



## Embotics V-Commander 2.0 — Lifecycle Management for Virtual Machines

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### Management Summary

It started, as so many things did, with the Internet and the early e-business initiatives. Unlike old batch payroll workloads, the demands of e-business on computer resources were not predictable. The more successful the business, and the more interactive the nature of the business process, the more unpredictable they became. This spawned a need for resource redundancy and quick and easy fail-over, which seemed most easily met by buying more low-cost, x86 servers. In time, this sprawl of underutilized servers offended the wallets of data center budgets and consumed surprisingly many hours of management. Deployment of applications the traditional way took too long, and most clustering scenarios were not designed for routine and frequent failure that a large sprawl makes inevitable.

Virtual Machines (VMs) address both the problem of sprawl and low server virtualization and the management pains of custom deployment and clustering. Adoption of virtual machines has been rapid – but now they have become a sprawl. Like many incidental amenities of life (notepads, pens, and cell phone chargers), it seemed relatively painless just to deploy more – but the results are not pretty. The less-visible but still painful licensing costs are a budgetary concern. With VMware's *VMotion*, the sprawl gained legs and had many more places to inhabit, each with additional costs. Control of the *whole* virtual machine environment cannot be achieved by hardware or application management.

The deployment of a virtual machine, which is where other VM management products focus, is only the start of an event-filled life. *VMotion* may take the VM to different pieces of hardware. Changes to the resident application and changes to the data it uses may change a VM's relationship with other software elements. **The virtual machine explosion calls for lifecycle management, not just element management, and not just of individual virtual machines.** Like a naval armada, the aggregate is the domain of management and the containers are a relevant tier of control. **To retire hardware safely – which happens periodically – you must have knowledge and control, not just of the applications, but also of the containers perched in memory and what dependencies they have to other virtual machines housed elsewhere.**

Embotics, a privately held company based in Ottawa, released its *V-Commander 1.0* at the end of 2007 to address this need for Virtual Machine Lifecycle Management. It deals with the fleet management issues that go beyond the realm of physical-to-virtual translation – issues that became necessary when the virtual machine population grows beyond family or clan size. Now, a bare six months later, Embotics is announcing a new version, which some beta customers are already using in production. The new features of *V-Commander 2.0* are what early customers demanded. As David Lynch, Vice President of Marketing, put it, "You don't know what you *need* to do until you know what you *can* do." For more details about using VMs well, please read on.

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## The Virtues and Challenges of Virtualization

Virtualization, as a paradigm, is replete with timely virtues. It underlies the always-on operations that many business situations require. It contributes to the two kinds of green that also concern business – the ability to reduce their energy/carbon footprint, and their ability to control their greenback dollar costs. It also gives another layer of manageability. Manageability at a software level supports building availability in software, instead of in a set of powered, redundant hardware. Now that hardware is better instrumented and more autonomic, this software-based availability has slimmed down hardware sparing at many data centers, with financial and energy benefits.

But, most useful of all to today's business, virtualization gives more flexibility to data center operations. A repository of application golden images and virtual machine templates allows new instances of an application to be deployed in a virtual machine that has been designed and pre-configured for quick deployment on a share of a server processor. New images may be deployed in response to a spike in demand, or they may be deployed to substitute for an application instance that is starting to fail, or an instance on hardware that is starting to fail. Images may be moved from one server to another, taking their links to data with them. The convenience of the virtual machines and the data center flexibility they support, in most cases, more than make up for the processor cycles used to support them. The exceptions come in high performance computing, where the workloads tend to be optimized to use every available processor cycle without an intermediary layer.

### *The Challenges that Come with Success*

With the deployment of hordes of virtual machines, the fleet management approach becomes imperative for four reasons.

1. **Licensing and maintenance costs add up** and retirement of virtual machines becomes just as critical as their deployment.
2. **As applications get componentized**, a weak link becomes a serious flaw – and unless you know why it was weak, replacing it with a clone may not solve the problem.
3. **Security requires awareness.** If you do not know the provenance of a virtual machine, you may be unaware of the effect its operations may have on your system. Fleet-style manage-

ment gives a point of mediation between the security lock-down imperative and the operations need for flexibility. You can do both.

