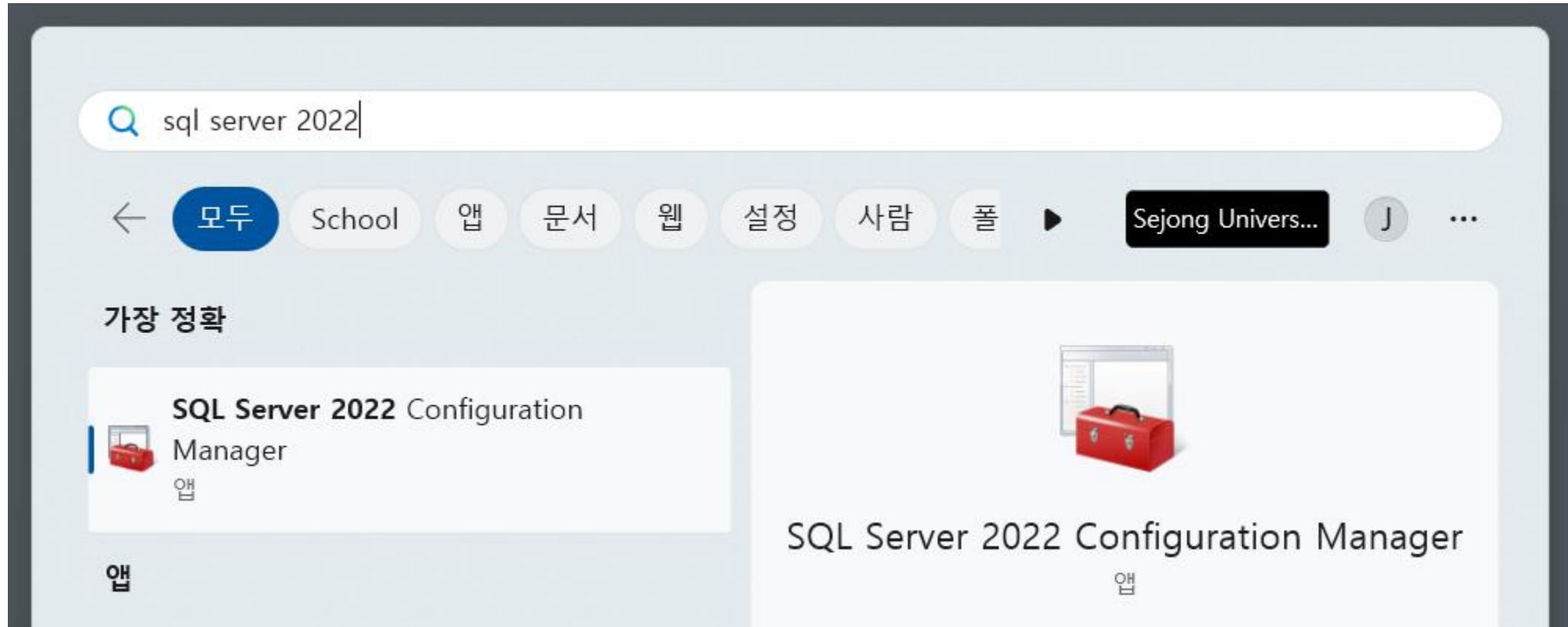


ODBC Programming 1

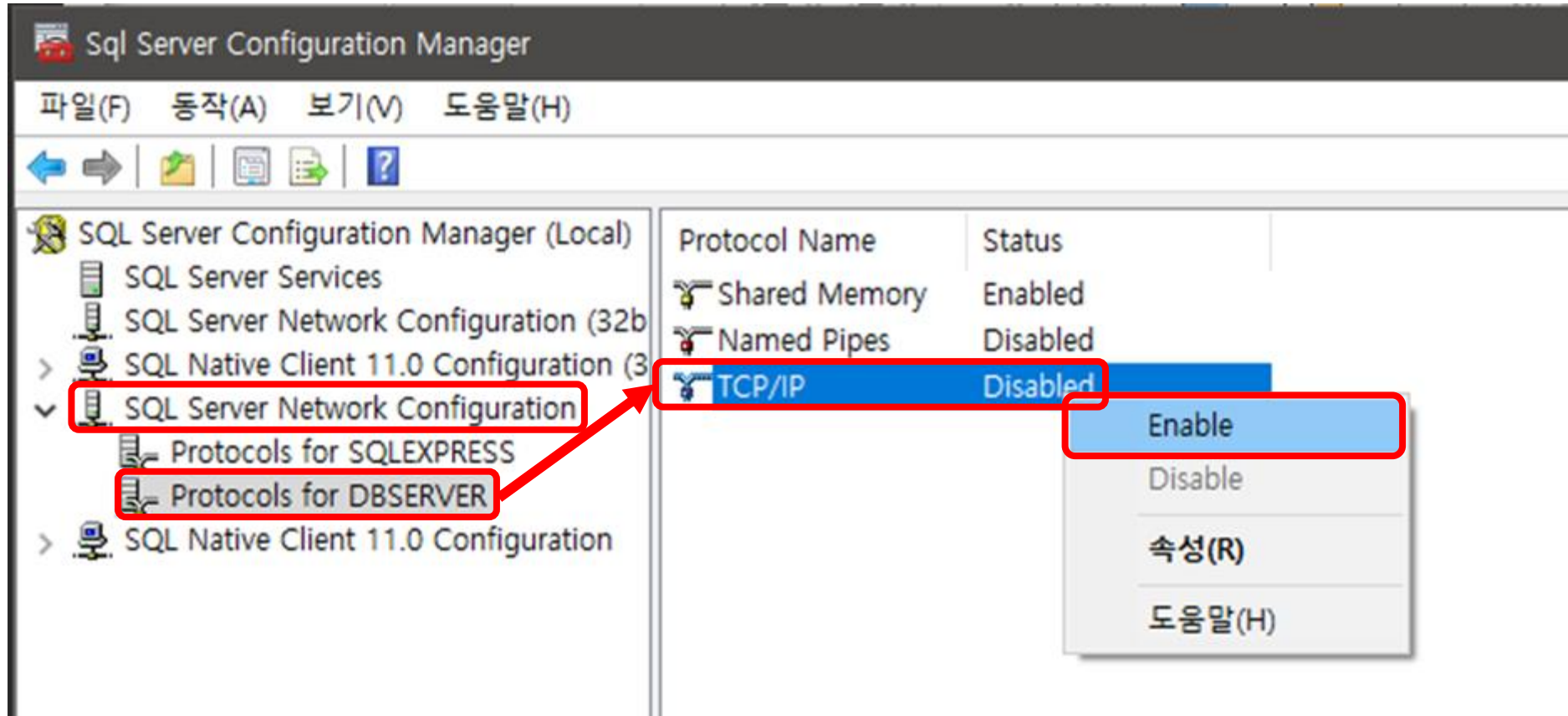
Database (Spring 2023)

ODBC Programming : TCP/IP Config



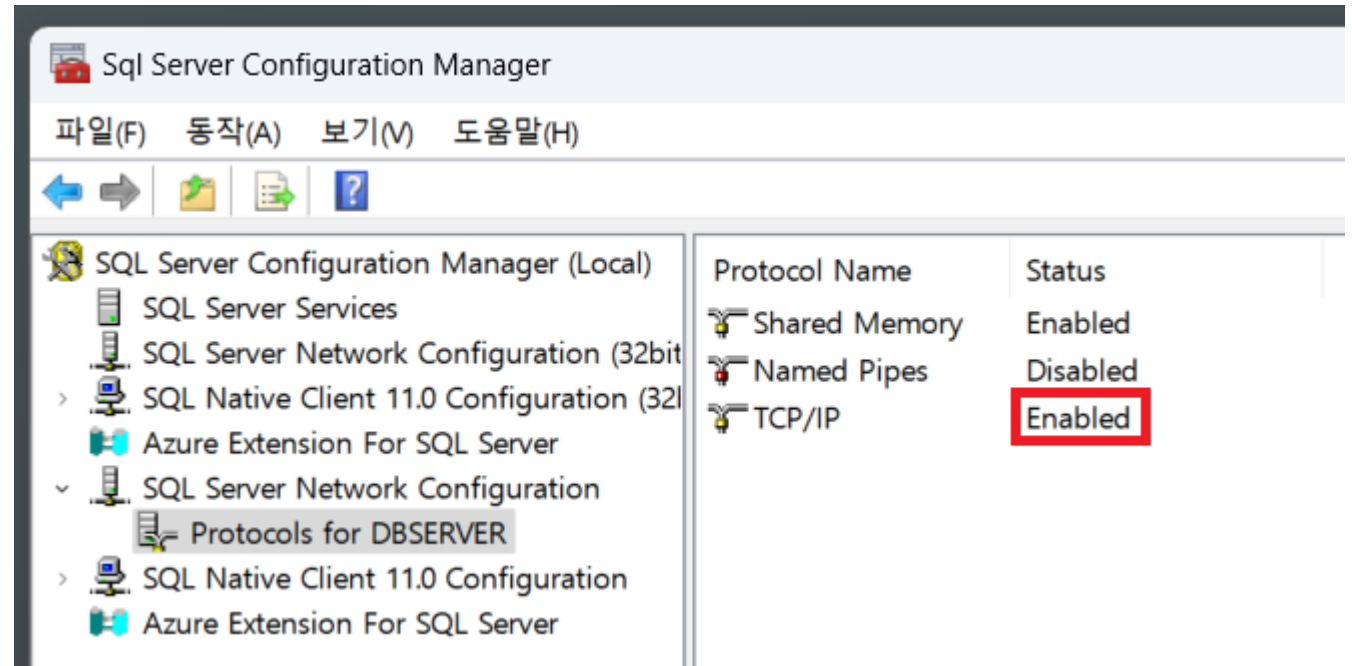
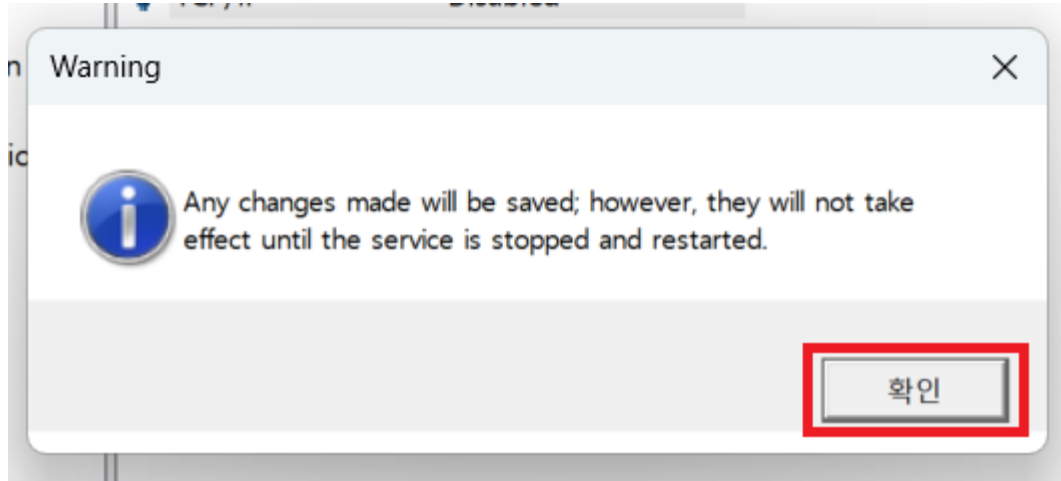
[Start menu] -> [search: "SQL Server 2022 Configuration Manager"]
(or [File location: C:\Windows\SysWOW64\SQLServerManager16.msc])

