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Research on Detecting Faults Based on Internet Control Message Protocol

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Abstract:
All types of network management may suffer with a problem of unapproachable host, congestion and inappropriate functioning of the switches connected in the network. In order to detect these problems is a tremendous job for the network management section. This paper also helps for knowing that whether various devices are connected in the network will works properly or not. With the help of such application all the IP addresses of the network are used to check for any error present in the known network and then it displays all the information about that switch that is faulty or malfunctioning. This technique may helps in discovering the switches that undertaking the problems of no connection, improper functioning, and congestion and accounts it to the concerned section. All the switches are to be analyzed are sent a series of ICMPECHO_Request messages and on the basis of the all replies received, a decision will be created and any problem may occurs in the network is reported.

Keywords: Fault detection, internet control message protocol, pinging

1. Introduction
Nowadays, Network becomes more expensive and complex. Most of the companies and Institutes are depend on these networks for its business activities. One of the methods which are used for making network more appropriate is to find a network fault as soon as possible and here fault detection mechanism plays an precious role over network management. The main aim of this scenario is to check the network in order to detect any error and fault may occur in the network. After that display all the specific information about a specific switch that is known to be malfunctioning.

It is based on evaluating the status of the switches in a network which is actually connected with a database system. It deals with the process of "Pinging" of various IP addresses that may be stored in the database and produce various ping static for theses IP addresses. By pinging all the IP addresses of these systems we can also check for any error present in the given network and then it displays all the information about the particular switch that is malfunctioning.

2. Related Work
This part of paper explained the related work that has been done in this research. The following main phases are explained in this research.

2.1. Research
The earlier research related to our approach is "Distributed, Agent Based, Network Fault Diagnosis System" which is done by John L. Murdoch school of computing Napier University 2003 and this technique is very expensive. Another research is "Simple Packet Aggregation Technique for Fault Detection" which is done by Akira Kanamaru in 2000 and this technique is based on aggregation model and it is very expensive. Our research is "Detection Fault Based on Protocol" it is less expensive as compare to other technique. In this we do the pinging of various IP address.

2.2. Designing
Database Designing is major factor to achieve a high level of efficiency in development of any application. Improper database designing may leads to unexpected results. So database designing is a crucial phase. Efficiency of presented work is totally depends on database designed for the application because all the functionality provided by this application is an output of query executed on developed database of application.

Database table are design after going through all five form of normalization. Tables are free from any inconsistency and data redundancy.
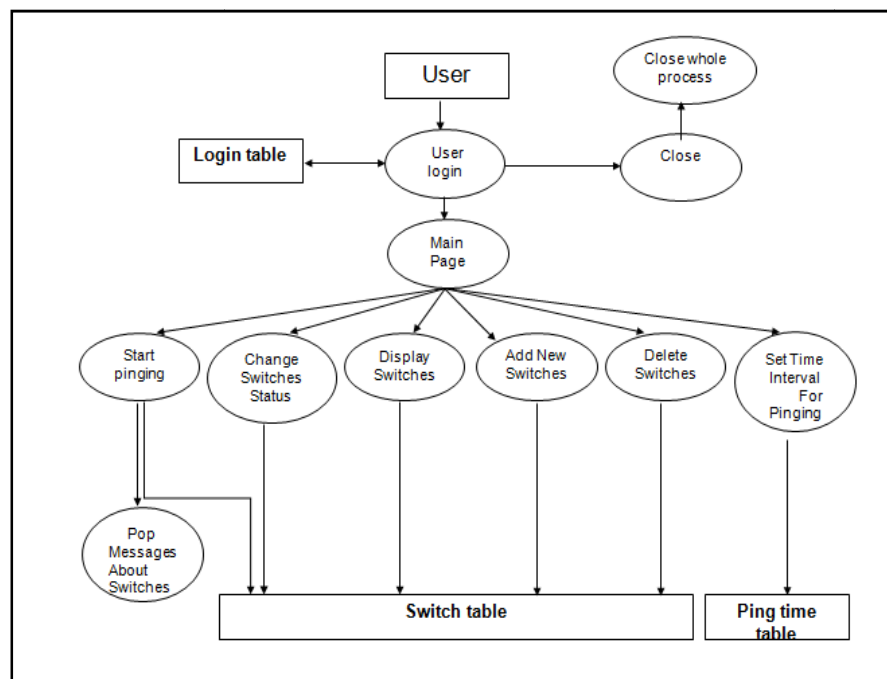
Figure 1: System Design

2.3. Implementation

Implementation is the process of bringing a newly developed system or revised into operational one. It is the practical job of putting a theoretical design into practice. It may involve the complete implementation of a computer complex or the introduction of one small subsystem. The new system and its components are to be tested in a structured and planned manner. The implementation stage of a project is very complex and time consuming and many more people are involved in the earlier stages. This involves care full planning, investigation of the current syscareful planning, investigation of the current system and constraints of implementation, creating computer-compatible files, installing hardware, training the operating staff in the changeover procedure before the system is setup and running. A critical factor in the conversion is not disrupted the functioning of the organization.

2.4. Testing

Testing is the process of executing the program with the intend of finding errors. Testing cannot show the absence of defect, it can only show that software errors are present. The testing principles used are

- Tests are traceable to customer requirements.
- 80% of errors will likely be traceable to 20% of program modules.
- Testing should begin 'in small' and progress towards testing 'in large'.

System testing is vital for the success of any software system. In this phase, several tests and validation will be carried out on modules to check for their functionality. Testing and debugging is a very critical in system development.

