A Project Report on

SOFTWARE MODELLING TOOL

Submitted By

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CSE3001: SOFTWARE ENGINEERING

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ACKNOWLEDGEMENT

To complete this project, we had to take the help and guideline of some respected persons, who deserve our greatest gratitude. This project was only made possible because of the invaluable efforts from everyone involved, directly or indirectly. We would like to express our gratitude towards our guide, Prof.Swathi J N, who was immensely helpful in guiding us at every step in the project and also for all her constructive inputs that helped make the final product. It helped us understand the area of Software Engineering much more clearly and we are grateful for her support throughout the project. Without her support and guidance, this project would not have been possible.

We conclude by thanking Vellore Institute of Technology, for providing us with a flexible choice and execution of the project and also for supporting our research and execution related to the project.

EXECUTIVE SUMMARY

Our software modelling tool is aimed to design software development projects with the help of flowcharts and diagrams, to easily track, plan and make your software development process easy. Our software modelling tool focuses mainly on Flowchart diagrams, Timeline diagrams, FishBone diagrams, and Database model diagrams.

The project is equipped with a login system through which registered users can work on diagrams that they might have worked on previously. The drag-drop feature makes the tool user-friendly and very easy to get started with. Our tool provides an in-depth analysis of various drawing tools. This tool simplifies the user operations and improves the intelligence of drawing. It also provides features like robust file compatibility; excellent file compatibility supports users to import and export drawings to a variety of file formats. It can run all features and templates identically on different platforms including Windows, Mac, Linux and Web.

Our tool supports a wide variety of diagrams to meet all your needs for business office, strategic analysis, human resources, engineering management and more.

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1. INTRODUCTION

1.1 Objective

The tool allows users to choose from various diagram templates all in one place. The idea of having Timeline Chart, Fishbone Diagram, Database Model, Gantt Chart and Flow Chart in one application tool could help in reducing the time spent on searching for different tools to make software modelling diagrams. Apart from software engineers, the tool is also useful in other industries as making timelines and scheduling tasks using Gantt chart would assure proper distribution of work amongst the workers as well as the given time. We aim to reduce the time that people spend learning to use various tools to model diagrams, instead they can just use one tool to make all the required diagrams.

1.2 Motivation

The motivation for this project came from doing some research on various open-source CASE tools based on Project Management, Requirements Management and Software Design. We realized that in the process of doing this project we will have to make many diagrams, some of which we have also made in the past, and are not even related only to this particular subject. We thought it would be helpful to have a tool that contains templates for many such diagrams, so that users that are making them for the first time could easily make the diagrams.

1.3 Background

After we explored various open-source CASE tools, we decided to go on to implement this specific project idea because we saw that although there are similar software designing tools that already exist, but either they have too many diagrams, which makes it confusing for a first-time user, or there is no template which could be helpful as a guide to a first-time user. So we thought of making such a tool that would be user-friendly and reusable as the user could work on a previous file by simply importing the file, thus making it useful for many organizations.

2. PROJECT DESCRIPTION AND GOALS

Our project Software Modelling Tool is designed to enable users to make various software modelling diagrams all in one place. The software modelling tool is aimed to design software development projects with the help of flowcharts and diagrams, to easily track, plan and make your software development process easy.

Our software modelling tool focuses mainly on Flowchart diagrams, Timeline diagrams, FishBone diagrams, and Database model diagrams.

The drag-drop feature makes the tool user-friendly. This tool simplifies the user operations and improves the intelligence of drawing. The tool allows the user to import charts that they have worked on previously.

It also provides features like robust file compatibility. Excellent file compatibility supports users to import and export drawings to a variety of file formats. It can run all features and templates identically on different platforms including Windows, Mac, Linux and Web.

3. TECHNICAL SPECIFICATION

3.1 Software Hardware Specifications

Hardware:

1. 2Ghz dual core processor
2. 2GB RAM (System Memory)
3. 25GB of hard drive space (or USB stick, memory card or external drive)

Software:

1. Any UNIX based operating system such as OS X, Ubuntu, Arch, Linux etc.
2. Any text editor or IDE that can compile Java GUI, ex. NetBeans, Eclipse

3.2 Product Function

The following is a table of the requirements that the system SHALL meet. The list of requirements was produced from the initial project documentation provided by the requirements expert.

Table 1 : Table of SHALL Requirements

ID	Origin	Shall Requirement
1	User	The system SHALL allow the user to use upto three free editable canvas without logging in.
2	User	The system SHALL allow users to make an account and save their work.
3	User	The system SHALL allow the user to add and remove figures and shapes using a mouse.
4	User	The system SHALL allow the user to add text inside shapes using a keyboard.
5	User	The system SHALL allow the user to drag and drop any shape and resize on the canvas.
6	User	The system SHALL allow the user to import and edit the previous work done with the extension provided by the system.
7	User	The system SHALL allow users to use pre-saved templates and customize them.
8	User	The system SHALL allow the user to save drafts to their google drive.
9	Admin	The system SHALL allow admin to login as admin.
10	Admin	The system SHALL allow the admin to handle the database and maintain it.

11	Admin	The system SHALL allow the admin to check the data saved on the database.
12	Admin	The system SHALL allow the admin to take action on the data saved and the user.

User Characteristics

The following table identifies and describes the different users of the Software Modelling Tool. The information gathered about the different users of the system helped define what the software needs to do. Also, these users are referenced in the requirements and diagrams.

Table 2 : Table of User Characteristics

User	**Description**
Managers	The user can be anyone who wants to make a flowchart, timeline, etc. This is a very large group of users from all different backgrounds, because of this, the system should be easy to use and conform to commonly understood user interface styles for wide acceptance.
Teachers/Educators	A teacher/educator can use the Software Modelling tool to create timetables for their students.
Students	When a teacher/educator creates a timetable for students, the student can view the timetable using the tool. Students can also use the tool to make flowchart diagrams for a new topic/algorithm that they might have learnt.
Product Designer	Product designers can use our Software Modelling tools to create designs for products to be sold to companies.
Administrator	The Administrator user will be computer literate and technically competent in performing administration on computer systems.

4. DESIGN APPROACH AND DETAILS

4.1 Design Approach / Materials & Methods

4.1.1 Architecture Model

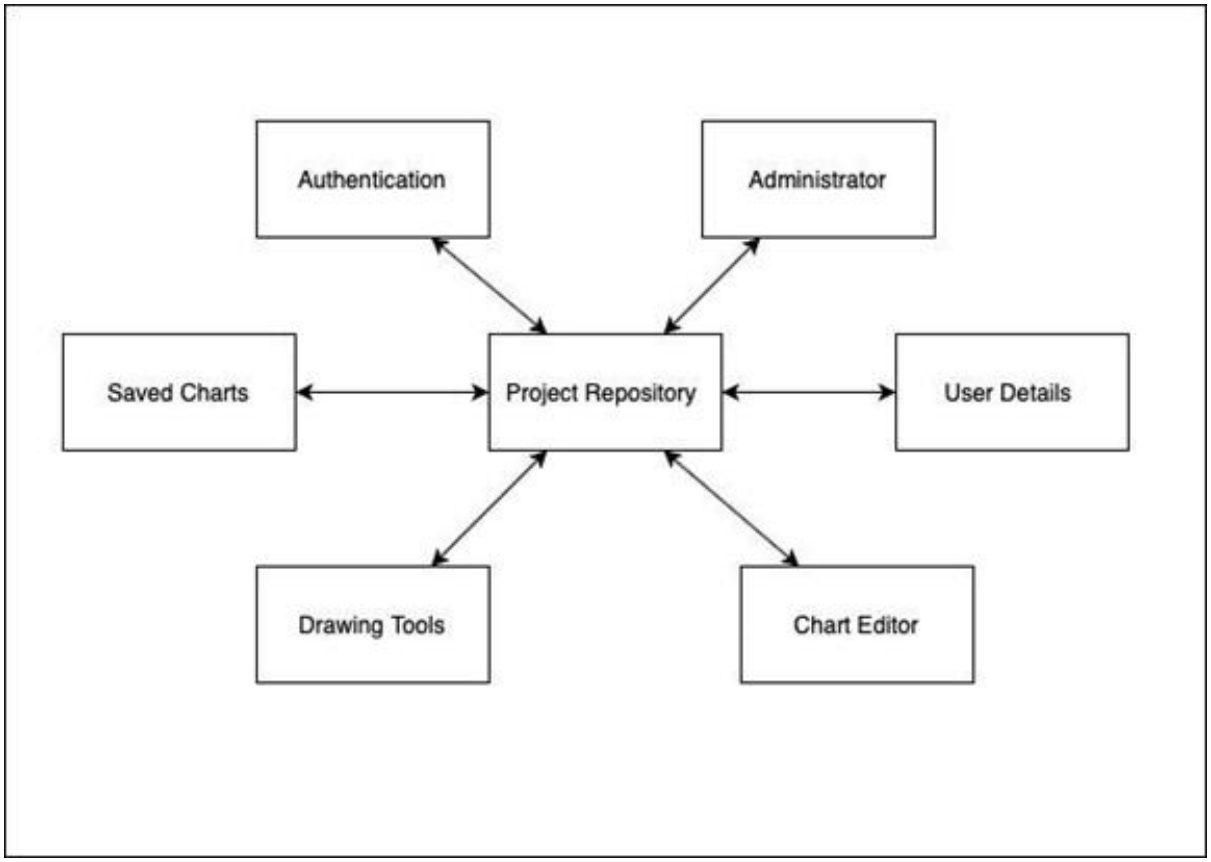


Figure 1, Architecture Model

A repository architecture is a system that will allow several interfacing components to share the same data. Our project focuses mainly on 4 diagrams namely flowcharts, fishbone diagram, timeline chart and ER diagrams. All these four diagrams require the same components, shapes and text field options. So for these reasons we have selected the repository architecture for our project. In our project, each subsystem does not require direct communication with other subsystems to perform its respective function and can work efficiently by directly accessing the database for those details. For example, access to drawing tools doesn't require direct communication with the authentication subsystem as it only needs to know which chart the user is working on.

4.1.2 Control Model

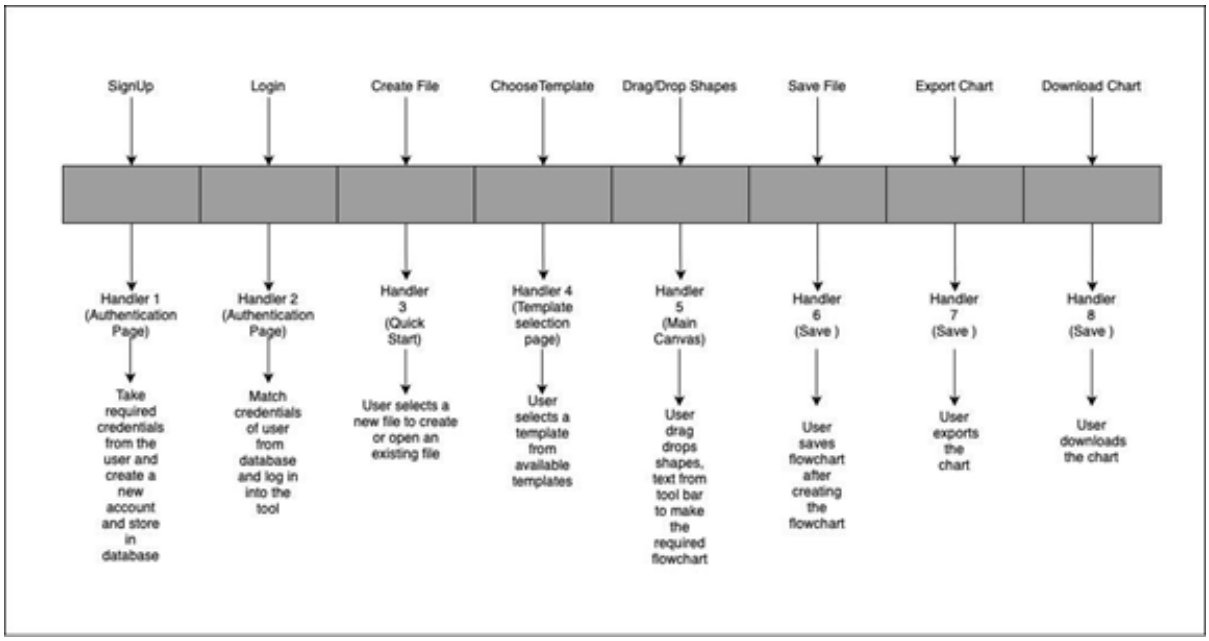


Figure 2, Control Model

Since there are multiple events related to charts that can happen in our tool, the Interrupt Driven Model is the most suitable one. Each and every event is handled by a particular handler and a certain process happens accordingly. This is suitable for our project as every button reacts differently, so each button calls a different event and immediate response to each event is required which is the concept of this event-based model.