4. **End of life issues** – if you do not track all your containers, it is hard to clean them up when their work is done. Retiring an application is much easier with virtualized resources – but only if you know and understand the full map of dependencies.

While open source virtual machines may make the cost issue less painful, the lack of control of the containers – aging, flawed, variant, or even rogue – is a bad situation waiting to happen. Embotics' V-Commander is focused on meeting just those challenges.

### **Embotics V-Commander**

Like all management products, *V-Commander* has three dimensions of functionality – *control*, *policy*, and *visibility*, by which a complexity can be turned into an ordered space, which then can be automated as desired.

To date, Embotics has focused on VMware and on building out the functionality that V-Commander customers want. Embotics will support Microsoft *Hyper-V* and *System Center Virtual Machine Manager* by the end of 2008. Embotics is a Citrix partner, and intends to support a comprehensive variety of server virtual machines. According to VP of Marketing David Lynch, "Embotics customers have exhibited a widespread desire to use more than one kind of virtual machine, depending on the nature and longevity of the application involved."

### **Control**

#### The Template Repository

V-Commander, at present, supports a secure, centralized repository of VM templates. The consistency of templates is particularly important when many parts of the business are deploying virtual machines. The body of templates may be as large as necessary. Anything applied to a template will be inherited by VMs created from that template.

At the initial launch of V-Commander, the repository was the foundation of all control. It supported tagging and tracking of deployed VMs. The tagging showing pedigree, relationships to other deployed VMs, and deployment status on VMWare ESX. The monitoring included the ability to start, stop, and alert about a VM, and the ability to quarantine.

With version 2.0 of V-Commander, the tag-

ging function has moved outside the repository, following the same rationale as having both a registry and repository in service oriented architectures (SOAs). This tiering makes sense. Policies have a different cadence of change than templates.

### Tagging Improvements

Also with version 2.0, the sophistication of tagging and tracking has been considerably expanded. The idea of pedigree expanded into lineage and genealogy. It turns out that it is very useful to know exactly where a particular VM came from and how it has been transformed over time. This all becomes part of what Embotics calls *VM Identity Management*. V-Commander 2.0 also adds support for Microsoft *Active Directory*. Clones of a specific VM are treated as children. If a VM is getting unstable, management will want to identify its siblings and cousins to check on their stability. With a body of approved “golden” templates in a repository, each characterized as to their appropriate use, V-Commander can now alert if a valid VM was not created from the appropriate template.

This more sophisticated use of tagging gives a new kind of descriptive specificity to the data center. Like the customization overlay in lean manufacturing, it lets data center architects design more sophisticated aggregates of process with which to delight customers.

### Policy

At its original launch, V-Commander allowed administrators<sup>1</sup> to define policies as to where the VM was spawned from and where it is allowed to run. When these policies are changed, V-Commander could identify all of the deployed VMs that are not compliant with the policy change. Policies could be set for groups of VMs. One click deployment and rollback allow the effects of policies to be tested.

### Improvements in Zoning

Customers asked for more kinds of zoning in V-Commander 2.0. They wanted zones that could encompass more kinds of infrastructure – not just the obvious Web tiers, but also everything from data centers and VM Virtual Centers and clusters to folders and resource pools.

The development of zoning often works like this: Customers usually start with a production zone of defined hosts, to assure that production

workloads run only there. The Internet-facing demilitarized zone (DMZ) is another obvious zone that has higher security requirements and a more-immediate need to cope with demand bursts than other parts of the data center environment. Transaction processing also has a need for high availability. In addition, customers wanted overlapping zones. Some situations demand both high availability and the extra security of, say, a DMZ.

All these new kinds of zones can be policy targets. This allows the VM landscape to more closely match the inherent complexity of business process in a way that does not involve scripting or other one-off, hard-to-control and harder to audit approaches. Business support environments are not simple ecosystems – and the ability to attach policy to a container like a virtual machine gives the system both flexibility and security that securing at the application level, or at the hardware level, cannot achieve.

