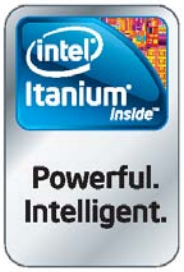
Migrating from SPARC to HP + Intel standards-based infrastructure

Cost savings, architecture options, supporting technologies, process recommendations



Technical white paper

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Executive summary

In today's IT environment, eliminating fixed costs associated with older, dedicated servers is an excellent way to shift budgets and resources to projects which make the business more competitive. Many organizations running mature application environments based on SPARC hardware are saddled with expensive support and maintenance costs for these servers, as well as high operating costs to manage large, underutilized data centers.

Adopting a, standards-based HP Converged Infrastructure can help businesses cut hardware, support, and maintenance costs up to 74% and achieve server consolidation ratios up to 11:1.[1] The HP Converged Infrastructure delivers the data center of the future to overcome IT sprawl with innovations that brings you simplicity, integration, and automation to help meet your businesses' demands.

HP Converged Infrastructure offers flexible, modular solutions that integrate and dynamically align compute, storage, network and facility resources. For example, the combination of HP servers powered by Intel® processors, plus HP storage, all managed through HP Systems Insight Manager, provides a proven, cost-effective and tightly integrated alternative to expensive SPARC infrastructure. In addition to better performance, customers get tremendous cost savings from lower power usage, reduced floor space requirements, and vastly improved server and storage utilization. These advantages translate into lower fixed costs and lower budget demands—freeing up resources for business growth.

HP has extensive migration expertise based on real-world experience—the migration from SPARC-based, distributed environments to a modular, converged data center is a well understood process. Customers can leverage the best practices of HP, and HP Enterprise Services (formerly EDS, an HP company), to identify and mitigate risks and maximize total return on the migration investment. With years of proven migration expertise, HP's migration center can guide you to deliver a smooth, seamless migration experience.

This paper outlines the advantages of HP Converged Infrastructure, specific design alternatives, project oversight, and guidance on infrastructure planning. It offers insights into both the benefits of the move to a converged data center—greatly reduced costs, simplified management and increased flexibility—and the process for making the migration a smooth, effective transition.

Advantages of migration

Application, data, and infrastructure migration requires solid planning, based on a well rounded understanding of costs, benefits, and risks. This section describes infrastructure cost savings opportunities, technology options, and design considerations.

In the past, it was sufficient to consider just one, or possibly two, aspects in parallel. However, the opportunity to cut data center costs through virtualization and consolidation makes moving from SPARC to industry-standard HP servers a far-reaching solution—with much broader impacts than simply porting to get more performance. Leveraging the efficiencies of the new infrastructure can quickly pay back one-time porting costs, and the ongoing savings can be applied to address new business priorities. Cost savings derive from the four following areas.

Maximize server uptime and improve productivity

Data intensive enterprise workloads, including business processing and decision support, are placing the current infrastructure under tremendous stress. HP's next-generation ProLiant servers with Intel's latest processors include technology innovations to maximize server uptime and improve server productivity. This maximizes application uptime with a 200% boost in server availability compared to previous generation ProLiant servers, and includes self-healing resiliency.

[1]Source: Alinean TCO analysis

Balanced Scaling

Legacy systems typically have inadequate scaling of compute capabilities to effectively handle complex/demanding workloads and exponential data growth. HP's portfolio of scale-up ProLiant servers is optimized for the most demanding, data-intensive workloads. Moving to HP ProLiant servers can help reduce the data center footprint and costs with a consolidation ratio of at least 91:1 made possible through performance gains achieved by balanced scaling.

Workload consolidation and virtualization

Moving to industry-standard HP servers with Intel processors provides a much more robust palette of cost reduction options than simply faster processors and denser form factors. Virtualization enables multiple workloads to share a single physical server. Coupled with tools such as HP Capacity Advisor, customers can realize far higher server utilization, while lowering growth-based capital outlay.

IT operations

Traditional distributed server and storage models have led to complex and difficult–to-provision infrastructures. In the next-generation data center, virtualized servers and storage replace one-to-one wiring with virtual connections. These connections are agile, and can be easily changed to meet business needs. Since industry-standard servers can support multiple operating systems, data center managers have greater flexibility for provisioning and moving applications. Customers can leverage HP products such as Systems Insight Manager (SIM) and Virtual Connect (for blades) to cut operational costs. SIM provides comprehensive, single pane-of-glass management for BladeSystem enclosures, and Virtual Connect enables simple provisioning and changes to your BladeSystem infrastructure.

IT administration

SPARC infrastructure running Solaris has traditionally been managed with tools such as Sun Management Center, and more recently, xVM Ops Center. These tools only address Sun environments, and therefore require dedicated staffing and skills. Migration to the HP and Intel infrastructure enables integrated management. HP SIM, for example, supports VMware, Windows®, HP-UX, and more as well as Solaris and Linux® on x86 servers.

Hardware and software support

Workload consolidation reduces server and core count. Hardware support costs, compared to support costs for existing servers, consistently drop by a factor of 10 or more. Since software such as Oracle Enterprise Edition Database is priced per processor core, this means significantly lower software licensing[2] and support costs as well.

