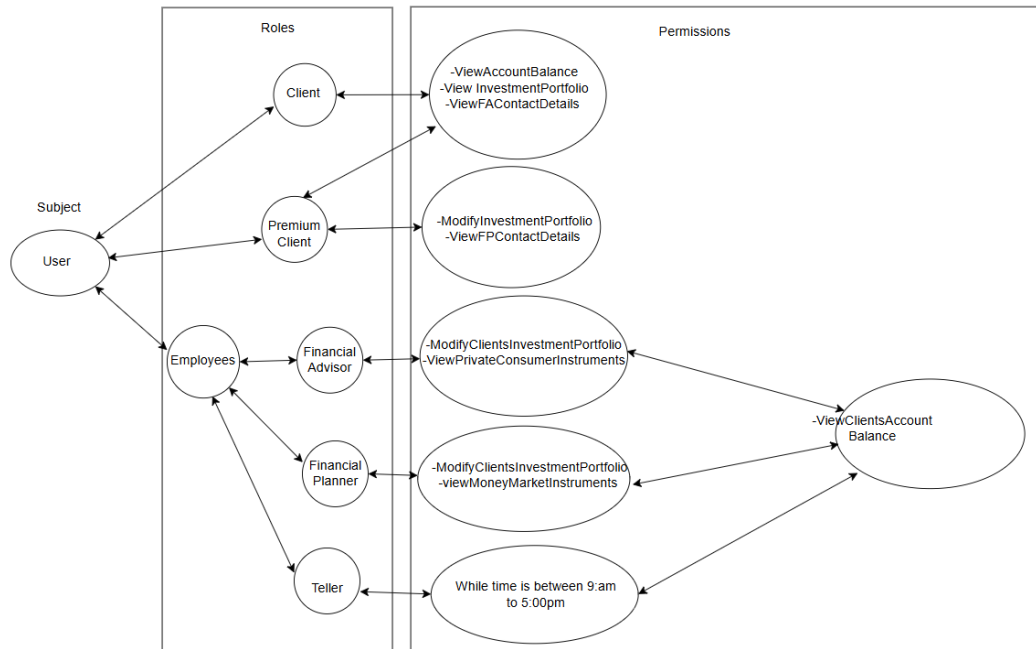<u>Problem 1</u>

a) My prototype will be using RBAC, the access policy provided by JustInvest is based on roles such as client, premium client, financial, Advisor, Financial Planner, and Teller. RBAC is best as permission are assigned based on user roles.

b)

c)
<u>Problem 2</u>

a) The hash Algorithm I used is pepper hashing, so I used an unsaved salt that io genertated
   The hash function I used is SHA3-384, because it satisfies properties H1, H2 and H3 meaning it has preimage resistance, second preimage resistance and collision resistance. It has a hash length of 384. I chose this because it is large enough to provide a sufficient margin against brute force attacks without being too tasked on resources. Salt length is 128 bits (16 bytes). For salt generation I used the urandom(16) function in the os library.

b) The password file follows the structure of "username:Role:Hashed password" for each row of user data stored. The username stores the name of the user, the role component stores the user's role as the system has no other means of keeping track of the user and their role in the company. The Hashed password part stores the hashed version of the password.

Boma:Client:e4bb111ef28121e9ebc7a1a66e357e45:363b6fb7f55c2d0477ce6067fc09d57f8d3a8b26a81dc0a3ffe304405ed2e23c
Sasha Kim:Client:efc187b26067a00f2be8fd291de37e35:0569ebff4cfe19c83bc64dcffbc7aa2248d2ad5a0d5ea12919e05115ccff489408e4c2f0256e0d96fbdb6eda9ae9f4b6
Noor Abbasi:PremiumClient:3d12b5ba69efb226df9529bd8f44fffc:b5adf5c72832db3f2cc8b1e82b46d5f4738cc6a9fac4cf9042f2c9107154c8e3991ba894e2e54d68bc155863035a3b07

c) I tested adding a user using Sasha Kim and Noor Abasi and it saved to the password file as seen above.
   Then I tested retrieving the right password from the file with Sasha Kim it was able top retrieve and showing it worked correctly.

Then tested retrieving the wrong password from the file with Noor Abasi it failed to retrieve showing it worked correctly

Problem 3

d)

```
Sign Up
Enter your username: Sasha Kim
Enter your role (Client, PremiumClient, FinancialAdvisor, FinancialPlanner, or Teller): Client
Enter your password: dog
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: 
```

This test covers trying to sign up with a word on the weak password list

```
Sign Up
Enter your username: Sasha Kim
Enter your role (Client, PremiumClient, FinancialAdvisor, FinancialPlanner, or Teller): Client
Enter your password: dog
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha Kim
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: 
```

This test covers trying to sign up with the username

```
Sign Up
Enter your username: Sasha Kim
Enter your role (Client, PremiumClient, FinancialAdvisor, FinancialPlanner, or Teller): Client
Enter your password: dog
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha Kim
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha@1
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: 
```

This test covers trying to sign up with less than 8 character word

```
Sign Up
Enter your username: Sasha Kim
Enter your role (Client, PremiumClient, FinancialAdvisor, FinancialPlanner, or Teller): Client
Enter your password: dog
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha Kim
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha@1
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: SashaG@145blahblahblah
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: |
```

These covers are trying to sign up with a password more than 12 words

```
Sign Up
Enter your username: Sasha Kim
Enter your role (Client, PremiumClient, FinancialAdvisor, FinancialPlanner, or Teller): Client
Enter your password: dog
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha Kim
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: Sasha@1
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: SashaG@145blahblahblah
Error: Password does not meet the security requirements.
Please try entering a stronger password.
Enter your password: SashaKM@1!
User 'Sasha Kim' enrolled successfully.
User successfully signed up.
```

This is trying to sign up with an appropriate password

This test covers full coverage because it shows every possible situation that a user
might encounter.

Problem 4

e)