BENEFITS OF CLOUD COMPUTING FOR NETWORK INFRASTRUCTURE MONITORING SERVICE

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ABSTRACT

Although, building a monitoring system for IT infrastructure is an important issue, it is not an easy process. Monitoring software might be complicated, inflexible and expensive. Among many IT service cloud computing has its remarkable benefits for network monitoring service. Cloud Computing is a style of computing where IT-related capabilities are provided "as a service" Advantages of cloud computing such as monitoring capabilities, pricing, and ease of use have been created a remarkable milestone for network monitoring framework. Providing a monitoring service on the cloud can be a valuable addition for today's development growth of cloud computing.

KEYWORDS: *Monitoring, Cloud, Computing, IT infrastructure, Network, Systems.*

I. INTRODUCTION

IT administrators are responsible for maintaining the health of their networks. They ensure that the network's resources hold the highest levels of confidentiality, integrity, and availability. [1]
Monitoring network infrastructure components makes it easy for IT administrators to be aware of any network and problems as soon as it happened so the response will be at real time. Today, from the largest corporations, to the smallest single office shop, businesses need all of their network devices up and running mostly at 24x7x365. Even a brief outage with a printer, switch, or other network device can greatly impact an organization's business productivity. Most of business either pay a lot on implementing and configuring monitoring systems or ignore this aspect at all in order to reduce cost and efforts on such systems.
This paper aims to show that using monitoring as a service on the cloud might have a great impact on monitoring IT infrastructure industry.

II. MONITORING SYSTEMS

In concept, monitoring systems are simple: an extra system or collection of systems whose job is to watch the other systems for problems. [1]
During the last decade contingency plan is one of most critical issues in business world. Organizations nowadays are setting plans for disaster recovery and backups. Monitoring plan is almost as important as other contingency plans like disaster recovery and backups.
On the other hand implementation and configuration of a monitoring system is not an easy process or an inexpensive one.
According to author's survey 33% of the respondents stated that, they're not using any IT infrastructure monitoring software either because budget issues or configuration issues. The other 67% respondents who are using IT infrastructure monitoring software are complaining about high cost, hard configuration and implementation and the required of expensive hardware for monitoring software that they're using.

2.1 Monitoring Systems basics characteristics:

There are three basic issues about network monitoring systems that describe the way of communication between monitoring application and its clients:

2.1.1 Protocols:

This aspect describes the protocol that monitoring systems will use for collecting system data from hosts and devices being monitored.
SNMP (Simple Network Management Protocol) is a good example for such protocols. Most computers and networked devices will have some form of SNMP access. The advantage of SNMP for monitoring is its low bandwidth requirements and universal usage in the industries. However, there are other protocols that are suitable for monitoring applications such as TCP/IP and UDP.

2.1.2 Data Accessing:

Data access refers to the interface by which the monitored data can be utilized by other processes. For instance the monitor system may be writing data directly into a database, allowing other processes to access the database outside the context of the monitor system.

2.1.3 Mode

The data collection mode of the monitor system can be one of the following three modes:

2.1.3.1 Monitor poll

Monitored hosts can be accessed via Telnet/SSH to execute scripts or dump files or execute other OS-specific commands, applications can be polled for state data, or their state-output-files can be dumped.

2.1.3.2 Agent push

In agent-push mode, the monitored host is simply pushing data from itself to the monitoring system. This can be done periodically, or by request from the monitor system asynchronously.

2.1.3.3 Hybrid mode

The median mode between 'monitor-poll' and 'agent-push' is a hybrid approach.

2.2 Network monitoring systems challenges:

Building a monitoring infrastructure is a complex undertaking. The system can potentially interact with every system in the environment, and its users range from the layman to the highly technical. Building the monitoring infrastructure well requires not only considerable systems know-how, but also a global perspective and good people skills. [1]

2.2.1 Limited IT-budget issues:

Monitoring systems are not cheap solutions. Unfortunately with limited IT-budget most of the small to medium size business companies fail to set up a good network monitoring systems.