Rapid payback with lower hardware and support costs

HP offers the most comprehensive portfolio of scale-up solutions in the industry, with new G7 generation servers based on Intel® Xeon® 7500 processors. They can offer payback in your investment in less than three months with breakthrough efficiencies.

A complete project cycle for upgrading an enterprise application, such as SAP®, can take 12 to 24 months. However, transitioning the underlying hardware infrastructure to HP servers and upgrading the database can take far less time, and deliver immediate performance gain and cost reduction. Total Cost of Ownership (TCO) studies, based on the Alinean methodology (www.alinean.com), show break-even return on new HP server investments in as little as 9 months. Breakeven is based on comparing ongoing support costs with the purchase of new HP hardware, support, and administration. Table 1 provides examples that illustrate the advantages of moving to industry-standard HP servers with Intel processors.

[2] Oracle has changed the Core Processor Licensing Factor for Intel Itanium Series 93xx from 0.5 to 1.0. This is applicable for new servers purchased on or after Dec 1, 2010

Table 1: SPARC and HP server TCO comparisons[3].

SPARC Server	HP Server	Core reduction	3 year server cost comparison	Cost savings &payback
3 x Sun Fire 4800 (12 core each)	1 x BL490c ProLiant blade w/Intel Xeon (8 cores)	28	SPARC 3 yr support = $684k HP purchase + 3 yr support = $78k	89% 7 months
1 x Sun Fire 15000 (72 core)	2 x DL580 ProLiant Servers (8 core each)	48	SPARC 3 yr support = $1.76M HP purchase + 3 yr support = $144k	92% 6 months
2 x Sun Fire 6900 (48 core each)	3 x BL860c i2 Integrity (8 cores each)	72	SPARC 3 yr support = $2.3M HP purchase + 3 yr support = $735K	69.12% 9 months
5 x Sun Fire 15000 (72 core each)	1 x BL890c i2 Integrity (32 cores each)	328	SPARC 3 yr support = $12.5M HP purchase + 3 yr support = $1.02M	91.8% 6 months

For a quick comparison of HP and SPARC server costs, take advantage of the HP ROI tool at http://www.hp.com/go/tcochallenge. Ask your HP account manager for a detailed TCO analysis for your specific environment.

Savings from data center operations

The rich features of the HP servers and StorageWorks Storage Array Network (SAN) environments enable effective consolidation and management of application environments that provide benefits significantly beyond hardware performance alone. HP data center solutions are based on HP System Insight Manager. This umbrella toolset provides integrated oversight of servers, storage, and network components, greatly simplifying management across the data center.

Unified administration across Unix®, Linux, Windows

Most large organizations have substantial investments in Linux and Windows servers. HP recommends operations and administration be integrated across all environments, including UNIX. This approach improves staffing utilization, reduces toolset complexity, and cuts costs. Beyond saving cost, organizations can also reduce risk by having multiple people trained on similar tools. HP administration tools, such as HP SIM provide a consistent approach for managing across HP-UX, Linux, and Windows. This open and centralized approach ensures efficiency, and eliminates the need for Sun Management Center.

A recent IDC study concluded that HP SIM enabled customers to realize an average savings of $35k per 100 users over three years. The savings came from reduced administration and support costs, improved user productivity, increased revenue due to higher uptime, and elimination of redundant management tools. IDC found that a fully loaded deployment costs $1.7k per 100 users, and break-even time was 4 months.[4]

For specific advantages and approaches to integrated management, see the section "Server and application management."

[3] Total cost of ownership results from Oracle Sun TCO Challenge calculator found at www.hp.com/go/tcochallenge
[4] Gaining Business Value and ROI with HP Systems Insight Manager, IDC, May 2007

Integrated server and storage management

Traditional point-to-point networking often creates a complex infrastructure. This makes provisioning changes cumbersome and error-prone. HP tools give administrators efficient ways to make changes.

- Provisioning: For example, the HP BladeSystem c-Class environment eliminates the point-to-point wiring required to match servers to storage in a distributed environment. It automatically matches the correct Media Access Control (MAC) addresses, storage locations, and applications to reduce provisioning time and errors.
- Storage administration: Tools and services are available that can help move data from older to newer storage devices, with the ability to target the new environment for performance and ease of manageability.

Power and cooling

HP Converged Infrastructure has the industry's most comprehensive scale-up x86 server solution—it can help businesses consolidate 90 or more legacy servers on to a single system to get a 96% reduction in license fees and 96% reduction in power & cooling costs. Alinean-based TCO studies consistently show that HP servers with Intel Xeon and Intel® Itanium® processors deliver lower power and cooling costs than SPARC servers. HP extends these processor-based efficiencies, with server-based power management strategies and highly efficient cooling techniques. Dense computing solutions such as the HP BladeSystem c-Class server blades simplify power management and reporting. All of these techniques combine to reduce power and cooling costs relative to distributed SPARC servers.

Workload virtualization – server level

All HP servers can support multiple applications and operating systems within a single server. This basic capability is adequate for smaller workloads and data centers. These features are common between HP Integrity and HP ProLiant blade and rack-based servers. HP Insight Control, server management built into HP ProLiant servers, enables you to proactively manage ProLiant server health, deploy ProLiant servers, optimize power consumption and control ProLiant servers from anywhere. It has the ability to reduce operational expenses by $48,300 per 100 users over 3 years For HP ProLiant servers, Matrix Operating Environment[5] allows you to analyze and optimize your infrastructure by managing physical and virtual resources in the same way. For instance, administrators can provision individual servers with several operating system instances and applications and then modify those instances as business requirements change.

