**Software Requirements Specification**

For

CIA Fact-book Mapper

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CSE 219

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1. Introduction

1.1 Purpose

a) To define and effectively communicate a specific design of a CIA Statistical Fact-book World Mapper

b) This document is initially intended for but not limited to use by a software developer to provide guidelines for implementation or by a user of the software created who wishes to become more knowledgeable about the software’s specific implementation.

1.2 Scope

a) The name of the software is: CIA Statistical Fact-book World Mapper

b) This software will allow the end user to be able to:

- Open a previous statistical view that has been made

- Navigate the rendered map from manipulating a viewport which includes:

- Using both mouse and/or keyboard input for:

- Zooming in and out

- Moving up/down/left/right

- Select specific countries/polygons for more detailed information

- Using mouse input

- Select specific statistical views for displaying data across multiple countries/polygons using separate scales of colors. (ie. shades of red)

- Customize the options of rendering the current statistical view

- Save the current statistical view the user selected

- Output views as image files for later use

c) The goal of the program is to provide the user an aesthetic reinforcement of analyzing data stored in .dbf files and displaying it in rendered .shp files all in an easy to use manner. It also provides the means to make detailed statistical world graphs of any data stored in .dbf files for output as image files, thus allowing the user to make complex statistical images easily.

1.3 Definitions, Acronyms, and Abbreviations

- CIA/WFSM (CIA / World Fact-book Statistical Mapper): The WFSM will be the acronym used when referring to the CIA World Fact-book Statistical Mapper.

- SHP File (Shape File): The Shape File contains geospatial vector data that is used as a popular standard for geographic information system software. A single shape file can spatially describe points, polygons, and/or polylines which could represent geographical data like countries, wells, rivers, and/or roads.

- DBF File (Database Format File): A database format file is a standard for storing database information that contains columns (fields) and rows (records). For the scope of this software however, fields will only be able to hold either a type of Number (N) or Text (C).

- Viewport: Contains the constraint view that the user can see at any given time. The user can however manipulate the position of the viewport to see parts of a map that may or may not be showing at any given time.

- Latitude: The Latitude is an angular distance of the earth from the north or south of the equator and is measured in degrees. (Horizontally displayed)

- Longitude: The Longitude is an angular distance that specifies the east-west position of a point on the earth’s surface and is measured in degrees (Vertically displayed)

- Equator: The Equator is the latitude that is equidistant from both the North and South Pole, hence, dividing the Earth into both the Northern and the Southern Hemisphere.

- Tropic of Cancer: The Tropic of Cancer, which is also referred to as the northern tropic, is the northern-most position of latitude on the Earth where the Sun may appear directly overhead at its zenith.

- Tropic of Capricorn: The Tropic of Capricorn, which is also referred to as the southern tropic, is the southern-most position of latitude on the Earth where the Sun may appear directly overhead at its zenith.

- CIA World Fact-book (Central Intelligence Agency): The CIA World Fact-book will essentially be where most of the compiled database files will have statistics from. Currently the CIA World Fact-book contains information on 266 world entities.

- SRS: Software Requirements Specification

- GUI: A GUI or Graphical User Interface is an Acronym which will be used to describe all the visual elements that the user will be able to interact with.

- End User: The End User is the term used to describe any entity interacting with the finalized program (ie. consumer, or software tester)

1.4 References

a) http://www.cs.sunysb.edu/~cse219/

- Home page for Computer Science 219, used as a reference for retrieving documentation on format and layout of program architecture.

b) http://www.dbf2002.com/dbf-file-format.html/

- Describes the file structure of dbf files for use and implementation in software engineering.

c) http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf

- Describes the file structure of shp files for use and implementation in software engineering.

1.5 Overview

a) This SRS contains specific requirements for the implementation of a CIA World Fact-book Statistical Mapper, which includes:

- Explanation of how statistics will be displayed

- Description of how the end user will be able to interact with the program

- Details of each GUI component and how it will respond to various end user events and input

- Examples of end user interaction with the program and how it will respond to such input

b) This document is organized by being divided into two sections:

1. Overall Description

- This section will hold a general overview of the WFSM, as well as describe the end user interactions with the software.

2. Specific Requirements

- This section will outline all possible functions that can be performed by all users of the WFSM, as well as outline how the program will respond to all forms of input.

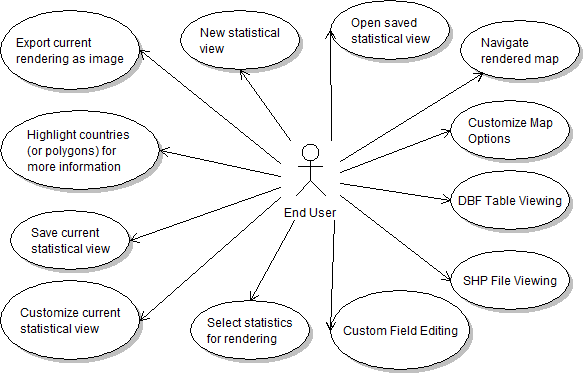
2. Overall Description

2.1 Product Perspective

The implementation of CIA/WFSM is completely independent of other software and is completely self-contained. No inherent interface will be required because the program itself is independent of any larger system.

