

Diagnostic Software for Network Problems Identification

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Abstract – Network operations can be notified of network issues at both local and remote offices often times even before users begin experiencing problems. Being able to identify, troubleshoot and resolve problems quickly from central location saves companies a lot of money and avoids expensive and time consuming dispatches to remote locations. So far, Diagnostic Software have been developed for network problems, but the ones available work effectively in wireless network and in the monitoring of network interferences. In this thesis, a Diagnostic Software for the identification of problems in a network has been developed with special focus on local area network and on issues like diagnosis of: TCP/IP stacks, NIC using local host IP address, IP address status of local host and all interfaces on local host name and remote host name. The software was developed using Java Programming language on a web platform. It addresses the problem of configuration and the physical connections like cables and network interface card. Additionally, this research experiment suggests that an ideal diagnostic software should be developed that can comprehensively handle network problems (physical, configuration and software problems) in both wired and wireless networks. We therefore conclude that the interoperability of these areas in one software would be revealing and indeed rewarding.

Keywords – Diagnostic, Software, Troubleshoot, Configuration, Interference.

I. INTRODUCTION

Making devices talk to each other for the purposes of communication is nothing new. Early forays into telephony such as the telegraph and telephone have since evolved into more complicated devices, and now a computer can be networked to the Internet, another PC, or even a home stereo. In the early 1960s, individual computers had to be physically shared, making the sharing of data and other information difficult. Seeing this was impractical, researchers developed a way to “connect” the computers so they could share their resources more efficiently. Hence, the early computer network was born. [1]

Through the then-new communication protocol known as packet switching, a number of applications, such as secure voice transmission in military channels became possible. These new circuits provided the basis for the communication technologies of the rest of the 20th century, and with further refinement these were applied to computer networks.

These networks provided the basis for the early ARPANET, which was the forerunner of the modern Internet. The Advanced Research Projects Agency (ARPA) submitted the proposal for the project on June 3,

1968 which was approved a few weeks later. This proposal entitled “Resource Sharing Computer Networks” would allow ARPA not only the further sharing of their data, but would allow them to further their research in a wide variety of military and scientific fields. After being tested in four locations, the network spread and the new protocols created for its use evolved into today’s World Wide Network.[4]

In 1977, early PC-based Local Area Networks, or LANs (Local Area Networks) were spreading and while initially restricted to academics and hobbyists, they eventually found their way into the workplace and in homes, although the explosion into the latter two arenas is a relatively recent phenomenon. LAN variants also developed, including Metropolitan Area Networks (MANs) to cover large areas such as a college campus, and Wide Area Networks (WANs) for university-to-university communication, [3]. With the widespread use of computers in the corporate world, the speed and convenience of using them to communicate and transfer data has forever altered the landscape of how people conduct business.

Regardless of the size or number of employees, every network user experiences networking problems at some time or other. Anticipating the most common problems ahead of time and working to avoid them is the best way to reduce Help Desk calls and ensure a smooth daily networking experience. One problem that may arise is the issue of a duplicate IP address. This is, quite simply, the address that the network uses to identify a specific computer. Connectivity issues are among the most common problems that are brought to the doorstep of the systems department of a company. This can be caused by a number of things, including configuration changes or the malfunction of connectivity devices, such as in the case of an NIC, a switch, router or hub. there are sometimes simply problems with the physical cables that connect various types of computerized equipment. Sometimes these physical connections become broken, severed or simply short out. [2]

The aim of this study is to critically examine the problems of a simple Local area network in an organization, and consequently develop software and techniques that can be used to effectively identify and eliminate these problems.

II. MATERIALS AND METHOD

The methodology applied in this project is prototyping. A diagnostic software is developed, tested and

implemented with two systems in a network, the confirmation gives the assurance that when it is used in a LAN with more systems it will be able to diagnose the problems in that network.

Other steps used include:

1. The examination of different problems in a network settings (LAN and WLAN)
2. Analysis, design and development of the software.
3. Testing of the software developed to ensure practical techniques for problems identification.

Comm View for WiFi tool was used instead of Netstumbler because of:

- support for a wider range of **adapters and protocols**;
- clarity of the graphical interface;
- ease of comprehension of the generated report

With CommView for WiFi you can see the list of network connections and vital IP statistics and examine individual packets. Packets can be decrypted utilizing user-defined WEP (Wired Equivalent Privacy) or WPA (WiFi Protected Access) keys and are decoded down to the lowest layer, with full analysis of the most widespread protocols.[5], [8]

The software developed – DIAGNOSTIC SOFTWARE FOR NETWORK PROBLEM IDENTIFICATION, is designed on the java platform as a Servlet. Servlet is a Java application that runs in a web server or application server and provides server – side processing, typically to access a database or perform e-commerce processing. It is a Java – based replacement for CGI script, Active Server Pages (ASPs) and proprietary plug-ins written in C and C++ for specific web servers. Because they are written in Java, servlets are portable between servers and operating systems. The servlet programming interface (Java servlet API) is a standard part of J2EE. If a web server such as Microsoft Internet Information Server (IIS), does not run servlet natively, a third party servlet plug-in can be installed to add the runtime support.

This is implemented as a Java Server page (JSP). JSP is an extension to the Java servlet Technology from sun that provides a simple programming vehicle for displaying dynamic contents on a web page. The JSP is an HTML page with embedded Java source code that is executed in the web server or application server. The HTML provides the page layout that will be returned to the web browser, and the Java provides the processing; for example, to deliver a query to the database and fill in the blank fields with the results. The JSP is compiled into byte code (into a servlet) when first encountered by the server. [6], [7] This software is an interactive software which is meant to have a request and then respond with the following design as shown in fig1 below.

