

Exercises: Introduction to Entity Framework

This document defines the **exercise assignments** for the ["Databases Advanced – EF Core" course @ Software University](#).

1. Import the SoftUni Database

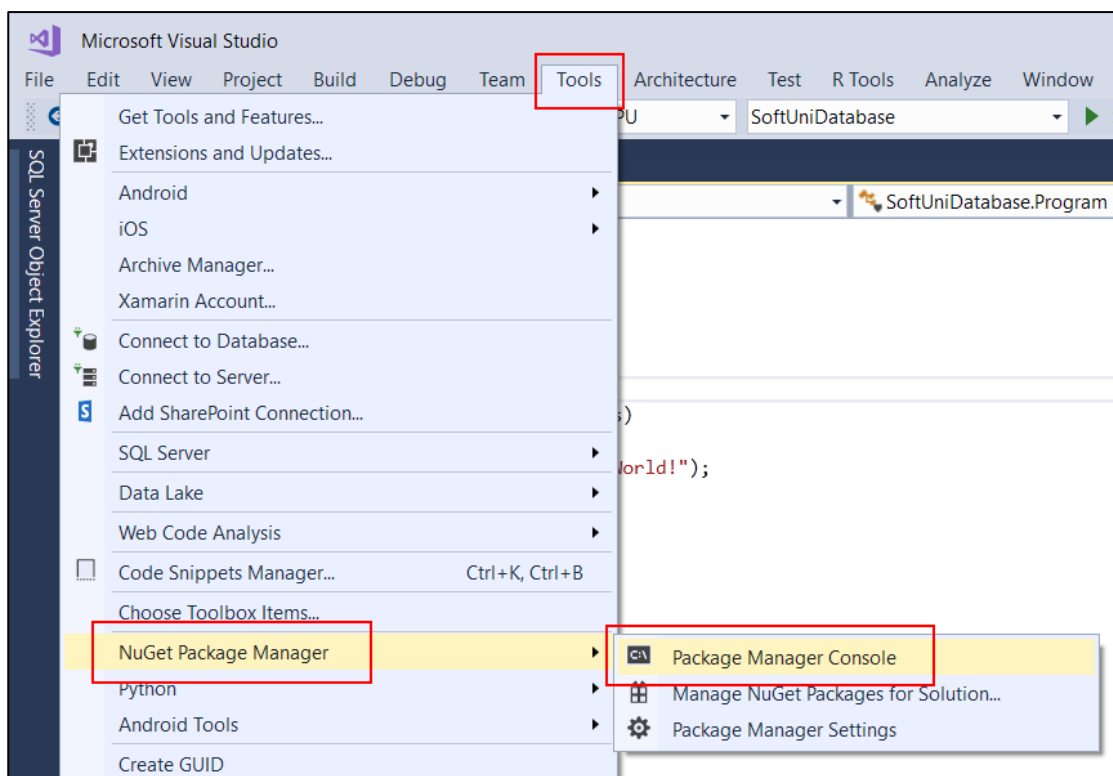
Import the SoftUni database into SQL Management Studio by **executing** the provided **.sql** script.

```
SoftUni-Database...
1  -----
2  -- This script will create a sample database "SoftUni" in      --
3  -- MS SQL Server and will populate sample data in its tables.  --
4  -----
5
6  USE master
7  GO
8
9  CREATE DATABASE SoftUni
10 GO
11
12 USE SoftUni
13 GO
14
15 CREATE TABLE Towns(
16     TownID int IDENTITY NOT NULL,
17     Name VARCHAR(50) NOT NULL,
18     CONSTRAINT PK_Towns PRIMARY KEY CLUSTERED(TownID ASC)
19 )
20 GO
```

