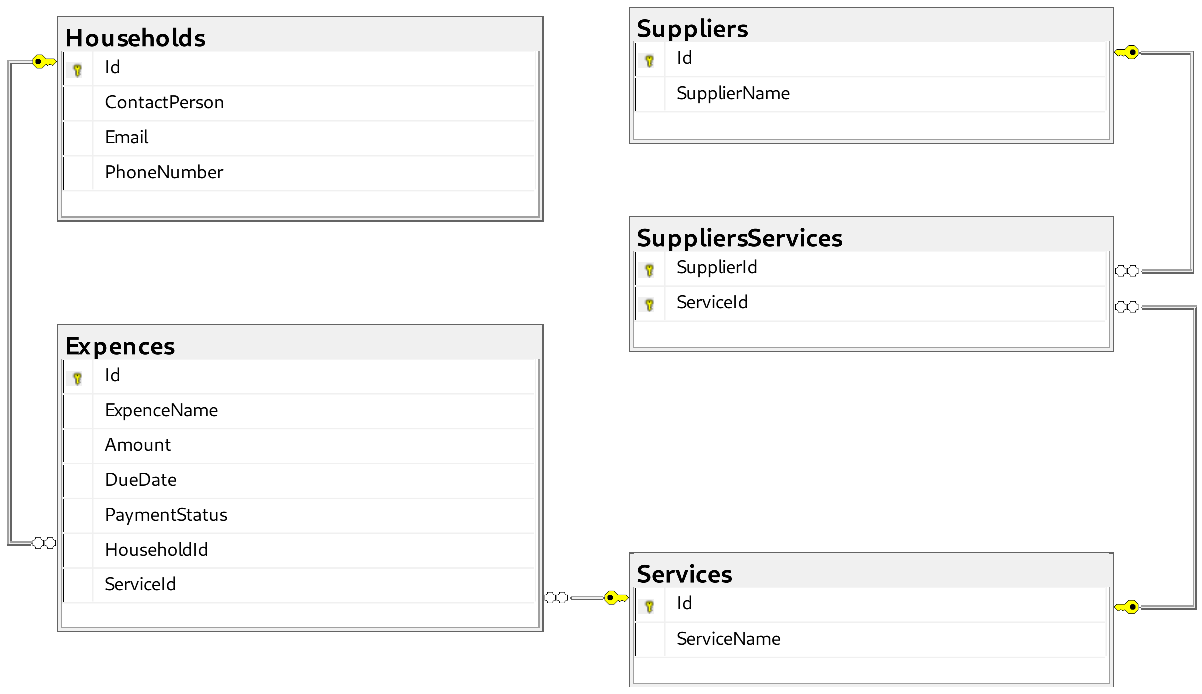
Entity Framework Core – Exam Prep II

Submit your solutions in the **SoftUni Judge** system (delete all **bin/obj** and **packages** folders) here.

Before submitting your solutions in the **SoftUni Judge** system, delete all **bin/obj** and **packages** folders. If the **zip** file is still too large, you can delete the **ImportResults**, **ExportsResults** and **Datasets** folders too.

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.

NetPay



1. Project Skeleton Overview

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

- **Data** – contains the **NetPayContext** class, **Models** folder, which contains the **entity classes** and the **Configuration** class with the **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 **import** results you make in the **Deserializer** class
- **ExportResults** – contains the **export** results you make in the **Serializer** class

2. Model Definition (60 pts)

The application needs to store the following data:

Household

- **Id** – **integer**, **Primary Key**
- **ContactPerson - text** with length **[5, 50] (required)**
- **Email** – **text** with length **[6, 80] (not required)**
- **PhoneNumber** – **text** with **length 15. (required)**
    - The phone number must **start with a plus sign**, followed by **exactly three digits** for the country code, a **slash**, **exactly three digits** for the area or service provider code, a **dash**, and **exactly six digits** for the subscriber number:
        - Example -> **+144/123-123456**
        - **Use** the following string **for** correct **validation**: @"^\+\d{3}/\d{3}-\d{6}$"
- **Expenses -** a collection of type **Expense**

Expense

- **Id** – **integer**, **Primary Key**
- **ExpenseName – text** with length **[5, 50] (required)**
- **Amount -** a **decimal value** in the **range [0.01, 100 000]**(**required**)
- **DueDate - DateTime (required)**
- **PaymentStatus – PaymentStatus enum (Paid = 1, Unpaid, Overdue, Expired) (required)**
- **HouseholdId - integer**, **foreign key (required)**
- **Household – Household**
- **ServiceId - integer**, **foreign key (required)**
- **Service - Service**