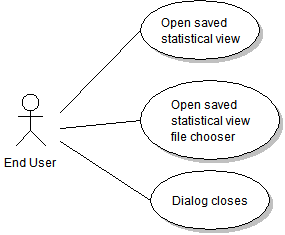
2.2 Product Functions

There is a single type of user that can perform functions in WFSM, and that is the end user. The use case diagrams on the following pages detail the various functions that the end user can perform:



2.2.1 Function Use Cases

A1. Use Case: Open saved statistical view

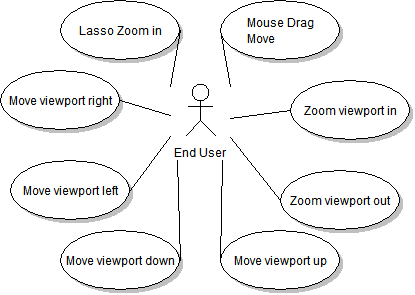


- Purpose: to read in a saved statistical view that was created by the user previously

- Description:

* On program start, the world map will be rendered from a .shp file, and its database statistics will be loaded from a .dbf file. By selecting “Open Statistical View” the user will be able to load a previously saved statistical view using statistics that have been previously selected.
* When the end user selects this option, a file chooser will appear asking the user to navigate to the saved statistical view file and select it to load it.
* If the user selects a valid WFSM file after pressing OK, then the program will open and render the statistical view for manipulating.
* The user would also be able to press “X” on the window to cancel the load in the file chooser, or the user can press CANCEL

A2. Use Case: Navigate Rendered Map

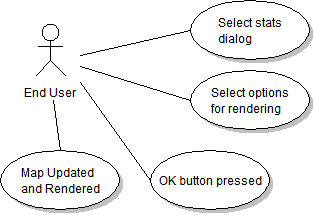


- Purpose: to manipulate the viewport such that the user can get different perspectives on the same rendered map.

- Description:

* On starting the program, the user will be able to navigate and manipulate their view of the world through the current viewport immediately.
* Using keyboard input (ie. arrow keys) the user will be able to move the viewport to change the current view, and zoom in or out.
* Using mouse input (ie. move drag) the user will be able to move the viewport to change the current view, and zoom in by using a lasso zoom.
* The program will be constantly checking for user input on manipulating the map, and the map will respond immediately to any user input.

A3. Use Case: Select Rendering Options

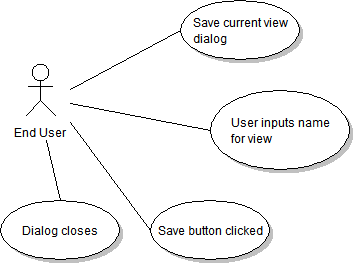


- Purpose: To model different rendering views on the world map, allowing the user to have an accurate statistical graph of the world based on the data used to render on the map.

- Description:

* Upon opening the program, the user will be able to choose from the current .dbf (database) statistics to generate a color coded graph of the world countries (polygons) that are currently rendered.
* When the Select Statistics option is chosen, the dialog box with types of information to render by are displayed for the user to choose from.
* The user will be able to choose from any piece of the data for rendering on the map.
* After the options in the dialog box are selected, the user has customized his display options appropriately, and the OK button is pressed, the dialog box closes.
* Once the dialog box has been closed, and there was no invalid input given for the custom statistical rendering done, then the map will render and update its view to tailor to the options the user selected.

A4. Use Case: Save Current Statistical View

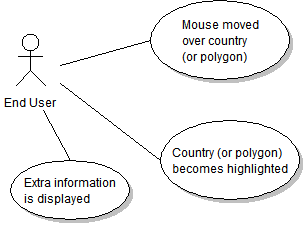


- Purpose: To save or read out the current statistical view that has been manipulated to show data that the user has changed for later use.

- Description:

* After the user edits the current statistical view using their custom settings, the user will be able to save that view for later use.
* When selecting the Save Statistical View option, the user will be presented with a file chooser menu, allowing the user to input the desired name and location for which the statistical view will be saved as.
* If the user is currently editing a statistical view that has been saved already, then the Save option will over write the old save with the new one. In all other cases however it will use the “Save As” methods.

A5. Use Case: Highlight Countries (or polygons) for More Information

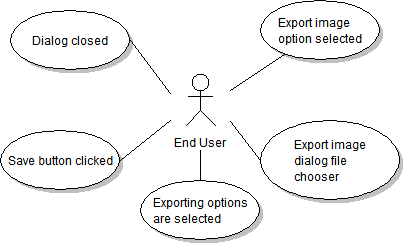


- Purpose: To provide a more interactive feeling to the user when the user is looking at the currently displayed countries

- Description:

* As the user moves his/her mouse, different polygon shapes representing countries will ‘light up’, therefore empathizing different areas of the map.
* As a customized option, the user should be able to get more information on a specific country he/she may select.

A6. Use Case: Export current rendering as image

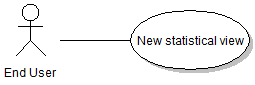


- Purpose: To be able to export current statistical views as images in a format that would be acceptable in presentations, data arrangements, for educational or personal use.

