

Process MeNtOR 3.0

Global Statistics Analysis
Project
Requirements Model

version:	2.4
Print Date:	
Release Date:	
Release State:	
Approval State:	
Approved by:	
Prepared by:	
Reviewed by:	
Path Name:	
File Name:	CS 2212 SRS Document
Document No:	

Document Change Control

Version	Date	Authors	Summary of Changes
2.4	03/01/2021	Matti Majeed	Added use case 5&6 sequence and activity diagrams. Updated Use case 5&6 diagrams, Actor diagram, and Gantt chart.
2.4	03/01/2021	Brendan Bain	Added Use Case 2 & 3 sequence and activity diagrams, updated use case diagrams.

2.4	03/01/2021	Eric Liu	Added Use Case 7&8 sequence and activity diagrams, Fixed use case 7 and 8 diagrams and updated some actor and domain model descriptions.
2.4	03/01/2021	Maram Ahmer	Added Use Case 1 & 4 sequence and activity diagrams. Fixed use cases 1 & 4. Added test cases.

Document Sign-Off

Name (Position)	Initials	Date
Eric Liu	E.L	03/01/21
Brendan Bain	B.B	03/01/21
Maram Ahmer	M.A	03/01/21
Matti Majeed	M.M.	03/01/21

Contents

1	Introduction.....	7
1.1	Purpose.....	7
1.2	Overview.....	7
1.3	References.....	7
2	Business Scenario Model.....	7
2.1	Actors.....	7
2.1.1	Overview.....	8
2.1.2	Actor Diagram.....	8
2.1.3	Actor Definitions.....	9
2.1.3.1	User	9
2.1.3.2	System	9
2.1.3.3	Credential database	10
2.1.3.4	World Bank Database	11
2.1.3.5	Analysis server	11
2.1.3.6	Rendering server	12
2.2	Use Case Descriptions.....	12
2.2.1	Use case 1	13
2.2.2	Use case 2	14
2.2.3	Use case 3	14
2.2.4	Use case 4	15
2.2.5	Use case 5 & 6	16
2.2.6	Use case 7	17
2.2.7	Use case 8	18

2.3	Use Case Diagrams.....	18
2.3.1	Use Case 1.....	19
2.3.2	Use Case 2.....	19
2.3.3	Use Case 3.....	20
2.3.4	Use Case 4.....	20
2.3.5	Use Case 5.....	21
2.3.6	Use Case 6.....	21
2.3.6	Use Case 7.....	21
2.3.7	Use Case 8.....	22
3	Domain Model.....	23
3.1	Domain Model Class Diagram.....	23
3.2	Domain Model Class Definitions.....	23
3.2.1	User	23
3.2.2	Login interface	24
3.2.3	Analysis	24
3.2.4	Selection	25
3.2.5	Data element.....	25
3.2.6	Year	25
3.2.4	Display.....	26
3.2.5	viewers.....	26
3.2.5	World Bank Database.....	27
3.2.5	Country.....	27
4	Sequence and Activity Diagrams.....	28
4.1	Sequencing Diagrams.....	28

4.2	Activity Diagrams.....	32
5	Non-Functional Requirements Specification.....	36
5.1	Overview.....	36
5.2	Enabling Technologies.....	36
5.2.1	Target Hardware & Hardware Interfaces.....	36
5.2.2	Target Development Environment.....	36
5.2.3	System Interfaces.....	36
5.3	Capacity Planning.....	36
5.3.1	Permanent Storage.....	36
5.4	Network.....	37
5.5	Workstations.....	37
5.6	Operational Parameters.....	37
5.6.1	Useability.....	37
5.6.2	Reliability.....	37
5.6.3	Maintainability.....	38
5.6.4	Portability.....	38
6	Activities Plan.....	39
6.1	Gantt Chart.....	39
6.2	Project Backlog and Sprint Backlog.....	39
6.3	Group Meeting Logs.....	40
7	Test Driven Development.....	41
8	Domain Dictionary (optional and as required).....	44
8.1	Terms and Abbreviations.....	44

1 Introduction

1.1 Purpose

The purpose of this project is to gather global statistics from different countries using the World Bank's database, process the statistics, and display them using different graphs and charts based on the user's choice.

1.2 Overview

The software will retrieve statistics from the World Bank's database relating to global statistics. The user will first need to log in with a username and password, which will be stored in an external file. If the login is successful, the user will be able to choose from a list of statistics he/she would like to see analyzed. After the type of analysis to be performed is selected, next, the country on which the analysis will be performed must be selected. Some countries may not have the required data available to them; in that case, an appropriate message will be displayed informing the user. The user will then be able to choose from what year the data to be analyzed be retrieved from. The program will then analyze the data and display it using the appropriate graphs, which the user will also choose from. The user will also be able to hide or display the graphs of their choosing.

1.3 References

CS2212B project description

CS2212B Lectures

UMLet: www.umlet.com

For some Use Cases:

<https://online.visual-paradigm.com/diagrams/solutions/free-use-case-diagram-tool/>

2 Business Scenario Model

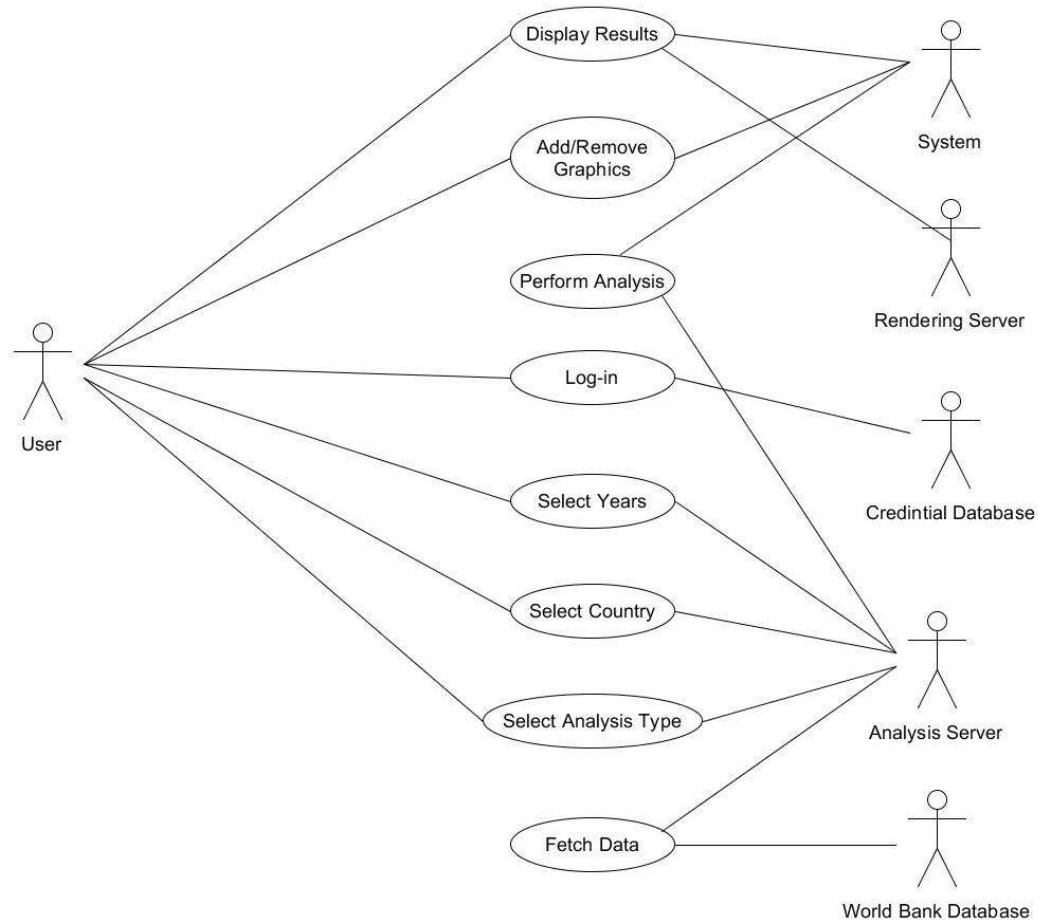
2.1 Actors

2.1.1 Overview

The actors include the end user of the software and the World Bank's data repository. The user must login in order to initiate a session. A session will allow the user to select the type of analysis to be performed, the years on when the analysis will be considered, and the country, all in no particular order. The user will also be able to add and remove a selected graph during the session. The World Bank data repository will deliver the statistics required for the analysis.

2.1.2 Actor Diagram

Diagram showing all the actors present in the system and the roles each actor is able to perform and use cases it can interact with.



2.1.3 Actor Definitions

2.1.3.1 User

Description	The User is a human actor that interacts with the system. The roles of this actor include selecting the country, selecting the type of analysis to perform, selecting the year interval, logging in and adding or removing graphics.
Aliases	None.
Inherits	None.
Actor Type	Active
Contact Person	
Contact Details	

2.1.3.2 System

Description	The system is the data fetching and processing part of the program. The system must perform the analysis, add or remove graphics
Aliases	None.

