STAFF
1782
       S.JEROME
2106
       C.KIM
                  ASSISTANT MANAGER
                  GENERAL MANAGER
3426
        Y.PARK
                  MANAGER
        J.CHOI
                  STAFF
4377
                  PRESIDENT
C:\Users\DM\source\repos\DB_Test\x64\F
  창을 닫으려면 아무 키나 누르세요.
```

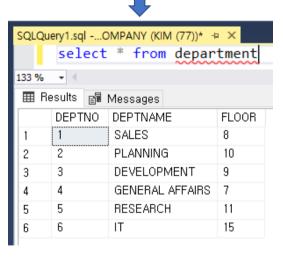
ODBC Programming: SELECT Example 4 (Join)

```
□int main(int argc, char *argv[])
     if (db_connect())
         printf("Connected to %s!\n\n", dataSourceName);
         SOLHSTMT hStmt; // Statement Handle
         SOLCHAR query[101];
         if (SOLAllocHandle(SOL_HANDLE_STMT, hDbc, &hStmt) == SOL_SUCCESS)
            sprintf_s((char *)query, 101, "SELECT EMPNAME, DEPTNAME FROM EMPLOYEE AS E, DEPARTMENT AS D WHERE E.DNO = D.DEPTNO");
            SQLExecDirect(hStmt, query, SQL_NTS);
            SQLCHAR empName[10];
                                                                      ■ Microsoft Visual Studio 디버그 콘솔
            SQLCHAR deptName[20];
                                                                     Connection Success!!
            SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 10, NULL);
            SQLBindCol(hStmt, 2, SQL_C_CHAR, deptName, 20, NULL);
                                                                                               PLANNING
                                                                     IM . CHO.
            while (SQLFetch(hStmt) != SQL_NO_DATA)
                                                                       ..IEROME
                                                                                               DEVELOPMENT
                printf("%s\t", empName);
                                                                                               PLANNING
                printf("%s\n", deptName);
                                                                                               DEVELOPMENT
                                                                                               DEVELOPMENT
            SQLCloseCursor(hStmt);
            SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
                                                                                               PLANNING
                                                                       .I FF
                                                                     C:₩Users₩DM₩source₩repos₩DB_Test₩x64₩Re
이 창을 닫으려면 아무 키나 누르세요.
         db_disconnect();
     return 0;
```

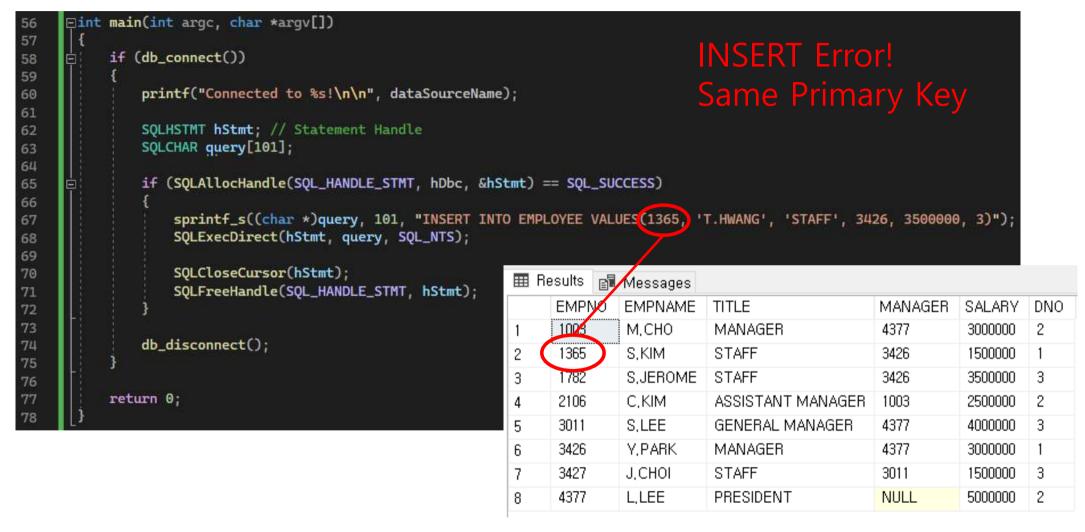
ODBC Programming: INSERT Example 1

```
□int main(int argc, char *argv[])
57
           if (db_connect())
59
60
               printf("Connected to %s!\n\n", dataSourceName);
