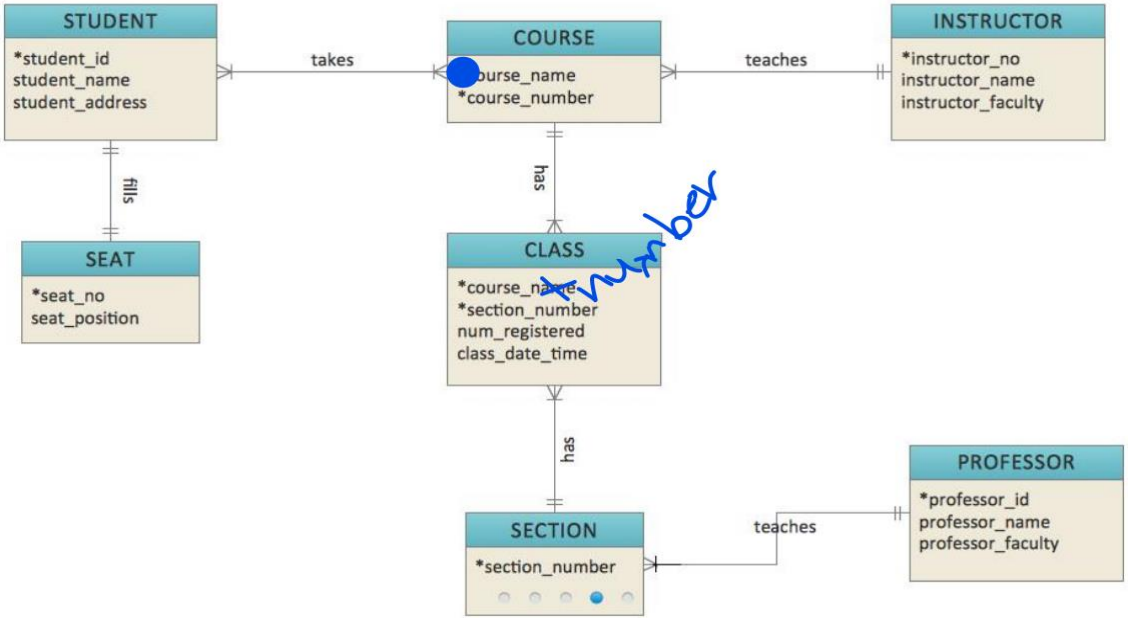
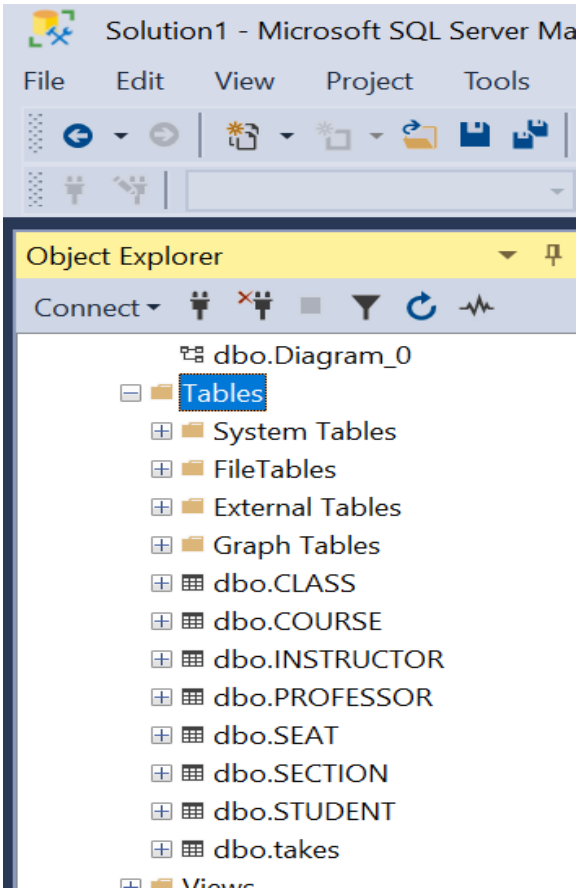
Amirkabir University of Technology (AUT)
Tehran, Iran
Lab Database, Computer Engineering Department
Tina Gholami (9531307) Report 1

Part 1) MSSMS ER model report:

After opening up a new project on MSSMS (name: Lab_ass_1) and connecting to server to the database, the entities (tables) and their relations should be designed according to the lab description file. Towards that end, first, the entities are made according to the ER diagram on page 16 of the lab description file.