Inherits	None.
Actor Type	Passive
Contact Person	
Contact Details	

2.1.3.3 Credential Database

Description	The server is accessed through the system by means of the log-in interface. The credential database is a database that stores users log in information and authorizes logins.
Aliases	None.
Inherits	None.
Actor Type	Passive
Contact Person	
Contact Details	

2.1.3.4 World Bank Database

Description	The World Bank Database an external actor accessed through the system. The World Bank Database stores all the data on the countries of the world.
Aliases	None.
Inherits	None.
Actor Type	Passive
Contact Person	
Contact Details	

2.1.3.5 Analysis Server

Description	Deals with analysis such as the selections from viewer selections to the country selection. Mainly deals with analysis.
Aliases	None.
Inherits	None.

Actor Type	Passive
Contact Person	
Contact Details	

2.1.3.6 Rendering Server

Description	Deals with rendering the results of the computed data. Allows for visual representation of the data.
Aliases	None.
Inherits	None.
Actor Type	Passive
Contact Person	
Contact Details	

2.2 Use Case Descriptions

This section documents the complete business scenarios within the scope of this project.

2.2.1 Use Case 1: The User Logs into the System

Goal in Context:

The user uses a login and password to enter the system, and view different types of data from the World Bank database.

Actors:

User

Server

Preconditions:

1. User ID
2. Password

Trigger:

Login button

Scenario Text:

1. System displays login page
2. User enters username and password
 - 2.1. If the username or password is incorrect, an error message is displayed
3. If the username and password are correct, the server authorizes entry and logs into the system.

Alternative Scenario Courses:

1. The username or password or both are incorrect, an error message is shown.

Constraints:

None.

Questions:

None.

2.2.2 Use Case 2: Selecting the analysis type to be performed

Goal in Context:

In this scenario, the user selects one of the eight analysis methods. The user chooses one of the analysis methods from a list of analysis methods. If the analysis method is different than the previous selection, the list of viewers is cleared. If the same analysis method is reselected, the list of viewers does not change.

Actors:

User

Preconditions:

1. The user is logged in

Trigger:

The user clicks on the list of analysis methods to change the type of analysis

Scenario Text:

1. Select the desired analysis method

Alternative Scenario Courses:

None.

Constraints:

None.

Questions:

None.

2.2.3 Use Case 3: Selecting a country to fetch and visualize data for

Goal in Context:

In this scenario, the user selects a country to fetch data on. The user chooses from a list of all the countries in the world, and the system verifies the country's data is permitted to be fetched for the analysis method specified. If data can be fetched and processed for the specified country and analysis, the system will do so. If the country's data is restricted, a message will be displayed informing the user data processing and/or fetching is not available for the selected type of analysis.

Actors:

User
World Bank Database
system

Preconditions:

1. The user is logged in
2. The analysis method has been chosen

Trigger:

The user clicks on the list of countries to change the selected country

Scenario Text:

1. Select the desired country
2. Check if the method of analysis is permitted for the selected country
 - 2.1 If the country's data is not restricted for the selected analysis method, display error message
3. Fetch data

Alternative Scenario Courses:

Alternative 1: If the country's data is restricted for the selected analysis method, display an error message.

Constraints:

None

Questions:

None.

2.2.4 Use Case 4: Selecting the Years for Which the Analysis Type is to be Performed**Goal in Context:**

The user selects the years for which to view country data from the World Bank database

Actors:

User

World Bank database

Preconditions:

1. The user has been logged in
2. The user has selected the country for which to perform analysis on

Trigger:

"Show results" button

Scenario Text:

1. The user selects the start and end years from a menu
 - 1.1. If the years are invalid or no data is present, display an error message

Alternative Scenario Courses:

1. If one of the dates is invalid or information is not available, show an error message.

Constraints:

The start year must be before the end year.

Questions:

If only one year has available data, and the other year is invalid will any information be shown?

2.2.5 Use Case 5 & 6: Adding and removing viewers to display results.

Actors: The User

Preconditions: User Must be logged in.

Trigger: The user must have already selected the data to be analyzed and the viewers must be deployed.

Scenario Text:

1. User activates deployed viewer list.
2. User Selects button to add a viewer or User selects button to remove a viewer.

Alternative Scenario:

1. The user attempts to add a viewer that is not compatible with selected analysis. In this case, a message will appear informing the user.

2. User attempts to remove a viewer that is not already on screen. An error message informs the user as such.

Constraints:

None

Questions:

None

2.2.6 Use Case 7: Performing the Results

Actors: The user, The system, World Bank Database

PreConditions: The user has selected a country, a range of years and the viewers they want to use.

Trigger: Once the user has selected the country, the type of analysis they want to perform, the years, and the viewers they want to use in order to display the results, then they can initiate the analysis by pressing the “Recalculate” button. The pressing of the “Recalculate” button will perform the following

Scenario Text:

1. User has selected a country, a range of years and viewers they want to use.
2. User presses the “recalculate” button.
3. Initiates strategy and compute data
 - 3.1 If no processing is needed (i.e. the data can be displayed as they have been retrieved)
 - 3.2 If processing *is* required (e.g. you need to compute a ratio)
 - 3.3 If all the data required for the computation of the selected type of analysis is not available (e.g. values are missing). Message to user that analysis can’t be performed
4. Analysis proceeds (even for some of the selected years) then the *result* object is populated so that the results can be displayed

Alternative Scenario:

If all the data required for the computation of the selected type of analysis is not available (e.g. values are missing). Message to user that analysis can’t be performed

1. Thus display error message

Constraints:

1. Data not available for computation

Questions:

None

2.2.7 Use Case 8: Displaying the Results

Actors: The User, The System

Preconditions: System properly computes data

Trigger: System finished computing data

Scenario Text:

1. System finished computing data
2. System renders results on selected viewers
 - 2.1 Viewers identified number of series of data to be visualized
3. Displays rendered results to user

Alternative Scenario:

1. System doesn't finish computing data and results can't be displayed

Constraints:

None

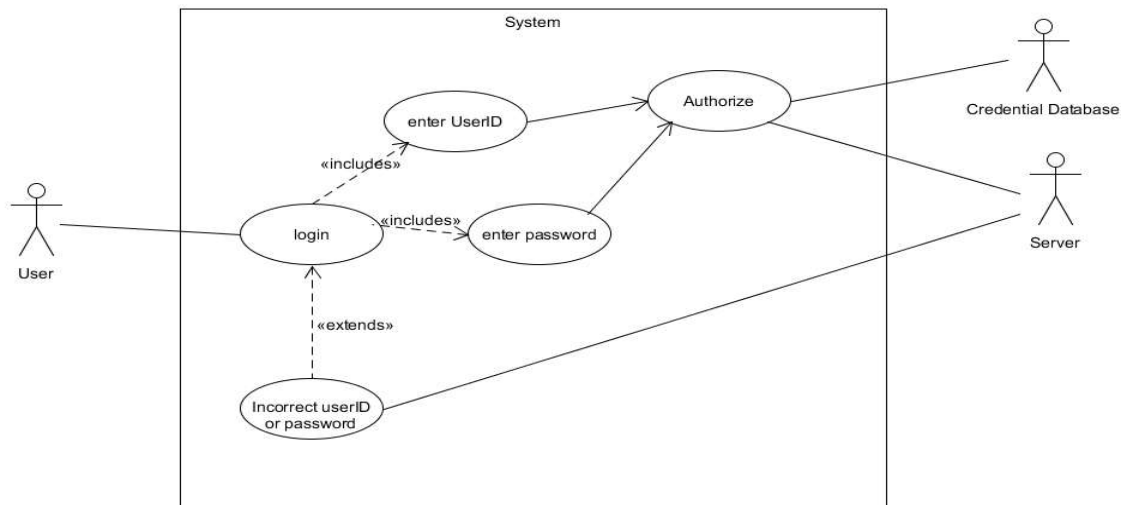
Questions:

None

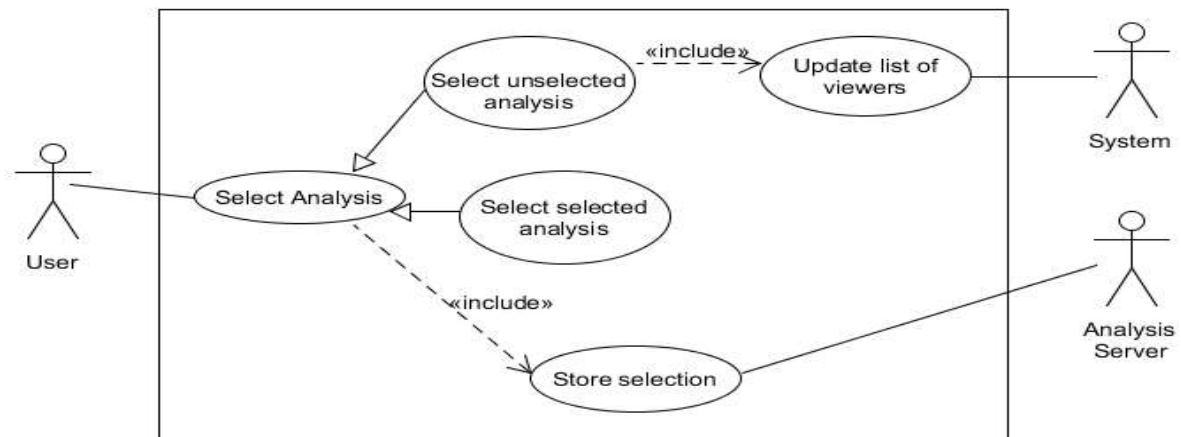
2.3 Use Case Diagrams

This section presents the business scenarios of the subject area in a graphical form.

