Project Requirements:

BankEase: User-Friendly and Secure Banking App

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A. Identify a list of Potential Users

A1: List of user interviews

User 1:

- Age: 35
- Gender: Male
- Occupation: Business
- General description: Using online banking apps on daily bases and not having to visit bank branches more often.
- What type of bank account do you currently have (e.g. checking, savings, etc) and how do you primarily use it?
  "I have a checking and saving account, and I primarily use my checking account for day-to-day expenses and my savings account for long-term saving goals."
- How often do you visit a physical bank branch to manage your accounts?
  "I rarely visit a physical bank branch. Maybe once or twice a year at most."
- Do you use online banking or a mobile app to manage your accounts? If so, how frequently do you use it?
  "Yes, I use a mobile banking app to manage my accounts. I use it almost daily to check my balance, transfer funds and pay bills."
- Have you ever had issues or concerns with your bank account that required you to speak with a customer service representative? If so, how did you handle it?
  "Yes, I have had issues before, such as fraudulent activity on my account. I usually handle it by calling the customer service or using the chat feature on the mobile app to report the issue and get it resolved."
- How do you typically deposit money into your account (e.g. direct deposit, ATM, in-branch deposit, mobile deposit)?
  "I primarily use direct deposit for my paychecks, but I also occasionally use mobile deposit for checks that I receive."
- How do you monitor your account activity for potential fraud or errors?
  "I monitor my account activity regularly through the mobile app. I set up alerts for certain types of transactions, such as large purchases, and review my transaction history regularly to ensure that everything is accurate."

- How satisfied are you with the way you manage your personal banking and finances?

  "I am very satisfied with the way I manage my personal banking and finances. The mobile banking app has been a huge help in making it easy and convenient to manage my accounts, and I feel confident that my finances are in good shape."

User 2:

- Age: 67
- Gender: Female
- Occupation: Retired
- General description: Retired elder
- What type of bank account do you currently have (e.g. checking, savings, etc) and how do you primarily use it?

  "I currently have both a checking and savings account with my bank. I use my checking account primarily for paying bills and everyday expenses, while my savings account is where I keep my emergency fund and any extra money that I can save up."

- How often do you visit a physical bank branch to manage your accounts?

  "I like to visit my bank in-person, so I typically visit a physical bank branch about once a month to manage my accounts. This includes depositing money, withdrawing cash, and speaking with a teller about any questions or concerns I have."

- Do you use online banking or a mobile app to manage your accounts? If so, how frequently do you use it?

  "I do not use online banking or a mobile app to manage my accounts. I prefer to handle my banking in-person because it feels more secure and I can talk to someone if I have any questions or issues."

- Have you ever had issues or concerns with your bank account that required you to speak with a customer service representative? If so, how did you handle it?

  "I have had a few issues with my bank account in the past. There was one time when I noticed an unauthorized charge on my account. I immediately called the

bank's customer service line and spoke with a representative who helped me resolve the issue and get the charge removed."

- How do you typically deposit money into your account (e.g. direct deposit, ATM, in-branch deposit, mobile deposit)?

  "I typically deposit money into my account through in-branch deposits. I prefer to deposit money in-person because I feel more comfortable knowing that my money has been deposited directly into my account and that I have a receipt as proof."

- How do you monitor your account activity for potential fraud or errors?

  "I monitor my account activity by reviewing my monthly statements and keeping track of my transactions in my checkbook register. If I notice any suspicious activity or errors, I immediately contact my bank to report the issue and get it resolved."

- How satisfied are you with the way you manage your personal banking and finances?

  "I am satisfied with the way I manage my personal banking and finances. While I know that using online banking or a mobile app could make things more convenient, I prefer to handle my banking in-person because it feels more secure to me. I also feel like I have a better handle on my finances when I can physically see and handle my money."

User 3:

- Age: 21
- Gender: Male
- Occupation: Student
- General description: Majoring in Public Health and works part-time as hotel receptionist.
- What type of bank account do you currently have (e.g. checking, savings, etc) and how do you primarily use it?

  "As a student, I currently have a checking account with a local bank. I primarily use it to deposit my scholarship and work payments, and to pay for my day-to-day expenses such as food, rent and transportation."

- How often do you visit a physical bank branch to manage your accounts?

  "I rarely visit a physical bank branch since most of my banking activities can be done online or through the bank's mobile app. I only visit the branch if I have to deposit a large sum of cash or if there's an issue that can't be resolved online or through customer service."

- Do you use online banking or a mobile app to manage your accounts? If so, how frequently do you use it?