Service

- **Id** – integer, **Primary Key**
- **ServiceName – text** with length **[5, 30] (required)**
- **Expenses -** a collection of type **Expense**
- **SuppliersServices -** collection of type **SupplierService**

Supplier

- **Id** – integer, **Primary Key**
- **SupplierName** – **text** with length **[3, 60]** (**required**)
- **SuppliersServices -** collection of type **SupplierService**

SupplierService

- **SupplierId – integer, Primary Key, foreign key (required)**
- **Supplier – Supplier**
- **ServiceId – integer, Primary Key, foreign key (required)**
- **Service – Service**

3. Data Import (20pts)

To ensure the application's functionality, it is essential to **populate the database with initial data**. Inside the **DbContext class**, you will find a **commented-out section** specifically designed for seeding data.
Before applying migrations and updating the database, please **uncomment this section**.

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

Use the provided **JSON** and **XML** files to populate the database with data. **Import all the valid information** from the 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 format!

If some data appears to be duplicated, do not import the entity, print a duplication data message:

Error message
Error! Data duplicated.

XML Import

Import Households

Using the file "**households.xml"**, **import the data from the file** into the database.

Each imported **household should be validated** and **added to the database if it meets the specified criteria**. The method should **return a string containing information about each import attempt**, formatted as described.

Constraints

- **Validation of Households Entities** - Each household entity must be validated against the following criteria:
    - **ContactPerson** – Must meet the constraints for the property, described above
    - **Email** – Must meet the constraints for the property, described above
    - **PhoneNumber** - Must meet the constraints for the property, described above
- If **any validation error occurs** for a household entity, the **entity should not be imported**, and an
  error message should be appended to the method's output.
- **Duplication Check** - Before adding an entity to the database**,**
  ensure there are no existing records with the same:
    - **ContactPerson** OR **Email** OR **PhoneNumber**
- If **any of these fields match an existing record**, the **household entity should not be imported**, and a **duplication error message should be appended** to the method's output

- **Success Messages**
  - For **each successfully imported household**, append a **success message** to the output, formatted as **Successfully imported household. Contact person: {contactPerson}**
- **Data Persistence**
  - After processing all households from the XML file, **add the valid household entities** to the proper collection
  - **Save the changes** to the database

Success message
Successfully imported household. Contact person: {**contactPerson**}

Example

households.xml

```xml
<?xml version="1.0" encoding="utf-8" ?>
<Households>
    <Household phone="+144/123-123456">
        <ContactPerson>Alexander Ivanov</ContactPerson>
        <Email>alexander.ivanov@example.com</Email>
    </Household>
    <Household phone="+144/124-123457">
        <ContactPerson>Vasil Dimitrov</ContactPerson>
        <Email>vasil.dimitrov@example.com</Email>
    </Household>
    <Household phone="+166/124-166457">
        <ContactPerson>Dimi</ContactPerson>
        <Email>tooShortName@example.com</Email>
    </Household>
    <Household phone="+199/124-166457">
        <ContactPerson>TooLongName
ThatWillNotBeInsertedDueToLenghtDatabaseConstarints</ContactPerson>
        <Email>v.dimitrova@example.com</Email>
    </Household>
...
</Households>
```

Output

```
Successfully imported household. Contact person: Alexander Ivanov
Successfully imported household. Contact person: Vasil Dimitrov
Invalid data format!
Invalid data format!
Successfully imported household. Contact person: Georgi Nikolov
...
```

Upon **correct import logic**, you should have imported **44 records**

JSON Import

Import Expenses

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

Constraints

- If any of the required properties is missing, **do not** import any part of the entity and **append an error message** to the **method output**.

- **If any foreign key leads to an inexisting record valid record, do not** import any part of the entity and **append an error message** to the **method output**.
- If **any validation error occurs** for the **expense** entity (**invalid name, amount, date** OR **payment status**), **do not** import any part of the entity and **append an error message** to the **method output**.
  - The **DateTime data** in the document will be in the following format: "yyyy-MM-dd"
  - Make sure you use **CultureInfo.InvariantCulture**
- All records in **"expenses.json"** are guaranteed to be **unique**
- To receive the **correct Success message**, remember to **format the Amount value** to the
second decimal place.

