Software Requirements Specification

for

Delta Shell

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version
Sam Portillo	9/13/2019	Initial template	1.0
Anh Pham	9/24/2019	Messaging App Requirements 3.400	1.0
Anh Pham	9/28/2019	Messaging App Contents plan layout	1.0
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Chandler Atchley	10/01/2019	Adding text editor sections 1-3	1.0
Krish Shah Monteiro	10/02/2019	Finalizing sections 4 and 5 for Bigcalc, Making changes requested by the team leader.	1.0
Sam Portillo	10/02/2019	Section 5.4.100.1 Definitions & Section 5.4.100.2 Quality Attributes Priority Table to apply to all projects.	1.0
Sam Portillo	10/02/2019	Section 6 to apply to all projects.	1.0
Chandler Atchley	10/02/2019	Adding text editor sections 4-5	1.0

Origin Of Traceability

00 The following table denotes each members ID. Each reference is composed of one of the following ID's. For more details please see section 1.2 Document Conventions.

ID	Delta Member
100	Sam Portillo
200	Chandler Atchley
300	Kazuki Kanke
400	Anh Pham
500	Angelito Sabino
600	Krish Shah

1 Introduction

1.100 This Software Requirements Specification (SRS) provides insights on the essential details to develop a successful software system. So this SRS document provides a complete description of the requirements of an Operating System, Command Line Interface Shell as well as the preinstalled software -- text editor, messaging, shopping cart, calculator, Tetris game. This introduction provides an overview by highlighting the purpose, scope, definitions, acronyms, abbreviations, references, and overview of an SRS document.

1.200 The text editing software “Teddy” is a graphical text editor along the lines of others bundled with desktop environments, such as Microsoft Notepad or gedit.

1.300 The shopping cart application let the user choose the goods, and price will be calculated automatically. Also, it will display the price and tax.

1.400 The messenger app is a messaging app offers the user the ability instant messaging, sharing photos and communicating with chat groups and channels.

1.500 The game software is called “Tet-ri-poff” and will be a playable replica version of Tetris, a tile puzzle game originally developed by a Russian software engineer.

1.600 If there is one device other than our mobile devices, that we seem to use in our daily lives is a calculator. A calculator helps the user make faster decisions in terms of mathematical, scientific,economic or commercial expressions. However, the normal calculator limits its functionality, which is why I am proposin make bigcalc, the calculator.

1.1 Purpose

1.1.100 The purpose of this SRS is to provide details on the OS and command line shell release 1.0, target audience, interfaces, and expected functionality in order to attain development and maintenance costs, and if pursued, the Software Design Specification (SDS). For the scope of this product please see Product Scope. This project will simply be referred to as the OS.

1.1.200 The purpose of the text editor is to provide the user of the operating system a GUI-based program to create, open, modify, and save text files.

1.1.300 The purpose of the shopping cart is to calculate the price of goods and manage the product data.

1.1.400 The purpose of the messaging app is to let users communicate with each other.

1.1.500 The purpose of the Tet-ri-poff game is to entertain users of the OS.

1.1.600 Bigcalc is a calculator that includes the functionality of a normal calculator, in addition with unique features that will cater to the needs of the scholastic community, the average householder and also the business world.

1.2 Document Conventions

1.2.100 This SRS document uses the following reference numbering convention:
1.2.100.1 Each Delta member is given an ID, this ID is used as a starting number to reference their requirements, this starting value is appended to the Table of Contents numbering system, with possibly appended detailed points.

1.3 Intended Audience and Reading Suggestions

1.3.100 The intended audience for this SRS document are team leaders, project managers, software developers, unit testers, software documentation writers, staff, and the customer requesting an estimate of costs for this project, and users.

1.3.200 For the text editor, the intended end user is any end user of the OS that is literate and competent enough with computers to use the text editor as a graphical alternative to the OS' command line functions to read and edit text files.

1.3.300 The intended audience for the document are team leaders, project managers, software developers, unit testers, software documentation writers, staff, and the customer requesting

1.3.400 For the Messaging App, the main audience and users are general users who want to communicate with others using their computers. The general users are able to read, send and receive messages from the server through the application**.** Refers to Section 2.400.3 for more information on users.

1.3.500 For the Tet-ri-poff game, the intended audience of users range from children to adults of varying skill levels. The assigned difficulties are for the user to determine which skill bracket they fit in.

1.3.600 Bigcalc will be used by a group of diverse users. For the business users, bigcalc will hold features that will help them calculate their bank interest rates, mortgage amounts and stock market returns without clicking on a bunch of numbers and mathematical operators. For the student users, bigcalc provides the commonly used scientific and algebraic functions used in their classes. For the householders, Bigcalc comes with a budgeting tool that will help them manage their budget.

1.4 Product Scope

1.4.100 This OS provides a shell that is capable of creating a hierarchical file directory structure of folders & files. This shell provides commands to create, seek, read, write, delete, and list files, as well as executing user application software. In line with corporate goals, this OS provides a platform to showcase custom user software to demonstrate the benefits of a custom OS to better serve the needs of a given client.

1.4.200 The text editor will provide a graphical user interface to open, edit, write, create, and save text files in ASCII format or in Unicode. It will also provide utilities expected of modern text editors.

1.4.300 Shopping application will provide calculation product that user can calculate the price of goods.

1.4.400 The Messaging Application will be a communication product. This product gives the users the ability to read, send, receive messages from other users of this application. This product will also give the users and convenient way to quickly access to other featuring application from the Delta Shell such as Calculator, Games, Shopping Cart and Text Editor. It will consist of two main components: A System Specific Service Module and a Graphical User Interface Module.

1.4.500 Tet-ri-poff is intended for entertainment purposes. It will allow a user to play a similar version of the original “Tetris” game using pre-assigned controls and will also keep track of scores and save them to a separate file to review and compare.

1.4.600 Bigcalc is a calculator that intends to make the user’s calculating experience more fun, approachable and unique. Bigcalc unlike a normal calculator is more user friendly and will provide the user with a range of features. As mentioned in 1.1.600, the uniqueness of Bigcalc, facilitates better user understanding and provides the user with a huge range of options that a normal calculator does not.

1.5 References 

1.5.100 Karl E. Wiegers (1999), *IEEE Software Requirements Specifications Template*
1.5.101 https://standards.ieee.org/standard/830-1998.html
1.5.102 World Infomania, https://twitter.com/worldinfomania/status/532253926016299008
1.5.103 Desiderius Erasmus, https://en.wiktionary.org/wiki/in_the_land_of_the_blind,_the_one-eyed_man_is_king

1.5.200 https://en.wikipedia.org/wiki/Microsoft_Notepad
1.5.201 https://en.wikipedia.org/wiki/Gedit
1.5.202 https://en.wikipedia.org/wiki/Unicode
1.5.203 https://en.wikipedia.org/wiki/ASCII

1.5.300 https://en.wikipedia.org/wiki/Shopping_cart_software

1.5.400 https://blog.discordapp.com/how-discord-stores-billions-of-messages-7fa6ec7ee4c7?gi=b4e05cbce391

1.5.500 https://en.wikipedia.org/wiki/Tetris
1.5.501 http://zetcode.com/tutorials/javagamestutorial/tetris/
1.5.502 http://www.kosbie.net/cmu/fall-08/15-100/handouts/notes-tetris/2_1_DesignOverview.html

1.5.601 https://www.instructables.com/id/How-to-Make-a-Simple-Calculator-in-Java/
1.5.602 http://www.sharp-calculators.com/files/composite_file/file/63-operation_guide_el-531w_ser.pdf
1.5.603 https://codescracker.com/java/program/java-program-make-calculator.htm

2. Overall Description

2.1 Product Perspective

2.1.100 OS:

This is a new self-contained software product based off a Unix OS and shell. This product includes the following custom applications -- text editor, messaging, shopping cart, calculator, and a Tetris game.

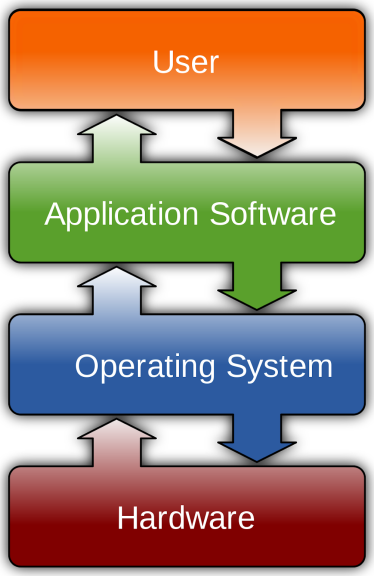


Figure 2.1.100.1
See Reference 1.5.102

2.1.200 The text editor is a standard text editor as often bundled in with operating systems or desktop environments.

2.1.300 Shopping cart is similar to calculator that user can buy the goods.

2.1.400 The Messaging Application is taking references from the Discord voice & text chat app.

2.1.500 The Game "Tet-ri-poff" is a replica based off the original game "Tetris" developed by Alexey Pajitnov.

2.1.600 Bigcalc is a unique take on the normal calculator. Bigcalc does not limit itself to the generic and fundamental mathematical calculations but goes as far as helping the user with unique features such as calculating bank interest rates, stock returns and so on. These functions when performed on a normal calculator would seem to require multiple clicks on a bunch of button, but bigcalc does the same in just a few clicks.

2.2 Prod Functions

2.2.100 OS:

Following is a list of user command line functions for the OS shell:

- Create folder or file
- Open file
- Seek file
- Read file
- Write file
- Close file
- Delete folder or file
- List directory elements
- Save & load a file structure
- Execute applications

The following syntax graph describes all possible sequences of input data:

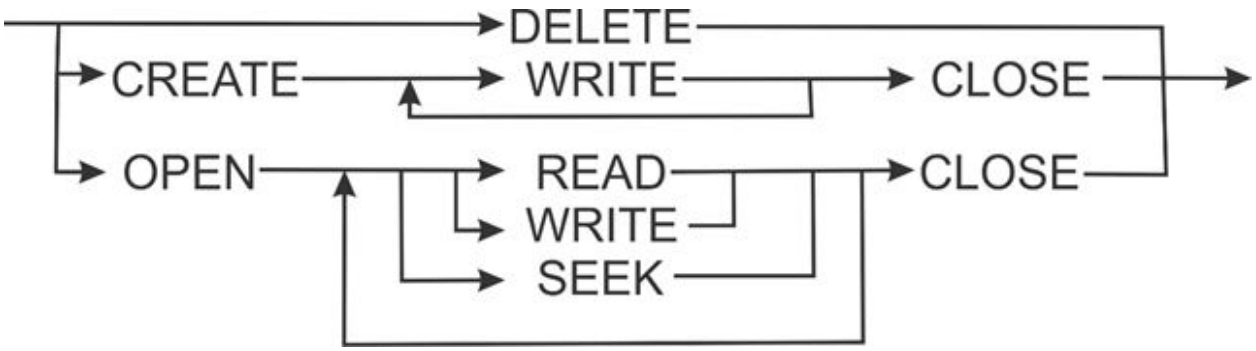


Figure 2
OS input data sequences

2.2.200 The following are the functions of the text editor:

- The application provides a graphical user interface for editing ASCII or Unicode text.
- The application allows the user to open, edit, write, create, and save ASCII or Unicode text files.

2.2.300 The following are the functions of the text editor:

- The application provides the shopping cart apps.
- The application allows the user to open, edit and create goods.

2.2.400 Following is the list of product functions ava le in the Messaging App

- The application can display user messages.
- The application can manages user profiles
- The application allows users to read, send and receive messages within the application.

- The application allows eligible users to manage and organize the channels within the application.
- The application allows users to quickly access to featuring application from the Delta Shell.

2.2.500 List of functions available in the Tetris Game

- The application displays a menu upon startup to choose from a list of functions.
- The application allows the user to play the game in different difficulties with varying speeds.
- The application can keep track of the score and save them to a remote .txt file to review and compare.
- The application provides instructions and controls on how to play the game.
- The game allows users to hold a block to save and use later.
- The application will output music.
- The application will allow users to save the game's current score and end the game.

2.2.600

- 1. The user enters the Bigcalc command in the OS shell to use the software
- 2. A physical calculator is displayed on the screen
- 3. The user works with any of the numbers and operations from the screen and will end the expression clicking on the "=" button.
- 4. This is followed by an immediate output for that expression.
- 5. However, if the user chooses the button that says 'addfeat', it will display a new physical calculator.

Note - In doing so the user cannot go back to the original calculator, mentioned in step 2.

- 6. The user will then click on one of the options on the new calculator.
- 7. The user will be prompted for the required data for that option opted in step 5
- 8. The user clicks on the "=" button that displays the value on the screen.
- 9. The user now decides to exit the 'addfeat' calculator by clicking on the exit button.
- 10. The user now returns to the original calculator mentioned in steps 1 through 3.
- 11. The user decides to exit the software , he clicks on the 'exit' button.

2.3 User Classes and Characteristics

2.3.100 This base OS model only has one class of users where all are Administrators.

2.3.200 The text editor assumes only one class of user, who will open and edit files that they have access to within the operating environment.

