UNIVERSITY OF INFORMATION TECHNOLOGY

FACULTY OF SOFTWARE ENGINEERING

Object-Oriented Software Development

BANK OPERATION MANAGEMENT APPLICATION

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TPHCM, 01 - 2022

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Document change record sheet

Date	Version	Description	Authors
25/9/2021	1.0	Description, system construction, functions and Initialization	All
30/9/2021	1.1	Analyze requirements, build Use case diagrams and design databases	All
10/10/2021	1.2	Conduct initial design of the application interface	All
20/10/2021	1.3	Do the coding parallel to the interface design	All
10/12/2021	1.4	Complete the functions set out as required	All
15/12/2021	1.5	Handling errors and adding administrative functions for manager	All
25/12/2021	1.6	Check the software and fix the errors that arise	All
30/12/2021	1.7	Make a report for the system	All
5/1/2022	2.0	Complete and release the system	All

Contents

I. Overview

1. Project overview

Banking is one of the sectors most strongly affected by the industrial revolution 4.0. Bank branches always place very high requirements on security and efficiency and rationality in working processes to prevent even the smallest potential errors. Bank Management software is a great solution to help operate and manage business processes more efficiently.

2. System requirement – purpose of the project

- Build an intuitive, easy-to-use system
- The system has all the basic functions required by the bank
- The system has a modern and easy-to-use interface
- Easily manage business operations (loan profile, loan contract, loan application)
- Helping to technology and modernize businesses
- Financial management, revenue reporting

II. State of the project

1. Purpose of the system

1.1 Actual demand

BankManagement software is a software developed to apply technology to bank management. Through this software system, you can easily perform operations such as appraisal, monitoring, reporting on the loan process, profit statistics of the bank...

1.2 Development opportunities

The management of the old process is inefficient, requiring a system that allows the most effective management for both users and customers. From employee management, customer records, contracts, reports, loan records, etc., using the same synchronous and transparent system not only saves effort and time but also increases accuracy... The future software will meet the needs of many banks when the trend of using online financial applications is increasing.

2. Description of users/forms and related entities

2.1 Plan

Organizational status: know the organizational structure of the business.
The current state of information technology: determine the level of hardware of the enterprise, the level of software support, and the level of information technology of employees and customers of the enterprise.
Business status: define the list of businesses that will be supported by computerization and the level of support (functional requirements) and other non-functional requirements.

2.2 Method

Method of researching documents: to know about the current state of the organization, the current state of information technology, the current state of business.
Interview method: current information technology, current professional status. Mainly ask about computer skills, interface, and function requirements.

2.3 Current status survey

2.3.1 Organizational status

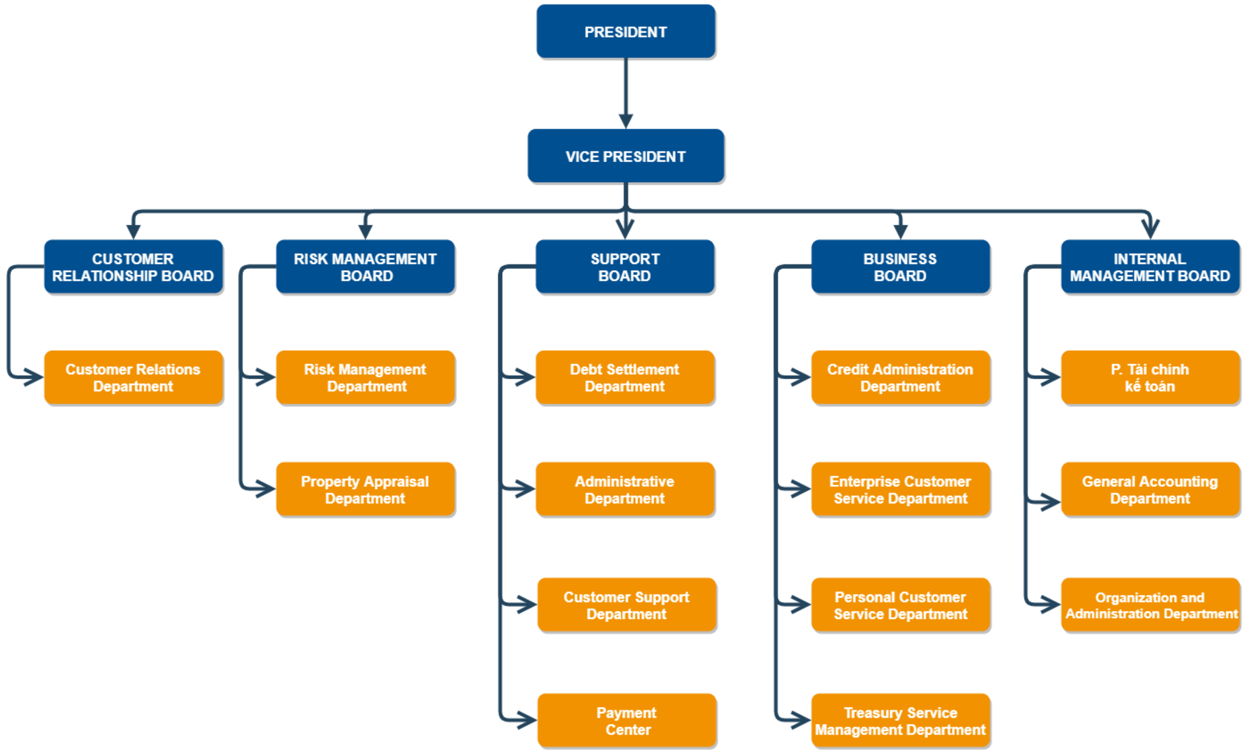

PRESIDENT
VICE PRESIDENT
CUSTOMER RELATIONSHIP BOARD
RISK MANAGEMENT BOARD
SUPPORT BOARD
BUSINESS BOARD
INTERNAL MANAGEMENT BOARD
Customer Relations Department
Risk Management Department
Property Appraisal Department
Debt Settlement Department
Administrative Department
Customer Support Department
Payment Center
Credit Administration Department
Enterprise Customer Service Department
Personal Customer Service Department
Treasury Service Management Department
P. Tài chính kế toán
General Accounting Department
Organization and Administration Department

Figure 1. Bank's organizational structure

2.3.2 Current state of informatics

• *Hardware*

Computer system configuration

	Management department	Staff Department
Processor	CPU Intel Xeon Platinum 8280 / 38.5 MB / 2.7GHz turbo / 28 cores 56 threads	AMD Ryzen Threadripper PRO 3995WX / Socket sWRX80 / 256MB / 4.2Ghz / 64 cores 128 threads
RAM	64GB	16GB
Hard Disk	1TB (HDD) and 1TB (SSD)	1TB (HDD) and 1TB (SSD)

Video card	GeForce RTX 3090	Radeon RX 6900 XT

Internet system using Viettel optical cable with 120Mbps speed to broadcast wifi through the WAN port of Ubiquiti EdgeRouter 4 with the ability to provide 500 users at the same time.

• *Software*

Name	License	Function
Android	X	Operator System
Android Studio		IDE/Text Editor
Visual Studio Code		
MongoDBCompass	X	Database Management
Amazon Web Service	X	

• *People, the level of informatics*
- Cashiers can easily absorb information technology.
- Marketing staff with computer certification certificates.
- HR staff have been using bank management software well.

2.3.3 Current status of the business

• *List of occupations corresponding to the department*

- **The Customer Relations Department** contacts and directly contacts customers to advise and sell products that the bank provides.
- **The Risk Management Department** identifies, analyzes, measures and assesses risks, thereby finding measures to control and overcome the consequences of risks for business activities in order to make optimal use of resources.
- **The Property Appraisal Department** appraises property prices for loan purposes at banks before granting limits to help banks avoid risks.
- **The Debt Settlement Department** identifies and applies debt settlement solutions.
- **The Administrative Department** controls administrative costs of the whole system according to the annual budget plan and within the cost norms.
- **The Customer Support Department** updates and stores information and data collected from customers and provides them to relevant departments for the development of products and services of the bank**.**
- **The Payment Center** is in charge of the interbank payment system with modern payment centers to ensure interbank payments in the region and nationwide.
- **The Credit Administration Department** identifies, analyzes, and measures the level of risk, thereby proposing measures and management methods to limit and eliminate the level of credit risk in the bank's credit activities.
- **The Enterprise Customer Service Department** is in charge of a company's financial transactions with an organization that provides business loans, credits, accounts designed specifically for companies and businesses.
- **The Personal Customer Service Department** is in charge of the services and products offered to individuals and households through a network of branches.
- **The Treasury Service Management Department** performs work related to treasury money operations.
- **The Finance and Accounting Department** collects, records, processes, and analyzes economic and financial transactions, and at the same time provides necessary information for the management of monetary activities at the bank, and other financial transactions. organization, individual.
- **The General Accounting Department** collects, records, and summarizes economic transactions arising from business activities of the bank, providing information for the management of the bank's monetary activities.
- **The Organization and Administration Department** advises leaders on human resources, completing archiving, administrative clerical, and asset management tasks for the bank.

3. Description of processes

3.1 Submit loan profile

Actor’s Activities	System’s reaction
This use case begins when a staff click “create loan profile”	
Actor will fill **loan profile** with the information that the customer provided	-System will confirm whether the entered information is valid or not, then report an error if so.
Actor click the send button	-Loan profile will be saved and sent to the appraisal department

3.2 Create appraisal report

Actor’s Activities	System’s reaction
This use case begins when the staff clicks the appraisal loan profile.	
Actor click the “create appraisal report for loan profile” button	-System will display the detailed information of the appraisal report on the screen with the customer's information already entered.
Actor enter detailed information for the appraisal report	
Actor click send appraisal report	-System will save the appraisal report into the database and send it to the approval department

3.3 Loan review

Actor’s Activities	System’s reaction
This use case begins when the executive department clicks the “review ” button.	
Actor will click the “review” button	-System will show the loan profile and appraisal report on the screen.
Actor will click the “approve” button	-System will update the loan profile’s state and send it to staff for creating a loan contract

*Sub-event:

Actor’s Activities	System’s reaction
This use case begins when the executive department clicks the “reject ” button.	
Actor will click the “reject” button	-System will update the loan profile’s state to **“Rejected”**

3.4 Create loan contract

Actor’s Activities	System’s reaction
This use case begins when staff clicks the “create loan contract” button	
Actor will click the “create loan contract” button	-System will display loan contract sample on the screen.
Actor will enter contract information	
Actor will click the “save contract” button	-System will save loan contract into the database.

4. Functional requirements

No.	Operation’s name	Form	Constraint	Note
1	Loan	Form1	Cons1	
2	Receive profile	Form1.1	Cons1.1	
3	Validate profile	Form1.2	Cons1.2	
4	Appraise customer	Form1.3	Cons1.3	
5	Review profile	Form1.4	Cons1.4	
6	Create loan contract	Form1.5	Cons1.5	
7	Disburse	Form1.6	Cons1.6	
8	Profile management	Form2	Cons2	
9	Modify profile	Form2.1	Cons2.1	
10	Monitor report	Form2.2	Cons2.2	
11	Notify payment due date	Form2.3	Cons2.3	
12	Receive, validate application	Form2.4	Cons2.4	
13	Resolve application	Form2.5	Cons2.5	
14	Liquidate contract	Form2.6	Cons2.6	
15	Pay, report	Form3	Cons3	

16	Pay debt	Form3.1	Cons3.1	
17	Create final settlement	Form3.2	Cons3.2	
18	General report	Form3.3	Cons3.3	

5. Non-functional requirements

6. Evolution requirement

No.	Operation	Parameter need to be modified	Value domain need to be changed
1	Update contract detail	- Customer’s information - Contract’s state	

7. Effectiveness requirement

No.	Operation	Process time	Storage	Note
1	Create contract	500 contracts/time		
2	Search contract	500-1000 milliseconds		
3	Save contract	Instantly		
4	Search application	500-1000 milliseconds		

5	Notify	1-3 seconds		
6	Review profile	Instantly		
7	Create report	1-3 seconds		

8. Convinience requirements

No.	Operation	Easy to study	Easy to use	Note
1	Create contract	5 minutes instruct	The average fail rate is 1%.	
2	Search contract	3 minutes instruct	Unnecessarily know of the contract that needs to be found	Search accurately
3	Save contract	Doesn't need instruction		
4	Search application	3 minutes instruct	Unnecessarily know of the application that needs to be found	Search accurately
5	Notify	Doesn't need instruction		
6	Review profile	Doesn't need instruction		
7	Create report	10 minutes instruct	Doesn't need many actions	

9. Compatible requirements

No.	Operation	Related object	Note
1	Send notification	To all of the devices installed the application	Independent of OS version or application version
2	Export profile	To printer	Independent of printer type
3	Export report		
4	Export application		
5	Export contract		

10. Security requirements

No.	Operation	System admin	Board of directors	Business department	Appraisal department	Support department
1	Decentralization	X				
2	Receive profile					x
3	Validate profile			x		

4	Appraise customer				x	
5	Review profile		x			
6	Create contract			x		x
7	Disburse			x		x
8	Modify contract			x		
9	Monitor report			x		
10	Notify payment due date			x		x
11	Receive, validate application					x
12	Resolve application		x			
13	Liquidate contract			x		x
14	Pay debt			x		x
15	Create final settlement			x		
16	General report			x		

11. Safety requirements

No.	Operation	Object	Note
1	Recover	Loan profile, reports, applications, certificates of payment, contracts deleted	
2	Actual delete (Can’t recover)	Loan profile, reports, applications, certificates of payment, contracts deleted	
3	Can’t delete	- Dossiers and documents related to customers who have a valid contract with the bank. - Profiles, documents related to a customer that currently has valid contract with the bank	

12. Technology requirements

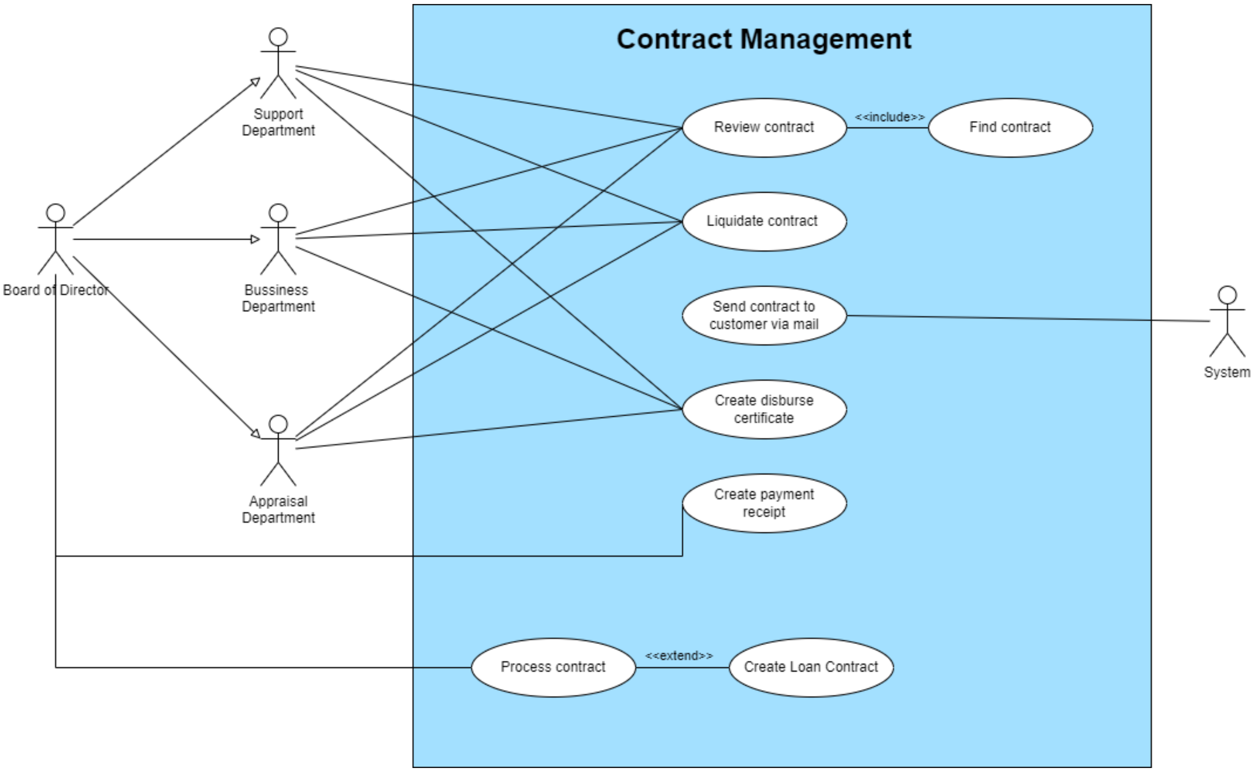
No.	Requirement	Detail describe	Note
1	Fix bugs easily	Identify bugs in an average of 15 minutes	Not affect other modules when fixing this module
2	Easy to maintain	Fix bug in an average of 1 hour	
3	Easy to upgrade	Adding a new feature or upgrade an existing feature quickly.	With requirements

4	Reuseable	Some modules can be reused in some other projects	With requirements
5	Fast completion	Build bank operation management in an average of 4 to 6 weeks	With requirements
6	Flexible	Switch to another database within 2 days	With requirements

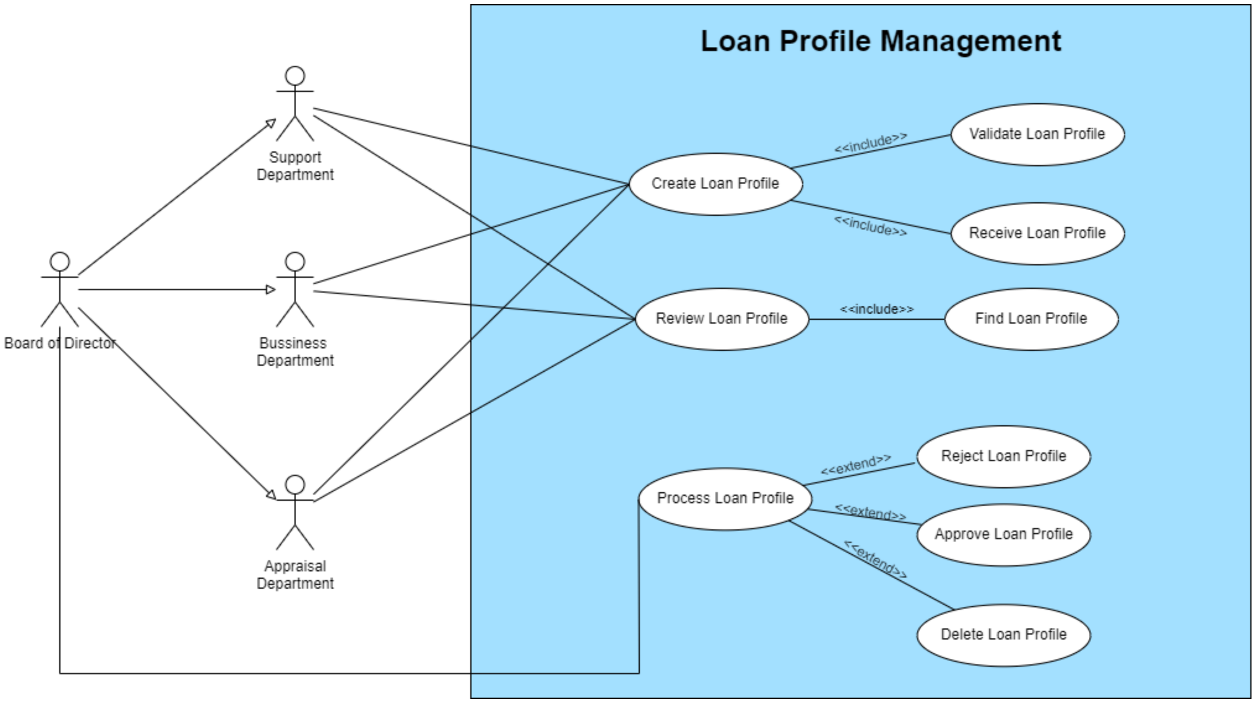
III. Use-case of the project

1. Use-case diagram

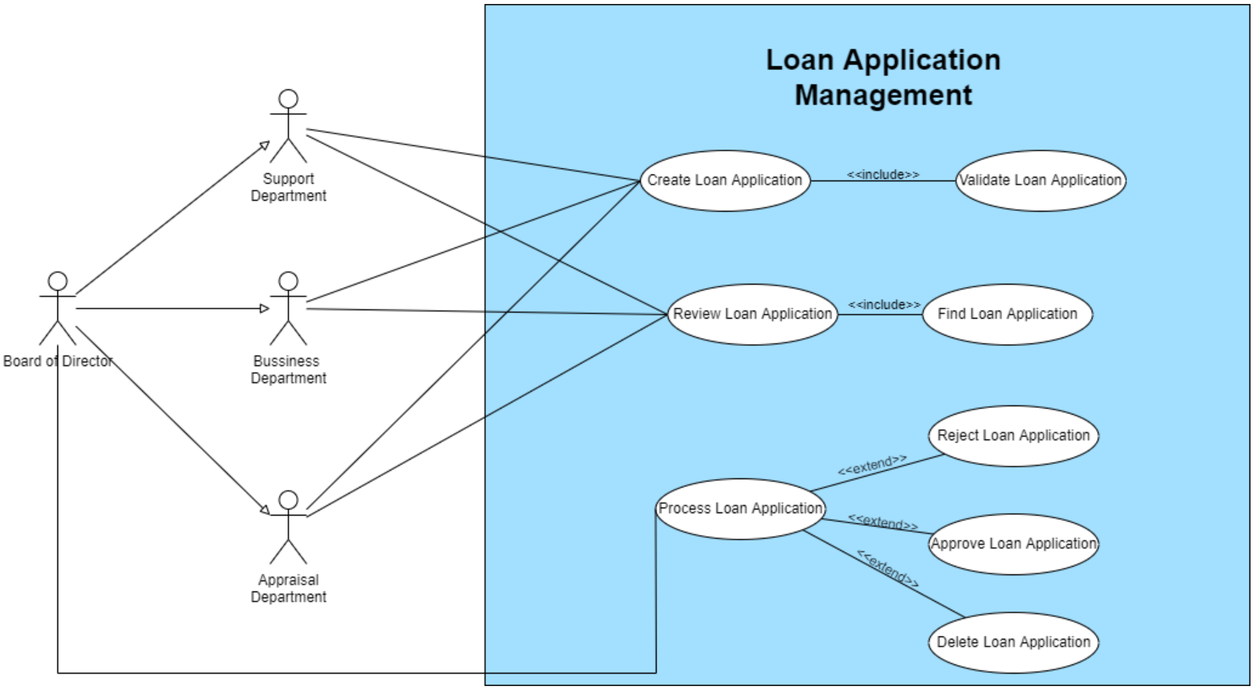
1.1. Contract management contract



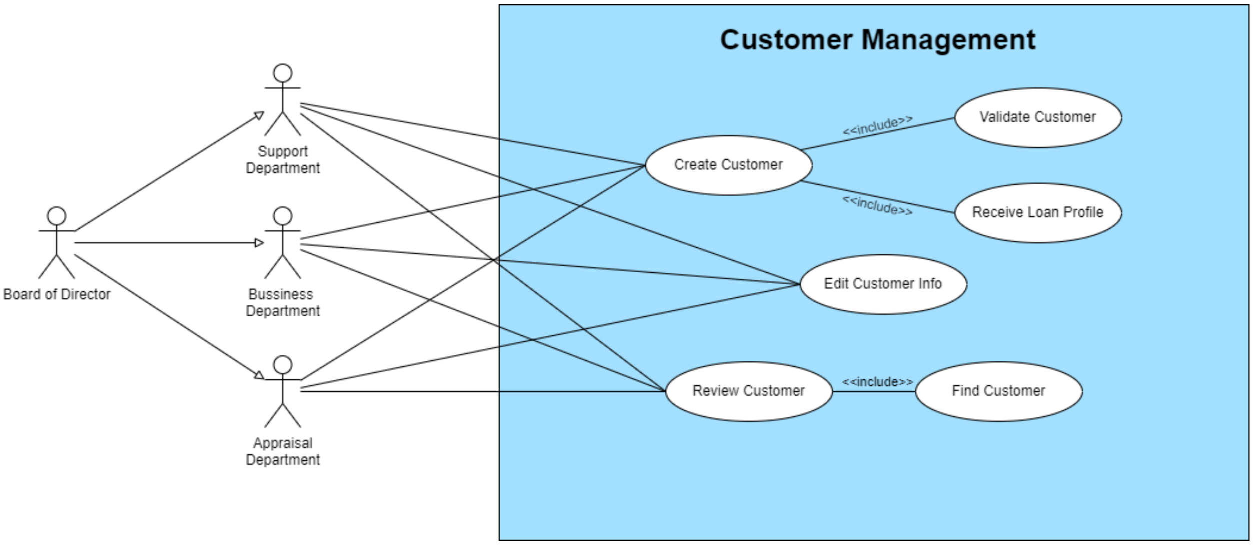
1.2. Loan profile management contract



1.3. Loan application management contract



1.4. Customer management contract



2. Actor list

No	Name of Actor	Short description/Notes
1	Board of directors	In charge of a bank branch, the only actor that has permission to accept or reject loan profiles.
2	Business department	Working with document, or support customer
3	Appraisal department	Appraise customer and create appraisal report
4	Support department	Mostly work with customers
5	System	Storage and handling automated works

