

Curtin University – Discipline of Computing

Program Design & Implementation (COMP1007/5011)

Assignment – Semester 1, 2022

**Assignment Due: Sunday 22 May 2022 at 23:59PM
(Perth time).**

Assignment Outcomes

Upon successful completion of this assignment, you will be able to:

- Design a solution to a given problem using pseudocode;
COMP1007 ULO 2, 3, 4 / COMP5011 ULO 1, 3, 4.
- Identify the datatypes required within the designed solution;
COMP1007 ULO 1, 2, 4 / COMP5011 ULO 1, 2, 3, 4.
- Create simple classes to aid in the designed solution;
COMP1007 ULO 2, 4 / COMP5011 ULO 2, 3, 4.
- Use programming skills to implement your design in Java; and
COMP1007 ULO 1, 2, 3, 4 / COMP5011 ULO 1, 2, 3.
- Construct well-structured and documented Java code.
COMP1007 ULO 1, 2, 3, 4, 5 / COMP5011 ULO 1, 2, 3, 4.
- **COMP5011 only:** communicate design decisions appropriately.
COMP5011 ULO 4.

Program Description

This assignment forms a major part of the assessment (up to 30%) for the Program Design and Implementation unit. Please keep up-to-date with announcements on Blackboard to ensure that all that is required is submitted at the appropriate time.

Please read this document carefully, as extensions will not be granted due to the misreading of this document. If you are unsure of something, please contact the teaching staff for clarification.

Background

Different organisations throughout the world make large amounts of data publicly accessible for free – what is commonly known as “open data”. The Joint Research Centre (JRC) of the European Commission is one such organisation, with a current project gathering information regarding the spread of COVID-19. To find out more about this project, please visit the following GitHub repository (<https://github.com/ec-jrc/COVID-19>).

One of the outputs of this project is a dataset detailing the active and historical cases of COVID-19 by country and category (available for download at [this link](#)). The dataset is updated frequently (you can see daily updates in the repository) and contains the volumes of cases over time.

The Big Picture

In this assignment, you will design (using pseudocode) and implement (using Java) a program that will allow users to interrogate a cleaned subset of the data to understand the spread of COVID-19 throughout the world. In the real world, we may wish to understand all (or most) of the data attributes (i.e. ‘columns’) and records (i.e. ‘rows’) in the dataset and keep the data up to date each day. However, there is no need to worry; you can relax, we won’t need to go this far. You will only need to use the specified extract.

There is a lot of data in the file which can be analysed. An important thing to know is that there

are six different continents where countries can be located within (with notations in brackets):

- Asia (AS);
- Europe (EU);
- Africa (AF);
- South America (SA);
- North America (NA);
- Oceania (OC).

For this assignment, the other important breakdowns are by country and date.

Your program will create knowledge by generating statistics in response to user requests, using the data within the provided .csv file. The data will need to be processed through the creation of objects and then the appropriate calculations performed.

The Tasks

The following details the tasks that form the basis of the assignment. *Please continue to the next page to read the tasks.*

1. The Data

Here is a screen capture showing a sample of the data that is in the .csv file to be processed. The data will be extracted from the file and loaded into your program for processing.

Note: the data file you have been provided with has been modified, with some data (columns and rows) removed and column names changed. Hence, if you go to the JRC GitHub repository listed above and download a more up-to-date version, you will need to either delete several columns or ignore them when you process the data.

Date	iso3	Continent	CountryName	lat	lon	CumulativePositive	CumulativeDeceased	CumulativeRecovered	CurrentlyPositive	Hospitalized	IntensiveCare	NUTS
31/1/2021	AFG	AS	Afghanistan	33.930445	67.678945	55023	2400		52623			AF
31/1/2021	ALB	EU	Albania	41.156986	20.181222	78127	1380	47424	29323	324	19	AL
31/1/2021	DZA	AF	Algeria	28.026875	1.65284	107122	2888		104234			DZ
31/1/2021	AND	EU	Andorra	42.542268	1.596865	9937	101		9836	44		AD
31/1/2021	AGO	AF	Angola	-11.209451	17.880669	19782	464		19318			AO
31/1/2021	AIA	NA	Anguilla	18.225119	-63.07213	17	0		17			AI
31/1/2021	ATG	NA	Antigua and Barbuda	17.363183	-61.789423	218	7		211			AG
31/1/2021	ARG	SA	Argentina	-38.421295	-63.587403	1915362	47775		1867587			AR
31/1/2021	ARM	AS	Armenia	40.066181	45.111108	167026	3080		163946			AM
31/1/2021	ABW	NA	Aruba	12.517713	-69.965112	6858	58		6800			AW
31/1/2021	AUS	OC	Australia	-26.853388	133.275154	28806	909		27897			AU
31/1/2021	AUT	EU	Austria	47.697542	13.349319	411921	7710	383153	21058	1387	297	AT
31/1/2021	AUT	EU	Austria	47.697542	13.349319	411513	7850	383158	20505			AT
31/1/2021	AZE	AS	Azerbaijan	40.147396	47.572098	229935	3119		226816			AZ
31/1/2021	BHS	NA	Bahamas	24.885993	-76.709892	8174	176		7998			BS
31/1/2021	BHR	AS	Bahrain	26.039722	50.559306	102626	372		102254			BH
31/1/2021	BGD	AS	Bangladesh	23.68764	90.351002	535139	8127		527012			BD
31/1/2021	BRB	NA	Barbados	13.18355	-59.534649	1498	12		1486			BB
31/1/2021	BLR	EU	Belarus	53.711111	27.973847	248336	1718		246618			BY
31/1/2021	BEL	EU	Belgium	50.499527	4.475402	711417	21118		690299	1788	315	BE
31/1/2021	BLZ	NA	Belize	17.192929	-88.5009	11877	301		11576			BZ
31/1/2021	BEN	AF	Benin	9.322048	2.313138	3786	48		3738			BJ
31/1/2021	BMU	NA	Bermuda	32.320236	-64.774022	691	12		679			BM
31/1/2021	BTN	AS	Bhutan	27.515709	90.442455	859	1		858			BT
31/1/2021	BWA	AF	Botswana	-22.344029	24.680158	21293	134		21159			BW
31/1/2021	BRA	SA	Brazil	-14.242915	-53.189267	9118513	222666		8895847			BR
31/1/2021	VGB	NA	British Virgin Islands	18.573601	-64.492065	141	1		140			VG

