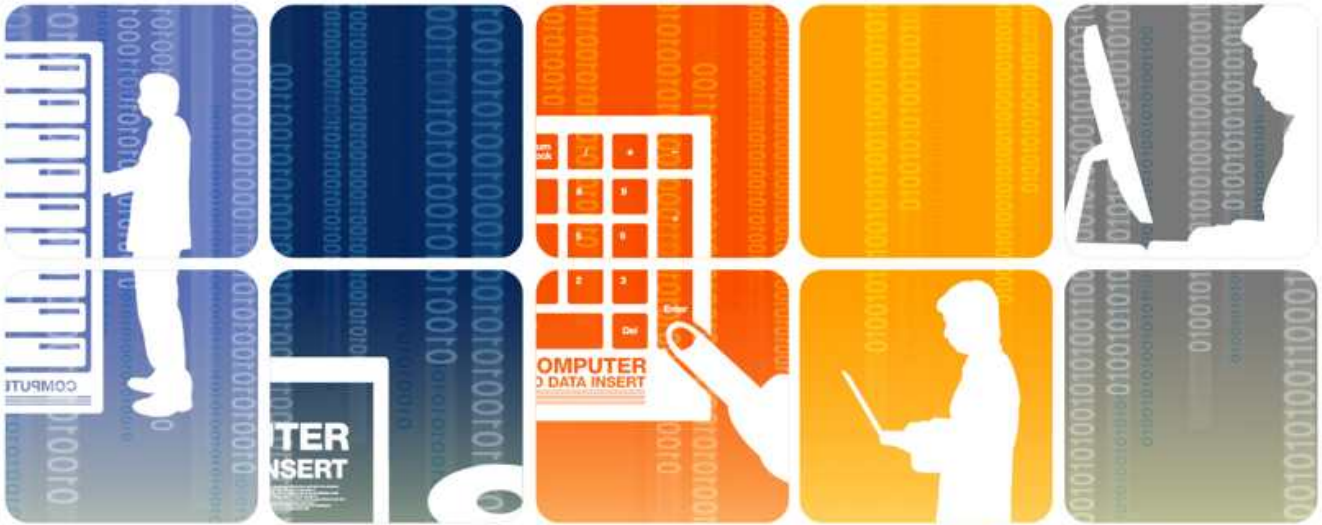
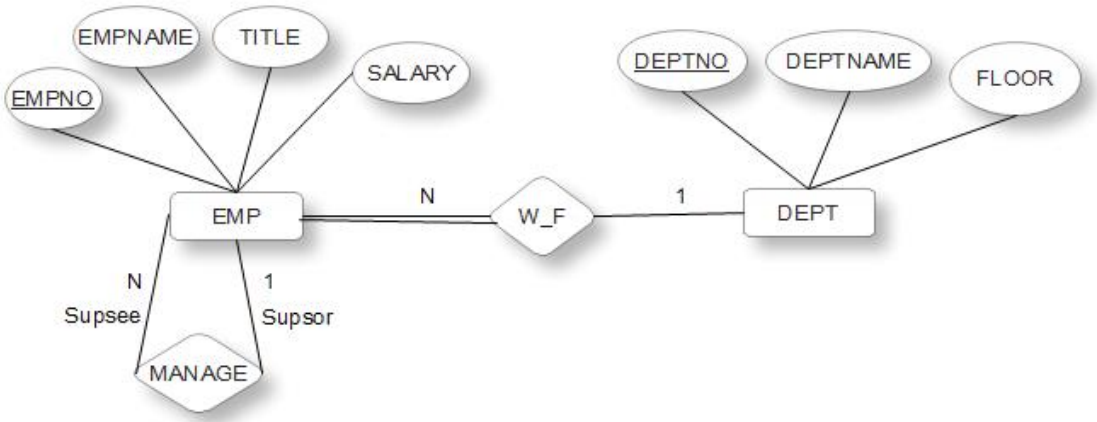


Database Systems

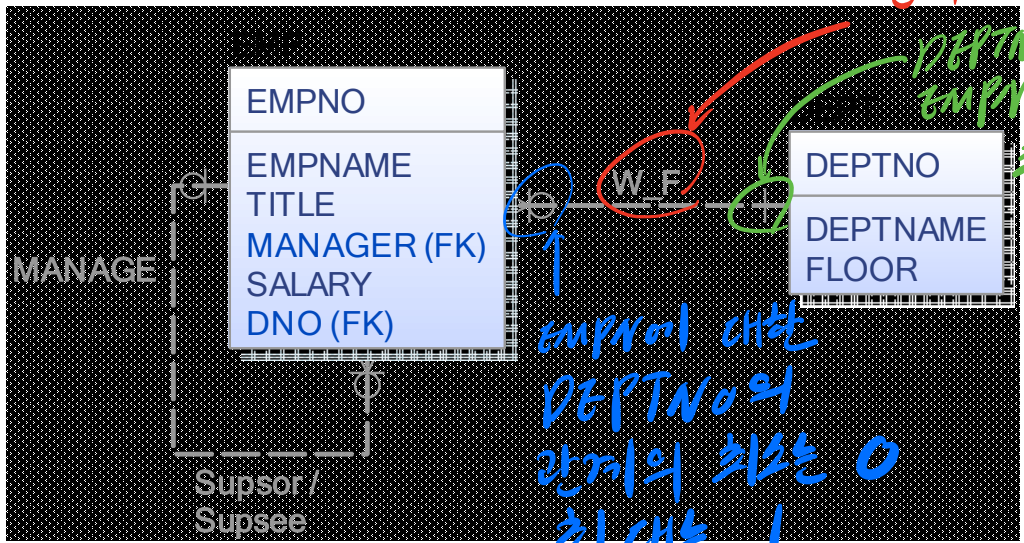
ER-WIN, MS SQL SVR, SSMS, and SQL Introduction

