Bank System

User Manual

Author	**Yiming Chen**
Group	**Team 5**
Date	**2022/6/10**

Catalog

1. Introduction

This manual provides general information and procedures for using the Bank System. Users will learn how to use basic functions of Bank system. Contact Team 5 for more information.

2. Technical Descriptions

This section provides an overview of the different components in the Bank System, and recommendations for use of the equipment.
Bank System is a system that can help people manage their money and deal with others. People can easily make it on their phones or using ATM on the road.

2.1 System Composition

The Bank System consists of three major parts:

- Backend (System)
- ATM's Interface
- APP's Interface

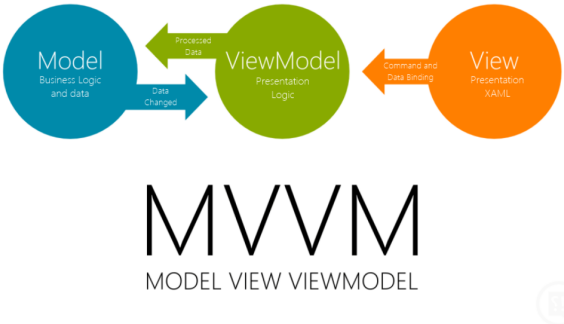

Fig 2.1 System Design

Our system is based on MVVM, that means the whole system is separated and has low reliance on each other. Hence, in our system, one backend can contract with many ATMs and APPs, though too many connections may cause jams since MATLAB is not enough efficient for server usages.

2.2 Interface Overview

2.2.1 ATM Interface

Fig. 2.2. ATM Interface

2.2.2 APP Interface

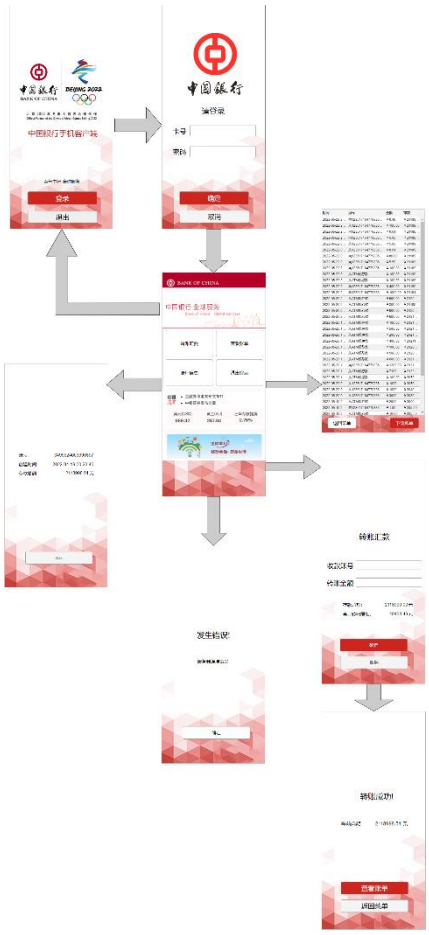

Fig. 2.3. Doctor Interface

2.3 Installation

2.3.1 Prerequisites

- Your computer must be running Windows 10, version 1809 or newer.
- Install MATLAB (version >= 2020)
- Install MATLAB Database extension

2.3.2 Environment

- Open MATLAB in final_submission/ and run env.m
- Make sure there is no **there is no Chinese in the work path.**

From this and below, your work path must be final_submission/

2.3.3 Run System

- Run src/main.m and you will get two UI and a backend in your MATLAB environment.
- If you want more ATM, run final_submission/src/frontend/frontend_atm.m.
- If you want more APP, run final_submission/src/frontend/frontend_app.m.

2.3.4 Run Tests

- You can find all the tests in tests/ and run them freely.

2.3.5 FAQ

- If you receive “SQLite file does not exist” please make sure your work path is correct.
- If you receive “未定义与‘string’类型的输入参数相对应的函数‘sqlite’”, please make sure you have Installed MATLAB Database extension.

