BENEFITS OF VIRTUALIZATION IN EDUCATIONAL INSTITUTE

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ABSTRACT

Virtualization refers to a concept in which access to a single underlying piece of hardware, like a server, is coordinated so that multiple guest operating systems can share that single piece of hardware, with no guest operating system being aware that it is actually sharing anything at all.

Server Virtualization is the most common type of virtualization. In server virtualization, each operating system believes it has sole control of the underlying hardware, but in reality, the virtualization software controls access to it in such way that a number of operating systems can work without worrying about the state of the state of the hardware.

Virtualization, by offering the ability to host multiple guest systems on a single physical server, helps organizations to reclaim data center territory, thereby avoiding the expense of building out more data center space.

The paper presents the benefits of implementing virtualization technology in educational institute.

KEY WORDS

Virtualization, Data centre,Optimization

MOTIVATION

Some upfront research was done to determine whether the virtualization will benefit the organization. The points cited below are the reason that made the organization to go ahead with virtualization.

Under Utilized Hardware

Many servers in the organization were installed with the old "one application, one server" mindset. Many servers were running at only 10 to 15 percent of total processing capacity. Thus, 80 or 90 percent of the server's computing power was unused. An example for this was the licensing servers which **were** used to provide license for invoking the software in client machines. The capacity of the hardware and the utilization was like train capable of accommodating several thousand passengers carrying 100 passengers.

Increased Energy costs

The increased use of computing devices across the campus was leading to the more consumption of electrical power. In fact, electricity ranks as one of the top five costs in their operating budgets. The expenditure for 30 physical servers and ACs running for them was the point to be considered.

System Administration costs

Every server requires care and feeding by system administrators who ensure that the server runs properly. Common system administration tasks include monitoring hardware status; replacing defective hardware components; installing OS and application software; monitoring critical server resources such as memory and disk use. The expenditure for server maintenance was another serious concern.

Organizations find maintenance and upgrades difficult to accomplish. Although not incurring extra pay costs, there is still a cost to the organization as staff is forced to work additional, inconvenient hours leading to dissatisfied employees.

System Maintenance costs

The Maintenance costs for thirty physical servers also add to the Opex.Also replacement of hardware increases the downtime of servers leading to inconvenience to users.

Running similar software instances at various locations having separate hardware was to be eliminated.

SERVER VIRTUALIZATION@KLEIT

- Product support evaluation

The end vision is to run virtualization product more efficiently. So, the critical factors in virtualization product evaluation are the support for important applications, ease of operation/maintenance, support from vendor, recurring cost, utilizing existing hardware. An Organization considered evaluating product from both commercial and open source products like VMware, Citrix ,Microsoft , Suse, Xen.

- Evaluating cost

Moving to virtualized environment invokes the analysis of financial resources. This is because having clarity on costs implications speeds approval of the project by the Management.

- Conducting POC

Many of the institutes conducted POC using products from VMware, Citrix , Microsoft , Suse, Xen. It is tried to evaluate to see whether the less expensive product meets our needs.

- Capacity planning

Capacity planning refers to the process of analyzing total load and calculating what hardware should be purchased to ensure full utilization while avoiding insufficient capacity to meet peak requirements.

- Cost Justification & procurement

Pre Procurement activities that were considered, along with a list of pros and cons for each option were documented and approval was sought for implementation of server virtualization

A pre implementation discussion was done by the implementation team comprising of key executives, IT support team from their organizations & vendor representatives.

The implementation plan included time bound activities like selection of applications, services to be virtualized & migration.

- Pilot implementation

A virtualization pilot is essentially an implementation of a proposed architecture with an aim of gathering valuable information about the proposed architectures.

A pilot system was chosen with an eye towards ensuring they are an accurate sample of our final set of systems.

- Installing a mini production environment

Initially two blade servers were used for virtualization by increasing the RAM capacity to its maximum. The existing Storage System (NAS Box) was used for holding the VMs. DHCP and ADS servers were moved to the Virtualization environment having a backup on standalone servers. Blade servers were chosen for pilot considering the fact that they provide more cost-effective redundancy for system resources like networking and power.

- Managing pilot systems

When the pilot infrastructure was up and running, the systems were exercised with representative workloads.

Migrating to the new environment

Moving production systems required careful planning to ensure that the systems are successfully migrated while imposing the least possible downtime. Other Application servers which consist of database, license management, web application were also migrated to the production environment. Still the storage remains the same NAS box by using ISCSI for data transfer.

Administering virtualized environment

Current Server Count : 30
Future Server Count: 02
Guest machines per server: 05

Virtualization Product Used: VMware Vsphere 5.0 standard
VMware Vcenter Server to manage virtual machines

THE BENEFITS

By applying virtualization, Institution raised the hardware use rates from 15 percent to 80 percent, there by making much more efficient use of capital.

Virtualization enables the organization to reduce the total number of machines in use by up to 90 percentthus reducing the overall cost of energy for the institution

Virtualization reduced the amount of system administration work necessary for hardware, thus improving system administration. Virtualization made server maintenance and upgrades significantly easier and less expensive.

Apart from College level virtualization, department level virtualization has also been done using Xen tool to better utilize the departmental hardware resources.

CONCLUSION

The server virtualization resulted in better utilization of physical resources, reducedIT operation costs, many automation options, easy scalability and availability of new services in minutes. The virtualization environment set up may also be used by staff and students for the virtualization related research and projects.

THE ROAD AHEAD

From Server virtualization to private cloud

The IT infrastructure comprising of Server virtualization of can be upgraded to private cloud to get powerful software and massive computing resources where and whenever there is a need. Cloud services provide On-demand computing and storage, a familiar development experience and Online services for anywhere, anytime access to powerful web-based tools.

Desktop Virtualization

Desktop virtualization is the concept of isolating a logical operating system (OS) instance from the client that is used to access it. A virtual machine runs on a fully-functional PC, with a hypervisor in place. Client-based virtual machines can be managed by regularly syncing the disk image with a server.

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