How Virtugo and DRS Provide a Complete Solution

What is DRS?

The Distributed Resource Scheduler (DRS) is an optional (separately licensed) feature of VirtualCenter 2.0 that in its basic form allows for resource balancing across ESX 3.x servers in a DRS cluster.

Before going into what DRS actually does, we need to talk about the differences in resource management between ESX 2.x and ESX 3.x, specifically lets only look at memory and CPU resources because only these two resources are used by DRS for load balancing purposes. I/O bandwidth is not taken into consideration.

How is Resource Management accomplished in ESX 2.x

VMware ESX 2.x has the concept of shares, and the setting of minimum and maximum values. A minimum setting for CPU or memory sets a guaranteed floor, for instance 20% of total CPU resources. A maximum setting is an upper limit like 80% of CPU resources. Shares come into play when there is resource contention. When VM A has 2000 shares and VM B has 1000 shares, VM A will get 66.33% of what's available and VM B will get 33.33% (roughly).

How does Virtugo improve this process?

Virtugo will dynamically adjust the CPU, Memory, and Disk I/O ESX 2.x shares in real time to improve the overall application and system response time. Optimize dynamically manages the movement of shares as applications require additional resources. This means that a dynamic ESX 2.x environment will now be able to respond quickly to peak loads, alleviate resource contention thus allowing IT organization to meet service level agreements.

Resource Management in ESX 3.x

VMware ESX 3.x also has the shares concept although the names are a bit different. Minimum is now called reservation and maximum is called limit. ESX 3.x introduces the concept of compute resources. A compute resource is an aggregation of resources (only CPU and memory) from one or more hosts. For example, a single host might have four 3Ghz CPU's and 16GB of memory totaling 12Ghz and 16GB. But when you have three hosts like that in a cluster, you have 36Ghz of CPU power and 48GB of memory at your disposal.

These compute resources can then be carved up into resource pools. Resource pools are defined and managed in VI Client or VirtualCenter 2.0. You just assign memory and CPU resources to the resource pool and you give the resource pool reservations, on limits and share settings.

It is clear from the short explanation above that resource scheduling in ESX 3.x is a bit more complex than before. Hands-on experience with the product will reveal how easy it is to work with.

You should be aware of the fact that resource pools are a feature of ESX 3.x, not of DRS. Then what exactly does DRS do?

Based on analysis of available resources (CPU and memory), DRS will move (or recommend to move) virtual machines to hosts where the requested resources are available. DRS can be set to one of three modes: manual, automated and partially automated. In manual mode, DRS will provide recommendations to the administrator who can then take action. In automated mode, DRS automatically moves VM's when needed. In partially automated mode, DRS will automatically place the VM on a host that has the required resources (initial placement) but will not move the machine

afterwards. You can set placement constraints like "do not put VM A and VM B on the same host".

DRS automates vmotion operations with the intention of moving VM's at defined times or limits. For example, if a given ESX server can no longer support the workload, a VM can be migrated to another ESX server with excess capacity.

The important factor here is the issue of when that vmotion decision is made.

How does Virtugo Improve this process?

DRS is a workload balancing tool, not an optimization tool – there is a very significant difference. Virtugo Optimize allows system administrators to assign Service Levels to all the VM's to ensures that the resources on the ESX Server are being effectively allocated and utilized. The potential of resources sitting idle on one VM without the ability to be leveraged by another could cause an unnecessary DRS event.

This is a far greater criteria than simply monitoring the amount of usage. With Optimize an important VM is allocated as many resources as needed when it has a need. It never suffers because of low reservations, or another larger VM in the way. This provides a significant performance advantage. It provides optimal usage of the ESX server resources.

VMware has no plans to integrate the Optimize functionality into VMware ESX 3.x (this information was provided to Virutgo, and its customers during this beta program).

There is no conflict between DRS and Virtugo Optimize - because Optimize will automatically re-optimize the ESX environments once the virtual infrastructure load has been rebalanced by DRS. Simply put, ***Optimize improves upon, and increases the ability for DRS to effectively balance workload.***

Additional tools to help ESX administrators

Virtugo Perform also contains Historical Performance reporting, which significantly increases the administrators visibility into the usage of hosts ESX server and VM's. The reports expose average and maximum usage over weeks or months, which provides significant information when considering movements. Having DRS move VM's only to move them again, is not helpful.

In a DRS managed environment, Virtugo Perform provides a report which graphically shows the movement of VM's between hosts, and provides a comparison of the performance data of a VM and the various hosts. This type of report is also helpful in judging the effects of DRS and managing the virtual environment.