Problem Statement – Banking Application

Although the basic type of services provided by banks varies depending on the type of bank and the country, services typically include: accepting deposits from customers and issuing current or checking accounts and savings accounts to individuals and businesses. Loans to individuals and businesses, Cashing a check Facilitating money transfers such as wire transfers and cashiers cheques, as well as consumer and commercial financial advisory services, financial transactions can be carried out through a variety of channels.

Motivation to building banking project:
To create a system that will monitor the activities of a specific bank's transactions without the need for manual processing. All transactions will be updated automatically based on the information stored in the record. The main goal of this project is to create a system that can handle the overall tasks that occur within the institutions with minimal effort.

The application shall have different type of users

1. Customer
2. Staff
3. Approver

Where each type of the user is given dedicated role.

Technology List

Type	**Name**
Backend	SpringBoot
Frontend	React , hook and redux
Cloud	AWS
Architecture	Microservices

Port Numbers

Service Name	Port Number
MS1	8100-8105
MS2	8200-8205
MS3	8300-8305
Eureka	8761
API Gateway	8765

MySQL	3306
MongoDB	27017
Angular Application	4200

Package names

Layer Type	Name
App	com.learning
Service	com.learning.service
Contracts/interfaces	com.learning.contracts
Repository	com.learning.repo
JPA	com.learning.jpa
Entity	com.learning.entity
Controllers	com.learning.controller
Cross Cutting/AOP	com.learning.aop
Others	com.learning.*

Scope of work – Backend

The application shall Registration, Login, and showing Food items when user logs in to the system, the user should have a proper authentication and authorization system.
The application shall allow registration, login of customer, staff and super admin.

1. The customer shall be able to Create Account, Add Beneficiary, Modify Beneficiary, Transfer Money, View Statement, Reset Forget password
2. The staff should be able to view Account statement, Approve Beneficiary, Approve Account, Enable or disable Customer
3. The super admin can create Staff and enable or disable

Given backend & the end points to be built:

Method	End point	Description + Payload

POST	/api/customer/register	To register the user with basic details like
		Input:
		{
		username:String,
		fullname:String,
		password: String
		}
		
		Return code: 201
		Return:
		{
		id: Number,

		username:String, fullname:String, password: String } **Description:** The end point shall save the customer record to the DBMS (Mysql), and as acknowledgement the actual object is given(JSON). **DBMS:** Mysql

POST	/api/customer/authenticate	To validate the customer is registered in the system
		
		Input:
		{
		username: String,
		password: String
		}
		Return:
		"JWT Token"
		
		Return Code: 200
		When user details are wrong Return **Code:** 403 (Forbidden)
		DBMS: Mysql

POST	/api/customer/:customerID/acocunt	To create account for the customer
		Input payload
		{
		accountType:Enum(SB/CA),
		accountBalance:Number,
		approved: String - no (default)
		}
		When successful
		Return code: 200
		{
		accountType:Enum(SB/CA),
		accountBalance:Number,
		approved: no,
		accountNumber: Number,
		dateOfCreation: date/time,
		customerId: Number
		}
		
		When not successful
		{

		Message: "Account cannot be created" } **Return code:** 403 **DBMS:** MongoDB/Mysql

PUT	/api/customer/:customerID/account/:accountNo	**Role:** Staff
		To approve the account which is create by customer by
		Input payload
		{
		accountNumber: Number,
		approved: yes
		}
		When successful
		Return code: 200
		{
		accountNumber: Number,
		approved: yes
		}
		
		When not successful
		{
		message: "Please check Account Number"
		}
		Return code: 403
		DBMS: MongoDB/Mysql

GET	/api/customer/:customerID/acocunt	To get all the accounts which are opened by the customer the end point should return an array of account, balance, and type, and status. [{ accountNumber: Integer, accountType:Enum(SB/CA), accountBalance:Number, accountStatus: Enum(Enable/Disable) }, { accountNumber: Integer, accountType:Enum(SB/CA), accountBalance:Number, accountStatus: Enum(Enable/Disable) },]

<table>
<tr><td></td><td></td><td>Return code: 200
DBMS: MongoDB</td></tr>
<tr><td>GET</td><td>/api/customer/:customerID</td><td>To return customer by specifying id
When valid
{
username: String,
fullName : String,
phone: String,
pan:String,
aadhar: String
}
When Id not found:
{
Message: ”Sorry Customer With <ID> not found”
}

Return Code: 200
DBMS: Mysql</td></tr>
<tr><td>PUT</td><td>/api/customer/:customerID</td><td>Should update the user customer in the payload which shall match the username and updated the existing customer with the new details.

When valid
{
customerId: Number,
fullname: String,
phone:String,
pan: String,
aadhar : String,
secretQuestion: String,
secretAnswer: String,
pan: multi part/image,
aarchar : multi part/ image
}
Return Code: 200
When Id not found:
{
Message: ”Sorry customer With <ID> not found”
}
DBMS: Mysql</td></tr>
<tr><td>GET</td><td>/api/customer/:customerID
/account/:accountID</td><td>Should get the customer account with the specified account</td></tr>
</table>

		number :accountID
		When Valid :
		
		{
		accountNumber: Integer,
		accountType:Enum(SB/CA),
		accountBalance:Number,
		accountStatus:Enum(Enable/Disable),
		transaction: [
		{
		date: date/time,
		reference: String,
		amount: number,
		db-cr: Enum(DB/CR)
		},
		{
		date: date/time,
		reference: String,
		amount: number,
		db-cr: Enum(DB/CR)
		} ,
		…
		]
		}
		
		Return Code: 200
		When Id not found:
		{
		Message:"Sorry Account With <ID> not found"
		}
		DBMS: MongoDB

POST	/api/customer/
	:customerID
	/beneficiary
		Should add the beneficiary for the customer with valid account number
		{
		accountNumber: Number,
		accountType: Enum(SB/CA),
		approved: no
		}
		When Valid :
		{
		Message: "Beneficiary with <Account Number> added"
		}
		Note: By default active : Yes
		Return Code: 200
		When Id not found:
		{
		Message: "Sorry Beneficiary With