ODBC Programming : TCP/IP Config



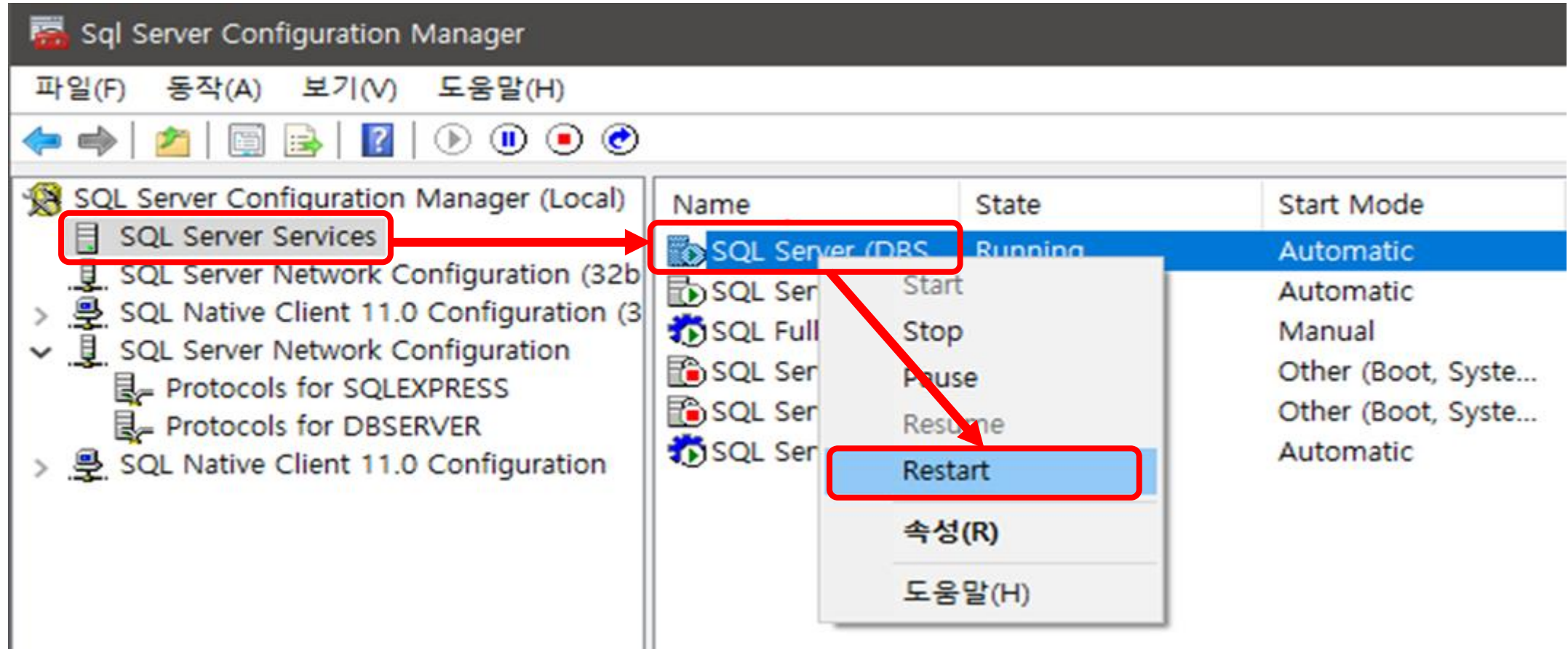
[SQL Server Configuration Manger] -> [SQL Server Network Configuration] -> [Protocols for DBSERVER] -> [TCP/IP] -> [Enable]

ODBC Programming : TCP/IP Config



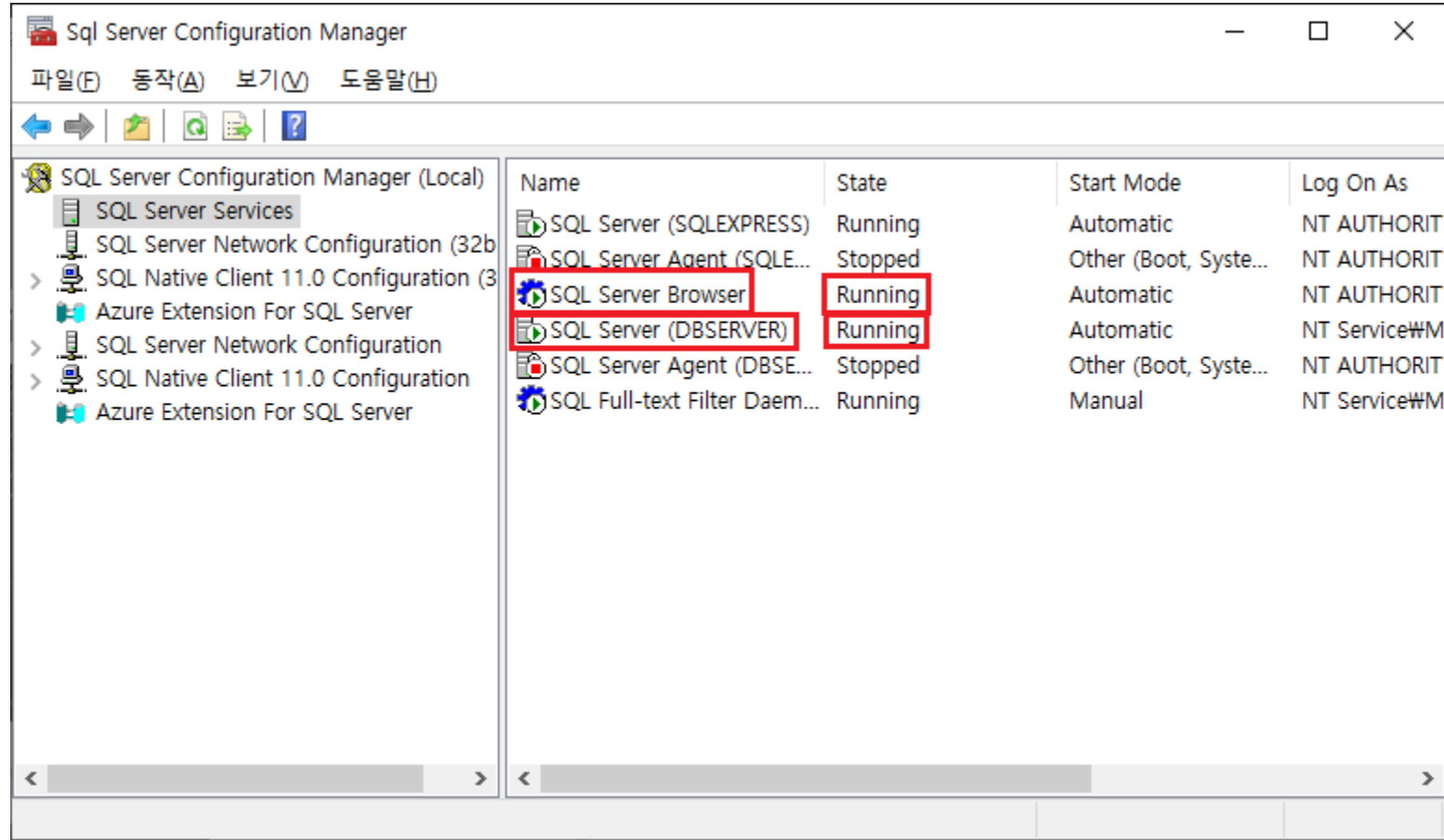
[확인] -> [check: TCP/IP Enabled]

