IBM System Software —
A Sea Change for Enterprise IT Management

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Management Summary

Building systems to support operational scale and big data is a different challenge from building to optimize the use of constrained resources. Add in frequent chronic but not constant demands for resources, and new sourcing options – like software-as-a-Service (SaaS) and cloud – and the challenge becomes an opportunity to take out costs. There is no universal answer. The challenge is always about using resources effectively, but now many approaches can be taken, and a more diligent examination of system trade-offs is needed to determine how best to capitalize on new opportunities.

This shift is similar to what occurred during the evolution of automobiles. Once, in the industry's infancy, automobiles were tested by hill climbs and road races, and nursed to success by frequent tinkering. Functionality and pulling power were the goals. Then came the amenity era, when mechanical marvels of automatic transmissions and power steering helped the driver. More recently, electronic amenities, such as tire pressure monitoring and on-board diagnostics, give a more systemic assist. They automate what we or our mechanic would have done back in the days when cars were less reliable and tune-ups were frequent. Parking-aiding cameras and accident-response services (like *OnStar*) enhance safety and add the automotive equivalent of disaster recovery. As a result, the car-buying decision is a complex evaluation of trade-offs, from carrying capacity versus mileage to the theoretical value of the latest electronic feature, all considered in the context of family needs, particularly when vehicles are shared. CAPEX is merely painful but OPEX haunts the owner for the duration of the asset.

The use of technology has followed a similar path. Technology was seen as a swap-out for human labor, much as the automobile replaced the horse. When resources were inadequate, the ability to do *more* was the technology imperative. When the sprawl of *more* became burdensome, amenities such as virtualization became popular. With information technology, unlike the automobile, the management costs of data center operations, and the challenge of its evolution, become problems that, like bottlenecks, are often displaced but seldom solved. Meanwhile, IT has added new amenities, such as self-service by customers, which are business game changers and strong lures for new customers. They greatly expand how technology can be best leveraged for business value, and demand a rethink on how IT is managed.

With IBM System Software, IBM seeks to change the economics of technology use by extending and enhancing enterprise systems management to support a vastness of scale and a precision of delivery. System Software addresses Integrated Infrastructure Management. IBM Tivoli products now are focused on *integrated service management*. This bifurcation creates a clear but evolvable partnership between *what is done* and *what is used to do it*. Together they add coherence and consistency to the support of inevitably complex business operations. This, in turn, makes both scale and change more easily supported. For more on the particulars and benefits of IBM System Software, please read on.

The New Realities of Business

Several new imperatives demand a rethinking of priorities for enterprise systems management.

- **The Web is becoming the delivery vehicle for both customer interaction and business operations.** Discovering and meeting the needs of a sustainable customer base entails monitoring and analyzing masses of detail to understand and improve the experiences of every customer, partner, and employee – many of whom will have only a digital relationship with your organization[1]. This is a different situation from the days when human-to-human interactions were the primary mode of interaction. *Integrated strategies that can evolve easily and rapidly are required.*

- **The volatility of markets and the inevitability of the constant threat of easy customer churn make frequent delivery of new goods and services a key to business sustainability.** The technical infrastructure must support a high rate of change. *IT must be both flexible and rugged.*

- **Self-service via mobile devices satisfies customer impatience and reduces the delays of traditional workplace processes, particularly when most workers are located remotely.** This adds resource constraints back into the challenge – but in a part of the technology domain over which the business has little control. How you deploy and manage technology translates directly into the hard costs of business support. In most cases, Web and human support are both needed – and they need to be integrated in a single addressable context. *The role of integration is not just glue but also substrate.*

- **IT is now even less of a bounded, internal domain.** This is not a new reality, but it is spreading. *The discipline of today's cost cutting, and the efficiencies of SaaS and cloud offerings turn IT management from merely complex into a system-of-systems operation.*

So, now, system optimization is more than just stretching resources and doing more with less. It is also about supporting all that needs to be done, wherever and however it is done, as part of a larger wholeness that enables business coherence. This means the system must be designed with extensibility and evolvability as basic assumptions.

Emerging New Patterns of Technology Use

What is daunting for many businesses is that the consequences of the new realities mentioned above come not as the familiar litany of more but as a jarring need for new kinds of technology support.

Analytics

The analytics that have been the darlings of real-time businesses like trading are being used increasingly to optimize how many kinds of businesses are done. They need big memory to house temporary tables and intermediate states of analysis – but you wouldn't want to build a whole data center just to suit them – or rely only on appliances where your needs may grow rapidly.

Data

Both the databases (themselves) and keeping operations updated and available present a different kind of challenge. It involves not just the rapid growth of data but also the addition of new data elements sources, many of them untrusted or anecdotal. These must be leveraged without compromising traditional data quality. Perhaps the biggest challenge may be the short time frame in which they are expected to be usable.

