DATABASES / DATABASES I

2024/2025 – Fall Semester

Practical Classes Workbook (Part 2)

Class 4

TABLE OF CONTENTS

1. Introduction to SQL Server Management Studio (SSMS)

Creating an empty database

There are two options to create a database in SSMS.

1) Using the wizard:
   I. Right click on “Databases” in the Object Explorer (section on the left)
   II. Choose “New Database…”
   III. Write the “Database name” and click “Ok”

2) Writting a script:
   I. In a script, write the following code:

```
USE MASTER
GO
```

To make sure the database is being created in the master.

```
CREATE DATABASE database_name
GO
```

To create the new database.

   II. Write code to create objects
   III. Execute the script

Later we will see how to create tables in a database. For now, let’s use the scripts generated in Power Designer to create databases that already have the complete data model (tables and associations).

Creating a database from a PD DDL Script

If we open a DDL script generated by PD and run it right away, the database objects will be created in the master, which is a system database. This is not what is intended.

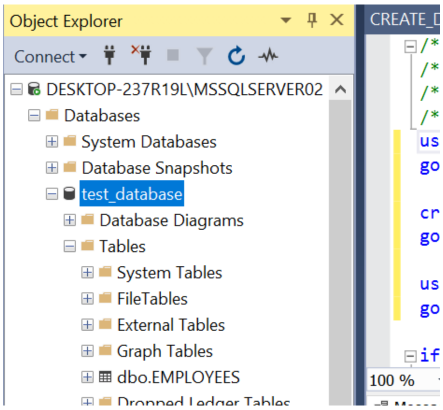
After creating the database in master, you want to ensure that all objects (tables, indexes, associations, etc.) are created in this specific database and not in the master as well.To do this, you use USE database_name at the beginning of your script to make sure the context has switched to the new database, and all objects will be created there.

To do this:

I. Open the SQL script and, at the top, add the code in the section *Creating an empty database.*

II. If you now execute the script, you create the new database, however you must add an extra line to make sure the objects are created in that new database:

```
USE database_name
GO
```



III. Execute the script

By executing the script, the new database will be created with all the objects designed in PD.

In the Object Explorer, try refreshing and you will see your new database. In this example, the database is called “test_database” and has only one table - “EMPLOYEES”.

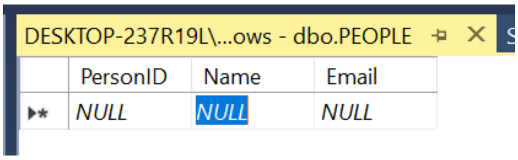
Manual Data Insertion

There are much more efficient ways to insert data then manually, but it might be easier in this introductory phase and for small and fast insertions.

The steps are the following:

I. Right click on the name of the table you want to insert data
II. Choose the option "Edit top 200 rows"

A new separator will open, and you will see the table in a format where the attributes are the columns, and the records are the rows. See an example below.



DESKTOP-237R19L\...ows - dbo.PEOPLE

	PersonID	Name	Email
▸*	*NULL*	*NULL*	*NULL*

III. Write on the cells and press "Enter" to insert a new record.

Note: You will not be able to insert values in identity columns (defined in PD as serial). This column values are automatically generated, and they will be sequential.

Database Backup

To save a database (database objects + data) outside of the SSMS environment, a backup should be done.

I. Right click on the database you want to do the backup
II. Go to "Tasks" and then "Back Up…"
III. If needed, change the location where the backup file (*.bak* extension) will be stored. To do that:
    a. Click "Add…"
    b. On "…", select the folder you want and write the name of the file (don't forget the "*.bak*" at the end of the file name)
IV. Click "Ok" until the end

The *.bak* file created can be shared between users and **to restore**/load it back to SSMS the steps are:

I. Right click on "Databases"
II. Choose "Restore Database…"
III. In the Source page select "Device" and click on the "…"
    a. Click "Add" and select the *.bak* file path.
IV. Press "Ok" until the end and when it is done you will see the database on the Object Explorer.

Note: To restore a database there must not be a database with the same name already created.

2. Import and Export Data

To and From Excel

Instead of doing a backup that saves the entire database (objects + data), it is possible to save only the data by exporting it to an excel file that can later be imported to SSMS again.

