

Dedicated and Virtual Server Monitoring-as-a-Service via the Web

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Abstract— Now a days, most of the organizations use virtualization technique to enhance their productivity. Due to heavy load on the physical server, it does not perform maximum utilization of its resources. Thus, a physical server is allowed to partition into many virtual servers. Computer resources get shared among different virtual servers. It does not require a distinct computer for each server. Many servers can exist on the same computer. Virtual web server provides an easy and economic way of hosting web services. This has been assumed that each website is served with a dedicated server which increase its overall performance.

In our paper, we present an approach for monitoring the virtual server which not only includes the overall performance but also include the fine details. These details include the number of VMs hosted on the server, the number of VMs are powered on and the status of CPU, disk and memory utilization. As there are different monitoring agents for different VMwares. Such as x86 virtualization uses VMware vSphere and there is a different agent for unix virtualization. But we are providing monitoring as a service which is suitable for all types of virtualization techniques.

Keywords- Physical Server, Virtual Server, SNMP, Management Information Base.

I. INTRODUCTION

Server is the important element of computer network which plays a crucial role in handling services to the users. The procedure of monitoring system resources of server is called server monitoring. These resources include CPU utilization, disk usage, Network and I/O performance, memory usage. With the help of server monitoring, we can provide a better planning of capacity usage which satisfies the client to a great extent [1]. The condition of server is highly responsible for the condition of your application. As we are hosting our applications on the server so it must be capable enough, that's why server monitoring is required. Server monitoring also provides data in reference to your operating system.

Difference between physical server and virtual server

Parameters	Physical Server	Virtual Server
Cost	It is costly	It saves money in terms of hardware cost, human resource and power management.
Performance	If a work load increases it is difficult to handle for a single machine.	If a work load increases, there are many virtual machines to handle the load.
Time Management	This is more complex and time consuming to manage hardware devices.	Virtualization products have efficient techniques for managing time across virtual servers.
Business Continuity	If hardware fails, whole business stops.	If one virtual server fails, it instantly switch over to the other server.
Point of failure	If a single server goes down, entire business got affected.	There are more number of servers so the risk is quite low.
Relocation	This is very difficult in case of physical servers.	It provides easy migration.

II. WHY VIRTUAL SERVER MONITORING IS ESSENTIAL

With the advancements in IT technologies, virtualization has been emerged as a prominent technique. Virtualization provides several benefits including optimum resource utilization and cost savings. Virtual servers have taken the place of physical servers. As physical servers are huge

machines which consumes more space and power. Virtualization of servers decreases time, energy and it also reduces the cooling costs of servers. Server is that IT machine which signifies the central key of your business. This may be a FTP, email or application server in which downtime can never be afforded [2]. Server monitoring is very necessary to protect the business and all the applications that are running. Thus, the monitoring of server plays a crucial role in small business as well as large enterprises. In spite of all these benefits, it is also facing many new challenges in the field of monitoring. In case of physical surrounding, if there is a problem with one machine it does not affect the other machines [3]. But in the case of virtualized environment, if there is a failure in a virtual machine it significantly affects the other machines also. That's why stringent monitoring is required in case of virtualization. Monitoring a virtual server is also essential to properly allocate the resources to VM machines. As improper distribution of resources will degrade the performance of applications [4].

III. DIFFERENCE OF MONITORING PROCEDURES BETWEEN PHYSICAL SERVER AND VIRTUAL SERVER

Now-a-days there are different types of virtualization technologies. So it is difficult to monitor different machines through a single agent. This single agent will not be able to check all the conditions of VM machines such as the number of VMs are powered on, the status of CPU, disk and memory utilization of each VM. Each VM machine has a heterogeneous platform so no single agent will support all the virtual machines [5].

This is not the case of physical server, only a single agent is developed to monitor all the functionalities of the same physical server.

IV. CONCEPT AND WORKING OF VIRTUAL WEB SERVER

Web server is basically used to deliver web pages. Websites get hosted on the web servers. The working of web server includes that each server carries a domain name with the associated IP address. There is only fixed amount of load which a web server can handle [6,7]. Thus to minimize the increased load, the concept of virtual web server is arise. In a virtual web server we can host multiple domain names on a single server. With this method the resources can be shared which can decrease the overall load of the server.