- Description:

* After a statistical view is set up, the end user can export the view in a format like .jpg that allows for use in educational documents, presentations, and data analysis documents
* Once the Export function is called, a file chooser box will open up asking the user what he/she would like to name the image, and the file format by which the image will be saved as.
* If all valid input is given, and the SAVE button is pressed the program will then take a snapshot of the current statistical view and save it using the options the user provided.

A7. Use Case: New Statistical View

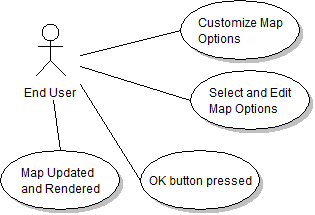


- Purpose: To be able to start the statistical view fresh, wiping all current data and view options off

- Description:

* After new statistical view is chosen, the end user will see all of his/her options reverted back to their defaults and all changes made are erased.
* The map will be re-rendered and updated with all the default values and settings

A8. Use Case: Map Options

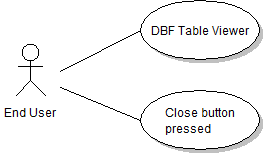


- Purpose: To be able to customize the display options of the map loaded.

- Description:

* When the Customize Map Options menu option is selected the end user will be presented with a series of choices for editing the look and feel of the rendering of the map.
* The user will be able to enter in a new map title if none exists, or edit the current map title if the map is saved with one.
* The user will be able to edit the settings of the map legend, which include its color scale, labeling, and organization.
* When the OK button is pressed, the Map Options are put into effect immediately by the map and map legends re-rendering themselves and displaying the updated setting data.

A10. Use Case: View DBF

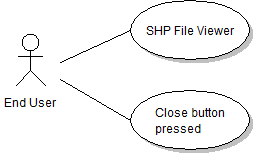


- Purpose: To be able to display the DBF file currently loaded

- Description:

* When the View DBF menu option is selected the end user will be presented with the DBF file that is currently loaded.
* The user will only be able to view the DBF table, and not make any changes to it
* Upon clicking the CLOSE button, the Table viewer window closes

A11. Use Case: View SHP

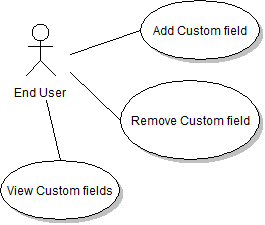


- Purpose: To be able to display the SHP file currently loaded

- Description:

* When the View SHP menu option is selected the end user will be presented with the SHP file that is currently loaded.
* The user will only be able to view the SHP file rendering, and not make any changes to it
* Upon clicking the CLOSE button, the SHP viewer window closes

A12. Use Case: Custom field editor



- Purpose: To be able to give the user the power to customize the types of statistics to render by (including making their own formulas).

- Description:

* When the Customize Field Editor menu option is selected the end user will be presented with a series of choices for creating their own custom field, as well as removing any fields he/she may have made already.
* The user will be able to see an entire list of custom fields that they have made, and select them to edit or remove.
* The user will be able to link table data using the field name ‘tags’ in fields he/she creates.
* The user will be able to create their own formulas from a combination of these tags.
* When the OK button is pressed, the Custom Field Options are put into effect immediately by the Renderer and allowing the user to select these fields for statistical display on their current statistical view.

2.3 User characteristics

2.3.1 End User

- The end user is a person of any level computer expertise and knowledge who wishes to use the program solely for the purpose of visualizing world statistical data and manipulating it.

2.4 Constraints

2.4.1 The CIA/WFSM is limited in performance by specifically the system is it running on.

2.4.2 The CIA/WFSM cannot perform any automatic statistical analysis; it can only compare various statistics between various countries.

2.4.3 The CIA/WFSM can only display statistical data that has been previous stored in a .dbf file, and can only display shapes previously stored in .shp files.

2.4.4 The user cannot view ‘over’ the boundaries of the Earth, hence zooming out past the standard political map and moving past the top/left/right/or bottom boundaries of the map are impossible.

2.5 Assumptions and Dependencies

2.5.1 Copyright

- The CIA is a registered government agency that serves as a civilian intelligence agency of the United States government and as such, an assumption is made that this implementation of software has not been made in connection with CIA or for commercial use without obtaining the proper permission from the relevant parties.

- The rendered map will contain shapes that represent any single countries statistics, and as such, the WFSM does not contain any affiliation or connection to any single country, nor does it have bias in displaying its statistics of any single country.

2.5.2 Programming Language

- The assumption is made that the WFSM will be developed and maintained using the Java programming language in the Eclipse IDE. Therefore, certain language and terms have been carefully selected when referring to specific implementations in relevance to the Java programming language. *Disclaimer: While it may be feasible to develop a WFSM under a different programming language, this SRS may not be appropriate for that implementation.*

2.5.3 Operating System

- Take note of the fact that this SRS was written with the single intent of conveying the needed instruction for design and implementation of a World Statistical Fact-book Mapper in a Windows environment. It is not recommended to use this SRS for developing a WFSM on anything other than the Windows platform and this SRS takes no responsibility for the accuracy of such implementation.

