Hands-on review of Linux System Management Solutions:

Red Hat vs. Levanta

White Paper

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Introduction

As the use of Linux expands in the enterprise, IT managers are looking for comprehensive system administration tools to help them manage the fast growing Linux environments. Typical organizations may have anywhere from dozens to thousands of Linux servers deployed, as physical servers and/or as virtual servers running on one of several virtualization platforms. They need to optimize their processes in order to migrate software from one physical or virtual platform to another, upgrade software, add or remove applications and so forth. Linux system management tools tend to fall into one of two categories: home-grown (combination of open-source software and custom-written scripts) or large, multi-OS management frameworks, such as HP/OpsWare, BMC/BladeLogic, etc.

Particularly within the Linux environment, many organizations still use home-grown tools, since general server management tools tend to be oriented more towards Windows and Unix servers. However, as the size of the Linux deployment grows, customizing scripts can be very time-consuming and require a high level of expertise, as well as time spent debugging and testing. Many organizations lose sight of the fact that 'free' tools that consume undue amounts of administrator or programmer time may be more "expensive" than buying a management package at the outset.

Methodology

In this review, I'll compare doing a series of common Linux management tasks manually, and with executing the same tasks using two Linux-oriented management applications: Red Hat's Network Satellite Server tools and Levanta's Intrepid M management appliance, for updating, management, provisioning and monitoring of systems. For each task, I'll compare set-up time, the time it takes to create the first template or script, and the time necessary to execute the task once everything has been set up.

The tasks included:

- Deploying Red Hat Linux ES 5.0 (RHEL5) on new hardware,
- Migrating the OS and applications from a virtual to a physical server,
- Migrating the OS and applications from old hardware to new hardware,
- Deploying a third-party application,
- Patching the OS,
- Patching applications,
- Rolling back to a previous patch level for OS,
- Rolling back to a previous patch level for an application, and
- Finding and undoing rogue changes to OS and applications.

The applications were the LAMP stack (Apache, MySQL and PHP/Perl), as well as Tomcat and VMWare. The RHEL5 installation was done from CD for the manual process and from an image for the other two. Application and patch installations were done from the network for the manual process and using the standard deployment model for the other systems.

Applying Patches

To test applying and rolling back patches, I applied the full set of recommended OS patches after installing the basic Red Hat Linux ES 5.0, and patched the applications from the ones provided with the OS, Apache 2.2.4, JBoss Enterprise Application Platform 4.2, MySQL 5.0.44, PHP 5.2.3 and Perl 5.8.8 to the latest versions available.

Provisioning

There are two standard approaches to provisioning: the procedural approach typified by scripting, and the image approach, which creates, compiles and deploys a specific image for each task. Levanta uses a different approach, a transactional approach, which allows a single image to work with varying hardware platforms and configurations.

The Manual Approach

The manual approach involved installing RHEL5 from CDs, which included installing the Apache web server, JBOSS server and other server packages. A semi-automated deployment model is also possible, using a boot CD with a minimum version of Linux followed by installing the full RHEL5 image over the network. This process would be somewhat faster than a manual install from CD or DVD, but would still require an administrator manually inserting disks in each system, and following some basic procedure on each system to start the installation process. Repurposing a server would also involve rebooting with a boot disk.

Getting past the necessity to touch each system calls for using a PXE server, DHCP server and other infrastructure components, which is certainly possible but requires substantial expertise as well as considerable investment in time to create the systems, debug the operation, create working policies and so forth. Given the costs of the Levanta or Red Hat appliances, unless your administrators have lots of free time, the appliances should quickly earn their keep.

Applying OS and application patches also requires running a script or using the Red Hat Network automatic settings to download and install patches, and this method provides no way to roll back patches or troubleshoot problems. While it would be theoretically possible to look up which files were patched, find the old versions and manually roll things back, the time involved would be orders of magnitude greater than with the appliances.

Red Hat Network Satellite 5.0

Red Hat has several management products that combine into an integrated offering that has considerable capability and good ease of use. The Red Hat Network offering at its most basic provides automatic updates of registered Red Hat operating systems, allowing them to get OS and application updates and patches automatically. Beyond the updates, the Red Hat Network features management, provisioning and monitoring, either as a service delivered from Red Hat or via a local appliance running the Red Hat Satellite 5.0 appliance software. Pricing for the service is $13,000/year for the Satellite appliance as well as a licensing fee per server for the update, management, provisioning and monitoring modules that can be up to $96 per module per server, depending on the number of servers licensed.