               SQLHSTMT hStmt; // Statement Handle
62
               SQLCHAR query[101];
63
               if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66
                   sprintf_s((char *)query, 101, "INSERT INTO DEPARTMENT VALUES(6, 'IT', 15)");
67
                   SQLExecDirect(hStmt, query, SQL_NTS);
68
69
                   SQLCloseCursor(hStmt);
70
                   SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
73
               db_disconnect();
74
75
76
           return 0;
```





ODBC Programming: INSERT Example 2-1 (Error)

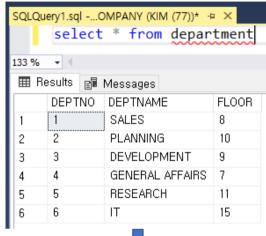


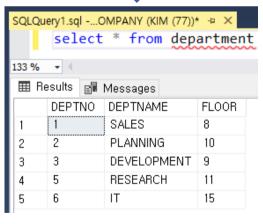
ODBC Programming: INSERT Example 2-2 (Error)

```
Dint main(int argc, char *argv[])
            if (db connect())
                 printf("Connected to %s!\n\n", dataSourceName);
                 SOLHSTMT hStmt; // Statement Handle
                 SOLCHAR query[101];
                 if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
                     sprintf_s((char *)query, 101, "INSERT INTO EMPLOYEE VALUES(1365, 'T.HWANG', 'STAFF', 3426, 3500000, 3)");
                     if (SQLExecDirect(hStmt, query, SQL_NTS) == SQL_ERROR)
69
                          SOLCHAR buffer[SOL_MAX_MESSAGE_LENGTH + 1];
                          SQLCHAR sqlstate[SQL_SQLSTATE_SIZE + 1];
                          SOLINTEGER sqlcode:
                          SOLSMALLINT length:
73
                          SQLError(hEnv, hDbc, hStmt, sqlstate, &sqlcode, buffer, SQL_MAX_MESSAGE_LENGTH + 1, &length);
74
                         printf("SOLSTATE %s\n", sqlstate);
                         printf("Native error code:%ld\n", sqlcode);
                          printf("%s\n\n", buffer);
78
                     SOLCloseCursor(hStmt):
                                                                                 Microsoft Visual Studio Debug Console
                     SOLFreeHandle(SOL_HANDLE_STMT, hStmt);
                                                                                |Connected to DB01_Server!
82
                                                                                SQLSTATE 23000
                                                                                Native error code:2627
[Microsoft][ODBC SQL Server Driver][SQL Server]Violation of PRIMARY KEY constraint 'PK_EMPLOYFE_140CF2
                 db_disconnect();
                                                                                EED91BC369'. Cannot insert duplicate key in object 'KIM.EMPLOYEE'. The duplicate key value is (1365).
                                                                                C:\Users\김한주\source\repos\CPP\x64\Release\CPP.exe (process 35016) exited with code 0.
