



Snapshot

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## The State of Enterprise Infrastructure and the Need for Infrastructure Simplification

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### The State of Enterprise Infrastructure

When considering the present state of enterprise IT deployments, one cannot help but to liken it to the morning-after affects felt during many spring break bacchanalias: "Where am I?" "How did I get here?" "Where's all my money?"

In the latter half of the 1990s, the IT industry saw a confluence of events that led to an unprecedented binge in IT investment. The excitement surrounding the commercial possibilities of the Internet raised the awareness of IT deployments in many decision makers' minds. While the Internet captured the imagination of those decision makers, it also presented notable problems. The torrent of Internet-related products created a whirlwind of confusion and uncertainty, and fear of falling behind drove many IT purchasing decisions. Unable to see clearly into the future, many companies bought products on a tactical basis. (Strategic decisions are very hard to make if planning horizons are only six months out.) Also stoking this orgy of spending for IT products were ominous issues surrounding Y2K, which became yet another excuse for overindulgent IT expenditure. While the issues and timeframes surrounding Y2K were much more concrete than were those surrounding the Internet, little strategic thinking accompanied these buying decisions either.

Yet despite all the confusion, trenchant new ideas did gain a foothold in the marketplace. The Internet brought a much greater awareness of the power of n-tier computing and the vast possibilities of managing and manipulating data in ways never before imagined. Distributed hardware and software resources allowed for more flexibility in data manipulation and access, but the physical implementation of the early n-tier environments have left IT managers with the chore of trying to make sense of what became a massive raised floor footprint, one that is largely fragmented, underutilized, and inefficient. In other words, many present IT deployments are typified by excess overhead and high degrees of underutilization. Thus, enterprise IT and the industry find themselves at the point where *Infrastructure Simplification* has become a necessity for survival. Without simplifying the myriad computing resources extant, the sheer cost of operation and maintenance will preclude any future investment, let alone achieve the ROI that would enable enterprises to eek out a competitive advantage in these vigilant economic times.

The IT headache faced by many today stems not from the idea of n-tier computing itself, but its misimplementation. In most cases to date, n-tier computing has been viewed as a physical description, manifested by distributed hardware; the very sort of vision that has led to the inefficiencies and problems previously described. To our way of thinking, n-tier computing is not about the physical location of CPUs, storage, applications, or the like, but rather it is a logical concept, one that allows for a much more fluid, efficient, and manageable use of IT deployments. As such, we believe that implementing technology accordingly will provide the beleaguered IT manager the path out of the present conundrum. Furthermore, we believe that the market today is providing the requisite technology that will address many of the symptoms of the late 1990s' IT hangover and provide for the transformation from the inefficient and underutilized *physical* n-tier environment to the efficiently utilized *logical* n-tier environment.

### What Enterprise IT Wants and Needs

It is not hard to identify what enterprise IT presently seeks. Cost reductions and greater ROI top the list, with the goal of better utilization of IT assets, improved management, rapid provision, greater business continuity, disaster recovery, greater resiliency, and security as the specific means to these ends. Attaining these leads to the following highly desirable outcomes:

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- The ability to make IT work for the enterprise, not the other way around. IT becomes the means to the enterprise's ends, not a distraction and cost center.
- Flexibility to respond to market changes. The vast interconnectivity amongst enterprises requires agility to meet new demands in real time, without disrupting business critical activities.
- Leveraging existing untapped or underutilized enterprise IT assets. Extending the useful lifespan of the existing asset base increases ROI and lowers TCO.
- Equipping IT managers to deliver applications and data more efficiently and effectively. IT can become an essential part of an enterprise's entrepreneurial efforts, allowing IT to become an enabler of new business opportunities.

### Marketplace Forces at Work

Fortunately for enterprise IT, there are a number of market forces driving the technological means to achieve the aforementioned goals. In many cases, these allow for the leveraging of existing deployments, or the rational consolidation of past investments into a simpler, cost effective, and more resilient computing infrastructure with minimal disruption to ongoing business operations.

Among these factors are:

- **Continuing advances in networking:** This applies to not only greater speeds and feeds, but also greater reliability, failover, and management.
- **The rapid adoption of Linux:** Linux is well beyond being an interesting new technology; it has a foothold within enterprise IT. ISVs are taking note and developing new Linux-based solutions that take advantage of the low cost structure and widespread support for multiple hardware platforms. These new applications offer a degree of hardware platform independence never before realized and should only further expand Linux' presence within enterprise IT.
- **Middleware and Java:** Developments in both continue to proffer greater flexibility in IT deployment strategies, allowing logical n-tier deployments to be created within a simplified IT infrastructure. As with Linux, ISVs are bringing to market products that take advantage of the increased flexibility afforded by these technologies.
- **Blade architectures:** Blade computing provides great flexibility in scaling out solutions to meet the dynamic needs of the enterprise while eliminating the cabling and real estate sprawl associated with early n-tier deployments. Additionally, blades offers a mix and match approach to computing where servers of differing characteristics can co-exist with equal access to storage and networking resources.
- **Grid computing:** By providing a greater leverage of existing IT recourses, grid computing networks are redeploying past investments with an eye to the future while raising the bar on performance and availability.
- **The mainframe:** The mainframe continues to reinvent itself by offering a new means to deploy workloads, manage their operation, and provide state-of-the-art Linux partitions (virtual environments) in a compact architecture that scales up to meet the ever-growing needs of the enterprise. In addition, through partitioning, the mainframe can also scale out through virtual blades/servers.
- **Cost containment and creating a positive ROT from IT investment:** The opportunity to leverage/redeploy existing technology investments through incremental deployments is compelling to many IT managers, not to mention financially focused corporate functionaries.