2.2.2 Managing heterogeneous environments issues:

In today's business, in order to meet business needs IT infrastructure might include mix of components. The days were an organization can adopt single technology are almost over. Today's organizations IT infrastructure mixes different platforms.

2.2.3 Managing the growth of IT infrastructure

As an organization grows, high demands of IT infrastructure grow as well. This required your monitoring system to be re-configured periodically.

2.2.4 Fast deployment

Organization's IT monitoring system has to be up to date to meet the continuity deployment of IT infrastructure. Adopting cloud technology will make it easier to overcome this problem.

2.2.5 Quick Customization:

The intuitive yet powerful features of cloud make it easy to adapt to the unique and fast changing, demands of your business.

III. CLOUD COMPUTING

Obviously "On the Cloud" is phrase that is being used a lot in today's IT world. "Pay only for what you use" is the most important concept that leads to success of the cloud. Among other benefits of the cloud hiding the complexity of IT technology from users and developers is another milestone of cloud revolution.
The following section will provide an overview of cloud computing in order to better understand this technology.

3.1 What is cloud computing?

Cloud Computing is internet based computing where IT related capabilities are provided "as a service". Users can access these services without having any pervious knowledge on how to manage and implement these services. Moreover, pay-per-use idea makes cloud computing a vey cost effective way in today's business.
"Although there is no standardized, uniform definition of cloud computing, its basic concepts as well as its general objectives are undisputed: Cloud computing uses virtualization and the modern Web to dynamically provide resources of various kinds as services which are provisioned electronically. These services should be available in a reliable and scalable way so that multiple consumers can use them either explicitly upon request or simply as and when required."[2].

3.2 Cloud Types

In order to better describe cloud computing, two cloud types have been defined:

3.2.1 **Deployment model**: refers to the location and management of the cloud's infrastructure. For example, Private, Public and Hybrid cloud

3.2.2 **Service Model**: consists of the particular types of services that you can access on a cloud computing platform. Such as, Services as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

3.3 Cloud Basics

Following are some technologies that cloud computing depend on:

3.3.1 **Virtualization:** "Resource virtualization is at the heart of most cloud architectures. The concept of virtualization allows an abstract, logical view on the physical resources and includes servers, data stores, networks, and software. The basic idea is to pool physical resources and manage them as a whole. Individual requests can then be served as required from these resource pools" [3]

3.3.2 **Service-Oriented Architectures** Set of principles and methodologies for designing and developing software in the form of components that are implemented as independent services. These services are well-defined business functionalities that are built as software components that can be reused for different purposes

3.3.3 **Web Services** The Web Services Architecture Working Group of the W3C defines Web services as follows [5]: A Web service is a software application identified by a URI, whose interfaces and binding are capable of being defined, described and discovered by XML artifacts and supports direct interactions with other software applications using XML based messages via internet-based protocols.

3.4 Understanding the Cloud Architecture:

In its very simplest description cloud computing architecture describes in two architectural layers that are connected to each other through a network, such as internet.

The front end: which is the side the computer user or client sees.
The front end includes the client's computer (or computer network) and the application required to access the cloud computing system [6]
The back end: This is the "cloud" section of the system.
On the back end virtualization plays a big role at this end. Various computers host virtual servers and data storage systems that create the "cloud" of computing services that are publicly accessible via internet.
This is a very simplistic description because each of these two components is composed of several components. [2]

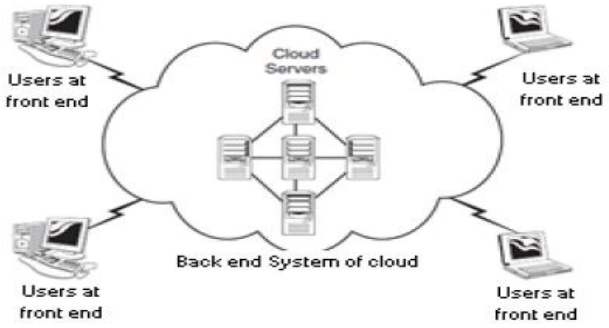

FIG 1: front end and back end cloud

3.5 Connecting to the Cloud:

There are different ways for clients to connect to the cloud, the most two common ways are:
Via a web browser.
A customized (proprietary) application that can be run on a server, PC or mobile.