Specific benefits of this level of virtualization include:

- Address changing business priorities: Administrators can assign specific system resources (CPU, memory, etc.) to different application components and database processes if they are running on the same OS instance. This allows critical processes automatic access to dedicated resources, based on business requirements.
- Moving applications: On HP Integrity servers, HP Workload Manager and Global Workload Manager allow resources to be distributed between HP servers, virtual machines, individual server blades, and between blade enclosures.
- Small or transient workloads: Using HP servers as virtual machines can be an attractive consolidation solution, such as for test and development environments. Coupled with virtualized workload management, it greatly reduces provisioning costs associated with development environments.
- Redundancy and high availability: HP Serviceguard delivers failover and application management between blade enclosures, operating within a single data center or across locations between distributed data centers. It supports HP Integrity servers with HP-UX. Additional mission critical capabilities include Oracle RAC, Windows Server 2008 failover clustering and Solaris clusters.

[5] delivered through Insight Dynamics—VSE

- Better processor scaling: HP's new class of scale-up systems can help achieve up to 20% better processor scaling than competitive 8-socket systems by reducing processor overhead with HP's Smart CPU caching.

Customers may choose from a variety of virtualization platforms. The HP Virtual Server Environment (VSE) product family supports ProLiant and Integrity servers and a broad set of operating systems. Products such as VMware and Xen Virtualization provide solutions for HP ProLiant platforms. Consult your HP infrastructure specialist when evaluating options.

Maximizing utilization and flexibility

Administrators seeking to maximize server utilization rely on HP-UX 11i v3, HP VSE, and HP Integrity servers—the Integrity Blade servers, Integrity rackmount servers and Superdome. Besides the virtualization capabilities described above, customers can take advantage of HP Instant Capacity to support growth and peak loads. HP Instant Capacity enables customers to purchase reserve capacity or temporary capacity and delay payment until it is activated.

With up to 128 cores in a single server, processing resources can be partitioned to support multiple, fully isolated, operating system instances. HP VSE also supports workload moves for very large single partitions (8 to 128 cores) to address business priorities, upgrades, and disaster recovery. HP Global Instant Capacity can be used to reduce hardware, software, and services costs when workloads move across servers, by permitting hardware to be shared among servers—allowing resources to be deactivated in one system and activated in another to meet changing demands.

Storage consolidation to storage array networks (SANs)

Mature enterprise application landscapes generally contain distributed database instances, application modules, and storage. Because the storage is distributed, it is difficult to manage and is generally under-utilized. This excess capacity is frequently difficult to detect and re-allocate, leading to unnecessary storage purchases and overhead costs.

During migration, customers can also realize greater cost savings by consolidating storage, rather than simply reattaching storage to new servers. With HP StorageWorks, customers can consolidate distributed storage islands to consolidated and virtualized SANs. These are managed through HP Systems Insight Manager, giving administrators a unified view of server and storage resources. SAN storage provides some key advantages:

- Virtualized spare capacity: With distributed storage, utilization must be managed individually. Since growth is not always consistent, it is easy to over-provision, which translates into unnecessary capital outlay. With virtualized storage, a smaller overhead pool can be called on to support multiple storage units. Storage administrators have better visibility of spare capacity, and can allocate it easily and dynamically among competing resources.
- Simplified provisioning: Storage arrays such as the HP EVA integrate tightly with provisioning tools such as HP Virtual Connect. Boot from SAN and logical servers work together to create a flexible resource for the business.
- Power and cooling: Modern storage arrays have sophisticated power management technology to reduce costs. Also, the density of current storage can create huge savings in floor space.

HP offers three lines of SAN products. The HP MSA series gives the flexibility to start small and then migrate drives or enclosures into larger configurations. It is designed to increase server storage capacity, while the module design enables expansion. The HP EVA series offers powerful, simple enterprise class storage. It enables affordable and simple enterprise storage at a low entry price and low total cost of ownership. The HP XP-series products offer bulletproof storage for 24x7 business continuity demands. They enable massive consolidation for greater efficiency and serve as a virtualization platform for internal and external data.

For a comparison of HP EVA administrative costs relative to competitive products, see the "Edison whitepaper" in the section "For more information". HP also offers a wide variety of other storage management solutions and products, including storage blades and a full line of backup products.

Flexible deployment of HP servers

HP servers deliver strong performance across a number of different kinds of workloads - transaction (OLTP), ad-hoc queries, high performance computing, end-of-period batch, and reporting workloads across all major industries. This capability improves business flexibility because servers can support multiple workloads. In addition, HP workload management software helps maximize utilization to boost ROI.