4.1.3 Use Case Diagram

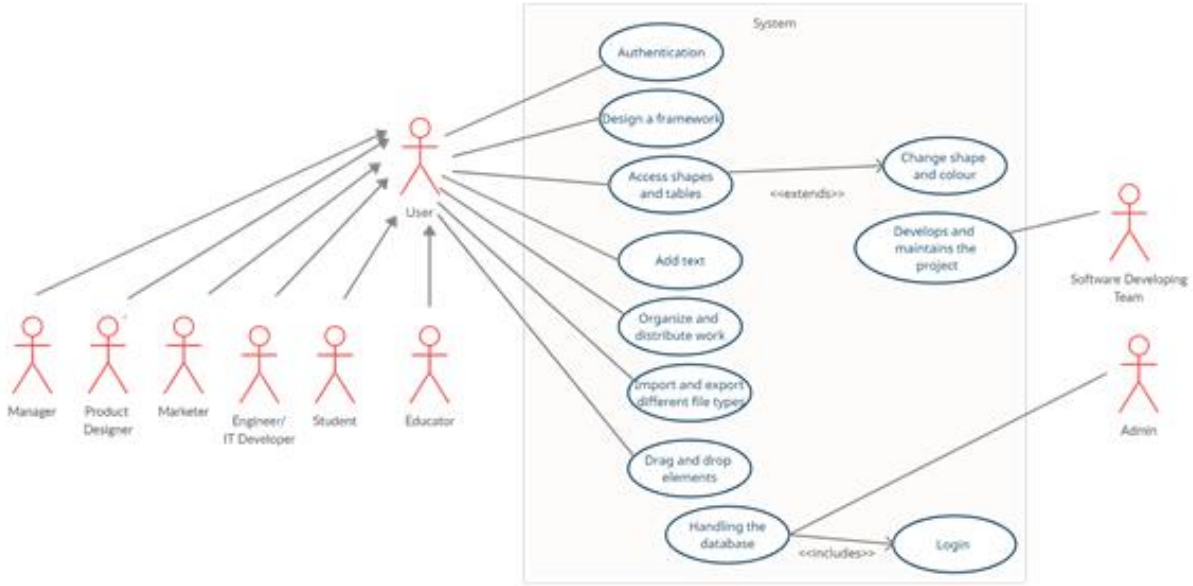


Figure 3, Use Case DIagram

4.1.4 Data Flow Diagram

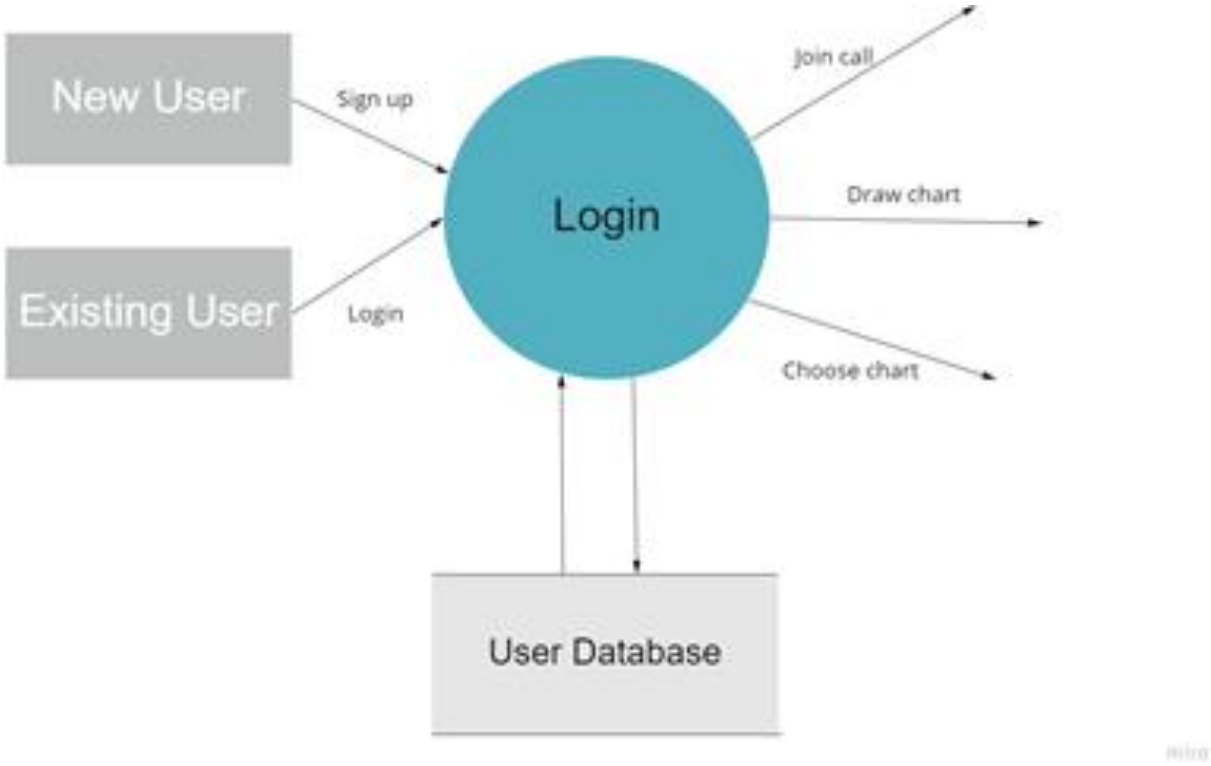


Figure 4, Data Flow Diagram, Level 0

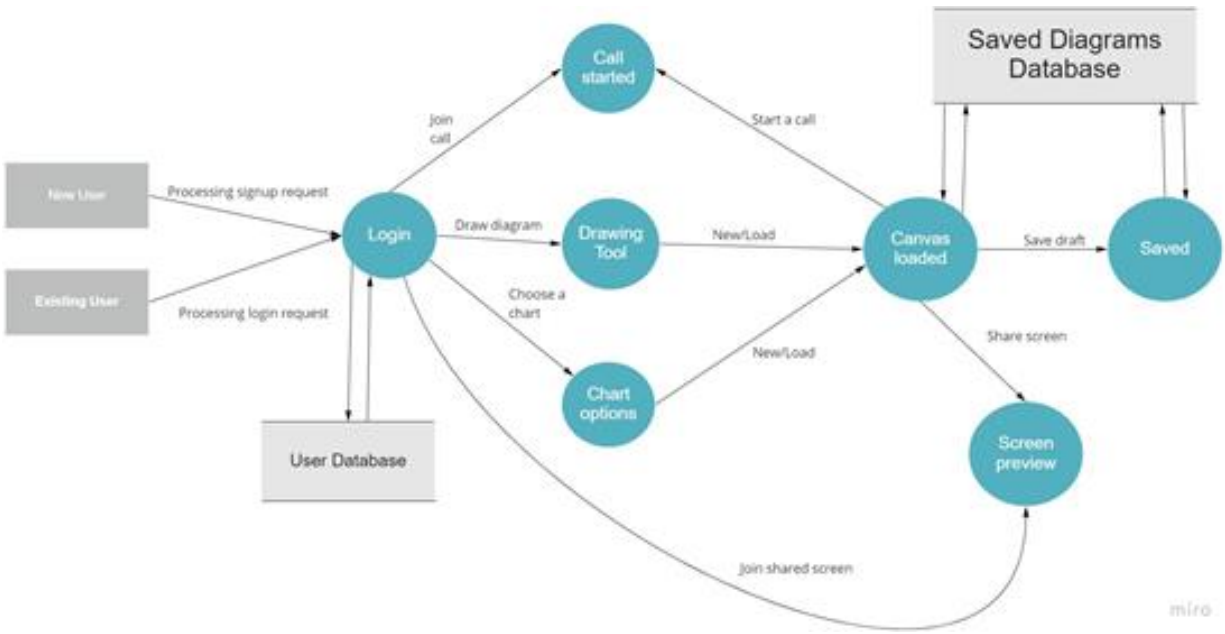


Figure 5, Data Flow Diagram, Level 1

4.1.5 State Transition Diagram

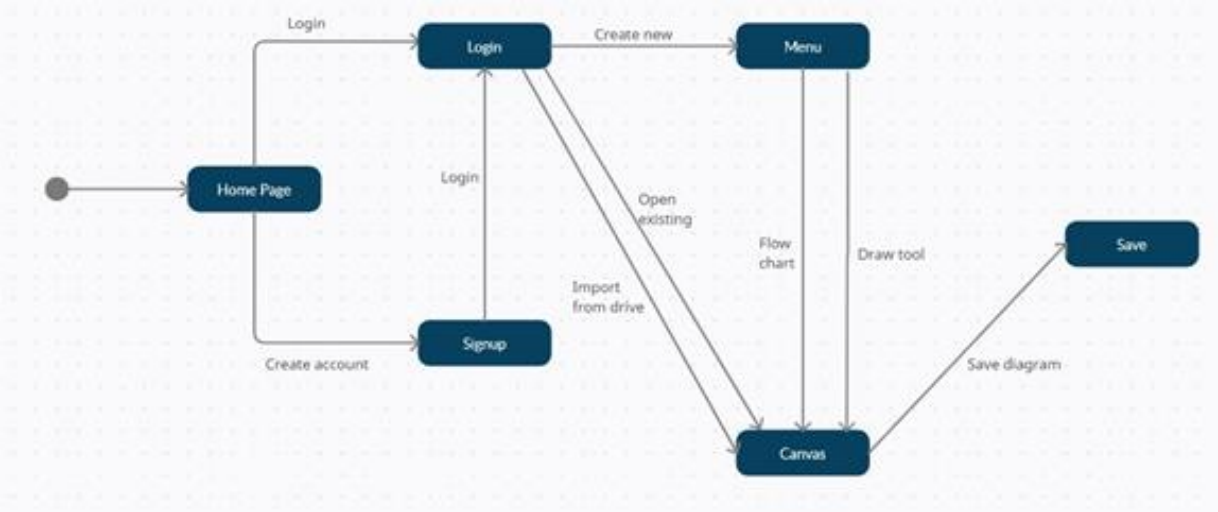


Figure 6, State Transition Diagram

4.1.6 Sequence Diagram

Signup of new user

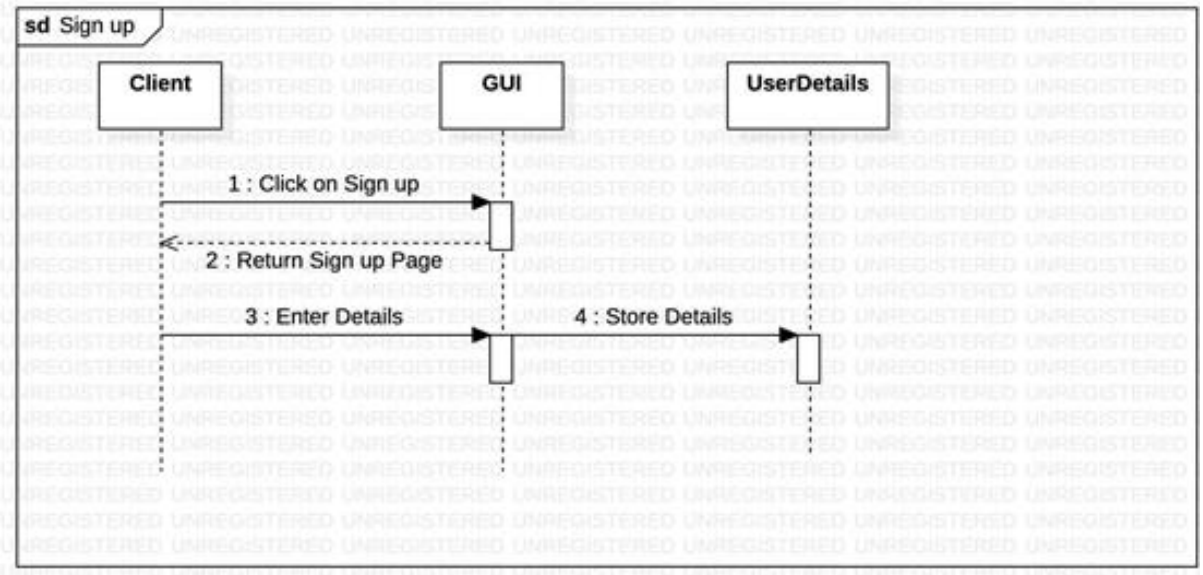


Figure 7, Software Modelling Tool Sequence Diagram

Login an existing user

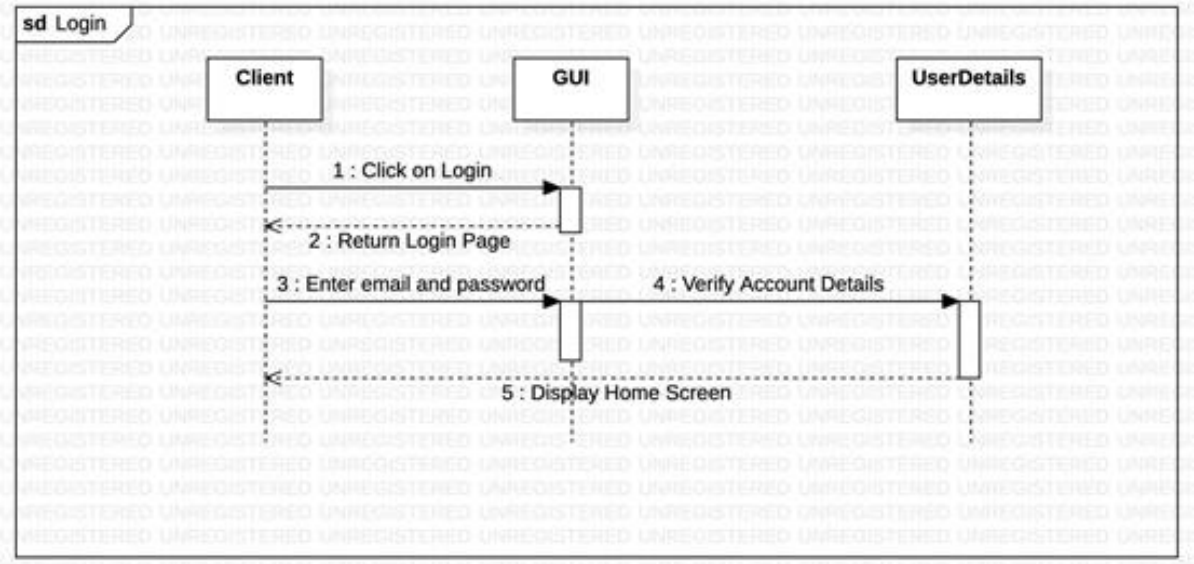


Figure 8, Software Modelling Tool Sequence Diagram

User works on a new chart from templates provided by the tool

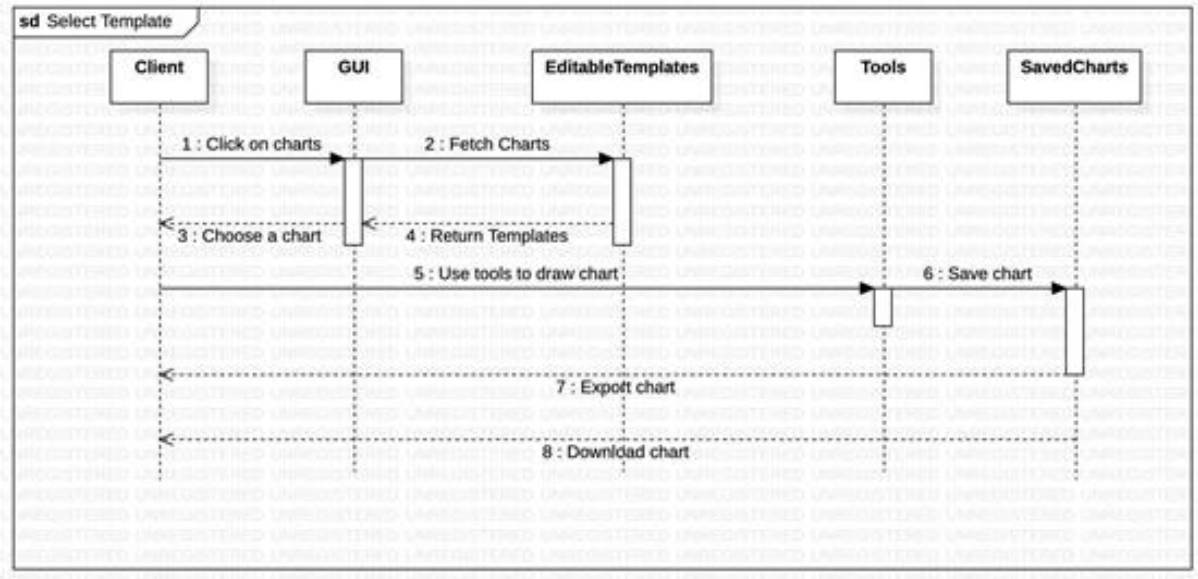


Figure 9, Software Modelling Tool Sequence Diagram

User imports chart to work on

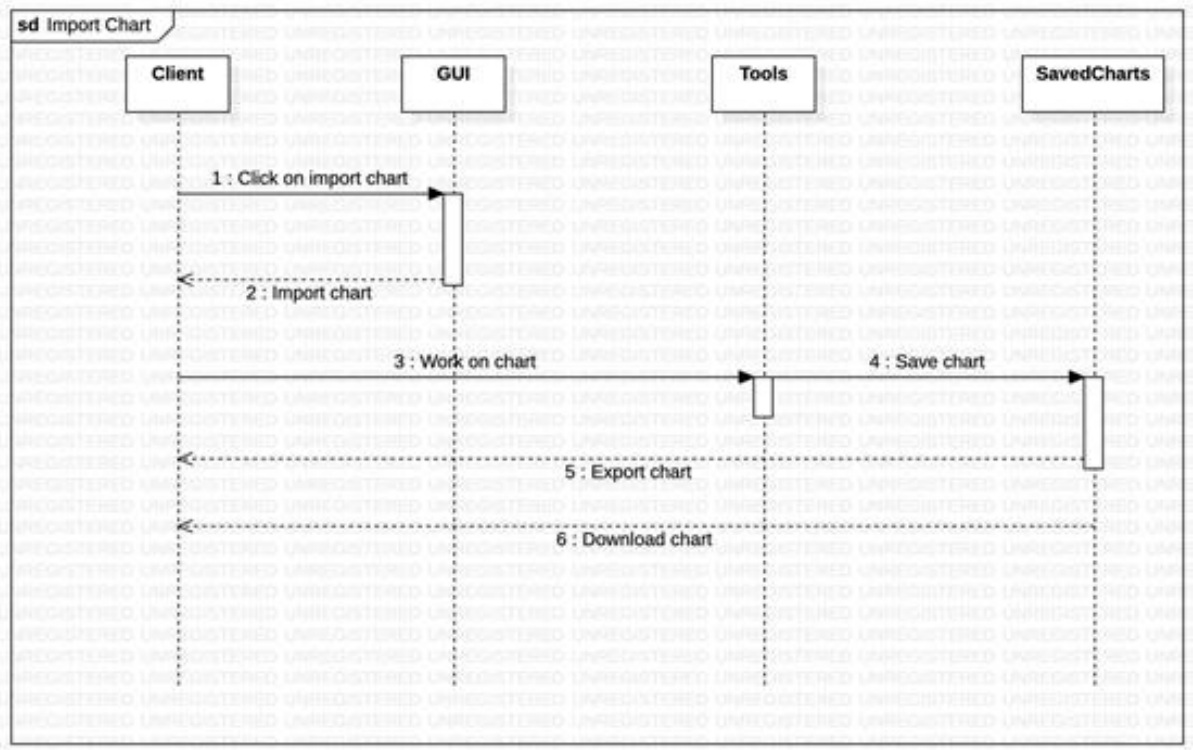


Figure 10, Software Modelling Tool Sequence Diagram

User works on a saved chart

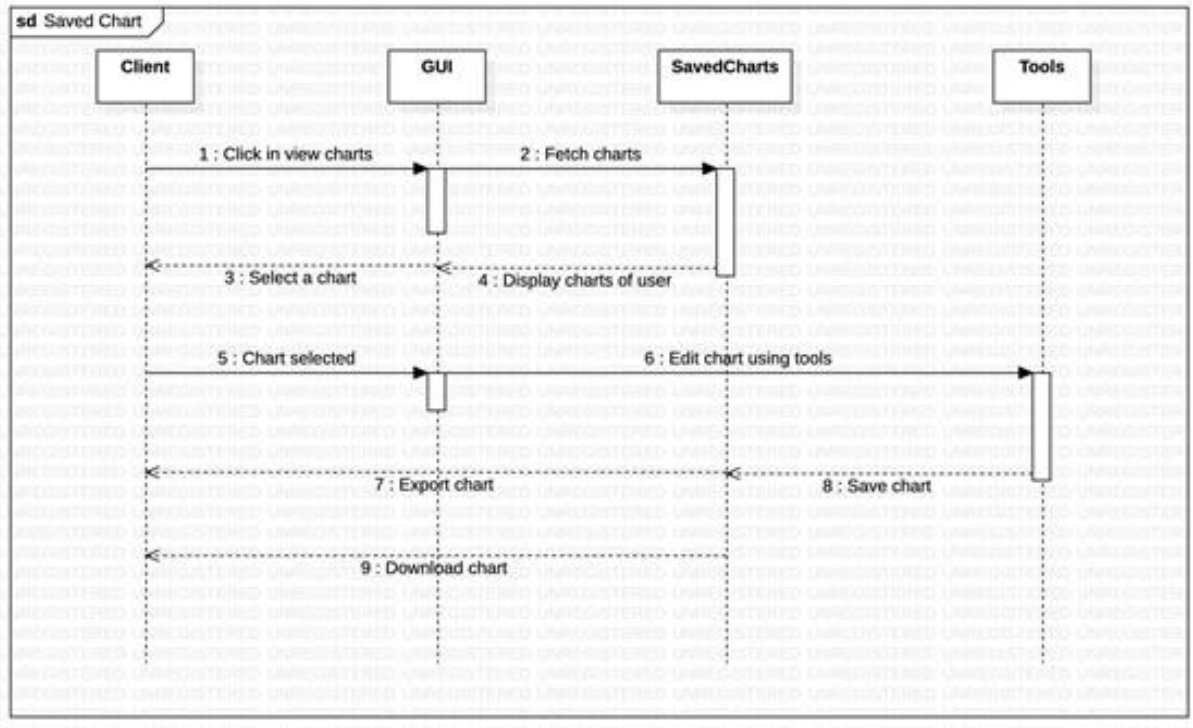


Figure 11, Software Modelling Tool Sequence Diagram

4.1.7 Collaboration Diagram

Signup of a new user

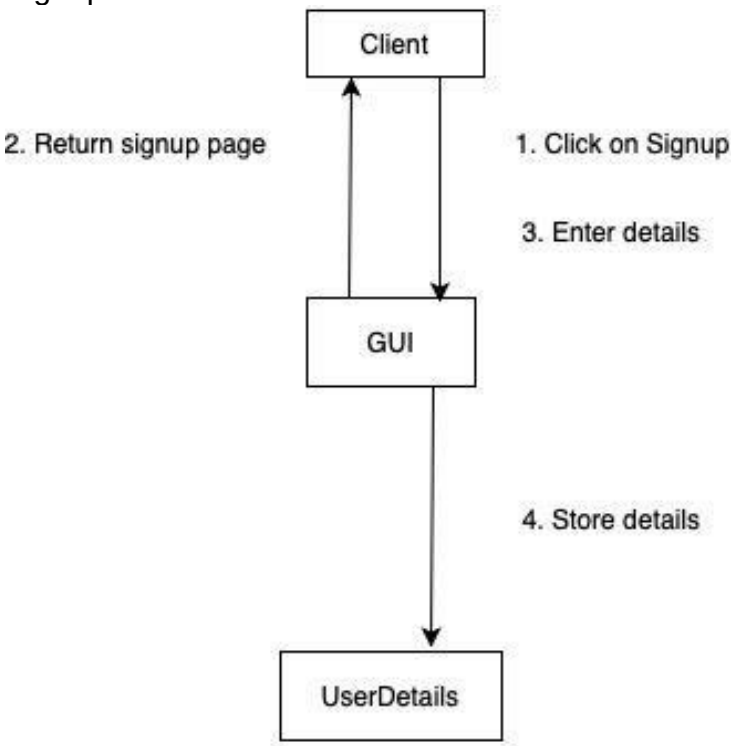


Figure 12, Software Modelling Tool Collaboration Diagram

Login an existing user

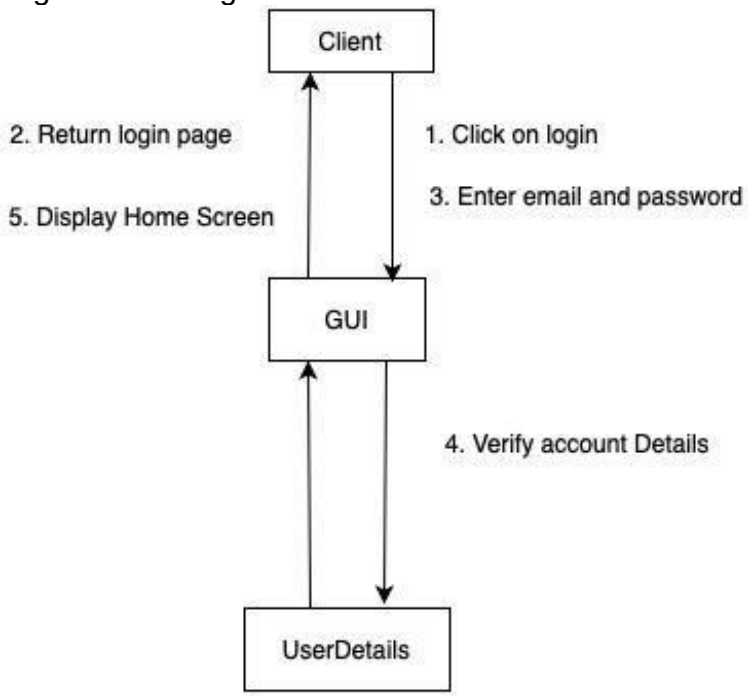


Figure 13, Software Modelling Tool Collaboration Diagram

