INGRES

VIRTUALIZATION

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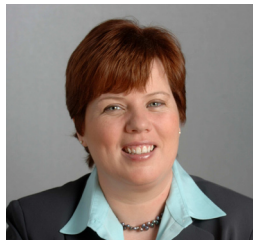

With all the hype currently surrounding virtualization one could be forgiven for assuming that it's a recent innovation, but virtualization has been available on the mainframe since the 1960's and was first introduced on the x86 platform over a decade ago. What we're seeing today is a resurgence brought about by the fact that today's hardware provides significantly more horsepower than is needed by the applications that it runs, so CPU utilization rates are at an all time low. This is a very important confluence of factors for CIOs ever mindful of their IT budgets. Virtualization enables IT to make more efficient use of this hardware and at the same time greatly simplifies the application environment.

What is Virtualization?

So, what is Virtualization? Virtualization allows a single computer to run multiple operating systems and applications concurrently and transparently. This provides significant improvements in hardware utilization, efficiency, flexibility and manageability. The virtualization software can either run directly on the bare metal, or on a host operating system, and enables the creation of virtual machines each of which has its own virtual CPUs, network interfaces, memory, storage, and operating system; it also contains a hypervisor which dynamically allocates hardware resources to the virtual machines.

The Benefits of Virtualization

Virtualization provides many tangible benefits for IT, ranging from improvements in efficiency and availability to cost savings and increased productivity.

Efficiency: Recent advances in hardware technologies have significantly increased the computing power available to IT, but the CPU needs of applications hasn't increased at the same pace, resulting in CPU utilization rates dropping to an all time low. Virtualization enables IT to increase CPU utilization rates through system consolidation and for traditionalists who prefer to separate server workloads, they can map each individual system to a separate virtual machine.

Robustness: Virtualization provides a safety net that an application error or system crash in one virtual machine will not have any impact on other virtual machines running on the same system.

Value: With virtualization, capacity can be used more effectively, reducing the number of systems required to support the IT infrastructure, which, in turn, reduces the hardware acquisition costs, the costs required to power, cool and host them, and the staff costs associated with managing the additional systems.

Productivity: Once created, a virtual machine can be cloned by simply copying the files or logical volumes associated with it. This can reduce the time required to provision a new system from days to minutes.

Portability: The use of abstract devices within virtual machines, coupled with the encapsulation of virtual data in virtual disks, makes it easy to move virtual machines from one physical system to another.

Availability: The ease with which virtual machines can be deployed and migrated across systems eliminates the need for planned downtime. Unplanned downtime due to system failure can also be reduced significantly.

Each virtual machine has its own virtual CPUs, Network Interface, Storage and Operating System

Virtualization and Software Engineering

Virtualization first appeared in the quality assurance cycle of the software engineering process. Specific deployment environments can be built and then replicated with ease, which dramatically reduces the time required to provision test systems, ensuring consistency in the QA process. When problems are uncovered during the QA process the environment, complete with running system, can be copied to the development or support systems for debugging and resolution. Eliminating the need to replicate test situations significantly increases developer productivity.

The use of virtualization is common in development, not just for troubleshooting problems identified during the test and validation process, but also for housing different development environments on a single development server. At Ingres Corporation, for instance, most developers use Linux as their primary development platform, but they will also have a library of virtual machines to ensure portability across different Linux versions and distributions as well as ensuring portability on Microsoft Windows. Hosting these as separate physical systems would be costly and onerous. The use of virtualization technologies during the development process measurably improves productivity and product quality.

One of the early uses of virtualization technologies was to stage software for demonstration at trade shows. The time required to provision systems for software tradeshows was reduced from days to minutes. Many software vendors, inspired by their own successes with virtualization, are now using virtual machines as a means of distributing their software.

Software Pricing for Virtualized Environments

Many software vendors tie their pricing to the number of CPUs available in a machine. The popularity of multi-core technologies has forced them to articulate precisely how they define a "CPU". Ingres, Microsoft and Red Hat have defined a CPU as a socket and have embraced per-socket pricing. Other vendors, such as Oracle, charge a premium for the extra CPU power the multi-core chips provide. Virtualization technologies have significantly increased CPU utilization pushing utilization rates from an average of 20% to more than 80%. The pervasiveness of virtualization technologies may force software vendors to rethink tying pricing to physical components.

Summary

Virtualization is revolutionizing the way that systems are being deployed today. Using virtualization software, a single server can carry the workload of ten or more servers without compromising performance, reliability or security. The simplicity of the deployment model means that new systems can be provisioned in a matter of minutes, and the increased efficiency and cost savings that virtualization provides means that it's on every CIO's radar. The tremendous success of the VMware IPO last month and the announcement that Citrix is to acquire the XenSource are indicators that the virtualization space is here to stay and will be even more interesting to watch over the coming years.

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