Simphile Mkhize

IT PAT 2021

System Design

Stokvel Manager Application

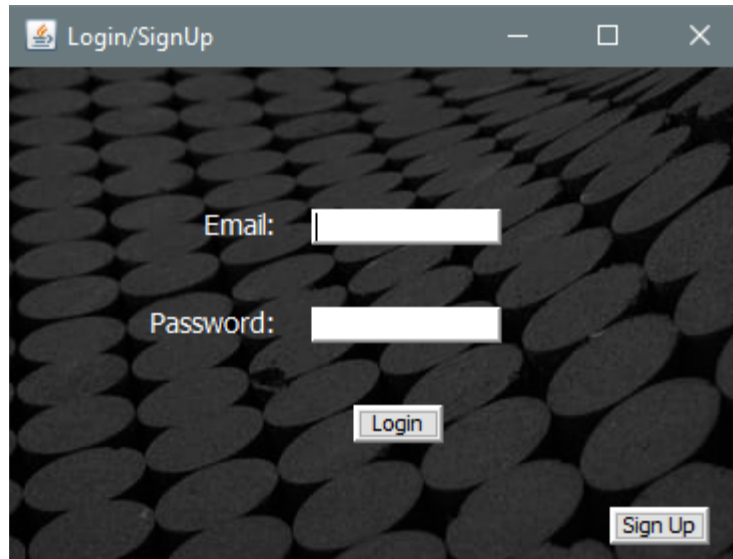# Table of Contents

User Interface Design

Login/Sign Up Screen

Description	When the user loads the application, they will see this screen first. They can enter their username and password, then select the "login" button, only if they already have an account. If they don't have an account, they should select the "sign up", which will take them to the "join stokvel" screen. Here they can create an account.
Data	• The user's username and password, once entered in the text fields • Errors messages will be displayed, if necessary • The dark background is aesthetically pleasing and foregrounds the buttons and text fields

Actions	Login button
	    • The entered data will be compared to the database and if it correlates, the user will be taken to the Home screen.
	    • If the data doesn't correlate, an error message will be displayed.
	Sign Up button
	    • The user will be taken directly to the Join Stokvel screen when this button is clicked.

Join *Stokvel* Screen
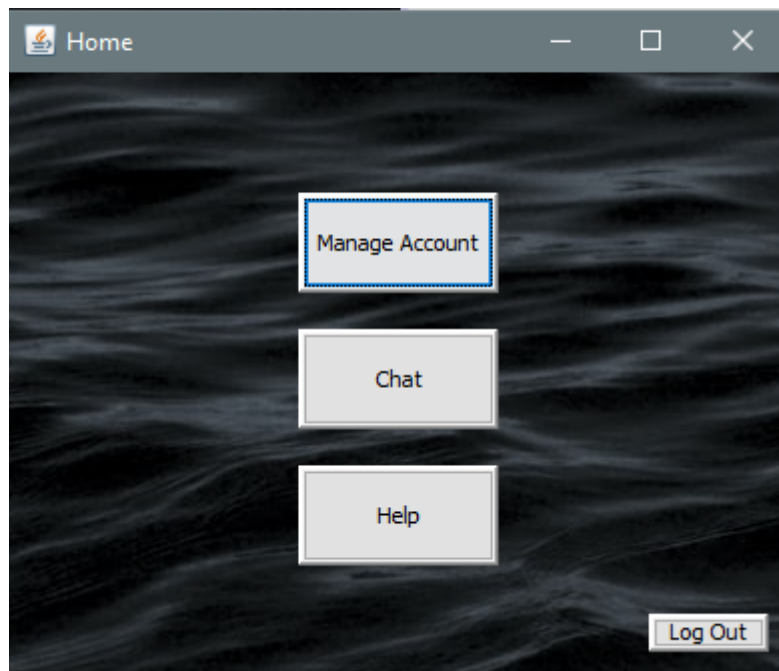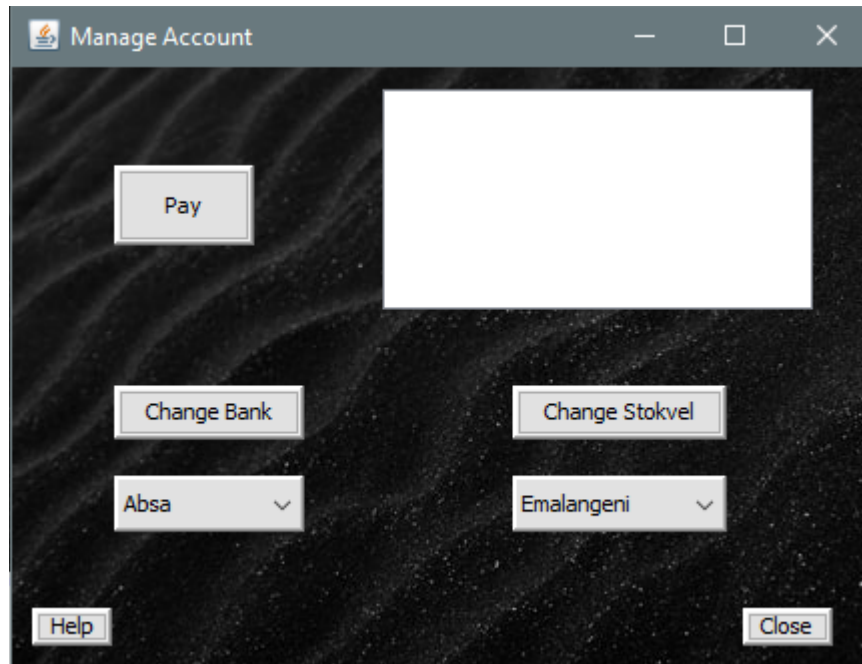