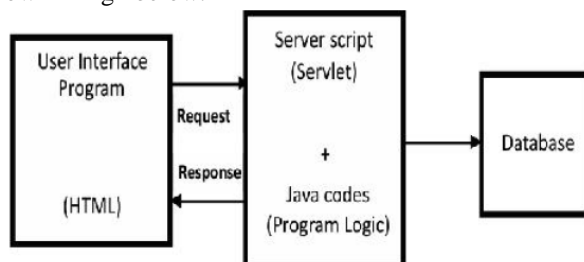


Fig.1. Servlet/JSP

It has the user interface program which is designed using Hypertext Markup Language which serves as the client and server script (Servlet) that runs on the web server plus the Java codes which of course presents the Java Server Page (JSP). This web based program does not have a database since it has no need to keep data but only for request to be made and the result given. The user interface with HTML presents the input environment where the user types in the request and the result will be displayed in the form of statement in the language understood by the end users.

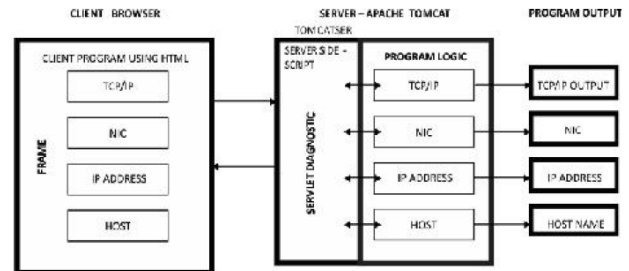


Fig.2. Structure of the system designed

III. RESULTS AND DISCUSSION

The system is developed on the version of Java called Netbeans 6.0. The software Tagged Esang Network Diagnostic Software (ENDS) runs on the Netbeans platform and opens to the Home page when it is run. The home page will list the features on the menu displayed as shown below in fig. 3. On the Home page, the following features appear on the Menu.

A. TCP/IP Stack

This feature diagnoses the status of the local host TCP/IP stack to confirm if it is faulty. Figs. 3 and 4 below show the main screen for TCP/IP stack and when it is activated to diagnose the local host respectively. When the TCP/IP stack is initialized, it will show on the screen “TCP/IP stack is initialized and not faulty and the reverse if it is not initialized or is faulty.

B. Network Interface

This module diagnoses the status of NIC on the host and checks the status of the interface on the remote system. These two will be done when the IP address of each is entered in the box provided and the last one is checks the status of all interfaces on Host.

C. IP Address Module

In this module, it is possible to retrieve the IP address of the host system if it is set, retrieve the IP addresses of all interfaces on the host if available and also confirm the connection status of the remote network system by typing IP address of the particular remote system. All these will be done by selecting the radio button in each case and then clicking on “check”.

Host Name

This module retrieves the host name of the host system and also confirms the host name of the remote network system.



Fig.3. Home page of ENDS

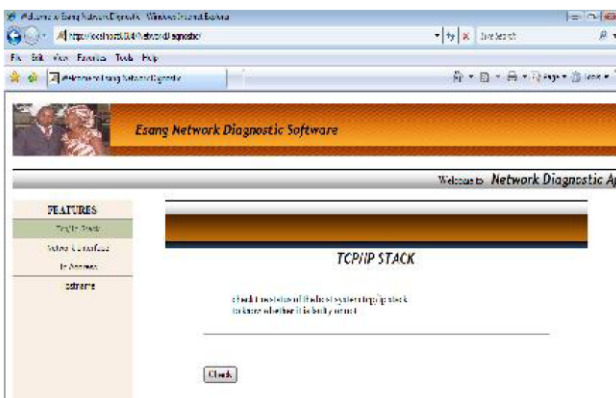


Fig.4. The main screen for TCP/IP Stack

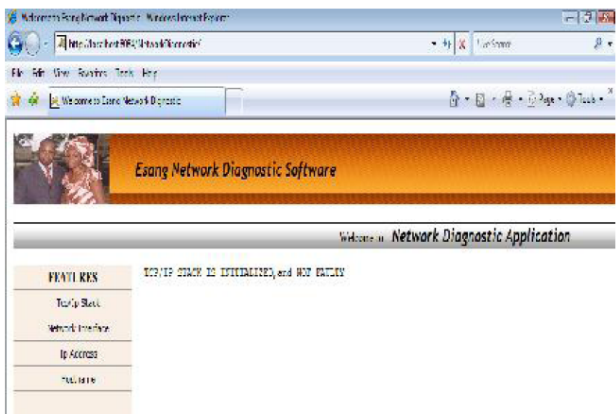


Fig.5. Showing the output when the status of TCP/IP Stack was checked

- Diagnosis of the status of the local host TCP/IP stack
- Diagnosis of the NIC status using Local Host IP address and all interface functionalities on host systems.
- Diagnosis of IP address status of local host, all interfaces on the local host and connection to the remote system – connectivity test.
- Diagnosis of local host names and remote host names – connectivity test.

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IV. CONCLUSION

A Diagnostic Software for network problems identification has been developed to diagnose the network problems identified. The software is developed using Java servlet and the output displayed on a web platform.

The software contains four main modules which perform the following functions: