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Project Title: Relationship between Money and Time with Virtualization

Technology

DA Class ID: (A full and accurate number is a must!)

The Specification:

This report details an evaluation of the impacts of virtualization technologies on resources and time of an organization. A virtualized environment differs from a standalone physical server environment in terms of application execution time and cost of support and implementation. A virtual environment for a stock trading will be developed. The virtual trading environment will be put to test using NASDAQ trading engine and results compared with standard servers. Application execution time and cost of implementation plays a major role in the choice of a server deployment. As organizations seek to leverage web-based services to maximize output and minimize operational and hardware costs, virtualization is at the heart of this premise. This project aims to compare standard server deployments with virtualized environment using Windows Server 2003 Enterprise Edition using cost and application execution time. Using a Physical to Virtual migration tool, a set up physical environment will be migrated to the virtual mode and performance and cost of deployment parameters measured. The project deviates from the previous proposal by specifying the actual requirements in form of software, hardware and physical devices needed to implement the project.

Project concept

The project is carried out in the backdrop of understanding how reliable and costly a virtual environment differs from that of a traditional server environment. This project tries to answer the question of money and time relationship in a way of comparing these two environments. While virtual environments are preferred over the traditional environments, there is no way that these two ways are the same in cost and time. This is the reason this project is being undertaken. The researcher sought to test the engine of NASDAQ in a virtual environment. This would be compared to the results of a traditional environment.

Data source

For the solution and effective comparison to be undertaken, there is a need to have data for comparison. The data for the data will be obtained from the logs and tools that will be used to measure the time and money in the virtual environment. The data will be obtained from the project. This is undertaken in terms of a lab testing where the virtual environment will be tested against a traditional environment. The time and cost of running an engine in a virtual environment will be the source of important data that will be used.

Tools to be sued

There will be software that will be used in the project. One of the tools is Linux operating system, Microsoft 2012 server edition, and data analysis tool (SPSS). This is important information that needs to be included and undertaken in the project.

Skills

There will be skills that will be learned from the experiment. One of the skills that will be learned is the money value of running an engine in a virtual environment. This is important information that will be valuable to the researcher. From a technological perspective, the researcher will be able to learn on the new skills on running an engine in a virtual environment. This is a new technology that will be valuable to the researcher. It is important to understand the technical procedures and the settings that will enable the running to take place.

Literature Survey:

Virtualization is a term used to describe the building of virtual versions of software, operating systems, and network resources among other components on the virtual platform contrary to actual versions. With virtualization, numerous operations can be conducted with less effort and resources. Usually every computing device requires resources to manage and keep it running. However, virtualization has presented a new front where minimal resources are required to maintain a large number of workstations executing a particular task. A company can chose to migrate its resources such as hardware, operating systems, storage facilities and network servers to virtualized environments. Software is used to effect these changes and present a new appearance. Organizations and businesses benefit from virtualization by leveraging the capabilities of redundant servers with advanced storage abilities through the use of Virtual Machine Monitor. A Virtual Machine Monitor is a single computer with a host program that allows multiple supports of identical execution environments. All the users in VMM

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see their systems as self-contained computers isolated from other users, in spite the fact that all users are served by the same machine. The use of virtual machines significantly reduces the cost of hardware and related systems that empowers and organization's computing environment. Backup and restore services are also offered in VMM Virtualization (Wolf).

Virtualization technology has made it possible to develop virtual team software. Virtual team is defined as group of people who are working at different geographic sites and a project team whose members telecommute. IT managers are constantly devising new approaches of managing a virtual team due to their ability to reduce power needs by minimizing the number of servers used to run applications. Increased efficiency attained from the use of Virtual machines and environments is a key element in enhancing IT services and businesses . Given that the workload of the application is shared among different servers, performance is enhanced together with the overall speed of the application. Traditional practices of procurement and ordering in organizations which normally span numerous departments and weeks of interaction, if not months, are reduced to a few mouse clicks on a virtualized environment. This significant reduction is beneficial to project managers engaging virtual teams to deliver a certain project on a stipulated time frame. The development lifecycle is adversely reduced since virtual teams are operating round the clock from their remote locations. For instance, in the development process of an application, virtual team members based in New York could be coding the application during the day while their workmates based in Shanghai could be debugging the code during the night. Coding done on virtual servers is transmitted to debugging

locations saving on time and cost. Through consolidation, organizations get to conserve storage facilities since there is no need to purchase additional hardwares. Also, the applications code is not altered thus, programmers can continue working on their original work.

However, management challenges are inevitable. The project manager needs to constantly update the latest technological changes as well as create daily briefs on the progress of the project and the challenges evident with their recommended solutions.

Virtualization has been applied immensely in the development of small to medium-size software and applications. Large scale applications do not easily fit into virtualization servers because linking of more than one server could lead to performance degradation.

An example of virtualization technologies is Server Farms utilized by large industry players such as Google and Amazon. Virtualization helps these organizations to cover their numerous data centres. Companies who have not shifted their systems to the clouds can leverage virtualization to derive immense dividends from this technology (Rolf).

Server virtualization uses software-based partitioning technique to create multiple virtual servers running numerous applications on a single server.

The general benefits derived from virtualization include;

Decreased count of physical servers required to run applications, thus, translating to few equipment and enormous savings in terms of energy, cooling, space maintenance and personnel.

Enhanced organizational agility

Shifting focus of IT department from strictly fixing computer malfunctions to improving the functionality of the company.