3. Operating Instructions

This section provides a detailed explanation of Bank System’s functionality and operating procedure.
Users can use our Bank System easily after reading these introductions.

3.1 ATM Operation

3.1.1 Login in

When ATM start, this is the default Interface.

Fig. 3.1. ATM Default Interface

Default Components

- ① **"Insert Card".** Clicking on this button will open a new window that ask you to input card number. (To simulate insert card).

Operation Procedure for Login

1. Press Insert Card to

Then it will change to Login Interface

Fig. 3.2. ATM Login Interface

Login Components

- ① **"Number Pad".** Clicking on this Pad to insert password
- ② **"OK Button".** Click to send login data
- ③ **"Back Button".** Click to back to last interface

Operation Procedure for Login

1. Using "Number Pad" to insert your correct password.
2. Clicking on OK.

If the password and account is correct, then it will change to Main Interface.

3.1.2 Main Interface

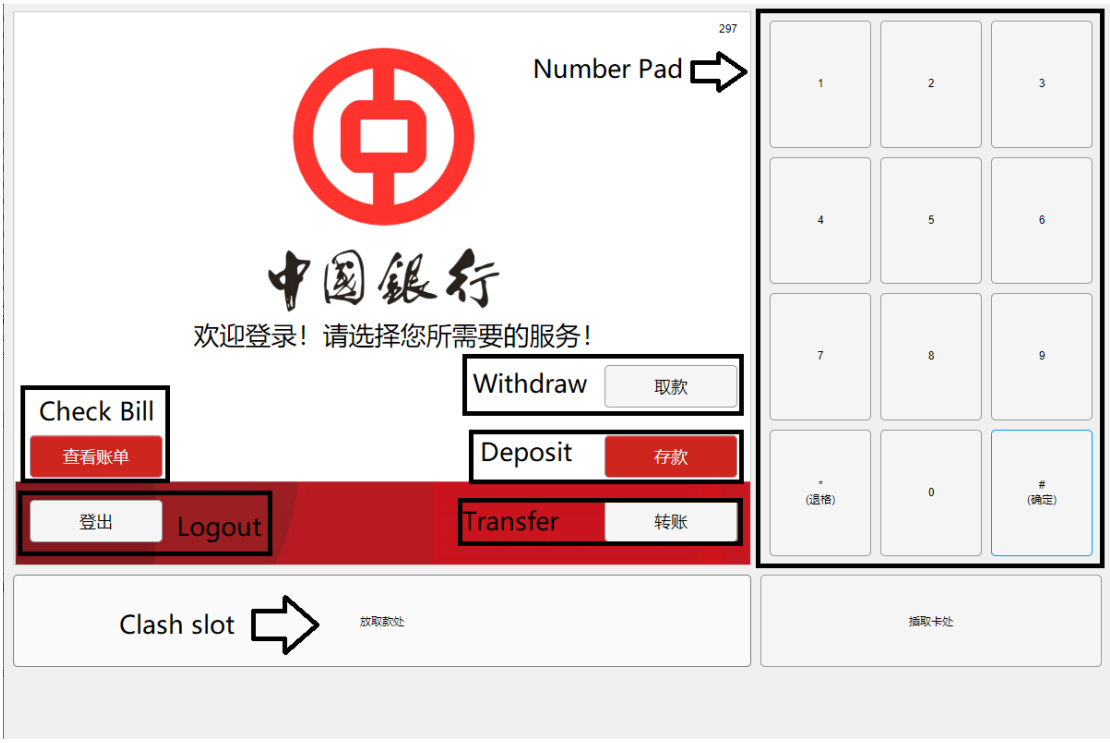

Fig. 3.3. Main Interface

Main Interface Components

- ① **"Check Bill Button".** Clicking on it to check your bill.
- ② **"Withdraw Button".** Clicking on it to withdraw money.
- ③ **"Deposit Button".** Clicking on it to deposit money.
- ④ **"Transfer Button".** Clicking on it to do transfer.
- ⑤ **"Logout Button".** Clicking on it to logout and leave.
- ⑥ **"Number Pad".** Use this pad to insert number.
- ⑦ **"Clash slot".** Withdraw or deposit will need you to put or get money there.

