Coupay System Design Document Series

Outline design specification

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1 Introduction

1.1 Purpose

The purpose of writing is to explain the design method of **coupay** Payment system in the first stage of design considerations, including procedures for the basic organizational structure of the processes, procedures, systems, modules, to divide and function, providing a basis for the detailed design of the program. This guide is written for system designers, software developers, system designers and client-side project review officers.

1.2 Background

This system named **coupay**, is a third-party payment system, developed by Day Sheng-Chang team from South China University of technology.

1.3 Definition

- Android ： Android is based on Linux free and open source operating system, mainly used in mobile devices, such as smart phones and tablet PC, led and developed by the Google and the Open Handset Alliance.
- NFC ： NFC is the abbreviations of Near Field Communication, short-range wireless communications technology. Jointly developed by Philips and Sony, NFC is a kind of contactless identification and interconnection technologies for mobile devices, consumer electronics, PC and smart control tool for short-range wireless communication.
- Mobile: mobile terminals or mobile communication terminal refers to the computer can be used in mobile devices, broadly speaking, including mobile phones, laptop, Tablet PC, POS even the onboard computer. But this article mainly refers to mobile phones.
- System accounts: accounts belonging to system users, there is a certain capital.
- Consumer experience: the evaluation for certain assumption of users, including evaluation of text, ratings to sellers, pictures and so on.
- JSON ： JSONObject class is a third-party JAVA class, used to store key-value pairs for data interaction.
- C/S ： C/S structure, the client and server architecture. It is a software system architecture, through which you can fully take advantage of hardware environments on both ends, the rational allocation of tasks to Client -side and Server -side implementation, reduces the communication overhead system.
- B/S ： B/S structure, a structure of the browser and the server, is a network structure with the rise of WEB.
- SSH ： SSH struts+spring+hibernate is an integrated framework, which is one of the popular Web Application of open source frameworks.
- HTTP ： Detailed rules of the mutual communication between the browser and the Web server,

transmitted via the Internet World Wide Web document data transfer protocol.

- SQL SERVER ： It is a comprehensive database platform.