V. FEATURES OF THE PROPOSED MODEL

1. Graphical display of CPU, memory and disk utilization
2. Alarms should be generated if any malfunctioning occurs
3. **SQL server monitoring** -: This shows the status and capacity of the database, long running queries.
4. **IIS monitoring**: It also performs IIS monitoring.
5. **Monitor Network Interface traffic**: It identifies the status of machines in the network, the amount of load server will handle.
6. **Capacity planning**: It allocates the resources in an efficient manner.
7. **Virtual server monitoring**: It monitors the VMWare ESX and ESXi servers and their guest virtual machines

VI. WORKING OF THE PROPOSED MODEL

In the working of web server, first of all SNMP must be enabled in both the Linux and windows. Simple Network Management Protocol (SNMP) is an application-layer protocol which is used to exchange information between network devices. SNMP agent must be enabled which is used to collect management information and handover to the SNMP manager [8,9,10]. SNMP agent maintains the information database. The database which is shared between agent and manager is called Management Information Base (MIB).

The monitoring tool access the machines through their host name or IP address. Then with the help of SNMP the value of specified components get fetched. The monitoring tool then compares the given value with the configured thresholds. If there is any error then alert got generated via email or SMS. It also takes corrective action by running user scripts or can also restart a service. This tool also monitors the availability and response time of a web server. The tool also generates reports and performance graphs based on the data value given by SNMP.

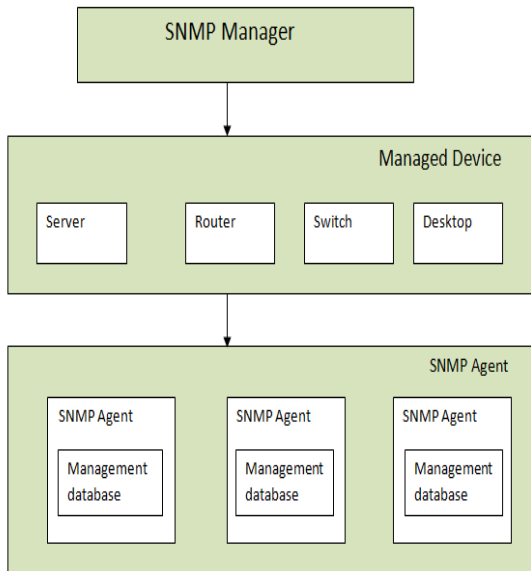


Fig 1 SNMP Management

VII. BENEFITS OF PROVIDING VIRTUAL SERVER MONITORING AS A SERVICE

It contains many benefits which are:

- **Platform Independent:** This tool is suitable for any platform either Linux or windows
- **Manage virtual server more effectively:** It manages the server in an effective way within budget.
- **Easy to Use:** It is quite simple to use.
- **Cost –Effective:** This tool is economic and incur less cost.
- **Low Maintenance:** This can be maintained easily.
- **Increased Reliability:** This tool enhances the reliability.
- **Increased Security:** It also provides high security which is an essential feature.

VIII. IMPLEMENTATION SHOWN VIA SCREENSHOTS

1) System Details:

Figure2 shows the system details provides the basic information which includes name of the system, its IP and the Kernel Version.

The uptime and last boot time is also shown in it. It also give information about the current users and average load of the

system. It specifies the total number of processes running on the system.

System Vitals	
Hostname	prachi.ipdatavault.com
Listening IP	172.25.26.48
Kernel Version	6.1.7600 (32-bit)
Distro Name	Microsoft Windows 7 Ultimate
Uptime	1 hours 22 minutes
Last boot	Sat, 25 Jul 2015 05:12:13 GMT
Current Users	1
Load Averages	5
System Language	English - United States (1033)
Code Page	windows-1252
Processes	94

Fig2 System Details

2) Hardware Information:

Figure3 shows Hardware Information which includes many sections. In the first section it specifies the number of processors. Then it identifies the number of Peripheral Component Interconnect devices.

It also identifies the number of Integrated Development Environment and lastly it shows the number of Universal Serial Bus connected to the computer.