Operation Procedure for Logout

1. Click on the Logout Button.
2. You will return to default interface.
3. Remember to click Insert Card to get your card back.

3.1.3 Check Bill

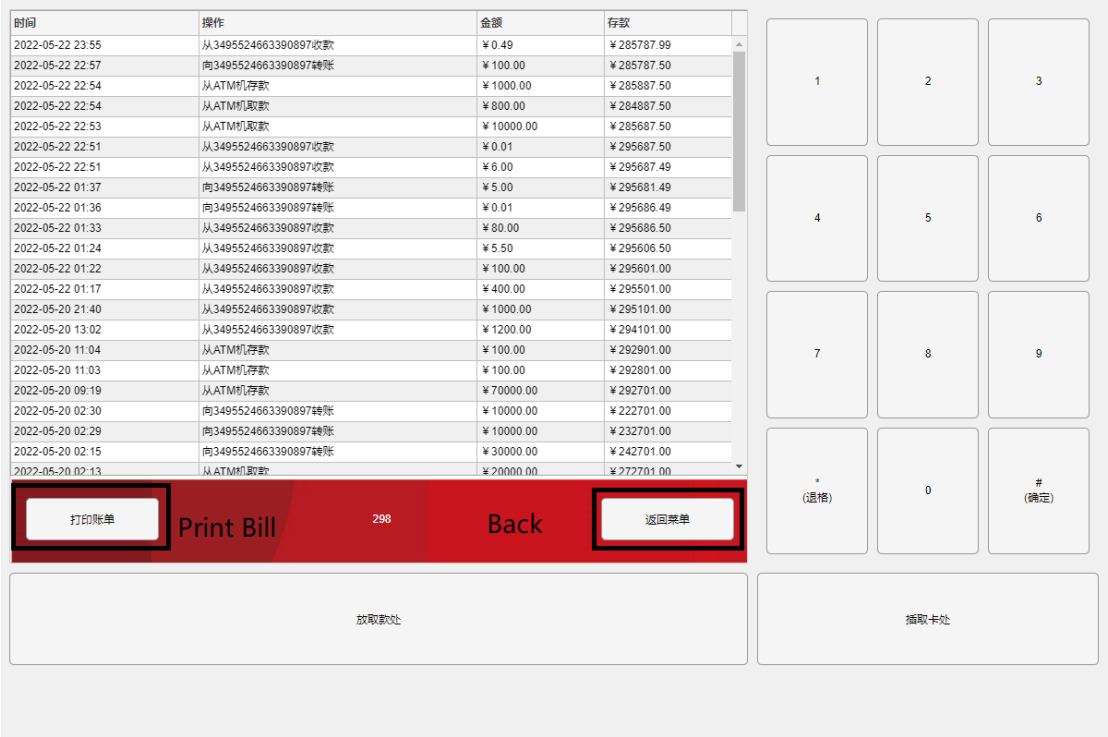

Fig. 3.4. Check Bill Interface

Check Bill Interface Components

- ① **"Print Bill Button".** Clicking on this to get a bill file. (to simulate the paper bill)
- ② **"Back Button".** Clicking on this button to back to last interface

