



## **AICULUS DASHBOARD**

## **TECHNICAL REPORT**

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Version 01.04

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## DOCUMENT CONTROL

Version #	Implemented By	Implementation Date	Reviewed By	Approval Date	Reason
V1.0	Team	01/10/2018	Project team	05/10/2018	Initial Draft
V1.1	Team	19/10/2018	Project team	20/10/2018	Amended the test case table
V1.2	Team	21/10/2018	Project team	22/10/2018	User Stories and Sequence diagram
V1.3	Team	26/10/2018	Project team	29/10/2018	Proofreading
V1.4	Team	2/11/2018	Project team	02/11/2018	Update Appendix

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## **1 EXECUTIVE SUMMARY**

AiCULUS dashboard is a web - based project which helps users to view graphical representation of index data for providing trade actions so that the users can easily analyse the data. By the visual representation, users can understand the relationship between data quickly and also understand the trends by which if the product sales are going up or Is the Share A price is going low compared to Share B and C which helps the user to make a decision promptly.

These types of dashboards can also be used to monitor current status of product or data in supermarkets to monitor the product movements, in medical field to monitor the patient's health and in call centers to monitor the current call volume etc.

This Aiculus dashboard is analysing the consumption in different industry which is energy, consumer staples, healthcare etc. That is, if we consider Energy then how much growth in there in the sector in the energy consumption will be analysed and represented in a graph.

After the analysis, the data is represented in different ways:

- GICS Sector
- Region weights
- Country weights
- VMQ Score
- Top ten holdings for Portfolio
- and also daily or monthly or yearly analysis of data is compared with the index data.

The main deliverables of the project are:

- Backend
- Frontend
- Customer Interface
- Unified web-based solution
- Database system

## **2 INTRODUCTION**

### **2.1 PROJECT OBJECTIVE**

The project is to develop a graphical dashboard which shows visual representation of current performance, as well as trends of products by analysing the data. This will eliminate the complexity of understanding the data and strike attention to important information. The users can view the monthly trends of their products like shares, stocks and also customise their view to daily or to yearly which will compare the data of two years. Different types of charts like line or bar charts will be used for the representation. The data will be read from an excel file and also will be connected to more databases like SQL. The dashboard will be deployed in Google Engine.

The scope and objective of the project is as follows:

- To develop web- based dashboard.
- Analysis the data from the excel and represent using bar chart.

### **2.2 SPRINT RELEASE**

Sprint of the project is

Sprint 1: Setting up the environment.

Sprint 2: Design the web page.

- Display six graphs in the Index page (Pie, Bar, Line representation)
- Reading mock data from excel file using GoLang

Sprint 3: Graphical representation using excel data. (Mock data)

Hide the Menu bar.

Represent whole data in one page without scrolling.

Sprint 4: Changes in Index Page

- Display 3 graphs
  - GICS Sector
  - Country Weight
  - Regional Weight
- VMQ Score Table
- Line chart.

And connected with real data

Sprint 5: In the GICS sector, add toggle with GICS Weight graph

And click on GICS Sector view the details of GICS which include Graph and the table.

Testing of the sprint 5

Sprint 6: Changes in GICS Sector, make two layers.

Home page: Click on GICS Sector

Layer 1: Detail graph of GICS graph, GICS Active graph and table

Layer 2: Click the name of the sector in the GICS table from Layer 1 and it will display the filtered portfolio table of the selected sector.

Change in Index page. Decrease the width of the Line Graph and increase the length and display in the last part of the page.

Documentation and Testing of sprint 6

Sprint 7: Home page: Click on Regional Weight

Layer 1: Detail graph of Regional Weight, Regional Weight Active graph and table

Layer 2: Click the name of the sector in the Regional Weight table from Layer 1 and it will display the filtered portfolio table of the selected sector.

Change in Index page. Decrease the width of the Line Graph and increase the length and display in the last part of the page.

In the index page, add the VMQ table.

Documentation and Testing of sprint 7

Sprint 8: From the index page, if the user clicks VMQ table then the user can view the whole VMQ table and a graph layout with a message to the user "Select the security from the table".

After security is selected the corresponding graph can be seen at the graph layout area.

The validation part while reading the data from excel file.

Documentation and Testing of sprint 8.

Sprint 9: The Country graph have to move to the second layer of regional graph and link to one button "country".

In the index page "Top 10 Holding from Portfolio" has to displayed in a table.

Layer1: It should show details table of Portfolio with bar graph has to display.

## **2.3 STAKEHOLDERS AND USER**

AiCULUS was founded in October 2017 by Omaru Maruatona and is located in Melbourne, Victoria. The main aim of the company is to develop secure technology for the businesses to utilise and take advantage of the new technologies and research findings [1].

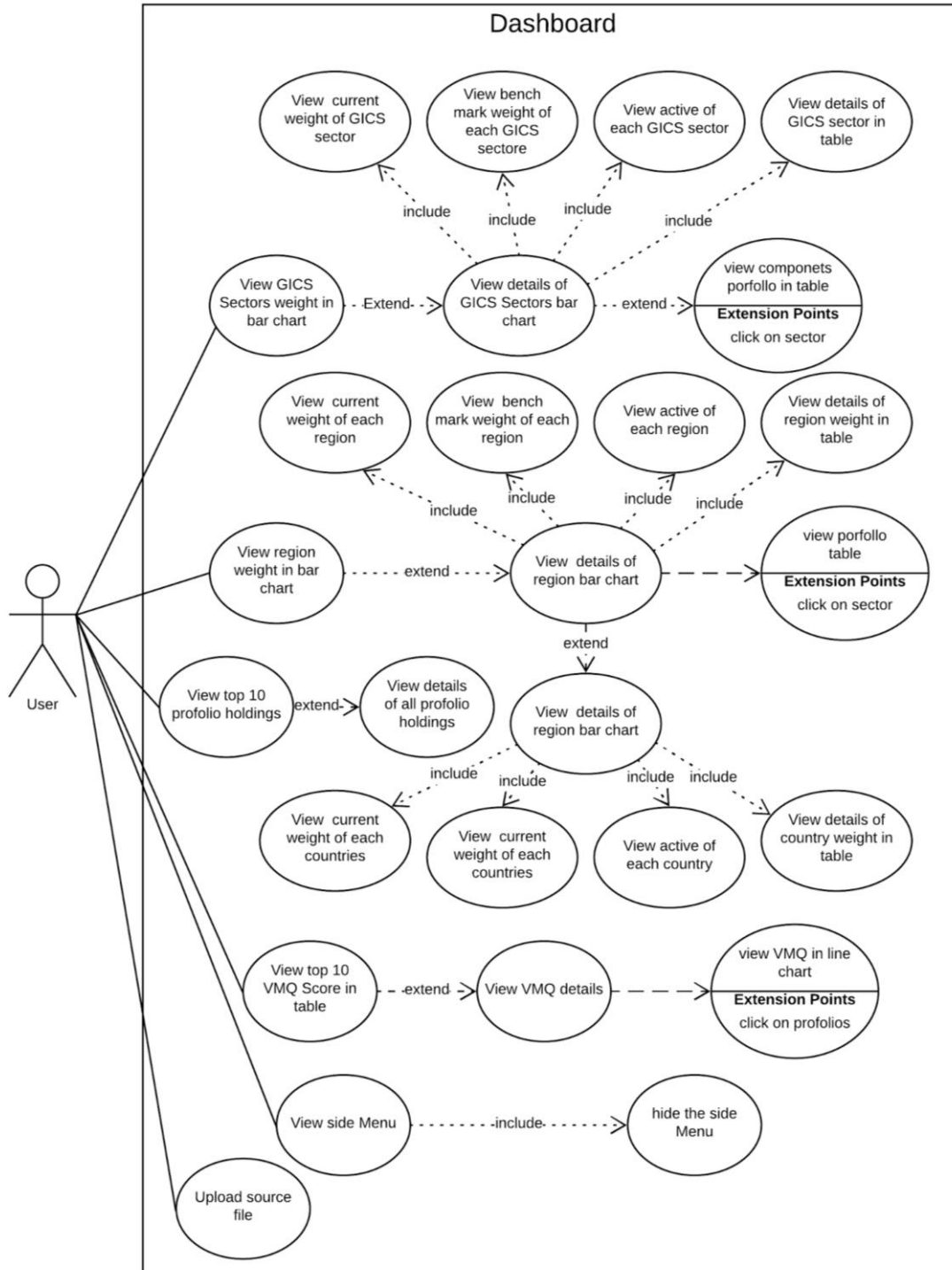
The company specialises in solving problems through risk analysis, Artificial Intelligence and Cybersecurity. The technology developed by the company is based on Business biased AI and Security platformization. The current services provided by the company are Harambi which could be used to identify and secure the API

transactions between businesses and Simba which is an AI Platform where organisations can establish forecasting models [1].

The target users of this project are Money managers, Traders, Portfolio managers.

### 3 REQUIREMENTS

#### 3.1 USE CASE DIAGRAM



**Figure 1: Use case Diagram**

The use case diagram for the Aiculus dashboard. The actors of this system are portfolio managers, traders or money managers. The actors can view securities and their current status

and able to understand the trends. Initially, the user can view the menu, two bar graph, VMQ top 10 table and Top 10 holdings of portfolio and the line graph. From the index page other functions are extended from there to give more details of the index tables and graph.

