POWERFUL NETWORK MONITORING SYSTEM WITH ADDITIONAL SERVICES INCREASING THE NETWORK PERFORMANCE

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ABSTRACT

A powerful and excellent network monitoring system called Nagios helps the various organizations of medium and large scale to detect and solve the IT infrastructure monitoring related problems before they affect crucial and confidential business information. A new feature of services were added to the existing system which has no such type are configuration for Various levels of authentication, Bandwidth usage and alerting services. The Nagios alerts user whenever a defect occurs and alerts when the problem resolved. The alerts were delivered through email,sms,pager.The alert about a particular service can also be delivered through commenting the service from the admin manually. As there were group of admins, any can send alert to the hosts and the chance of conveying wrong alerts by any exist. So making the different login credentials to all the level of authorities helps the user to receive correct alert about the status of the service.The bandwidth usage indication of a client system added to Nagios indicates the Bandwidth usage from a host machine and if the usage limit reached,an alert will be generated and delivered to the admin.Network Development Life Cycle was chosen as a methodology for implementing this system in the network. Nagios is installed in Ubuntu Operating System along with Multi-Router Traffic Grapher (MRTG) and Mail Postfix. MRTG and Mail Postfix were configured to be integrated with the Nagios System. On the client side,NSClient++ has been installed, for monitoring the bandwidth and performance of windows based on operating system.

Keywords: *Nagios, Network monitoring, Email notification, SMS alert, Network Performance,Multi Router-Traffic Grapher (MRTG)*

1.   INTRODUCTION

Nagios is a network monitoring tool and it can be installed in Ubuntu/Linux/Unix based OS and was able to configured easily. The various versions of Nagios are: Nagios XI,Nagios Log Server, Nagios Network Analyzer, Nagios Fusion,Nagios Incident Manager, Nagios Reactor, Nagios Core. Nagios Core provides an environment to monitor all the devices registered in a network. The remote hosts and their services can be monitored remotely in a local network. Nagios monitors entire infrastructure to ensure systems, application services, and business processes were functioning properly. It can alert technical staff about the problem and offers monitoring scheduling and alerting services for servers. Postfix/sendEmail mail server were configured to be integrated with

the Nagios system in order to send the email alerts. In the windows based client machine, the NSClinet++ has been installed for monitoring bandwidth and performance of other services of a host system. Similarly in the Linux/Unix based client machine NRPE has been installed for monitoring the services and the admin system configured with NRPE plugin.Nagios can be used to monitor all sorts of things such as, Pinging the host system, Services like Dynamic Host Control Protocol, Domain Naming System, File Transfer Protocol,SecureShell,Telnet,Hypet Text Transfer Protocol, Network Transfer Protocol, Post Office Protocol v3,Internet Message Access Protocol, Simple Mail Transfer Protocol,etc.DataBase servers like MySQL,etc.,and Apache, Postfix, etc.

2.   TRAINING OF PARAMETERS

The network traffic is due to number of devices and applications. Without the useful tools that can analyze and display network traffic related problems, a network admin has to identify the network problem which consumes a lot of time and energy. By using Nagios tool applications, plugins and configuration, this issue can be easily solved. The increase in usage of bandwidth and reaching the limit allotted may effect the performance of the sytem.The bandwidth alerting service will continuously check for the status and if the status is observed as CRITICAL or UNKNOWN, immediately an alert will be generated indicating the issue and will be delivered to the network administrator Integrated MRTG also enable the network admin to view the bandwidth congestion during the peak hours. This is an prior prevention of bandwidth outage in the network.For a network to be performed in good condition,the below applications were developed:

1. Nagios build in with Multi-Router Traffic Grapher
2. Nagios with email alert notification
3. Developing and testing in wireless network

The Network Monitoring Tool like Nagios simplifies the difficulty of every network admin.Nagios is a real time open source network tool to display network traffic. The admin and host can monitor the flow of traffic in a network without disturbing the network. We propose the new services in Nagios which is effective in monitoring network,bandwidth,alert through email. The flexibility to Real-time analysis of network helps to detect network errors and thus prevents the network to down.

2.1   Nagios built in with Multi Router Traffic Grapher:

1.Ability to monitor bandwidth traffic.
2.Ability to determine the minimum and maximum bandwidth.