- Wide range of processor and server choices: HP offers Intel Xeon-based ProLiant servers and Intel Itanium-based Integrity servers. Both server lines are offered as BladeSystem c-Class blade servers, rack-mount and standalone servers. Choices scale from 1 cores to 128 cores in hard partitionable Superdome servers.
- The new HP ProLiant G7 servers are designed for leadership price/performance and reliability. ProLiant G7 servers are excellent platforms for many application implementations. Powered by the Intel Xeon 5600 and 7500 Processor Series, the HP ProLiant G7 server family offers exceptional scalable performance, coupled with world-renowned reliability. With the new Intel Xeon 7500 processor, the HP ProLiant server can deliver up to 20x the performance per server, as compared to 4-socket, single-core servers. This advanced capability enables up to 20:1 server consolidation, up to 90% lower operating costs, and an estimated return on investment in as little as one year.
- HP Integrity servers are designed for business-critical applications. Integrity servers offer balanced performance, highly reliable processor and server architecture, and a full range of workload consolidation and virtualization capabilities.
- Operating system options: ProLiant servers are certified with Linux, and Windows. Multiple releases of Linux are supported, including SUSE, Red Hat, and Oracle Unbreakable Linux. HP works with virtualization vendors such as VMware and others to ensure support for virtualized workloads. HP Integrity servers support HP-UX. Virtualization, such as Integrity Virtual Machines, is managed through HP VSE.

Making smart infrastructure choices

The HP + Intel standards-based environment offers deployment options such as scale up, scale out, split-tier, all while supporting HP-UX, Linux, and Windows. This allows customers to optimize platforms for specific use cases, and mix and match to balance cost and business requirements. Table 2 gives general guidance for product selection, based on the complexity of the environment. However, each customer is different, and the sections that follow provide drill-down on the choices and decision criteria.

Table 2: Application landscapes and matching HP product portfolios.

Landscape summary	Server family	Storage family
Complex landscapes with many SPARC servers, with or without existing virtualization. Requires maximum results out of virtualization and consolidation technologies.	HP Integrity servers, leveraging partitioning, pay per use and instant capacity to minimize processor and license count for the back-end database, with ProLiant servers for the front end tier.	EVA or XP based on data size and management requirements.
Midsized, somewhat less complex environments, with some mixed SPARC plus x86 servers.	HP Integrity and/or ProLiant x86 servers (rack or blades). Migrate to virtualized servers whenever feasible. For instance, to host core application instance or Oracle database.	MSA or EVA based on data size and management requirements.
Primarily smaller SPARC servers typically distributed one per application.	Consider migrating core database instance to HP Integrity servers. Leverage ProLiant servers or blades for application and presentation layer.	MSA or EVA based on data size and management requirements.

Matching operating systems, servers and workloads

The choice of Linux, Windows, or HP-UX for specific workloads depends on several factors. An HP solution architect can help map your IT strategy to specific solutions as part of the migration planning. Areas to consider include:

- Application porting: Porting applications from Solaris/SPARC to Linux and HP-UX is accelerated by a rich set of assessment and code conversion tools and guides. These tools let customers select target platform(s) based on business criteria, such as performance, availability, or long term roadmap. See the companion whitepaper "Database and application migration from SPARC to HP + Intel standards based infrastructure" literature number 4AA2-5418ENW.
- Third-party applications: Many vendors now develop their applications on Linux, so new versions and patches are available on that operating system first. Deploying the application is a low-risk process as long as the ISV supports the application and version on the target platform.
- Flexibility: Linux and Windows are available for ProLiant platforms, and HP-UX is available on HP Integrity. Choosing for platform flexibility helps lower infrastructure risk.
- Workload management: As mentioned above, HP-UX with HP VSE provides the broadest set of consolidation, virtualization, and workload management options. It is well suited to complex, business-critical database or application portfolios. It easily supports application stacking to reduce overall instance count and simplify management.
- Availability: In many cases, availability requirements for core data are far higher than for the individual applications that process it. For that reason, companies often run the database instance in a high availability configuration. This can be server-based clustering such as HP Serviceguard. In addition, the high-reliability designs of HP Integrity and Intel Itanium reduce downtime risks. For applications with lower availability requirements, or deployed in redundant or grid configurations, lowest cost is often the deciding factor. In those cases, customers often consider Linux or Windows on ProLiant.
- Single-instance scalability: HP Integrity can support up to 128 cores with the HP-UX 11i v3 operating system. Certain applications and databases run most cost-effectively in a single-instance, scale-up environment, due to savings in software licenses and administration. The new ProLiant G7 servers can help achieve 20% better processor scaling than competitive 8-socket systems.

Table 3 illustrates typical Linux and UNIX use cases and platform recommendations. Customers also have the option to use Windows on HP ProLiant servers.

Table 3: Server selection use cases

OS Strategy	Option	Best-fit use case
Transition to Windows	Windows ProLiant Xeon	▪ Multi-vendor environment, including Windows
Transition to Linux	Linux ProLiant Xeon	▪ Applications and custom code ▪ Database including scale-out architecture
Stay with UNIX	HP-UX Integrity Itanium	▪ ISP apps anc core database; i.e. SAP ▪ Business critical scale-up, scale-out database architecture ▪ Advanced virtualization and workload management

Scaleup and Scaleout database architectures

Consistent leadership in TPC benchmarks (www.tpc.org) demonstrates that Oracle Database scales well in an HP Integrity symmetrical multi-processing (SMP) platforms. Using SMP for scale up is a well established architecture for large-scale data processing. The new HP ProLiant G7 servers can deliver 3 times greater database performance than previous HP ProLiant servers, and deliver improved scalability.[6]

At the same time, in recent years Oracle Database 10g or 11g combined with Oracle RAC has provided a well defined method for scaling out to many nodes. In many cases, a scale-up solution can be more efficient that a scale-out over the long term. While scale-up solutions may have higher initial hardware costs, these environments tend to realize greater management efficiencies and savings over time. Oracle RAC configurations can be deployed on HP Integrity with HP-UX or Linux, or on HP ProLiant servers with Linux. HP offers Reference Architectures to provide guidance on deployment options.

