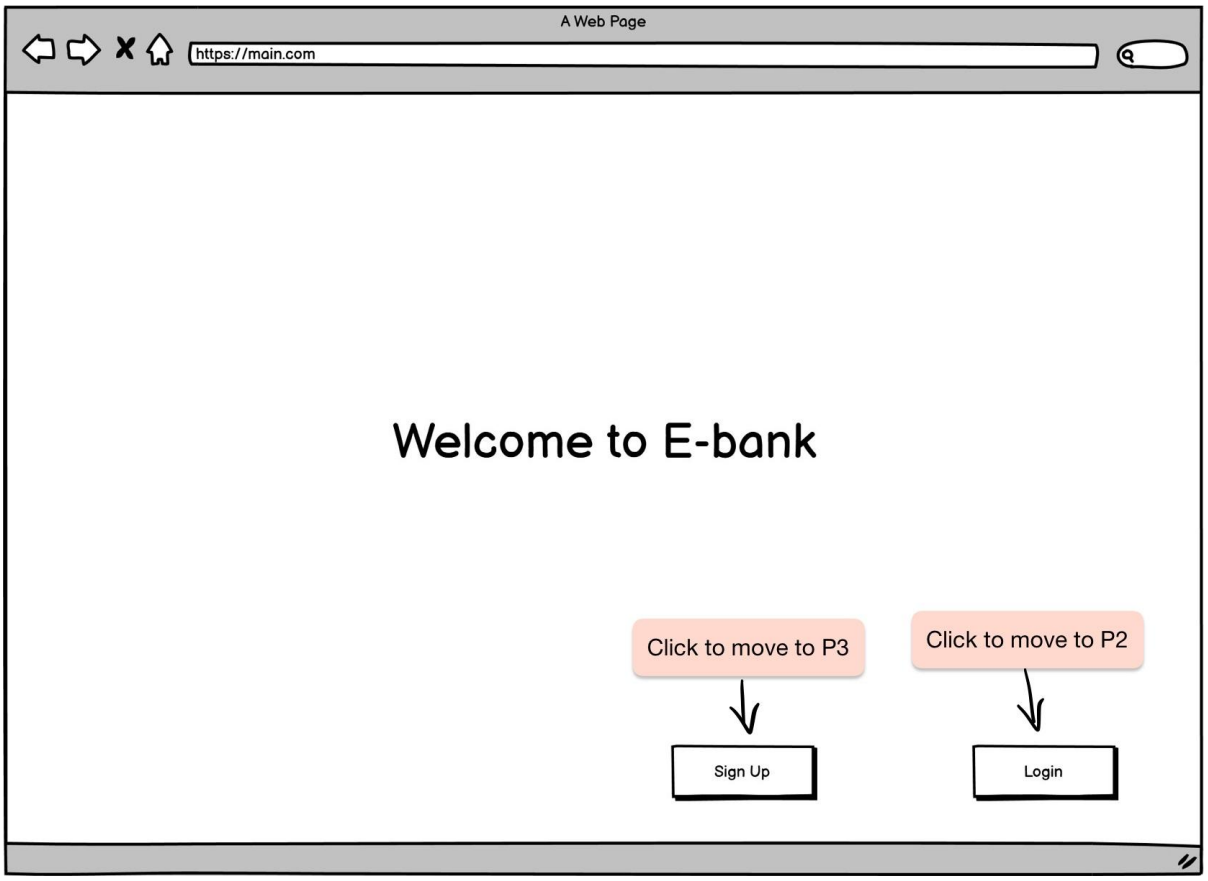
Online Banking Systems on AWS

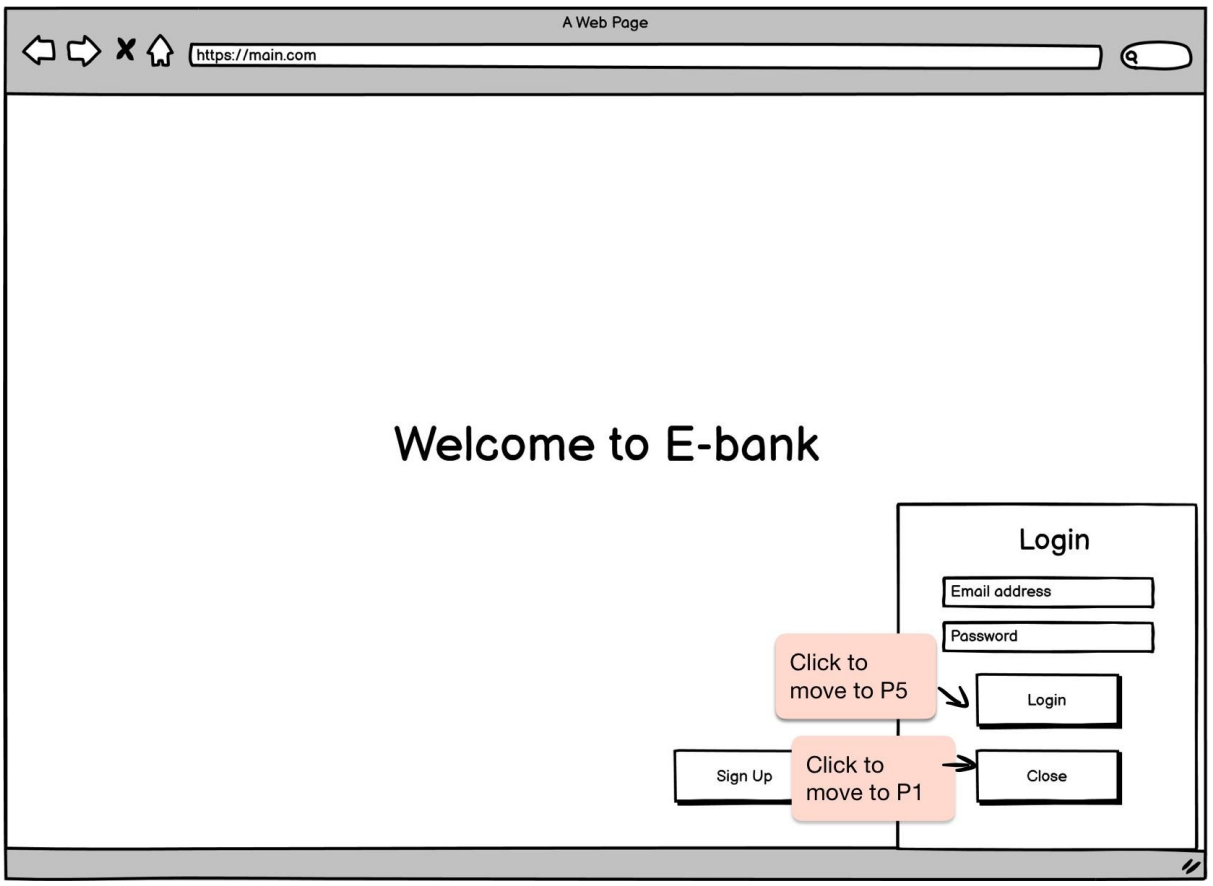
Overview

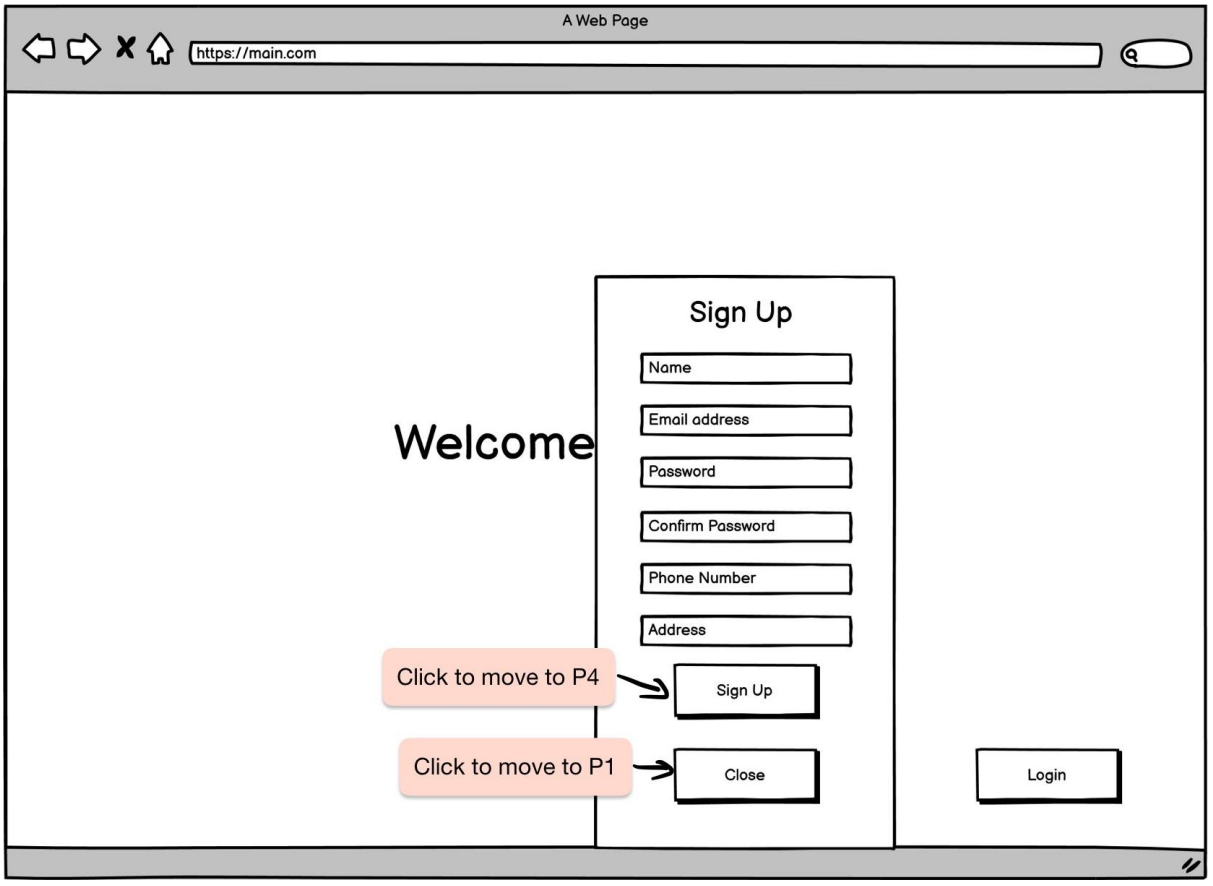
The purpose of this project is to familiarize students with building modern applications on Cloud Platform. In this project, students will build an online banking system from scratch, including low level design, database schema design, infrastructure setup, implementation, testing and monitoring.