Bread Crumbs

The new sensor-based information flows that inform operations (video, RFID, etc.) are very dissimilar to traditional structured data and files. Some feeds are sampled; some are kept. This may involve a different kind of process, a different kind of availability, a lower level of recoverability, and a different set of cost parameters, if you do not want to go broke.

Opinions and Feedback

Social media is not a part of many business operations, but one subject to viral and unexpected growth. Leveraging the new intimacy with customers involves analysis, such as Semantics, that is different from that used for portfolio analysis. The business benefits are hard to quantify, but the penalties of not participating in this area are considerable.

All of the above now are critical to opera-

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[1] The operational benefits of organizational transparency only work if you address all three domains.

tional competence – and most of them feed or harvest from each other. None can be sub-optimized. Only by thinking of technology as a systemic whole can businesses maintain the agility they need to respond to opportunities and threats in a useful time frame.

Every element of the systems supporting these new operational competencies must be instrumented and monitored, not just as an element, but also as part of a larger component, and also as part of the whole system. With systemic thinking, redundancies inherent in a stove-piped approach introduce brittleness and excess cost.

IBM System Software

IBM Systems Software changes the paradigm of enterprise-class systems management. Much of the design for this change has come out of its thousands of *Smarter Planet* engagements, each of which has expanded the concept of what systems management entails. Cross-platform[2] management capabilities allow customers to leverage what they have and minimize unnecessary change. IBM Systems Software elements are built on the element managers inherent in their products, which continue to be provided as part of the deployed product at no cost. They leverage an enhanced *IBM Systems Director* that accepts a variety of plug-in modules. They can be extended by a new set of advanced capabilities. In general, the paradigm is that of a base functionality, with a variety of optional completers to fit the needs of individual customers. This approach allows a customer to aggregate and standardize the management of several system commonalities across a multi-platform environment at a careful pace, focusing first on organizationally-specific pains.

Core Elements – Virtualization, Availability, and Management

Virtualization

For Server Virtualization, Systems Director offers VMControl. This product provides multi-platform virtualization management for *KVM*,

VMware, Microsoft *Hyper-V*, IBM *PowerVM*[3], and IBM *z/VM*. It is included in the current IBM Systems Director Editions and for IBM System Director V2.2, it is available as a plug-in. The *Express Version* focuses on classical management of virtual machines. The *Standard and Enterprise Editions* extend the functionality to include management of application images and clones.

Storage Virtualization

For Storage Virtualization, IBM offers *Storage Control*, a plug-in to Systems Director based on *IBM Tivoli Storage Productivity Center*. It is tightly integrated with IBM Systems Director and manages integrated physical and virtual server and storage management, from creation or deployment to destruction or retirement, for the entire lifecycle. It requires an *IBM DB2* restricted use, no-additional-cost license to support the Systems Director database.

Network Virtualization

Network Control configures, monitors, and manages network switches used in *IBM Blade-Center*, including those from QLogic, Brocade, Cisco, and Juniper. It discovers and inventories virtual switches including VMware *ESXi*, and *ESX4*, IBM PowerVM*,* and Red Hat *Enterprise Virtualization Hypervisor (EV-H)* and *Enterprise Virtualization Management (EV-M)* – the new names for the KVM product. It is included in the Systems Director Editions or as a plug-in for Systems Director 6.2.1 and later. A free, 60-day trial is offered by IBM.

Management

IBM Systems Director has been a key product for many years. Now, it has become a flexible tool that is the basis of system-wide infrastructure management. With its *RESTful*[4] interfaces and IBM's *iWidget* standard, there are a broad set of capabilities to which it can be

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[2] IBM supports heterogeneity in its x86, Power, and z platforms, so it has both the breadth and a good reason to take on cross-platform management. This would seem to be self-serving, but it also is *future proofing*. Next year's inventions cannot be assumed to be just derivatives of existing technologies, much as the owners of those technologies would like that to happen.

[3] The POWERVM hypervisor uses advanced LPARs to support totally isolated partitions that can run AIX or Linux. AIX has additional security features (role-based access control. Trusted AIX Multi-Level Security, Labeled Securty, and a Stack Execution Disable features that foils buffer overi flow attacks. You will know where this will be useful to you. Its Real Sense Server Source is a multi-threaded agent that can combine multiple protection technologies with a firewall and a vulnerability-focused Intrusion Protection System (IPS) for the ultimate in very localized protection for key workloads.

[4] *REST (Representational State Transfer)* is an architectural style typified by the World Wide Web that governs the behavior of resources

linked. All the other elements of IBM System Software come as plug-in modules to the Systems Director product. Additional management modules are available for Security and Energy Management.

Energy

Controlling the energy draw of a data center will be a popular reason for many organizations to use System Software's comprehensive energy management. The benefits come in immediately fungible dollars.