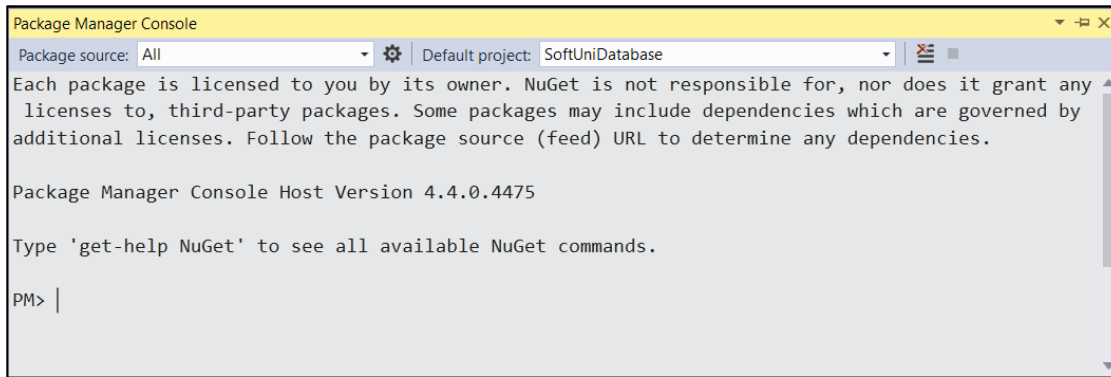
2. Database First

Model the existing database by using Database First.

First create a new empty **.Net Core ConsoleApplication** and after it is created open the **Package Manager Console**:



It will look something like this:



Use it to run the following commands **one by one**:

```
Install-Package Microsoft.EntityFrameworkCore.Tools -v 2.2.0
Install-Package Microsoft.EntityFrameworkCore.SqlServer -v 2.2.0
Install-Package Microsoft.EntityFrameworkCore.SqlServer.Design
```

These are the **packages** you will need, in order to **scaffold** our **SoftUniContext** from the **SoftUni** database.

Next, we must **execute** the **command** to **scaffold** our **context class**. It will consist of 4 things:

- First, the name of the command:

```
Scaffold-DbContext
```

- Second, the connection we will be using (our connection string):

```
-Connection "Server=<ServerName>;Database=<DatabaseName>;Integrated Security=True;"
```

For **ServerName**, use the name of your local MS SQL Server instance or ".".

For **DatabaseName**, use the name of the database you want to use, in this case – **SoftUni**.

- Third, we need to declare our service provider, we'll be using **Microsoft.EntityFrameworkCore.SqlServer**:

```
-Provider Microsoft.EntityFrameworkCore.SqlServer
```

- And the fourth thing we'll do, is to give it a directory where all of our models will go (e.g. **Models**):

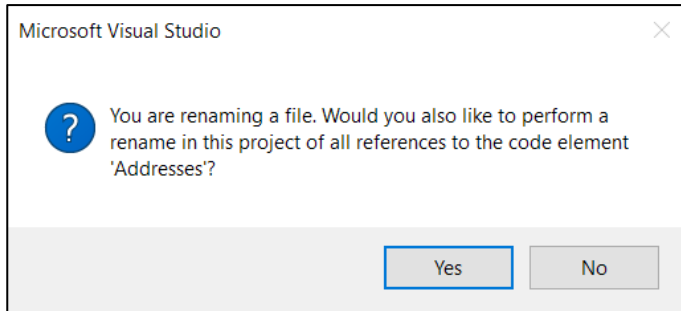
```
-OutputDir Data/Models
```

Our final command will look like this:

```
Scaffold-DbContext -Connection "Server=.;Database=SoftUni;Integrated Security=True;"
-Provider Microsoft.EntityFrameworkCore.SqlServer -OutputDir Data/Models
```

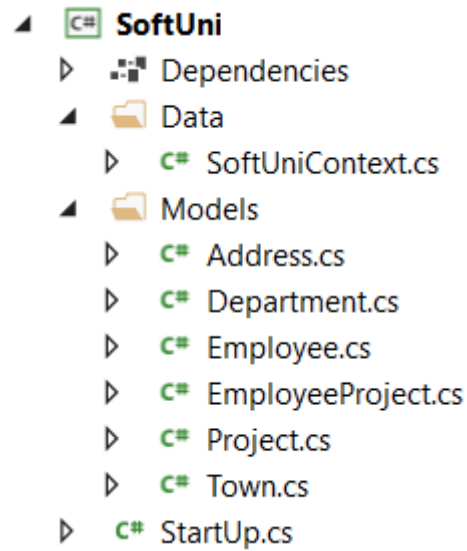
Execute the **whole command** on a **single line**

Entity Framework Core has successfully **mapped the database schema to C# classes**. However, it isn't good enough with names – all classes have been pluralized. Use the **Solution Explorer** in Visual Studio to move the **SoftUniContext** class out of **Models** into the **Data** folder and rename all of our classes properly. Use **right click → Rename** or the **F2** shortcut and press **OK** on this **pop up window** after each class:



This way Visual Studio will also **rename** the **classes everywhere** they're used.

