The Design of Game Platform Based on Java

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Abstract. In the face of rich game resources, it is necessary to have a good tool to manage games and improve the user's game experience. This is the meaning of the game platform. The game platform described in this paper adopts Java technology, and uses C/S mode and My SQL database to complete the design of the platform. This game platform has the functions of login module, management module and so on. Through the platform, it can realize jigsaw puzzle, Snake game and real-time battle of LAN tank war game. The paper describes in detail the early preparation, overall design, specific implementation and functional testing of the game platform. All functions of the platform can be used normally, the game can also run normally under the rules, which has completed the requirements.

1. Introduction
In 1952, the first video game to be recorded by humans, the Tic Tac Toe game was born. In this year, humans invented the first generation of computers based on vacuum tube technology, which is the carrier of this video game. Today, all kinds of excellent games are also blooming. Collecting and classifying games through the game platform facilitates the functions of game management, protection of games, acceleration of games, downloading of updated games, and password-free login games after login to the platform. It greatly facilitates the operation and maintenance of game companies and gives players a better game experience[1]. Completing the design of the platform can also provide valuable reference value for the development of such projects in the future. Based on this framework template, the required management functions are perfected.

2. The overall design of the platform

2.1. The overall architecture design of the platform
The functions and attributes of the integrated platform can be divided into three layers: the login layer, platform management layer, and game operation layer. The platform structure is shown in Figure 1.

Platform development environment
Computer system: windows 10
JDK version: JDK1.8.0_171
Development tools: Eclipse IDE for Java
Database: My SQL-5.7.21
Computer: lenovo laptop
2.2. Platform process design
When users using this game platform, they first need to open the login interface to enter their account name and matching password to login. The platform compares the obtained account name and password with the information in the user table in the database. When the account name and password match at the same time, the user is allowed to log in and open the platform management interface.

After successful login, the user selects the services provided in the platform according to his own needs. The user can view the number of games he owns, the name, etc. through the platform, or open the game directly through the platform. Users can also view game data such as personal game scores and rankings stored in the database on the platform. Platform use process is shown in Figure 2.

2.3. Applied technology
- The Java language. The program written in the Java language has a concise and rigorous structure. The syntax used is concise and clear. The encapsulation call of the core class provides great convenience for the program's future development, maintenance, and modification. Because it supports network applications and communication protocols, it will be very powerful in promoting the development of Internet and Web-related software[2].
- Object-Oriented programming. The three major characteristics of object-oriented languages in the definition of history are encapsulation, inheritance and polymorphism. The most convenient place for programming is to create the project and encapsulate the operating code of the data and the data in the developed project together in the same object[3].
- Socket. Socket is mainly based on two communication protocols. One is based on TCP protocol to provide reliable connection-oriented two-way communication, and the other is based on UDP protocol to provide unreliable unconnected two-way communication[4].
- MySQL database. This game platform uses MySQL database to store management information. MySQL is currently the most popular open source cross-platform relational data management system developed by Swedish MySQL AB Company. It can be regarded as the fastest SQL database management system in the world today, and many domestic companies use it to store data[5].

3. The specific realization of the platform function
3.1. Login module
In this design, it is planned to use a small window to display it. The window contains an input text box for user name and password, a login button and a clear button. The login screen is shown in Figure 3.

3.2. Platform module
When designing the platform, the interface of this layer is expected to be divided into upper and lower parts. The upper half is used to display the functions of personalized information, display platform logo and information query. In the lower half of the game, the game is available in the display game library.

3.3. One of the game puzzle modules
When you start the game, you first show the player a picture. Then divide the picture into nine pieces. Remove the piece in the bottom right corner, which is the ninth piece. Then randomly disturb the picture sequence. Players use the free area to move the rest of the picture blocks, restoring the picture using as few moves as possible.

![Figure 3. Login screen](image1)
![Figure 4. Puzzle interface](image2)
![Figure 5. Snake game interface](image3)

3.3.1. Interface implementation. In the design of this game, the complete picture is first displayed in the operation area, and when the game is started, the line of the well type is added to divide the picture into nine pieces and display the blank in the position of the ninth piece. Add three function buttons at the bottom of the interface to control the game. Players can select different pictures to play by selecting buttons. The puzzle interface is shown in Figure 4.

3.3.2. Function implementation. First import the game picture already stored in the project folder. The system generates a random number, moves the eight picture blocks at random, and updates the coordinates of the blank block each time it moves. When the listener receives the mouse click information, the clicked image is moved to a blank area, and the effect of the movement is achieved by the continuous redrawing of the window. In this process, the sequence of pictures is continuously judged. When the sequence is the same as the beginning, the game is successful. Use the JOptionPane method to pop up the puzzle box.

3.4. The game two greed snake module
Players use the keyboard to control the snake's direction so that snakes can eat more food. The system randomly generates a food on the map. As the player helps the Snake grow up, the Snake's body will become longer and its movement speed will increase slightly. The game ends when a snake eats a snake across the map's borders or ties itself.

3.4.1. Interface implementation. The interface design of this game is to create a game map area first, and the snake's movement and food location are limited to this area. Bottom add control game tips and current score display. Snake game interface shown in Figure 5.

3.4.2. Function implementation. In this game, the background of the game is drawn as a white rectangle. Since there is no artwork, the red rectangle is used to represent the food, and the black rectangle is used to represent the snake. Using the Linked List doubly linked list to store the snake's
body, the Linked-list's remove-last() method is ideal for changing the snake's physical state. The keyboard monitor is used during the game to get the player to change the direction of the snake, and continue to determine whether the rectangle where the snake's head is located intersects with the obstacle.