User works on a new chart from templates provided by the tool

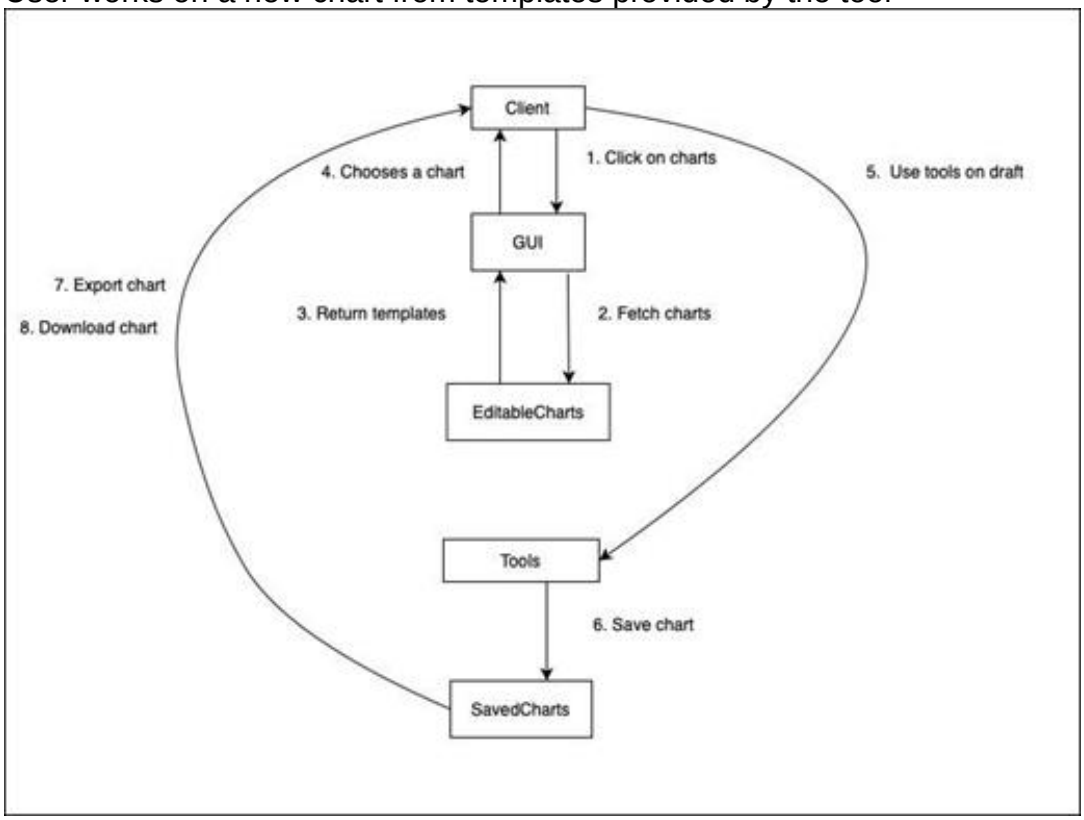


Figure 14, Software Modelling Tool Collaboration Diagram

User imports chart to work on

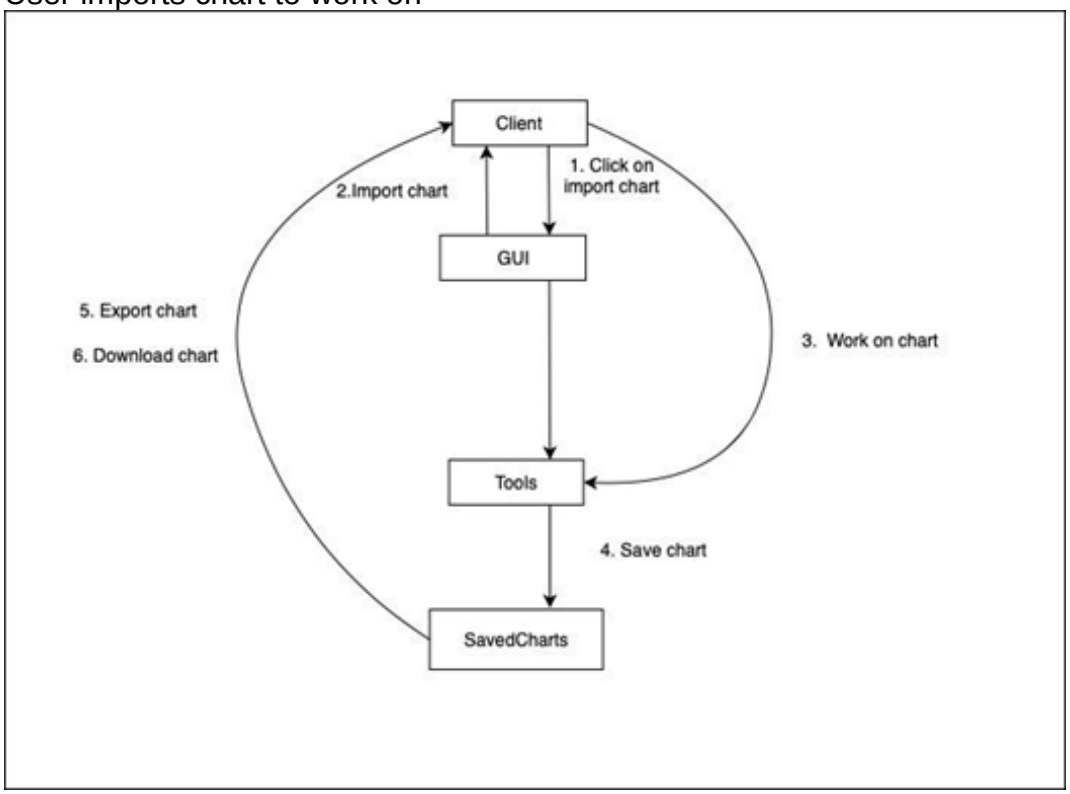


Figure 15, Software Modelling Tool Collaboration Diagram

User works on a saved chart

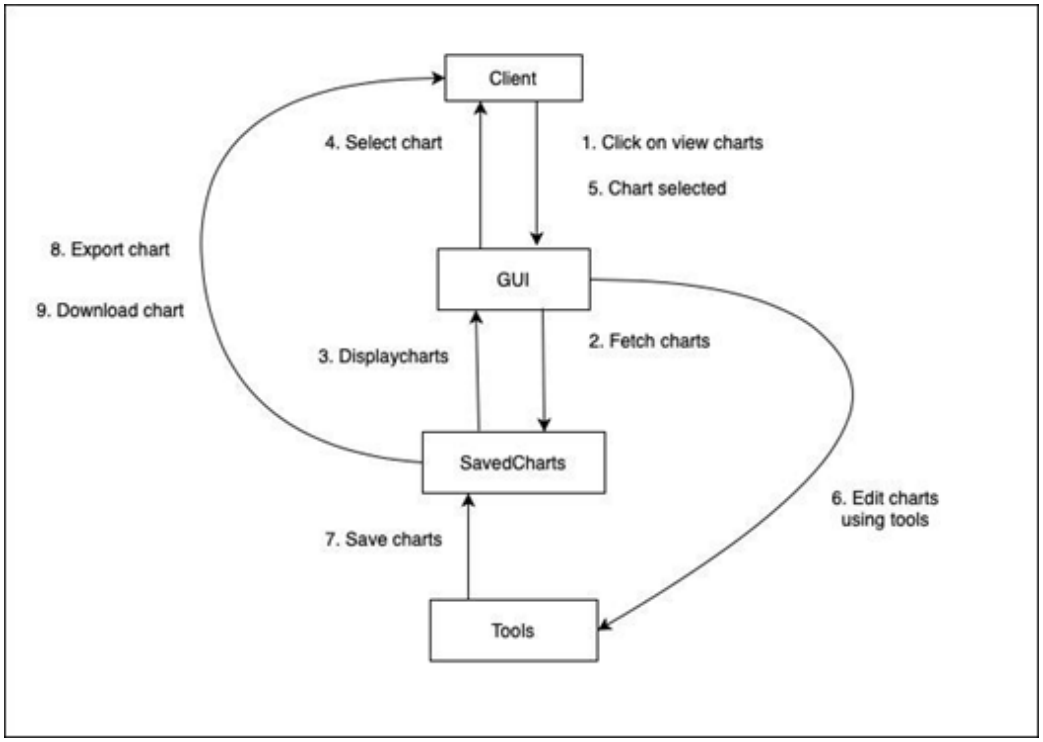


Figure 16, Software Modelling Tool Collaboration Diagram

4.1.8 ER Diagram

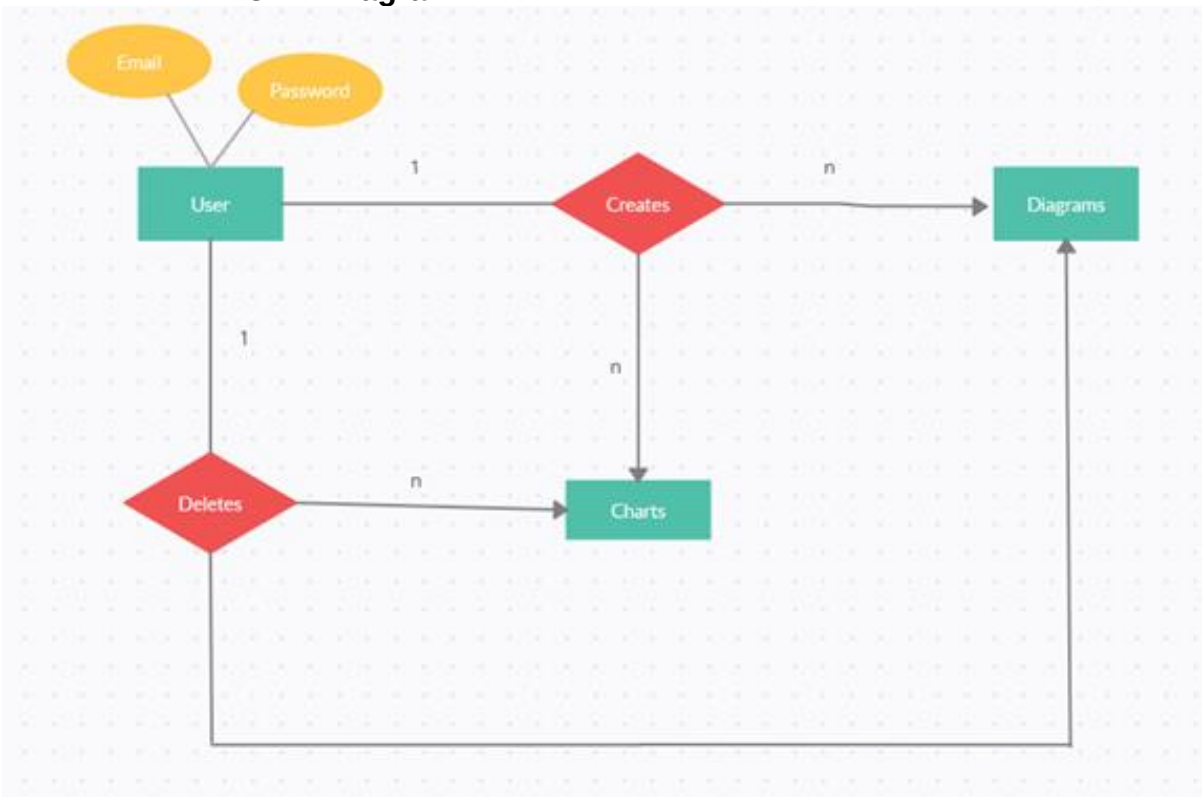


Figure 17, ER Diagram

4.1.9 Class Diagram

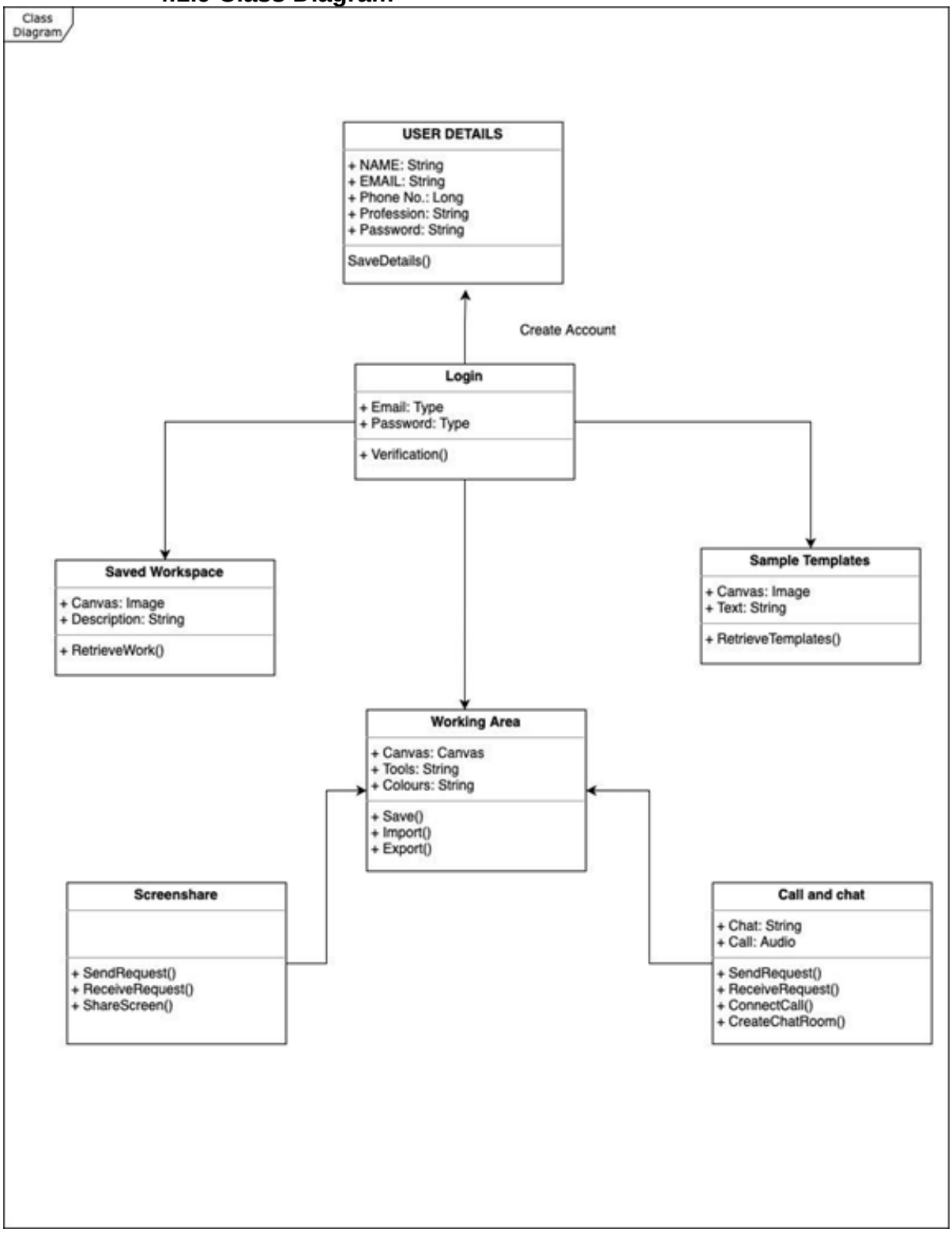


Figure 18, Class Diagram

4.1.10 Activity Diagram

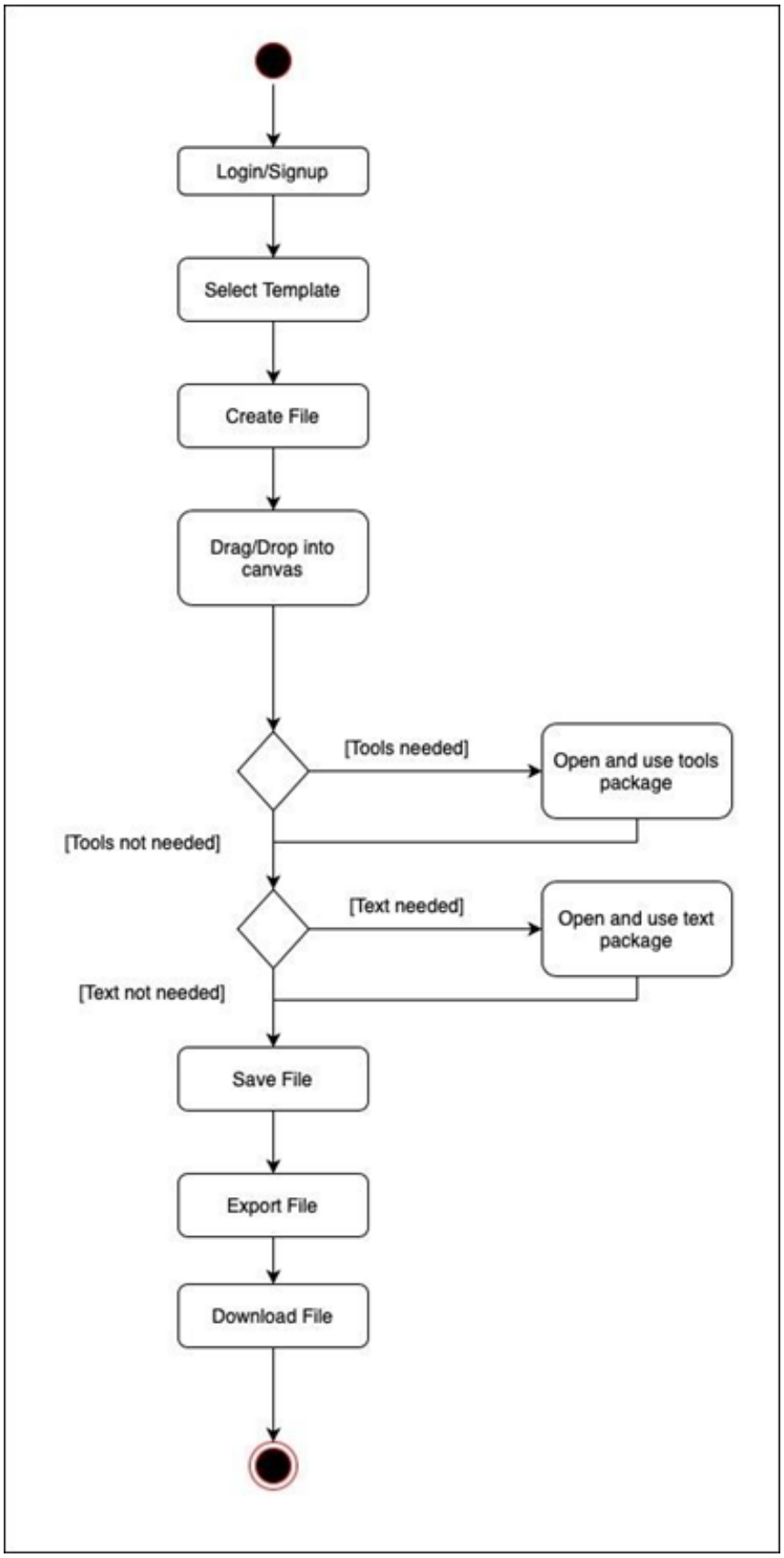


Figure 19, Activity Diagram

4.2 Codes and Standards

The software has been developed using java version jdk-16.0.1

4.2.1 Libraries used:

- javax.swing.*;
- java.awt.*;
- java.awt.event.*;
- java.io.File;
- Java.sql.*;
- java.awt.event.ActionEvent;
- java.awt.event.ActionListener;

4.2.2 API used:

- Google API

4.2.3 Standards Followed:

- Global variables have a limited use
- Standard headers for different modules have been mentioned
- All naming conventions for local, global variables have been followed
- Functions, dependencies and libraries have been clearly stated and named
- Proper indentation has been followed throughout the codes
- Exception and error handling measures have been taken for backend and frontend codes
