

ODBC Programming 2

Database (Spring 2023)

ODBC Programming : Create Example Tables

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

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "SELECT EMPNAME FROM EMPLOYEE WHERE DNO = 2");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR empName[11];
71             SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 11, NULL);
72
73             while (SQLFetch(hStmt) != SQL_NO_DATA)
74             {
75                 printf("%s\n", empName);
76             }
77
78             SQLCloseCursor(hStmt);
79             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
80         }
81
82         db_disconnect();
83     }
84
85     return 0;
86 }
```

ODBC Programming : SELECT Example 1

	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

Microsoft Visual Studio 디버그 콘솔

```
Connection Success!!  
M,CHO  
C,KIM  
L,LEE  
  
C:\Users\DM\source\repos\DB_Test\x64\BF  
이 창을 닫으려면 아무 키나 누르세요.
```

ODBC Programming : SELECT Example 2-1

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "SELECT * FROM DEPARTMENT");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR empName[11];
71             SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 11, NULL);
72
73             while (SQLFetch(hStmt) != SQL_NO_DATA)
74             {
75                 printf("%s\n", empName);
76             }
77
78             SQLCloseCursor(hStmt);
79             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
80         }
81
82         db_disconnect();
83     }
84
85     return 0;
86 }
```

ODBC Programming : SELECT Example 2-1

Results		Messages	
	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	4	GENERAL AFFAIRS	7
5	5	RESEARCH	11

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Connection Success!!	
1	
2	
3	
4	
5	
C:\Users\WDM\source\repos\DB_Test\bin\x64\	
이 창을 닫으려면 아무 키나 누르세요.	

**SELECT * FROM
DEPARTMENT**

But only prints DEPTNO.

WHY?

ODBC Programming : SELECT Example 2-2

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "SELECT * FROM DEPARTMENT");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR deptNo[20];
71             SQLCHAR deptName[20];
72             SQLCHAR floor[30];
73
74             SQLBindCol(hStmt, 1, SQL_C_CHAR, deptNo, 20, NULL);
75             SQLBindCol(hStmt, 2, SQL_C_CHAR, deptName, 20, NULL);
76             SQLBindCol(hStmt, 3, SQL_C_CHAR, floor, 30, NULL);
77
78             while (SQLFetch(hStmt) != SQL_NO_DATA)
79             {
80                 printf("%-5s", deptNo);
81                 printf("%10s", deptName);
82                 printf("%6s\n", floor);
83             }
84
85             SQLCloseCursor(hStmt);
86             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
87         }
88
89         db_disconnect();
90     }
91
92     return 0;
93 }
```

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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

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "SELECT EMPNO, EMPNAME, TITLE FROM EMPLOYEE");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR empNo[20];
71             SQLCHAR deptName[20];
72             SQLCHAR title[30];
73
74             SQLBindCol(hStmt, 1, SQL_C_CHAR, empNo, 20, NULL);
75             SQLBindCol(hStmt, 2, SQL_C_CHAR, deptName, 20, NULL);
76             SQLBindCol(hStmt, 3, SQL_C_CHAR, title, 30, NULL);
77
78             while (SQLFetch(hStmt) != SQL_NO_DATA)
79             {
80                 printf("%-8s", empNo);
81                 printf("%10s", deptName);
82                 printf("%6s\n", title);
83             }
84
85             SQLCloseCursor(hStmt);
86             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
87         }
88
89         db_disconnect();
90     }
91
92     return 0;
93 }
```

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Connection Success!!

1003	M.CHO	MANAGER
1365	S.KIM	STAFF
1782	S.JEROME	STAFF
2106	C.KIM	ASSISTANT MANAGER
3011	S.LEE	GENERAL MANAGER
3426	Y.PARK	MANAGER
3427	J.CHOI	STAFF
4377	L.LEE	PRESIDENT

C:\Users\DM\source\repos\DB_Test\x64\RP
이 창을 닫으려면 아무 키나 누르세요.

ODBC Programming : SELECT Example 4 (Join)

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "SELECT EMPNAME, DEPTNAME FROM EMPLOYEE AS E, DEPARTMENT AS D WHERE E.DNO = D.DEPTNO");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR empName[10];
71             SQLCHAR deptName[20];
72
73             SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 10, NULL);
74             SQLBindCol(hStmt, 2, SQL_C_CHAR, deptName, 20, NULL);
75
76             while (SQLFetch(hStmt) != SQL_NO_DATA)
77             {
78                 printf("%s\t", empName);
79                 printf("%s\n", deptName);
80             }
81
82             SQLCloseCursor(hStmt);
83             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
84         }
85
86         db_disconnect();
87     }
88
89     return 0;
90 }
```

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Connection Success!!

M.CHO	PLANNING
S.KIM	SALES
S.JEROME	DEVELOPMENT
C.KIM	PLANNING
S.LEE	DEVELOPMENT
Y.PARK	SALES
J.CHOI	DEVELOPMENT
L.LEE	PLANNING

C:\Users\DM\source\repos\DB_Test\x64\Re
이 창을 닫으려면 아무 키나 누르세요.

ODBC Programming : INSERT Example 1

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "INSERT INTO DEPARTMENT VALUES(6, 'IT', 15)");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCloseCursor(hStmt);
71             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
72         }
73
74         db_disconnect();
75     }
76
77     return 0;
78 }
```

