DynaSis ≡

Understanding Virtualization

vir·tu·al

/ˈvərCH(o͞o)əl/

adjective

COMPUTING:

- not physically existing as such but made by software to appear to do so.
   "a virtual computer"
   synonyms: simulated, artificial, imitation, make-believe

- carried out, accessed, or stored by means of a computer, especially over a network.
   "a virtual library"

If your business has an IT network, and for those who dont, you have probably heard the term "virtualization" and, like most people, might find it just a bit confusing. According to the above dictionary definition, it sounds like a virtual computer is one that doesn't really exist but seems to. Well, we techies have to plead "guilty" to generating confusing terms that only we understand so in the next several paragraphs, we're going to clear things up a bit. (If you still need more explanation, please give us a call. No obligation…we just want to help you understand.)

First of all, let's clear up one misconception: virtualization and cloud computing are not the same thing. However, virtualization is one of the elements that makes cloud computing so effective.

 Let's get some terminology straight:

Servers: *many people think a server is a computer. Nope. It is a program that resides in a computer and is designed to "serve" software to…*

Clients: *…clients are workstation computers that are served by the servers. In other words, rather than having software programs reside in each computer, the server provides the software to each computer as needed.*

When you think about a computer and its operating system, you normally think about ONE computer and ONE operating system. With virtualization, we split the capacity of the computer into smaller segments and that creates the capability of installing a different operating system into each segment. These operating systems can be identical, or each can be different (Mac OS, Linus, Windows, etc.). If you create four segments with four operating systems, you have effectively, or "virtually" created four separate computers, but the ACUTAL computer, referred to as a "host", can now SERVE four separate CLIENTS. It is a virtualized server. Yes, you need to buy a somewhat larger computer to handle the load, but it is a lot more cost efficient than buying four computers.

Now, on top of the operating systems, we install multiple "virtual" sets of software. You may be familiar with Apple's Boot Camp app which allows you to install Microsoft Windows operating system on a Mac alongside the Mac operating system. Apple created Boot Camp for those who prefer Macs but also need to use Windows for programs not available in their OS. Boot Camp is virtualization software.

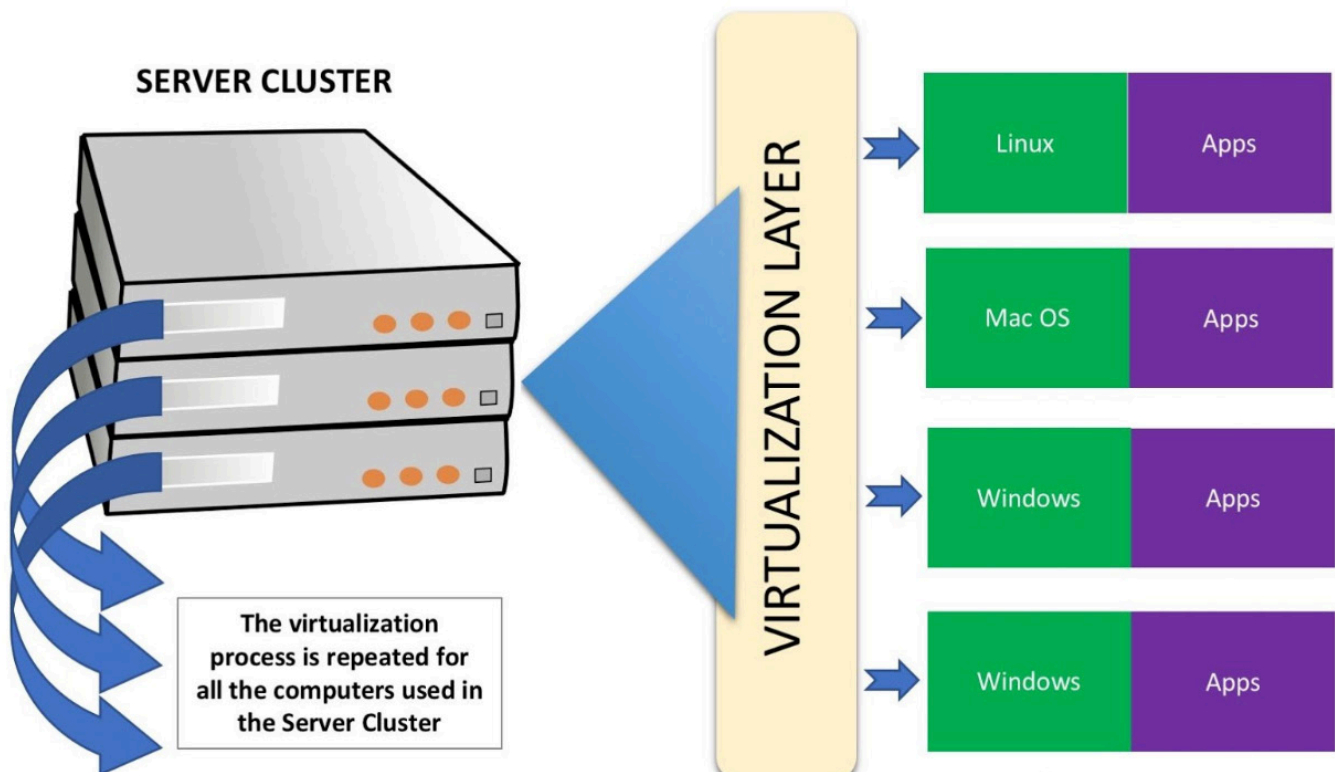The diagram below should help you understand the basic concept.