ODBC Programming : TCP/IP Config



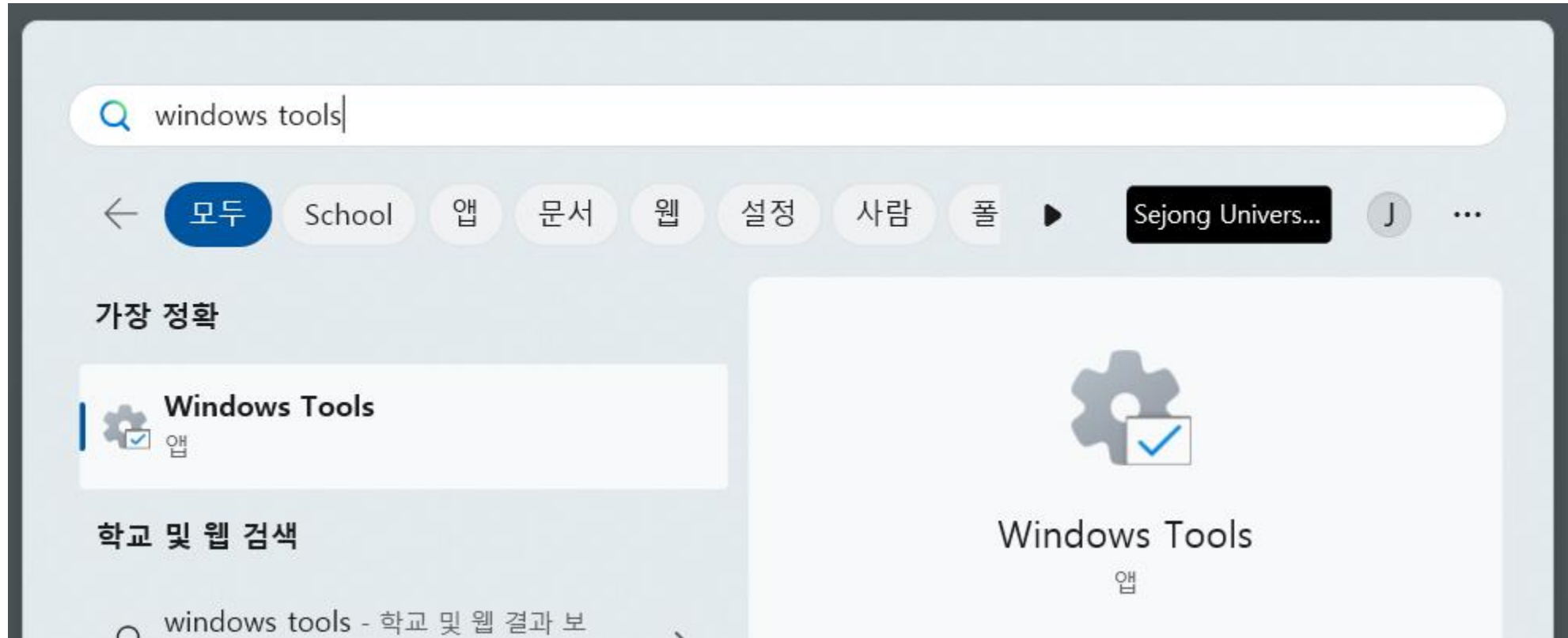
[SQL Server Configuration Manager] -> [SQL Server Services] ->
[SQL Server (DBSERVER)] -> [Restart]

ODBC Programming : TCP/IP Config



SQL Server Browser: Running, SQL Server (DBSERVER): Running

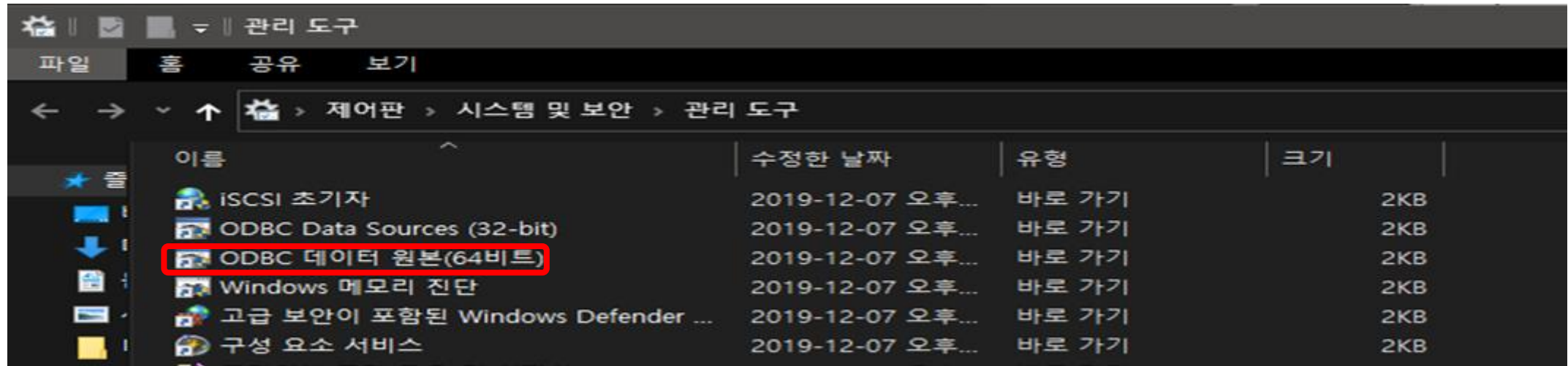
ODBC Programming : ODBC Config



[Start menu] -> [search: "Windows Tools"]

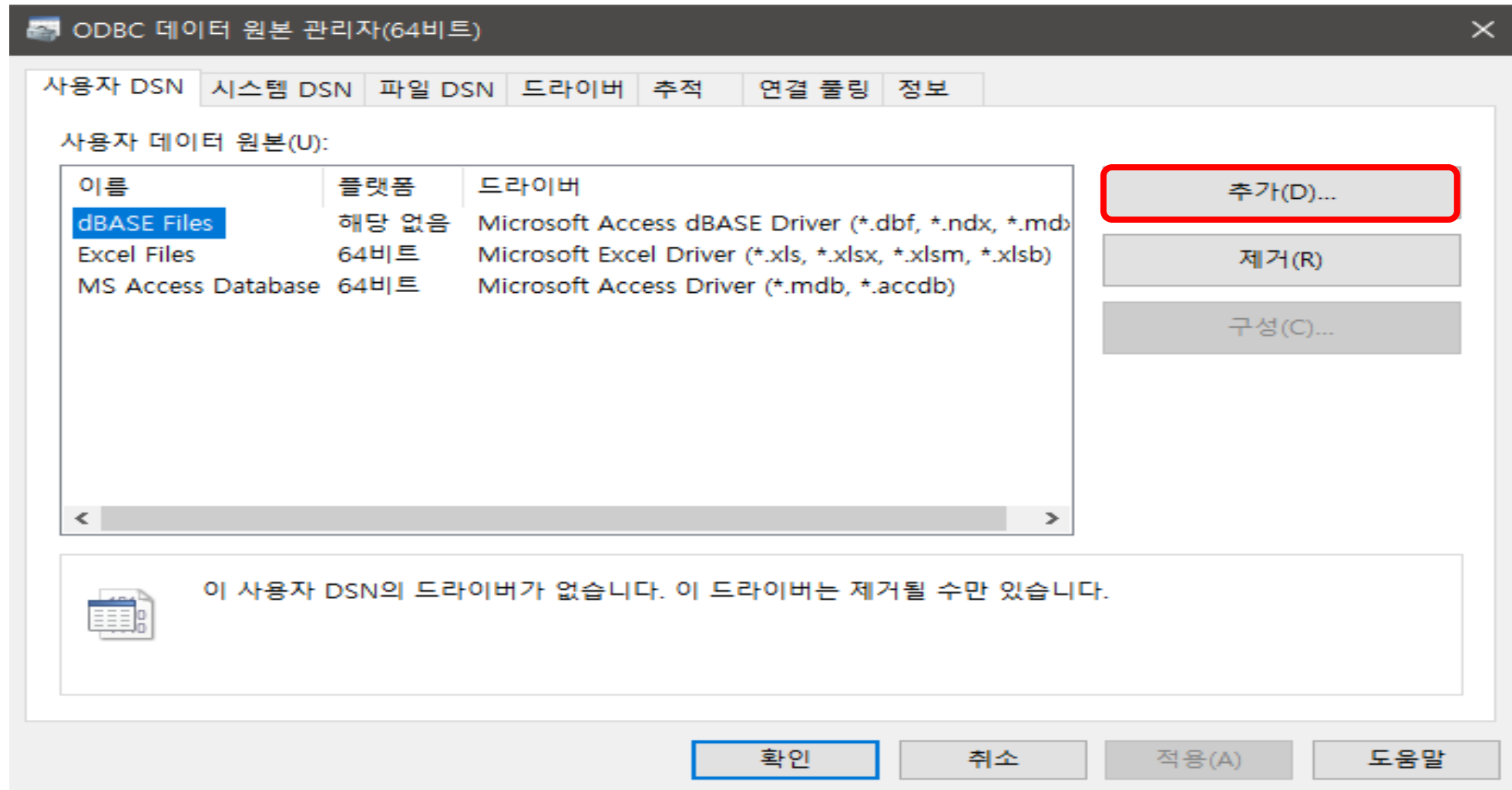
(for Windows 10: [Start menu] -> [search: "Windows 관리 도구"])

