VIRTUAL NETWOK COMPUTING (VNC) USING JAVA

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I hereby declare that this project report entitled

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DEDICATION

To my beloved parents,
you're the light that leading me to the place where I find pence.

My friends,
who always by my side during my hard time.

To most special person,
you're the strength that keeps me walking.

Thank you for all your support.

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Last but not least, I would like to take this opportunity to thank my family and BITC's friends for their encouragement and help that was so meaningful to me throughout this project. A very big thank you also goes to my friends who are supported me from the beginning till the end of this PSM report preparation.

ABSTRACT

The Virtual Network Computing (VNC) software is a client/server application, which enables user to view, monitor and take control of other application on different host. Using this software, network administrator will be able to get detailed view of all the running processes or applications in client desktop and kill any applications that are deviant and cause harm to other clients in the network environment. VNC uses Remote Frame Buffer (RFB) protocol that connects the client to the server. VNC server can either allow or not allow clients to access some application through its own desktop. It also helps administrators to monitor and observe clients activities through their desktop. VNC is developed using Java technology on the Windows platform, which is the ideal platform for network computing.

ABSTRAK

Perisian *Virtual Network Computing (VNC)* adalah aplikasi klien/pelayan yang membenarkan pengguna untuk melihat, memerhati dan mengawal aplikasi dari *host* lain. Sistem ini akan digunakan oleh pengurus rangkaian untuk mendapatkan gambaran sebenar semua proses/aplikasi yang berlaku di *desktop* klien dan menamatkan aplikasi yang merbahaya dan boleh merosakkan klien-klien yang lain di dalam rangkaian. VNC menggunakan protokol *Remote Frmae Buffer (RFB)* untuk menghubungkan klien kepada pelayan. Pelayan VNC boleh sama ada membenarkan atau melarang klien untuk mengakses sebahagian aplikasi yang mendatangkan kerosakan kepada pengguna lain melalui *desktop* pelayan. *Virtual Network Computing (VNC)* dibangunkan dengan menggunakan teknologi Java di Windows platform yang sememangnya sesuai untuk aplikasi *network computing.*

TABLE OF CONTENT

LIST OF TABLES

LIST OF DIAGRAMS

LIST OF SYMBOLS/ACRONYMS

GUI	-	Graphical User Interface
IP	-	Internet Protocol
I/O	-	Input/Output
LAN	-	Local Area Network
MB	-	Mega Byte
NIC	-	Network Interface Card
PC	-	Personal Computer
RAM	-	Random Access Memory
RFB	-	Remote Frame Buffer
VNC	-	Virtual Network Computing
AUT	-	Application under Test
UAT	-	User Acceptance Test

LIST OF ATTACHMENTS

CHAPTER I

INTRODUCTION

1.1 Project Background

Virtual Network Computing or in short, VNC is a remote control software which user can control applications on different hosts. It combines windows of multiple remote desktops into a single desktop screen. One computer, which acts as a server, can view and interact with another computer (viewer) although they are running on different platform.

VNC has been widely use by millions throughout industry, academia and privately. In industry area, VNC can be used to provide a flexible hot-desking and road-warrior environment by allowing employees to access their office desktop and server machines from any machine in the company's offices or from other remote sites, regardless of the type of computers involved at either end. An equally popular business application of VNC is in remote system administration, where VNC is used to allow administrators to take control of employee machines to diagnose and fix problems or to access and administer server machines without making a trip to the console.

VNC also can be used as a teaching tool. In this mode generally the teacher's screen is viewable by the students but they may not control it. The teacher can broadcast student's screen, monitor students as they work, restrict the use of applications and web sites, carry on bidirectional text or audio conversations and

lectures or remote control a student PC for one-on-one instruction.

VNC use one protocol called RFB, which stands for Remote Frame Buffer. It is a simple protocol for remote access to graphical users interface. RFB works over high bandwidth links to send an image of the frame buffer. RFB works best in local area network, but still possible to use it over other links with less performance.