3. Use-case list

No	Actor	Name of Use-case	Short description/Notes
1.	Support Department, Business Department, Appraisal Department, Board of Director	Review contract	
2.	Support Department, Business Department, Appraisal Department, Board of Director	Find contract	
3.	Support Department, Business Department, Appraisal Department, Board of Director	Liquidate contract	

4.	System	Send contract to customer via mail	
5.	Support Department, Business Department, Appraisal Department, Board of Director	Create disburse certificate	
6.	Board of Director	Create payment receipt	
7.	Board of Director	Create Loan Contract	
8.	Support Department, Business Department, Appraisal Department, Board of Director	Create Loan Profile	
9.	Support Department, Business Department, Appraisal Department, Board of Director	Review Loan profile	
10.	Support Department, Business Department, Appraisal Department, Board of Director	Find Loan Profile	
11.	Board of Director	Reject Loan Profile	
12.	Board of Director	Approve Loan Profile	
13.	Board of Director	Delete Loan Profile	
14.	Support Department, Business Department, Appraisal Department, Board of Director	Create Loan Application	
15.	Support Department, Business Department, Appraisal Department, Board of Director,	Review Loan Application	

16.	Support Department, Business Department, Appraisal Department, Board of Director	Find Loan Application	
17.	Board of Director	Reject Loan Application	
18.	Board of Director	Approve Loan Application	
19.	Board of Director	Delete Loan Application	
20.	Support Department, Business Department, Appraisal Department, Board of Director	Create Customer	
21.	Support Department, Business Department, Appraisal Department, Board of Director	Edit Customer Info	
22.	Support Department, Business Department, Appraisal Department, Board of Director	Review Customer	
23.	Support Department, Business Department, Appraisal Department, Board of Director	Find Customer	

4. Use- case specification

4.1. Use-case “Review contract”

Use case’s name	Review contract

Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Contract button on the left side tab. 2) List of contract will be shown on UI. 3) Actor click on one of the contract form that list 4) Detail information about that contract will be shown
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.2. Use-case "Find contract"

Use case's name	Find Contract
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Contract button on the left side tab. 2) Contract Dashboard will be shown 3) Actor enter the information need to find (contract number, customer phone,…) 4) List of contract result will be shown on UI.

Alternative flow	2.1) Found nothing => application will show empty state.
Post-condition	The system is ready for the next operation.
Extend point	None

4.3. Use-case “Liquidate contract”

Use case’s name	Liquidate contract
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the “Application” button on the left side tab. 2) Application Dashboard will be shown on UI. 3) Actor click on the “Create” button from the Dashboard. 4) A drop down will be shown 5) Actor select “Liquidation Application” menu item. 6) Actor fill the Liquidation Application information. 7) Actor click “Save” button. 8) The application will be created.
Alternative flow	7.1) The information is incorrect (missing some field, invalid format) => System will show error dialog.
Post-condition	The system is ready for the next operation.
Extend point	None

4.4. Use-case “Send contract to customer via mail”

Use case’s name	Send contract to customer via mail
Actor	System
Pre-condition	System is running smoothly, use case “Create Loan Contract” has just happened
Basic flow	1) System will create a pdf file base on the loan contract has just been created. 2) System will send the pdf file to customer by their email.
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.5. Use-case “Create disburse certificate”

Use case’s name	Create disburse certificate
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Contract button on the left side tab.

	2) List of contract will be shown on UI. 3) Actor click on one of the contract form that list. 4) Detail information about that contract will be shown. 5) Actor click button "Add" next to text "Disburse certificate". 6) A create dialog will be shown. 7) Actor enter the amount to be disbursed. 8) Actor click save. 9) The disburse certificate will be created
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.6. Use-case "Create payment receipt"

Use case's name	Create payment receipt
Actor	Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Contract button on the left side tab. 2) List of contract will be shown on UI. 3) Actor click on one of the contract form that list. 4) Detail information about that contract will be shown. 5) Actor click one of the liquidation applications from the list. 6) Actor click "Add payment receipt" button. 7) The payment receipt will be created
Alternative flow	

Post-condition	The system is ready for the next operation.
Extend point	None

4.7. Use-case “Create loan contract”

Use case’s name	Create loan contract
Actor	Board of Director
Pre-condition	● The actor must be authenticated. ● The use case “Review Loan Profile” has just happened. ● Current reviewing profile hasn’t had contract yet. ● Current reviewing profile was approved.
Basic flow	1) Actor click “Create contract button” 2) A create contract dialog will be shown. 3) Actor enter required information. 4) Actor click “Save” button. 5) Contract will be created.
Alternative flow	3.1) The information is incorrect (missing some field, invalid format) => System will show error dialog.
Post-condition	The system is ready for the next operation.
Extend point	None

4.8. Use-case “Create Loan Profile”

Use case’s name	Create Loan Profile
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated.
Basic flow	1) Actor clicks the “Profile” button on the left side tab. 2) Profile Dashboard will be shown on UI. 3) Actor click on the “Create” button from the Dashboard. 4) Actor select customer. 5) A Profile templete will be shown 6) Actor enter required information to create loan profile. 7) Actor click next to navigate to review information. 8) Actor click “Save” button 9) Profile will be created
Alternative flow	7.1) The information is incorrect (missing some field, invalid format) => System will show error dialog.
Post-condition	The system is ready for the next operation.
Extend point	None

4.9. Use-case “Review Loan Profile”

Use case’s name	Review Loan Profile
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the “Profile” button on the left side tab. 2) List of profile will be shown on UI. 3) Actor click on one of the profile form that list 4) Detail information about that profile will be shown
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.10. Use-case “Find Loan Profile”

Use case’s name	Find Loan Profile
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Profile button on the left side tab. 2) Profile Dashboard will be shown.

	3) Actor enter the information need to find (profile number, customer phone,…) 4) List of contract result will be shown on UI.
Alternative flow	2.2) Found nothing => application will show empty state.
Post-condition	The system is ready for the next operation.
Extend point	None

4.11. Use-case "Reject Loan Profile"

Use case's name	Reject Loan Profile
Actor	Board of Director
Pre-condition	● The actor must be authenticated. ● The use case "Review Loan Profile" has just happened. ● The Profile has not been approved.
Basic flow	1) Actor click "Reject" button. 2) The profile will be rejected
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.12. Use-case “Approve Loan Profile”

Use case’s name	Approve Loan Profile
Actor	Board of Director
Pre-condition	● The actor must be authenticated. ● The use case “Review Loan Profile” has just happened. ● The Profile has not been approved.
Basic flow	3) Actor click “Approve” button. 4) The profile will be approved.
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.13. Use-case “Delete Loan Profile”

Use case’s name	Delete Loan Profile
Actor	Board of Director
Pre-condition	● The actor must be authenticated. ● The use case “Review Loan Profile” has just happened. ● The Profile has not been approved.
Basic flow	5) Actor click “Delete” icon button. 6) The profile will be deleted.
Alternative flow	

Post-condition	The system is ready for the next operation.
Extend point	None

4.14. Use-case “Create Loan Application”

Use case’s name	Create Loan Application
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the “Application” button on the left side tab. 2) Application Dashboard will be shown on UI. 3) Actor click on the “Create” button from the Dashboard. 4) A drop down will be shown 5) Actor select application type in dropdown menu. 6) Actor fill the required information. 7) Actor click “Save” button. 8) The application will be created.
Alternative flow	7.1) The information is incorrect (missing some field, invalid format) => System will show error dialog.
Post-condition	The system is ready for the next operation.

Extend point	None

4.15. Use-case "Review Loan Application"

Use case's name	Review Loan Application
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the "Application" button on the left side tab. 2) Application Dashboard will be shown on UI. 3) Actor click on one of the applications shown on dashboard. 4) A Review Application dialog contain detailed information about that application will be shown.
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.16. Use-case "Find Loan Application"

Use case's name	Find Loan Application
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated

Basic flow	1) Actor clicks the Application button on the left side tab. 2) Application Dashboard will be shown 3) Actor enter the information need to find (application number, customer phone,…) 4) List of contract result will be shown on UI.
Alternative flow	Found nothing => application will show empty state.
Post-condition	The system is ready for the next operation.
Extend point	None

4.17. Use-case “Reject Loan Application”

Use case’s name	Reject Loan Application
Actor	Board of Director
Pre-condition	● The actor must be authenticated. ● The use case “Review Loan Application” has just happened. ● The Application has not been approved.
Basic flow	7) Actor click “Reject” button. 8) The application will be rejected
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.18. Use-case "Approve Loan Application"

Use case's name	Approve Loan Application
Actor	Board of Director
Pre-condition	● The actor must be authenticated. ● The use case "Review Loan Application" has just happened. ● The Application has not been approved.
Basic flow	9) Actor click "Approve" button. 10)The application will be Approved.
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

4.19. Use-case "Create customer"

Use case's name	Create Customer
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Application button on the left side tab. 2) Application Dashboard will be shown. 3) Actor click "Create" button. 4) A create dialog will be shown.

	5) Actor enter the required information. 6) Actor click save. 7) The customer will be created
Alternative flow	6.1) The information is incorrect (missing some field, invalid format) => System will show error dialog.
Post-condition	The system is ready for the next operation.
Extend point	None

4.20. Use-case "Edit Customer Information"

Use case's name	Edit Customer Information
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	● The actor must be authenticated. ● The use case "Review Customer" has just happened.
Basic flow	1) Actor click "Edit" button. 2) A edit customer screen will be shown. 3) Actor changes customer info. 4) Actor click "Save" button. 5) Customer will be updated.
Alternative flow	4.1) The information is incorrect (missing some field, invalid format) => System will show error dialog.

Post-condition	The system is ready for the next operation.
Extend point	None

4.21. Use-case “Review customer”

Use case’s name	Review Customer
Actor	Support Department, Business Department, Appraisal Department, Board of Director
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the “Customer” button on the left side tab. 2) List of Customer will be shown on UI. 3) Actor click on one of the Customer form that list 4) Detail information about that Customer will be shown
Alternative flow	
Post-condition	The system is ready for the next operation.
Extend point	None

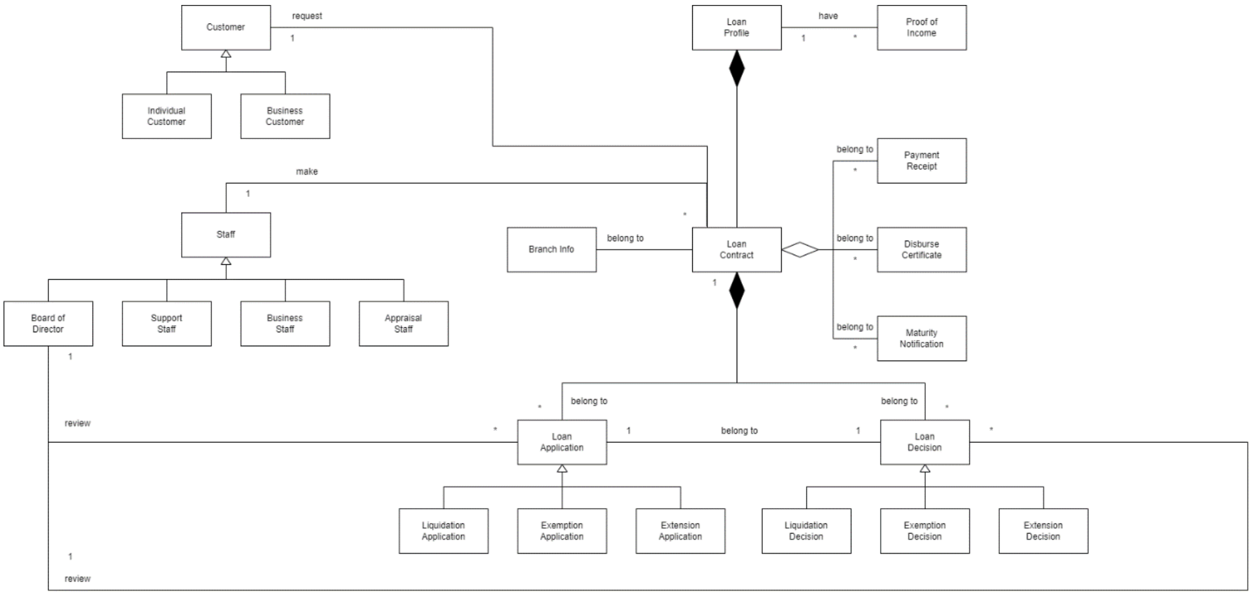
4.22. Use-case “Find customer”

Use case’s name	Find Customer
Actor	Support Department, Business Department, Appraisal Department, Board of Director

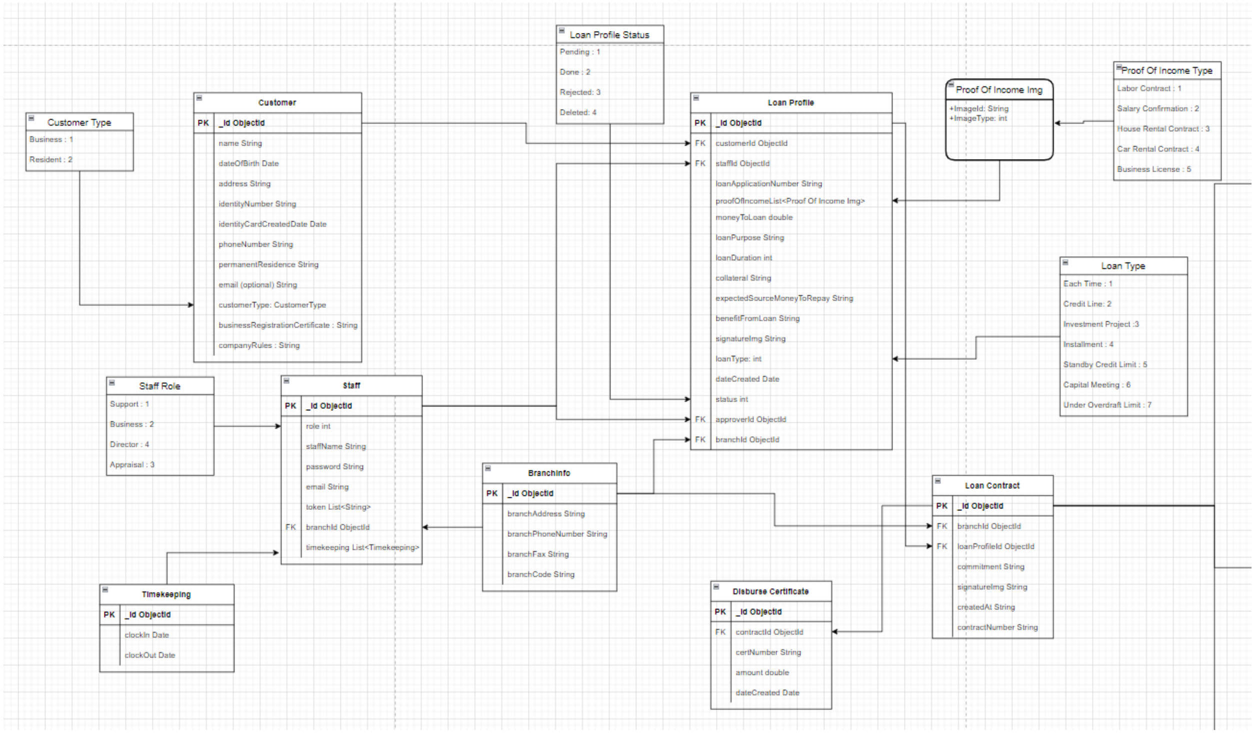
Pre-condition	The actor must be authenticated
Basic flow	1) Actor clicks the Customer button on the left side tab. 2) Customer Dashboard will be shown 3) Actor enter the information need to find (customer name, customer phone,…) 4) List of Customer result will be shown on UI.
Alternative flow	Found nothing => application will show empty state.
Post-condition	The system is ready for the next operation.
Extend point	None

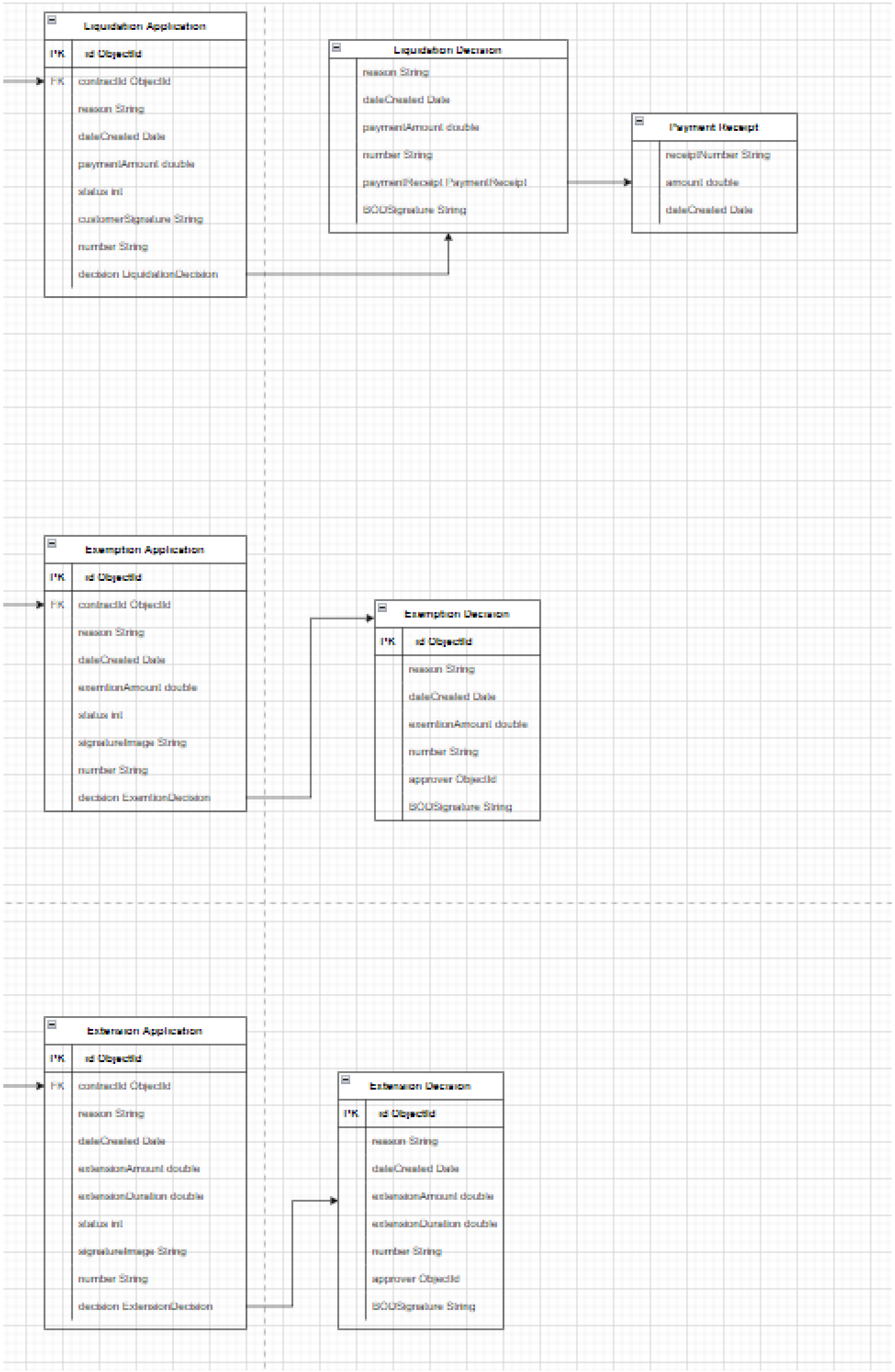
IV. Class diagram

1. Class diagram (conceptual level)



2. Class diagram (analysis level)




Liquidation Application
PK id ObjectId
FK contractId ObjectId
reason String
dateCreated Date
paymentAmount double
status int
customerSignature String
number String
decision LiquidationDecision
Liquidation Decision
reason String
dateCreated Date
paymentAmount double
number String
paymentReceipt PaymentReceipt
BODSignature String
Payment Receipt
receiptNumber String
amount double
dateCreated Date
Exemption Application
PK id ObjectId
FK contractId ObjectId
reason String
dateCreated Date
exemtionAmount double
status int
signatureImage String
number String
decision ExemtionDecision
Exemption Decision
PK id ObjectId
reason String
dateCreated Date
exemtionAmount double
number String
approver ObjectId
BODSignature String
Extension Application
PK id ObjectId
FK contractId ObjectId
reason String
dateCreated Date
extensionAmount double
extensionDuration double
status int
signatureImage String
number String
decision ExtensionDecision
Extension Decision
PK id ObjectId
reason String
dateCreated Date
extensionAmount double
extensionDuration double
number String
approver ObjectId
BODSignature String

See full-size here

3. Class diagram explanation

3.1. Loan Profile Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	id of loan profile, generated every time a new loan profile is created on mongoose.
2	customerId	ObjectId	FK	id of customer who owns this profile.
3	staffId	ObjectId	FK	id of staff who creates this profile.
4	loanApplicationNumber	String		identify number of this loan profile.

