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Levanta Transforms Linux System Administration

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Management Summary

It is hard to miss the transformation that has taken place in the delivery of health care. In the past, a family doctor who knew you well and would do whatever was needed was the expectation and, for many, a cherished memory. One forgets that the unpredictability of that system often caused appointment schedules to fall an hour behind by noon, and the number of patients a doctor could treat was low, making health care expensive. The accountability of doctors was limited, as most worked alone. The change to a more transactional mode of health care delivery has made quality heath care more accessible and affordable for more people. Now, assistants do routine tasks like taking blood pressure. The doctor may spend less time with you, but it is more focused on diagnosis. More specialization helps doctors keep up with research. Group practices make deviant behavior by doctors more gracefully corrected. And, of course, HMOs are able to chart the effectiveness of the medical practices, and to characterize the health of the populations they serve, to serve them better, and to manage their operational risks. Some find that the impersonal quality of modern health care can sometimes produce a doctor who sees you as the sum of your vices and variances from the norm, and who seems more interested in making the numbers right than in treating your idiosyncratic totality. What you really want is someone who will combine the specific focus of the old-time family doctor with the metrics and consequent knowledge that is a hallmark of modern medicine.

IT application administration has the same kind of variance as the health care described above:

- There is a manual, procedural approach, like the old family doctor, where provisioning and configuration of an application and operating system on a hardware device is an arduous process, and administration is a matter of watchfulness. Automation can streamline this process, but its benefits are limited and change is not easier.

- A more recent approach is to abstract the application and operating systems into images to be cloned. Here, over time, the variances from the image become a management problem, and much desired incremental change is hard to support.

Neither of these approaches provides the quick recovery, easy evolution, and full documentation that help the CIO, like an HMO, manage operational costs effectively.

Nowhere is this more a problem than in Linux environments, where the open, no-frills operating system lacks the bulk (and latency) of easy-manage amenities. With the emergence of swarms of Linux-based servers, and location-optional, budget-friendly computing alternatives like service-oriented architectures and grids, the need for lean, effective, highly documentable administration of these systems has grown urgent.

Levanta, a Linux service company in a previous incarnation, has developed a mode of efficient application management it calls transactional system administration. Because the kernel of Linux (and, now, Open Solaris) is knowable and addressable, those platforms have the potential to be managed by transaction, not by process or by deviations from the norm. Now, in addition to software for IBM zSeries and Intel x86 platforms, Levanta has launched a management appliance, the Intrepid, that integrates the application tightly with the Linux operating system kernel, and, basically, deploys the resulting meld on servers as they would a thin client. Read for details.

Server Swarms

The expense of very reliable hardware outstrips the budgets of many organizations that rely on technology to perform their business processes. The alternative is to pragmatically design for occasional failure through scale-out, service-oriented architectures. As enterprises have become experienced at scale-out architectures, they have learned that, though their capital costs for hardware and software are less, the many-ness of servers amplifies IT management headaches. Remote deployments in low-IT skill environments exacerbate them further. And Linux, though low-cost, is multi-instance (many flavors and patch levels), which makes things even worse.

To these headaches are added two inherent discomforts of the new reality. The first is the *high rate of change* that must be supported. The second is the demand for *full documentation*, made explicit by government regulations, but inherent as:

- A function of good organizational governance,

- A ramification of federated processes, partnering and outsourcing,

- A consequence of the need of large systems to optimize on many levels to many different factors, and thus to model the effects of change before implementation, and

- An inevitable by-product of the quick evolution and multifaceted nature of the security threats that confront today's IT environments.

And so, like the businesses they support, and like the evolution in health care, IT systems administration must adapt and become transactionally-oriented, if it is to scale to support, or be a part of, comprehensive IT solutions.

The Levanta Solution

Because the kernels of Linux[1] are exposed as Open Source, and because they use file-system structures of the UNIX heritage to document hardware requirements, rather than the more impenetrable database structures of some other operating systems like Windows, Levanta can work directly with aspects of the operating system kernel when deploying an application or distribution. This means it can define all the machine settings for a particular application, but without reference to a particular machine. This allows the application and

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[1] Levanta plans to develop a product for Open Solaris environments.

Levanta Components

- A *Repository* on the management appliance holds templates and software binaries for all operating systems and applications in read-only form. There is also a private storage area in the appliance to hold applications in the environment that Levanta should not manage.