인하대학교

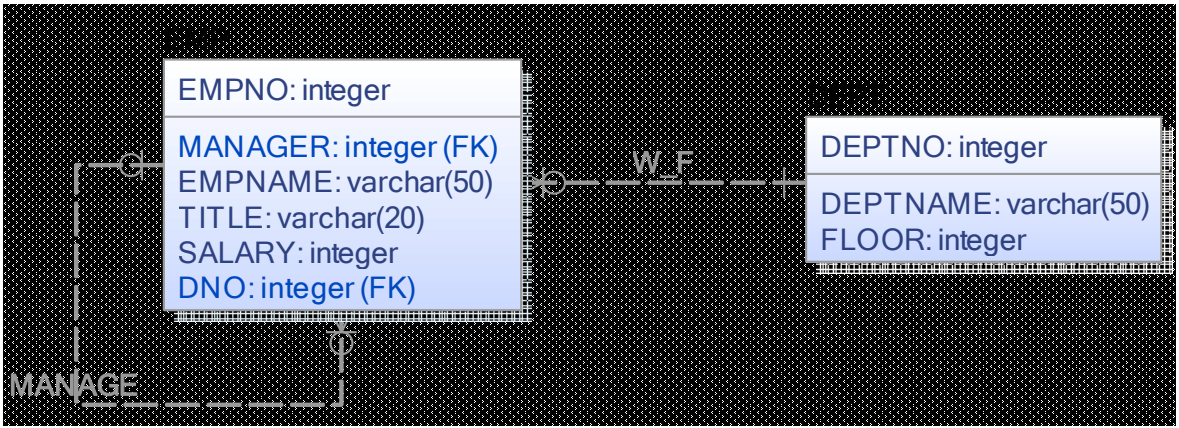
ER-Diagram for Sample DB



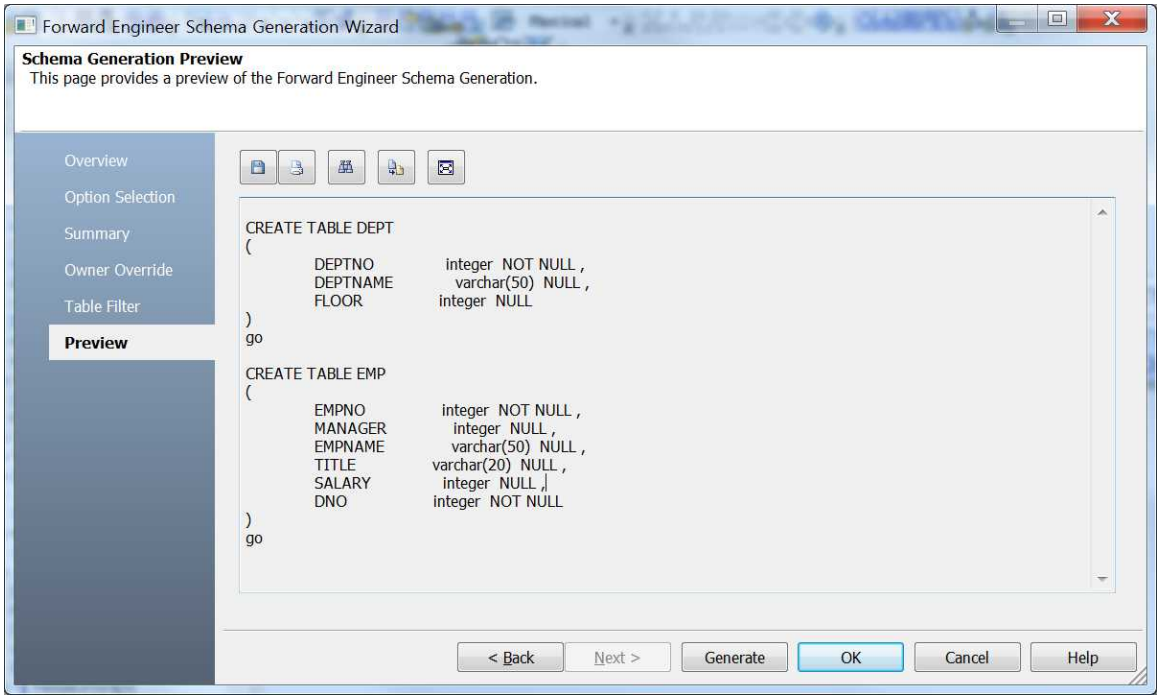
ER-WIN Diagram for Sample DB



ER-WIN Diagram for Sample DB



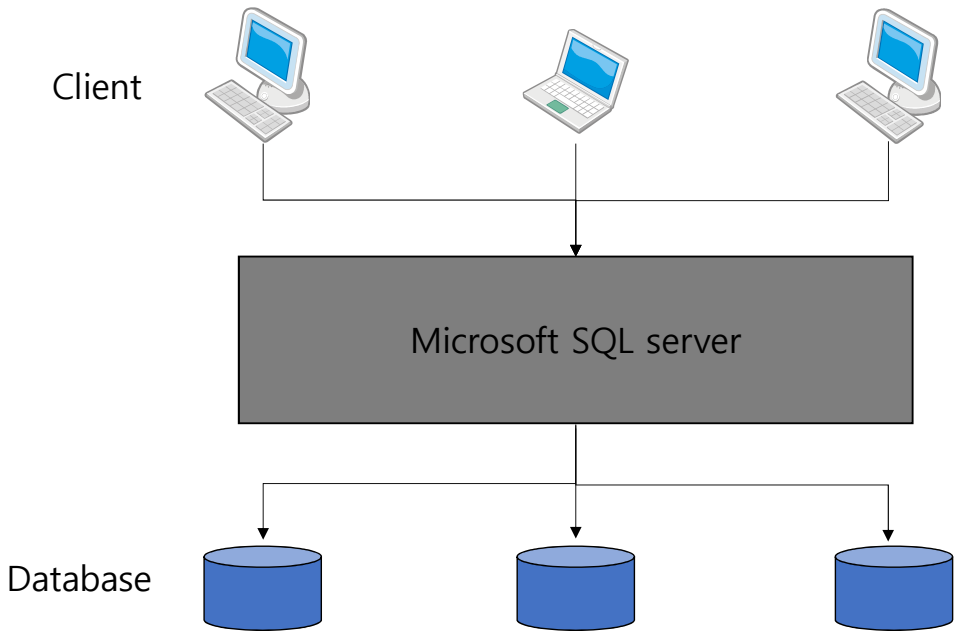
ER-WIN Diagram for Sample DB



Microsoft SQL server

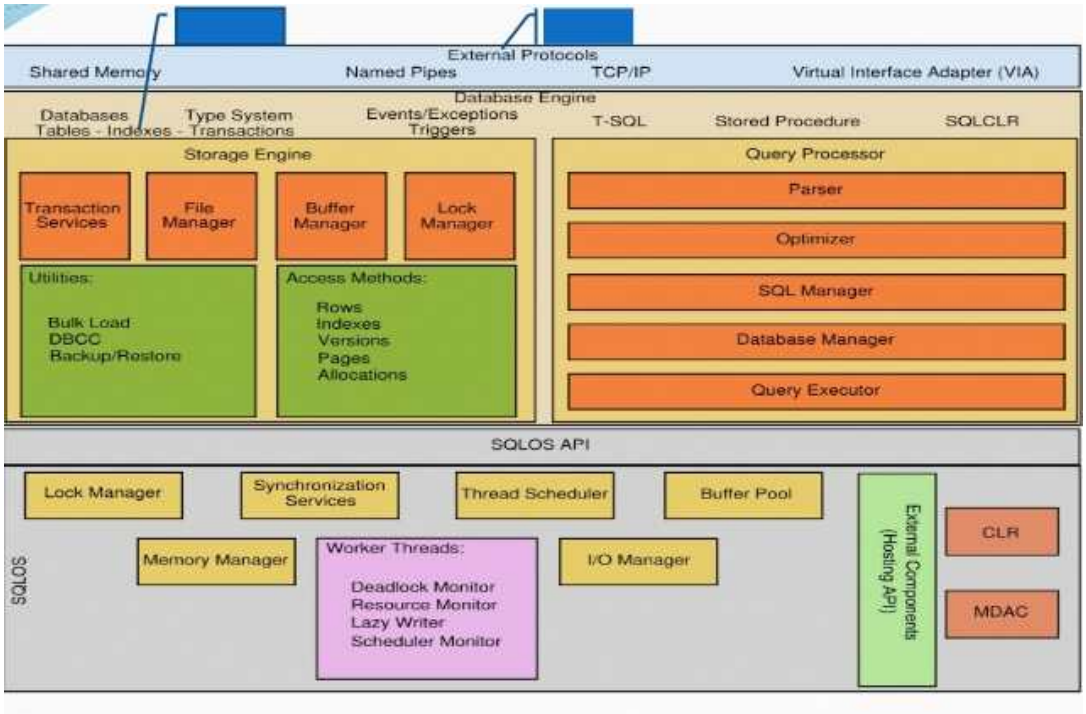
- A relational database management system developed by Microsoft
- As a database server, it is a software product with the primary functions of **defining, modifying,** and **retrieving data** as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet).

MS SQL server architecture



MS SQL server architecture (cont'd.)

- Internal structure of MS SQL sever (reference)



Install MS SQL server

- Microsoft SQL Server 2016 Express 다운로드 또는
- Microsoft SQL Server 2017 Express 다운로드

- https://www.microsoft.com/ko-kr/sql-server/sql-server-downloads

Attribute data types

- **In MS-SQL SERVER…**

Data type	Length	Description
bigint	8	Integer from -2^63 (-9 223 372 036 854 775 808) to 2^63-1 (9 223 372 036 854 775 807).
int	4	Integer from -2^31 (-2 147 483 648) to 2^31-1 (2 147 483 647).
smallint	2	Integer from -2^15 (-32 768) to 2^15-1 (32 767).
tinyint	1	Integer from 0 to 255.
bit	1 bit	Integer 0 or 1.
decimal(precision, scale)	5-17	Numeric data type with fixed precision and scale (accuracy 1-38, 18 by default and scale 0-p, 0 by default).
numeric	5-17	Same as data type 'decimal'.
money	8	Financial data type from -2^63 (-922 337 203 685 477.5808) to 2^63-1 (922 337 203 685 477.5807) with the precision of one ten-thousandth unit.
smallmoney	4	Financial data type from -2^31 (-214 748.3648) to 2^31-1 (214 748.3647) with the precision of one ten-thousandth unit.
float(n)	4-8	Numeric data type with float precision, where n is the number of mantis bits (1-24, accuracy of 7 digits, size of 4 bytes and 25-53, accuracy of 15 digits and size of 8 bytes).
real	4	Numeric data type with float precision that is defined as a float(24).
datetime	8	Data type representing date and time from 1.1.1753 to 31.12.9999 with precision about 3ms. Values are rounded to .000, .003 and .007.
smalldatetime	4	Data type representing date and time from 1.1.1900 to 6.6.2079 with precision of 1min. Values up to 29.998 are rounded down and values from 29.999 are rounded down to the nearest minute.

Attribute data types (cont'd.)

- **In MS-SQL SERVER …**

Data type	Length	Description
char	n	Char string of fixed length and max. length of 8000 chars.
varchar	n	Char string of variable length and max. length of 8000 chars.
text	n	Char string of variable length and max. length of 2^31-1 (2 147 483 647) chars.
nchar	2*n	Unicode char string of fixed length and max. length of 4000 chars.
nvarchar	2*n	Unicode char string of variable length and max. length of 4000 chars.
ntext	2*n	Unicode char string of variable length and max. length of 2^30-1 (1 073 741 823) chars.
binary	n+4	Binary data of fixed length and max. length of 8000 bytes.
varbinary	n+4	Binary data of variable length and max. length of 8000 bytes.
image	n	Binary data of variable length and max. length of 2^31-1 (2 147 483 647) bytes.
cursor		For storing the reference to cursors in a variable or in a procedure (no for CREATE TABLE).
sql_variant		For storing value of another type (no text, ntext, image, timestamp, sql_variant) of max. length to 8016 bytes. ODBC doesn't fully support this data type.
table		For storing the query result for the later usage.
timestamp	8+4	Data type generates automatically binary numbers, unique in the database, used mostly to the rows identification. There can be only column of this data type in the table.
uniqueidentifier		Data type for storing GUID (new by means of the NEWID function or existing from the string in the form xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx, for example 6F9619FF-8B86-D011-B42D-00C04FC964FF).