- Scale out with HP ProLiant and Linux: This option addresses new G7 generation servers based on Intel Xeon 7500 Processor Series. This configuration leverages the latest Oracle RAC technology for flexible node, CPU, storage load and failover management. Single-node instances can scale to 32 cores. Careful tuning of Oracle RAC is essential.
- Scale out with HP Integrity and HP-UX or Linux: Oracle10g with RAC can take advantage of the midsize and high-end Integrity SMP servers. Clusters such as these are termed "fat node" clusters in contrast with those based on many one or two socket servers. This approach offers the benefits of RAC deployment, while keeping the number of nodes down.
- Scale up with HP Integrity and HP-UX: This option delivers robust system management, flexibility, availability, and scaling provided by 64-bit HP Integrity systems and the HP-UX operating system. In addition, smaller SMP configurations can be run as dynamic partitions within large HP Integrity systems. Customers can optimize processor utilization and meet peak performance demands by deploying HP Instant Capacity (iCAP) solutions within a single server. Scale up configurations support Oracle Database 10g or 11g database and do not require Oracle RAC. The scale up approach is also ideal for Sybase (with HP-UX) and Microsoft® SQL Server (with 64-bit Windows).

[6]Source: HP internal hardware testing comparison

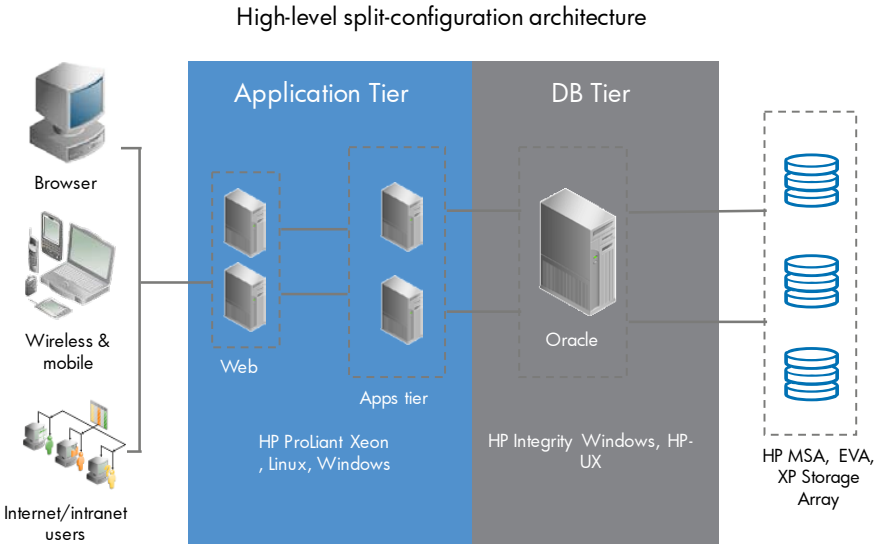
Flexibility and cost savings with split-tier architecture

As mentioned above, there are many viable infrastructure options in a standards-based environment. Most application vendors also support "split-tier" environments, where lower-cost application servers complement large, high reliability, database servers. A typical case is ProLiant application servers running Linux, with a database server running HP-UX on HP Integrity servers.

Choice extends to form factors as well. The HP BladeSystem c-Class supports ProLiant and Integrity blades, with the same set of operating system choices as rack or standalone servers. Split-tier configurations can be supported between blade and rack servers. HP management tools, based on HP Systems Insight Manager, provide a unified view across all products.

Figure 1 illustrates generalized split-tier architecture.

Figure 1: Split-tier architecture applied to enterprise applications



Cost-efficient clustering, availability, and disaster recovery

Virtualization and integrated workload management combine to offer choices in how to deploy high availability solutions. Your HP application architect can help you determine which alternatives would best support your business.

- Bladed environments: Blades in separate cabinets provide similar availability levels to standalone servers. When moving to a multi-blade environment, consider the opportunity to add high availability with multiple enclosures. HP workload management tools can handle moving the workload based on availability or business priorities.
- Leverage test and development resources: Another choice for providing high availability is to failover workloads from production to development resources. When development resources are housed in an alternate data center, this approach also delivers disaster recovery.
- Multiple data centers: By applying business priorities to applications, based on HP workload management tools, customers can leverage multiple data centers to maintain critical applications. This method reduces outlays for redundant servers or application instances.

