Process MeNtOR 3.o

Uni-SEP

< statistic-analyze system of COVID-19>

Design Document

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6	2020/11/17	Ziqingqing Ye	Part 2, 7

Document Sign-Off

Name (Position)	Signature	Date

Contents

1 Introduction

1.1 Purpose

This document details the requirements the system <statistic-analyze system of COVID-19 >. This system allows for retrieving COVID-19 infection related data for one or more selected countries, computing different statistics on these data, and display the computed statistics on a map.

1.2 Overview

Text providing a roadmap to the sections and diagrams in your document

The programming tasks for this project are summarized as follows:

1. *Evaluation of user credentials stored on DB.*
2. *Evaluation of countries added to the list of countries.*
3. *Evaluation of countries removed from the list of countries.*
4. *The system performs the calculation and return the result.*
5. *Read required data from website.*
6. *Displaying the result on the map.*

The SDD document contains the following information:

1. *Component Diagram of the system (Architecture). The level of detail and granularity will be at the Java Package level of detail.*
2. *UML Class Diagram for each class we modify or write for the extensions. The detail class diagram contains the classes in UML notation and a table for each class with its data members and methods with the appropriate signatures. Design pattern are identified.*
3. *Design Patterns for all major methods and are applicable to this system.*
4. *Activity Plan includes project backlog, spring backlog and meeting logs. We followed a Scrum process model, provide a list of product backlog items and select items for our Sprint backlog. Also, the meeting log records the topics, date and participants of each meeting.*
5. *Test Cases are provided for each category.*

1.3 Resources - References

Include references to other documents that may assist in the understanding of this document. (i.e. past SRS and SDDs)

References that may assist in the understanding of this document:

Past SRS: https://owl.uwo.ca/access/content/attachment/14cf632f-5973-48fa-8af3-b83bf5627021/SRS-Template-v2.0-2020-1.pdf

System description: https://owl.uwo.ca/access/content/group/c9cc47fe-7c6c-49b0-9dd5-247a2977f123/Project%20Resources/CS2212A-Project-Description.pdf

2 Major Design Decisions

We have got an example snippet of code for accessing web site using an http GET request from a within java program, retrieving a JSON stream, and extracting the information regarding the confirmed COVID-19 cases. To be specific, the jpeg world map is provided, along with the .csv file listing the longitude and latitude coordinates of all countries. The Java libraries we may need to perform such renderings are listed in Appendix I.D., and the logic where you draw a circle on the jpeg map is also given.

What we need to do are:

1. *Proxy class needs to be implemented to complete the operation of the login services.*
2. *Façade design pattern for coordinating activities between the UI and the backend services.*
3. *Calls Factory method design pattern in where a concrete analysis that implements the analysis interface is returned.*
4. *State design pattern allows **AnalysisType** is applied to all such objects which are in the same state.*
5. *Observer design pattern define a one-to-many dependency between **Signal** and **UpdateAnalysis** so that when Signal change state, all its dependents are notified and updated.*

3 Architecture

Below is the package level component diagram of the system [Figure 1]. And the methods that each interface contains is illustrated in Table 1, 2 and 3.