3. Specific Requirements

3.1 External Interfaces

3.1.1 Open Statistical View

* Purpose: To allow the user to select a previously made statistical view for current manipulation and editing from the GUI
* Source of Input: Operating system will return the user-performed action on the Open Statistical View file chooser dialog box, and then send it to the appropriate event handler.
* Recognized Input: Mouse Clicked (on buttons within the file chooser)
* Relationship to other input/output: Once a mouse is clicked, the click is detected by the Open Statistical View Option and then handled through the file chooser dialog box.

3.1.2 Save Statistical View

* Purpose: To allow the user to save an already made statistical view that has been manipulated to the users liking.
* Source of Input: Operating system will return the user-performed action on the Save Statistical View menu option, and then send it to the appropriate event handler.
* Recognized Input: Mouse Clicked (on the menu option or shortcut keyboard key)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the Save Statistical View handler and then handled through the file chooser dialog box (only if there does not exist an already saved copy of the view).

3.1.3 Navigate Rendered Map

* Purpose: To allow the user to manipulate the viewport showing the current view of the rendered map.
* Source of Input: Operating system will return the user-performed action on the rendered map, and then send it to the appropriate event handler.
* Recognized Input: MouseDragged, or KeyEvent (Keyboard Event of pressing a Key down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the rendered map (jPanel/jFrame) and then handled through the Map Motion Handler.

3.1.4 Rendering Options

* Purpose: To allow the user to change the rendering of what data is being compared between countries.
* Source of Input: Operating system will return the user-performed action on the Select Statistics Menu Option, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the Select Statistics Menu Option and then handled through the Statistics Renderer Handler.

3.1.5 Highlight Countries for More Information

* Purpose: To allow the user to change the rendering of what data is being compared between countries.
* Source of Input: Operating system will return the user-performed action on the Select Statistics Menu Option, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the Select Statistics Menu Option and then handled through the Statistics Renderer Handler.

3.1.6 Export Current Rendering as Image File

* Purpose: To allow the user to export the current view that he/she might have made for external use as an image file
* Source of Input: Operating system will return the user-performed action on the Export Rendering as Image Option, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the Export Rendering as Image Option and then handled through the Image Rendering Handler.

3.1.7 New Statistical View

* Purpose: To be able to start the statistical view fresh, wiping all current data and view options off and resetting them to their defaults.
* Source of Input: Operating system will return the user-performed action on the New Statistical View Option, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the New Statistical View Option and then handled through the New Statistical View Option Handler.

3.1.8 Map Options

* Purpose: To be able to customize the display options of the map loaded.
* Source of Input: Operating system will return the user-performed action on the Map Options menu item, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the Map Options menu item and then handled through the Map Options Handler.

3.1.9 DBF File Viewer

* Purpose: To be able to display the DBF file currently loaded
* Source of Input: Operating system will return the user-performed action on the DBF File Viewer menu item, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the DBF File Viewer menu item and then handled through the DBF File Viewer Handler.

3.1.10 SHP File Viewer

* Purpose: To be able to display the SHP file currently loaded
* Source of Input: Operating system will return the user-performed action on the SHP File Viewer menu item, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the SHP File Viewer menu item and then handled through the SHP File Viewer Handler.

3.1.11 Custom Field Editor

* Purpose: To be able to give the user the power to customize the types of statistics to render by (including making their own formulas).
* Source of Input: Operating system will return the user-performed action on the Custom Field Editor menu item, and then send it to the appropriate event handler.
* Recognized Input: MouseClicked, or KeyEvent (Keyboard Event of pressing a Key shortcut being pressed down)
* Relationship to other input/output: Once a mouse is clicked (or shortcut keyboard input is typed), the event is detected by the Custom Field Editor menu item and then handled through the Custom Field Editor Handler.

3.2 Functions

3.2.1 Open Statistical View

|  |  |
| --- | --- |
| Use Case  Name: | Open Statistical View |
| Priority: | High |
| Trigger: | Selecting “Open Statistical View” menu option |
| Precondition: | User has started up the program and is able to see a map rendered without any statistics being loaded |
| Basic Path: | 1. User is prompted to load a statistical view file within the “Open Statistical View” dialog box. 2. User chooses an appropriate statistical view file and presses OK 3. The map then renders to show the custom data loaded from the statistical view file |
| Alternate Path: | 1. User could press CANCEL and stop the loading process 2. User could exit out of the Open Stat View dialog box |
| Post-condition: | The user can now work with the loaded statistical view |
| Exception Path: | 1. User could select an invalid file |
| Other: | - |
| Reference: | SRS Section 2.2.1.A1 |

3.2.2 Save Statistical View

|  |  |
| --- | --- |
| Use Case  Name: | Save Statistical View |
| Priority: | High |
| Trigger: | Selecting “Save Statistical View” menu option |
| Precondition: | User has started up the program and has edited the map to render statistical data but the current view has not been saved. |
| Basic Path: | 1. User chooses to save the current view 2. If the map hasn’t been saved yet, then the program sends the event to the “Save As” handler, else it is sent to the “Save” handler 3. The User can then type in a name for the view to be saved as 4. The user presses OK and file is saved |
| Alternate Path: | 1. User could press CANCEL and stop the loading process 2. User could exit out of the Open Stat View dialog box 3. If the user enters a name of a file that already exists, the user will then be asked if he/she may want to over write that file |
| Post-condition: | The user can now load the saved statistical view at a later date |
| Exception Path: | 1. If the user enters a name with either invalid characters or a length that is too large, a prompt will appear telling the user how the input was incorrect and it will terminate the saving procedure. |
| Other: | - |
| Reference: | SRS Section 2.2.1.A4 |

