# Databases Advanced Exam - 4 April 2021

Exam problems for the [Databases Advanced - Entity Framework course @ SoftUni](https://softuni.bg/courses/entity-framework-core). Submit your solutions in the **SoftUni judge** system (delete all "**bin**"/"**obj**" and "**packages**" folders).

**AutoMapper** is **optional**.

Your task is to create a **database application**, using **Entity Framework Core,** using the **Code First** approach. Design the **domain models** and **methods** for manipulating the data, as described below.

# TeisterMask

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## Project Skeleton Overview

You are given a **project skeleton**, which includes the following folders:

* Data - contains the TeisterMaskContext class, Models folder which contains the **entity classes** and the **Configuration** class with **connection string**
* DataProcessor - contains the Serializer and Deserializerclasses, which are used for **importing** and **exporting** data
* Datasets - contains the .json and .xml files for the import part
* ImportResults - contains the **import** results you make in the Deserializer class
* ExportResults - contains the **export** results you make in the Serializer class

## Model Definition (50 pts)

The application needs to store the following data:

### Employee

* Id - integer, Primary Key
* Username - text with length **[3, 40]**. Should contain only **lower** or **upper** case letters and/or **digits**. (**required**)
* Email – text (**required**). Validate it! There is attribute for this job.
* Phone - text. **Consists** **only of three groups** (**separated by '-'), the first two consist of three digits and the last one - of 4 digits.** (**required**)
* EmployeesTasks - collection of type EmployeeTask

### Project

* Id - integer, **Primary Key**
* Name - text with length **[2, 40]** (**required**)
* OpenDate - date and time (**required**)
* **DueDate** - date and time (**can be null**)
* Tasks - collection of type Task

### Task

* Id - integer, **Primary Key**
* Name - text with length **[2, 40]** (**required**)
* OpenDate - date and time (**required**)
* **DueDate** - date and time (**required**)
* ExecutionType - enumeration of type ExecutionType, with possible values **(**ProductBacklog, SprintBacklog, InProgress, Finished**)** (**required**)
* LabelType - enumeration of type LabelType, with possible values **(**Priority, CSharpAdvanced, JavaAdvanced, EntityFramework, Hibernate**)** (**required**)
* ProjectId - integer, foreign key (required)
* Project - Project
* EmployeesTasks - collection of type EmployeeTask

### EmployeeTask

* EmployeeId - integer, Primary Key, foreign key (required)
* Employee - Employee
* TaskId -integer, Primary Key, foreign key (required)
* Task - Task

## Data Import (25pts)

For the functionality of the application, you need to create several methods that manipulate the database. The **project skeleton** already provides you with these methods, inside the Deserializer class. Usage of DataTransferObjects and **AutoMapper** is **optional**.

Use the provided **JSON** and **XML** files to populate the database with data. Import all the information from those files into the database.

You are **not allowed** to modify the provided **JSON** and **XML** files.

**If a record does not meet the requirements from the first section, print an error message:**

|  |
| --- |
| **Error message** |
| Invalid Data! |

### XML Import

#### Import Projects

Using the file **projects.xml**, import the data from the file into the database. Print information about each imported object in the format described below.

##### Constraints

* If there are **any validation errors** for the **project** entity (such as invalid **name** or **open date**), **do not** import any part of the entity and **append an error message** to the **method output**.
* If there are **any validation errors** for the **task** entity (such as invalid **name**, **open** or **due date** are missing, **task open** **date** is before **project open date** or **task due date** is after **project due date**), **do not import it (only the task itself, not the whole project)** and **append an error message to the method output**.

