Performance analysis virtual server VMware Vsphere 5.5 with physical enterprise server

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Performance analysis virtual server VMware Vsphere 5.5 with physical enterprise server

Dwi Ely Kurniawan[1*], Muhammad Nashrullah[1], Nuning Kurniasih[2], Achmad Daengs GS[3], Citra Kurniawan[4]

[1]Department of Informatics Engineering,Politeknik Negeri Batam, Indonesia
[2]Faculty of Communication Sciences, Library and Information Science Program, Universitas Padjadjaran, Bandung, Indonesia
[3]Department of Management, University of 45 Surabaya, Indonesia
[4]Department of Electrical Engineering, Sekolah Tinggi Teknik Malang, Indonesia

*Email: dwialikhs@polibatam.ac.id

Abstract. The increasing number of servers used to support all the activities that assist the production of a company. Usually, it will be a waste, because a physical server cannot share resources such as CPU, RAM, and network. It will force the company to buy a new server each time to implement a new system. Therefore, we examined and analyzed the comparison of performance on a physical server with a virtual server that is built as an IP camera server to answer the needs of the company.After testing and getting the data, we conclude that in the testing of a turn on, restart and shut down servers, virtual servers have very much superior performance compared to physical servers. While in terms of performance of the CPU, RAM, and network, both physical servers and virtual servers do not have a significant difference. However, the important notes are in virtualization, it can perform resource sharing, and this technology is needed by companies in this era.

1. Introduction

The more the company needs within the scope of IT, the more servers are used to support all activities that help the production process. However, often the addition of these servers becomes a waste because one physical server cannot run multiple Operating Systems, thus forcing the company to add server every time implementing the new system. Waste also occurs on physical servers in the sector of hardware usage, because on physical servers, hardware resources can only be used by those servers only [1-2]. That is, unused hardware resources, just wasted because it cannot be used together. Based on the observations of Tony L. senior analyst of D. Brown Associates Inc., New York, that servers in most organizations only use 15-20% of the actual capacity [3]. In addition to purchasing and maintenance, the organization also faces new problems, namely low server utilization.

Currently in XYZ company has been using 120 units of IP Camera as a monitoring media in certain areas, and plans to add 15 units of IP Camera again. Each IP Camera is located on a physical server with a maximum of 64 units of IP Camera per server. This means that currently XYZ Company already has 2 physical servers to meet the needs of IP Camera, and must provide 1 more physical server unit for the addition of 20 units of IP Camera [4]. Obviously, this is a waste, considering the previous 2 IP Camera servers also have not used the resources optimally. Finally, now the problem is getting a solution, namely server virtualization technology that can build a physical host into multiple virtual servers that can use hardware resources together, and facilitate the work of a server administrator in managing

the server, not only from the technical point of view but also the efficiency time.Server virtualization is the creation of a virtual (not actual) version of an entity, such as an operating system, storage device or network resource. Server virtualization is a server resource concealment technology such as the number and identity of individual physical servers, processors, RAM, and Operating System from the user's server [5]. The goal is to enable resource sharing on the software and hardware side so as to improve resource utilization and flexibility. With virtual server technology, a server administrator can also easily manage all server needs with centralized management, without having direct contact with the physical server.Based on the above background, this article intends to understand how the migration process from a physical server to virtual server, also analyze the performance comparison of a physical server with a virtual server and compare management efficiency on a physical server with the virtual server. So companies get a reference to switch to virtual server technology.

2. Methods

The study was built to compare the performance of server-based IP servers with virtual servers. Initially, it will be built a physical server that serves as IP Camera Server then converted into a virtual server, then collect data from the resource performance on each server when added IP Camera in it by using solar winds server and application monitor.

Testing is done by building the server in accordance with the specified specifications, perform simulation/trial to get the data, then analyze the data obtained to be taken conclusion. Testing consist of 6 steps that is installation and configuration VMware ESXi as a virtual server host (1), build a Physical server into an IP Camera Server (2), the physical server is converted to the virtual server (3), retrieve data from both servers by taking 24 samples of data on each test and retrieving the average rating (4), analysis of test result data (5), formulate conclusions (6).