Hardware Information	
Machine	System manufacturer System Product Name
CPU	Number of processors: 2 ▶ Pentium(R) Dual-Core CPU E5700 @ 3.00GHz ▶ Pentium(R) Dual-Core CPU E5700 @ 3.00GHz
PCI	Number of devices: 15
IDE	Number of devices: 2
USB	Number of devices: 8

Fig 3 Hardware Information

3) Memory Usage:

Figure4 shows Memory usage which contains two sections one is Physical memory and other is SWAP.In

Physical memory it shows the total usage, then how much memory is free and how much is used. It also specifies the total size of the Physical memory.

Swap space is used when the amount of physical memory (RAM) is full. If the system needs more memory resources and the RAM is full, inactive pages in memory are moved to the swap space.

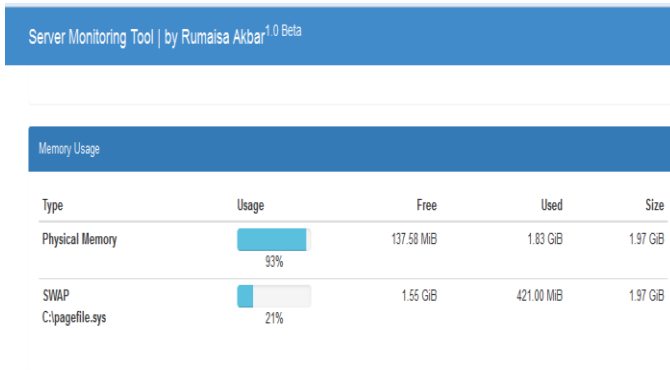


Fig 4 Memory Usage

4) **Mounted File system:**

Figure 1.5 shows the various drives which includes the local Disk, Compact Disk as well as removable disk. It will show the free size and used size of all the drives whether it is mounted on C, D, E, F and G.

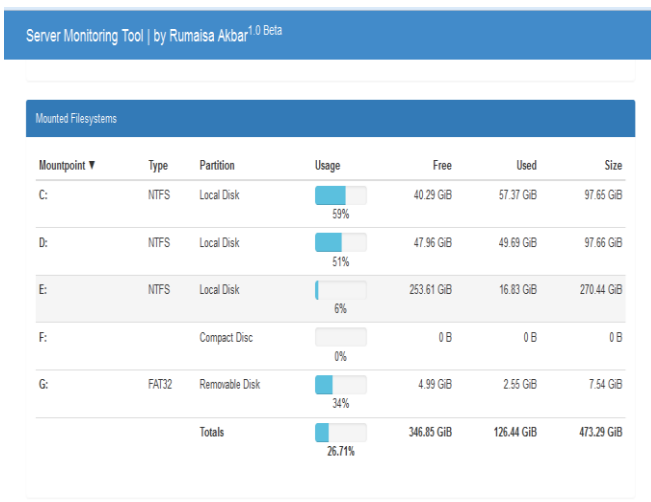


Fig 5 Mounted File system

5) **Network Interface:**

Figure 6 shows all the network connected devices. This gives information of the data sent, received. It also specifies any error or drop.

Device	Receive	Sent	Err/Drop
▶ Marvell Yukon 88E8042 PCIe Fast Ethernet Controller	5.53 MiB	1.14 MiB	4/4
▶ Intel(R) WiFi Link 5100 AGN	0 B	0 B	0/0
▶ Intel(R) WiFi Link 5100 AGN	0 B	0 B	0/0
Teredo Tunneling Pseudo-Interface	0 B	0 B	0/0
Reusable Microsoft 6To4 Adapter	0 B	0 B	0/0
6TO4 Adapter	0 B	0 B	0/0
▶ VMware Virtual Ethernet Adapter for VMnet8	0 B	0 B	0/0
▶ Marvell Yukon 88E8042 PCIe Fast Ethernet Controller	0 B	384 B	0/0
▶ Juniper Network Connect Virtual Adapter	0 B	0 B	0/0
▶ VMware Virtual Ethernet Adapter for VMnet1	0 B	0 B	0/0

Fig 6 Network Interface

IX. FORMATION OF GRAPHS BASED ON PARAMETERS WITH THE HELP OF TABULAR DATA

Various machines can be connected to the Server Monitor Tool. But in the analysis we connected three machines i.e. Machine 1, Machine 2 and Machine 3. The data is collected on different dates on the above three machines.