5	proofOfIncomeList	List<Proof of Income Img>		this loan profile’s proofs of income
6	moneyToLoan	Double		Loan amount of the loan profile
7	loanPurpose	String		Purpose of the loan profile
8	loanDuration	Int		Loan duration of the loan profile
9	collateral	String		Collateral of the loan profile
10	expectedSourceMoneyToRepay	String		Expected source of money use for repaying of the loan profile
11	benefitFromLoan	String		Bank’s benefit from this loan profile

12	SignatureImg	String		Customer’s signature on loan profile
13	loanType	Int		Loan type of application
14	dateCreated	Date		Loan application creation date
15	Status	Int		Status of loan application
16	approverId	ObjectId	FK	id of the manager approves the profile
17	branchId	ObjectId	FK	Id of branch info where the loan application is created

3.2. Staff Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	id of each staff in the bank
2	role	Int		The role of the employee in the bank
3	staffName	String		Name of staff to display in the system
4	password	String		hashed-password of each employee used to log into the system,
5	email	String		Email of each employee used to log into the system

6	token	List<String>		list of access tokens created when staff logged into the system
7	branchId	ObjectId	FK	Information about the branch where the employee works
8	timekeeping	List<Timekeeping>		employee timekeepings

3.3. Branch Info Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	id of each bank branch
2	branchAddress	String		address of each branch

3	branchPhoneNumber	String		Phone number of each branch
4	branchFax	String		Fax of each branch
5	branchCode	String		Code of each branch

3.4. TimeKeeping Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	id of each timekeeping
2	clockIn	Date		time that staff starts working
4	clockOut	Date		time that staff ends working

3.5. Customer Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	id of each customer
2	name	String		Name of customer
3	dateOfBirth	Date		Date of birth of customer
4	address	String		Customer's address
5	identityNumber	String		Customer's identification number (ID)
6	identityCardCreatedDate	Date		customer’s identification card created date

7	phoneNumber	String		Customer’s phone number
8	permanentResidence	String		customer's residence address
9	email	String	Optional	Customer’s email
10	customerType	Int		Customer type
11	businessRegistrationCertificate	String		Business’s certificate if customer is business customer
12	compayRules	String		Company rules if customer is business customer

3.6. Proof Of Income Img Table:

No	Attribute Name	Type	Constraints	Meaning/ Note

1	imageId	String		id of each image in loan application
2	imageType	Int		Proof of income type

3.7. Loan Contract Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of each loan contract
2	branchId	ObjectId	FK	Id of branch info where the loan application is created
3	loanProfileId	ObjectId	FK	Id of loan profile related to this contract
4	commitment	String		Commitment of the loan contract

5	signatureImg	String		Customer’s signature on loan contract
6	createdAt	String		Create at of loan contract
7	contractNumber	String		Contract number of loan contract

3.8. Disburse Certificate Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of each disburse certificate
2	contractId	ObjectId	FK	Id of loan contract
3	certNumber	String		Number of certificates

4	amount	Double		The amount specified in the certificate
5	dateCreated	Date		Date created disburse certificate

3.9. Liquidation Application Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of Liquidation Application
2	contractId	ObjectId	FK	Id of loan contract
3	reason	String		Reason of liquidation application

4	dateCreated	Date		Date Create liquidation application
5	paymentAmount	Double		the amount paid in the payment application
6	status	Int		Status of application
7	customerSignature	String		Customer’s signature in application
8	number	String		Number of liquidation application
9	decision	LiquidationDecision		Decision of the liquidation application

3.10. Liquidation Decision Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	reason	String		Reason of liquidation decision
2	dateCreated	Date		Date created of liquidation decision
3	paymentAmount	Double		Payment amount of liquidation decision of the bank
4	number	String		Number of liquidation decision
5	paymentReceipt	PaymentReceipt		Payment receipt of liquidation decision

6	approver	ObjectId		id of director creates the decision
7	BODSignature	String		signature url of director creates the decision

3.11. Payment Receipt Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	receiptNumber	String		Number of receipt
2	amount	double		Amount of receipt
3	dateCreated	Date		Date created of payment receipt

3.12. Exemption Application Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of each exemption application
2	contractId	ObjectId	FK	Id of loan contract
3	reason	String		Reason of exemption application
4	dateCreated	Date		Date created of exemption application
5	exemptionAmount	Double		Amount of exemption application
6	status	int		Status of exemption application

7	signatureImage	String		Customer's signature on application
8	number	String		Number of exemption application
9	decision	Exemption Decision		Exemption Decision of the bank

3.13. Exemption Decision Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of each exemption decision
2	reason	String		Reason of each exemption decision
3	dateCreated	Date		Date created of exemption decision

4	exemptionAmount	Double		Amount of exemption decision
5	number	String		Number of exemption decision
6	approver	ObjectId		id of director creates the decision
7	BODSignature	String		signature url of director creates the decision

3.14. Extension Application Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of each extension application
2	contractId	ObjectId	FK	Id of loan contract owns this application

3	reason	String		Reason of extension application
4	dateCreated	Date		Date created of extension application
5	extensionAmount	Double		Amount of extension application
6	extensionDuration	Double		Duration of extension application
7	status	int		Status of extension application
8	signatureImage	String		Customer’s signature on application

9	number	String		Number of extension application
10	decision	Extension Decision		extension Decision of the bank

3.15. Extension Decision Table:

No	Attribute Name	Type	Constraints	Meaning/ Note
1	_id	ObjectId	PK	Id of each extension decision
2	reason	String		Reason of each extension decision
3	dateCreated	Date		Date created of extension decision
4	extensionAmount	Double		Amount of extension decision

5	extensionDuration	Double		Duration of extension decision
6	number	String		Number of extension decision
7	approver	ObjectId		id of director creates the decision
8	BODSignature	String		signature url of director creates the decision

3.16. Enum Table:

No	**Loan Profile Status**
1	Pending
2	Done
3	Rejected
4	Deleted

No	Proof of Income Type
1	Labor Contract
2	Salary Confirmation
3	House Rental Contract
4	Car Rental Contract
5	Business License

No	Loan Type
1	Each Time
2	Credit Line
3	Investment Project
4	Installment

5	Standby Credit Limit
6	Capital Meeting
7	Under Overdraft Limit

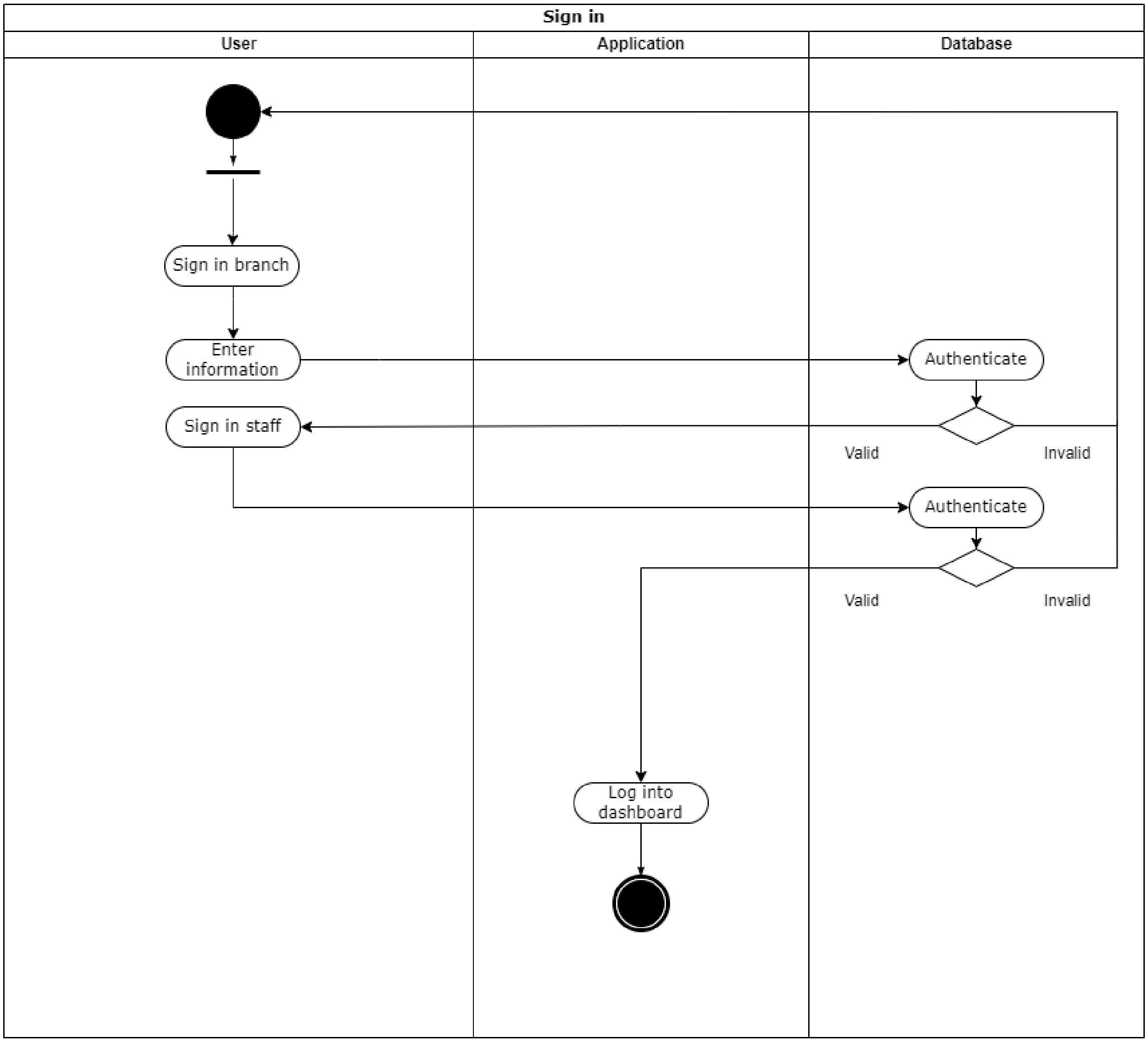
No	**Customer Type**
1	Business
2	Resident