3.5. Game 3 LAN tank wars module

Tank Wars is a famous game that requires players to kill all enemy computer tanks while protecting themselves. This game is the most complex and involved module in the platform.

![Figure 6. The Interface](image)

3.5.1. Interface implementation. The server-side interface is the host interface and the right-hand panel provides control functions. The game needs to be played on the same LAN, so the method of viewing the IP address of the local machine is provided in the lower right corner of the panel. The host player enters the room number and nickname to create a room waiting for the slave to join. The interface is shown in Figure 6. The interface of the slave machine is the client interface. The right panel provides the user with the function of inputting the host IP address, room number and their own nickname. In order to ensure reliable communication at both ends, only the client enters the same information as the server to play online.

3.5.2. Function implementation. The steps for writing this game can be divided into five steps: The first step, when building a server-side framework, is to use some simple statements to assume that subsequent functions have been implemented, or to use a blank structure to add to the design of the program. This not only makes the framework more three-dimensional, but also reduces the work behind the amount.

In the second step, because the interfaces of the host and the slave are very similar, the client framework is very simple to build. It only needs to copy the server-side framework to rewrite the function and layout of the operation panel. The framework for both steps is to use the J Frame class to construct the form and add text boxes and buttons.

The third step is to write a server thread class that references Socket sockets to connect two clients. Create server proxy thread class and client proxy thread class to send and receive specific communication information at both ends. Then, the method of sending and receiving information is perfected into the framework of both ends, and the server and the client use information that has been agreed upon to represent the specific meaning. Next, design a complete session for both ends and perform a simple test.
The fourth step, call the java.awt package to draw geometric figures to represent the corresponding object. Draw with different colored brushes to distinguish between master and slave computers and computer tanks. In the development of the map class, it is necessary to create a two-dimensional array that is as large as the game interface. The shape of the map is designed by changing the values of the members in the array.

In the fifth step, first use the created public class to design the game board faces on both sides in detail, and add logic rules such as game rules. Secondly, write the server-side drawing thread and draw the client's thread. The functions of these two threads are very similar. The difference is that the forms they repaint are not the same. Then add the game message handling mechanism to the two communication agent threads that have been created. Finally, add the main board of the game to the server and the client to replace the blank part of the structure, and perfect the functions reserved for the construction of the two ends of the framework.

3.6. Database design

3.6.1. Analysis and design of tables. As shown in Table 1. User information table mainly used to store the user's account name and password. Player score sheet: It mainly records players’ scores in each game. As shown in Table 2

| Field Name | type of data | Field size | Is the primary key | Instructions |
|------------|--------------|------------|--------------------|--------------|
| Mg-no      | Var-char     | 50         | yes                | account name |
| Password   | Var-char     | 50         | no                 | password     |

| Field Name   | type of data | Field size | Is the primary key | Instructions |
|--------------|--------------|------------|--------------------|--------------|
| Name         | Var-char     | 50         | yes                | nickname     |
| Score-one    | int          | 50         | no                 | Score        |
| Score-two    | int          | 50         | no                 | Score        |

3.6.2. Database operation method. Through the interface provided by JDBC connect to the MySQL database. The use of SQL statements can achieve the specific operations of the database functions [6].

4. Platform functional test
The main purpose of the software testing process is not to show the correctness of the software product, but to explore possible hidden defects in the software [7]. According to the source of information used in the test design, the test is mainly divided into two concepts: white box test and black box test [8]. The structural test technology and the programming of the program were performed simultaneously. The test was generally successful. The functional test items and results are presented in Table 3.

5. Summary
This platform is a Java-based game management platform. In the early stages of development, the overall framework was designed. Then the tasks were completed in sequence according to planned routes. The entire life cycle of development was accompanied by corresponding tests until the game platform was completed according to plan, among which the major shortcomings are as follows:

- Due to technical issues, copyright issues, etc., this game only supports small games that you write and cannot add other outside games. In the future development, the author will advance towards more complex and extensible design goals.
• All elements of the game platform, such as windows, buttons, text boxes, and game models, are implemented in the Java toolkit. They belong to the most original design and do not carry out aesthetic design, which makes the overall image of the platform somewhat rigid.

| No | Test items          | Test content                                                                 | Results                  | No  | Test items          | Test content                                                                 | Results                  |
|----|--------------------|------------------------------------------------------------------------------|--------------------------|-----|--------------------|------------------------------------------------------------------------------|--------------------------|
| 1  | Login test         | Enter an exact account name and password that matches the database           | Normal login             | 5   | Snake game test    | During the running of the game, check whether the functions are normal, and test the game rules by way of wall crash, self-mutilation, etc. | The game is running normally |
|    |                    | Enter three incorrect account names and passwords                           | Login failed with appropriate prompt |     |                    |                                                                               |                          |
| 2  | View score information | Click on the link button of the viewing information to see if the scoring panel pops up | Ability to see score information |     | LAN Tank Battle Test | Detect whether the master and slave can establish a connection. After the connection is successful, the two ends are prompted. Whether the party will prompt the other party after exiting. | Communication function is normal |
| 3  | Platform opens the game | Open the game one by one through the platform                                 | Can open the game         | 6   |                    | After the host sets up the game room, the slave machine enters an unmatched IP address or room number. | Give an error after a short delay |
| 4  | Jigsaw puzzle testing | Perform multiple game tests by selecting different pictures to see if they are operating normally | The game is running normally |     |                    | Test whether the tank can move on the map; if it encounters other tanks or obstacles, it will not restrict movement; whether the two bullets can hurt | The functions of the game are operating normally |

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