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# Sun's N1 Mega-Vision — Managing to a Java Beat

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#### **Management Summary**

There is a mantra of simplicity these days, especially in IT departments. This is not surprising, since complexity adds to costs, and budgets have never been squeezed tighter, but the call for simplicity shouldn't be interpreted, well, too simply. We all wish the business world and the enterprise IT systems were simpler. But there needs to be a distinction between complexity that is natural (i.e., comes with the territory in which most multifaceted enterprise exist) and complexity that is *imposed* as part of some enterprise management decision (e.g., the need to manage thousands of servers).

Enterprises are complex because their business models, product lines, sales channels, customer relationships, etc., are complex. Even highly-focused niche businesses get complexity from the strategic partner relationships on which they depend. In fact, the capabilities of IT/communications systems have allowed enterprise complexity to flourish, particularly when bad times drive organizational consolidation, outsourcing, and second source contingency planning. Managing this complexity can be a problem.

By contrast, the management of IT systems and components is usually complex at first, and then becomes simpler and simpler. With time, the complexity (as seen by the caretakers) can be engineered into the background. IT complexity doesn't go away (it almost always increases), but automation (mostly software) allows it to be seen simply and managed at a higher level.

As business processes are more tightly integrated through IT systems, a lot of companies are considering how to manage these large, ever-more-complex IT environments to provide a guaranteed quality of service. The traditional computing tools of abstraction and automation can present a simpler and easily comprehensible view of what is going on (with drill-down specifics in areas where something is going wrong). However, service guarantees are a long step beyond monitoring and reacting, and the accelerating rate of business process (and consequent IT) change challenges many traditional IT procedures.

Sun proposes to manage mega-environments with its next generation architecture, N1. As Sun's Java technology changed the way software was developed, N1 changes the way IT environments and data, are managed by defining enterprise IT as an environment for providing business services. Each "business service" includes:

- the aggregation of application resources that support a business process,
- the definition of the infrastructure requirements of the service, authentication and encryption procedures
- and the metrics by which the business services will be measured.

This is an object-oriented concept, where all information about the service becomes a bundled part of the service to be implemented. It is Java, super-sized.

Though it is a major shift in focus for IT management that will take time to materialize, N1 is philosophically "binary-compatible" with Sun's past approaches, and will be comfortably familiar to Sun's installed base. Like Java, the N1 approach will appeal to many beyond that installed base. For a closer look at what it is all about, read on.

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## What IT's All About

*N1* transforms Sun's concept of "The Network is the Computer" into "The Network is the Data Center."<sup>1</sup> N1 turns the focus from the (too many) boxes and their configuration to the business services the environment as a whole provides.

N1 starts with a robust IT environment and highly available and heterogeneous business infrastructure. Staffed management is focused at the business service level. Underneath, abstracted by virtualization and managed by software, are the operating systems, redundancy and clustering, load balancing and other similar high availability features. Beneath that layer are the physical assets. With enough resources (money), inherent device self-management, and redundancy and fail-over capabilities, these physical devices become replaceable assets whose attachment and detachment are non-urgent maintenance processes. N1 finally allows IT management to address the needs of business on business terms.

This is a wonderful but challenging shift. Defining the rules for these business services is a bit like strategic planning – you end up dissecting the "obvious" in uncomfortable wavs. This task will be evolutionary for many. Sun sees N1 as a path of gradual implementation, starting with highly structured processes like transactions and document routing where metrics abound. As enterprises gain experience in writing business rules, they can move on to address more variable business routines where standard metrics of response time may not be as relevant to process success as the establishment of a trusted relationship, which cannot be easily optimized for time.

N1 uses the classic tools of automation (management by fixed procedures), virtualization (management of aggregated functions), and charge-back (management by cost). None of these tools are new: Caesar used all of them when commanding his armies' invasion of Gaul and other adjacent territories. Roman soldiers knew how to fight, were deployed flexibly in legions, and paid well enough (and poorly enough) to keep performing well. Similarly, N1 uses compute devices as logical-level foot soldiers – units of capability which can be aggregated together, partitioned apart, and failed-over in between. Space and time are not the impediments they were in Caesar's time, and loom large mainly in our need to pay for them. New things are possible.

The computing tools of automation, virtualization and charge-back that Sun is using are common to all vendor versions of this super-sized compute environment. To differentiate, it is necessary to examine more closely what Sun sees involved in each.