1.4 Reference materials

a. Software requirements specification

2 Overall design

2.1 Rules of requirements (see Software requirements specification)

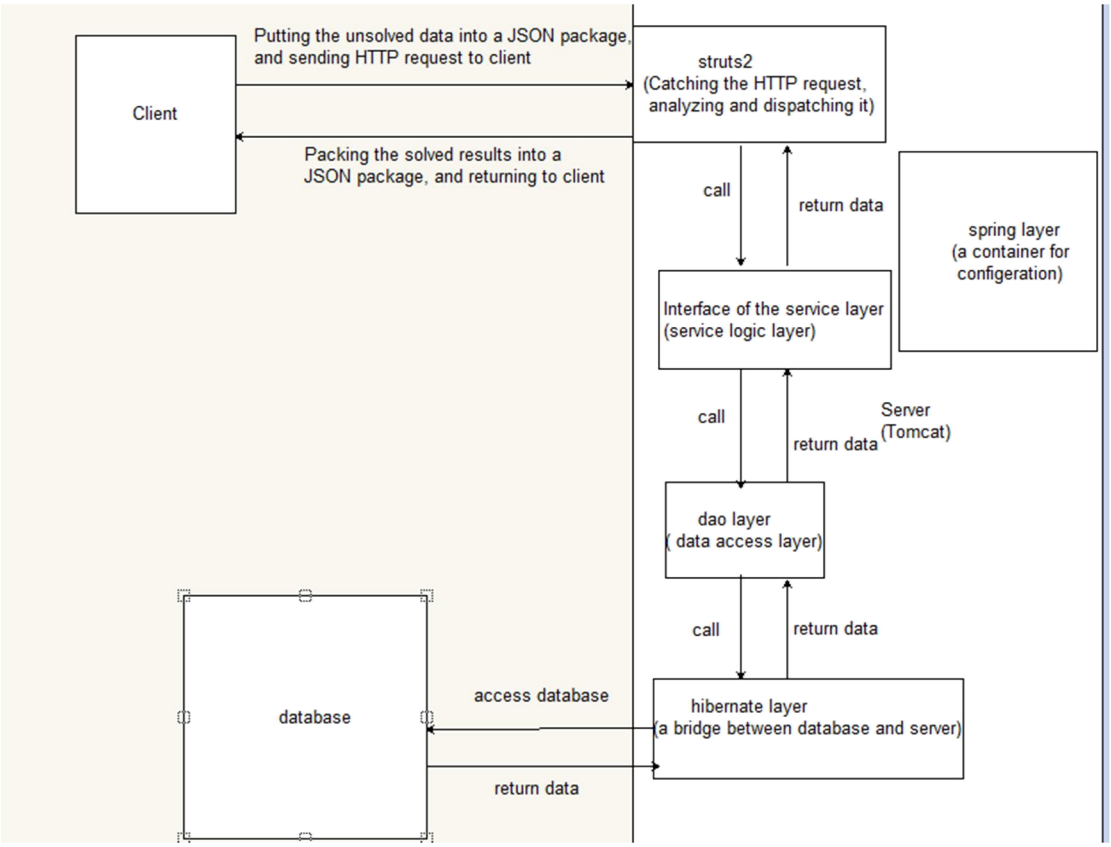
2.2 Running environment

Consumer version: install android2.3 or higher, cameras, NFC hardware and network functions of mobile terminals.
Business Version: installing Win7/Vista/Win2003/WinXP/Win8 systems PC
The administrator version: browser

2.3 Basic design concepts and processes

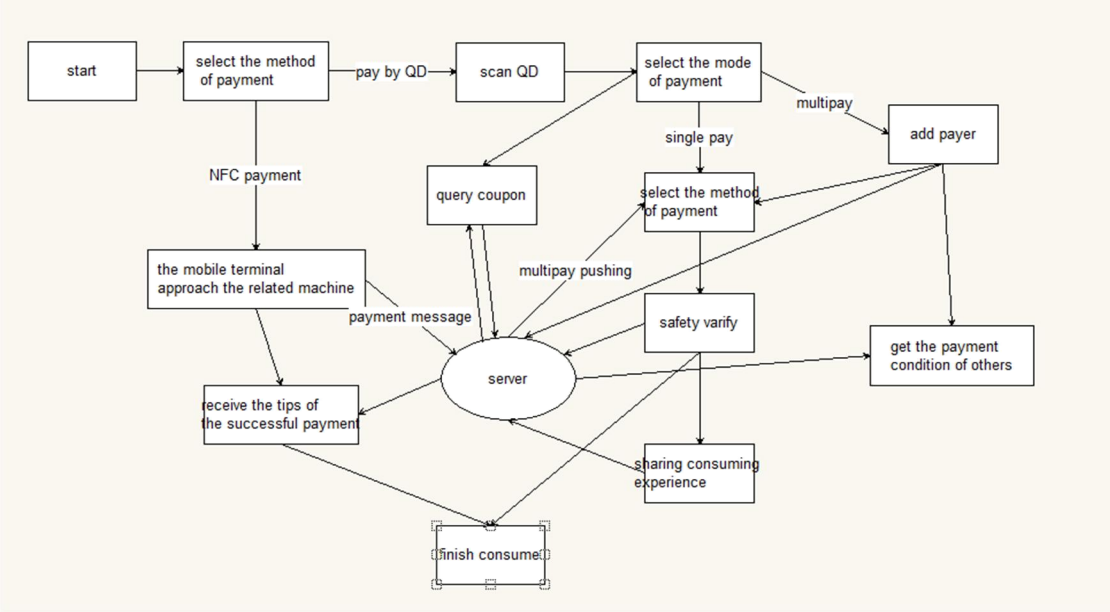
The user version and business version of our system use C/S Schema, the administrators version use B/S Schema, the server use SSH (Spring3, Struts2, Hibernate) the three-tier model, client-side and server-side communicated by HTTP agreement, and interacted through the JSON format.