So, what's happening is that the virtualization layer, which has been created by the virtualization software, resides in the computer – what you may think of as the "server" – allowing the multiple operating systems to be installed independently, creating, in effect, multiple computers, or "machines". These are commonly known as VMs or Virtual Machines.
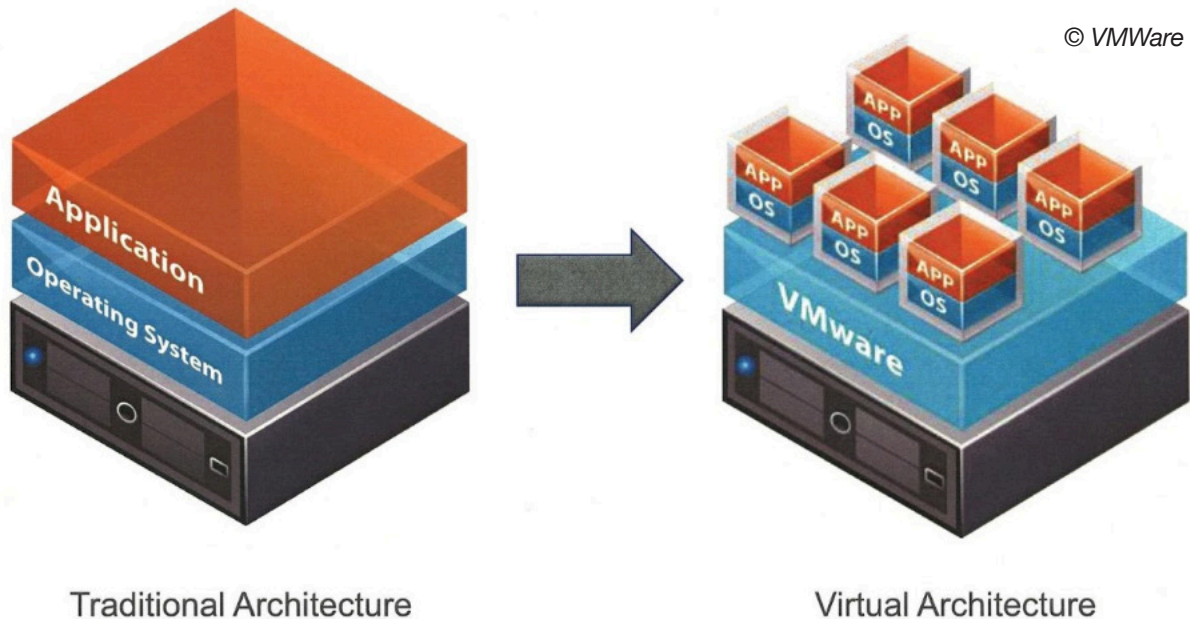
We can now take this a step further by creating a group ("clusters") of these virtualized servers that can also function as backups for each other. If a VM machine goes bad, we can copy and paste software from one VM to another rather than reinstalling or migrating an entire physical server's operating system, applications, data, etc. While it used to take as much as a whole day to bring a new server online after a crash, we can now cut that time to a small fraction. No longer must we migrate everything off

and reinstall. With proper planning, the major disruptions to email and other IT services caused by these failures can now be avoided.

