Program:	**CPA3-4**
Course:	**INFO-3138**
Professor:	**Tony Haworth**
Project:	**#2 – Global Economies**
Due Date:	**Friday, July 29th, 2022 <u>by 11:59 pm</u>**
Last Update:	**June 30th, 2022**

To be completed either individually, or with one other student!

Description

Code a C# console (.NET Core) application that uses an XML file (*global_economies.xml*) for data storage and generates parameterized reports based on user inputs. The XML file contains economic data (inflation, interest rates, unemployment) for countries and regions around the globe for all years from 1970 up to 2021. The data are from https://www.kaggle.com/datasets/prasertk/inflation-interest-and-unemployment-rate?resource=download. Your users should be able to view two types of tabular reports: all types of economic information for a selected region or a specific metric (type of economic information) for all regions. Regardless of the type of report selected, due to screen-space limitations all reports generated will be limited to a range of years. The specific range of years should be selected by the user. After completing this project, you should be able to apply the DOM and XPath to navigate and retrieve information from an XML document tree.

Requirements

Create a Windows C# console (.NET Core) program that does the following:

1. Displays an appropriate title

2. Displays a main menu of the following options for the user to choose from:
    a. Select a limited range of years (maximum of 5) to include in the reports of either type below
    b. Generate a report of all types of economic data for a user-selected region
    c. Generate a report of a user-selected type of economic information for all regions
    d. Exit the program

3. Obtains the user's main menu selection

4. If the user elects to set the years for the reports, prompts them for a *starting-year* (≥ 1970 and ≤ 2021) and an *ending-year* (≥ *starting-year* and ≤ 2021 and < *starting-year* + 5). Note that due to screen space limitations, the report should show a maximum of 5 consecutive years of economic data. User inputs should be validated to ensure they are within range! <u>You should set *starting-year* and *ending-year* to default values (such as 2017 and 2021 respectively) when the program launches so that a report can be generated even if the user doesn't adjust these values.</u>

5. If the user elects to generate a report:

    a. Obtains an input value from the user for the parameter of the selected report as follows:

Report Type	Prompt Should Include…	User Inputs
For a region	A numbered menu of all regions listed in the XML file (see Figure 2)	A valid region number
For a metric (a type of economic information)	A numbered menu of all the types of economic information listed in the XML file (see Figure 3)	A valid metric number

    Again, user inputs should be validated to ensure they are within range!

    b. Generates a report in the console window for the selected report type and input parameters. The report should include:

        i.   An appropriate title that includes any additional information required to interpret the report such as the report type and the selected region or economic metric

    b. Appropriate column labels

    c. Values organized into neat columns as follows:

Report Type	Columns Required
For a region	First column shows the metric label (type of economic information) such as "Inflation (CPI)", with one metric label per row. Each remaining column shows the value for the specified metric from the first column of the row, for a specific year.
For an economic metric	First column shows the region name, with one region name per row. Each remaining column shows the value for the specified region from the first column of the row, for a specific year.

IMPORTANT: The XML data set is incomplete such that some regions are missing data for some metrics in some years. If a region is missing the requested data for a column in a report just print a '-' (hyphen) character!

    Note that your report columns should be formatted neatly such that:
    - No line exceeds 100 characters in length (if necessary you can slightly truncate the region name in the first column, for the second report type)
    - Numbers are rounded to two decimal places (as they are in the XML file)
    - Columns are consistently aligned/justified

    Note also that you are <u>not</u> expected to sort the table rows.

6. After the user's selection from the main menu is processed the program should display the menu again and allow the user to select another option. This should continue until the user elects to exit the program.

Additional Non-Functional Requirements

1. Your program must use the DOM to load the XML document tree from the XML file, and it must use <u>XPath</u> for each of the following:

    a. To obtain the names of all the regions included in the XML file so that a numbered menu of regions can be displayed (for the first report type)

    b. To obtain the metrics (labels for the different types of economic information) from the "labels" element of the XML file so that a numbered menu of metrics can be displayed (for the second report type)

    c. To get descriptions for each metric from the "labels" element of the XML file for the first column of a report for a selected region

    d. To get names for each region for the first column of a report for a specified metric

    e. To obtain any data from the XML file that are needed to generate rows for any report

2. Your program must use the XML data file in the form provided <u>without modifications</u>.

3. Your program should handle any *IOException, XmlException* or *XPathException* that could be generated.

Sample Output

```
World Economic Data
===================

'Y' to adjust the range of years (currently 2017 to 2021)
'R' to print a regional summary
'M' to print a specific metric for all regions
'X' to exit the program
Your selection: Y

Starting year (1970 to 2021): 1980

Ending year (1970 to 2021): 1970
ERROR: Ending year must be an integer between 1980 and 1984.

Ending year (1970 to 2021): 1983
```