●System flow chart

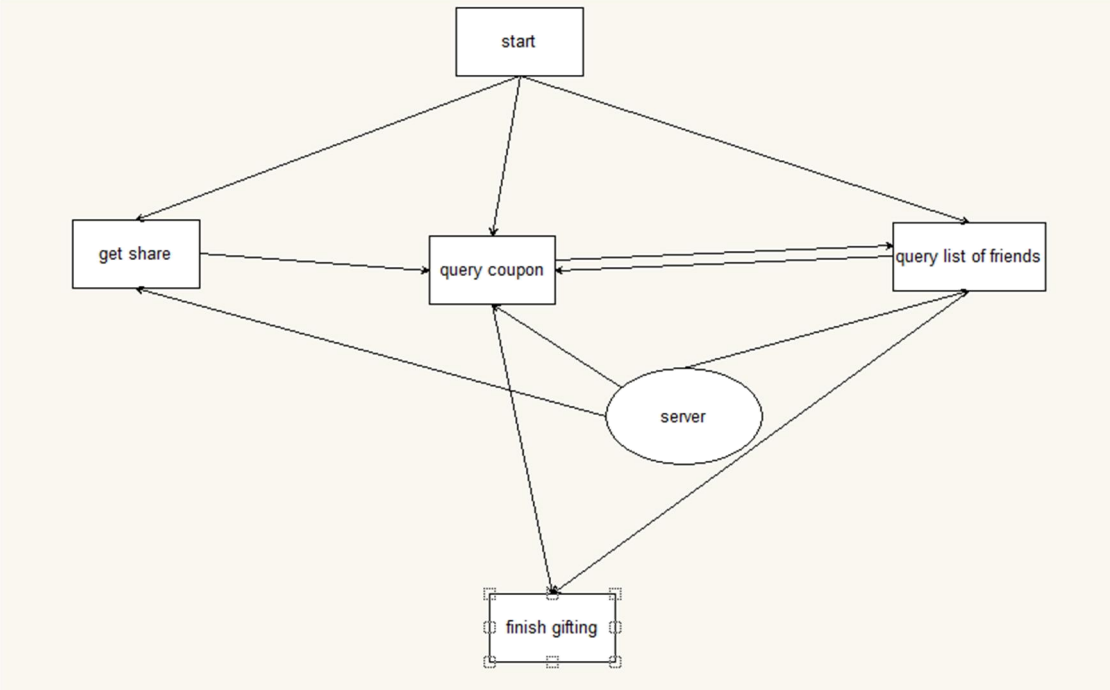


●Following is a more complex case handling process

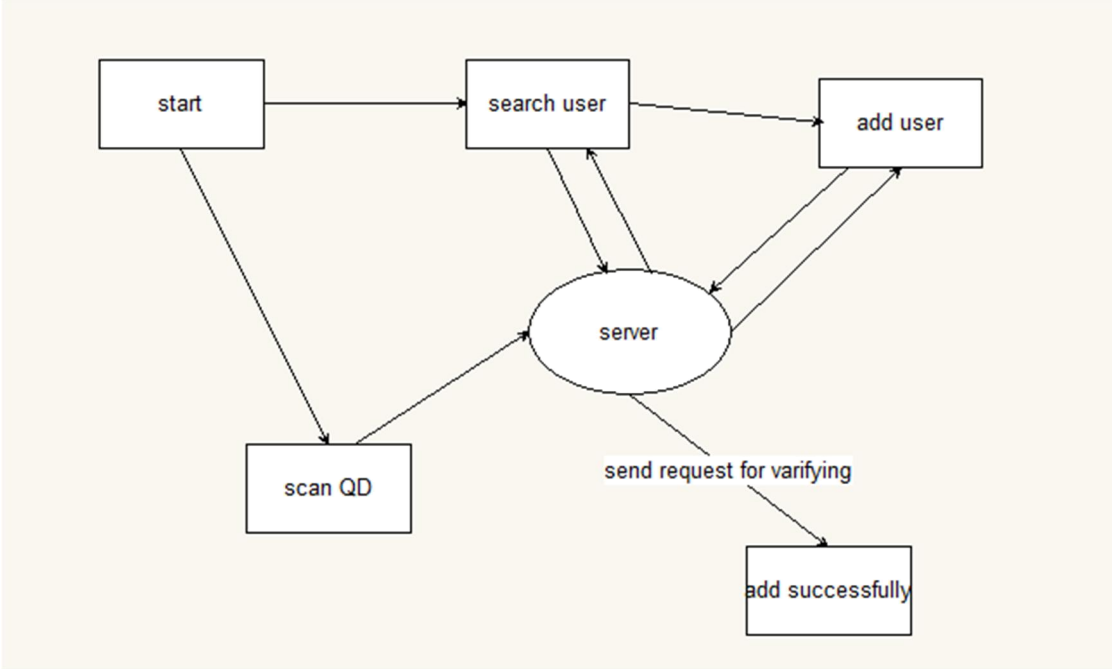
● Payment process