3. Proposed Technique

To develop a technique which is concerned with the detecting the switches undergoing the problems of no connection, improper functioning, and congestion and reports it to the concerned departments. All the switches to be analyzed are sent a series of ICMPECHO_Request messages and on the basis of the replies received, a decision is made and any problem in the network is reported.

3.1. Advantages of this technique

Following are the advantages of this technique that are given under:
1. Less expensive: it is not costly as compare to other technique.
2. Easy to access: it does not have any complexity, its user friendly.
Time saving: its time saving that means we don't have to ping the each IP address separately.

3.2. Algorithm

Steps of algorithm are as follows:
1. Create Database for application using JDBC: ODBC drivers.
2. Start Java application.
3. Enter user name and password.

4. Display applet interface with user driven menu.
5. Select "Set Time Interval" button to assign delay between security checks.
6. Select "Add New Switch" button to insert node information, such as:
   IP Address, Department, Contact Name and Contact No,
   in the database created in Step 1.
7. Select "Delete Switch" button to delete information from the database by typing the IP address of the node in the IP address field followed by pressing the Delete button.
   a. IF node is present in database, delete node information from
   b. Database and display success message.
   c. ELSE, display node not present message.
   d. Press back button to go back to previous menu.
8. Select "Display Switch" button to display the list of node entries in the database along with their information such as IP Address, Department, and Contact etc. in a tabular format.
9. Select "Check Status of Switch" button to view or change the checking status of the node.
10. Set status from either Yes to No or vice-versa using radio buttons.
    a. Press Save and Back button to return to the previous menu.
11. Redo any step from steps 5-10 according to usage of network.
12. Select "Start Pinging" button to begin analyzing the network.
    a. Select an IP address from the database.
    b. IF check status flag of this node is NO discard any operation on this node.
    c. ELSE, generate ICMP requests for the node IP address.
    d. Wait for ICMP replies from the node.
    e. IF ICMP replies are not received display an alert message for that node as not reachable and continue.
    f. ELSE, continue.
    g. IF EOF of database wait for interval equivalent to interval selected in Step 1.
    h. ELSE, go to next node information in database.
    i. Go to Step 12.a
    j. IF "Stop Pinging" button is pressed go to Step 13.
13. Redo any step from steps 5-10 according to usage of network.
14. Select "Close" button to terminate the program.

3.3. Result Analysis
The home page of this software displays various buttons through which different tasks can be performed described as follows:
Firstly, a pop up "login" window asks the user to enter the username and the password. If these fields are matched correct to the existing database, these are accepted and the user is allowed to work on the application.
1) Start Pinging: This button starts checking the status of the switches.
2) Add switch: Switches can be added to the network by adding relevant information in the Database.
3) Delete switch: A switch can be deleted from the database by entering the respective IP address.
4) Set time interval: It sets the time interval for pinging the switches periodically.
5) Display switches: It displays to the user the information of   each switch.
6) Change/check status of the switch: This button offers to change the status of the switch.
7) Close: It terminates the java application

4. Conclusions and Future Scope
An effective technique for network management using ICMPECHO_Request and Reply has been devised which reports any anomalies in the network whether it may be unreachable switch or turned inactive. The application is even capable of detecting congestion in the route to a particular switch. The application reports exact malfunctioning on the basis of the ICMPECHO replies.
This application can be further improved by the introduction of a raw ICMPECHO packet rather than using the custom ping methods to send and receive ICMP packets. Use of raw ICMPECHO packets will increase the efficiency of the application and may speed up the detection of errors in the network with a factor of 2.

5. References
i. William Stallings, Data and Computer Communications, Eight Edition, Prentice Hall of India, 2007.
ii. Douglas E. Comer ,"Computer Networks & Internet ", Pearson Education Asia , 5th Edition ,2008
iii. William Stallings, Computer Networking with internet protocol and technology, Pearson Education,3rd Edition ,2009
iv. Prakash C. Gupta, Data Communications and computer networks, 2006
v. Fred Halsall, Data Communication, Computer Networks & Open System, Addision Wesley, 2000.
vi. Richard W. Stevens, TCP/IP Illustrated, Vol 1 Addition-Wesley, 2006.
vii. Douglas E.Comer, Internetworking with TCP/IP, Volume 1, 2, Forth Edition Pearson Education Asia 2006.
viii. Craig Hunt, TCP/IP Network Administration, 3rd Edition, 2002

ix.   ED Tittel, Computer Networking, The McGraw-Hill, 2002

x.   C.J. Date, Hugh Darwen, Nikos Lorentzos. Temporal Data and the Relational Model. Morgan Kaufmann 2003.

xi.   V.S.Bagad, I.A.Dhotre, Computer Communication Network, 2009.

xii.   Comer 2000, Error Reporting vs. Error Correction, describes the ICMP protocol that is used to handle datagram errors.

xiii.   Marsden (1986): Communication network protocols 2nd Edition. Chartwell Bratt

xiv.   http://en.wikipedia.org/wiki/internet_control_message_protocol

xv.   http://en.wikibook.org/wiki/communication_network/ip_protocol_and_icmp

xvi.   Postel SJ. Internet Control Message Brian W Protocol. RFC0792, September 1981

xvii.   http://en.wikibooks.org/wiki/Communication_Networks/IP_Protocol_and_ICMP

xviii.   http://en.wikipedia.org/wiki/icmp_echo_request

xix.   Wayne Tomasi, data communication and networking, Pearson education, 1st Edition, 2007

xx.   Tanenbaum, Computer Networks, Pearson Education, 4th Edition, 2003.