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JAVA REMOTE CONTROL SYSTEM

Thesis

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Abstract

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<p>With the rapid development of computer networks, the network applied to various fields. In order to improve the efficiency and convenience, and users' demand, network remote monitoring software was developed, remote monitoring software is also now frontier technology and many countries are actively in research and development. Remote monitoring also applied to various fields, such as: telemedicine, tele-trial, distance learning, and bring users efficiency and convenience.</p> <p>People do not need carry computer everywhere; the operation of your the server can be implemented with a distant through the remote monitoring.</p> <p>In order to improve the professional skills and use the understanding of the underlying Java knowledge, Java language is used as the background in this thesis. The development of the remote monitoring software use Java technology to complete all the functions. This thesis describes the specific process of the development of remote control software, the Java programming language complete the remote control software's analysis, requirements, design and development process.</p> <p>Using the system proposed by us, users can break through the restrictions of geographical space to monitor remote computers without being at site; users can upload to or download from remote computers; users can use keyboard and mouse in a simulated manner; you can run arbitrary DOS commands on remote computers; users can perform remote operations such as shutdown or reboot These functionalities meet the majority of people's actual needs for remote monitoring.</p>		

<p>Key words RMON, Java Robot, Socket Programming, TCP / IP protocol</p>

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1 INTRODUCTION

With the rapid development of computer networks in various fields, computer technology has already penetrated into every aspect of people's lives inseparably, according to the daily needs of people and current trend the monitoring of the computer screen has become the focus of attention, computer screen controls have been applied to all areas of people's lives, such as: distance learning, network administrators need to monitor the situation of other computers, teachers monitoring of student machines, telemedicine, distance trial. With the needs of society, people's demands, and the birth of the remote control software produce not only a breakthrough in computer technology but also affection to some other areas. Remote control software is not only easy to use but also powerful, and improves the efficiency of people in a lot of areas.

This thesis is about the process of developing the software and this is a challenge for me since my knowledge of Java language is limited. The development of whole software can be a huge and long term of work. So all need to start from the beginning. So go to the library read the relevant books, network information and similar research. Also topics and other information can be help for understanding the principles design based on the Java remote monitoring system and the knowledge and methods of acquisition and transmission of the monitoring images. Also for achieving the simulation techniques of remote controlling computers' mouse and keyboard.

According to users' requirements design the interface referring to the conventional remote control software. And have a deep understanding of the internal implementation of Java-based remote control by books and examples. This makes a functional innovation based on the original remote control software system. Also using the new technology makes the system more efficiently.

2 BACKGROUND

With the rapid development and popularity of computer networks, computers have infiltrated into all areas and have been applied to various fields; the remote control is the leading subject of domestic and international research, with many challenges and difficulties. But it should be society's needs, both domestic and foreign developers active research carried out in foreign countries, more emphasis on the development of this technology. Such as: Massachusetts Institute of Technology and Stanford University in 1892 to unite the development of Internet-based remote monitoring system open architecture, diagnostics protocols, transport protocols and legal and other limitations on the user's breakthrough system (Erbschloe, 2008).

In the meantime, the cooperation between Stanford University and the Massachusetts Institute of Technology open next generation internet-based remote monitoring and diagnostic demonstration system, which is an innovative simultaneously been spending by many industry giants, such as: the creation of Ford industry, the computer industry and instrumentation industry, HP, Sun, Boeing and many other large companies to actively support and full cooperation. Later, the companies have launched a Testbed experimental system together. Testbed is an embedded web network, initially formed in the range of Internet information monitoring and diagnostics with real-time Java reasoning and Bayesian Net (Erbschloe, 2008).

2.1 Research

Many international organizations, conjunct a number of organizations have come to carry out monitoring and fault diagnosis equipment consulting and technology promotion through the network means, and to develop an information exchange formats and standards of some columns. Many large companies are adding their Internet products functions, methods such as Bentley Company's computer line equipment operation monitoring system Date Manager 2000 can be exchanged through the Network Dynamic Data transmission equipment operating status information to the remote terminal. The famous National Instruments Company is also its product Lab Windows / CVI and Lab VIEW added network communication processing module, which can by WWW, FTP and e-mail mode monitor data transmission within the network. France "ALARM" research team of

the production process and the smart home monitoring system has been long-term studies, and applied in various projects (Deitel, 2004).

2.2 Subject background and significance

The remote control software of this research is based on the Java language. In past, the use of the Java language in remote control software was limited, so this time using the Java language is a big challenge. Due to Java's characteristics of cross-platform, this software is not inferior to other remote control software, which not only enables remote control software to achieve cross-platform functionality. But also for the most important that could understand more of the application of the Java language, improve programming skills and combine the theoretical knowledge to the practical using, realize the powerful of Java language's technology.

On the current trend, Java language was used more on Website, while the software for UI is very little. It is powerful of Java language's cross-platform function, but the presence of the inside Java language 's virtual machine, resulting the software's running speed has been restricting a lot. Although the research topic may be limited in practical terms, but this attempt is a breakthrough (Erbschloe, 2008).

3 SYSTEM ANALYSIS

According to other remote monitoring software and the actual need to use, the system main functions are as follows. Screen monitoring functions means capturing server screen, transferred to the client, and display. The client can complete a variety of emulation operations to server mouse, such as left and right mouse button pressed and bounce, moving mouse and using the wheel of mouse. Keyboard function is that client can complete keyboard emulation to server. The pressing of the keyboard from client can be transmitted to the server, and perform on server. The client can upload any file to server. Client can specify the storage path and transfer rate of file to server. Also users can download any file from the server resource. The client can communicate with server by send message. Remote command execution is that by inputting the appropriate DOS commands from the client can be transmitted to the server and performed, and returns the result. The server will shutdown by client clicking the shutdown button (Erbschloe, 2008).

3.1 Feasibility Analysis

This research and development controlling software system is based on the Java language, but the limited knowledge of many system designs to computer network and some protocols of network is the limited. So the most difficult problems must be solved, which is to understand the network and protocol. In the past, what have been done the most is the development of website system, but this time B / S software and Java UI design are going to be used, which are some difficulties. Furthermore, the achievements of the internal specific technologies are controlling the mouse and keyboard, desktop screenshots, image transmission, transferring mouse and keyboard's operation. The Java API already exists a class `Java.awt.Robot`. Robot is used to generate input events, it can be achieved the programming project's automatic testing, automatic presentation, or other operating application to the mouse and keyboard control through Java, it is the core functional to achieve the Remote Desktop Connection and it can make the programming easy (Bloch, 2009-05-12).

3.1.1 Technical feasibility

The subject adopted the Eclipse, Java language, computer network TCP / IP protocol. Eclipse is an open source development tools, which the developers use most of time. And it is a Java-based extensible development platform. On its own, it is only a framework and services for building development environments by plug-in component. Eclipse is the next-generation IDE development environment, which was originally developed by IBM to replace the business software Visual Age for Java. And now Eclipse is managed by the non-profit Foundation Software Suppliers Union (Eclipse Foundation). Eclipse is famous across-platform free integrated development environment cross-platform, initially mainly used for Java language development. By installing various plugins, Eclipse supports different computer languages, such as C ++ and Python development tools. Eclipse itself is just a framework, but supporting multiple plug-ins makes that Eclipse more functional flexible compare to the IED software (Bloch, 2009-05-12).