IV. NETWORK MONITORING SYSTEMS IN THE CLOUD COMPUTING ERA

4.1 How is it done on the cloud?

Based on what it has been stated above in basic characteristics of network monitoring systems and cloud basic (sections 2.1 and 3.3) the process of monitoring on the cloud will be described in the following (see Fig1):
APIs or web services (monitoring agent) are deployed and installed on monitored clients via monitoring service providers. This agent manages the communication between the monitoring system on the cloud and the client.
The monitoring agent manages the communication using communication protocols, mostly http/https protocols.
Depending on monitoring service provider, but providers mostly use Agent-Push mode to get information about monitored services. Agent-Push mode needs less customization on clients' firewalls and that is way such mode is the preferred mode.
The following chart will describe the common process of implementing monitor on the cloud service.

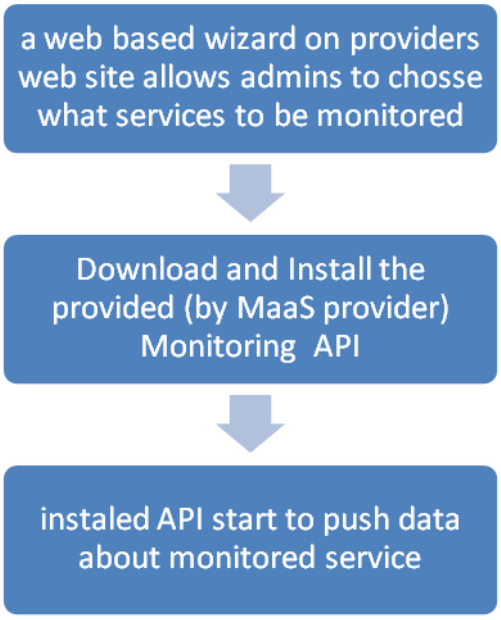

Fig 2. Monitor as a Service process

4.2 Cloud computing benefits for network monitoring systems:

Challenges of network monitoring systems that have been stated above (section 2.2) could be considered as drawbacks of traditional network monitoring systems in the age of cloud computing. Cost reduction, availability, and flexibility are among other benefits that give the advantage for monitoring on the cloud over traditional monitoring systems. Following are some advantages of the cloud that can be addressed for network monitoring system challenges:

4.2.1 **Cost reduction** Cloud computing is not only help to reduce the hardware and software cost, but it also gives the chance to stay updated with new technologies without worrying about extra costs.

4.2.2 **Immediacy** The cloud based network monitoring systems provides us monitoring solutions in relatively lesser time rather than the traditional approach. This can hugely reduce the time delays when dealing with different network components running different platforms.

4.2.3 **Availability**
The most essential part about the cloud computing is that the availability of services is guaranteed from provider side

4.2.4 **Scalability**
Cloud is providing more flexibility to increase the needed infrastructure and the services according to the need of the clients. Also, it will reduce the valuable time needed to offer a new service.

V. EXAMPLES OF "MONITORING AS A SERVICE" PROVIDERS

5.1 BijK.com server monitor provides monitoring service for linux operating systems such as debian and redhat, databases such as MySQL and other cloud service such as RACKSPACE Cloud

5.2 Dotcom-Monitor.com provides monitoring services such as up-time monitoring, cpu load and mail black lists.

5.3 LogicMonitor Pre-configured, hosted monitoring tells you everything about the health and performance of your systems, and proactively alerts you to issues.

5.4 Server Density: is provided monitoring service for several OSs such as windows, linux and unix, databases and other service such as web service.

VI. CONCLUSION

While traditional network monitoring systems have its limitations, monitoring on the cloud is given the solution that will meet today's business requirements. Monitoring as a service is a way to increase capacity or add capabilities on the IT infrastructure without investing in new in infrastructure, training new personnel, or licensing new software. Additionally, Deploying an IT infrastructure monitoring system based on cloud will solve complex issues of traditional monitoring systems such as cost and complexity of configuration and implementations.

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