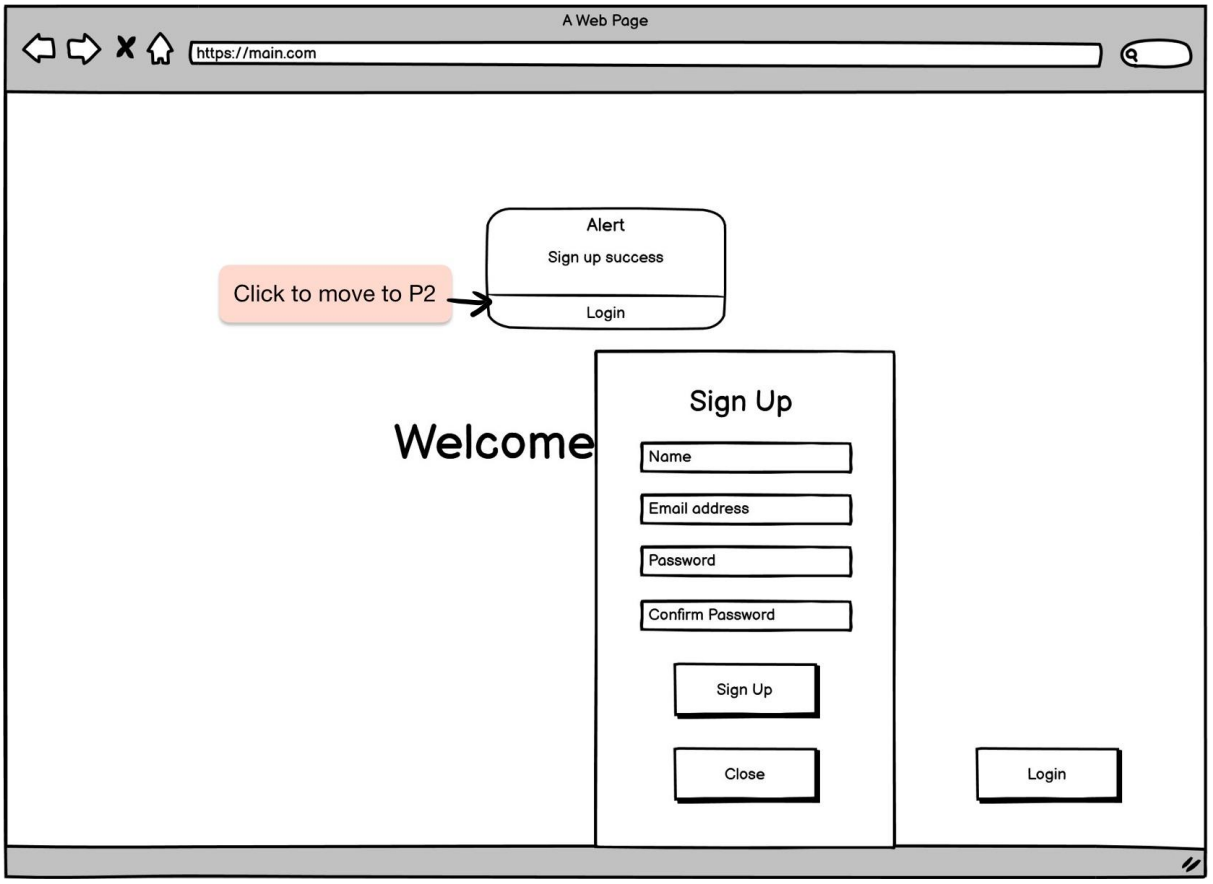
Low Level Design

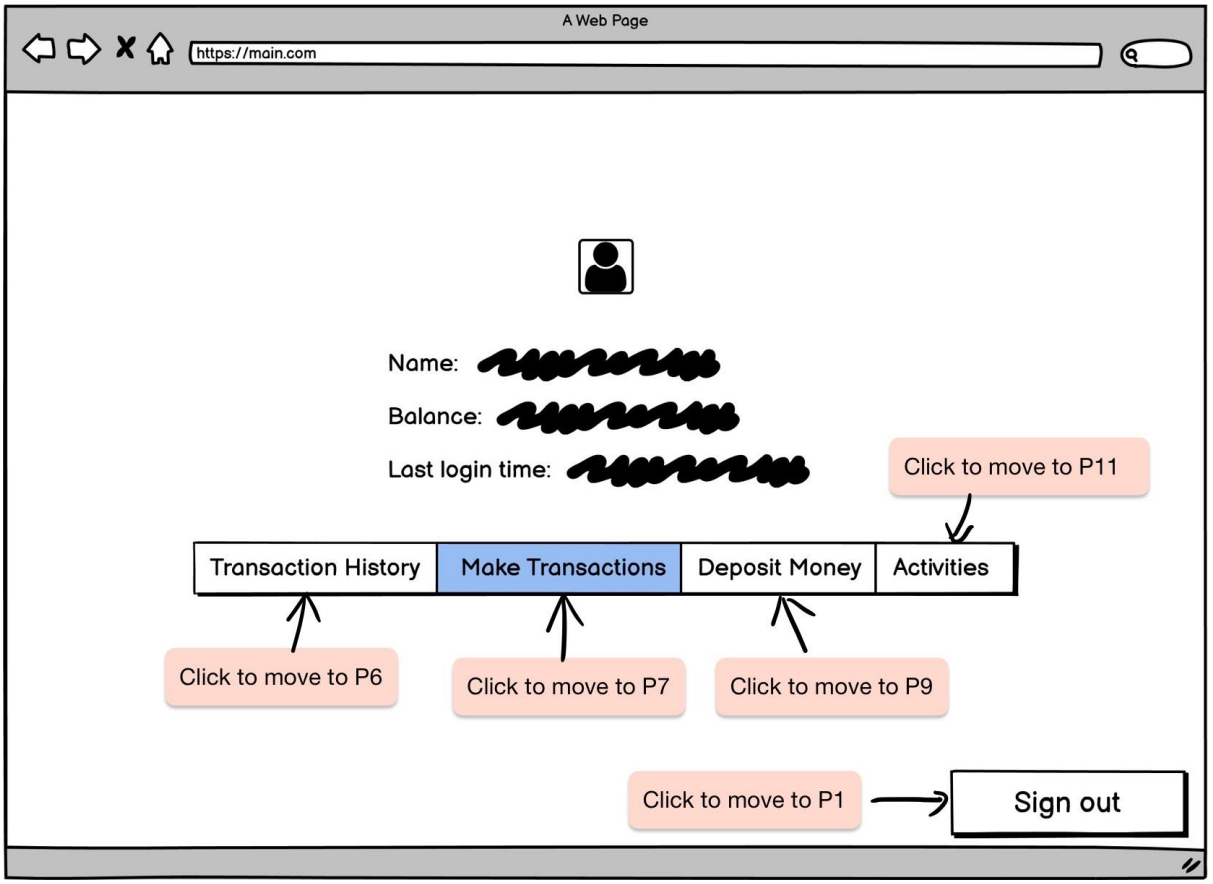
UI Mock-up

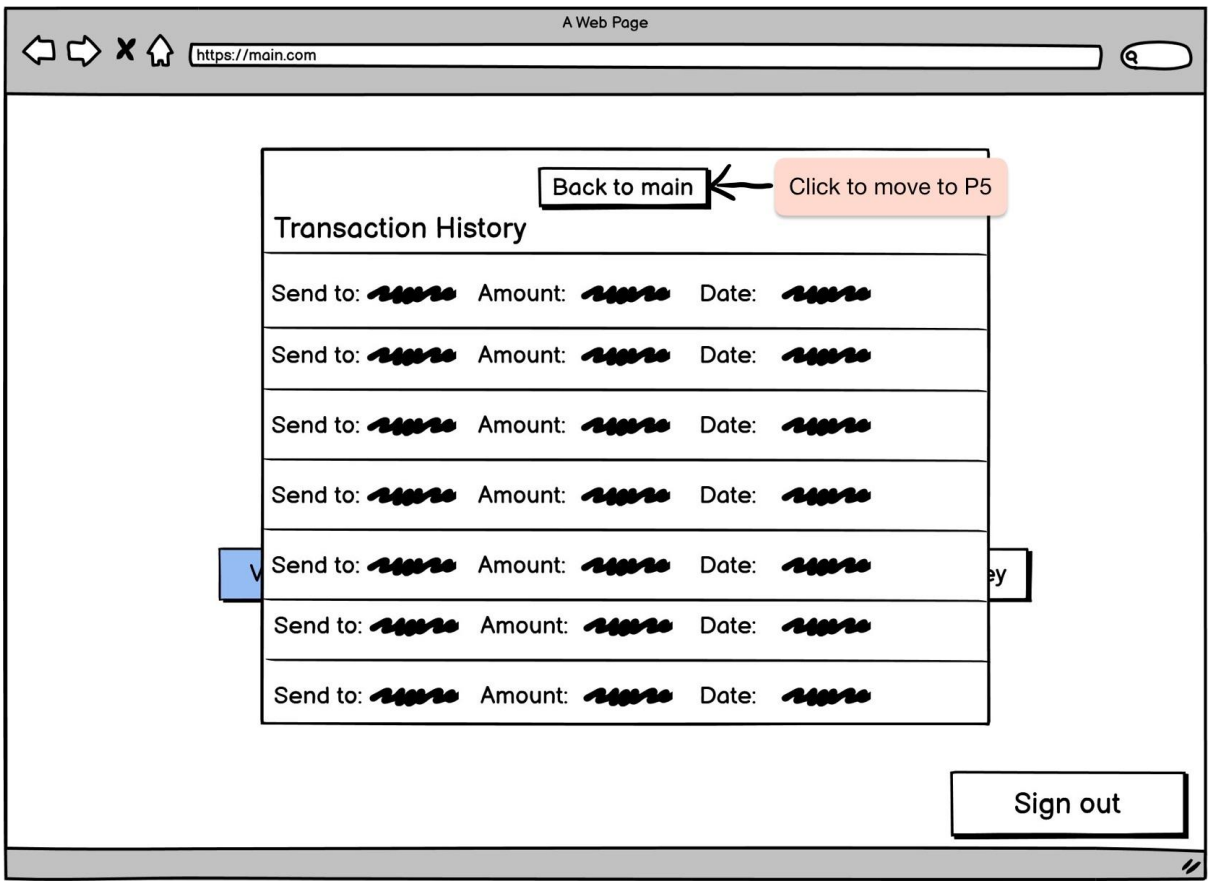