3.2.3 Navigate Rendered Map

|  |  |
| --- | --- |
| Use Case  Name: | Navigate Rendered Map |
| Priority: | Medium |
| Trigger: | Any related Keyboard or Mouse input |
| Precondition: | User has started up the program |
| Basic Path: | 1. User presses any keyboard shortcut or mouse button that has a map navigation button bound to it. 2. The event gets passed to the appropriate handler (ie. MouseMotionListener for a Lasso Zoom or MouseDrag event) 3. The viewport is updated and re-rendered based on the manipulation made |
| Alternate Path: | - |
| Post-condition: | The user can now see an updated view of the map |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A2 |

3.2.4 Rendering Options

|  |  |
| --- | --- |
| Use Case  Name: | Select Rendering Options |
| Priority: | Medium |
| Trigger: | Selecting “Rendering Options” option |
| Precondition: | User has started up the program |
| Basic Path: | 1. User presses selects the option to customize rendering statistics on the map 2. The event gets passed to the statistics rendering handler, and options like color choice are presented to the user. 3. The viewport is updated and re-rendered based on the statistical selection made from the field of the .dbf file, as well as the options given by the user. |
| Alternate Path: | 1. User can CANCEL his/her choice to select a field to render data by |
| Post-condition: | The user can now see an updated view of the map, with the selection of data being displayed and custom colors showing. |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A3 |

* + 1. Highlight Countries for More Information

|  |  |
| --- | --- |
| Use Case  Name: | Highlight Countries for More Information |
| Priority: | Low |
| Trigger: | MouseOver event of any specific country |
| Precondition: | User has started up the program and toggled “Mouse Over For More Information” Boolean |
| Basic Path: | 1. User moves mouse over any specific country and more accurate detailed information is displayed |
| Alternate Path: | None |
| Post-condition: | The “More info” box, will now contain updated information of the country selected |
| Exception Path: | 1. The only exception will happen when no country is selected; however it will be properly handled by displaying a blank “More Info” box. |
| Other: | - |
| Reference: | SRS Section 2.2.1.A5 |

3.2.6 Export Current Rendering as Image File

|  |  |
| --- | --- |
| Use Case  Name: | Export Current Rendering as Image File |
| Priority: | Low |
| Trigger: | “Export as Image” menu option selected from mouse click |
| Precondition: | User has started up the program |
| Basic Path: | 1. User presses selects the option to export the current view as an image. 2. A file chooser dialog menu opens asking the user where to store the image, what time name the image, and in what format to export the image as. 3. The event gets passed to the image export handler with all the information the user provided (name, stored location, and file type). 4. If the user provided valid input then the view is exported as an image with the options that were given by the user (specific location, name, and file type). |
| Alternate Path: | 1. The user can change their mind about exporting the view as a file and chose CANCEL or ‘x’ on the file chooser dialog box. |
| Post-condition: | The user will now be able to have a separate image file for external use of their custom statistical view. |
| Exception Path: | 1. The user could enter invalid input for the file name, and therefore will be prompted to change the name before saving again 2. The user could enter a file name that exists already, and therefore will be prompted to over write that image file to save |
| Other: | - |
| Reference: | SRS Section 2.2.1.A6 |

3.2.7 New Statistical View

|  |  |
| --- | --- |
| Use Case  Name: | New Statistical View |
| Priority: | High |
| Trigger: | Selecting “New Statistical View” menu option |
| Precondition: | User has started up the program |
| Basic Path: | 1. After the user has selected the New Statistical View menu item, all formulas, custom fields, edits, setting changes, and rendering options are reset to defaults 2. The map is then re-rendered and displayed to show this. |
| Alternate Path: | - |
| Post-condition: | The user can now work a blank statistical view to manipulate |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A7 |

3.2.8 Map Options

|  |  |
| --- | --- |
| Use Case  Name: | Map Options |
| Priority: | Medium |
| Trigger: | Selecting “Map Option” menu option |
| Precondition: | User has started up the program |
| Basic Path: | 1. After the user has selected the Map Options menu item, the user will be presented with a Map Options dialog box and be able to edit certain values of the map being rendered 2. After the values have been edited and changed to the user’s liking, they can chose the OK button 3. Map Options dialog box closes, and updates the current view to reflect changes the user may have made on it. |
| Alternate Path: | - |
| Post-condition: | The user can now view the updated map with his/her customized settings. |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A9 |

3.2.9 DBF File Viewer

|  |  |
| --- | --- |
| Use Case  Name: | DBF File Viewer |
| Priority: | Low |
| Trigger: | Selecting “DBF File Viewer” menu option |
| Precondition: | User has started up the program |
| Basic Path: | 1. After the user has selected the DBF File Viewer menu item, the user will be presented with a window showing the table containing all the data stored in the DBF File 2. When the user is finished viewing the table, they can chose the CLOSE button 3. DBF File Viewer window closes |
| Alternate Path: | - |
| Post-condition: | The user can now view the DBF file that the program is reading from. |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A10 |

