EBU6304 Software Engineering Group Project

A Kids Bank Application

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Group 023

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1. The purpose and scope of the application

1.1 Project Name:

Kids Bank Application

1.2 Purpose:

Deliver a Virtual Bank Application for Kids. The application is to educate children about the value of money and the concept of a bank, encouraging them to engage in tasks to earn pocket money, save for goals, and spend responsibly.

1.3 Scope:

We defined the following user roles & modules for the Kids Bank application.

Two roles:

- Child Account
    - **Target Age Range**: Typically 5 -12 years old.
    - **Role**: The main users who interact with the application to complete tasks, earn rewards, redeem gifts, and manage their virtual bank accounts.
    - **Goals:** Learn financial literacy, understand the value of money, and practice managing their finances in a controlled, gamified environment.
- Parents/Guardians Account
    - **Role**: Supervisors who oversee their children's activities within the application.
    - **Goals:** Set up tasks and rewards, saving goal, provide the gifts, monitor progress, and ensure the financial education content aligns with their teaching goals.

Ten Modules:

- Sign up an account with parent role or child role
- Login module
- Home module
    - Show child account's balances and saving goal in the dashboard
    - Parent can set up the Saving Goal for linked child account
- Earn Money module
    - Child can earn virtual money by implementing the tasks
    - Parent can add/edit/delete the tasks for linked child account
- Redeem Gifts module
    - Child can redeem gifts using his/her earned virtual money
    - Parent can add/edit/delete the gifts for linked child account
- Fixed Deposit module
    - Child can transfer the account balances to fixed deposit for earning the interest.
    - Parent can set up the deposit interest for linked child account
- My Account module

    - Show child account's transactions
- Profile module
    - Show/edit the child or parent account's profile
- Settings module
    - Show/edit the child or parent account's settings, such as dark module, time zone, language, etc.
    - Parent can set up linked child account. If a parent account linked multiple child account, the parent can set up the default linked child account. The parent account only show default linked child account's data in Home/Earn Money/Redeem Gifts/Fixed Deposit/MyAccount modules after login.
- Logout module
    - Logout and back to login page

2. Project management

2.1 Techniques

In this project, we adopted and implemented ***Agile Development Framework*** we learned this semester throughout the entire project development lifecycle:

Initiation -> Iteration (Planning ← → Delivery) -> Closure.

2.2 Tools

We used GitHub as collaboration tool for backlog management, sprint planning, status tracking, and project report. For online communication, we used WeChat. (***GitHub Link***)

2.3 Planning

In the project initiation phase, we created a project roadmap with key milestones, including backlog readiness date, scope and prototype readiness date, technical design completion date, each sprint's start and end dates, demo dates, submission date, and more. This helped us establish a clear timeline and targets for each phase.

In the project planning/delivery phase, we initially allocated user stories to four sprints based on estimation and priority. During each sprint planning meeting, we adjusted the plan according to actual progress and enhanced it based on team members' suggestions from the sprint retrospective

2.4 Estimating

Estimation runs through the entire development cycle of our project to ensure effective control and keep the project on track.

Effort estimation helps us create a more reasonable project plan. In the initiation phase, we estimated key features using T-shirt sizing and create a rough sprint plan based on these estimations. In the planning and delivery phase, as requirements become more detailed and designs are finalized, we break down key features into smaller stories with estimated story points. This allows for more precise sprint planning and also helped team members understand how many stories they can take on.

Risk estimation enables us to proactively address potential issues. In the initiation phase, risk assessment focuses on scope and design definition. In the planning and delivery phases, we assessed the impact of sprint plan delays and quality issues. Through estimation, we determined the need to set aside a reasonable amount of buffer time for project risk control.

2.5 Decision Making

We set up weekly face-to-face meetings to sync up on status, sprint planning, and discuss open issues. At the end of each sprint, we hold a sprint retrospective. Additionally, we created a chat group on WeChat for daily communication. When team members have differing opinions, we adopt democratic voting principles to ensure that decisions are reasonable and valid.

2.6 Adapting to Changes

During implementation, we sometimes discover that a feature can be designed more user-friendly, or we encounter technical limitations. When these issues significantly impact the application scope or plan, we held a team meeting to discuss and determined whether to accept the changes.

3. Requirements

3.1 Requirement Gathering

When we received the application’s objective and general requirements, we used the following methods to develop real customer requirements:

Observation

We researched some popular banking software and children's game software. From the banking software, we learned some basic banking operations and financial

fundamental knowledge. From the children's software, we learned what kind of UI design would attract children.

Interviewing
We interviewed our relatives who have children and discussed with them what features they would like to see in a Kids Bank application, as well as what features would attract their children.

Questionnaire
Based on the results of our observations and interviews, we designed a questionnaire and sent it to relevant relatives and friends to gather feedback. In the end, we received 23 completed questionnaires. ***Please see the results from Appendix 2*.**

Brainstorming

We conducted a brainstorming sessions among team members to collect the ideas and consider requirements from the perspective of our target customers.

3.2 Prototype

UI prototyping can help us to clarify requirements, identify issues early, improve communication, facilitate feedback, estimate the efforts, and enhance user experience. After completing the requirement collection, we began to create the UI prototype. During the process of prototyping, we gradually confirmed the main functions and workflows, ultimately completing the prototype of the key features. ***See prototype details in Appendix 1*.**

3.2 Prioritization

MVP (Minimum Viable Product) : After gathering requirements, we compiled a comprehensive list with numerous features. Due to timeline and resource limitations, we cannot implement all of them in the first release. Therefore, we identified the MVP features for scope control and defined 10 MVP features for the application's first release.

Story Priority : After breaking down the requirements into stories, we planned sprints for these stories. We prioritized the stories as P1, P2, and P3, assigning P1 stories to the earlier sprints. We categorized happy-path cases as P1, main functions as P2, and error-handling and performance as P3.

3.3 Estimation Method

We used T-shirt size for modules/features estimation:

- **Scale**: XS, S, M, L, XL
- **Baseline:** The "Login" module is sized as M. We compared other modules' effort/complexity to the login module when evaluating them

We used story points for story estimation:

- **Scale:** Fibonacci Sequence: 0.5, 1, 2, 3, 5, 8
- **Baseline**: The "login correctly" story is assigned 2 points. We compared other stories' effort/complexity to the login story when evaluating them.