1.2 Problem Statements

VNC software is developed to overcome some problems that occur in today LAN environment such as:

1. the administrator finds it is hard to prevent users from accessing and downloading files from the internet. Some of the data entered into the local network may come along with viruses and cause harm to other computers in the network.
2. users request to have some software and application to install in their computers. It difficult for administrator to go to their computer if they are in different place/buliding.

1.3 Objectives

The main objectives in developing Virtual Network Computing server are listed below:

- To develop, configure and finally setup VNC server in multiple LAN environment.
- To view file from remote client without having to go to clients' machine.
- To allow multiple users connect at the same time and will each have their own user interface and share a single session.

1.4 Scopes

- VNC software is applied across the network in multiple LAN environments. It can control clients' behaviors, which are located in different LAN.
- Administrators can control a remote client from the server.
- Change access rights, attributes, view, edit and execute files from clients.

1.5 Project Significance

This program is a helpful tool for LAN administrators and anyone who are involved in controlling client desktop through his PC. It also helps administrator control and monitor user's behaviors in their own desktop environment. In addition, it prevents unnecessary access to restricted website which can harm other users in local network by terminating what the users do.

1.6 Conclusion

As the conclusion, VNC gives an instant remote connectivity from one computer to others. It gives many benefits to administrator to control the client's activities in LAN environment such as office, seminar, meeting or class environment. With VNC, administrators can now remotely monitoring all processes and application, which run by users. The next chapter will discuss about research study about the system of the system that is going to be developed and methodology that will be use during development process.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Literature review is an important chapter in this project as it is a research study of the system that is going to be developed. A comparison made between existing systems and the Virtual Network Computing software. Through this study, the developer would be able to gain more knowledge and understanding in developing new software. As a result, the developer would be able to improve the weaknesses and integrate the existing strengths with the new features in order to improve functionality of existing software.

A literature review summarizes, interprets and evaluates existing "literature" (or published material) in order to establish current knowledge of a subject. The purpose for doing so relates to ongoing research to develop the knowledge. The literature review may resolve a controversy, establish the need for additional research and/or define a topic of injury.

The purpose of a literature review is to establish current knowledge on an issue that relates to the topic of research. Literature review is an important process in a system development. Literature review provides the necessary background and information and thus acts as a base to start off a research with. In this stage, findings,

summary, analysis and synthesis of the system will be done. This is to ensure the full understanding of the system and that the most suitable software and tools are used.

2.2 Fact and Finding

A common method for allowing remote access to protected computing resources is to use remote control software. The functionality allows users to remotely access certain computers on corporate LAN. One of the software that relates with remote access criteria is Virtual Network Computing.

2.2.1 Virtual Network Computing

VNC is inherently a client-server technology. It is the job of this software to serve up the machine's desktop to the network. Administrator sits at different machine, controlling clients' desktop from other location. VNC server and client are available for a variety of platforms, including Microsoft Windows95/NT and most versions of UNIX.

The server can use the clients' desktop, move the mouse, type into text, boxes, and click on icons. Administrator can examine the PC's configuration remotely or demonstrate how to do a particular task while the user watches how it is done.

Another option is to allow the remote user to access the desktop in view-only mode. This allows monitoring of the desktop without interference, which could be very useful for demonstration purposes.

By having stateless clients, multiple client connections and disconnections will not cause any adverse side effects to the collaboration session. Because all operating

systems support this frame-buffer concept, heterogeneous collaboration can be established.

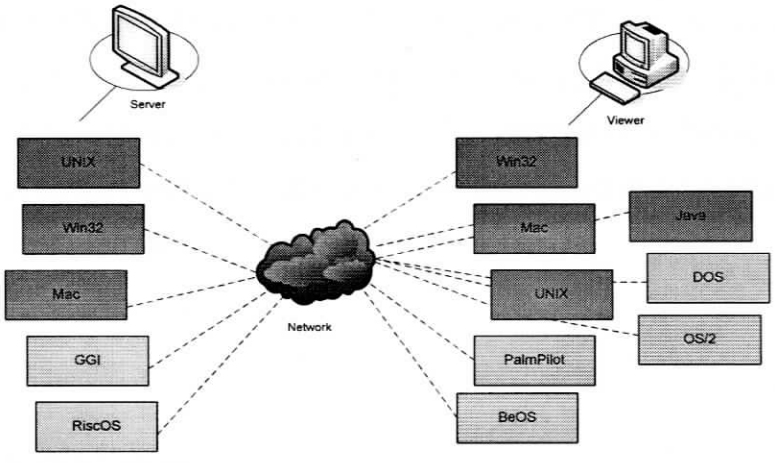

Figure 2.1: Network Interaction between Server and Client

Although VNC is the name of the technology as a whole, the protocol it uses is called RFB, which stands for Remote Frame Buffer. RFB is a simple protocol for remote access to graphical user interfaces.