3.2.10 SHP File Viewer

|  |  |
| --- | --- |
| Use Case  Name: | SHP File Viewer |
| Priority: | Low |
| Trigger: | Selecting “SHP File Viewer” menu option |
| Precondition: | User has started up the program |
| Basic Path: | 1. After the user has selected the SHP File Viewer menu item, the user will be presented with a window showing the table containing all the data stored in the SHP File 2. When the user is finished viewing the table, they can chose the CLOSE button 3. SHP File Viewer window closes |
| Alternate Path: | - |
| Post-condition: | The user can now view the SHP file that the program is reading from. |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A10 |

3.2.11 Custom Field Editor

|  |  |
| --- | --- |
| Use Case  Name: | Custom Field Editor |
| Priority: | Low |
| Trigger: | Selecting “Custom Field Editor” menu option |
| Precondition: | User has started up the program |
| Basic Path: | 1. After the user has selected the Custom Field Editor menu item, the user will be presented with a window all custom fields the user has made 2. The user will be able to add or remove fields from the list 3. When the user is finished editing custom fields, they can chose the CLOSE button 4. Custom Field Editor window closes |
| Alternate Path: | - |
| Post-condition: | The user can now view the custom fields he/she made for rendering |
| Exception Path: | - |
| Other: | - |
| Reference: | SRS Section 2.2.1.A12 |

3.3 Performance Requirements

3.3.1 The program will only support use by one user on a single windows desktop environment at one time. The rendering of the detail within the shape file will be purely determined by the processing power of the CPU running it. The logical and physical memory constraints of WFSM are only dependant on the system running WFSM, therefore, the amount of logical space needed to store any saved and/or exported data is reliant on the system the program is currently active on.

3.4 Logical Database Requirements

3.4.1 Shape File Database

- This database should store all the data necessary for loading the world shape file data at any other date.

3.4.1.1 Information Shared

- Since the scope of this SRS defines that the map renders the entire world’s shape files, every country in the world will need to have its own shape file associated with it, or a global shape file will need to be stored will all the countries data.

3.4.1.2 Frequency of Use

- The database will be accessed every time the user opens up the program

3.4.1.3 Accessing Capabilities

- To access this data, the program will make use of an Iterator for reading in all the shape files data, and return all the shp objects of the world, representing countries.

3.4.1.4 Data Entities and Relationships

- The data entities (shp) are only related to the display of the map and the rendering of the pixels of each shape from the shp files.

3.4.2 DBF File Database

- This database should store all the data necessary for loading the world statistics.

3.4.1.1 Information Shared

- Since the scope of this SRS defines that the map renders the entire world, the dbf should be structured around the fact that an entry for every country is needed.

3.4.1.2 Frequency of Use

- The database will be accessed every time the user opens up the program, and after the shape files are loaded.

3.4.1.3 Accessing Capabilities

- To access this data, the program will make use of an Iterator for reading in all the dbf file data, and return the dbf file table for use from the program.

3.4.1.4 Data Entities and Relationships

- The data entities (dbf fields and records) are only related to the statistical display options when rendering comparisons on the map, however loading an accurate and properly formatted dbf is essential to maximizing program usability.

3.4.3 Statistical Rendered Database

- This database should store all the data necessary for managing the different statistical views the user created.

3.4.1.1 Information Shared

- Every saved statistical view will be able to be used at any other future date, or on any other machine with WFSM installed, therefore allowing statistical views to be shared.

3.4.1.2 Frequency of Use

- This database will only be used when the user has a previously saved statistical view that he/she may want to view, or if the user wishes to save their current statistical view

3.4.1.3 Accessing Capabilities

- To access this data, the program will make use of a DataInputStream for reading in the file format of the custom statistical view saved. To save to this data, the program will make use of a DataOutputStream for writing out the file format of the custom statistical view currently being rendered on the viewport.

3.4.1.4 Data Entities and Relationships

- The data entities are only related to WFSM itself, and therefore cannot be written to or read from on anything other than WFSM. It is the users choice however if he/she may want to make use of saving or loading any custom statistical view files.

3.4.4 Statistical Formula Database

- This database should store all the data necessary for managing the different statistical formulas the user created.

3.4.1.1 Information Shared

- Every saved statistical formula will be able to be used at any other future date, or on any other machine with WFSM installed, therefore allowing statistical formulas to be shared.

3.4.1.2 Frequency of Use

- This database will only be used when the user has a previously saved statistical formula that he/she may want to use, or if the user wishes to save their current statistical formulas they have created.

3.4.1.3 Accessing Capabilities

- To access this data, the program will make use of a DataInputStream for reading in the file format of the custom statistical formula saved. To save to this data, the program will make use of a DataOutputStream for writing out the file format of the custom statistical formula(s) that the user has made.