OTI and IBM's IDE product development group, starting in April 1999, originally created eclipse. IBM provided the initial Eclipse code base, including the Platform, JDT and PDE. IBM launched Eclipse project, around the Eclipse project has been developed into a big Eclipse Union, which has more than 150 software companies involved, including Borland, Rational Software, Red Hat and Sybase and. Eclipse is an open source project, it is actually a Visual Age for java alternatives, its interface is almost the same as the previous Visual Age for Java, but because of open source, anyone can get it for free, and user can open the own plug-in, more people paid attention on it. Then there are many large companies like Oracle have also joined the project (Tan, 2011).

Java was developed by James Gosling and his colleagues, and officially launched in 1995, Java was originally called Oak, in 1991 and is designed for embedded chip of consumer electronics products, in 1995 its name changed into Java, and re-designed for the development of Internet applications. The Hot Java browser which is Implemented by Java showed the characteristics: cross-platform, dynamic Web, Internet computing. Since then, Java has been widely accepted and promoted the rapidly development of Web, and commonly used browsers all support Java applet. On the other hand, Java technology is also constantly updated. Java was very popular, rapidly developed and strong impact the C

++ language since it launched. In the global cloud computing and mobile Internet industry environment, Java has the significant advantages and broad prospects. Jar file format is based on the ZIP file format, but the different is, Jar file is not only used to compress and release, but also for the management, package libraries, components and plug-ins, furthermore it can be directly used like the compiler and the tool such as JVM (Tan, 2011).

3.1.2 Environmental requirements

Since the software is based on Java language, therefore, the client and server all need to have Java environment. For not affect any functions of the software the Java environment for JDK1.5.0 or later is recommended. The software needs PC, windows operation system and Linux systems as the operating environmental. For avoiding unnecessary problem, the Windows XP operating system, Linux kernel version 2.6.30 or more it is recommended, The Java environment needs to be configured in both client and server operating system. Hardware requirements for running the software are Pentium 200Mhz or more for CPU, 256MB memory, standard VGA 256-color display mode above for graphics card and 8x CD-ROM or more for Drive (Zhao, 2005).

3.1.3 Investment and economic feasibility analysis

Developing remote control system can greatly reduce costs, also provides a convenient environment for people and avoiding the unnecessary trouble for carrying the laptop outside. Such as distance learning, telemedicine and other systems, people no longer need to go to the scene of teaching or medical, just use the remote control can achieve what you want to do (Lin, 2015).

The development of this software does not require a larger budget. In the development process of the software, how to reduce costs and improve efficiency is the important point for the development of the system design. This development does not require additional hardware. Software and operating system environments will require no additional high-level software but only JDK. At this stage, the system software and hardware equipment are easily satisfied for developers and users of economic conditions in general

3.2 Requirements analysis

Remote control system has been applied to various fields, such as: telemedicine, tele-trial, distance learning. People have been very dependent on this technology products, remote control systems bring a great convenience to people's lives. There is no longer need to carry the computer away from home, user can remotely control the other computer. And many universities are developing of such technology, and now most of the remote control system is not the use of the Java language, there are limitations in terms of cross-platform (Wu, 2005).

But this time the subject of research and development is based on Java development. Java has the functionality of cross-platform, so as new features it is more preponderant than other remote control system. In summary, the Java-based remote control system has been the cutting-edge technology that people cannot be out of. This product will also achieve great results (Wu,2005).

Through the research, reference the existing remote control system and in order to meet the needs of users, first the system needs to establish a server. Then take the initiative to connect to remote computers, control the computer via TCP / IP protocol and remote computer by input DOS commands. The software also has the function of monitor remote desktop, managing the management of remote computer task, having a dialog with the remote computer and managing the remote computer's resources internally (Wu,2005).

3.3 Project plan

Project objectives in line with SMART (text retrieval system machine) principle, the Java based on remote control system are as follows objectives. The main objective of Java-based remote control system is the remote controlling screen which allowed users to control their computer more convenient and efficient. The main function of the remote control system is configuration, creating server, a dialog with the remote host, entering DOS commands on remote computers, managing the Task Manager of remote computer and other functions. After the implementation of the project, it can save a lot of expenses for the corporate sector (R.J, 2003).

3.3.1 Overview

Efficiency is very important for users. After completed the development of the remote control system, people can remotely control their computers, distance learning, tele-trial, telemedicine and other projects, which greatly improves user productivity, provides a convenient and saves the company's costs (R.J, 2003).

After the project development the Control remote program will be in the form of CD-ROM based on Java and system specification and the system is deployed to the LAN. Project acceptance is divided into internal and external acceptance, after the development the project, the internal acceptance is made by the company's internal testers according to project requirements, after internal acceptance the project will do the external user acceptance. The main demand of the external acceptance is supply the specification to user (R.J, 2003).

3.3.2 Project development system

In order to complete each module of the project on time, each part should be to high quality developed. First divided the system according to the module division, and then gradually develops the system by each module. Do the integration and testing after the completion of each module. At the end, accept of the whole project (R.J, 2003).

4 SYSTEM DESIGN

Remote control system was designed to improve the convenience and efficiency capabilities. With this system, people can remotely control their computers, is not only high efficiency and convenient, but also promoted the development of this technology. The system can be remotely control resource information of the computer, control the computer desktop, manage task manager, command DOS, remote dialog and other functions. This system is mainly to achieve the following goals: using the lowest cost and short-term to develop a very practical system, reducing the cost of labor, improving the efficiency of handling affairs of people and creating the user-friendly, simple and clear interface (Liu, 2015).

4.1 Function modules

The overall design diagram of the system is shown in Graph 1. First start client, the user need to set parameter and a file will be generated in server. The resulting server files will be copied to the client, the appropriate thread will be started after running and the specified port number will be opened for reading various data and commands. Client will correspond various operations, such as messaging and screen monitoring. These instructions will be transmitted through the socket to server. Server receives the command and identified. And then in accordance with instructions to get local data transfer to related the socket to the client. After receiving the data transmission from server, client will process the related data. The image will be displayed, the text will be display in a corresponding module and the file will be saved in the corresponding place according to the parameters set by the user. When a client module stopped, this module thread on server will stay the state of waiting for a connection and waiting for the next time the client is connected.

The overall design diagram of the system shown in Graph 1.