Figure 1 – Adjusting the range of years to use in the reports

```
World Economic Data
===================

'Y' to adjust the range of years (currently 1980 to 1983)
'R' to print a regional summary
'M' to print a specific metric for all regions
'X' to exit the program
Your selection: r

Select a region by number as shown below...
  1. Afghanistan
  2. Africa Eastern and Southern
       Due to the extreme length of the list a large section has been left out from this screen capture.
264. Yemen, Rep.
265. Zambia
266. Zimbabwe

Enter a region #: 39

Economic Information for Canada
-------------------------------

         Economic Metric    1980    1981    1982    1983

            Inflation CPI   10.13   12.47   10.77    5.86
            Inflation GDP       -       -       -       -
          Real Interest %       -       -       -       -
        Lending Interest %   14.25   19.29   15.81   11.17
        Deposit Interest %   11.52   15.96   12.92    7.33
        Unemployment NTL %    7.54    7.61   11.04   12.02
        Unemployment IPO %       -       -       -       -
```

Figure 2 - Report for a selected region

```
World Economic Data
===================

'Y' to adjust the range of years (currently 1980 to 1983)
'R' to print a regional summary
'M' to print a specific metric for all regions
'X' to exit the program
Your selection: m

Select a metric by number as shown below...
  1. Inflation CPI
  2. Inflation GDP
  3. Real Interest %
  4. Lending Interest %
  5. Deposit Interest %
  6. Unemployment NTL %
  7. Unemployment IPO %

Enter a metric #: 2

Inflation GDP By Region
-----------------------

                          Region    1980    1981    1982    1983

                     Afghanistan       -       -       -       -
    Africa Eastern and Southern   19.21   10.85    7.70   11.56
    Africa Western and Central    11.98   10.63   13.82    9.93
       Due to the extreme length of the list a large section has been left out from this screen capture.
                          Zambia   11.76    7.16    6.14   18.63
                        Zimbabwe   12.74    6.60    3.86  -10.50
```

Figure 3 - Report for a selected metric

```
World Economic Data
===================

'Y' to adjust the range of years (currently 1980 to 1983)
'R' to print a regional summary
'M' to print a specific metric for all regions
'X' to exit the program
Your selection: X

All done!
```

Figure 4 – Exiting the program

Grading Scheme

Item	Marks
Handles all exceptions of the following types: *IOException, XmlException, XPathException*	2
Program title and menu option selection by user, allows repeated selections	1
Setting the range of years based on user input, with input validation	2
Report for a selected region: • Region selection by user, including a menu of numbered regions generated using XPath and including input validation	5
• Report title, columns labels, required formatting (e.g. maximum width = 100 characters) First column values (economic metric descriptions) are obtained from the *labels* element of the XML file using XPath	5
• Report data is obtained using XPath, is complete and is correct	10
Report for a selected economic metric: • Metric selection by user, including a menu of numbered metrics generated using XPath and including input validation	5
• Report title, columns labels, required formatting (e.g. maximum width = 100 characters) First column values (region names) are obtained from the *region* elements of the XML file using XPath	5
• Report data obtained using XPath, complete and correct	10
Deduction if the path information for the XML file needs to be corrected in the code!	-5
TOTAL	45

Submit

Via the link on the *Project 2* dropbox in FanshaweOnline an archive (ZIP) file of your cleaned Visual Studio solution including the XML data file

Submit your project on time!

The late submission policy for this project is that you will lose 10% if your project is less than 1 day (< 24 hours) late. You will lose an additional 10% for each additional day up to a maximum of 5 days or 50%. Projects received later than five days after the submission deadline won't receive any marks.

Submit your own work and *keep it to yourself*!

You must not submit code written by another student or obtained from another source. You must not share your code with another student. These activities are academic offenses. If you cheat, you may get a mark of zero. Repeat offenses carry even more severe penalties such as receiving an F grade or being expelled. However, students *are* encouraged to share ideas and to work together on practice

exercises since this enhances the learning process. Just make sure to submit your own code and benefit from having made the effort on your own!

Project Corrections

If any corrections or changes are necessary they will be posted to the course web site and you will be notified of any changes in class. It is your responsibility to check the site periodically for changes to the project. Additional resources relating to the project may also be posted.