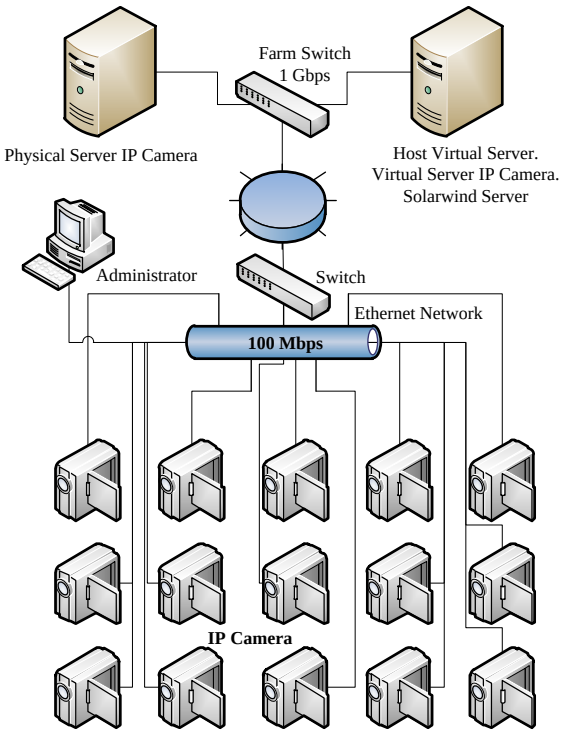

Figure 1. Network topology design.

Figure 1 shown that the physical server and the virtual server host are on the same network. Both use Farm Switch with 1 Gbps Ethernet speed. While on the IP Camera side, its Ethernet speed is 100 Mbps. SolarWinds NPM servers and virtual IP Camera servers reside on the same host

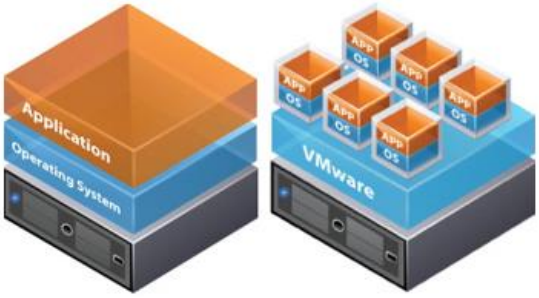

Figure 2. Comparison of physical server design and virtual server.

Figure 2 is a technological difference between physical server and virtual server. On a physical server, there is only one operating system and application function used on that server. While on a virtual host server, there is a physical machine (server) can be installed more than one operating system and application using VMware as the platform of its virtual server. VMware vSphere is a product of VMware which includes VMware ESXi 5.5 as a hypervisor and VMware vCenter as a management center.For the installation of ESXi 5.5 as the hypervisor (host) of the virtual server, the minimum recommended VMware hardware requirements are as follows:

1. The server has a 64-bit processor.
2. Minimum has two CPU cores.
3. Minimum 4GB RAM, recommended 8 GB to get all the features available on ESXi 5.5.
4. Supports hardware virtualization (Intel VT-x or AMD RVI).
5. For AMD Opteron-based systems, it must use the Opteron Rev E processor or later.
6. For Intel Xeon-based systems, processors must already support Intel Virtualization Technology (VT).
7. Has 1 Gigabit or more, or 10GB Ethernet controllers.
8. Having a dedicated SAN disk with Fiber Channel or iSCSI whose capacity is used to create virtual servers.
9. One USB unit that supports to install ESXi in it.

Based on the minimum recommendations suggested by VMware, the servers used in this study are as follows:

Table 1. Virtual Host Server and Physical Server Specification.