The final result should look like this:



Don't forget to fix the **SoftUniContext's** namespace after moving it and add a reference to the **Models** namespace:

Make sure that your namespaces are **exactly** the same as these:

```
SoftUni
SoftUni.Data
SoftUni.Models
```

Finally, we want to clean up the packages we won't be using anymore from the package manager GUI or by running these commands:

```
Uninstall-Package Microsoft.EntityFrameworkCore.Tools -r
Uninstall-Package Microsoft.EntityFrameworkCore.SqlServer.Design -RemoveDependencies
```

3. Employees Full Information

NOTE: You will need method `public static string GetEmployeesFullInformation(SoftUniContext context)` and `public StartUp` class.

Now we can use the **SoftUniContext** to extract data from our database. Your first task is to extract **all employees** and return their **first**, **last** and **middle** name, their **job title** and **salary**, rounded to **2 symbols** after the decimal separator, all of those separated with a space. Order them by **employee id**.

Example

Output

Guy Gilbert R Production Technician 12500.00
Kevin Brown F Marketing Assistant 13500.00
...

4. Employees with Salary Over 50 000

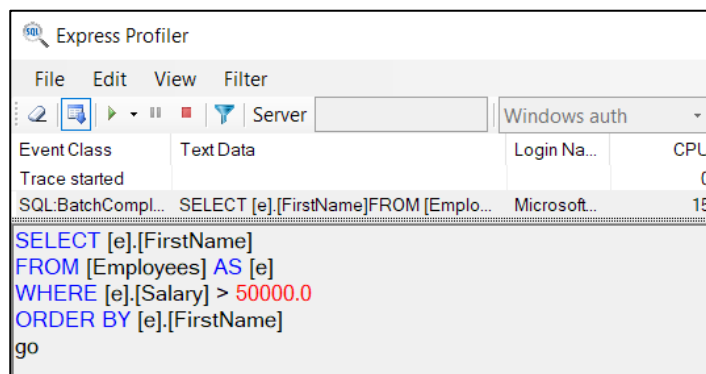
NOTE: You will need method `public static string GetEmployeesWithSalaryOver50000(SoftUniContext context)` and `public Startup` class.

Your task is to extract **all employees** with **salary** over **50000**. Return their **first names and salaries** in format **"{firstName} - {salary}"**. Salary must be rounded to **2 symbols**, after the decimal separator. Sort them **alphabetically** by first name.

Example

Output
Brian - 72100.00
Dylan - 50500.00
...

Use **Express Profiler** and check if the query Entity Framework Core sent is correct (there is only one query, but there may be more that are performed by EF for checks).



5. Employees from Research and Development

NOTE: You will need method `public static string GetEmployeesFromResearchAndDevelopment(SoftUniContext context)` and `public Startup` class.

Extract all employees from the **Research and Development** department. Order them by **salary** (in ascending order), then by **first name** (in descending order). Return only their **first name, last name, department name** and **salary** rounded to **2 symbols**, after the decimal separator in the format shown below:

Example

Output
Gigi Matthew from Research and Development - \$40900.00
Diane Margheim from Research and Development - \$40900.00

...

Use Express Profiler and check if the made query by Entity Framework is correct (there is only one query).

```
SELECT [e].[FirstName], [e].[LastName], [e.Department].[Name] AS [DepartmentName], [e].[Salary]
FROM [Employees] AS [e]
INNER JOIN [Departments] AS [e.Department] ON [e].[DepartmentID] = [e.Department].[DepartmentID]
WHERE [e.Department].[Name] = 'Research and Development'
ORDER BY [e].[Salary], [e].[FirstName] DESC
go
```

6. Adding a New Address and Updating Employee

NOTE: You will need method `public static string AddNewAddressToEmployee(SoftUniContext context)` and `public StartUp` class.