2.2 Nagios email notification:

An alert notification will be generated whenever the bandwidth reaches the certain threshold and make the system to prevent network outage and also capable of delivering alerts through email whenever a problem in the network arise.

2.3 Nagios Level of Authentication:

Nagios provides various level of authentication, so that the technical staff or group of admins provided with different logging credentials to avoid taking some action about the clients that can be made only by the concerned admin.

3.METHODOLOGY

Nagios is a powerful network monitoring tool. Huge quantity of plugins are available from the Nagios Library,indiccates that it could be customized based on the requirements. It also maintains log files indicating the time and date of alerts been sent and the change in status of services. Nagios provides the flexibility for developing custom host and service checks to the user.

3.1 The process of monitoring Network QoS in Dynamic Real Time System

The monitoring of network is an important part of network resource management. The vast increase in the growth of computer network and internet makes the monitoring more delicate and more challenging. Netmon is designed[1], to monitor the performance of packet data network, which in turn measures network performance using SNMP information.But,this approach does not provide information of network path and computer host[2].So it is not preferable to be used as network monitoring tool for resource management. The another tool that was considered during research was Resource Monitoring System(REMOS),which is currently being developed at Carnegie Melon University[3].Resource Monitoring System is flexible for allowing the network aware application for obtaining the static and dynamic information about a network. The network utilize SNMP and benchmark techniques for collecting the information on status.

3.2 Good windows Bandwidth management:

The good bandwidth Management is a well featured traffic management tool for Windows and provides bandwidth control and QoS at cost effective. The bandwidth shaper, bandwidth limit were specified for each user based on the QoS rules. The main feature of Good Bandwidth Management is the application of speed control rules to a particular host without changing the

existing network infrastructure can be easily managed through Windows GUI.

4. PROPOSED SYSTEM

The Fig 1 shows the setup of a wireless LAN with 400 Mbps speed. The Nagios Core is installed at the server system.

The new services that were added to the Nagios are Setting up authenticated users, Bandwidth usage indicator, sms and email alert notification. The sms and email alert notification helps the host as well as the admin to get notified about the configured services fed for monitoring their status. Alerts will be generated from the server automatically if a state change of any service in the host machine happens. In the server computer, services like Apache Web Server, Postfix mail server and Nagios were installed. The server was monitoring the host(Client) and router since Nagios can monitor hard drive space, network, uptime and down time of a node.
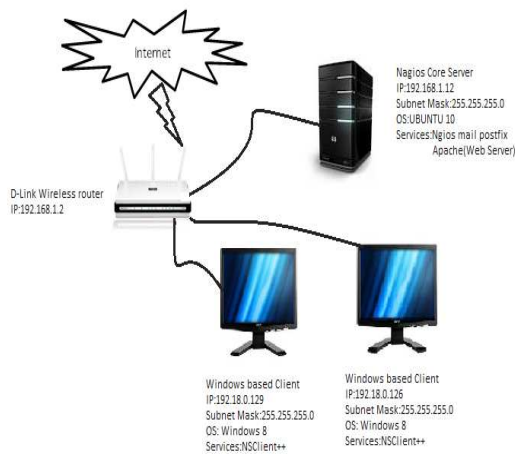
Fig 1 :Design Of Proposed Model

The client is installed with NSClient++ for windows based machine and with NRPE for Linux/Unix based machine which act as Nagios service for the client side and send data to the Nagios Server. From there, Nagios was able to determine the size of the network and where the nodes are located. An alert is sent to the network admin if there a problem with a host and most importantly when the bandwidth hits a certain threshold set up by the network admin. The tests are done to ensure the data collected are satisfied to the parameter, have been selected. All of the services are configured in order to test the Network Monitoring Bandwidth Alert System.