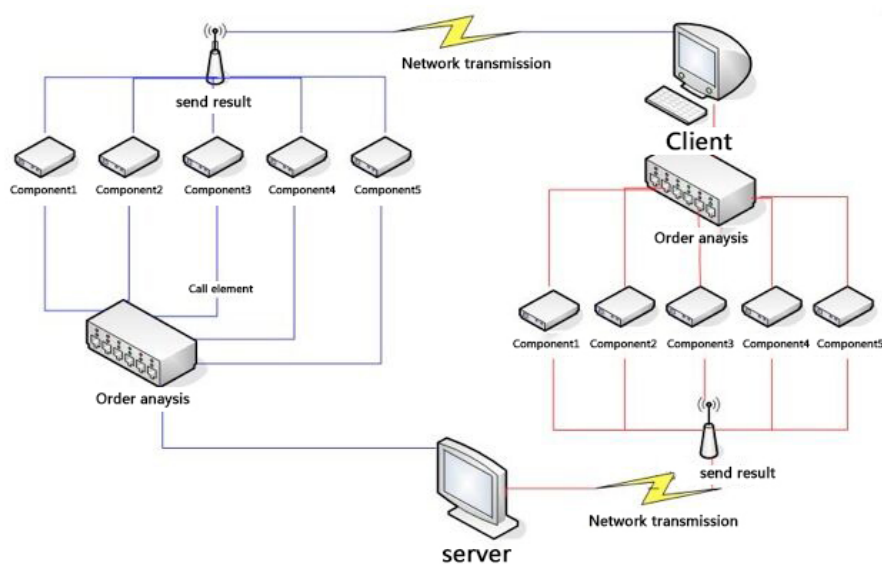
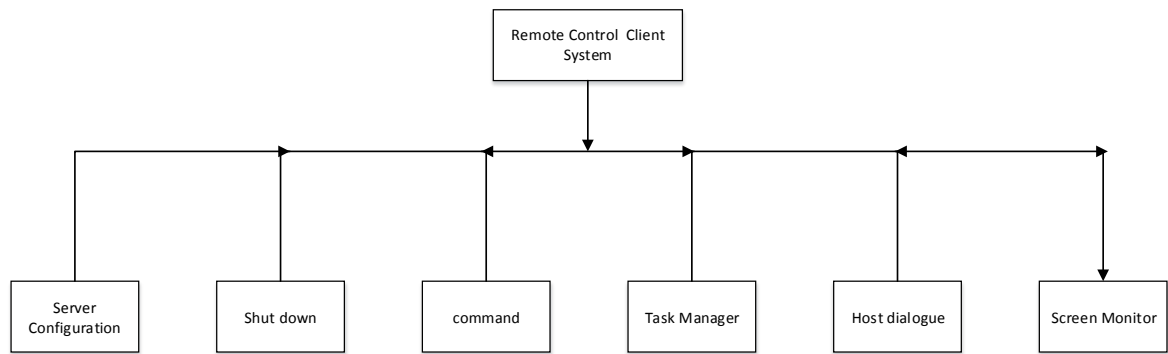


Image 3.1 System Overall schematic design

4.2 The main function of the client module

According to user requirements analysis, and referring the remote control software from the past. The remote control software realizes the connection to the remote server, shutdown, dialoguing with the remote host and monitoring the remote computer screen, these functions are shown clearly in the Graph.

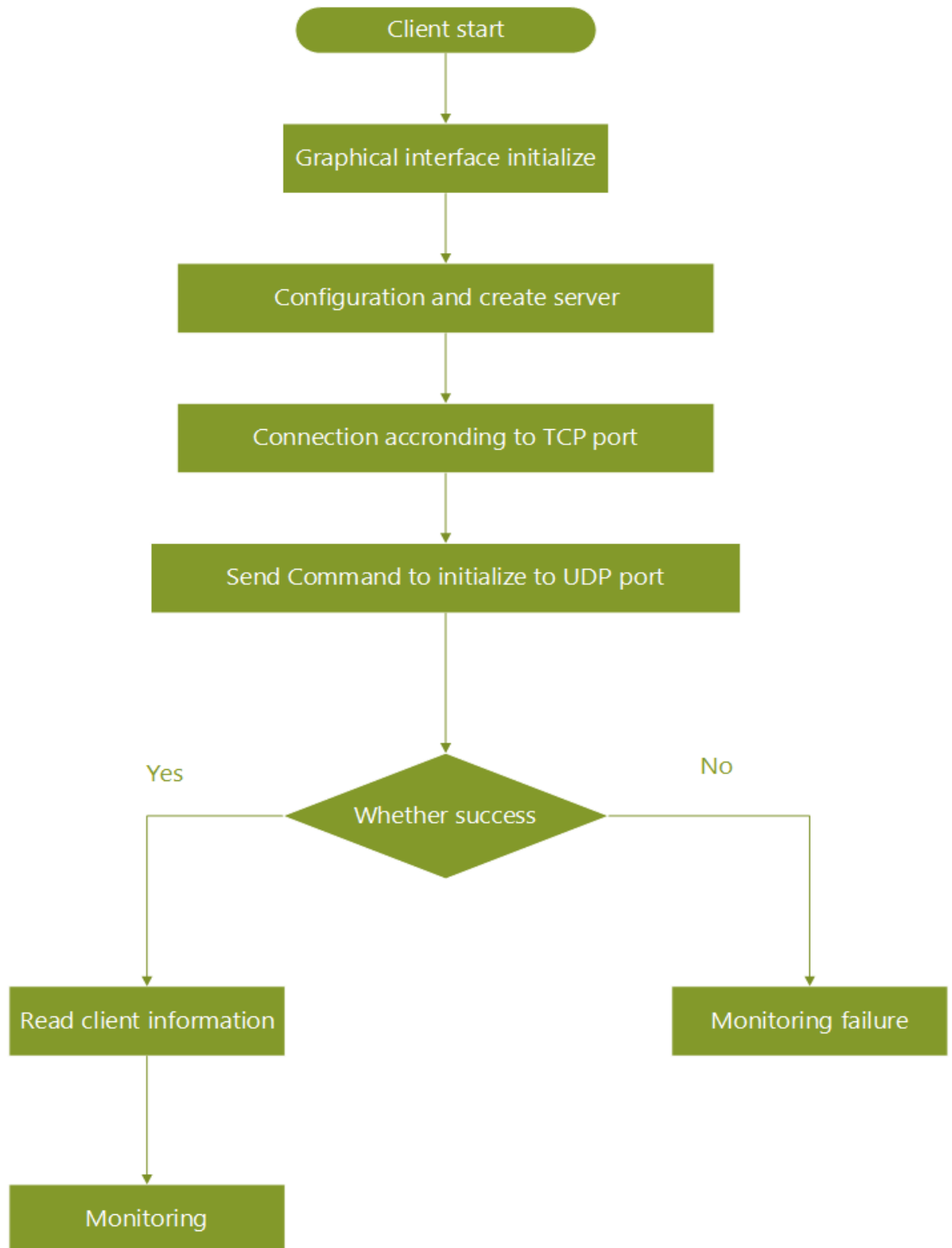
So in the basic functional modules, there are six functions to choose from: server generating, sending remote messages, monitor remote screen, file upload and download, remote command execution, shutdown and log off. Of particular note is the functional structure of the server. After running the program, all the functions will be implemented in a multi-threaded background. These threads correspondence with client corresponding function and collecting local information for these modules, and then transmitted over the network. At the mean time the server can accept client commands (Tan, 2011).