3.4 Requirement Iteration

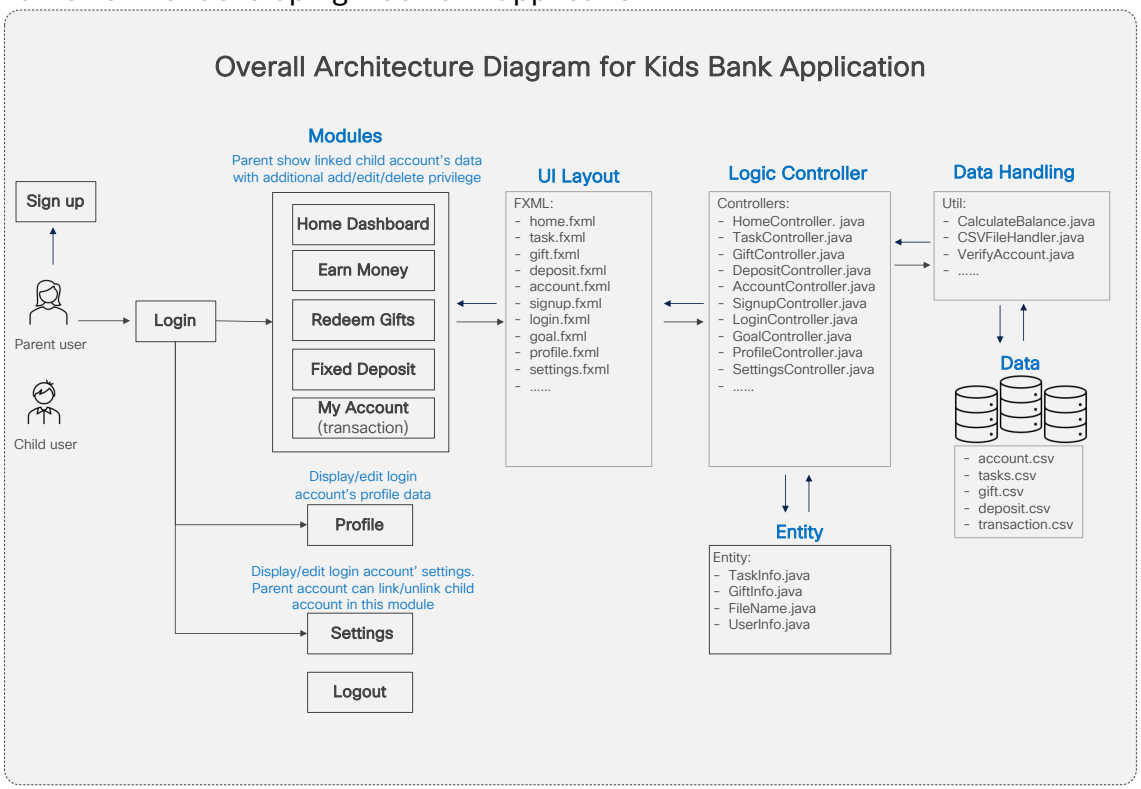
During the sprint, we continuously updated the requirements and backlog based on feedback from the following actions

- Demo feedback
- Team' sprint result review
- Team members' feedback

4. Analysis and Design

4.1 Overall Architecture

To deliver a robust and user-friendly interface, we chose JavaFX as the primary framework for developing Kids Bank application.



4.2 Storage Constructure

Based on requirements and data flow, we have defined 5 files to store the user data:

- We used a traditional horizontal table structure for the following files where each column stores data related to the same properties:
  - **account.csv:** Stores user account information, saving goals, profile details, and settings
  - **gift.csv**: Stores gift information for the Redeem Gift module
  - **tasks.csv**: Stores task information for the Earn Money module
  - **deposit.csv**: Stores static deposit interest information

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	userID	account	password	first_name	last_name	type	savegoal	linkID	darkmode	language	timezone	createtime	modifiedtime	linkcode
2	321	maggie@co.(	pass	maggie	test	child	1000	322	light	English	GMT+8 Beijir	2024/4/14 18:18	2024/5/15 14:59	862618
3	322	maggie2@co	pass	Sally	Yuan	parent	0	321	light	English	GMT+8 Beijir	2024/4/14 18:18	2024/4/14 18:18	599469
4	323	test1@co.co	pass	test1	pass	child	0	322	light	English	GMT+8 Beijir	2024/4/14 19:06	2024/4/14 19:06	715452
5	324	test2@co.co	pass	test2	test2	child	0	322	light	English	GMT+8 Beijir	2024/4/14 19:07	2024/4/14 19:07	650264
6	325	test3@co.co	pass	test3	test3	child	0	322	light	English	GMT+8 Beijir	2024/4/14 19:07	2024/4/14 19:07	540572
7	326	test4@co.co	pass	test4	test4	child	0	0	light	English	GMT+8 Beijir	2024/4/14 19:08	2024/4/14 19:08	722274
8	327	test5@co.co	pass	test5	test5	child	0	322	light	English	GMT+8 Beijir	2024/4/14 19:08	2024/4/14 19:08	833673
9	328	test8@co.co	pass	test8	test8	child	0	329	light	English	GMT+8 Beijir	2024/4/14 21:46	2024/4/14 21:46	214369
10	329	test8parent(	pass	test8parent	test	parent	0	328	light	English	GMT+8 Beijir	2024/4/14 21:48	2024/4/14 21:48	299927
11	330	maggie10@c	pass	maggie10	test	parent	0	0	light	English	GMT+8 Beijir	2024/5/3 13:20	2024/5/3 13:20	767434
12	331	unitparent@	pass	unit1	test	parent	0	332	light	English	GMT+8 Beijir	2024/5/23 15:08	2024/5/23 15:08	932579
13	332	unitchild@c(	pass	unit2	test	child	1000	331	light	English	GMT+8 Beijir	2024/5/23 15:08	2024/5/23 15:10	877681

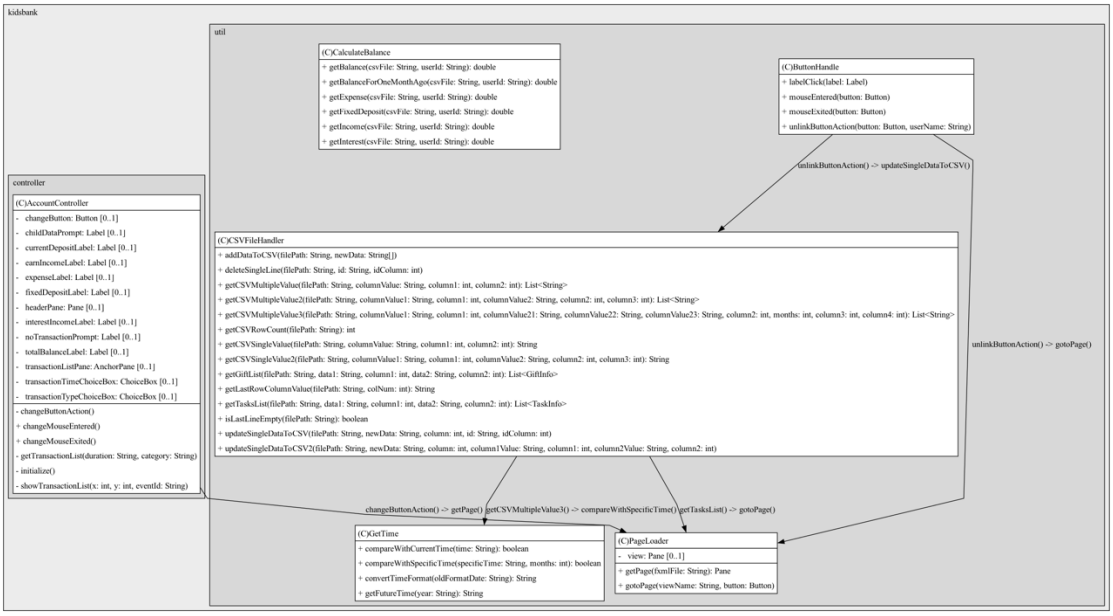
- For the following file, we utilized a vertical table structure because each row represents an event with distinct behaviors:
  - **transaction.csv**: Stores all transaction event information