		<Account Number> not added” } **DBMS:** MongoDB
GET	/api/customer/ :customerID /beneficiary	Should get all the beneficiary for the given customer id When Valid : [{ beneficiaryAccountNo: Number, beneficiaryName: String, active: Enum (Yes/No) }, { beneficiaryAccountNo: Number, beneficiaryName: String, active: Enum (Yes/No) }, …] **Return Code:** 200 When Id not found: [] **DBMS:** Mysql/MongoDB

DELETE	/api/customer/
	:customerID
	/beneficiary/:beneficiaryID
		Role: Customer
		
		When Valid :
		{
		message: “Beneficiary Deleted Successfully”
		}
		Return Code: 200
		
		When Not Valid:
		{
		message: “Beneficiary Not Delete”
		}
		DBMS: MySql

PUT	/api/customer/ /transfer	Role: Customer To transfer the amount from one account to another account payload { fromAccNumber: Number, toAccNumber: Number, amount: Number,

		reason: String,
		by:customer
		}
		Return Code: 200
		
		When Not Valid:
		{
		message: ”From/To Account Number Not Valid”
		}
		DBMS: MongoDb

GET	/api/customer/
	/:username/forgot/
	question/answer
		Role: Customer
		{
		message: “Details validated”
		}
		Return Code: 200
		
		When Not Valid:
		{
		Message: ”Sorry your secret details are not matching”
		}
		DBMS: Mysql

PUT	/api/customer/
	/:username/forgot
		Role: Customer
		{
		username:String,
		password:String
		}
		Return Code: 200
		{
		message: ”new password updated”
		}
		When Not Valid:
		{
		Message: ”Sorry password not updated”
		}
		DBMS: Mysql

POST	/api/staff/authenticate	To validate the staff should be able to login to the system with validate username and password **Input:** { username: String, password: String

		} **Return:** "JWT Token" **Return Code:** 200 When user details are wrong Return **Code:** 403 (Forbidden) **DBMS:** Mysql

GET	/api/staff/account/
	:accountNo
		Role: Staff
		To get the statement of particular account, given the account id
		Return Value
		{
		accountNo:Number,
		customerName: String,
		balance: Number,
		transaction:[
		{
		date: date,
		reference: String,
		amount:Number,
		transactionType:
		Enum(CR/DB)
		},
		{
		date: date,
		reference: String,
		amount:Number,
		transactionType:
		Enum(CR/DB)
		}
		…
		]
		}
		Return Code: 200
		
		When Not Found
		{
		message:"account not found"
		}
		
		DBMS: MongoDB

GET	/api/staff/beneficiary	Role: Staff List all the beneficiary to be approved

		Return Code: 200 [{ fromCustomer: Number beneficiaryAcNo: Number, beneficiaryAddedDate: date, approved: String(No) }, { fromCustomerAcNo: Number toBeneficiaryAcNo: Number, beneficiaryAddedDate: date, approved: String(No) }, ..] **Return Code:** 200 When not no beneficiary found to be approved [] **DBMS:** Mysql

PUT	/api/staff/beneficiary	**Role:** Staff
		Approve the beneficiary which were added by customer
		
		Payload
		{
		fromCustomer: Number
		beneficiaryAcNo: Number,
		beneficiaryAddedDate: date,
		approved: String (Yes)
		}
		
		Return Code: 200
		{
		fromCustomer: Number
		beneficiaryAcNo: Number,
		beneficiaryAddedDate: date,
		approved: String (Yes)
		}
		Return Code: 200
		When error while approving
		{
		Message: “Sorry beneficiary not approved”

		} **DBMS:** Mysql

GET	/api/staff/accounts/approve	**Role:** Staff
		List all the accounts to be approved
		Return Code: 200
		[
		{
		accType:String,
		customerName: String,
		accNo: Number,
		dateCreated: date,
		approved:no
		},
		{
		accType:String,
		customerName: String,
		accNo: Number,
		dateCreated: date,
		approved:no
		}
		…
		]
		
		DBMS: Mysql

PUT	/api/staff/accounts/approve	**Role:** Staff
		Approve the list of accounts added by the customer, so that that the transaction can be done
		
		Payload
		{
		accType:String,
		customerName: String,
		accNo: Number,
		dateCreated: date,
		approved:String (Yes),
		staffUserName:String
		}
		Return Code: 200
		
		When error while approving
		{

		message: “Approving of account was not successful” } **DBMS:** Mysql

GET	/api/staff/customer	**Role:** Staff
		List all the customer
		[
		{
		customerId:Number,
		customerName: String,
		status: Enum(Enable/Disable)
		},
		{
		customerId:Number,
		customerName: String,
		status: Enum(Enable/Disable)
		}
		…
		]
		Return Code: 200
		Note:
		1. By default when customer registers status: Enable
		
		When no customer are there
		[]
		
		DBMS: Mysql

PUT	/api/staff/customer	Enable or disable the customer, based on that the customer should be able to login
		
		{
		customerId:Number,
		status: Enum(Enable/Disable)
		}
		Return Code: 200
		When Error
		{
		message:”Customer status not changed”
		}
		
		DBMS: Mysql

<table>
<tr><td>GET</td><td>/api/staff/customer
/:customerID</td><td>Role: Staff
Get customer with the id
{
customerId:Number,
customerName: String,
status: Enum(Enable/Disable),
created:date,
}
Return Code: 200
Note:

Return Code: 403
{
message:”Customer Not Found”
}

DBMS: Mysql</td></tr>
<tr><td>PUT</td><td>/api/staff/
/transfer</td><td>Role: Staff
To transfer the amount from one account to another account

payload {
fromAccNumber: Number,
toAccNumber: Number,
amount: Number,
reason: String,
by:String (Staff)
}
Return Code: 200

When Not Valid:
{
message: ”From/To Account Number Not Valid”
}
DBMS: MongoDb</td></tr>
<tr><td>POST</td><td>/api/admin/authenticate</td><td>To validate the admin is registered in the system

Input:
{
username: String,
password: String
}
Return:
“JWT Token”</td></tr>
</table>

		Return Code: 200 When user details are wrong Return **Code:** 403 (Forbidden) Note: There will not be registration, in the DB there shall be role called "admin" **DBMS:** Mysql

POST	/api/admin/staff	Create staff in the system
		{
		staffFullName: String,
		staffUserName: String,
		staffPassword: String
		}
		