### 3.2 USER STORIES

Feature/Epic Name: FR1 GICS graph			
ID: Name	Bar chart Display	Priority	High
<b>As a user</b> <b>I want</b> to have a bar chart to display the holding portfolios under each GICS sector <b>So that</b> I can see weight of holding portfolios under each sector			
Acceptance Criteria:			
AC1: Verify that the bar chart shows three letters which short of each GICS sector			

**Table 1: Bar chart Display**

Feature/Epic Name: FR1 GICS graph			
ID: Name	Benchmark Display	Priority	High
<b>As a user</b> <b>I want</b> to view both current and benchmark for holding portfolios under each GICS sector <b>So that</b> I can active of holding portfolios of each GICS sector			
Acceptance Criteria:			
AC1: Verify that the bar chart shows both portfolio and benchmark			

**Table 2: Benchmark Display**

Feature/Epic Name: FR2 Regional graph			
ID: Name	Bar chart Display	Priority	High
<b>As a user</b> <b>I want</b> to have a bar chart to display the holding portfolios under each Region <b>So that</b> I can see weight of holding portfolios under each Region			
Acceptance Criteria:			
AC1: Verify that the bar chart shows data of five given regions			

**Table 3: Bar chart Display**

Feature/Epic Name: FR2 Regional graph			
ID: Name	Benchmark Display	Priority	High
<b>As a user</b> <b>I want</b> to view both current and benchmark for holding portfolios under each Region <b>So that</b> I can active of holding portfolios of each Region			
Acceptance Criteria:			
AC1: Verify that the bar chart shows both portfolio and benchmark			

**Table 4: Benchmark Display**

Feature/Epic Name: FR3 Top 10 VMQ Table			
ID: Name	Display	Priority	High
<b>As a User</b> <b>I want</b> to view a table shows the 10 holding portfolios with best ten VMQ score <b>So that</b> I can easily identify the items with most value			
Acceptance Criteria:			



AC1: Verify that the table shows rank, V score M score, Q score, and VMQ score of each portfolio  
 AC2: Verify that the positive score shows as green colour and the negative score shows as red colour  
 AC3: Verify that the table shows the data of 10 portfolios

**Table 5: Display\_ Top 10 VMQ Table**

Feature/Epic Name: FR4 Top 10 portfolios Table			
ID: Name	Display	Priority	High
<b>As a User</b> <b>I want</b> to view a table shows the 10 holding portfolios with best ten VMQ score <b>So that</b> I can easily identify the items with most value			
Acceptance Criteria:			
AC1: Verify that the table shows rank, V score M score, Q score, and VMQ score of each portfolio AC2: Verify that the positive score shows as green colour and the negative score shows as red colour AC3: Verify that the table shows the data of 10 portfolios			

**Table 6: Display\_ Top 10 portfolios Table**

Feature/Epic Name: FR5 Upload File			
ID: Name	Upload	Priority	Medium
<b>As a user</b> <b>I want</b> to upload the file through a website <b>So that</b> I can update the latest daily data to the server			
Acceptance Criteria:			
AC1: Verify that the upload only accepts csv file AC2: Verify that the upload will validate the data file			

**Table 7: Upload**

### 3.3 FUNCTIONAL REQUIREMENTS SPECIFICATION

Req. ID	Description	Priority	UC covered
FR1	The user shall able to view a menu bar, 2 bar graphs which are GICS sector and Region Weight bar chart, 2 Tables which are Top 10 VMQ and Top 10 Holdings from portfolio and 1 Line chart showing the index change over a period.	High	Yes
FR1.1	The user shall click the GICS sector bar chart and then the user can view the detailed GICS bar graph, GICS Active bar graph and the Table.	High	Yes
FR1.1.1	The User shall click each sector in the GICS table then can view the filtered portfolio table of selected sector.	High	Yes
FR1.2	The user shall click the toggle slide switch in the GICS Sector Bar graph to view the GICS Active bar graph.	Low	Yes
FR2	The user shall able to view the regional weight graph	High	Yes
FR2.1	The user shall click the regional weight graph, then can view the detailed regional weight graph and regional active graph and the corresponding table.	High	Yes
FR2.1.1	The user shall click the region in the table and see the detailed portfolio of selected	High	Yes

	region in the table.		
FR2.2	The user can able to click the button named "Country" from the layer 2 of the regional graph and have to view the detailed graph representation of country weights and country active and the details in the table.	High	Yes
FR2.2.1	The user can able to select one country from the table and can able to see that country's holding details in the next layer.	High	Yes
FR3	The user shall able to view the Top 10 VMQ Table.	High	Yes
FR3.1	The user can able to click the Top 10 VMQ table and able to view the detailed table in the layer 2 and also display a text "Select one security from the table"	High	Yes
FR3.1.1	The user can able to select the security from the detailed VMQ table and can able to view the corresponding graph in the right side of the table.	High	Yes
FR4	The user shall able to view the Top 10 Holdings of portfolio.	High	Yes
FR4.1	The user can able to view the link of "details of Holding portfolio" and which will show the details graph and table in the layer 2.	High	Yes

FR5	The user shall able to custom the view of stock value as daily, monthly or yearly basis.	High	Yes
FR6	The user shall able to hide the Menu bar by clicking the option	Low	No
FR7	The user can able to upload the file.	Low	Yes
FR8	The user can sort the tables in the alphabetic order.	Low	No

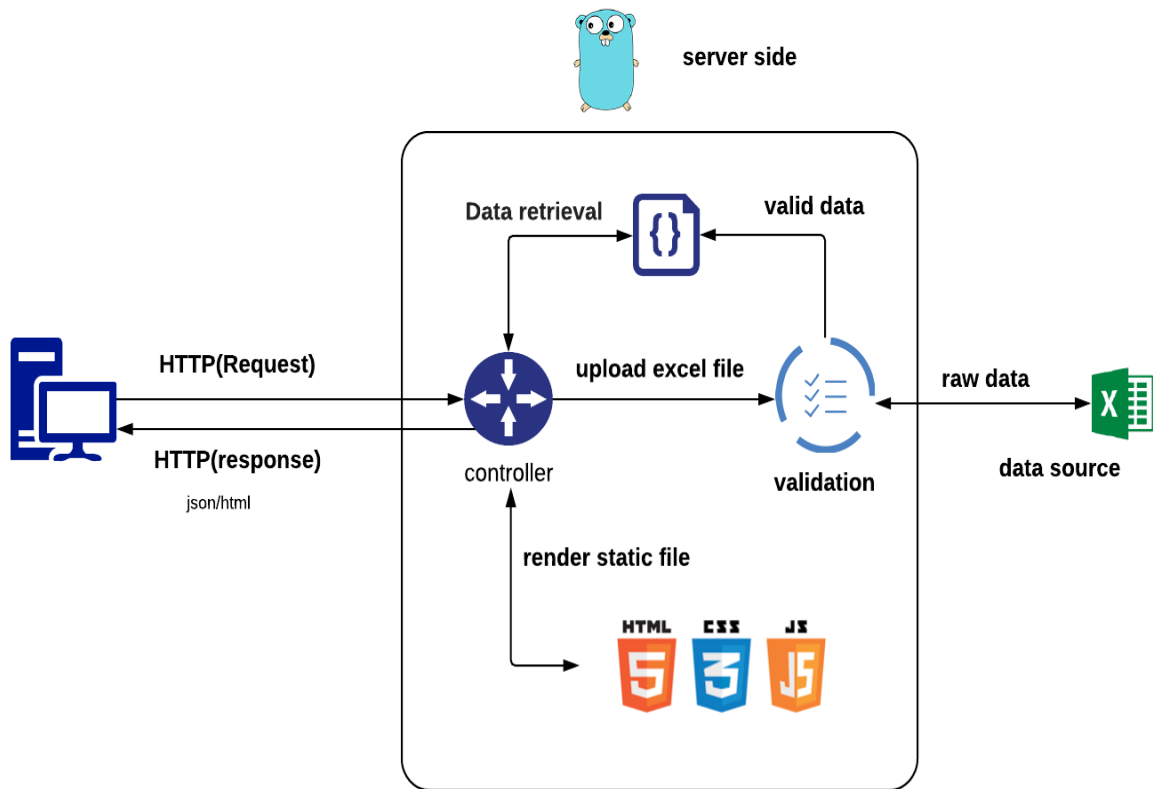
**Table 8: Functional Requirements**

### 3.4 NON-FUNCTIONAL REQUIREMENTS SPECIFICATION

Req. ID	Description	Priority
NFR1	The user can access the system 24/7	High
NFR2	Restricted portability (Desktop access)	Medium

**Table 9: Non-Functional Requirements**

## 4 ARCHITECTURE



**Figure 2: Architecture Diagram**

The raw data is retrieved from the excel file and the data is validate by checking the data format and the missing data. If the data is not in the correct format, then the system will reject and ask user to upload the correct format file. As a second validation, the user checks the data type is correct and is there is any data is missing if data is missing the system ignore the row and make a log and read the next row. After the validation, the data is used to calculate the data and assign the value for different graphs and table. When the user browses the dashboard, the user is viewing the front end which is formed using HTML, CSS and JS. When the user uploads a new data file, the system will check for the file format is xls if the format is wrong then the user is asked to upload the data file in correct format.