	A	B	C	D	E	F	G	H	I	J	K	L
1	event	type	eventvalue	eventID	userID	createtime	modifiedtime					
2	FixedDeposit_Value	cancelled	200	900003	321	2024/2/6 16:40	2024/5/5 16:53					
3	FixedDeposit_ID	id	70002	900003	321	2024/2/6 16:40	2024/2/6 16:40					
4	FixedDeposit_Duration	year	2	900003	321	2024/2/6 16:40	2024/2/6 16:40					
5	FixedDeposit_StartTime	time	2023/3/2 16:40	900003	321	2024/2/6 16:40	2024/2/6 16:40					
6	FixedDeposit_EndTime	time	2025/3/2 16:40	900003	321	2024/2/6 16:40	2024/2/6 16:40					
7	FixedDeposit_percentage	interest	15%	900003	321	2024/2/6 16:40	2024/2/6 16:40					
8	FixedDeposit_Value	finished	300	900019	321	2023/3/2 16:40	2023/3/2 16:40					
9	FixedDeposit_ID	id	70001	900019	321	2023/3/2 16:40	2023/3/2 16:40					
10	FixedDeposit_percentage	interest	10%	900019	321	2023/3/2 16:40	2023/3/2 16:40					
11	FixedDeposit_Duration	year	1	900019	321	2023/3/2 16:40	2023/3/2 16:40					
12	FixedDeposit_StartTime	time	2023/3/2 16:40	900019	321	2023/3/2 16:40	2023/3/2 16:40					
13	FixedDeposit_EndTime	time	2024/3/2 16:40	900019	321	2023/3/2 16:40	2023/3/2 16:40					
14	FixedDeposit_Interest	positive	30	900019	321	2024/3/6 16:40	2024/3/6 16:40					
15	Implement_Tasks	positive	88	900009	321	2024/4/13 15:05	2024/4/13 15:05					
16	Implement_Tasks_ID	id	50012	900009	321	2024/4/13 15:05	2024/4/13 15:05					
17	Implement_Tasks	positive	10	900010	321	2024/4/13 22:06	2024/4/13 22:06					
18	Implement_Tasks_ID	id	50001	900010	321	2024/4/13 22:06	2024/4/13 22:06					

4.3 UI and Controller

In JavaFX, the user interface (UI) layout is defined in an FXML file. Each FXML file has an associated controller class that handles UI interactions. We used some common UI components defined by JavaFX in the application, such as Stage, Scene, Pane, Label, Button, TextField, TableView, ScrollPane, etc.

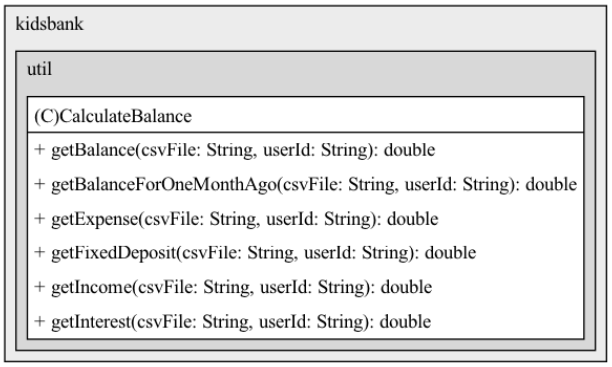
Sample: UML diagram for AccountController.java



4.4 Identify util class

We have abstracted common actions into utility classes (Util classes).

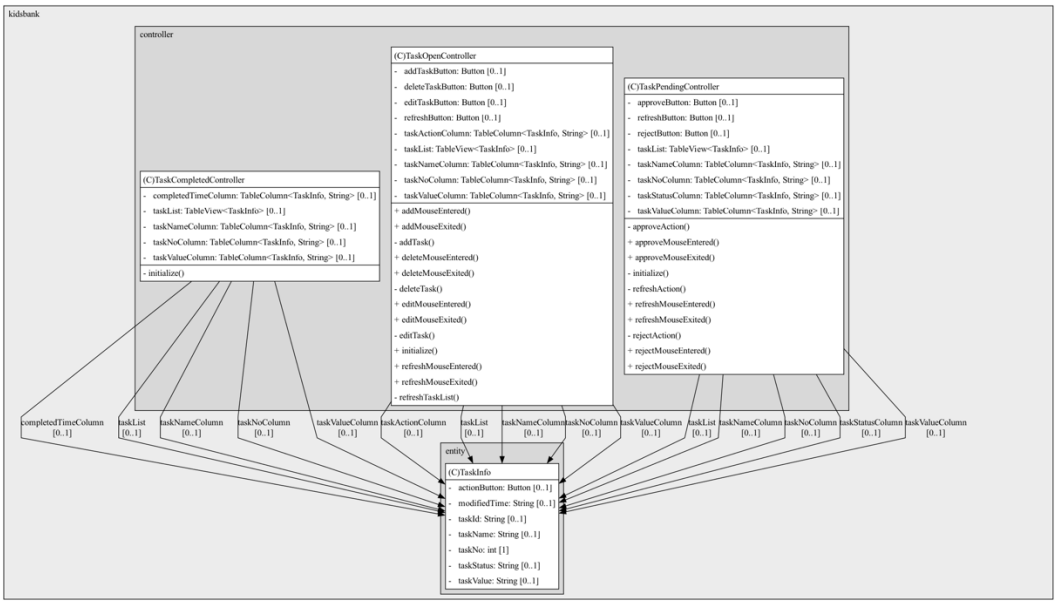
Sample: UML diagram for CalculateBalance.java



4.4 Identify entity class

We have defined constants & the properties and behaviors of the objects in entity classes (Entity classes). Such as files name, tasks' properties, gifts' properties, etc.

Sample: UML diagram for TaskInfo.java



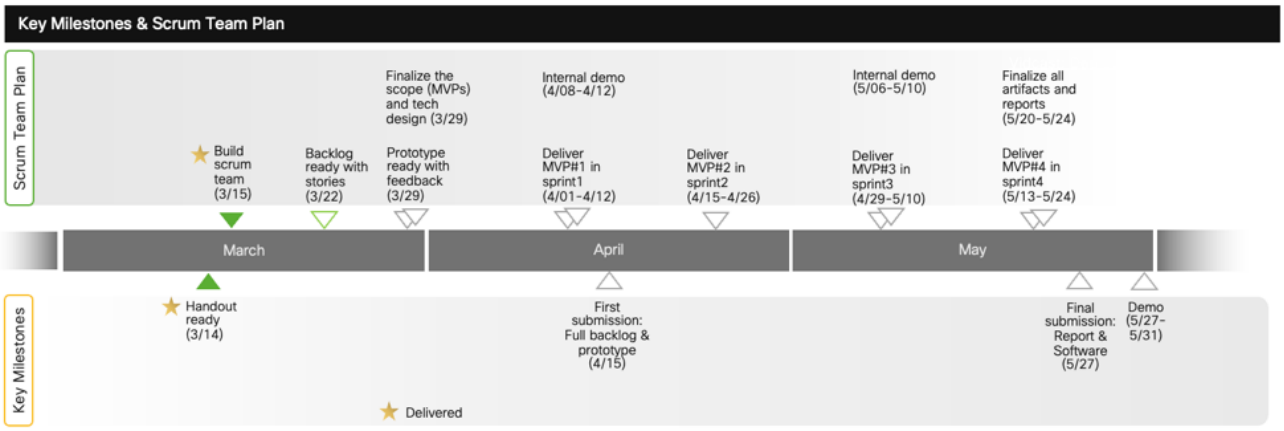
4.6 Design Principle

Follow up the basic Java development principle to ensure a well-organized, maintainable codebase with clear separation of concerns:

- **Design Patten**:
    - We adopted Model-View-Controller (MVC) pattern
- **Classes:**
    - We followed up Single Responsibility Principle (SRP), so that each class has only one responsibility
    - Also comply Open-Closed Principle (OCP)
- **Methods:**
    - Utility Methods: Reusable, stateless functions located in utility classes.
    - Entity Methods: State and behavior related to domain objects, located in entity classes.
    - Controller Methods: Handle user input and control the flow, located in controller classes.
    - Service Methods: Contain business logic, located in service classes.

5. Implementation

5.1 Overall Plan and Milestones



5.2 Implementation Summary

Date	Items	Detailed Deliveries in project team
March 14	Handout Ready	Received a comprehensive project handout detailing objectives, scope, key features, and the development timeline.
March 15	Built Scrum Team	▪ Assembled a scrum team consisting of developers, testers, designers, and a project manager. ▪ Conducted a kick-off meeting to align the team on the project goals and roles.
March 22	Backlog Ready with Stories	▪ Created a detailed product backlog with user stories focusing on the features of the electronic banking system. ▪ Prioritized the backlog items and ensure clarity on the acceptance criteria for each story.
March 29	Finalized the Scope and Tech Design, and completed the prototype	▪ Finalized the minimum viable products (MVPs) that will be delivered in each sprint. ▪ Developed a technical design document covering system architecture, database design, and key algorithms. ▪ Prototype is ready with feedback ▪ Developed a low-fidelity prototype of the kids banking system. ▪ Conducted a feedback session with stakeholders and incorporate necessary changes.
April 1 – April 12	Sprint 1	Focus on JavaFX learning and complete the happy path for Login & Signup module
April 12	First Internal Demo & Submission	▪ Demonstrated the progress to stakeholders and gather feedback. ▪ Submitted the complete product backlog and refined prototype. ▪ Ensure that all stories for the upcoming sprints are well-defined and prioritized.

April 15 – April 26	Sprint 2	Started the implementation for Home, Earn Money, Redeem Gift, Link a child Account, and Fixed Deposit modules. Happy path works for these modules.
April 29 – May 10	Sprint 3	Started working on My Account, Profile, and Setting modules, and implemented more functions for other modules.
May 10	Second internal Demo	▪ Conducted another internal demo to showcase the newly added features. ▪ Gathered feedback and plan for final adjustments.
May 13 – May 24	Sprint 4	▪ All of remaining functions are implemented. Prepare the project report. ▪ Finalized all artifacts and reports ▪ Compiled all development artifacts, user manuals, and final reports.
May 24	Final Internal Demo	Presented the complete system to stakeholders and make any last-minute adjustments based on feedback.
May 27	Final Submission	Submitted the final project report and the fully developed software.
May 27 – May 31	Demo	▪ Conduct the final demo showcasing the fully functional electronic banking system for children. ▪ Highlight key features, user experience improvements, and educational benefits.

5.3 Strategy of the Iteration (Sprint)

Considering the project completion deadline, we divided the project into four iterations, each lasting approximately two weeks. We followed the Scrum process in each sprint .

- Sprint backlog grooming & planning
- Stand up meeting (conducted by WeChat group communication & weekly sync up)
- Demo sessions
- Sprint result review & retrospective

Main focuses in 4 sprints:

- Sprint#1: JavaFX learning, Login & Sign up
- Sprint#2: Home, Earn Money, Redeem Gift, Link a child Account, and Fixed Deposit modules can work with happy path
- Sprint#3: Start working on My Account, Profile, and Setting modules, and implement more functions for other modules.
- Sprint#4: All of remaining functions are implemented. Prepare the project report.

5.3 Sprint Plan and Key User Stories

Module	Key Stories Title	Priority	Description	Sprint	Points
Sign up	Sign up correctly	P1	Sign up child account and parent account	#1	2
	Sign up error handling	P3	Sign up account with invalid input	#3	1
Login	Login correctly	P1	Login with existing parent or child account	#1	2
	Login error handling	P3	Login with wrong account info	#2	1
Left Menu	Left Menu	P1	Left menu is key navigation menu to all of modules	#1	5
Home	Dashboard	P1	Show account dashboard for balances	#2	3
	Setup goal	P2	Parent account set up a saving goal for child account	#3	2
	UI for no linked child	P2	Show alert UI for one parent account when there is no linked child	#3	2
Earn Mony	Open Tasks list	P1	List all of available open tasks	#2	5
	Add a task	P2	Parent account add a task for the child	#2	2
	Edit a task	P2	Parent account edit a task for the child	#2	2
	Delete a task	P2	Parent account delete a task for the child	#2	1
	Done Tasks	P2	Child account click “Done” to complete the task	#3	2
	Completed Tasks list	P3	Show child account’s completed tasks list	#4	1
	Approve a task	P2	Parent account approve a “Done” task	#3	2
	Reject a task	P3	Parent account reject a “Done” task	#4	1
Redeem Gifts	Gift List	P1	Show available gifts list	#2	5
	Add a gift	P2	Parent account add a gift	#3	3
	Delete a gift	P3	Parent account delete a gift	#3	1
	Redeem a gift	P3	Child account redeem a gift	#3	2
	Redeem gift history	P3		#4	
	Redeem gift error	P3	Redeem gift error handling	#4	1
Fixed Deposit	Deposit dashboard	P2	Show deposit and interest dashboard	#2	2
	Transfer deposit	P2	Transfer available deposit to fixed deposit	#2	3
	Fixed deposit list	P2	Show all of fixed deposit	#2	3
	Withdraw fixed deposit	P2	Withdraw an on-going fixed deposit	#3	3
My Account	Balance dashboard	P2	Show account’s balance	#3	2
	3 months transaction list	P2	Show latest 3 months all transaction list	#3	5
	Half year transaction list	P2	Show latest half year all transaction list	#3	1
	One year transaction list	P2	Show latest one year all transaction list	#3	1
	Earned money transaction	P3	Show all transaction list for earned money	#4	3
	Redeemed gifts transaction	P3	Show all transaction list for earned money	#4	1
	Fixed deposit transaction	P3	Show all transaction list for earned money	#4	1
Profile	Show/Edit profile	P2	Show and edit the profile	#3	2
	Upload profile picture	P3	Upload new picture for the account profile	#4	2
Settings	Dark mode setting	P3	Show and edit the dark mode	#4	1
	Time zone setting	P3	Show and edit the time zone	#4	1
	Language setting	P3	Show and edit the language	#4	1
	Linked child user list	P2	Show linked child user list	#2	5

	Link a child user	P2	Link a child account to current parent account	#2	3
	Unlink a child user	P3	Unlink a child from current parent account	#3	2
	Set default linked user	P3	Set a linked child user as default linked user	#3	2
Logout	Logout	P2	Logout	#2	2

6. Testing

6.1 Test Strategy

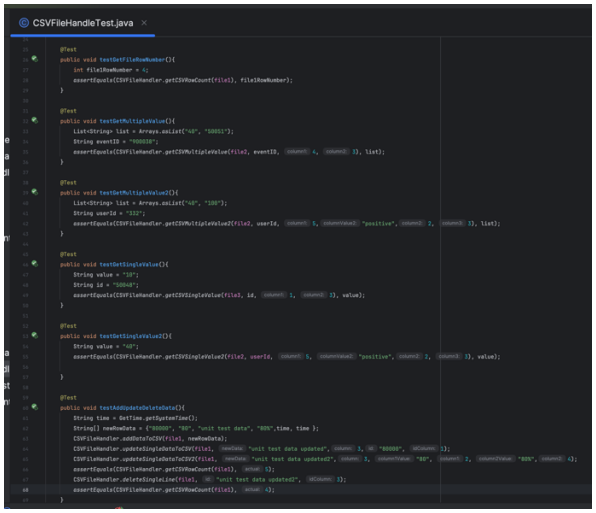
We defined the following test strategy in the project :

1. Design test cases (unit test & manual test) before starting the implementation to align with TDD (Testing Driven Development) strategy
2. Use test metrics for detailed case design to ensure all of scenarios and path are covered.
3. Ensure that classes for logic and boundary implementation are tested with JUnit, achieving 90%+ coverage
4. Test classes for UI layout and control manually during integration testing
5. Acceptance Test should include end-to-end functional tests, error handling tests, and usability tests.