● Gift coupon

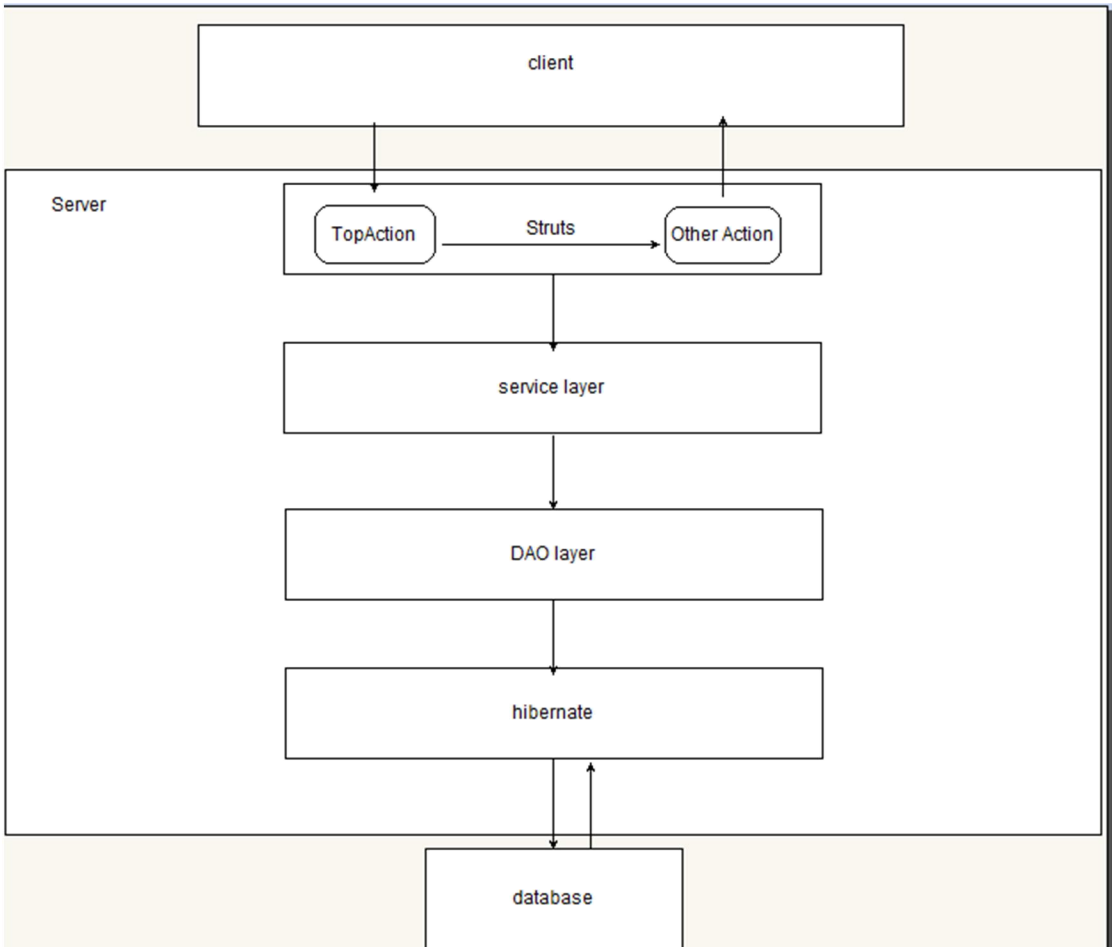


● Add friends


start
search user
add user
server
scan QD
send request for varifying
add successfully