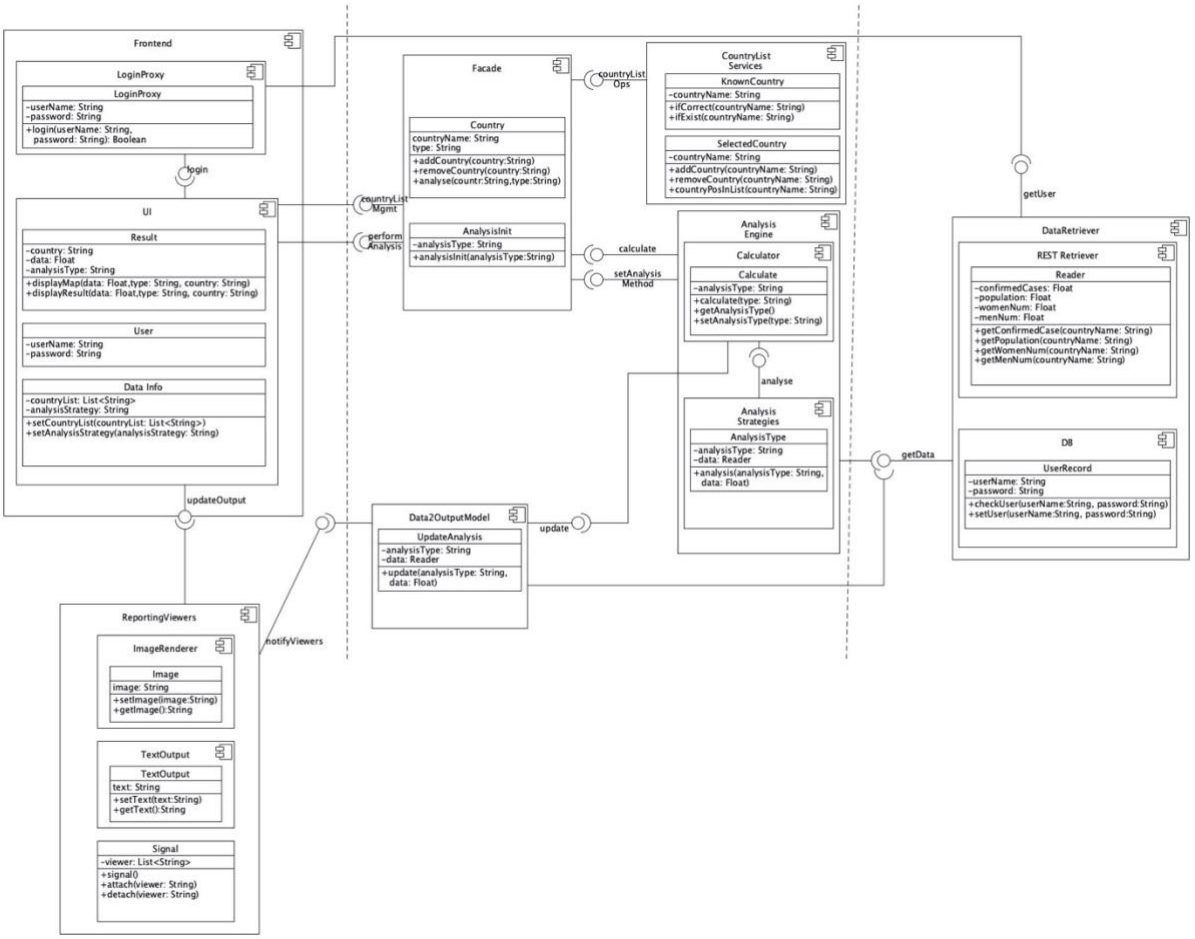


Figure 1: Component Diagram

Table 1: Interface Methods for Frontend, UI and ReportingViewers

LoginProxy	login	login(userName:String,password:String)
UI	updateOutput	displayMap(data:Float,type:String,country:String)
		displayResult(data: Float,type: String, country: String)
ReportingViews	notifyViews	signal()

Table 2: Interface Methods for Façade, Data2OutputModel, CountryList Services and Analysis Engine

Façade	countryListMgmt	addCountry(country: String)
		removeCountry(countryName: String)
	performAnalysis	analysisInit(analysisType:String)
CountryList Services	countryListOps	ifCorrect(countryName: String)
		ifExist(countryName: String)
		addCountry(countryName: String)
Calculator	calculate	calculate(type: String)
	setAnalysisMethod	getAnalysisType()
		setAnalysisType(type:String)

Analysis Strategies	analyse	Analysis(analysisType:String, data:Float)
Data2OutputModel	update	update(analysisType: String, data: Float)