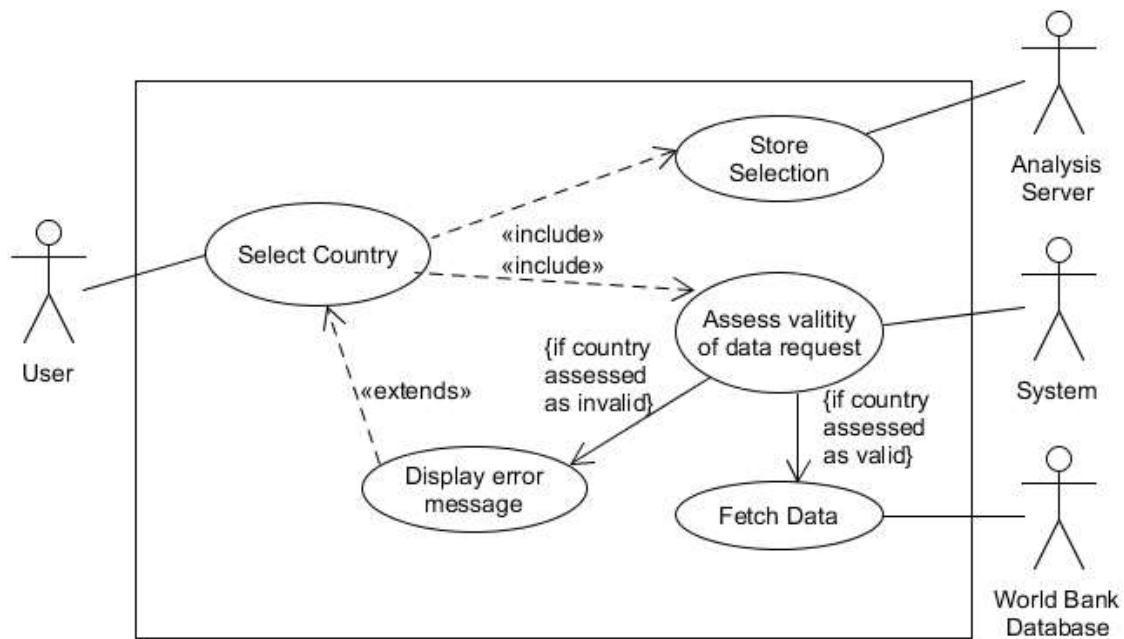
2.3.1 Use Case 1: The User Logs into the System



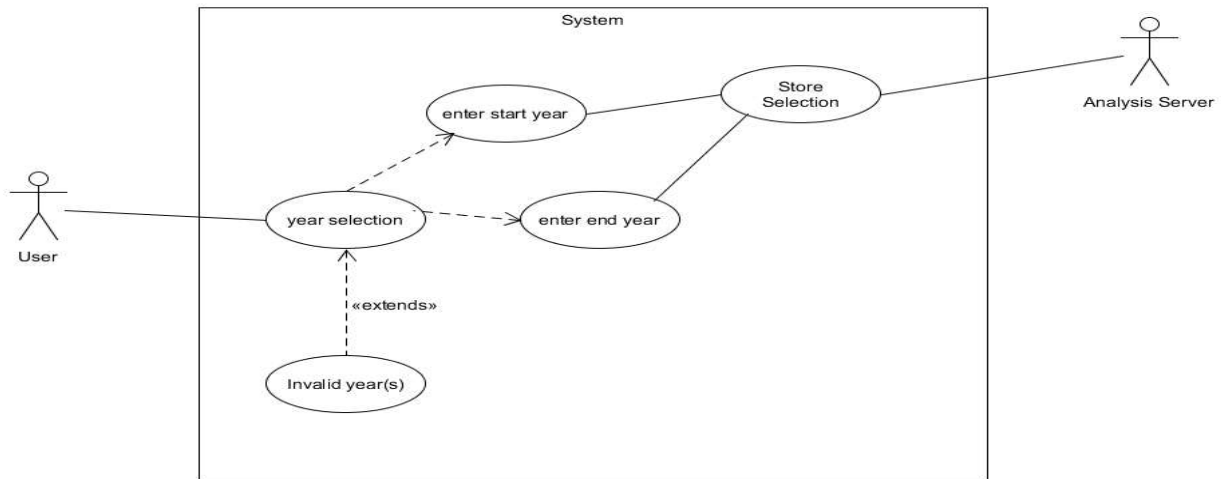
2.3.2 Use Case 2: Selecting the analysis type to be performed



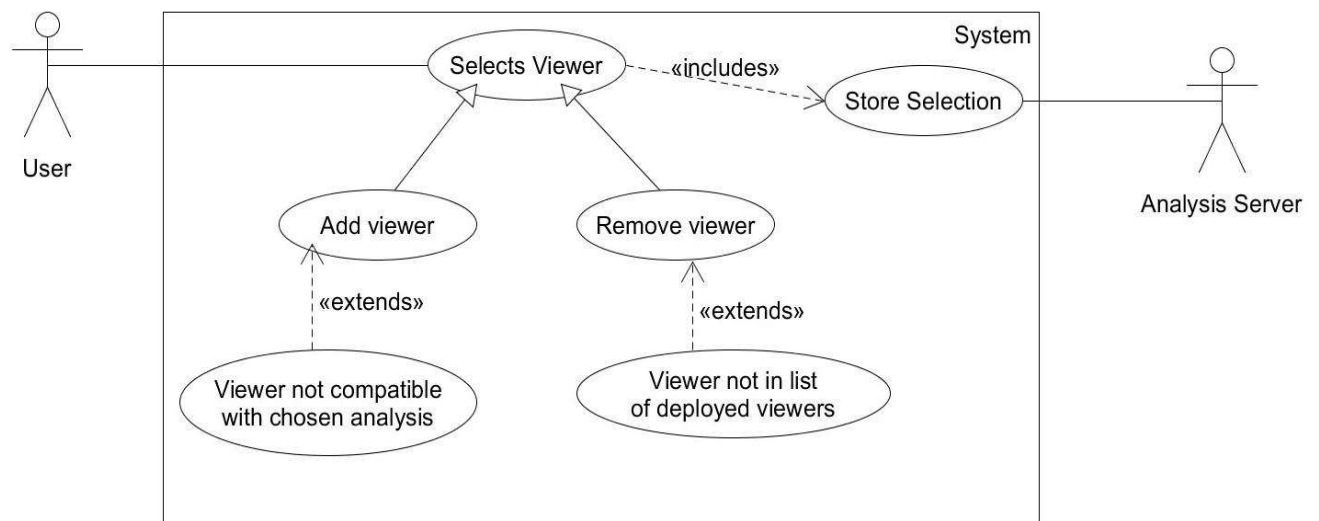
2.3.3 Use Case 3: Selecting a country to fetch and visualize data for