Figure 1: A screenshot of (a portion of) the data file.

2. Required Classes and Class Fields

For this program, you are required to write two classes:

- CovidRecord class;
- Country class.

The `CovidRecord` class will have the following class fields (instance variables):

- date (**String**)
- cumulativePositive (**Integer**)
- cumulativeDeceased (**Integer**)
- cumulativeRecovered (**Integer**)
- currentlyPositive (**Integer**)
- hospitalized (**Integer**)
- intensiveCare (**Integer**)
- country (a `Country` object)

The `Country` class will have the following class fields (instance variables):

- iso3 (**String**)
- continent (**String**)
- countryName (**String**)
- nuts (**String**)
- lat (**Real Number**)
- long (**Real Number**)

Note: `CovidRecord` class contains a `Country` class as one of its class fields.

You are required to design these classes in pseudocode and implement them in Java to be used within your program.

3. Menu System

As you have done in the practical worksheets, you will implement a menu system that provides the user with the options to select what areas they will carry out an analysis on and what specifics will be in the analysis.

The first menu will ask users for which grouping they would like to interrogate, where 'XYZ' will be replaced with the number of records loaded:



Welcome to the JRC COVID-19 Analysis Program. There are a total of 'XYZ' records loaded. Please make a selection from the Menu below to choose which area (or date) to analyse:

- > All countries
- > Countries in South America
- > Countries in North America
- > Countries in Oceania
- > Countries in Asia
- > Countries in Africa
- > Countries in Europe
- > Enter a Country
- > Enter a Date

Enter selection:

You are required to design this menu in pseudocode and implement it in Java within your program.

4. Knowledge to Display

After selecting the area or date that the user wishes to interrogate, they are then presented with another Menu to select the knowledge that they want:

Please select from a statistic below:

- > Total number of cumulatively positive cases
- > Total number of cumulatively deceased cases
- > Total number of cumulatively recovered cases
- > Average daily number of currently positive cases
- > Number and percentage of cumulatively positive cases recovered
- > Number and percentage of cumulatively positive cases deceased
- > All of the above statistics

Enter selection:

You are required to design this menu in pseudocode and implement it in Java within your program.

5. Displaying Knowledge to the User

For the requested knowledge to be useful to the user, it must be displayed in an appropriate and meaningful way. In response to the user's selection, you must display the output in an easy to understand and meaningful way.

Once the requested knowledge has been displayed to the user, the program returns to the first menu and waits for the user to input their next choice.

You are required to design this output style in pseudocode and implement it in Java within your program.

An example of output to the user may be:

Cumulative number of positive cases in Oceania: 12345678.
20% (154321/771605) cases recovered on 31/12/2021.

6. COMP5011 only: Discussion

For students studying COMP5011, answer the following two (2) questions in a separate document:

1. Suggest an additional class that could be aggregated into CovidRecord to help store the data within each record. Specify the name and attributes of the class and the benefits of storing the data in this manner.
2. Justify the validation you have included within both classes for any class fields where you have validation. That is, specify what validation you have undertaken and why you have (or have not) done so.

Things to Note

Your program should be designed in pseudocode and implemented in Java, using the knowledge you have gained in this unit.

Your pseudocode needs to follow the **CLUCC** principles (clear, logical, understandable, consistent and correct).

Your Java code needs to comply with the Coding Standard and be well documented.

You must determine the most appropriate course of action to deal with missing data, i.e. when there is no value for a record in the data file.

Assignment Submission Details

You will need to complete and submit the following deliverables:

- Signed "Student Declaration of Originality" for the work;
- The pseudocode for the entire program (classes and 'menu program');
- The Java code for the entire program (classes and 'menu program');

- The word processor document discussing the program (for **COMP5011 only**);
- A narrated screen capture (maximum length of two minutes), demonstrating your application in use in .mp4 format (must be viewable in VLC).

Assignment Due: Sunday 22 May 2022 at 23:59PM
(Perth time).

Where to submit: Blackboard submission point.

The Blackboard submission point will be announced via Blackboard closer to the due date. Please contact the teaching staff via either email or Piazza for any clarifications.