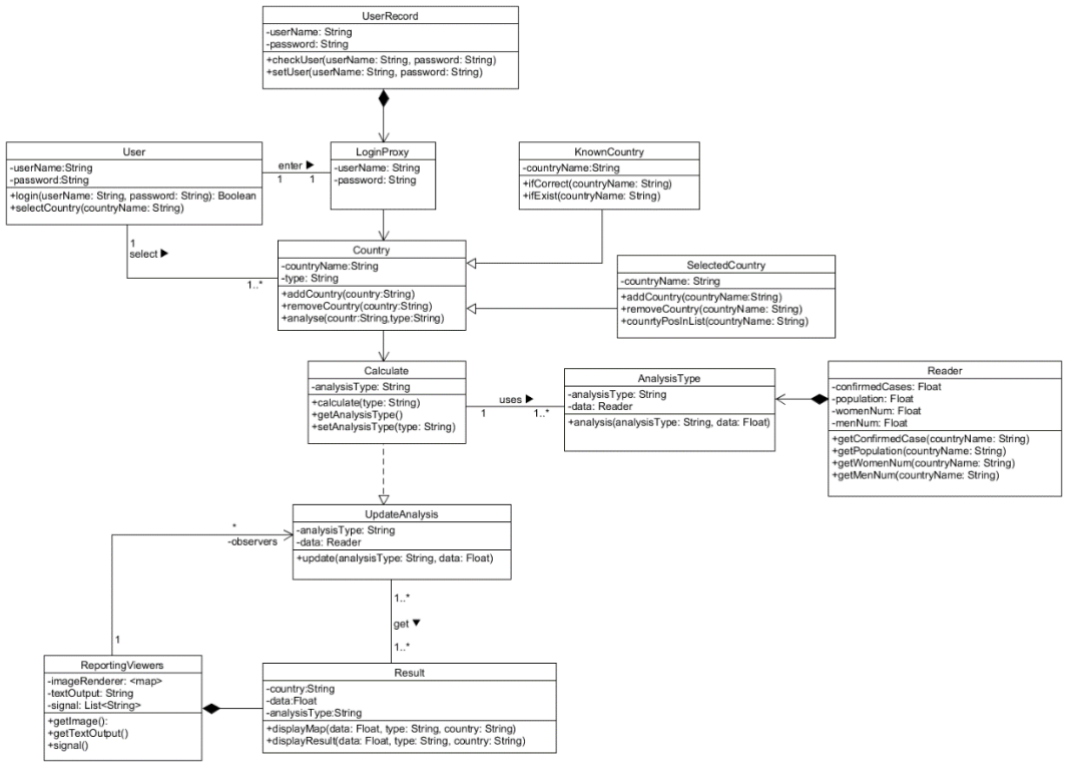
Table 3: Interface Methods for DataRetriever

DataRetriever	getUser	checkUser(userName:String, password:String)
		setUser(userName:String, password:String)
	getData	getConfirmedCase(countryName: String)
		getPopulation(countryName: String)
		getWomenNum(countryName: String)
		getMenNum(countryName: String)

4 Detailed Class Diagrams

4.1 UML Class Diagrams

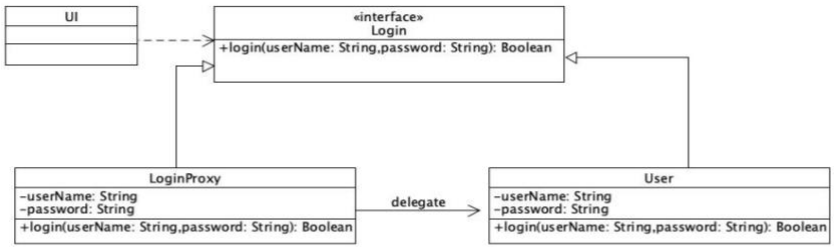
Detailed class diagrams for each class you modify or write for the extensions. You can separate the class diagrams per module they appear. Tables should also be included listing the methods of each class with a short description of what each method does. Please indicate if you a specific design pattern is used in your class diagrams.