		Return Code: 200
		
		When user name already exists or any error
		Code: 403 (Forbidden)
		DBMS: Mysql

GET	/api/admin/staff	**Role:** Admin List all the Staff [{ staffId:Number, staffName: String, status: Enum(Enable/Disable) }, { staffId:Number, staffName: String, status: Enum(Enable/Disable) }…] **Return Code:** 200 When no staffs are there [] **DBMS:** Mysql
PUT	/api/admin/staff	Enable or disable the staff, based on that the staff should be able to login {

		staffId:Number,
		status: Enum(Enable/Disable)
		}
		Return Code: 200
		When Error
		{
		message: “Staff status not changed”
		}
		
		DBMS: Mysql

Scope of work – Frontend

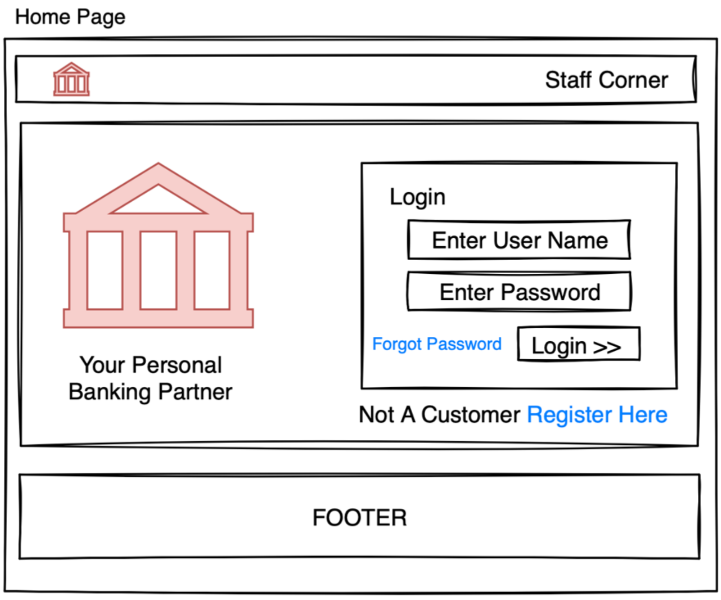
The application shall allow user to

1. Customer - Home Page
2. Customer - Registration
3. Customer - Login
4. Customer – Forgot Password
5. Customer - Logout
6. Customer - View dashboard
7. Customer – Create Account
8. Customer – Add Beneficiary
9. Customer – Remove Beneficiary
10. Customer – Transfer Amount
11. Customer - Update Profile
12. Customer - View Account Statement
13. Staff - Login
14. Staff – Logout
15. Staff – Approve/Reject Customer Account
16. Staff - Enable / Block Customer
17. Staff – Credit/Debit Amount
18. Staff – Approve/Modify Beneficiary
19. Staff – View Account Statement
20. Approver – Create Staff
21. Approver – Enable /Disable Staff

User Stories

1. Customer - Home Page

As a customer,
I want to see the home page of the web application
So that I can login to the banking



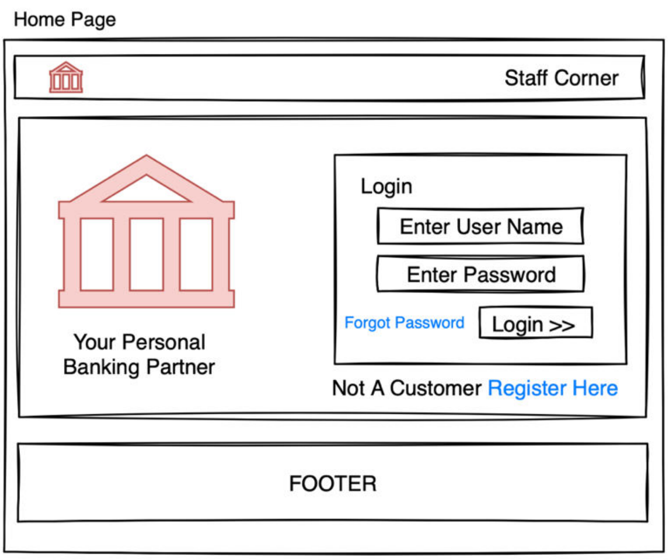
2. Customer - Registration

As a customer,
I want to get registered into the banking app,
So that I can login to the system to create an account and do transaction

Acceptance Criteria:

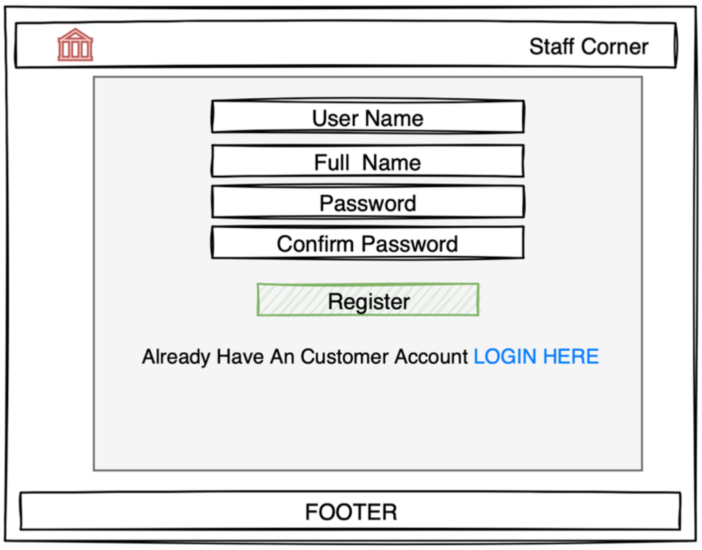
Given when the application is loaded
Then Navigate to the register page which shall be located in the home screen “Register Here”
And Enter user name (which shall be unique)
And Enter full name
And Enter password
And Enter confirm password (both should be the same)
When Click on “Register” button
Then A confirmation message to be shown “You Registered successfully”

Home Screen



Registration Screen

Customer Registration



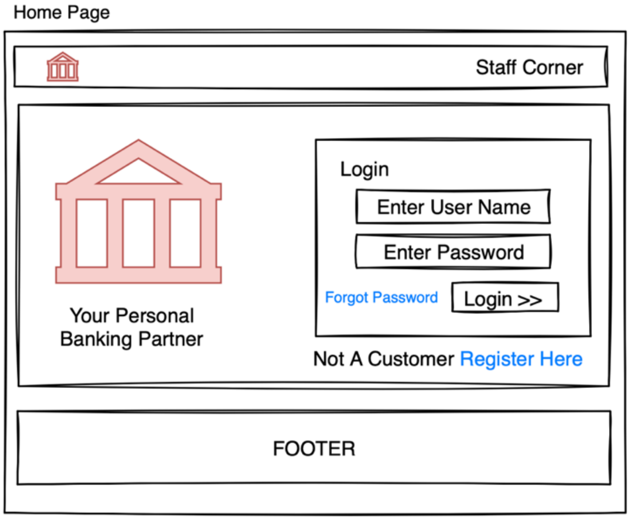
3. Customer - Login

As a customer,
I want to be able to login to the web app
So that I can view the dashboard which has list of accounts which is created.