These market and technology drivers are leading to a number of ongoing changes within the IT landscape. First, applications are becoming increasingly abstracted from the operating systems and hardware upon which they run. Middleware and Java are playing a key role in this abstraction. Second, the dynamic allocation of IT resources is becoming more commonplace, as blades, grid computing, and ongoing networking advances provide a much more fluid deployment of IT resources driven by when they are needed and where they are needed. This fluidity addresses many of the flaws of the first instantiation of n-tier computing (physically distributed computing), by decoupling virtual assets from physical servers where they historically resided in order to place these workloads on the server best suited to perform the workload. This freedom of locating virtual resources can also respond to shifting workload and business demands by reallocating resources as needed. With Linux, middleware, and Java, applications can be moved amongst servers without the hassle of recompilation for specific hardware platforms. As a result, the basic economics of IT are changing as the quest for *Infrastructure Simplification* is driving a new IT landscape.

## The New IT Landscape

This new landscape — driven by customer needs and market developments — offers a new vision of how to implement, manage, and maintain IT resources. Physically mapped IT resources are giving way to logically or virtually mapped IT services that are increasingly detached from geographic location and operating system dependencies. The emergence of technologies such as grid computing, virtual partitioning, and blade computing is laying the foundation at the very time that IT managers are seeking new ways to bring their deployments under operational and financial control.

We see three specific centers of gravity upon which this new IT environment will be built:

- **Resources that Scale Up:** These resources are typified by the mainframe, i.e., physically integrated CPUs, memory, and storage in an environment that provides for the rapid deployment of virtual resources that can be dynamically assigned to enterprise business needs. This tight integration of resources can scale to provide computing solutions for the most demanding workloads. Additionally, mainframes through partitioning capability can scale out as well by creating virtual blades that can provide a rapidly deployable state-of-the-art computing resource as demand warrants.
- **Resources that Scale Out:** Blades and virtual blades offer enterprise IT the ability to grow as needed, in a modular fashion. This approach ensures that increased demands for IT resources will be met not by simply adding over-provisioned capacity that will only infrequently be fully utilized, but rather by adding capacity that is integrated into the whole pool of resources available through virtualization. Blade servers with their direct sharing of resources typify this shared yet simplified approach to n-tier computing.
- **Virtual resources:** These include remote/distributed CPUs, storage, management, data access, applications, and computing grids. Access to applications and data will be increasingly abstracted from the physical tether of the operating system or servers upon which they are executing and grids leverage this trend to provide rapid scaling and resiliency previously unavailable in the general marketplace. We believe that demand for software based sharing of resources both internal and external to the enterprise will only grow as grids demonstrate their ease and flexibility in responding in real time on an as-needed basis for the most demanding business and scientific workloads.

In short, the combination of blades, grid computing, and mainframes — all running within a logically n-tier environment — will provide enterprises with greater flexibility in addressing present and future IT needs. Virtual resources running on any of these hardware implementations can provide a more granular capture and distribution of resources for ongoing operations and meet peak demand periods without the overhead and underutilization of resources commonplace in today's IT infrastructure.

## What Does It All Mean?

Enterprise IT needs to clean up its act, as it were. The first implementations of n-tier computing — as promulgated by the advent of the Internet — have been largely focused on physically distributed hardware and software; a deployment misstep which led to a glut of tactically deployed and underutilized assets, that often created isolated islands of information across the enterprise. Organizations want IT to work flexibly, respond to market challenges, and leverage underutilized corporate assets; i.e., be part of a strategic solution that is resilient and makes IT work for the enterprise, not the other way around. The competitive realities of the marketplace have spoken and for enterprises to be competitive in the future, the following will issues will have to be addressed in a cost effective and mission critical fashion:

- The basic economics of IT are changing.
- Existing physically distributed n-tier solutions are inefficient.
- n-tier computing is a logical, not a physical concept.
- Physically mapped IT resources will give way to logically structured, and centrally managed virtual resources.
- Distributed networks & IT resources will be consolidated into three centers of gravity: scaling up (mainframes), scaling out (blades), and virtualized resources (SANs, grids, etc.).
- Blades + Grids + Mainframes = New Flexibility.
- Linux will figure prominently in the new IT equation.

A key to meeting these goals will be the strategic understanding that new technologies and products in the marketplace now provide the means for enterprise IT to incrementally redeploy their assets in a logically n-tier environment without the inherent overhead and underutilization of past implementations. This *Infrastructure Simplification* through blade servers, grid computing, and yes, mainframes offers a wide array of options for scaling out or up within a virtual framework. The ability to invest more granularly — with greater return on each individual investment through more efficient use — will to our way of thinking be the means by which enterprise IT evaluates offerings and opportunities going forward.