2.3.300 Shopping cart assume that user can choose products. And if user clicks the goods, it will add the price their shopping cart.

2.3.400 The messaging app is a connecting bridge between users to users with the monitoring of a few individual volunteered as moderators to keep the server from getting spam and harmful unwanted contents, so there are two main groups of users for this application: the general users and the moderators.

2.3.400.1 General User

Common users who want to communicate with others via this messaging application will be the general users. They will be given access to the majority of the application functions to conveniently sharing their ideas, messages through the network.

2.3.400.2 Moderators

Moderators are hand picked and assigned role by the application creator or administrator of the server. Some users who can control, manage as well as organize the server with fairness and rules defined by the Delta Members and the application creator. They will have permission to BAN or KICK a member from the server or to change the rules of the channels.

2.3.500 The Tetris game will be accessible by users of the OS model. The game will provide three levels of difficulty so it will divide users into three classes of players. “Easy” will be for beginner-level users, “Normal” will be for intermediate-level players, and “Hard” will be for advanced-level players.

2.3.600 The software ‘bigcalc’ could be used by users that are 10 years and older. Bigcalc could be used by students for their math and science problems. The calculator could also be used by people for their job tasks and also by householders. Most of the scientific functions like sin, cos and tan will require their own functional lay and the additional features,like the tax return options and the budgeter require distinct classes for each option that is a part of the addfeat calculator.

2.4 Operating Environment

2.4.100 This OS & custom applications are only supported for Windows 10 64 bit with Java JDK 8 Update 221 or higher installed and a minimum hardware requirement of a 1GHz processor, 2 GB of RAM and ~ 20GB of free space. Furthermore, this OS and custom applications are only supported to work in IntelliJ, Version: 2019.2.3, Build: 192.6817.14, September 24, 2019.

2.5 Design and Implementation Constraints

2.5.100 The OS, calculator and Tetris are limited to the capabilities of building an application in Java JDK 8 Update 221 on a Windows 10 64 bit system.

2.5.200 The text editor will be limited by the limitations of Java JDK 8 Update 221 and its implementation of the Swing API as implemented on a Windows 10 64 bit system.

2.2.300 The main display will be good picture. It will show up the product picture and price. It will be user limitation interfaces.

2.5.400 The primary limitation of the messaging app will be the deployment and connecting the application online from the user computer to a cloud database server using MongoDB. Simultaneously every users can connect to the same messaging server database through the application at any given time. Connection to internet service is the main constraint the application will have. As an external requirement, this application is required to be written 90% in Java.

2.5.500 (Refer to 2.5.100 for design constraints)

2.5.600

2.5.600.1 Since, the scope of operations on bigcalc is pretty huge, if the user enters a number that is way too large for the calculator to work with or if the user performs an operation with the wrong operands, the software could crash due to incoherent data.

2.5.600.2 While switching the calculators as mentioned in steps 5 through 8 mentioned in section 2.2.600, a weakly constructed decision structure could hinder the transitioning amongst the calculator.

2.5.600.3 Bigcalc does not consider any inputs from the keyboard. Therefore, it is less flexible in terms of inputting data.

2.6 User Documentation

2.6.100 Regarding the OS, the user documentation is in the user command line interface, CLI.

2.6.200 Regarding the text editor, the user help guide will be provided in the form of an ASCII text file that can be opened within the editor.

2.6.300 Regarding the shopping cart, the user can choose the product what they want.

2.6.400 Regarding the Messaging App, a user help guide will be provided with the application. This help guide explains the main features and functionality of the application with visual presentation and key notes to the general UI elements to help users get to know the application much easier. This help guide will be included with the application in pdf format. (../application/doc/helpguide.pdf)

2.6.500 Regarding The Tetris-Based game, the user can select the option at the main menu screen “How to play” and when the function is called, it will display general instructions and controls on how to play the game. There will be another option “more” for more instructions on this pop up to see further details on how the difficulties change the speed and score.

2.6.600 The user will be provided with a reference manual that will help the user with any prospective problems that they may face. The manual will be made accessible by clicking on the ‘help’ button on the calculator. The manual will cover all the features alphabetically making it easier for the user to seek help.

2.7 Assumptions and Dependencies

2.7.100 Regarding the OS, the application software is stored outside of this OS and is merely linked to provide a facade of unity.

2.7.300 My software data does not have any assumptions and dependencies. This feature will be refresh the application every 5 seconds to get updated messages and user status

2.7.400 The messaging app uses MongoDB to store its user account data and messages data, using the same database server we establish connections between users and server via websockets. This feature will be refresh the application every 5 seconds to get updated messages and user status. If the user computer loses internet connection or connection to the server while being used, the application will temporary stop letting user inputting or receiving messages.

2.7.500 The Tet-ri-poff game’s only assumption is that while running this OS, A standard keyboard and mouse are installed. The standard I/O allows the user to have full control over all

the functions in the game. If the user does not know how to play the game, the application provides instructions and controls on how to do so.

2.7.600 Any wrong use of the basic scientific and mathematical operations could create a potential problem for the calculator. Therefore, the user is expected to have the right knowledge of these operations. But as a precaution the manual should nudge the user in the right direction. The creation of the actual physical calculator will include the use of javascript and JFX.

3. External Interface Requirements

3.100 External Interface Requirements for the OS

3.100.1 User Interfaces

3.100.1.1 The OS is a command line interface (CLI) that requires the IntelliJ IDE.
3.100.1.2 The OS user background is black.
3.100.1.3 The OS has the following font requirements: san serif, consolas, size 13.
3.100.1.4 The OS screen contains 32 rows of text x 240 characters wide.
3.100.1.5 The OS user input is green.
3.100.1.6 The OS user output is white.
3.100.1.7 The OS uses a screen resolution of 1920 x 1080 lines of vertical resolution of pixels.

```
> create D dir1
> create U dir1/one.txt
> write 51 In the land of the blind, the one eyed man is king.
> close
> dir
 dir1
+      one.txt
> open I dir1/one.txt
> read 51
In the lan
d of the b
lind, the
one eyed m
an is king
.

>
```

Figure 3.100.1.7

3.100.2 Hardware Interfaces

3.100.2.1 The OS has the following hardware interface requirements:
3.100.2.1.1 Standard US Keyboard
3.100.2.1.2 Standard US Mouse
3.100.2.1.3 Standard US Monitor

3.100.3 Software Interfaces

3.100.3.1 The OS has the following software interface where it is the parent thread & will execute application software on child threads.

3.100.4 Communications Interfaces

3.100.4.1 The OS does not have any communication interface requirements.

3.200 External Interface Requirements for Text Editor

3.1.200 User Interfaces

3.1.1.200 Main Interface

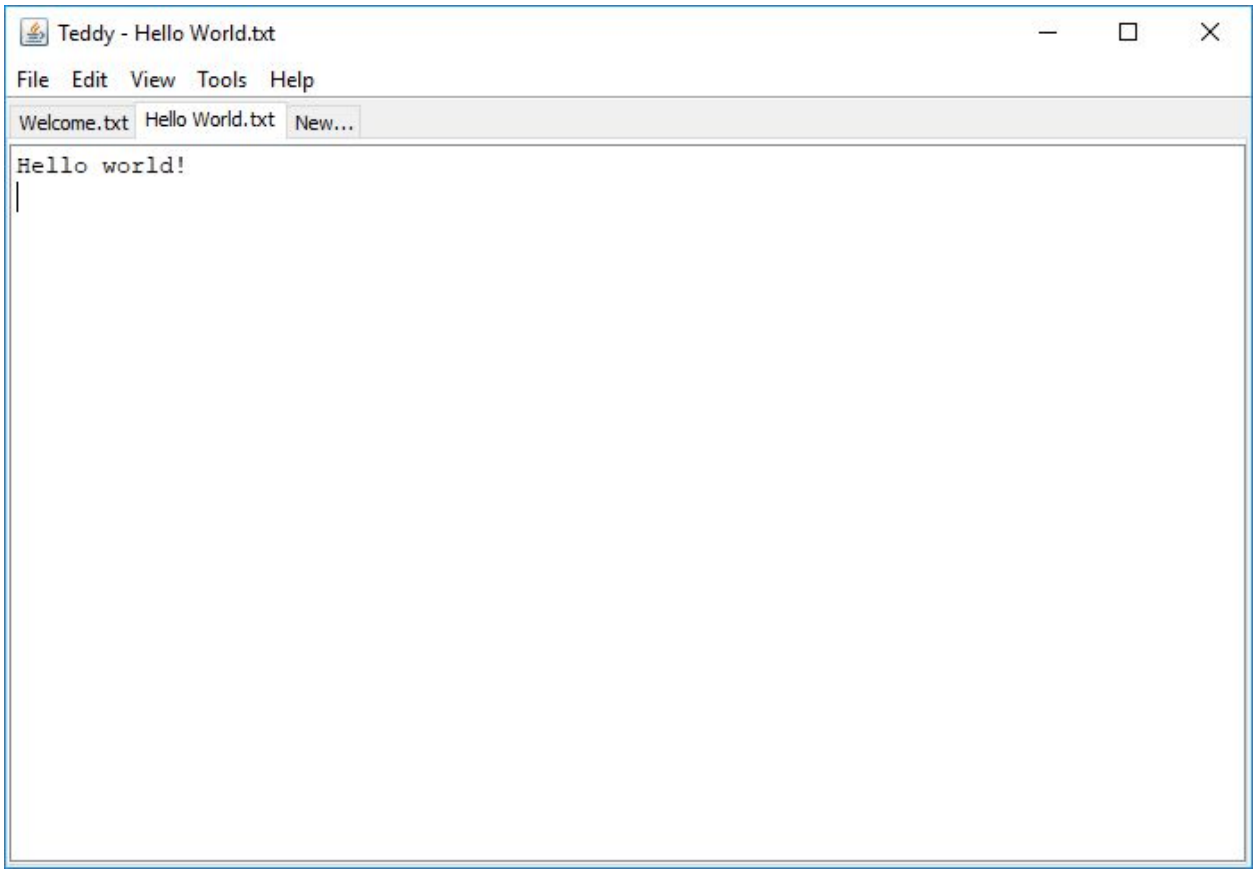


Figure 3.1.1.201

3.1.2.200 File Open/Save Dialog

The text editor shall use the File Chooser component provided by Java's Swing library to allow the user to open and save files.

3.2.200 Hardware Interfaces

The text editor shall run in an operating environment as described by section 2.4, and will additionally require a keyboard and a monitor with a minimum resolution of 640 pixels by 480 pixels.

3.3.200 Software Interfaces

The text editor will be launched using the OS Shell.

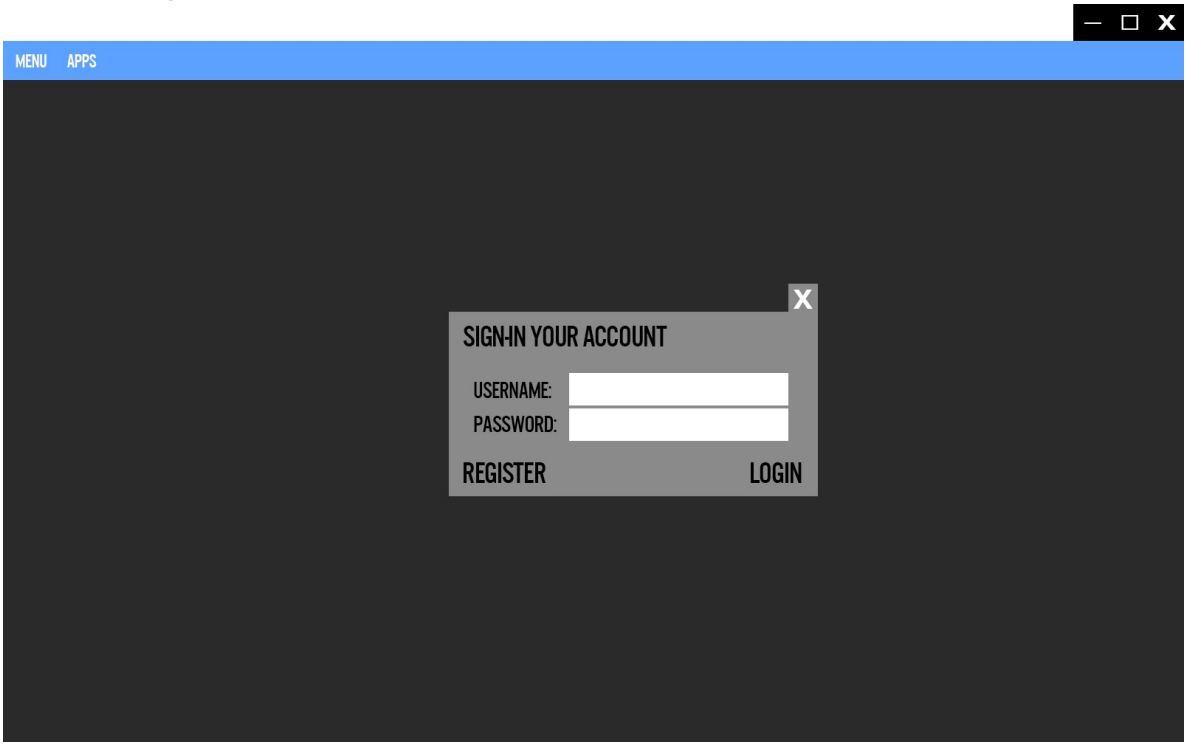
3.4.200 Communications Interfaces

The text editor will read, display, and write text content in UTF-8 format. The text editor will also read and display text in ASCII format, which is a subset of UTF-8.