No	**Staff Role**
1	Support
2	Business
3	Director

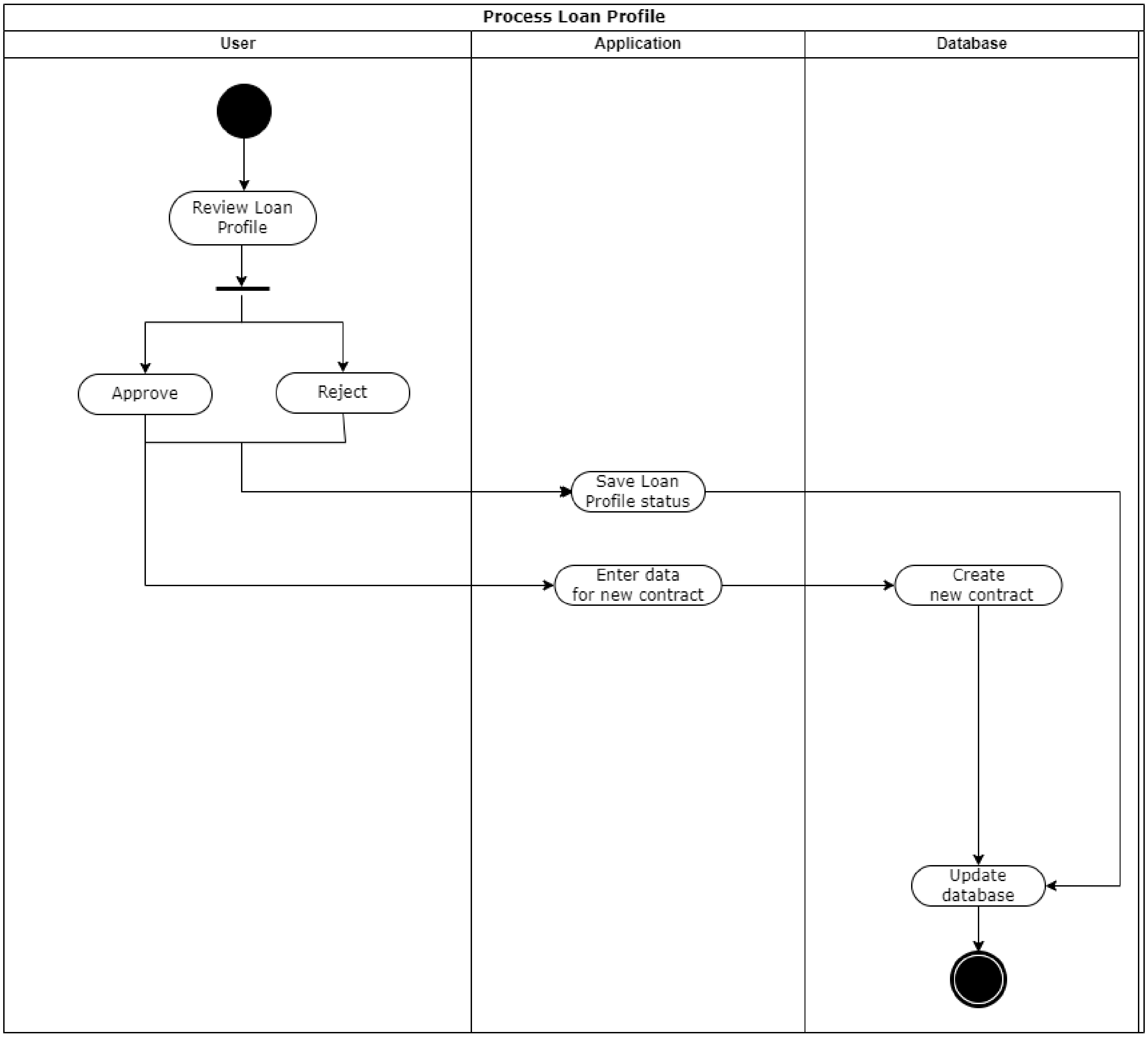
4	Appraisal

V. Activity diagram

1. Sign in diagram

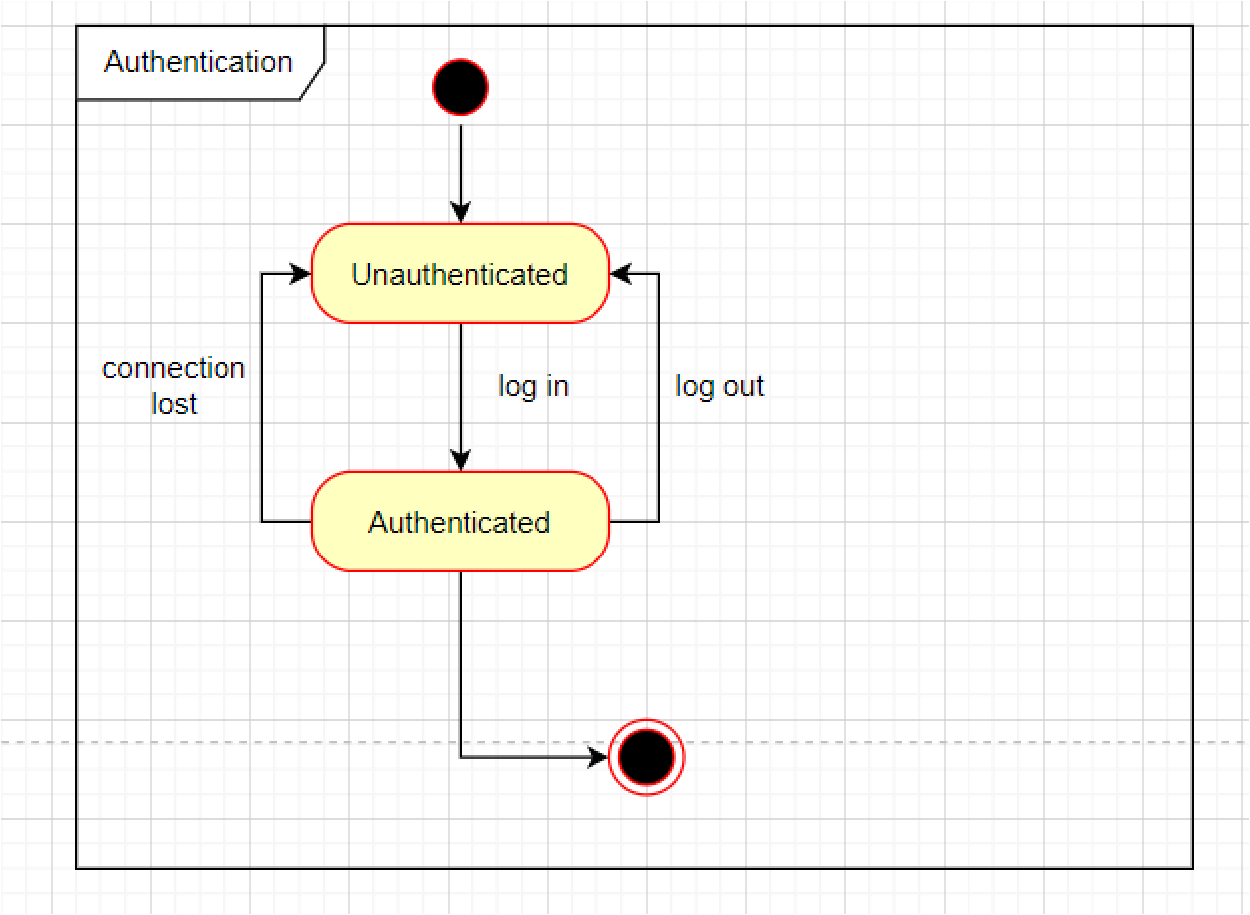


2. Process loan profile diagram

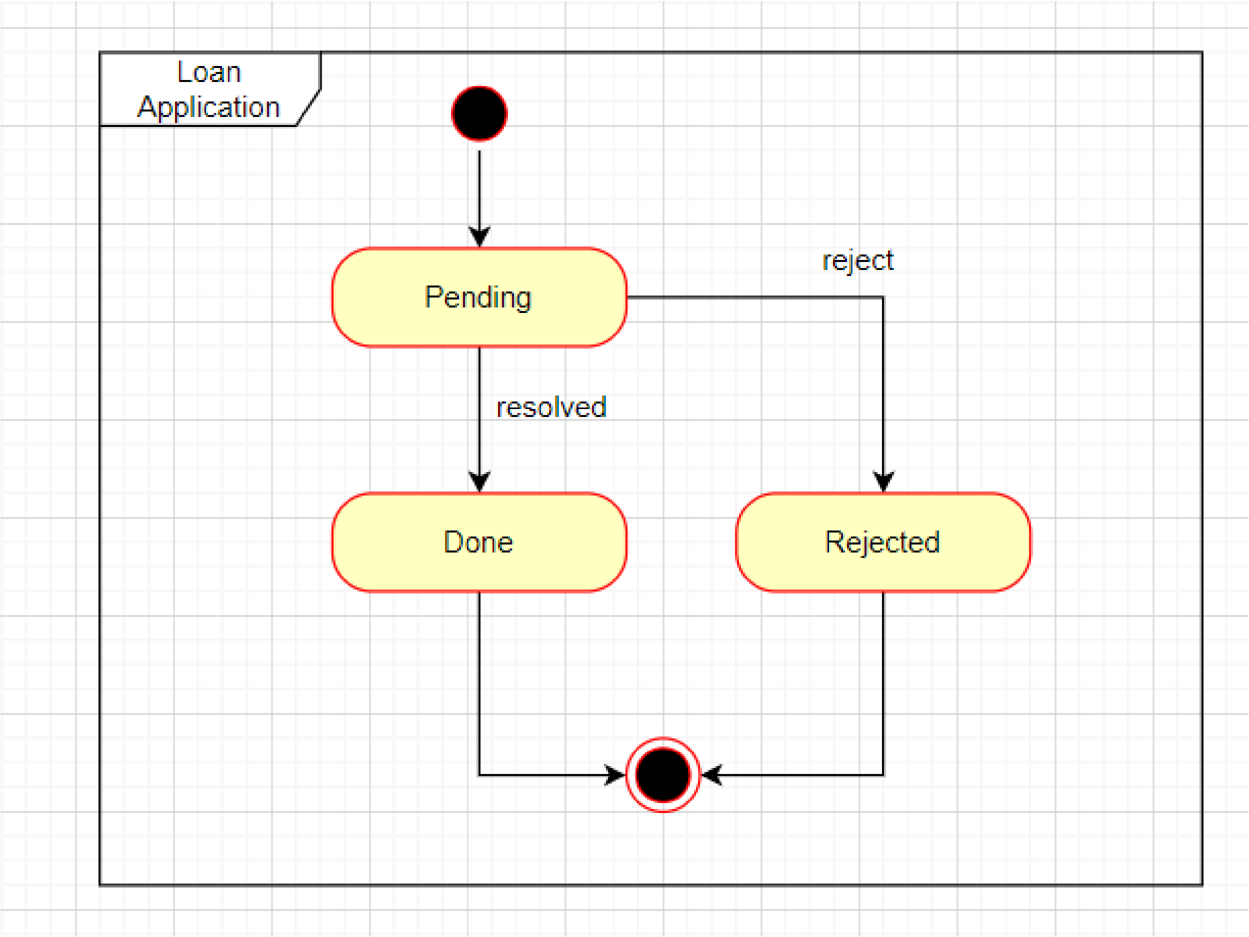


VI. State diagram

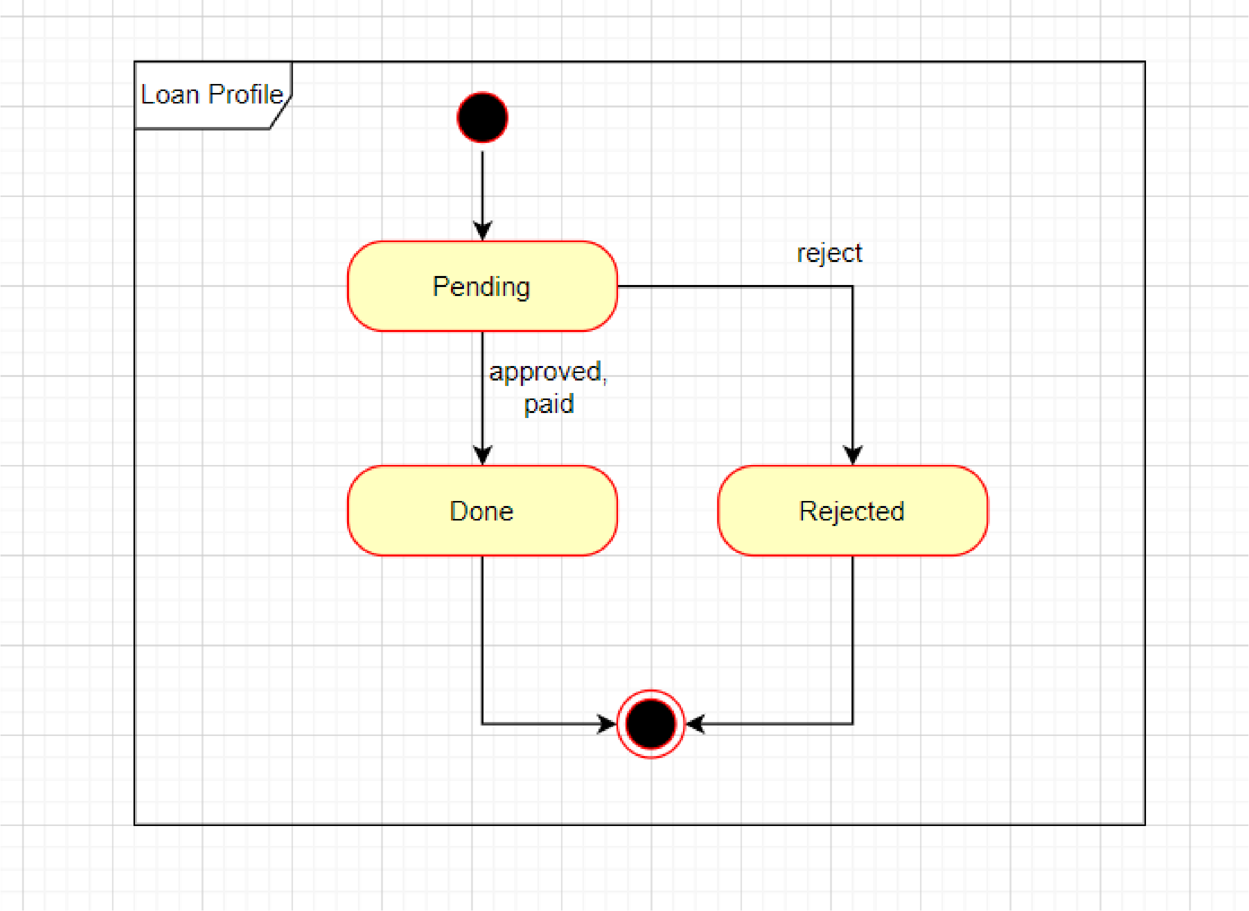
1. Authentication status diagram



2. Loan application status diagram

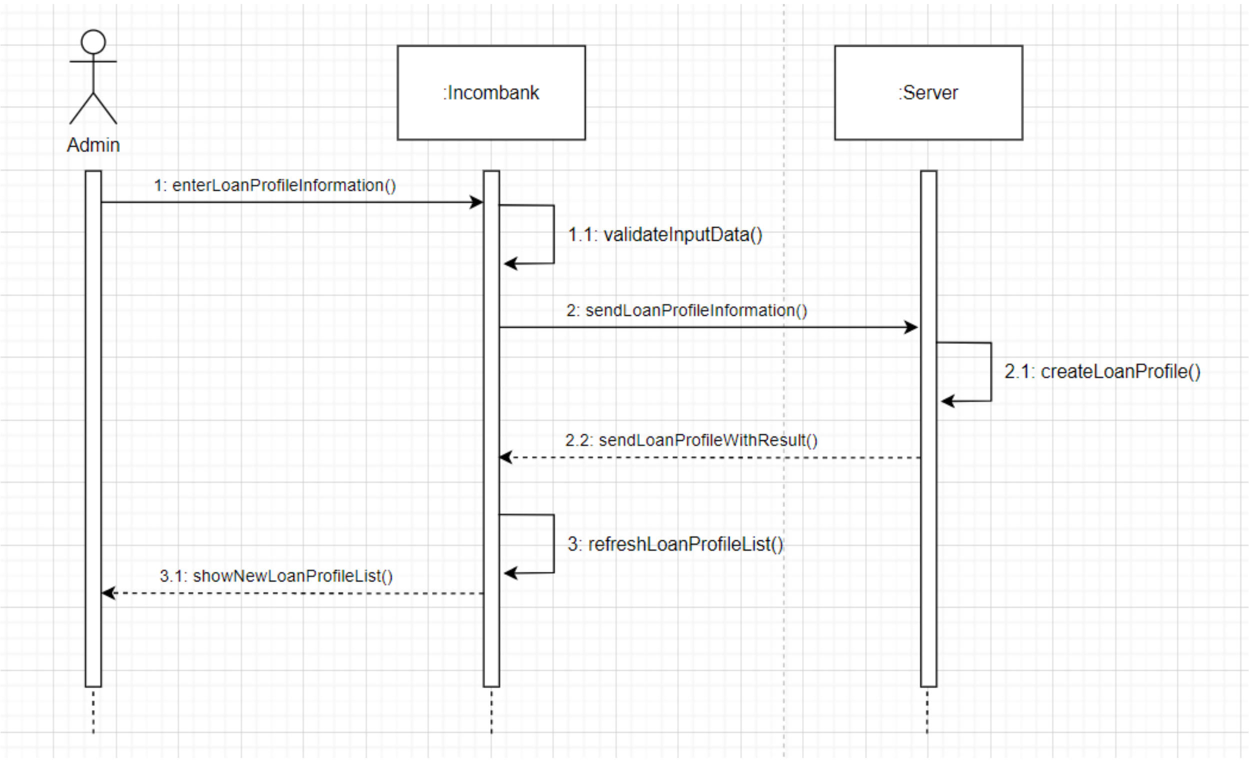


3. Loan profile status diagram

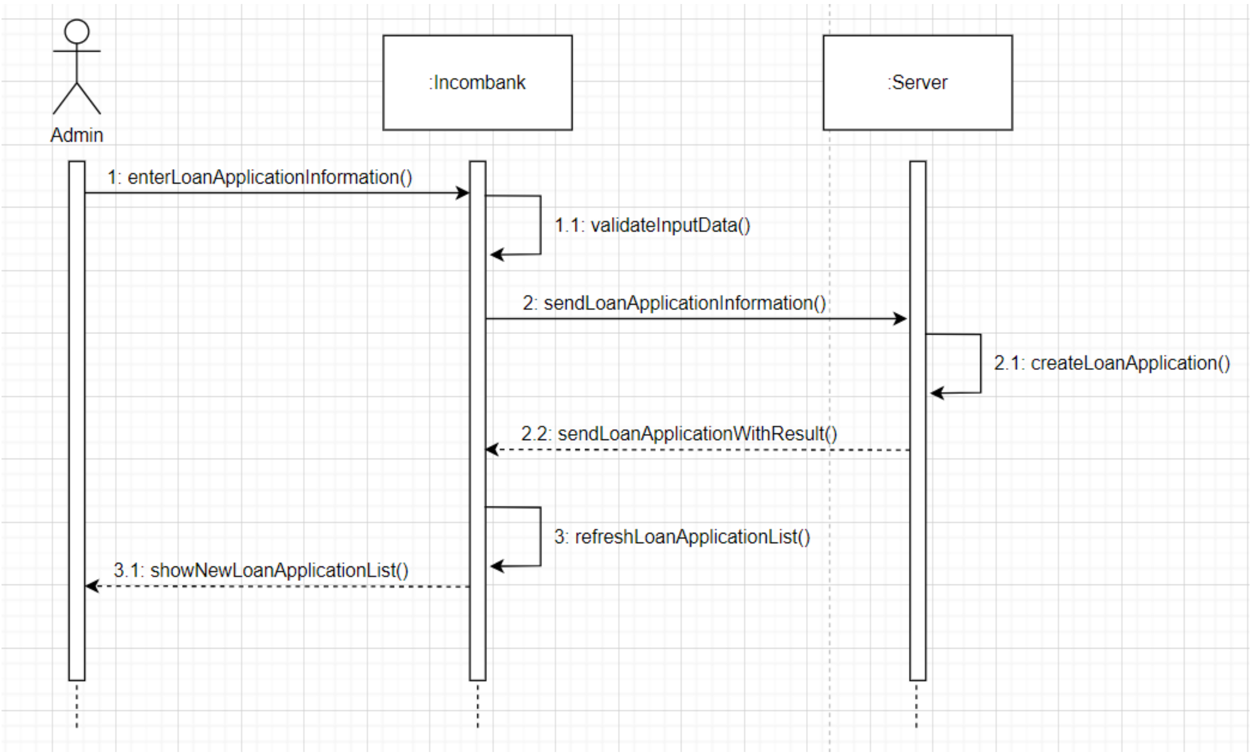


VII. Sequence diagram

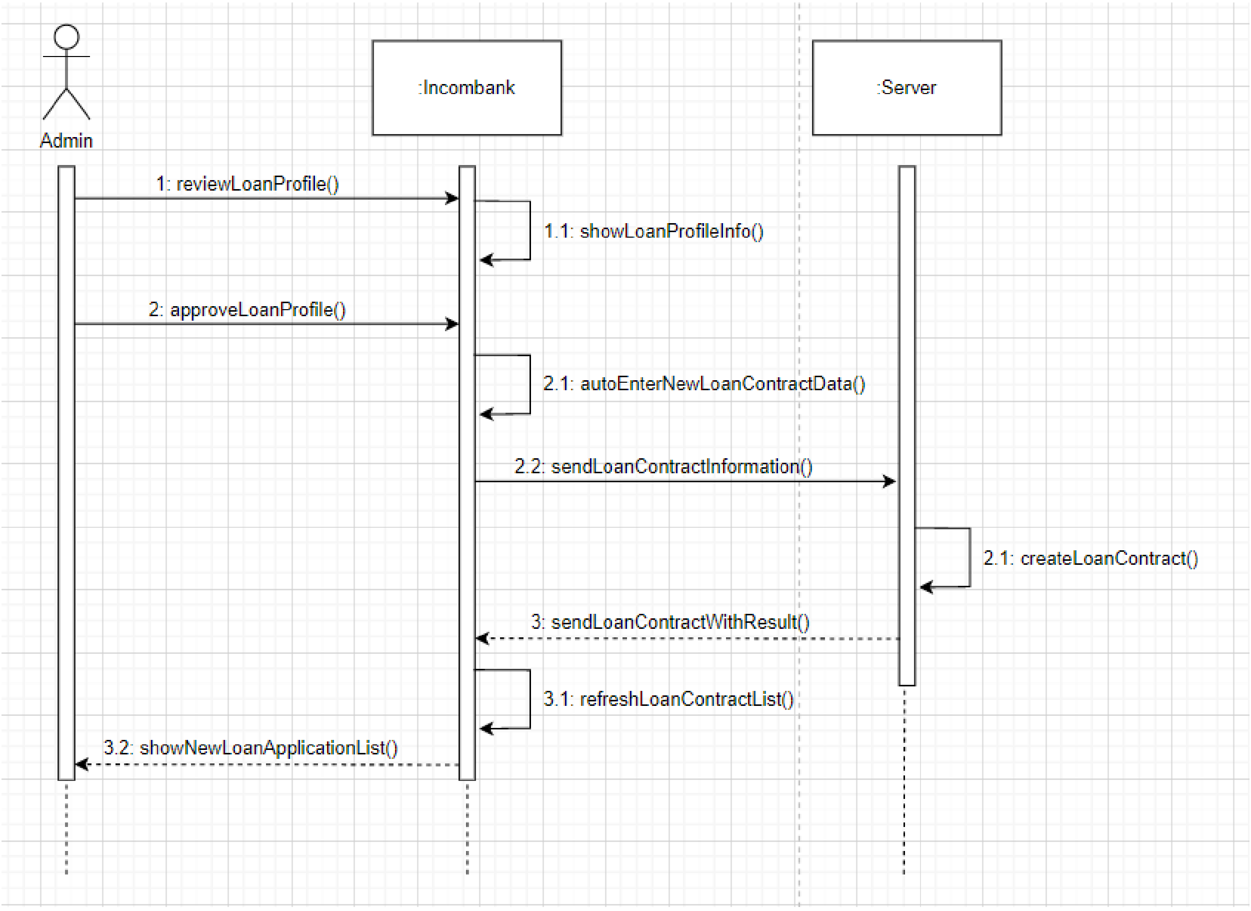
1. Create loan profile diagram


:Incombank
:Server
Admin
1: enterLoanProfileInformation()
1.1: validateInputData()
2: sendLoanProfileInformation()
2.1: createLoanProfile()
2.2: sendLoanProfileWithResult()
3: refreshLoanProfileList()
3.1: showNewLoanProfileList()

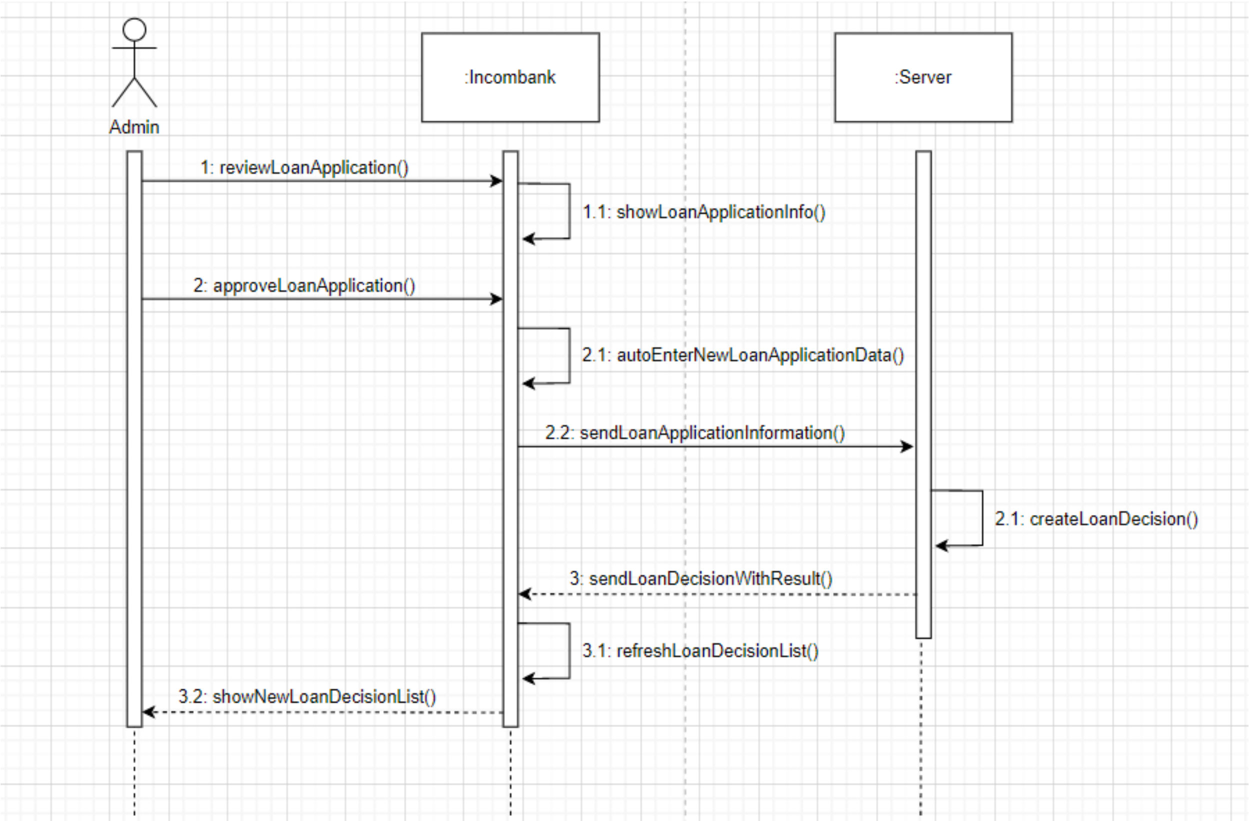
2. Create loan application diagram


Admin
:Incombank
:Server
1: enterLoanApplicationInformation()
1.1: validateInputData()
2: sendLoanApplicationInformation()
2.1: createLoanApplication()
2.2: sendLoanApplicationWithResult()
3: refreshLoanApplicationList()
3.1: showNewLoanApplicationList()

3. Create loan contract diagram

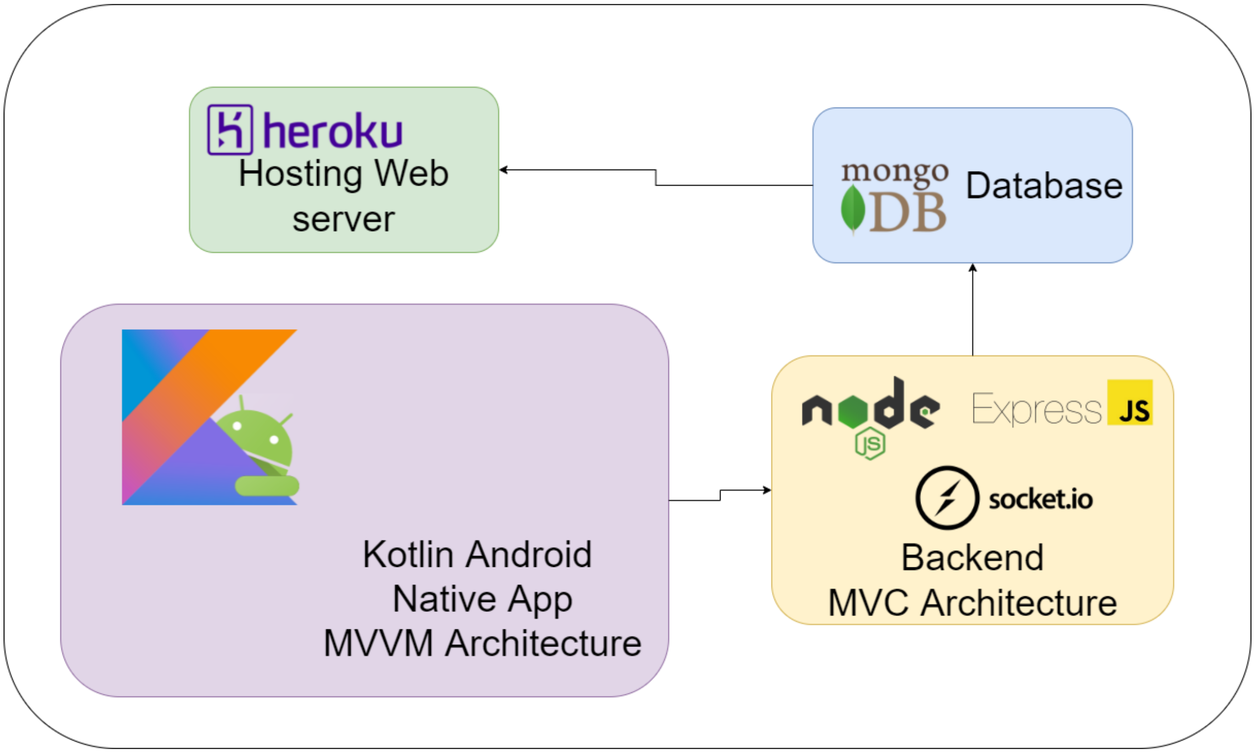

Admin
:Incombank
:Server
1: reviewLoanProfile()
1.1: showLoanProfileInfo()
2: approveLoanProfile()
2.1: autoEnterNewLoanContractData()
2.2: sendLoanContractInformation()
2.1: createLoanContract()
3: sendLoanContractWithResult()
3.1: refreshLoanContractList()
3.2: showNewLoanApplicationList()

4. Create loan decision diagram


Admin
:Incombank
:Server
1: reviewLoanApplication()
1.1: showLoanApplicationInfo()
2: approveLoanApplication()
2.1: autoEnterNewLoanApplicationData()
2.2: sendLoanApplicationInformation()
2.1: createLoanDecision()
3: sendLoanDecisionWithResult()
3.1: refreshLoanDecisionList()
3.2: showNewLoanDecisionList()

VIII. Architecture design

1. Application Architecture Overview

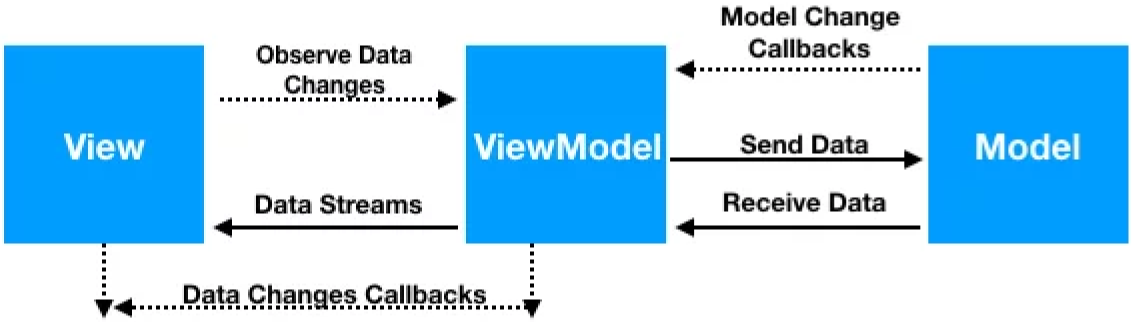


This application is implemented with the architecture shown above, it includes:

- ***Front-end:*** is the layer in which the users interact with an application. Front-end contents Shared UI code, Code Behind and Designers used to represent information to user.This layer is built based on Android framework,written in Kotlin and target tablet devices, with MVVM as its architecture.
- ***Back-end:*** is the layer responsible for providing RestAPI for the front-end layer, as well as handling the communication between front-end and database.This layer is built on top of NodeJS, ExpressJS and socket.io, written in Javascript with MVC architecture.
- ***Database:*** This application use mongoDB as its database, it's a is a document database designed for ease of development and scaling
- ***Hosting:*** The back-end layer is hosted on Heroku, it's a free hosting service for small project, so it's quite slow for performance.

2. Application Architecture in detail

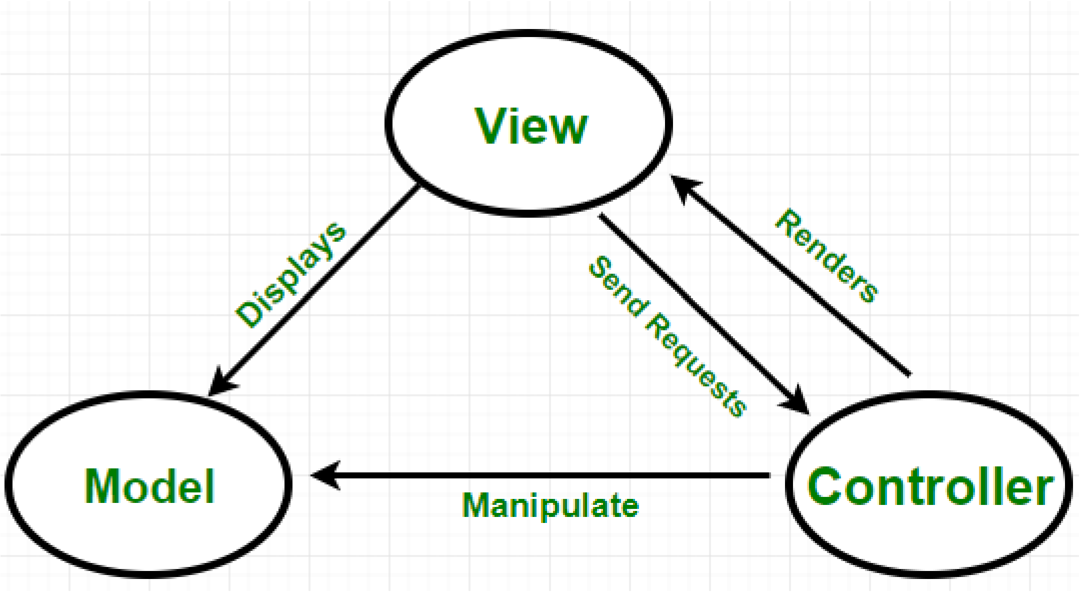
2.1. Front-end layer



The front-end layer is built with MVVM (Model-View-View Model) architecture, which includes :

- ***Model:*** This holds the data of the application. It cannot directly talk to the View. Generally, it's recommended to expose the data to the ViewModel through Observables.
- ***View:*** It represents the UI of the application devoid of any Application Logic. It observes the ViewModel.
- ***ViewModel:*** It acts as a link between the Model and the View. It's responsible for transforming the data from the Model. It provides data streams to the View. It also uses hooks or callbacks to update the View. It'll ask for the data from the Model.