6.2 Unit Test

- Covered all of classes under util package
- Classed under controller package are for FXML UI, and require mocking for unit tests. Therefore, we did not cover them with unit tests in this project, but we plan to enhance this in future iterations.

Sample: CSVFileHandleTest.java



6.3 Integration Test

- In each sprint, we conducted the integration test cross different modules using manual test.

6.4 Acceptance Test

- In each sprint, we conducted end-to-end tests & error handling tests for the end-user cases.

6.6 Test Metrics & Test Result

All tests passed, and the end-user behaviour met our expectations. (***See detailed result from Appendix 3***)

7. Future Iterations

In future iterations, we should enhance the UI to be more attractive and easy to use for children, and add new features to reward children when they reach their savings goals. Additionally, we should ensure the application can run on various devices, such as mobile phones, iPads, and more.

Individual contribution and reflection

Team Leader

QM no: 210979169

Name: Zixin Yuan

Main contribution: As the team lead for this project, I played a pivotal role in guiding my team to successfully develop a small-scale application based on Java, and deliver it on time with required quality standards. My key accomplishments in the project include:

- **Scrum Team Formation:** I organized and established the Scrum team, delegate the various roles and responsibilities to team members after team discussion
- **Process Development:** Led the team in defining and implementing Scrum processes, including sprint planning, sync-up meeting, sprint reviews, and retrospectives.
- **Requirement Management:** Drew the prototype, and managed and prioritized project requirements to ensuring alignment with project goals.
- **Technical Decision-Making:** Determined the technical stack and architectural decisions, such as selecting JavaFX for UI development.
- **Project Planning and Progress Tracking:** Created detailed project plans, set milestones, and monitored progress to ensure on-time delivery.
- **Risk Management:** Identified potential risks, implemented mitigation strategies, and resolved issues promptly to avoid project delays.
- **Testing and Quality Assurance:** Organized various testing activities, including test case design, unit tests, integration tests, and TDD practices to maintain high-quality standards.
- **Module Development:** Acted as the module owner for 4 key modules: Login, Main Menu, Earn Money, and My Account.
- **Project report:** delivered the project report with team member' support.

Reflective statement: Leading this project provided me with invaluable experience in project management, team leadership within an agile framework, and enhanced my skills in Java development. This role also strengthened my ability to solve problems efficiently, such as technical hurdles and requirement changes, required us to remain flexible and proactive. Overall, leading this project let me realized the effectiveness of agile methodologies and the importance of strong leadership in software development. It not only honed my technical skills but also enhanced my ability to manage and lead a team towards successful project delivery.

Member

QM no: 210978933

Name: Yingnan Zhou

Main contribution: As a member of this project, I was fully involved in the development process and served as the module owner for the Sign Up module and the Redeem Gifts module. With the support of my teammates, I successfully completed the development of these two modules on time. My key accomplishments in the project include:

- Wrote the use stories for Login, Signup, and Redeem Gifts modules
- Support on questionnaire survey
- Support on brainstorming for requirement gathering
- Learned the JavaFX framework for UI development
- Completed Signup and Redeem Gifts modules as module owner
- Wrote test cases for Signup and Redeem Gifts modules, and implemented these test cases.

Reflective statement: Participating in this project was an enriching experience that significantly enhanced my technical skills and understanding of the software development process. As the module owner for the Sign Up and Redeem Gifts modules, I was deeply involved in all stages of development, from initial brainstorming to final implementation. Completing the Sign Up and Redeem Gifts modules as the module owner was a significant achievement. These tasks required careful planning, coding, and testing to ensure timely and successful delivery. Writing and implementing test cases for these modules highlighted the importance of thorough testing in delivering high-quality software. Throughout the project, the support and collaboration with my teammates were invaluable. Their feedback and assistance were crucial in overcoming challenges and ensuring the modules were developed efficiently and effectively. Overall, this project has been a profound learning experience. It has deepened my technical expertise, particularly in JavaFX, and enhanced my ability to work collaboratively in a team setting. Moreover, it reinforced the importance of clear communication, meticulous planning, and rigorous testing in software development.

Member

QM no: 210978999

Name: Mingye Yang

Main contribution: As a member of this project, I was fully involved in the development process and served as the module owner for the Fixed Deposit module, and co-work for My Account module. With the support of my teammates, I successfully completed the development of these two modules on time. My key accomplishments in the project include:

- Wrote the use stories for My Account and Fixed Deposit module
- Support on questionnaire survey
- Support on brainstorming for requirement gathering
- Research the popular bank applications
- Learned the JavaFX framework for UI development
- Completed Fixed Deposit module as module owner
- Completed the common UI for “Alert message for parent account”
- Co-worked to complete the “My Account” module
- Wrote test cases for My Account and Fixed Deposit modules, and implemented these test cases.

Reflective statement: Participating in this project provided me with invaluable experience and insights into the development process and the workings of an agile team. Serving as the module owner for the Fixed Deposit module, I was able to see firsthand the importance of teamwork, effective communication, and robust planning. One of my key contributions was writing the user stories for both the My Account and Fixed Deposit modules. This task enhanced my understanding of requirement gathering and how to break down requirements into actionable development tasks. Learning the JavaFX framework for UI development was a significant milestone for me. It improved my technical skills and my ability to create intuitive and user-friendly interfaces. Practicing the Scrum process throughout the project reinforced my understanding of agile methodologies. Transparent can make the work more efficient.
Overall, this project has been a profound learning experience, deepening my technical expertise, enhancing my collaboration skills, and solidifying my grasp of agile development practices.

Member

QM no:210979099

Name: Ziyao Su

Main contribution: As a member of this project, I was fully involved in the development process and served as the module owner for the Home module, and co-work for Earn Money module. With the support of my teammates, I successfully completed the development of these two modules on time. My key accomplishments in the project include:

- Wrote the use stories for Home and Main Menu modules
- Support on questionnaire survey
- Support on brainstorming for requirement gathering
- Learned the JavaFX framework for UI development
- Completed Home module as module owner
- Co-worked to complete the “Earn Money” module
- Wrote test cases for Home, Main Menu and Earn Money modules, and implemented these test cases.

Reflective statement: Participating in this project has been a transformative experience, significantly enhancing my skills in software development and teamwork. As the module owner for the Home module and a collaborator on the Earn Money module, I was deeply involved in the entire development process, from initial planning to final implementation. Learning the JavaFX framework for UI development was a pivotal aspect of my role. This knowledge enabled me to develop intuitive and responsive interfaces for the Home module, contributing to a seamless user experience. Writing and implementing test cases for the Home, Main Menu, and Earn Money modules underscored the critical role of rigorous testing in software development. This process ensured our modules were reliable, functional, and free of significant bugs.
Overall, this project has been an invaluable learning experience. It has deepened my technical expertise, particularly in JavaFX, and improved my ability to work collaboratively within an agile framework. Moreover, it reinforced the importance of clear communication, meticulous planning, and thorough testing in achieving successful project outcomes.