### End-of-Life Management

Virtual machine retirement and asset reclamation, something Embotics calls *expiry*, turned out to be very important to customers. V-Commander 2.0 enhances expiry by making it a four-step process.

1. At any time, an administrator can attach an expiration date to a virtual machine. Expiration dates can be set in the particular machine, or in the template, where they will be inherited by all machines made from the template, or for groups of virtual machines.
2. Some time before the expiration date, V-Commander will initiate an action – usually a notification that the virtual machine is coming to its end of life. The administrator may change the date or take actions, as appropriate.
3. At the expiration date, the VM is turned off. It continues to incur costs for disk space and licensing.
4. Sometime after the expiration date (usually 15-45 days later, set by zone or global), the system will delete the virtual machine or archive it and remove it from inventory. This gap gives lines of business time to complain and restore the virtual machine.

This staggered process meets a need to make expiration and removal the same kind of staged, well-considered process as deployment. Setting an automatic expiry forces IT to come to the business folks periodically to ask if they still need that virtual machine. Many VMs are deployed for a project, and without a process to support it, are not properly cleaned up.

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<sup>1</sup> V-Commander 2.0 offers role-based access security, defining five roles.

## Visibility

### Dashboards

Visibility comes in dashboards that support operational oversight, control, and audit, with drill-down capability. With V-Commander 2.0, more details are visible. The dashboard always identified the total number of VMs – running and not running. Now, it also identifies mismatched or otherwise irregular VMs, expired, suspect, and unapproved. Up to 50 default and custom attributes may be used, and unlimited custom reports can be created. Some customers are asking for dashboards for business users and other roles. This capability will be available in a few months in a maintenance release of V-Commander 2.0.

### Reporting

V-Commander reporting can go well beyond traditional metrics. It can also identify costs associated with a particular virtual machine or groups of machines, including offline, unauthorized, aging, and expired VMs. This reporting can be by cost center, security status, etc.

A typical *Offline Aging Report*, for instance, will identify how many offline virtual machines a data center is currently licensing. It will also report how long each has been offline, and how much disk space, licensing fees and support costs can be reclaimed by expiring the virtual machine. All of this is useful information.

Some customers set a global cost/VM in terms of licensing and management. Others segment further, assigning costs that vary with the operating system of the guest application – something that Embotics supports with V-Commander 2.0. Others have indicated an interest in segmenting by transaction type or application– something that Embotics is considering for a future release.

The challenge is that the more granular the cost metrics, the more effort is required to set, manage, and evolve them. Having a variety of options to work with allows cost structures be built to meet business expectations as well as IT traditions.

### Integration with other Management Products

V-Commander can provide feedback into process, event management, performance management and other tools. It interfaces with VMWare *Virtual Center*, Microsoft *Systems Center*, Citrix *Management Center*, and *PlateSpin* products, as well as into data center management tools like Tivoli and HP *OpenView*. V-Commander is addressable as a Web Service and also offers an API for custom applications. Lynch says that Em-

botics can create a custom plug-in for an application in a couple of weeks.

## Conclusion

While using virtualization brings great benefits to data center administration, it is *how* they are used that can create value to the business, which is a matter of proper management.

Managing your virtual machines as a fleet of deployable, redeployable, evolvable, and expirable resources makes a lot of sense. It has many advantages over managing by herds of physicality and application realms, because it addresses the manyness and roaming (the critical components of almost all contemporary angst, when you think about it) that are not well managed from either traditional perspective.

This management of an aggregate also is an example of the disciplines needed for the management of the new virtualized data center paradigms of cloud computing and mega-management touted by Google, Microsoft, IBM, HP and other forward-thinking and nakedly ambitious folks. Consider how the management style supported by Embotics V-Commander 2.0 is not just as a tool to manage your present VM fleet, but it is a management style to help you start thinking about external mercenary forces that might help you achieve your goals. Embotics' V-Commander is more than just a set of tools (though they are nifty); it is a vehicle for looking at assets in a more strategic way.



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