The Satellite server is a software package that is installed on an RHEL5 system. It requires an Oracle backend database, which can be an embedded runtime Oracle system or a schema script that sets up the necessary database on an existing server. It also requires setting up separate PXELinux and DHCP servers to get the same levels of functionality as the Levanta appliance. These additional servers are not included with the Satellite package, and while not too difficult to get or install, do complicate the installation process.

Features and functionality are good, with a clean GUI and a fair degree of flexibility in terms of multiple levels of users and groups to allow for granular management of systems. It is simple to set up kernels to boot from, and to add applications to profiles to create images for application, web or database servers. Profiles can be created manually or an existing system can be used to create a profile.

One big limitation is that only software installed via RPM packages will be discovered and provisioned – software installed via other methods cannot be detected. This means capturing the state of a server with custom software or any patches not applied via RPM is not possible – deploying custom applications will require separate scripts, and rollbacks of patches installed via script or other method than RPM will not work. In addition, the Satellite Server and Red Hat Network work exclusively with Red Hat Enterprise Linux.

Since images are downloaded from network storage to the local storage for each server, deployment times will be affected by network traffic and link speeds.

Levanta Intrepid S Appliance

Levanta's appliance is unique in a couple of ways from the other products reviewed here. Not only does it use a procedural model to execute tasks, but all the servers it manages boot via PXE (pre-boot execution environment) and load Linux from internal (1TB) storage of the appliance. This means that creating copies of a server environment doesn't require copies from one server to another – the boot image is cloned on the appliance itself, a much faster process.

In addition to enabling simple creation and management of boot images, the Levanta appliance can easily create checkpoints to enable the admin to effortlessly back out of an application or OS patch and can use policies to apply actions across servers or groups of servers (e.g. rolling out a tested patch to all the JBOSS servers, but not to the web servers).

The Levanta appliance supports a variety of Linux versions, including RHEL, Red Hat Fedora and Novell/SuSE Linux. The appliance can either deploy RPM packages directly, or capture the difference between two checkpoints, create an RPM from the differences, and deploy that package to any number of servers desired.

The appliance is easy to manage, with both a web-based GUI and a command-line interface. All the major tasks such as creating templates, creating virtual servers (Vservers), creating policies, adding software packages (applications or patches), activating servers with specific Vservers, etc. are easily accomplished through either the CLI or GUI. A relatively inexperienced administrator can use this system to deploy a variety of pre-defined or custom software packages to available hardware without a lot of study. This is in contrast to the manual approach or the Red Hat, which requires considerable expertise to use.

In addition to deploying the operating system and a variety of applications to new or existing hardware on demand, the Levanta system can be used in concert with load balancers such as F5's BIG/IP and the load balancer enabler policy template to respond dynamically to changing loads in a web farm. The system can add additional servers to a policy group when loads are high, or remove extra servers when loads are low, repurposing the servers to an alternate software image.

Vservers can be checked to see if they're controllable, and migrated from one piece of hardware to another if the original Vserver becomes unresponsive. This allows for fault tolerance similar to clustering, without the expense and complexity typical of most clustering solutions.

As can be seen from the performance table, the Levanta appliance takes the shortest time to perform every task. This is not only due to the ease of use of the interface and the fact that wizards make it easy to set up each task the first time, but also because the integrated storage that each physical server boots from resides on the appliance, which makes deploying images to multiple servers or creating copies of existing images extremely fast.

The intuitive GUI and ease of use made very rapid deployment possible, as well as the easy roll-back of patches or other software installed after the original image, I'd expect the Levanta appliance to quickly pay for itself in any datacenter with more than a dozen Linux servers.

The Levanta appliances come in three versions: S, M and X. The entry-level Intrepid S with 10 managed-server licenses (the model used for this test) is priced at $4,995. Additional server licenses can be purchased separately at $350 per server. The S can also be field-upgraded (via a software upgrade) to the Intrepid M, the NAS-attached model, capable of managing several hundred servers. Intrepid X, a fully redundant appliance-pair is targeted at data centers that have Storage Area Network (SAN) and need scalable I/O.

Results

As can be seen from the following table, the Levanta appliance was able to outperform the manual process by a very wide margin, and the RedHat Network product by substantial margins. Of course, any management platform will outperform the manual process, since automating deployment yields substantial benefits over repeating the same manual process.

However, there is another factor that is harder to quantify. That is the time necessary to create and deploy a new package in the first place. For instance, to deploy an RPM manually to a dozen servers, a new script would need to be written, tested, debugged, then deployed to each server. With a management system, the process of deploying a package is less complex than writing a shell script, but ranges from a fairly simple process to a wizard-based process that is completely painless. In the case of the Levanta system, an additional performance factor is the use of the internal storage in the appliance for boot image – there is no need for the copying of files over the network to deploy packages – any copying is done internally on the appliance, at much higher speeds.