                                                                                Press any key to close this window . . ._
            return 0;
```

ODBC Programming: DELETE Example 1

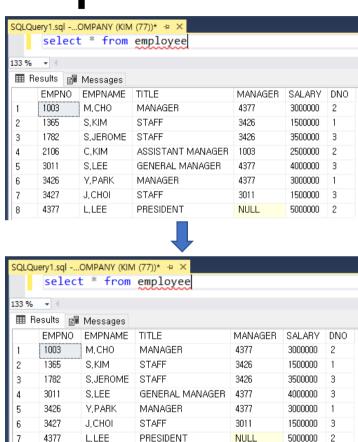
```
□int main(int argc, char *argv[])
56
57
           if (db_connect())
59
               printf("Connected to %s!\n\n", dataSourceName);
60
61
               SQLHSTMT hStmt; // Statement Handle
62
               SQLCHAR query[101];
63
64
               if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66
                   sprintf_s((char *)query, 101, "DELETE FROM DEPARTMENT WHERE DEPTNO = 4");
67
                   SQLExecDirect(hStmt, query, SQL_NTS);
69
                   SQLCloseCursor(hStmt);
70
                   SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
71
72
73
               db_disconnect();
74
75
76
           return 0;
```



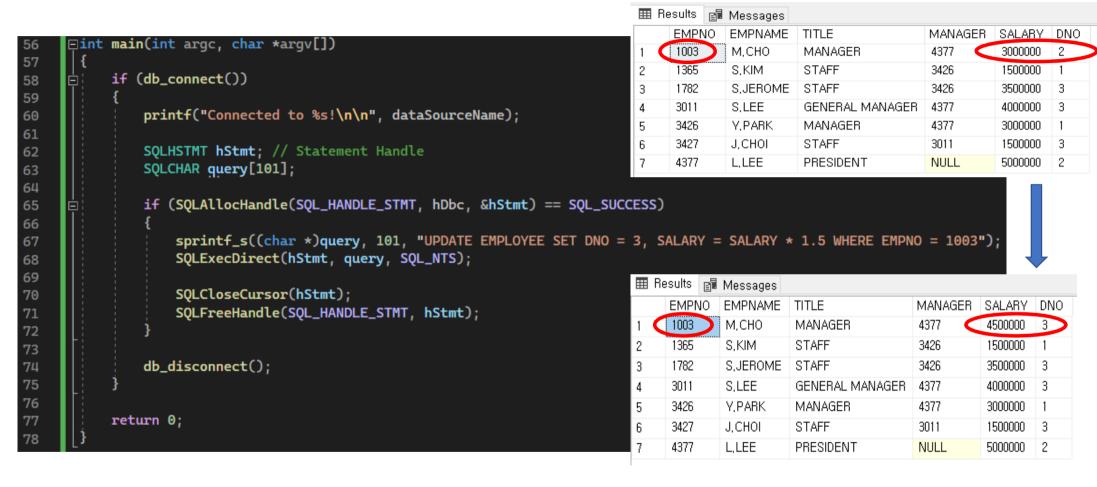


ODBC Programming: DELETE Example 2

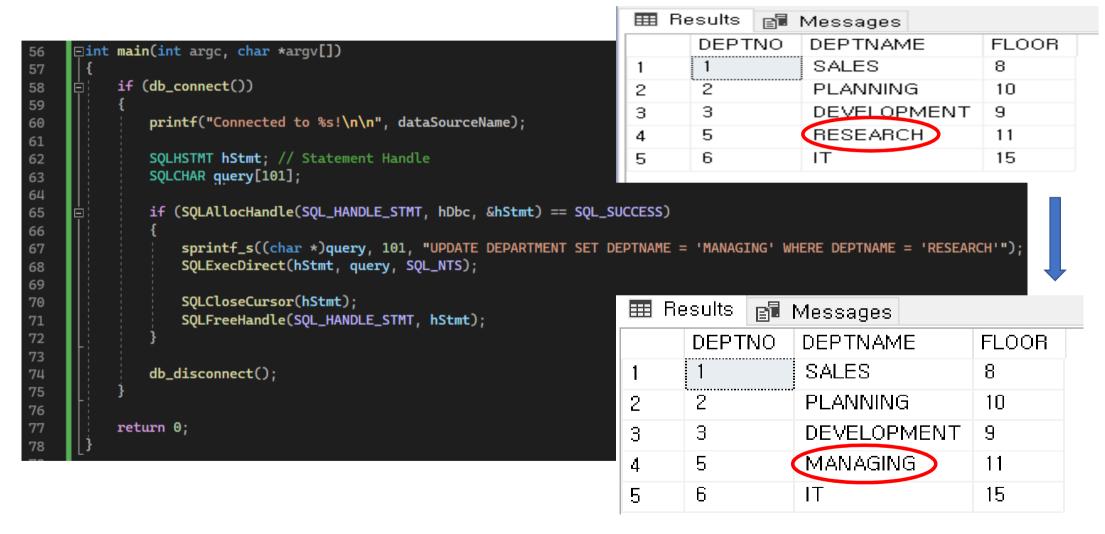
```