Speck	**Virtual Host Server**	**Physical Server**
Manufacturer	IBM	IBM
Model	IBM Flex System x240	System x3650
Memory	256 GB	8 GB
Processor	16 * Intel Xeon CPU E5-2670 @ 2.60GHz	2 * Intel Xeon CPU 5160 @ 3.00GHz
Internal Disk Size	1000 GB	600 GB

After that do the process of migration or convert from physical server to virtual server, to test the performance on the virtual server. Before the migration process, it is necessary to match the components on the physical server to comply with the Microsoft Windows Server 2008 R2 Enterprise (x64) SP1 Operating System recommendation on the virtual server.Server migration process (converting) from physical server to virtual server using VMware vCenter Converter stand alone. Initially, after the physical server is in complete condition both hardware and software it will start by installing the program from VMwarev Center Converter stand alone. After the migration process is done, then the next step is to configure the IP address to be different from the physical server so there is no conflict, because, at the time of migration/convert, the result is identic so that the IP address will be the same.

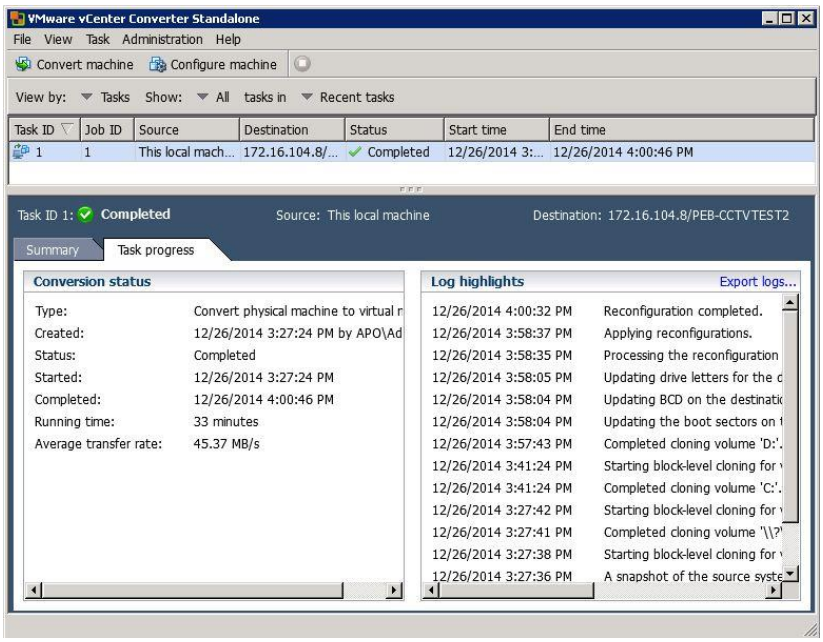

Figure 3. Completed status converting server physical to virtual

Figure 3 showed that the converter program automatically converts physical servers to virtual servers. The time required is very short, only 33 minutes to convert a physical server into a virtual server with 600 GB hard drive capacity.

3. Result

Physical IP Camera server and virtual IP Camera server are registered as nodes in solar winds to be able to record all activities. Then, added 5 units of IP Camera on each server at the same time. Next, collect data from each server for 4 hours (1 sample data / 10 minutes), meaning there are 24 sample data obtained. After the data collected, the addition of 5 units of IP Camera again to each server, which mean 10 IP Cameras. The data is recorded in the form of numbers and graphs up to 20 units of IP Camera installed.