Graph 2 Remote Control System Service Module

4.3 Process and analysis system

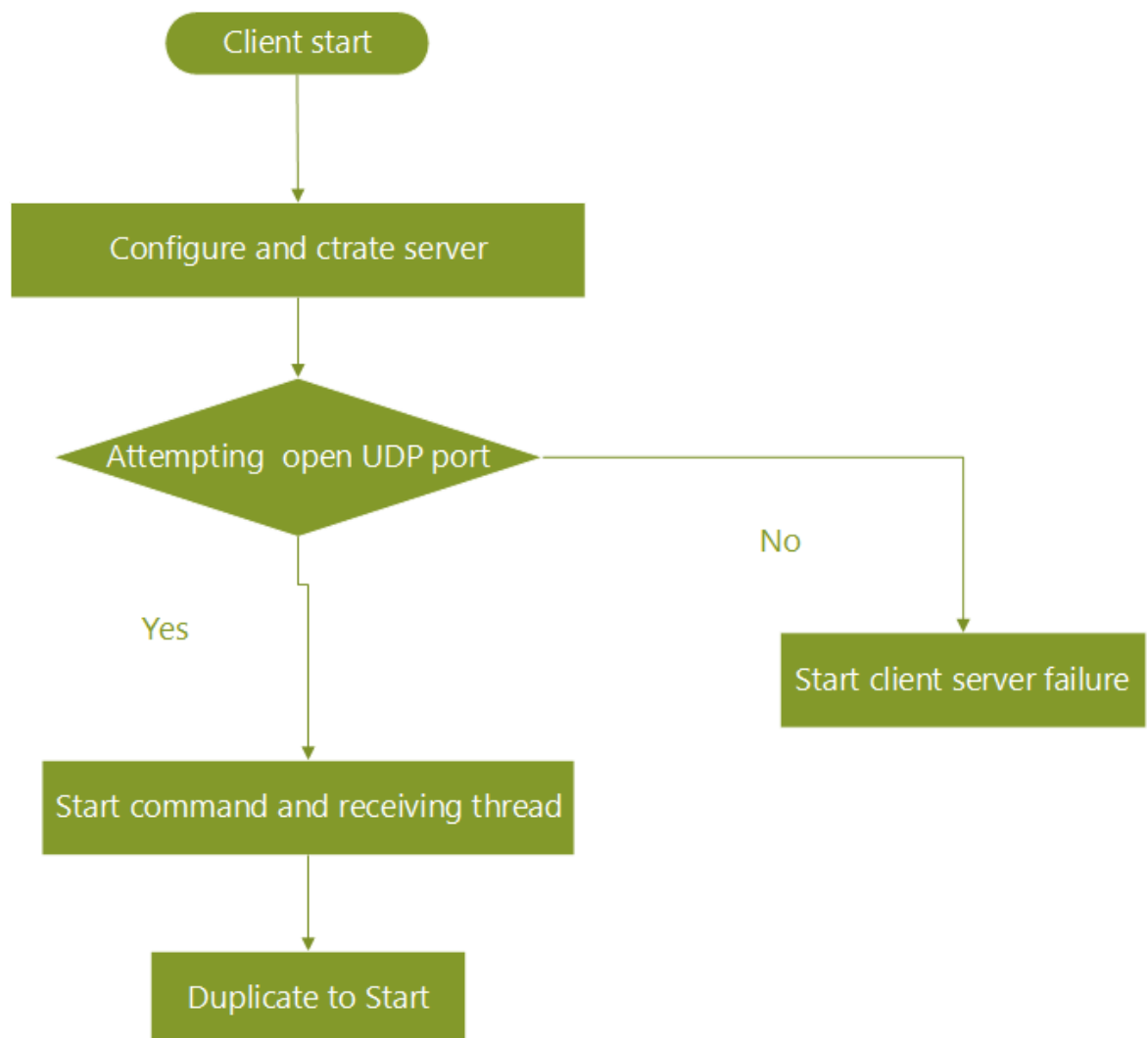
After this remote monitoring software starts on the client, first initialized the window class that implements the graphical display, and then the server configuration and create, enter the local IP, server port, the local port, connection password, save location. if the port is occupied or blocked by the firewall after user create client server is configured and listening TCP port, a timeout failure message will be sent. If successful, the host of the information, the start control module and screen-monitoring module will be read. Client flow chart is shown in Graph 3



Graph 3 Master host start flowchart

4.3.1 Client process

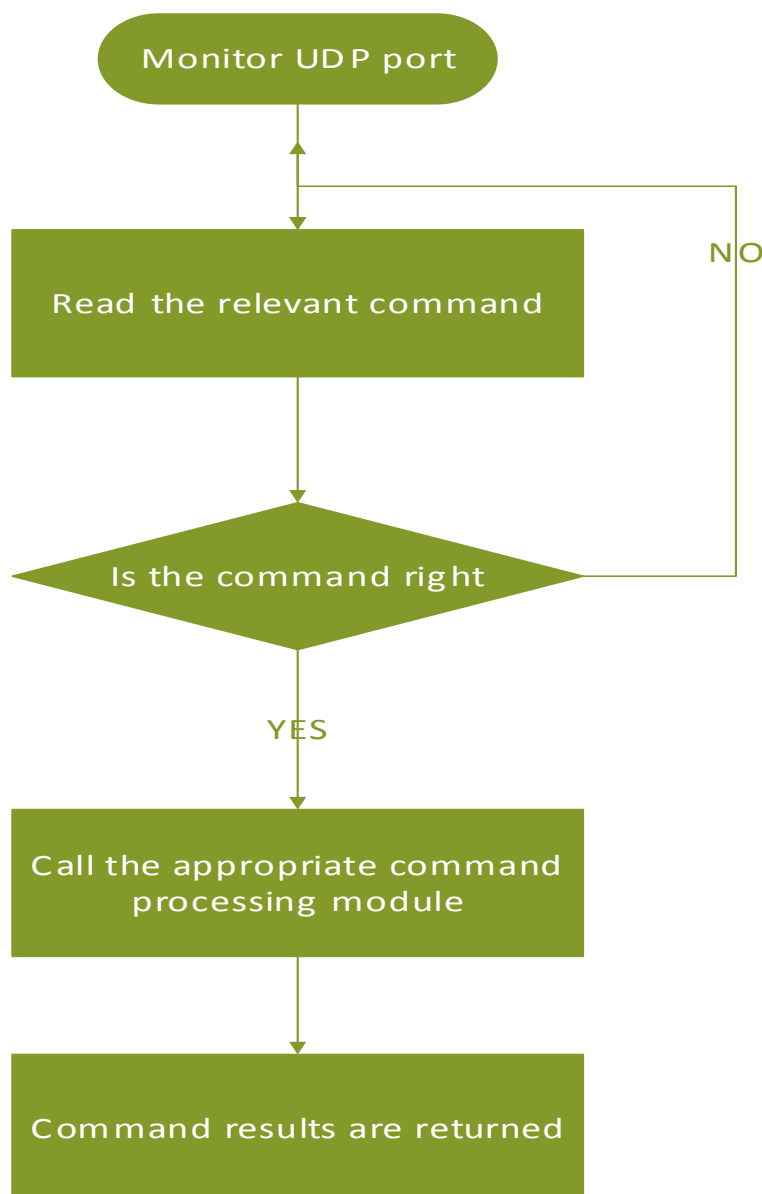
The client does all the server's configuration and creation. IP and port has already been configured, in the process of configuration it is better to choose the port that system cannot be occupied in order to avoid a conflict cannot connect. In the proceeding, when client will try to open UDP port connection, if found to be blocked by firewall or antivirus software, it will return a failure message. Otherwise, it will start for incoming UDP socket, and then open a command received thread, socket calls to resolve the class received parse acquisition command, and the command for subsequent processing. The client flowchart is shown in Graph 4.