ODBC Programming : ODBC Config



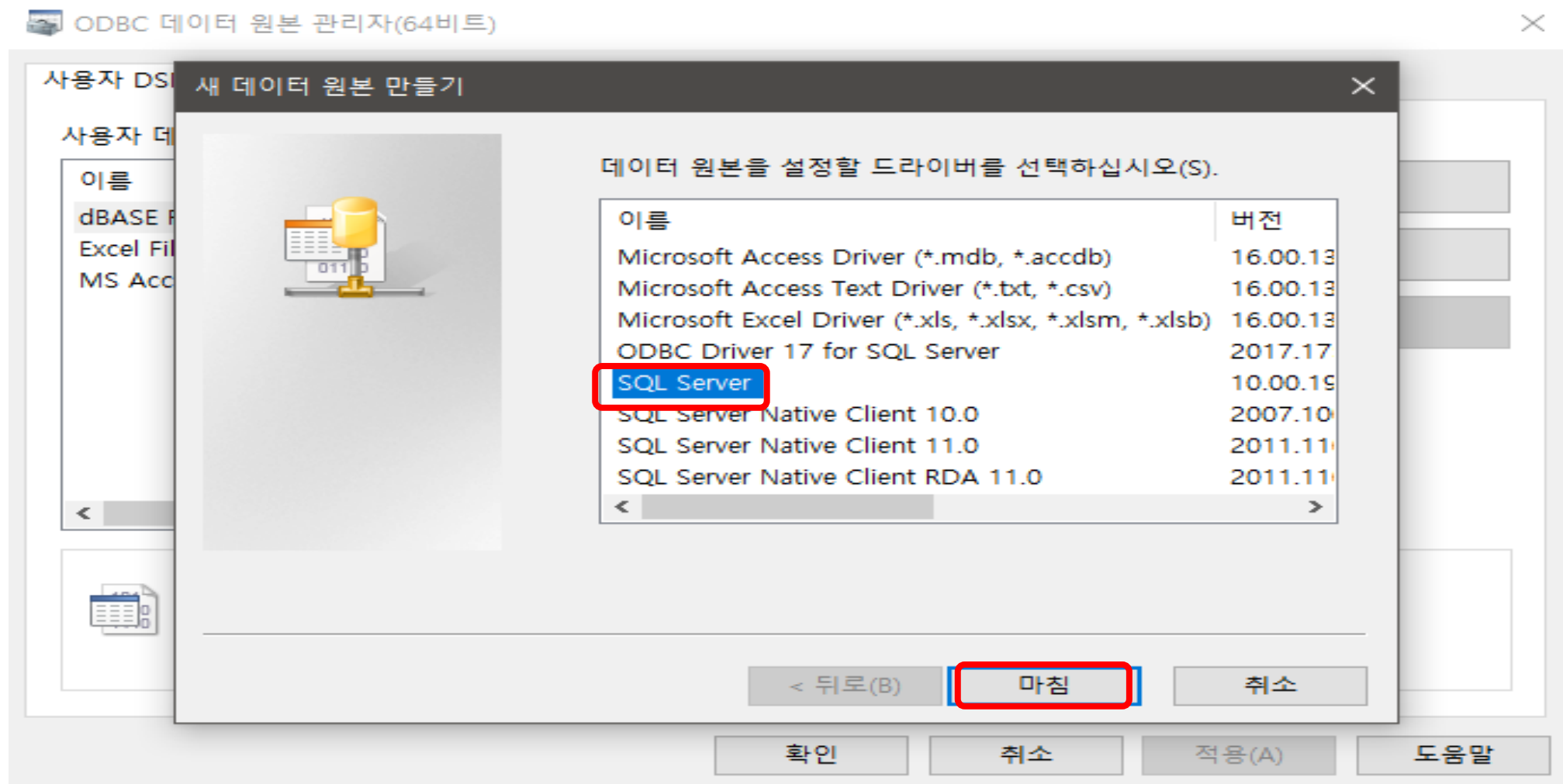
[Windows Tools] -> [ODBC 데이터 원본(64bit)]

ODBC Programming : ODBC Config



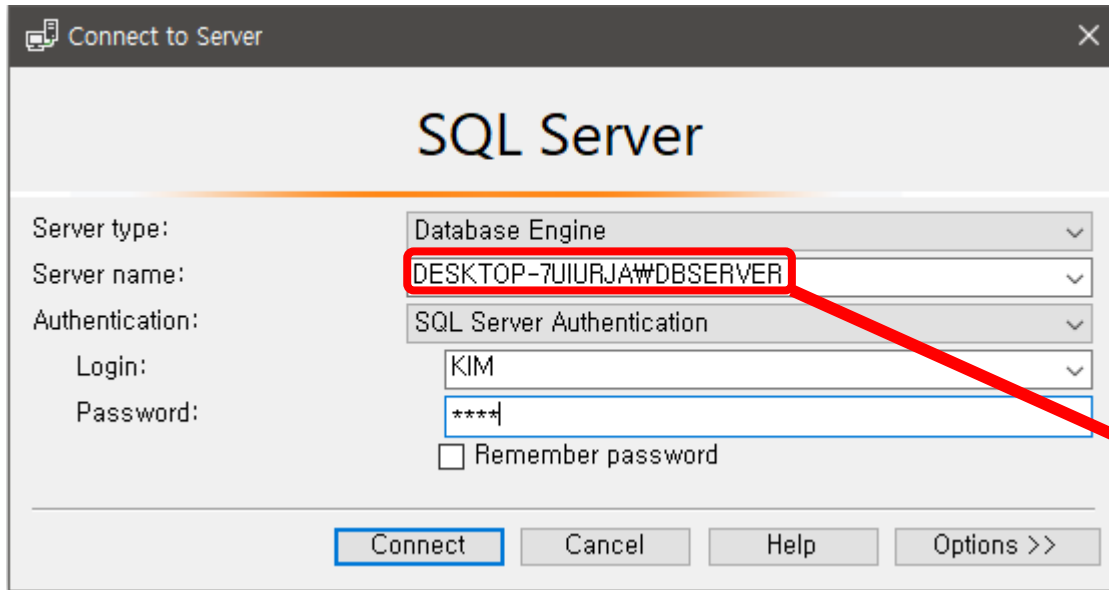
[ODBC 데이터 원본 관리자(64bit)] -> [사용자 DSN] -> [추가]

ODBC Programming : ODBC Config

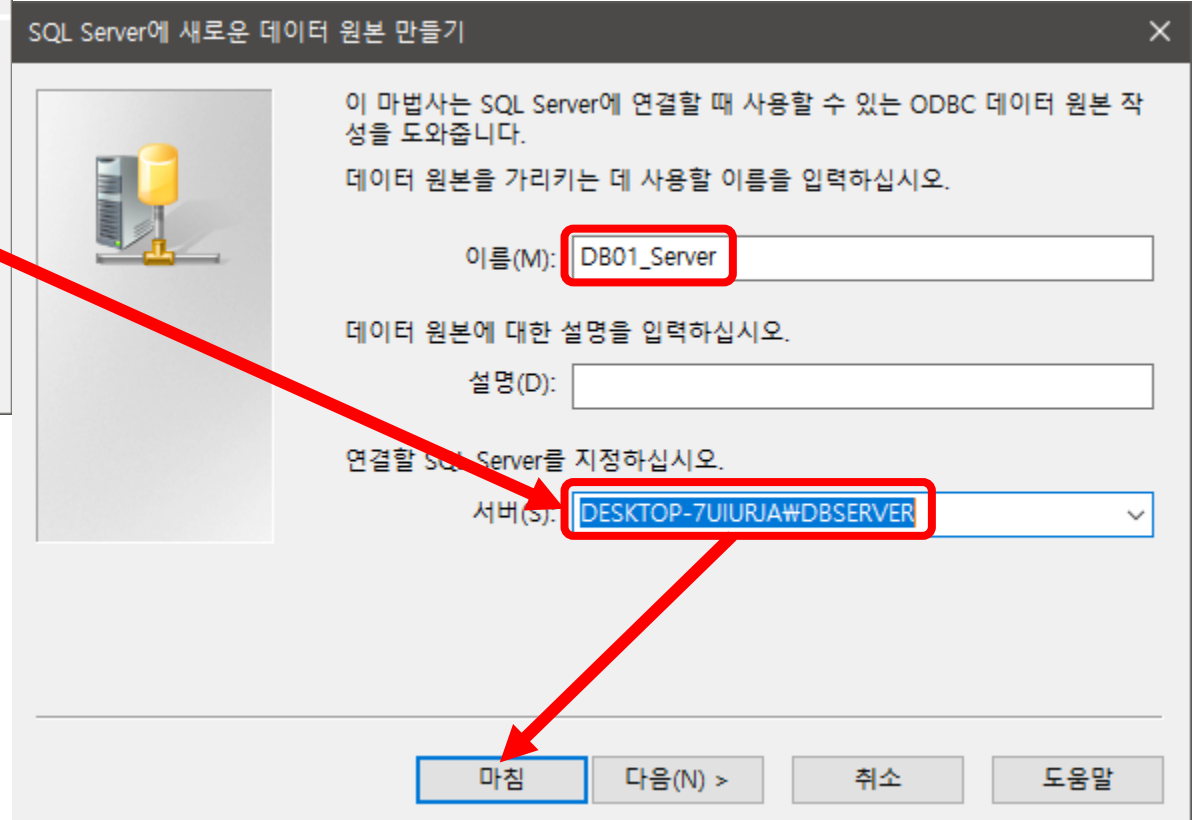


[새 데이터 원본 만들기] -> [SQL Server] -> [마침]