2.3.4 Use Case 4: Selecting the Years for Which the Analysis Type is to be Performed

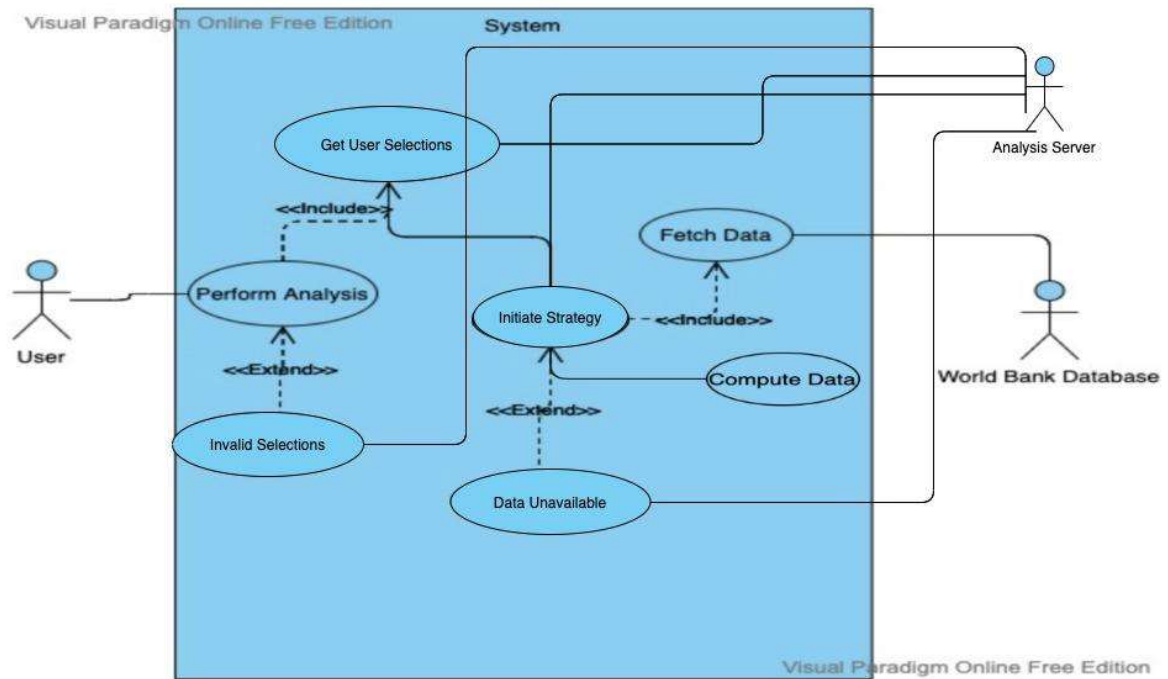


2.3.5 Use Case 5&6: Adding and removing viewers to display results



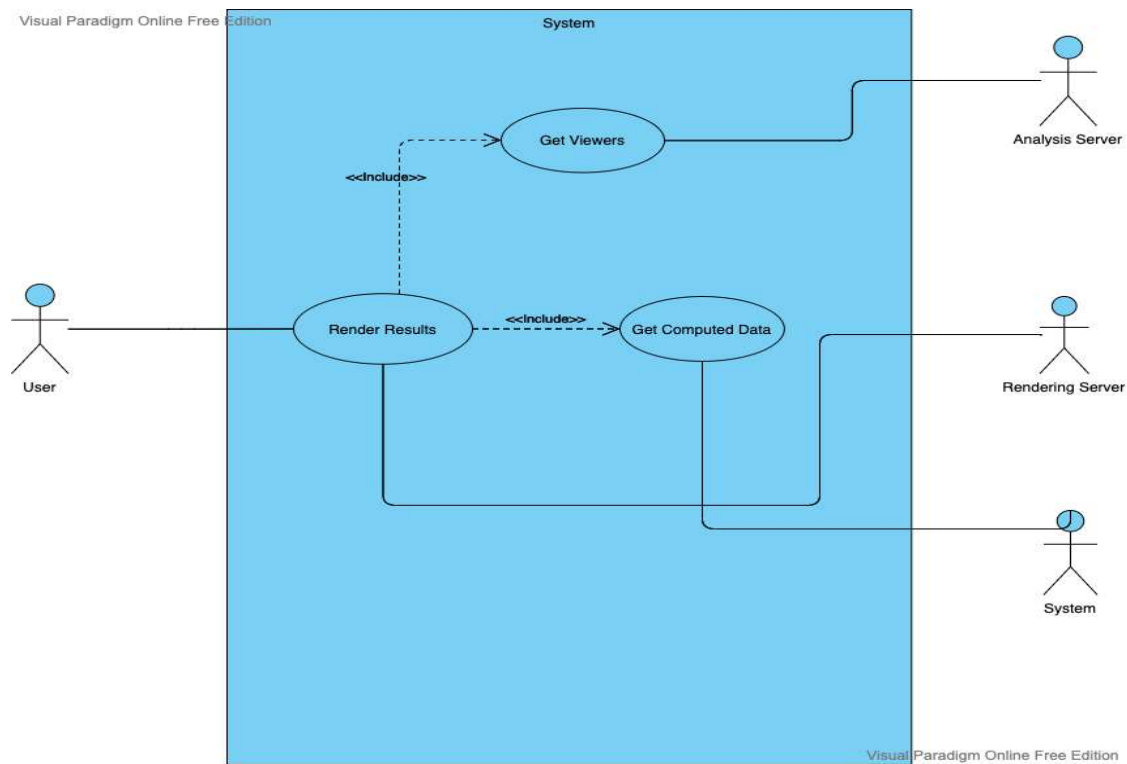
2.3.6 Use Case 7: Performing the Analysis

Visual Paradigm Online Free Edition



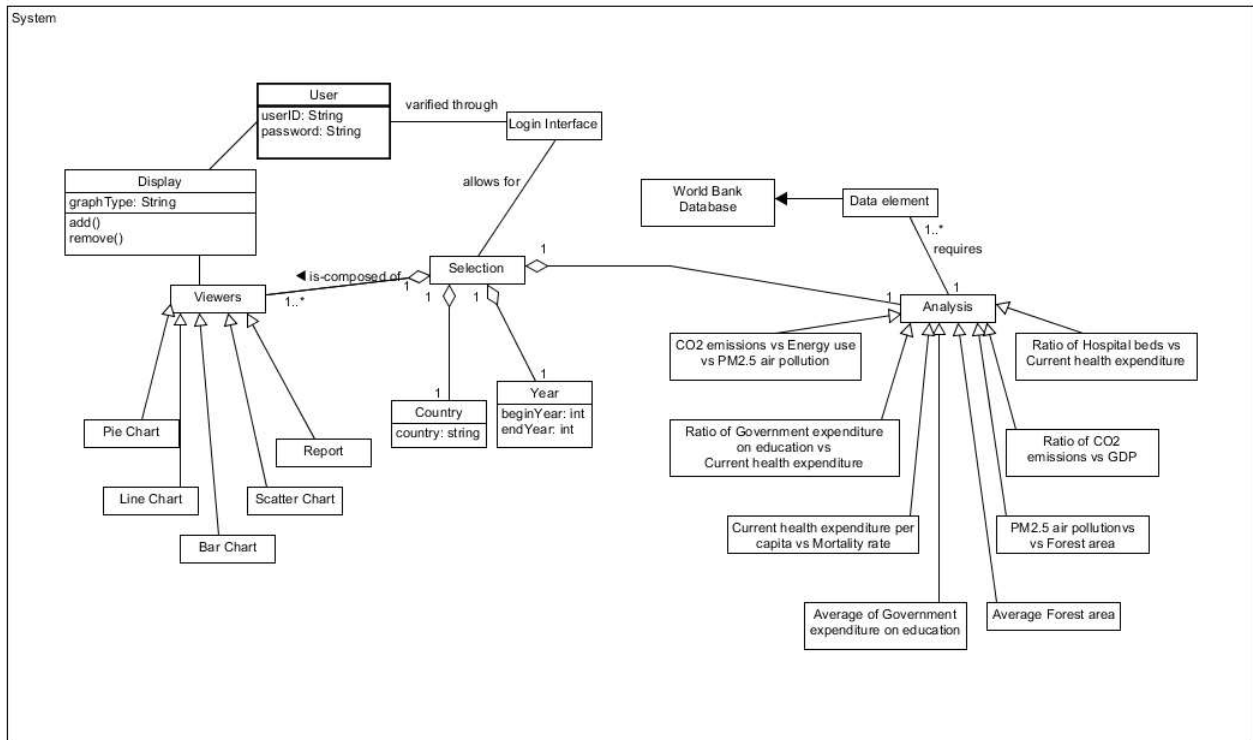
Visual Paradigm Online Free Edition

2.3.7 Use Case 8: Displaying the results



3 Domain Model

3.1 Domain Model Class Diagram



3.2 Domain Model Class Definitions

3.2.1 User

Description	The user itself that is going to login and use the system
Attributes	UserID: String Password: String

Responsibilities	The user is responsible for logging into the system and using the features that the system offers correctly.
Business Rules	State any important business rules or constraints that need to be implemented by this domain model class.

3.2.2 Login Interface

Description	Allows the user to login to the system using a correct userID and password.
Attributes	none
Responsibilities	The login interface is for users to enter their own userID and password in order to allow the user to login and use the system. If the user enters an invalid userID or password an error message is displayed and the user will need to enter a correct userID and password in order to proceed.
Business Rules	

3.2.3 Analysis

Description	The type of analysis the user specifies
Attributes	none
Responsibilities	To specify the type of analysis the user has chosen for the analysis

Business Rules	Some countries will be restricted from certain analysis types.
-----------------------	--

3.2.4 Selection

Description	The overall selections the user has made
Attributes	none
Responsibilities	To contain the users choices of displayed viewers, selected country, year, and type of analysis.
Business Rules	

3.2.5 Data Element

Description	A statistic element of data/statistic from the world bank database
Attributes	none
Responsibilities	To contain data to be used for analysis and to be put into a visual representations
Business Rules	

3.2.6 Year

Description	A representation of the specified interval of time in years for the analysis
--------------------	--

Attributes	beginYear: int endYear: int
Responsibilities	To specify the start and end years from the user for the interval the user wants the analysis to be performed over
Business Rules	

3.2.7 Display

Description	Displays requested information
Attributes	graphType: String add() remove()
Responsibilities	To display the information/ graphs that have been calculated by the Information Processing System. To remove and add graphs based on user request
Business Rules	

3.2.8 Viewers

Description	The Graphs on which the analysis results will be displayed.
--------------------	---

Attributes	
Responsibilities	Display the results of the analysis performed.
Business Rules	

3.2.9 World Bank Database

Description	Provides information requested by Information Processing System
Attributes	
Responsibilities	To provide information in the form of a json file to the Information Processing System
Business Rules	

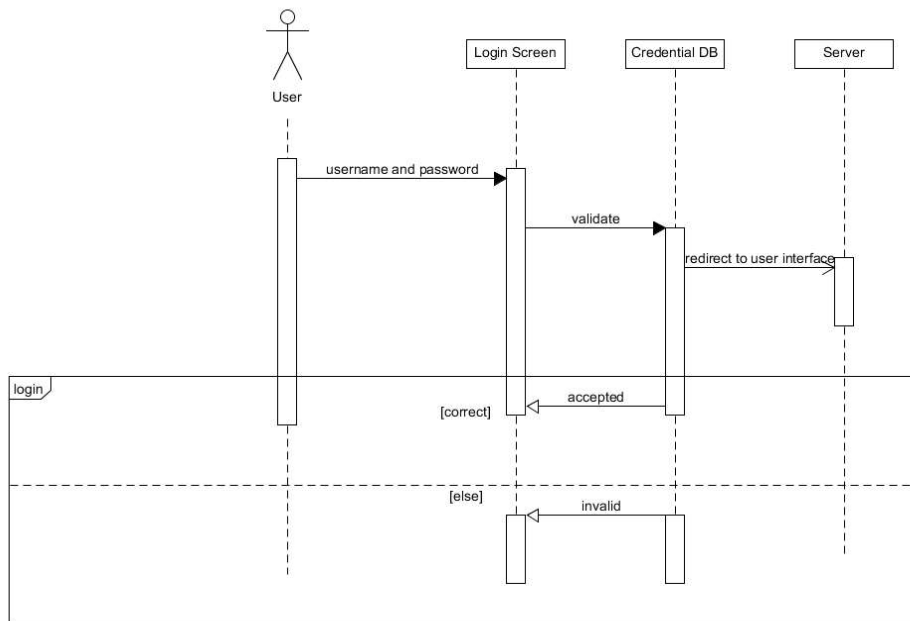
3.2.10 Country

Description	Specified country for analysis
Attributes	country: String
Responsibilities	To specify the country in order to analyze data of that specified country.
Business Rules	

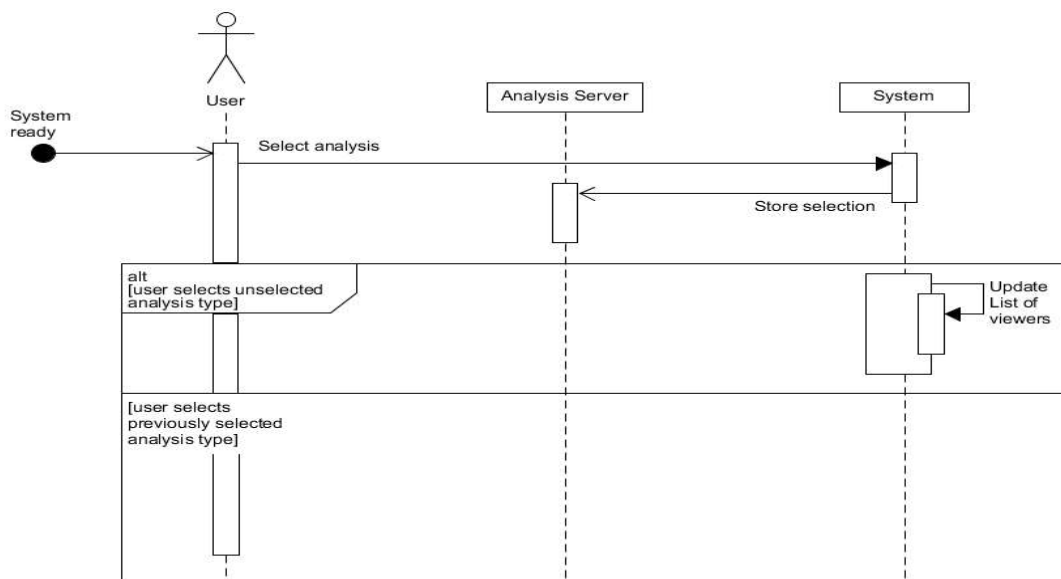
4 Sequence and Activity Diagrams

4.1 Sequencing Diagrams

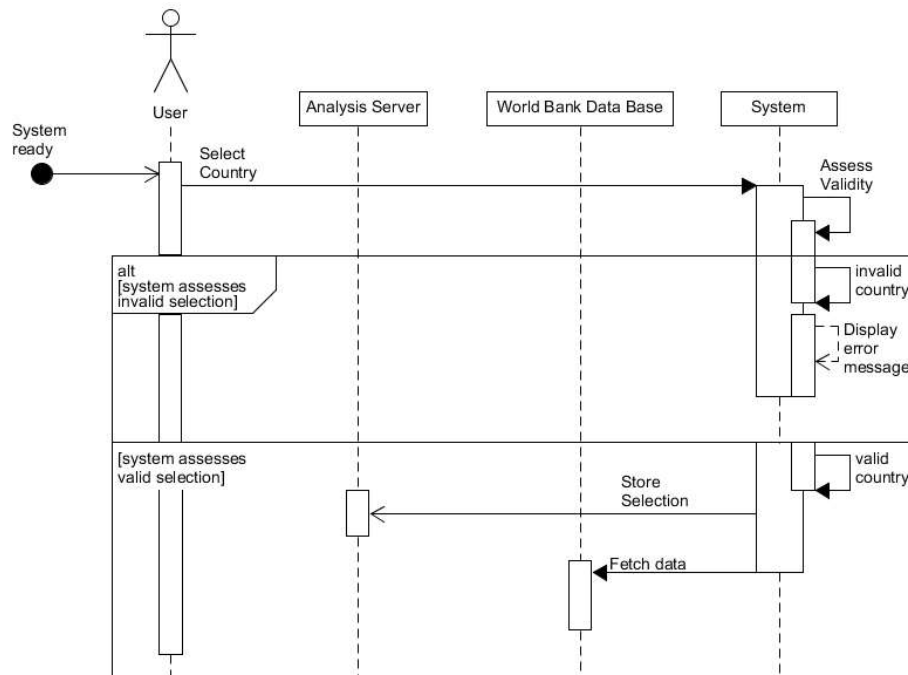
4.1.1 Sequence Diagram for Use Case 1:



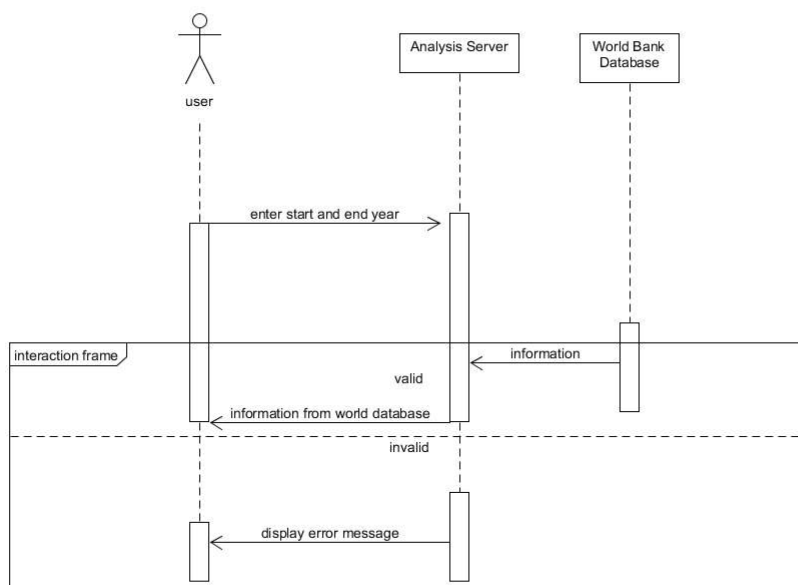
4.1.2 Sequence Diagram for Use Case 2:



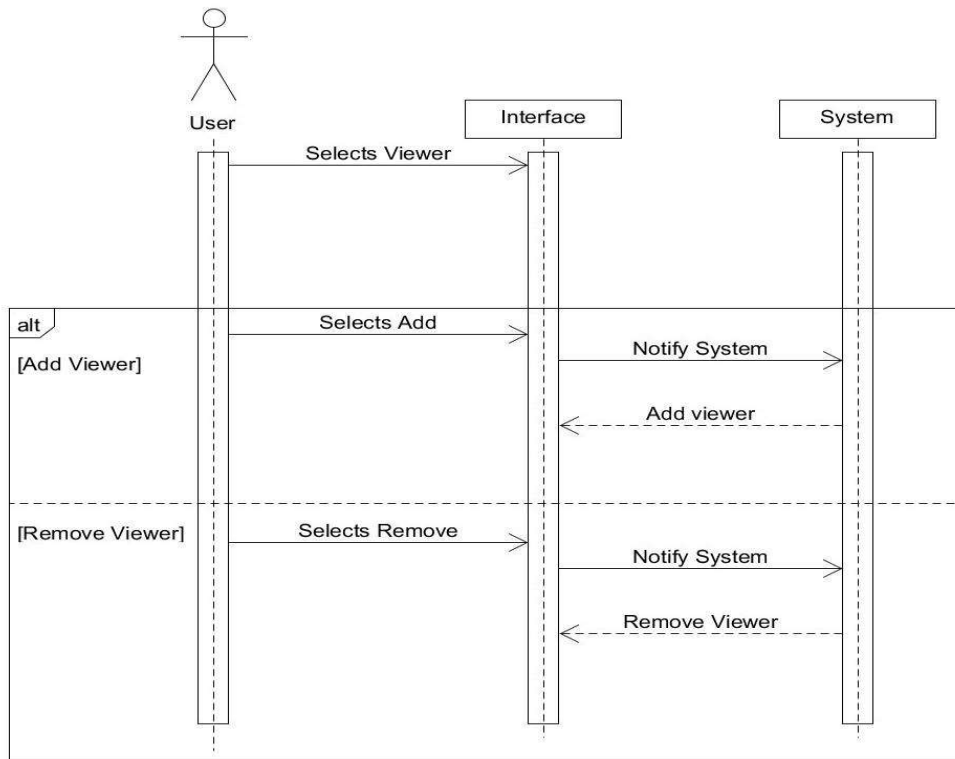
4.1.3 Sequence Diagram for Use Case 3:



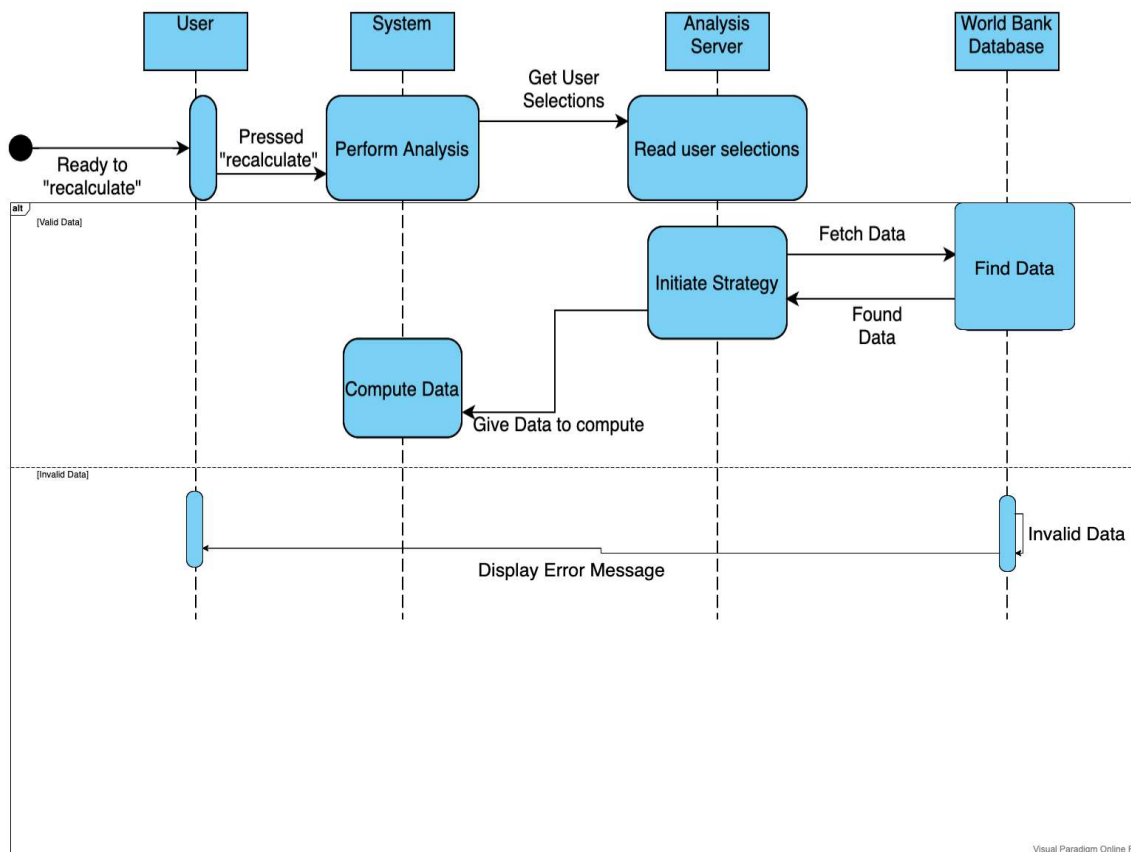
4.1.4 Sequence Diagram for Use Case 4:



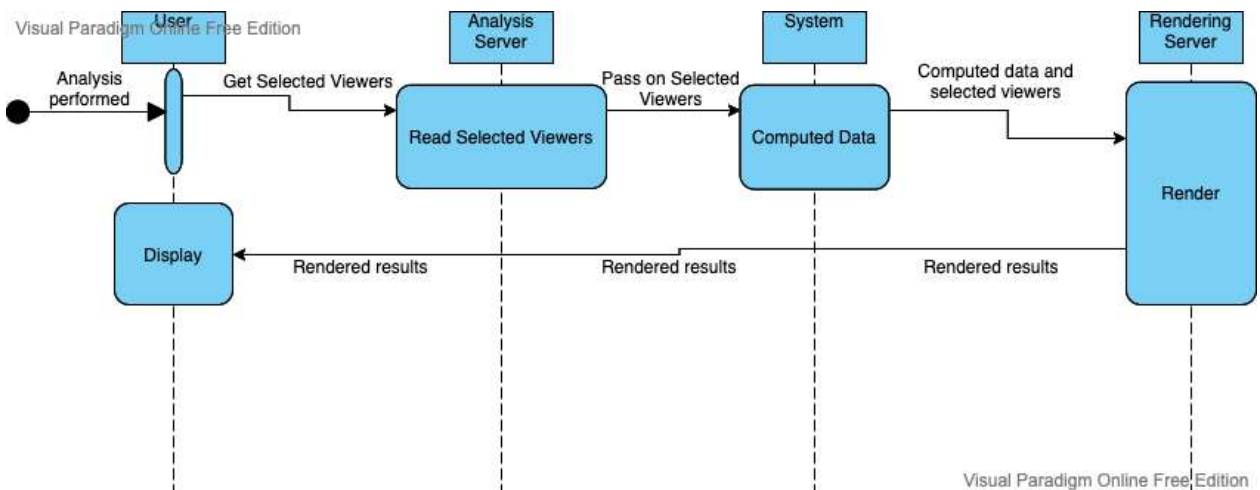
4.1.5 Sequence Diagram for Use Case 5 & 6:



4.1.6 Sequence Diagram for Use Case 7:

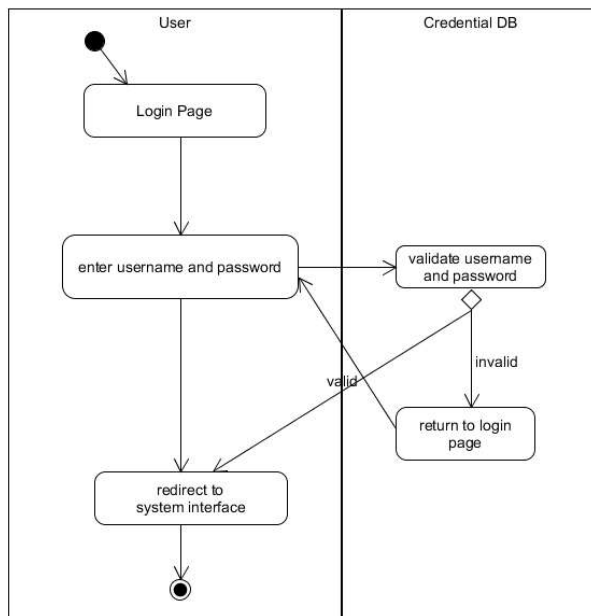


4.1.7 Sequence Diagram for Use Case 8:

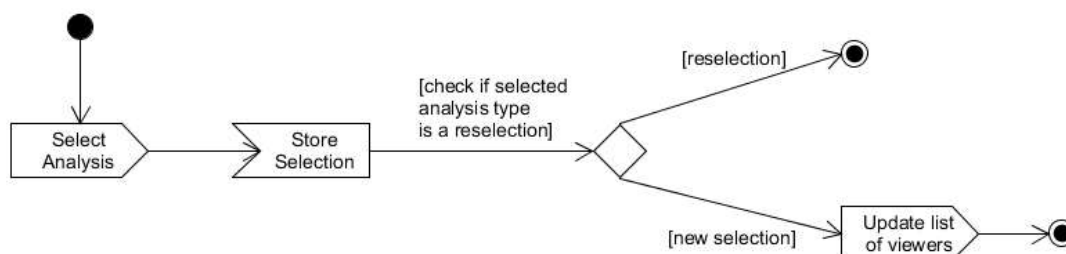


4.2 Activity Diagrams

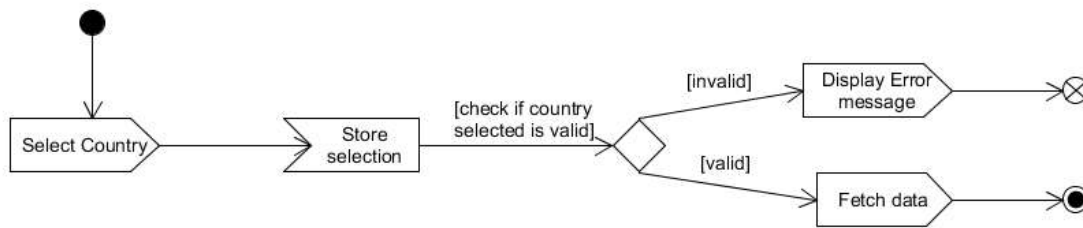
4.2.1 Activity Diagram for Use Case 1:



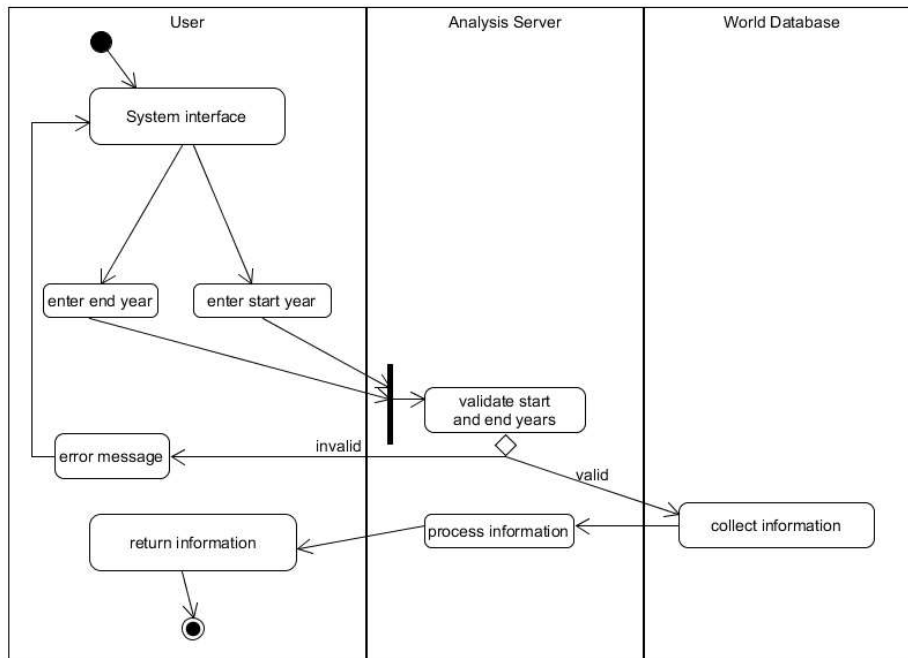
4.2.2 Activity Diagram for Use Case 2:



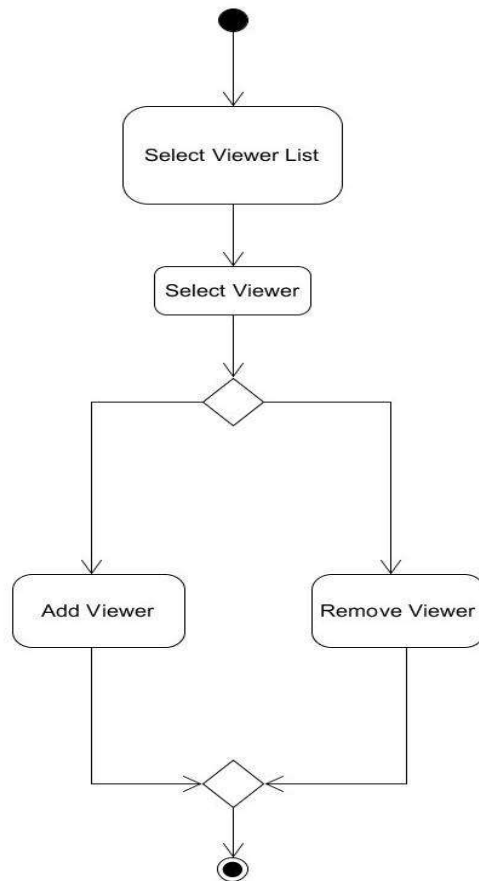
4.2.3 Activity Diagram for Use Case 3:



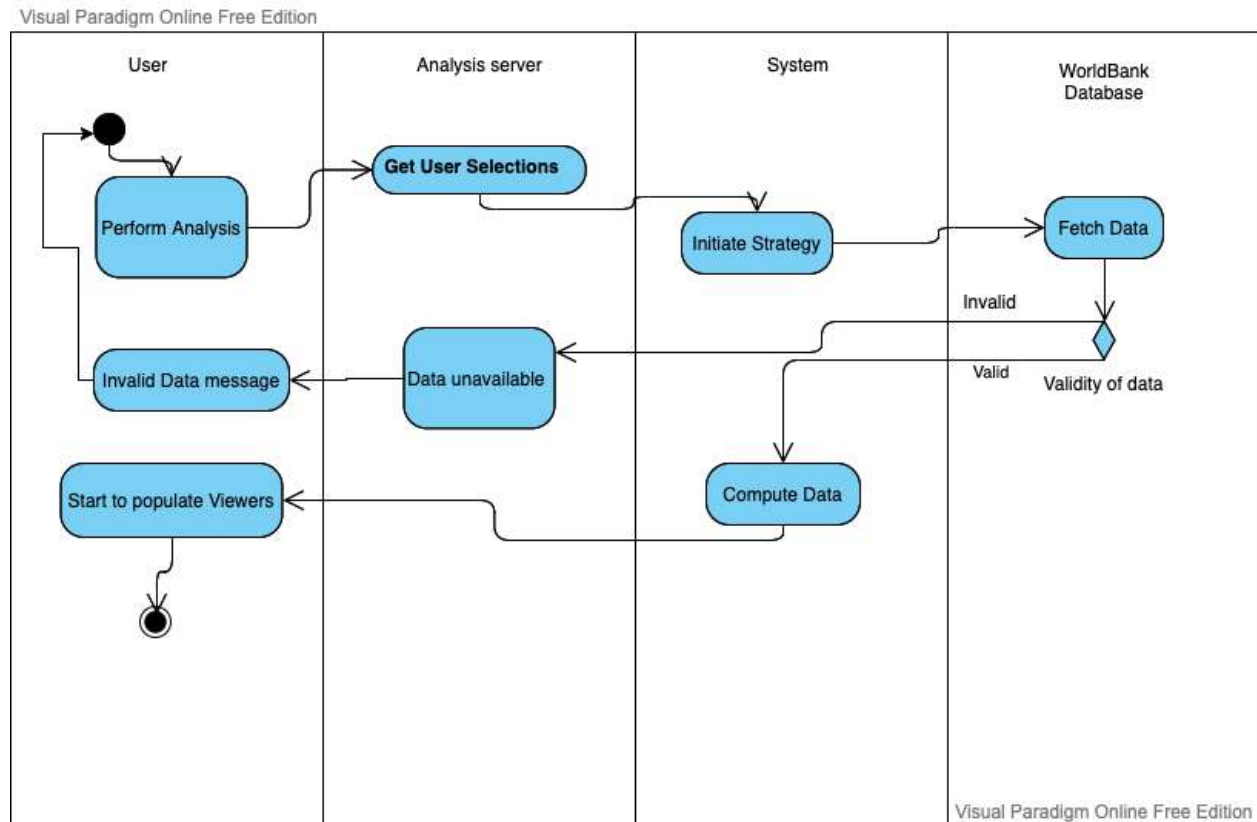
4.2.4 Activity Diagram for Use Case 4:



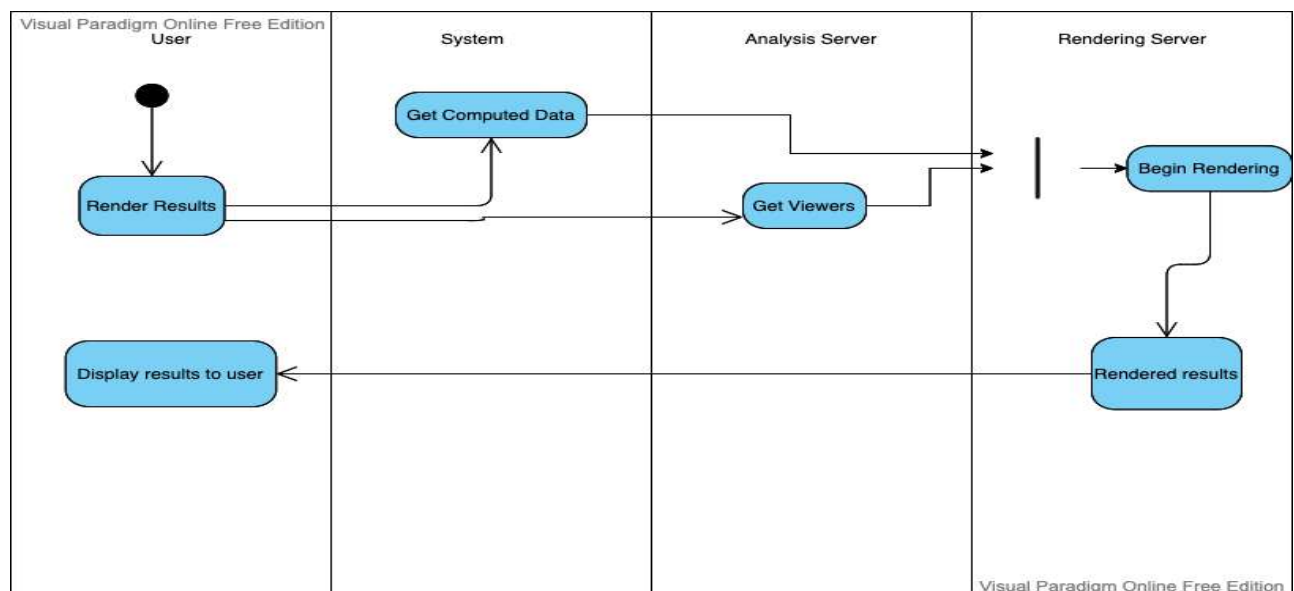
4.2.5 Activity Diagram for Use Case 5 & 6:



4.2.6 Activity Diagram for Use Case 7:



4.2.7 Activity Diagram for Use Case 8:



5 Non-Functional Requirements Specification

Authentication for user login.