2.4 Structure

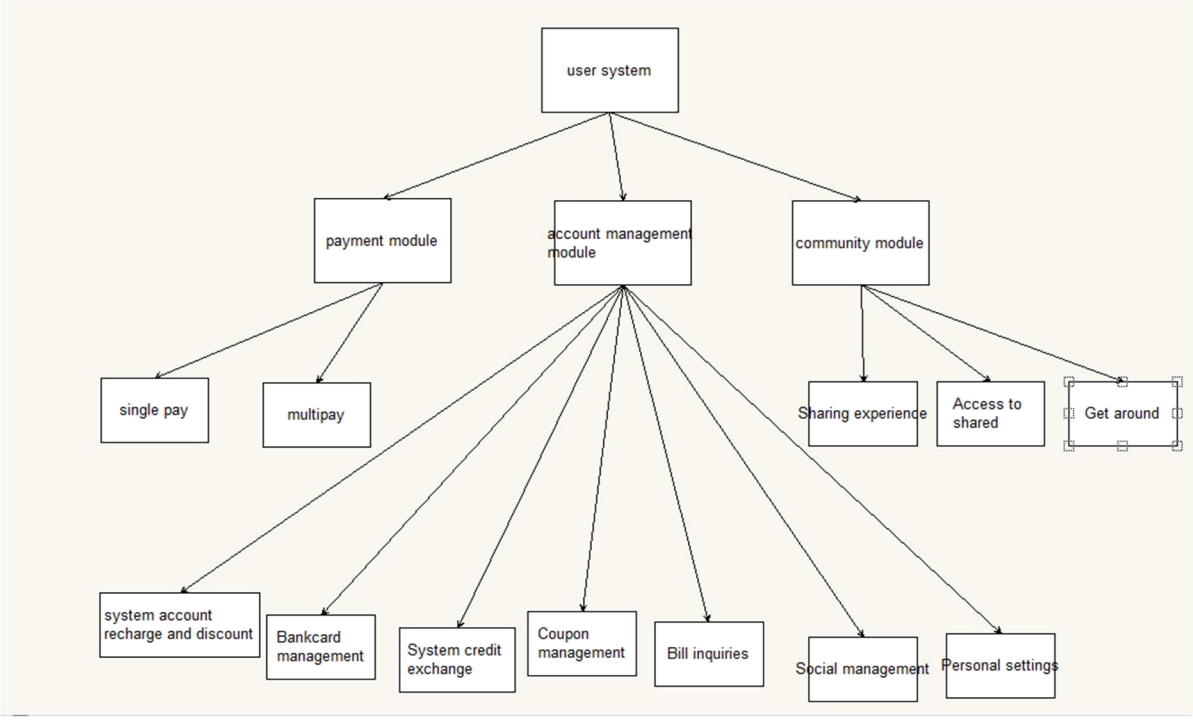
●System architecture diagram



System elements (modules)	Identifier	Function
Struts	***Action	Block HTTP Request, and analyze and dispatch the data
Spring	ApplicationContext***	The configuration of container
Hibernate		Access to the database, the bridge to connect to the database and server
Dao	***Dao	Encapsulates data processing functions
Domain		Database entity

		classes that encapsulate data
Service	***ServiceImpl	Business functions for the processing of data
Service Layer interface	***Service	Business function interface, easy to Action Function call