- No identifier has a multiple usage
- GOTO statements are not used
- Codes are well documented
- High congestion, low coupling used
- Modularity maintained by reusing functions to create multiple cards and info pages.

4.3 Constraints, Alternatives and Tradeoffs

Constraints

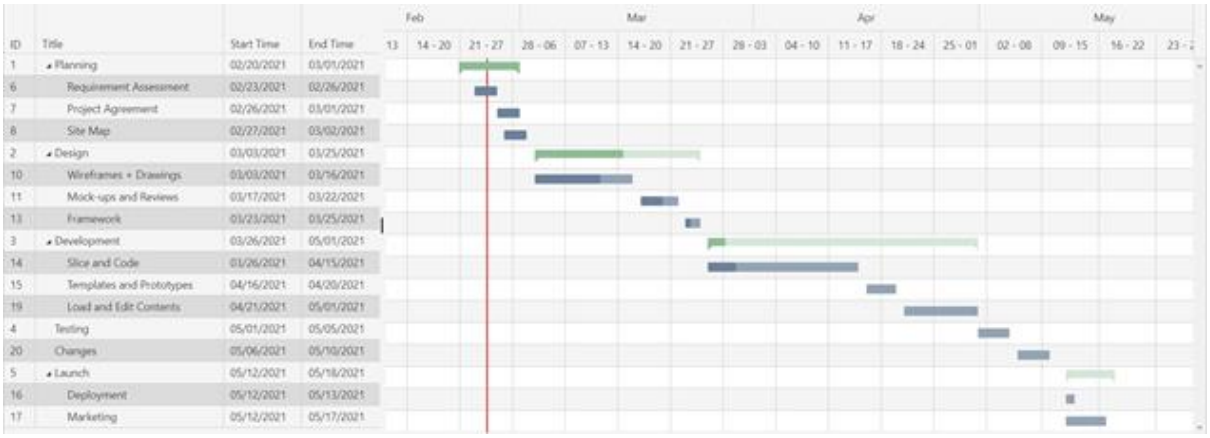
The following is a table of the design constraints that the system SHALL meet. The list of constraints was produced from the initial project documentation provided by the requirements expert.

Table 3 : Table of Design Constraints

ID	Origin	Shall Requirement
1	User	A user shall not be able to use more than 3 templates on a free account.
2	User	System shall not allow users to login from multiple devices. The account will be logged out automatically from the previous device when the account is signed up on a new device.
3	User	System shall not allow the user to work on different canvas at same time.
4	Admin	System shall use the existing protocols for calling and chatting features. (DTLS and SRTP)
5	User	System shall allow the user to connect the call or chat only to the people who are the user of the system.
6	User	The user shall not be able to share the design without login into an account.
7	User	The user shall not be able to export the design without logging in to their account.