  "Yes, I use both online banking and a mobile app to manage my accounts. I use the online banking portal to check my account balance, view transaction history, and pay bills. I use the mobile app more frequently since it's more convenient and allows me to check my account balance on-the-go, transfer money, and deposit checks using my phone camera."

- Have you ever had issues or concerns with your bank account that required you to speak with a customer service representative? If so, how did you handle it?

  "I had an issue once when a check I deposited was returned for insufficient funds, even though I had received confirmation that the check had been accepted. I contacted the bank's customer service through the app's messaging feature and they quickly resolved the issue by reversing the fee and crediting my account."

- How do you typically deposit money into your account (e.g. direct deposit, ATM, in-branch deposit, mobile deposit)?

  "I typically receive my scholarship and work payments through direct deposit. If I have cash, I either deposit it through an ATM or at the bank branch."

- How do you monitor your account activity for potential fraud or errors?

  "I monitor my account activity regularly by checking my transaction history through the online banking portal and the mobile app. I also set up account alerts to notify me of any unusual activity, such as large purchases or withdrawals. If I notice any suspicious activity, I immediately contact the bank's customer service to report it."

- How satisfied are you with the way you manage your personal banking and finances?

"I'm satisfied with the way I manage my personal banking and finances. The online banking portal and mobile app make it easy for me to track my expenses and manage my money. However, as a student, I'm still learning about personal finance and how to make the most out of my money. I plan to educate myself more on financial literacy and start saving more for my future."

A2: List of initial tasks

Frequent and Important Task:

Task	Description
View account balances	Users should be able to see the balances of all their accounts in one place, including checking and savings accounts.
Transfer funds	Users should be able to easily transfer money between their own accounts or to other people's accounts.
Pay bills	Users should be able to pay bills directly from the app, either by setting up automatic payments or manually initiating payments.
Deposit checks	Users should be able to deposit checks remotely using the mobile app, without having to visit a physical bank branch.
View transaction history	Users should be able to view their transaction history for each account, including details such as the date, amount, and location of each transaction.
Set up account alerts	Users should be able to set up alerts for specific account activities, such as when a large transaction is made or when a bill is due.
Report fraud or errors	Users should be able to easily report any fraudulent activity or errors on their account, and receive prompt assistance from customer service.

Infrequent but Important Tasks:

Task	Description
Apply for loans or credit cards	Users should be able to apply for loans or credit cards directly from the app, without having to visit a physical

	bank branch.
Open new accounts	Users should be able to open new accounts, such as a new savings account or a credit card account, directly from the app.
Speak with customer service	Users should be able to speak with a customer service representative through the app, either by phone or chat.
Set up savings goals	Users should be able to set up savings goals, such as a down payment for a house or a vacation, and track their progress towards those goals.

Infrequent and Unimportant Tasks:

Task	Description
View promotional offers	Users should be able to view promotional offers from the bank, such as new account bonuses or credit card rewards, but this should not be a primary feature of the app.
View account statements	Users should be able to view their account statements, but this should not be a primary feature of the app since most users will receive their statements by mail or email.
Redeem rewards	If the bank has a rewards program, users should be able to redeem their rewards directly from the app, but this should not be a primary feature of the app since most users will not have a significant number of rewards to redeem.

B. Task list validation

B1: List of user discussions on the tasks

Users	User Description	What do you think of the application?	What would you like to add, change or delete?
1	**Age:** 35 **Gender:** Male **Occupation:** Business	"I think an online banking app would be incredibly helpful for me. I often need to check my account	"Add more features to manage long-term saving goals, such as investment options or savings plans.

	General description: Using online banking apps on daily bases and not having to visit bank branches more often.	balances, transfer money between accounts, and pay bills on the go. With an online banking app, I would be able to do all of these things from my smartphone or tablet, without needing to visit a physical bank branch or use a desktop computer. It would save me time and make banking more convenient."	Change the user interface to make it more intuitive and user-friendly."
2	**Age:** 67 **Gender:** Female **Occupation:** Retired **General description:** Retired elder	"As someone who prefers to go in-person to the bank, I may not find an online banking app as useful as others. However, there are still times when I am unable to visit a branch in person, such as during busy work days or when I am traveling. In those situations, having an online banking app would be helpful so that I can still access my account information and complete basic transactions from my mobile device."	"Add a feature to schedule appointments with bank representatives so that the user can visit a branch at a time that is convenient for them. Change the interface to make it more user-friendly for in-person banking, such as providing clear information about the branch locations and services."
3	**Age:** 21 **Gender:** Male **Occupation:** Student **General description:** Majoring in Public Health	"As a student, I think an online banking app would be incredibly helpful for managing my finances. I am often busy with classes and other activities, so being able to quickly and easily check my	"Add more tools to help students manage their finances, such as budgeting or saving tools specifically designed for students. Change the user interface to make it more

	and works part-time as hotel receptionist.	account balances, pay bills, and transfer money between accounts would be very convenient. Additionally, as I start to build credit and savings, an online banking app would help me keep track of my progress and plan for my financial future."	appealing and engaging for younger users."