Benefits of hosting for the Converged data center

As part of migration, consider approaches that allow you to reduce costs and improve service levels while avoiding capital outlays. Partnering with HP Enterprise Services allows you to concentrate on your core business and get the benefit of a trusted ally to manage your business technology. HP's Applications Modernization Services cover a broad range of customer migration needs. Some specific advantages of hosting include:

- Lower capital costs: Hosting can shift capital outlay to the hosting provider. This reduces the up-front costs of upgrading to new applications and infrastructure.
- Leverage standardized platforms: Hosting drives infrastructure consistency to simplify management and meet service levels. Hosting customers get the advantage of this expertise without staffing internally.
- Migration expertise: HP Enterprise Services has a great depth of experience porting and upgrading databases and applications as part of the hosting process. Handing off these tasks frees internal resource to deliver competitive advantage for the business.
- Application modernization: HP Enterprise Services can leverage local, near-shore, and offshore resources to efficiently upgrade applications. Offloading these tasks frees on-staff resource for business innovation.

Weighing the SPARC alternative

Today, many organizations rely on SPARC servers to support both application and database workloads. When that decision was made, choosing a single architecture (and operating system) was common practice. However, with the recent performance increases of Intel Xeon processors, a SPARC-only architecture can have drawbacks:

- Server cost: Smaller 1-2 socket SPARC servers are relatively more expensive than their Intel Xeon equivalents. At the same time, large SPARC servers are more expensive per core than x86 servers. SPARC no longer demonstrates price/performance leadership.
- Software licensing costs[7]: Oracle database licenses are much less expensive on Intel Xeon or Intel Itanium processors compared with SPARC.
- Economics of split-tier architecture: As described earlier, enterprise applications can be run with different server architectures at the application and database tier. Current best practices assign smaller servers, such as Intel Xeon blades, to the application/web tier. Larger servers, whether based on SPARC or Intel-based processors, continue in the database server role. This approach reduces costs by matching server architectures to business requirements.

Maintaining a SPARC-only architecture in the face of ever-increasing price performance advantages for Intel Xeon servers at the application layer can lead to unnecessary additional costs which can be difficult to justify. Business basics will demand that IT revisit that choice whenever Intel Xeon server price / performance increases. Eventually, a TippingPoint will be reached:

- The cost premium of small SPARC servers over small Intel Xeon-based servers can no longer be justified.
- Application workloads will be moved or ported to Solaris or Linux on Intel Xeon servers.

[7] Oracle has changed the Core Processor Licensing Factor for Intel Itanium Series 93xx from 0.5 to 1.0. This is applicable for new servers purchased on or after Dec 1, 2010

This can cause a cascade of economic and risk implications for the business.

1. Moving the application servers from SPARC, leaves only large SPARC database servers. These are burdened with premium-priced Oracle licenses.
2. Solaris / SPARC specialists move from "core" to "niche" positions in the IT organization, raising talent retention risks.
3. Price / performance capabilities of Intel-based servers make SPARC database servers a poor TCO and risk management choice.
4. Risk: The SPARC market is declining rapidly and R&D invested in the processor and supporting server architectures are being reduced by market trends. Fujitsi, the only designer/manufacturer of medium/large SPARC environment have their major revenue coming from Intel- based servers.

At this point, the IT organization must evaluate options for next-generation database servers, and these facts will emerge:

- Intel-based servers, such as the new HP ProLiant scale-up servers or HP Integrity, have lower TCO with lower maintenance cost than SPARC-based servers.
- Database migration from SPARC servers to Intel-based servers is straightforward and low risk, with a rich set of tools and services to simplify the move.

Replacing the SPARC infrastructure with HP Converged Infrastructure solution model has the following benefits:

- Reduced costs with proven lower TCO, better return on investment (ROI).
- Greater choice and flexibility in server, OS, and ISV support.
- Reduced risk and dependence relying on one vendor.
- Removal of uncertainty with solid and stable product roadmaps.
- Increased confidence with proven SPARC migration expertise.
- Higher performance with industry standard Intel-based architecture.
- Similar reliability with full redundancy, virtualization, management, and clustering.
- New levels of simplicity, integration, and automation to enable you to focus on meeting your businesses' demands.

In summary, staying with an all-SPARC environment puts the business at great risk from both a competitive and financial perspective.

HP Migration Center

While IT leaders understand the benefits of moving to current, standards-based infrastructure, the "how" can seem daunting. Many technical hurdles stand between users and a seamless, positive, migration experience. Over the past 20 years, HP has helped tens of thousands of customers take advantage of HP infrastructure to reduce costs, improve performance, and gain competitive advantage. Through the HP Migration Center, HP combines best practices from real-world migration experience with migration tools and new technologies such as HP Converged Infrastructure, to give you simple, low-risk solutions.

Migration Paths for SPARC Infrastructure

HP's tailored "Migration Assessments" can provide details on options, for instance, migration to HP-UX 11i on HP Integrity servers or Windows or Linux on HP ProLiant servers. In many cases, such as moving from SPARC environment, tremendous cost savings can be achieved by adopting a "split tier" environment of ProLiant Xeon and Integrity/Intel Itanium servers running a mix of Windows, Linux, and HP-UX 11i.

HP-UX 11i on HP Integrity for Advanced Mission-Critical Environments

How do you consolidate older SPARC environments or upgrade applications and databases while maintaining service levels? With HP-UX 11i on HP Integrity servers, you can preserve UNIX skills and software assets, improve utilization, and simplify and automate management and processes all in a safer, more agile UNIX mission-critical operating environment.