2.2. Back-end layer

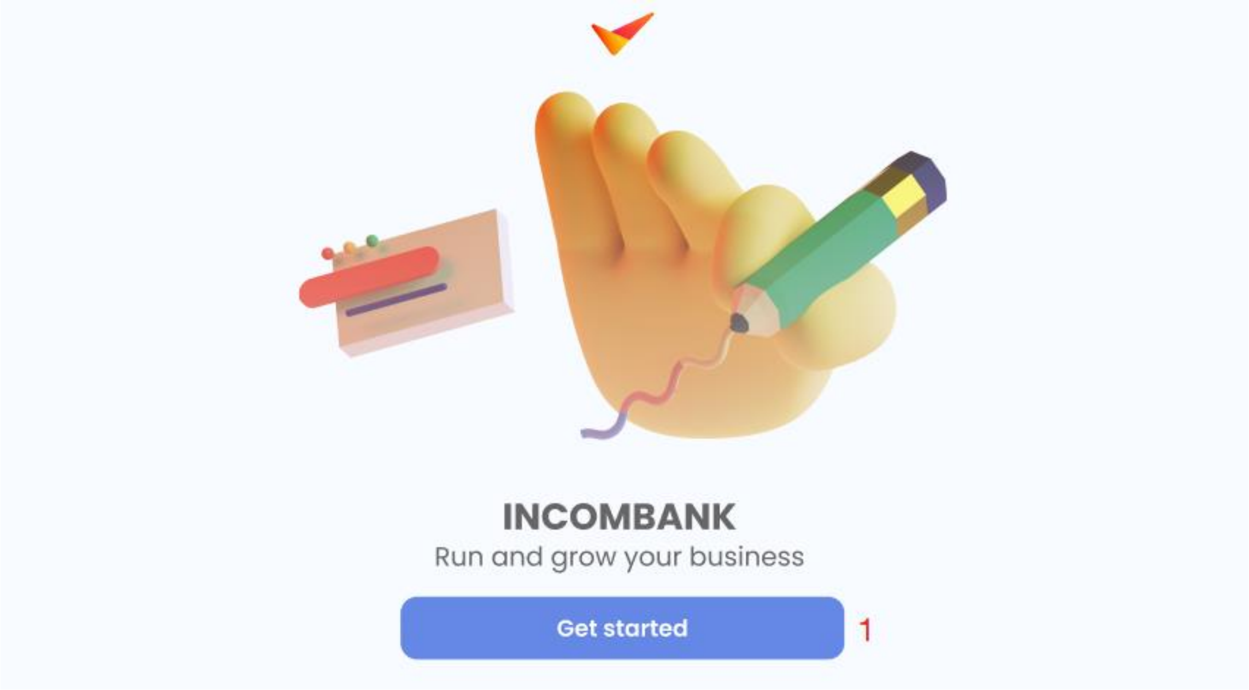


The back-end layer is built with MVC (Model-View-Controller) architecture, which includes :

- Model: Model represents the structure of data, the format and the constraints with which it is stored. It maintains the data of the application. Essentially, it is the database part of the application.
- View: View is what is presented to the user. Views utilize the Model and present data in a form in which the user wants. A user can also be allowed to make changes to the data presented to the user. They consist of static and dynamic pages which are rendered or sent to the user when the user requests them.
- Controller: Controller controls the requests of the user and then generates appropriate response which is fed to the viewer. Typically, the user interacts with the View, which in turn generates the appropriate request, this request will be handled by a controller. The controller renders the appropriate view with the model data as a response.

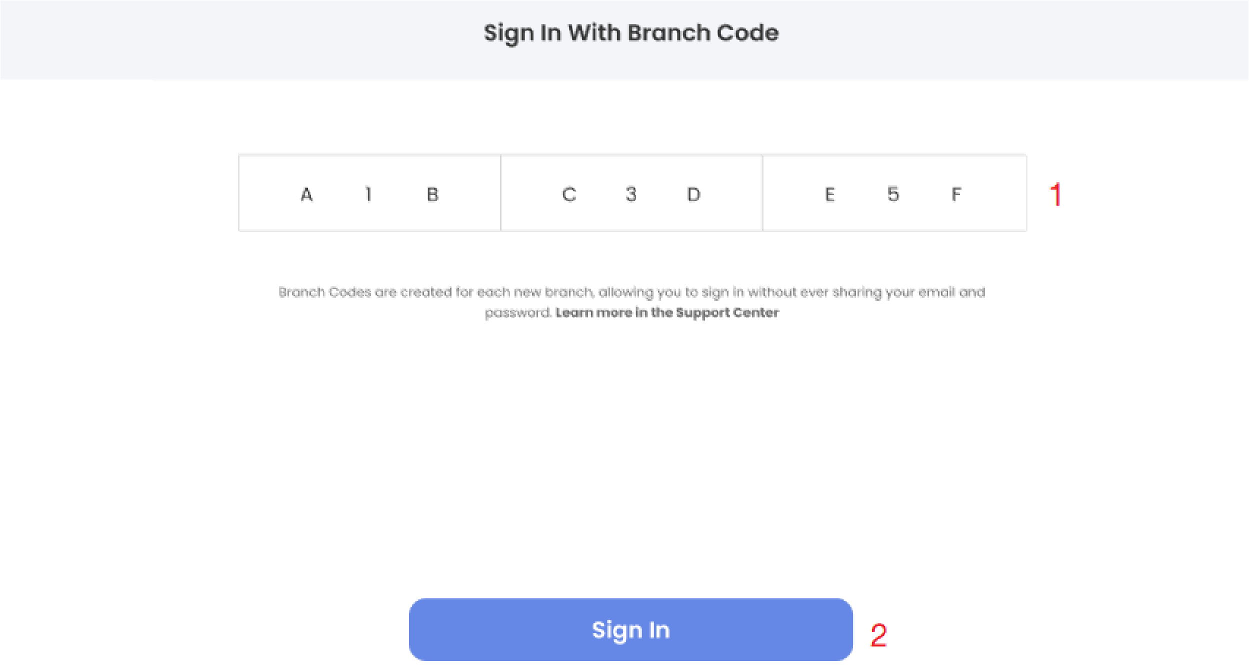
IX. Interface design

1. Welcome screen



No	Name	Type	Feature	Calling Condition	Note
1	getStarted_Button	Button	Navigate to sign in branch screen	Click the button	

2. Sign in brach screen

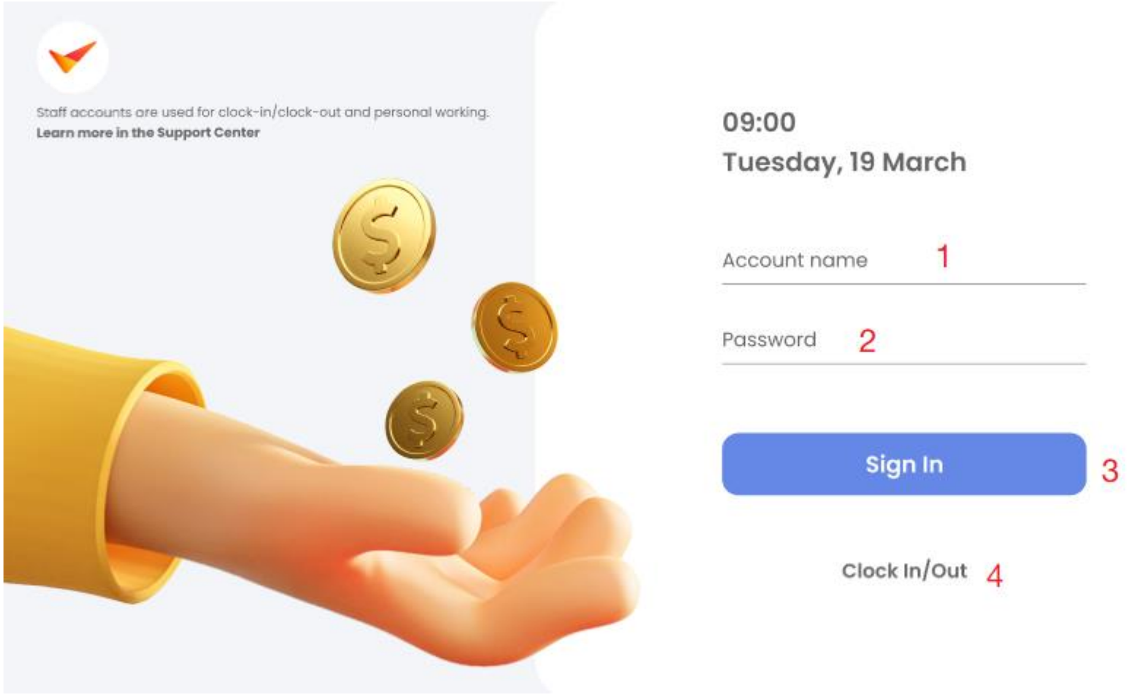


Sign In With Branch Code

Branch Codes are created for each new branch, allowing you to sign in without ever sharing your email and password. **Learn more in the Support Center**

No	Name	Type	Feature	Calling Condition	Note
1	branchCode_EditText	EditText	Enter input as branch code	Type in edit text	
2	getStarted_Button	Button	Navigate to sign in staff screen	Click the button	

3. Sign in staff screen

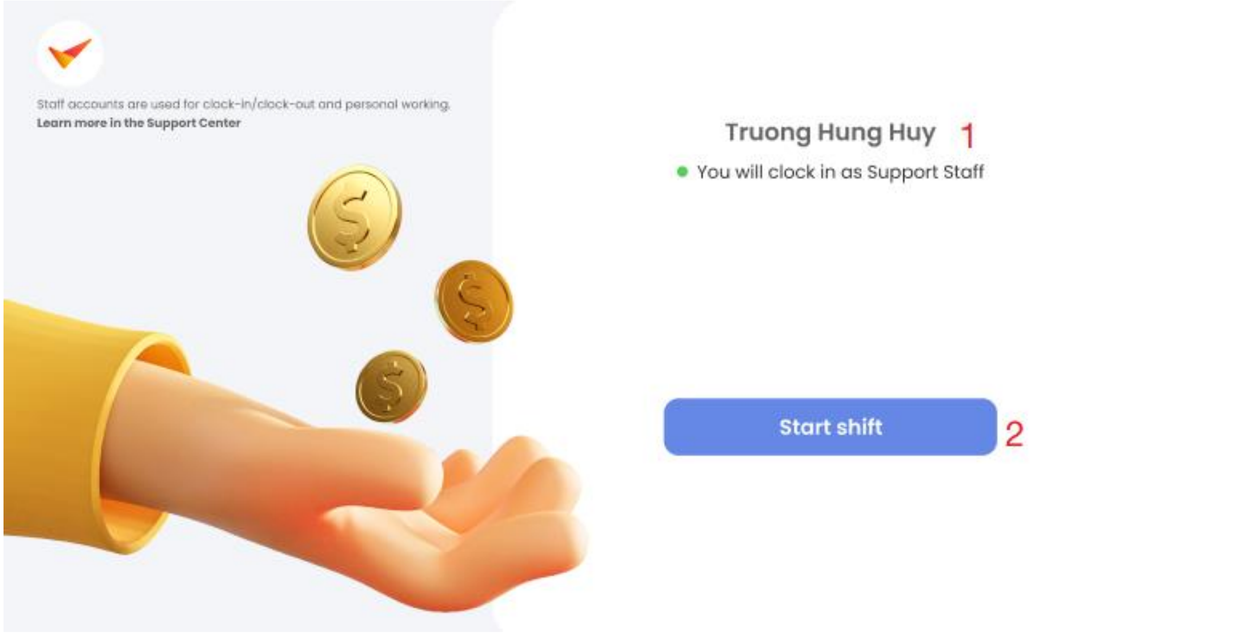


Staff accounts are used for clock-in/clock-out and personal working.
Learn more in the Support Center

09:00
Tuesday, 19 March

No	Name	Type	Feature	Calling Condition	Note
1	account_EditText	EditText	Enter input as account	Type in edit text	
2	password_EditText	EditText	Enter input as password	Type in edit text	
3	signIn_Button	Button	Navigate to dashboard if not in “Clock in/out” mode	Click the button	
4	clockInOut_Button	Button	Enable “Clock in/out” mode	Click the button	

4. Clock in/out screen (start shift)



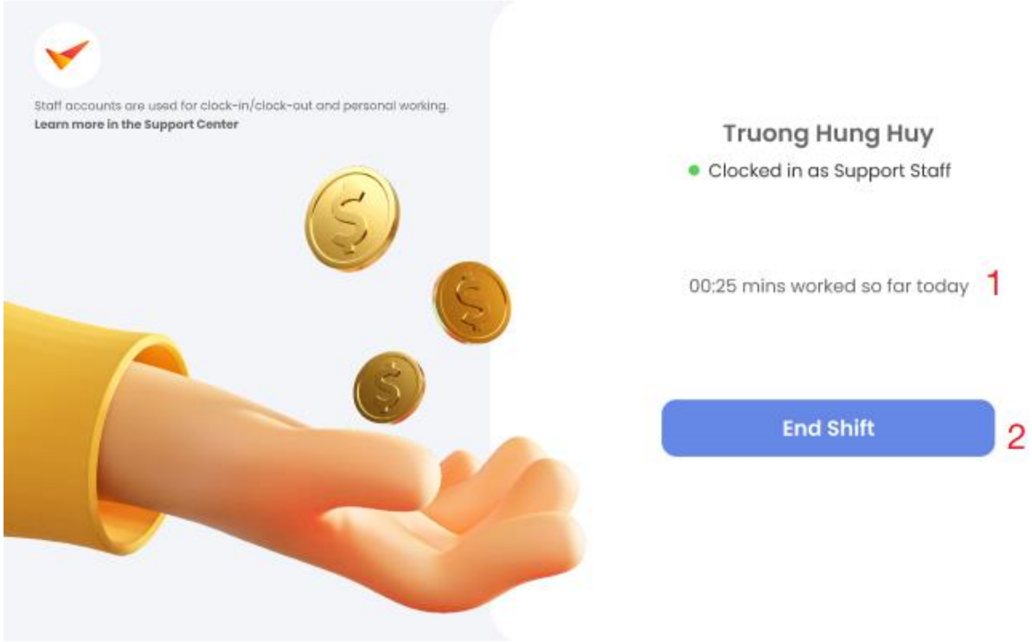
Staff accounts are used for clock-in/clock-out and personal working.
Learn more in the Support Center

Truong Hung Huy

You will clock in as Support Staff

No	Name	Type	Feature	Calling Condition	Note
1	staffInfo_TextView	TextView	Show info		
2	startShift_ Button	Button	Navigate	Click the button	

5. Clock in/out screen (end shift)



Staff accounts are used for clock-in/clock-out and personal working.
Learn more in the Support Center

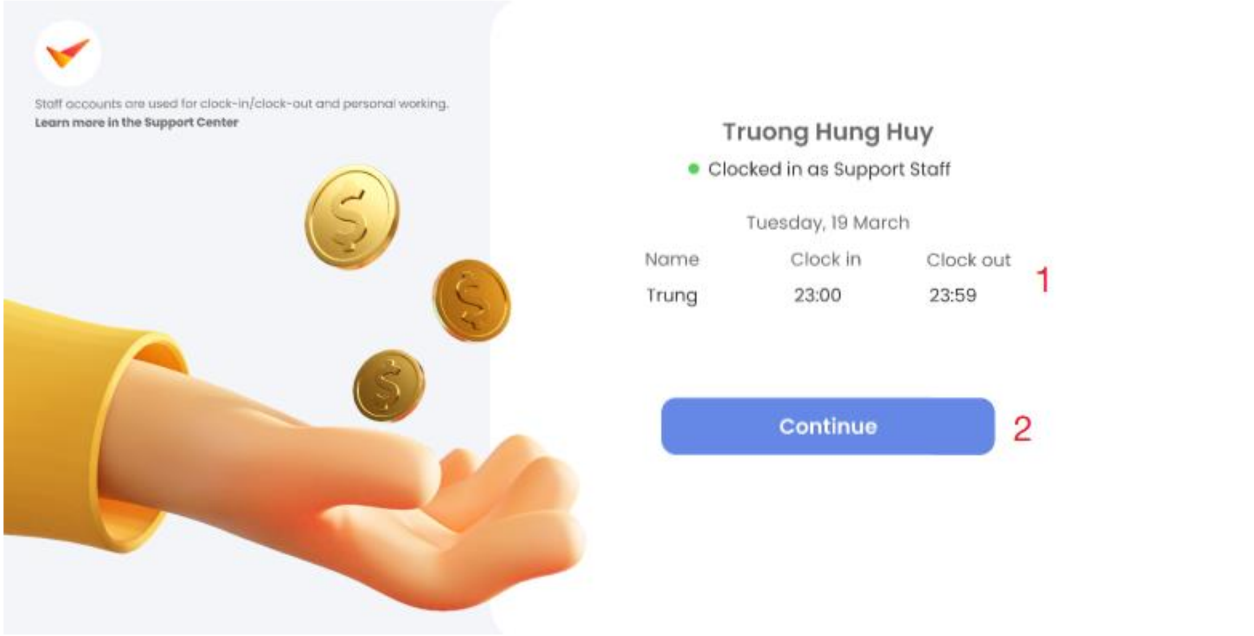
Truong Hung Huy

● Clocked in as Support Staff

00:25 mins worked so far today

No	Name	Type	Feature	Calling Condition	Note
1	staffTimekeeping_TextView	TextView	Show info		
2	endShift_ Button	Button	Navigate	Click the button	

6. Clock in/out screen (Summarize)



Staff accounts are used for clock-in/clock-out and personal working.
Learn more in the Support Center

Truong Hung Huy

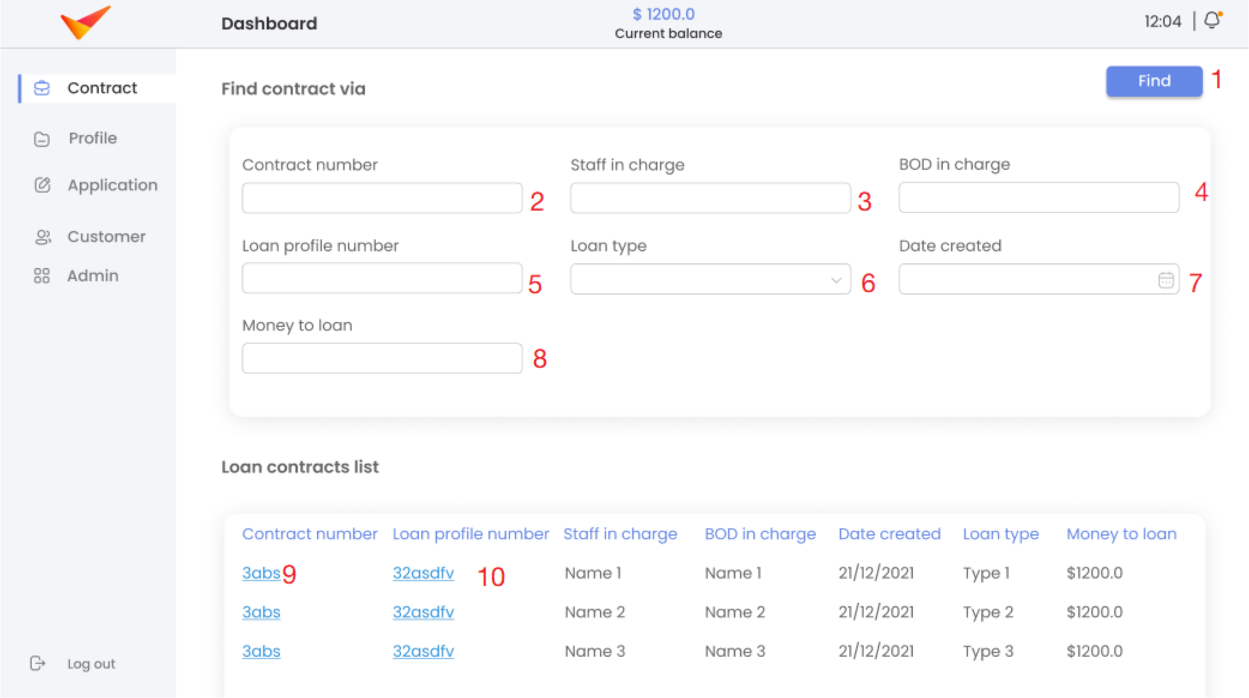
● Clocked in as Support Staff

Tuesday, 19 March

Name	Clock in	Clock out
Trung	23:00	23:59

No	Name	Type	Feature	Calling Condition	Note
1	staffTimekeepingResult_TextView	TextView	Show info		
2	continue_ Button	Button	Navigate to sign in staff screen	Click the button	

7. Contract screen

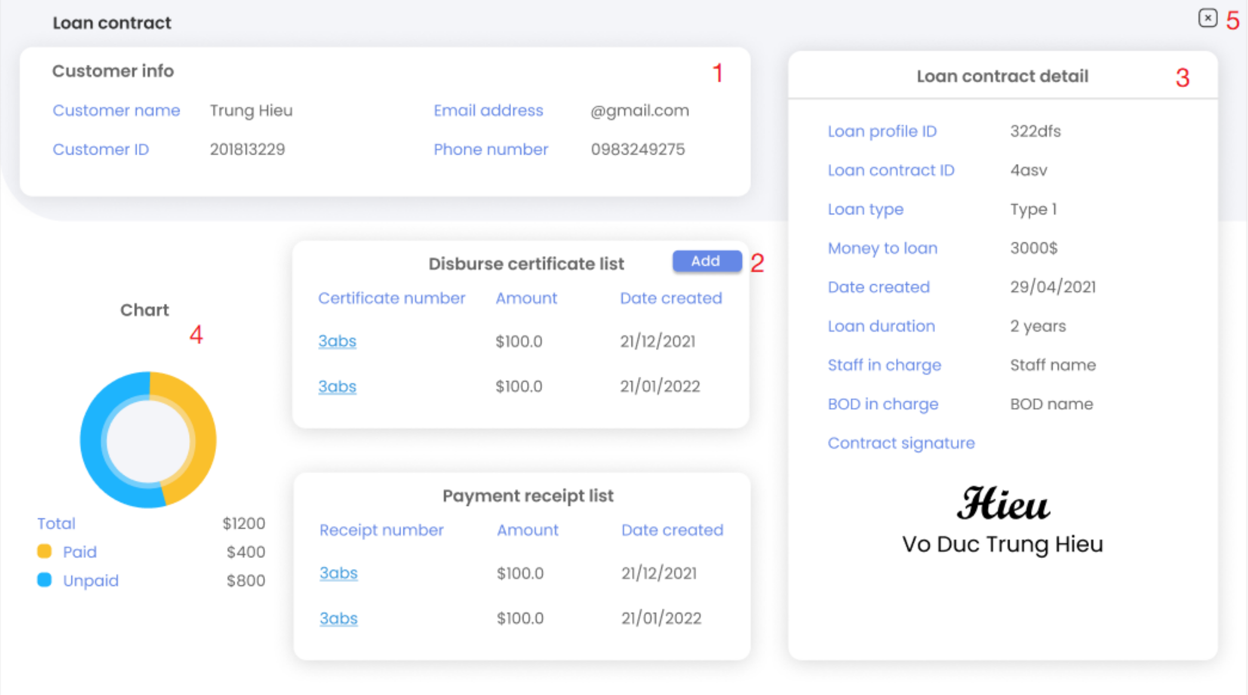


Contract number	Loan profile number	Staff in charge	BOD in charge	Date created	Loan type	Money to loan
3abs	32asdfv	Name 1	Name 1	21/12/2021	Type 1	$1200.0
3abs	32asdfv	Name 2	Name 2	21/12/2021	Type 2	$1200.0
3abs	32asdfv	Name 3	Name 3	21/12/2021	Type 3	$1200.0