Insert commands for EMP

```
use companyDB;

insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '김창섭', '대리', 1003, 2500000, 2);
insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '박영권', '과장', 4377, 3000000, 1);
insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '이수민', '부장', 4377, 4000000, 3);
insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '조민희', '과장', 4377, 3000000, 2);
insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '최종철', '사원', 3011, 1500000, 3);
insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '김상원', '사원', 3426, 1500000, 1);
insert into EMP(EMPNO, EMPNAME, TITLE, MANAGER, SALARY, DNO)
      values (2106, '이성래', '사장', null, 5000000, 2);
```

Insert commands for DEPT

```
use companyDB;

insert into DEPT(DEPTNO, DEPTNAME, FLOOR) values (1, '영업', 8);
insert into DEPT(DEPTNO, DEPTNAME, FLOOR) values (2, '기획', 10);
insert into DEPT(DEPTNO, DEPTNAME, FLOOR) values (3, '개발', 9);
insert into DEPT(DEPTNO, DEPTNAME, FLOOR) values (4, '총무', 7);
```

Sample DB

EMPLOYEE

EMPNO	EMPNAME	TITLE	MANAGER	SALARY	DNO
2106	김창섭	대리	1003	2500000	2
3426	박영권	과장	4377	3000000	1
3011	이수민	부장	4377	4000000	3
1003	조민희	과장	4377	3000000	2
3427	최종철	사원	3011	1500000	3
1365	김상원	사원	3426	1500000	1
4377	이성래	사장	∧	5000000	2

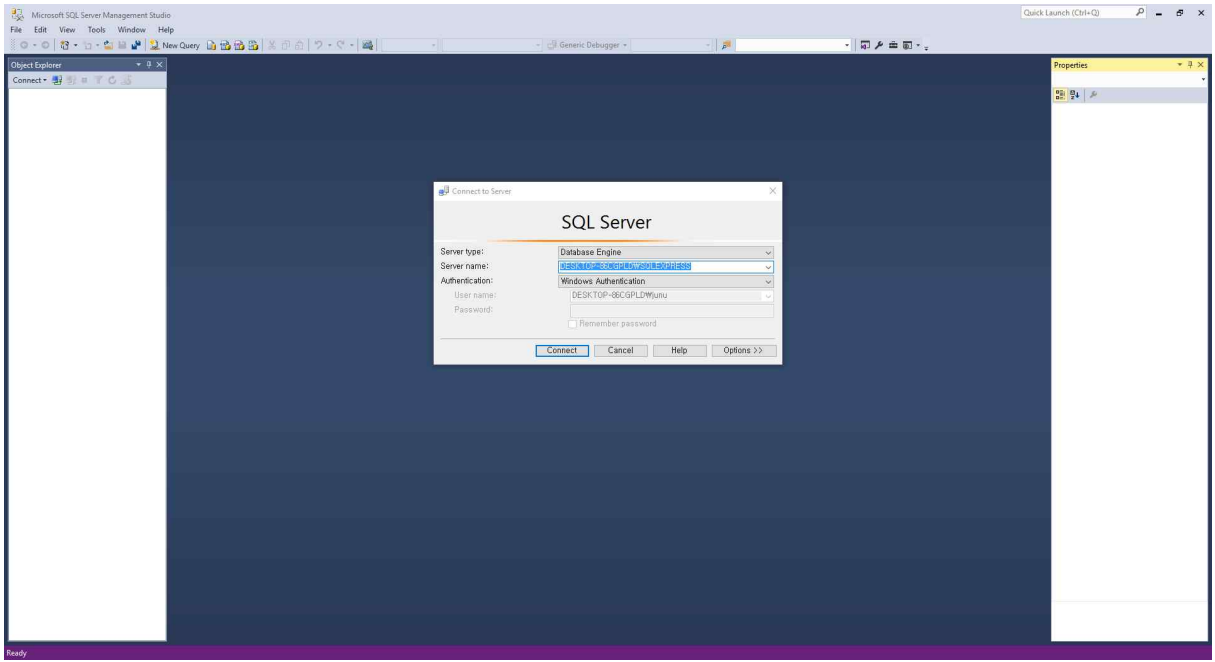
DEPARTMENT

DEPTNO	DEPTNAME	FLOOR
1	영업	8
2	기획	10
3	개발	9
4	총무	7

[그림 4.8] 관계 데이터베이스 상태

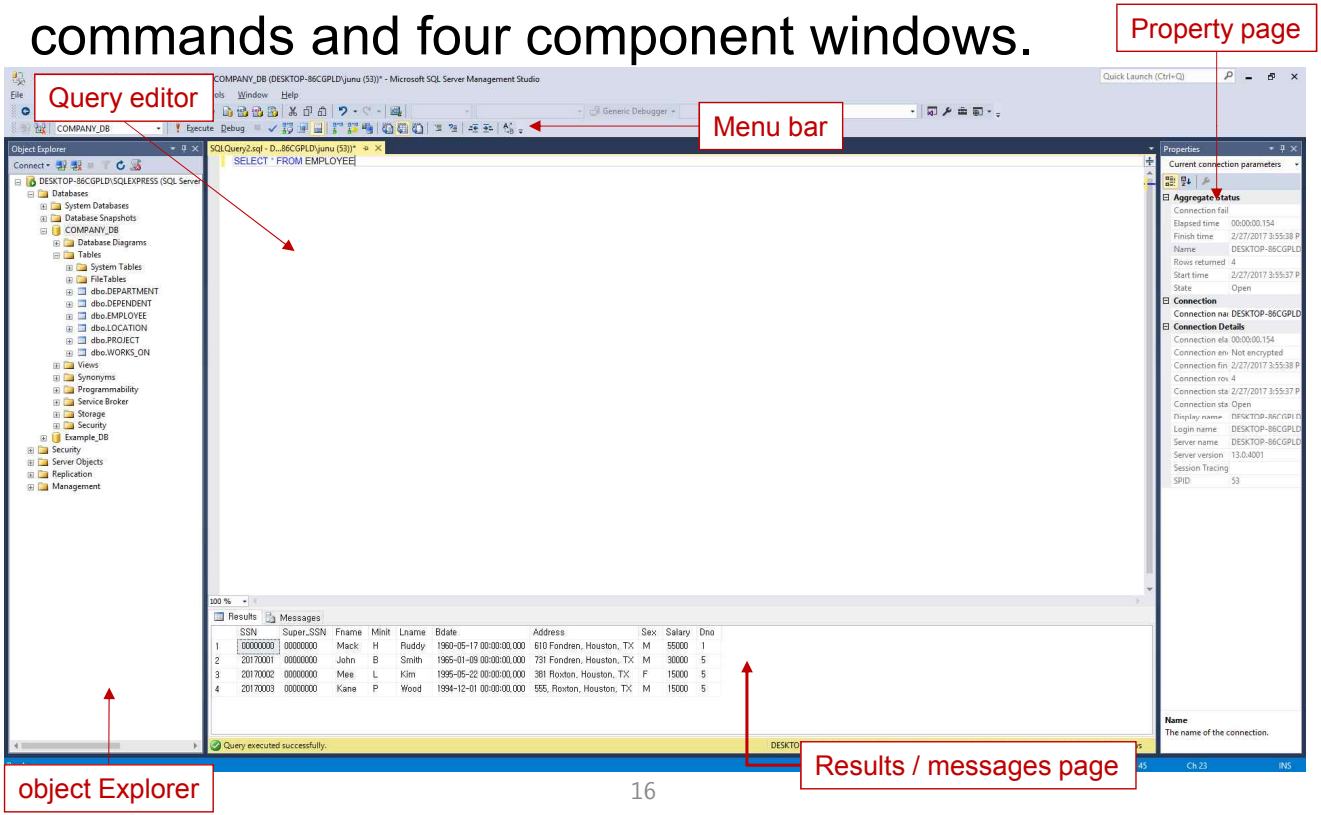
Microsoft SQL server

- Program execution
  - [start button] → [program] → [Microsoft SQL Server] → [Microsoft SQL Server Management Studio]



Basic screen configuration

- It consists of one menu bar for simple selection of commands and four component windows.