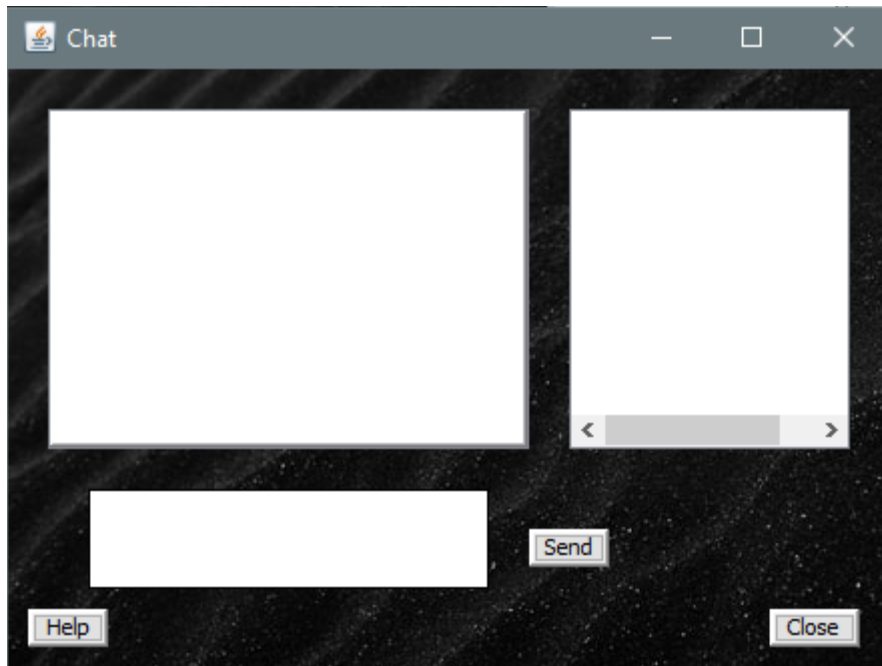| Description	After clicking "sign up", the user will be brought to this screen. Here they will be able to enter their personal details, select which *stokvel* they are joining, and create a username and password. A list of available stokvels will be accessible via a button.
Data	• The user's personal details, name of the stokvel they are joining, and username and password, once entered in the text fields • Errors messages will be displayed, if necessary. E.g., users under the age of 16 cannot use the application & password must be at least 5 characters. • The dark background is aesthetically pleasing and foregrounds the buttons and text fields
Actions	Join button • The entered data will be added to the relevant database tables and then the user will then be taken to the Home screen. • If the entered data doesn't correlate to the relevant text fields or the entered stokvel doesn't exist, an error message will be displayed. Stokvel Info button • The user can click on this button to get information on the available stokvels to join. Under each stokvel name, the following will be listed: number of members in the stokvel, stokvel member limit, monthly payment figure, interest rate and pay out structure. This will be displayed on the screen. Back button • Returns the user to the login page