Fint main(int argc, char *argv[])
           if (db_connect())
59
               printf("Connected to %s!\n\n", dataSourceName);
62
               SQLHSTMT hStmt; // Statement Handle
               SQLCHAR query[101];
               if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
67
                   sprintf_s((char *)query, 101, "DELETE FROM EMPLOYEE WHERE EMPNAME = 'C.KIM'")
                   SQLExecDirect(hStmt, query, SQL_NTS);
                   SQLCloseCursor(hStmt);
70
                   SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
               db_disconnect();
           return 0;
```



ODBC Programming: UPDATE Example 1

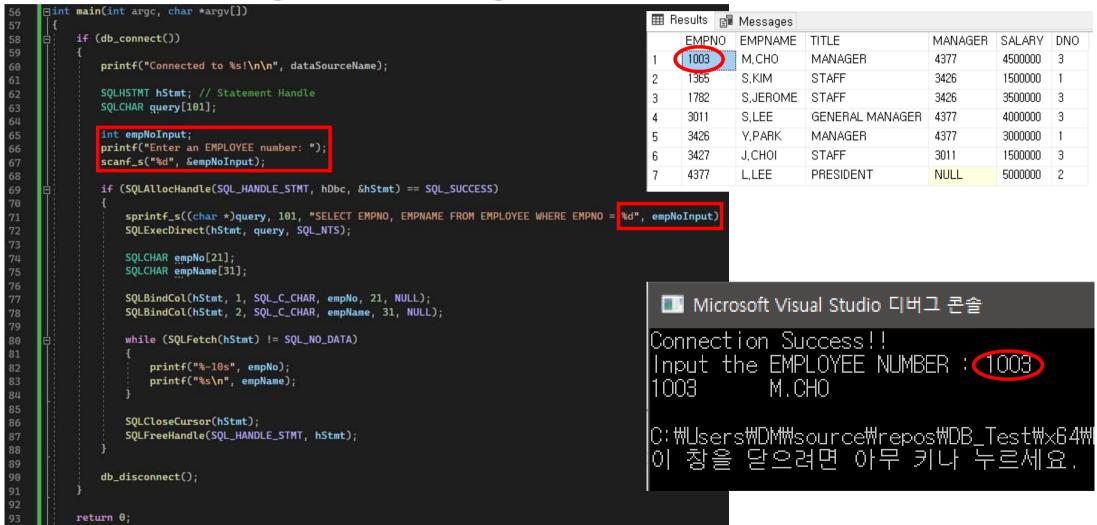


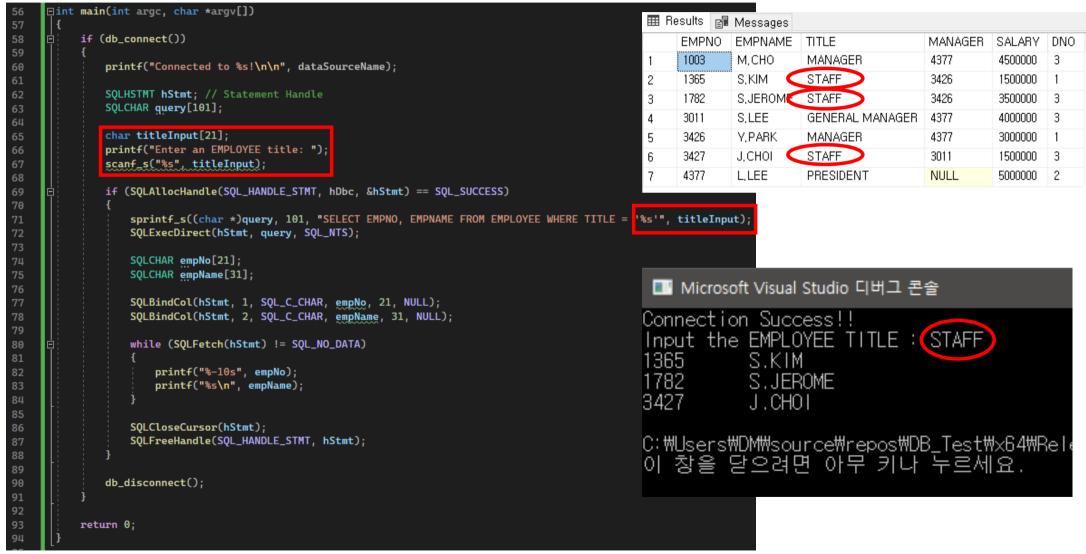
ODBC Programming: UPDATE Example 2



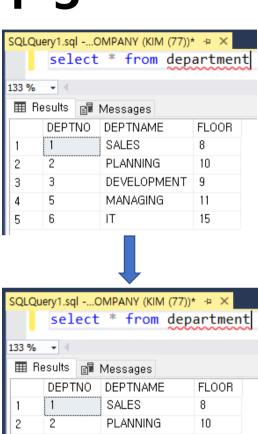
ODBC Programming 2 (Advanced)

Database (Spring 2023)





```
□int main(int argc, char *argv[])
                                                                 Microsoft Visual Studio Debug Con...
