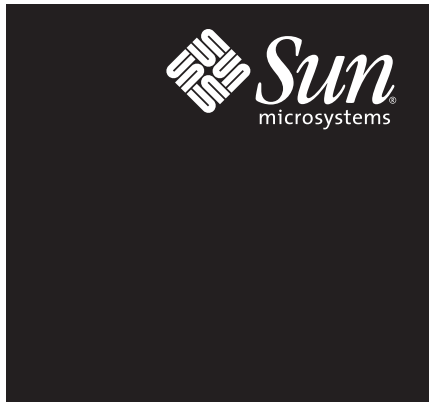
The Sun Service Optimized Data Center (SODC) Program

Bringing Order to Chaos with Agile and Secure Data Center Infrastructure, Operations, and Management



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Executive Summary

While most organizations strive for streamlined, secure, and agile operations, their data centers often remain mired in the complexity left from years and decades of silo-oriented legacy deployments. These mostly reactive environments are now largely ill-prepared to handle the challenges brought by popular Web services and associated service oriented architectures (SOAs). Beyond today's demands, its clear that future competitive and regulatory pressures will require data centers that are tightly aligned with the businesses they support, while remaining centered around the essential services provided to their customers and clients.

Comprised of a set of Sun and Sun partner technologies, the Sun™ Service Optimized Data Center (SODC) program creates a comprehensive roadmap that can transform the data center into an agile, efficient, and secure service driven environment. Rather than viewing the IT operation as a cost center, this highly-customized approach emphasizes the data center as a strategic business driver and an essential competitive weapon. The SODC Program brings together Sun's industry-leading Solaris™ Operating System (OS) and key enterprise systems technologies. These advanced tools are complemented by the Sun™ Operations Management Capability Model (OMCM) — a comprehensive and continuously improving methodology that enhances IT management.

The key elements of the SODC program are platform simplification, process automation, and service architectures. This comprehensive approach includes methodologies for consolidation and migration, standard operating environments, application and OS provisioning, service delivery networks, virtualization, service oriented architectures, and many more. The SODC program gives organizations the ability to:

- **Move quickly to help meet ever-changing business needs:** Flexible and efficient IT operations let organizations respond rapidly to new challenges and opportunities.
- **Promote Innovation:** Improved utilization makes more resources available so organizations can stay ahead of the competition with new products and services.
- **Speed time-to-market of new products and services:** Better data center efficiencies result in more testing to promote faster and higher-quality designs.
- **Leverage IT investment as a critical business driver and strategic weapon:** Improved utilization lets organizations react more quickly to changing business needs such new competitive products and services, new delivery channels, and new government regulations.
- **Reduce Risk:** Reducing the number of operating environments, consolidating onto vertical or horizontally scaled platforms and storage environments and deploying enterprise architecture, shared services models, and service oriented architectures, all help to reduce risk and improve security.

The Challenges of Modern Data Centers

Today's data centers have moved well beyond the image of glass-housed cost centers with raised floors and spinning tape drives. In fact, modern IT operations have become an essential driver of business priorities, forging close relationships with business units and featuring direct involvement in key initiatives. Increasingly, without agile and efficient data center operations, enterprises cannot react quickly to counter competitors, adapt to rapidly changing business conditions, or move to implement new regulations. The challenges to modern data centers are many and varied:

- **Complexity:** With their need to support legacy environments as well as deploy new Web-based application services, modern data centers are frequently saddled with staggering complexity. Today, a typical data center may have many operating systems, hundreds of applications, thousands of servers, and hundreds of terabytes of storage. Large enterprises may host 5,000 to 15,000 servers with storage capacities expressed in petabytes. All of this complexity reduces the ability of the data center to respond, and results in increased management costs and risks to the business.
- **Increasing heterogeneity:** In a typical Global 2000 enterprise data center, it may not be unusual to find a mix of mainframes, high-end and mid-range UNIX® systems, commercial-off-the-shelf (COTS) Linux boxes, and a collection of servers running various Microsoft Windows environments. Typical supported applications range from e-mail, databases, data warehouse/business intelligence, OLTP, Web services, groupware, workflow, and document management to CRM, ERP, SCM, SFA, and others. These disparate systems and environments add complexity and contribute directly to management expense.
- **Increasing operations management challenges:** Operations management includes the daily management of network computing operations that comprise management of assets, changes, data, IT processes, networks, systems, service desk, and software. People, process, and technology issues related to each functional area of the data center must also be addressed. Here too, increased heterogeneity has resulted in operations management becoming even more challenging. Today organizations are trying to reduce data center operational expenses through improved productivity. Capital cost reduction is also targeted through improved utilization of the existing IT infrastructure. Ultimately, improved quality of service delivery requires the thorough enforcement of service-level agreements and precise tracking of the associated costs.
- **Decreasing budget:** With increased emphasis on return on investment (ROI) and increased profits, IT budgets have come under painful constraints, and everyone is expected to do more with less. Operations budgets are down for the third year in a row, with many organizations resorting to further elimination of staff to keep costs down. With capital budgets under pressure, some organizations are attempting to extend the life of older technology, while at the same time purchasing "disposable" commercial off-the-shelf hardware. Organizations are increasingly attracted by pay-per-use subscription services now being offered by software and systems vendors.
- **Outsourcing and off-shoring issues:** In the past, outsourcing was sold to many IT shops as a cure for all of their problems. For many, however, outsourcing only transferred the IT management burden to a third party, resulting in unacceptable service delivery levels and rising costs. Many organizations outsourced their IT operations only to eventually bring them back in-house when the true cost was known. Understanding the impact and trade-offs of potential outsourcing options is now considered critical to success.
- **Compliance and governance:** Issues related to identity theft and well-publicized corporate scandals during the last several years have had a significant impact on the enterprise. Recent legislative acts have been passed in the United States and elsewhere, regulating issues such as privacy (California Senate Bill 1386), finance (Gramm-Leach-Bliley Act), healthcare (the Health Insurance Portability and Accountability Act), national security (USA PATRIOT Act), corporate governance (21 CFR Part 11, Sarbanes-Oxley Act, and SEC Rule 17a-4), and even corporate risk management (Basel II in Europe). While most of this legislation imposes stringent requirements on how companies manage the private information of their constituents, customers, employees, and shareholders, most of the burden of data privacy and information lifecycle management falls on IT operations.

Introducing the Sun Service Optimized Data Center Program

Acknowledging the many issues that face IT organizations, the Sun Service Optimized Data Center (SODC) program not only recognizes the inevitability of the heterogeneous data center, but also helps to optimize the resulting infrastructure. Sun's view of service optimization goes well beyond consolidation, recognizing that efficient use of resources increases system utilization, lowers total cost of ownership (TCO), and improves profitability. This broad approach encompasses centralization, physical consolidation, data integration, application integration, and storage consolidation.

The Sun SODC program is an industry-leading combination of Sun's technological innovations, data-center design methodologies, and IT Service Management offerings. This comprehensive approach details a step-by-step roadmap of solution methodologies to achieve the high level of efficiency and flexibility described in Sun's N1™ Grid vision for the future of the data center. The SODC program also seeks to optimize the data center for the deployment of service oriented architectures (SOAs). One of the key tenets of the SODC program is virtualization of resources at every level, including applications, memory, processors, storage, and even the network itself.

The Business Case for SODC

With IT operations increasingly linked to business success, many organizations are simply unable to respond quickly or effectively to business changes, challenges, and opportunities. This inflexibility has a number of causes:

- For many organizations, considerable IT manpower is consumed in the maintenance of various silo-centric operations. While some vendors push standardization as a solution, many IT departments have no choice but to maintain essential legacy applications, databases, and systems — making standardization literally impossible. For example, replacing a large legacy database with a modern relational database can be prohibitively expensive.
- Excessive complexity also leads to reduced flexibility. Sun estimates that an average large enterprise has 27 different directory stores while a typical end user must maintain seven passwords. This burdensome complexity leads to problems of duplication, replication, poor synchronization, and poor security — all resulting in reduced agility.
- Many IT operations lack the tools and metrics needed to help them understand the health of their IT infrastructure. This lack of understanding leaves many unprepared to plan for disasters or to establish necessary levels of capacity in case of spikes in business demand.
- Many IT operations also lack consistency and the ability to measure service delivery capability. Multiple different versions of deployed applications, operating systems, tools, and various patch levels all exacerbate this situation.