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

select * from department

133 %

Results Messages

	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	4	GENERAL AFFAIRS	7
5	5	RESEARCH	11



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

select * from department

133 %

Results Messages

	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	4	GENERAL AFFAIRS	7
5	5	RESEARCH	11
6	6	IT	15

ODBC Programming : INSERT Example 2-1 (Error)

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "INSERT INTO EMPLOYEE VALUES(1365, 'T.HWANG', 'STAFF', 3426, 3500000, 3)");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCloseCursor(hStmt);
71             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
72         }
73
74         db_disconnect();
75     }
76
77     return 0;
78 }
```

INSERT Error!
Same Primary Key

Results		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 : INSERT Example 2-2 (Error)

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "INSERT INTO EMPLOYEE VALUES(1365, 'T.HWANG', 'STAFF', 3426, 3500000, 3)");
68             if (SQLExecDirect(hStmt, query, SQL_NTS) == SQL_ERROR)
69             {
70                 SQLCHAR buffer[SQL_MAX_MESSAGE_LENGTH + 1];
71                 SQLCHAR sqlstate[SQL_SQLSTATE_SIZE + 1];
72                 SQLINTEGER sqlcode;
73                 SQLSMALLINT length;
74                 SQLError(hEnv, hDbc, hStmt, sqlstate, &sqlcode, buffer, SQL_MAX_MESSAGE_LENGTH + 1, &length);
75                 printf("SQLSTATE %s\n", sqlstate);
76                 printf("Native error code:%ld\n", sqlcode);
77                 printf("%s\n\n", buffer);
78             }
79
80             SQLCloseCursor(hStmt);
81             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
82         }
83
84         db_disconnect();
85     }
86
87     return 0;
88 }
```

Microsoft Visual Studio Debug Console

Connected to DB01_Server!

SQLSTATE 23000
Native error code:2627
[Microsoft][ODBC SQL Server Driver][SQL Server]Violation of PRIMARY KEY constraint 'PK_EMPLOYEE'. Cannot insert duplicate key in object 'KIM.EMPLOYEE'. The duplicate key value is (1365).

C:\Users\김한주\source\repos\CPP\64\Release\CPP.exe (process 35016) exited with code 0.
Press any key to close this window . . .

ODBC Programming : DELETE Example 1

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "DELETE FROM DEPARTMENT WHERE DEPTNO = 4");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCloseCursor(hStmt);
71             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
72         }
73
74         db_disconnect();
75     }
76
77     return 0;
78 }
```

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

select * from department

133 %

Results Messages

	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	4	GENERAL AFFAIRS	7
5	5	RESEARCH	11
6	6	IT	15



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

select * from department

133 %

Results Messages

	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	5	RESEARCH	11
5	6	IT	15

ODBC Programming : DELETE Example 2

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "DELETE FROM EMPLOYEE WHERE EMPNAME = 'C.KIM'");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCloseCursor(hStmt);
71             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
72         }
73
74         db_disconnect();
75     }
76
77     return 0;
78 }
```

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

select * from employee

133 %

Results 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



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

select * from employee

133 %

Results 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	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

ODBC Programming : UPDATE Example 1

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "UPDATE EMPLOYEE SET DNO = 3, SALARY = SALARY * 1.5 WHERE EMPNO = 1003");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCloseCursor(hStmt);
71             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
72         }
73
74         db_disconnect();
75     }
76
77     return 0;
78 }
```

	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	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



	EMPNO	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

ODBC Programming : UPDATE Example 2

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
66         {
67             sprintf_s((char *)query, 101, "UPDATE DEPARTMENT SET DEPTNAME = 'MANAGING' WHERE DEPTNAME = 'RESEARCH'");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCloseCursor(hStmt);
71             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
72         }
73
74         db_disconnect();
75     }
76
77     return 0;
78 }
```

Results		Messages	
	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	5	RESEARCH	11
5	6	IT	15



Results		Messages	
	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	5	MANAGING	11
5	6	IT	15

ODBC Programming 2 (Advanced)

Database (Spring 2023)