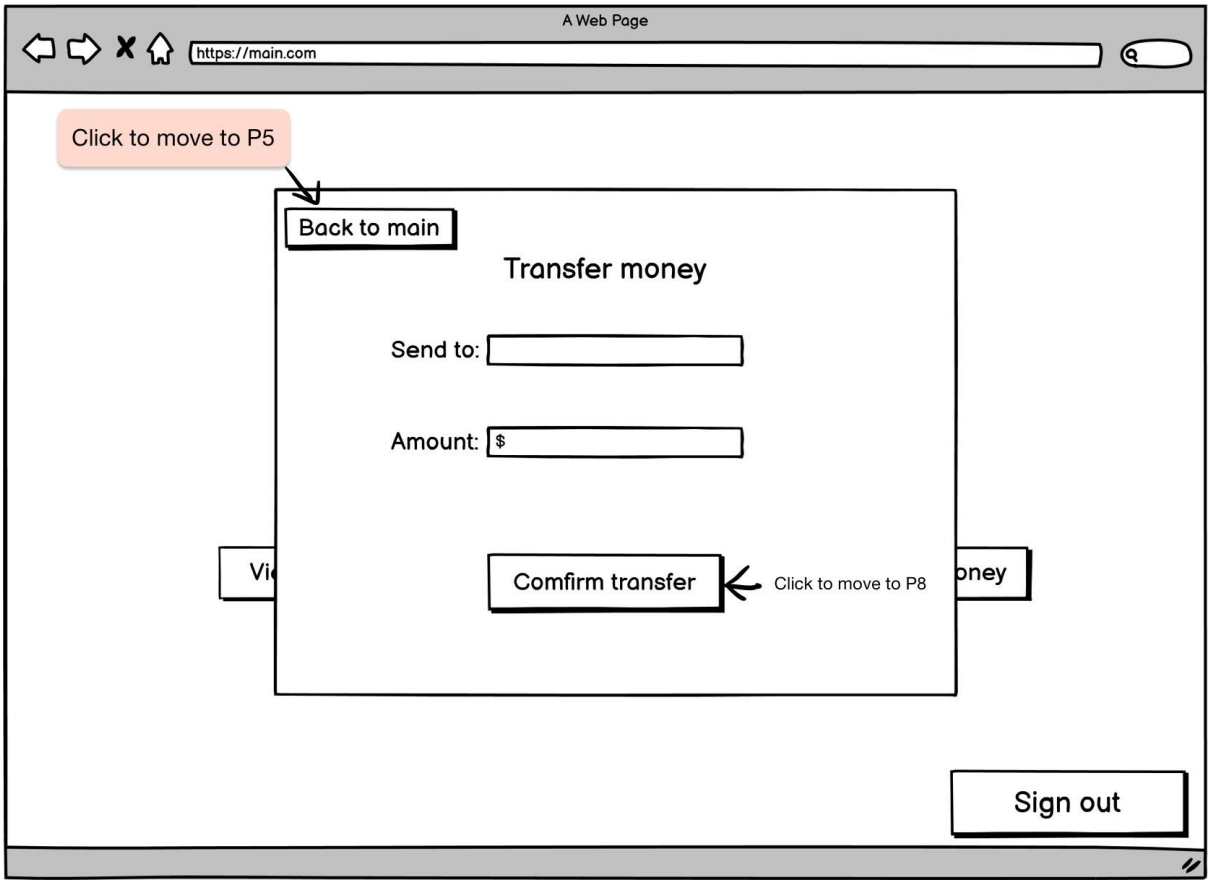

A Web Page
https://main.com
Welcome to E-bank
Login
Email address
Password
Click to move to P5
Login
Sign Up
Click to move to P1
Close