Sun SODC Initiatives

Ultimately, achieving operational efficiency and improving data center effectiveness are long-term goals that involve many different disciplines of the IT organization. To address these challenges and shortcomings, Sun's SODC program is currently divided into seven major initiatives (illustrated in Figure 1):

- Migrate — to reduce complexity
- Consolidate — to reduce cost
- Develop SOAs — to reduce cost, improve business flexibility, and provide shared service models
- Improve operational capability — to provide better predictability, reliability, and manageability
- Automate using N1 Grid technology — to improve network service deployment and reduce time to market through application and OS provisioning, system management, and Grid Computing
- Change business models — to adapt to utility and subscription-based computing
- Embrace IT governance and supporting architecture — to maintain a proactive technology plan over time

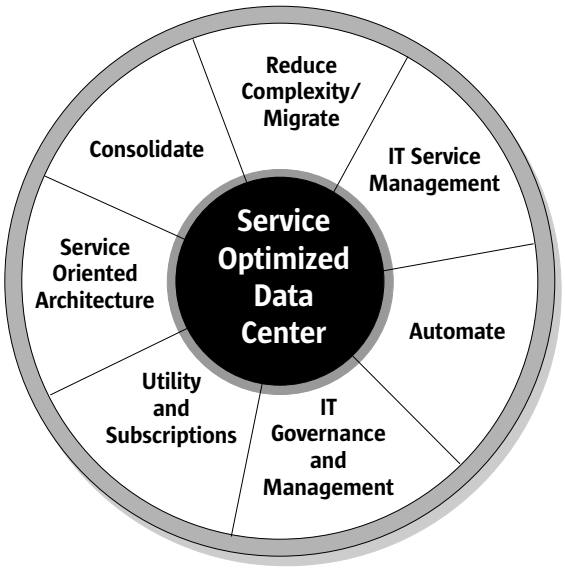

Figure 1. Seven elements of IT optimization in Sun's Service Optimized Data Center program

All of the seven initiatives comprising Sun's SODC program can have measurable benefits to the organization in terms of agility, efficiency, and security. However, it is important to note that these initiatives need not be executed in any particular order. Depending on the current operational environment and organizational interests, individual initiatives can be targeted for execution while some may not be required at all. The main goal of the SODC program is to provide a realistic plan to realize Sun's N1 vision through specific and actionable initiatives. Figure 2 illustrates a successful data center optimization effort, and the sections that follow discuss these initiatives in more detail.

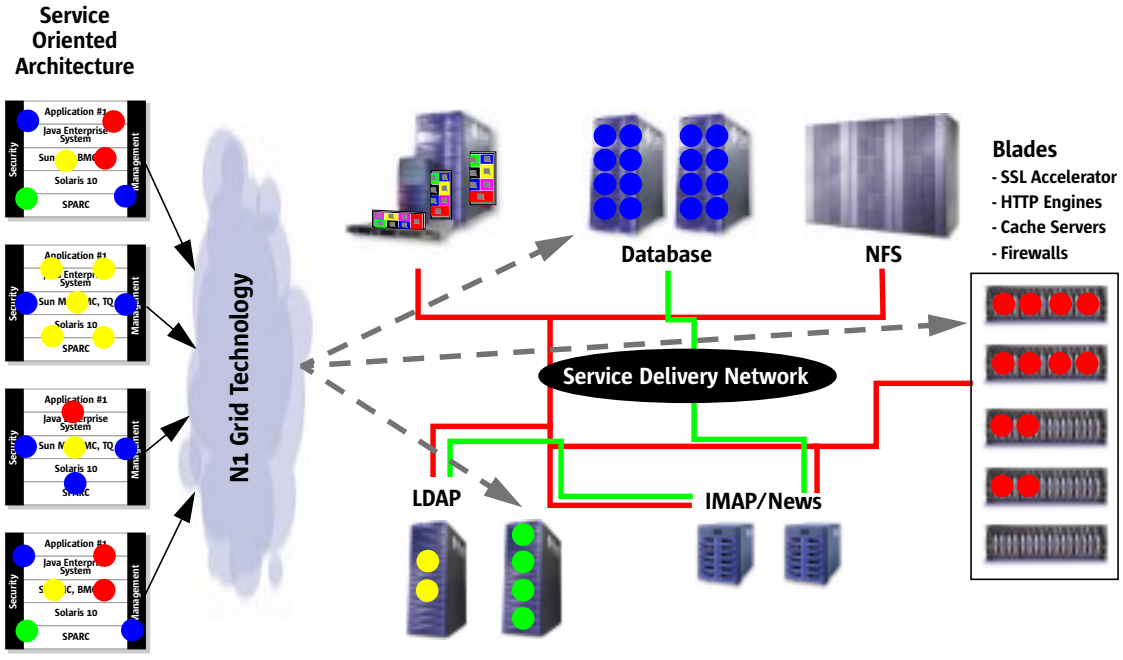

Figure 2. A typical service optimized data center using N1 Grid technology over a Service Delivery Network