ODBC Programming : Advanced 1-1

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         int empNoInput;
66         printf("Enter an EMPLOYEE number: ");
67         scanf_s("%d", &empNoInput);
68
69         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
70         {
71             sprintf_s((char *)query, 101, "SELECT EMPNO, EMPNAME FROM EMPLOYEE WHERE EMPNO = %d", empNoInput);
72             SQLExecDirect(hStmt, query, SQL_NTS);
73
74             SQLCHAR empNo[21];
75             SQLCHAR empName[31];
76
77             SQLBindCol(hStmt, 1, SQL_C_CHAR, empNo, 21, NULL);
78             SQLBindCol(hStmt, 2, SQL_C_CHAR, empName, 31, NULL);
79
80             while (SQLFetch(hStmt) != SQL_NO_DATA)
81             {
82                 printf("%-10s", empNo);
83                 printf("%s\n", empName);
84             }
85
86             SQLCloseCursor(hStmt);
87             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
88         }
89
90         db_disconnect();
91     }
92
93     return 0;
94 }
```

	EMPNO	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

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```
Connection Success!!
Input the EMPLOYEE NUMBER : 1003
1003      M.CHO

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

ODBC Programming : Advanced 1-2

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         char titleInput[21];
66         printf("Enter an EMPLOYEE title: ");
67         scanf_s("%s", titleInput);
68
69         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
70         {
71             sprintf_s((char *)query, 101, "SELECT EMPNO, EMPNAME FROM EMPLOYEE WHERE TITLE = '%s'", titleInput);
72             SQLExecDirect(hStmt, query, SQL_NTS);
73
74             SQLCHAR empNo[21];
75             SQLCHAR empName[31];
76
77             SQLBindCol(hStmt, 1, SQL_C_CHAR, empNo, 21, NULL);
78             SQLBindCol(hStmt, 2, SQL_C_CHAR, empName, 31, NULL);
79
80             while (SQLFetch(hStmt) != SQL_NO_DATA)
81             {
82                 printf("%-10s", empNo);
83                 printf("%s\n", empName);
84             }
85
86             SQLCloseCursor(hStmt);
87             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
88         }
89
90         db_disconnect();
91     }
92
93     return 0;
94 }
```

	EMPNO	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

Microsoft Visual Studio 디버그 콘솔

Connection Success!!
Input the EMPLOYEE TITLE : STAFF
1365 S.KIM
1782 S.JEROME
3427 J.CHOI

C:\Users\DM\source\repos\DB_Test\x64\Release
이 창을 닫으려면 아무 키나 누르세요.

ODBC Programming : Advanced 1-3

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         int deptNo, floor;
66         char deptName[31];
67         printf("Enter a DEPARTMENT number: ");
68         scanf_s("%d", &deptNo);
69         printf("Enter a DEPARTMENT name: ");
70         scanf_s("%s", deptName);
71         printf("Enter a DEPARTMENT floor: ");
72         scanf_s("%d", &floor);
73
74         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
75         {
76             sprintf_s((char *)query, 101, "INSERT INTO DEPARTMENT VALUES(%d, '%s', %d)", deptNo, deptName, floor);
77             SQLExecDirect(hStmt, query, SQL_NTS);
78
79             SQLCloseCursor(hStmt);
80             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
81         }
82
83         db_disconnect();
84     }
85
86     return 0;
87 }
```

Microsoft Visual Studio Debug Console

Connected to DB01_Server!

Enter a DEPARTMENT number: 4
Enter a DEPARTMENT name: DATABASE
Enter a DEPARTMENT floor: 8

C:\Users\김한주\source\repos\CPP\CPP64\Release\CPP.exe (process 37584) exited with code 0.

Press any key to close this window . . .

SQLQuery1.sql -...OMPANY (KIM (77))

select * from department

133 %

Results Messages

	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	5	MANAGING	11
5	6	IT	15



SQLQuery1.sql -...OMPANY (KIM (77))

select * from department

133 %

Results Messages

	DEPTNO	DEPTNAME	FLOOR
1	1	SALES	8
2	2	PLANNING	10
3	3	DEVELOPMENT	9
4	4	DATABASE	8
5	5	MANAGING	11
6	6	IT	15

ODBC Programming : Advanced 2-1

```
if(SQLAllocHandle(SQL_HANDLE_STMT, hDbc , &hStmt) == SQL_SUCCESS)
{
    sprintf((char*) query , "SELECT * FROM EMPLOYEE");
    SQLExecDirect(hStmt, query , SQL_NTS);
```

```
SQLBindCol(hStmt , 1 , SQL_C_CHAR , empno , 20 , NULL);
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);
SQLBindCol(hStmt , 5 , SQL_C_SLONG , &salary , 0 , NULL);
```

What if the SELECT
columns too many?