3.1. *Testing Results Startup, Shutdown and Restart Server*

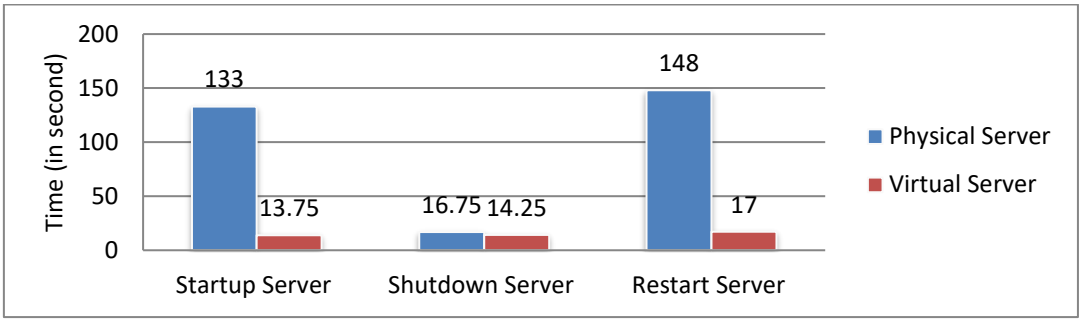

Figure 4. Testing results startup, shutdown and restart server

Testing is done when the server is turned on by doing calculations (seconds) and pinging the server. Based on Figure 4 shows that the physical server startup is very long, until it takes an average of 2 minutes 13 seconds, while the virtual server takes only 13.75 seconds which means 10 times faster than the physical server to turn it on (startup). The time required to restart the physical server is very long, to an average of 2 minutes 28 seconds, while the virtual server takes just 17 seconds to restart after restarting. However, for a server time shutdown time is only 2.5 seconds apart with a virtual server.

3.2. *Results of Processor Performance*

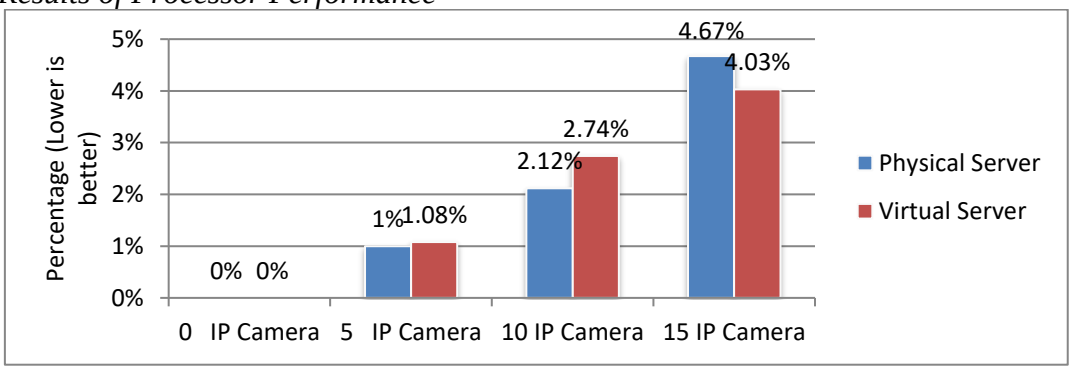

Figure 5. Results of processor performance

Figure 5 shows that the more IP cameras added to the server, the higher the CPU usage. CPU usage on a virtual server is slightly higher than CPU usage on physical servers when 5 and 10 IP cameras are added in it, but when the number of IP Cameras is 15 units, the CPU usage on the virtual server is 0.64% lower than CPU usage on the physical server.

3.3. *Results of Memory RAM Performance*

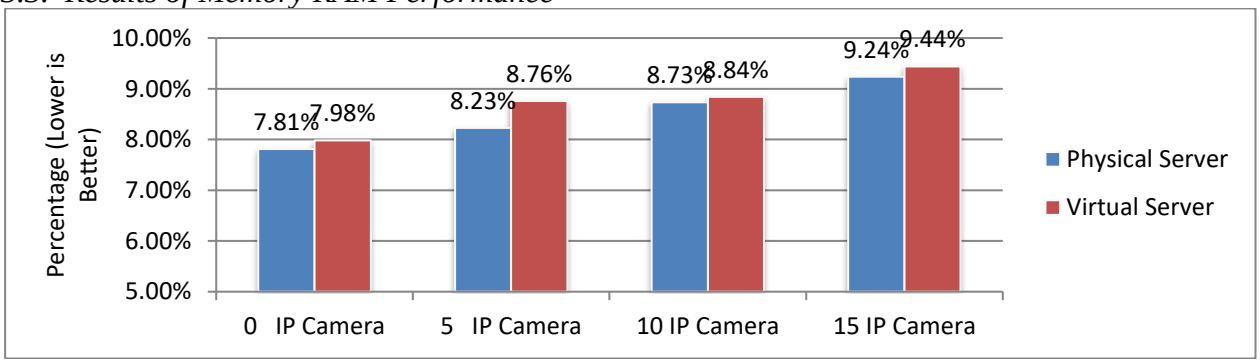

Figure 6. Results of memory RAM performance

Figure 6 shows that each addition of the number of IP cameras can increase the amount of RAM usage, but the difference in RAM usage between the two servers is very small, not even the difference. The average increase in the amount of RAM usage on physical servers, when added 5 units of IP Camera, is only 0.48%, while the virtual server is 0.49%.

