Server Virtualization and the Push Towards a Virtual Future

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Abstract

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Server Virtualization and the Push Towards a Virtual Future

Since the implementation of the internet, servers traditionally have been dedicated to a specific machine. That machine is assigned the appropriate hardware and software to handle the workload required to keep the server active. As a server becomes increasingly populated, companies would need to establish another machine to balance the workload of increased server activity. This is done to prevent their servers from completely crashing and increase interaction between users and the company’s server(s). In doing so, companies spend their valuable time and money into this repetitive task by having their employees set up and configurate these servers over and over, as well as spending several thousand dollars to not only purchase the technology needed, but to pay their employees to perform these redundant tasks as opposed to coming up with new innovative ideas for the company. However, the industry is beginning to make the transition out of the ancient stone age, and are beginning to explore newer technologies, such as virtual machines. Taking the leap of faith by diving into these new technologies and moving into the next era, the industry is beginning to take their physical servers and consolidate them into virtualized servers using virtual machines. This process is typically referred to as server virtualization, also known as pushing the servers to “the cloud”. Throughout this paper, “server virtualization” and “the cloud” will be used frequently, sometimes even interchangeably. To help better understand what server virtualization is and why there is an increase in the demand for pushing company information to the cloud, this paper examines several companies and other articles to help better explain the process of server virtualization, as well as provide the benefits for converting over to the cloud. Given these resources the paper will look at why companies, if they have not already, should begin consolidating their servers virtually, and what problems that virtual technology should address for a stronger and better future.

# Literature Review

In Lefteris Karafilis’s (2013) article, Karafilis discusses eight benefits to using VMWare’s virtualization technology to create virtual servers for businesses. These benefits include: Improving time spent on routine IT administrative tasks, improving backup and data protection, responding to changing business needs, improving hardware consolidation and utilization, recover from human error, improve uptime, extends the life of legacy applications, and improving server security (Karafilis, 2013). Investigating these benefits further, Karafilis elaborates on each benefit as to how and why VMWare’s server virtualization technology is the right call for any and every business of all sizes.

Server virtualization improves time spent on IT admin tasks with the helpful tool of automation. With automation, an admin can tell the server to perform specific tasks automatically, which can be done on a schedule or can be done when an event is triggered. Karafilis provides several examples such as managing server loads, monitoring performance, adding/removing hardware resources, and organizing server roles (Karafilis, 2013). By utilizing these automation tools, an admin spends less time manually tinkering with their servers. This increases productivity with a company and allows for more progression towards new innovations for the company, or even allow admins to catch up on back logged tasks.

Protecting company data is important for any business. Virtualization allows for easier data backup and data restoration processes. Karafilis explains that the backup process can be done in three different levels: server level, application level, and file level (Karafilis 2013). Using these three levels, a user can completely backup and restore any aspect of their server. This can be as small as a single file, all the way up to whole applications and servers if the user so wants to backup that much. Gone are the days where a server crashing and restoring files is a complete nightmare and headache for users. Now with several mouse clicks and a little bit of waiting, an entire server can be completely restored to its original working state.

Prior to virtualization, scaling a company’s technological needs used to be a daunting task. Between dealing with HR to accept the request for more servers, and admins having to configure the new servers, it used to be a real time-consuming task that would be a pain to deal with. However, now with virtualization, a user can add, move, remove, and even clone servers as needed to fit business needs. In Karafilis’s article, he explains, “If you need a new server for your new ERP[[1]](#footnote-1854) software, you can easily provision one from your latest Window Server Template and install the appropriate software without researching for new hardware server or installing the OS from scratch with corporate settings” (Karafilis, 2013). ERPs are not the only application that benefit from the flexibility and the ease of use of virtualization, however. As previously discussed, virtualization can be done at three various levels, and can be easily be cloned or removed from a virtual server in a significantly decreased time span than dealing with multiple physical servers. Parallel to this, admins spend less time doing this (what was common) routine task, allowing them to spend more time on other projects for their company.

On top of not needing to rely on as many physical machines, Karafilis moves on to explain that another benefit to virtualization is fully utilizing physical machines as best as possible and consolidating hardware. In many cases, one physical server (without the use of virtualization) is not being ran to utilize all its available resources. To further support this, an article written by James Glandz expresses that a survey conducted found at most servers were only being utilized between 7 to 12 percent (Glandz, 2012). Although the excuse to not fully utilizing the machines to 100 percent is due to, “well if it needs to be utilized more, we will have the resources when that day comes,” rarely does that day come for many companies. With the utilization of virtualization, one physical machine is more than capable of running multiple images with plenty of resources still available to allocate/deallocate/reallocate if and when need be. Not only does utilization increase, but physical space is saved as well. Although physical machines have gotten smaller over the years, they still require a physical space to be stored in. With virtual servers, a company significantly reduces the required space needed to store their physical equipment.

Moving forward with Karafilis’s remaining four benefits, they can be quickly wrapped up due to mostly being explained in previous benefits. It is still, however, important to mention these benefits specifically as they are highlights of virtualization technology. The fifth benefit of server virtualization is being able to recover easily from human error. As previously mentioned, images of a server/application can be copied with virtualization technology, allowing easy roll back or destruction of images as need be.

Benefit six to server virtualization is improved uptime. What this means, is that by virtualizing servers, the amount of time that a company’s servers are active without disruption is increased. Although briefly discussed earlier, Karafilis explains here that images can be moved from one physical machine to another, without having to cause downtime on a business’s server (Karafilis, 2013). Of course, more uptime on company servers means continued reliability for end users, and less stress on admins to maintain server workloads during times of update or error.

Many companies today are still using what is deemed as “legacy” applications, which in the IT industry, legacy software refers to older hardware or software that is outdated regarding current technologies. Sometimes when unfortunate events happen that cause a server to go down, some of these legacy applications are not so simple to acquire, putting the company in an awkward and difficult place. With virtualization, a company can create images with the legacy hardware or software to keep their servers live and healthy in the instance of failure.

Finally, server virtualization greatly improves the security of servers. Although Karafilis does not elaborate elegantly on this benefit, there are plenty of other resources that help back up his argument. One of those resources is an article written by Kaushik Pal (2015), who provides insight on how security is improved. In his article, Pal expresses that the hypervisor[[2]](#footnote-31876), if implemented correctly, is a huge factor in security. Pal claims that by securing virtual machines with thin hypervisors this makes development easy and efficient to run with minimal overhead, and because of reduced overhead a hypervisor is less likely to be afflicted by malicious code (Kal, 2015). Because of the reduced overhead, a virus, or other code that is not intentionally wanted, is easier to detect and deal with on a hypervisor that is not dealing with large overhead. On top of that, in the instance that a virtual server does become infected by a virus, or is attacked by other means, it is easy to isolate that individual image from the company’s network to prevent any further damage. This allows the rest of the company’s servers to maintain an active status, while admins study and observe the infected/attacked image and implement preventative measures against the attack from happening again.

**Discussion**

1. ERP is short for Enterprise Resource Planning, which is a type of software used by companies to help manage day-to-day business activities. [↑](#footnote-ref-1854)
2. A hypervisor is the software that runs atop of the physical machine’s operating system to allow the creation and utilization of virtual machines. [↑](#footnote-ref-31876)