                                                                                                     if (db_connect())
                                                                Connected to DB01_Server!
              printf("Connected to %s!\n\n", dataSourceName);
                                                                Enter a DEPARTMENT number: 4
                                                                Enter a DEPARTMENT name DATABASE
              SQLHSTMT hStmt; // Statement Handle
                                                                Enter a DEPARTMENT floor 8
              SQLCHAR query[101];
                                                                C:\Users\U2 한주\source\repos\CPP\x64\Release
             int deptNo, floor;
                                                                char deptName[31];
              printf("Enter a DEPARTMENT number: ");
                                                                Press any key to close this window . . .
              scanf_s("%d", &deptNo);
              printf("Enter a DEPARTMENT name: ");
              scanf_s("%s", deptName);
70
              printf("Enter a DEPARTMENT floor: ");
             scanf_s("%d", &floor);
              if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
                 sprintf_s((char *)query, 101, "INSERT INTO DEPARTMENT VALUES(%d,'%s',%d)", deptNo, deptName, floor);
76
                 SQLExecDirect(hStmt, query, SQL_NTS);
78
                 SQLCloseCursor(hStmt);
                 SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
              db_disconnect();
          return 0;
```



DEVELOPMENT 9

11

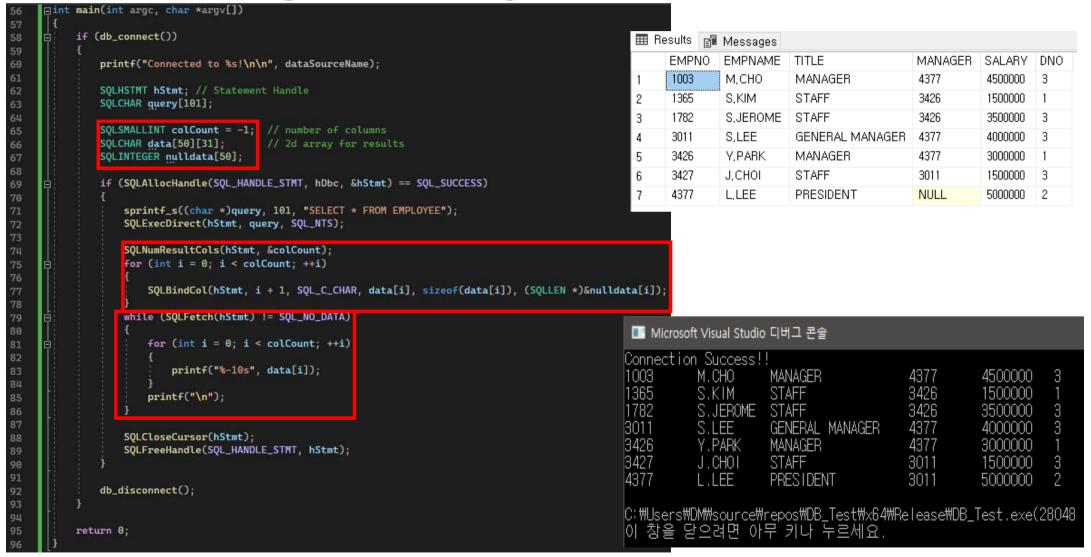
15

DATABASE MANAGING

ΙT

```
if(SQLAllocHandle(SQL_HANDLE_STMT, hDbc , &hStmt) == SQL_SUCCESS)
   sprintf((char*) query , "SELECT * FROM EMPLOYEE");
   SQLExecDirect(hStmt, query, SQL_NTS);
                                                                What if the SFLECT
   SQLBindCol(hStmt, 1, SQL_C_CHAR, empno, 20, NULL);
                                                                columns too many?