5 Use of Design Patterns

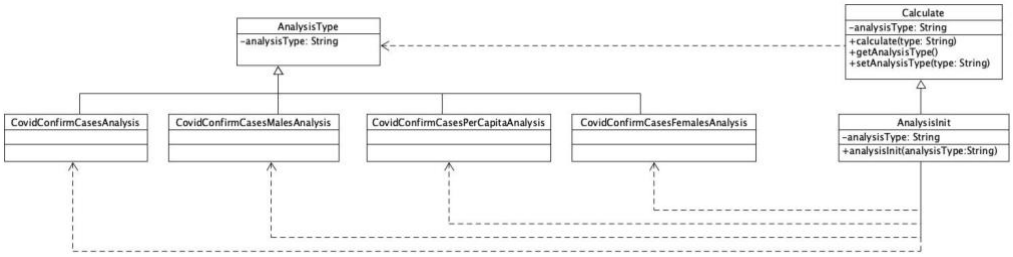
Description of the design patterns used along with their corresponding class diagrams.

Proxy Design Pattern:



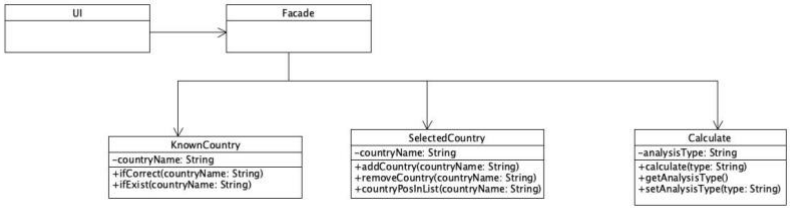
We use the Proxy Design Pattern to execute the login process. We use the LoginProxy to implement the login function so that we can provide some additional functions such as security for login process.

Factory Method Design Pattern:



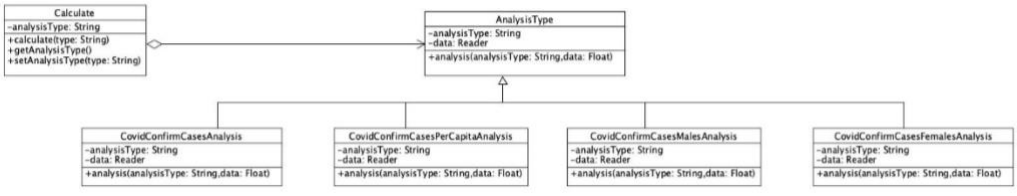
There are four types of analysis type in total. For users, they only choose the analysis method, but we do not what the users know which analysis strategy we use in details in order to deal with the specific analysis type. So we use the Factory Method Design Pattern so that the factory can select the related strategy in order to handle the required analysis method.

Façade:



When users want to manage the country list or to perform specific analysis method on selected countries, they do not need to know how those functions work in detail. What they need to do is just selection and the system will do the exact implementation. So, for the user interface (UI), it only needs to interact with the Façade, and the Façade will re-direct the related instructions coming from user interface to the specific implementation. Thus, we can get benefit from the Façade Design Pattern.

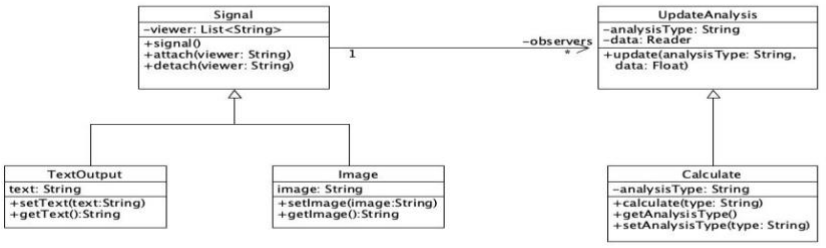
State Design Pattern:



According to the selection of analysis method, we will require different data in order to do the calculation of different analysis types. Besides, the calculation method for different analysis types will

be different as well. In this case, we use the State Design Pattern so that the behavior of the analysis will be changed according to the analysis method required.