Operation Procedure for Print Bill

1. Click on the Print Bill Button.
2. In the workdir, you will find bill.xlsx.

3.1.4 Withdraw

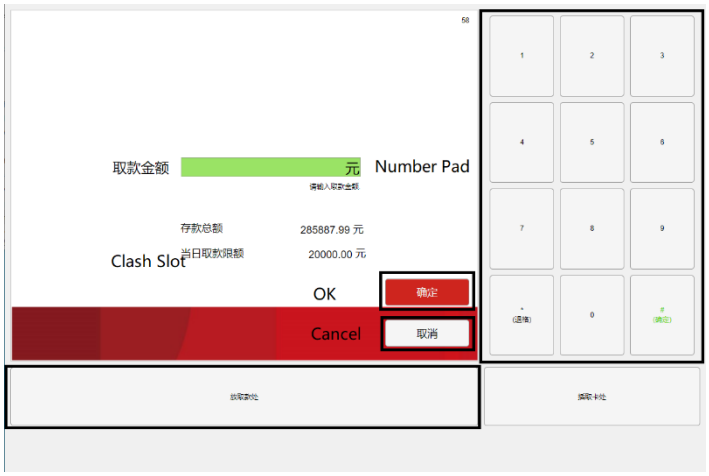

Fig. 3.5. Withdraw Interface

Withdraw Interface Components

- ① **"OK Button".** Clicking on it to withdraw.
- ② **"Cancel Button".** Clicking on it to back to last interface.
- ③ **"Clash Slot".** You can get your money here.
- ④ **"Number Pad".** Using this pad to input the number you want to withdraw.

Notice：

1. There is a limit one account can withdraw one day.

2. User can not withdraw more than the money he has.

Operation Procedure for Withdraw

1. Using number pad to insert the number you want to withdraw. (only whole hundred will be accept).
2. Clicking OK Button to send request.
3. If accepted, you can get you money from clash slot.

3.1.5 Deposit

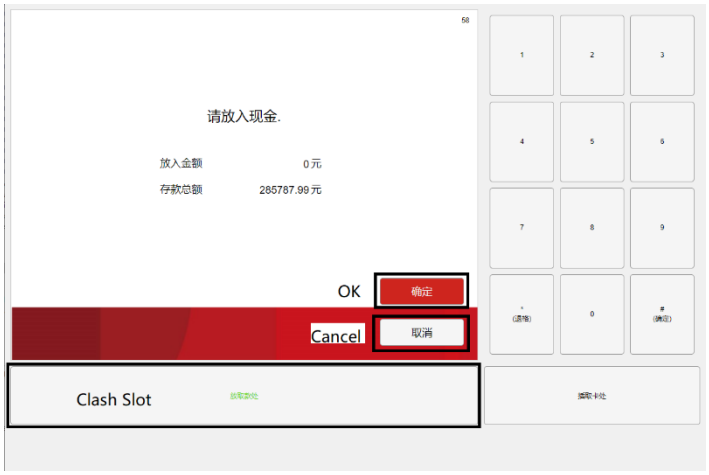

Fig. 3.6. Deposit Interface

Deposit Interface Components

- ① **"OK Button".** Clicking on it to deposit.
- ② **"Cancel Button".** Clicking on it to back to last interface.
- ③ **"Clash Slot".** You should put your money here.

Operation Procedure for Deposit

1. Clicking Clash slot and input the number of moneys you want to deposit. ()
2. Clicking OK Button to send request.
3. If accepted, you can receive a message in the Fig 3.7.
4. Then you can checkbill by clicking Check Bill Button, then refer to 3.1.3.
5. Clicking the back button and back to last interface.