Acceptance Criteria:

Given when the application is loaded
When Navigate to the login page (Click on "Login" button on home page)
And Enter valid username
And Enter valid password
And Click Login button
Then customer is taken to home page where customer can list of accounts he/she has
And option to click on profile
And Create Account, Add Beneficiary, Modify Beneficiary, Transfer Money, View Statement

Home Page



4. Customer – Forgot Password

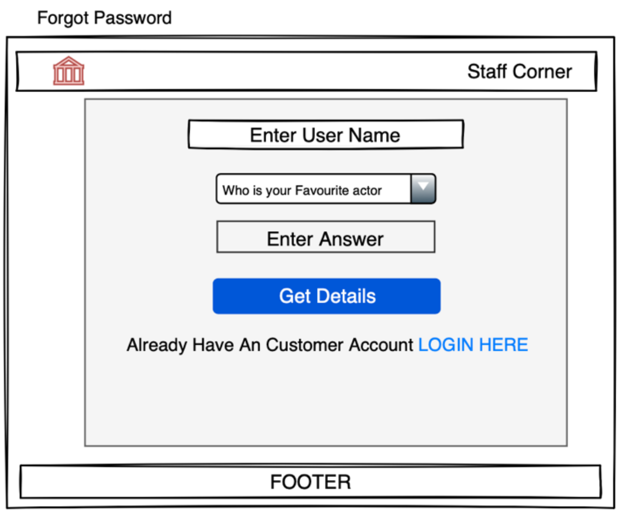
As a customer,
I want to be able to give my security question and answer
So that I can reset my forgot password

Acceptance Criteria (1):

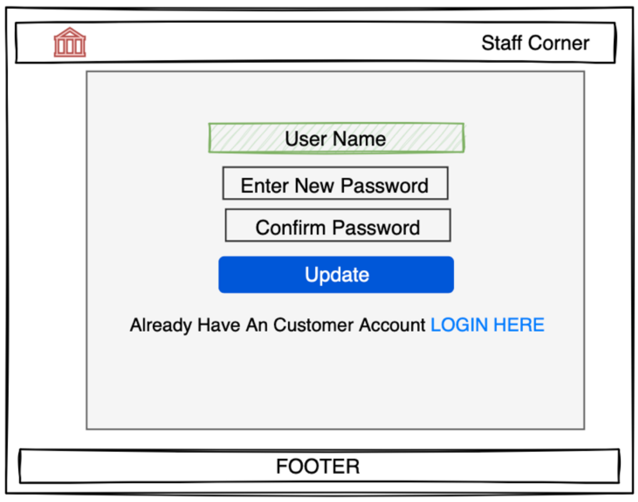
Given when the application is loaded
When user is on the home page
And clicks on "Forgot Password'
Then a new screen to be shown when use enter username, select security question and enter security answer
When the details are valid
Then the user to be taken to another screen where user name should be shown
And new password and confirm password field should be entered
When clicked on "Update" button
Then password and confirm password fields should be matched
When matched then the database should set with the new password
And user to be taken to home page

Acceptance Criteria (2):

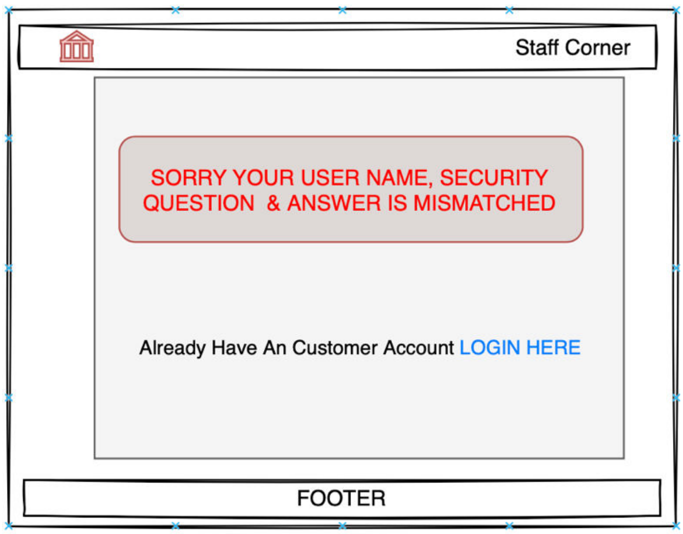
Given when the application is loaded
When user is on the home page
And clicks on "Forgot Password'
Then a new screen to be shown when use enter username, select security question and enter security answer
When the details are not valid
Then the user to be taken to another screen an error message to be shown



Update Password



security question mismatch



5. Customer - Logout

As a customer,
I want to be able to log out from the web app,
So that I can end my current session.