Observer Design Pattern:



In the system, users might alter their choices on countries they selected for the analysis or analysis method they want to perform. Whenever a change happens, there should be an update on related components. And all the components that have expressed interest on the data model should be notified so that the information in those components can be updated as well. Thus, we need the Observer Design Pattern in order to handle the notification of update.

6 Activities Plan

6.1 Project Backlog and Sprint Backlog

In this Section, and assuming you follow a Scrum process model, provide a list of product backlog items so that you can select items for your Sprint backlog. Make sure the product backlog list and the tasks in each product backlog item are consistent with the Gantt Chart in Section 6.1. above.

Backlog Item	Estimate (hours)
Allow a user to log into the system	1
If username/password is wrong, the application will terminate	0.2
As a user, I want to add a country in the list	0.2
The user can type a country name or select a country from a drop-down menu	0.5
As a user, I want to remove a country from the list	0.5
A misspelled country name will result in an error	0.2
The selected country can be removed from the selected country panel	0.2
There are 4 different types of analyses as a user select a country to perform analysis on	0.5
The system can display the analysis result	0.5
If the analysis proceeds incorrectly, it will return error	0.5

All the specific data required for performing the analysis can be found and returned from the appropriate web site.	1
The user will receive an error message if the error occur when reading data from the website	0.2
The system can render the data in different colors (or shapes)	1
The system can display the data on the map intuitive	0.5

6.2 Group Meeting Logs

In this Section you write minutes of each meeting, listing the attendance, what the topics of discussion in the meeting were, any decisions that were made, and which team members were assigned which tasks. These minutes must be submitted with the project report in each deliverable and will provide input to be used for the overall assessment of the project.

Present Group Members	**Meeting Date**	**Minutes**	**Issues Discussed / Resolved**
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/10	20	Assigned Tasks Ziqingqing Ye is responsible for completing the introduction, major design decision, and the test driven development part. Xinyi Lin is responsible for drawing class diagram and complete the activities plan Tianci Du is responsible for drawing the component diagram and the use of design pattern.
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/11	30	Discussed and made the major design decision.
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/13	80	Discussed about the classes and components together, and then helped Tianci Du to draw the component diagram.
Tianci Du, Xinyi Lin,	2020/11/14	60	Helped Xinyi Lin to draw the class diagram.

Ziqingqing Ye			Revised the component diagram.
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/15	60	Discussed about the design patterns and helped Tianci Du to complete the part 5.
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/16	40	Made the project backlog, and discussed the backlog items together.
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/17	60	Discussed about test cases.
Tianci Du, Xinyi Lin, Ziqingqing Ye	2020/11/18	40	Completed the SDD.

7 Test Driven Development

Test cases will be provided in the form of a table as follows:

Test ID	The unique Id of the test case
Category	Which part of the system is tested (*e.g. evaluation of user credentials stored on file or DB*)
Requirements Coverage	The unique ID of the requirement tested (*e.g. UC1-Successful-User-Login*)
Initial Condition	Initial conditions required for the test case to run (*e.g. the system has been initiated and runs*)
Procedure	The list of steps required for this test case (*e.g.* *1. The user selects login* *2. The user provides a user name* *3. The user provides a password* *4. The user logs-in into the system and is presented with the main UI window*)
Expected Outcome	The expected outcome of the test case (*e.g. the login form closes, and the user is presented with the main UI window*)
Notes	Any other notes you may want to add for this test case, which are also reflected in the requirements specification (*e.g. the user should provide only alphanumeric user names and passwords without any special characters*)

Test ID	Test case 1
Category	Evaluation of user credentials stored on DB

Requirements Coverage	UC1-Successful-User-Login
Initial Condition	The system has been initiated and runs
Procedure	1. The users are greeted with a login window 2. The user inputs a user name 3. The user inputs a password 4. The user clicks the submit button to log into the system and is presented with the main UI of the application
Expected Outcome	The login window closes, and the user is presented with the main UI of application.
Notes	The user should provide only alphanumeric user names and passwords without any special characters within specific length. And both the user names and passwords can not be null.