Success message
Successfully imported expense – {**expenseName**}, Amount: {**amount:F2**}

Example

expenses.json

```
[
  {
   "ExpenseName": "Electricity Home",
   "Amount": 120.50,
   "DueDate": "2024-08-25T00:00:00",
   "PaymentStatus": "Unpaid",
   "HouseholdId": 1,
   "ServiceId": 1
  },
  {
   "ExpenseName": "Water Home",
   "Amount": 50.50,
   "DueDate": "2024-08-20T00:00:00",
   "PaymentStatus": "Unpaid",
   "HouseholdId": 1,
   "ServiceId": 2
  },
  {
   "ExpenseName": "Internet Home",
   "Amount": 40.00,
   "DueDate": "2024-08-25T00:00:00",
   "PaymentStatus": "Not Paid",
   "HouseholdId": 1,
   "ServiceId": 3
  },
  {
   "ExpenseName": "Internet Office",
   "Amount": 70.00,
   "DueDate": "2024-08-15T00:00:00",
   "PaymentStatus": "Paid",
   "HouseholdId": 2,
   "ServiceId": 3
  },
...
]
```

Output

```
Successfully imported expense. Electricity Home, Amount: 120.50
Successfully imported expense. Water Home, Amount: 50.50
Invalid data format!
Successfully imported expense. Internet Office, Amount: 70.00
Successfully imported expense. Water Summer House, Amount: 10.50
Successfully imported expense. Security Home, Amount: 50.00
Invalid data format!
...
```

Upon **correct import logic**, you should have imported **105 records**

4. Data Export (20 pts)

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

XML Export

Export Households Which Have Expenses To Pay

Export **all households** which have **at least one expense** with a **payment status different from "Paid"**. The households should be **exported with all their expenses that are NOT "Paid"**.
The exported **data should be in XML format**.
Order the **households alphabetically** by their **contact person**. Within each household, **order the expenses** by **payment date in ascending order** and by **amount in ascending order** if dates are the same.

Data Fields

- **Household**:
  - **ContactPerson**: Export the contact person of the household
  - **Email**: Export the email of the household
  - **PhoneNumber**: Export the phone number of the household
  - A collection of **Expenses**
- **Expense:**
  - **ExpenseName**: Export the name of the expense
  - **Amount**: Export the amount of the expense, **formatted** to the second decimal place
  - **PaymentDate**: Export the due date of the expense
  - **ServiceName**: Export the name of the service

Expected XML Output:

- The root element should be **<Households>**
- Each household should be represented by a **<Household>** element
- Each expense should be represented by an **<Expense>** element within its associated household

Example

ExportHouseholdsWhichHaveExpensesToPay(context)

```
<?xml version="1.0" encoding="utf-16"?>
<Households>
  <Household>
    <ContactPerson>Alexander Ivanov</ContactPerson>
    <Email>alexander.ivanov@example.com</Email>
    <PhoneNumber>+144/123-123456</PhoneNumber>
    <Expenses>
      <Expense>
      <ExpenseName>Water Home</ExpenseName>
      <Amount>50.50</Amount>
      <PaymentDate>2024-08-20</PaymentDate>
      <ServiceName>Water</ServiceName>
    </Expense>
    <Expense>
      <ExpenseName>Electricity Home</ExpenseName>
      <Amount>120.50</Amount>
      <PaymentDate>2024-08-25</PaymentDate>
      <ServiceName>Electricity</ServiceName>
    </Expense>
  </Expenses>
 </Household>
 <Household>
  <ContactPerson>Anton Kolev</ContactPerson>
  <Email>anton.kolev@example.com</Email>
  <PhoneNumber>+144/123-126786</PhoneNumber>
  <Expenses>
    <Expense>
      <ExpenseName>Water Summer House</ExpenseName>
      <Amount>10.50</Amount>
      <PaymentDate>2024-07-20</PaymentDate>
      <ServiceName>Water</ServiceName>
    </Expense>
  </Expenses>
 </Household>
...
<Households>
```

JSON Export

All Services With Suppliers

Export **all services** along **with their associated suppliers**. The exported **data** should be in **JSON format** and adhere to the following specifications:

- **Selection Criteria**:
  - Select all services.
  - For each service, export its name.
  - For each service, include all suppliers that provide the service
- **Data Fields**:
  - **Service**:
    - **ServiceName**: The name of the service.
  - **Supplier**:
    - **SupplierName**: The name of the supplier.
- **Ordering:**
  - Order **services alphabetically** by ServiceName.
  - For each service, order the **suppliers alphabetically** by SupplierName**)**

Example

ExportServicesWithSuppliers(context)

`[`
` {`
`  "ServiceName": "Electricity",`
`  "Suppliers": [`
`   {`
`    "SupplierName": "E-Service"`
`   },`

```
      {
        "SupplierName": "Energy-PRO"
      },
      {
        "SupplierName": "Light"
      },
      {
        "SupplierName": "ZEC"
      }
    ]
  },
  {
    "ServiceName": "Gas",
    "Suppliers": [
      {
        "SupplierName": "BlueHome"
      },
      {
        "SupplierName": "GasGas"
      }
    ]
  },
...
]
```