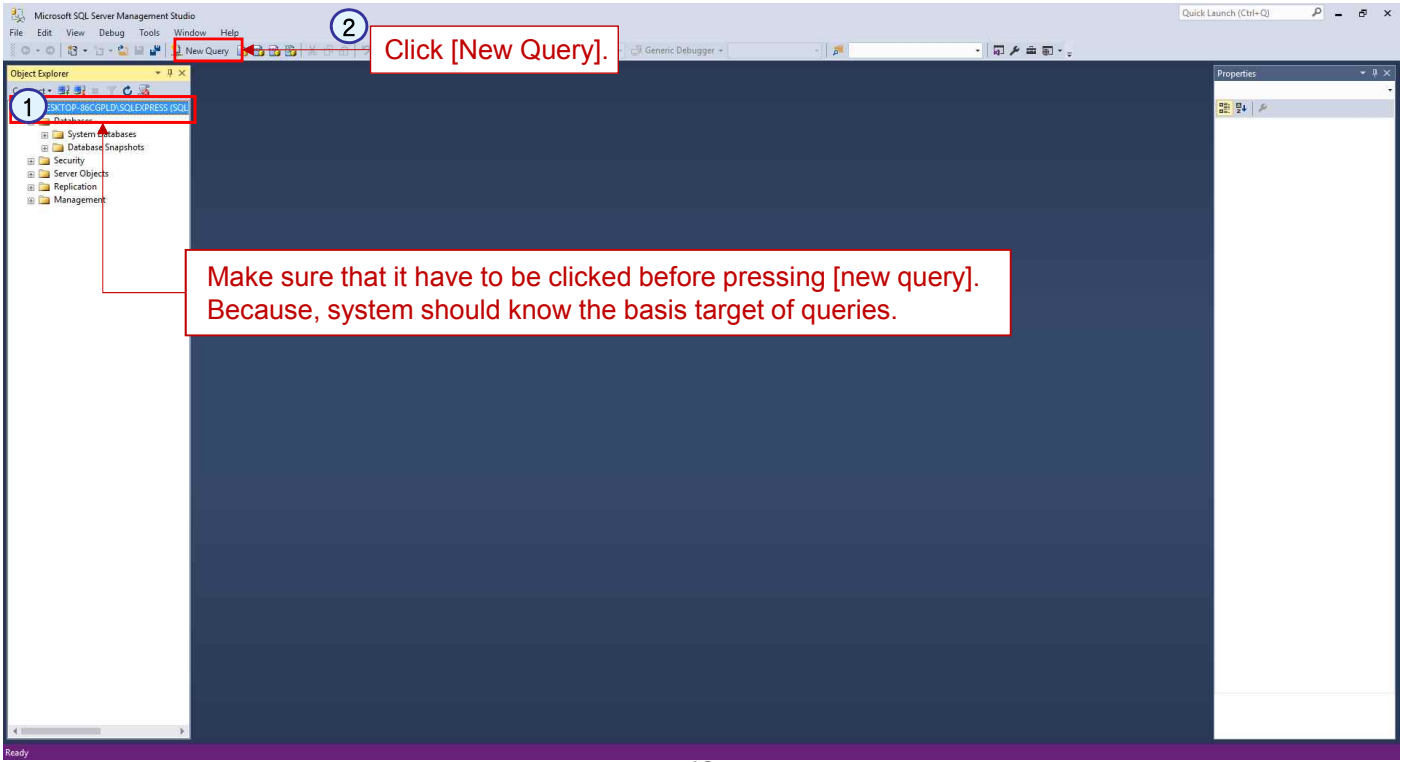
Basic screen configuration (cont'd.)

Division	Function
Menu bars	➢ The buttons to help modeling works are gathered. ➢ It can be located anywhere user want.
Query editor	➢ By using the Database Engine Query Editor in SQL Server Management Studio you can write and edit queries as scripts. ➢ You use scripts when you have to process Windows System commands and Transact-SQL statements in the same script.
Object Explorer	➢ SQL Server Management Studio provides features for managing objects in instances of the Database Engine, Analysis Services, Integration Services, and Reporting Services.
Results / messages page	➢ You can see results of query, messages.
Property page	➢ Property page dialog boxes in Microsoft SQL Server Management Studio all use a common format displaying information with expanding and collapsing categories. ➢ The fields shown depend on the particular property ➢ Properties shown in gray are read-only. ➢ Categorized and Alphabetic buttons are near the top of each property page.

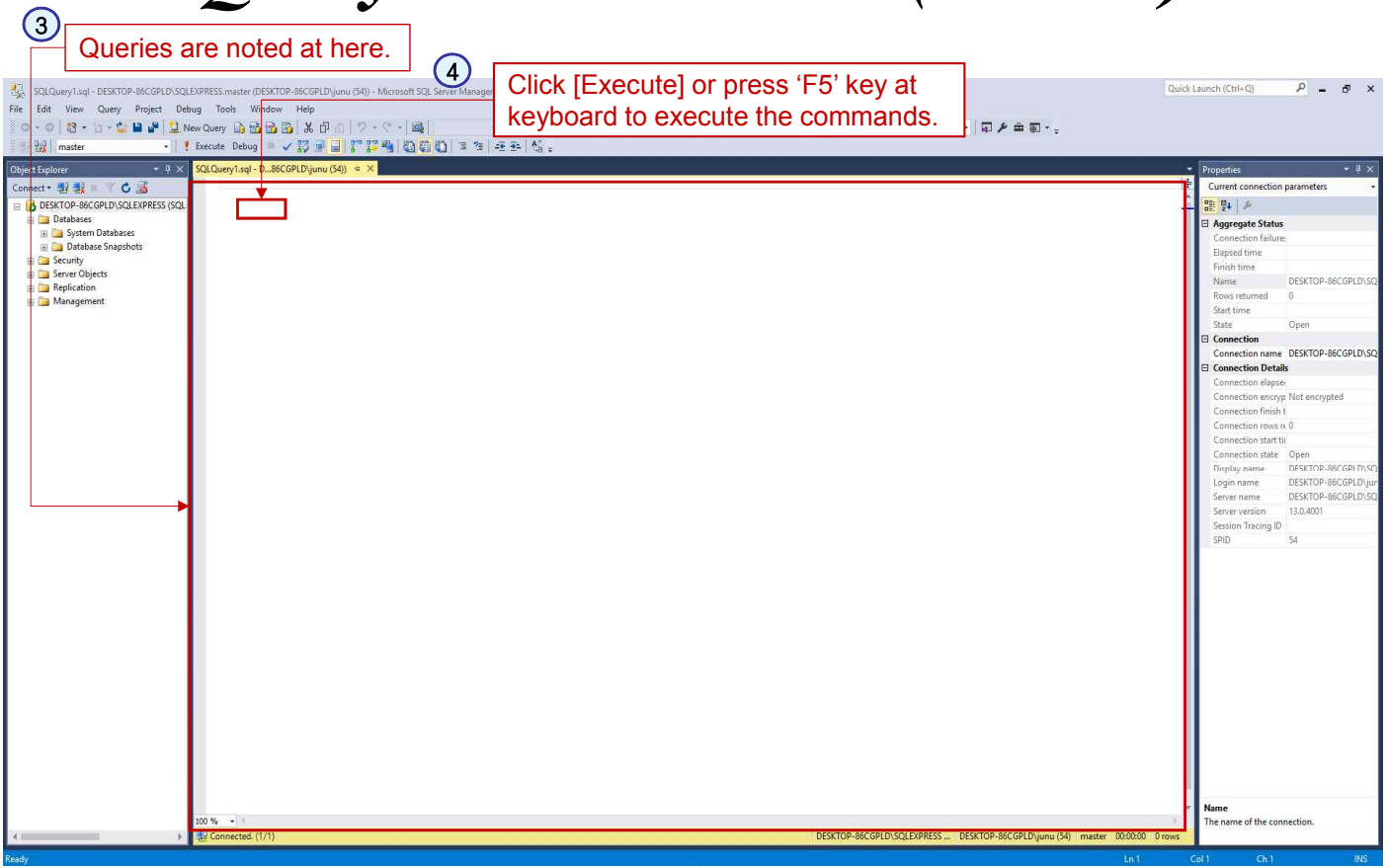
References : https://docs.microsoft.com/en-us/sql/ssms/use-sql-server-management-studio

Query editor window

- Query editor window can be created by following steps

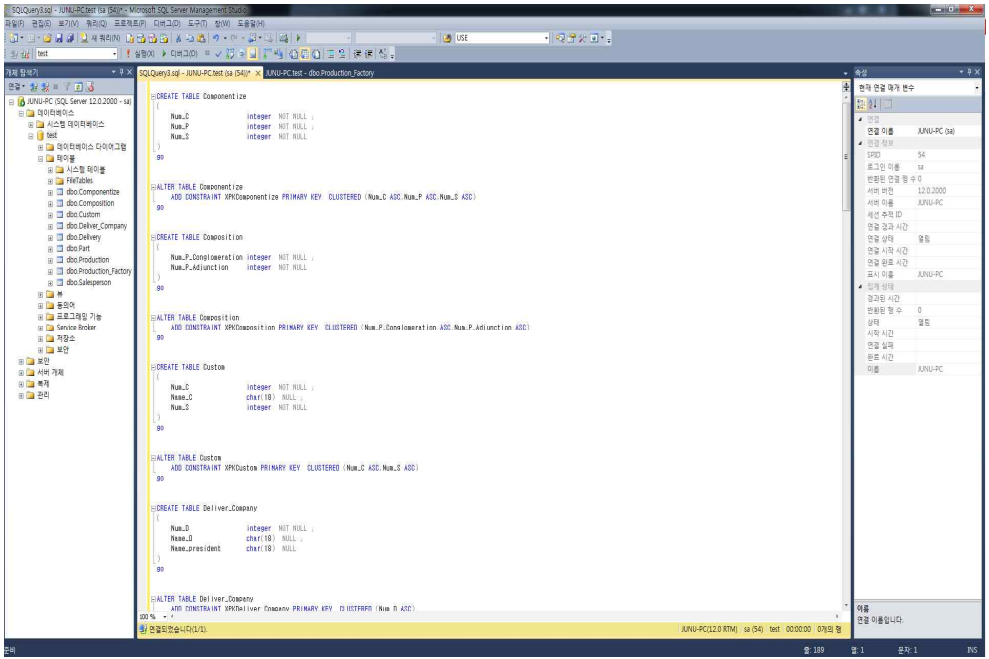


Query editor window (cont'd.)