The tabular data is shown below:

1) **Values of processors (%) used in Graph:**

Date	Processor 1(%)	Processor 2(%)	Processor 3(%)
01.08.2015	20	37	21
02.08.2015	38	45	37
03.08.2015	14	36	49
04.08.2015	28	57	39
05.08.2015	47	17	67

Based on the above table graph is drawn in which

X-axis:Date

Y-axis:Processors (%)

Graphical Representation:

CPU Load

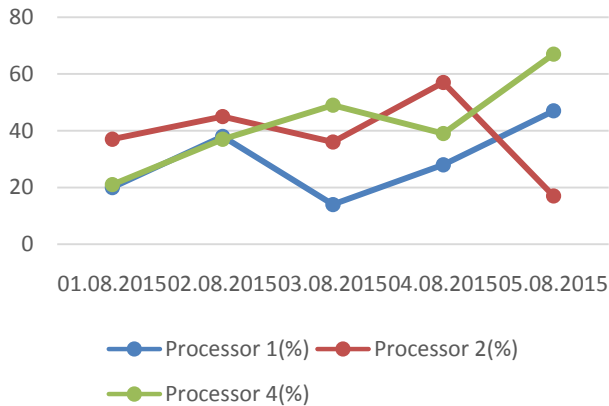


Fig 7 CPU Load Graph

2) Values of memory (GB) used in Graph:

Date	Physical Memory(GB)	Memory Used(GB)	SWAP Used(GB)
01.08.2015	8	7.13	10.52
02.08.2015	16	12.24	12.44
03.08.2015	8	6.28	4.89
04.08.2015	8	5.66	10.45
05.08.2015	16	11.56	12.45

Based on the above table graph is drawn in which

X-axis:Date

Y-axis:Memory (GB)

Memory Pressure

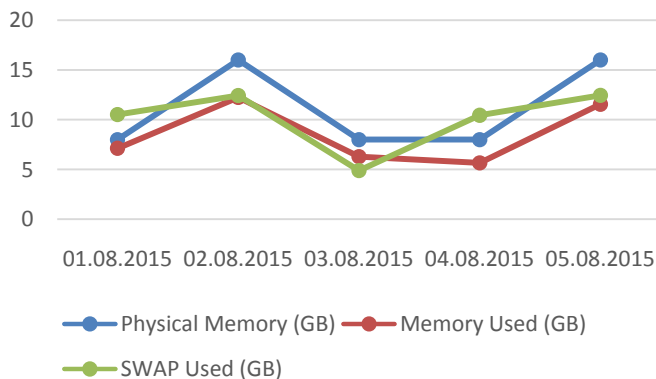


Fig 8 Memory Graph

3) Values of Disk Space (GB) used in Graph:

Date	Free Space(GB)	Used Space(GB)	Total Space(GB)
01.08.2015	40.29	30.54	97.66
02.08.2015	46.43	28.22	88.24
03.08.2015	54.63	56.67	120.44
04.08.2015	38.34	45.54	95.22
05.08.2015	65.98	48.67	108.62

Based on the above table graph is drawn in which

X-axis:Date

Y-axis:Disk Space (GB)

Disk Load

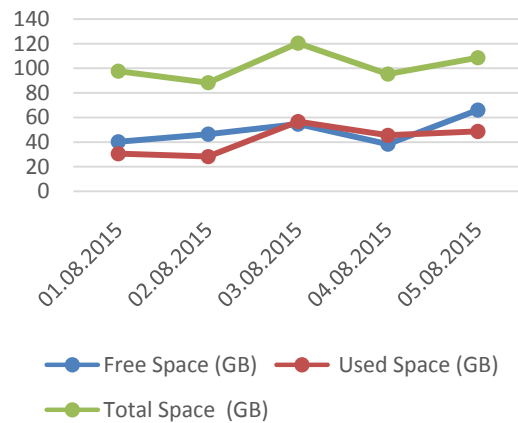


Fig 9 Disk Load Graph

X. CONCLUSION AND FUTURE WORK

This tool monitors and control the performance of the server. It considers the advantages and simplicity of SNMP. It also alarm the users if any problem occurs. This tool has higher practical significance. As it shows the monitoring results in the form of graph, so it is also suitable for the users. This is a standard approach for any kind of platform. This tool effectively monitors the load of the server by properly allocating the resources of the VM machines. It can also monitor more than a web server at the same time.

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