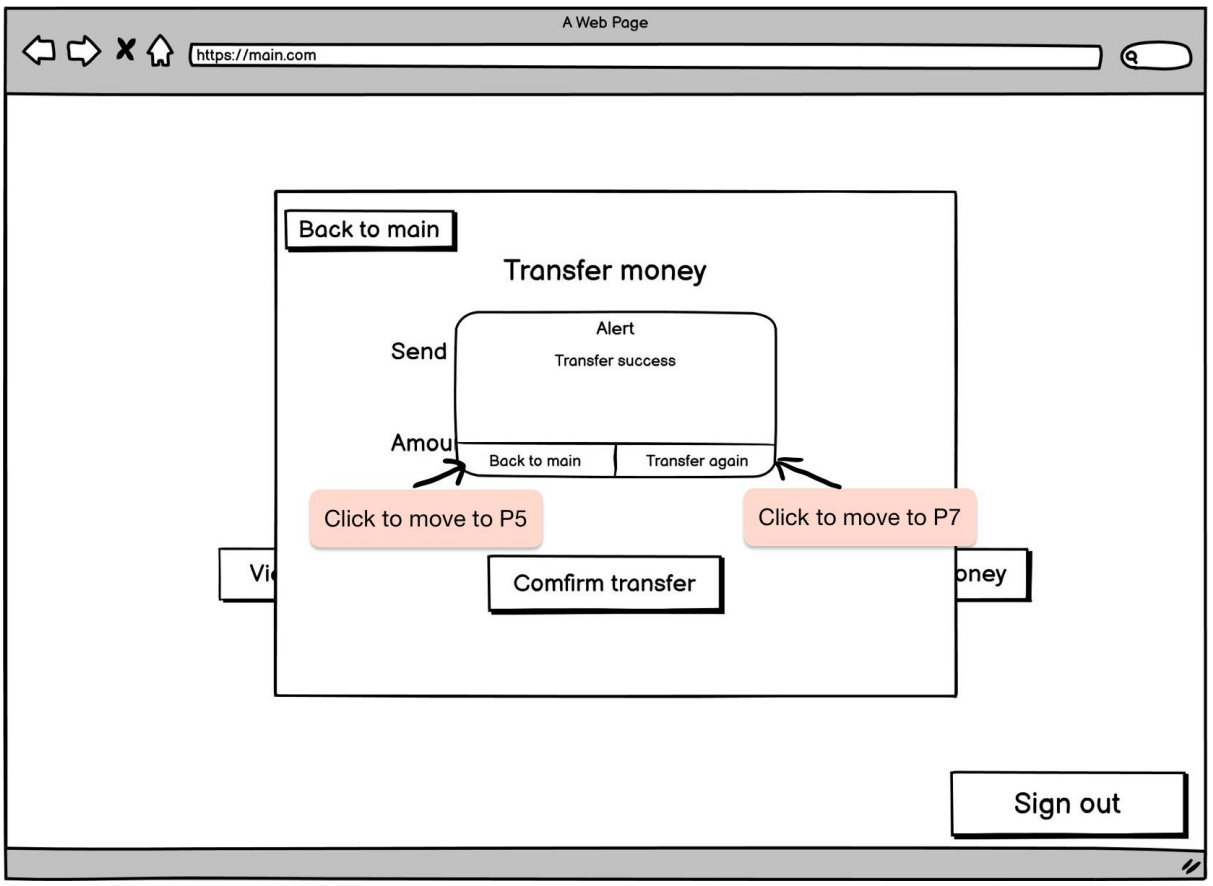

A Web Page
https://main.com
Welcome
Sign Up
Name
Email address
Password
Confirm Password
Phone Number
Address
Click to move to P4
Sign Up
Click to move to P1
Close
Login