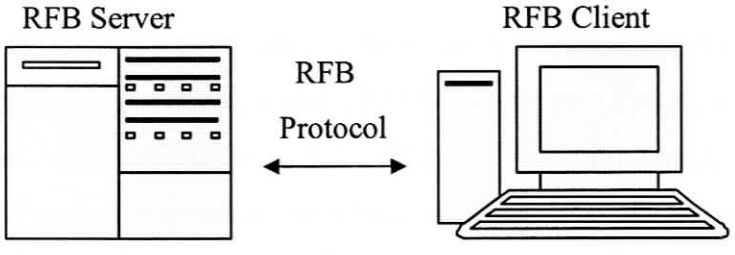

Figure 2.2: RFB Protocol

RFB protocol makes the client stateless. If a client disconnects from a server and reconnects back to the same server, the previous clients' session is pre-served. Different client from different endpoint can connect at the same server.

The RFB protocol is a very simple protocol used by the VNC client to send display information about the client desktop to the server in the form of simple frame buffer contents. It supports compression and reduces the raw contents of the frame buffer to about 1/20th its original format. It also applies different encoding schemes to different sections of the frame buffer, thereby further increasing the efficiency. The RFB protocol however does not support any kind of encryption of data transfers thereby posing a serious security problem. Moreover, the authentication is based on a simple challenge-response algorithm.

2.2.2 VNC Authentication

VNC uses a simple DES based challenge-response authentication scheme. In order to authenticate the client, the server sends a random 16 byte challenge and the client then encrypts the challenge with DES using the user supplied password as a key. If the response matches the expected result, the client is authenticated. Otherwise, the server closes the connection. There are a number of possible vulnerabilities with this mechanism:

1) **Password** - being limited to 8 characters, could be brute force guessed by an attacker who continually tries to authenticate using different passwords. The standard way of making such attacks unfeasible is to enforce a delay between failed authentication attempts. If there has been a failed authentication attempt, delay sending the challenge to the next client who connects for a number of seconds.

2) **Predictability** of the random challenge sent by the server. If the server, under any circumstances, sends a challenge, which has previously been used in a successful authentication attempt, there is the possibility that an attacker may use the previously observed valid response again. An example of such is if the server re-seeds the random number generator used to produce the challenge with the current time on

each connection attempt. In this case, if an attacker connects to the VNC server within the same one-second window as a valid client, then the attacker will receive the same challenge as the valid client and use the response from that client to authenticate.

Challenge-response authentication schemes are inherently susceptible to man-in-the-middle attacks. The basic idea is that attacker uses a client to generate a valid response for a given challenge. One way of carrying out such an attack is if the attack can intercept and modify the packets flowing between the client and the server. The attacker can then replace the challenge from the server with a challenge the attacker has received in a pending authentication attempt. The client then returns a valid response for that challenge with which the attacker can use to complete its authentication.

2.2.3 Java Technology

Java is a reflective, object-oriented programming language developed initially by James Gosling and colleagues at Sun Microsystems. Java was intended to replace C++, although the feature set better resembles that of Objective-C. Java should not be confused with JavaScript, which shares only the name and a similar C-like syntax. Sun Microsystems currently maintains and updates Java regularly.

Java is platform independence, means that programs written in the Java language must run similarly on diverse hardware. One should be able to write a program once and run it anywhere.

The first implementations of the language used an interpreted virtual machine to achieve is portability. Portability is difficult goal to achieve and Java's success at that goal has been mixed. Although it is indeed possible to write programs for the Java