- *MapFS,* Levanta's Linux kernel-loadable module, resides on, and boots off, the network, often in Levanta's appliance, but fools servers into thinking they're running locally. MapFS also tracks all file changes to the system, even down to the byte levels, and acts as a broker to redirect file changes over the network to the Intrepid.

- An *Overlay* module for each server resides on the Intrepid and tracks all events, regardless of what caused them (thus fulfilling some compliance regulations). By treating the state of the application like versions of data, they overcome some difficulties that have plagued IT environments for a long time.

- A *SmartMirror* module back in the management appliance monitors the overlay and gathers and documents state changes, permitting rollback to a previous state of any server on with byte-level granularity.

A loop between the *Overlay* and *Smart Mirror* modules allows for quick recovery from a fault, easy evolution of a patch level, or testing of system evolution on a sample instance of the application.

By these components, Levanta allows computing environments to be rapidly created, migrated, put into hibernation, and destroyed. By testing an application or operating system change on an instance, or set of instances, and then deploying the change once on the template in the repository, the environment can be expeditiously evolved. Because the architecture is transactional, all is documented.

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operating system to be quickly and safely deployed to a variety of appropriate hosts, be they desktops, blades, pizza boxes, or virtual machines. The application and operating system, thus fully documented, become more portable, so that failing hardware can be abandoned and the environment re-invoked elsewhere (think of the Mad Hatter's tea table in *Alice in Wonderland*).

Levanta Intrepid Features

Why an appliance? Because, for smaller enterprises, departments within large entities, and educational institutions, a localized appliance to administer Linux environments is needed urgently.

- Price: $7,495.
- Includes 10 licenses to manage servers and workstations.
- Additional Licenses $250 each
- Includes templates for Engineering Workstation, Office System, Web Server, Mail Server, SMB Server, Calendar Server, and Source Control Server.
- Includes 1.4 TB of internal SATA storage
- Dual hot-swap power supplies
- Hot-swap fans
- Two 10/100/1000 Ethernet NICs
- Supports RedHat, SuSE and Fedora distributions of Linux

Levanta used this approach to deploy Linux on both IBM's zSeries Mainframe and xSeries Intel servers, and to switch environments between the two platforms as needed. Now, with the *Intrepid M* appliance, this legerdemain can be implemented more widely on any server that runs RedHat, SuSE, or Fedora distributions of Linux. This approach is similar to the use of incremental backups and synthetic fulls in Continuous Data Protection (CDP) scenarios, or Network Appliance's evolvable *FlexClones* of data[2]. Furthermore, in server environments, this approach gives profound benefits:

- Recovery, and reaction to application hangs and other faults, becomes both easier and faster. A rollback to a known good state is possible in minutes.

- Because there is only one instance of the application, licensing for inactive instances can be avoided. This gives all the benefits of a thin-client architecture in a server environment. Application and Web servers, unlike

end-users' laptops, do not have an "offline" *modus operandi*.

- Evolving a server farm supporting the same application becomes a matter of tweaking the template and synthesizing the particular instances with their custom checkpoints.

- Most importantly, IT administration becomes a litany of transactions rather than a process. IT can do a lot with transactions. It can track them, analyze them, automate them, determine and isolate faults, determine usage (and bill for it), develop usage trends, model what-ifs, and generate all the information needed to set evolvable policies.

Without conversion to a transactional mode, automation of complexities like application management can seem either risky or crude.

Conclusion

Levanta's approach to application administration, the continuous data protection schemes of various storage management providers, and the proliferation of virtual machines all focus on better management through rampant documentation. Recent productivity increases have come through the digitization and componentization of process. Levanta brings the benefits of the resilience, integrity, and rollback of the transaction environment to Linux systems administration. Think of what this could do for your organization.

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[2] For more on Network Appliance's FlexClones, see **The Clipper Group Navigator** dated November 15, 2004, entitled *NetApp FlexVol and FlexClone Raise the Rate of Return on Storage Resources* available at http://www.clipper.com/research/TCG2004094.pdf, and **The Clipper Group Navigator** dated April 19, 2005, entitled *The Data Side of Grid - The Roles of Containers and a Single Name Space*, and available at http://www.clipper.com/research/TCG2005022.pdf.

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