Test ID	Test case 2
Category	Evaluation of user credentials stored on DB
Requirements Coverage	UC1-Unsuccessful-User-Login
Initial Condition	The system has been initiated and runs
Procedure	1. The users are greeted with a login window 2. The user inputs a user name 3. The user inputs a password 4. The user clicks the submit button, a pop-up window notify the user that there is an error with the provided credentials and the application will terminate
Expected Outcome	The application terminates and the user has to re-enter the system to provide valid user name and password.
Notes	The user should provide only non-nullable alphanumeric user names and passwords without any special characters within specific length. And the user cannot login unsuccessfully for too many times in short period (to increase the security of user account).

Test ID	Test case 3
Category	Evaluation of countries added to the list of countries
Requirements Coverage	UC2-Successful-Country-Adding
Initial Condition	The user has logged into the system and the main UI of application is displayed.
Procedure	1. The “Add a country” bar is presented to users 2. The user types the name of the country or select the country from a drop-down menu on the “Add a country” field 3. The user selects the “add” button to add the country to the list of countries to perform analysis of 4. The user selects which analysis to be performed on the country

	5. The country that the user selects is added into the list of countries, on which analysis is to be performed. The country's name will also be displayed on the UI panel along with all the other so far selected countries.
Expected Outcome	The country name along with the analysis to be performed on the specific country will be added to the list of countries as well as displayed on the UI panel.
Notes	The user should provide only non-nullable alphanumeric country name without any special characters within specific length. And the user can only provide country name one at a time.

Test ID	Test case 4
Category	Evaluation of countries added to the list of countries
Requirements Coverage	UC2-Unsuccessful-Country-Adding
Initial Condition	The user has logged into the system and the main UI of application is displayed.
Procedure	1. The "Add a country" bar is presented to users 2. The user types the name of the country or select the country from a drop-down menu on the "Add a country" field 3. The user selects the "add" button to add the country to the list of countries to perform analysis of 4. An error message displayed on the window
Expected Outcome	An error message displayed on the window and the adding operation failed.
Notes	The user should provide input within specific length.

Test ID	Test case 5
Category	Evaluation of countries removed from the list of countries
Requirements Coverage	UC3-Successful-Country-Removing
Initial Condition	The user has logged into the system and the main UI of application is displayed.
Procedure	1. The "Remove a country" bar is presented to users 2. The user types the name of the country or select the country from a drop-down menu on the "Remove a country" field 3. The user selects the "remove" button to remove the country from the list of countries to perform an analysis on 4. The country selected is removed from the list of countries, on which analysis is to be performed on
Expected Outcome	The country name along with the analysis to be performed on the specific country will be removed from the list of countries
Notes	The user should provide only non-nullable alphanumeric country name without any special characters within specific length. And the user can only provide country name one at a time.

Test ID	Test case 6
Category	Evaluation of countries removed from the list of countries
Requirements Coverage	UC3-Unsuccessful-Country-Removing
Initial Condition	The user has logged into the system and the main UI of application is displayed.
Procedure	1. The “Remove a country” bar is presented to users 2. The user types the name of the country or select the country from a drop-down menu on the “Remove a country” field 3. The user selects the “remove” button to remove the country from the list of countries to perform an analysis on Two condition: 3.1. If the country is not in the known countries list, an error message is display, showing that errors occur on the country name. 3.2. If the country name is in the known countries list, but the country name is not in the first place of the list of selected countries, an error message indicating that the country users want to remove from the list was not in there in the first place
Expected Outcome	An error message indicating the country name that user selected is invalid (not in the known countries list) or not in the first place of the selected countries list is displayed.
Notes	If the given country name to be removed is in the known country list, the system only needs to check if the country name is in the first place of the selected countries list. The system does not need to check if the country name will occur in the selected countries list or not.