.No	Name	Type	Feature	Calling Conditions	Note
1	Find_Button	Button	Find contract	Click on button	Information needed to search
2	Contract number_Edit Text	Edit Text	Enter contract number	Fill in edit text	
3	Staff in charge_Edit Text	Edit Text	Enter Staff in charge	Fill in edit text	
4	BOD in charge_Edit Text	Edit Text	Enter BOD in charge	Fill in edit text	
5	Loan Profile number_Edit Text	Edit Text	Enter Loan profile number	Fill in edit text	

6	Loan type_ComboBox	Combo Box	Select loan type	Select child elements of combo box	
7	Date created_Button	Button	Select Date created	Click on button calendar	
8	Money to loan_Edit text	Edit Text	Enter Money to loan	Fill in edit text	
9	Contract item_TextButton	Text Button	Navigate to detail screen	Click on button	Navigate to Loan Contract Detail
10	Profile item_TextButton	Text Button	Navigate to detail screen	Click on button	Navigate to Loan Profile Detail

7.1. Contract detail



Loan contract

Customer info

Customer name Trung Hieu
Email address @gmail.com
Customer ID 201813229
Phone number 0983249275

Disburse certificate list

Certificate number	Amount	Date created
3abs	$100.0	21/12/2021
3abs	$100.0	21/01/2022

Payment receipt list

Receipt number	Amount	Date created
3abs	$100.0	21/12/2021
3abs	$100.0	21/01/2022

Total	$1200
🟨 Paid	$400
🟦 Unpaid	$800

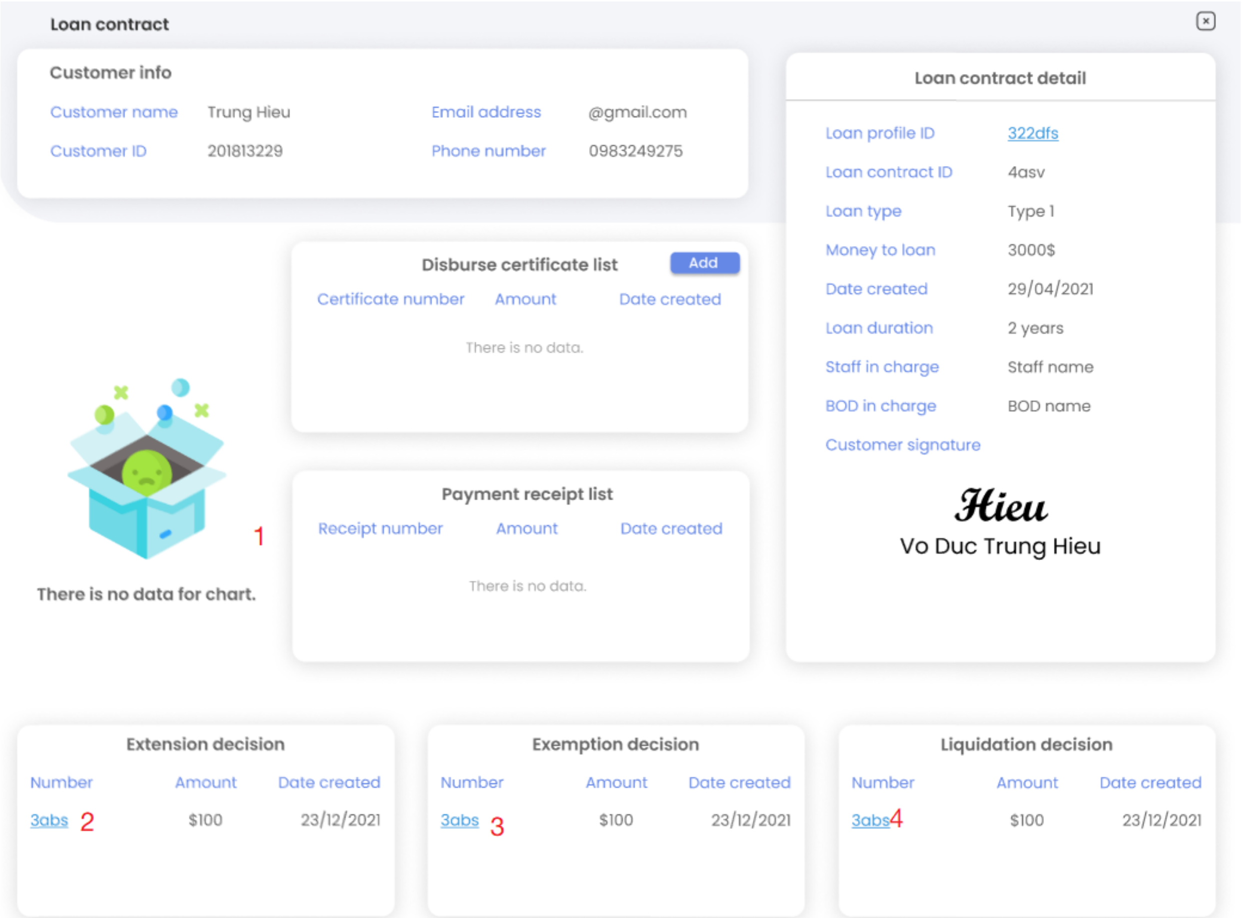
Loan contract detail

Loan profile ID	322dfs
Loan contract ID	4asv
Loan type	Type 1
Money to loan	3000$
Date created	29/04/2021
Loan duration	2 years
Staff in charge	Staff name
BOD in charge	BOD name
Contract signature	

Hieu
Vo Duc Trung Hieu

No	Name	Type	Feature	Calling Condition	Note
1	customer_CardView	CardView	Show data		
2	addDisburse_Button	Button	Add disburse	Click the button	
3	loanContract_CardView	CardView	Show data		
4	chart	Chart	Show data		
5	Close_Button	Button	Navigate to dashboard	Click the button	

7.2. Contract detail (below)



Loan contract

Customer info

Customer name	Trung Hieu	Email address	@gmail.com
Customer ID	201813229	Phone number	0983249275

Loan contract detail

Loan profile ID	322dfs
Loan contract ID	4asv
Loan type	Type 1
Money to loan	3000$
Date created	29/04/2021
Loan duration	2 years
Staff in charge	Staff name
BOD in charge	BOD name
Customer signature	

Hieu
Vo Duc Trung Hieu

Disburse certificate list Add

Certificate number	Amount	Date created

There is no data.

Payment receipt list

Receipt number	Amount	Date created

There is no data.

There is no data for chart.

Extension decision

Number	Amount	Date created
3abs	$100	23/12/2021

Exemption decision

Number	Amount	Date created
3abs	$100	23/12/2021

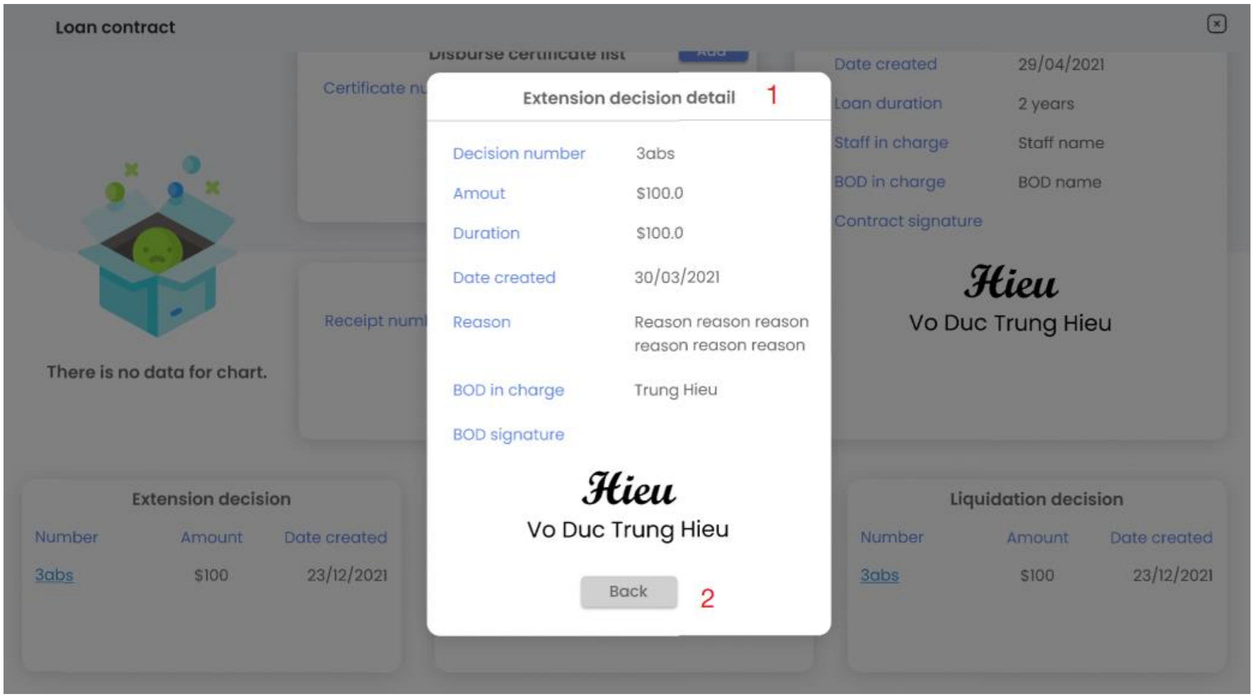
Liquidation decision

Number	Amount	Date created
3abs	$100	23/12/2021

No	Name	Type	Feature	Calling Condition	Note
1	emptyState_ImageView	ImageView	Show empty state	Only show when there is no data	
2	extension item_TextButton	Text Button	Navigate to detail screen	Click on button	
3	Exemption item_TextButton	Text Button	Navigate to detail screen	Click on button	

4	Liquidation item_TextButton	Text Button	Navigate to detail screen	Click on button	

7.3. Extension decision detail screen



Extension decision detail

Decision number 3abs
Amout $100.0
Duration $100.0
Date created 30/03/2021
Reason Reason reason reason reason reason reason
BOD in charge Trung Hieu
BOD signature
Hieu
Vo Duc Trung Hieu

Date created 29/04/2021
Loan duration 2 years
Staff in charge Staff name
BOD in charge BOD name
Contract signature
Hieu
Vo Duc Trung Hieu

Extension decision

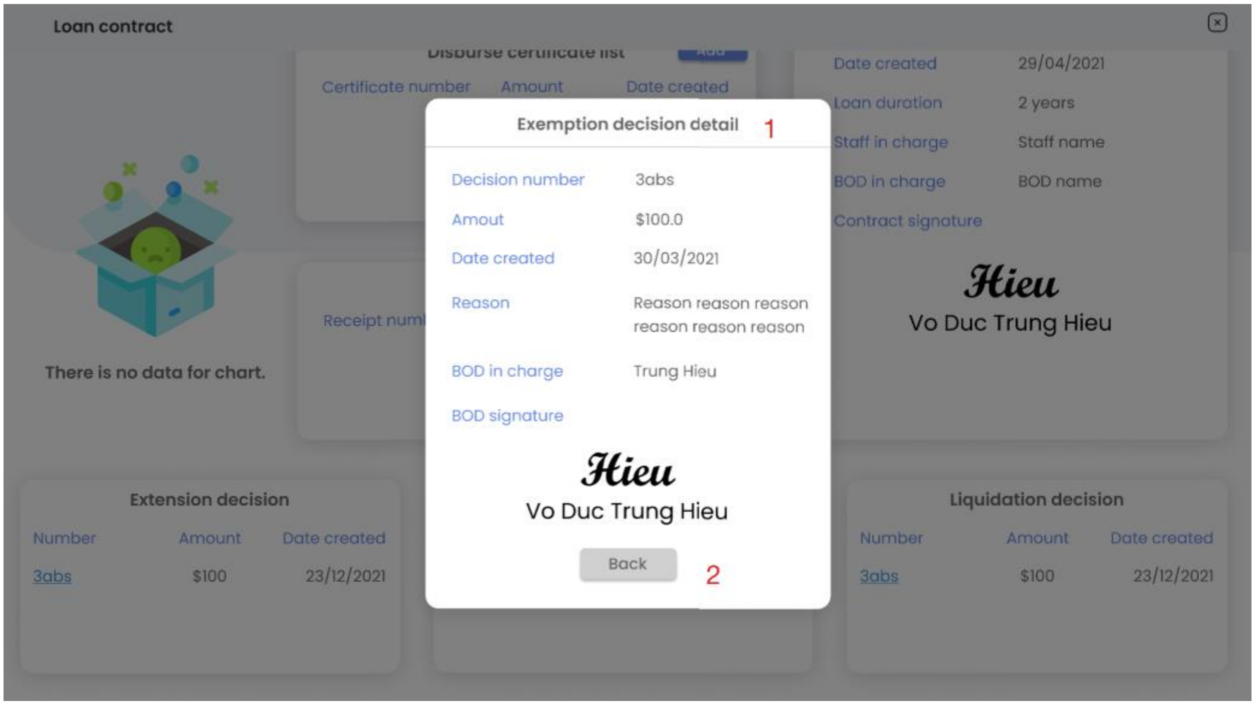
Number	Amount	Date created
3abs	$100	23/12/2021

Liquidation decision

Number	Amount	Date created
3abs	$100	23/12/2021

No	Name	Type	Feature	Calling Condition	Note
1	detail_CardView	CardView	Show data		
2	Back_Button	Button	Navigate one back	Click the button	

7.4. Exemption decision detail screen



Date created 29/04/2021
Loan duration 2 years
Staff in charge Staff name
BOD in charge BOD name
Contract signature

Hieu
Vo Duc Trung Hieu

Exemption decision detail

Decision number	3abs
Amout	$100.0
Date created	30/03/2021
Reason	Reason reason reason reason reason reason
BOD in charge	Trung Hieu
BOD signature	

Hieu
Vo Duc Trung Hieu

Back

Extension decision

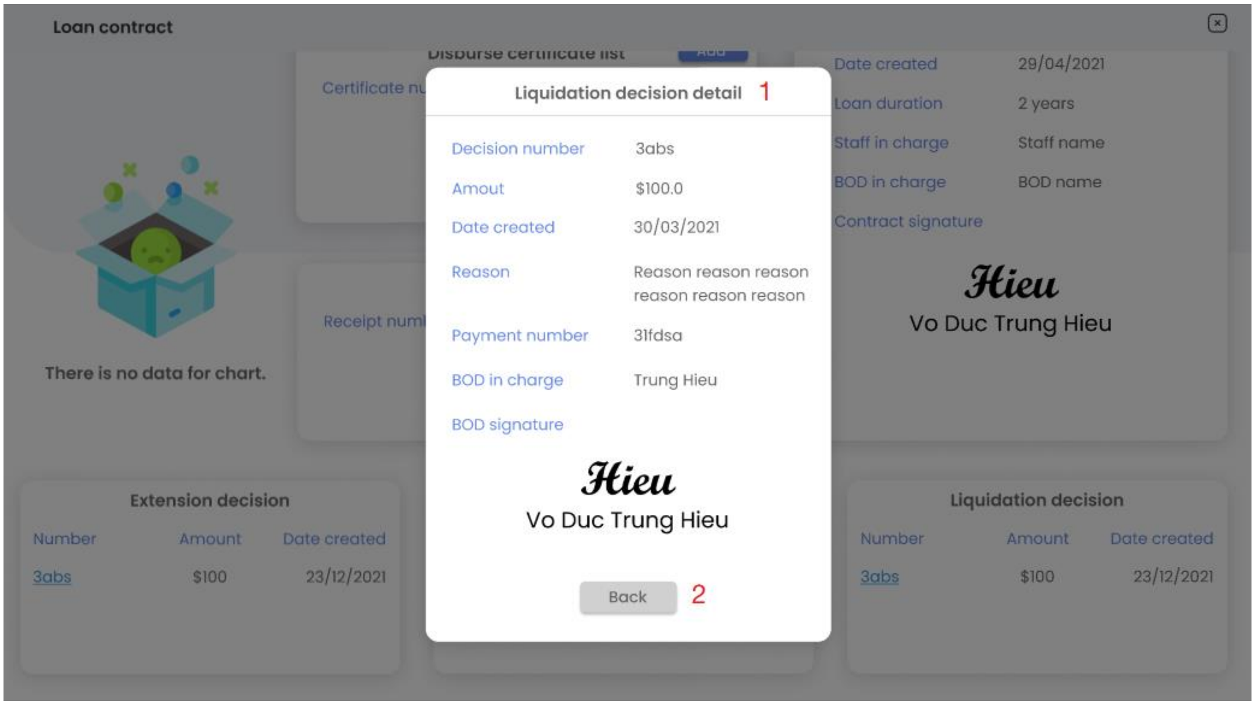
Number	Amount	Date created
3abs	$100	23/12/2021

Liquidation decision

Number	Amount	Date created
3abs	$100	23/12/2021

No	Name	Type	Feature	Calling Condition	Note
1	detail_CardView	CardView	Show data		
2	Back_Button	Button	Navigate one back	Click the button	

7.5. Liquidation decision detail screen



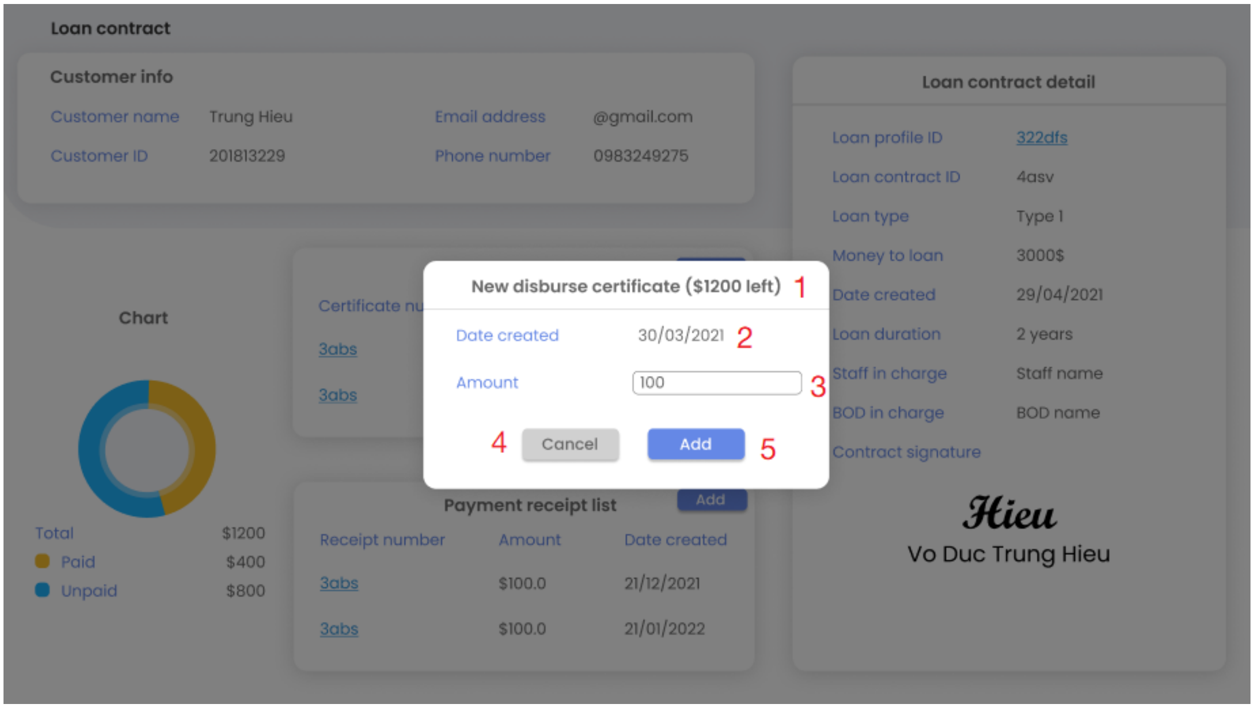
Liquidation decision detail

Decision number 3abs
Amout $100.0
Date created 30/03/2021
Reason Reason reason reason reason reason reason
Payment number 31fdsa
BOD in charge Trung Hieu
BOD signature

Hieu
Vo Duc Trung Hieu

No	Name	Type	Feature	Calling Condition	Note
1	detail_CardView	CardView	Show data		
2	Back_Button	Button	Navigate one back	Click the button	

7.6. Add disburse screen



Loan contract

Customer info

Customer name Trung Hieu

Email address @gmail.com

Customer ID 201813229

Phone number 0983249275

Loan contract detail

Loan profile ID 322dfs

Loan contract ID 4asv

Loan type Type 1

Money to loan 3000$

Date created 29/04/2021

Loan duration 2 years

Staff in charge Staff name

BOD in charge BOD name

Contract signature

Hieu

Vo Duc Trung Hieu

Chart

Total	$1200
● Paid	$400
● Unpaid	$800

Certificate nu

3abs

3abs

New disburse certificate ($1200 left) 1

Date created 30/03/2021 2

Amount 100 3

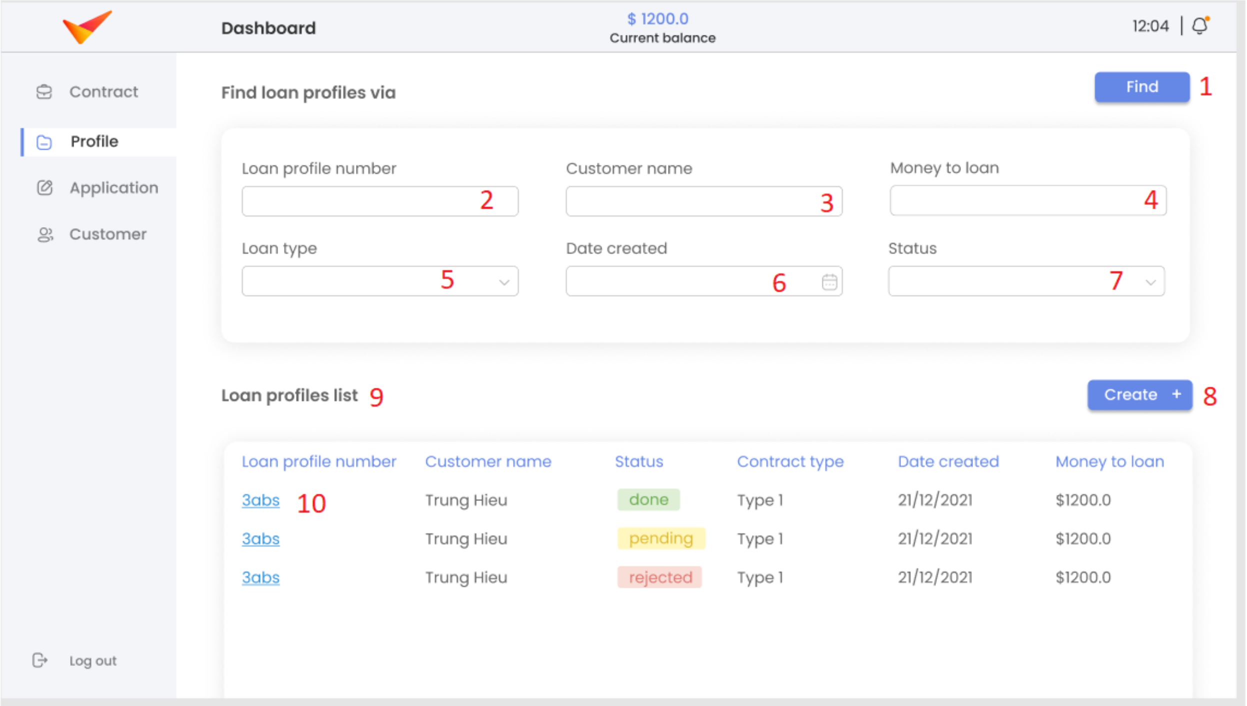
Payment receipt list

Receipt number	Amount	Date created
3abs	$100.0	21/12/2021
3abs	$100.0	21/01/2022

No	Name	Type	Feature	Calling Condition	Note
1	amountLeft_TextView	TextView	Show data		
2	dateCreated_ TextView	TextView	Show data		
3	amount_EditText	EditText	Enter amount data	Enter in EditText	
4	cancel_Button	Button	Navigate one back	Click the button	
5	add_Button	Button	Add disburse and go one back	Click the button	