Graph 4 host flowchart.

4.3.2 Command reception and processing

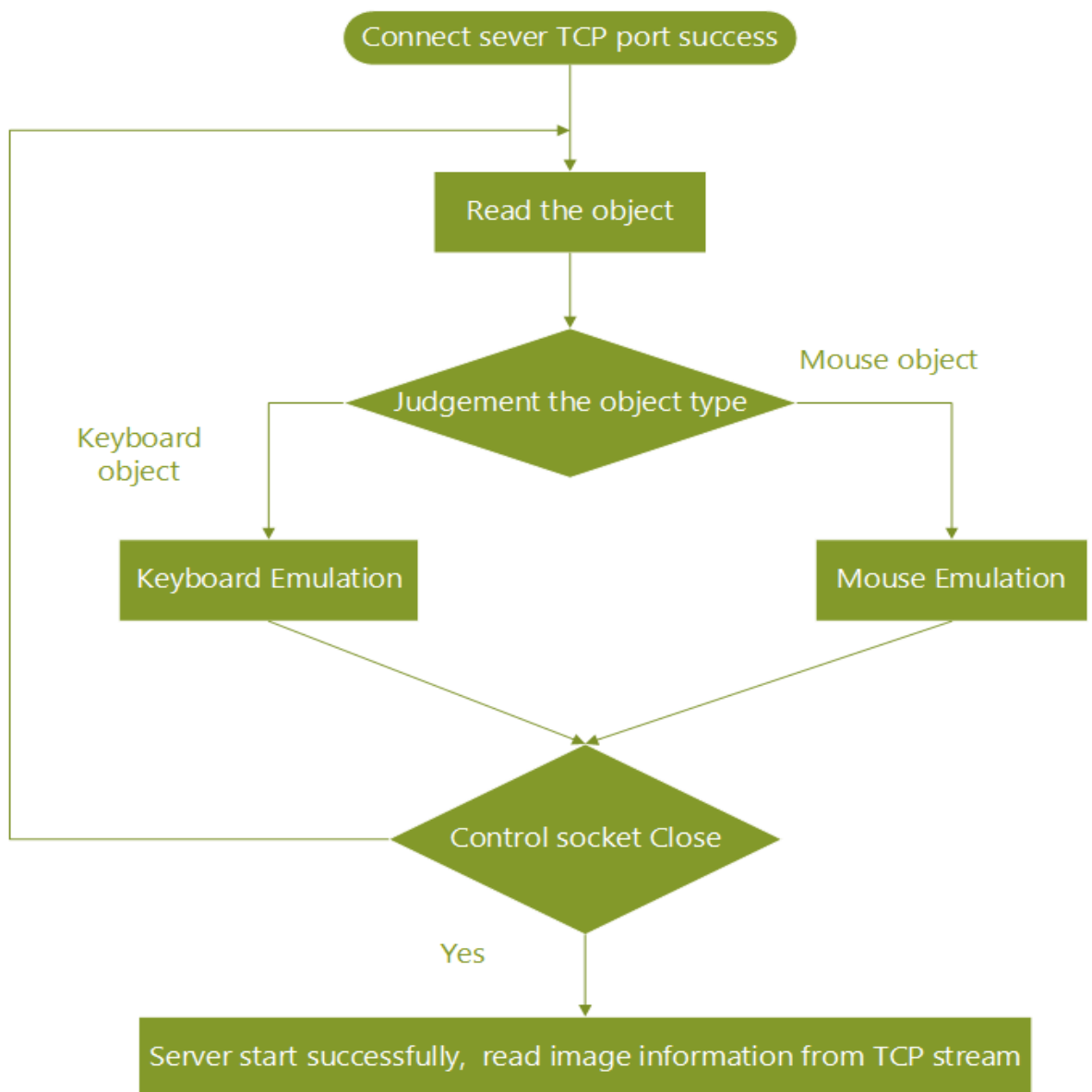
After the Remote server has been successful monitored, the client will start to monitor the server side. By listening the configured UDP port, if the client find the command, the client will star to read, and determine the command whether effective or not. If it effectives, command will be in port format, if it is not a valid command, the process will continue to return to the other command reads, and calls the appropriate command processing module for processing, the command processing returns to client. This flow chart is shown in Graph 5.



Graph 5 command receiving and processing flow chart

4.3.3 Remote control flow

After remote computer receive UDP command from client and get Client configured TCP port number, the connection is successful, the command-processing module processes the commands. Then these events objects must determine the event type, if it is mouse event, it is necessary to repeat mouse events to achieve mouse control, if it is a keyboard event, it is necessary to repeat the keyboard events to realize keyboard control. Then determine the order. If the control socket is closed you the event ends, otherwise continue reading event.



Graph 6 flowchart of remote control.

5 SYSTEM FUNCTION

The remote control software is written in Java graphics programming interface and developed by using the characteristic of modular and simplicity to achieve the preparation of the user interface. So that users can more easily control the remote host concise and improve efficiency (Longman, 2002).

The remote control software data communication channel is established by using Socket Programming. Socket Programming supports some basic ICP / IP network communication protocol operations, it shields some operating details of the underlying communication network. So it will make programming easier, also abstract the communication terminal.

And it provides sending and receiving the mechanism data as well as the capability of opening, calculating and shutting the communication. This software's client and server can achieve the communication and data transmission based on Java Socket programming techniques.

Both client and server called socket () method to produce the socket, the client first create a Socket object and then call accept () method of the Socket to listen, if the monitor client access, the accept () method will return to Socket object, by using the object can be achieving the data transmission and exchange between client and server. And once the client and server connected successfully, the data transmission between the client and the server side is bidirectional. When obtained Socket object, the ObjectInputStream target established by client and the ObjectOutputStream target established by server can receive and transmission data. After shut down the server, ServerSocket and Socket object will call close () method to close the socket and end remote monitoring (Zhao, 2005).