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
When Navigate to the Logout button (Click on "Logout" on top right corner)
Then End the current customer session
And Navigate to Home page of the application

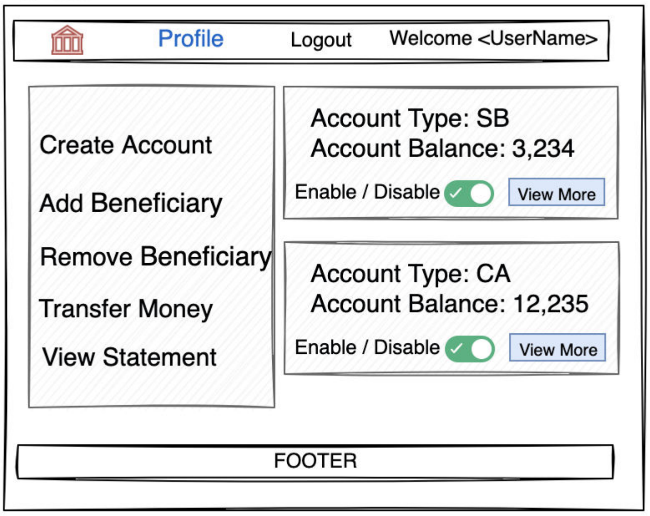
6. Customer - View dashboard

As a customer,
I want to be able to view the my accounts
So that I can do transaction and manage accounts

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of options like Create Account, Add Beneficiary, Remove Beneficiary, Transfer Money, View Statement
And on Right side of the screen the list of accounts the user has
And on top of the screen to Logout
And view profile

Dashboard



7. Customer – Create Account

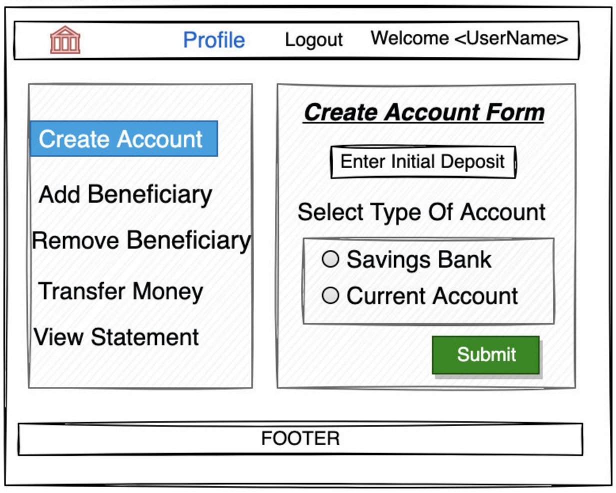
As a customer,
I want to be able to create an account
So that I can do transaction like transfer

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on “Create Account”
Then Create Account Form to be shown which shall ask for initial deposit, and type of account
When clicked on submit the account should be create
And message to be given “Account Creation under process”

Note: the account activation shall be done by admin

Create Account



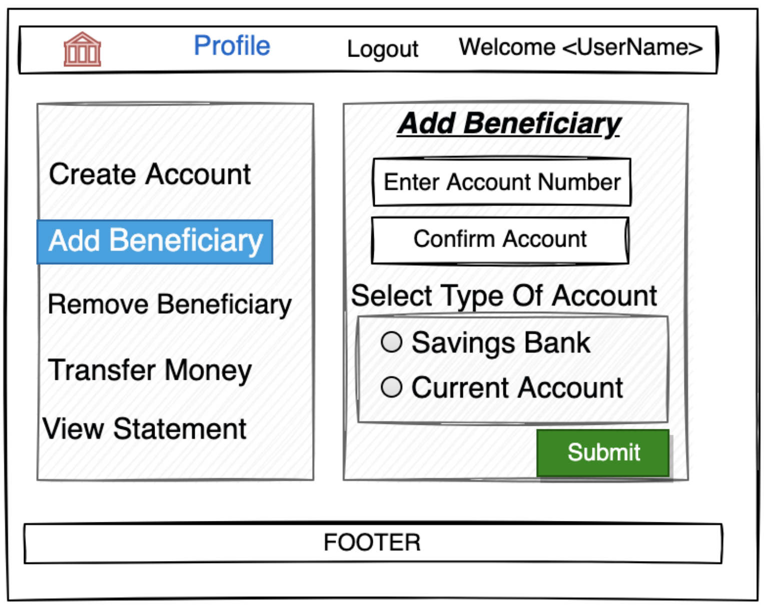
8. Customer – Add Beneficiary

As a customer,
I want to be able to add the Beneficiary
So that I transfer the amount

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on “Add Beneficiary”
Then Add Beneficiary form to be shown which shall ask for Account Number, Confirm Account Number, Type of the account
When clicked on “Submit” button
Then a message to be shown “Beneficiary added, and is validating”

Add Beneficiary



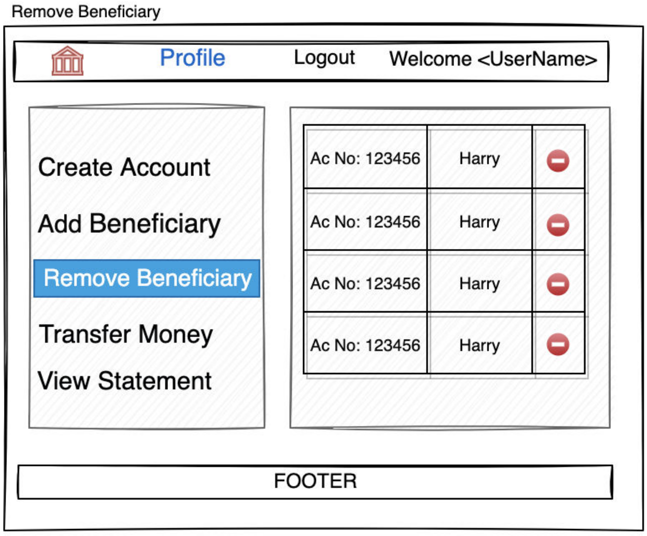
9. Customer – Remove Beneficiary

As a customer,
I want to be able to remove the Beneficiary
So that I don't have to make any transaction with the beneficiary

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on "Remove Beneficiary"
Then Remove Beneficiary form to be shown which shall list all the beneficiary added by me earlier
When clicked on (-) minus icon which is next to name
Then the beneficiary to be deleted
And a message to be shown "Beneficiary successfully deleted"
And with this Beneficiary not transaction shall happen