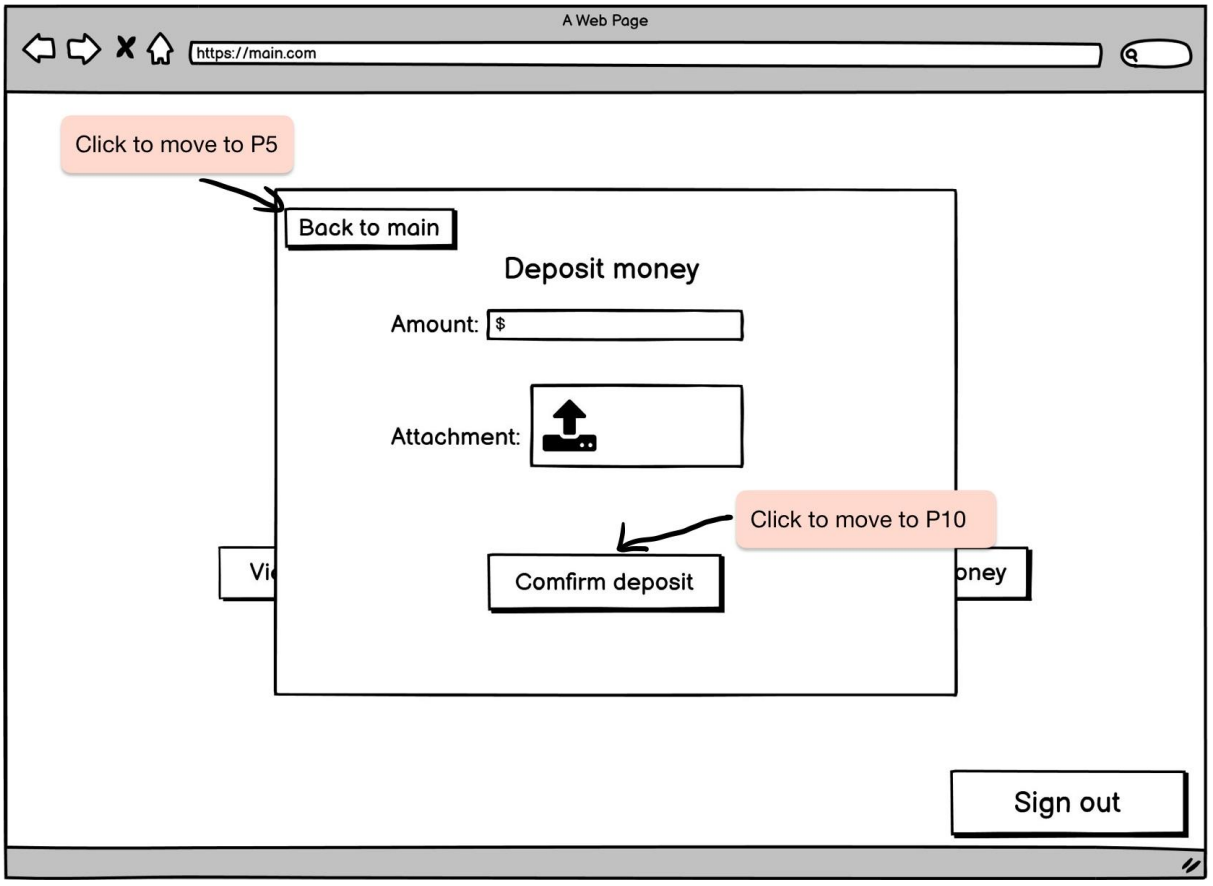

A Web Page
https://main.com
Alert
Sign up success
Login
Click to move to P2
Welcome
Sign Up
Name
Email address
Password
Confirm Password
Sign Up
Close
Login

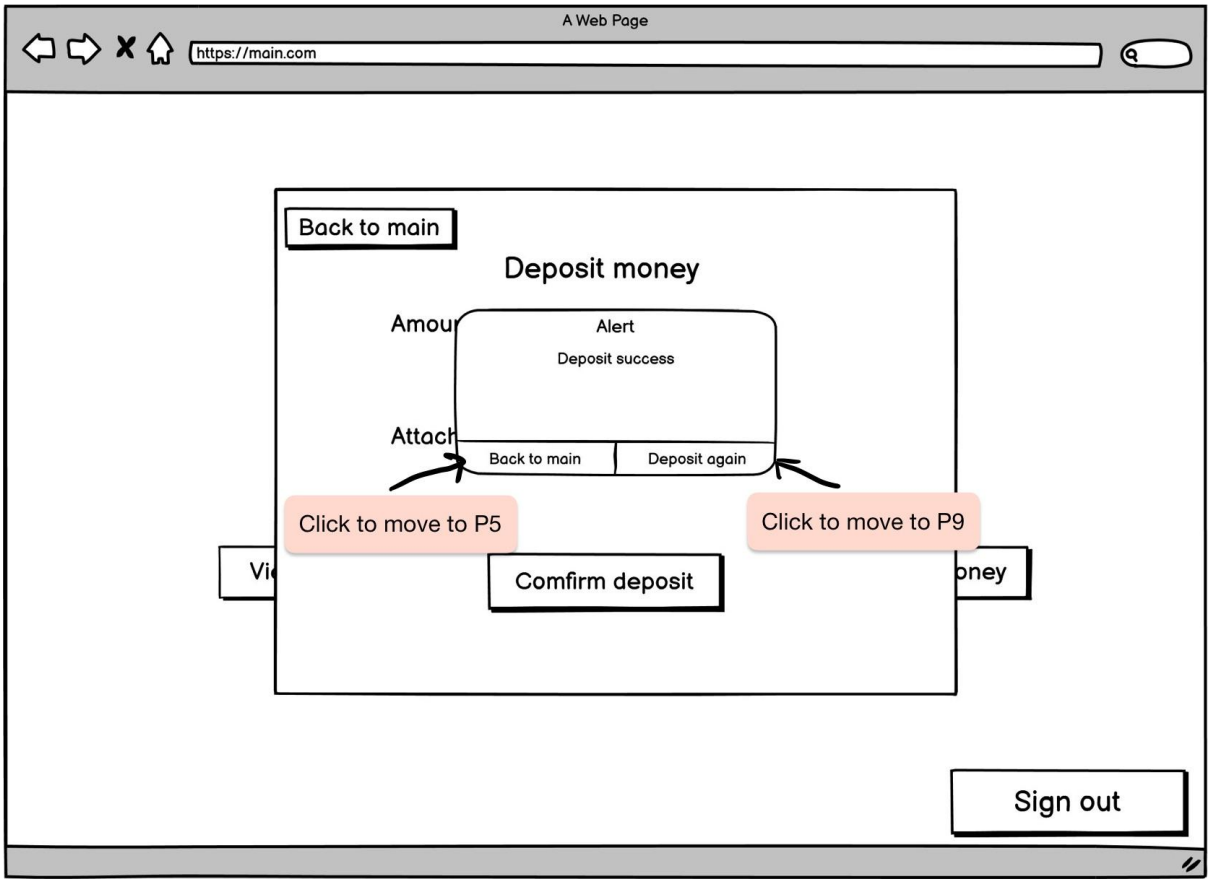

A Web Page
https://main.com
Name:
Balance:
Last login time:
Click to move to P11
Transaction History
Make Transactions
Deposit Money
Activities
Click to move to P6
Click to move to P7
Click to move to P9
Click to move to P1
Sign out