No	Name	Type	Feature	Calling Condition	Note
1	account_EditText	EditText	Enter input as account	Type in edit text	
2	password_EditText	EditText	Enter input as password	Type in edit text	
3	signIn_Button	Button	Navigate to dashboard if not in “Clock in/out” mode	Click the button	
4	clockInOut_Button	Button	Enable “Clock in/out” mode	Click the button	

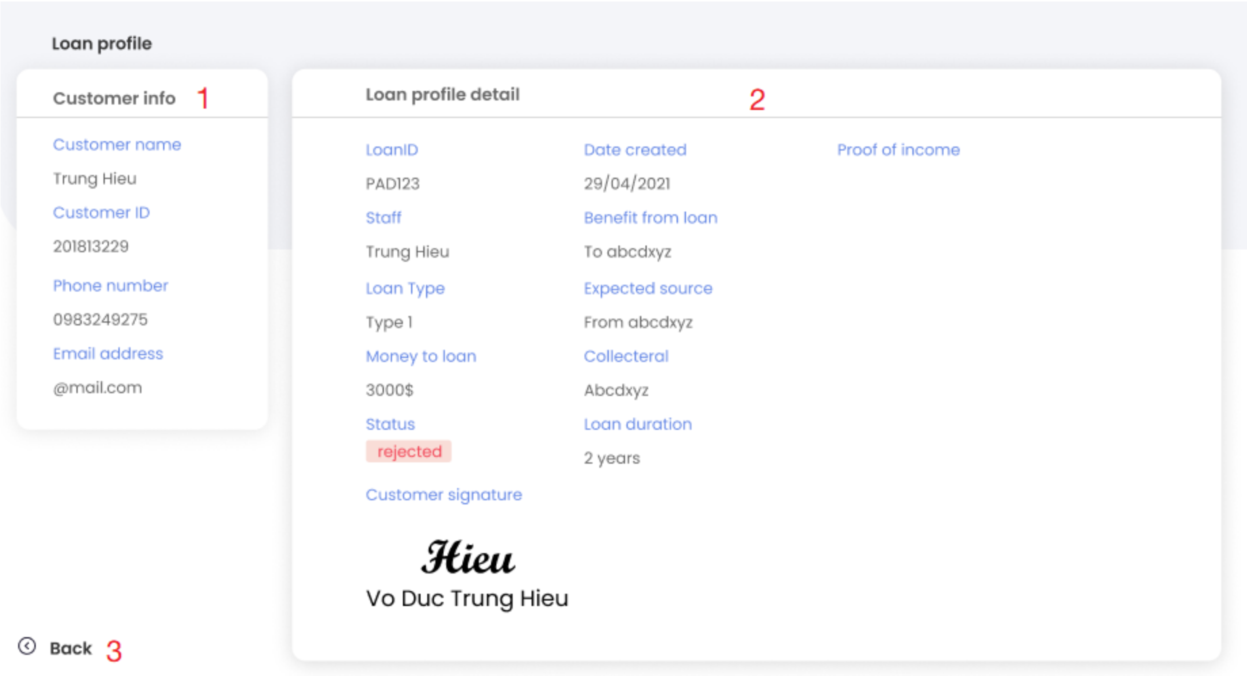
8. Loan profile screen



Loan profile number	Customer name	Status	Contract type	Date created	Money to loan
3abs	Trung Hieu	done	Type 1	21/12/2021	$1200.0
3abs	Trung Hieu	pending	Type 1	21/12/2021	$1200.0
3abs	Trung Hieu	rejected	Type 1	21/12/2021	$1200.0

No	Name	Type	Feature	Calling Conditions	Note
1	Find_Button	Find Button	Find loan profile	Click on button	
2	Loan profile number_EditText	Edit Text	Enter Loan profile number	Fill in Edit Text	
3	Customer name_EditText	EditText	Enter customer name	Fill in Edit Text	
4	Money to loan_EditText	EditText	Enter Money to loan	Fill in Edit Text	
5	Loan Type_ComboBox	Combo Box	Select Loan Type	Select child elements of combo box	
6	Date created_Button	Button	Select Date created	Click on button calendar	
7	Loan Status_Combo Box	Combo Box	Select Loan Status	Select child elements of combo box	
8	Create new Loan Profile_Button	Button	Create new Loan Profile	Click on button	
9	Loan profile list_RecyclerView	Recycler View	Show list of loan profile	Automatic	Change when click button Find
10	Loan profile item_TextButton	Text Button	Navigate to detail screen	Click on text button	

9. Profile detail screen



Loan profile

Customer info

Customer name
Trung Hieu

Customer ID
201813229

Phone number
0983249275

Email address
@mail.com

Loan profile detail

LoanID
PAD123

Date created
29/04/2021

Proof of income

Staff
Trung Hieu

Benefit from loan
To abcdxyz

Loan Type
Type 1

Expected source
From abcdxyz

Money to loan
3000$

Collecteral
Abcdxyz

Status
rejected

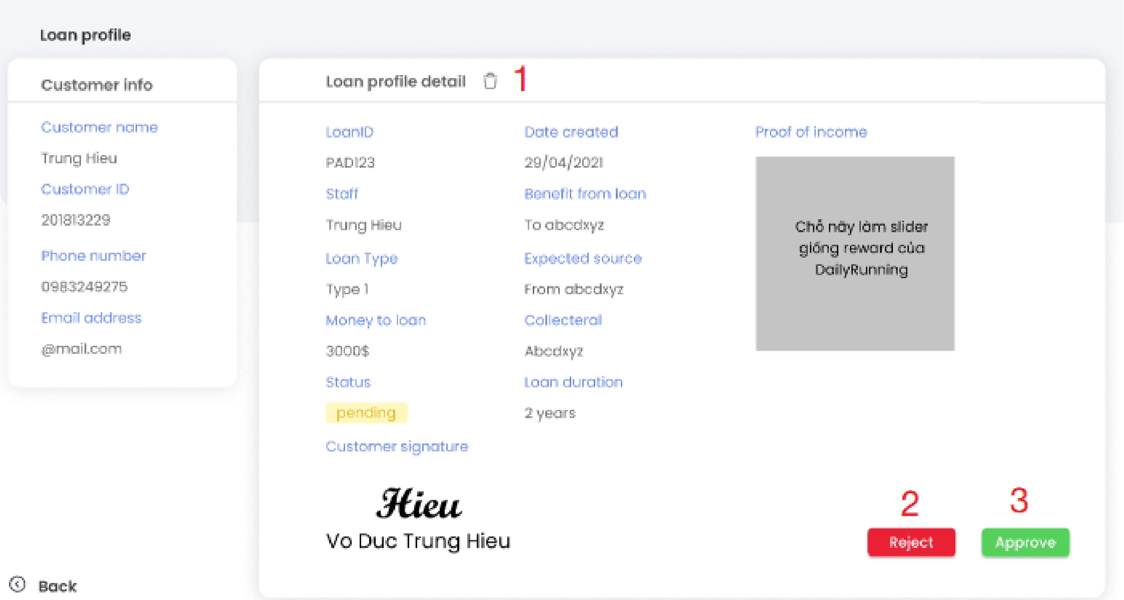
Loan duration
2 years

Customer signature

Hieu
Vo Duc Trung Hieu

No	Name	Type	Feature	Calling Condition	Note
1	customerInfo_CardView	CardView	Show data		
2	loanProfile_ CardView	CardView	Show data		
3	back_Button	Button	Navigate to profile screen	Click the button	

10. Loan profile (Reject/Approve)



Customer name
Trung Hieu
Customer ID
201813229
Phone number
0983249275
Email address
@mail.com

LoanID
PAD123
Date created
29/04/2021
Proof of income

Staff
Trung Hieu
Benefit from loan
To abcdxyz

Loan Type
Type 1
Expected source
From abcdxyz

Money to loan
3000$
Collecteral
Abcdxyz

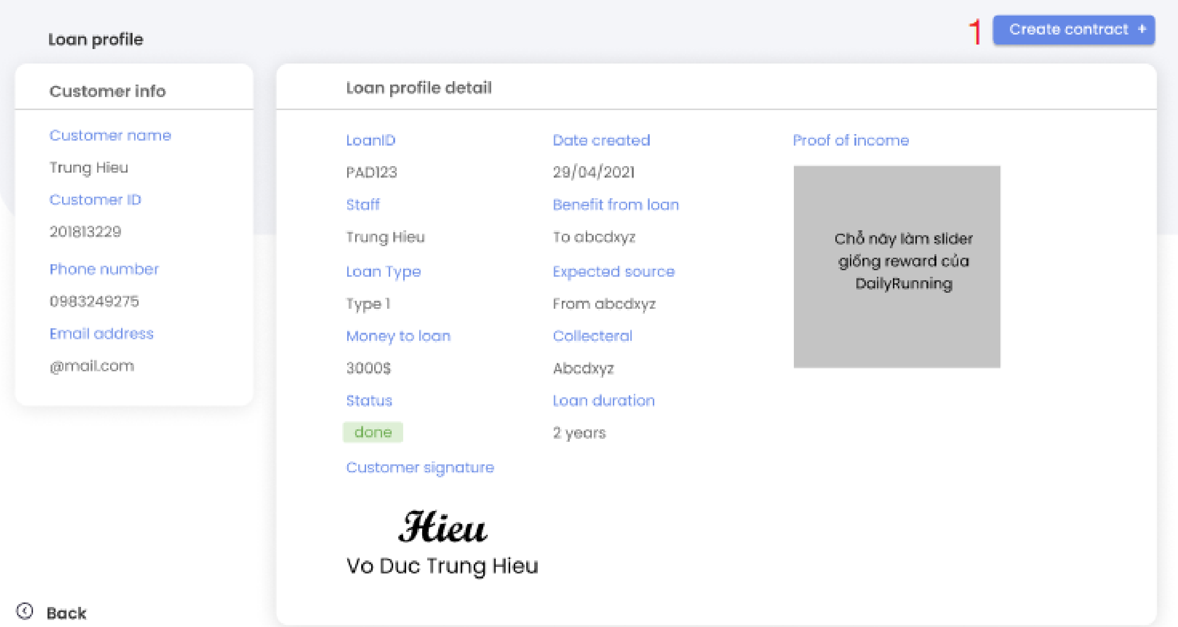
Status
pending
Loan duration
2 years

Customer signature
Hieu
Vo Duc Trung Hieu

Chỗ này làm slider giống reward của DailyRunning

No	Name	Type	Feature	Calling Condition	Note
1	delete_Button	Button	Delete Loan profile	Click the button	
2	reject_Button	Button	Reject loan profile	Click the button	
3	approve_Button	Button	Approve loan profile	Click the button	

11. Loan profile (Create contract)



Loan profile

Customer info

Customer name
Trung Hieu
Customer ID
201813229
Phone number
0983249275
Email address
@mail.com

Loan profile detail

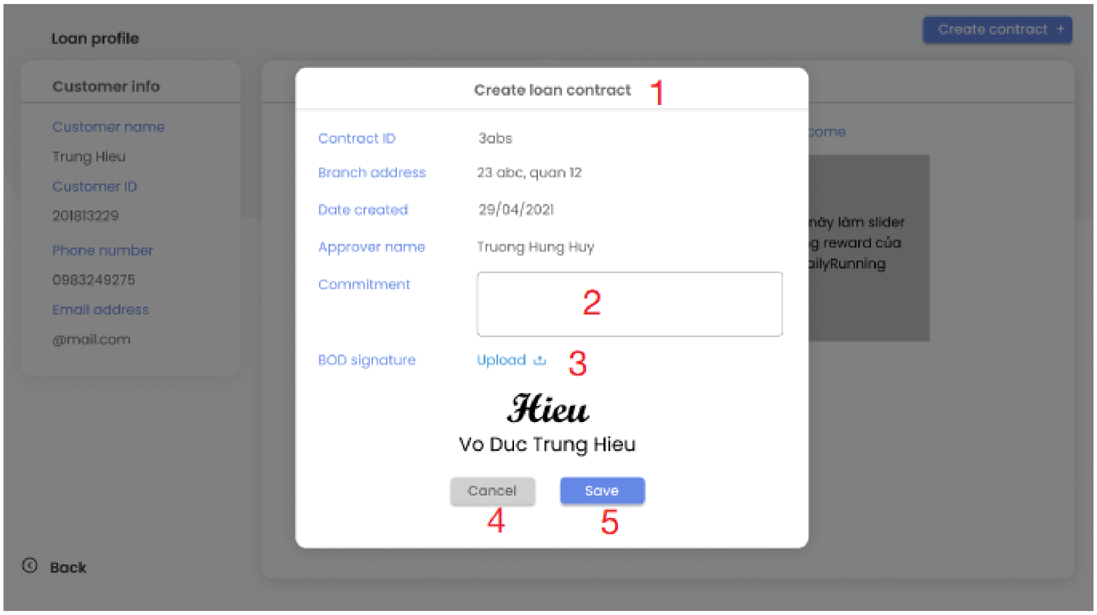
LoanID	Date created	Proof of income
PAD123	29/04/2021	Chỗ này làm slider giống reward của DailyRunning
Staff	Benefit from loan	
Trung Hieu	To abcdxyz	
Loan Type	Expected source	
Type 1	From abcdxyz	
Money to loan	Collecteral	
3000$	Abcdxyz	
Status	Loan duration	
done	2 years	

Customer signature

Hieu
Vo Duc Trung Hieu

No	Name	Type	Feature	Calling Condition	Note
1	createContract_Button	Button	Create contract	Clink the button	

12. Create contract



Customer name
Trung Hieu
Customer ID
201813229
Phone number
0983249275
Email address
@mail.com

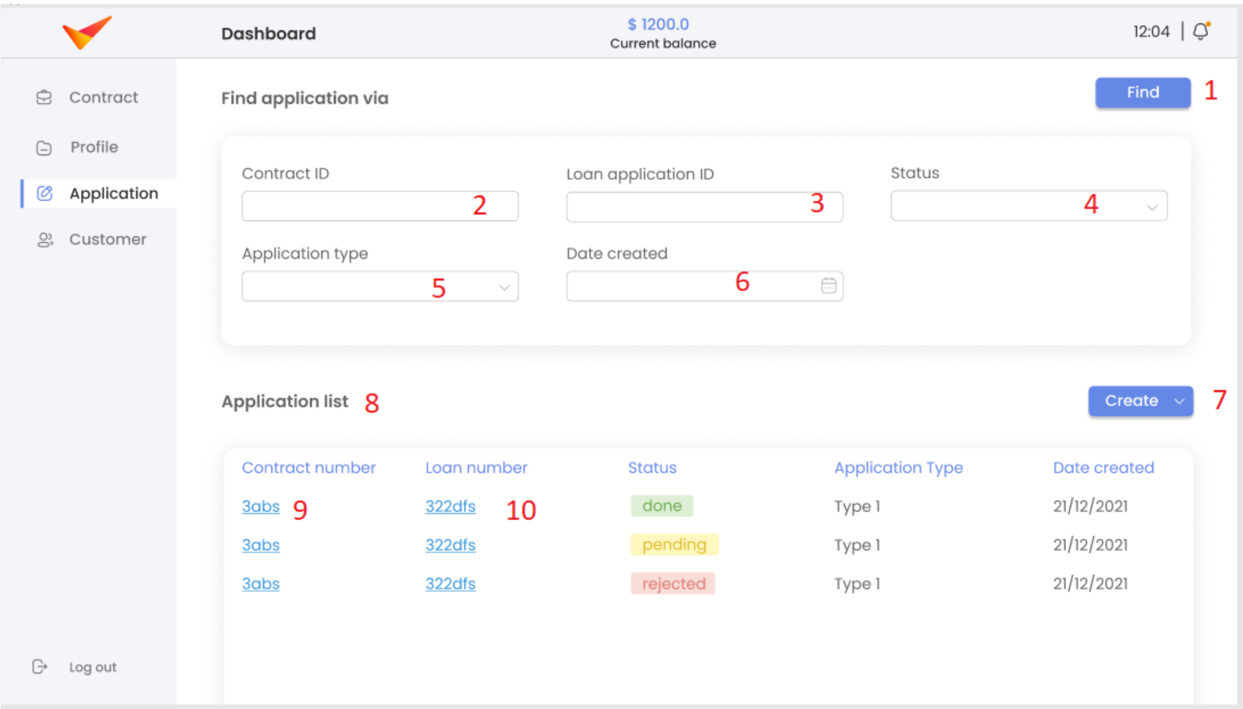
Contract ID 3abs
Branch address 23 abc, quan 12
Date created 29/04/2021
Approver name Truong Hung Huy
Commitment
BOD signature Upload

Hieu
Vo Duc Trung Hieu

come
này làm slider
g reward của
ailyRunning

No	Name	Type	Feature	Calling Condition	Note
1	loanContract_CardView	CardView	Show data		
2	commitment_EditText	EditText	Enter input as commitment	Type in edit text	
3	upload_Button	Button	Upload signature image	Click the button	
4	cancel_Button	Button	Navigate one back	Click the button	
5	save_Button	Button	Save loan contract	Click the button	

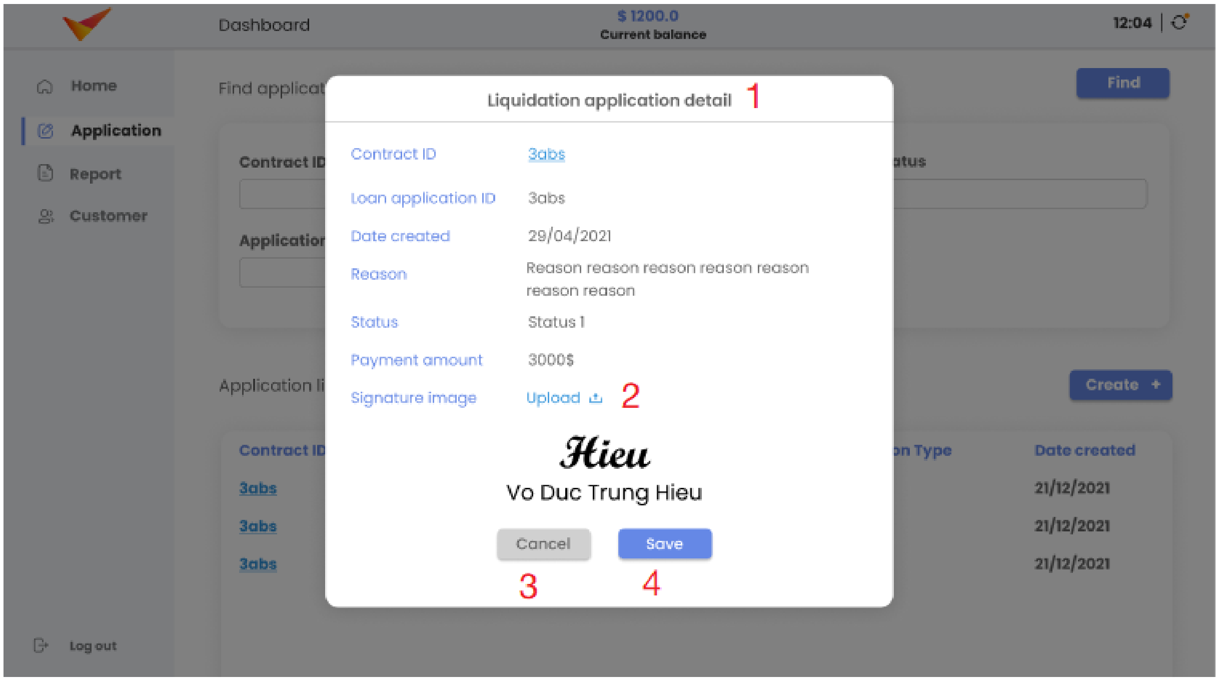
13. Application screen



No	Name	Type	Feature	Calling Conditions	Note
1	Find_Button	Find Button	Find application	Click on button	
2	Contract_EditText	Edit Text	Enter Contract	Fill in Edit Text	
3	Loan Application ID_EditText	EditText	Enter Loan Application ID	Fill in Edit Text	
4	Loan Status_Combo Box	Combo Box	Select Loan Status	Select child elements of combo box	
5	Loan Type_ComboBox	Combo Box	Select Loan Type	Select child elements of combo box	

6	Date created_Button	Button	Select Date created	Click on button calendar	
7	Create new Loan Application_Button	Button	Create new Application	Click on button	Show Combo box to select type create
8	Application List_RecyclerView	Recycler View	Show list of application	Automatic	Change when click button Find
9	Contract number item_TextButton	Text Button	Show info base on contract number	Click on text button	Navigate to Contract Detail Screen
10	Loan number item_TextButton	Text Button	Show info base on Loan number	Click on text button	Navigate to Loan Detail Screen