5. SCHEDULE, TASKS AND MILESTONES

5.1 Gantt Chart



ID	Title	Start Time	End Time
1	Planning	02/20/2021	03/01/2021
6	Requirement Assessment	02/23/2021	02/26/2021
7	Project Agreement	02/26/2021	03/01/2021
8	Site Map	02/27/2021	03/02/2021
2	Design	03/03/2021	03/25/2021
10	Wireframes + Drawings	03/03/2021	03/16/2021
11	Mock-ups and Reviews	03/17/2021	03/22/2021
13	Framework	03/23/2021	03/25/2021
3	Development	03/26/2021	05/01/2021
14	Slice and Code	03/26/2021	04/15/2021
15	Templates and Prototypes	04/16/2021	04/20/2021
19	Load and Edit Contents	04/21/2021	05/01/2021
4	Testing	05/01/2021	05/05/2021
20	Changes	05/06/2021	05/10/2021
5	Launch	05/12/2021	05/18/2021
16	Deployment	05/12/2021	05/13/2021
17	Marketing	05/12/2021	05/17/2021

Figure 20, Process Based Gantt Chart

ID	Title	Start Time	End Time
1	Language and Frameworks	03/26/2021	05/01/2021
6	Java	03/26/2021	05/01/2021
7	Java Swing	03/26/2021	05/01/2021
8	Java fx	03/26/2021	05/01/2021
2	Front-End	03/25/2021	04/05/2021
10	Login Options	03/26/2021	03/27/2021
11	Tools and Shapes	03/27/2021	03/29/2021
13	Canvas and Textfields	03/30/2021	04/01/2021
19	Options to improve UI	04/02/2021	04/05/2021
3	Back-end	04/06/2021	04/24/2021
14	Login Verification	04/06/2021	04/08/2021
15	Adding Functionalities	04/09/2021	04/16/2021
20	Edit Text Options	04/17/2021	04/20/2021
21	Adding Graphics Functions	04/20/2021	04/23/2021
22	Importing and Exporting ...	04/23/2021	04/30/2021

Figure 21, Product Based Gantt Chart

5.2 Activity Network Chart

Process Based

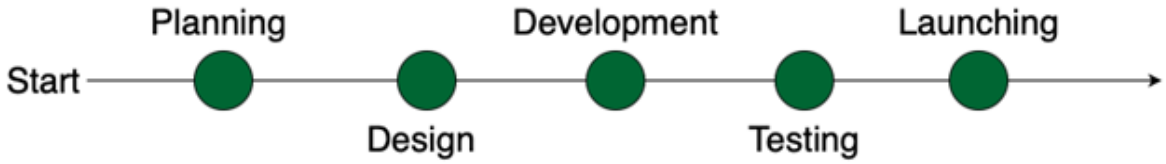
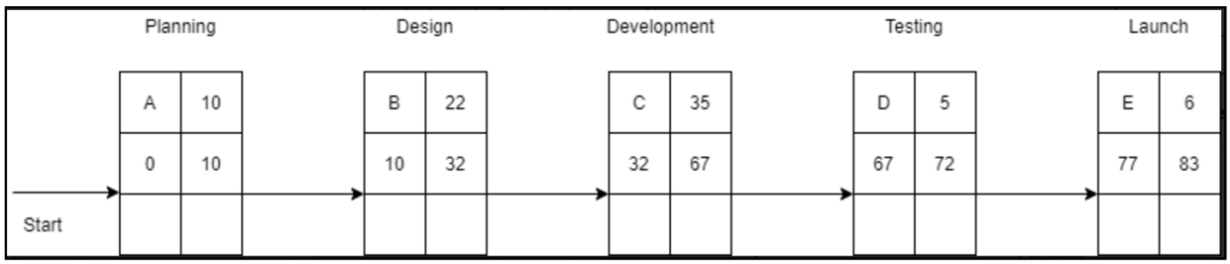


Figure 22, Process Based Activity Network Chart

Table 4: Process Based Activity Network Chart Table

Task	Label	Predecessor	Estimate Duration
Planning	A	-	10 days
Design	B	A	22 days
Development	C	B	35 days
Testing	D	C	10 days
Launching	E	D	6 days



Product Based

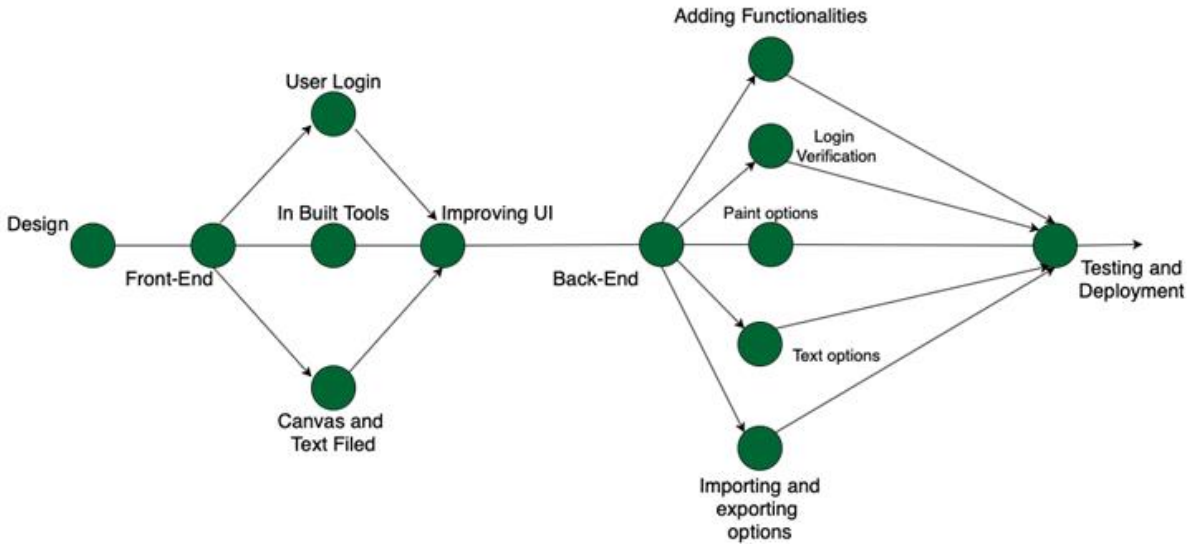
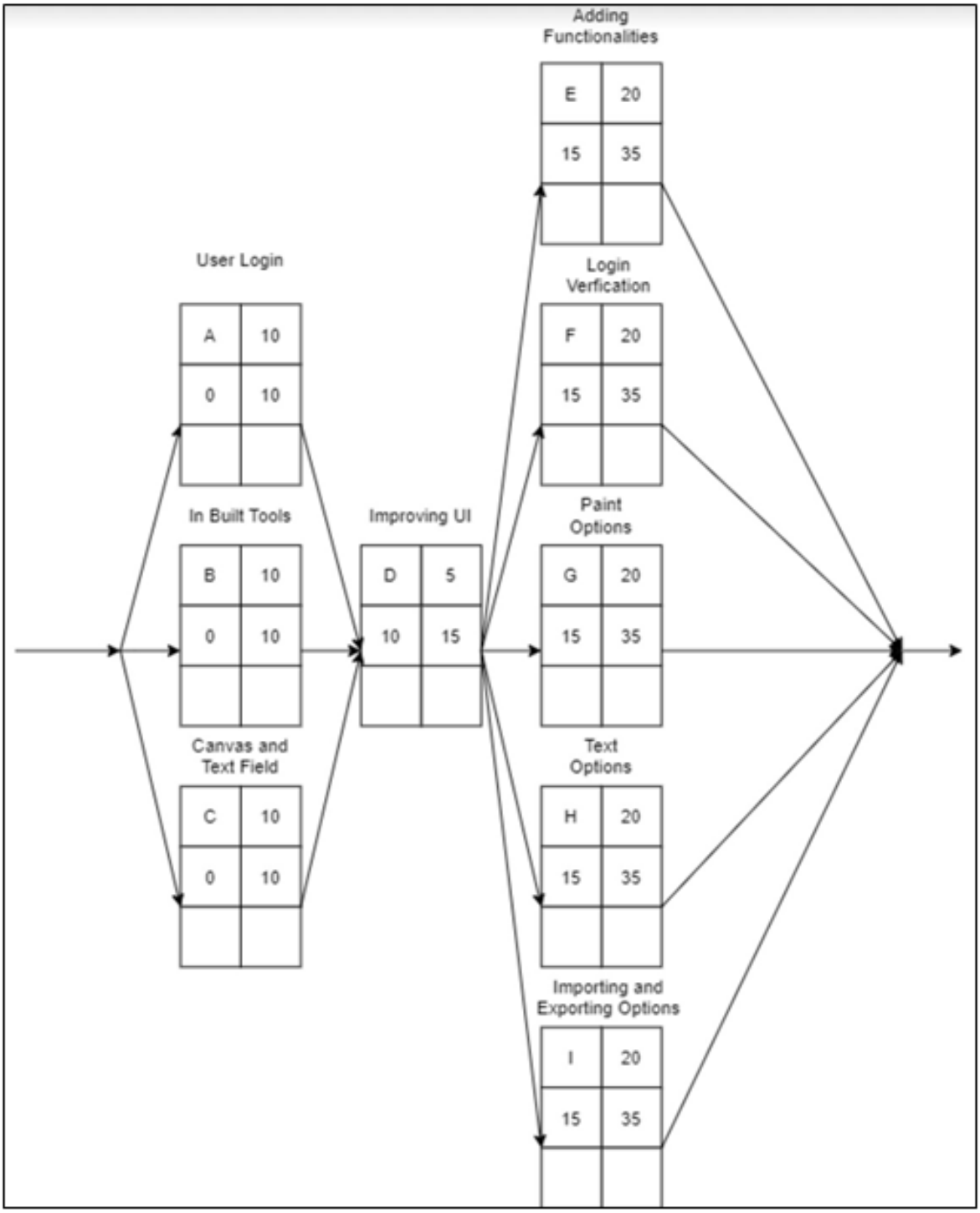


Figure 23, Product Based Activity Network Chart

Table 5: Product Based Activity Network Chart Table

Task	Label	Predecessor	Estimate Duration
User Login	A	-	10 days
Developing Tools	B	-	10 days
Canvas and Text Field	C	-	10 days
Improving UI	D	A, B, C	5 days
Adding Functionality	E	D	20 days
Login Verification	F	D	20 days
Paint Options	G	D	20 days

Text Options	H	D	20 days
Importing and Exporting Options	I	D	20 days



5.3 Work Breakdown Structure

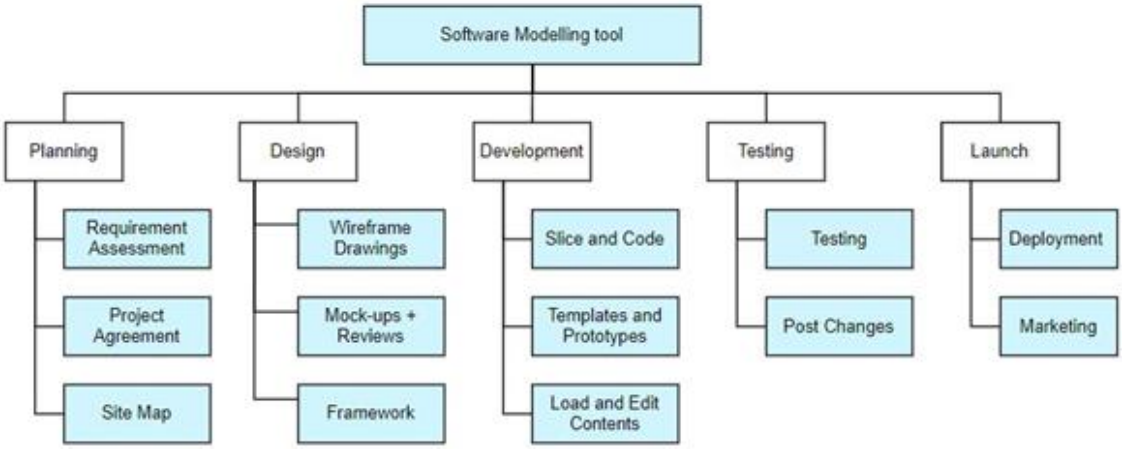


Figure 24, Process based Work Breakdown Structure

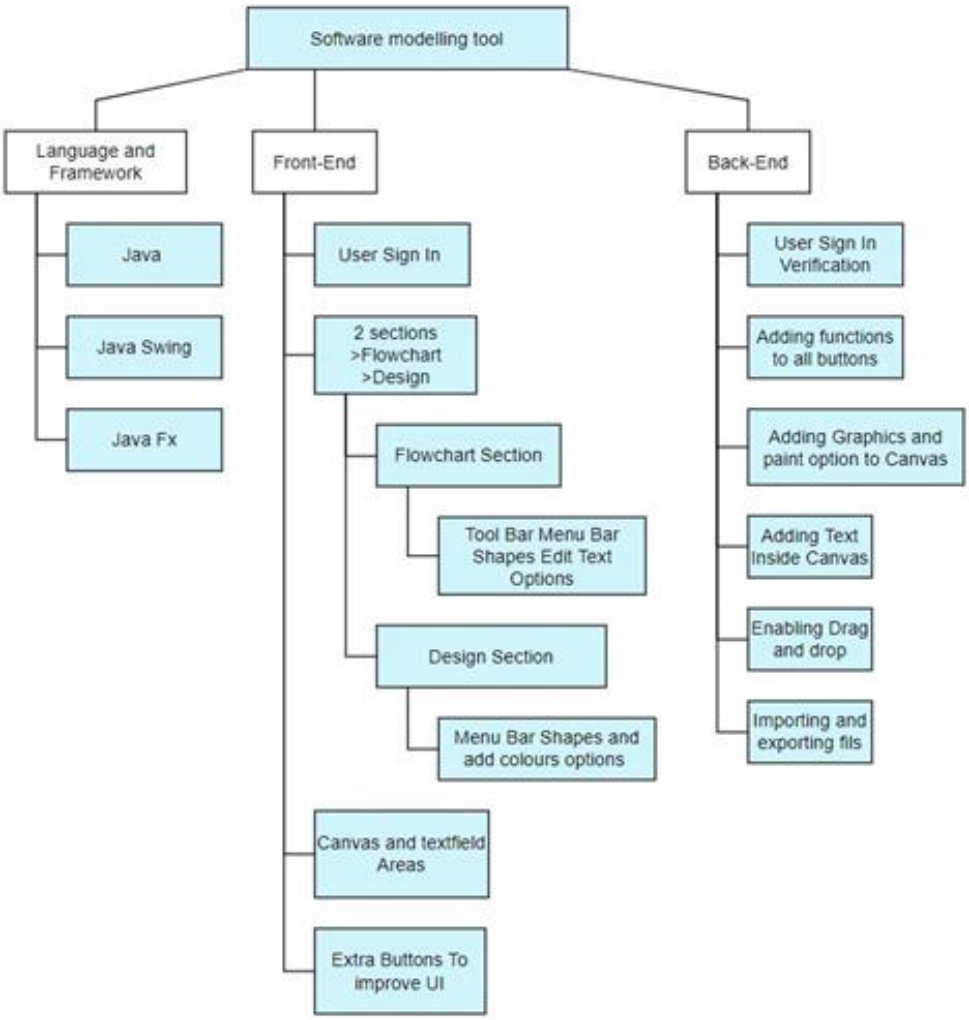


Figure 25, Product based Work Breakdown Structure

5.4 Timeline Chart

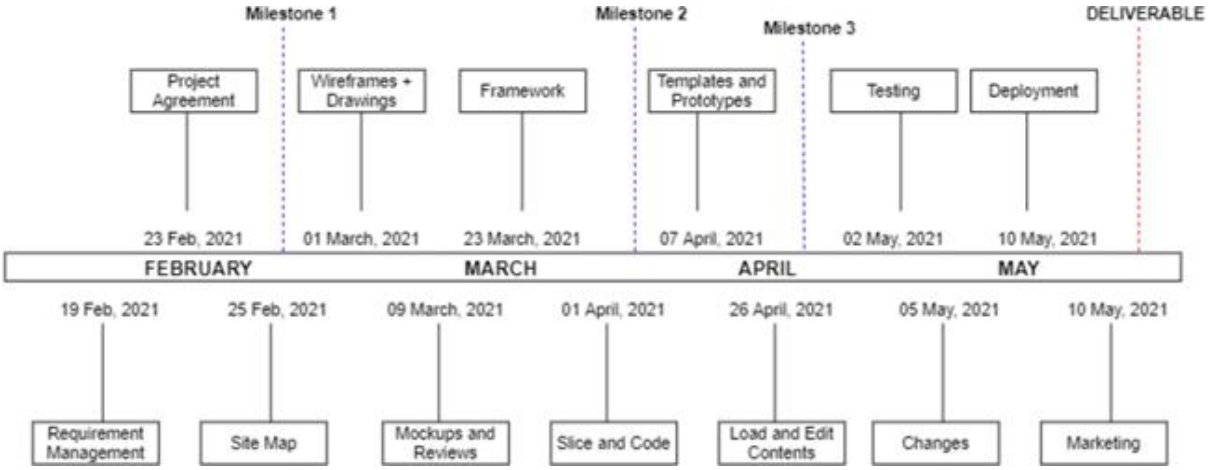


Figure 26, Timeline Chart

6. PROJECT DEMONSTRATION

Landing Module

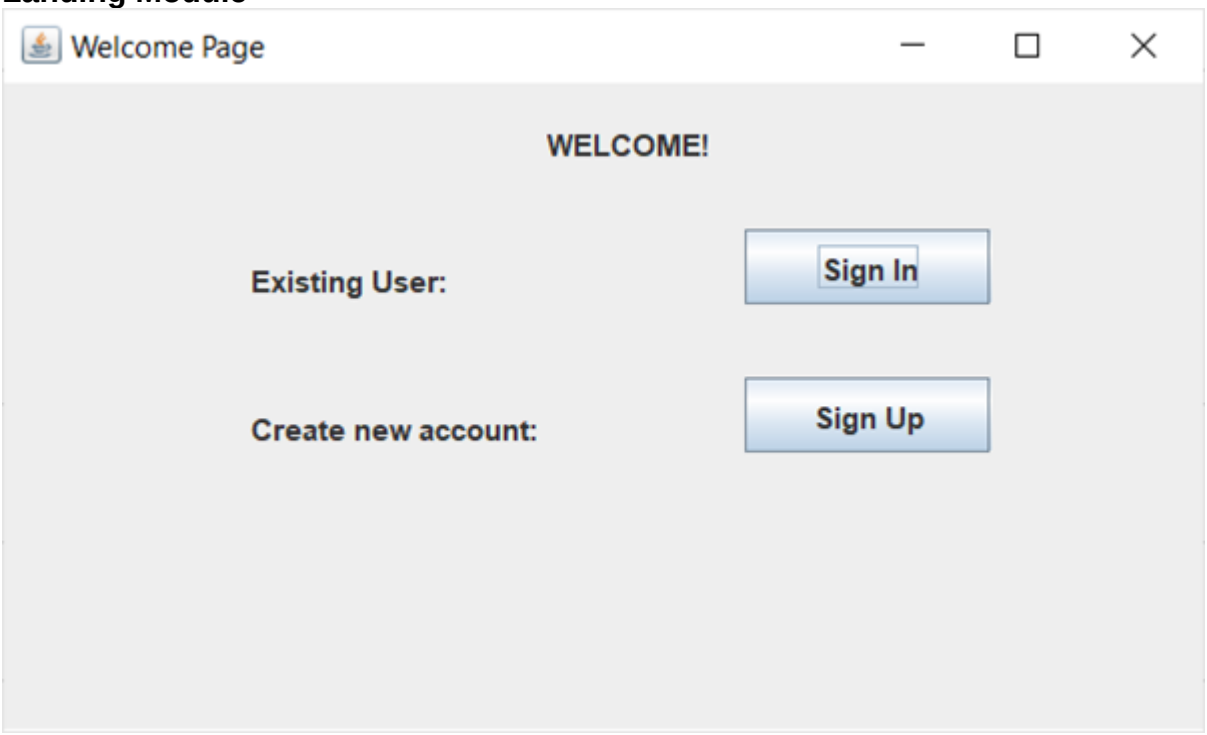


Figure 27, Welcome Page : The user can click on any one button

Sign Up Module

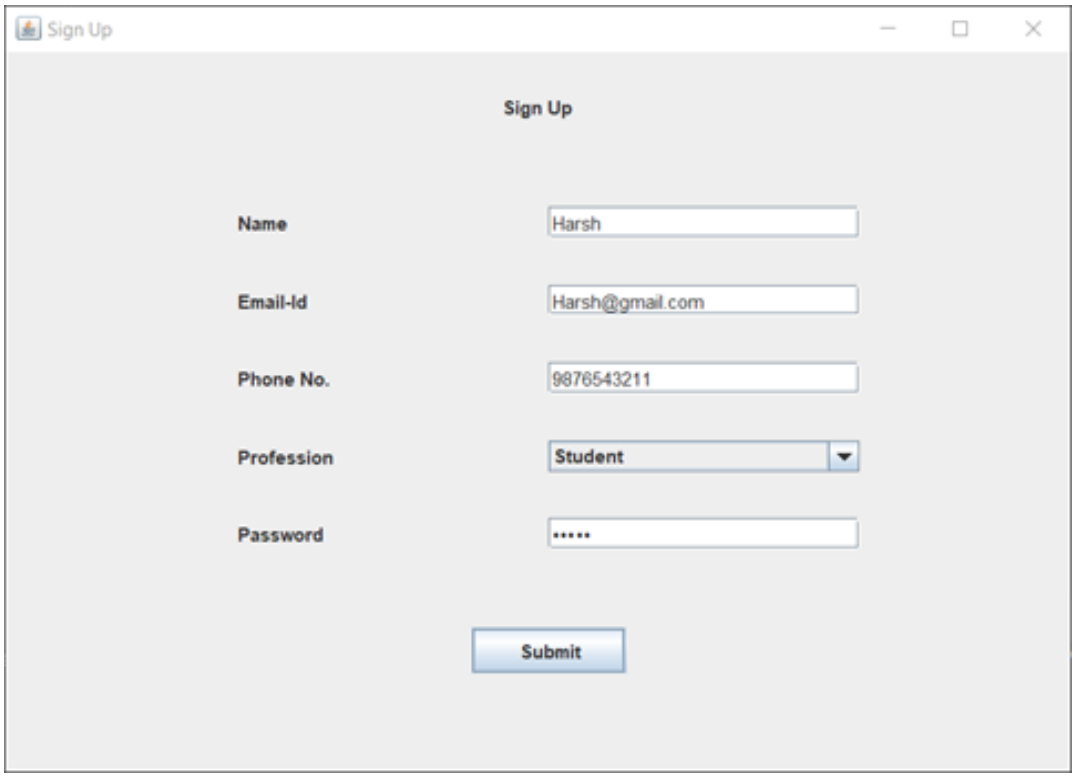


Figure 28, Signup Module : Enter new user details

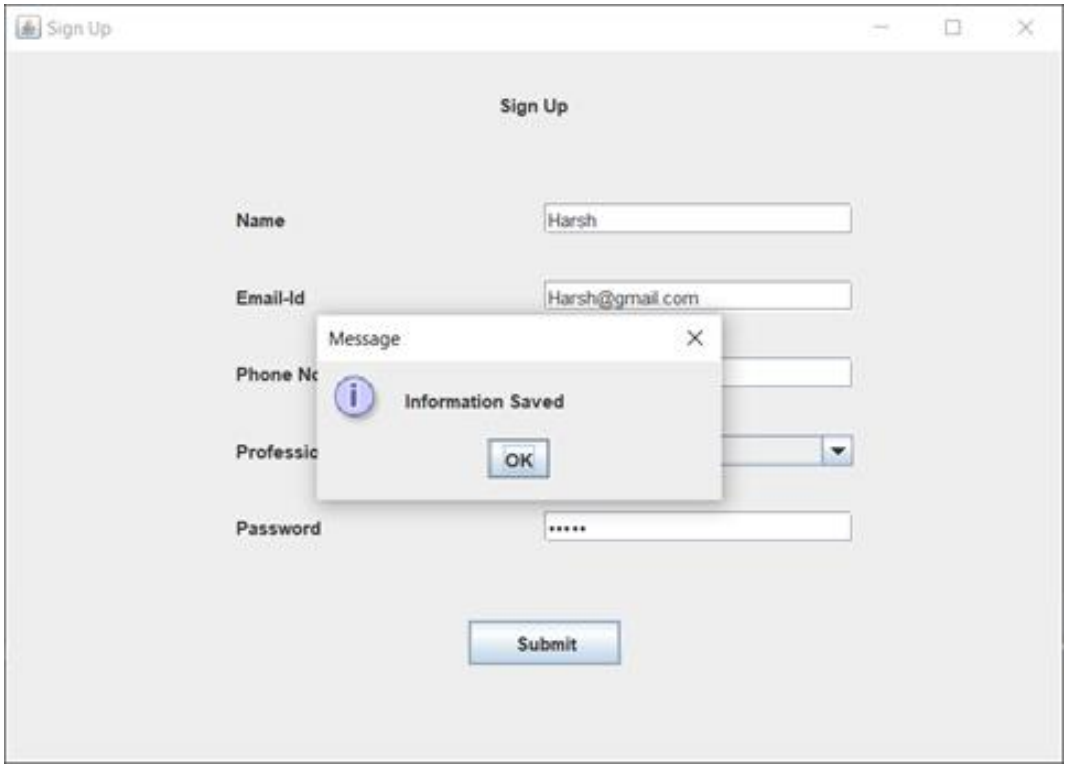


Figure 29, Signup Module : New user details have been saved

Sign In Module

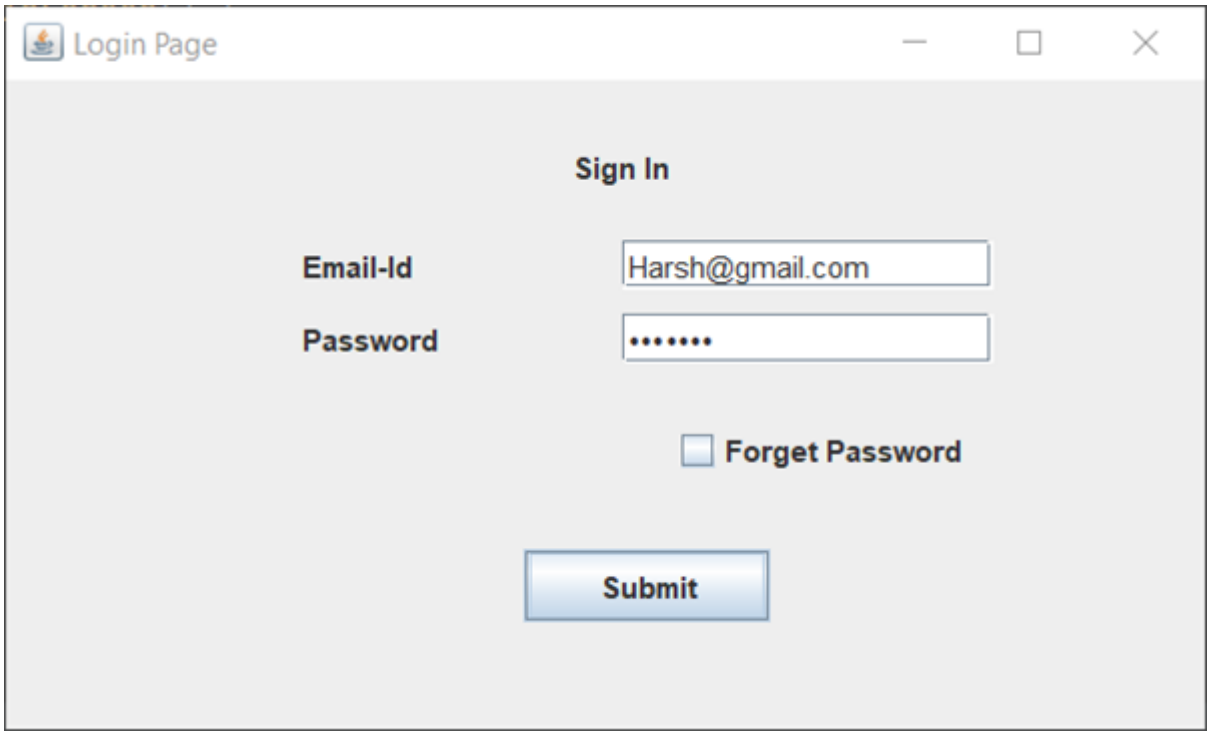


Figure 30, Signup Module : Enter details to sign in

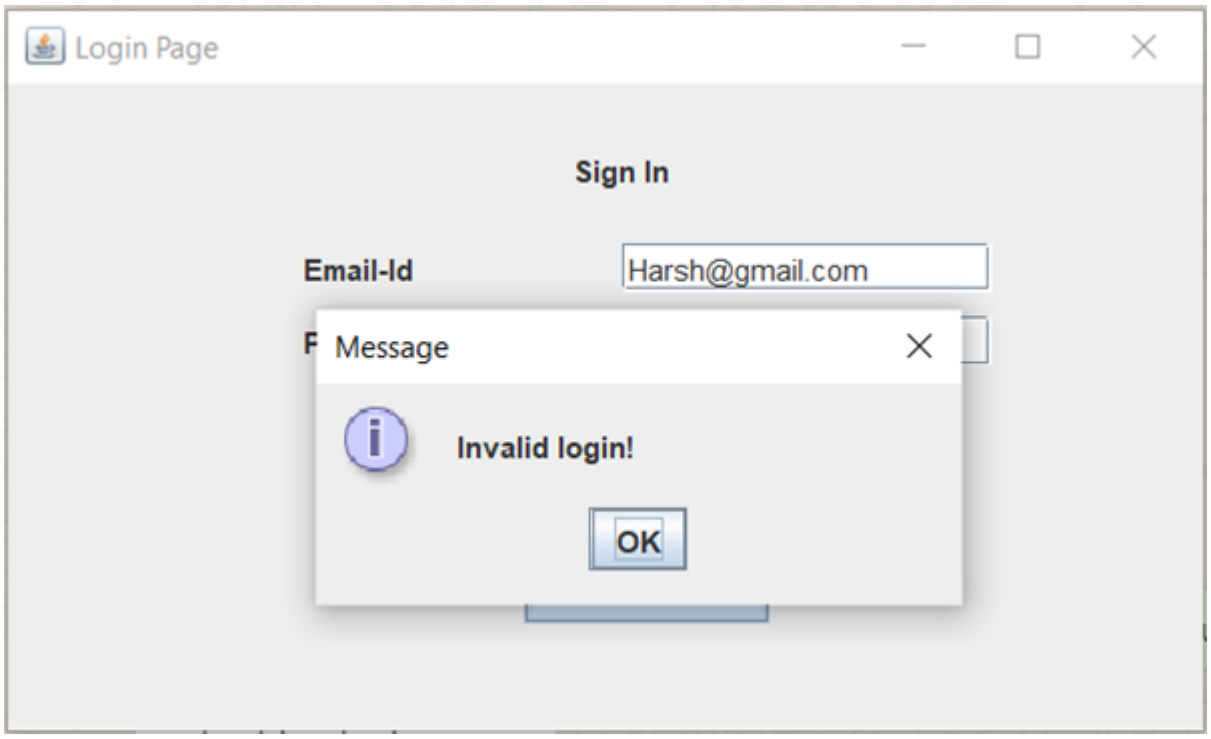


Figure 31, Signup Module : Invalid login prompt displayed

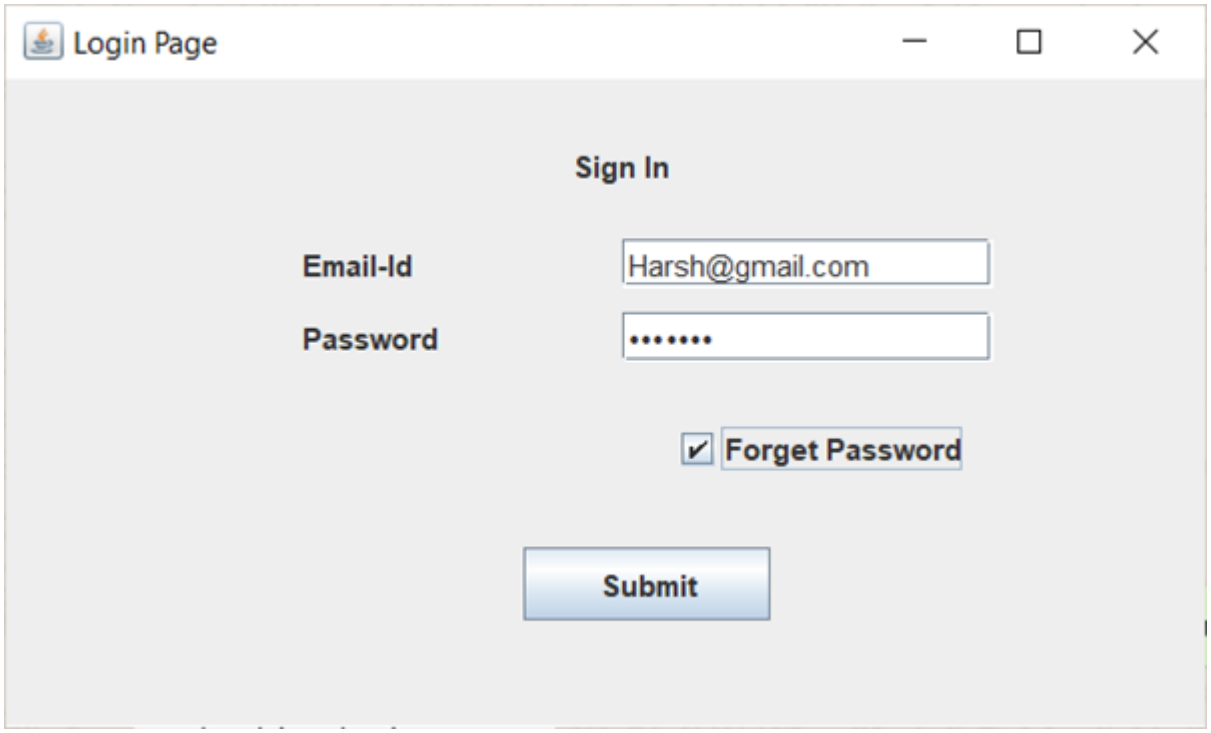


Figure 32, Login Module : Forget password option selected

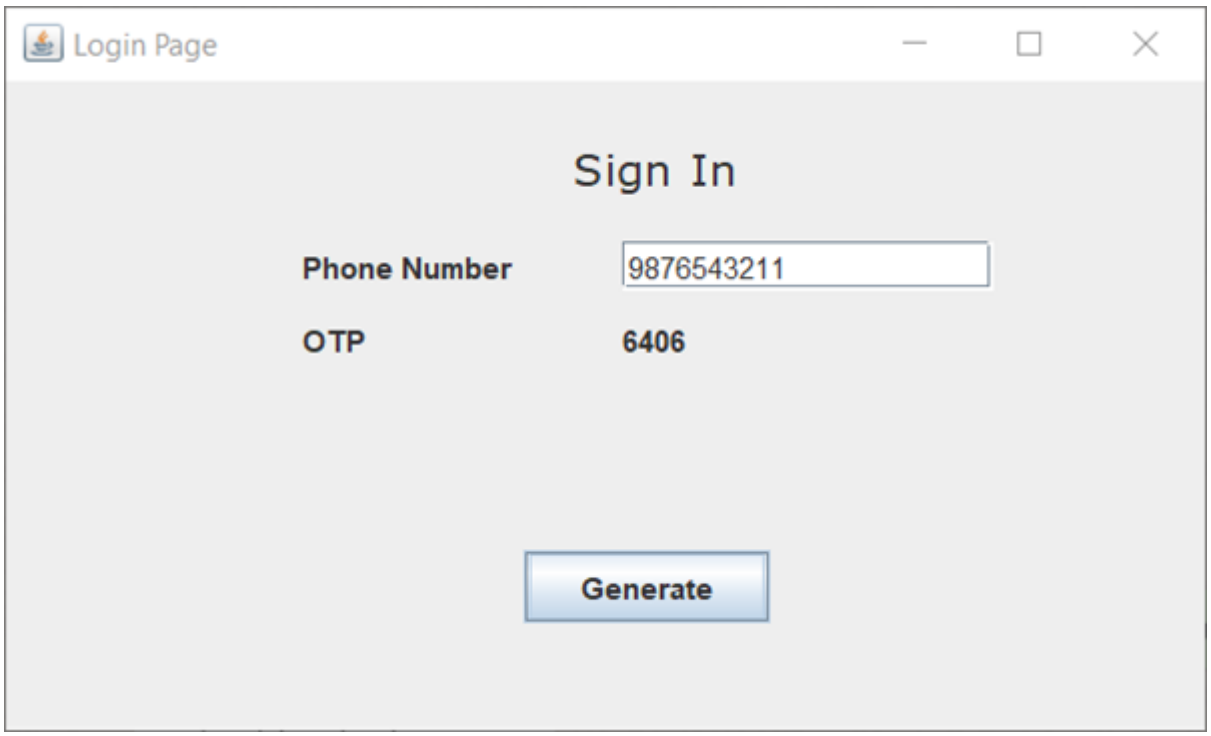


Figure 33, Login Module : Enter phone number for an OTP to be generated

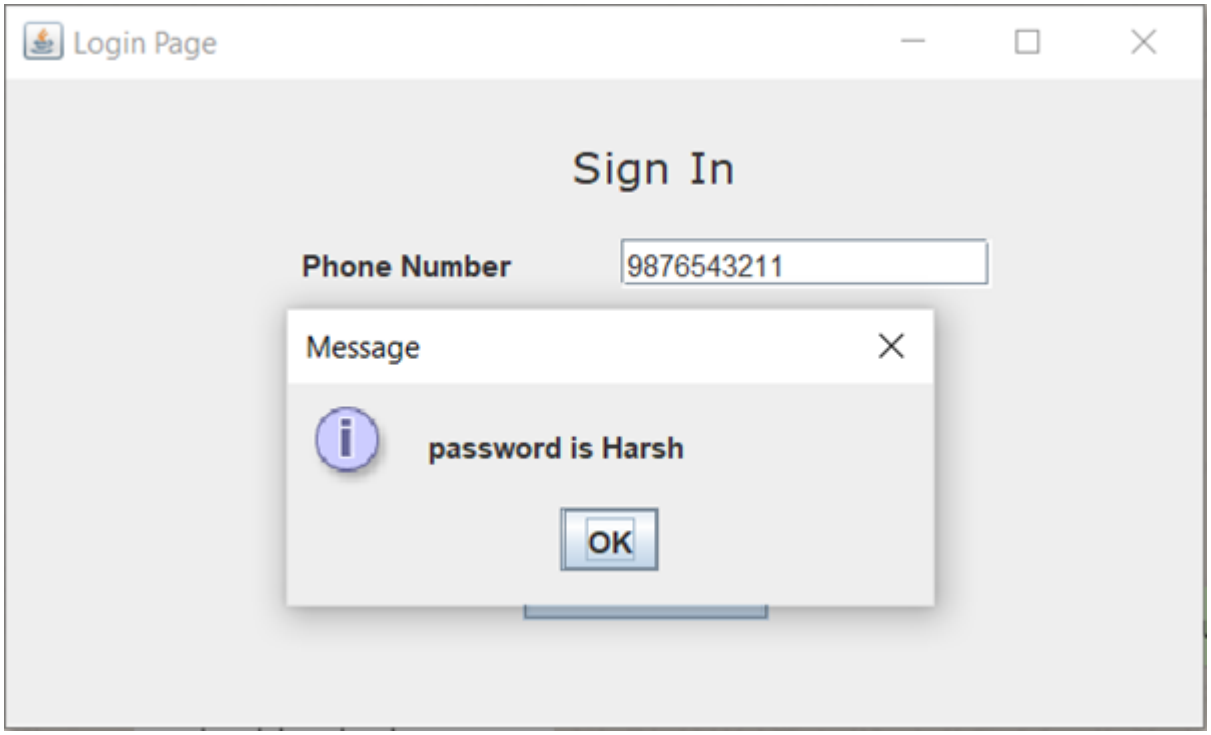


Figure 34, Login Module : User's password is displayed

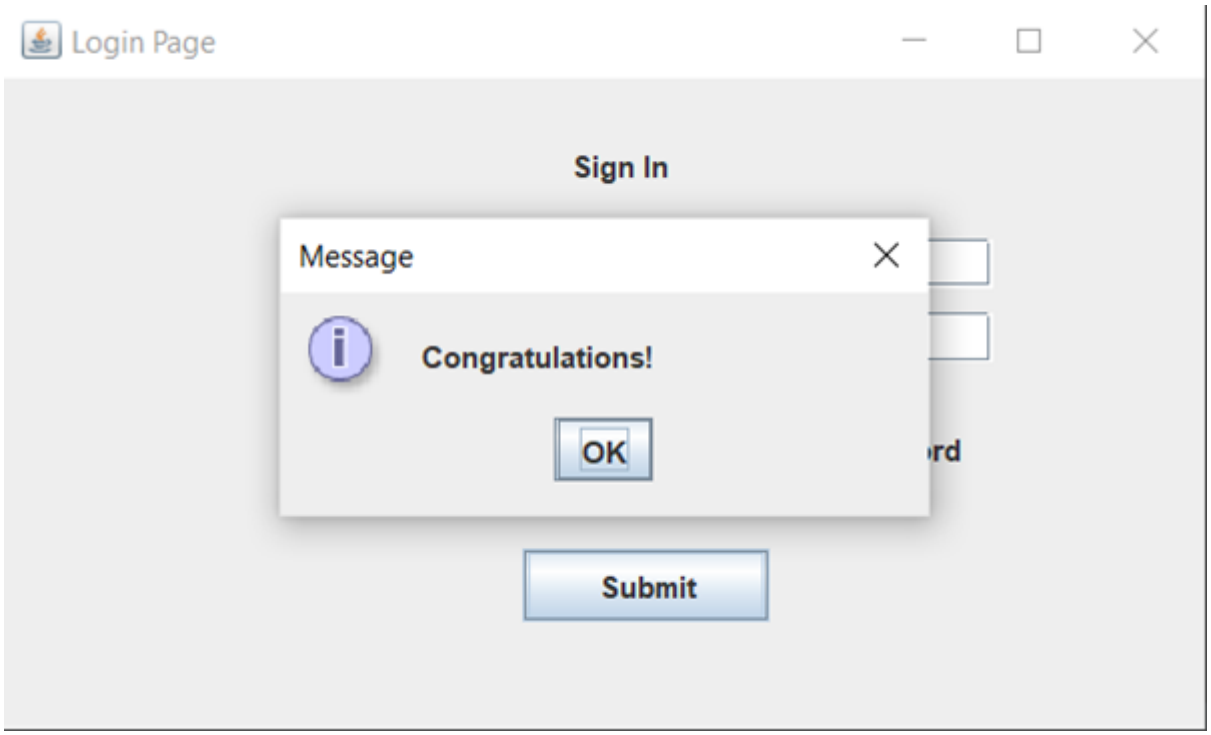


Figure 35, Login Module : User can now sign in

QuickStart Module

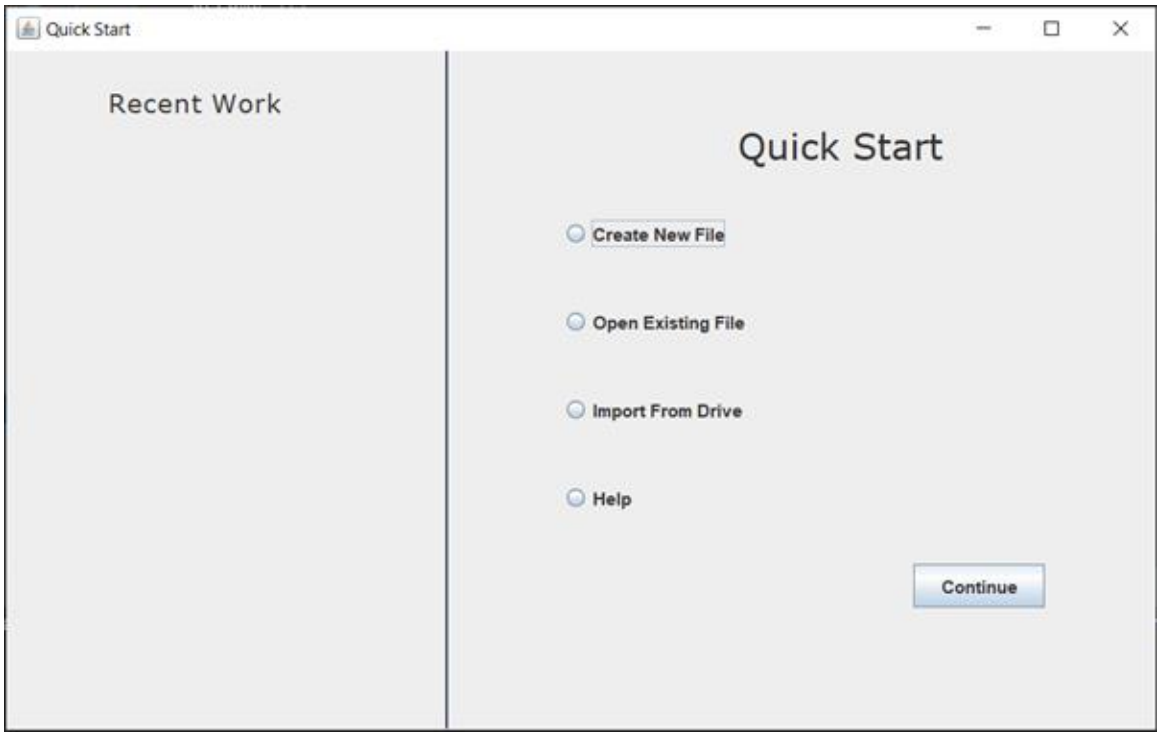


Figure 36, QuickStart Module : QuickStart Page is displayed after user signs in

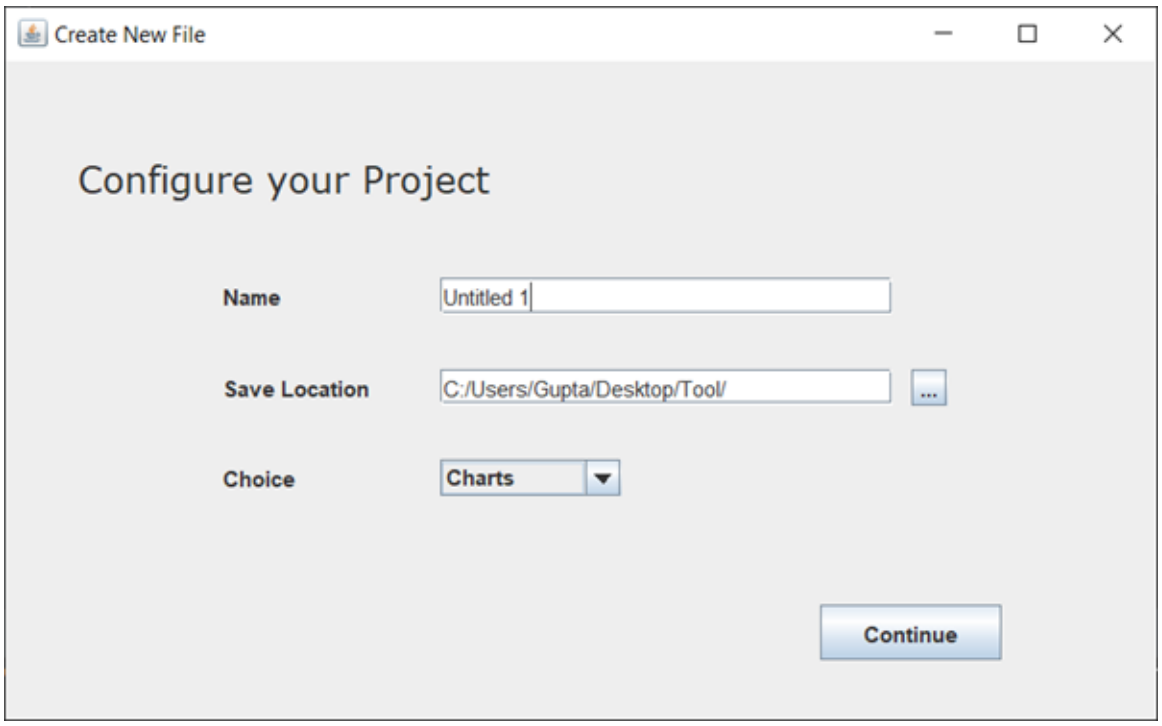


Figure 37, QuickStart Module : Create New File Option is selected, and user can create a new project