Home Screen

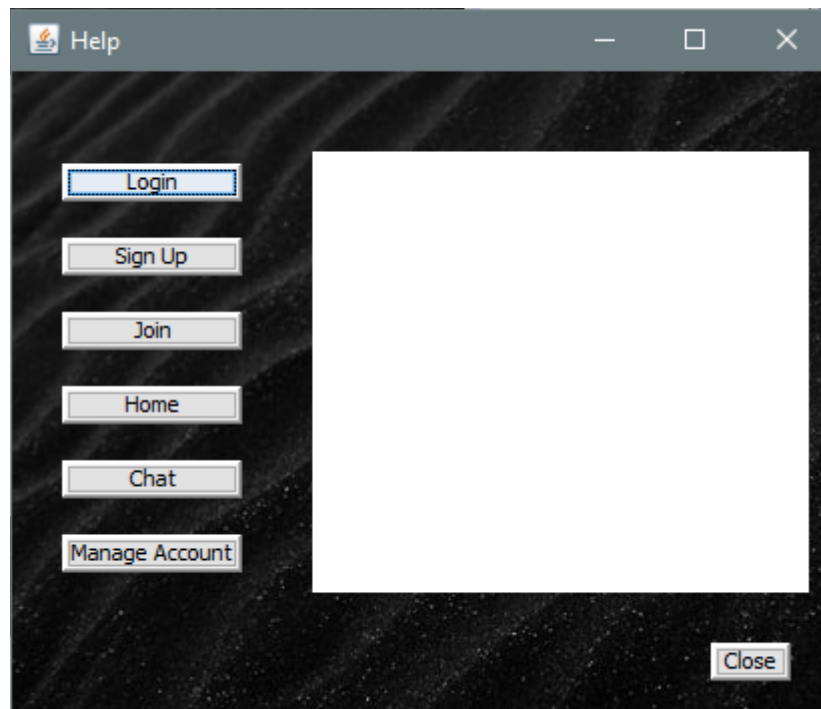| Description	This is the screen the user will see after they have completed their login or their sign up. The user can access all application functions from this screen. That includes Manage Account, Chat and Help.
Data	• There are three main buttons at the centre of this screen: Manage Account, Help and Chat. • The help button is accessible from all screens, excluding Login and Join Stokvel, and it takes the user to the Help screen. • The dark background is aesthetically pleasing and foregrounds the buttons.
Actions	Manage Account button • This button takes the user to the Manage Account screen, where they can make payments, view balances and complete other tasks relating to their account. Chat button • This button takes the user to the Chat screen, where they can send and receive messages from other users. Log Out button • This button will return the user to the login page. The user will be given an opportunity to confirm or deny this action.

Manage Account Screen

Description	This is the screen where the user can manage their stokvel account. They can make their payments, check balances (personal and stokvel) and change their bank and/or stokvel.
Data	• The amounts paid by the user will be added to the relevant database table fields. Changes made to account will also be updated in database • A text area showing stokvel information and total payments made by user. • Error and confirm messages will be displayed, if necessary. • The dark background is aesthetically pleasing and foregrounds the buttons and text area.
Actions	Pay button • Clicking this button will allow the user to make their monthly payment. This transaction will be recorded in the array and the database Change Bank button • Clicking this button will change the user's bank. They must first select one from a choice of other banks in a combo box. Change Stokvel button • Clicking this button will change the user's *stokvel*. They must first select one from a choice of other *stokvels* in a combo box. • All the user's payments (up to that point) will be added to the new stokvels total money collected and removed from their current stokvels total collections. Close button • Returns user to the home screen

Chat Screen

Description	On this screen, the user will be able to send and receive messages from members of their stokvel.
Data	• Stokvel member list will be displayed in text area • When a message is sent it is displayed in the chat text area • The dark background is aesthetically pleasing and foregrounds the buttons and text areas.
Actions	Send button • Once the user has typed their message in the text field, they press this button to send it. The messages will be displayed in a text area. Close button • Returns user to the home screen

Help Screen

Description	This screen is displayed when the user clicks the "help" button, which is accessible from other screens.
Data	• The user can click through a selection of buttons that will each display relevant information in a text area. • The dark background is aesthetically pleasing and foregrounds the buttons and text area.
Actions	All buttons • Each button, when clicked, will display information that is relevant to that specific screen. This information will be fetched from a text file.

