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Blackhawk Technology Consulting LLC

Blackhawk Virtualization Chargeback Methodology

Introduction:

Virtualizing your servers within your data center is a hot topic in today's IT world and it will only get hotter. IDC and Gartner have documented that as of September 2006, almost 70% of companies had already implemented or are planning to implement virtualization within a year. In fact, only 5% of the companies polled claimed to be unaware of virtualization. If your company is among the 70%, you certainly understand that virtualization may help take back control of your infrastructure as it enables you to see and manage your computing resources in ways that offer more reliability and flexibility, which is unrestricted by implementation, location or even physical packaging. With this virtualized environment, you have a logical representation of your servers resources rather than a physical representation of your servers resources. By gaining greater control of your infrastructure, you can improve your overall cost management.

While cost savings is a primary driver for an initial virtualization initiative, the full value of virtualization lies in its awesome ability to:

- Improve Your Total Cost of Ownership (TCO): By decreasing your management costs and increasing your asset utilization, you will be able to experience a reliable and rapid Return On Investment (ROI) with virtualization. By virtualizing your resources and making them easier to migrate or fail over to another physical server or other locations, you will be able to reliably enhance system availability and help lower the associated cost and complexity of DR/BC solutions.
- Increase Your IT Flexibility: By enabling a wide vendor choice, virtualization supports the "pulling" of resources which can be centrally managed through a single console to better support dynamically changing business requirements.
- Enable Access From a Shard Infrastructure: Virtualization provides an extremely robust and resilient foundation and shared infrastructure which

enables for better access to infrastructure and information in support of business applications and processes.

With the above benefits of virtualization, how come more businesses aren't making the rush towards virtualization? Even with all of the benefits of virtualization, there are some barriers to virtualization, with the most significant being the capability to quantify value, organizational barriers to fairly allocate virtualized server costs and when appropriate, charge back the appropriate department or organizational unit.

Until recently, the inherent drawback to implementing a virtualization initiative was the capability to equitably allocate the cost associated with that environment. The complexity that comes along with virtualization and the belief that there is no proven methodology today to allocate cost to departments and organizational units has many IT managers fearing that it will become a never ending "Black Hole".

Implementing a Successful Chargeback Strategy:

For businesses and IT organizations that which allocate costs to business departments or wish to influence their users behavior or even gain some perspective into requirements based on use, designing and implementing a chargeback strategy is a significant component in the adoption of a virtualized infrastructure. Now, how do you measure consumption of resources when you no longer have a dedicated departmental physical server? How do you map out utilization by Virtual Machine(VM) when features like VMware's VMotion allows for the movement from one physical server to another?

This concept of chargeback is not new. In fact it was first implemented over 40 years ago in the old mainframe days when IT departments were spending millions of dollars on a mainframe that was being shared by different departments. Implementing a successful chargeback strategy for mainframe users was relatively simple and could be executed in a matter of weeks. In the mid to late 90's, as servers were being rolled to the X86 models, each business department or organizational unit had their own dedicated physical server and as a result, the old chargeback model worked. Now, with the advent of virtualization, implementing a successful chargeback strategy can be a nightmare.

Even if your business does not have a chargeback process in place, it will be necessary and vital to show your users what it costs them. Without this type of cost visibility, it will be virtually impossible to put in place the necessary financial controls to contain the "Virtual Sprawl" so evident in today's virtual environments.

The majority of businesses and IT organizations recognize the importance of chargebacks and how it can give them visibility into which departments are using which resources, but don't know how to go about implementing it. Armed with the

best practices, methodology, services and tools from Blackhawk Technology Consulting LLC and Vkernel, Blackhawk Technology Consulting LLC can help your IT organization implement a successful chargeback strategy, a strategy which can scale with your ever-changing business needs.

Note: *Before you begin implementing the chargeback methodology described below, be sure to obtain the "Chargeback Calculator" that accompanies this document.*

The Blackhawk Chargeback Methodology:

The proposed methodology below enables IT organizations to recover data center expenses by allocating costs to business departments and units based on their actual use of hardware resources, software and other related expenses in the data center. This process is analogous to how a power company supplies electrical power or how a gas company delivers natural gas. The customers in these situations are charged for the resources that they actually use. When utilities and gas companies calculate the rates they have to charge to recover their costs and make a profit. Similarly, IT organizations will have to come up with rates for CPU, memory, storage and network which will recover the costs of buying hardware, software and operating the data center. If a profit is what is desired, then it must be figured into the rates as well.