4.1.Installation of Nagios core:

Extract the tar file of Nagios and follow the installation procedure mentioned in Nagios guide[4].The necessary plugins were needed to be installed for configuring Nagios.The latest plugins[5] are available as open source in the internet. Use those plugins and follow the installation procedure mentioned in the installation guide. After proper installation of the Nagios the web interface will be displayed while accessed as in fig2.
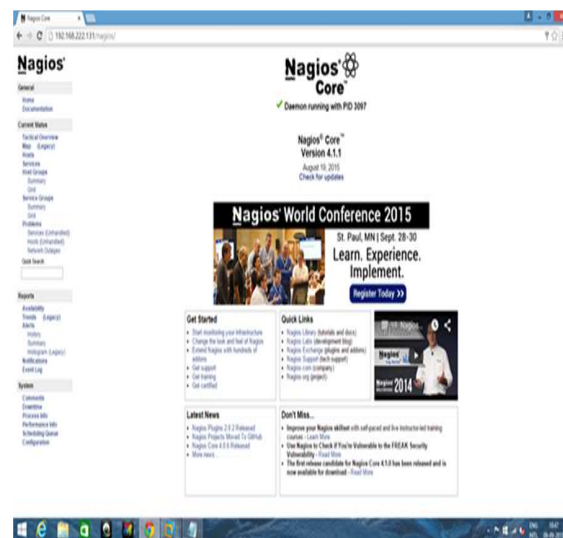
Fig 2:Nagios Core Home Page

4.2 Configuring for the additional services:

4.2.1. Setting up authenticated users

After configuring web server, it is required that authentication before accessing the Nagios CGIs.A admin account that can access the CGIs is required[6] through which all the services can be monitored, accessed and can even send notifications to a host about a service using custom service notification option.

If more number of contacts were defined for receiving notifications at the admin system, then separate login credentials were created based on the level of authority, to avoid some of the actions like sending service notifications by any, monitoring and taking actions irrespective of allotted services even if not necessary,etc.The following commands

define how to add additional users to authenticate to the CGIs with limited accessibility.

htpasswd   /usr/local/nagios/etc/htpasswd.users <username>

htpasswd   /usr/local/nagios/etc/htpasswd.users nagiosmont

This authentication is done by setting the use_authentication variable in the configuration file to a value 1.

For example,

use_authentication=1

The authentication to only limited number of services for this new log in credentials can be done. For example,

authorized_for_all_services=nagiosadmin,theboss

Fig 3:Log Credentials While Accessing The Web Page

The configuration for other limited access to services can also be done as mentioned in the customization process[6].The fig 3 will appear after logged in to the Nagios web access. The services with it's status indication OK,CRITIACL,WARNING will be displayed. The status information regarding each service is mentioned along with number of check attempts.
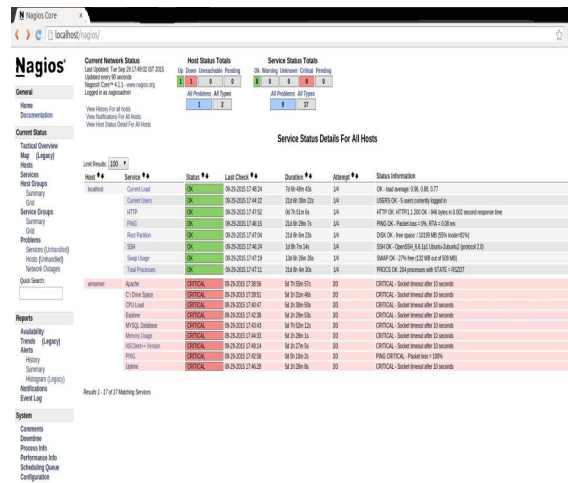
Fig4:Services With Status Information After Logged In To The Web Interface

4.2.2 Authenticating mail services:

After the proper installation of Nagios core, open the configuration path,

vi /usr/local/Nagios/etc/resource.cfg

Add the following lines with your particular smtp configuration:

$USER 5$=email@address.tld

$USER 7$=smtp.services.tld:25

Save the file resource.cfg, exit and open the following path and edit the file commands.cfg:

vi /usr/local/Nagios/etc/objects/commands.cfg

Provide the authentication for the two commands 'notify-host-by-email' and 'notify-service-by-email' in commands.cfg file. Now restart the Nagios and check for mail alerts.