Program Flow

General Program Flow
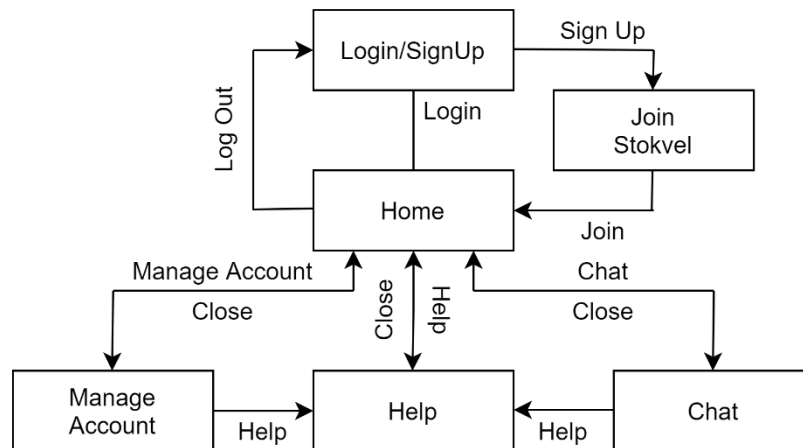
Login/Sign Up Screen

Join *Stokvel* Screen

Chat Screen

Manage Account Screen

Home Screen

Help Screen

Class Design

StokvelMember Class

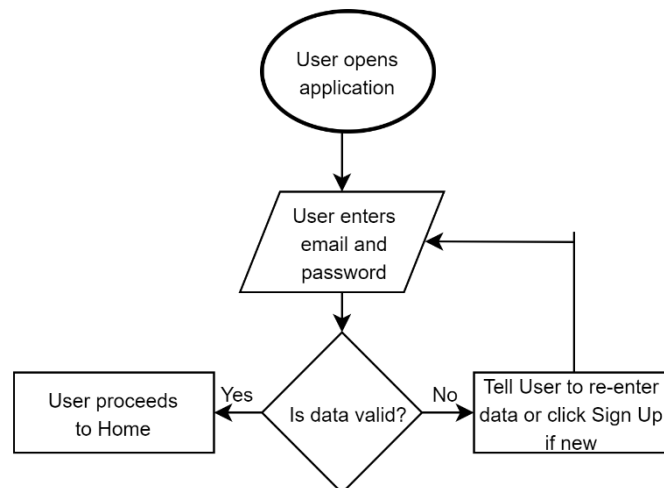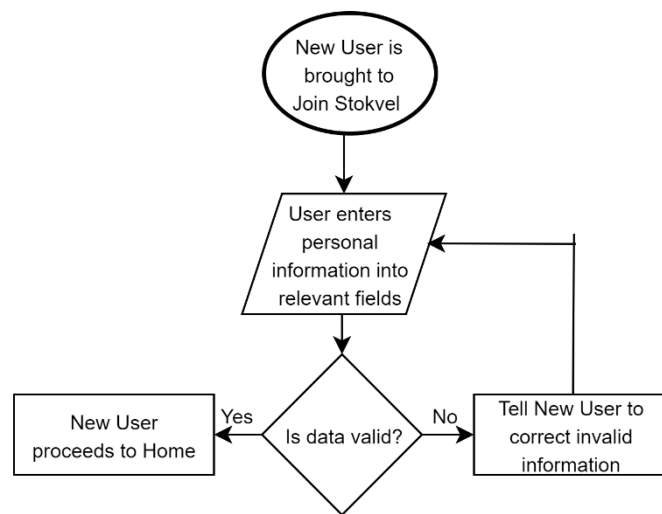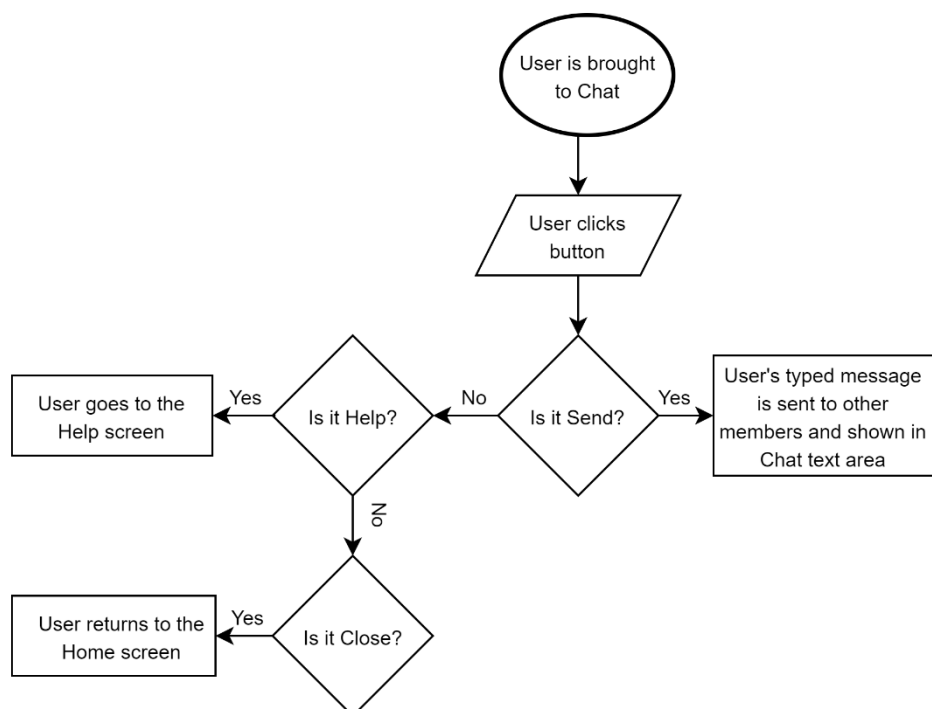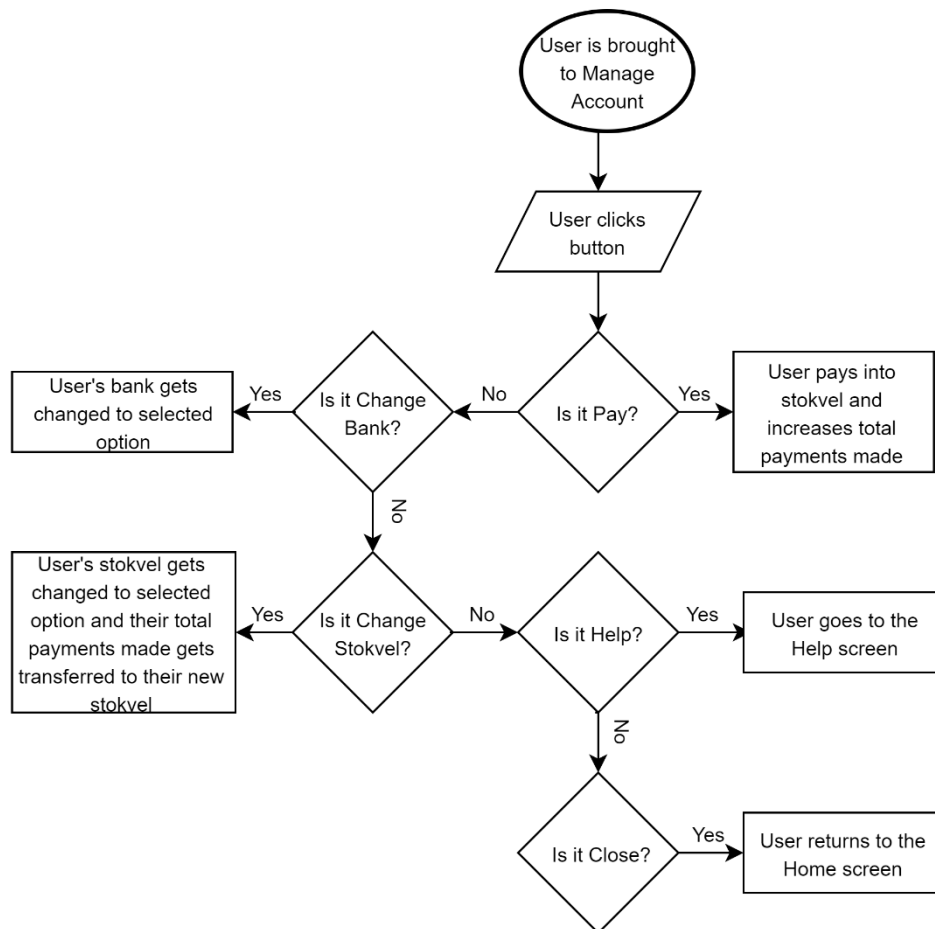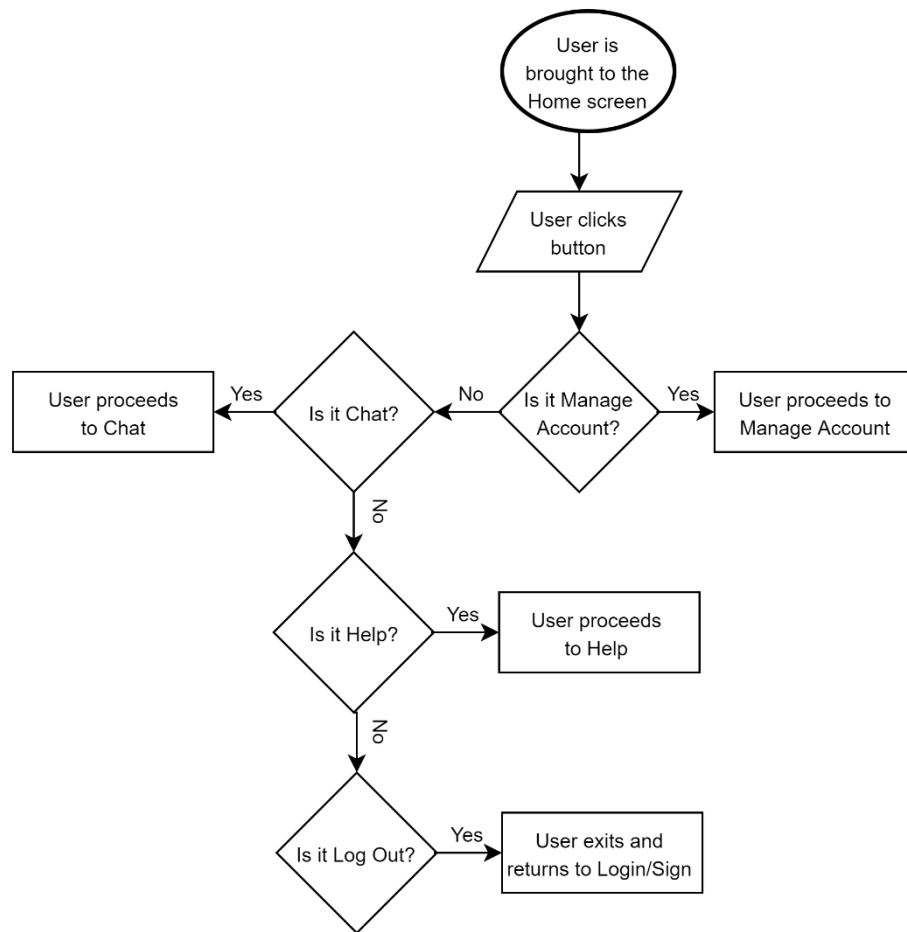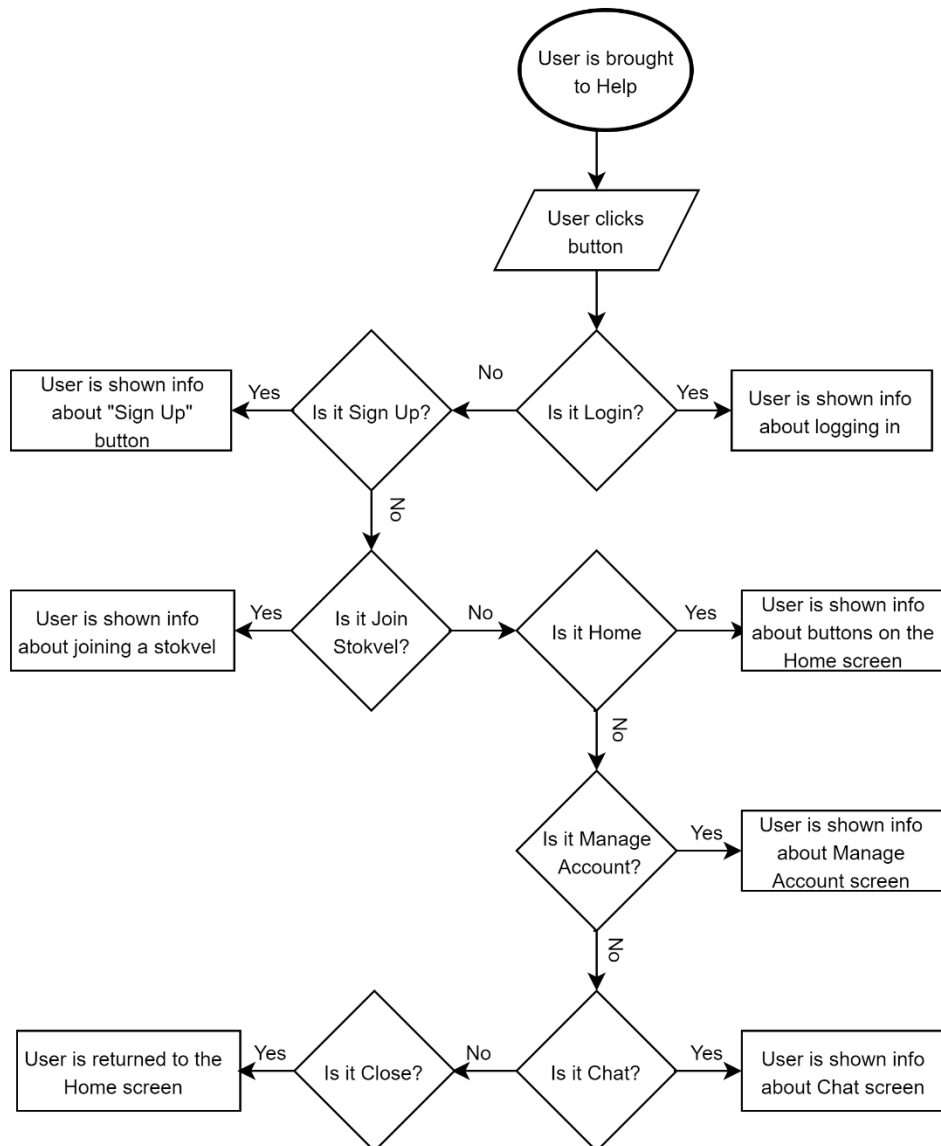| Stokvel Member Class	Description
-email : string	Stores the user's email
-password : string	Stores the user's password
-name : string	Stores the user's name
-surname : string	Stores the user's surname
-DOB : LocalDate	Stores the user's date of birth
-gender : string	Stores the user's gender
-bank: string	Stores the user's bank name