## Virtualization

According to Steve MacKay, Sun Vice President for N1 and Management Systems, "Virtualization decouples the once-fixed dependencies between applications, the operating environment and the hardware and software stack on which they run. Once decoupled, the resources in each of these stacks can be automatically and invisibly allocated and reallocated through software, thus increasing efficiency and flexibility. Virtualization enables abstraction of pools of resources, setting the stage for powerful automation and easy manageability." Thus virtualization involves aggregation and then using the aggregate as a single, greatly expanded, dividable resource. Like a checking account, you can allocate the resources as desired until the capacity is spent - and you can easily add more without disturbing existing allocations.

Sun N1 does both processor and storage virtualization. However, it does more. The concept of "business service" aggregates the business applications that jointly support a business process. Application management gives way to business services management through the same virtualization process.

In the server realm, the virtualization is done by Sun's acquisition, *Terraspring*, whose software comprises the "Control Plane" of N1. This is a conceptual object, not a physical one like a computer back-plane. It runs in a Solaris environment, and has a small footprint.

The back-end storage virtualization is provided by Sun's Pirus acquisition. Pirus has a switch but, in N1, the software will be

<sup>&</sup>lt;sup>1</sup> or, even, "The Data Center is the Network!"

incorporated into the control plane.

Virtualization by itself does not make things simple – indeed, by allowing more options, it can make things more complex. Virtualization demands far more granular monitoring be done under the covers by the next tool, which is automation.

## Automation

Automation is what computers were invented to do. By automating complex mathematical calculations, fewer mistakes were made. Databases put information in a more manipulable context, and allowed analysis that would be more difficult of the information were not assigned to fields Abstraction plays a part here, too, you will notice.

## Chargeback

Prioritization is almost always (eventually) enforced by a pricing structure that stems the compulsion to say "only the very best, in all ways, all the time."<sup>2</sup> In Sun's vision, accounting is integrated into the definition of a business service. This allows the cost of services to be recalculated atomically.

## The Benefits

## **Better Utilization**

It would seem that virtualization alone would give better resource utilization, and of course it does, which accounts for the viability of many virtualization solutions. It is when virtualization is combined with policydriven automation and the financial discipline of chargeback that you get the most cost savings. Not all is "Now" – some can be "Soon." Secondary copies of data can be staged on cheaper disks. Tape can be continued to be used effectively for more than archives, where the use of the data is predictable, and particularly where the data use involves a stream of sequential reads (i.e., streaming).

## **Better Efficiency**

Managing on the *business service* level

gives you a single format to guide both IT and business planning. How the business service will be deployed across a distributed, perhaps even partly outsourced environment is best first addressed at this high level of abstraction. Commercial grids and spot negotiations for processing of workloads also fit into the N1 concept.

## More Flexibility

The business service is a useful package/definition of functionality, because it can be modified without having to modify the larger environment. Centralized management of dynamic environments has led to tiered environments, and then to the object oriented approach. Developed as part of *Solaris*, "business service" containers will come to even greater prominence and utility in the N1 ecosystem. With detailed performance attributes, containers can also be used as virtual environments that can be optimized for a specific kind of workload.

## Yes, It's Sun's New IT Paradigm

N1 will again move the IT bottleneck, this time from application and physical level stovepipes back to throughput, both on processors and across the network. While both seem more than ample for today's needs, the systems are at present limited by the present configurations and needs of applications. Once you demolish the physical and application silos, you can use the rubble to create logical process highways. These highways can then foster evolution of business processes.

## ... And A Path To Utility Computing

By focusing on computing, Sun has crafted N1 into an architecture which will support a pay-per-use model of computing. The unit of use is the business process. Finding the unit by which a utility concept has been critical and surprisingly difficult. All physical-level metrics, such as by-theprocessor, and by-the-MIPS, become cumbersome and do not reflect quality of service and other metrics relevant from a consumer point of view. When consumption and supply were joined at the hip this was not a problem. In a utility, it becomes an impediment.

<sup>&</sup>lt;sup>2</sup> See The Clipper Group Explorer entitled dated October 31, 2002, entitled *The Accounting Pendulum Swings at Storage (or, Why The Taxman Cometh?* at http://www.clipper.com/research/TCG2002043.pdf

## Conclusion

Computers have become our mailboxes, our movie theaters, our link to a larger universe. It is easy to fall into the trap of wanting computers to mimic the devices they have replaced. N1 refocuses from *what computing can be forced to do* back to *what computing essentially is.* 

As IT systems more closely reflect the enterprises that use them, they become more difficult to manage in traditional, bottom-up ways. Many technology organizations are developing mega-visions to deal with IT complexity. Sun's

N1 vision, though not yet built out in all its ramifications, uses an object focus to organize all the complexity without specifying an inflexible grand scheme or framework. You need to spend some time thinking about this.



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