14. Application detail



Liquidation application detail

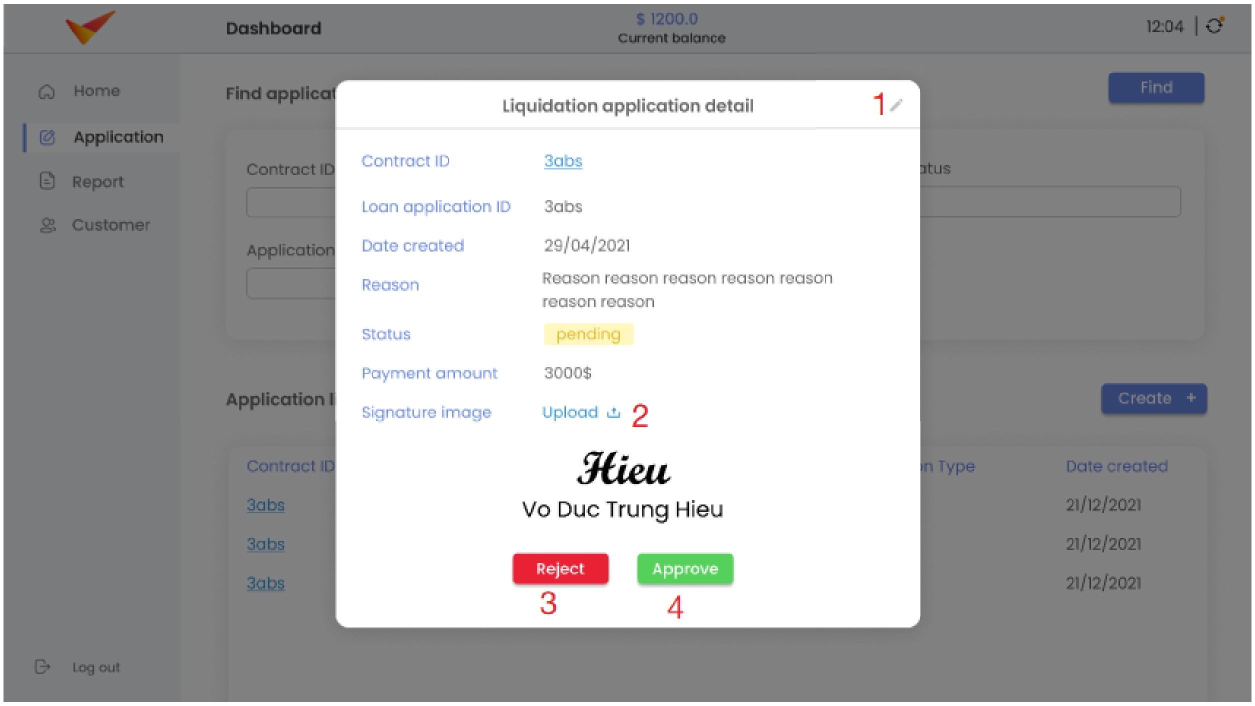
Contract ID	3abs
Loan application ID	3abs
Date created	29/04/2021
Reason	Reason reason reason reason reason reason reason
Status	Status 1
Payment amount	3000$
Signature image	Upload

Hieu
Vo Duc Trung Hieu

Contract ID	Date created
3abs	21/12/2021
3abs	21/12/2021
3abs	21/12/2021

No	Name	Type	Feature	Calling Condition	Note
1	loanApplication_CardView	CardView	Show data		
2	upload_Button	Button	Upload signature image	Click the button	
3	cancel_Button	Button	Navigate one back	Click the button	
4	save_Button	Button	Save loan contract	Click the button	

15. Application detail screen (Reject/Approve)



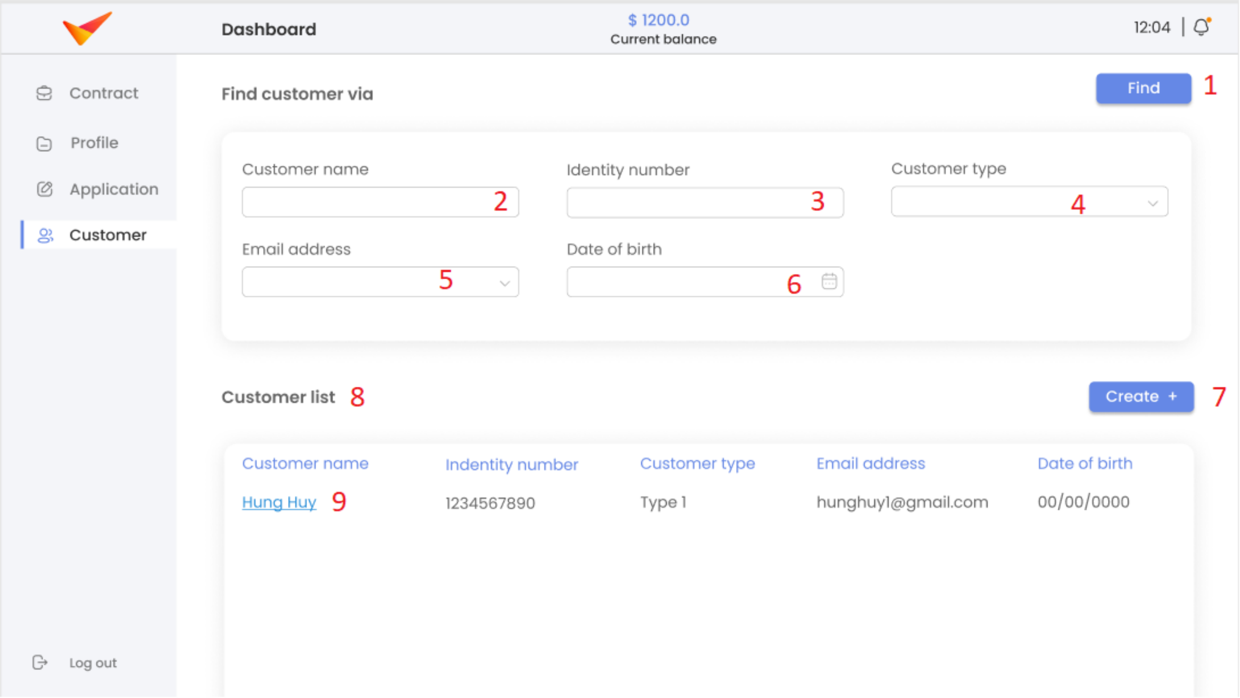
Liquidation application detail

Contract ID	3abs
Loan application ID	3abs
Date created	29/04/2021
Reason	Reason reason reason reason reason reason reason
Status	pending
Payment amount	3000$
Signature image	Upload

Hieu
Vo Duc Trung Hieu

No	Name	Type	Feature	Calling Condition	Note
1	edit_Button	Button	Change to edit mode	Type in edit text	
2	upload_Button	Button	Upload signature image	Click the button	
3	reject_Button	Button	Reject application	Click the button	
4	approve_Button	Button	Approve application	Click the button	

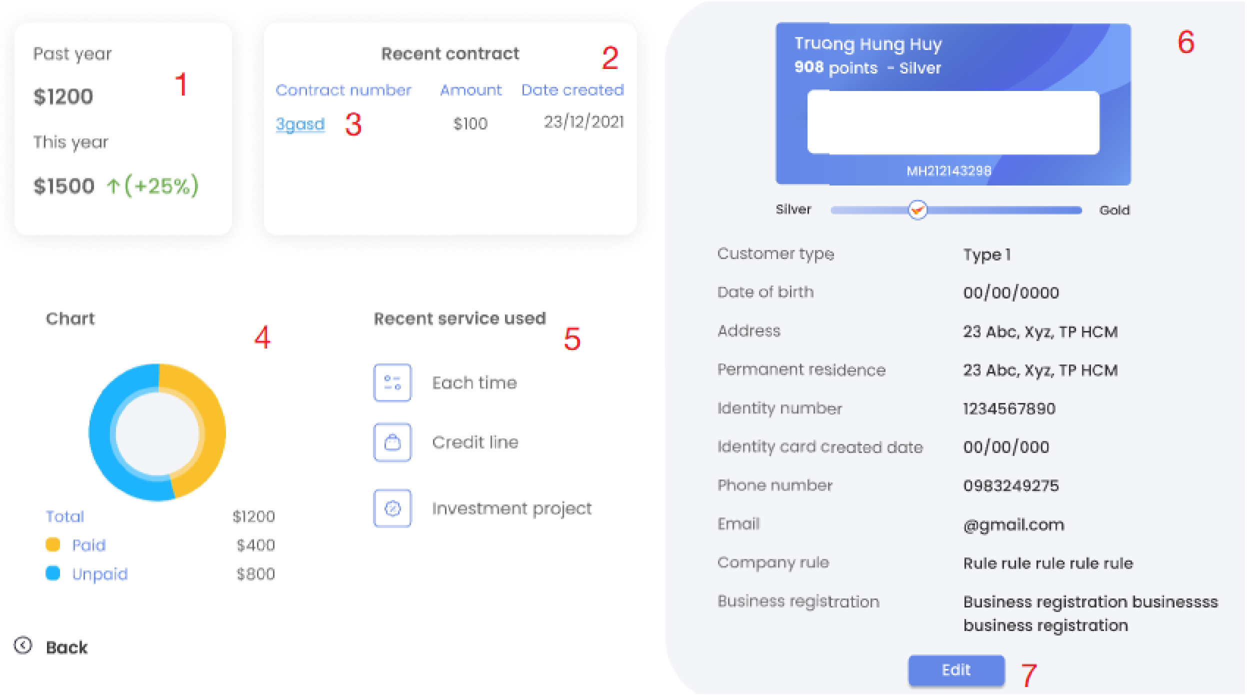
16. Customer screen



Customer name	Indentity number	Customer type	Email address	Date of birth
Hung Huy 9	1234567890	Type 1	hunghuy1@gmail.com	00/00/0000

.No	Name	Type	Feature	Calling Conditions	Note
1	Find_Button	Find Button	Find Customer	Click on button	
2	Customer Name_EditText	Edit Text	Enter customer name	Fill in Text Edit	
3	Identity number_EditText	Edit Text	Enter Identity number	Fill in Text Edit	
4	Customer Type_ComboBox	Combo Box	Select customer type	Select child elements of combo box	
5	Email Address_EditText	Edit Text	Enter Emaill Address of customer	Fill in Edit Text	
6	Date of birth_Button	Button	Select Date of birth	Click on button	
7	Create new Customer_Button	Button	Create new customer	Click on button	Navigate to Create new Customer Screen
8	Customer List_RecyclerView	Recycler View	Show list of customer in system	Automatic	Change when click on button Find
9	Customer Item_TextButton	TextButton	Show info of customer	Click on button	Navigate to Customer Detail Screen

17. Customer info screen



Past year
$1200
This year
$1500 ↑(+25%)

Recent contract

Contract number	Amount	Date created
3gasd	$100	23/12/2021

Chart

Total	$1200
Paid	$400
Unpaid	$800

Recent service used
- Each time
- Credit line
- Investment project

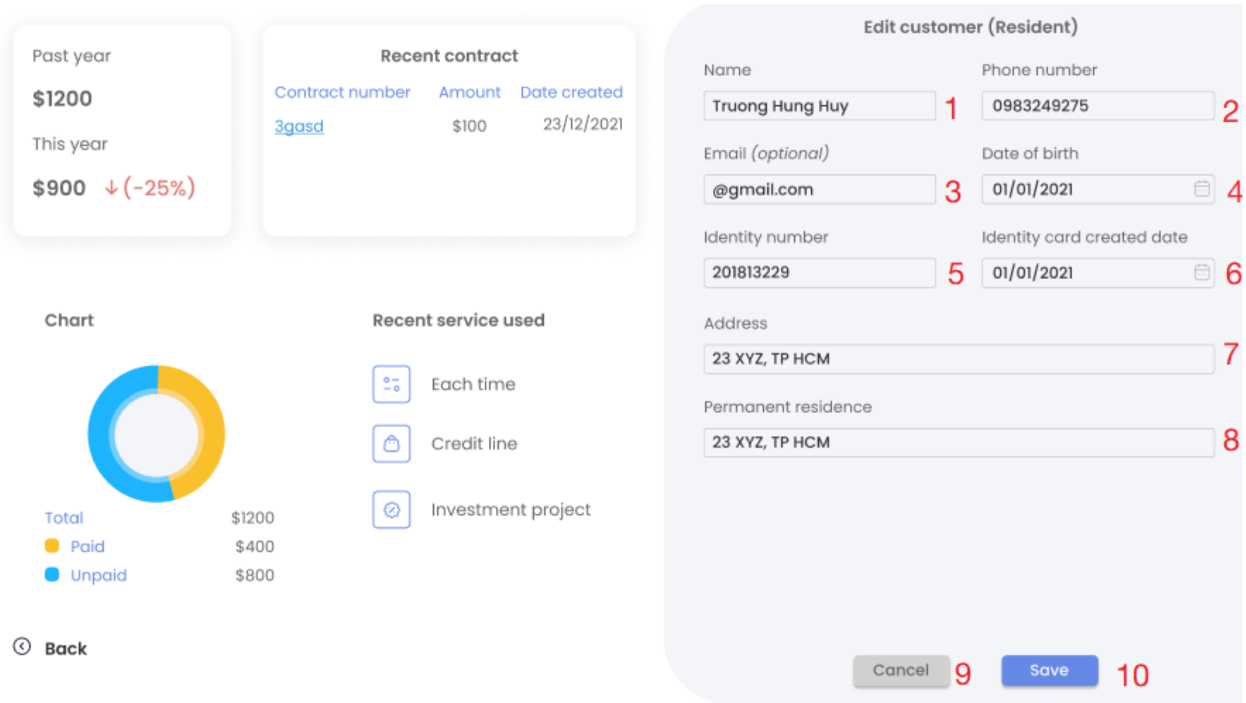
Truong Hung Huy
908 points - Silver
MH212143298
Silver — Gold

Customer type	Type 1
Date of birth	00/00/0000
Address	23 Abc, Xyz, TP HCM
Permanent residence	23 Abc, Xyz, TP HCM
Identity number	1234567890
Identity card created date	00/00/000
Phone number	0983249275
Email	@gmail.com
Company rule	Rule rule rule rule rule
Business registration	Business registration businessss business registration

No	Name	Type	Feature	Calling Condition	Note
1	amount_CardView	CardView	Show data		
2	recentContract_ CardView	CardView	Show data		
3	contractNumber_TextButton	TextButton	Navigate to contract detail screen	Click the button	
4	chart	Chart	Show data		

5	recentServiceUsed_RecyclerView	RecyclerView	Show data		
6	customerInfo_CardView	CardView	Show data		
7	Edit_Button	Button	Change to edit mode		

18. Edit Customer Info screen



Past year
$1200
This year
$900 ↓(-25%)

Recent contract

Contract number	Amount	Date created
3gasd	$100	23/12/2021

Chart

Total	$1200
● Paid	$400
● Unpaid	$800

Recent service used
- Each time
- Credit line
- Investment project

Back

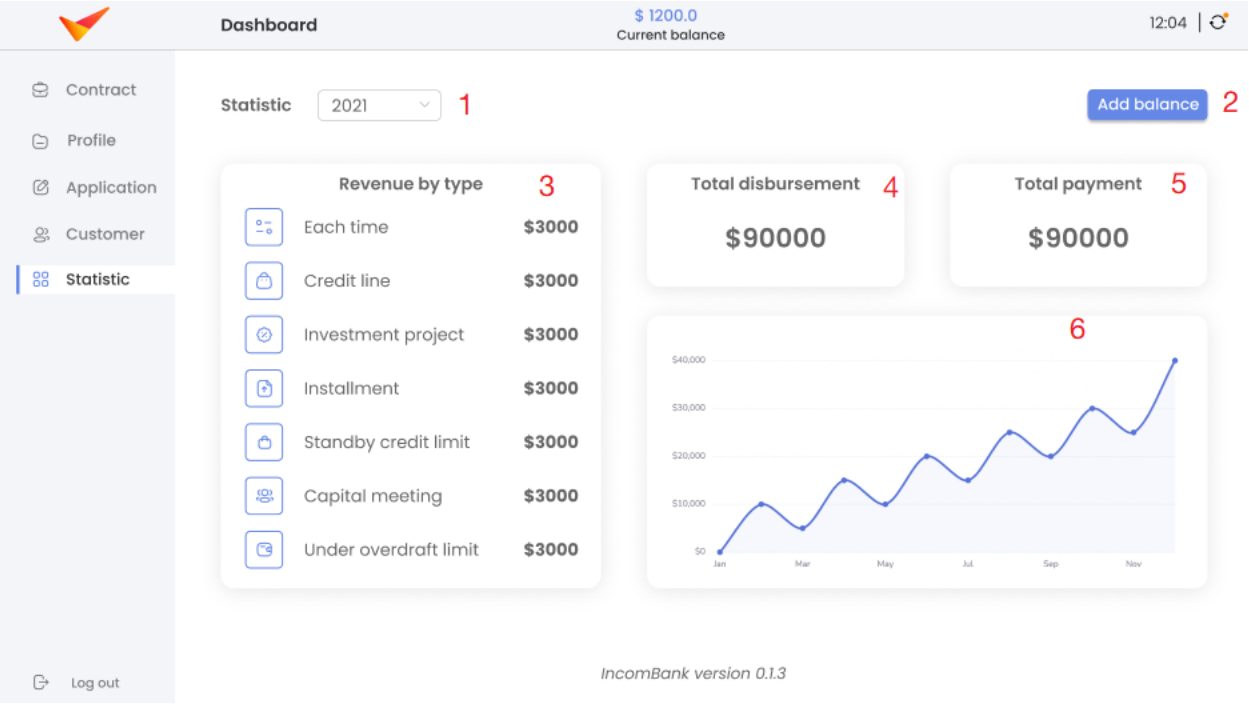
Edit customer (Resident)

Name: Truong Hung Huy
Phone number: 0983249275
Email *(optional)*: @gmail.com
Date of birth: 01/01/2021
Identity number: 201813229
Identity card created date: 01/01/2021
Address: 23 XYZ, TP HCM
Permanent residence: 23 XYZ, TP HCM

No	Name	Type	Feature	Calling Condition	Note
1	name_EditText	EditText	Enter input as name	Type in edit text	
2	phoneNumber_EditText	EditText	Enter input as phone number	Type in edit text	

3	email_EditText	EditText	Enter input as email	Type in edit text	
4	dateOfBirth_EditText	EditText	Enter input as date of birth	Type in edit text	
5	identityNumber_EditText	EditText	Enter input as identity number	Type in edit text	
6	identityCardCreatedDate_EditText	EditText	Enter input as identityCardCreatedDate	Type in edit text	
7	address_EditText	EditText	Enter input as address	Type in edit text	
8	permanentResidence_EditText	EditText	Enter input as permanentResidence	Type in edit text	

19. Admin screen



$ 1200.0
Current balance

12:04

Statistic 2021

Revenue by type

Each time	$3000
Credit line	$3000
Investment project	$3000
Installment	$3000
Standby credit limit	$3000
Capital meeting	$3000
Under overdraft limit	$3000

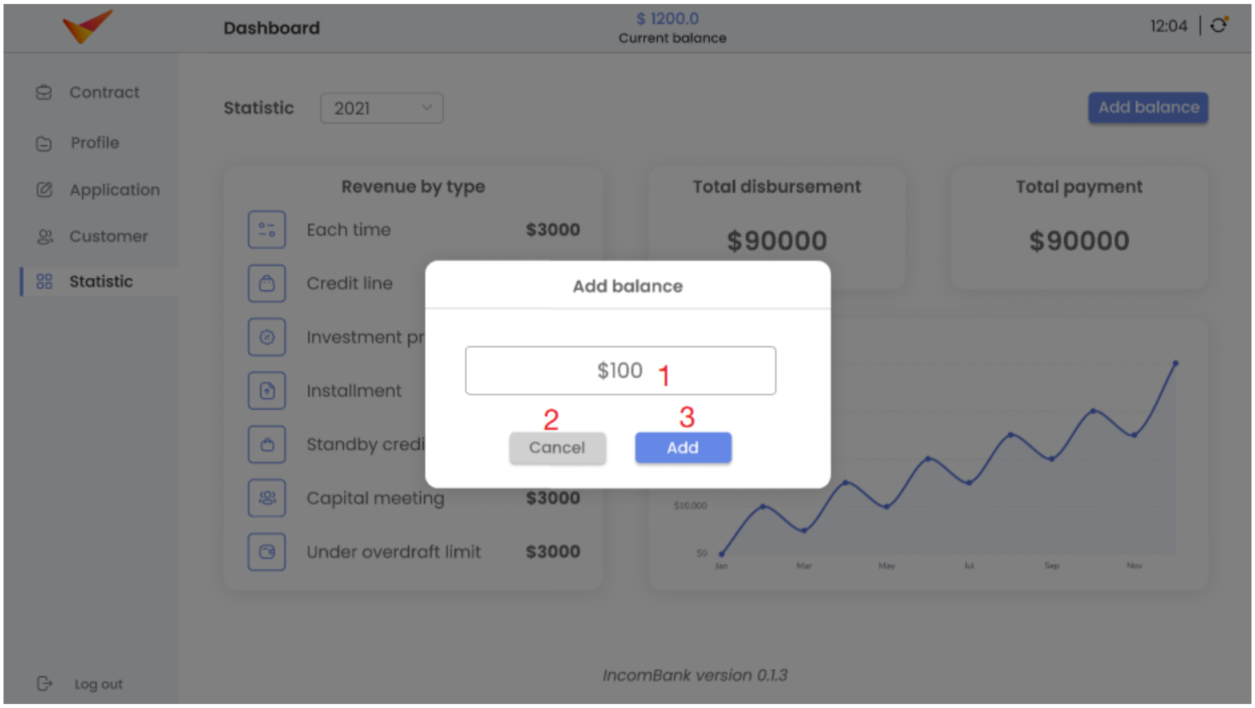
Total disbursement
$90000

Total payment
$90000

IncomBank version 0.1.3

No	Name	Type	Feature	Calling Condition	Note
1	year_Spinner	Spinner	Get data corresponding to year	Choose item in spinner	
2	addBalance_Button	Button	Add balance	Click the button	
3	revenueByType_RecyclerView	RecyclerView	Show data		
4	totalDisburse_CardView	CardView	Show data	Click the button	
5	totalPayment_CardView	CardView	Show data	Click the button	
6	Chart	Chart	Show data		

20. Add balance



Each time $3000
Credit line
Investment pr
Installment
Standby credi
Capital meeting $3000
Under overdraft limit $3000

Total disbursement $90000
Total payment $90000

$100

No	Name	Type	Feature	Calling Condition	Note
1	amount_EditText	EditText	Enter input as amount	Type in edit text	
2	cancel_Button	Button	Navigate one back	Click the button	
3	add_Button	Button	Add balance	Click the button	

X. Summary

1. Development Environment and Deployment Environment

1.1. Development Environment

- Operating system: Windows 10, MacOS.
- Database: MongoDB.
- Analysis, design tools: Figma, draw.io, notion.
- IDE: Android Studio, Visual Studio Code.
- Support tools: Postman, MongoDBCompass.
- Frameworks used: Android/Kotlin, ExpressJS.

1.2. Deployment Environment

- Operating system: Android 10 or above.
- Ram: 2GB
- Screen size: 1920x1080px.

2. Achievement

- Meet the system requirements, functional requirements of the project.
- Gorgeous User Interface, Extremely good User Experience, ease to use.
- Follow Android best practices, such as Hilt dependencies injection, ViewModel, data binding.
- Clean code, easy to maintain or upgrade.
- Apply object-oriented design, analysis, programming.
- Use websocket to synchronize data between devices.
- Statistics function helps the bank track their business performance.

3. Future development

- Apply Machine Learning/Deep Learning to get data from image (indentity card)
- Apply Blockchain for creating smart contract
- Create event/discount for customer (based on customer’s point/level)
- Intergrate calculating salary for staff (based on clock in/clock out function)
- Intergrate bar code scanner to get customer infor (based on barcode in customer info page)