Migrate to Reduce Complexity

A recent Gartner study claims that maintaining every additional operating environment requires 25 percent higher system administration costs. Unfortunately, a typical data center today may host a wide variety of operating environments including AIX, DG-UX, HP-UX, IRIX, Linux, MVS/VM, Mac OS, OS/370/390, OS/400, Ultrix, VMS, Windows, and z/OS — along with different versions, configurations, and patch levels within those environments. The overall goal of the migration initiative is to reduce the level of complexity in terms of platform standards, patch level variability, and the number of vendors with whom IT staff must interact. Lower levels of complexity contribute directly to increased reliability, enhanced security, and fewer required patches, upgrades, and configurations.

Sun's portfolio of migration services are designed to help organizations migrate from any of the environments listed above to the Solaris Operating System. At the same time, Sun also recognizes that no one vendor or operating environment provides solutions to all problems, and the SODC program focuses on migrating to a manageable number of operating systems and server architectures. To this end, Sun has introduced an Operations Management Capability Model (OMCM) that is based on a comprehensive, continuous improvement methodology for IT management that provides a practical frame and measurable roadmap for enhancing IT management.

Consolidate to Reduce Cost

Consolidating to fewer standardized platforms can result in reduced complexity, lower TCO, improved availability, a rationalized data model, and easier-to-manage service levels. A typical consolidation scenario is shown in Figure 3.

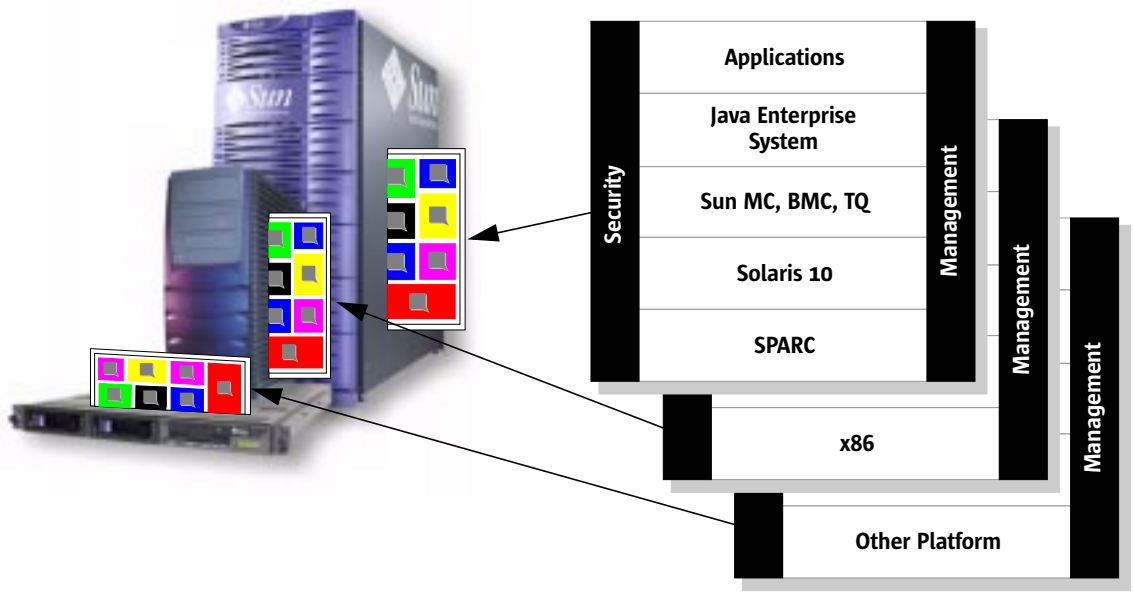

Figure 3. Consolidating to fewer platforms

Sun offers a variety of technologies that make effective consolidation possible:

- *Solaris 10 Containers* allow multiple applications to equitably share a single execution platform through flexible software-defined boundaries. An integral part of the Solaris 10 OS on all platforms, Solaris Containers (formerly N1 Grid Containers) isolate software applications and services. Solaris containers provide a breakthrough approach to virtualization and software partitioning, allowing many private execution environments to be created within a single instance of the Solaris OS. Each container has its own identity and IP address that is distinct from the underlying hardware, and each container behaves as if running on its own system. The result is consolidation that is simple, safe, and secure.