The proposed methodology for a chargeback strategy has several advantages:

- Easy To Understand: Based on experience, if a chargeback strategy is too difficult to understand then people will tend to resist it.
- Quick To Implement: Armed with the "Chargeback Calculator", all you have to do is to add a new host and recovery date to the calculator and the rates that you will need to charge are automatically updated.
- Flexible: You decide what the cost recovery time-frame is. You even have the ability to take existing hardware that was already purchased and accelerate its recovery.
- Extremely Fair: Cost centers get used for only the resources that they use.
- Extremely Extensible: Similar ideas can be applied to chargeback for other expenses such as software licenses, administration costs, electricity, etc.

The End Result:

The overall objective here is to recover data center expenses over a specific period of time, spread the costs among multiple business departments or units, charge the users for the resources that they actually use and quantify resource usage based on specific rates to fully recover the expenses.
The proposed methodology is designed to deal with additions and removals of server hardware and storage I.E., a real world example.

The old time proven model of per server no longer works or is it flexible to meet the ever-changing virtual world. In a dynamic VMware ESX environment where Virtual Machines (VMs) are automatically VMotioned from one host to another, a physical server is no longer a relevant boundary. Resource pools and clusters determine where and how resources will be used. As a result of this, the only methodology which makes sense is one based on "Resource Consumption", regardless from which hosts resources are being used.

I will now attempt to outline a process from which you can use to calculate daily chargeback rates for CPU, memory, networking and storage. Be sure to use the accompanying "Chargeback Calculator".

The Blackhawk Chargeback Methodology:

The following is the chargeback methodology that Blackhawk Technology Consulting LLC has decided to use in our Virtualization Chargeback Service:

List all purchased hosts and the cost spent on hardware

This is where you will want to list all server hardware which is being used in your environment to support your VMware ESX environment. Be sure to exclude software expenses. Optionally, you can also exclude the cost of local storage to more accurately calculate CPU and memory costs. The storage chargeback can be calculated separately under "Storage" tab. You can define each host by its vendor name, model or any other naming convention used in the organization.

Specify the number of months in which the cost needs to be fully recovered

The usual number here is 36 to to 48 months. However, thee is nothing wrong with a shorter period of time. You can experiment with different time-frames to see how it impacts your rates. Existing hardware might be good candidates for a shorter recovery period.

For each host specify how many departments/units/users will be using the hardware and be charged

The idea here is that since the host will be a shared resource, in order to correctly allocate costs, you will need to know how many cost centers will be using it. If you have organized your environment into clusters and resource pools, then you have a good idea in which resource pool the new host will participate in.Keep in mind that the less "shared" the server will be, the higher the chargeback rates.

The spreadsheet now calculates exactly how much money that you need to recover for this host on a monthly basis for CPU and memory. The next steps will show you how to tie the recovery rates to CPU and memory usage to calculate daily rates.

For each host use VirtualCenter, Vkernel or other software to tell you how many GHZ of CPU is used on a host on average in a given month
In this step, you are tying CPU usage to dollars. For example, you know that you will need to recover $4.00 per month for CPU, the idea here is to figure out the total CPU cycles per month and determine the rate that you need to charge when all or some of the CPU cycles are used. For existing hosts, you should capture information about cycles used by looking at the past 3 to 6 months. Keep in mind, that if the usage increases, then you will have to update this cell to make sure that the rates are being calculated correctly.
For a new host, use the CPU specification to figure out the maximum CPU monthly cycles. Remember, that you can always adjust this number over time once the host is in production and you see how it is really being used.

For each host use VirtualCenter Vkernel or other software to tell you how much memory in GB is being consumed on average in a month
This step is similar to the step above, except that you are dealing with memory instead. Once you know how much memory is being utilized on this host in a given month, you can figure out how to relate it to the amount of money that you need to recover per month to pay for memory.

Note: In the above steps, you will notice that we used calculated rates based on allocation of 60% of the hardware cost to memory and 40% to CPU. On an initial look, this might seem confusing, but it actually makes sense. In general, memory is slightly more expensive than CPU. The cost per GB of memory increases as you get more memory. For example, you can buy 1GB of memory for about $50.00. Now, if you wanted to buy 16GB of memory, you will spend about $2,100.00. CPU's in general, make up a smaller percentage of cost. For the most part, adding CPUs to host is less expensive than adding more memory.

Once you know how much memory is being utilized on this host in a given month, you can figure out how to relate it to the amount of money you will need to recover per month.

Now, the calculator calculates exactly how much you should charge daily. If you need to make a profit, then you will need to enter in the percentage there and then use the adjusted rates.

Repeat the above process for the storage
Click on the "Storage" tab and then go through the same calculation to calculate the storage rates.

Conclusion:

This concludes the simple but yet effective virtualization chargeback methodology for recovering costs in your VMware environment.