Scholarly contributions

Virtualization is a new phenomenon that is on its infant stage. This project is important because it adds important information about virtualized and standard servers to existing base of knowledge. Hypothesis results will specifically give insight to IT managers on the benefits and breakthroughs that can be realized from the adoption of virtualization processes. The comparison between the two environments will enrich business with the merits of deploying virtual services over the use of standard servers. The web is considered a game-changer in organizations IT services. Integration of virtualization over the web is the ultimate solution to any business entity looking forward to the new technology.

Evaluation Criteria

The project will be evaluated based on different types of virtualization mechanisms compared to standard physical server deployment. This includes OS virtualization, data virtualization, network virtualization and cloud-based virtualization.

OS-level virtualization involves the partitioning of the physical machine's resources at the operating system level to achieve VM's OS-level sharing. The parameters to be evaluated involve the capability of OS-level VMs on a single physical machine to share the same OS kernel. Also, it would be determined if a virtualization layer can be designed in a manner that allows processes in a VM to share as much resources on the host machine

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(Pelletingeas).

- Run zip 8. 1 to compress the Borland C++ 5. 5. 1 installation directory with size 51MB
- Launch XCopy to copy Borland C++ 5. 51 installation directory
- Run Borland C++ 5. 51 to compile its installed examples
- Launch Microsoft 2007 tom open 1. 25 MB . docx FILE
- Start Adobe Acrobat Reader 11. 0 to launch as 10. 9MB . pdf file
- Start Microsoft spreadsheet to open a 517KB . xls file

In comparing costs, licensing and support considerations will be put into focus for standard physical server deployment and a virtualized solution.

Analysis of the cost of implementation and support is critical for an informed decision making.

Conduct of the Project: The researcher will undertake this project using two servers which have 16GB RAM. The servers have Windows 2012 server which is used as the hyperbisor in this case. I wil have to create between four to eight virtual environments which will enable me to install Linux Operating system. This will enable me to create my lab which will enable me to test the NASDAQ trading engine.

A virtual environment will be set up to accommodate virtual statistics on cost and time parameters. The virtual environment will be enabled through the use of a Physical to Virtual Migration tool. The machines will be running Windows Server 2003 Standard Edition. Likewise, the cost of set up, time application access times and stability will be tested.

In evaluating cloud-based virtualization, network performance will be measured using GeekBench analytical tool. A Windows compatible version of

the software will be used and results saved in a text file. Apart from network performance, the tools used to measure TCP and UDP performances on virtual and physical platform.

The Design:

An assembly of all the technical and logical aspects of the experiment will be made before commencement. These includes the setting up of the physical virtual environment, Physical to Virtual migration toolkit, Windows Server 2003 Enterprise Edition and GeekBench analytical tool.

After assembly of all the software required to test data virtualization, operating system virtualization, cloud system virtualization and network virtualization, comparisons will be made basing on the cost of implementation and time variables. The environment upon which the tests are conducted is a typical stock trading platform. Specifically, NASDAQ trading engine will be used under standard server deployment and after virtual environment. A standard server environment will be set up and variables recorded. A server running in Windows Server 2008 and a minimum configuration of 8GB RAM is used. In this case, the cost of setting up standard server environment for stock trading will be recorded. Also time response parameters measuring the effectiveness of the system will be recorded. This is expected to be completed after a period of one month since commencement. A replicate system will be set up but this time with a virtualized deployment using Physical to Virtual migration tool. The P2V tool will migrate the physical server and make a virtual hard drive image of the server with the appropriate modifications to the stack so that the server will boot up and run as a virtual deployment. The configurations and physical

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characteristics of the physical environment is the same, thus, there is no need to rebuild the servers and reconfigure them as virtual components. The control parameters involved in this case include CPU utilization numbers and application response times. The rule of the thumb is not to let CPU utilization exceed past 50% during peak periods. Likewise, the application response times should not exceed reasonable Service Level Agreements (SLA) (Metzler). Normally, most modern servers used for in-house operations are limited at 1% to 5% CPU utilization. Since we are running eight operating systems at a single instance on a single physical device, CPU rates will reach 50% but are expected to average much lesser than this value because of peaks and valleys of OS cancelling each other out more or less.

Statement of Deliverables

This paper will discuss various virtualization technologies including data virtualization, OS virtualization, cloud hosted systems and network virtualization. Virtualization is essentially divided into three parts; platform virtualization, hardware-assisted virtualization and paravirtualization. The paper will compare and document cost and performance of a virtualized environment in comparison with standard physical server deployment for NASDAQ stock trading system.

A comparison of the results indicates that implementation of the OS-level VM accords shared execution environments for more than one host machine thus reducing start up and shut down costs, low resource requirement and high scalability.

Another deliverable expected in the project is a comparison table of the execution times of the various processes outlined in the Evaluation Criteria

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section under a standard and virtualized environment.

Also, the cost of implementation of a standard physical server and that for a virtualized environment is outlined. It is expected that the cost of physical standalone infrastructure will be more than the cost of support and maintenance for the virtual environment. Virtualization product deployed for NASDAQ stock trading experiment is Windows Server 2012. The server edition allows for the running of four virtual copies of Windows Server 2012 on a single machine with a single license. Microsoft licensing technology is a factor of virtualization technology hosting the Windows Server 2012 guest operating system. Thus, it is expected to be less than the cumulative cost of hardware, software, support and maintenance in standard physical environment.

Plan:

The project will be implemented in stages ensuring that each component has been covered effectively. The project is expected to be finalized after a period of six months. Using the stated design and methodology, tests will be conducted on virtualized environments and results compared on standards server environments. The results will be analyzed and a conclusion arrived at.

The following resources are required for the success of the plan;

- Server with minimum configuration of 8 GB Ram and Windows server 2008.

- Hard Disk drive of 1TB.

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