Member

QM no: 210978911

Name: Yao Song

Main contribution: As a member of this project, I was fully involved in the development process and served as the module owner for the Profile module, and co-work for Settings module. With the support of my teammates, I successfully completed the development of these two modules on time. My key accomplishments in the project include:

- Wrote the use stories for Profile module
- Support on questionnaire survey
- Support on brainstorming for requirement gathering
- Learned the JavaFX framework for UI development
- Wrote test cases for Profile and Settings modules, and implemented these test cases

Reflective statement: Participating in this project has been a highly educational and rewarding experience, greatly enhancing my skills in Agile software development process, teamwork, and project management. Collaborating on the Settings module emphasized the importance of teamwork and effective communication. Throughout the project, the use of agile practices such sync-up meeting, sprint planning, and retrospectives was instrumental in maintaining transparency, fostering collaboration, and ensuring continuous improvement. These practices helped the team stay on track, adapt to changes, and consistently deliver value.
Overall, this project has been an invaluable learning experience. It has deepened my technical expertise, particularly in JavaFX, and enhanced my ability to work collaboratively within an agile framework. Moreover, it reinforced the importance of clear communication, meticulous planning, and comprehensive testing in achieving successful project outcomes.

Member

QM no: 210978195

Name: Xiaoyu Feng

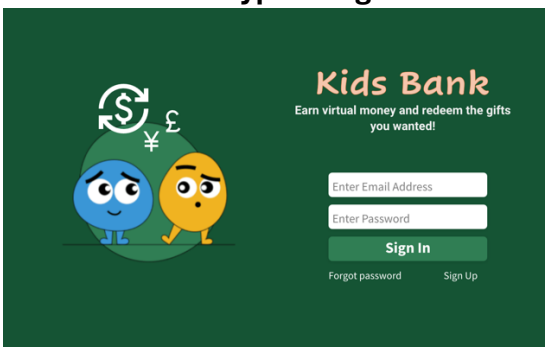
Main contribution: As a member of this project, I was fully involved in the development process and served as the module owner for the Settings module, and co-work for Earn Money module. With the support of my teammates, I successfully completed the development of these two modules on time. My key accomplishments in the project include:

- Wrote the use stories for Settings, Earn Money, and Logout module
- Support on questionnaire survey
- Support on brainstorming for requirement gathering
- Support on drawing prototype
- Research the popular Kids games application on UI design
- Learned the JavaFX framework for UI development
- Support on unit test for VerifyAccountTest.java
- Wrote test cases for Settings, Earn Money, and Logout modules, and implemented these test cases
- Organize the end-to-end test run in final acceptance test

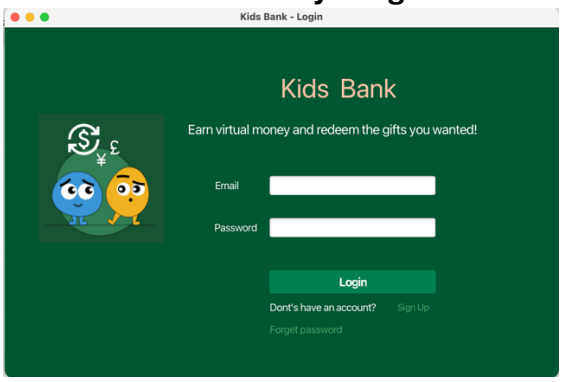
Reflective statement: Participating in this project provided me with a comprehensive understanding of the software development process within an agile framework.
One of my key contributions was writing user stories for the Settings, Earn Money, and Logout modules. Crafting these user stories enhanced my ability to think from the user's perspective and prioritize features that deliver the most value. In this project, I had full testing experience for unit test, integration test, end2end test, and acceptance test. This hands-on experience with testing reinforced the importance of maintaining high-quality standards through rigorous and continuous testing practices.
Overall, this project has been a profound learning experience that has deepened my technical expertise and enhanced my understanding of agile development principles. It reinforced the value of clear communication, stakeholder engagement, iterative development, and comprehensive testing in delivering successful software projects. Working collaboratively with my teammates, I have gained invaluable skills that will serve me well in future projects.