Use encapsulation features of Java, the package deal with each command as a class, carry out each treatment class called command processing, client for server configuration and create the initiative to connect a remote host computer, open the control command socket word, remote dialogue, task Manager, execute DOS commands, screen monitor, and the results and information flow to perform these operations are command module (Zhao, 2005).

5.1 The achievement of monitoring the client machine's screen

The remote monitoring software monitor screen is very simple, the server is being monitored and the screenshot will be sent to client and the client will receive in the form of image. This function used two classes: SendImageThread category and class GetImageThread. By using the appropriate method of SendImage Thread packaged and compressed the screenshot images and then send to client. And client use appropriate method of category GetImageThread receive image information and decompress and images, the image information displayed on the client screen. By this way the remote screen monitoring can be achieved (Wu, 2005).

5.2 Java principles in screen capture and achieve

Screen capture principle is more difficult to achieve, because this operation involves knowledge of the underlying operating system. But later by searching the information, under Windows operating system, screen captures almost all developed with VC, VB and other languages. But in the Java API, it provides a robot class "Robot" category. So Java Screen Capture realization becomes relatively simple (R.J, 2003).

Java.awt.Robot is used to produce a robot class native input events, through its Java program can automatically test program, automatically presentation, control mouse and keyboard applications. It is a key function for remote desktop connection; it can make complex programming greatly simplified. This class provides a way: createBapture (), by this method, the program can simply copy the pixels of a full desktop or desktop area to an object, as long as the server is stored in the object to an image file on the realization of the replication process of the screen (R.J, 2003).

The process of the screenshot in remote software process is as follows. First, depending on the images size and allocate memory space create a bitmap object, and then capture desktop and convert it into a bitmap BMP format images through the converter. After that transfer the images from BMP format into JPEG format, compressed and save the JPEG images into memory. Then send the storage space of the image memory stream, send the image data storage in the memory stream and release the space occupied by the object image (R.J, 2003).

Server receives image data follows the process of the following steps. First judge the images memory space, which has already been transmitted from the client. Then receive information transmitted from the image and display the received image on the screen (R.J, 2003).

6 SYSTEM OPERATION AND TEST

The processing of test software is an important aspect. The testing is along with the development of software together, to test each unit of the development of the program at any time and to ensure the correctness of the programming, reduce errors bring greater losses in the later development. Software Engineering named the process of the testing "software life cycle". A software testing life cycle including feasibility studies, requirements analysis, outline design, detailed design, coding and testing phases. During development, the developer may inadvertently cause some errors, so the test development process is important in each stage presence (Deitel, 2004).

The purpose of this test is to make each functional module divided into unit module as a module to run properly during the development process, in order to ensure the correct of the assemble test. This are unit testing in each phase of project development, this process will find a unit code errors and detailed design errors (Deitel, 2004).

Integration test is also known as system testing which means to assembled sub-module or subsystem into a complete system. And test as an entirety. In this process of the system testing, it not only can find design and coding errors, but also to verify that the system can provide requirements specification implemented in the function (Deitel, 2004).

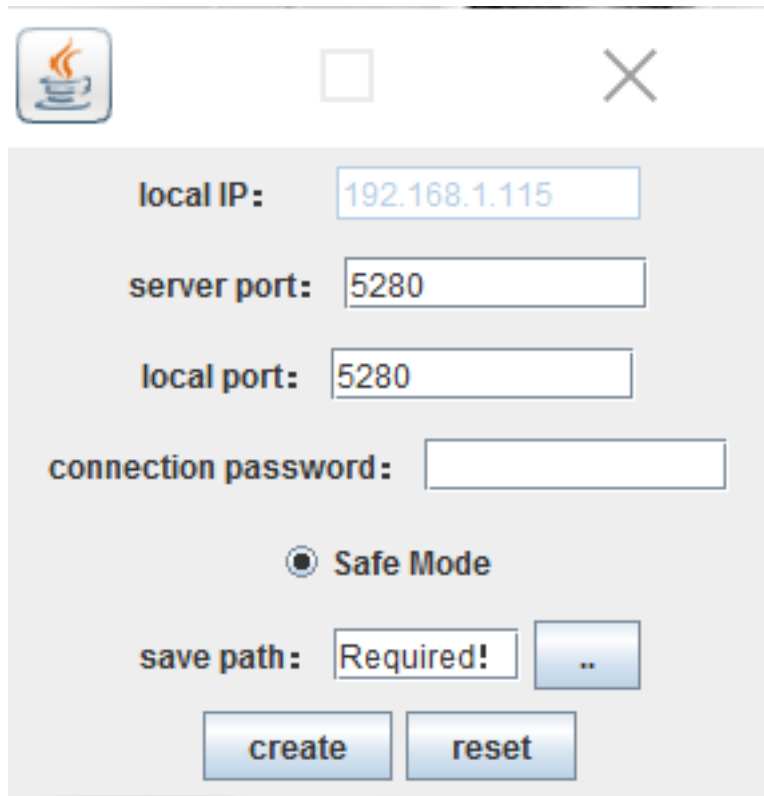
Acceptance test must be user involved, is under the completion of each development testing completed. The simulation software developed in the actual use of hardware and software environment, the purpose of acceptance testing is to test the developed software can meet user needs (Deitel, 2004). The remote control software uses a waterfall test method; the test sequence is unit testing, integration testing, and acceptance testing (Deitel, 2004).

6.1 Test Environment

The software-testing environment is simulated in the practical application of software and hardware environment, including the use of software, hardware, CPU, memory, and hard disk. The system in used is Windows 7 and the operating system is 64-bit. The chosen testing tools is Eclipse and JDK1.7.0. Hardware is 4GB memory; hard disk is 300G.CPU is Pentium Dual-Core CPU T4500 2.30GHz (Deitel, 2004).

6.2 Configuration and create a service

After clicked on the toolbar to configure server and the interface is shown in Graph 7. Click the generate button to automatically generate a file named as Server.jar, which is generated by the server after filling in the following information correctly. The local IP will automatically obtain the correct local IP address. The service port number will be filled with preferably four digits number. For example 5280, which is shown in the Graph 7. The local port can be the same number with the server port number. Connection password is password needed to connect to the active connection. The save path is for choosing the location to save the build server location. After fill up all the information, click the create button the file Server.jar will be generated automatically. If click the reset button all the other configuration information will be emptied except the local IP address.



Graph 7 configure the server interface

6.3 Running instances

After the client boot into the main interface, there are creating a server, acting connections, remote dialogue, monitoring and other functions on screen, shown in Graph 8. By moving the mouse to the tool button Active connection and Installation manual two options will be displayed. The skin button is the place where to choose the skin style including: system style, window style, Java style and motif style. The Graph 8 is the system style. In language, there is only one choose English so far. The option about software is in the about button.