The testing of connectivity helps in ensuring the successful implementation of delivering alerts. The network engineer is responsible for testing the connectivity by pinging the client from the server. The fig 5 shown below represents the schematic of network connectivity for SMS alerts.
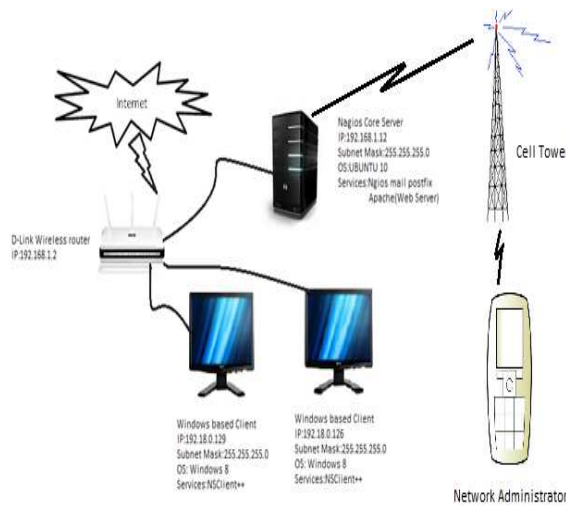
Fig 5:SMS And Email Notification Connectivity

4.2.3 Configuring for Bandwidth usage:

The bandwidth configuration helps the host to be careful while data usage in case if there exist only limited bandwidth usage allowance per a host.

To monitor bandwidth of the windows machine there is a need of plugin called *check_win_net_usage*

The check_nt allows to get to check one value (e.g. Bytes sent/s), if one needs to create graphics with Bytes_in and Bytes_out, there is need to bundle two checks in one. This is where this plugin plays its part. It launches two check_nt checks (one for Bytes sent/s and one for Bytes received/s) and bundles both checks to one common output.

Download the plugin check_win_net_usage. Save this plugin in the path
vi /usr/local/nagios/libexec

On the command line use the command :

./check_win_net_usage.sh -H 192.168.0.185 -p 12489 -i "VMware Accelerated AMD PCNet Adapter" -o KB

To monitor the network bandwidth usage add the following commands in commands.cfg file.

```
# check_win_net_usage - Output in KBytes/s
define command {
    command_name check_win_net_usage
```

```
command_line
$USER1$/check_win_net_usage.sh -H
$HOSTADDRESS$ -i $ARG1$ -o KB
$ARG2$
}
```

Add the following statements in windows.cfg file:

```
# Check Windows Network
define service{
    use             generic-service
    host_name       saiwindows
    service_description  Network Usage
    check_command
    check_win_net_usage!"VMware
    Accelerated AMD PCNet Adapter"
```

4.3.Custom Service Notification alert:

Any additional information regarding the status of a particular service can be delivered through an option mentioned "Custom Service Notification".The information to be delivered to the client can made through a comment.The fig 6 shows the Custom Service Notification Alert.

Fig 6:Sending Custom Service Notification Alert

Fig 7:Nagios Mail Alerts Log

If any service for example,CPU Load is in WARNING State, the mail will be delivered to the destination from the nagios server indicating the issue. The fig 6 represents the mail notification received about the service.

Fig 8:Email Notification Of Nagios

The service status of all the registered host systems is shown in the form of graph. If all the services of a particular host are OK, then the host will be displayed as green and if any of the service is UNKNOWN or CRITICAL the host will be displayed in red colour.The fig 7 indicates the graph of status of various host system.
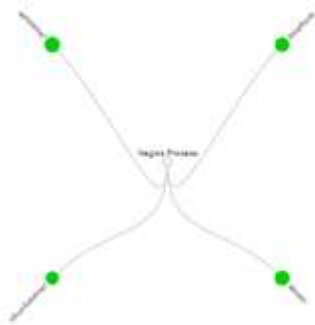

Fig 9:Graph Indicating The Status Of Various Hosts

The fig 8 shows the Network usage status which is nothing but Bandwidth usage of a particular client machine. If the status is OK, then the green colour is displayed, if it is UNKNOWN, yellow colour is displayed and if the status is CRITICAL, red colour is displayed.

Fig 10:Bandwidth Usage Indication And Other Services With Status And Number Of Check Attempts

5.CONCLUSION:

In this paper we made a proposal on the implementation of login authentication to various level of authorities, Nagios email notification and SMS alert. The alert notifications delivering help to improve the QoS of the network and prevent the network outages. Network outages causes a severe loss. With the implementation of new services in Nagios added a great value to improve the performance of network in the sense of monitoring the services of various host systems effectively and delivering automatically generated notifications or alerts from the server of admin about any service. This design can be even enhanced in future with delivering alerts to whats app and in any other social network sites. The time efficiency in delivering of alerts can be improved further as a future work.

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