3.400 External Interface Requirements for Messaging Application:

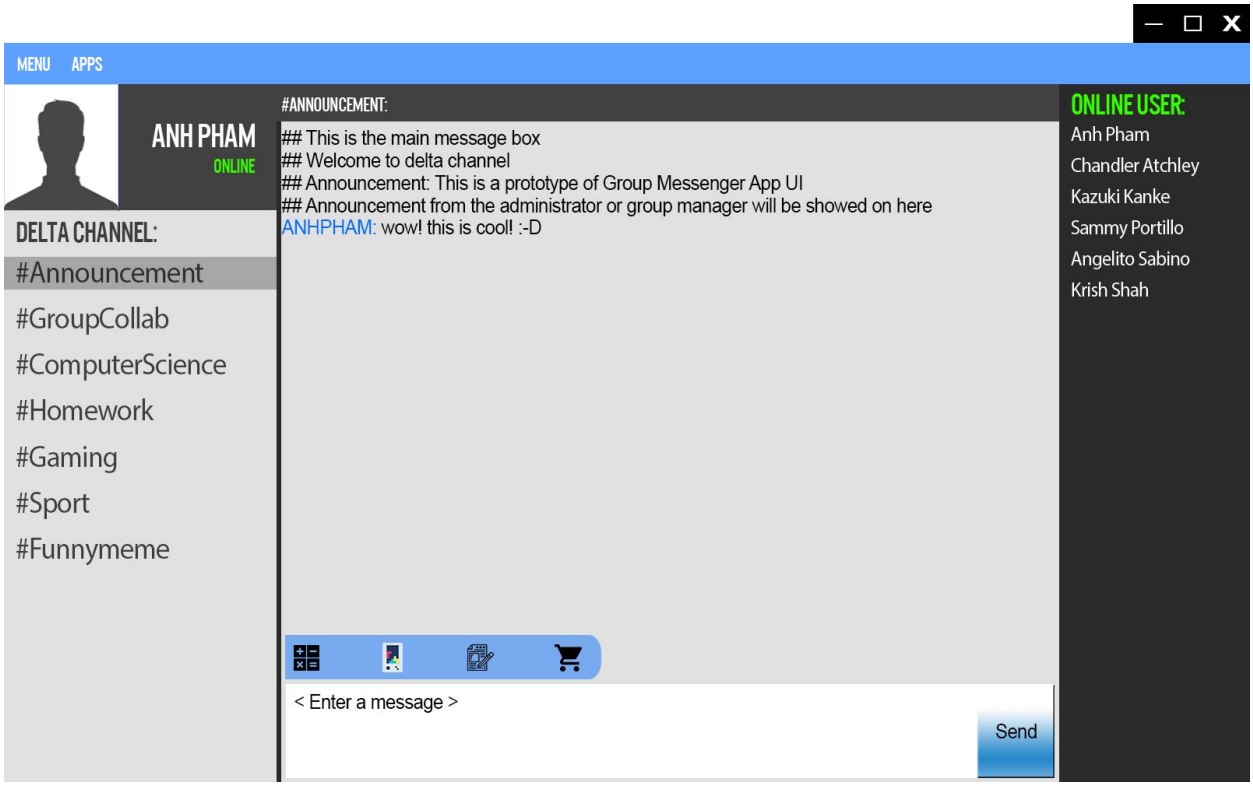
3.400.1 User Interfaces:

3.400.1.1 Login Interface:



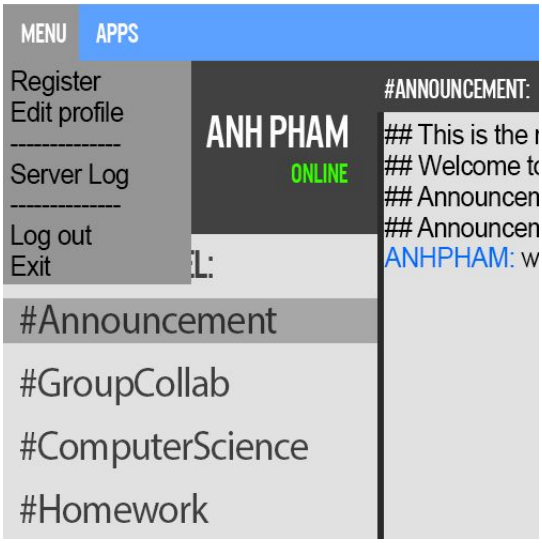
This login box is displayed when the application is launched. More specific details is posted in section 3.400.4.2.1

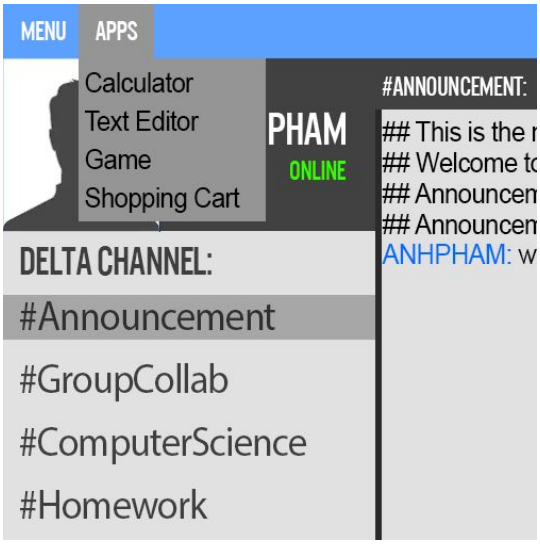
3.400.1.2 Main User Interface:



Main User Interface is the main interactive windows where the user sees, posts or replies to messages and status information of this server and its users.

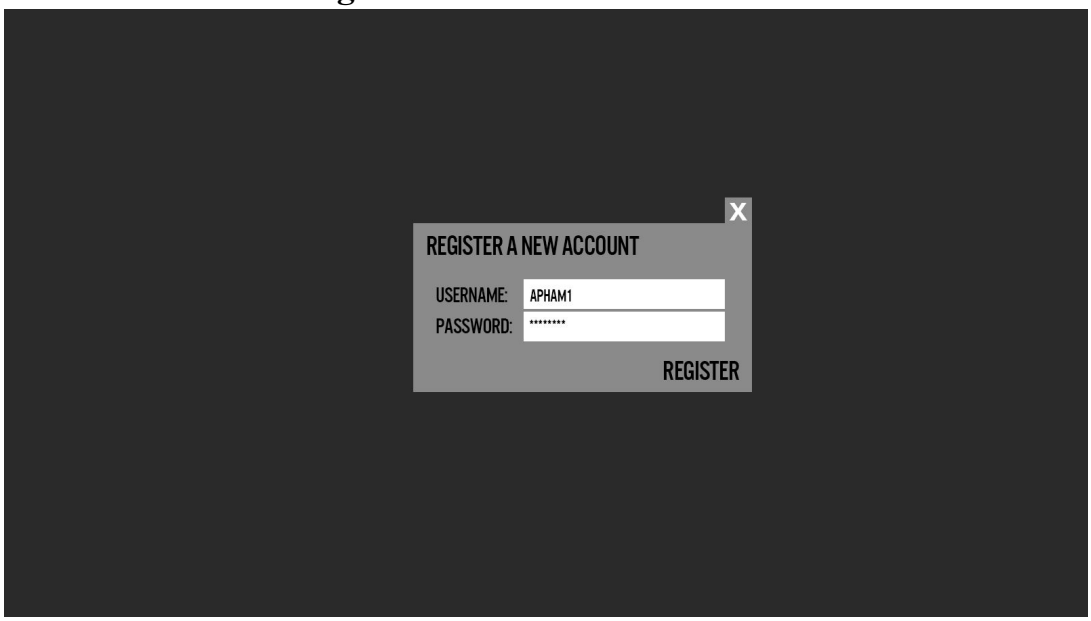
3.400.1.3 Drop-down menu list:





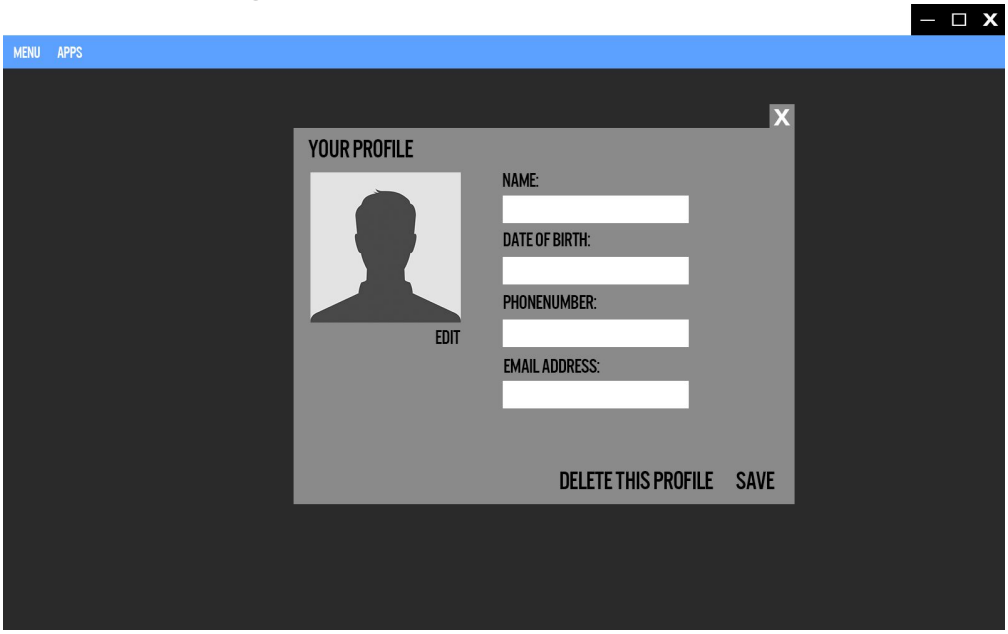
Drop-down menu list gives the user access to other features of the application.

3.400.1.4 New Account Register:



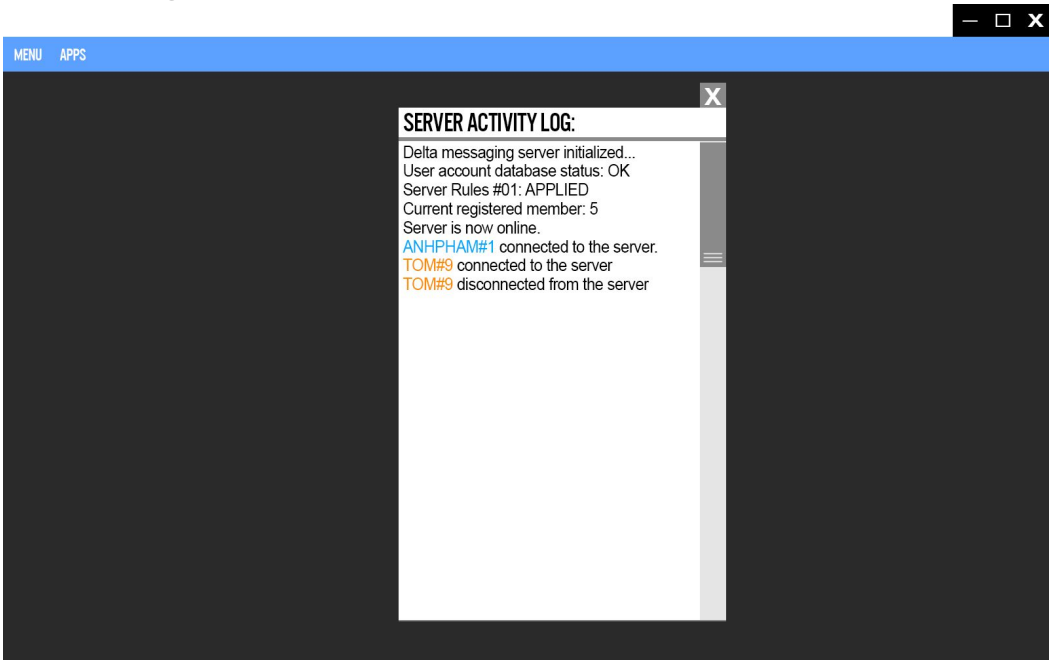
New Account Register is where the user registers a new account to access the application.

