



VMware's VMotion Creates New IT Possibilities

Analyst: Anne MacFarland

Management Summary

The pervasiveness of technology has changed *where, when* and *how* quickly business is done. Productivity is up and processes are more efficient, but this poses new baseline requirements for enterprise IT environments. New client needs must be met quickly. Change must be accomplished transparently to the users. Systems have to be there. **The challenge is to meet these new baseline requirements using existing assets within a budget that is constrained – or even shrunk by a need to fund new initiatives.** A large obstacle to meeting that challenge is the monopolization of underused hardware assets by applications. More flexibly coupling resources to meet the needs of the moment by using virtual machines removes this obstacle and permits, not just consolidation and higher utilization, but a more agile use of resources within the IT environment. This more frequent reconfiguration turns critical the capabilities of workload management, lifecycle support services, provisioning, and change management.

In the past, VMware's virtual machines have been used to isolate applications using heterogeneous operating systems in order to consolidate them on a shared Intel processor (and, recently, across two processors). Virtual machines have been used as easily-replaced application envelopes (think *latex gloves*) to protect vulnerably-located applications from contaminating the system, or vice versa. VMware's new capability, *VMotion*, provides the flexibility to do much more. **VMware allows an administrator to move an active, stateful application on a VMware ESX virtual machine from one processor to another – not just within a machine, but across the data center or even farther afield.** And it opens up some new ways to make the IT environment more resilient, cost-effective and responsive to the needs of its users.

- *What if you could move active applications from a server to an alternate host while system upgrades and patches were deployed?* Your applications could be continuously available.
- *What if you could balance workloads by moving active processes, instead of by configuring, provisioning and turning on other machines or processors?* What if an application had an unexpected spike and you could move it to a higher-performance processor to get more throughput? Your environment could react more deftly and your application licensing costs would be more stable.
- *What if you could move active applications out to remote servers?* You would be able to more fully and easily provision locations with no indigenous IT staff, and evolving environments would be easier.

Data center practices might change substantially due to the new mobility VMotion that delivers. Hardware architectures become foundations, which you clothe with applications as needed. Distributed architectures with more sophisticated functionalities are possible. Using grids becomes easier. Blade servers are enhanced with a new dimension of flexibility. Read on for more details.

IN THIS ISSUE	
➤ The Benefits of Application Mobility.....	2
➤ Conclusion	3

The Benefits of Application Mobility

Availability

The need to repair and evolve is not going to go away. There will always be a need to install software patches, and, over time, to upgrade system software and hardware. To upgrade hardware, operating systems and firmware without a service interruption, you have to move the applications running on a piece of hardware somewhere else. Traditionally, this has involved configuring and provisioning a separate instance of the application, modifying the storage or file system to recognize the alternate address, and cutting the functionality over with as brief a quiesce as possible. With the ability to move active processes on VMware virtual machines, the process is made more seamless and simpler. **The virtual machine does not change, only its location.**

To upgrade an application, you still have to shut down the old, obsolescent instance. But with *VMware Control Center*, you can **deploy the updated version in a virtual machine on a processor, clone it, promulgate the clones across the enterprise, and, using VMware's heartbeat feature, cut over from old to new virtual machines between one heartbeat and the next.** If it is running on a virtual machine, the quiesced, obsolete application can then be cleanly and entirely removed.

Improvements in hardware self-diagnosis and automated failover of hardware are addressing the hardware side of continuous availability. **With VMware VMotion, you can remove the software-based need for system downtime.**

Workload Management

Workload management, or a lack of it, is a hot topic for those with consolidated server environments. Workload management software assigns processes across multiple instances of an application. **VMware's virtual machines abet deft workload management by giving the ability to balance a workload, not across naked hardware architecture, but between isolated containers on a single processor.** With VMware Control Center, these virtual machines are easy to provision as demand requires.

VMotion has the ability to move the application to a higher performance processor in reaction to a spike of demand¹. The higher throughput would meet that demand. There would be no additional instances, so the software-licensing fee would not change. This migration (and a corresponding migration of low-priority processes to slower processors) can be managed by VMware Control Center. This gives a second dimension of resilience to traditional workload management practices. **Like enterprise data², applications often have a usage profile that waxes and wanes. Unless you can move applications easily, safely and completely from processor to processor, you cannot take advantage of these profiles and re-couple your processor fleet and your applications for higher utilization.**

Blade Center Environments

Think now about using virtual machines in blade environments, where the chassis often provides management and load balancing capabilities. Here, too, **the additional partitioning dimension of virtual machines³, the ability to manage at more levels, and VMotion's ability to move processes while active, could make the blade center even more versatile.**

Distributed Environments

Unnatural and natural disasters (like black-outs) have taught us the importance of remote-site functionality, and frugality has driven home the value of active-active clustering. **As enterprises and their strategic partners become more geographically distributed, and cloning of processes gets more sophisticated, there are new opportunities for robust, automated, distributed networks whose life cycle needs are managed remotely.** New applications for

¹ Think of a three-dimensional chessboard. Imagine that the upper levels give the chess pieces additional capabilities. Strategies would gain even more flexibility.