So far you have learned about the Virtualization Layers and about Virtualized Server Clusters and what they can accomplish, and how the VMs (virtual machines) sit on top of those layers. (There are also SVMs – Storage Virtual Machines – for data storage.) The virtualization layer is created by a program called a hypervisor. Each operating system vendor has its own hypervisor software: VMWare has ESXi, and Microsoft, Linux and the others all have theirs. (Note: DynaSis installs and supports VMWare virtualization software for many of our clients.)

Here's the cool part: everything we have discussed so far (hypervisors, virtual machines, applications, data) can easily be replicated onto other virtualized servers in the cluster giving us the ability to create highly effective redundancy for uninterrupted operation. This even allows us to unify all the data in Virtualized Storage Machines (VSMs) by linking the virtualized host servers together, effectively creating one large protected pool of data that is replicated for redundancy and serves the entire cluster. A number of vendors provide the platforms to accomplish this, such as VMWare's VSAN – Virtual Storage Area Network.

SERVER CLUSTER

The virtualization process is repeated for all the computers used in the Server Cluster

VIRTUALIZATION LAYER

Linux	Apps
Mac OS	Apps
Windows	Apps
Windows	Apps

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Traditional Architecture

Virtual Architecture

In case you are more visual, the top of this page includes a diagram provided by VMWare that compares traditional server architecture to a virtualized platform using VMWare, as explained above. (To be totally transparent, there are other software parts needed to make this whole thing work properly, but that gets to be a bit deeper than we need to go in this article.)

Among other things, the virtualization of servers has largely enabled what we today know as "cloud computing." (A side note: many people today think of Internet surfing as cloud computing. Not necessarily so. While some of the information you pull down may be residing in a cloud, when you fill out forms, look at images, load shopping carts, you are visiting websites using JAVA, HTML, etc.) Your virtualized software uses the same languages and procedures you have always used. Your "user experience" (UX) when using virtualization is identical to when you are using a traditional computer. The differences are in cost savings, increased processing speed, and in the security of redundancy and rapid recovery.

Since it is virtualization that has made cloud computing what it is today, let's dig a little deeper. You have no doubt heard of the Public Cloud. What it really is, is just Internet computing. As a personal user, you no longer need to own all sorts of

applications and storage space. You can rent them by the month/year as needed and access them from the provider's enormous data centers that have all the resources (and redundancy) you would ever need. You can keep your personal photos, emails, tax returns and literally everything else safe and secure and always available. Exactly the same thing applies as a corporate user except that you would have multiple users accessing the applications and data. And, yes, you would have full control over who has access to what.

How do they work? They use virtualized server clusters and computer layers and software to achieve computing power, data storage and subscription applications. Many services, like Gmail, are free, but the business of public clouds is to rent time and space to consumers and businesses, although they also derive revenue from the sale of advertising. In fact, for many, advertising is the main source of their income. To run efficiently and effectively, they must have enough reliable and continuous availability.

Private clouds are similar except, of course, they reside on the premises of the company that owns it, and that company, or its managed IT service provider, manages it. Many companies also opt for a hybrid cloud system, where certain functionality resides on site and others at a public data center.

Regardless of which way you choose to go, public, private, hybrid, cloud computing powered by virtualization offers significant cost, efficiency, and security advantages over traditional methodology. Here at DynaSis, as a managed IT support provider, we have been a leader in small to mid-sized business virtualization and cloud computing almost since our inception, more than 25 years ago. If you would like to learn more, give us a call at 678-373-0716 or visit us at www.DynaSis.com.