How to use SSMS (SQL server management studio) tool

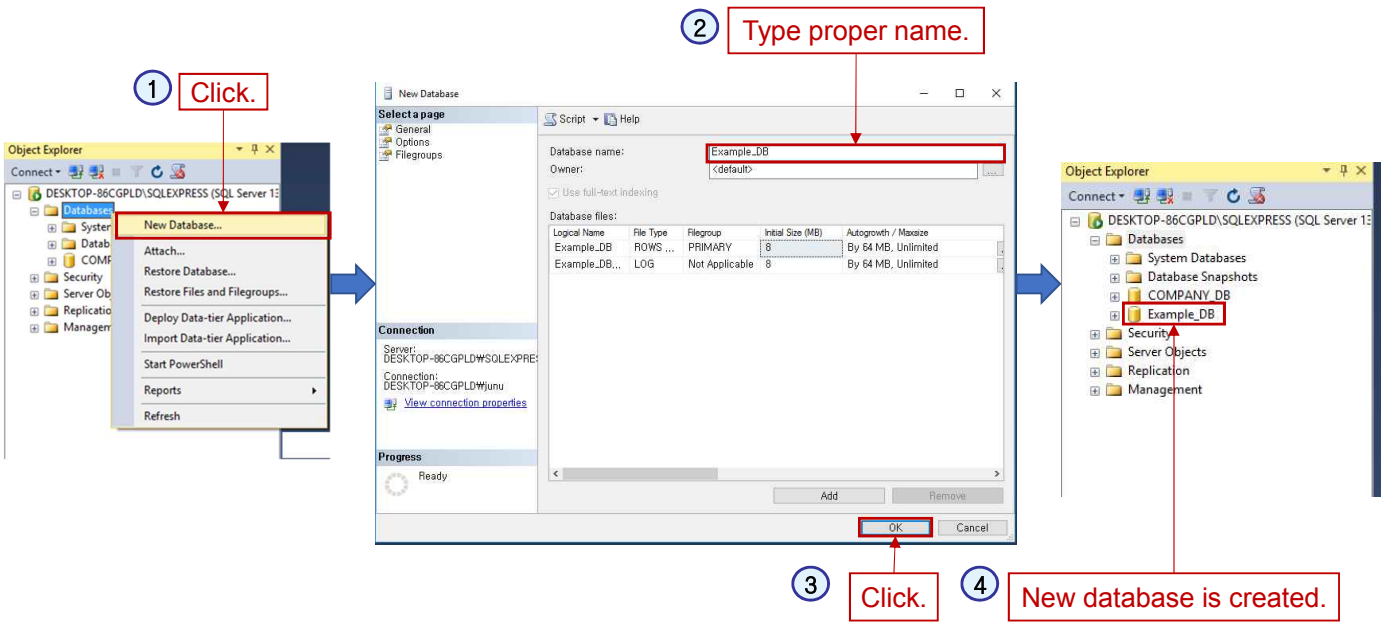
- Using GUI



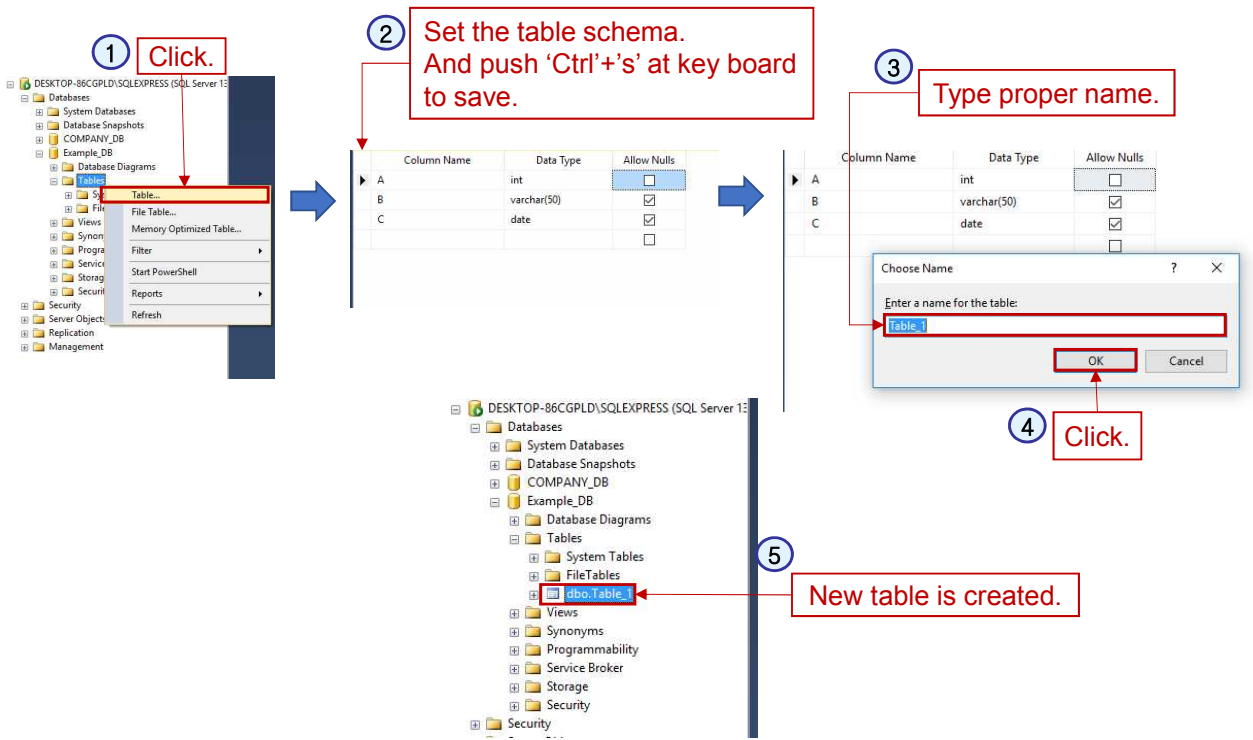
- Management 기능과 쿼리분석기가 통합된 관리 툴

- SSMS의 기능
  - 서버관리, 데이터베이스 생성/변경,
    DB백업 및 복구, 데이터 전송 및 변환

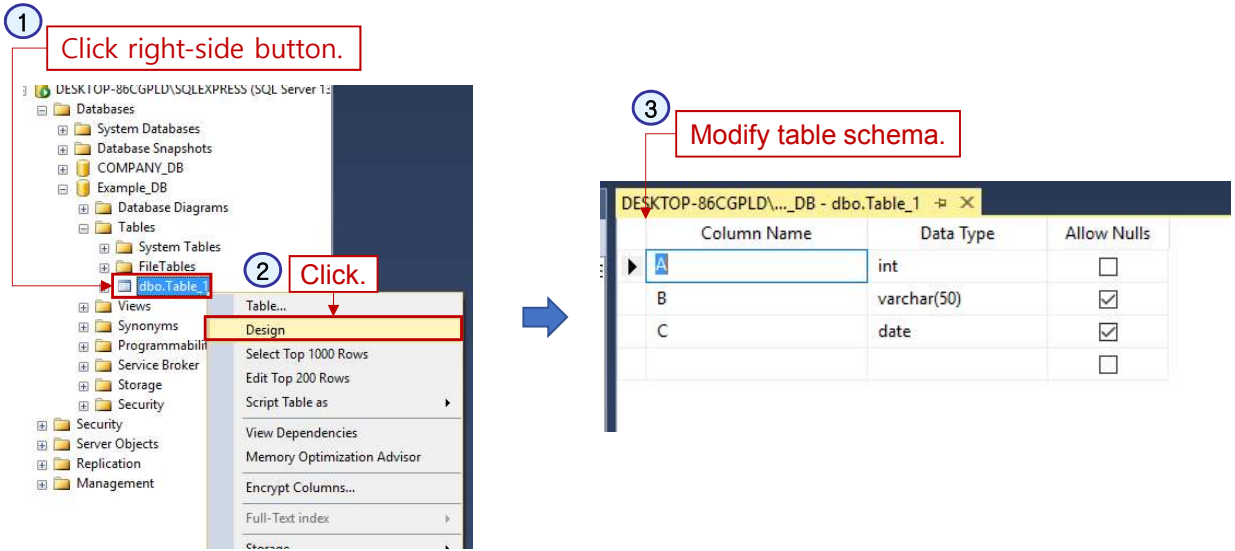
Create database



Create table

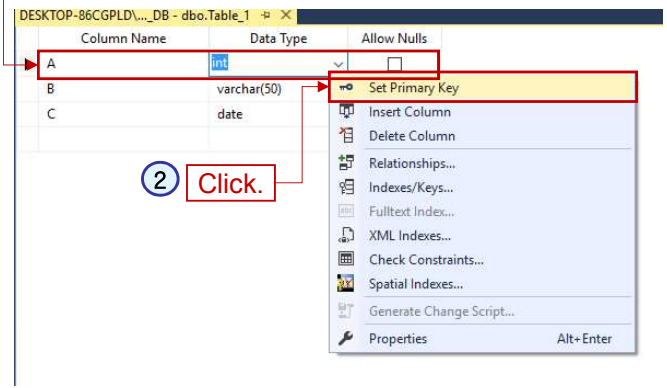


Modify table design