Fig. 3.7. Deposit Succeed Interface

3.1.6 Transfer

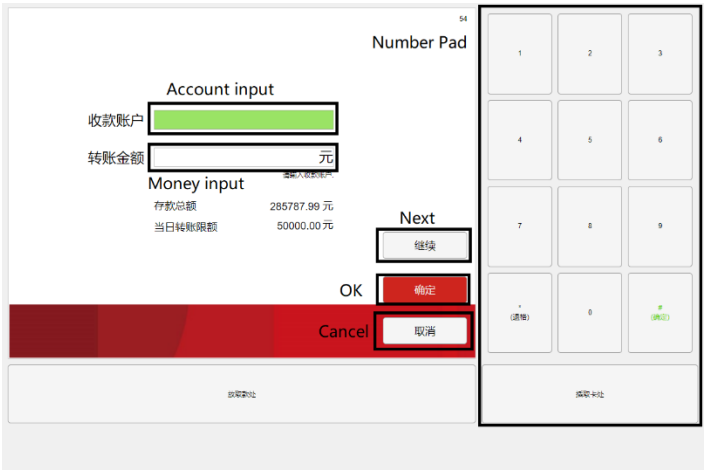

Fig. 3.8. Transfer Interface

Withdraw Interface Components

- ① **"Account input".** Input the target account number here.
- ② **"Money input".** Input the money you want to transfer.
- ③ **"Next Button".** After input account, you can click this to turn to Money Input.
- ④ **"OK Button".** Click it to send request.

- ⑤ **“Cancel Button”.** Click it to cancel transfer.
- ⑥ **“Number Pad”.** Using this pad to input the number and account number you want to transfer.

Notice：

1. There is a limit one account can transfer one day.
2. User can not transfer more than the money he has.
3. User can only transfer to an account that is valid.

Operation Procedure for Transfer

1. Using number pad to insert the account number you want to transfer.
2. Clicking Next Button to turn to Money input.
3. Using number pad to insert the money you want to transfer.
4. Click OK button to send request.
5. If accepted, transfer will be done.

3.1.7 Error

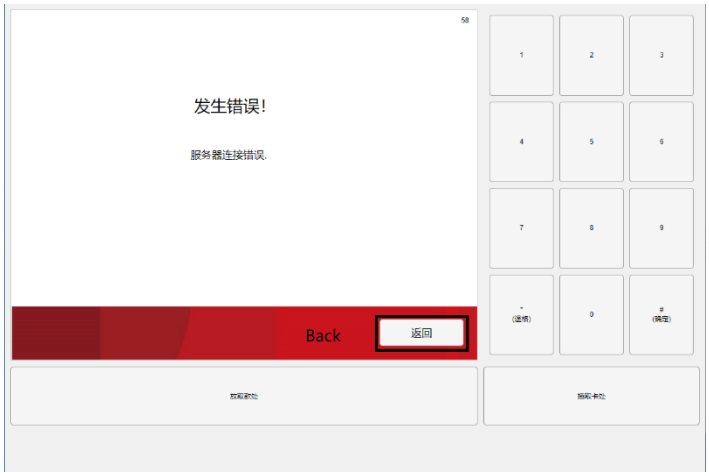

Fig. 3.9. Error Interface

Error Interface Components

- ① **“Back Button”.** Input the target account number here.

Operation Procedure for Deal with error

1. Click Back button to back to last interface.

3.2 APP Operation

3.2.1 Login in

When APP start, this is the default Interface.

Fig. 3.10. ATM Default Interface

Default Components

- ① **"Login".** Clicking on this button will ask you to login.

Operation Procedure for Login

1. Press Login.

Then it will change to Login Interface

Fig. 3.11. APP Login Interface

Login Components

- ① **"Cardnumber Input".** Input your cardnumber here.
- ② **"Password input".** Input your password here.
- ③ **"OK Button".** Click to send login request.
- ④ **"Back Button".** Click to return default interface.

Operation Procedure for Login

1. Input your card number.
2. Input your password.
3. Clicking on OK.

If the password and account is correct, then it will change to Main Interface.

3.2.2 Main Interface

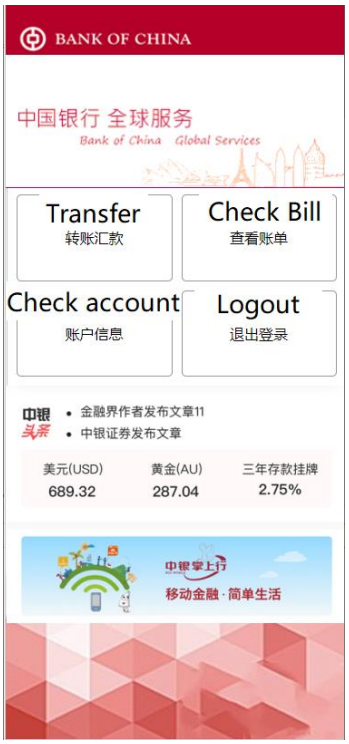

Fig. 3.12. Main Interface

Main Interface Components

- ① **"Transfer Button".** Clicking on it to make transfer.
- ② **"Check Bill Button".** Clicking on it to check your bill.
- ③ **"Check account Button".** Clicking on it to check your account profile.
- ④ **"Logout Button".** Clicking on it to logout.