UI Frameworks for System interface.

5.1 Overview

5.2 Enabling Technologies

5.2.1 Target Hardware & Hardware Interfaces

Where a requirement exists for a specific hardware environment to be used to deliver the system, detail the requirements.

This should specify the logical characteristics of each interface between software product and the hardware components of the system. It also covers such matters as what devices are to be supported, how they are to be supported, and protocols. For example, terminal support may specify full screen support as opposed to line by line.

5.2.2 Target Development Environment

Where a requirement exists for the system to be developed using specific platforms, software and tools, state the requirement.

5.2.3 System Interfaces

Due to deployment requirements, specific system interfaces may be required (eg. “the business cannot deliver service X if the new system does not talk to System B”). If these are known, state them. Focus on the enabling technology aspect of these connections.

Where specific technology must be used, document the requirements.

The account should list each system interface and identify the functionality of the software to accomplish the system requirement and the interface description to match the system.

5.3 Capacity Planning

5.3.1 Permanent Storage

What are the expected requirements with respect to permanent storage? What volume of data is to be held?

5.4 Network

What are the networking requirements? Explore these requirements in as much detail as possible.

5.5 Workstations

Explore the requirements for a workstation by covering the following subjects:

- *Diskspace*
- *Performance*
- *Memory*
- *Screen attributes*
- *Processor requirements*
- *Interfaces.*

5.6 Operational Parameters

5.6.1 Useability

Discuss the useability requirements for the new system. How understandable, learnable and operable is the new system to be?

5.6.2 Reliability

Discuss the requirements which respect to the level of reliability that is expected with the new system.

In particular, consider the following section on the recoverability requirements for the new system.

Recoverability & Backup

Describe the backup and recovery requirements for the system.

Restart

Describe the requirements for restarting the system after a temporary problem in the system hardware or software.

5.6.3 Maintainability

Explore the maintainability requirements for the new system. How easy should it be to analyse it, change it and test it?

What criteria will be used to measure the stability of the system?

5.6.4 Portability

*Review the requirements of the system in terms of portability. Consider how *adaptable*, *installable*, and *replaceable* the system is to be.*

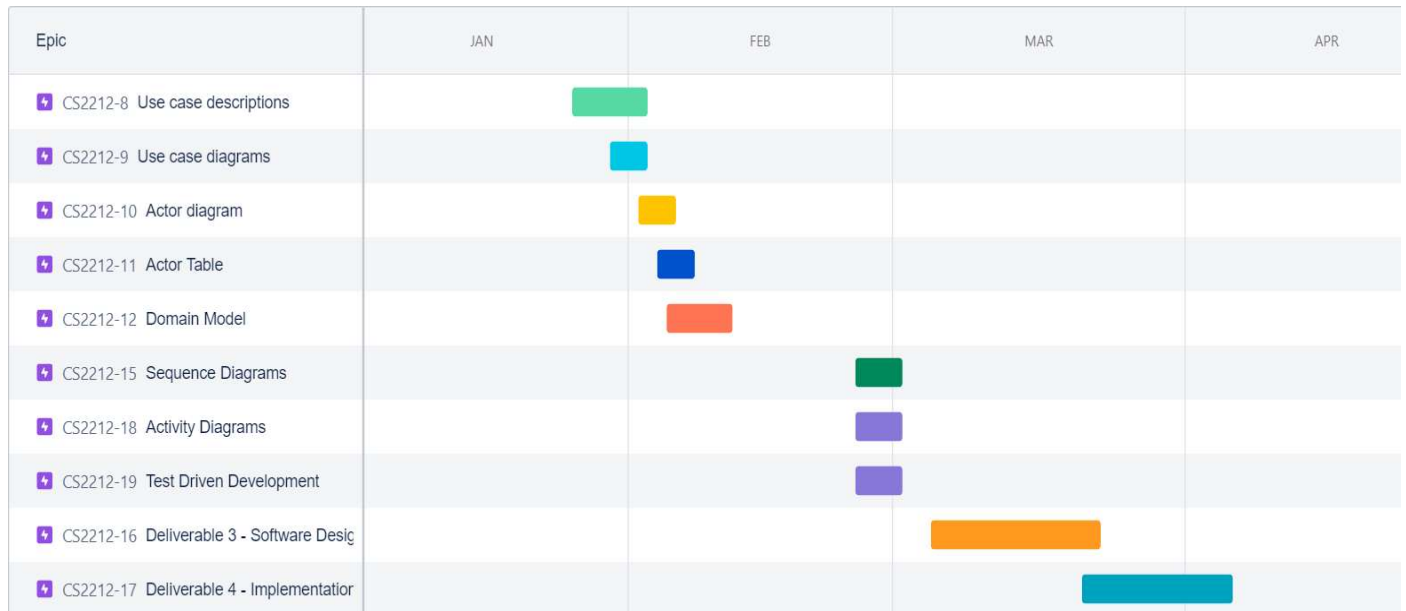
Should the system conform to any portability standards?

The section should specify the attributes of software that relate to the ease of porting the software to other host machines and/or operating systems. This may include:

- *Use of proven portable languages*
- *Use of a particular compiler or language subset*
- *Use of a particular operating system.*

6 Activities Plan

6.1 Gantt Chart



6.2 Project Backlog and Sprint Backlog

- 1) Perform the Analysis
- 2) Select the analysis type
- 3) Select the country
- 4) Select the years
- 5) Display the results
- 6) Adding/Removing visual graphics
- 7) User logs into the system

6.3 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	Issues Discussed / Resolved
all	Jan 13	Exchanged contact info
all	Jan 22	Created jira to split tasks and srs doc for collaborative work
Maram Abubaker Ahmer , Brendan Kyle Bain	Feb 3	Reviewed use case 1, 3, & 4 Created Project backlog
all	Feb 5	Reviewed use cases and the actor diagram. Created gantt chart
all	Feb 6	Complete use cases, create domain model
all	Feb 8	Finalize SRS document, go over any final edits and submit deliverable 1

all	March 1	Assemble all sequence and activity diagrams, fix use case diagrams, submit deliverable 2
-----	---------	--

7 Test Driven Development

Test ID	Test 1
Category	User Logs into the system successfully
Requirements Coverage	UC 1 Successful User Login
Initial Condition	The login system has been initialized, and the credential database and server are correctly implemented
Procedure	<ol style="list-style-type: none"> 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 login form closes, and the user has access to the system
Notes	The user should provide a username and password in lower case, only using alphanumeric characters and no special symbols.

Test ID	Test 1.2
Category	User is unsuccessful in system login
Requirements Coverage	UC1 Unsuccessful User Login
Initial Condition	The login system has been initialized, and the credential database and server are correctly implemented

Procedure	<ol style="list-style-type: none"> 1. The user selects login 2. The user provides a user name 3. The user provides a password 4. The user attempts to log into the system, either the username or password are incorrect 5. The system prompts the user to input a correct username and password
Expected Outcome	The login form prompts the user to provide a correct username and password combination
Notes	

Test ID	Test 5.1
Category	Use Case 5: User Adds a Viewer
Requirements Coverage	Use Case 5: Viewer is added successfully
Initial Condition	The user is logged in and has selected an analysis and a country and years for the analysis to be performed on.
Procedure	<ol style="list-style-type: none"> 1. The user selects a viewer from the list. 2. The user selects the add button to add the viewer.
Expected Outcome	The viewer is successfully added to the User Interface.
Notes	

Test ID	Test 5.2
Category	Use Case 5: User Adds a Viewer
Requirements Coverage	Use Case 5: Viewer is not compatible with chosen analysis.

Initial Condition	The user is logged in and has selected an analysis and a country and years for the analysis to be performed on.
Procedure	<ol style="list-style-type: none"> 1. The user selects a viewer from the list. 2. The user selects the add button to add the viewer.
Expected Outcome	The user is notified with a message stating that the viewer is not compatible with chosen analysis.
Notes	

Test ID	Test 6.1
Category	Use Case 6: User Removes a Viewer
Requirements Coverage	Use Case 6: Viewer is removed successfully
Initial Condition	The user is logged in and has selected an analysis and a country and years for the analysis to be performed on.
Procedure	<ol style="list-style-type: none"> 1. The user selects a viewer from the list. 2. The user selects the remove button to remove the viewer.
Expected Outcome	The viewer is successfully removed from the User Interface.
Notes	

Test ID	Test 6.2
Category	Use Case 6: User Removes a Viewer
Requirements Coverage	Use Case 6: Viewer is not deployed.
Initial Condition	The user is logged in and has selected an analysis and a country and years for the analysis to be performed on.

Procedure	1. The user selects a viewer from the list. 2. The user selects the remove button to remove the viewer.
Expected Outcome	The user is notified with a message stating that the viewer is not deployed onto the interface.
Notes	

8 Domain Dictionary (optional and as required)

8.1 Terms and Abbreviations

Term	Definition