- *Enterprise System Domains* provide hardware partitioning that can be used to provide fault-isolated domains on Sun Fire Enterprise servers. Each fault-isolated domain supports a single instance of the Solaris OS — with each OS instance able to support multiple Solaris 10 Containers. The considerable flexibility afforded by the combination of Enterprise System Domains and Solaris 10 containers means that system resources can be allocated to consolidated applications with flexibility and very fine granularity.
- *Chip Multi-Threading* technology in the UltraSPARC® IV and future SPARC® processors provides capacity for more available execution threads. More capacity translates into greater available resources for the consolidation of disparate applications.

Develop Service Oriented Architectures

Service oriented architectures work well with existing multi-tier infrastructure topologies and are generally built using two or more software tiers (including the Web/presentation tier, application tier, and back-end/database tier). SOAs are built as loosely coupled, coarse-grained shared services that use open standards and protocols to communicate — with repeatable application patterns for delivering services. SOAs provide the ability to break traditional applications into smaller component processes, ultimately facilitating plug-and-play software that can easily change with business requirements. Web services developed with an SOA model help enable more standard process integration methods for users with heterogeneous applications or connectivity requirements between business partners.

The SOA concept is not new, and SOA principles have been understood since the mid-1980s when distributed computing and remote procedure calls initially came to market. However, the use of SOAs during the 1980s and 1990s was typically limited to cutting-edge projects whose architects had the vision, discipline, and money to invest in the initial stages of application development. The biggest impediment to widespread adoption of SOAs was the lack of standard middleware infrastructure, or even a standard API and protocol for SOA interfaces. Early efforts such as the Open Software Foundation's Distributed Computing Environment (DCE) and the Object Management Group's Common Object Request Broker Architecture (CORBA) provided a starting point but relatively few followers. Now, the unanimous vendor acceptance of Java™ technology, especially Java 2 Enterprise Edition (J2EE), and emerging Web services standards such as SOAP, UDDI, and WSDL has contributed significantly to mainstream SOA deployment.

Improve Operational Capability

Operational capability is the combination of people, process and tools that provides an organization the ability to deliver IT services to an agreed upon service level in a predictable fashion with acceptable risk and cost. The key to improving operations capability involves transitioning from the traditional silo-centric data center to a service-driven data center. This transformation goes beyond cost cutting, re-architecting or re-hosting applications, to an entirely new way of running IT operations. Sun's Operations Management Capability Model (OMCM) is based on industry standards such as the Information Technology Infrastructure Library (ITIL) and the Control Objectives for Information and related Technology (COBIT). Sun's OMCM uses capability-based evaluation criteria, and is built on the SunTone™ Management Framework.

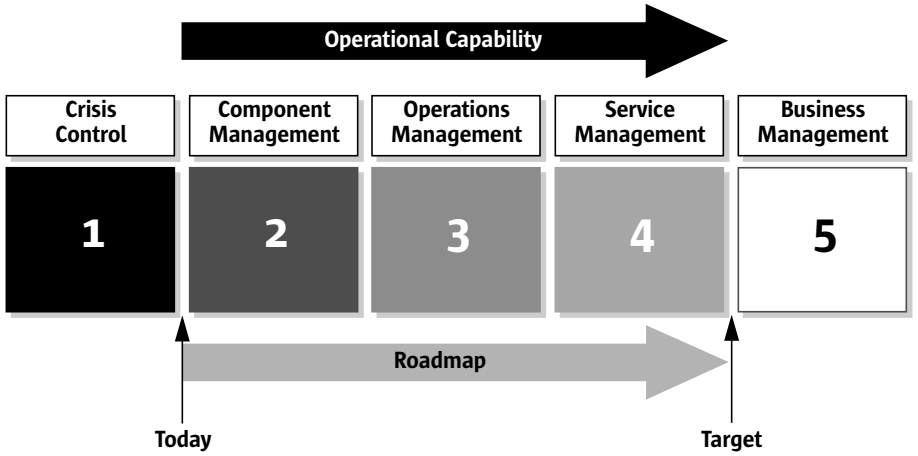

Figure 4. Sun's Operations Management Capability Model (OMCM)