## 5 SEQUENCE DIAGRAM

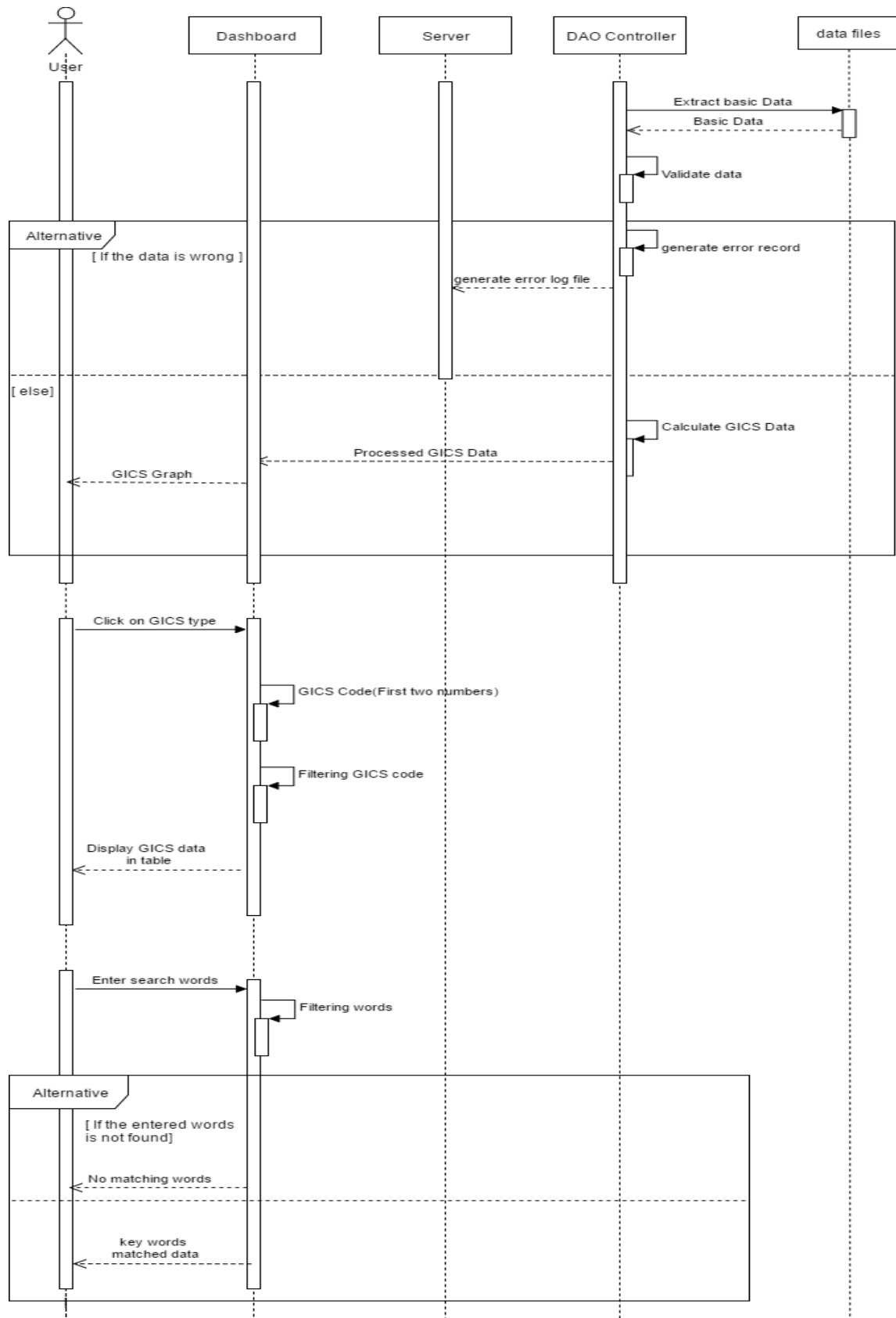


Figure 3: GICS-Sequence Diagram

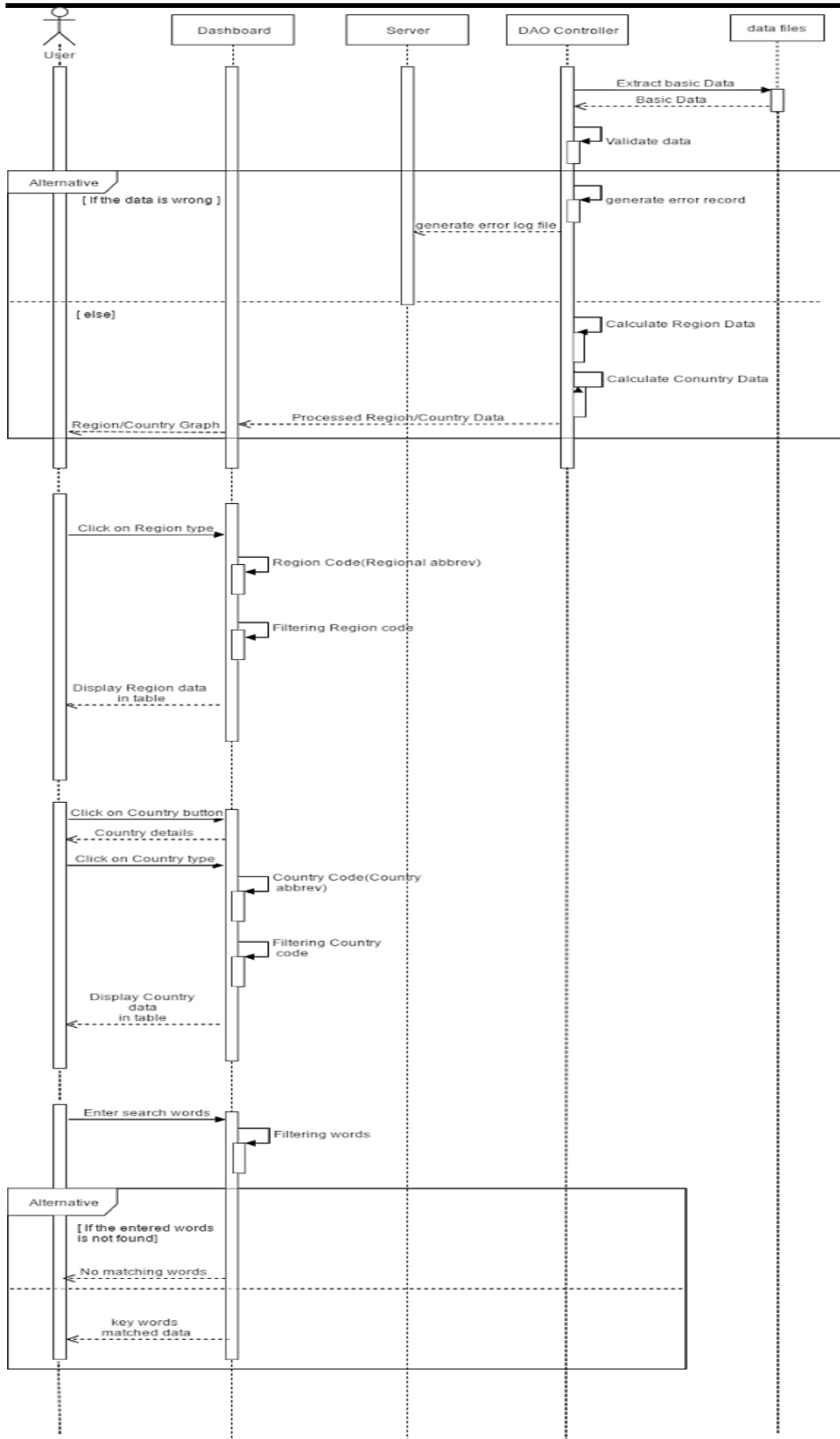


Figure 4: Region-Sequence Diagram

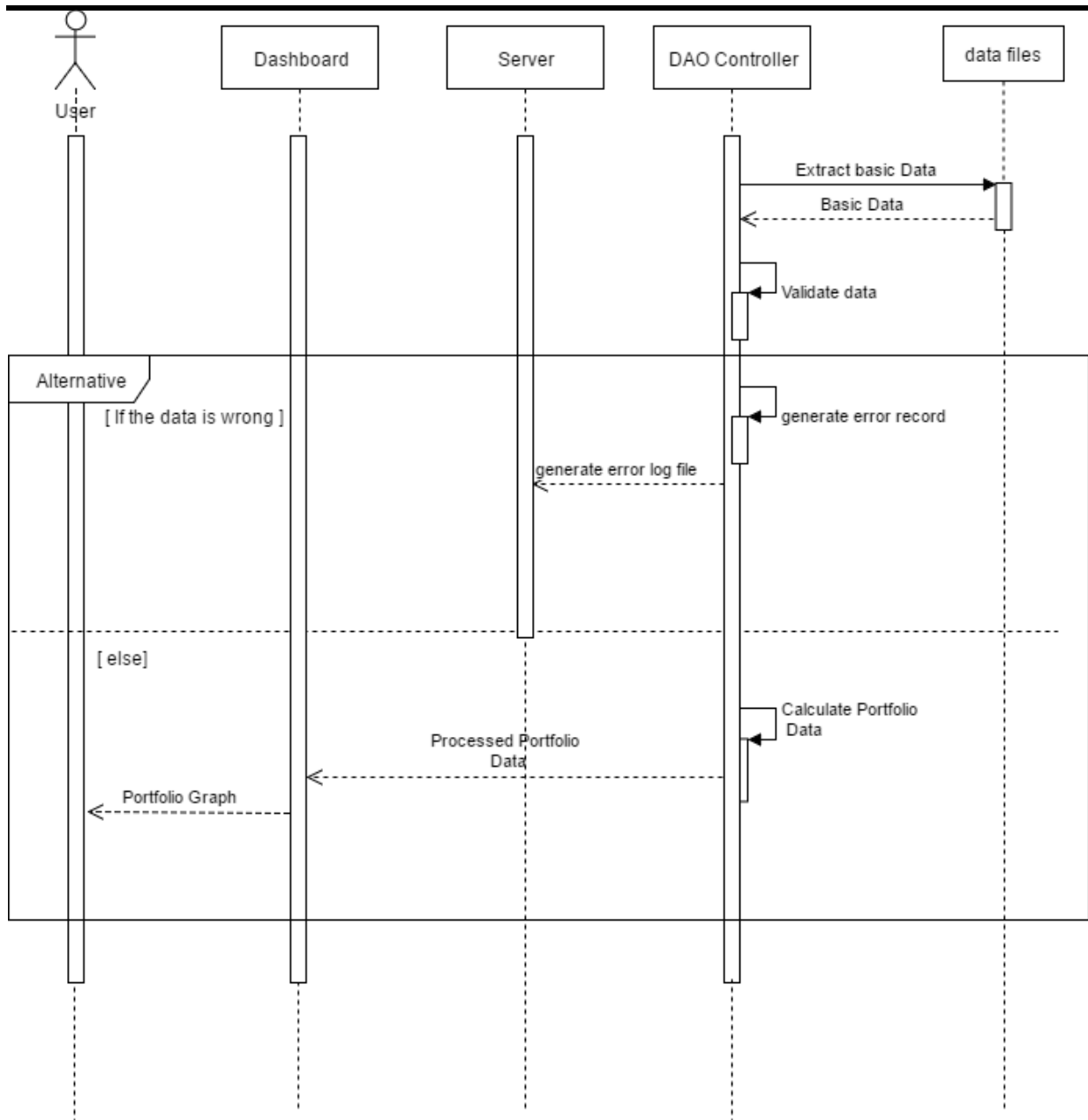


Figure 5: TOP10-Sequence Diagram



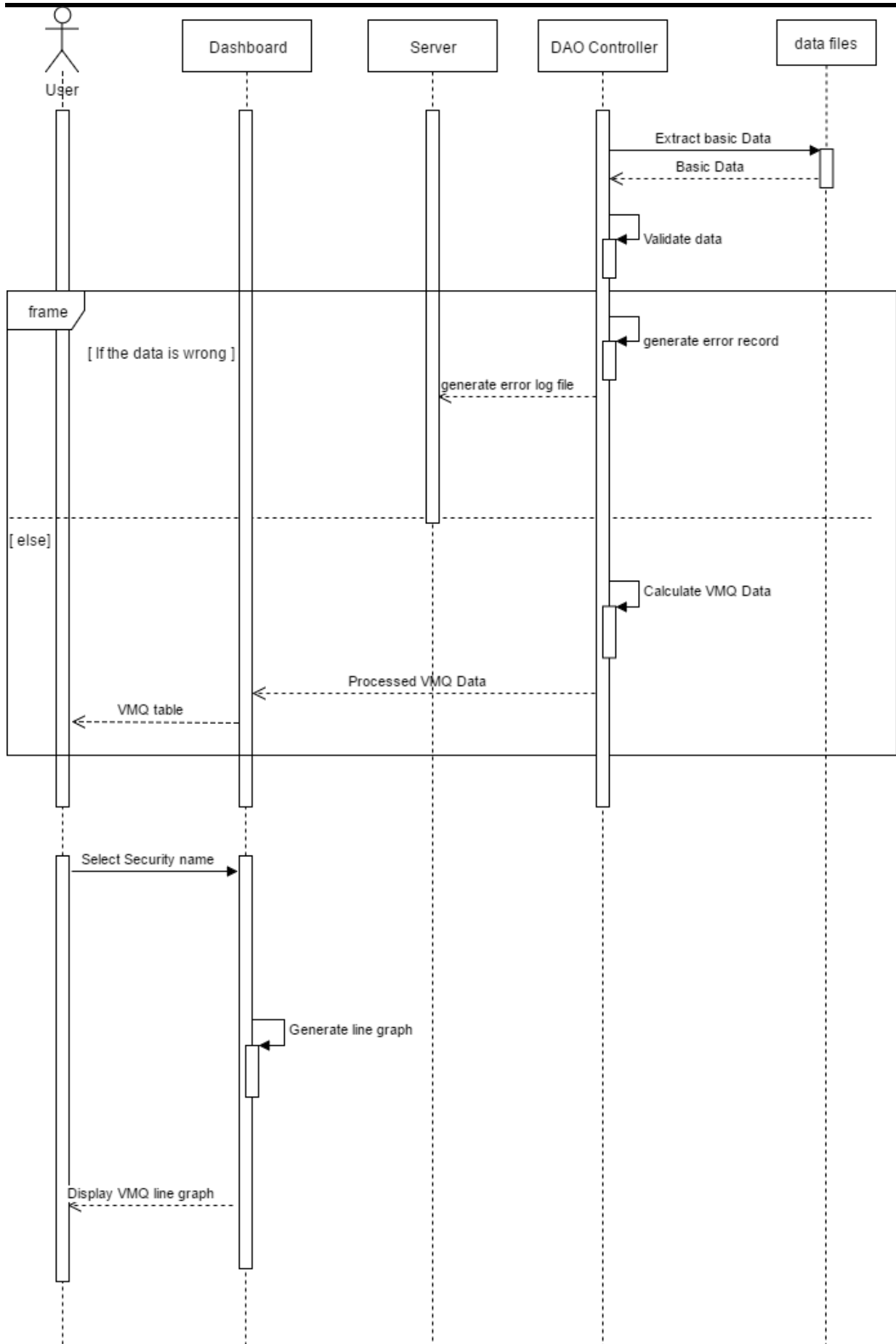


Figure 6: VMQ-Sequence Diagram

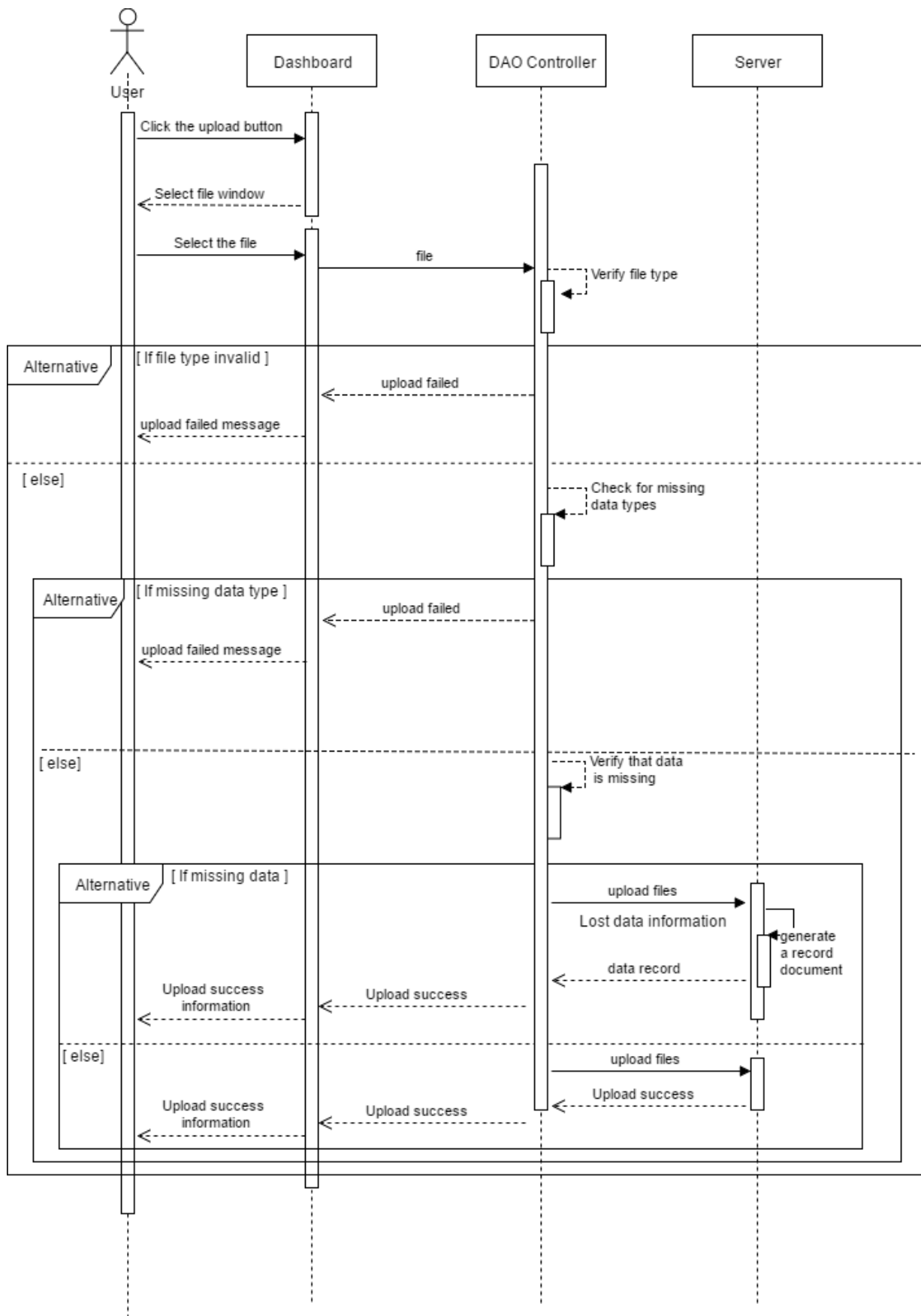