Test ID	Test case 7
Category	Evaluation of analysis
Requirements Coverage	UC5-Successful-Country-Analysis
Initial Condition	The user has selected the countries to perform analysis on.
Procedure	1. The user selects the specific type of analysis they want to perform from a drop-down menu of available analyses (4 different types in total). 2. The user presses the “Recalculate” button to perform analysis. 3. The system identifies and retrieves the individual pieces of data required for the type of analysis selected. 4. The system performs the calculation and returns the result of analysis. 5. The system display the result to the user.
Expected Outcome	The analysis proceeds correctly and the results are returned and displayed to the user.
Notes	The same analysis has to be performed for all selected countries.

Test ID	Test case 8
Category	Evaluation of analysis
Requirements Coverage	UC5-Unsuccessful-Country-Analysis
Initial Condition	The user has selected the countries to perform analysis on.
Procedure	1. The user selects the specific type of analysis they want to perform from a drop-down menu of available analyses (4 different types in total). 2. The user presses the “Recalculate” button to perform analysis. 3. The system cannot identify and retrieve all the individual pieces of data required for the type of analysis selected. 4. An error message is displayed to the user.
Expected Outcome	The analysis proceeds incorrectly and the error message is returned and displayed to the user.
Notes	The same analysis has to be performed for all selected countries.

Test ID	Test case 9
Category	Evaluation of data read from web site
Requirements Coverage	UC5-Successful-Data-Read
Initial Condition	The user has selected the countries to perform analysis on, and has selected the specific analysis type.
Procedure	1. According to the selected analysis type, the system sends a request to web sites to read the specific data required to perform the analysis. 2. All the required individual pieces of data can be found on the website and the website return those data to the system
Expected Outcome	All the specific data required for performing the analysis can be found and returned from the appropriate web site.
Notes	

Test ID	Test case 10
Category	Evaluation of data read from web site
Requirements Coverage	UC5-Unsuccessful-Data-Read
Initial Condition	The user has selected the countries to perform analysis on, and has selected the specific analysis type.
Procedure	1. According to the selected analysis type, the system sends a request to web sites to read the specific data required to perform the analysis. 2. Some or all of the required data for selected analysis type are not available on the website or error occur when the website tries to return the data to the system

	3. The website return an error message to the system 4. An error message is displayed to the user
Expected Outcome	The system receives an error message indicating that error occur when reading data from the web site. And the error message is displayed to the user.
Notes	

Test ID	Test case 11
Category	Evaluation of displaying the result
Requirements Coverage	UC6-Successful-Display-Result
Initial Condition	The selected statistical analysis is completed and its results have been calculated and are ready to be displayed.
Procedure	1. According to the results of statistical analysis, the system will be able to render the data in different colors (or shapes). 2. Display the data on the map intuitive
Expected Outcome	The results are displayed correctly and intuitively.
Notes	Do not just display the results in text or using very small or overlapping characters to represent analysis results between countries. Do not having infinitesimally small circles for countries with very low population.

Test ID	Test case 12
Category	Evaluation of displaying the result
Requirements Coverage	UC6-Unsuccessful-Display-Result
Initial Condition	The selected statistical analysis is completed and its results have been calculated and are ready to be displayed.
Procedure	1. According to the results of statistical analysis, the system will be able to render the data in different colors (or shapes). 2. The data displayed on the map is not intuitively (might be a lot of overlapping or the symbols used to represent data is not appropriate). Or the data is not correct.
Expected Outcome	The results are not displayed correctly and intuitively.
Notes	