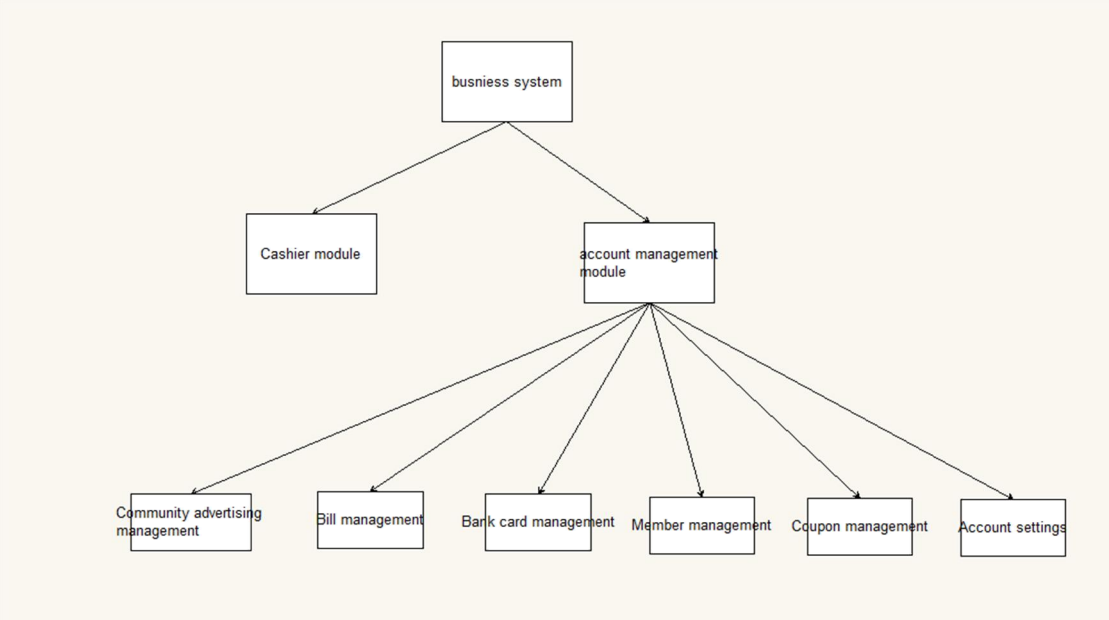
●User version:



Module name	Functional description
Payment modules	Through NFC or scanning the QR code, through the security validation then complete consumption, more-than-one-person payment now use AA Sharing
System account recharge and discount	Money from a user's system will amount is transferred to the system account in the bank account, while binding the system account fund transfer to bank account
Bank card management	Binding the bank account to the system account, easy for payment operations
System credit exchange	User exchange the coupon with system credit
Coupon management	View the coupon, you can do the gift coupon operation
Bill inquiries	Query user-related transactions

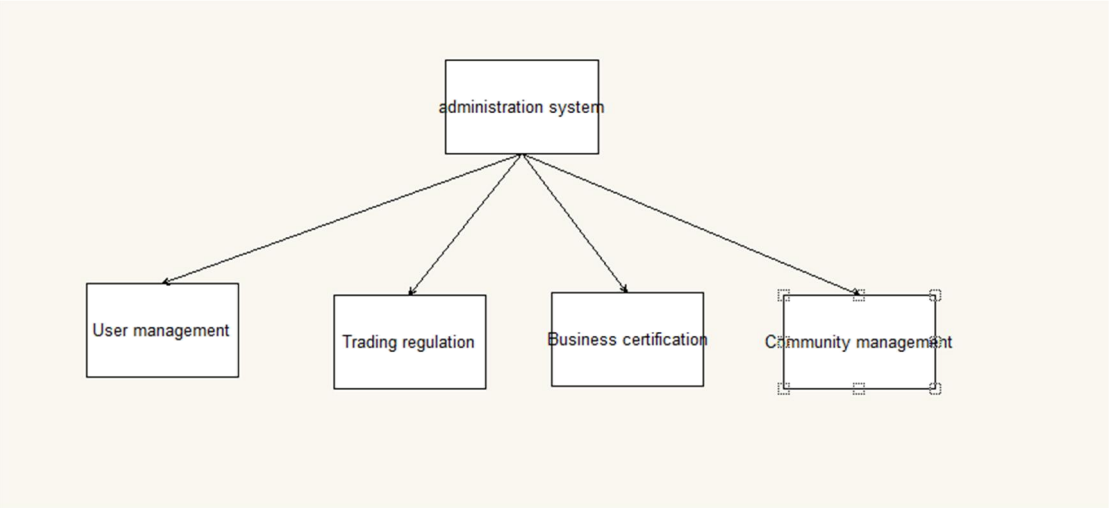
Social management	Deleting and concern about friends or sellers, query friends or sellers details, retrieve the user or sellers
Personal settings	Personalization
Sharing experience	After a consumption users may be undertaking an assessment of the consumer and to share to the community, for reference by friends
Access to shared	Viewing friends share
Get around	According to geographical location to get around business information