Operation Procedure for Logout

1. Click on the Back Button to back to main interface.

3.2.3 Check Bill

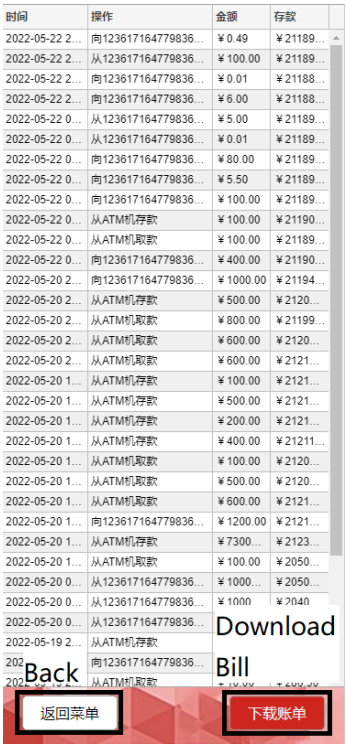

Fig. 3.13. Check Bill Interface

Check Bill Interface Components

- ① **"Download Bill Button".** Clicking on this to get a bill file.
- ② **"Back Button".** Clicking on this button to back to last interface

Operation Procedure for Print Bill

1. Click on the Download Bill Button.
2. In the workdir, you will find bill.xlsx.

3.2.4 Transfer

Fig. 3.14. Transfer Interface

Withdraw Interface Components

- ① **"Account input".** Input the target account number here.
- ② **"Money input".** Input the money you want to transfer.
- ③ **"OK Button".** Click it to send request.
- ④ **"Cancel Button".** Click it to cancel transfer.

Operation Procedure for Transfer

1. Input the target account number.
2. Input the money you want to transfer.
3. Click OK button to send request.
4. If accepted, transfer will be done and you will get a message in Fig 3.15.
5. Then you can check bill. (refer to 3.2.3).
6. Click back button to back to main interface.

Fig. 3.15. Transfer Interface

3.2.5 Check Account

Fig. 3.16. Check Account Interface

Error Interface Components

- ① **"Back Button".** Input the target account number here.

Operation Procedure for back.

1. After check your profile, click Back button to back to last interface.

3.2.6 Error

Fig. 3.17. Error Interface

Error Interface Components

- ① **“Back Button”.** Input the target account number here.

Operation Procedure for back.

2. Click Back button to back to last interface.

4. Maintenance

Administrators can maintain and manage the whole system in this version of the Bank System using administrative authorities. Since interfaces for administrators’ management are unavailable currently, these actions of management can be done in command line.

4.1 Run Server

After installation in a right way, you can run or restart the server by running src/backend/backend.m. After this, an instance of Server named server will be available in the base environment of MATLAB.

4.2 Administrator Operation

To communicate with the server in command line, you must invoke the post method of Server and send in an instance of Request. Some examples are given as below, for more information, please refer to the specification document in docs/specification/specification.pdf
More examples and available accounts for testing and maintenance can be found in src/backend/backend_test.m

4.2.1 Login

```
server.post( ...
      Request("/slogin", ...
            containers.Map(["adminId", "password"], ["adminId", "password"]) ...
            , "admin", 0 ...
      )...
)
```

To do anything to database, admin should first login.
To login, admin should input his or her id and password in the post which is marked red.
Then, copy this to MATLAB Command line and enter.
Session id will be sent back with the response, you need to send it with your other requests as a token for your identification.