ODBC Programming : ODBC Config

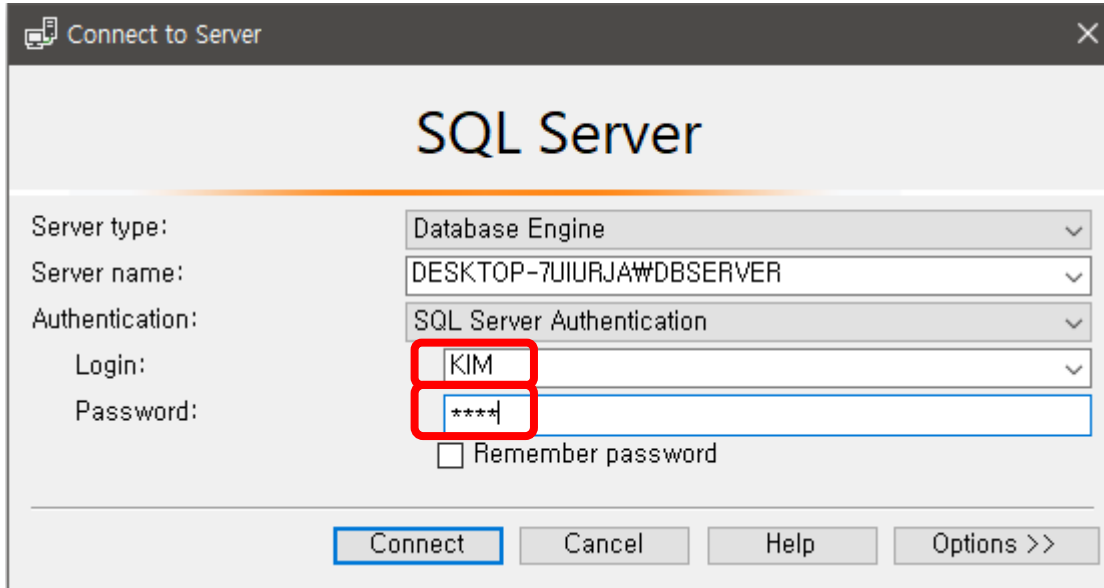


(※ refer to SSMS's connection screen)



Specify the SQL Server

ODBC Programming : ODBC Config



Connect to Server

SQL Server

Server type: Database Engine

Server name: DESKTOP-7UIURJAWDBSERVER

Authentication: SQL Server Authentication

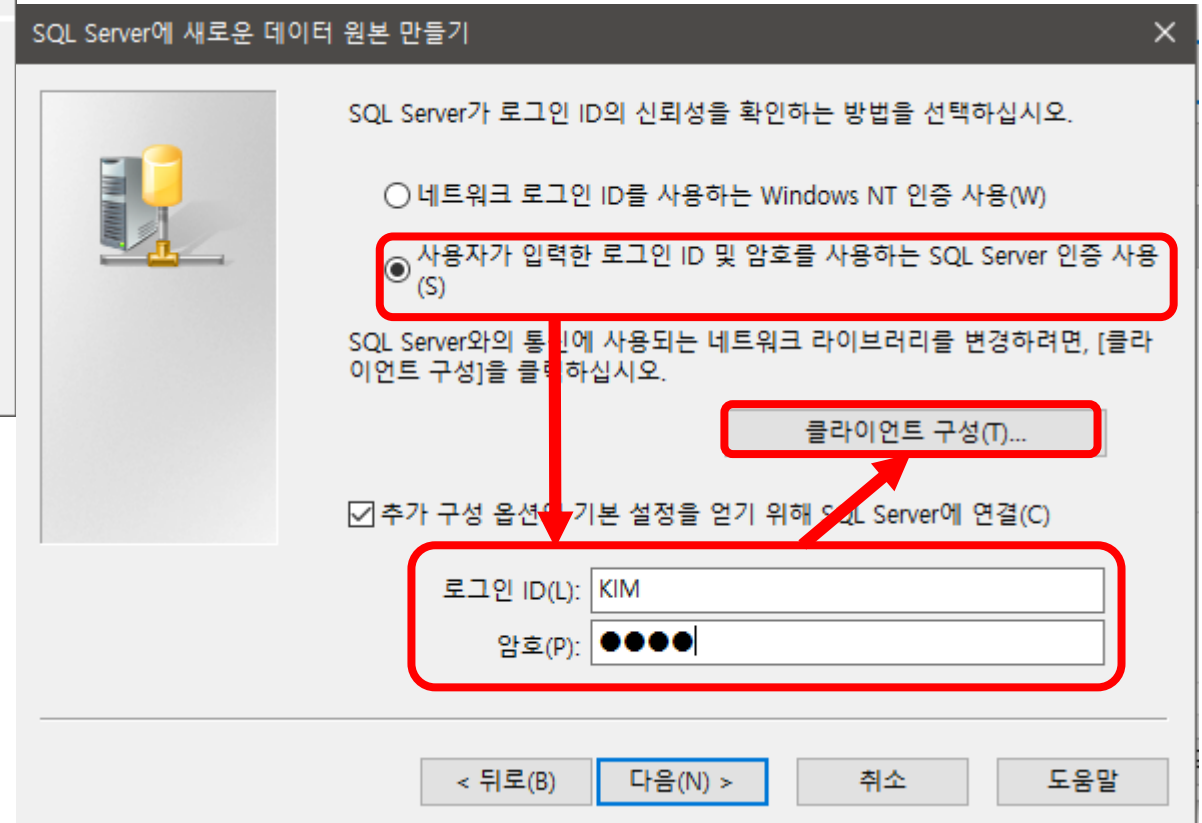
Login: KIM

Password: ****

☐ Remember password

Connect Cancel Help Options >>

(※ refer to SSMS's connection screen)



SQL Server에 새로운 데이터 원본 만들기

SQL Server가 로그인 ID의 신뢰성을 확인하는 방법을 선택하십시오.

☐ 네트워크 로그인 ID를 사용하는 Windows NT 인증 사용(W)

☒ 사용자가 입력한 로그인 ID 및 암호를 사용하는 SQL Server 인증 사용(S)

SQL Server와의 통신에 사용되는 네트워크 라이브러리를 변경하려면, [클라이언트 구성]을 클릭하십시오.

☒ 추가 구성 옵션 기본 설정을 얻기 위해 SQL Server에 연결(C)

클라이언트 구성(T)...

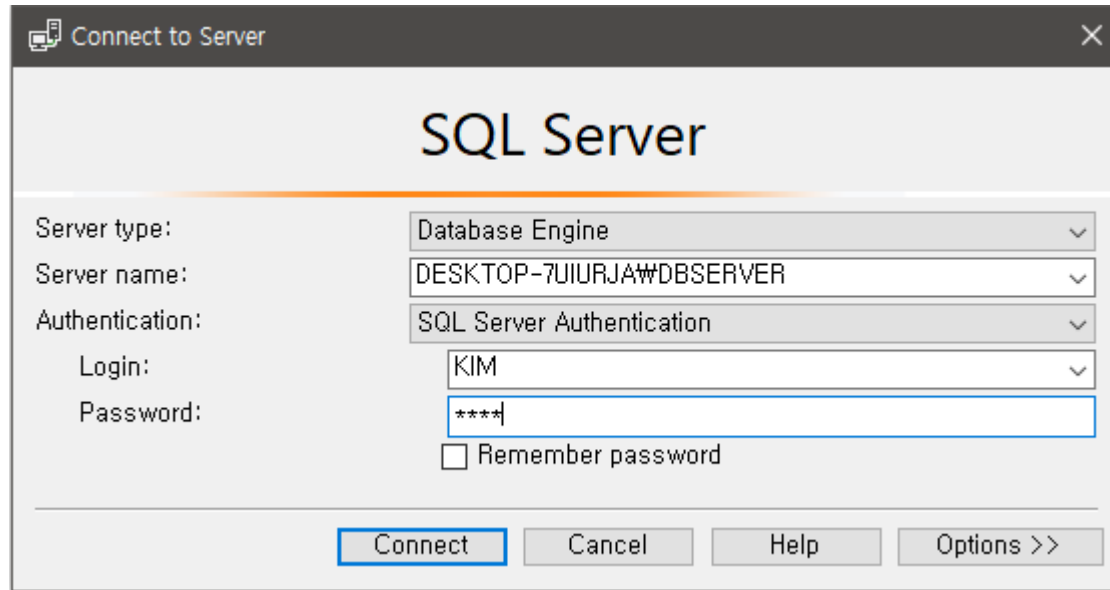
로그인 ID(L): KIM

암호(P): ****

< 뒤로(B) 다음(N) > 취소 도움말

[Enter the ID and PW of the SQL Server] -> [Client Configuration]

