

# Nagios (Example Paper for I524)

TONY LIU<sup>1</sup>, VIBHATHA ABEYKOON<sup>1</sup>, AND GREGOR VON LASZEWSKI<sup>1</sup>

<sup>1</sup>School of Informatics and Computing, Bloomington, IN 47408, U.S.A.

status: early draft, paper-1, S17-TS-000?, S17-TS-0003, S17-TS-0001 April 9, 2017

**Nagios is a system, network and infrastructure monitoring tool providing instant awareness of IT infrastructure. Nagios allows to monitor the infrastructure, alert the system admin, provide visualized reports, schedule downtime for maintenance, and plan upgrade in advance with trends and capacity diagrams. The design emphasizes highly on flexibility and scalability. We summarize details of Nagios and outline how it is useful as part of the services used in big data.** © 2017 <https://creativecommons.org/licenses/>. The authors verify that the text is not plagiarized.

**Keywords:** Cloud, I524

<https://github.com/vibhatha/sp17-i524/blob/master/paper1/S17-TS-0003/report.pdf>

## 1. INTRODUCTION

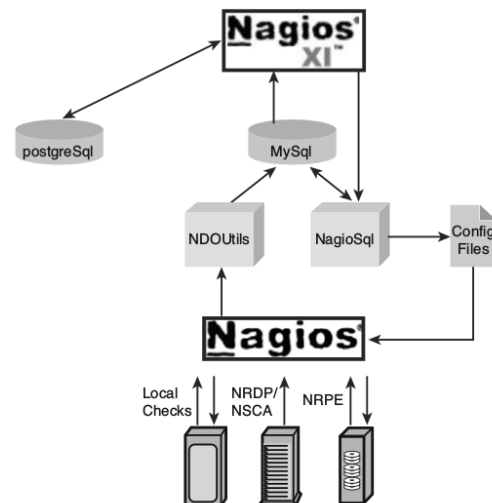
Nagios [1, 2] is a system, network and infrastructure monitoring tool under open source license that provides instant awareness of mission-critical IT infrastructure. Nagios allows to monitor the infrastructure, alert the system admin, provide visualized reports, schedule downtime for maintenance, and plan upgrade in advance with trends and capacity diagrams. Its design emphasizes highly on flexibility and scalability. To provide such flexibility, Nagios is composed of different modules. Through the modular design Nagios can adapt easily to systems and networks monitoring needed by different users. It also allows integration of new components that allow adaptation towards service monitoring needs that have not yet been distributed with Nagios, allowing extensibility.

## 2. ARCHITECTURE

Nagios [3] flexible modular architecture allows users to customize modules to monitor the network and infrastructure. We show the elementary Nagios architecture in Figure 1 [4].

Nagios architecture consists of two main databases. They are MySQL and PostgreSQL. Nagios XI is directly connected with MySQL and PostgreSQL. There are two main components connected with MySQL, NDOUtils and NagioSQL. These are two components. The databases keep the parameters and configurations needed for the Nagios Core configuration from the XI interface [5]. The NagioSQL refers to the configuration files to get configuration parameters. NagioSQL forms an advanced configuration section of the XI interface to enable the functionality. Nagios local installation is also connected with three main components. They are Local Checks, NRDP/NSCA and NRPE components.

Nagios has a number of components such as Nagios core, file system, Nagios daemon, services, plugins, event handlers,



**Fig. 1.** Nagios Architecture [4].

performance processors and notification commands.

The main component is *Nagios core*, which is a scheduler daemon detecting network devices and services regularly. The core can alert the administrator through various notification methods like email, message and web interface about system and event changes to alert of issues and system states. Nagios plugin features allow to register events that can be triggered to execute actions and print status updates.

It has two types, check and notification. Both are used by Nagios core. The check plugin is used to check and monitor devices and services. The notification plugin is used to send out alerts if the check plugin detected any status change. Beside

these two, the users themselves can develop their own custom plugins.

Nagios uses *modules* that call through the Nagios API Nagios Events that are enacted upon by the Nagios Broker. The user can develop a modules with customized functionality and embed them within Nagios core. Whenever an event triggers the module, the module will be called to execute. The benefit of Nagios module is that the user can access all necessary information within the core process such as the Nagios status and check results.

Nagios' configuration file is text-based. It supports the sophistication of Nagios allowing to monitor large infrastructure. Also, the user must understand the configurable options. Management of the configuration has to be conducted carefully to avoid simple mistakes such as introduced by spelling errors. However, sample configurations and tools to generate configuration files by applying such configuration templates are also supported by a user-friendly web interface.