Create a new address with **text "Vitoshka 15"** and **TownId 4**. Set that address to the employee with last name **"Nakov"**.

Then order by **descending** all the employees by their **Address' Id**, take **10** rows and from them, take the **AddressText**. Return the results each on a new line:

Example

Output
Vitoshka 15
163 Nishava Str, ent A, apt. 1
...

After this **restore** your **database** for the tasks ahead!

Hints

Create the address and find the employee with last name equal to **"Nakov"** in order to assign the address to him.

7. Employees and Projects

NOTE: You will need method `public static string GetEmployeesInPeriod(SoftUniContext context)` and `public StartUp` class.

Find the first **10** employees who have **projects** started in the period **2001 - 2003** (inclusive). Print each employee's **first name, last name, manager's first name and last name**. Then return **all** of their **projects** in the format **"--<ProjectName> - <StartDate> - <EndDate>"**, each on a **new row**. If a project has no end date, print **"not finished"** instead.

Constraints

Use date format: **"M/d/yyyy h:mm:ss tt"**.

Example

Output

Guy Gilbert - Manager: Jo Brown
--Half-Finger Gloves - 6/1/2002 12:00:00 AM - 6/1/2003 12:00:00 AM
--Racing Socks - 11/22/2005 12:00:00 AM - not finished
...

8. Addresses by Town

NOTE: You will need method `public static string GetAddressesByTown(SoftUniContext context)` and `public StartUp` class.

Find all addresses, **ordered** by the **number of employees** who live there (**descending**), then by **town name** (**ascending**), and finally by **address text** (**ascending**). Take only the **first 10 addresses**. For each address return it in the format "**<AddressText>, <TownName> - <EmployeeCount> employees**"

Example

Output
163 Nishava Str, ent A, apt. 1, Sofia - 3 employees
7726 Driftwood Drive, Monroe - 2 employees
...

9. Employee 147

NOTE: You will need method `public static string GetEmployee147(SoftUniContext context)` and `public StartUp` class.

Get the **employee with id 147**. Return only his/her **first name**, **last name**, **job title** and **projects** (print only their names). The projects should be **ordered by name** (**ascending**). Format of the output.

Example

Output
Linda Randall - Production Technician
HL Touring Handlebars
...

10. Departments with More Than 5 Employees

NOTE: You will need method `public static string GetDepartmentsWithMoreThan5Employees(SoftUniContext context)` and `public StartUp` class.

Find **all departments** with more than **5 employees**. Order them by **employee count** (**ascending**), then by **department name** (**alphabetically**).

For each department, print the **department name** and the **manager's first and last name** on the **first row**. Then print the **first name**, the **last name** and the **job title** of every **employee** on a new row.

Order the employees by **first name (ascending)**, then by **last name (ascending)**.

Format of the output: For each department print it in the format "<DepartmentName> - <ManagerFirstName> <ManagerLastName>" and for each employee print it in the format "<EmployeeFirstName> <EmployeeFirstLast> - <JobTitle>".

Example

Output
Engineering - Terri Duffy
Gail Erickson - Design Engineer
Jossef Goldberg - Design Engineer
...

11. Find Latest 10 Projects

NOTE: You will need method `public static string GetLatestProjects(SoftUniContext context)` and `public StartUp` class.

Write a program that returns information about the **last 10 started projects**. **Sort them by name** lexicographically and return **their name, description and start date**, each on a new row. Format of the output

Constraints

Use date format: "M/d/yyyy h:mm:ss tt".

Example

Output
All-Purpose Bike Stand Research, design and development of All-Purpose Bike Stand. Perfect all-purpose bike stand for working on your bike at home. Quick-adjusting clamps and steel construction. 9/1/2005 12:00:00 AM
...

12. Increase Salaries

NOTE: You will need method `public static string IncreaseSalaries(SoftUniContext context)` and `public StartUp` class.