ODBC Programming : ODBC Config



Connect to Server

SQL Server

Server type: Database Engine

Server name: DESKTOP-7UIURJAWDBSERVER

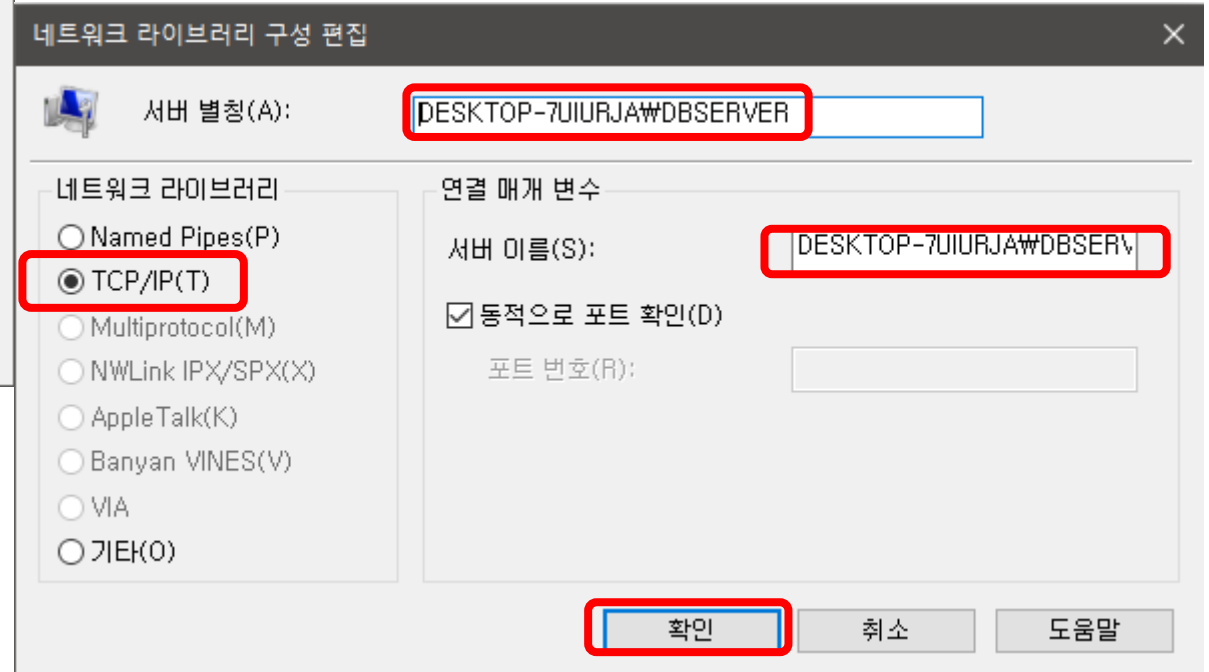
Authentication: SQL Server Authentication

Login: KIM

Password: ****

☐ Remember password

Connect Cancel Help Options >>



네트워크 라이브러리 구성 편집

서버 별칭(A): DESKTOP-7UIURJAWDBSERVER

네트워크 라이브러리

- ☐ Named Pipes(P)
- ☒ TCP/IP(T)
- ☐ Multiprotocol(M)
- ☐ NWLink IPX/SPX(X)
- ☐ AppleTalk(K)
- ☐ Banyan VINES(V)
- ☐ VIA
- ☐ 기타(O)

연결 매개 변수

서버 이름(S): DESKTOP-7UIURJAWDBSERVER

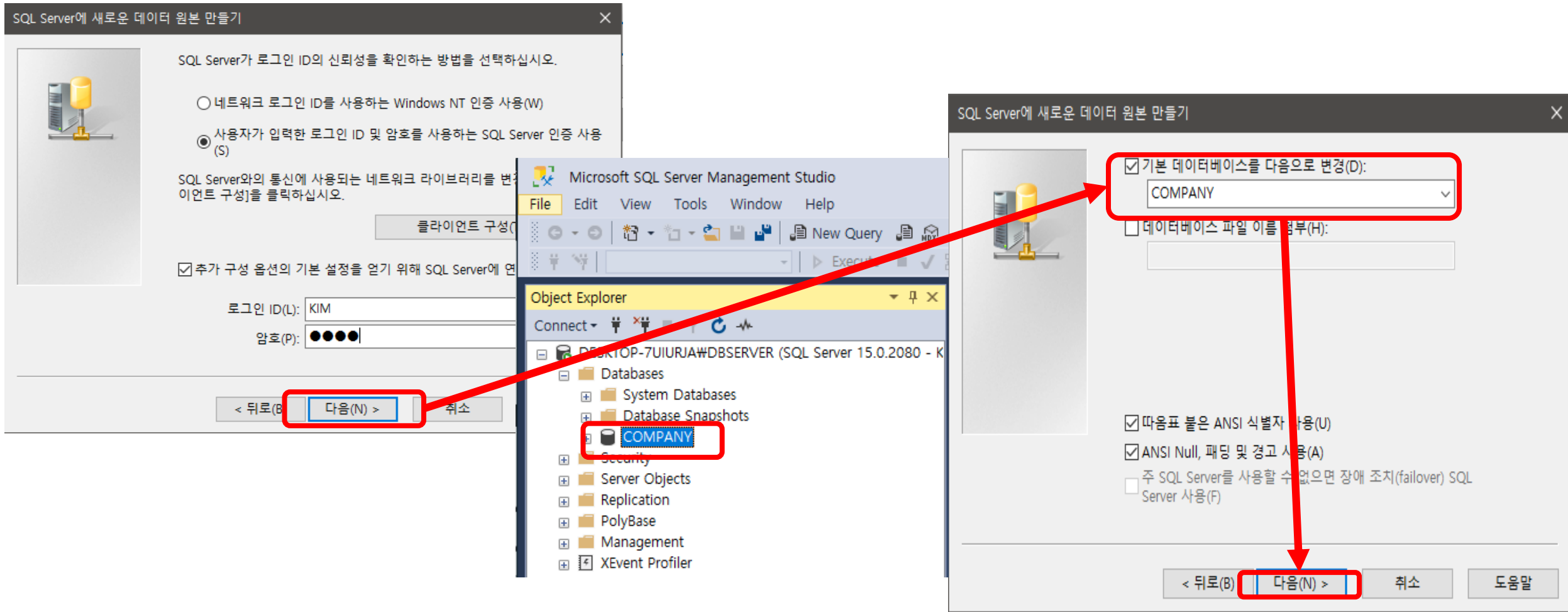
☒ 동적으로 포트 확인(D)

포트 번호(P):