3.400.1.5 Profile Editing:



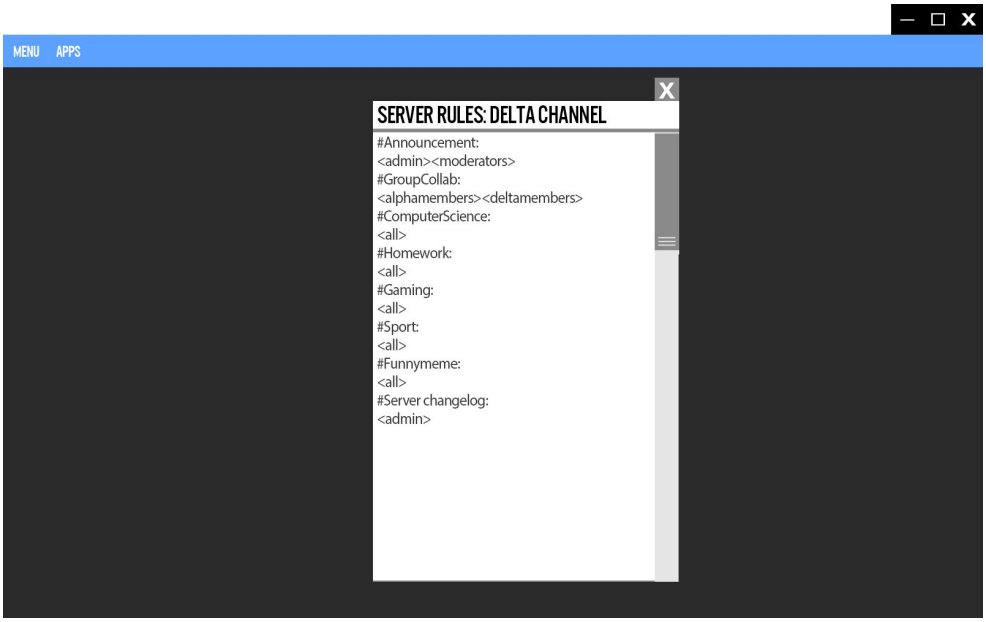
Profile Editing is where the user's changes his or her profile picture and information.

3.400.1.6 Server Log:



Server Log is where the user sees server information and status.

3.400.1.7 Server Rules:



Server rules is where the user defines channel privileges (Refers to section 3.400.4.1.3)

3.400.2 Hardware Interfaces

The Messenger App will require the user's computer to meet the following requirements:

- Internet connection with minimum speeds of 10Mbps download speed, 2Mbps upload speed.
- Keyboard
- Mouse
- Monitor
- Storage space with the minimum of 16GB available

3.400.3 Communication Interfaces

3.400.3.1 Websockets

Websockets are the essential pathway for communication between the user and the server for this messaging application. The System Specific Service will use an identical websocket on both server and client to receive and send messages back and forth and display them on the user interface using the Graphical User Interface Module.

3.400.3.2 MongoDB database

The MongoDB database will be the choice for the database of the messaging server, the database will store the user account database and message database. This includes the following:

- Username and password
- Profile pictures
- Date of Birth
- Phone Number
- Email Address
- User messages

The Messaging Application will interact, access and modify this MongoDB database, when the user tries to login onto the server via the application, the user input information will be sent to the server's user account database to validate user's access, this process is handled by the ID Scanner module *(Refers to Section 4.400.1.1)*. After successfully logged in, the application will continuously fetching for new messages from the message database every one second, this process is handled by the Text Handler module *(Refers to Section 4.400.1.2).*

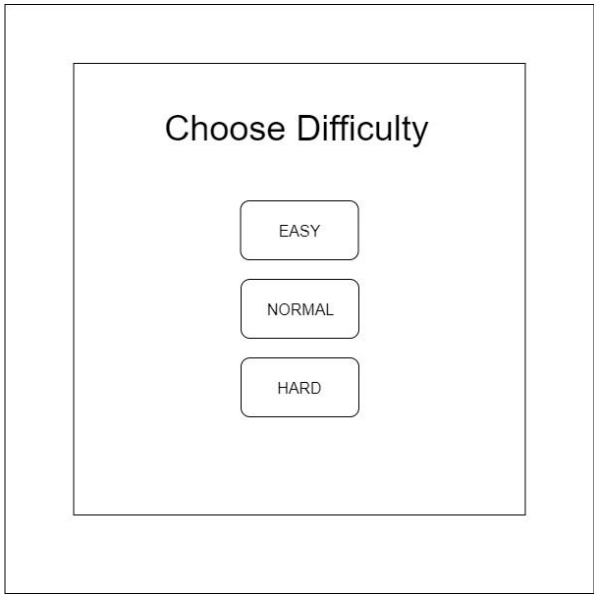
3.500 External Interface Requirements for Tetris Game

3.1.500 User Interfaces

3.1.501 The game will open with a menu to choose between functions such as starting a new game, viewing instructions for how to play, checking scores and exiting.

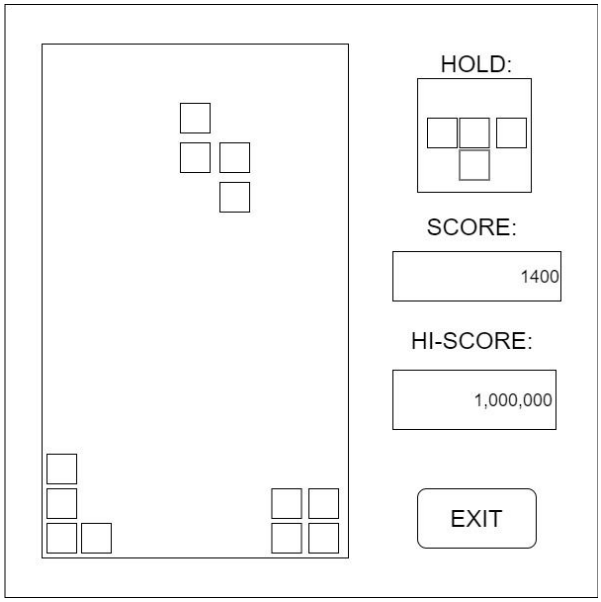
(figure 3.1.501)

3.1.502 Upon starting a new game, the application will bring up a separate menu that allows users to choose a difficulty. If there is a previous save state, there will be a button that appears that allows users to continue from the last game.



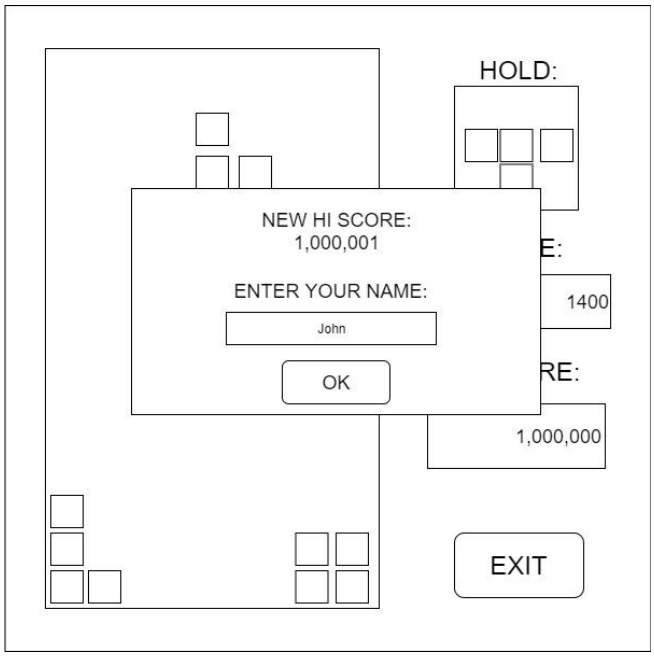
(figure 3.1.502)

3.1.503 Once a difficulty is chosen, the game interface opens and immediately begins the game. It will display the game, a score, the piece that is being currently held (if there is one) and an exit button that prompts a window that asks if the user wants to save their state or return to the menu.



(figure 3.1.503)

3.1.504 Upon finishing a single game, the game will pop up a message that indicates your score, and asks for your name to save. There will be an OK button after and will not allow the score to be left empty. If you beat the high score the message will tell you.



(figure 3.1.504)

3.2.500 Hardware Interfaces

3.2.501 The game will require I/O of a monitor, a standard keyboard with directional keys and ‘z’, ‘x’, and ‘c’ keys for the controls, and a standard mouse to select between the menu options. It will also require and Operating System of Windows 10 (64-bit) and requires Java 8+ to be installed. For the music to be heard, a sound device must be connected.