●Business version



Module name	Functional description
Cashier module	Results to generate QR codes for consumers who are based on scans, accepting consumer successful payment information and display
Community advertising management	Release management ad
Bill management	Query trade record
Bank card management	Binding the bank account to the system account
Member Management	Managing the business member, and adjust the preferential rules
Coupon management	Editing and publishing coupons, free coupons for regular users
Account settings	Set the business related information

●Administrator version



Module name	Functional description
User management	Querying user information or banning account
Trading regulation	Searching real-time trading information and immediately stopping certain transactions
Business certification	Approve or reject merchant registration request
Community management	Managing community content and advertising

2.5 The relationship between functional requirements and program

● User version

	Payment module	Account management module	Community modules
Cashier module		√	
Bank card management		√	
System credit exchange		√	
Coupon management		√	√

Querying bills		√	
Social management		√	
Personal settings		√	
Sharing experience	√		√
Access shared			√
Getting around			√
Single payment	√		
Multipay	√	√	

● Business version

	Cashier module	Account management module
Paying and generating QR codes	√	
Receive information of payment	√	
Community advertising management		√
Billing management		√
Bank card management		√
Member Management		√
Coupon management		√
Account settings		√

2.6 Unsolved questions

- Data security issues
- Payment mechanism for security issues

3 Interface design

3.1 User interface

- User version: interface made by the class library providing by android sdk, there is no difference on the method of between using the system and the general android application.
- Business version: interface made by the QT Class library , developed on win7, having the graphical user interface
- The administrator version: interface developed by the jsp+css, interface is simple and easy to operate

3.2 External interfaces

- User version:

a) Interface with the bank transfer service

The system to send the bank transfer request, receive transfer of results to the user.

- Business Version:

a) Interface with the original receipt system of the business

This system receives the total amount of payment from the original receipt system of the business and sends generated QR codes, after paying success, pushes the receipt information to original billing system.

b) Interface with the original member system of the business

The modification of the VIP of business will keep synchronous with the original member system of the business

3.3 Internal interface

- User version:

A) Interface with the server

This system uses JSON format to encapsulate the data, sends request to the server HTTP, the Server encapsulates the processing results and returns them to the client in the same way.

- Business Version:

A) Interface with the server

This system sends requests to the server HTTP, the server packs and returns results.

- Administrator:

A) Interface with the server

This system sends requests to the server HTTP, the server packs and returns results.

- Server:

A) Interfaces with database

This system uses JDBC to connect the database.

B) Struts interfaces with the business logic layer

Realizing separation between struts and the service layer by that the struts layer calls the interfaces of the service layer.

4 Run design

4.1 Running modules

- In the payment module, when pay with other people, account management module is called to query friends.
- In the payment module, when transfer finishes, community module is called to share the consuming experiences.
- In the payment module, when transfer verifies, account management module is called to query the coupons.

4.2 Operation control

After the client sends the data to the server, it waits for the return information handling of server, the server receives and processes data, when completed, the results are returned to the client.

4.3 Run time

Each module running time should be limited in 1-2 seconds, the main factors influencing the running time are Wi-Fi network and server hardware configurations.

5 System data structure design (See database design document)

6 System error process design

6.1 Error message

When the programs running there will be two types of errors:
1. Due to input information, or unable to meet the demands of producing errors, known as a soft error.
2. Due to other problems, such as network transfer timeouts, known as a hard error.

- For soft errors, to succeed in the login, registration, payment, etc. and input data validation module and process data analysis, judge the wrong type, and generate a corresponding error statement, which are sent to the output modules.
- Hard error, to output some simple error statements in the corresponding module, and reset the program. Returns the input stage.

6.2 Remedial measures

- In terms of network transmission, if the local wireless network provided by sellers breaks down and it is considered by connecting to wireless network provided by communication operators.
- In terms of database maintenance, because the data in the database has been backed up, it can depend on the recovery capabilities of the database after the system breaks down, and then restart depending on the log file, even if the system crashes the user data will not be lost or damaged.

6.3 Design of system maintenance

- Maintain the data on the server database. Use database maintenance function mechanism of the SQL SERVER. For example, regularly backing up for database, maintaining and managing deadlock problems of the database and maintaining the consistency of the data in the database.
- To maintain the client on a regular basis, and introducing new version.