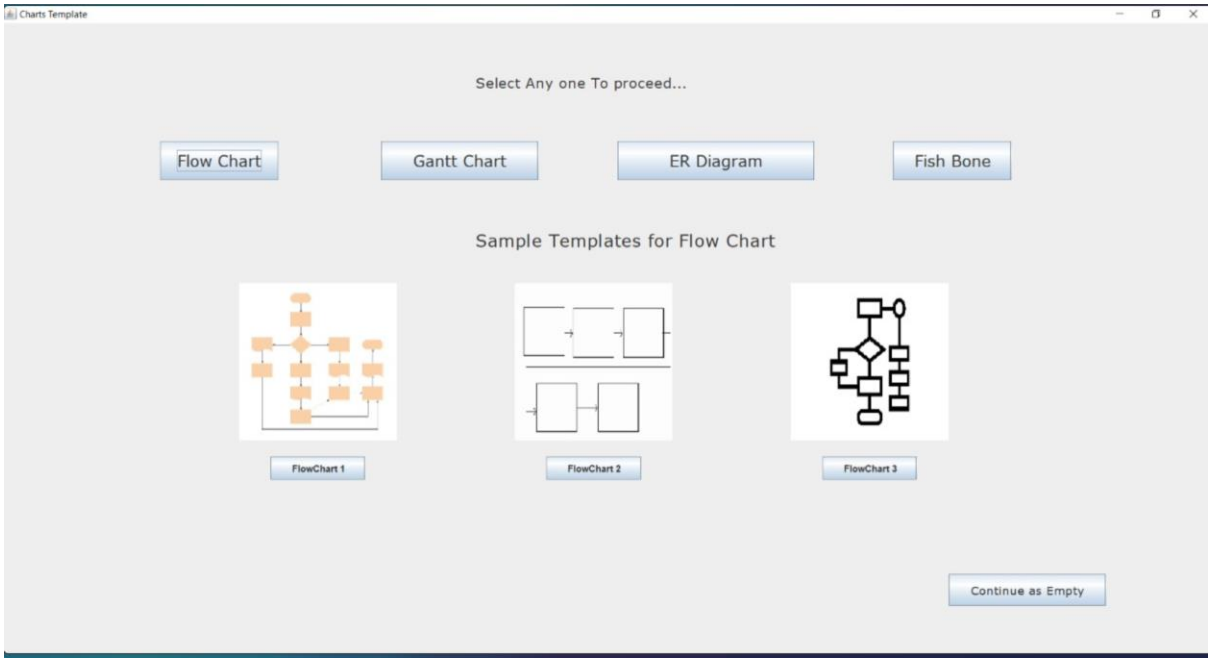


Figure 38, QuickStart Module : Choose a template(Flowchart)

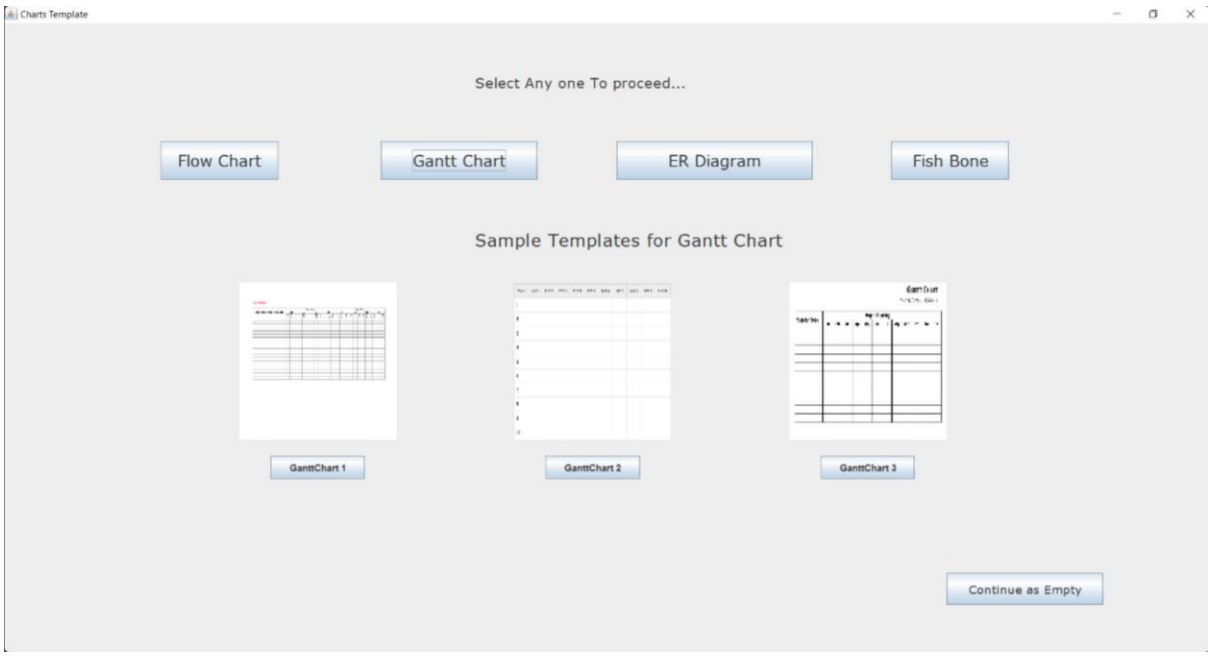


Figure 39, QuickStart Module : Choose a template(Gantt Chart)

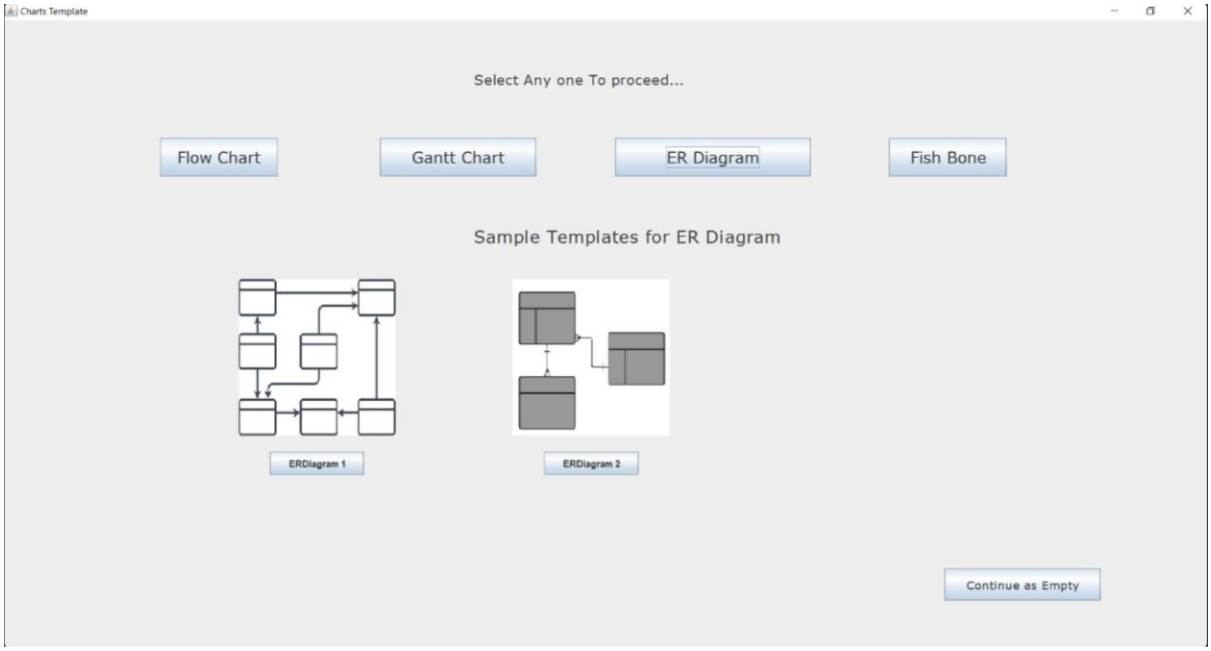


Figure 40, QuickStart Module : Choose a template(ER Diagram)

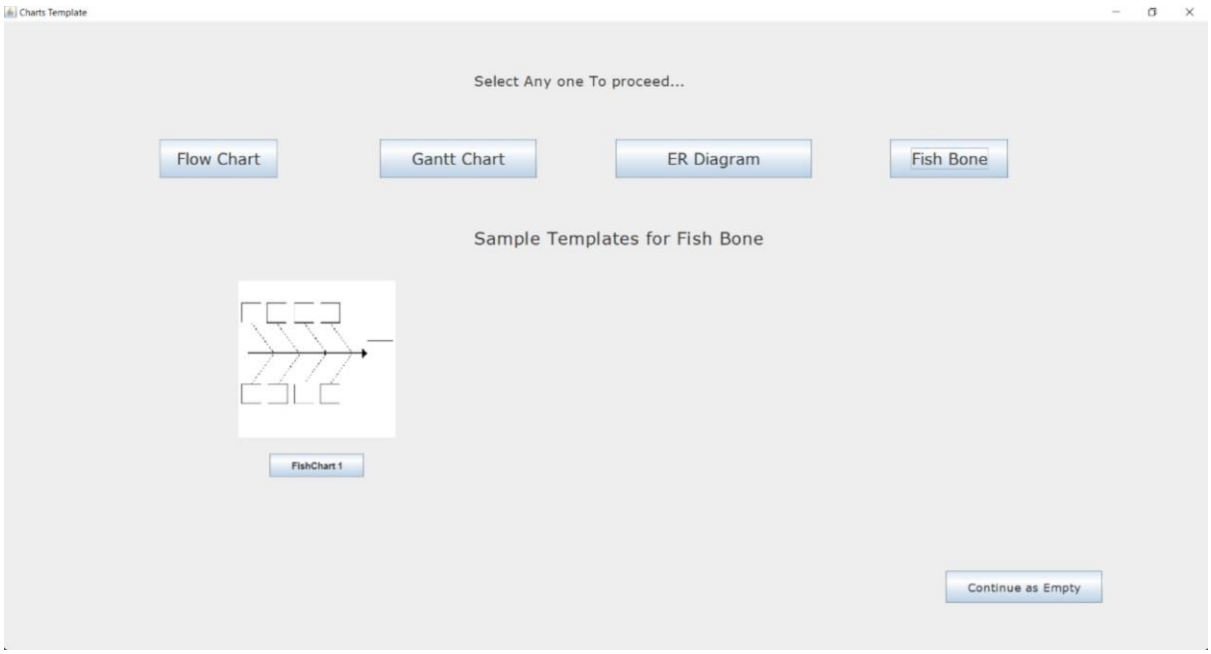


Figure 41, QuickStart Module : Choose a template(Fish Bone Diagram)

Workspace Module

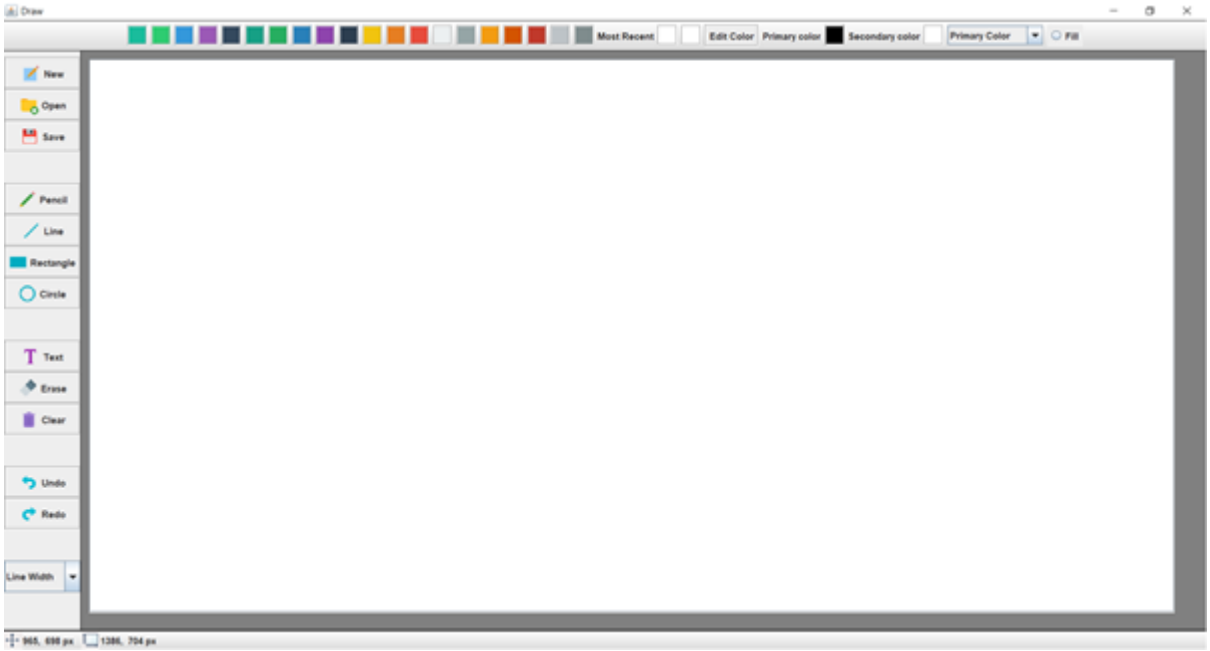


Figure 42, Workspace Module : A new canvas is loaded for the user to work on

TEST CASES

Test Case ID	Test Objective	Test Data	Expected Results	Actual Results	Test Pass/Fail
SystemModelling_1	Signup Page	(valid input) Name- Name Email- Name@gmail.com Phone Number-9876543211 Profession - Anything Password – Name	Information saved	Information saved	Pass
SystemModelling_2	Signup Page	(invalid input – fields left empty)	Please enter the information	Please enter the information	Pass
SystemModelling_3	Login Page	(valid input) Email - Name@gmail.com Password - Name	Must Login Successfully	Logged in Successfully	Pass
SystemModelling_4	Login Page	(invalid input – user does not exist, signup first)	Signup Page must open	Signup page opened	Pass
SystemModelling_5	Login Page	(invalid input – password incorrect)	Invalid input	Invalid input	Pass
SystemModelling_6	Login Page	(invalid input – All textbox Left Blank)	Enter email and password	Enter email and password	Pass

SystemModelling_7	Forgot Password	Forgot Password checkbox checked	Reset Password window must open	Window Opened	Pass
SystemModelling_8	Forgot Password	(valid input) Phone Number-9876543211	An OTP and Password must display	OTP and Password Displayed	Pass
SystemModelling_9	Create New File from QuickStart Page	Create New File radio button selected	If continue button is selected configure your project window must open	Window Opened	Pass
SystemModelling_10	Open Existing File from QuickStart Page	Open Existing File radio button selected	If continue button is selected Existing file window must open	Window Opened	Pass
SystemModelling_11	Import from Drive from QuickStart Page	Import from Drive radio button selected	If continue button is selected Drive should open	Drive Opened	Pass
SystemModelling_12	Select Help from QuickStart Page	Help radio button selected	If continue button is selected Help Window must open	Window Opened	Pass
SystemModelling_13	Configure your project	(valid input) Folder Name – Anything Folder Location – Anything from the pc Choice – charts	Folder must be created as a category of charts	Folder created	Pass

SystemModelling_14	Configure your project	(invalid input – location cannot be found/incorrectly formatted File Name)	Location not found	Location not found	Pass
SystemModelling_15	Select continue as empty	Continue as empty button selected	Main draw area must open	Draw area opened	Pass

7. COST ANALYSIS / RESULT & DISCUSSION

COST ANALYSIS

Since this project is a web server hosted program, the only expenses are the cost of web hosting, which can be collected through advertisements on the website. This will be free of cost for the client/end user. Moreover, revenue can be generated in the long-term period.

RESULT & DISCUSSION

We have spent the past 3 months designing and implementing the final product called Software Modelling Tool. The outcome of the project - Software Modelling Tool, is a tool that is useful to a wide range of users, it can be used by software engineers, students, teachers, managers, consultants and more. Our tool speeds up the strategic analysis and time spent in organizing it efficiently.

The project was deeply studied and analysed to design the code and implement. It was done under the guidance of the experienced project guide. All the current requirements and possibilities have been taken care of during the project time.

After carrying out the implementation of this application, we understand that its usage gives the user ultimate ease of access to various diagrams and templates all in one place. This application is an efficient and user-friendly product as the user will not have to explore and use several tools to make the required diagrams.