3.3.500 Software Interfaces

3.3.501 The game will open through the OS Shell upon calling it and will run on a child thread.

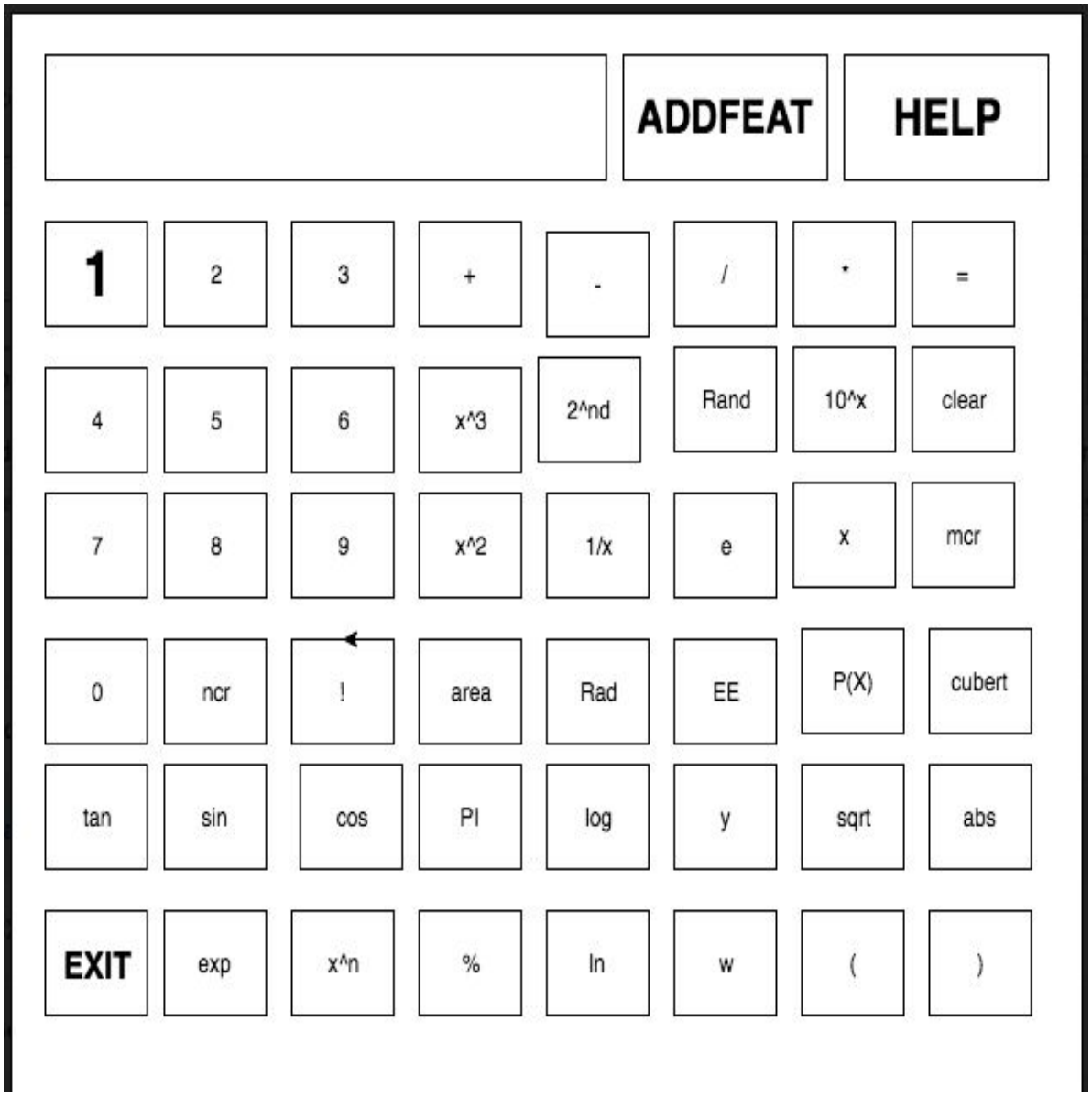
3.4.500 Communications Interfaces

3.4.501 The game will not require any communications interfaces.

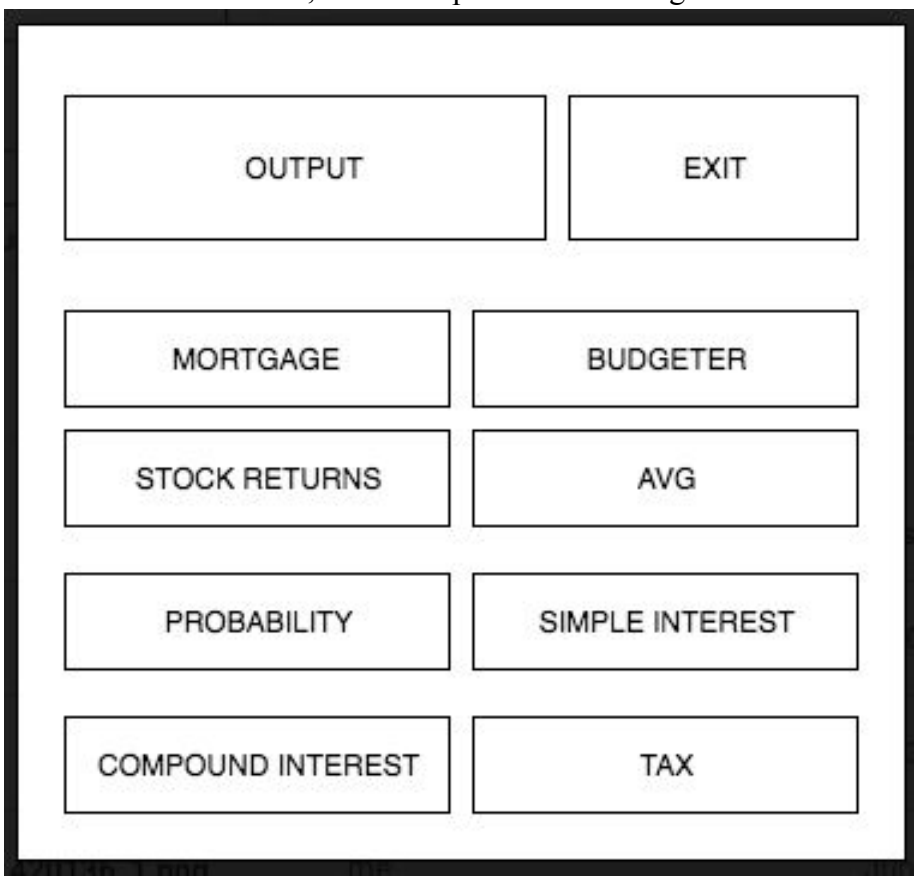
3.600 External Interface Requirements for Bigcalc (the calculator)

3.1.600.1 User Interface

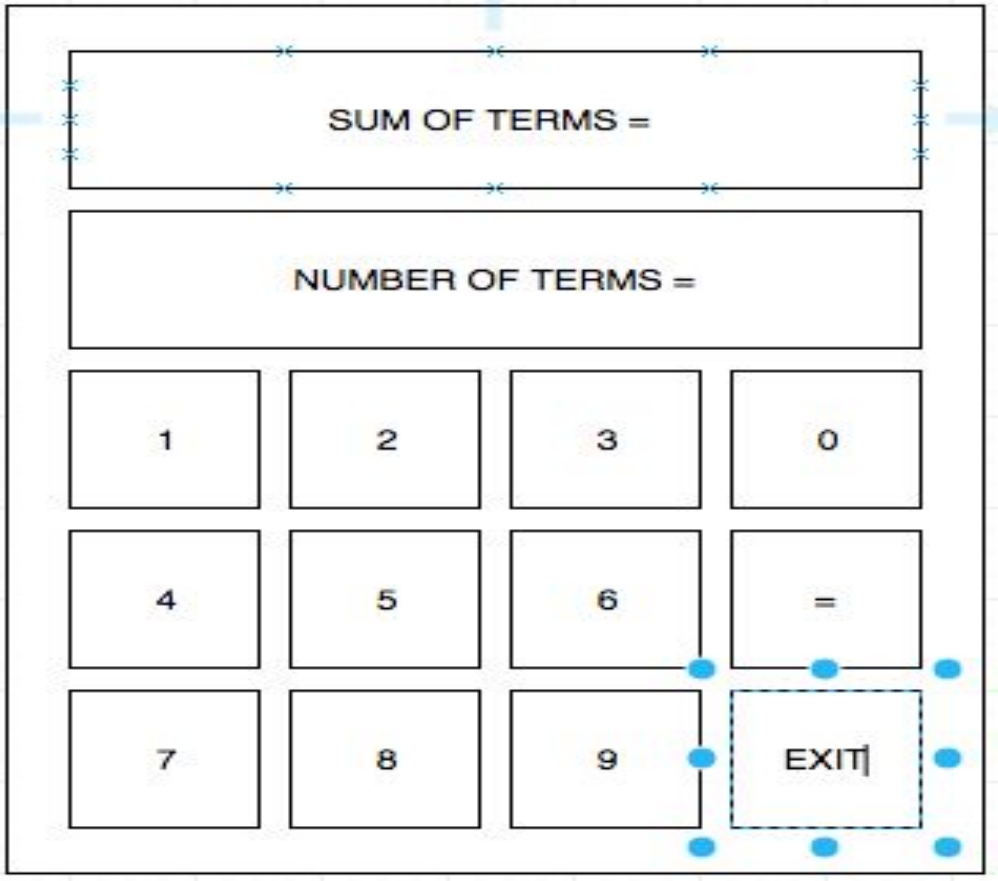
On requesting the bigcalc command in the OS , the user will see the following graphical Interface.The user will be able to perform the basic mathematical and scientific functions on this interface.



3.1.600.2
However, if the user wishes to explore the additional features, they could do so by clicking on the ‘ADDFEAT’ button, that will open this following ‘addfeat’ interface



3.1.600.3
The following dialog box will ask the user for data required for the selected option from the ‘ADDFEAT’ option mentioned in 3.1.600.2’. If the user is done with using the calculator and wishes to exit the software, he could do so by clicking on the “EXIT” button.
Note - once the user is in the ‘ADDFEAT’ calculator (from section 3.1.600.2) he cannot not go back to the normal calculator(from section 3.1.1.600).



3.2.600. Hardware Interfaces

Bigcalc requires

- The functionality of a normal mouse or trackpad to click on the buttons ,in order to access them,
- A monitor for the Input-Output inserted by the user and displayed by the software.

3.3.600 Software Interfaces

- Bigcalc is a part of the operating system software. Therefore, if the user wishes to explore bigcalc, they need to enter the command ‘bigcalc’.

3.4.600 Communication Interfaces

- Since the bigcalc performs all its functions by itself, it does not require any communication interfaces.

4. System Features

4.100 Following are the System Features of the OS:

The following table illustrates the meaning of the following references for the OS & custom applications:

References	Description
4.ID.x.1	Feature Name.
4.ID.x.2	Describes the syntax of the user command.
4.ID.x.3	Describes the feature.
4.ID.x.4	Describes the level of Priority of this feature. Low → Extra unrequested features Medium → Desirable Functionality High → Essential and required functionality
4.ID.x.5	Provides the Stimulus/Response Sequences
4.ID.x.6	Functional Requirements

Figure 4.101

The system administrator has access to all system commands:

4.100.1.1 Create

4.100.1.2 create [type] name

4.100.1.3 Create is a shell command that either creates a directory or a user data file. Accessing subdirectories by using the following syntax create [D | U] parent_directory/sub_directory

Where type is as follows:

type	description
U	creates a user data file with given name.
D	creates a directory with given name.

Figure 4.100.1.3.1

4.100.1.4 Priority: High

4.100.1.5 Stimulus/Response Sequences:

Use Case 4.100.1:

Stimulus	Response Sequence
create D dir1	1. Creates a directory named, ‘dir1’. 2. Show the ‘>’ prompt.
create U dir1/one.txt	1. Creates a user file in ‘dir1’ named ‘one.txt’. 2. Sets the file open for reading or writing. 3. Sets the file pointer to the beginning of the file, position 0. 4. Show the ‘>’ prompt. 5. Wait for new user input.
write 48 Be careful with what you hear, you may go blind.	1. See 4.100.5.1. 2. See Reference 1.5.103
close	3. See 4.100.6.1.

4.100.1.6 Functional Requirements:

REQ-4.100.1.6.1: Only one create or open file is permitted at a time.

REQ-4.100.1.6.2: Free sector(s) to create the new directory or user data file.

REQ-4.100.1.6.3: The OS will prompt the user of an illegal use of the parameters with the following statement, ‘Illegal use of parameters.’.

4.100.2.1 open

4.100.2.2 open [mode: I | O | U] name

4.100.2.3 Open is a Unix shell command that opens a user data file in one of three modes. Associated with each open file is a pointer to the next byte to be read or written. Opening a file for input or update places the pointer at the first byte of the file, while opening a file for output places the pointer at the byte immediately after the last byte of the file.

The following table describes the open commands 3 modes:

Mode	Description
I	Input mode means that only READ and SEEK commands are permitted.
O	Indicates output mode which means only a WRITE command is permitted.
U	Indicates update mode which allows READ, WRITE, and SEEK commands.

Figure 4.100.2.3.1

4.100.2.4 Priority: High 

4.100.2.5 Stimulus/Response Sequences:

Use Case 4.100.2:

Stimulus	Response Sequence
create U one.txt	See 4.1.1.100
Write 51 In the land of the blind, the one eyed man is king.	1. Writes up to x characters of the string, 'In the land of the blind, the one eyed man is king.' to the open file. 2. Starting from the beginning of the string. If x > string length then fill string with '.' until x characters are written. 4. Show the '>' prompt. 5. Wait for new user input. 6. See 4.5.1.100.
close	1. Close the last opened file, in this case close the file one.txt. 2. See 4.6.1.100.

Continuation of Use Case 4.100.2 : Use Case 4.100.3:

Stimulus	Response Sequence
open I one.txt	1. The first parameter, I denotes to open the file only for a read or seek command.

	2. The second parameter, one.txt denotes to open the file 'one.txt' located in the current directory. 3. Sets the file pointer to the beginning of the file, position 0. 4. Show the '>' prompt. 5. Wait for new user input.
read x	1. See 4.100.4.1.
close	See 4.100.6.1.

4.100.2.6 Functional Requirements:
REQ-4.100.2.6.1: Only one create or open file is permitted at a time.
REQ-4.100.2.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, 'Illegal use of parameters.'.

4.100.3.1 seek

4.100.3.2 seek [base: -1 | 0 | 1] offset
4.100.3.3 Sets a file pointer to a given position in a file.

The following table describes the base parameter of the seek command:

base	description
-1	Set the position of the file pointer to the beginning of the file.
0	Set the position of the file pointer to the current position of the file pointer.
1	Set the position of the file pointer to the end of the file.

Figure 4.100.3.3.1

offset is an integer indicating the number of bytes from the 'base' that the file pointer should be moved.

4.100.3.4 Priority: Medium
4.100.3.5 Stimulus/Response Sequences:

Continuation of Use Case 4.100.2: Use Case 4.100.4:

Stimulus	Response Sequence
open I one.txt	See 4.2.1.100
seek -1 3	1. The first parameter, -1 denotes to start the file pointer from the beginning of the file. 2. The second parameter, 3 denotes to offset the file pointer by 3 bytes (3 characters) towards the end of the file. 3. Set the file pointer to position 3, in this case, on the letter 'l'.
read 10	1. See 4.4.1.100 2. Output, 'the land o'. 3.
seek 0 2	1. The first parameter, 0 denotes to start the file pointer from its current position in the file. 2. The second parameter, 2 denotes to offset the file pointer by 2 bytes (2 characters) towards the end of the file. 3. Set the file pointer to position 15, in this case, on the letter t.
read 10	1. See 4.4.1.100. 2. Output, 'the blind,'.

4.100.3.6 Functional Requirements:

REQ-4.100.3.6.1: A file must have initially been created or opened and in an open state.

REQ-4.100.3.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, 'Illegal use of parameters.'.

4.100.4.1 read

4.100.4.2 read n

4.100.4.3 This function reads n bytes of an open user data file. And advances the file pointer to the next read character in the file. This command may only be used between an OPEN (in input or update mode) and the corresponding CLOSE command. If possible, ‘n’ bytes of data should be read and displayed. If fewer than ‘n’ bytes remain before the end of file, then those bytes should be read and displayed with a message indicating that the end of file was reached.

4.100.4.4 Priority: High

4.100.4.5 Stimulus/Response Sequences:

Continuation of Use Case 4.100.2: Use Case 4.100.5:

Stimulus	Response Sequence
open I one.txt	See 4.100.2.1
read x	1. Read the file starting from the file pointer. 2. Read up to x characters. 3. Advance file pointer to next character to read. 4. Output to the screen the characters read, ‘In the land of the blind, the one eyed man is king.’ 5. If the file pointer reaches the end of the file then output the message, ‘<End Of File>’. 6. Show the ‘>’ prompt. 7. Wait for new user input.
close	See 4.100.6.1.

4.100.4.6 Functional Requirements:

REQ-4.100.4.6.1: A file must have initially been created or opened and in an open state.

REQ-4.100.4.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, ‘Illegal use of parameters.’.

4.100.5.1 write

4.100.5.2 write n data

4.100.5.3 This function writes n bytes of data to an open user data file. This command causes the first ‘n’ data bytes from ‘data’ to be written to the file. If fewer than

‘n’ bytes are given, then append sufficient blanks to ‘data’ to make ‘n’ bytes. If it is impossible to write ‘n’ bytes (because the disk is full) then an appropriate message should be issued, but the command should be otherwise treated as if the largest possible value of ‘n’ was specified.