HP-UX on Integrity servers delivers leadership quality, error avoidance and self-healing and smart serviceability design. HP Matrix Operating Environment provisions infrastructures in minutes, optimizes with built-in capacity planning and workload rebalancing, and protects service continuity with automated failover. HP Serviceguard Solutions provide transparent recovery to rapidly and automatically restore service availability after a failure.

Linux on HP ProLiant for Standards-based Infrastructure

With increasing pressure to drive down costs and free-up resources for growth, now is the time to consider migrating to a robust, UNIX-like open source operating system with industry-standard platforms. HP has introduced a new class of scale-up ProLiant servers built to be convergence-ready to fuel business innovation. A new Linux-based HP ProLiant server can pay for itself in as little as 30 days with breakthrough efficiencies.

These new ProLiant scale-up x86 servers extend the capability of ProLiant systems and provide a foundation for a converged infrastructure. They help free up operational dollars, speed up project success, and increase levels of application availability with HP Mission Critical Services.

Windows on HP ProLiant for Standards-based Servers

For those considering a move to an industry-standard platform, HP is the smart choice, offering market leadership, expertise and a comprehensive portfolio. HP's dominance in the Windows market and the 25-year strategic relationship with Microsoft includes engineering, testing, delivering, and supporting Windows environments.

HP is the number-one platform of choice for Windows Server solutions, according to IDC's February 2009 IDC Worldwide Quarterly Server Tracker. And HP enables backward compatibility with UNIX via native UNIX tools for Windows. Taking advantage of the cost-savings and stability of a Windows ProLiant solution is a wise business choice.

Infrastructure migration planning

This section provides a brief overview of migration planning based on HP experience migrating hundreds of customers to HP ProLiant and Integrity server platforms. A more detailed discussion of the planning process can be found in Appendix B.

The typical migration project phases include: 1) Plan: evaluate business needs and constraints, develop approach and detailed task breakdown; 2) Prepare: ready the infrastructure and tools for migration; 3) Test: test the tools, applications, and data in an environment that models the production environment; and 4) Implement: carry out the migration.

The migration process covers five key areas, with each area requiring resources for that specific effort. These efforts are undertaken in parallel, with the project management office providing overall coordination and leadership. The five key areas are:

- Project management: Coordinating and setting priorities for the migration, while ensuring rigorous attention to detail.
- Infrastructure: Architecture, servers and operating system choices, workloads, consolidation, virtualization.
- In-house or custom applications: Evaluate source code and build inventories, architecture options, compiler compatibility, and database compatibility.
- Commercial applications: Versions, upgrade paths, database versions, helper applications.
- Database: Version compatibility, database upgrade requirements, and migration strategies.

HP recommends that a project management office oversee and coordinate the individual tasks. This ensures that critical information is passed between teams on time. It also ensures consistent program review and resourcing priorities.

More detail on the project management and infrastructure planning portions of the migration are provided in Appendix B. Guidance on application and database migration will be provided in a companion whitepaper. HP also offers detailed porting guides for Linux and HP-UX, see the section "For more information" for URL reference links.

HP Migration Resources

To simplify migration, you need a well rounded team, ready to meet your needs. The HP Migration Center is the core of HP migration expertise, and draws on HP specialists, as well as partner and external resources to meet the needs of any particular migration. HP resources include:

HP Technology Services: This team assists with all areas of Converged Infrastructure deployment. That includes planning, data and application migration, code migration, and infrastructure design and setup.

HP Enterprise Services: Migration, hosting and outsourcing are critical elements of many large IT organizations. HP ES can take on management and hosting of legacy environments and can also host new Converged Infrastructure deployments. For example, HP ES manages one of the largest SPARC environments in the world, making it an ideal "bridge" resource during a migration project.

HP Education: Migration means change, and that means education. Customers find education critical in the early stages of migration to reduce uncertainty and increase comfort and familiarity with new tools, products, and processes. Training will get your team up to speed quickly, and enable them to make the most of your Converged Infrastructure investments.

Summary

Only HP delivers the industry's most comprehensive server portfolio, including scale-out and scale-up x86 servers, as well mission-critical Itanium-based servers, combining mission critical and industry-standard expertise. The power of converged infrastructure from HP enables customers to cut fixed costs and apply the savings to business-focused innovation. With HP, customers get a rich set of operating environments, and solid guidance on architecture choices. For the migration, HP makes a broad range of tools and services available to support customers.

This approach ensures rapid application porting or database migration with minimal risk. Moving to standards-based infrastructure enables IT to consolidate workloads and simplify administration, while delivering a platform for growth and innovation. Contact your HP account manager or authorized reseller to arrange for a TCO analysis or migration assessment.