   SQLBindCol(hStmt, 2, SQL_C_CHAR, empname, 30, NULL);
   SQLBindCol(hStmt, 3, SQL_C_CHAR, title, 30, NULL);
   SQLBindCol(hStmt, 4, SQL_C_SLONG, &dno, 0, NULL);
   SOLBindCol(hStmt, 5, SOL C SLONG, &salary, 0, NULL);
                                                           StatementHandle.
SQLRETURN SQLNumResultCols( SQLHSTMT
                                                          ColumnCountPtr );
                                    SQLSMALLINT *
SQLRETURN SQLBindCol(
```

```
StatementHandle.
SQLHSTMT
                  ColumnNumber,
SQLUSMALLINT
SQLSMALLINT
                 TargetType,
                 TargetValuePtr,
SQLPOINTER
SQLLEN
                 BufferLength,
SQLLEN *
                 StrLen or Ind
                                  );
```



	sults 📴	EMPNAME	TITLE	MANAGER	SALARY	DNO
1	1003	M,CHO	MANAGER	4377	4500000	3
2	1365	S,KIM	STAFF	3426	1500000	1
3	1782	S,JEROME	STAFF	3426	3500000	3
4	3011	S,LEE	GENERAL MANAGER	4377	4000000	3
5	3426	Y,PARK	MANAGER	4377	3000000	1
6	3427	J.CHOI	STAFF	3011	1500000	3
7	4377	L.LEE	PRESIDENT	NULL	5000000	2
Micro	osoft Visua	ıl Studio 디버.	그 콘솔		_	
	osoft Visua		그 콘솔			

```
□int main(int argc, char *argv[])
     if (db_connect())
        printf("Connected to %s!\n\n", dataSourceName);
         SQLHSTMT hStmt; // Statement Handle
         SQLCHAR query[101];
        SQLSMALLINT colCount = -1; // number of columns
        SOLCHAR data[50][31]. // 2d array for results
         SQLINTEGER nullData[50]; // array for null results
         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
            sprintf_s((char *)query, 101, "SELECT * FROM EMPLOYEE");
            SQLExecDirect(hStmt, query, SQL_NTS);
            SQLNumResultCols(hStmt, &colCount);
            for (int i = 0; i < colCount; ++i)</pre>
                SQLBindCol(hStmt, i + 1, SQL_C_CHAR, data[i], sizeof(data[i]), (SQLLEN *)&nullData[i]);
            while (SQLFetch(hStmt) != SQL_NO_DATA)
                for (int i = 0; i < colCount; ++i)
                    else printf("%-10s", data[i]);
                printf("\n");
            SQLCloseCursor(hStmt);
            SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
         db_disconnect();
     return 0;
```

⊞ Re		Messages				
	EMPNO	EMPNAME	TITLE	MANAGER	SALARY	DNO
1	1003	M,CH0	MANAGER	4377	4500000	3
2	1365	S,KIM	STAFF	3426	1500000	1
3	1782	S,JEROME	STAFF	3426	3500000	3
4	3011	S,LEE	GENERAL MANAGER	4377	4000000	3
5	3426	Y,PARK	MANAGER	4377	3000000	1
6	3427	J,CHOI	STAFF	3011	1500000	3
7	4377	L,LEE	PRESIDENT	NULL	5000000	2
■ N	Microsoft V	ïsual Studio □	버그 콘솔			
	ection S	Success!!		43 ⁷ 7	4500000	3

∷ ₩Users₩DM₩source₩repos₩DB_Test₩x64₩Release₩DB_Test.exe(34540 기 창을 닫으려면 아무 키나 누르세요.