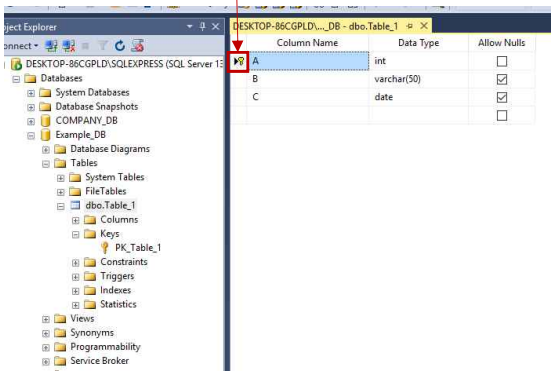


Set primary key

1. Click right-side button anywhere in row of attribute that you want to set primary key.

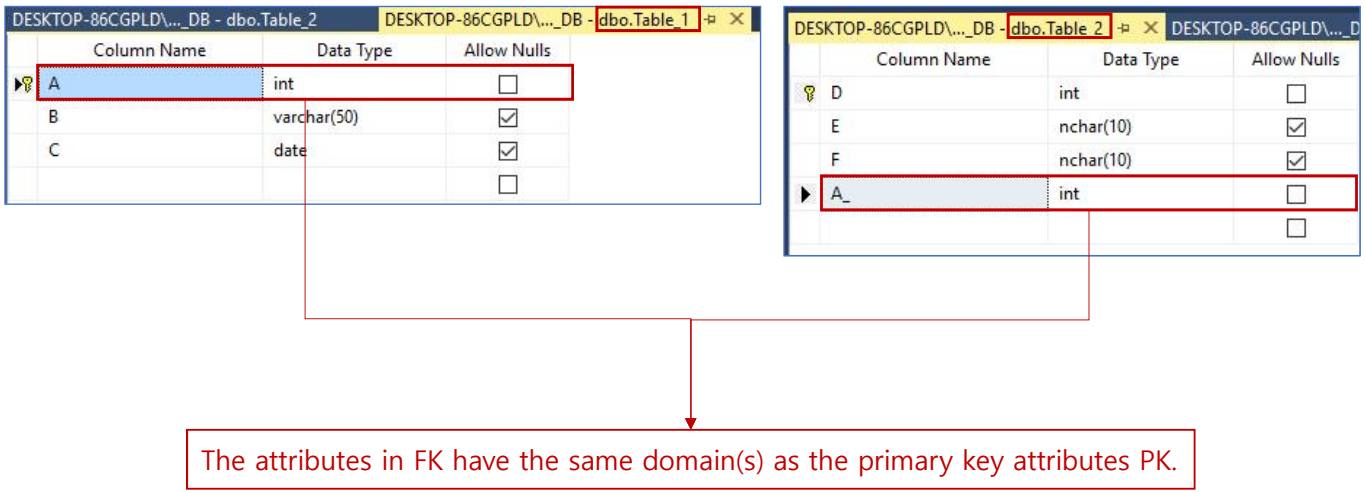


3. You can see key mark.

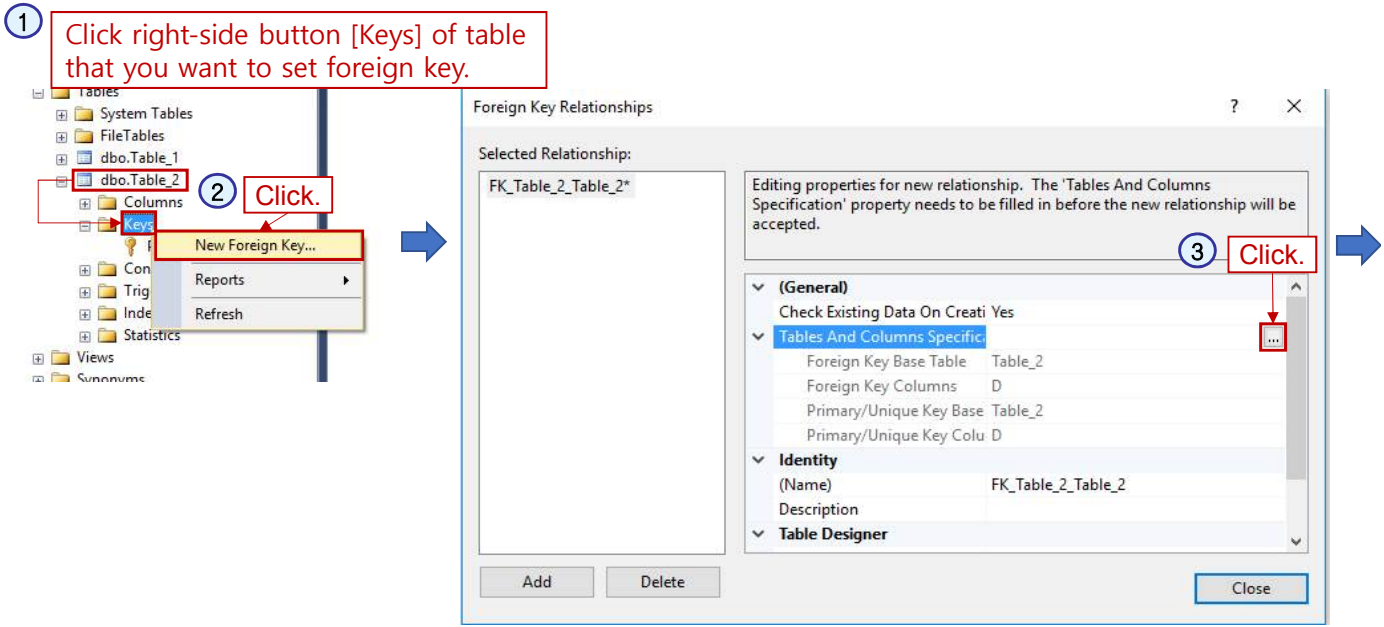


Set foreign key

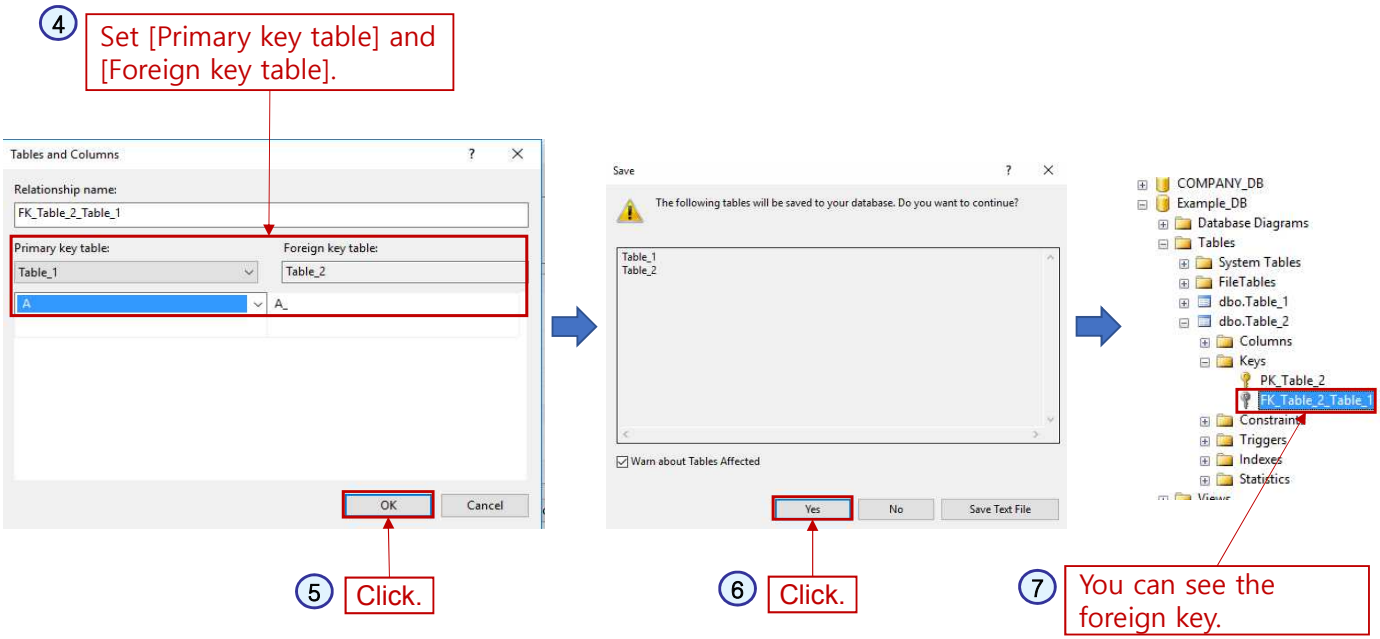
- How to connect attribute ‘A_’ of ‘Table_2’ into attribute ‘A’ of ‘Table_1’:



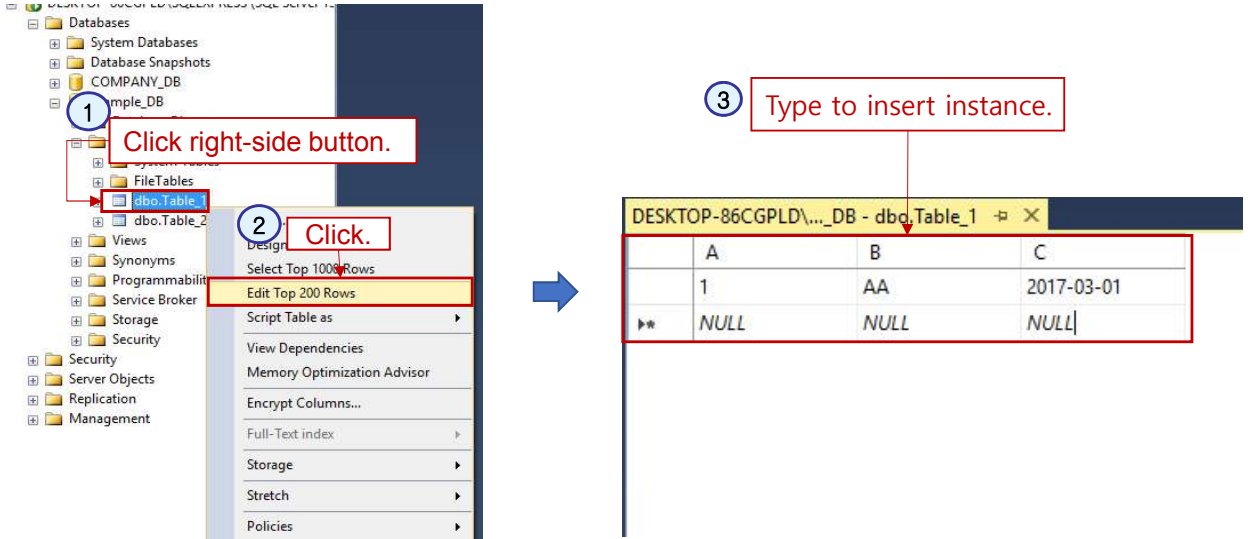
Set foreign key (cont'd.)



Set foreign key (cont'd.)

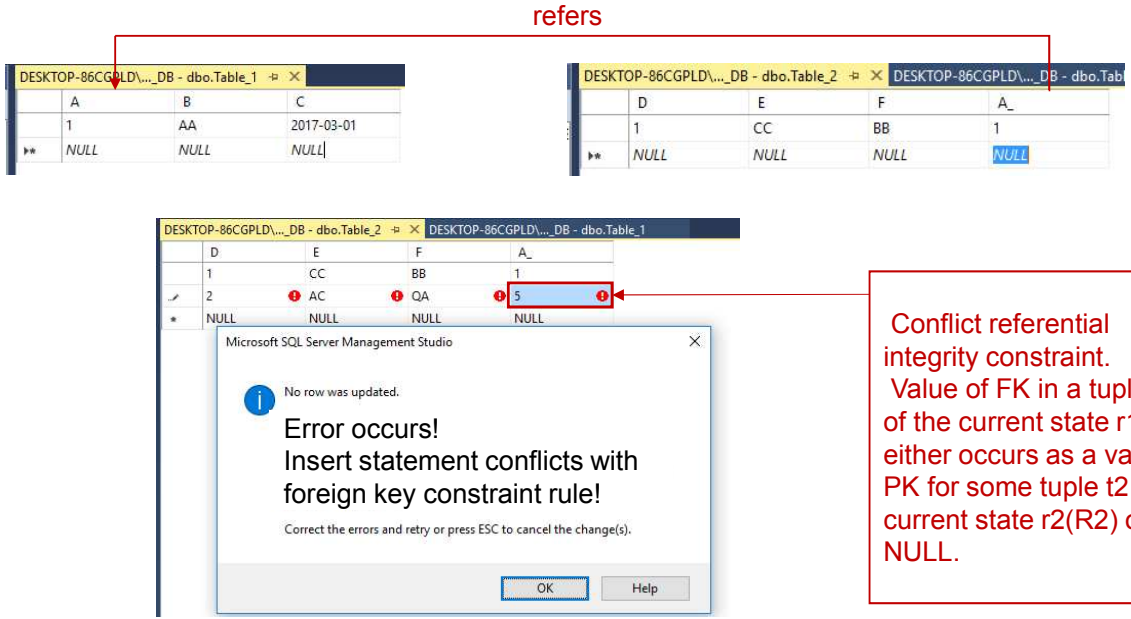


Insert instances

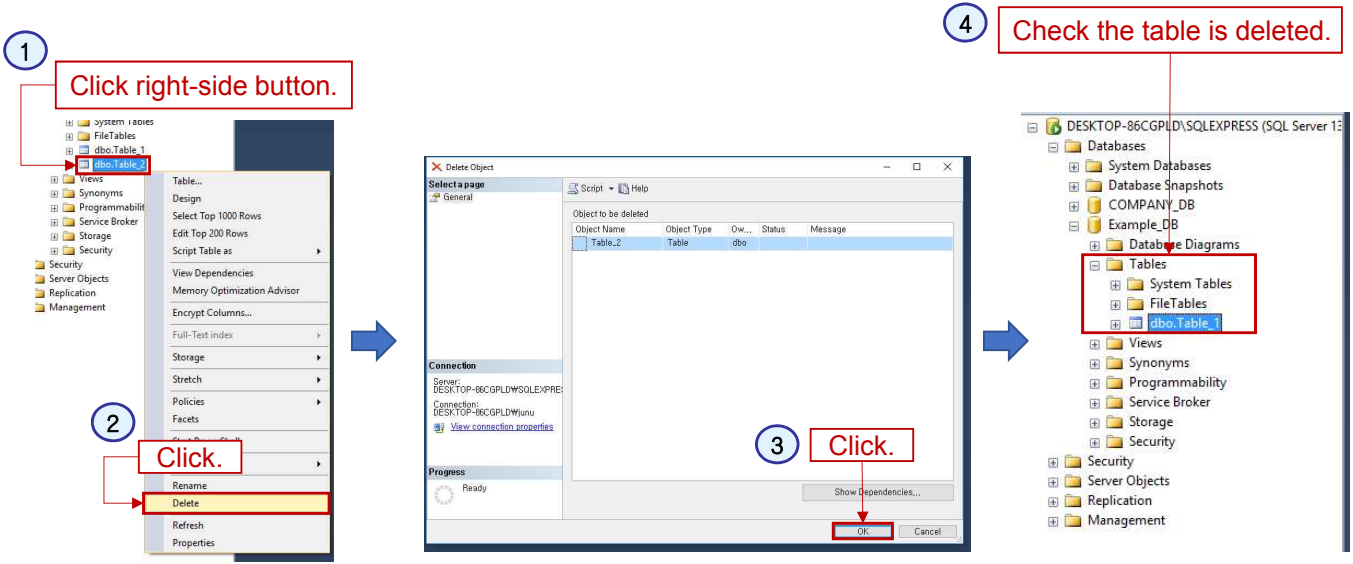


Insert instances (cont'd.)

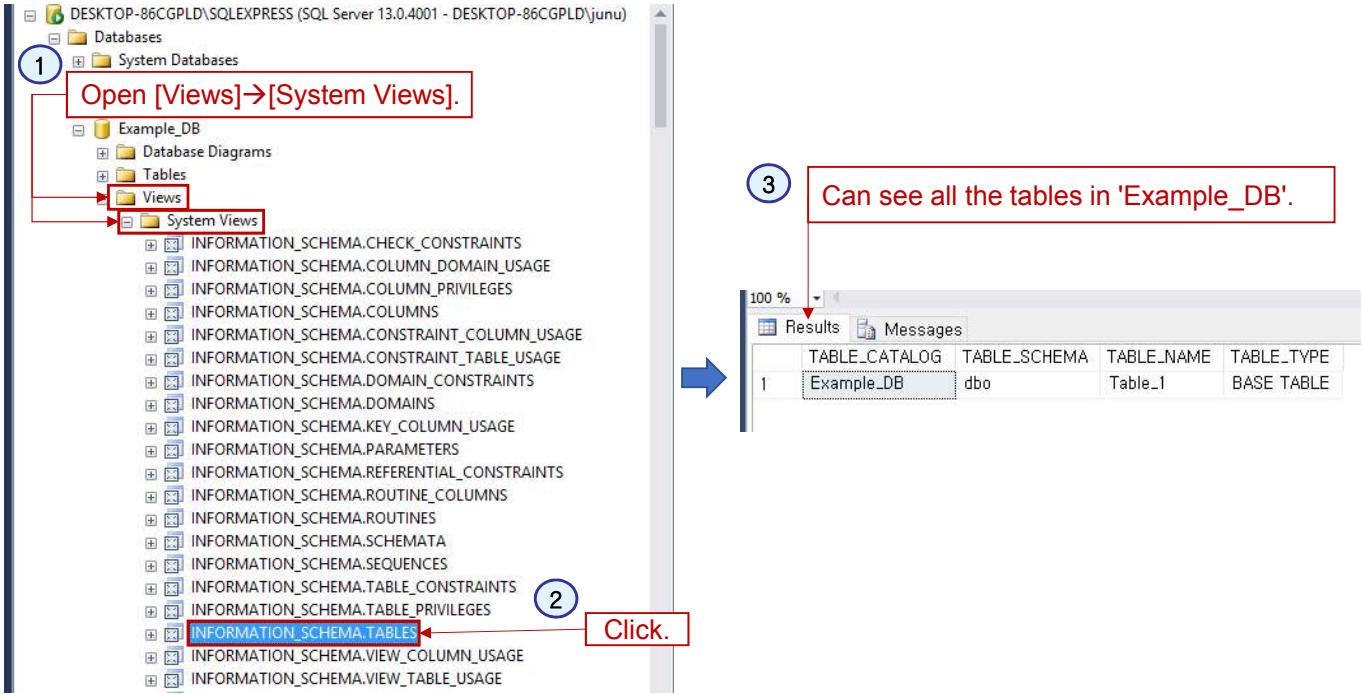
- When attribute 'A_' of 'Table_2' refers attribute 'A' of 'Table_1':



Delete table



System view (catalogs)



How to use SSMS (SQL server management studio) tool

- Using DDL commands.