```
SQLRETURN SQLNumResultCols( SQLHSTMT          StatementHandle,
                             SQLSMALLINT *      ColumnCountPtr );
```

```
SQLRETURN SQLBindCol(
    SQLHSTMT          StatementHandle,
    SQLUSMALLINT      ColumnNumber,
    SQLSMALLINT       TargetType,
    SQLPOINTER         TargetValuePtr,
    SQLLEN             BufferLength,
    SQLLEN *           StrLen_or_Ind    );
```

ODBC Programming : Advanced 2-1

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         SQLSMALLINT colCount = -1; // number of columns
66         SQLCHAR data[50][31]; // 2d array for results
67         SQLINTEGER nulldata[50];
68
69         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
70         {
71             sprintf_s((char *)query, 101, "SELECT * FROM EMPLOYEE");
72             SQLExecDirect(hStmt, query, SQL_NTS);
73
74             SQLNumResultCols(hStmt, &colCount);
75             for (int i = 0; i < colCount; ++i)
76             {
77                 SQLBindCol(hStmt, i + 1, SQL_C_CHAR, data[i], sizeof(data[i]), (SQLLEN *)&nulldata[i]);
78             }
79
80             while (SQLFetch(hStmt) != SQL_NO_DATA)
81             {
82                 for (int i = 0; i < colCount; ++i)
83                 {
84                     printf("%-10s", data[i]);
85                 }
86                 printf("\n");
87             }
88
89             SQLCloseCursor(hStmt);
90             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
91
92             db_disconnect();
93         }
94
95         return 0;
96     }
```

Results		Messages				
	EMPNO	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

Microsoft Visual Studio 디버그 콘솔

```
Connection Success!!
1003      M,CHO      MANAGER      4377      4500000      3
1365      S,KIM      STAFF        3426      1500000      1
1782      S,JEROME   STAFF        3426      3500000      3
3011      S,LEE      GENERAL MANAGER 4377      4000000      3
3426      Y,PARK     MANAGER      4377      3000000      1
3427      J,CHOI     STAFF        3011      1500000      3
4377      L,LEE      PRESIDENT    3011      5000000      2

C:\Users\WDM\source\repos\WDB_Test\Wx64\Release\WDB_Test.exe(28048)
이 창을 닫으려면 아무 키나 누르세요.
```

ODBC Programming : Advanced 2-2

Results		Messages				
	EMPNO	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

```
Microsoft Visual Studio 디버그 콘솔
Connection Success!!
1003      M. CHO      MANAGER      4377      4500000      3
1365      S. KIM      STAFF        3426      1500000      1
1782      S. JEROME    STAFF        3426      3500000      3
3011      S. LEE      GENERAL MANAGER  4377      4000000      3
3426      Y. PARK      MANAGER      4377      3000000      1
3427      J. CHOI      STAFF        3011      1500000      3
4377      L. LEE      PRESIDENT    3011      5000000      2

C:\Users\WDM\source\repos\WDB_Test\WDB_Test\Release\WDB_Test.exe(28048)
이 창을 닫으려면 아무 키나 누르세요.
```


ODBC Programming : Advanced 2-2

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         SQLHSTMT hStmt; // Statement Handle
63         SQLCHAR query[101];
64
65         SQLSMALLINT colCount = -1; // number of columns
66         SQLCHAR data[50][31]; // 2d array for results
67         SQLINTEGER nullData[50]; // array for null results
68
69         if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
70         {
71             sprintf_s((char *)query, 101, "SELECT * FROM EMPLOYEE");
72             SQLExecDirect(hStmt, query, SQL_NTS);
73
74             SQLNumResultCols(hStmt, &colCount);
75             for (int i = 0; i < colCount; ++i)
76             {
77                 SQLBindCol(hStmt, i + 1, SQL_C_CHAR, data[i], sizeof(data[i]), (SQLLEN *)&nullData[i]);
78             }
79             while (SQLFetch(hStmt) != SQL_NO_DATA)
80             {
81                 for (int i = 0; i < colCount; ++i)
82                 {
83                     if (nullData[i] == SQL_NULL_DATA) printf("NULL ");
84                     else printf("%-10s", data[i]);
85                 }
86                 printf("\n");
87             }
88
89             SQLCloseCursor(hStmt);
90             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
91         }
92
93         db_disconnect();
94     }
95
96     return 0;
97 }
```

Results						
	EMPNO	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

Microsoft Visual Studio 디버그 콘솔

Connection Success!!

1003	M,CHO	MANAGER	4377	4500000	3
1365	S,KIM	STAFF	3426	1500000	1
1782	S,JEROME	STAFF	3426	3500000	3
3011	S,LEE	GENERAL MANAGER	4377	4000000	3
3426	Y,PARK	MANAGER	4377	3000000	1
3427	J,CHOI	STAFF	3011	1500000	3
4377	L,LEE	PRESIDENT	NULL	5000000	2

C:\Users\#DM\source\repos\DB_Test\#x64\Release\DB_Test.exe(34540)
이 창을 닫으려면 아무 키나 누르세요.