4.2.2 Create Account

```
server.post( ...
    Request("/createAccount", ...
          containers.Map(["password"], ["password"]) ...
          , "admin", 1 ...
    )...
)
```

After login, admin can create account for new user.
Admin should input the password user want to set in the post where is marked red.
Then post it and the response will have a parament named “userId”, which is the new account id created.

4.2.3 Deactivate Account

```
server.post( ...
    Request("/deactiveAccount", ...
        containers.Map(["userId"], ["userId"]) ...
        , "admin", 1 ...
    )...
)
```

After login, admin can deavtice account for user.
If user lost his card, admin can help to deactive this account to protect his money.
To do this, admin should input the userId in the post where is marked red.
Then post it and this account will be deactive.

4.2.4 Activate Account

```
server.post( ...
    Request("/activeAccount", ...
        containers.Map(["userId"], ["userId"]) ...
        , "admin", 1 ...
    )...
)
```

After login, admin can active account for user.
To do this, admin should input userId in the post where is marked red, then post it.

4.2.5 Health Check

```
server.post( ...
    Request("/healthCheck", ...
        containers.Map() ...
        , "admin", 1 ...
    )...
)
```

After login, admin can manually run health check for the database.

4.2.6 Logout

```
server.post( ...
    Request("/slogout", ...
        containers.Map() ...
        , "admin", 1 ...
    )...
)
```

After login, you can use this request to logout, and the session corresponding to your session id will be deactivated.

4.3 Database

Except those methods available to the database mentioned above, you are allowed to manually access it using SQLite3 applications (SQLite3 >=3.38.2, zlib >= 1.2.11 and gcc >=5.2.0) with raw SQL statements. An installed instance of these applications can be found in src/backend/database. For more information, please refer to SQLite Home Page.
It should be mentioned that the password for testing users' accounts are 654321 or 114514. And the administrator account is 1926081719260817, with password 123456. The client key (or so called captcha) to activate APP for users is 123456.

4.4 System Log

To provide more traceability for errors and emergencies in the Bank System, error messages is printed on console with detailed location notes and explanations. Note that hardware warnings like when ATM runs out of money will also be considered as a kind of errors and will printed on console.

4.5 ATM Maintenance

By default, ATM provides 600,000 Yuan for withdrawals and 600,000 Yuan of space for depositions. Once the two are both full, the ATM will stop providing services and log an error message on console.
To handle this, you need to reset the cash tank of the ATM (not available in simulation environment), and restart the program.

5. Manual Tests

This section provides some manual tests which are run before the release of the Bank System. These tests can be easily carried out by hand and using UPPAAL. For more complicated validation information, please see Validation Document by Team 5.

5.1 Smoke Tests

There is a smoke test can do all the operation of ATM and APP, it will be helpful for you to use this bank system.

Test1 Steps

1.Insert card “1236171647798361”;

2.Input password “654321”

3.Login.

Test2 Steps

1.check bill

Test3 Steps

1.Do withdraw.

2.Insert 100

3.Get the money

Test4 Steps

1.Do deposit

2.Put in 200 money

3.Deposit 200 successfully

Test5 Steps

1.Do transfer

2.Insert account id

3.Insert 100

4.Transfer successfully.

5.Check bill and you can find the log of this transfer.

Test6 Steps

1.Open APP

2.Insert userId “1236171647798361”

3.Insert password “654321”

Test7 Steps

1.Do transfer

2.Set target id

3.Insert 1.32.

4.Transfer successfully.

Test8 Steps

1.Check bill

2.You will find the log of last transfer and other operations.

Test9 Steps

1.Check profile.

Test Function: tests/smokeTest/bankSmokeTest.m/testBank

5.2 UPPAAL Tests

Load Model Steps:

1. Open UPPAAL (version>=4.1.26)
2. Open tests/modelChecking/bank_model.xml

Test Properties Steps:

1. Load model with steps above.
2. Enter “验证器” tab.
3. Select all properties.
4. Press “开始验证” button.