Appendix 1: Prototype vs. Final Deliveries

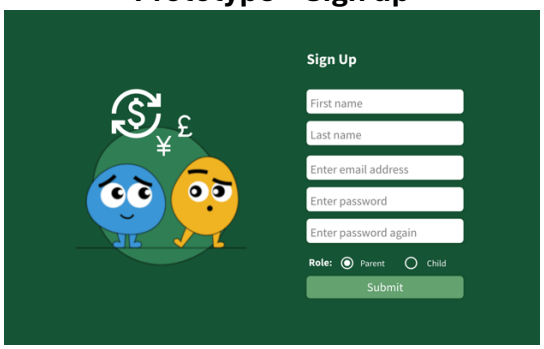
Prototype – Login



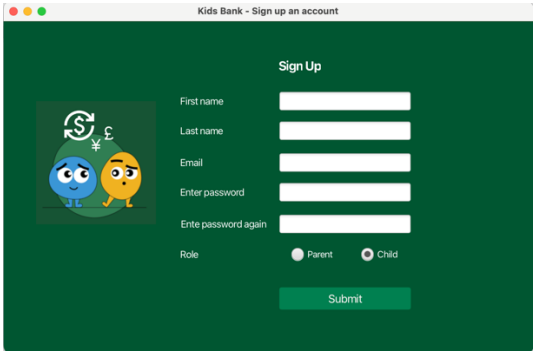
Final Delivery - Login



Prototype – Sign up

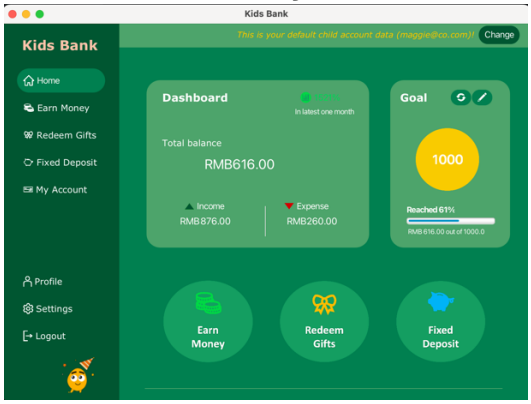


Final Delivery – Sign up



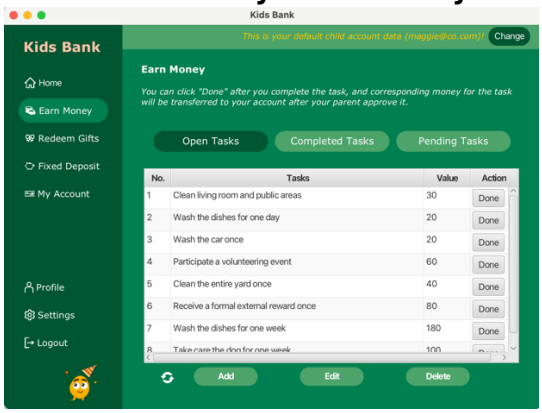
Prototype – Home

Final Delivery – Home

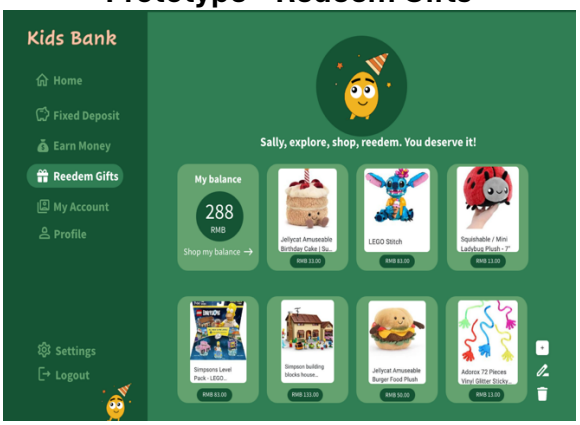


Prototype – Earn Money

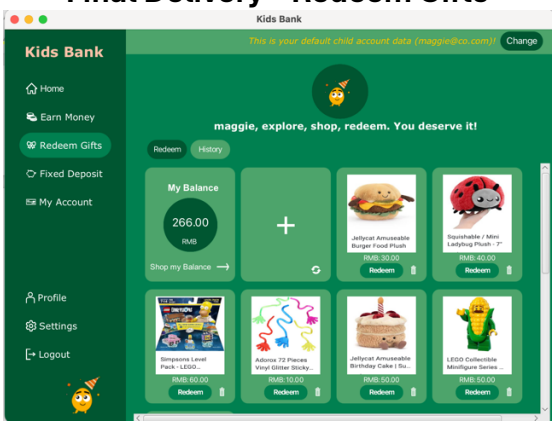
Final Delivery – Earn Money



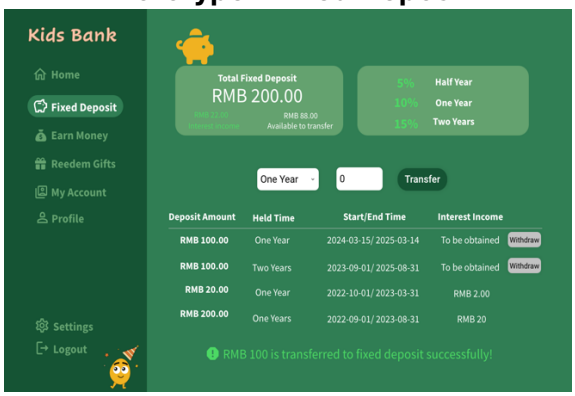
Prototype – Redeem Gifts



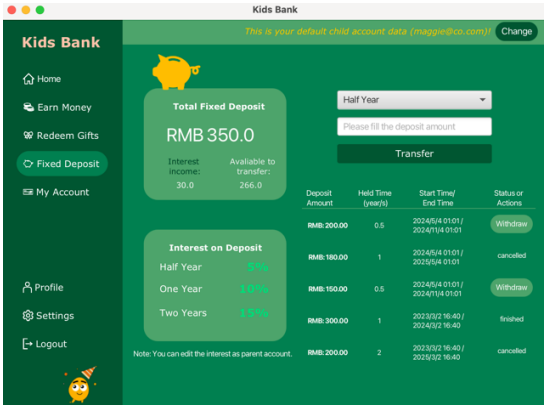
Final Delivery – Redeem Gifts



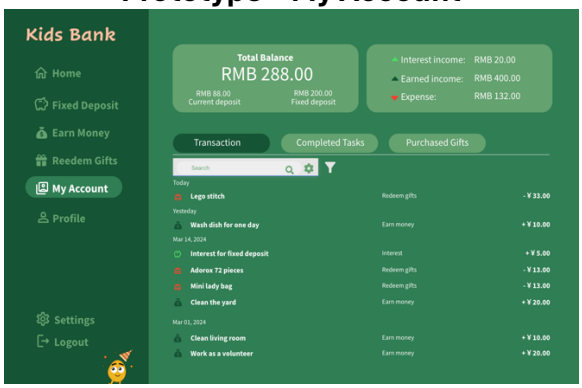
Prototype – Fixed Deposit



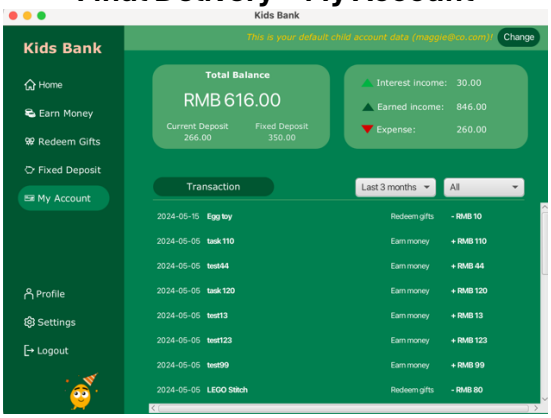
Final Delivery – Fixed Deposit



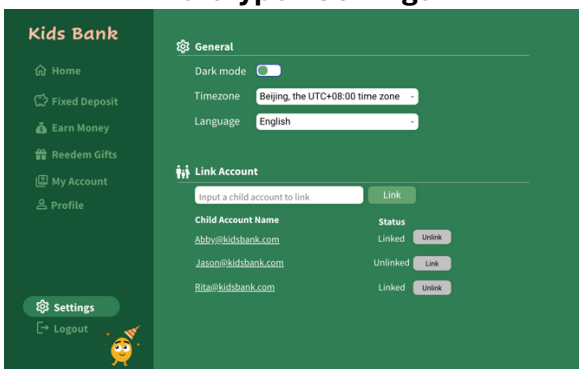
Prototype – My Account



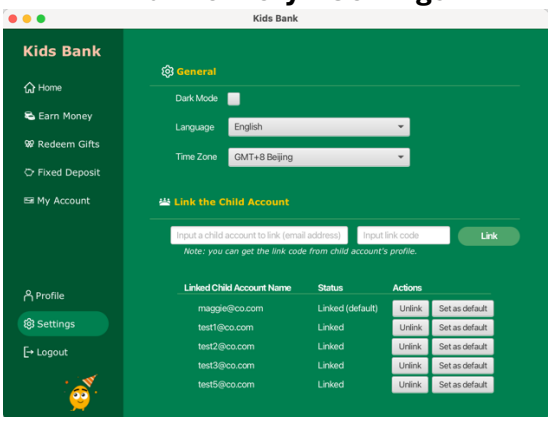
Final Delivery - My Account



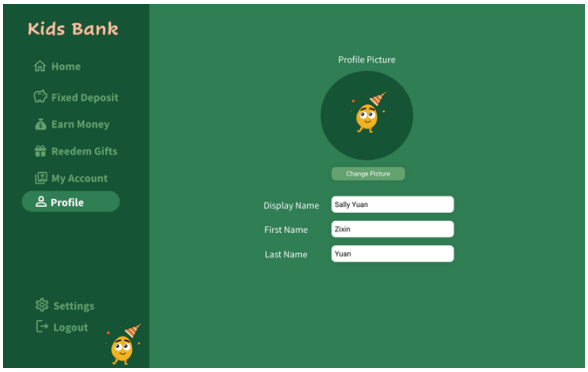
Prototype - Settings



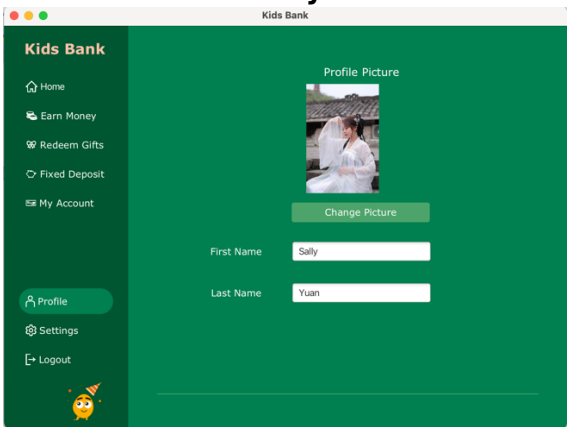
Final Delivery – Settings



Prototype – Profile



Final Delivery – Profile



Appendix 2: Questionnaire Results

1. What is the age of your child?

Option	Count	Percentage
A. Under 5 years	2	9.50%
B. 5-7 years	6	24.20%
C. 7-12 years	7	30.50%
Total Responses	23	100%