Nagios also contains a Web interface. It is developed using CGI technology in C programming language. Although it is not compatible with current popular web technologies like CSS, AJAX and JQuery, it provides sufficient scalability for larger infrastructures.

### 2.1. Comprehensive Monitoring

Using Nagios there are many structures that can be monitored, such as operating systems, networking protocols, system metrics and infrastructure components. There are many APIs to handle the easy monitoring of in-house applications, services and systems. In considering the network monitoring, basic use is the pinging and Nagios uses it in a complex way and configurations are complex as it is used to monitor many of the networking infrastructures. The feature is post query support is also there in Nagios, this is very important to monitor TCP or UDP connections with a particular host. The capability of pinging and keeping track on multiple ports is also enabled in this framework, so it is very easy to monitor a huge network in a particular organization. When it comes to service management, there are group service configurations that can be added to the system by Nagios, this provides a variety of options to a team to manage systems in a flexible way. There are a variety of centralized views provided. For instance General view provides a central dashboard which holds the keys to all other kinds of services and tools like monitoring performance, network outage, etc. Service details view provides the last check details, service type, host and many other information related to services. This is a vital tool, when it comes to managing thousands of services from a single organization. Host details and host groups can also be viewed by the tools in Nagios, this is very important to provide a more structured service when an organization have a number of clients, so the group management is a vital task when it comes to isolating services in cases of maintenance and development. Collapsed tree status map and marked up circular status map shows the connection between different hosts and routers in a network. This is an important tool to identify the service distribution and to identify breakdowns. By these views, the failures can be notified by a physical and geographical location, and this is a vital factor for a system management with less downtime [6].

### 2.2. Problem Remediation

Systems running on live environments generally associated with expected and unexpected problems. Tracking these problems

is a challenging task. Nagios has the capability of providing such events as alerts in an automatic way. Nagios consists of fast recovering capability with the support of automated tools. These tools has the capability of providing services with less downtime.

### 2.3. Visibility and Awareness

Visibility and awareness deal with a couple of factors. Notifications, real time updates, reporting, centralized dashboard are some of these main features. Nagios consists of a centralized dashboard which provides the access to all these information. The centralized architecture supports system administrators to deal with less problems in reaching vivid services in order to access information. In making decisions, it is vital to have access to all information in a quick manner. Nagios provides these features with the centralized dashboard.

### 2.4. Reporting

In referring to records and statistics, Nagios provide reporting tools to keep track on the outputs from the dashboards and central data collection systems, so that the data can be analyzed at the present moment and also the ability to check the data in the history. When it comes to tools like crystal reporting, casper reporting, etc, Nagios provide support to third party tools so the users can use the familiar reporting tools.

### 2.5. Open-Source

Nagios is an open source tool and the license for documentation and software is under different licenses. Nagios open software license [7], Nagios software license [8] and GPL are the licenses own by Nagios.

### 2.6. Multi-Tenant Capabilities

Concurrent access for multiple users is a vital factor as far as a scaled business is considered. The necessity of multiple user login, accessing data, sharing data and updating data is a vital task in such an organization. Nagios consists of a web interface which consists of all these features. The importance of the web interface is that, the installation cost and maintenance cost is less. Once it is deployed to a server, every user in that particular network containing the server has access to the web interface by means of web browser. As mentioned earlier, Nagios dashboard comes with a web interface enabling easy access to all users.

In referring to these factors, it is clear how Nagios can be used to implement a solid foundation to maintain the information technology based systems in an organization.

## 3. NAGIOS FOR BIG DATA

Big data is another word which refers to data sets generated by communication channels, networks, security details, etc. Nagios is a monitoring tool with major supporting tools to enhance network performance, failure detection, performance evaluation, etc. In referring to web services which access bulk data in form of JSON objects or SOAP format, network traffic occurred by these actions are very high. In such instances, Nagios can be used to monitor the network in order to provide better performance by analyzing the current status and providing suggestions on using the bandwidth widely. Furthermore, the monitoring tools and reporting tools can provide a wide idea on the fact how data is being collected in a particular network. The rate of change of free capacity of local storages in servers is a vital factor in case of providing storage facility with less data damage and no data loss.

Nagios has the capability of providing an analytic understanding on the nature of big data distribution and management in a particular network.