3.4.1.3.1 Note: Each Statistical formula, set of formulas or lack thereof will be associated with the given current statistical view when the file format is being loaded or saved

3.4.1.4 Data Entities and Relationships

- The data entities are only related to WFSM itself, and therefore cannot be written to or read from on anything other than WFSM. It is the users choice however if he/she may want to make use of saving or loading any custom statistical formula files.

3.5 Design Constraints

3.5.1 The program is limited by the amount of data stored in the given dbf file, as well as the detail rendered in the shp file. This also includes the limitation of rendering the viewport navigation towards highly detailed areas of the map. The map is also limited to the political map of Earth, and as such, the user cannot navigate the viewport past any of these bounds.

3.6 Software System Attributes

3.6.1 Map Startup Attributes

- On program startup, the entire map of the world should be rendered with random starting colors filling each country (or polygon). These colors should be randomized on every startup, but shouldn’t be aesthetically dysfunctional towards to look and feel of the program (ie. there shouldn’t be random bright neon colors of high contrast filling each country)

3.6.2 Event Handlers

3.6.2.1 Viewport Event Listeners

3.6.2.1.1 Keyboard Zoom In

|  |  |
| --- | --- |
| Trigger: | User presses the key bound to Zoom In |
| Event: | KeyEvent |
| Response: | The program will render a zoomed in version of the current viewport using the height and width of the viewport as reference points |

3.6.2.1.2 Keyboard Zoom Out

|  |  |
| --- | --- |
| Trigger: | User presses the key bound to Zoom Out |
| Event: | KeyEvent |
| Response: | The program will render a zoomed out version of the current viewport using the height and width of the viewport as reference points |

3.6.2.1.3 Keyboard Move Up

|  |  |
| --- | --- |
| Trigger: | User presses the key bound to Move Up |
| Event: | KeyEvent |
| Response: | The program will render a version of the current viewport that has been moved upwards using the X and Y center coordinates of the viewport as reference points |

3.6.2.1.4 Keyboard Move Down

|  |  |
| --- | --- |
| Trigger: | User presses the key bound to Move Down |
| Event: | KeyEvent |
| Response: | The program will render a version of the current viewport that has been moved downwards using the X and Y center coordinates of the viewport as reference points |

3.6.2.1.5 Keyboard Move Left

|  |  |
| --- | --- |
| Trigger: | User presses the key bound to Move Left |
| Event: | KeyEvent |
| Response: | The program will render a version of the current viewport that has been moved left using the X and Y center coordinates of the viewport as reference points |

3.6.2.1.6 Keyboard Move Right

|  |  |
| --- | --- |
| Trigger: | User presses the key bound to Move Right |
| Event: | KeyEvent |
| Response: | The program will render a version of the current viewport that has been moved right using the X and Y center coordinates of the viewport as reference points |

3.6.2.1.7 Mouse Drag Move

|  |  |
| --- | --- |
| Trigger: | User drags the mouse across the screen by right clicking |
| Event: | MousePressed, MouseDragged |
| Response: | The program will resolve the change in location from the start of the mouse being dragged to the finish at every operation loop, and will re render and display the viewport according to the same direction the mouse has been dragged in. |

3.6.2.1.8 Mouse Lasso Zoom

|  |  |
| --- | --- |
| Trigger: | User drags the mouse across the screen by left clicking |
| Event: | MousePressed, MouseDragged |
| Response: | The program will resolve the initial point of the mouse being dragged and then make a transparent selection box by which will be the new bounds of the viewport. If the box is not a perfect square then the program will zoom in on the center most bounds of the rectangle without stretching or skewing the map. |

3.6.2.1.9 Mouse Selection Highlight

|  |  |
| --- | --- |
| Trigger: | User moves the mouse over a country |
| Event: | MouseMoved |
| Response: | All relevant data will be displayed of that country in the Selection Info window, if there isn’t any country selected, then the Selection Info window will be blank. |

3.6.2.2 Main GUI Event Listeners

3.6.2.2.1 Open Statistical View (includes formulas)

|  |  |
| --- | --- |
| Trigger: | User selects “Open Statistical View” menu item |
| Event: | MouseClicked |
| Response: | Program will launch the “Open Statistical View” file chooser dialog box |

3.6.2.2.2 Save Statistical View (includes formulas)

|  |  |
| --- | --- |
| Trigger: | User selects the “Save Statistical View” or “Save Statistical View As” menu items |
| Event: | MouseClicked |
| Response: | Program will detect status of currently active statistical view, and either save the contents of it to the file associated with it, or open up the Save As file chooser dialog box to save a new Statistical View file |

3.6.2.2.3 View Loaded DBF

|  |  |
| --- | --- |
| Trigger: | User selects “View DBF Table” menu item |
| Event: | MouseClicked |
| Response: | Program will load the DBF table for viewing, but no manipulation of the data will be allowed. |

3.6.2.2.4 Rendering Options

|  |  |
| --- | --- |
| Trigger: | User selects “Rendering Options” menu item |
| Event: | MouseClicked |
| Response: | Program will launch the dialog box containing all the options for viewing and displaying the loaded dbf field data on the rendered shp file |