3.4. Network Testing

Average bps in is the average number of bits that go into the server in a matter of seconds (bits per second). Base on the test image 7 shows that the physical server is slightly superior compared to the virtual server. This means that the number of bits that enter into the physical server slightly more than the number of bits that enter into the virtual server. However, the difference of bps In between the two servers is not very significant, since it only differs several tens of thousands of bytes or only a few tens of kb (kilobyte) only.In other words, the difference in bps In is not a constraint.

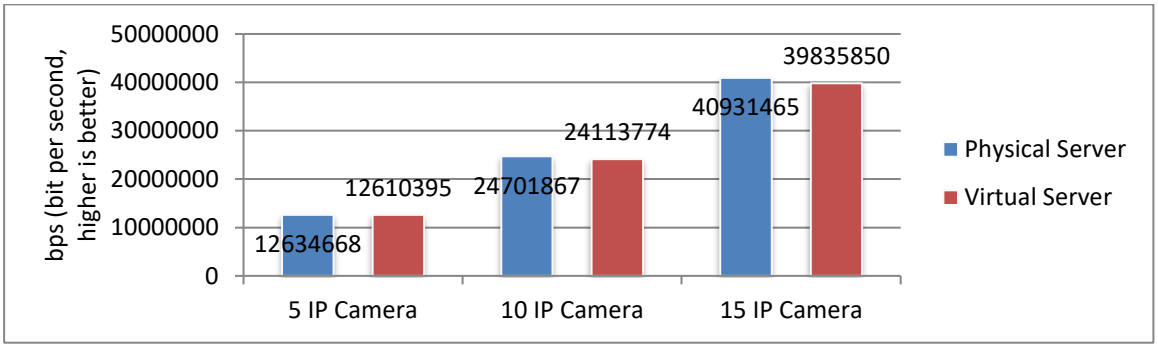

Figure 7. Average bps in

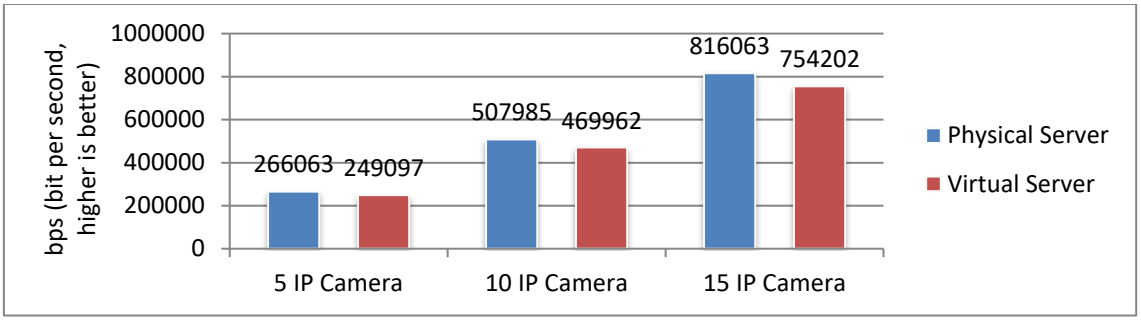

Figure 8. Average bps out

Average bps out is the average number of bits that come out of the server in a matter of seconds (bits per second). Base on the test image 8 shows that the physical server is slightly superior compared to the virtual server. In this case, the difference in bps out rate is not a significant constraint or difference.

4. Conclusion

Based on the test phase, it can be concluded; there is no significant performance difference from the physical server side with the virtual server based on testing done from CPU, RAM and Network side. The CPU usage on the virtual server is 0.64% lower than CPU usage on the physical server.The average increase in the amount of RAM usage on physical servers, when added 5 units of IP Camera, is only 0.48%, while the virtual server is 0.49%.Physical

servers a little longer in terms of startup and restarting when compared to virtual servers, however for a server time shutdown time is only 2.5 seconds apart with a virtual server. Migration process from physical server to virtual server does not require long time.

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