**NOTE**: Dates will be in format **dd/MM/yyyy**, do not forget to use **CultureInfo.InvariantCulture**

|  |
| --- |
| **Success message** |
| Successfully imported project - {**projectName**} with {**tasksCount**} tasks. |

##### Example

|  |
| --- |
| **projects.xml** |
| <?xml version='1.0' encoding='UTF-8'?>  <Projects>  <Project>  <Name>S</Name>  <OpenDate>25/01/2018</OpenDate>  <DueDate>16/08/2019</DueDate>  <Tasks>  <Task>  <Name>Australian</Name>  <OpenDate>19/08/2018</OpenDate>  <DueDate>13/07/2019</DueDate>  <ExecutionType>2</ExecutionType>  <LabelType>0</LabelType>  </Task>  <Task>  <Name>Upland Boneset</Name>  <OpenDate>24/10/2018</OpenDate>  <DueDate>11/06/2019</DueDate>  <ExecutionType>2</ExecutionType>  <LabelType>3</LabelType>  </Task>  </Tasks>  </Project>  ...  </Projects> |
| **Output** |
| **Invalid data!**  **Invalid data!**  **Successfully imported project - America with 2 tasks.**  **Successfully imported project - Hyster-Yale with 10 tasks.**  **Invalid data!**  **Invalid data!**  **Invalid data!**  **Invalid data!**  **...** |

Upon **correct import logic**, you should have imported **42 projects** and **62 tasks**.

### JSON Import

#### Import Employees

Using the file employees.json, import the data from that file into the database. Print information about each imported object in the format described below.

##### Constraints

* If any validation errors occur (such as invalid **username**, **email** or **phone**), **do not** import any part of the entity and **append an error message** to the **method output**.
* Take only the unique tasks.
* If a **task** does **not exist** in the database, **append an error message** to the **method output** and **continue** with the next **task**.

|  |
| --- |
| **Success message** |
| Successfully imported employee - {**employeeUsername**} with {**employeeTasksCount**} tasks. |

##### Example

|  |
| --- |
| **employees.json** |
| [  {  "Username": "jstanett0",  "Email": "kknapper0@opera.com",  "Phone": "819-699-1096",  "Tasks": [  34,  32,  65,  30,  30,  45,  36,  67  ]  },  ...  ] |
| **Output** |
| **Invalid data!**  **Invalid data!**  **Successfully imported employee - jstanett0 with 5 tasks.**  **Invalid data!**  **Invalid data!**  **Invalid data!**  **Invalid data!**  **Successfully imported employee - mmcellen1 with 15 tasks.**  **Invalid data!**  **Invalid data!**  **Successfully imported employee - cmartinho2 with 5 tasks.**  **Successfully imported employee - mdilucia3 with 9 tasks.**  **...** |

Upon **correct import logic**, you should have imported **30** **employees** and **249 employee tasks**.

## Data Export (25 pts)

**Use the provided methods in the** Serializer class**.** Usage of **Data Transfer Objects and AutoMapper** is **optional**.

### JSON Export

#### Export Most Busiest Employees

Select the **top** 10 **employees** who have **at least one task** that **its open date** is **after or equal** to the **given date** with their **tasks** that meet the same requirement (to have their open date after or equal to the giver date). For each **employee**, export their **username** and their **tasks.** For each **task**, export its **name** and **open date** (**must** be in format "**d**"), **due date** (**must** be in format "**d**"), **label** and **execution** type**.** Order the **tasks** by **due date** (**descending**), then by **name** (**ascending**). Order the **employees** by **all** **tasks** (**meeting above condition**) **count** (**descending**), then by **username** (**ascending**).

**NOTE**: Do not forget to use **CultureInfo.InvariantCulture.** You **may** need to **call** **.ToArray()** function **before the selection** in order to **detach entities from the database** and **avoid runtime errors** (**EF Core bug**).