3.6.2.2.5 Export as Image

|  |  |
| --- | --- |
| Trigger: | User selects “Export as Image” menu item |
| Event: | MouseClicked |
| Response: | Program will launch the dialog box asking the user to give more information on the details of how the image should be saved which includes: Name, Location, Image Type, Entire Map or Viewport only, Display Selected info, and Display Map Info |

3.6.2.2.6 Map Options

|  |  |
| --- | --- |
| Trigger: | User selects “Map Options” menu item |
| Event: | MouseClicked |
| Response: | Program will launch the dialog box giving the user the ability to assign the map a title, and edit the map legend |

3.6.2.2.7 View SHP File

|  |  |
| --- | --- |
| Trigger: | User selects “View SHP File” menu item |
| Event: | MouseClicked |
| Response: | Program will load the SHP file for viewing, but no manipulation of the data will be allowed. |

3.6.2.2.8 New Statistical View (removes formulas)

|  |  |
| --- | --- |
| Trigger: | User selects “New Statistical View” menu item |
| Event: | MouseClicked |
| Response: | Program will launch the “New Statistical View” handler |

3.6.2.2.8 Custom Field Editor

|  |  |
| --- | --- |
| Trigger: | User selects “Custom Field Editor” menu item |
| Event: | MouseClicked |
| Response: | Program will launch the “Custom Field Editor” handler |

3.7 Organizing the Specific Requirements

3.7.1 GUI Component Hierarchy:

3.7.1.1 Main GUI:

3.7.1.1.1 File Menu:

* New SV
* Open SV
* Save SV
* Export SV
  + As Image
* Quit Program

3.7.1.1.2 Edit Menu:

* Custom Field
  + Add
  + Remove
* Options
  + Mapper
    - Title
    - Legend
  + Renderer

3.7.1.1.3 View Menu:

* DBF Table
* SHP File
* Active Fields
  + Include filter for custom fields

3.7.1.1.4 Map Legend:

* Color denotations
* Units of field measurement
* Type of data
* Scale of data shown
* Organizational properties layout

3.7.1.1.5 Map Title:

* Shown at top center of viewport for rendering purposes

3.7.1.1.6 Quick View Bars:

* Presents menu bars (comboBoxes) for all available statistical view fields for quick rendering of map data (uses same handlers as Renderer Options)

3.7.1.2 Map Legend:

* Color shades information
* Units of field measurement
* Type of data
* Scale of data shown
* Organizational properties layout

3.7.1.3 Mouse Highlight Info:

- Enable/Disable option button

* Name
* Flag
* Selected Statistic Info

3.7.1.4 Open SV Dialog Box:

* Title of present working directory
* All contents of present working directory
* Directory traversal controls
* Selected SV text field
* OPEN and CANCEL buttons

3.7.1.5 Save As Dialog Box:

* Title of present working directory
* All contents of present working directory
* Directory traversal controls
* Name Input of SV text field
* SAVE and CANCEL buttons

3.7.1.6 Export SV Dialog Box:

* Title of present working directory
* All contents of present working directory
* Directory traversal controls
* Name Input of image text field
* Type of image dropdown menu
* EXPORT and CANCEL buttons

3.7.1.7 Mapper Options Dialog Box:

* Edit Map title text field
* Edit legend display
  + Colors
  + Units
  + Scale
* OK and CANCEL buttons

3.7.1.8 Renderer Options Dialog Box:

* Field to display data from
* Color to display
  + Shade value frequencies
* Random color?
  + Random shade freq?
* OK and CANCEL buttons

3.7.1.9 Custom Field Editor:

* Field name text box
* Link data from separate fields?
* Formula with that data?
* OK and CANCEL

3.7.1.10 DBF Table Viewer:

* List of all fields and records
  + No edits can be made
* Scroll bars for viewing information off window
* CLOSE button

3.7.1.11 SHP File Viewer:

* Show the full, uncolored SHP file loaded
  + No edits can be made
* CLOSE button

3.8 Supporting Information:

3.8.1 GUI Visual Design Layout:

3.8.1.1 Main GUI:

<Current Map Title>

World Fact-Book Statistics Mapper

File

Edit

View

Quick Render

Map Legend:

Transparent with information shown

Mouse over info:

Opaque with information shown

Show/hide button

Show/hide button

<Viewport displays map here>

3.8.1.2 DBF Viewer Window

<Column>

<Column>

<Column>

<Column>

<Column>

DBF Viewer: <DBF file name here>

3.8.1.3 SHP Viewer Window

SHP Viewer: <SHP file name here>

3.8.1.4 Custom Field Editor Window

**Value Calculation:**

Text

**Type:**

**Name:**

Custom Fields

Custom Field Editor

Current Fields

Selected Field

Add

Clear

<Formulas can go here>

Remove

Ok

Cancel

3.8.1.5 Renderer Options Panel

Renderer Options

Standard Fields

Ok

Cancel

Custom Fields

Color Options

Random

Chooser

**Selected Field:**

**Color:**

**Shade Freq:**

**Color:**

**Shade Freq:**

Red

3.8.1.6 Mapper Option Panel

Meters

Map Display Options

**Map Title:**

Ok

Cancel

**Legend Display**

**Scale::**

**Units::**

**Colors:**

**Selected:**

Commit

Clear