-cellno : string	Stores the user's cell phone number
-stokvel : string	Stores the user's stokvel
-payments : real	Stores the user's total payments value
+Constructor(inE : string, inP : string, inN: string, inS : string, inDOB : LocalDate, inG : string, inB : string, inC: string, inSt : string, inPay : real)	Used to instantiate objects of the StovkelMember class
+getEmail() : string	Retrieves the user's email
+getPassword() : string	Retrieves the user's password
+getName() : string	Retrieves the user's name
+getSurname() : string	Retrieves the user's surname
+getDOB() : LocalDate	Retrieves the user's date of birth
+getGender() : string	Retrieves the user's gender
+getBank() : string	Retrieves the user's bank
+getCellno() : string	Retrieves the user's cell phone number
+getStokvel() : string	Retrieves the user's stokvel
+getPayments : real	Retrieves the user's payments value
+setEmail(inE : string)	Allows the user's email to be changed
+setPassword(inP : string)	Allows the user's password to be changed
+setName(inN : string)	Allows the user's name to be changed
+setSurname(inS : string)	Allows the user's surname to be changed
+setDOB(inDOB : LocalDate)	Allows the user's date of birth to be changed
+setGender(inG : string)	Allows the user's gender to be changed
+setBank(inB : string)	Allows the user's bank to be changed
+setCellno(inC : string)	Allows the user's cell no. to be changed
+setStokvel(inSt : string)	Allows the user's stokvel to be changed
+setPayments(inPay : real)	Allows the user's payments value to be changed
+toString() : string	Displays the fields of the class as a string