4.100.5.4 Priority: High
4.100.5.5 Stimulus/Response Sequences:
See 4.100.2.5.

4.100.5.6 Functional Requirements:
REQ-4.100.5.6.1: A file must have initially been created or opened and in an open state.
REQ-4.100.5.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, ‘Illegal use of parameters.’.

4.100.6.1 close

4.100.6.2 close
4.100.6.3 This function closes any open files. This command causes the last opened or created file to be closed.

4.100.6.4 Priority: High
4.100.6.5 Stimulus/Response Sequences:
See section 4.100.2.5.

4.100.6.6 Functional Requirements:
REQ-4.100.6.6.1: A file must have initially been created or opened and in an open state.
REQ-4.100.6.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, ‘Illegal use of parameters.’.

4.100.7.1 delete

4.100.7.2 delete name

4.100.7.3 This command causes the named file or folder to be deleted. Deleting a folder frees a directory entry while deleting a file frees a directory entry as well as frees the sectors used by the data referenced by the user data file.

4.100.7.4 Priority: High

4.100.7.5 Stimulus/Response Sequences:

Continuation from Use Case 4.100.1: Use Case 4.100.6

Stimulus	Response Sequence
delete dir1/one.txt	1. Sets the status of this file to a free user entry located in dir1. 2. Sets the status of all the sectors used by this file to free. 3. Adds these newly freed sectors to a free sectors queue. 4. Show the '>' prompt. 5. Wait for new user input.
delete dir1	1. Sets the status of a directory entry in the root directory to free. 2. Sets the status of the sector used by dir1 to free. 3. Adds this newly freed sector to a free sector queue. 4. Show the '>' prompt. 5. Wait for new user input.

4.100.7.6 Functional Requirements

REQ-4.100.7.6.1: Must reference all files by absolute referencing from the root directory.

REQ-4.100.7.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, 'Illegal use of parameters.'.

4.100.8.1 java

4.100.8.2 Java application_name

4.100.8.3 This command executes the application software on its own thread.

4.100.8.4 Priority: High

4.100.8.5 Stimulus/Response Sequences:
Use Case 4.100.7:

Stimulus	Response Sequence
java Tetris	1. Execute the Tetris application on its own thread. 2. Show the '>' prompt. 3. Wait for new user input.

4.100.8.6 Functional Requirements

REQ-4.100.8.6.1: Can run multiple applications.

REQ-4.100.8.6.2: The OS will prompt the user of an illegal use of the parameters with the following statement, 'Illegal use of parameters.'.

4.100.9.1 default (unknown command)

4.100.9.2 Any unknown command

4.100.9.4 Priority: High

4.100.9.5 Stimulus/Response Sequences:

Use Case 4.100.8:

Stimulus	Response Sequence
cool	1. Prompt user, 'Unknown command.' 2. Show the '>' prompt. 3. Wait for new user input.

4.100.9.6 Functional Requirements

REQ-4.100.9.6.1: The OS will prompt the user with the following message, 'Unknown command.'.

4.100.9 OS System Shall statements:

4.100.9.1 The OS shall create folders.
4.100.9.2 The OS shall create files.
4.100.9.3 The OS shall open files for seeking, reading, & writing.
4.100.9.4 The OS shall close files.
4.100.9.5 The OS shall delete folders & files.
4.100.9.6 The OS shall execute applications on child threads.
4.100.9.7 The OS shall list folders & files.
4.100.9.8 The OS shall be able to save & load a file structure.

4.200 System Features of Text Editor

4.1.200 Edit Text Buffer

4.1.1.200 Description: The end user will be able to write and edit text in a text buffer, which may represent a currently-existing text file on the system hard drive, or a new file to be written to the drive later.

4.1.2.200 Priority: High

4.1.3.200 Stimulus-Response Sequence:

Stimulus: The user presses some keys representing letter inputs on their keyboard.

Response: The Text Buffer will display the letters that the user had typed.

4.1.4.200 Functional Requirements

REQ-1: The Text Buffer displays the letters typed in the original sequence that the end user had typed them on their keyboard.

4.2.200 Save File

4.2.1.200 Description: The end user will be able to save the text they've written in the text buffer to a file stored on the hard drive of the operating environment.

4.2.2.200 Priority: High

4.2.3.200 Stimulus-Response Sequence:

Stimulus: The user indicates that they would like to save the current text buffer to a file, by selecting "Save as…" from the File menu.

Response: The Text Editor displays a dialog that allows the user to choose a file to overwrite, or name a new file to save the contents of the text buffer to, within the text editor's active directory.

Stimulus: The user types in the dialog a name for a file that does not already exist in the active directory, and presses the "Save" button on the dialog.

Response: The Text Editor creates a new file and saves the contents of the text buffer to it.

4.2.4.200 Functional Requirements

REQ-1: The Text Editor will save to the disk the exact Unicode contents of the text buffer to the file in UTF-8 format.

4.3.200 Open File

4.3.1.200 Description: The end user will be able to open text files from the operating environment's hard drive and be able to view them in the text buffer for reading or editing.

4.3.2.200 Priority: High

4.3.3.200 Stimulus-Response Sequence:

Stimulus: The user indicates that they would like to open a file on the OS, by selecting "Open…" from the File menu.

Response: The Text Editor displays a dialog that allows the user to choose a file on the OS to open.

Stimulus: The user selects a file using the dialog and presses the "Open" button on the dialog.

Response: The contents of the selected file become open to view and edit within the text buffer.

4.3.4.200 Functional Requirements:

REQ-1: If the file to be opened contains valid UTF-8 text, it will be displayed prop[illegible] in the text buffer.

4.4.200 Adjust Font

4.4.1.200 Description: The end user will be able to adjust the style and size of the text that they see in the text buffer.

4.4.2.200 Priority: Medium

4.4.3.200 Stimulus-Response Sequence:

Stimulus. The user indicates that they would like to change the font they see of the text in the text buffer, but selecting "Font…" from the View menu.

Response: The Text Editor displays a dialogue that lists all the font styles currently installed on the system, as well as a list of numbers to indicate a font size to select.

Stimulus: The user selects the style and size the[illegible]nt to view the contents of the text buffer in, and then clicks the "Ok" button on the dialog.

Response: The font of the text in the text buffer is adjusted to match what the user had selected in the dialog.

4.4.4.200 Functional Requirements:

REQ-1: The font selection dialog will only contain compatible font styles installed within the operating environment.

4.5.200 Syntax Highlighting

4.5.1.200 Description: The end user will be able to see the text in the text buffer formatted according to a set of rules described in a file that is saved in a specific folder as part of the Text Editor's configuration.

4.5.2.200 Priority: Low

4.5.3.200 Stimulus-Response Sequence:

Stimulus: The user indicates that they would like to highlight the syntax to match language 'X' by selecting 'X' within the "Syntax Highlighting" submenu of the Tools menu.

Response: The Text Editor program loads the X.syntax file in the folder containing syntax highlighting rules into memory, and colors the text in the text buffer according to those rules.

4.6.200 Auto-save

4.6.1.200 Description: The contents of the text buffer are automatically saved every 5 minutes if it is modified within that time. The contents are saved to a predetermin[illegible]cation in the operating environment's file system.

4.6.2.200 Priority: Low

4.6.300 Stimulus-Response Sequence:

Stimulus: The user types something into the text buffer, but then leaves the computer to do something else for a minimum of 5 minutes.

Response: The Text Editor passively saves the contents of the buffer to a file.

Stimulus: The user has not returned, and a power failure forces the operating environment to shut down.

Response: The text that the user has worked so hard on is still saved on the operating environment's hard disk

Stimulus: Power is restored to the computing environment, and the user looks for the text in the configured auto-save location.

Response: The Text Editor once more has in its text buffer, the user's precious text.

4.400 System Features of Messaging App

System Features of the Messaging Application are listed in detail in section *4.1.400* and *4.2.400* The list includes ranked features with High, Medium and Low priority. Each feature is composed from four keys information: Description, Priority, Stimulus/Response Sequence and Functional Requirements. High priority features are main features required to be completed and presented at the time the first demo is due. Medium priority features are features needed to have during the demo but less impactful to the way the main application is running. Low priority features are the extra features that are nice to have but are not essential; therefore, they can be ignored if High and Medium priority features are still in incomplete status.

4.400 .1 System Specific Service Module Features

4.400.1.1 ID Scanner

4.400.1.1.1 Description: This System Specific Service Module should be able to validate a user account and password based on the data on the server's database to either grand or denies the user's access to the server.

4.400.1.1.2 Priority: High

4.400.1.1.3 Stimulus/Response Sequence:

Stimulus: A user enters his existed account ID and password correctly from the login screen

Response: This System Specific Service Module validates the account ID/password with the server's database and grant access to the user.

Stimulus: A user enters his account ID and password incorrectly from the login screen

Response: This System Specific Service Module validates the account ID/password with the server's database and deny access to the user due to account ID or Password invalid. Generate an ERROR Message "Invalid account ID or Password". Repeat the login process again until the user enters a correct account ID/password or quit the program.

Stimulus: A user enters his existed but BANNED account ID and password correctly from the login screen

Response: This System Specific Service Module validates the account ID/password with the server's database and denies access to the user due to account ID has been banned. Generate an ERROR Message "Your account has been BANNED, due to: <REASON>".

4.1.1.4.400 Functional Requirements:

R-1: This System Specific Service Module should be able to correctly search the input account ID/password for match with any account ID/password saved in the server database.

4.400.1.2 Text Handler

4.400.1.2.1 Description: This System Specific Service Module processes the input and output text. This helps the server manage the user input contents.

4.400.1.2.2 Priority: High

4.400.1.2 Stimulus/Response Sequence:

Stimulus: The user enters an input message and send it onto the server while being in a specific channel.

Response: This System Specific Service Module processes the user input message and push the message onto the user's current channel textbox. This module could deny the user input message if the user does not have the privilege to post text on said channel.

Stimulus: The user enters an input message and sends it onto the server while being in a specific channel without the server administrator's permission.

Response: This System Specific Service Module denies the user input message since the user does not have the privilege to send content on this channel.

4.400.1.2.4 Functional Requirements:

R-1: This System Specific Service Module should be able to process any user input message.

R-2: This System Specific Service Module should be able to push the message onto the correct server's channel textbox without any modification to the user input message.

R-3: This System Specific Service Module could deny a user's input if it does not meet the server rules (Refers to section 400.4.1.3).

4.400.1.3 Server Rules:

4.400.1.3.1 Description: This System Specific Service Module manages a set of user defined server rules such as the privileges and ranks of each user on a specific channel within the server. Using a numerous of tags apply to each user account, these server rules determine the user ability to read or send message onto a specific text channel on the server.

4.400.1.3.2 Priority: Medium

4.400.1.3.3 Stimulus/Response Sequence:

4.400.1.3.4Functional Requirements:

R-1: This System Specific Service Module should be able to identify the user ranking and privilege based on a set of the server rules list.

R-2: This System Specific Service Module should be able to grant or deny access (either read or write access or both) to any group members based on a set of the server rules list

4.400.1.4 Server Activity Log

4.400.1.4.1 Description: This System Specific Service Module shows the server information and status update.

4.400.1.4.2 Priority: Medium

4.400.1.4.3 Stimulus/Response Sequence:

Stimulus: The server is initialized to launch.

Response: This System Specific Service Module shows a message "The server is initialized" (Refers to section 400.1.6)

Stimulus: The server checks the user account database is found, readable and modifiable.

Response: This System Specific Service Module shows a message "User account database status: OK"

Stimulus: The server checks the user account database is not found or not readable and not modifiable.
Response: This System Specific Service Module shows a message “User account database status: NOT RESPONDING”.
Stimulus: The server checks for any user defined Server Rules.
Response: This System Specific Service Module shows a message “Server Rules #<number>: Applied”
Stimulus: The server checks the user account database for numbers of registered members
Response: This System Specific Service Module shows a message “Current registered member: <member count>”
Stimulus: The server is connected with a user account.
Response: This System Specific Service Module shows a message “<useraccountID> connected to the server”
Stimulus: The server is disconnected with a user account.
Response: This System Specific Service Module shows a message “<useraccountID> disconnected to the server”

4.400.1.4.4 Functional Requirements:

R-1: This System Specific Service Module should be able to show the user the server activity log whenever a server status changes.
R-2: This System Specific Service Module should be able to write all the server activity log into a log file for the server behavior monitoring purposes.

4.400.2 Graphical User Interface Module Features

4.400.2.1 User Login

4.400.2.1.1 Description: User should be able to use his registered id and password to login into the application.

4.400.2.1.2 Priority: High

4.400.2.1.3 Stimulus/Response Sequence:

Stimulus: The Messaging App is launched from the Delta Shell.
Response: A Login screen appears to the user
Stimulus: The user enters their ID and password from the keyboard into the designated blank fields.
Response: The Graphical User Interface Module will show a “LOGIN SUCCESSFUL” message if the user account and password are matched and exists in the server’s user account database proceeds to the main Messenger App windows, else displays ERROR Message: “Invalid user id or password.”