확인 취소 도움말

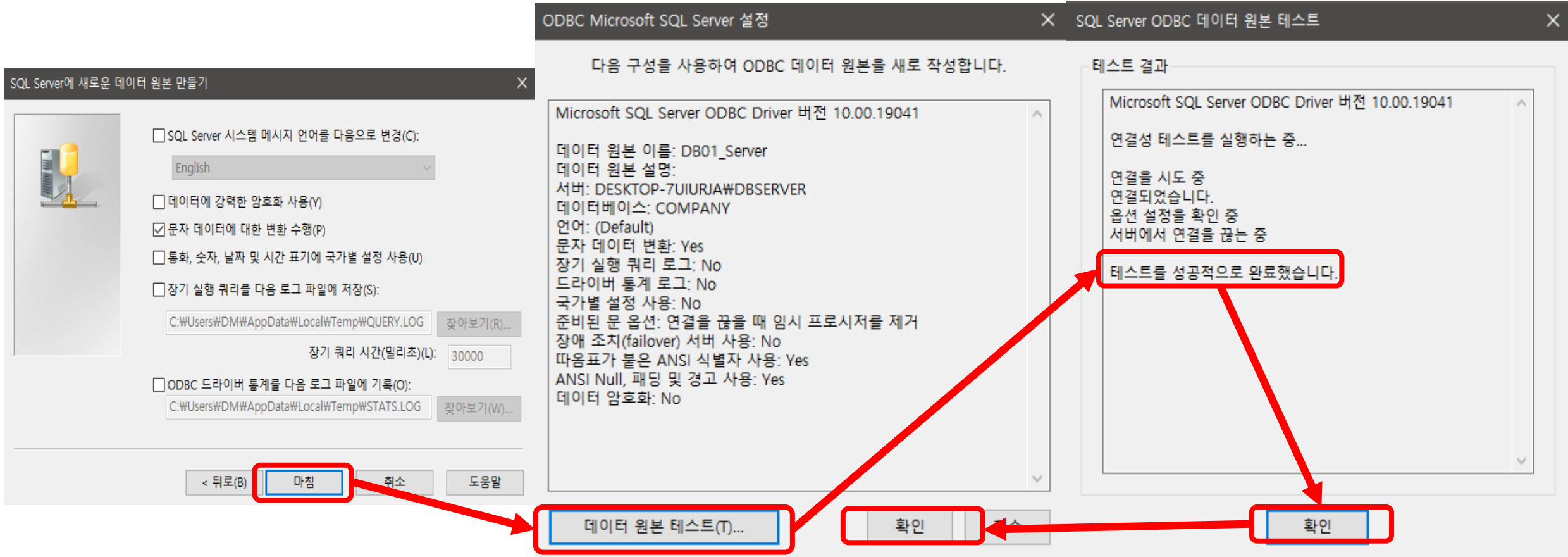
Check whether TCP/IP is selected

ODBC Programming : ODBC Config



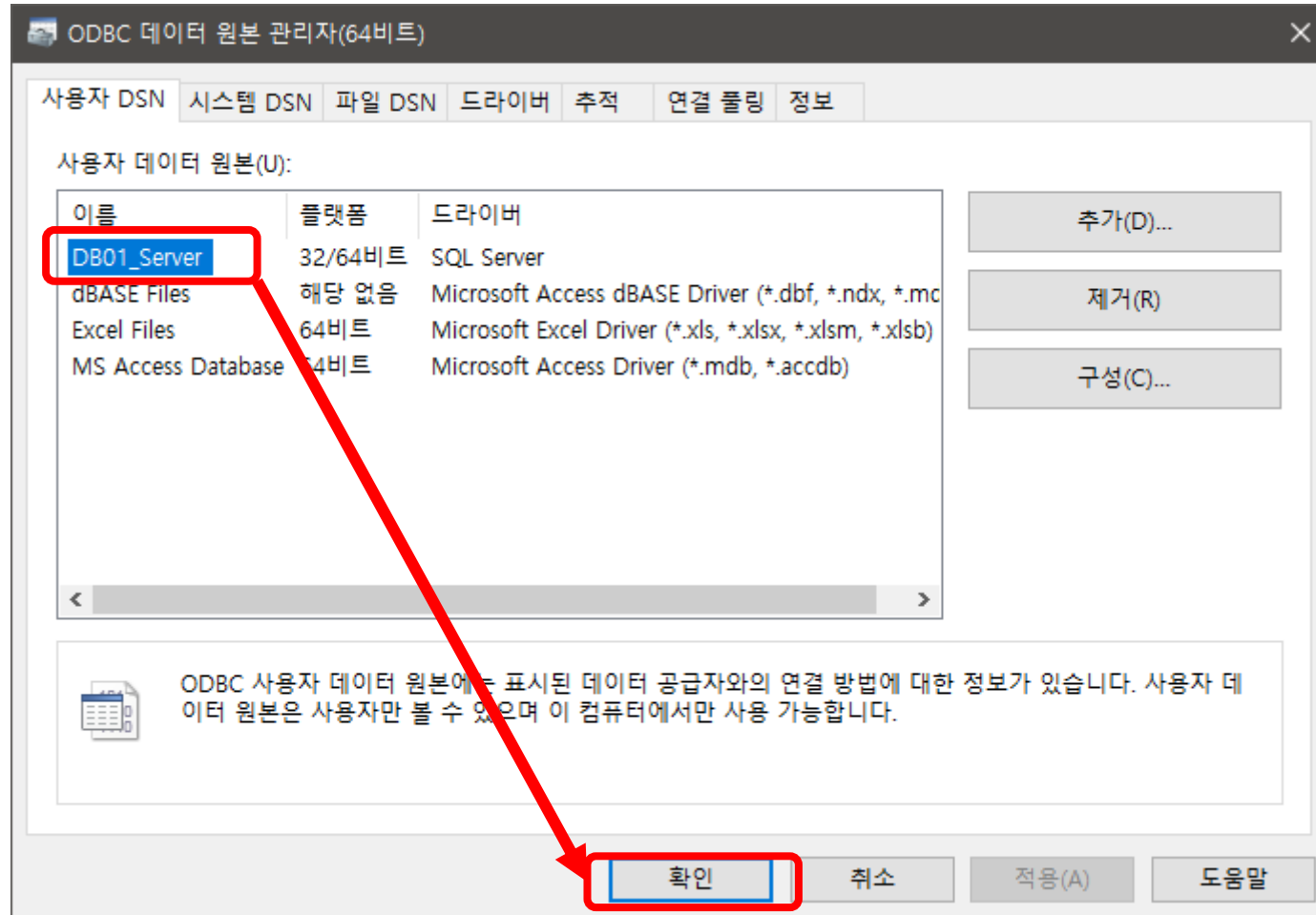
Set the default database [COMPANY]

ODBC Programming : ODBC Config



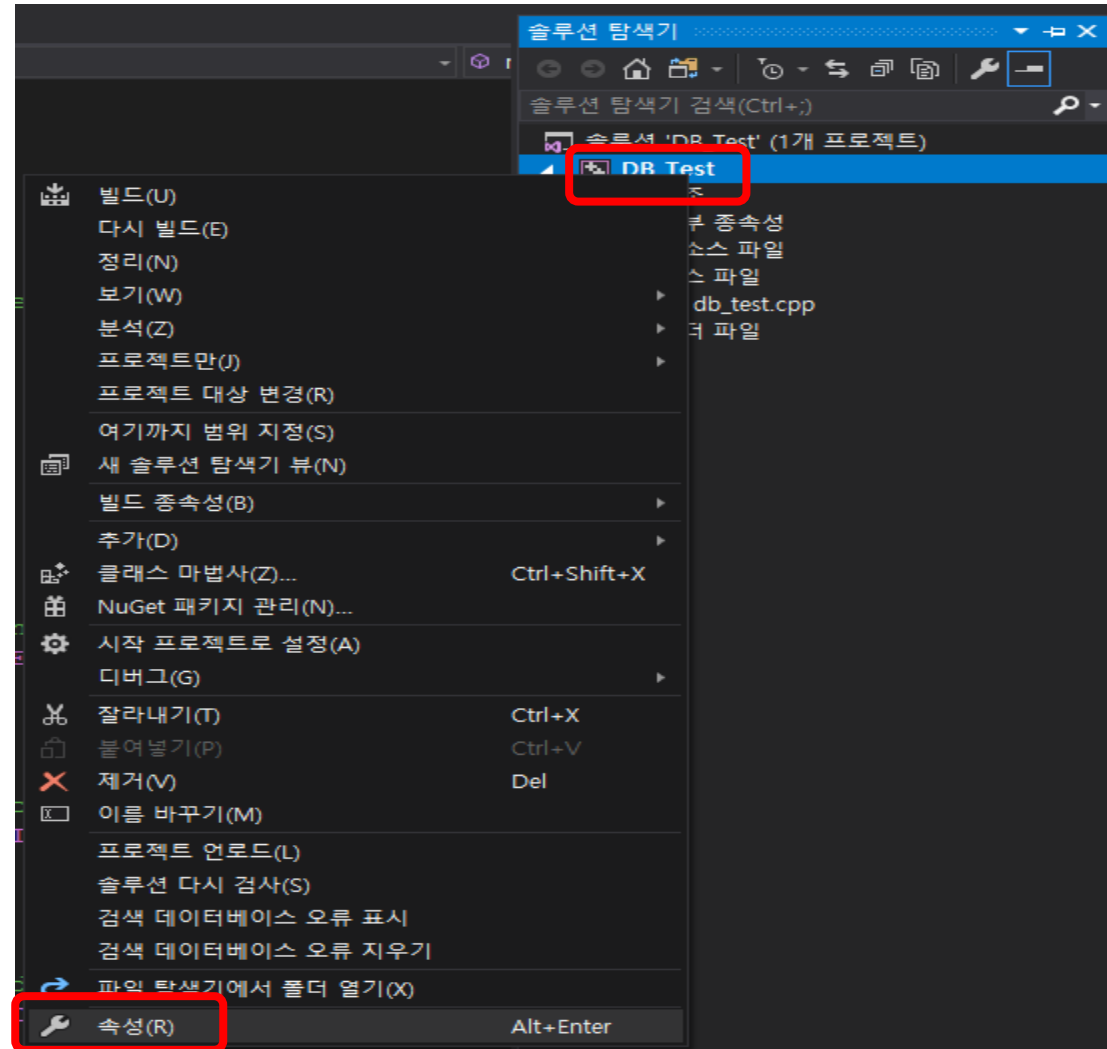
Test connection and finish

ODBC Programming : ODBC Config



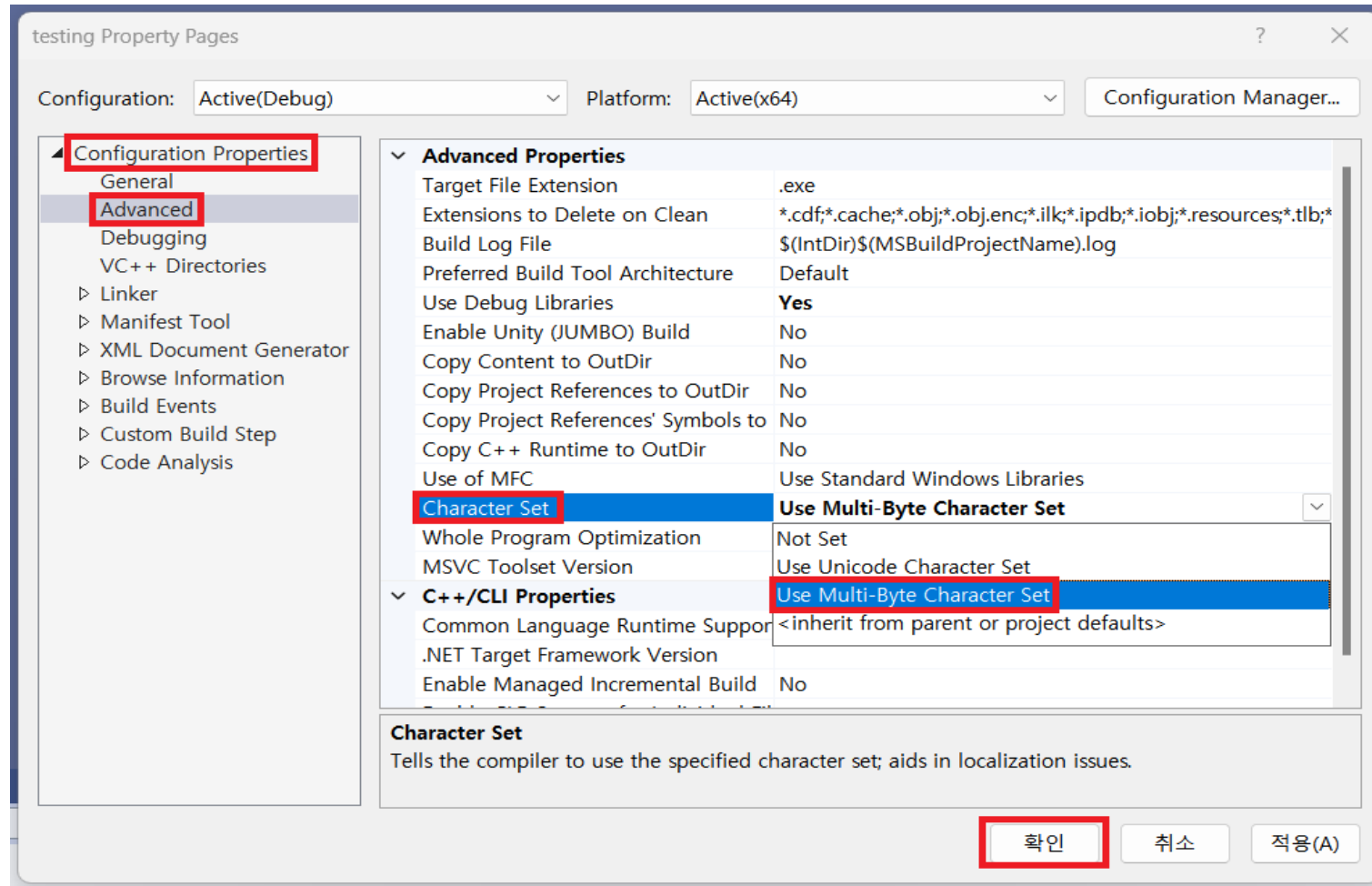
[Creation of new data source is completed]