Active Energy Manager is a System Software element and provides an aggregate view of actual energy use by elements of a system that support the IPv4 or IPv6 protocol. Active Energy Manager's comprehensive range provides a set of metrics that is critical when considering system trade-offs, particularly in geographies where additional energy capacity is not available.

Security

Infrastructure security is foundational to both operations and compliance. System Software in this area is represented both by OS-specific products and by aggregative products. *IBM Compliance Expert Express Edition for AIX* is a typical example of IBM's OS-specific offerings. It includes recommended systems settings to meet PCI-DSS compliance, COBIT[5] best practices (which feed into SOX reporting, and the U.S. Department of Defense's Security Technology Implementation Guide (DoDSTIG).

At a more aggregate level, *Tivoli Access Manager[6] (TAM)* for Operating Systems is offered for UNIX and Linux and supports consistent security across both platforms, which is helpful especially when they are co-located via virtualization. It supports fine-grained authorization, including audit logs for privileged and super users, and compliance reporting. It leverages a multi-threaded architecture (as you might expect) and integrates with *Tivoli Identity Management (TIM)* and other products needed to support capabilities like timely fraud detection. *Tivoli Risk Manager* monitors TAM for OS audit and events to correlate them in the context of other enterprise security events.

Security provides perhaps the clearest example of a coordinated, integrated, aggregated capability that can fully meet requirements at both systemic and organizational levels. Anything less is inadequate.

Availability

With the growth of information and leveraging of new kinds of information, availability has turned from an imperative into a topography.[7] It is no longer just an implacable requirement but a spectrum. There will always be a need in key applications for the ACID[8] properties and for two-stage commits that keep the books straight. At the opposite end of the spectrum is the IBM STREAMS environment for sensor and monitor feeds that converts values to usable information before it ever hits storage. If you were committed to a single infrastructure architecture or operating system, this would be an impossible choice. IBM supports both with its operating system breadth, and also provides a variety of information strategies to minimize both business risk and cost.

IBM offers *xCAT*, also known as the *Extreme Cloud Administrator Toolkit*. This is an open source, scalable, distributed computing management and provisioning tool that is supplanting the older *Clustering Systems Management* tool (which will continue to be supported). It also offers high performance math libraries – *ESSL* and *Parallel ESSL*. The jewel of the collection is *GPFS*, IBM's *General Parallel File System*, which has evolved to support globally distributed data centers as a single system.

This realm illustrates a significant area of evolution that an approach like IBM System Software supports. It is about not wearing the belt when the suspenders will do (or vice versa). Often, it's the carrying costs that erode profitability. Once you see all the elements and how they contribute (or not) to the health of the system, weeding is both possible and prudent.

Getting Started With IBM System Software

All of these tools come in a variety of strengths at a variety of price points. Many come with 60-day free trials. This allows cus-

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[5] COBIT stands for Control Objectives for Information and related Technology. It is an international standard.

[6] System Software is for IBM products. Tivoli products have always managed heterogeneous environments, and, specifically, products of other vendors.

[7] Compare it to how the existence of an archiving appliance empowers storage strategies.

[8] Atomicity, consistency, isolation, and durability are the four characteristics of ACID transactions, and the basis of trustable results.

tomers to pursue various strategies. For executives at some companies and service providers, energy draw caps are a primary concern. *Active Energy Manager* is a way to discover actual energy and thermal characteristics, and to use *Systems Director* monitoring elements to manage the power draws of underutilized server. In this scenario, the savings comes in dollars, which is clear and compelling. For those who have bought heavily into server consolidation but have found the tools to be inadequate, IBM Systems Director VMControl – which also comes in different strengths, may be the element that is most immediately useful. For those concerned with security, IBM's offerings in that area may be a good place to start.

IBM's approach to its System Management offerings, though a tad intimidating, also lets customers leverage their current environment of IBM products while exploring what is possible by System Software elements. This can make the transition both timely and safe.

Conclusion

With its Systems Software products, IBM aggregates the management of hardware and software infrastructure elements to provide visibility and control of the comprehensive set of interrelated parts upon which applications – some very large and complex – reside. In techie terms, it has separated the *where we do it* elements from the *what we do* elements.

The *what we do*, the grist of applications, changes with the business and should be based on business value trade-offs. The *where we do it* should be based on the pragmatics of operational requirements, energy use, and security, using whatever it takes to optimize all three in terms of cost.

IBM System Software is effective even where standardization has limited the range of assets to a single platform. Thinking more broadly, it is a combination of legacy support and future proofing. System Software lets a data center continue to use its existing equipment, something IBM calls *migration-in-place*. This should please the budget folks.

It would be foolish to think that all the good technologies have already been invented, and that all that is left is writing derivative applications. As we begin the New Year, the likelihood that unexpected presents of great business value will be delivered is high. The standards on which IBM System Software is based, and the common plug-ins, will facilitate rapid adoption of new and stunningly useful stuff. Contemplate this potential joy as we wait for the days to grow longer.

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