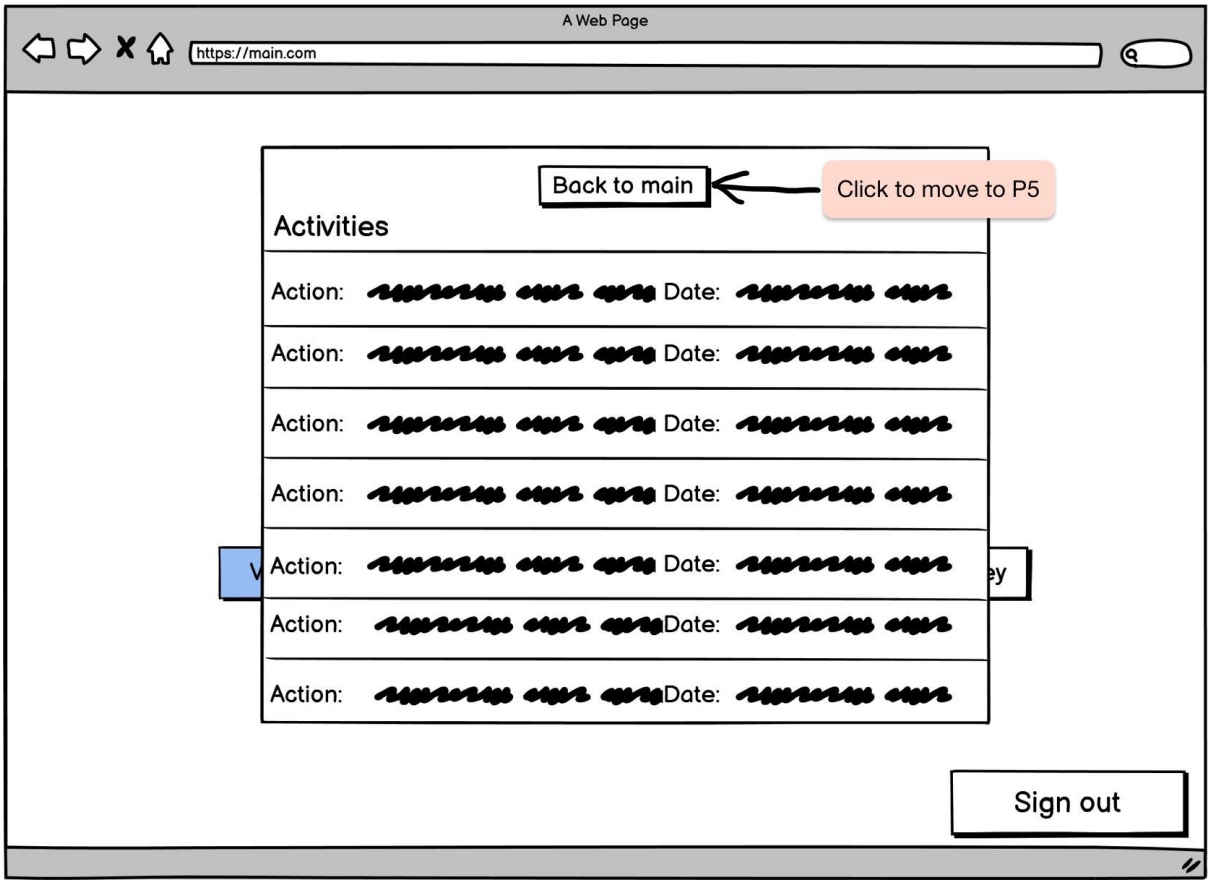

A Web Page
https://main.com
Back to main
Click to move to P5
Transaction History
Send to: Amount: Date:
Send to: Amount: Date:
Send to: Amount: Date:
Send to: Amount: Date:
Send to: Amount: Date:
Send to: Amount: Date:
Send to: Amount: Date:
Sign out


A Web Page
https://main.com
Click to move to P5
Back to main
Transfer money
Send to:
Amount: $
Comfirm transfer
Click to move to P8
Sign out

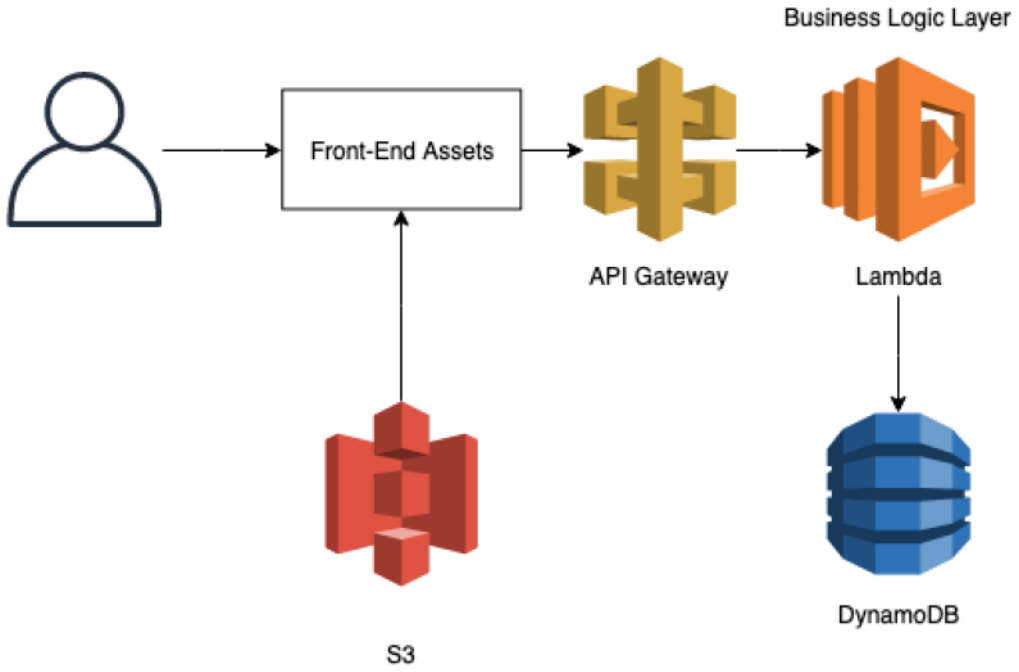

A Web Page
https://main.com
Back to main
Transfer money
Alert
Transfer success
Send
Amou
Back to main
Transfer again
Click to move to P5
Click to move to P7
Comfirm transfer
Sign out