ODBC Programming : Visual Studio Settings



[Create new project] -> [Project Properties]

ODBC Programming : Visual Studio Settings



[Configuration Properties] -> [Advanced] -> [Character Set] -> [Use Multi-Byte Character Set]
(for older versions of VS: [Configuration Properties] -> [General] -> [Character Set] -> [Use Multi-Byte Character Set])

ODBC Programming : Init

```
1  #include <stdio.h>
2  #include <Windows.h>
3  #include <sql.h>
4  #include <sqlext.h>
5
6  bool db_connect();
7  void db_disconnect();
8
9  SQLHENV hEnv = NULL;    // Environment Handle
10 SQLHDBC hDbc = NULL;    // Connection Handle
11
12 const char *dataSourceName = "DB01_Server";
13 const char *serverId = "KIM";
14 const char *serverPw = "kim123";
```

Basic settings for the use of ODBC

ODBC Programming : Connect

```
16 bool db_connect()
17 {
18     SQLRETURN Ret;
19
20     // Allocate the Environment Handle (hEnv)
21     if (SQLAllocHandle(SQL_HANDLE_ENV, SQL_NULL_HANDLE, &hEnv) != SQL_SUCCESS)
22     {
23         return false;
24     }
25
26     // Set attributes of the Environment Handle (hEnv)
27     if (SQLSetEnvAttr(hEnv, SQL_ATTR_ODBC_VERSION, (SQLPOINTER)SQL_OV_ODBC3, SQL_IS_INTEGER) != SQL_SUCCESS)
28     {
29         return false;
30     }
31
32     // Allocate the Connection Handle (hDbc)
33     if (SQLAllocHandle(SQL_HANDLE_DBC, hEnv, &hDbc) != SQL_SUCCESS)
34     {
35         return false;
36     }
37
38     // Connect to the SQL Sever with ODBC name, ID, and PW
39     Ret = SQLConnect(hDbc, (SQLCHAR *)dataSourceName SQL_NTS, (SQLCHAR *)serverId SQL_NTS, (SQLCHAR *)serverPw SQL_NTS);
40
41     if ((Ret != SQL_SUCCESS) && (Ret != SQL_SUCCESS_WITH_INFO))
42     {
43         return false;
44     }
45
46     return true;
47 }
```

Data Source Name **Server ID and Password**

ODBC Programming : Disconnect

```
49 void db_disconnect()  
50 {  
51     SQLDisconnect(hDbc);           // Disconnect from the SQL Server  
52     SQLFreeHandle(SQL_HANDLE_DBC, hDbc); // Free the Connection Handle  
53     SQLFreeHandle(SQL_HANDLE_ENV, hEnv); // Free the Environment Handle  
54 }
```

ODBC Programming : Main

```
56 int main(int argc, char *argv[])
57 {
58     if (db_connect())
59     {
60         printf("Connected to %s!\n\n", dataSourceName);
61
62         /* Your code goes here. */
63
64         db_disconnect();
65     }
66
67     return 0;
68 }
```

ODBC Programming : Create Example Tables

```
SQLQuery1.sql -...OMPANY (KIM (77))* -+ X
CREATE TABLE DEPARTMENT
(
    DEPTNO INTEGER NOT NULL,
    DEPTNAME CHAR(15),
    FLOOR INTEGER,
    PRIMARY KEY(DEPTNO)
);

INSERT INTO DEPARTMENT VALUES(1, 'SALES', 8);
INSERT INTO DEPARTMENT VALUES(2, 'PLANNING', 10);
INSERT INTO DEPARTMENT VALUES(3, 'DEVELOPMENT', 9);
```

Create the DEPARTMENT table

ODBC Programming : Create Example Tables

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

```
CREATE TABLE EMPLOYEE
(
    EMPNO INTEGER NOT NULL,
    EMPNAME CHAR(10),
    TITLE CHAR(20),
    DNO INTEGER,
    SALARY INTEGER,
    PRIMARY KEY (EMPNO),
    FOREIGN KEY (DNO) REFERENCES DEPARTMENT (DEPTNO)
);

INSERT INTO EMPLOYEE VALUES(2106, 'C.KIM', 'ASSISTANT MANAGER', 2 , 2000000);
INSERT INTO EMPLOYEE VALUES(3426, 'Y.PARK', 'MANAGER', 3 , 2500000);
INSERT INTO EMPLOYEE VALUES(3011, 'S.LEE', 'GENERAL MANAGER', 1 , 3000000);
INSERT INTO EMPLOYEE VALUES(1003, 'M.CHO', 'ASSISTANT MANAGER', 1 , 2000000);
INSERT INTO EMPLOYEE VALUES(3427, 'J.CHOI', 'STAFF', 3 , 1500000);
```

Create the EMPLOYEE table

ODBC Programming : Query

```
SQLHSTMT hStmt;        // Statement Handle

if (SQLAllocHandle(SQL_HANDLE_STMT, hDbc, &hStmt) == SQL_SUCCESS)
{
    // Query execution
    SQLExecDirect(hStmt, (SQLCHAR*)QUERY_STATEMENT, SQL_NTS);

    // Additional codes for the SELECT statement
    SQLBindCol(hStmt, (int)COL_NUMBER, TYPE, PTR_VAR, VAR_SIZE,
    NULL);
    SQLFetch(hStmt);

    // Codes for clean up
    SQLCloseCursor(hStmt);
    SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
}
```

The general code structure for a query

ODBC Programming : DATA TYPES

<C type identifier>

<ODBC C typedef>

<C type>

SQL_C_CHAR

SQLCHAR *

unsigned char *

SQL_C_SSHORT

SQLSMALLINT

short int

SQL_C_USHORT

SQLUSMALLINT

unsigned short int

SQL_C_SLONG

SQLINTEGER

long int

SQL_C_ULONG

SQLUINTEGER

unsigned long int

SQL_C_FLOAT

SQLREAL

float

SQL_C_DOUBLE

SQLDOUBLE

double

SQL_C_BIT

SQLSCHAR

unsigned char

SQL_C_BINARY

SQLCHAR *

unsigned char *

SQL Data types and values used in the SQLBindCol function

ODBC Programming : INSERT Example

```
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(4, 'DATABASE', 8)");
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



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

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 = 1");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR empName[21];
71             SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 21, 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 }
```

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

SELECT EMPNAME FROM EMPLOYEE WHERE DNO = 1

133 %

Results Messages

	EMPNAME
1	M,CHO
2	S,LEE

Microsoft Visual Studio Debug Console

Connected to DB01_Server!

M,CHO
S,LEE

C:\Users\김한주\source\repos\CPP\64\Release\CPP.exe (process 33896) exited with code 0.
Press any key to close this window . . .

ODBC Programming : SELECT 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, "SELECT EMPNAME, TITLE FROM EMPLOYEE, DEPARTMENT WHERE FLOOR = 8 AND DEPTNO = DNO");
68             SQLExecDirect(hStmt, query, SQL_NTS);
69
70             SQLCHAR empName[21], title[31];
71             SQLBindCol(hStmt, 1, SQL_C_CHAR, empName, 21, NULL);
72             SQLBindCol(hStmt, 2, SQL_C_CHAR, title, 31, NULL);
73
74             while (SQLFetch(hStmt) != SQL_NO_DATA)
75             {
76                 printf("%s %s\n", empName, title);
77             }
78
79             SQLCloseCursor(hStmt);
80             SQLFreeHandle(SQL_HANDLE_STMT, hStmt);
81         }
82
83         db_disconnect();
84     }
85
86     return 0;
87 }
```

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

```
SELECT EMPNAME, TITLE FROM EMPLOYEE, DEPARTMENT
WHERE FLOOR = 8 AND DEPTNO = DNO
```

133 %

Results Messages

	EMPNAME	TITLE
1	M.CHO	ASSISTANT MANAGER
2	S.LEE	GENERAL MANAGER

Microsoft Visual Studio Debug Cons...

```
Connected to DB01_Server!
M.CHO      ASSISTANT MANAGER
S.LEE      GENERAL MANAGER
C:\Users\김한주\source\repos\CPP\64\Release\
CPP.exe (process 29744) exited with code 0.
Press any key to close this window . . .
```