##### Example

|  |
| --- |
| Serializer.ExportMostBusiestEmployees(context, date) |
| [  {  "Username": "mmcellen1",  "Tasks": [  {  "TaskName": "Pointed Gourd",  "OpenDate": "10/08/2018",  "DueDate": "10/24/2019",  "LabelType": "Priority",  "ExecutionType": "ProductBacklog"  },  {  "TaskName": "Columbian",  "OpenDate": "10/24/2018",  "DueDate": "10/20/2019",  "LabelType": "Hibernate",  "ExecutionType": "InProgress"  },  {  "TaskName": "Cornflag",  "OpenDate": "09/27/2018",  "DueDate": "09/25/2019",  "LabelType": "CSharpAdvanced",  "ExecutionType": "SprintBacklog"  },  {  "TaskName": "Charleston Mousetail",  "OpenDate": "08/10/2018",  "DueDate": "07/07/2019",  "LabelType": "Hibernate",  "ExecutionType": "ProductBacklog"  },  {  "TaskName": "California Dwarf-flax",  "OpenDate": "10/01/2018",  "DueDate": "06/01/2019",  "LabelType": "Hibernate",  "ExecutionType": "Finished"  },  {  "TaskName": "Digitgrass",  "OpenDate": "06/02/2018",  "DueDate": "05/18/2019",  "LabelType": "EntityFramework",  "ExecutionType": "ProductBacklog"  },  {  "TaskName": "Hairy Mountain Mahogany",  "OpenDate": "09/21/2018",  "DueDate": "04/29/2019",  "LabelType": "Priority",  "ExecutionType": "SprintBacklog"  },  {  "TaskName": "White",  "OpenDate": "10/04/2018",  "DueDate": "04/21/2019",  "LabelType": "Hibernate",  "ExecutionType": "SprintBacklog"  },  {  "TaskName": "Bryum",  "OpenDate": "11/02/2018",  "DueDate": "01/19/2019",  "LabelType": "EntityFramework",  "ExecutionType": "ProductBacklog"  },  {  "TaskName": "American Star-thistle",  "OpenDate": "09/21/2018",  "DueDate": "11/29/2018",  "LabelType": "CSharpAdvanced",  "ExecutionType": "ProductBacklog"  },  {  "TaskName": "Wirestem Buckwheat",  "OpenDate": "04/13/2018",  "DueDate": "11/22/2018",  "LabelType": "Hibernate",  "ExecutionType": "InProgress"  },  {  "TaskName": "Spreading Sandwort",  "OpenDate": "02/19/2018",  "DueDate": "11/20/2018",  "LabelType": "Hibernate",  "ExecutionType": "InProgress"  },  {  "TaskName": "Cypress Panicgrass",  "OpenDate": "10/19/2018",  "DueDate": "11/17/2018",  "LabelType": "EntityFramework",  "ExecutionType": "InProgress"  },  {  "TaskName": "Calophyllum",  "OpenDate": "10/09/2018",  "DueDate": "11/15/2018",  "LabelType": "CSharpAdvanced",  "ExecutionType": "InProgress"  }  ]  },  ...  ] |

### XML Export

#### Export Projects with Their Tasks

Export all **projects** that have at least **one** task. For each **project**, export its **name**, **tasks count**, and if it **has end (due) date** which is represented like "**Yes**" and "**No**"**.** For each **task**, export its **name** and **label type.** Order the **tasks** by **name** (**ascending**). Order the **projects** by **tasks count** (**descending**), then by **name** (**ascending**).

**NOTE**: You **may** need to **call** **.ToArray()** function **before the selection** in order to **detach entities from the database** and **avoid runtime errors** (**EF Core bug**).

##### Example

|  |
| --- |
| **Serializer.ExportProjectWithTheirTasks(context)** |
| <?xml version="1.0" encoding="utf-16"?>  <Projects>  <Project TasksCount="10">  <ProjectName>Hyster-Yale</ProjectName>  <HasEndDate>No</HasEndDate>  <Tasks>  <Task>  <Name>Broadleaf</Name>  <Label>JavaAdvanced</Label>  </Task>  <Task>  <Name>Bryum</Name>  <Label>EntityFramework</Label>  </Task>  <Task>  <Name>Cornflag</Name>  <Label>CSharpAdvanced</Label>  </Task>  <Task>  <Name>Crandall</Name>  <Label>Priority</Label>  </Task>  <Task>  <Name>Debeque</Name>  <Label>JavaAdvanced</Label>  </Task>  <Task>  <Name>Guadalupe</Name>  <Label>JavaAdvanced</Label>  </Task>  <Task>  <Name>Guadeloupe</Name>  <Label>JavaAdvanced</Label>  </Task>  <Task>  <Name>Longbract Pohlia Moss</Name>  <Label>EntityFramework</Label>  </Task>  <Task>  <Name>Meyen's Sedge</Name>  <Label>EntityFramework</Label>  </Task>  <Task>  <Name>Pacific</Name>  <Label>Priority</Label>  </Task>  </Tasks>  </Project>  ...  </Projects> |