The OMCM employs a rigorous five-level model of continuous improvement for IT operations illustrated in Figure 4. Most organizations today reside at Level 1, implying that when something breaks in a customer environment, the customer calls the vendor for support and hopeful resolution. Level 2 represents a more predictive mode where IT operations can anticipate problems *before* they occur. Level 3 involves taking a proactive approach to managing the IT environment with effective problem avoidance. Level 4 represents true service-level management, where IT operations has specific defined service-level objectives. Finally, Level 5 represents the point where IT operations and data center capabilities are closely linked to key business drivers for the organization.

Sun can help organizations move systematically from Level 1 to Level 5 of the OMCM using the SunTone Management Framework (STMF) and third-party tools. The STMF involves people, processes, and tools (Figure 5) working within the existing environment in a product-agnostic fashion. To deploy custom OMCM implementations, Sun works with best-of–breed partners, including BMC, Micromuse, Proxima, Remedy, and TeamQuest. Further details of the Sun OMCM can be found in a Sun BluePrints publication entitled "The Operations Management Capability Model".

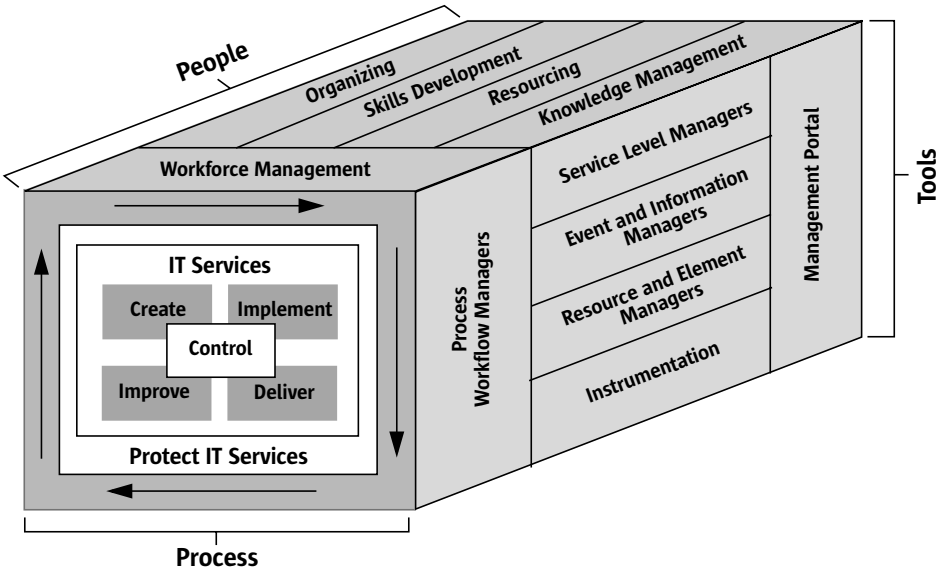

Figure 5. The SunTone Management Framework involves people, processes, and tools

Automate Using N1™ Grid Technology

Sun N1 Grid technology incorporates Sun products and best practices to redesign the data center for better agility and efficiency. The N1 Grid strategy is suitable for companies that deploy a large number of network services that change frequently. The goal of N1 Grid technology and services is to:

- Increase *utilization* by enabling a dynamic infrastructure
- Improve the *responsiveness* of IT organizations
- Lower infrastructure management *costs* through automation
- Enable *virtualization* of resources

Reinforcing Sun's N1 Grid vision, Gartner believes that during the 2006-2009 time frame, delivery of IT infrastructure services will become highly automated, followed automated execution of business process services in the 2009-2014 time frame[1]. While realization of these trends is still a few years away, many hope to gain competitive advantage by starting to building suitable automation infrastructure now. As a part of the SODC, Sun experts can work with IT staff throughout the entire process to define, test, and deploy the N1 Grid strategy in customized data center deployments.