Next, their relations (many-to-one, one-to-one, and one-to-many) with their according foreign keys are specified, according to page 6 of the lab description file.



Here are the tables in detail:

1) **Table STUDENT:**

DESKTOP-GEI9I0B\...s_1 - dbo.STUDENT | DESKTOP-GEI9I0B\...s_1 - dbo.STUDENT

Column Name	Data Type	Allow Nulls
student_id	int	☐
student_name	varchar(50)	☑
student_address	varchar(50)	☑
seat no	int	☐

DESKTOP-GEI9I0B\...s_1 - dbo.STUDENT | DESKTOP-GEI9I0B\...s_

student_id	student_name	student_address	seat_no
1	Sherlock	London	3
2	Leo	Oregon	4

2) Table SEAT:

DESKTOP-GEI9I0B\S..._ass_1 - dbo.SEAT | DESKTOP-GEI9I0B\S..._ass_1 - dbo.SEAT

Column Name	Data Type	Allow Nulls
seat_no	int	☐
seat_position	int	☑

DESKTOP-GEI9I0B\S..._ass_1 - dbo.SEAT

	seat_no	seat_position
	3	1
	4	2

3) Table COURSE:

DESKTOP-GEI9I0B\...ss_1 - dbo.COURSE | DESKTOP-GEI9I0B\...ss_1 - dbo.COURSE

Column Name	Data Type	Allow Nulls
course_number	int	☐
course_name	varchar(50)	☑
instructor_no	int	☐

DESKTOP-GEI9I0B\...ss_1 - dbo.COURSE

	course_number	course_name	instructor_no
	1	string theory	3
	2	AI	4

4) Relation Takes:

DESKTOP-GEI9I0B\S..._ass_1 - dbo.takes | DESKTOP-GEI9I0B\S..._ass_1 - dbo.takes

Column Name	Data Type	Allow Nulls
student_id	int	☐
course_number	int	☐

DESKTOP-GEI9I0B\S..._ass_1 - dbo.takes

	student_id	course_number
	1	2
	2	2

5) Table INSTRUCTOR:

DESKTOP-GEI9I0B\...- dbo.INSTRUCTOR | DESKTOP-GEI9I0B\...- dbo.INSTRUCTOR

Column Name	Data Type	Allow Nulls
instructor_no	int	☐
instructor_name	varchar(50)	☑
instructor_faculty	varchar(50)	☑

DESKTOP-GEI9I0B\...- dbo.INSTRUCTOR | DESKTOP-GE

	instructor_no	instructor_name	instructor_faculty
	3	Einstein	physics
	4	Andrew NG	cs

6) Table CLASS:

DESKTOP-GEI9I0B\S...ass_1 - dbo.CLASS | DESKTOP-GEI9I0B\S...ass_1 - dbo.CLASS

Column Name	Data Type	Allow Nulls
course_number	int	☐
section_number	int	☐
num_registered	int	☑
class_date_time	datetime	☑

DESKTOP-GEI9I0B\S...ass_1 - dbo.CLASS

course_number	section_number	num_registered	class_date_time
1	4	30	2021-01-03 13:00:00.000
2	5	40	2021-01-03 15:00:00.000

7) Table SECTION:

DESKTOP-GEI9I0B\S...s_1 - dbo.SECTION | DESKTOP-GEI9I0B\S...s_1 - dbo.SECTION

Column Name	Data Type	Allow Nulls
section_number	int	☐
professor_id	int	☐

DESKTOP-GEI9I0B\S...s_1 - dbo.SECTION | DESK

section_number	professor_id
4	3
5	4

8) Table PROFESSOR:

DESKTOP-GEI9I0B\...- dbo.PROFESSOR | DESKTOP-GEI9I0B\...- dbo.PROFESSOR

Column Name	Data Type	Allow Nulls
professor_id	int	☐
professor_name	varchar(50)	☑
professor_faculty	varchar(50)	☑

DESKTOP-GEI9I0B\...- dbo.PROFESSOR | DESKTOP-GEI9I0B\...-

professor_id	professor_name	professor_faculty
3	Shahriari	ce
4	Bagheri	ce

Now, to see the foreign keys and relations in more detail:

1) **fills: (one-to-one relation)**

Tables and Columns

Relationship name:

FK_STUDENT_SEAT

Primary key table:

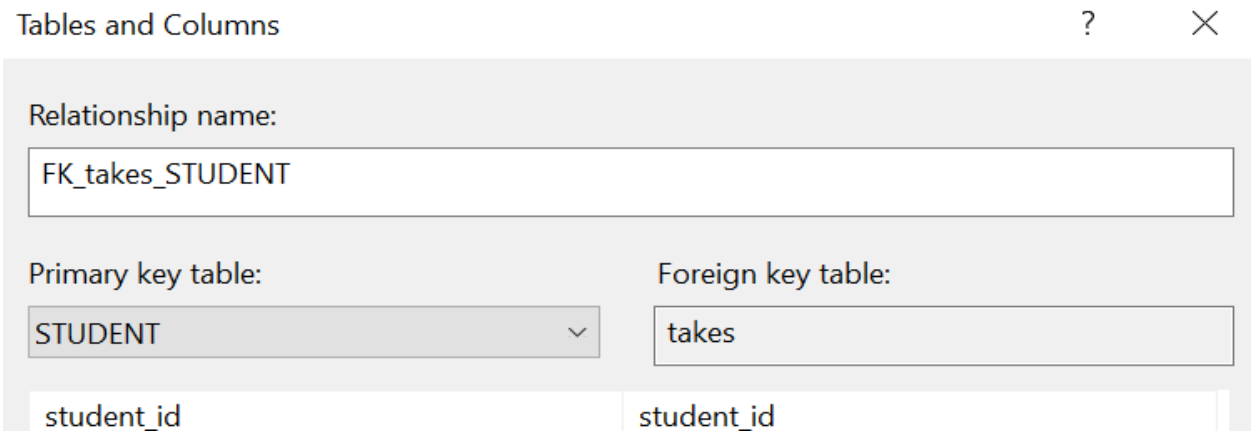
SEAT

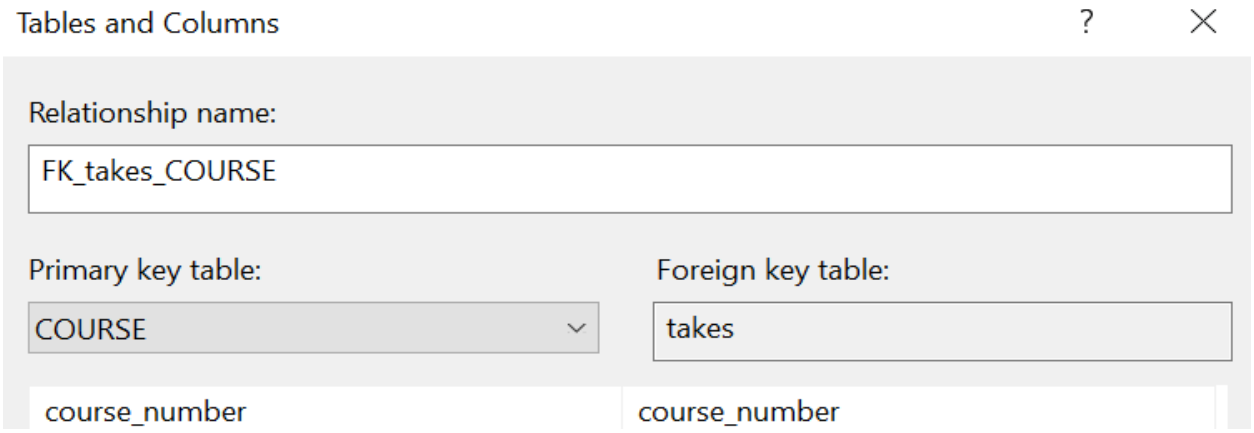
Foreign key table:

STUDENT

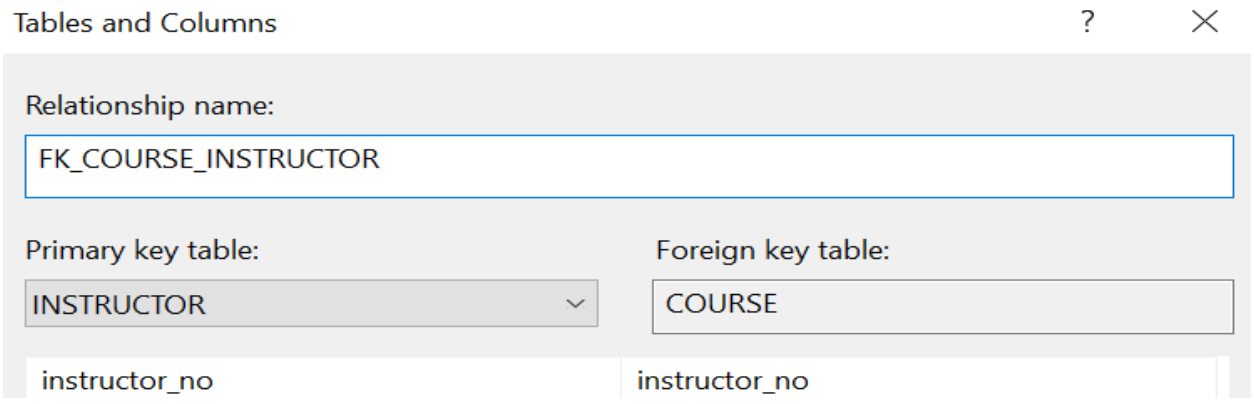
seat_no	seat_no

2) takes: (many-to-many relation)

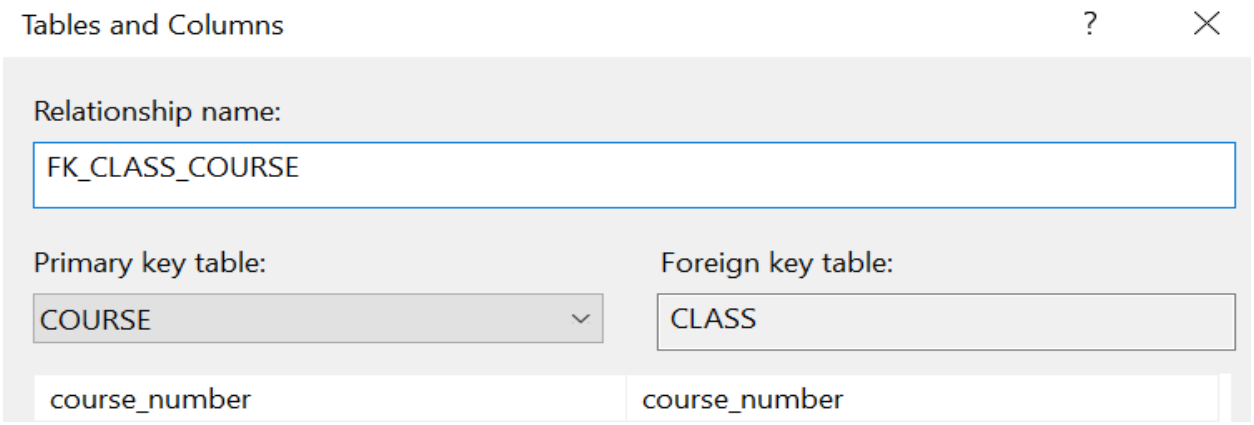




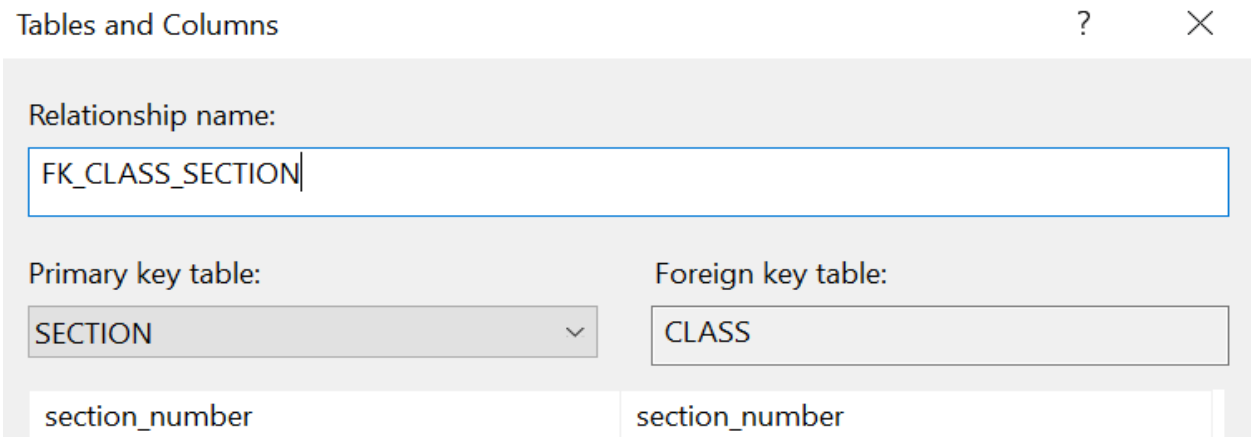
3) teaches: (many-to-one relation)