Remove Beneficiary



10. Customer – Transfer Amount

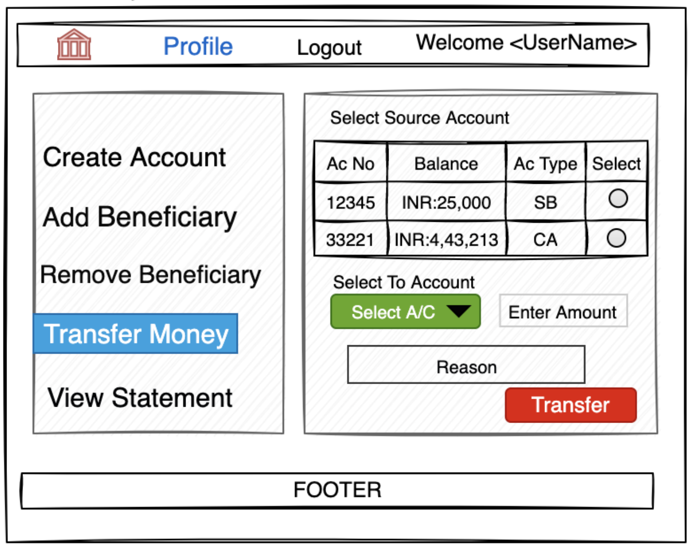
As a customer,
I want to be able view all the accounts
So that I can transfer amount to another account or I can receive

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on "Transfer Money"
Then all the account which the user has to be shown in a tabular format
And there shall be a drop down of the account who's Beneficiary are approved

When selected the Beneficiary
And entered the amount
And entered the reason for the transfer
And the amount entered is less than the balance amount of the selected account
When clicked on “Transfer” button
Then the transfer should successfully be taken
And a message to be shown “Transaction Successful”

Transfer Money



11. Customer – Update Profile Amount

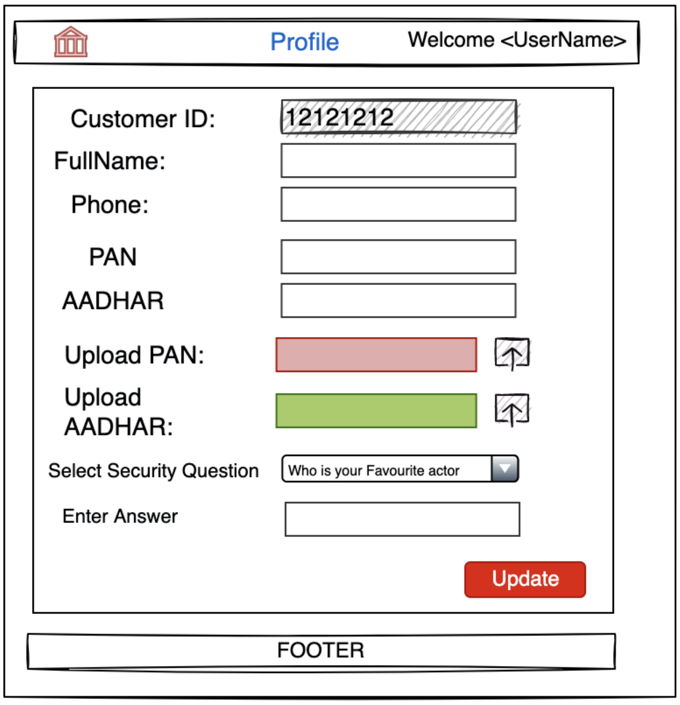
As a customer,
I want to be able view update my profile information
So that I can store my PAN, AADHAR, Secret Question and Password

Acceptance Criteria:

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on “Profile” link on top of the screen
Then a new page should be shown where customer id should not be editable, FullName, Phone, PAN, AADHAR, etc
When user enters full name, PAN, AADHAR, attachment of PAN, AADHAR, Select security question, Security Answer
And clicked on “update” button
Then message to be shown “Profile updated successfully”

Note: any of these fields are option

Profile



12. Customer – View Account Statement

As a customer,
I want to be able view my account statement
So that I should know how my transaction's had happened in the past

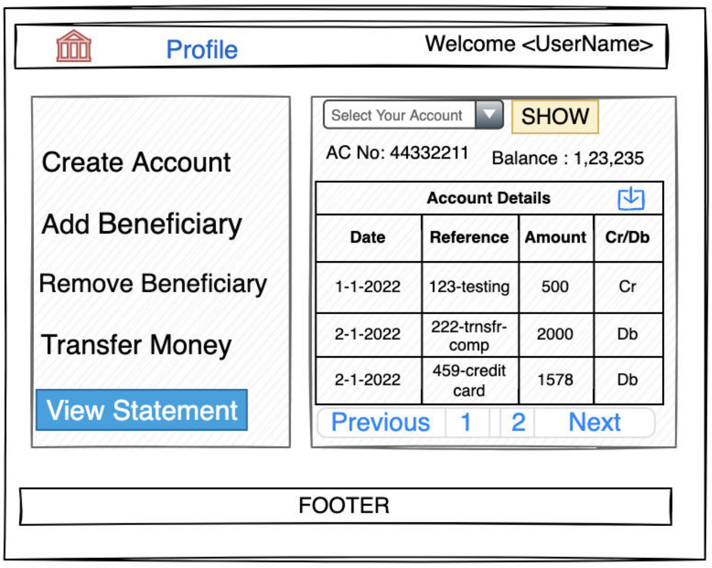
Acceptance Criteria(1):

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on "View Statement"
Then a new page should be shown where list of accounts which user has to be shown in the drop down upon selecting the account
And clicking on the Show button
Then the account statement to be shown in the descending order of the date with the type of transaction
And end user should be able to download the statement in the PDF / Excel format

Acceptance Criteria(2):

Given when the application is loaded
And the customer is logged in
Then show dashboard which has list of accounts
When clicked on "View More" on the dashboard
Then the account statement to be shown in the descending order of the date with the type of transaction
And end user should be able to download the statement in the PDF / Excel format

View Statement



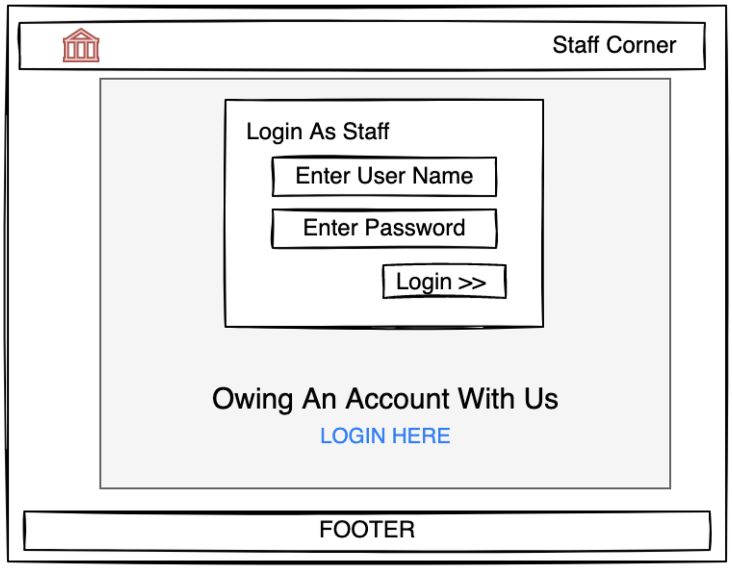
13. Staff – Login

As a staff,
I want to be able to login to the web app
So that I can view account statement, approve Account, Approve Beneficiary , Enable or Disable Customers