### 3.1. Big Data Requirements for Monitoring

In monitoring of clouds and clusters, Nagios can be used as a powerful tool. The clouds and clusters always depend on the network. In such scenarios, network traffic monitoring, failure detection, network bottle-neck detection and similar tasks can be done using Nagios. And also the status monitoring such as memory, network bandwidth, cpu performance, gpu performance and similar activities can be tracked using Nagios.

Servers, disks and file systems are vital factors in big data management. The server performances and storage status is a vital factor for an organization providing cloud based software solutions. So these file system management becomes a very important task in order to provide less downtime services. Nagios has monitoring capability and visualizing capability, these dashboards can be used to provide information to the users in an easy manner. Real time performance update, storage status, server failures can be detected using Nagios. All these factors together form a solid background to provide cloud based software solutions [9].

## 4. NAGIOS FOR BIG DATA APPLICATION

Big data applications are the applications handling huge amount of data and thousands of users through out a network. In such a process, there are many factors that has to be considered. Performance is one of the main concerns in an organization. In order to achieve better performance, speed of the network, easy access to data, user management, security and many more factors contribute. Nagios has the capability of monitoring most of these factors and it provides updates, reports and centralized dashboard to system administrators. Big data always deal with very complex networks, so data flow must be smooth and fast. Nagios provides the network monitoring tools to understand the nature of a network in a given time. With the real time updates, the bottle-necks and network related problems can be traced quickly. Multi-user management is also a value added feature in Nagios, with big data applications, many users access same bulk of data in same time. Network monitoring tools and other performance tools in Nagios provide a wide understanding about user actions and network traffic distribution. Nagios provide a better infrastructure to this kind of applications.

## 5. CONCLUSION

Nagios provides a wide understanding to the network management, reporting, centralized dashboard and many more other features enabling a solid foundation for a scalable organization. It offers a variety of reports and vivid dashboards under the main panel to help system administrators to make decisions in an easier way. Nagios can be identified as a long term solution for big data related systems to manage both users and resources. Nagios shape up the organizational hierarchy in order to provide flexible and smooth services to the customers. In big data management, the network monitoring, file system monitoring, database monitoring are vital factors. Nagios provides infrastructure to all these components in order to provide better performance to the users. Cloud infrastructure relies on low downtime and better performance. Nagios provide the necessary tools to track the health of clouds and storages. Nagios is a useful tool to manage big data and big data related problems.

## REFERENCES

- [1] Nagios Enterprises, "Nagios components," Web Page, accessed: 2017-1-11. [Online]. Available: <https://www.nagios.org/projects/>
- [2] Wikipedia, "Nagios," Web Page, Feb 2017. [Online]. Available: <https://en.wikipedia.org/wiki/Nagios>
- [3] C. Issariyapat, P. Pongpaibool, S. Mongkolluksame, and K. Meesublak, "Using nagios as a groundwork for developing a better network monitoring system," in *2012 Proceedings of PICMET '12: Technology Management for Emerging Technologies*, July 2012, pp. 2771–2777.
- [4] D. Josephsen, *Nagios: Building Enterprise-Grade Monitoring Infrastructures for Systems and Networks*, 2nd ed. Upper Saddle River, NJ, USA: Prentice Hall Press, 2013.
- [5] David Josephsen, "Nagios," Web Page, April 2013. [Online]. Available: <http://www.informit.com/articles/article.aspx?p=2033339&seqNum=2>
- [6] Network Startup Resource Centers, "Network mangement and monitoring," Web Page - Pdf, Feb 2017. [Online]. Available: <https://nsrc.org/workshops/2012/apricot-nmm/materials/nagios.pdf>
- [7] Assets Nagios, "Nagios open software license," Web Page, Feb 2017. [Online]. Available: [https://assets.nagios.com/licenses/nagios\\_open\\_software\\_license.txt](https://assets.nagios.com/licenses/nagios_open_software_license.txt)
- [8] Assets Nagios, "Nagios software license," Web Page, Feb 2017. [Online]. Available: [https://assets.nagios.com/licenses/nagios\\_software\\_license.txt](https://assets.nagios.com/licenses/nagios_software_license.txt)
- [9] Zachary Conger, "Answering big data questions: Monitoring at petabyte scale," Web Page, Feb 2017. [Online]. Available: <http://altitudedigital.com/tech-blog/when-big-data-gives-you-big-problems-and-how-to-fix-them/>