DB Class

DB Class	Description
-connection : Connection	Stores the Connection object
-statement : Statement	Stores the Statement object
-resultSet : ResultSet	Stores the ResultSet object
-connectionStatus : string	Stores the connection status
+Constructor()	Establishes the connection with the database
+select(s : string) : ResultSet	Used to fetch data (select) from the databases
+query(q : string)	Used to update, delete, or insert in the database

StokvelMemberManager Class

StokvelMemberManger Class	Description
-smArr : StokvelMember[]	Creates array of StokvelMember objects
-smSize : int	Array control variable
-db : DB	Used to connect the class to the database
+Constructor()	Adds existing values from database to array
+getDetails(e : string) : StokvelMember	Returns existing user data from array
+addStokvelMember(email : string, password : string, name : string, surname : string, DOB : string, gender : string, bank : string, cellNo : string, stokvel : string)	Adds new users to the array and to the database
+getStokvelMembers(s : string) : string	Returns the name of all members in the same stokvel
+changeBank(e : string, b : string)	Changes the user's bank
+changeStokvel(e : string , s : string)	Changes the user's stokvel and moves their payments
+getPayments(s : string) : double	Returns monthly payments value for specific stokvel
+addPayments(e : string, s : string)	Adds the user's payments to the array and database

Tools Class

Tools Class	Description
-db : DB	Used to connect the class to the database
+checkAge(DOB : string) : int	Used to verify a new user's age (16 and older)
+verifyLogin(e : string, p : string) : boolean	Used to verify a user's login by checking database
+checkEmail(e : string) : boolean	Used to ensure that the new user has a unique email
+getDate() : string	Returns the current date as a string
+getHelpInfo(h : string) : string	Returns a help description
+getStokvelInfo(s : string) : string	Returns either specific stokvel info or all stokvel info