B2: Lists of revised tasks

Revised Task	Revised Task Description	Revised Rank/Importance
Account Management	Develop a user-friendly interface for users to manage their checking and savings accounts.	High
Deposit Functionality	Allow users to deposit money through the app using mobile deposit or direct deposit.	High
Fraud and Error Detection	Implement a robust system to detect and alert users of potential fraudulent activity or errors in their account.	High
Bill Payment	Provide a feature for users to pay their bills conveniently through the app.	Medium
Customer Support	Integrate a chat or messaging feature for users to reach out to customer service representatives.	Medium
Security	Ensure the security of user data and transactions through advanced security measures such as two-factor authentication and data encryption.	High
Budgeting Tools	Include budgeting and financial	Low

	planning tools to help users manage their finances better.	
Personalized Recommendations	Provide personalized recommendations and offers based on users' spending patterns and financial goals.	Low
Investment Management	Allow users to invest in stocks, mutual funds, and other investment products through the app.	Low

B3: Revised list of users

Based on my interaction with user and revised task list, the following features I would like to add and change are:

- To manage bank accounts efficiently
- Deposits and withdrawals from their accounts
- Detect errors in bank accounts
- Bill payments
- Finances effectively using budgeting tools
- Invest their money through the banking app
- Manage their investments efficiently.

Placement in context

C. Literature Synopsis

Kuznetsov, K., Avdiienko, V., Gorla, A., & Zeller, A. (2016). Checking app user interfaces against app descriptions. *Proceedings of the International Workshop on App Market Analytics*. https://doi.org/10.1145/2993259.2993265

The article proposes a technique for checking whether the user interface of a mobile app matches its description or specification. The authors use automated techniques to compare the layout and functionality of an app against its textual description, identifying discrepancies and potential bugs. The technique is demonstrated on several popular Android apps, including a banking app, showing its effectiveness in detecting mismatches between app UI and specification. This proposed approach can help improve

the quality and reliability of mobile apps, including those used in sensitive domains such as banking.

Sadeghi, A., Esfahani, N., & Malek, S. (2017). Mining mobile app markets for prioritization of security assessment effort. *Proceedings of the 2nd ACM SIGSOFT International Workshop on App Market Analytics*. https://doi.org/10.1145/3121264.3121265

The article discusses a method for prioritizing security assessments of mobile apps in app markets. The authors propose a framework that uses app market data to identify high-risk apps based on factors such as popularity and user ratings. They also consider app categories, such as banking apps, which are considered high-risk due to the sensitive data they handle. The framework uses machine learning algorithms to analyze app market data and generate a risk score for each app. The authors apply the framework to a dataset of banking apps and demonstrate its effectiveness in identifying high-risk apps that require further security assessment.

Shaikh, A. A., & Karjaluoto, H. (2016). The effects of mobile banking application user satisfaction and system usage on bank-customer relationships. *Proceedings of the 20th International Academic Mindtrek Conference*. https://doi.org/10.1145/2994310.2994330

The article examines the relationship between customer satisfaction and usage of mobile banking applications and how these factors affect bank-customer relationships. The study found that user satisfaction with mobile banking applications positively impacts customer loyalty and strengthens the relationship between customers and their banks. Additionally, the frequency of mobile banking application usage was found to be positively related to customer loyalty. The authors suggest that banks should focus on improving the usability and functionality of their mobile banking applications to enhance customer satisfaction and strengthen customer relationships.

Tibrewala, S., & Faria, A. D. O. (2020). Making Banking Secure via BioMetrics application built using oneAPI and DPC++ based on SYCL/C++. *Proceedings of the International Workshop on OpenCL*. https://doi.org/10.1145/3388333.3388671

The article discusses the use of biometric authentication to enhance the security of banking applications. The system leverages features such as fingerprint recognition, facial recognition, and voice recognition to authenticate users and ensure secure access to banking services. The authors also provide a detailed analysis of the system's performance and effectiveness in protecting against unauthorized access to sensitive financial information. Overall, the article highlights the potential benefits of incorporating biometric authentication into banking applications to enhance security and protect against fraud.