N1 Grid technology can help IT organizations:

- Manage the network service lifecycle with increased ease and speed
- Reduce the time from business concept to network service deployment by as much as 40 percent
- Simplify service provisioning through proven N1 Grid architecture design and software technology that allows centralized control of multi-tier network services
- Mitigate risks inherent in new technology and new process adoption by sharing Sun expertise
- Leverage real-world patterns and experience through proofs-of-concept that demonstrate architectural benefits and potential gains

Change Business Models to Embrace Utility and Subscription Payment Models

In spite of the hype that has historically surrounded utility computing and subscription models, they are clearly a large part of a compelling IT future. Based on customer demand, vendors are now finally moving towards pay-per-use and subscription-based pricing models. This trend promises to relieve IT shops from never-ending software upgrades, "shelfware" headaches, painful patches, and frequent hardware purchases. To support these models, Sun believes that business processes and services must be closely linked to SOA-delivered applications hosted on well-constrained, metered, and efficient infrastructure. Applications and their infrastructure must also be able to respond to unexpected changes and peak demands. Sun is already marketing middleware and even hardware on a subscription basis with the Java Enterprise System available at $100 per employee per year and Grid Computing hardware resources at the rate of $1 per CPU per hour.

Embrace IT Governance and Architecture

Corporate scandals in the resent past have led to the passage of the Sarbanes-Oxley Act of 2002 (SOX) and similar corporate governance laws in the United States, Europe, and elsewhere. While stringent, these laws have helped to improve discipline and rigor in most IT organizations by forcing an examination of fundamental business processes, often resulting in redesign with input from important stakeholders. While many CIOs have been frustrated in the past in their efforts to get IT and the business to work together, they can now use this legislation as a springboard to greater efficiency and clearly-documented interfaces for business and IT.[2]

To facilitate the spirit and letter of this legislation, IT organizations must construct a flexible compliance architecture that also meets business needs. In addition, full compliance will require a significant on-going effort as the legal framework continues to evolve. Compliance officers will have to understand the processes and systems

1.Gartner on Outsourcing, 4Q04 , Lorrie Scardino et al., ID #G00125258, Gartner Inc., 6 December, 2004.

2.Telephone Company CIOs Should Use Compliance Architecture, Jay E. Pultz and Kathie Hackler, ID #: G00124895, Gartner Inc., 16 November 2004.

before adopting best practices. To comply with SOX and future regulatory requirements, collaboration systems will have to be formal, process-oriented, and well documented. The following related activities can be anticipated:

- Storing corporate content using integrated document management systems, records management, and e-mail archiving and management
- Managing data using a content-management approach including coordinated metadata and data warehouses
- Managing performance with workflow, online analytical processing, business intelligence, and business activity monitoring
- Providing access and responses with Web-based publishing and collaboration tools
- Reporting to and advising stakeholders on the state of the business with electronic filing, reporting tools, score-cards, and dashboards

Recognizing these requirements, Sun envisions a future where many of today's applications will become quickly outmoded, with SOAs gradually replacing current application architecture. Because this process will probably take place over several years, IT organizations will likely deploy next-generation architecture in a phased approach (Figure 6). Sun can work with organizations to help establish this roadmap now, while providing ongoing periodic reviews. Because Sun actively participates in many industry standards bodies and is a major contributor to the open source community, new technologies will become available as they are ready for use.