A Web Page
https://main.com
Click to move to P5
Back to main
Deposit money
Amount: $
Attachment:
Click to move to P10
Comfirm deposit
Sign out


A Web Page
https://main.com
Back to main
Deposit money
Amou
Alert
Deposit success
Attach
Back to main
Deposit again
Click to move to P5
Click to move to P9
Vi
Comfirm deposit
oney
Sign out


A Web Page
https://main.com
Back to main
Click to move to P5
Activities
Action:
Date:
Action:
Date:
Action:
Date:
Action:
Date:
Action:
Date:
Action:
Date:
Action:
Date:
Sign out

System architecture



Api design

API type: REST API

Function: Sign-Up

HTTP Methods: POST

Api request: **String** Email, **String** Password, **String** Name

Api response: **String** Description.

Method and Description:

signUp()

Returns the description related to the registration information. This description describes the reason for the registration failure.

Function: Login

HTTP Methods: GET

Api request: **String** Email, **String** Password

Api response: **String** Description, **String** auth token

Method and Description:

login()

Returns the description related to the login information. This description describes the reason for the login failure, as well as the account balance, user name, account operation audit trail information for successful login. If the login is successful, the API will return an Auth token for further use, otherwise, it will return null.

Function: getHistory

HTTP Methods: GET

Api request: **String** UserID, **String** auth token

Api response: **List of strings** Account Transaction History

getHistory()

Returns a list of strings related to the user ID. Each element string in the list indicates a transaction, which contains the date, amount, and payee.

Function: getActivity

HTTP Methods: GET

Api request: **String** UserID, **String** auth token

Api response: **List of strings** Account Activity

getHistory()

Returns a list of strings related to the user ID. Each element string in the list indicates an activity, which contains a date and an operation.

Function: Transfer money

HTTP Methods: POST

Api request: **String** Sender User ID,**String** Receiver User ID, **Number** Amount of money, **String** auth token.

Api response: **String** Description.

transferMoney()

Returns the description describing the reason for the login failure.

Function: Deposit money

HTTP Methods: POST

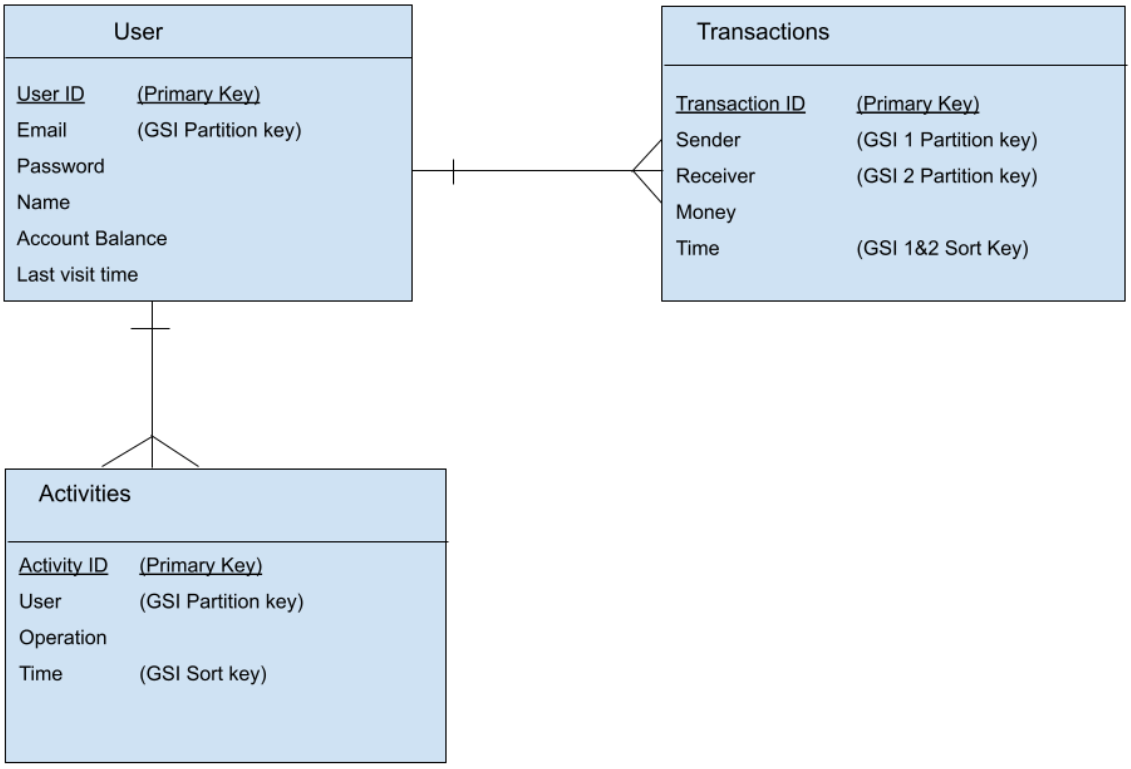
Api request: **String** User ID, **Number** Amount of money, **String** auth token, **File** Attachment

Api response: **String** Description.

depositMoney()

Returns a status code indicating the status of the deposit (0 means failure, 1 means success). The description describes the reason for the login failure.

Database Schema Design



Things to notice

We need to make sure all transactions have ACID properties:

In order to ensure the ACID properties in the database, the project will use all-or-nothing DynamoDB transactions to update the database. The project will also use version numbers for optimistic locking to ensure isolation and concurrency issues.

We need to make sure all data are stored and transmitted securely (at least needs to be encrypted):

The data communication between the server and the client will be securely protected through HTTPS, and sensitive data will be encrypted in the program and stored in the database. In order to prevent malicious users from performing unauthorized operations, the project will use Vigenère cipher to generate tokens that can authenticate users.