² See *Tiered Storage Classes Save Money – Getting The Most Out Of Your Storage Infrastructure* in **The Clipper Group Explorer** dated August 29, 2002, at www.clipper.com/research/TCG2002030.pdf.

³ By subdividing processors with virtual machines, you can make a bunch of 2-way blades look more like a big 16-way (or more) virtual SMP box.

such environments could be tested and configured as virtual machines at one location⁴. Then the stateful configurations can be moved down the wire to where they are needed. **The small performance hit of running applications in a virtual machine is more than made up for by the security, isolation and complete environment that a virtual machine affords.**

Grids and Utility Computing

One thorny issue in growing grids is one of fastidiousness. The bigger the grid, the more resilience and productivity it brings to all members. But the idea of growing grids beyond corporate boundaries, or offering them on a commercial basis, evokes worries about trust and about unknowable sources of corruption. **A virtual machine that can be moved while running takes care of a lot of these concerns.** Like the latex glove that protects the nurse from infectious patients, mobile virtual machines could allow safe processing in potentially risky environments.

The ability to move a virtual machine also changes the logistics of workload deployment on grids. With the capability of being moved before a workload is “done,” a grid workload could be deployed more opportunistically. If the host environment became unexpectedly busy, the virtual machine could be moved again. Low-priority workloads could, clone, split and crawl around the environment, mopping up surplus cycles. With Web-based monitoring, an administrator could know what an application had accomplished. The *where* is irrelevant.

With VMotion, very high hardware utilization rates are achievable. High utilization of assets is critical to the ability to offer a computing utility at an attractive price. The utility approach works best where the resource is bankable, which computing cycles are not. On the other hand, there are many applications (including that famous utility, called *back-up*) that can be run *in the background* and are not response-time sensitive. VMotion won't do it all, but it could become a critical tool for managing utility

computing environments.

Limitations

VMotion does not move data. Therefore it is useful only in environments where data storage is networked. Integrating VMotion management with caching server management in a larger management framework would be useful if you can distribute virtual machines over large distances. Attribute-based storage, a developing form of storage, offers the same envelope-like qualities for a body of data that virtual machines do for applications and their operating environment. In the future, these two technologies could enhance each other.

Conclusion

Adding mobility to virtualization is a stunningly good idea. It will change how you see your hardware and how you design your systems. It will change how you deploy your applications, particularly those that come in independent, synchronizable modules like databases management systems. *DB2* and *Oracle 12g* come to mind. **Now is the right time to consider another operational dimension. Ask yourself what VMotion can do for your enterprise.**



⁴ Virtual machines can consolidate testing of complex environments onto one machine and can allow easier testing of different asset options.

About The Clipper Group, Inc.

The Clipper Group, Inc., is an independent consulting firm specializing in acquisition decisions and strategic advice regarding complex, enterprise-class information technologies. Our team of industry professionals averages more than 25 years of real-world experience. A team of staff consultants augments our capabilities, with significant experience across a broad spectrum of applications and environments.

- ***The Clipper Group can be reached at 781-235-0085 and found on the web at www.clipper.com.***

About the Author

Anne MacFarland is Director of Enterprise Architectures and Infrastructure Solutions for The Clipper Group. Ms. MacFarland specializes in strategic business solutions offered by enterprise systems, software, and storage vendors, in trends in enterprise systems and networks, and in explaining these trends and the underlying technologies in simple business terms. She joined The Clipper Group after a long career in library systems, business archives, consulting, research, and freelance writing. Ms. MacFarland earned a Bachelor of Arts degree from Cornell University, where she was a College Scholar, and a Masters of Library Science from Southern Connecticut State University.

- ***Reach Anne MacFarland via e-mail at Anne.MacFarland@clipper.com or at 781-235-0085 Ext. 28. (Please dial "1-28" when you reach the automated attendant.)***

Regarding Trademarks and Service Marks

The Clipper Group Navigator, The Clipper Group Explorer, The Clipper Group Observer, The Clipper Group Captain's Log, and "*clipper.com*" are trademarks of The Clipper Group, Inc., and the clipper ship drawings, "*Navigating Information Technology Horizons*", and "*teraproductivity*" are service marks of The Clipper Group, Inc. The Clipper Group, Inc., reserves all rights regarding its trademarks and service marks. All other trademarks, etc., belong to their respective owners.

Disclosure

Officers and/or employees of The Clipper Group may own as individuals, directly or indirectly, shares in one or more companies discussed in this bulletin. Company policy prohibits any officer or employee from holding more than one percent of the outstanding shares of any company covered by The Clipper Group. The Clipper Group, Inc., has no such equity holdings.

Regarding the Information in this Issue

The Clipper Group believes the information included in this report to be accurate. Data has been received from a variety of sources, which we believe to be reliable, including manufacturers, distributors, or users of the products discussed herein. The Clipper Group, Inc., cannot be held responsible for any consequential damages resulting from the application of information or opinions contained in this report.