4.400.2.1.4 Functional Requirements:

R-1: When the messenger app is launched, the login screen should be displayed to the user.
R-2: The program id scanner should be able to scan and authorize the user account and password from the user input based on the database on the server.
R-3: The login screen should be automatically disappeared and the user will be able to use the application main functionality after the user successfully logged into the server immediately.

4.400.2.2 New Account Registration

4.400.2.2.1 Description: User should be able to create a new user account to access the server and use the Messaging App.
4.400.2.2.2 Priority: High
4.400.2.2.3 Stimulus/Response Sequence:
Stimulus: The Messenger App is launched from the Delta Shell.
Response: A Login screen appears to the user
Stimulus: The user clicks on register to access the new account registration screen.
Response: The Graphical User Interface Module will show a user account registration box with blank input fields for the user to type in their new account ID and password. If the ID has been taken, shows ERROR Message "Account ID has been taken". When the user enters a valid un-registered account ID, the program proceeds back to the login screen as section 4.2.1.400, the user can now use the newly created account ID/Password to login into the server.
4.400.2.1.4 Functional Requirements:
R-1: The user should be able to get to the new account registration screen from the login screen or main application menu.
R-2: The user should be able to create a new account if the account ID has not been taken and denies from registering if the account ID has been taken.
R-3: The user should be able to use his new successfully created an account to access the server.

4.400.2.3 Main Messaging App UI

4.400 .2.3.1Description: User should be able to see, send and receive messages from the server via the main UI of the Messaging Application.
4.400.2.3.2 Priority: High
4.400.2.3.3Stimulus/Response Sequence:
Stimulus: The user successfully logged into the server.
Response: "Login successful" message is displayed for 3 seconds then disappear. Afterward, the client application should display the main Messenger App UI to the user.
Stimulus: The user clicks on a channel in the server.
Response: This Graphical User Interface Module should be able to display all the content from said channel to the user.
Stimulus: After selecting a channel, the user may enter a message into the blank input message box then press the SEND button or ENTER on the Keyboard
Response: The Graphical User Interface Module should be able to display the text that the user was inputting and update the currently selected channel content with the user's message via the Text Handler module (section ***4.4.1.2.400)***.
4.400.2.1.4 Functional Requirements:
R-1: The user should be able to interact *(giving command or input from external devices, refers in Section 3.2.400)* with the application through this Graphical User Interface Module, this includes functions such as: typing, sending message, mouse-click on icons and menus.
R-2: This Graphical User Interface Module should be able to display the menu, textbox, user online status and quick access buttons *(refers to Section 3.1.2.400)* to the user display device 100% of the time.

4.500 System Features of Tetris Game

4.1.500 Difficulty

4.1.500.1 Description: This feature allows the user to choose the difficulty which is based on the speed of the blocks. The score counter will be increased or decreased depending on the selected difficulty.

4.1.500.2 Priority: High

4.1.500.3 Stimulus/Response Sequence:

-User chooses difficulty "EASY". The score counter will now be reduced by half.
-The rate at which the block drops for this game is now at one row every two seconds.
-Game initiates.
-Block waits for two seconds, then moves down one row.
-User chooses difficulty "NORMAL". The score counter will keep score normally.
-The rate at which the block drops for this game is now at one row every seconds.
-Game initiates.
-Block waits for one second, then moves down one row.
-User chooses difficulty "HARD". The score counter will now double the score.
-The rate at which the block drops for this game is now at one row every half second.
-Game initiates.
-Block waits for half a second, then moves down one row.

4.1.500.4 Functional Requirements:

User should be able to choose one of the three difficulty levels using a mouse. The game cannot begin unless the user has selected one.

4.2.500 Drop

4.2.500.1 Description: This feature allows the user to instantly drop a piece to the lowest spot in its current position

4.2.500.2 Priority: Medium

4.2.500.3 Stimulus/Response Sequence:

-User initiates new game.
-User presses the up directional key.
-The current block immediately drops to the lowest possible point in its current position.
-The block confirms it has been placed and a new block is called.
-Game Continues

4.2.500.4 Functional Requirements:

-User must input the up directional key in order to call this function.

4.3.500 Rotate Left/Right

4.3.500.1 Description: This feature allows the user to rotate the current block 90 degrees to the right in order to better position the block to fit the puzzle.

4.3.500.2 Priority: High

4.3.500.3 Stimulus/Response Sequence:

-User initiates new game.

-User presses the ‘z’ key. 
-The current block rotates 90 degrees to the left.
-User presses the ‘x’ key.
-The current block rotates 90 degrees to the right.

4.3.500.4 Functional Requirements:

User must input the ‘z’ or ‘x’ on the keyboard in order to call this function and rotate the block.

4.4.500 Move Left/Right

4.4.500.1 Description: This feature allows the user to manually move the block left or right.

4.4.500.2 Priority: High

4.4.500.3 Stimulus/Response Sequence:

-User initiates new game.
-User presses the right directional key.
-The whole block moves a column to the right.
-User presses the left directional key.
-The whole block moves a column to the left.
-Game Continues

4.4.504 Functional Requirements:

User must press down the left or right directional key. This is a key function in navigating your piece horizontally to the desired location.

4.5.500 Move Down

4.5.500.1 Description: This feature allows the user to manually move the block down a row without restraint of the timer. This gives users the ability to speed up the game at will.

4.5.500.2 Priority: Medium

4.5.500.3 Stimulus/Response Sequence:

-User initiates new game.
-User presses the down directional key.
-The block moves down a row without regard to the timer. The timer continues separately and does not reset, and will still continue to move down according to the difficulty speed.
-Game Continues

4.5.500.4 Functional Requirements:

User must press the down directional key. This is not a necessary function but allows the user to speed up the game as they desire.

4.6.500 Store/Swap

4.6.500.1 Description: This feature allows the user to store the current piece and allow a new random block to appear. If a piece is already being held, it is swapped with the current piece and cannot be swapped until the swapped block is placed. This allows the user to be flexible and use their pieces more efficiently and strategically.

4.6.500.2 Priority: Medium

4.6.500.3 Stimulus/Response Sequence:

-User Initiates Game
-Block Appears
-User presses ‘c’

-Block is stored and shown in display box on the top right of the screen.
-New Block Appears.
-User presses up, calls Drop function, and instantly places block.
-New Block Appears.
-User presses ‘c’ and current block is swapped with block that is currently held.
-Game Continues

4.7.500 Exit/Pause/Save

4.7.500.1 Description: This feature allows the user to pause the game temporarily. It is a button on the bottom right of the game interface when you are playing. When pressed, it opens up a window with three options that allows the user to continue, save the current game’s score by calling the Save Score function, or exit the game completely and go back to the main menu. Alternatively, the user can press the ‘p’ key to call this function.
4.7.500.2 Priority: High
4.7.500.3 Stimulus/Response Sequence:
-(Game has been continually running for 2 minutes)
-User places block
-New Block Appears
-User presses the Exit Button.
-Game Pauses and Exit window pops up.
-User selects Save.
-Application calls the Save Score function.
-Game Exits to Menu.

4.7.500.4 Functional Requirements:
The User can decide whether or not to save the score. But in order to pause the game to pull up the menu, the user must use the mouse to click the button OR use the ‘p’ key to call this function.

4.8.500 Save Score

4.8.500.1 Description: This feature will be called immediately upon finishing a game. It will bring up a dialog box that will display their score, and prompt the user for a name input only. Once the user presses OK, their name and score will be saved to a remote .txt file to access at a later time and compare scores.
4.8.500.2 Priority: High
4.8.500.3 Stimulus/Response Sequence:
-User Places block
-Block touches top of screen due to lack of space
-Game Ends and calls Save Score function.
-Dialog box displays score and asks for User to input their name.
-User inputs AAA
-User selects OK
-Data is saved, and the application closes the game and returns to the main menu.
4.8.500.4 Functional Requirements:
The User must enter their name and click the OK button in order for the game to save the name and score to the assigned or created .txt file.

4.9.500 Check Scores

4.9.500.1 Description: This feature allows the user to check previous scores to compare their scores with other scores either by them or by other users. It will organize them into the top 5 scores and will display both their name and score.
4.9.500.2 Priority: Low
4.9.500.3 Stimulus/Response Sequence:
-User calls Save Score function by finishing current game.
-User inputs name into dialog box and clicks OK.
-Application returns to Main Menu
-User Selects “Hi-Scores”
-New Window opens displaying the top 5 scores along with the name inputted by the user who achieved that score. .
4.9.500.4 Functional Requirements:
-Users must have played the game previous in order to see any names with scored on that screen. User must click the “Hi-Scores” Button in order to call this function.

4.10.500 Exit

4.10.500.1 Description: This feature allows the user to exit the application completely.
4.10.500.2 Priority: High
4.10.500.3 Stimulus/Response Sequence:
-User is at main menu
-User selects exit
-Application Closes
4.10.500.4 Functional Requirements:
User needs to press this button or close the window in order to return to the OS. Once the function is called, the child thread from the OS is also freed.

4.600 System Features of BIGCALC

- The following documentation will hold features with priorities high, medium and low.
- The following documentation uses the word “operations” that refers to the mathematical, scientific and additional feature functions.

4.600.1 Button click

4.600.1.1 Description : Buttonselect will detect if a user is clicking on a specific button using the cursor’s positioning. Note - If the cursor clicks on the blank spaces in between the boxes nothing happens.
4.600.1.2 Priority: High
4.600.1.3 Stimulus/Response Sequence: The feature will go call the function/class used for that button
4.600.1.4 Functional Requirements: The feature should allow the user to click on a button

4.600.2 Exit

4.600.2.1 Description: Exit will quit the software and will take the user back to the OS Shell
4.600.2.2 Priority: High
4.600.2.3 Stimulus/Response Sequence: This feature will exit the software
4.600.2.4 Functional Requirements: The user should click on the "EXIT" button and the button should be a functional button.

4.600.3 Expression evaluator

4.600.3.1 Description : This feature will monitor the expression used by the user.
4.600.3.2 Priority: High
4.600.3.3 Stimulus/Response Sequence: This feature will grab the operation from every individual operation class or function being used in the expression
4.600.3.4 Functional Requirements: The user should enter an operation and not simply numbers.

4.600.4 No Expression

4.600.4.1 Description: This feature is used in an event when the user does not perform an operation but simply enters a number.
4.600.4.2 Priority: Medium
4.600.4.3 Stimulus/Response Sequence: Will display the number entered.
4.600.4.4 Functional Requirements: The user should only enter a number without any operation buttons .

4.600.5 Clear Screen

4.600.5.1 Description: This feature is used when the user clicks on the "CLEAR" button.
4.600.5.2 Priority: Medium
4.600.5.3 Stimulus/Response Sequence: clears the input expression stored in the Expression evaluator feature mentioned in 4.600.3.
4.600.5.4 Functional Requirements: The user should click on the "clear" button.

4.600.6 Print Output

4.600.6.1 Description: Displays the value evaluated by Expression evaluator
4.600.6.2 Priority: High

4.600.6.3 Stimulus/Response Sequence: Accesses the Expression evaluator feature mentioned in 4.600.3 and prints the final value of the expression in the output box
4.600.6.4 Functional Requirements: The user needs to click on the "=" butto

4.600.7 DispAddfeat

4.600.7.1 Description: Is a feature that monitors the "ADDFEAT" button used to access the additional features provided by the calculator.
4.600.7.2 Priority: Medium
4.600.7.3 Stimulus/Response Sequence: Displays the "ADDFEAT" calculator.
4.600.7.4 Functional Requirements: The user needs to click on the "ADDFEAT" button.

4.600.8 ADDFEAT Data

4.600.9.1 Description: Used by the software to collect all the data required for the "ADDFEAT" calculator options.
4.600.9.2.Priority: Medium
4.600.9.3.Stimulus/Response Sequence: Displays the 'ADDFEAT' calculator as mentioned in 3.1.600.2.
4.600.9.4.Functional Requirements: The user needs to select one of the options from the 'ADDFEAT' calculator.

4.600.9 Manual

4.600.9.1 Description: This feature is used when the user needs to refer to the manual for help
4.600.9.2 Priority: Low
4.600.9.3 Stimulus/Response Sequence: Displays a physical manual that the user could reference.
4.600.9.4 Functional Requirements: The user needs to click on the "HELP" button as displayed in section 3.1.600.1.

5. Other Nonfunctional Requirements
5.1 Performance Requirements

5.1.100 OS:

5.1.100.1 After each entry of a user command line the system will respond less than 100 ms (99% of the time).

5.1.100.2 Static numerical requirements:

5.1.100.2.1 This product supports one terminal.

5.1.100.2.2 This product does not support simultaneous users.

5.1.100.2.3 This product only supports text as input & text as output.

5.1.200 Text Editor “Teddy”:

5.1.200.1 A file that is less than one megabyte in size will be loaded and displayed in less than 5 seconds 99% of the time.

