Virtualization

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It this paper I will discuss the topic of virtualization. I will cover what it does, how it works, a few types and a succinct history of it. The idea and concept of virtualization allows us to have a cloud computing environment that is huge today, and ultimately is the future. “virtualization is software that separates physical infrastructures to create various dedicated resources. It is the fundamental technology that powers cloud computing. [Cloud Computing: A Small Business Guide] "Virtualization software makes it possible to run multiple operating systems and multiple applications on the same server at the same time," said Mike Adams, director of product marketing at VMware, a pioneer in virtualization and cloud software and services. "It enables businesses to reduce IT costs while increasing the efficiency, utilization and flexibility of their existing computer hardware." (1)

“The technology behind virtualization is known as a virtual machine monitor (VMM) or virtual manager, which separates compute environments from the actual physical infrastructure. Virtualization makes servers, workstations, storage and other systems independent of the physical hardware layer, said John Livesay, vice president of InfraNet, a network infrastructure services provider. This is done by installing a Hypervisor on top of the hardware layer, where the systems are then installed." (1)

“There are many reasons why people utilize virtualization in computing. To desktop users, the most common use is to be able to run applications meant for a different operating system without having to switch computers or reboot into a different system. For administrators of servers, virtualization also offers the ability to run different operating systems, but perhaps, more importantly, it offers a way to segment a large system into many smaller parts, allowing the server to be used more efficiently by a number of different users or applications with different needs. It also allows for isolation, keeping programs running inside of a virtual machine safe from the processes taking place in another virtual machine on the same host.”(2)

Virtualization allows a user to partition a machine with multiple systems because its ”technology that allows you to create multiple simulated environments or dedicated resources from a single, physical hardware system. Software called a hypervisor connects directly to that hardware and allows you to split 1 system into separate, distinct, and secure environments known as virtual machines (VMs). These VMs rely on the hypervisor’s ability to separate the machine’s resources from the hardware and distribute them appropriately.” (3)

“The original, physical machine equipped with the hypervisor is called the host, while the many VMs that use its resources are called guests. These guests treat computing resources—like CPU, memory, and storage—as a hangar of resources that can easily be relocated. Operators can control virtual instances of CPU, memory, storage, and other resources, so guests receive the resources they need when they need them. (3)

Ideally, all related VMs are managed through a single web-based virtualization management console, which speeds things up. Virtualization lets you dictate how much processing power, storage, and memory to give VMs, and environments are better protected since VMs are separated from their supporting hardware and each other. Simply put, virtualization creates the environments and resources you need from underused hardware.”(3)

From a security stand point as red hat points out virtualization allows corrupted data =, viruses to be placed on a virtual machine, and not be a threat to the host. Think of it as a laboratory that is isolated in a virtual world. Similar to the big clear boxes sealed up with only a pair of big heavy rubber gloves that keep the user safe but allow them to interact with whatever is in the box. When they are done the box is sterilized and returns to its original state, given that its handled properly.

So the history of virtualization as an idea isn’t really new. Redhat below give a brief history that highlights in this day and age an idea may precede an ability out current technology to do something we haven’t really done much of before. As the phrase goes necessity it the mother of invention, time and a real need bring things like virtualization and the cloud to life.

“While virtualization technology can be sourced back to the 1960s, it wasn’t widely adopted until the early 2000s. The technologies that enabled virtualization—like hypervisors—were developed decades ago to give multiple users simultaneous access to computers that performed batch processing. Batch processing was a popular computing style in the business sector that ran routine tasks thousands of times very quickly (like payroll). But, over the next few decades, other solutions to the many users/single machine problem grew in popularity while virtualization didn’t. One of those other solutions was time-sharing, which isolated users within operating systems—inadvertently leading to other operating systems like UNIX, which eventually gave way to Linux®. All the while, virtualization remained a largely unadopted, niche technology.(4)

Fast forward to the 1990s. Most enterprises had physical servers and single-vendor IT stacks, which didn’t allow legacy apps to run on a different vendor’s hardware. As companies updated their IT environments with less-expensive commodity servers, operating systems, and applications from a variety of vendors, they were bound to underused physical hardware—each server could only run 1 vendor-specific task. This is where virtualization really took off. It was the natural solution to 2 problems: companies could partition their servers and run legacy apps on multiple operating system types and versions. Servers started being used more efficiently (or not at all), thereby reducing the costs associated with purchase, set up, cooling, and maintenance. Virtualization’s widespread applicability helped reduce vendor lock-in and made it the foundation of cloud computing. It’s so prevalent across enterprises today that specialized virtualization management software is often needed to help keep track of it all.” (4)

So what types of virtualizations are out there? As red hat explains below there are 3 types, Servers, Operating systems, and networks.

“Servers are computers designed to process a high volume of specific tasks really well so other computers—like laptops and desktops—can do a variety of other tasks. Virtualizing a server lets it to do more of those specific functions and involves partitioning it so that the components can be used to serve multiple functions. (4)

“Operating system virtualization happens at the kernel—the central task managers of operating systems. It’s a useful way to run Linux and Windows environments side-by-side. Enterprises can also push virtual operating systems to computers, which:

* Reduces bulk hardware costs, since the computers don’t require such high out-of-the-box capabilities.
* Increases security, since all virtual instances can be monitored and isolated.
* Limits time spent on IT services like software updates.” (4)

“Network functions virtualization separates a network's key functions (like directory services, file sharing, and IP configuration) so they can be distributed among environments. Once software functions are independent of the physical machines they once lived on, specific functions can be packaged together into a new network and assigned to an environment. Virtualizing networks reduces the number of physical components—like switches, routers, servers, cables, and hubs—that are needed to create multiple, independent networks, and it’s particularly popular in the telecommunications industry.” (4)

In closing virtualization allows us to maximize resources in the most efficient way possible. In a fluctuating world and the ebb and flow of the IT business, scalability is the word to live by.

References

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