Write a program that increase salaries of all employees that are in the **Engineering, Tool Design, Marketing or Information Services** department by **12%**. Then **return first name, last name and salary** (2 symbols after the decimal separator) for those employees whose salary was increased. Order them by **first name (ascending)**, then by **last name (ascending)**. Format of the output.

Example

Output
Ashvini Sharma (\$36400.00)
Dan Bacon (\$30688.00)
...

13. Find Employees by First Name Starting With "Sa"

NOTE: You will need method `public static string GetEmployeesByFirstNameStartingWithSa(SoftUniContext context)` and `public Startup` class.

Write a program that finds all employees whose first name starts with "Sa". Return their **first**, **last name**, their **job title** and **salary**, rounded to **2 symbols** after the decimal separator in the format given in the example below. Order them by **first name**, then by **last name (ascending)**.

Example

Output
Sairaj Uddin - Scheduling Assistant - (\$16000.00)
Samantha Smith - Production Technician - (\$14000.00)
...

14. Delete Project by Id

NOTE: You will need method `public static string DeleteProjectById(SoftUniContext context)` and `public Startup` class.

Let's **delete** the project with id **2**. Then, take 10 projects and return their names, each on a new line. Remember to restore your database after this task.

Example

Output
Classic Vest
Full-Finger Gloves
...

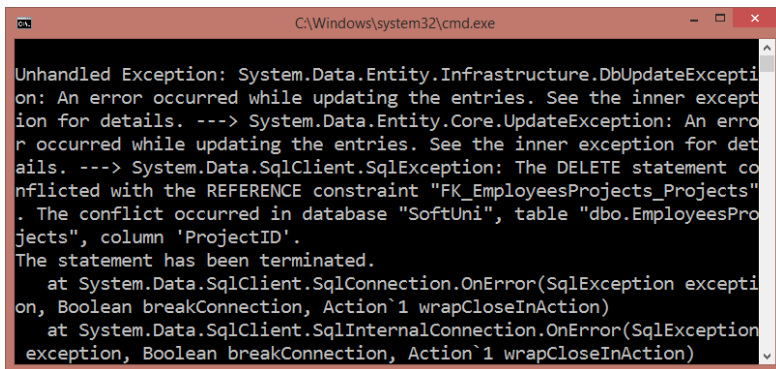
Hints

If we try to delete the project directly:

```
var project = context.Projects.Find(2);
context.Projects.Remove(project);

context.SaveChanges();
```


This happens:



```
C:\Windows\system32\cmd.exe

Unhandled Exception: System.Data.Entity.Infrastructure.DbUpdateException: An error occurred while updating the entries. See the inner exception for details. --> System.Data.Entity.Core.UpdateException: An error occurred while updating the entries. See the inner exception for details. --> System.Data.SqlClient.SqlException: The DELETE statement conflicted with the REFERENCE constraint "FK_EmployeesProjects_Projects". The conflict occurred in database "SoftUni", table "dbo.EmployeesProjects", column 'ProjectID'.
The statement has been terminated.
   at System.Data.SqlClient.SqlConnection.OnError(SqlException exception, Boolean breakConnection, Action`1 wrapCloseInAction)
   at System.Data.SqlClient.SqlInternalConnection.OnError(SqlException exception, Boolean breakConnection, Action`1 wrapCloseInAction)
```

The project is **referenced** by the junction (many-to-many) table **EmployeesProjects**. Therefore we cannot safely delete it. First, we need to remove any references to that row in the **Projects** table.

This is done by removing the project from all employees who reference it.

```
var project = context.Projects.Find(2);
//TODO: Delete project from employees who reference it

context.Projects.Remove(project);

context.SaveChanges();
```

15. Remove Town

NOTE: You will need method `public static string RemoveTown(SoftUniContext context)` and `public Startup` class.

Write a program that **deletes a town** with name „Seattle“. Also, **delete all addresses** that are in those towns. Return the **number of addresses** that were **deleted** in format “{count} addresses in Seattle were deleted“. There will be **employees** living at those addresses, which will be a problem when trying to delete the addresses. So, start by setting the **AddressId** of each employee for the given address to **null**. After all of them are set to null, you may safely remove all the addresses from the **context.Addresses** and finally remove the **given town**.

Example

Output
44 addresses in Seattle were deleted