5.1.200.2 When a file is saved, the system will write its contents to the disk and return control to the user within a time that scales with the size of the file to be written, and will not take longer than one second for each megabyte to be saved, 99% of the time.

5.1.400 Messaging App:

5.1.1.400 The System Specific Service Module will fetch new message data from server every one second at least 90% of the time.

5.1.2.400 The System Specific Service Module will validate users credential upon login no longer than 5 seconds at least 90% of the time.

5.1.3.400 The Graphical User Interface Module and The System Specific Service Module will work together to process and display correct, unmodified , up-to-date messages to the users every one second at least 90% of the time.

5.1.4.400 The Graphical User Interface Module will display up-to-date messages within 5 seconds after the users logged onto the server.

5.1.5.400 The Graphical User Interface Module will update the display contents every one second at least 90% of the time.

5.1.500 Tet-ri-poff

5.1.1.500 The difficulties change the block’s drop speed based on the user’s skill level. These values are based on seconds and will be declared using java’s timer function which is based on milliseconds.

5.1.2.500 Because the game is not heavily graphics or processing-power based, but just simple arrays with timers, the block’s drop speed will not be affected or require powerful hardware.

5.1.600

5.1.600.1. The System should identify the “=”button for evaluating an expression.

5.1.600.2. The System should be unresponsive if the user clicks only on operations

(+,- and so on).

5.1.600.3 The System should wait for the user to enter their input in the process of completing an expression.

5.1.600.4 The System should be unresponsive if the cursor only hovers over the screen.

5.1.600.5 The system should go back to the shell when the user clicks on the “EXIT” button as mentioned in section 4.600.2.

5.2 Safety Requirements

5.2.100 This OS base model does not contain any Safety requirements.

5.2.200 The Text Editor will not allow the end user to edit files that constitute the integrity of the operating environment unless the end user has administrator access to those files.

5.2.300 Shopping cart mobile apps does not have security system and safety requirements.

5.2.

5.2.1.400 At Delta Team, we value and put your privacy to the highest priority, we will not sell/redistribute your personal information to any third party companies or unauthorized individual. Storing your personal data on the server’s database is optional and is not required to be identical with your real life personal data.

5.2.2.400 The users of the messaging app should be mindful with their own personal data and what they share online with other people. Avoid giving stranger critical personal information (such as Social Security Number, Bank Account, User account and password…). Report any harassment or server rules violation to a moderator or administrator of the server as soon as possible.

5.2.500 Tet-ri-poff does not contain any safety requirements.

5.2.600

5.2.600.1. In an event where the user enters a large number or performs a function that creates a huge output, the software may experience memory leaks. In order to prevent this, a limit for the digits for the number should be set, for instance, setting the limit of 9 digits that could be displayed in the output box.

5.2.600.2. In an event when the user does not use the right operands in an operation, might affect the final output of the expression.For instance, when the user calculates the factorial of 50, it will produce a huge output. In order to prevent this from happening the function’s could be set to a max value.

5.3 Security Requirements

5.3.100 OS:

5.3.100.1 This OS base model does not contain any Security requirements.

5.2.200 The Text Editor will not allow the end user to edit files that the end user does not have access to within the operating environment.

5.3.300 This apps does not have any security requirements

5.3.400 Messaging App

5.3.1.400 All users are required to register their own user account and password to access the application.

5.3.2.400 All users password must be at least 8 characters long and contains at least 1 number and 1 special character.

5.3.500 Tet-ri-poff does not contain any security requirements.

5.3.600 The calculator does not require any security requirements because the output that the user works with, gets erased once the user exits the software. Moreover, bigcalc does not require the user's personal information at any point in its functioning.

5.4 Software Quality Attributes

5.4.100.1 Definitions

The OS and custom applications use the following definitions:

Adaptability → the extent of a software system being able to tolerate changes without an increase in cost or a 1 day delay.

Availability → the probability that the software systems are available for use at least 99% of the time.

Correctness → correctness implies that an algorithm is 100% consistent with respect to its SRS.

Flexibility → the ability for the software to adapt to at least 1 different project.

Interoperability → The ability of separate systems to share protocols, code and data.

Maintainability → the software system is eligible to be repaired, enhanced, modified for under $1,000 / month.

Portability → See Flexibility.

Reliability → the software applications are continuously available with out error at least 99% of the time.

Reusability → See Portability.

Robustness → this system is guaranteed to not fail below 90% with any 1 to 10 character combination of the first 128 characters of the ASCII table.

Testability → every requirement needs to be 100% testable in under 1 hour by 1 person.

Usability → is 90% or more of intended users can successfully use any application with in the first 10 minutes of use.

5.4.100.2 Quality Attributes Priority Table

5.4.100.2.1 The OS and custom applications use the following table to provide the level of priority for the following characteristics:

ID	Characteristic	Priority
1	Adaptability	Low
2	Availability	High
3	Correctness	High
3	Flexibility	Low
4	Interoperability	Low
5	Maintainability	Medium
6	Portability	Low
7	Reliability	High
8	Reusability	Low
9	Robustness	Medium
10	Testability	High
11	Usability	Low

Figure 5.4.100.3

5.4.100.4 The set of basic functions from section 4 can easily be called from a GUI implying a GUI can easily be implemented for creating & maintaining a file structure, file editor as well as other applications.

5.4.200 Text Editor “Teddy”:

5.4.1.200 The Text Editor is reliable to the point that, if the operating environment has sufficient memory to contain the user’s current text buffer, in addition to fonts, syntax highlighting rules, etc., the program will not crash and lose what the user has typed without saving it to a temporary file.

5.4.300 Shopping cart: This product can access the user, and GUI imply can easily be implemented.

5.4.400 Messaging App

Ease of use and application performance and responsiveness should continuously improve based on the users and the supervisors’ feedback from the first demo until (but not limited to) the final product is introduced. We at Delta Team will always strive to deliver the best software experience available to the users.

5.4.500 Tet-ri-poff Game

The ease of use of this application is very simple and straightforward. The use of buttons with clear indications of what they do and minimal features allows the actual game to be played after a few clicks. Since Tet-ri-poff is based off the puzzle game “Tetris” it will require the same amount of skill to play and enjoy. Ease of learning depends on the User, however the controls are very simple and straightforward. It is very usable and can be replayed as much as the user desires.

5.4.600 Bigcalc (the calculator)

Most of the mathematical operations used by bigcalc are predefined, this makes the system more reliable. Additionally, the software does not give the user any sort of access to change the functioning of the calculator, hence, making the system more stable and consistent. Lastly, the diverse features used by bigcalc increases the overall usability of the software.

5.5 Business Rules

5.5.100 OS:

5.5.100.1 This OS base model has one acting administrator role.

5.5.200 Text Editor “Teddy”:

5.5.200.1 The text editor will not bypass the operating environment’s permissions that it yields to end users to access the files the Text Editor can edit.

5.5.200.2 The text editor will not bypass the operating environment’s permissions that it yields to end users to write files to the directories that the Text Editor lets the user select.

5.5.400 Messaging App:

5.5.400.1 The messaging app is available to access for all users of the OS. No third-party is allowed to access the users’ personal information.

5.5.500 Tet-ri-poff Game

5.5.500.1 The Game is intended to be used by all Users of the OS. There are no special permissions or hidden/extra features depending on the user. This game in intended for pure entertainment purposes and provides equal levels of enjoyment for all.

5.5.600 Bigcalc (The calculator)

5.5.600.1 In an unfavorable event, bigcalc will quit and will take the user back to the OS shell.

6. Other Requirements

6.100 The OS and custom applications will be written in Java **Version 8 Update 221.**

6.100.1 The OS file structure is saved using a Java Serialized object.

Appendix A: Glossary

Application: A software that performs user tasks
ASCII: The original, and now widely adopted, standard for encoding the letters and punctuation of the English alphabet, as well as a number of control sequences. It is a subset of the UTF-8 standard.
CLI: Command Line Interface
Database: A data structure storing data
JFX: Java Virtual Effects
Demo: A demonstration of the product functions and features
Developer: A person or a group of people who develop software.
GB: Gigabyte, a unit for storage capacity.
GUI: Graphical User Interface
Internet: a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.
Java Virtual Machine: A virtual environment that Java Code runs on.
Java: A software programing language
Keyboard: An external input device.
Module: Part of the program which undertakes a specific task.
MongoDB: A database service provider
Monitor: An external output device.
Mouse: An external input device.
OS: Operating System
Password: A string that holds key to access a specific content or feature, usually go with a user account.
RAM: Random Access Memory.
SRS: Software Requirements Specifications
Stimulus: An action that triggers response.
Supervisor: Professor Hank Stalica.
Shell: The shell is a command interpreter in an operating system such as Unix or GNU/Linux, it is a program that executes other programs.
TeamDelta: A group of individuals who works on this project.
Text Buffer: A finite but arbitrarily long string of text stored in the working memory of a program, that also provides an interface to edit its contents.
Thread: The virtual version of a CPU core that handle a specific task.
Unicode: The computing standard for encoding and representing text from a wide array of human languages.
User account: An account to recognize a user's identity on the server.
User: The person who use the software.
UTF-8: The leading implementation for encoding text that abides to the Unicode standard.
Windows: An operating system developed by Microsoft.

Comment Summary

Page 2

1. Good TOC. Goes to maintainability and consistency. Formatting is good. page numbers included for each section.

Page 3

2. Where's 4.300?

Page 6

3. Ok, that's why section 300 was missing. Kazuki didn't contribute anything. Got it, won't penalize you.
4. Backwards Traceability satisfied with this table for all requirements.

Page 7

5. A little awkward with the number in the introduction section, but I can see why you did it.
6. So unifying language would have been much better. This makes the product feel really disjoint as if it weren't a single product or team effort.

Page 8

7. Again, a little awkward feel. This is supposed to be a unified effort. This section could have flowed better.
8. Got it. Good to be explicit about this.

Page 9

9. A lot of duplicated language in here. Also, this section is for describing the intended audience of an SRS document, not who the users of your software are going to be. I.E., testers, project managers, developers.

Page 10

10. I have no idea what this means.
11. Not bad, overall. More unifying language would have been better.

Page 11

12. Could be formatted better, along with some labels indicating what these links are for and why I should care.

Page 12

13. Cool.
14. Not exactly sure what it means to be a standard text editor, but we'll find out...

15. I don't know what this means.
16. I don't know what this means.
17. Good description.

Page 13

18. Good intro.
19. Good 'nuff.
20. A little terse...
21. Good..

Page 14

22. Good intro info...
23. Kind of awkward here...jst gives me a bunch of bullet points. Also, the formatting is inconsistent with what's listed earlier in the document. Hurts maintainability and consistency.

Page 15

24. What kind of user? Old person? Child?
25. Good.
26. Good.

Page 16

27. Very good. Very verifiable.
28. Nonsensical based on the rest of the information placed here. This reads more like requirements rather than constraints that could impact design decisions.
29. Fair enough.
30. What's "pretty huge"? Ambiguous. Unverifiable. Need specific limitations.
31. What's a weakly constructed decision structure?
32. Consider? Not sure what that means. Do you mean that it takes no input?

Page 17

33. Has nothing to do with documentation.
34. All good for each product except the shopping cart.
35. More of a requirement than assumption or dependency. None would probably have been a better answer.

Page 18

36. Mmmmm...okay... This section is about assumptions that could impact design decisions, not about skill level of users.

Page 26

37. This type of information is actually fine to include in an SRS. You juggled including this information without including specific design stuff like a detailed schema well.

Page 33

38. This table here is great and goes a long way toward establishing maintainability and forwards traceability and ranking for importance.

    Nice.

Page 34

39. Uses cases are perfectly great to use to specify requirements. The detailed steps eliminate ambiguity.
40. The Numbering system guarantees forwards traceability.

Page 35

41. Ranked by desirability, good.

Page 36

42. Good.

Page 42

43. I note no use of use cases in this section. This is inconsistent with the previous section and hurts maintainability and consistency.

Page 43

44. What's properly mean?

45. What are the allowable font sizes?
46. What location? How is it determined?

Page 44

47. Why is this preamble just here and not in the other sections? Inconsistent.
48. What is an incorrect/correct password? Unverifiable. Ambiguous.

Page 45

49. Does this mean I could type a message this is 10 million lines long?
50. Ok, what are the rankings?
51. What does that mean? They can't send a message or retrieve a message?

Page 47

52. What's that goign to look like? Did you list it in the earlier section?

Page 48

53. What's it initialized to?
54. Which key is that?

Page 49

55. There we go. Unambiguous, verifiable.

Page 53

56. A stimulus/response sequence details what the user does and how the system responds.
57. What caused that to be d isplayed?
58. That's a stimulus, not a functional requirement.
59. That's a stimulus..
60. That's a response.

Page 54

61. Not verifiable and ambiguous.

Page 55

62. Inconsistent with other items in this section.
63. Should be set or will be set? Ambiguous.

Page 57

64. Excellent.
65. Ambiguous, non-verifiable. No idea what easily be implemented means.
66. Lot of language here is unverifiable.