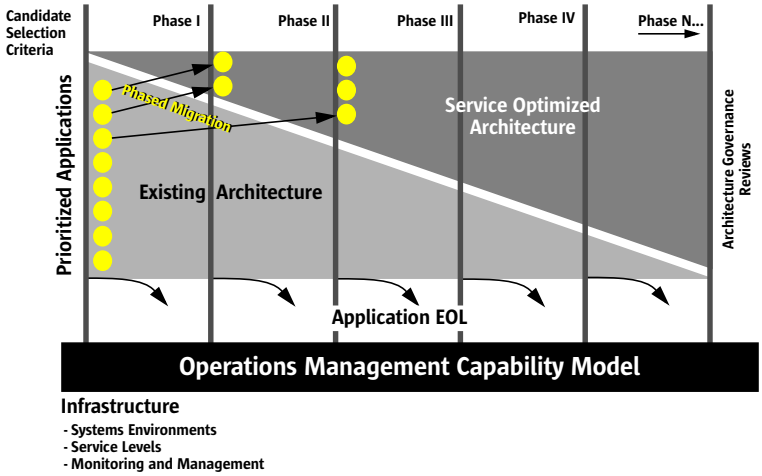

Figure 6. Architecture for IT Governance requires a phased approach

Sun's Leadership Role in Service Optimized Data Center Design

Sun has been a leader and innovator in service-optimized data center design for most of its existence. Sun pioneered the tenants of network computing (circa 1985), introduced the software-as-service concept (circa 1998), and innovated with Capacity on Demand licensing (summer 2000) long before these key technologies and methodologies became recognized by the industry at large. In spite of this leadership heritage, Sun understands that each organization and business has unique requirements, and that no one vendor can meet every customer need.

As a result, Sun provides complete solutions, working closely with vendor-agnostic systems integrators to recommend the most cost-effective solutions that best address the needs of each unique organization. Sun's SODC practice experts help organizations optimize their data center using a three-phased approach:

- **Phase 1 — Evaluate**
  This phase involves joint planning sessions that identify key initiatives and issues required to optimize the data center
- **Phase 2— Roadmap and Plan to Execute**
  This phase establishes a 2-3 year roadmap and outlook for key projects while integrating tactical solutions into the overall IT strategy
- **Phase 3 — Implement**
  This final phase provides services for implementing the projects identified in the roadmap and involves a Program Management Office to provide oversight for the various initiatives.

A Broad Portfolio of Data Center Services

As part of the SODC initiative, Sun offers a broad set of methodologies and technologies to help customers migrate to the next-generation data center, including:

- Enterprise Consolidation
- Enterprise Migration
- N1 Grid Computing
- Grid Computing
- Sun Mainframe Rehosting
- Service Oriented Architectures
- Enterprise Architecture Design Services
- Service Delivery Networks
- Sun Customer Ready Systems program
- Sun BluePrints Program
- Infrastructure Services
- Business Continuity
- Application Readiness Services
- Sun Reference Architectures
- Data Center Reference Implementations
- Utility Computing
- Managed Services

Implementing an SODC Roadmap

Building a service optimized data center is ultimately a journey and not a destination. As new solutions, technologies, and tools become available, the data center must incorporate them as quickly and seamlessly as possible. If done correctly as a part of a continuous improvement strategy, this process need not imply drastic changes, gratuitous migrations, and costly business interruptions.

Sun's Data Center Roadmap Service is targeted at business and technology experts who want to maximize budgetary and planning cycles. The Roadmap Service requires joint participation from business and technology executives and from Sun's architectural specialists. Implementing an SODC roadmap is a critical strategy for envisioning how the data center will change to optimize around services while improve IT agility, security, and efficiency to gain significant competitive advantage.

Developing an SODC roadmap typically involves a lead architect, an engineer, and a project manager from Sun, and implies the following steps:

- Presentation of Sun's products, services, and supporting programs
  - SOA Readiness Service
  - N1 Optimization Workshop/Proof of Concept
  - Service Management/Planning Workshop
  - Operations Capability Assessment
  - Data Center Assessment (Systems and Storage; Migration, Consolidation, and Architecture)
- Evaluation of current data center environment and long-term goals
- Gap analysis for goals and capabilities
- Development of a guide towards actionable steps
- Periodic reviews with key stakeholders and technology providers

Conclusion

In the quest to align IT infrastructure with current and future business requirements, Sun begins with a proven model of the service-optimized data center and then helps clients build to the specific requirements of their environment and their business. Beyond selling hardware, software, services, or data center support contracts, this approach takes the long-term view of building infrastructure that can truly benefit the business and further its goals. With over 20 years of technology and standards experience, Sun can provide the key methodologies and technologies that deliver real results — including N1 Grid technology, Java technology, and the considerable innovation inherent in the Solaris 10 Operating System. With the SODC program, organizations retain control over their infrastructure while Sun helps them achieve their goals through a systematic and elegantly architected process that measures ROI at each step along the way. Sun's SODC program aims to make each individual organization more efficient and effective at achieving their most important goals and objectives. The result is in an efficient and agile service-driven environment that acts as a strategic business driver and an effective competitive asset for the business.

For More Information

For more information about any of the products, services, programs, and customer success stories related to Sun's SODC program, please visit http://www.sun.com/sodc/

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