Database and Text file Design

tblStokvelMembers

Field Name	Data Type	Description	Sample Data
Email - PK	Short Text	Stores user's email	jenna123@gmail.com
Password	Short Text	Stores user's password	Jenna27364
Name	Short Text	Stores user's name	Jenna
Surname	Short Text	Stores user's surname	Marbles
DOB	Date/Time	Stores user's date of birth	1995/08/16
Gender	Short Text	Stores user's gender	Female
Bank	Short Text	Stores user's bank name	African Bank
CellphoneNumber	Short Text	Stores user's cell phone number	0834536352
Stokvel	Short Text	Stores user's stokvel	Volcano
TotalPayments	Currency	Stores user's total payments	R900,00

tblStokvel

Field Name	Data Type	Description	Sample Data
Stokvel - PK	Short Text	Stores the stokvel's name	Volcano
MonthlyPayment	Currency	Stores the stokvel's monthly payment	R450,00
MemberLimit	Number	Stores the stokvel's member limit	200
PayoutStructure	Short Text	Stores the stokvel's pay out structure	Yearly
MoneyCollected	Currency	Stores the total money collected	R

tblTransactions

Field Name	Data Type	Description	Sample Data
TransactionID - PK	AutoNumber	Stores the transaction's ID	
Email	Short Text	Stores the user's email	
Stokvel	Short Text	Stores the user's stokvel	
TransactionDate	Date/Time	Stores the transaction date	
TransactionAmount	Currency	Stores the amount paid	

Text File – help.txt

- The help descriptions are stored in a text file
- The text file is structured with 6 lines (one for each help description)
- Each line has the help name and the help description, separated by the delimiter "#"
- The help description is further separated by "-" for each new line of the description
- The help description will be separated and formatted accordingly once called

Sample Data

SignUp#If a user does not have an existing account, they can use this feature to create one-The new user should just click the "Sign Up" button, without entering any information in the text fields-After clicking the "Sign Up" button, the user will be brought to the "Join Stokvel" screen#

Explanation of Secondary Storage

Databases

tblStokvelMembers

- Stores all the important information of user, relating to their stokvel account
- Allows for easy manipulation of the data, quick collection of data to store in primary memory and provides reliable storage
- Reliability is key for the user's data because it is important and needs to be kept safe and private
- Written to by the StokvelMemberManager class to update fields and add new users
- Written to by Tools class to collect data, change data and add data in the table
- Holds the edge over more basic secondary storage types because of the reliability of a database table and ease of manipulation and collection

tblStokvel

- Stores important information about each stokvel
- Constantly gets updated as new members join and a current members make payments
- Used by Tools Class to retrieve vital information
- Cannot be written to by user input, which increases security and reliability
- Holds the edge over a text file or other more basic secondary storage types due to the ability to be updated constantly and securely store important information

tblTransactions

- Stores all transactions that have been made by all users
- Constantly updated, as users make payments
- Only written to when a user makes a payment, however it could be called to give the accurate transaction history of a particular user or stokvel
- Holds the edge due to ability to store all data in a clear structured manner, while also providing added security and privacy

Text Files

help.txt

- Stores the help descriptions required by the help feature of the application
- Cannot be written to by any user input or class, but can be edited manually if there are any updates
- The data is not vital to application function and can easily be replaced if the text file becomes corrupted or gets lost
- Holds the edge over bigger data storage types due to simplicity of stored data and a low storage capacity

Explanation of Primary Data Structure

Array

StokvelMember[]

- An array of StokvelMember objects is created when the StokvelMemberManager class is instantiated, it is called StokvelMember[].
- This array acts as the primary memory for the application while in use.
- The array data structure is created by adding all the existing users' data from the database table tblStokvelMembers to itself. This is done with the aid of the database connection provided by the DB class.
- New users are also added to the array and the database.
- Using the accessor and mutator methods created in the StokvelMember class, many task can be carried out using this array.
- This array also allows for most of the code to be placed in the backend, leaving a simpler, more refined front-end section of code.

Classes and Objects

StokvelMember Class

- Each element of the array is an object of the StokvelMember class, so by using the accessor and mutator methods of that class many tasks and processes can be done.
- This class also helps to keep most of the code in the back-end, adding to the security of the information stored and provided.

DB Class

- Allows the primary data structure (StokvelMember[]) to collect and write data to and from the database and its tables.
- Also allows for all class to read and write to and from the database.

StokvelMemberManager Class

- Used to instantiate the primary data structure and complete tasks with it.
- Has various methods that allow the array to be used efficiently and effectively.
- Helps to provide the user with an overall enjoyable experience.