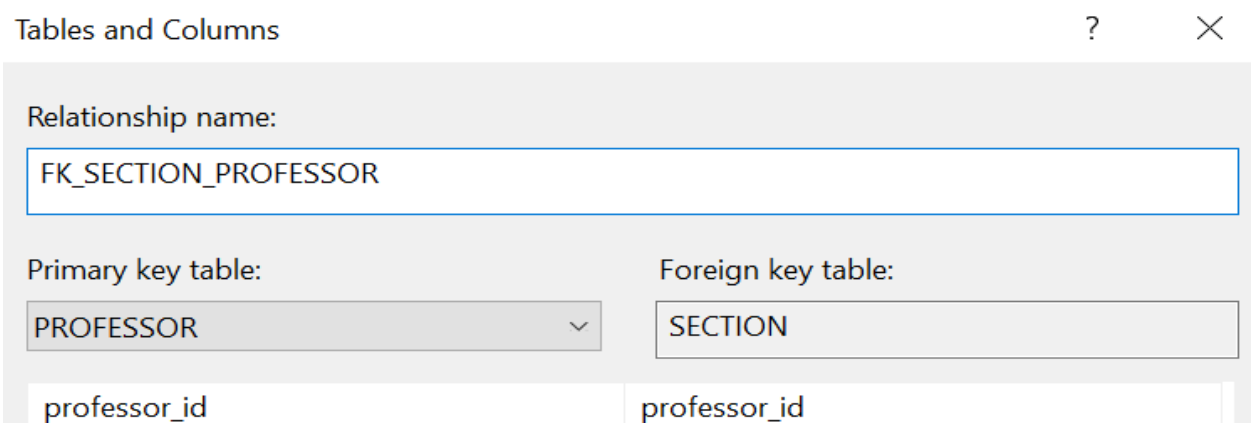
4) has: (one-to-many relation)



5) has: (many-to-one relation)



6) teaches: (many-to-one relation)



Part 2) Describe two different files with the extensions .mdf and .ldf in the data base:

.mdf: The file where data in the database is stored.

.ldf: The file where transactions and logs in the database is kept.

Every database in SQL Server stores at lease tow files with the extensions .mdf and .ldf where the former is for storing the data (data file), and the latter is for saving the logs (log file).

The data file contains information such as the tables, relations, indexes, procedures, and views. Common extension for these files are .mdf and also .ndf

On the other hand, log files contain information that help recover transactions. Common extension for these files are .ldf

The path where these two files are being stored on my PC (and usually other PCs too) is:

C:\Program Files\Microsoft SQL Server\MSSQL15.SQLEXPRESS\MSSQL\DATA

Part 3) Describe different data.

Before inserting data in the database, its type should have been specified in the tables (relations). That is because when the data is being inserted in the memory, both the database and the operating system need to know how much memory should be dedicated to each data instance. And if the inserted data type violates the pre-specified data type, then the database server will probably give errors.

نوع داده	محدوده قابل قبول	فضای لازم
bigint	از منفی دو به توان ۶۳ تا دو به توان ۶۳ منهای یک	۸ بایت
Int	از منفی دو به توان ۳۱ تا دو به توان ۳۱ منهای یک	۴ بایت
Smallint	از ۳۲۷۶۸- تا ۳۲۷۶۷	۲ بایت
tinyint	از صفر تا ۲۵۵	۱ بایت

Data Type Categories:

Data types in SQL Server are organized into the following categories:

Exact numerics	Unicode character strings
Approximate numerics	Binary strings
Date and time	Other data types
Character strings	

In SQL Server, based on their storage characteristics, some data types are designated as belonging to the following groups:

- Large value data types: **varchar(max)**, and **nvarchar(max)**
- Large object data types: **text**, **ntext**, **image**, **varbinary(max)**, and **xml**

Exact numerics

bigint	numeric
bit	smallint
decimal	smallmoney
int	tinyint
money	

Approximate numerics

float

real

Date and time

date

datetimeoffset

datetime2

smalldatetime

datetime

time

Character strings

char

varchar

text

Unicode character strings

nchar

nvarchar

ntext

Binary strings

binary

varbinary

image

Other data types

cursor

rowversion

hierarchyid

uniqueidentifier

sql_variant

xml

Spatial Geometry Types

Spatial Geography Types

table

Here were the different data and their types accepted by SQL.