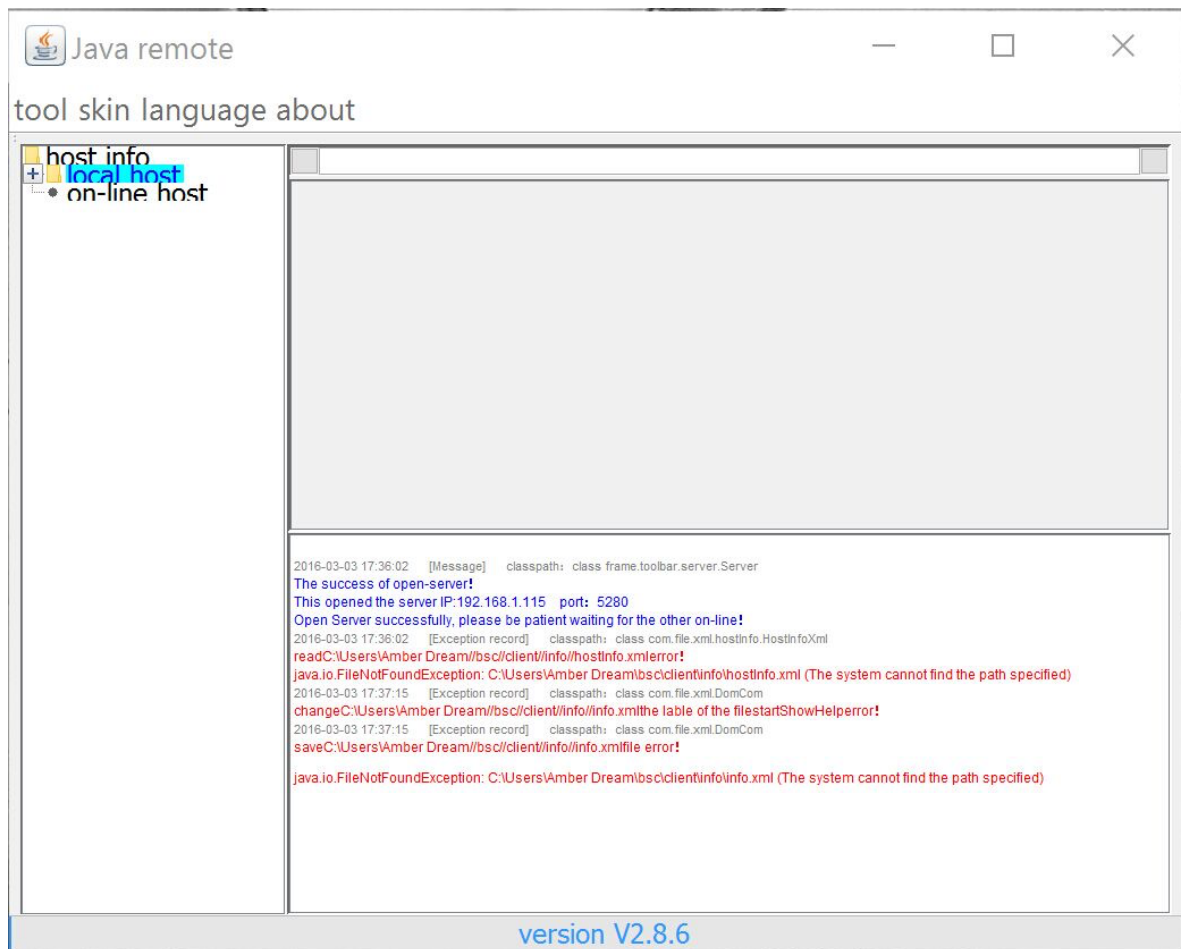
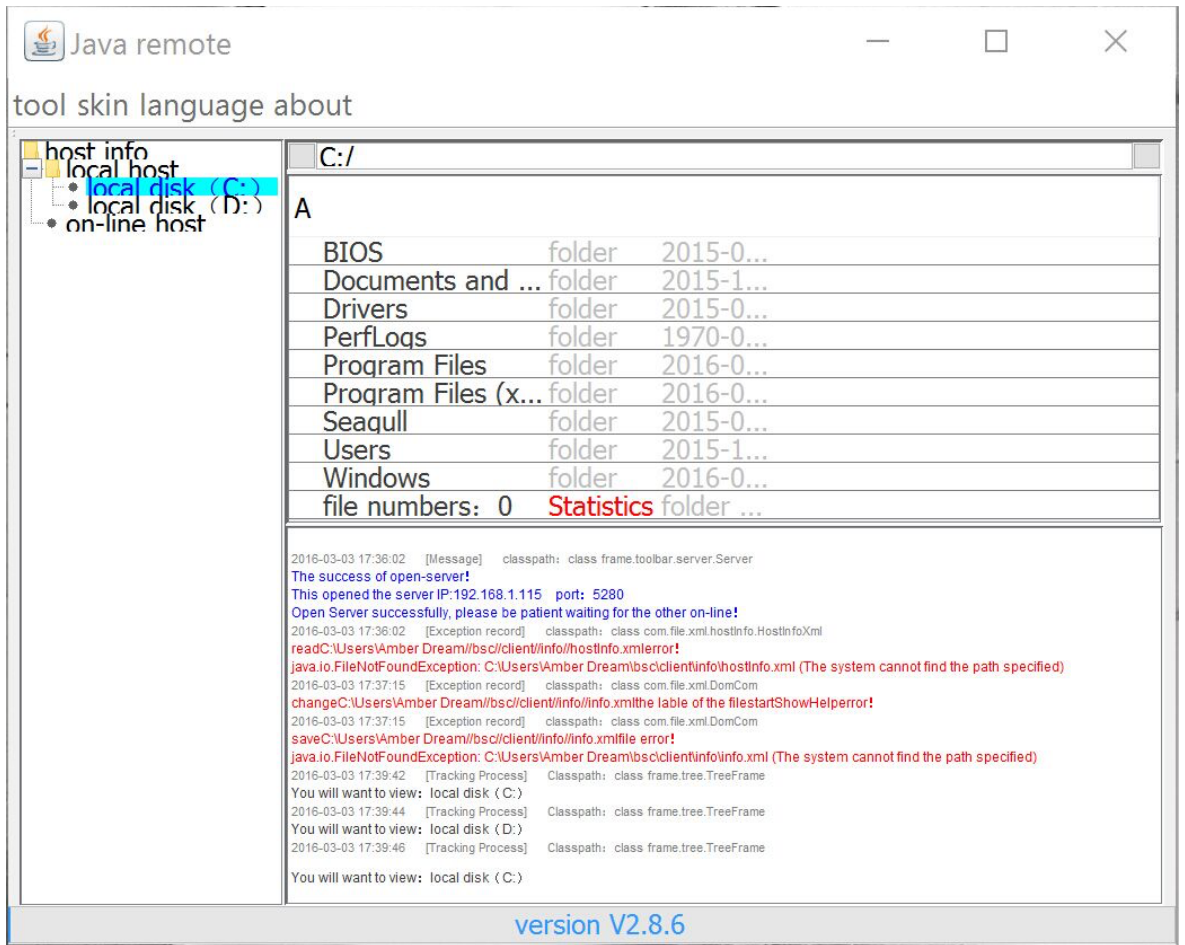


Figure 8 client interface.