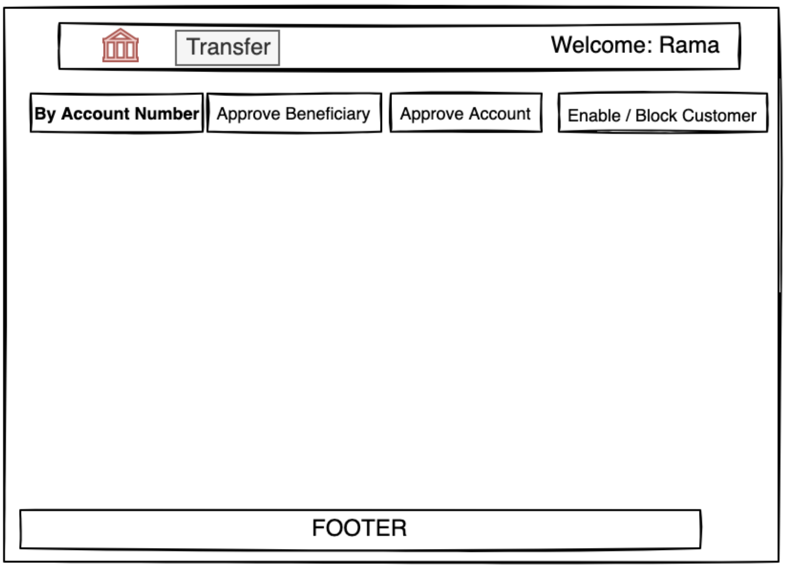
Acceptance Criteria:

Given when the application is loaded
When Clicked on "Staff Corner" which is located on top right corner
Then staff login page should be shown
And Enter valid username
And Enter valid password
And Click Login button
Then staff is taken to home page where staff is given various choices like "By Account Number", "Approve Beneficiary", "Approve Account", "Enable/Disable Account"

STAFF VIEW



Dashboard



14. Staff – Logout

As a staff,
I want to be able to log out from the web app,
So that I can end my current session.

Acceptance Criteria:

Given when the application is loaded
And the staff is logged in
When Navigate to the Logout button (Click on "Logout" on top right corner)
Then End the current customer session
And Navigate to Home page of the application

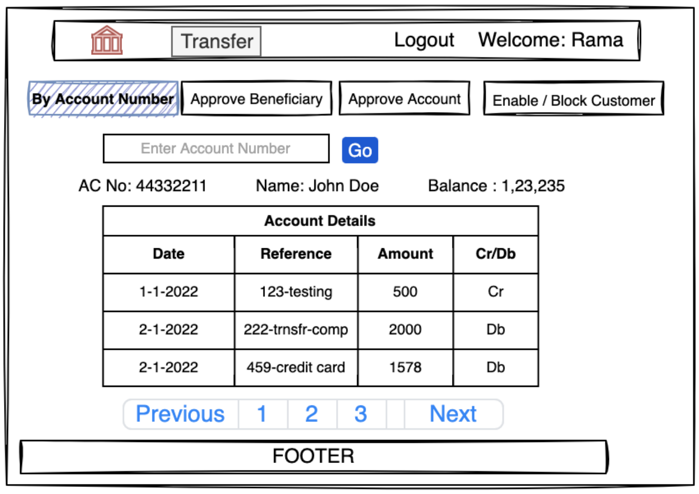
15. Staff – Approve/Reject Customer Account

As a staff,
I want to be able enter account number,
So that I can view account transaction

Acceptance Criteria

Given when the application is loaded
And the staff is logged in
Then show dashboard
When clicked on "By Account Number"
Then a new page should be shown where application shall accept valid account number
When clicked on GO Button
Then the account statement to be shown in the descending order of the date with the type of transaction
And customer Name, and current balance to be shown

View Account



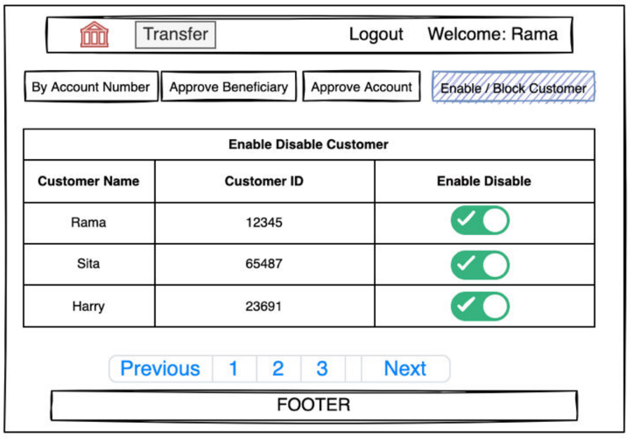
16. Staff - Enable / Block Customer

As a staff,
I want to be able to view all the customers
So that I can enable or disable the login

Acceptance Criteria

Given when the application is loaded
And the staff is logged in
Then show dashboard
When clicked on "Enable / Block Customer"
When a new page shall open and list all the customers who are registered to the system
And staff is provided with a toggle button next to customer Id
When disabled
Then customer should not be able to login
When enabled
Then customer should be able to login