Task	Manual	Red Hat	Levanta
Install Linux on new hardware	65	16	5
Migrate OS & applications to replacement hardware	125	22	8
Migrate OS & applications from virtual to physical	125	31	18
Deploy 3rd party application	22	14	4
Deploy OS patches	18	16	8
Deploy application patches	25	15	3
Roll back Linux patches	N/A	16	4
Roll back application patches	N/A	22	3
Discover & undo root casues of rogue changes	N/A	14	8

Fig. 1 - Time Comparison

Conclusion

The point of implementing a Linux management system is to streamline the process of managing Linux servers and deploying operating systems and applications to new hardware or virtual instances. While it may be tempting for administrators with low budgets to write their own scripts or download the free open source utilities, in the long run, the time spent getting the system up and running and then creating, debugging and deploying images will be much greater than with the Levanta or Red Hat systems. Both appliances offer a much simpler interface and tools to simplify the process of defining and deploying packages.

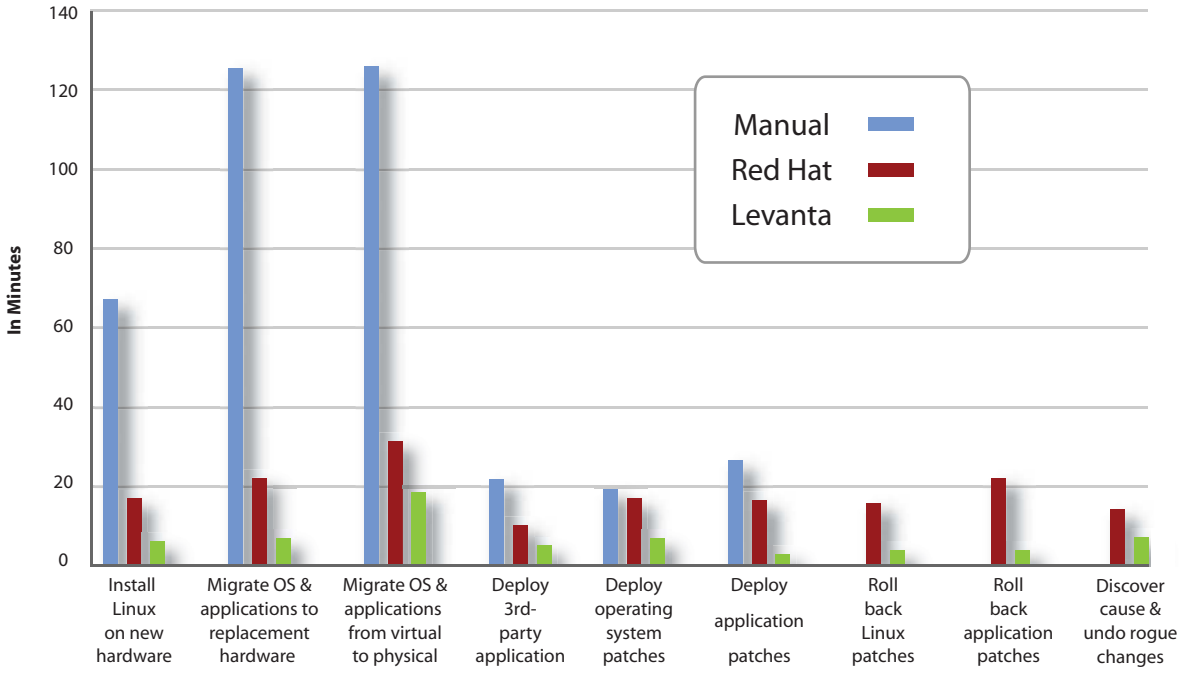

Fig. 2 - Levanta Time Savings

Levanta ups the ante with high performance storage on the appliance, a very simple and easy to use interface, and wizards that make it easy for even inexperienced admins to create and deploy software, easily roll back patches and repurpose systems as desired. Considering the difference between the Levanta S appliance and one year of the Red Hat Satellite server is less than $7,000, it is easy to recommend the Levanta system wholeheartedly to anyone with Linux systems.

About the Author

Logan Harbaugh is a freelance reviewer and IT consultant located in Redding, CA, who has worked in IT for more than 20 years. He is currently a Senior Contributing Editor with InfoWorld, and has written reviews for many publications and web sites, including Storage Magazine, Information Week, eWeek, Network World, Linux Journal, PC Magazine and Internet.com. He has also written two books on network troubleshooting.