Figure 7: Upload-Sequence Diagram

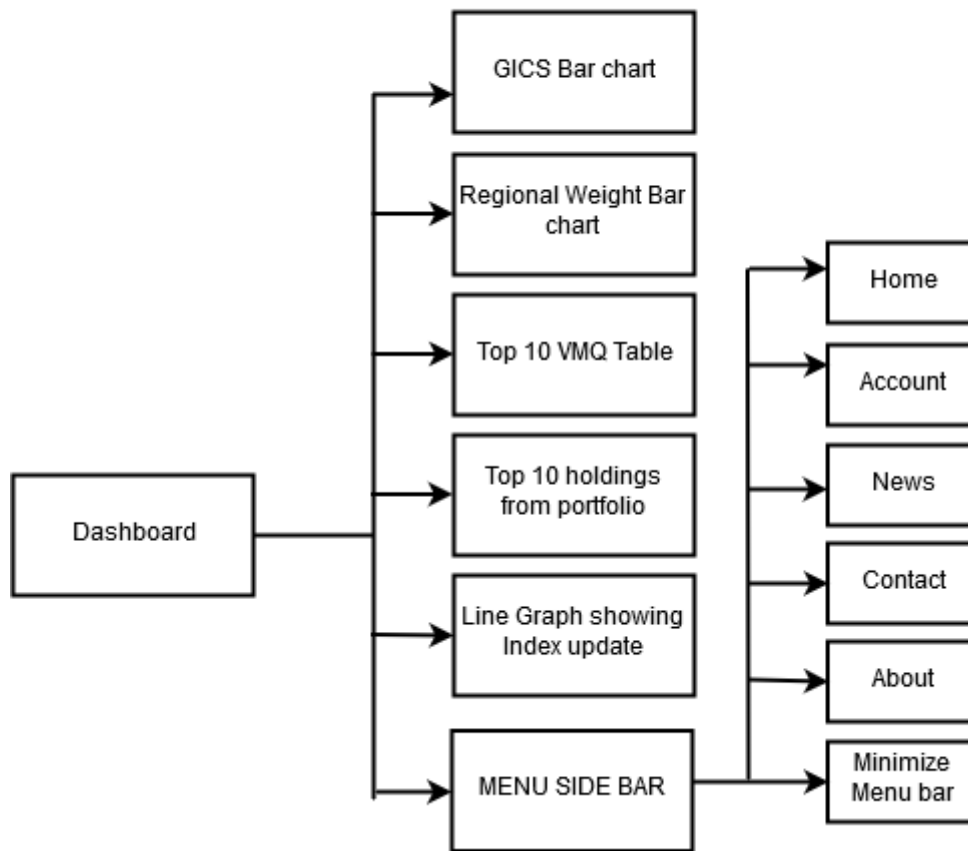
## 6 TECHNICAL FRAMEWORK

The main components of Web application Framework are

- UI - The User Interface or UI is handled by the Bootstrap using CSS, Javascript, HTML5.
- Database - The database used is Excel file
- Web Server- The web server is handled by GoLang.
- Web app framework - Gin from GoLang

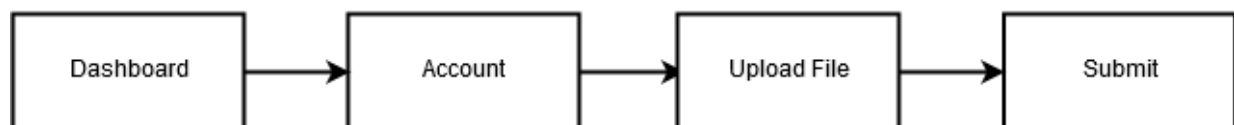
## 7 WORKFLOW DIAGRAM

### AICULUS Dashboard

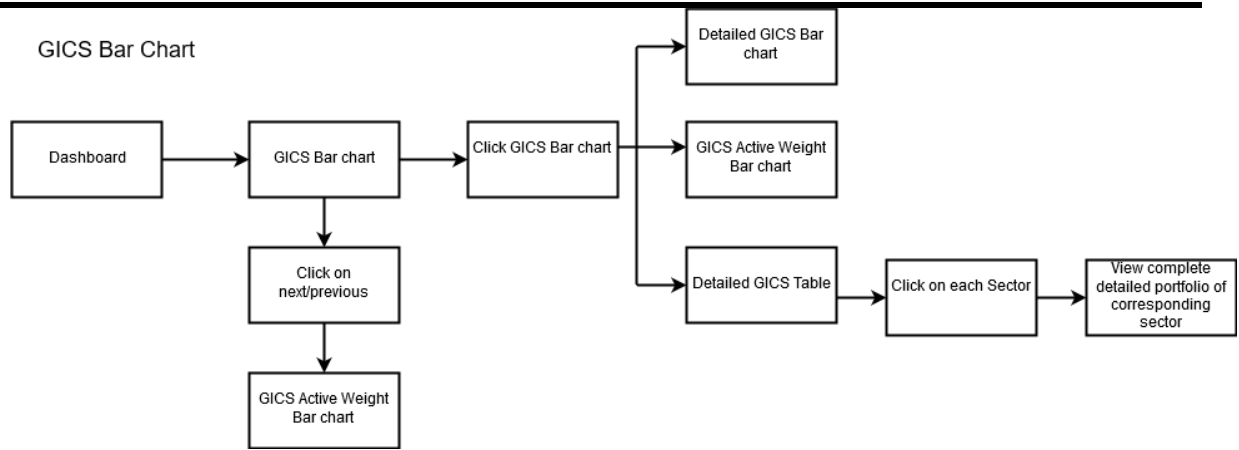


**Figure 8: Dashboard**

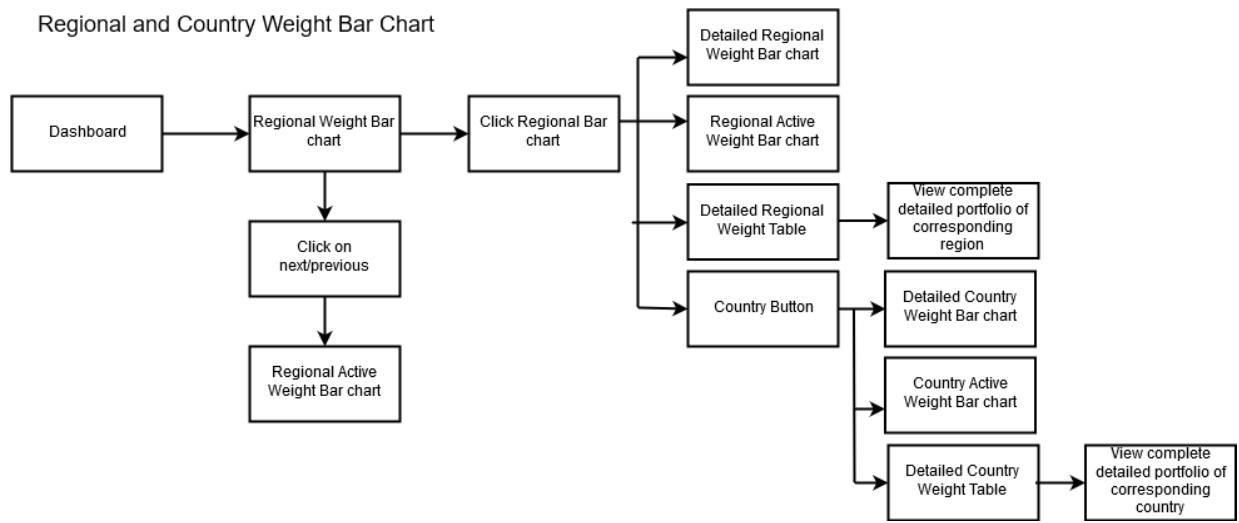
### Upload a File



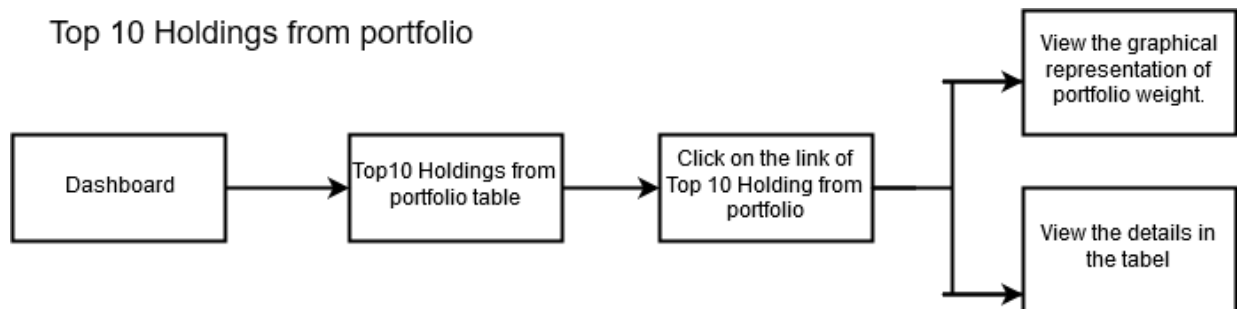
**Figure 9: Upload a File**



**Figure 10: GICS Bar Chart**



**Figure 11: Regional and Country Weight Bar Chart**



**Figure 12: Top 10 Holdings from portfolio**

## VMQ Table

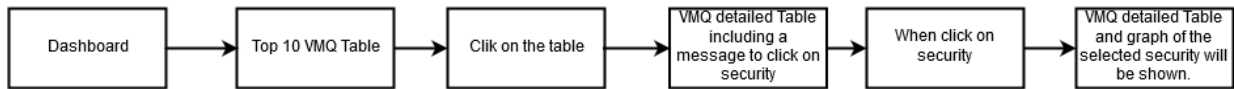


Figure 13: VMQ Table

## 8 IMPLEMENTATION

This is web-based dashboard which is developed using three tier architecture. The web application is developed with HTML 5, CSS, BootStrap, Chart.js, Google Chart and GoLang. The data is retrieved from excel file and to read the excel data the GitHub libraries (Figure 14: Library Excelize [5]) is used for the version control.

["github.com/360EntSecGroup-Skylar/excelize"](https://github.com/360EntSecGroup-Skylar/excelize)

Figure 14: Library Excelize

Gin Library is used as Http web framework to manage the request from client side and also pass the data to the back end. We can transfer the data from frontend to server easily. (Figure 15: Library gin [6]).

["github.com/gin-gonic/gin"](https://github.com/gin-gonic/gin)

Figure 15: Library gin

The index page of dashboard is with two bar graph and two table and one-line chart (Figure 16: Index page).

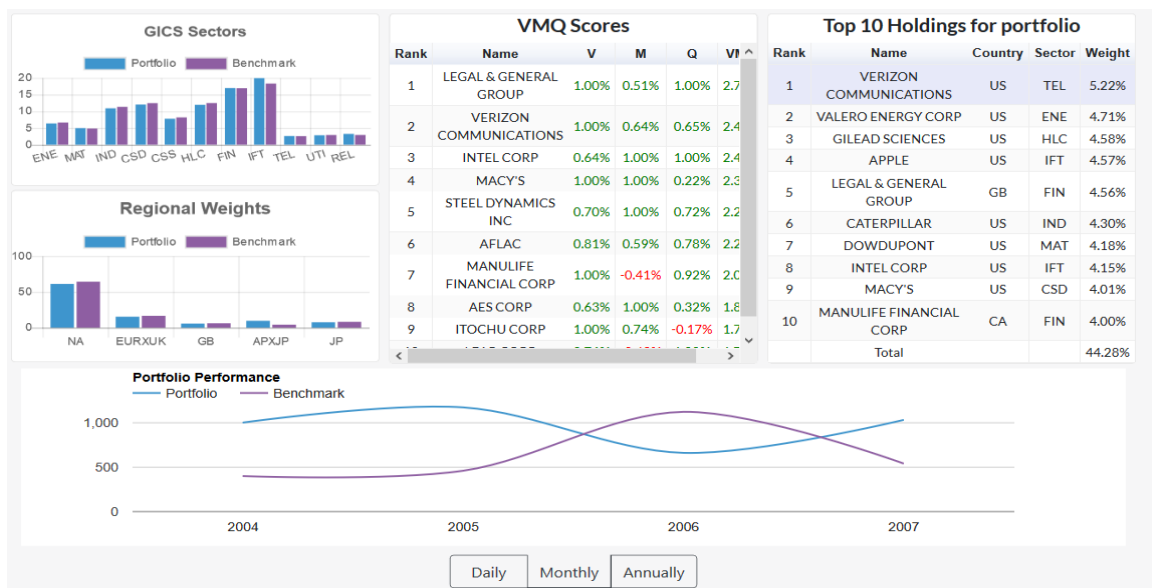
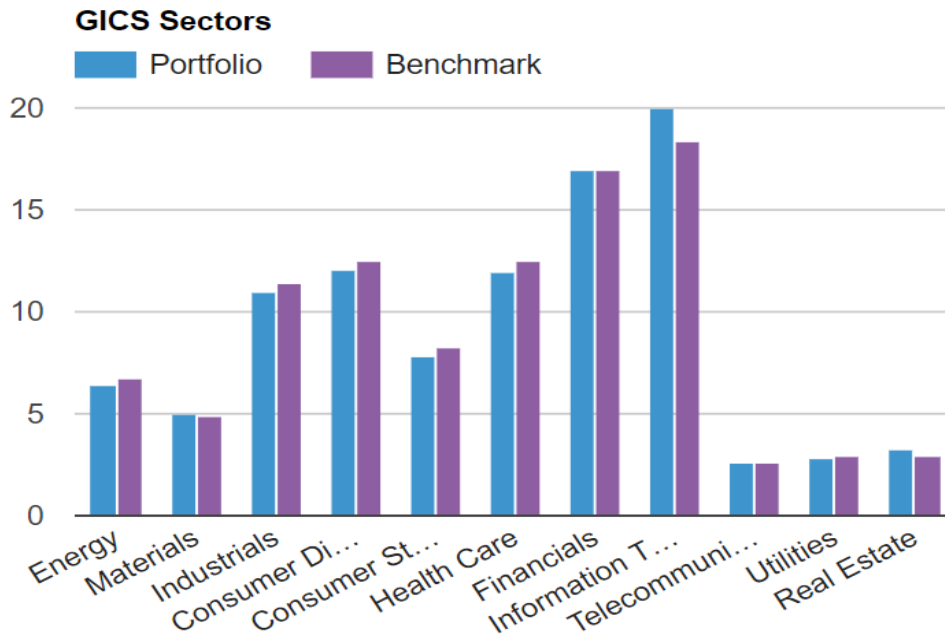


Figure 16: Index page

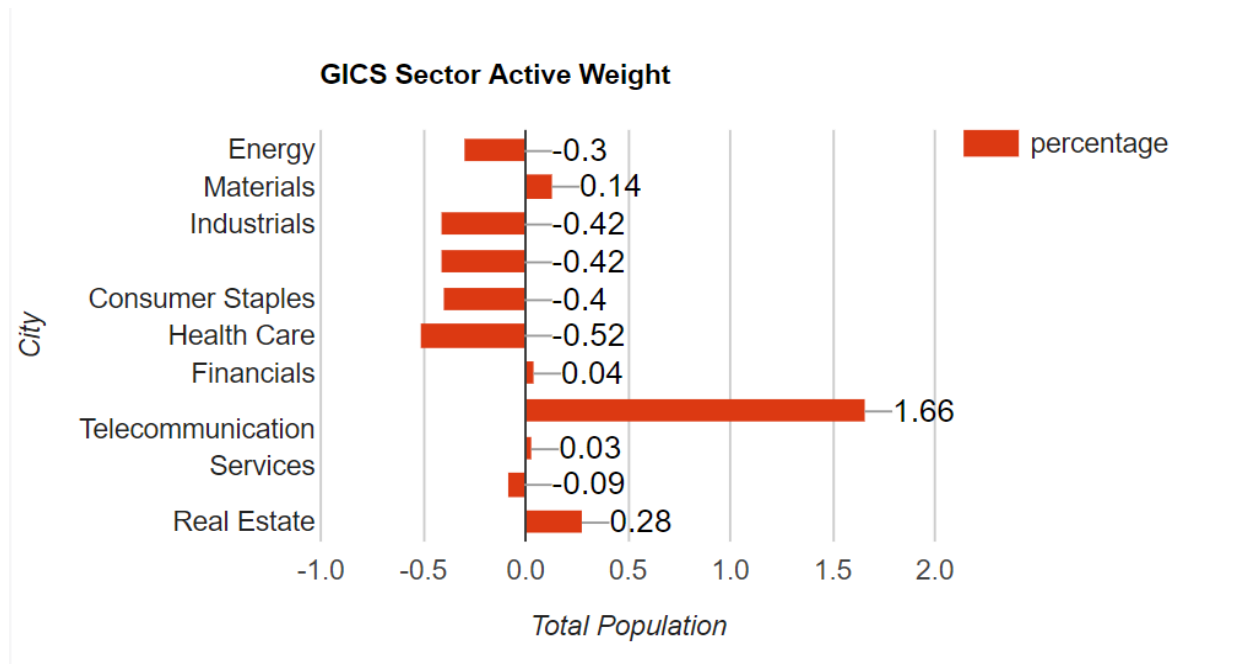
## 8.1 IMPLEMENTATION OF GICS GRAPH

After the data is acquired, the data is separated to different data set to make it easier to read from for different graph. After reading the data, we classified the data into three different types based on three functional requirements. For GICS graph, BuildGICSList() list is called and that list is used for the calculation of benchmark and stock. After the calculation the data is used to represent the graph (Figure 17: GICS Sector Graph).



**Figure 17: GICS Sector Graph**

The percentage of each sector is calculated using Setpercentage function and its used to represent the GICS Active Graph (Figure 18: GICS Active Graph).



**Figure 18: GICS Active Graph.**

The data is read based on the sector and the table is displayed in the next layer of the GICS Sector Graph (Figure 19: GICS Sector Detailed Layer). In the dashboard, the graph is shown in less detailed form and toggle is used to for GICS sector graph so when the user clicks the toggle the user can view the active graph. When the user clicks on the GICS graph on the dashboard the user will go to the next layer and can view detailed graphs and table. The user can also sort the table and custom the table.

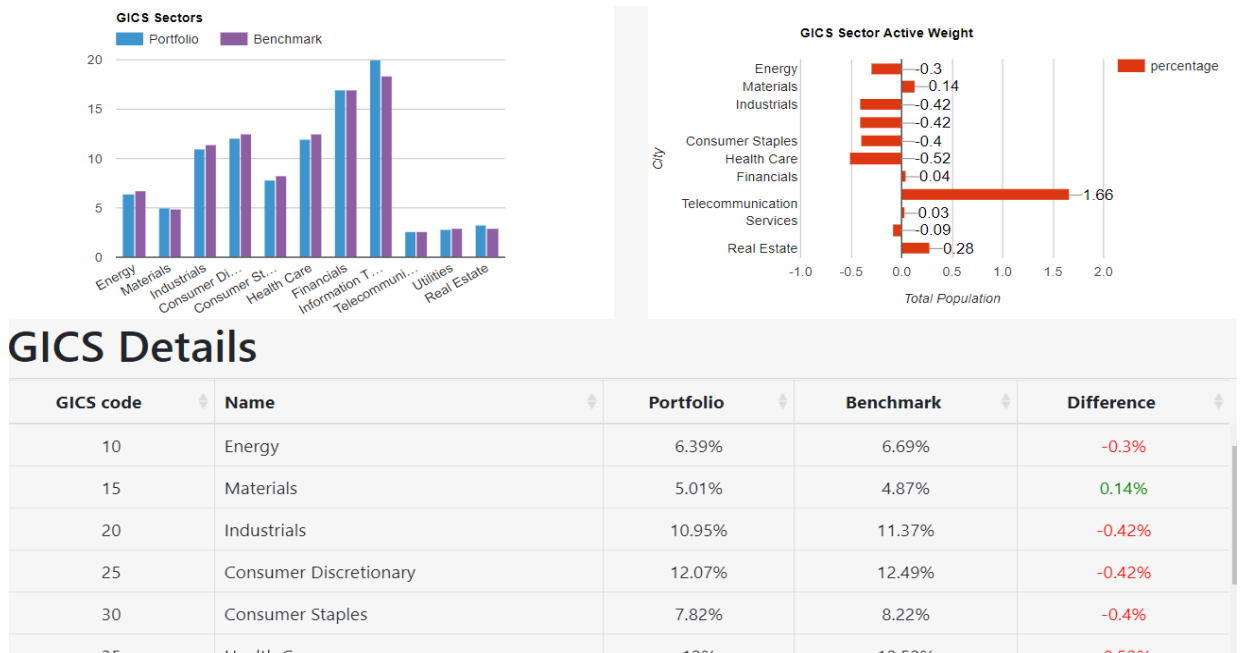


Figure 19: GICS Sector Detailed Layer

Then the user can select any one sector from the table to view the full details of that particular sector in the next layer (Figure 20: Detailed table of Selected sector). Since this table have lot of details the user can use search to find a specific detail.

<div>Search</div>						
Date	ISIN	RIC	Name	isocty	GICS	Portfolio
07-31-18	AU000000CCL2	CCL.AX	COCA-COLA AMATIL	AU	30201030	\$3,609,312,549.04
07-31-18	AU000000TWE9	TWE.AX	TREASURY WINE ESTATES	AU	30201020	\$9,840,967,523.38
07-31-18	AU000000WES1	WES.AX	WESFARMERS	AU	30101040	\$41,689,677,503.75
07-31-18	AU000000WOW2	WOW.AX	WOOLWORTHS GROUP	AU	30101030	\$29,185,834,420.70
07-31-18	BE0974293251	ABI.BR	ANHEUSER-BUSCH INBEV	BE	30201010	\$77,197,590,760.01
07-31-18	BE0974256852	COLR.BR	COLRUYT	BE	30101030	\$3,593,475,117.41
07-31-18	CA01626P4033	ATDb.TO	ALIMENTATION COUCHE B	CA	30101030	\$19,828,562,033.41
07-31-18	CA2918434077	EMPa.TO	EMPIRE CO A	CA	30101030	\$3,574,910,082.17
07-31-18	CA5394811015	L.TO	LOBLAW	CA	30101030	\$10,121,118,574.81
07-31-18	CA59162N1096	MRU.TO	METRO A	CA	30101030	\$8,194,492,910.77
07-31-18	CA8029121057	SAP.TO	SAPUTO	CA	30202030	\$7,736,795,865.08
07-31-18	CA9611485090	WN.TO	WESTON (GEORGE)	CA	30101030	\$4,252,516,736.04
07-31-18	CH00009002962	BARN.S	BARRY CALLEBAUT	CH	30202030	\$3,747,947,482.83

Figure 20: Detailed table of Selected sector

## 8.2 IMPLEMENTATION OF REGIONAL WEIGHT AND COUNTRY WEIGHT

The data for regional and country was retrieved from BuildRegionList. The data is used to calculate CURR\_PORT and MSWLD for region weight graph and the percentage for the region active graph along with the graph the table of regional weight is displayed in the next layer when the user click the regional graph from the dashboard. From this layer, the user can click the country button to view the country weight graph and table (Figure 21: Regional weight and Country weight details).

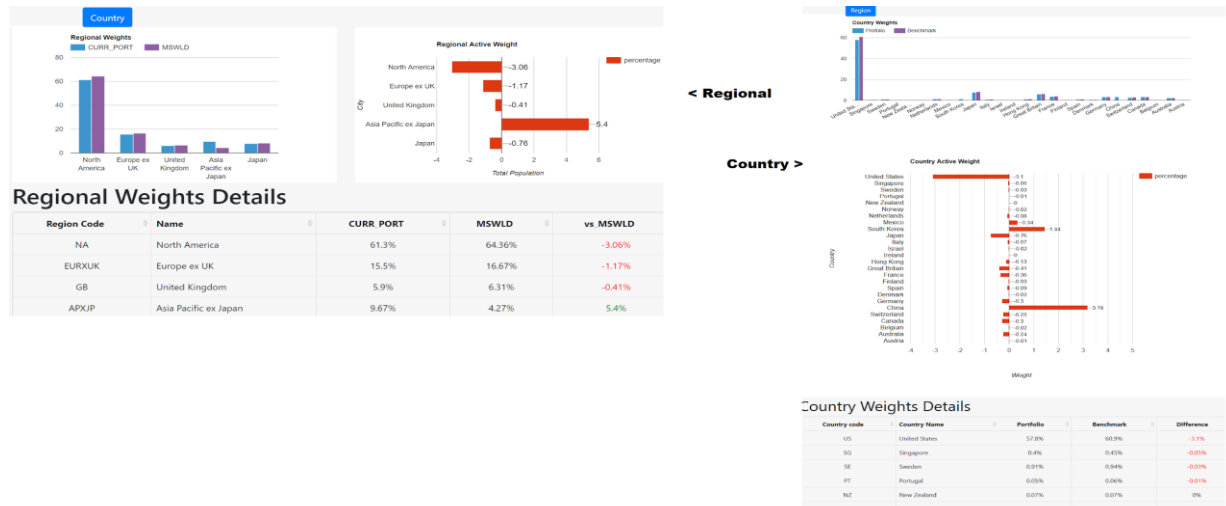


Figure 21: Region and Country graph

And same as GICS, from the Country and Regional weight detail graph the user can select one and view the detailed table.

## 8.3 IMPLEMENTATION OF VMQ TABLE

The Top 10 VMQ Table is sort according to the VMQ total score and the data is the recent data and on the click from VMQ table will goes to next level which shows all list of VMQ table and clicking the security in the table the user can view the graph which compare the data from history (Figure 22: VMQ Table with graph).

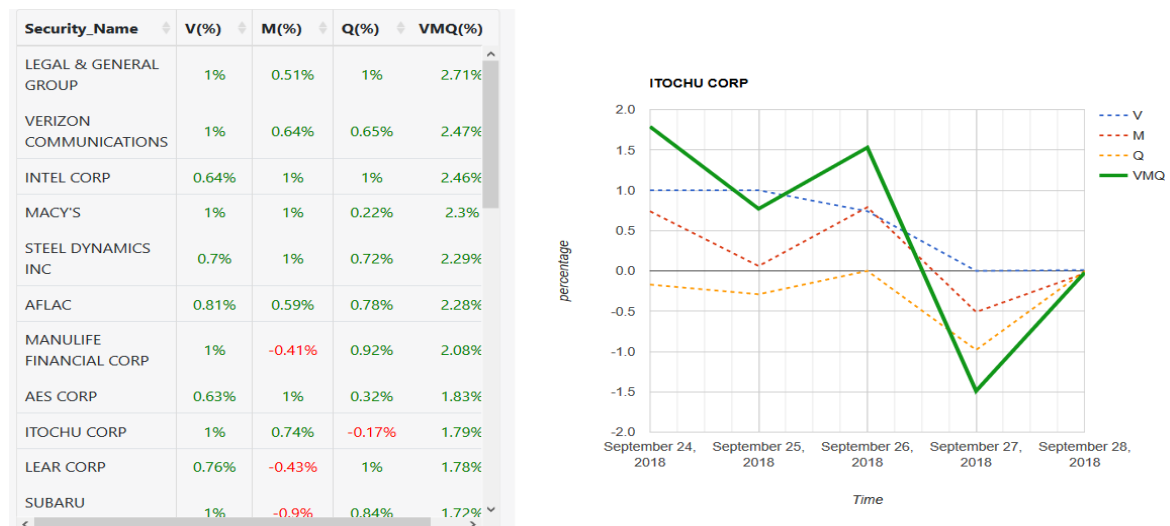


Figure 22: VMQ Table with graph



## 8.4 IMPLEMENTATION OF TOP 10 HOLDING FOR PORTFOLIO

The top 10 Holding is the data from the portfolio and the top ten is displayed according to the weight of the data and on the click of the table the whole detailed graph and table is displayed (Figure 23: Holding for Portfolio ).

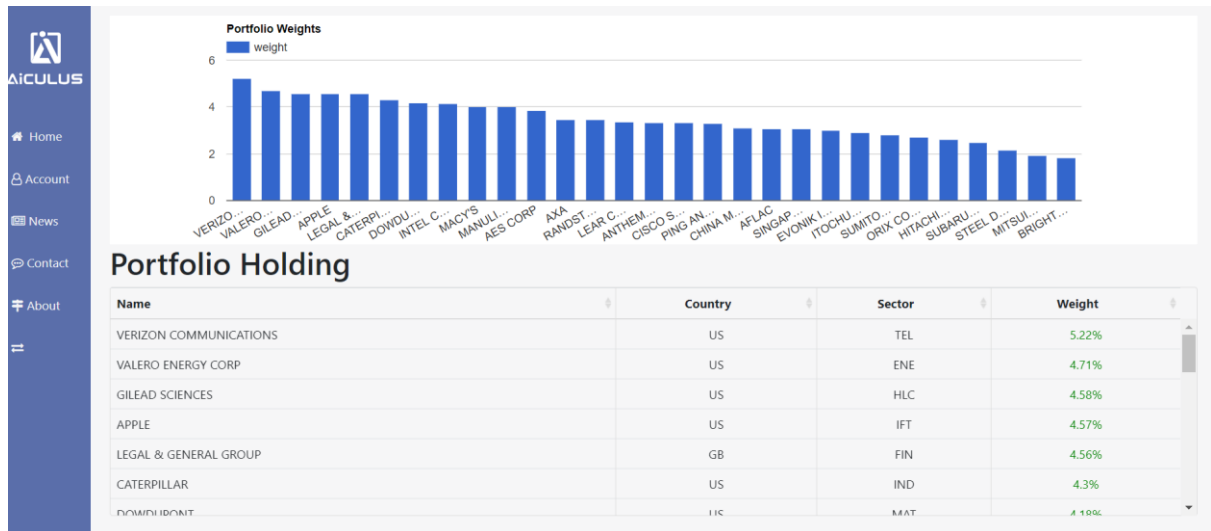


Figure 23: Holding for Portfolio

## 8.5 IMPLEMENTATION OF LINE GRAPH

The data used is mock data and its hold for future consideration. The table is meant for displaying daily update, monthly and yearly.

## 8.6 VALIDATION

While uploading a new file from the account, the file is checked for the correct format of the header and the header column has error upload will not be done and message will be sent showing the file is in incorrect format. And if all the header part is correct the file will replace the older one and will check for the missing data. If there is any missing value in the row that row will be recorded in an array and will not used for calculations and continue reading next row. After that the user will get a message showing which row has error.

# 9 DEPLOYMENT INSTRUCTIONS

## 9.1 SYSTEM REQUIREMENTS

The minimum system requirements are

Operating system	Windows or MAC operating system
Processor	32-bit OS
Storage	16GB

RAM	1 gigabyte (GB)
Hard Disk	32- bit
Browser	Any web browser like Chrome, Firefox
Other requirement	<ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• MS Office</li> </ul>

**Table 10: System Requirements**

## 9.2 SYSTEM SET UP

The user has to do following steps [4].:

1. Install the GoLang into the system. The instruction is provided in the <https://golangbot.com/golang-tutorial-part-1-introduction-and-installation/>
2. After installing, add the Libraries
  - a. Excel -Go to this link <https://github.com/360EntSecGroup-Skylar/excelize>
  - b. Follow the installation part
 

```
go get github.com/360EntSecGroup-Skylar/excelize
```
  - c. Gin - Go to this link <https://github.com/gin-gonic/gin>
  - d. Follow the installation part
 

```
$ go get -u github.com/gin-gonic/gin
```
3. Download Any IDEs that work with GoLang like Visual Studio Code

## 9.3 Running the Code

- From the GitHub account download the project and place it in the Go Workspace.
- Open the project using any IDE and run the “main.go”
- Then open any browser and in the url use <http://localhost:8080/>
- The code will be run successfully.

## 10 TEST SPECIFICATIONS

For testing automation tool is used which is Selenium framework. The Test case are covered based on the requirement and it's break down to small units to get maximum test coverage.

The BeforeMethod and AfterMethod is used to call the web driver and quit the driver respectively at the time of each test. The testng-result.xml gives whole outcome of the testing. If there any test is skipped, any failed test and pass [7].

Test Case ID	Req. Covered	Test Scenario	Test Steps	Precondition	Test Data	Expected Result
TC_01	Yes	Verify the given url is loading the "Aiculus Dashboard"	Application should be installed in the computer.	-	web site"http://localhost:8080/"	The web site should load the "Aiculus Dashboard" successfully.
TC_02	Yes	Verify the user can view contact details when click on the contact.	Application should be installed in the computer.	The website has to loaded	web site"http://localhost:8080/"	The Contact details will be displayed successfully.
TC_03	Yes	Verify the user can view the details of "About".	Application should be installed in the computer.	The website has to loaded	web site"http://localhost:8080/"	The user can view the "About" successfully.
TC_04	Yes	Verify the user can reach to "Home" page from any other layer when click on 'Home'	Application should be installed in the computer.	The website has to loaded	web site"http://localhost:8080/"	The "Home" page will be displayed.

TC_05	No	Verify the user can't able to upload image file.	Application should be installed in the computer.	The website has to loaded	web site"http://localhost:8080/" . A file in the named "aiculus-logo-colour" in the desktop folder TESTDATA.	The user can't able to upload any other file except xls format file. And user gets a message to upload xls file.
TC_06	No	Verify when user uploading the file it's validating.	Application should be installed in the computer.	The website has to loaded	web site"http://localhost:8080/" . A file in the named "Book1" in the desktop folder TESTDATA.	The user should able to upload the file and the system should validate the data.
TC_07	Yes	Verify the "Menu" bar minimise when clicking the toggle button.	Application should be installed in the computer.	Web site has to load and th e element has to locate correctly.	web site"http://localhost:8080/" Web element location	After clicking the element, the slide bar must minimise and just show the symbols.
TC_08	No	Verify the MouseHover in the graph.	Load the web application Pointer should point th e position until the user changes the mouse position	Web site has to load and th e element has to locate correctly.	web site"http://localhost:8080/" Web element location	Pointer should point the point to the position.
TC_09	No	Verify the Title is correct	Application should be installed in the computer.	The website has to loaded	web site"http://localhost:8080/" Title ="Title"	Title will be displayed successfully.

Graph 1_GICS						
TC_10	Yes	Verify that click the GICS Sector graph its loading the details page in layer 2	Application should be installed in the computer	The index page must load and have to find the GICS Sector graph	web site"http://localhost:8080/" Web element location	After clicking the GICS Sector should show the detailed page which contain GICS Sector graph, Active Sector and the table
TC_11	Yes	Verify the user can view the the GICS Active graph after clicking the next from GICS Sector Graph in the Index page.	Application should be installed in the computer.	The index page must load and have to find the GICS Sector graph	web site"http://localhost:8080/" Web element location	After clicking the next from the GICS sector graph, the GICS Active graph will be displayed successfully.
TC_12	Yes	Verify the user can click the toggle to view the previous graph in the GICS graph	Application should be installed in the computer.	The index page must load and have to find the GICS Sector graph	web site"http://localhost:8080/" Web element location	After clicking the previous from the GICS sector graph, the GICS Active graph will be displayed successfully.
TC_13	Yes	Verify the user can click sector in GICS table show detail of the same sector in the layer 3	Application should be installed in the computer.	The index page must load and have to find the GICS Sector graph and layer 2 has to	web site"http://localhost:8080/" Web element location	The user can able to see the selected sectors details in layer 3.

				connected with the Graph and table should connected with details		
<b>Graph 2_Regional</b>						
TC_14	Yes	Verify the user can view the Regional Active Weighted graph after clicking next from the Regional Weight Graph in the Index page.	Application should be installed in the computer.	Web site has to load and able to locate regional graph.	web site"http://localhost:8080/" Web element location	After clicking the webelement next, the Regional Activegraph have to displayed instead of Regional weight graph.
TC_15	Yes	Verify the user can view the Regional Active Weighted graph after clicking previous from the Regional Weight Graph in the Index page.	Application should be installed in the computer.	Web site has to load and able to locate regional graph.	web site"http://localhost:8080/" Web element location	After clicking the webelement Previous, the Regional Activegraph have to displayed instead of Regional weight graph.
TC_16	Yes	Verify that clicking Regional weight graph from index page can view the details in layer 2.	Application should be installed in the computer.	Web site has to load and able to locate regional graph.	web site"http://localhost:8080/" Web element location	After clicking the one region from table should show the details in layer2.

TC_17	Yes	Verify when user select particular region from table can view that regions details in the layer 3.	Application should be installed in the computer.	Web site has to load and able to locate regional graph. Clicking it should load the layer 2 first and has to locate the table and user can able to select the region.	web site"http://localhost:8080/" Web element location	The details of that particular region selected will be displayed.
TC_18	Yes	Verify clicking the country button in the Layer 2 of Regional Weights Graph, it will change the button into Region	Application should be installed in the computer.	Web site has to load and locate the country button.	web site"http://localhost:8080/" Web element location	Button text should display "Region"
TC_19	Yes	Verify clicking the country button in the Layer 2 of region weight bar graph can display the Country details	Application should be installed in the computer.	Web site has to load and locate the country button.	web site"http://localhost:8080/" Web element location	Detailed page with Country graphs and table will be displayed successfully.

TC_20	Yes	Verify that selecting one country from country table will show the corresponding details in table	Application should be installed in the computer.	Web site has to load and locate the country button. And select the country from the table.	web site"http://localhost:8080/" Web element location	Detailed page with the particular country details will be displayed.
<b>VMQ TABLE</b>						
TC_21	Yes	Verify when user click one of the VMQ in the Top ten VMQ it will go to second layer which shows the detailed VMQ Table	Application should be installed in the computer.	Web site has to load and the VMQ table from index page has to locate correctly.	web site"http://localhost:8080/" Web element location	The detailed page with VMQ score will be displayed.
TC_22	Yes	Verify when the user clicks one security from the VMQ table in the layer 2 can see corresponding graph on the right.	Application should be installed in the computer.	Web site has to load and the VMQ table from index page has to locate correctly.	web site"http://localhost:8080/" Web element location	Graph has to displayed.
<b>TOP 10 HOLDINGS FROM PORTFOLIO</b>						



TC_23	Yes	Verify when click in the link of Top 10 Holding of portfolio it will goes to layer 2 showing the detailed page	Application should be installed in the computer.	Web site has to load, and the element has to locate correctly.	web site "http://localhost:8080/" Web element location	Detail page of portfolio has to displayed.
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Table 11: Test Case

## 11 TESTING RESULTS

Test	# Passed	# Skipped	# Failed	Time (ms)	Included Groups	Excluded Groups
Default suite						
<a href="#">Default test</a>	23	0	0	167,358		

Class	Method	Start	Time (ms)
Default suite			
Default test — passed			
TestNG.TestProject	<a href="#">GICSlayer3</a>	1540775442458	1263
	<a href="#">MouseHover</a>	1540775451055	127
	<a href="#">MouseclickGICS</a>	1540775456482	738
	<a href="#">bName</a>	1540775462881	1199
	<a href="#">countryButton</a>	1540775469648	1239
	<a href="#">countrySelected</a>	1540775478120	1670
	<a href="#">graphVMQ</a>	1540775487278	846
	<a href="#">menubarAbout</a>	1540775493654	503
	<a href="#">menubarContact</a>	1540775499547	459
	<a href="#">menubarHome</a>	1540775505661	1249
	<a href="#">menubarMinimise</a>	1540775514204	203
	<a href="#">pageTitle</a>	1540775521724	60
	<a href="#">regionalWeightMouseclick</a>	1540775529145	619
	<a href="#">regionalWeightlayer2</a>	1540775537057	1287
	<a href="#">toggleGICSnext</a>	1540775545516	220
	<a href="#">toggleGICSprevious</a>	1540775553681	174
	<a href="#">toggleRegionalWeightNext</a>	1540775561067	216
	<a href="#">toggleRegionalWeightPrevious</a>	1540775569258	138
	<a href="#">top10Portfolio</a>	1540775575255	627
	<a href="#">top10VMQ</a>	1540775583140	643
	<a href="#">uploadFile</a>	1540775589376	569
	<a href="#">uploadImageFile</a>	1540775595456	571
	<a href="#">url</a>	1540775601578	65

Figure 24: Test Result

## 12 FUTURE CONSIDERATIONS

- The Line chart in the index page is showing with one day data. In the future, daily data will be stored, and the line chart can be used to represent daily, monthly and yearly data variation.
- The VMQ table in the Index page has to change as top ten according to the VMQ score values. The graph in the layer 2 is retrieved using mock data given by sponsors. In the future the real data will be used.
- The “News” in the menu bar has to change to RSS Feed and get the News updates.
- In the next stage, the VMQ table values will represent along with arrows which will compare the data in the history and the arrow indicate whether the stock is increasing or decreasing (Figure 25: VMQ Score).

VMQ Scores				
Name	V	M	Q	VMQ
LEGAL & GENERAL GROUP	▲ 1.00%	▲ 0.51%	▲ 1.00%	▲ 2.71%
VERIZON COMMUNICATIONS	▲ 1.00%	▲ 0.64%	▲ 0.65%	▲ 2.47%
INTEL CORP	▲ 0.64%	▲ 1.00%	▲ 1.00%	▲ 2.46%
MACY'S	▲ 1.00%	▲ 1.00%	▲ 0.22%	▲ 2.30%
STEEL DYNAMICS INC	▲ 0.70%	▲ 1.00%	▲ 0.72%	▲ 2.29%
AFLAC	▲ 0.81%	▲ 0.59%	▲ 0.78%	▲ 2.28%
MANULIFE FINANCIAL CORP	▲ 1.00%	▼ -0.41%	▲ 0.92%	▲ 2.08%
AES CORP	▲ 0.63%	▲ 1.00%	▲ 0.32%	▲ 1.83%
ITOCHU CORP	▲ 1.00%	▲ 0.74%	▼ -0.17%	▲ 1.79%
IFAR CORP	▲ 0.76%	▼ -0.43%	▲ 1.00%	▲ 1.78%

Figure 25: VMQ Score

- In the account tab, when uploading the file, the status bar should include.
- The user can custom the dashboard by select the data type and generate the graph accordingly.

## 13 REFERENCES

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## APPENDIX

## USERSTORIES

Feature/Epic Name: FR1 GICS graph			
ID: Name	Bar chart Display	Priority	High
<b>As a user</b> <b>I want</b> to have a bar chart to display the holding portfolios under each GICS sector <b>So that</b> I can see weight of holding portfolios under each sector			
Acceptance Criteria:			
AC1: Verify that the bar chart shows three letters which short of each GICS sector			

Table 1: Bar chart Display

Feature/Epic Name: FR1 GICS graph			
ID: Name	Benchmark Display	Priority	High
<b>As a user</b> <b>I want</b> to view both current and benchmark for holding portfolios under each GICS sector <b>So that</b> I can active of holding portfolios of each GICS sector			
Acceptance Criteria:			
AC1: Verify that the bar chart shows both portfolio and benchmark			

Table 2: Benchmark Display

Feature/Epic Name: FR2 Regional graph			
ID: Name	Bar chart Display	Priority	High
<b>As a user</b> <b>I want</b> to have a bar chart to display the holding portfolios under each Region <b>So that</b> I can see weight of holding portfolios under each Region			
Acceptance Criteria:			
AC1: Verify that the bar chart shows data of five given regions			

Table 3: Bar chart Display

Feature/Epic Name: FR2 Regional graph			
ID: Name	Benchmark Display	Priority	High
<b>As a user</b> <b>I want</b> to view both current and benchmark for holding portfolios under each Region <b>So that</b> I can active of holding portfolios of each Region			
Acceptance Criteria:			
AC1: Verify that the bar chart shows both portfolio and benchmark			

Table 4: Benchmark Display

Feature/Epic Name: FR3 Top 10 VMQ Table			
ID: Name	Display	Priority	High
<b>As a User</b> <b>I want</b> to view a table shows the 10 holding portfolios with best ten VMQ score <b>So that</b> I can easily identify the items with most value			
Acceptance Criteria:			
AC1: Verify that the table shows rank, V score M score, Q score, and VMQ score of each portfolio AC2: Verify that the positive score shows as green colour and the negative score shows as red colour AC3: Verify that the table shows the data of 10 portfolios			

Table 5: Display\_ Top 10 VMQ Table

Feature/Epic Name: FR4 Top 10 portfolios Table			
ID: Name	Display	Priority	High
<b>As a User</b> <b>I want</b> to view a table shows the 10 holding portfolios with best ten VMQ score <b>So that</b> I can easily identify the items with most value			
Acceptance Criteria:			
AC1: Verify that the table shows rank, V score M score, Q score, and VMQ score of each portfolio AC2: Verify that the positive score shows as green colour and the negative score shows as red colour AC3: Verify that the table shows the data of 10 portfolios			

Table 6: Display\_ Top 10 portfolios Table

Feature/Epic Name: FR5 Upload File			
ID: Name	Upload	Priority	Medium
<b>As a user</b> <b>I want</b> to upload the file through a website <b>So that</b> I can update the latest daily data to the server			
Acceptance Criteria:			
AC1: Verify that the upload only accepts csv file AC2: Verify that the upload will validate the data file			

Table 7: Upload

**FUNCTIONAL REQUIREMENTS SPECIFICATION**

Req. ID	Description	Priority	UC covered
FR1	The user shall able to view a menu bar, 2 bar graphs which are GICS sector and Region Weight bar chart, 2 Tables which are Top 10 VMQ and Top 10 Holdings from portfolio and 1 Line chart showing the index change over a period.	High	Yes
FR1.1	The user shall click the GICS sector bar chart and then the user can view the detailed GICS bar graph, GICS Active bar graph and the Table.	High	Yes
FR1.1.1	The User shall click each sector in the GICS table then can view the filtered portfolio table of selected sector.	High	Yes
FR1.2	The user shall click the toggle slide switch in the GICS Sector Bar graph to view the GICS Active bar graph.	Low	Yes
FR2	The user shall able to view the regional weight graph	High	Yes
FR2.1	The user shall click the regional weight graph, then can view the detailed regional weight graph and regional active graph and the corresponding table.	High	Yes
FR2.1.1	The user shall click the region in the table and see the detailed portfolio of selected	High	Yes

	region in the table.		
FR2.2	The user can able to click the button named "Country" from the layer 2 of the regional graph and have to view the detailed graph representation of country weights and country active and the details in the table.	High	Yes
FR2.2.1	The user can able to select one country from the table and can able to see that country's holding details in the next layer.	High	Yes
FR3	The user shall able to view the Top 10 VMQ Table.	High	Yes
FR3.1	The user can able to click the Top 10 VMQ table and able to view the detailed table in the layer 2 and also display a text "Select one security from the table"	High	Yes
FR3.1.1	The user can able to select the security from the detailed VMQ table and can able to view the corresponding graph in the right side of the table.	High	Yes
FR4	The user shall able to view the Top 10 Holdings of portfolio.	High	Yes
FR4.1	The user can able to view the link of "details of Holding portfolio" and which will show the details graph and table in the layer 2.	High	Yes



FR5	The user shall able to custom the view of stock value as daily, monthly or yearly basis.	High	Yes
FR6	The user shall able to hide the Menu bar by clicking the option	Low	No
FR7	The user can able to upload the file.	Low	Yes
FR8	The user can sort the tables in the alphabetic order.	Low	No

**Table 8: Functional Requirements****NON-FUNCTIONAL REQUIREMENTS SPECIFICATION**

Req. ID	Description	Priority
NFR1	The user can access the system 24/7	High
NFR2	Restricted portability (Desktop access)	Medium

**Table 9: Non-Functional Requirements****SYSTEM REQUIREMENTS**

Operating system	Windows or MAC operating system
Processor	32-bit OS
Storage	16GB
RAM	1 gigabyte (GB)
Hard Disk	32- bit
Browser	Any web browser like Chrome, Firefox
Other requirement	<ul style="list-style-type: none"> <li>● Internet Connection</li> <li>● MS Office</li> </ul>

**Table 10: System Requirements**