To export data from a database in SSMS to excel:

I. Right click on the database and select "Tasks"

II. Choose "Export Data…". You will see a prompt window:
    a. In the "Choose a Data Source" window, select the "SQL Server Native Client 11.0" (or "Microsoft OLE DB Provider for SQL Server" if the other is not an option) and press "Next"
    b. In the "Choose a Destination" window, select "Microsoft Excel", choose the Excel file path and press "Next"

III. In the window "Select Source Tables and Views", select the tables from which you want data to be saved. Each table selected will be a different sheet in the excel file.

IV. Go until the end and click "Finish".

Note: if there are pages that are not mentioned in the steps above, it is because you should leave the default selections.

To import an excel file, the logic and steps are similar:

I. Right click on the database and select "Tasks"

II. Choose "Import Data…". You will see a prompt window:
    a. In the "Choose a Data Source" window, select "Microsoft Excel", choose the Excel file path and press "Next"[1]
    b. In the "Choose a Destination" window, select "SQL Server Native Client 11.0" (or "Microsoft OLE DB Provider for SQL Server" if the other is not an option) and press "Next".

III. In the "Select Source Tables and Views" select the sheets from where you want to load data into the database. Confirm if all the sheets are being mapped to the correct table in the database (the names of the tables in the right must not have a "$").

IV. If in the excel file you have columns of type serial, make sure that for those tables you click on the correspondent row, click "Edit Mappings…" and check the box to "Enable identity insert".

V. Press "Ok", go until the end and click "Finish".

<u>IMPORTANT NOTE:</u> Due to foreign keys, data cannot be inserted in a random order. If some table is pointing to another table, then that other table's data must be inserted first. To avoid having to run multiple "Import Data": before doing the import we can run the following code to disable all the constraints:

```sql
-- disable all constraints before loading data to avoid FK restrictions
EXEC sp_MSForEachTable "ALTER TABLE ? NOCHECK CONSTRAINT all";
```

Then, we do the import of all tables at once and at the end we **must not forget** to put the constraints back on:

```sql
-- enable all constraints
EXEC sp_MSForEachTable "ALTER TABLE ? WITH CHECK CHECK CONSTRAINT all";
```

<u>Tip:</u> If you want to delete all the data in the database, follow these same steps. First, disable the constraints, then delete the data using the line of code below and then put the constraints back on.

```sql
-- delete data in all tables
EXEC sp_MSForEachTable "DELETE FROM ?";
```

[1] If you have an error, try to save the excel in the format "Excel 97-2003 Workbook (.xls)" and choose that one

To SQL Script

An alternative to exporting data to excel is to export it to an SQL script that just needs to be ran afterwards to load back the data.

To export data from a database in SSMS to excel:

I. Right click on the database and choose “Tasks”
II. Select “Generate Scripts…”
III. Click “Next” on the first window and on the second choose “Select specific database objects” and specify the tables you want to save data from or select all if you want to export all the data.
IV. In the next page, select “Save as script file” and go to the “Advanced” options.
    a. There, in the “Types of data to script”, choose “Data only”.
V. Go until the end and click “Finish”.

Exercises

9. Take the script generated in the TV Shows exercise (available in Moodle – *TVShows_DDL_ex1.sql*).

    i. Create a new database called "TVShows" by executing the SQL script in SSMS. Add the necessary lines of code to the script to make it work as intended.
    (tip: check the section "Creating an empty database")

    ii. Manually insert the following 2 records in the TVShows table:
    Record 1 – the title is "The Handmaid's Tale", it was released in 2017 and its rating is 8.4. Its genres are "Drama", "Sci-Fi" and "Thriller".
    Record 2 – the title is "The Bear", it was released in 2022 and its rating is 8.6. Its genre is "Drama".
    Do additional steps if necessary.
    (tip: check the section "Manual Data Insertion")

    iii. Create an Excel file with a sheet PERSONS, write the PERSONS table attributes as columns and add 2 rows at your choice to it. Add another excel sheet called GENRES, put the table's attributes as columns and add rows for the genres "Comedy" and "Crime".
    Import the data in the excel file to the correspondent tables in the database.
    (tip: check the section "Import and Export Data")

    iv. Create a backup file from the TVShows database, then delete the database and restore it. Check if all the data is as before.
    (tip: check the section "Database Backup")

    v. Export all the data in the database to an SQL script, delete all the data from the database and execute the created script to import the data back.
    (tip: check the section "Import and Export Data")