Approve Account



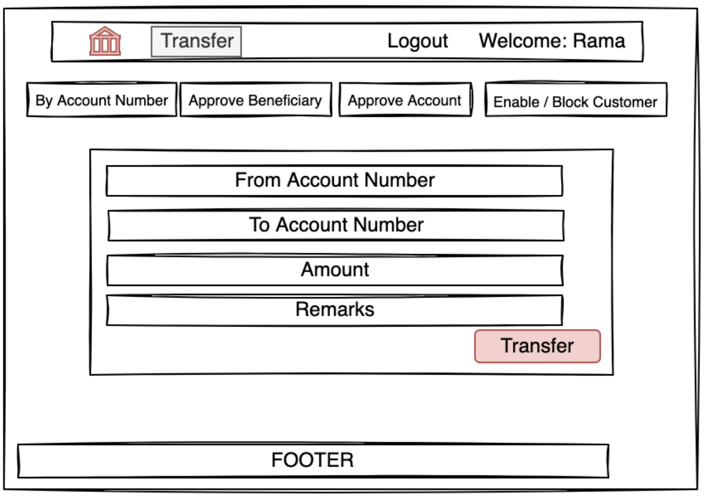
17. Staff – Credit/Debit Amount

As a staff,
I want to be able to enter account number (from/to), amount, reason
So that I can transfer amount on behalf of customer

Acceptance Criteria

Given when the application is loaded
And the staff is logged in
Then show dashboard
When clicked on "Transfer" on top of the screen
Then a new form should be shown which shall take from Account number, To Account Number, Amount, Remarks
When the details are valid
And clicked on "Transfer" button
Then the transaction should be successful

Transfer



18. Staff – Approve Beneficiary

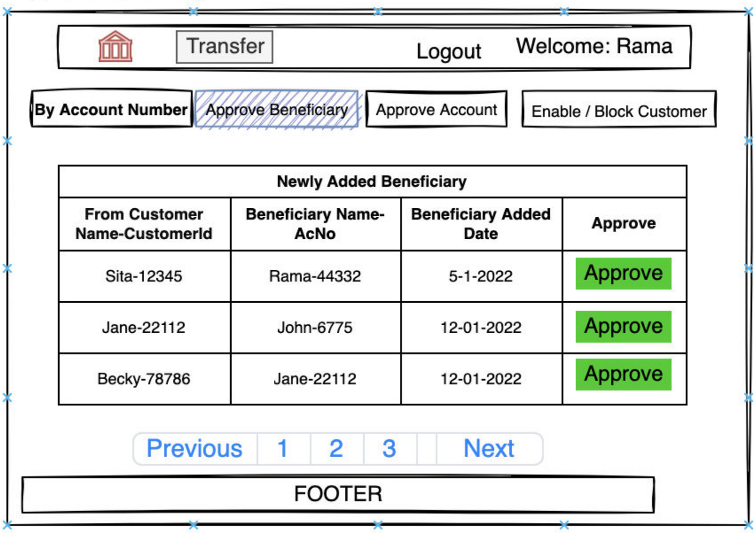
As a staff,
I want to be able to see all pending approved Beneficiary
So that I can approve the Beneficiary post validating details

Acceptance Criteria

Given when the application is loaded
And the staff is logged in
Then show dashboard
When clicked on "Approve Beneficiary"
Then list of beneficiary to be shown in a form to table
When clicked on Approve against the Name of the Customer Name
Then an acknowledgement to be shown "Beneficiary Approve"

Note: Any transaction to be done only post approval Staff / Customer

Approve Beneficiary



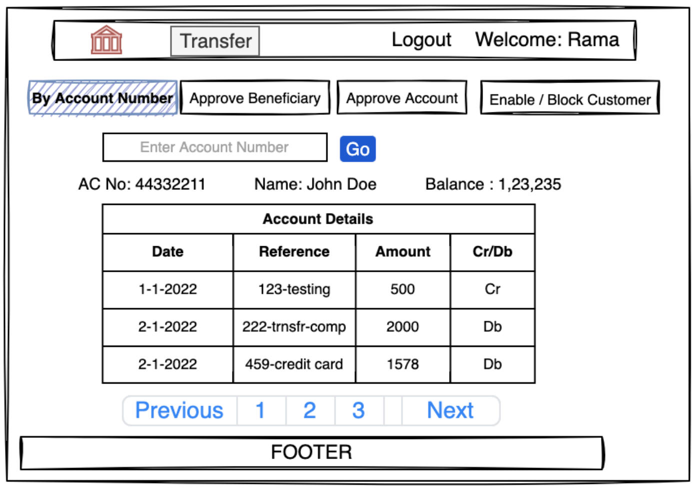
19. Staff – View Account Statement

As a staff,
I want to be able to see transaction of account
So that I can provide better understanding of transaction

Acceptance Criteria

Given when the application is loaded
And the staff is logged in
Then show dashboard
When clicked on "By Account Number"
Then a new form to be opened
And there shall be a text box which should ask for valid account number
When entered and clicked "Go"
Then the transaction of the particular account number to be shown in descending order of date

View Account



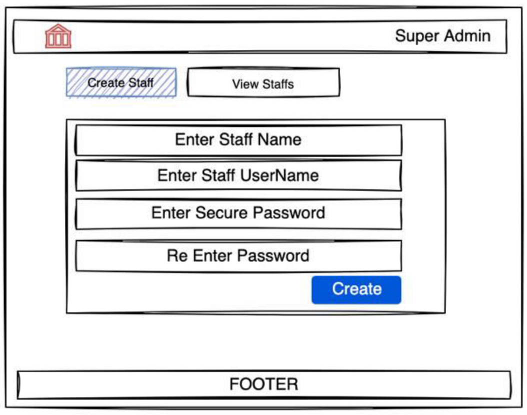
20. Approver – Create Staff

As a super admin,
I want to be able to create staff
So that staff manages the bank

Acceptance Criteria

Given when the application is loaded
When clicked on Staff Corner
When entered the user name as admin@admin.com, and password: secret@123
Then a form to be shown to create a staff asking Staff Name, Staff User Name (unique), password, confirm password
When clicked on Create button
Then Message to be shown “Staff Created Successfully”

Create Staff



21. Approver – Enable /Disable Staff

As a super admin,
I want to be able to suspend the staff
So that I can restrict

Acceptance Criteria

Given when the application is loaded
When clicked on Staff Corner
When entered the user name as admin@admin.com, and password: secret@123
Then dashboard to be shown
When clicked on View Staffs
Then list of staffs to be shown
And against the username there shall be a toggle button
When toggled the user should be enable or disabled to login

Enable Disable Staff