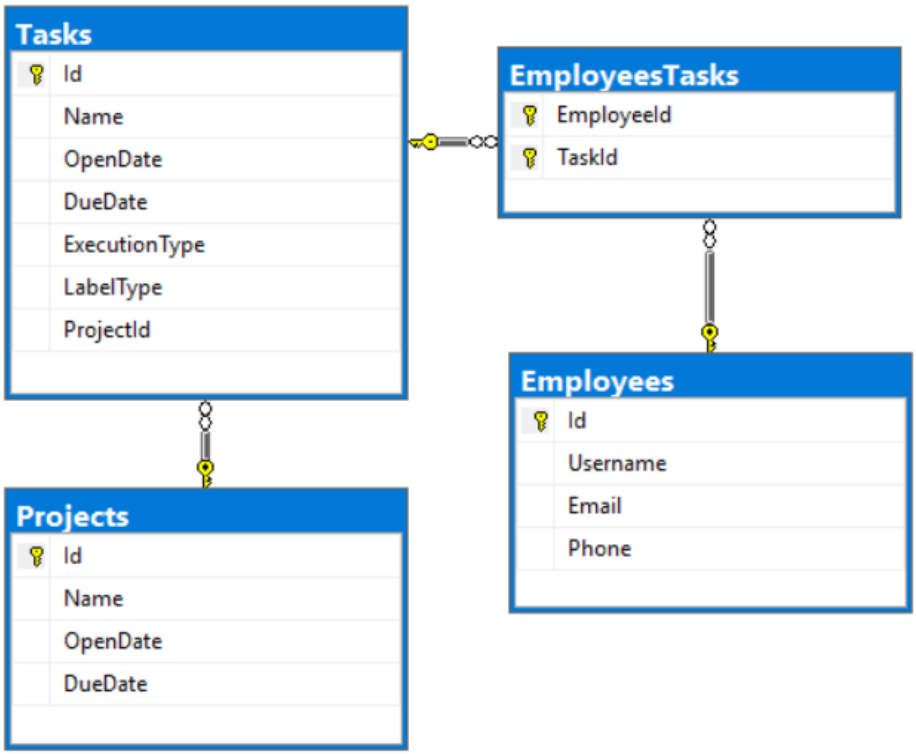
# Databases Advanced Exam

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

**Automapper** is not allowed.

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




## 1. 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 **`Deserializer`** classes, which are used for **importing** and **exporting** data
- **`Datasets`** - contains the **`.json`** and **`.xml`** files for the import part
- **`ImportResults`** - contains the **export** results you make in the **`Deserializer`** class
- **`ExportResults`** - contains the **import** results you make in the **`Serializer`** class

## 2. 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**

## 3. 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 **Data Transfer Objects** 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 **214 employee tasks**.

# 4. Data Export (25 pts)

Use the provided methods in the **`Serializer`** class. Usage of **Data Transfer Objects** 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 count** (**descending**), then by **username** (**ascending**).

**NOTE**: Do not forget to use **`CultureInfo.InvariantCulture`**

#### 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**).

### 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>
```