By clicking the button local disk C or all the information of the client will be displayed in the right column, which is shown in Graph 9. For example, click the BIOS in the right column the details also will be seen. So basically all the information of the client can be checked in here. Click the on-line button the information of the on-line server will be shown. In here all the files in server can be check as well. At the bottom, here is the place for display the running condition. Also the version of the software is V2.8.6 as shown in the Graph 9.



Graph 9 local disk information of client

7 MAJOR CODES

Because of the UDP protocol does not establish a connection for server so the construction DatagramSocket instance and specify the local port are needed. By DatagramSocket receive method instance receiving DatagramPacket, DatagramPacket intermediate contains the content of the communication and use the send and receive methods DatagramSocket to collect and send DatagramPacket. The UDP of client step is simple, mainly includes the following three steps: first, construct a DatagramSocket. And use DatagramSocket instance method send and receive DatagramPacket. After all, call the close method to close DatagramSocket. As step, Java programming language, UDP sockets are very simple. the data transmission efficiency is high of UDP protocol, and without establishing a connection (Yang, 2001-10-26).

```
public void run(){
    LogFrameCon.printlnInfo(this.getClass()+"|Open Accept message thread");
    try {
        // create a data socket
        DatagramSocket datasocket=new DatagramSocket(localPort);
        boolean bool=true;
        while(bool){
            byte br[]=new byte[1024*64];// UDP protocol can not exceed the
amount of each transfer of the data more than 66K
            // create a datapacket
            DatagramPacket dataPacket=new DatagramPacket(br,br.length);
            // use socket to receive message and write the monitor message
into DGP
            datasocket.receive(dataPacket);
            String recmsg= new String (br).trim(); // the message that has
been received
            showRecMsg(recmsg);
        }
    } catch (Exception e) {
        LogFrameCon.warnInfo("Receiving an error message when chatting",
MessageReceive.class.toString(), e.toString());
        e.printStackTrace();
    }
}
```

```

    }
}

```

Java provides us with more than 60 data stream. For these data streams from the functions are divided into two categories: input and output streams. From the stream structure can be divided into the byte stream (in bytes or called byte-oriented processing unit) and a stream of characters (in characters called character-oriented or processing unit). Input and output streams are based on byte streams `InputStream` and `OutputStream`. Byte stream input and output operations are implemented by these two subclasses. In this system design and coding process, we will use the following data stream and the corresponding method. `ByteArrayInputStream` and `ByteArrayOutputStream` are byte array stream. When transmitting data via UDP protocol, you need to type byte array data type. We can use this data stream corresponding data conversion and transmission of data by using methods: `int read ()` and `void write ()`, `byte [] toByteArray ()`, `String toString ()`, `void close ()` methods. `ObjectOutputStream` stream can be used for transferring the object's data stream. The main method is to use `write ()` in the remote monitoring for transmitting keyboard and mouse operation target (Yang, 2010-07-01).

In the socket programming mainly use the data streams `BufferedReader` to read and write the string. `DataInputStream` and `DataOutputStream`, two data streams are more based in socket programming, any data type data can be transferd, an input, an output, but efficiency is generally low. Depending on the method used for data of different types of options, such as `writeInt ()` and `readInt ()`. `BufferedReader` and `BufferedWriter` flow, both flow due to the high transmission efficiency, it is generally used for packaging other data streams in order to improve data transmission efficiency, the methods used to `read ()` and `write ()` method (Yang, 2010-07-01).

During screen monitor, using the cache jpeg format after image capture, this image format compared to other types of image compression have a very significant effect. Using this encoding format for storing images can significantly reduce the network load. In addition during the transmission of the picture, we also use Java class library that comes with ZIP compression image compression process, so that more greatly reduces the burden on the network (Yang, 2010-07-01).

```

public void run() {
    while (bool) {
        try {
            socket = new Socket(serverIp,Integer.parseInt(serverPort));

            new SocketMessage().sendMessage(socket,
ParamCmd.SCREEN_SHOW);

            DataInputStream dis = new
DataInputStream(socket.getInputStream());
            DataOutputStream dos = new
DataOutputStream(socket.getOutputStream());
            ZipInputStream zis = new ZipInputStream(dis);
            zis.getNextEntry();
            Image image = ImageIO.read(zis);
            label1.setIcon(new ImageIcon(image));
            scrollPane1.setViewportView(label1);
            ScreenshowFrame.this.validate();
            dis.close();
            dos.close();
            socket.close();

            TimeUnit.MILLISECONDS.sleep(ParamXml.screenshowSleepTime);
        } catch (Exception e) {
            LogFrameCon.warnInfo("Screen monitor error ! ",
this.getClass().toString(), e.toString());
            e.printStackTrace();
        }
    }
}

```

8 CONCLUSION

This thesis describes the entire process of remote software development, including the development of Java-based development at home and abroad of remote control software. The software needs analysis, a series of instructions outline design, detailed design, coding, testing, deployment, and development the difficulties encountered in the process of development log, development progress and so on.

In the development of Java-based remote control software, still encounter many difficulties, because in the past doing Java Web projects are aspects of the project, on the current trend, Java technology is mainly used in Java Web Respect Compare more, such as JSP, J2EE, etc. And this development project is to use Java technology to develop their own interface, and the knowledge of the network involves comparing, for example: computer networks, TCP / IP protocol, Socket programming. My subject is software engineering, so the knowledge about network is very little, but doing this project have to deeply understand the underlying knowledge about network and data transmission principle.

This system is a high performance system, integrated design through the front, we can see that this high performance system. Client multi-threaded design patterns. When the client operates an open each module to start a thread, will assign the appropriate memory and run time within the operating system after the thread starts, when the user closes the module, this module automatically closes the thread destroyed, will be released memory, so the cost can easily be threaded, as long as the client user does not open all the modules of the operating system overhead will be very small. Server thread uses blocking socket and close management.

After the server is running, open multiple threads, each thread is blocked out, within the operating system allocated fewer resources only when the client host the thread of the thread activation monitor, server thread will corresponding share resources when client disconnects, the server thread running over, return blocking listening state, freed some resources, so that the system overhead will be greatly reduced. During screen monitor, using the cache after image capture jpg format, using pictures of this encoding format for storage, it can significantly reduce the network load. In addition during the transmission of the picture, we also use Java class library that comes with ZIP compression image compression process, so that more greatly reduces the burden on the network. Efficient

selection of data streams is also made in this system. Java There are many types of data streams, each data stream has its own characteristics, but the data transfer rate for each data stream is different, the write data is concerned, `BufferedOutputStream` is the shortest time-consuming, while the worst performance `FileWriter`, read data front, `BufferedInputStream` the best performance, while the worst performance `FileReader`. So, when it comes to reading and writing flow, we chose high-performance high-speed data streams can significantly improve our data transmission speed.

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