Create database

```
CREATE DATABASE database_name
[ ON
    [ < filespec > [ ,...n ] ]
    [ , < filegroup > [ ,...n ] ]
]
[ LOG ON { < filespec > [ ,...n ] } ]
[ COLLATE collation_name ]
[ FOR LOAD | FOR ATTACH ]
```

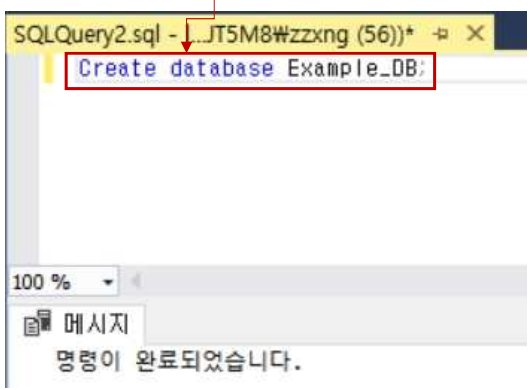
데이터베이스의 데이터 부분이 저장되는 데이터 파일 정의

데이터베이스의 로그가 저장되는 로그파일을 정의

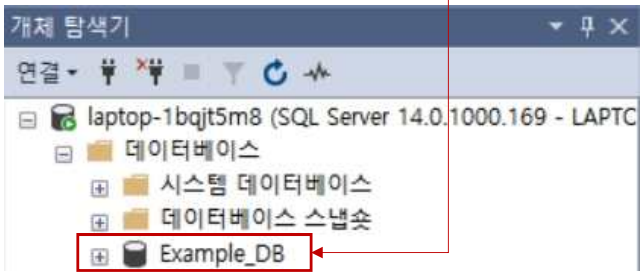
데이터 정렬 정의

이전 버전과의 호환성을 위해 지원되는 절

① Type to create database



② New database is created.

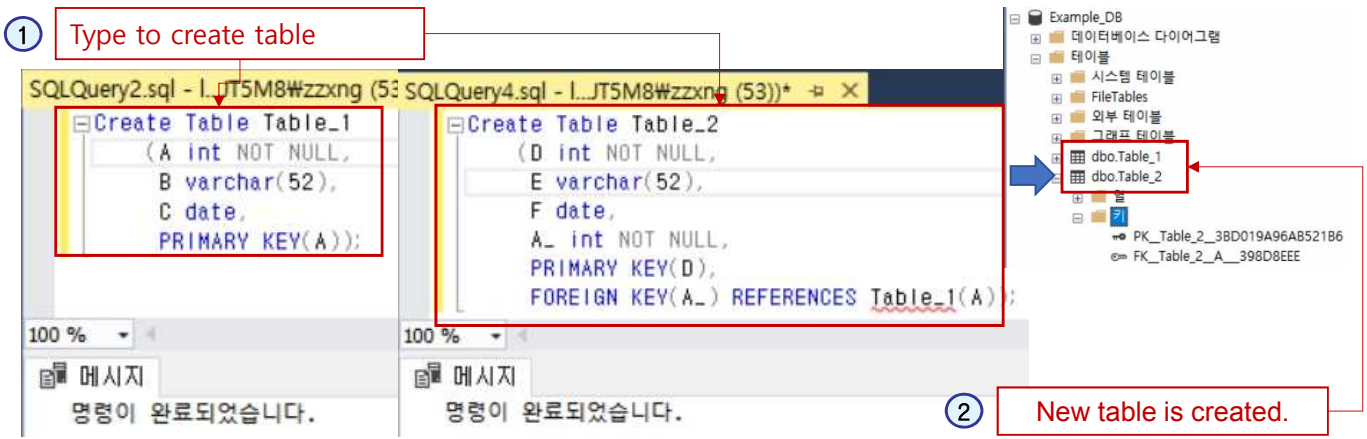


Create table

```
CREATE TABLE
    [ database_name.[ owner ] . | owner. ] table_name
    ( { < column_definition >
        | column_name AS computed_column_expression
        | < table_constraint > ::= [ CONSTRAINT constraint_name ] }
            | [ { PRIMARY KEY | UNIQUE } [ ,...n ]
    )
[ ON { filegroup | DEFAULT } ]
[ TEXTIMAGE_ON { filegroup | DEFAULT } ]
```

PRIMARY KEY, NOT NULL, UNIQUE, FOREIGN KEY 또는 CHECK 제약 조건 정의

constraint	Description
NULL | NOT NULL	Null 허용 여부
PRIMARY KEY	지정한 열에 대해 고유한 인덱스 지정(1개)
UNIQUE	지정한 열에 대해 고유한 인덱스 지정(n개)
FOREIGN KEY...REFFERENCES	참조 무결성 제공
ON DELETE {CASCADE|NO ACTION)	부모 테이블에서 삭제시 해당 행 삭제
ON UPDATE {CASCADE|NO ACTION)	부모 테이블에서 삭제시 해당 행 업데이트
CHECK	열에 입력할 수 있는 값 제한



Modify table design

```
ALTER TABLE table
{ [ ALTER COLUMN column_name
    { new_data_type [ ( precision [ , scale ] ) ]
        [ COLLATE < collation_name > ]
        [ NULL | NOT NULL ]
        | {ADD | DROP } ROWGUIDCOL }
    ]
    | ADD
        { [ < column_definition > ]
        | column_name AS computed_column_expression
        } [ ,...n ]
    | [ WITH CHECK | WITH NOCHECK ] ADD
        { < table_constraint > } [ ,...n ]
    | DROP
        { [ CONSTRAINT ] constraint_name
            | COLUMN column } [ ,...n ]
    | { CHECK | NOCHECK } CONSTRAINT
        { ALL | constraint_name [ ,...n ] }
    | { ENABLE | DISABLE } TRIGGER
        { ALL | trigger_name [ ,...n ] }
}
```

변경된 열의 새 데이터 형식

열에 null 값 허용 여부를 지정

ROWGUID 속성을 추가/삭제

하나 이상의 열 정의 / 테이블 제약 조건 추가 지정

테이블에서 열 / 제약 조건 제거

제약조건 설정 여부 지정

트리거 설정 여부 지정

Insert instances

```
INSERT INTO [table_name] VALUES ('data1', 'data2', ... );
// 테이블 생성시의 Attribute 순서와 dataType에 맞게 입력

INSERT INTO [table_name] (attr1, attr2, ... )       VALUES ('data1', ....);
// 전체 Attribute가 아닌 특정 Attribute 에만 입력 할 경우 사용
```

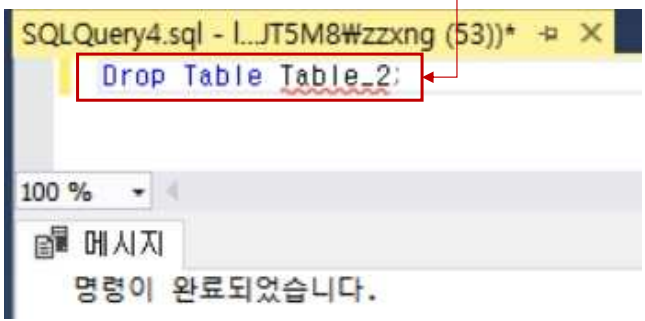
① Type to insert instances

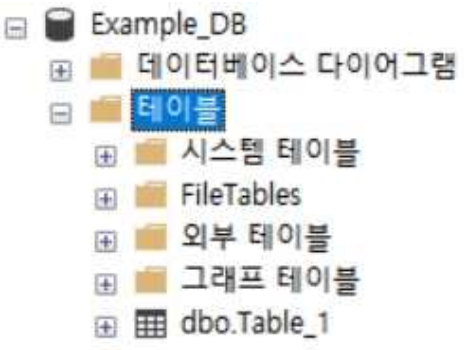
② You can see inserted instances

Delete table

```
DROP TABLE table_name
```

① Type to delete table





THANK YOU

인하대학교