2. What is the gender of your child?

Option	Count	Percentage
A. Male	12	49.50%
B. Female	11	48.40%
C. Prefer not to say	1	2.10%
Total Responses	23	100%

3. What is your relationship to the child?

Option	Count	Percentage
A. Mother	11	54.70%
B. Father	9	41.10%
C. Guardian	2	3.20%
Total Responses	23	100%

4. How often do you talk to your child about money and savings?

Option	Count	Percentage
A. Never	5	14.70%
B. Occasionally	7	33.70%
C. Frequently	6	29.50%
Total Responses	23	100%

5. Does your child have any experience with handling money (e.g., allowance, chores, etc.)?

Option	Count	Percentage
A. Yes	12	52.17%
B. No	8	34.78%
Total Responses	23	100%

6. Does your child have access to a smartphone, tablet, or computer?

Option	Count	Percentage
A. Yes	18	85.30%
B. No	5	14.70%
Total Responses	23	100%

7. How comfortable is your child with using digital applications?

Option	Count	Percentage
A. Very uncomfortable	2	10.50%
B. Uncomfortable	3	14.70%
C. Neutral	5	25.30%
D. Comfortable	6	29.50%
E. Very comfortable	4	20%
Total Responses	23	100%

8. How important do you think it is for children to learn about money management?

Option	Count	Percentage
A. Not important	1	5.30%
B. Slightly important	2	10.50%
C. Moderately important	6	25.30%

D. Very important	7	29.50%
E. Extremely important	7	29.50%
Total Responses	23	100%

9. Would you be interested in using an application like Kids Bank to teach your child about money management?

Option	Count	Percentage
A. Yes	16	70.50%
B. No	7	29.50%
Total Responses	23	100%

10. What features would you find most beneficial in a financial education tool for children? [Multiple Choice]

Option	Count	Percentage
A. Tracking allowance and spending	16	70.50%
B. Setting savings goals	14	65.30%
C. Learning about interest and savings	13	60%
D. Earning money through tasks and chores	15	74.70%
E. Redeeming points for gifts	11	54.70%
F. Educational games and quizzes about money	18	80%
Total Responses	23	100%

11. How important is it for the application to have the following features? [Multiple Choice]

Option	Count	Percentage
A. Simple and engaging interface	1	5.30%
B. Parental controls and monitoring	2	10.50%
C. Rewards system for completing tasks	7	25.30%
D. Educational content about money management	6	34.70%
E. Customization options for tasks and goals	5	24.20%
Total Responses	23	100%

Appendix 3: Test Metrics with Test Results

Module	Test Case	Child Account - Test Result (Pass/Not Pass)	Parent Account - Test Result (Pass/Not Pass)
Login & Logout	Login with correct account info	Pass	Pass
	Login with wrong user name	Pass	Pass
	Login with blank input	Pass	Pass
	Login with wrong mail	Pass	Pass
	Forgot password when login	Implement in future	Implement in future
Sign up	Register with Email	Pass	Pass
	Sign up error handling	Pass	Pass
	Password Strength	Pass	Pass
	Registration Failure	Pass	Pass
	Email Already Used when sign up	Pass	Pass
	Confirm Registration	Pass	Pass
Parent role & child role	Role Selection at Signup	Pass	Pass
	Parental Consent for Child Account	Implement in future	Implement in future
	Access Control for Child Accounts	n/a	Pass
	Setting Financial Goals by Role	n/a	Pass
	Monitoring & Reporting	Implement in future	Implement in future
	Educational Content for Different Roles	Pass	Pass
Home/ Dashboard/ Saving Goal	Display the total balance and the change trend	Pass	Pass
	Shows income & expesne & trends	Pass	Pass
	Left Menu	Pass	Pass
	Edit the goal	n/a	Pass
	Illegal character input when edit goals	n/a	Pass
	Blank input when edit goals	n/a	Pass
	Show the process of the goal	Pass	Pass
	UI for no linked child	Pass	n/a
	Enter shortcut to fixed deposit	Pass	Pass
	Enter shortcut to earn money	Pass	Pass
	Enter shortcut to reedem gifts	Pass	Pass
Earn money	Display open tasks	Pass	Pass
	Display completed tasks	Pass	Pass
	Display pending tasks	Pass	Pass
	Done tasks	Pass	Pass
	Add a task	n/a	Pass

	Illegal character input when add tasks	n/a	Pass
	Blank input when add tasks	n/a	Pass
	Approve a task	n/a	Pass
	Reject a task	n/a	Pass
	Edit a task	n/a	Pass
	Delete a task	n/a	Pass
Redeem gifts	View Available Gifts	Pass	Pass
	View current balance in redeem gifts	Pass	Pass
	Add a gift	n/a	Pass
	Illegal character input when add gifts	n/a	Pass
	Blank input when add gifts	n/a	Pass
	Upload a gift picture	n/a	Pass
	Delete a gift	n/a	Pass
	Insufficient balance to redeem gifts	Pass	Pass
	Select a Gift for Redemption	Pass	Pass
	Confirm Redemption	Pass	Pass
	Redeemed gifts history	Pass	Pass
	Track Gift Delivery	Implement in future	Implement in future
Fixed deposit	Create a Fixed Deposit	Pass	Pass
	Insufficient balance prompt	Pass	Pass
	Blank deposit input error	Pass	Pass
	View Fixed Deposit Details	Pass	Pass
	Edit Funds to Fixed Deposit	Pass	Pass
	Break Fixed Deposit Early	Pass	Pass
	Withdraw fixed deposit	Pass	Pass
My account	Display balance dashboard in My Account	Pass	Pass
	Detail of income and expenditure	Pass	Pass
	3 months transaction list	Pass	Pass
	Half year transaction list	Pass	Pass
	One year transaction list	Pass	Pass
	Earned money transaction	Pass	Pass
	Redeemed gifts transaction	Pass	Pass
	Fixed deposit transaction	Pass	Pass
	Completed tasks	Pass	Pass
Settings	Select light or dark mode	Pass	Pass
	The choice of time zone	Pass	Pass
	Language settings	Pass	Pass
	Parents connect to their child's account	n/a	Pass
	Children already linked reporting	n/a	Pass

	Blank link codes or emails error reporting	n/a	Pass
	Unlink children	n/a	Pass
	Set a child account as the default account	n/a	Pass
	List the linked children	n/a	Pass
Profiles	Profile picture uploading	Pass	Pass
	Display name	Pass	Pass
	Edit name	Pass	Pass
	Save profile modification info	Pass	Pass
	Display link code	Pass	n/a
	Link code cannot be modified	Pass	n/a
	Logout successfully	Pass	Pass