For more information

Services

- Data center virtualization: http://h20219.www2.hp.com/services/cache/583797-0-0-225-121.html
- Sun to HP Migration: http://www.hp.com/go/sun2hp
- HP Migration Center: http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA1-0783ENW.pdf
- Storage and data migration: http://h20219.www2.hp.com/services/us/en/consolidated/infrastructure-storage-data-migration.html
- Applications Modernization Services: http://h10134.www1.hp.com/services/appsmodernization

HP hardware and configurations

- HP Servers: http://www.hp.com/go/integrity
- HP Solution Blocks: http://h18004.www1.hp.com/products/blades/solutions/solution-blocks.html
- Oracle Reference Architectures: http://h71028.www7.hp.com/enterprise/cache/150368-0-0-0-121.html

HP StorageWorks EVA

- HP StorageWorks EVA: http://www.hp.com/go/eva

Software and application porting

- HP Systems Insight Manager: www.hp.com/go/sim
- Solaris to HP-UX Porting Kit: www.hp.com/go/SHPK
- Solaris to Linux Porting Kit: http://www.hp.com/go/SLPK
- Solaris Transition Kit: http://www.hp.com/go/STK
- HP-UX 11i v3: http://www.hp.com/go/hpux11iv3
- HP VSE: http://www.hp.com/go/vse
- HP Serviceguard: http://www.hp.com/go/Serviceguard
- OpenSolaris: http://opensolaris.org/os/
- Sun Developer Network Tools Forum: http://forum.java.sun.com/index.jspa?tab=devtools
- Intel White Paper on Endianness: http://www.intel.com/design/intarch/papers/endian.htm

HP partnerships

- Oracle: www.hp.com/go/oracle
- SAP: http://www.hp.com/go/sap

Appendix A: Infrastructure Migration Guidelines & Steps – Plan Phase

Appendix A outlines the tasks and outcomes for moving from a distributed server environment to a consolidated, virtualized environment. These guidelines apply to the "Plan" phase of infrastructure migration.

Step 1a. Inventory workloads

In this step, collect detailed information about the workloads that make up application landscape. While the focus is on the production landscape, be sure to gather information on the relative sizing of the development and test environments as well.

The key elements to gather are the number and types of servers and processors, operating system types and versions, and software licensing. Also define any existing high availability or disaster recovery configurations. Use this information to generate a complete current cost envelope, with focus on license counts per application and total support costs.

This current state cost assessment will be valuable when evaluating server and architecture alternatives.

Step 1b. Classify workloads

Collect detailed information on how the servers are used by the business. This identifies complementary workloads and other opportunities to share resources and reduce overall CPU count. Dedicated servers are frequently only utilized at 15 – 25%, so this step can open opportunities for consolidation or reduction in processor count.

This step requires performance tracking of peak and average workloads on all critical servers. It also requires analysis of workload clustering and business needs to capture "perfect storm" scenarios such as month-end or quarter-end reporting. Large workloads with out of sync peaks can be good candidates for resource sharing. Also, identify business priorities, since virtualization can pull resources from low priority workloads during peak times.

Step 2. Develop projected workload requirements

In this step, overlay current workload requirements with future requirements. These include business needs and additional performance loads imposed by the newer application or database versions. This step identifies the "delta" in performance required to support the migrated landscape.

Keep in mind that with a virtualized environment, additional resource can come from better utilization. A projected 25% increase in processing power may not mean 25% more core-equivalents of servers need to be purchased. Bear in mind that virtualization does incur processing overhead as part of instance management. It can also introduce latency into I/O performance. Both of these should be addressed as part of workload sizing and grouping.

Elements to consider when gauging server requirements include new demands for high availability, changes in peak and average loads, response time, and addition of new applications modules, reporting data marts, and so forth. The output of this task is the application inventory and aggregate computing resource required. This resource can frequently be reduced as virtualization opportunities are clarified.

Step 3a. Aggregate workloads

Combine the workload models and landscape inventory to define complementary workloads that share resources. For smaller servers, this means assigning the workloads on a per-server basis. For cell-based Integrity servers, additional efficiency, peak load resourcing, and failover can be gained by leveraging HP Pay Per Use, Instant Capacity, and partitioning.

Start by mapping business needs for peak loads, high availability, and disaster recovery to groups of workloads. In general, grouping a mixture of "business critical" and lower priority workloads creates a shared resource pool. These can also be separated geographically to address disaster recovery. Use grouping to create a shortlist of virtualization and load-sharing opportunities. Include "instant capacity" options for Integrity servers.

Step 3b. Define virtualization opportunities

The previous step identified workloads that could be clustered. This step starts the workload sizing process, and also determines when HP ProLiant servers or Integrity servers are most appropriate for hosting them.

Starting with the projected core requirements from step 2, and the logical clusters from 3a, determine the server or partition sizes needed to support the workloads. Also, identify the most appropriate virtualization approach: virtual machines, hard or soft partitions, instant capacity, and so forth. Apply the operating system design considerations provided earlier.

The goal is rough sizing and server/OS selections for each workload grouping.

Step 4. Optimize virtualization for performance, availability and cost

This step identifies the virtualization options with the highest return. Step 3b provided an assessment of the server requirements to support the workloads, and identified the ways that overall utilization could be maximized. In this step, servers, processors, and software licensing are combined to generate a total cost of ownership for the new landscape. The hard cost savings defined here underpin the TCO of the entire project.

Appendix B: Infrastructure Migration Planning

Appendix B outlines in more detail some of the key elements of infrastructure migration planning, including project management, infrastructure and workload migration planning and server and application management.

Project management

Migration takes place on four parallel paths, as outlined in the paper. These include: infrastructure consolidation, custom application migration, commercial application migration, and database consolidation and migration. HP recommends that a project management office oversee and coordinate the individual tasks. This ensures that critical information is passed between teams on time. It also ensures consistent program review and resourcing priorities. Table B-1 identifies typical roles for migration.

Table B-1: Migration project roles

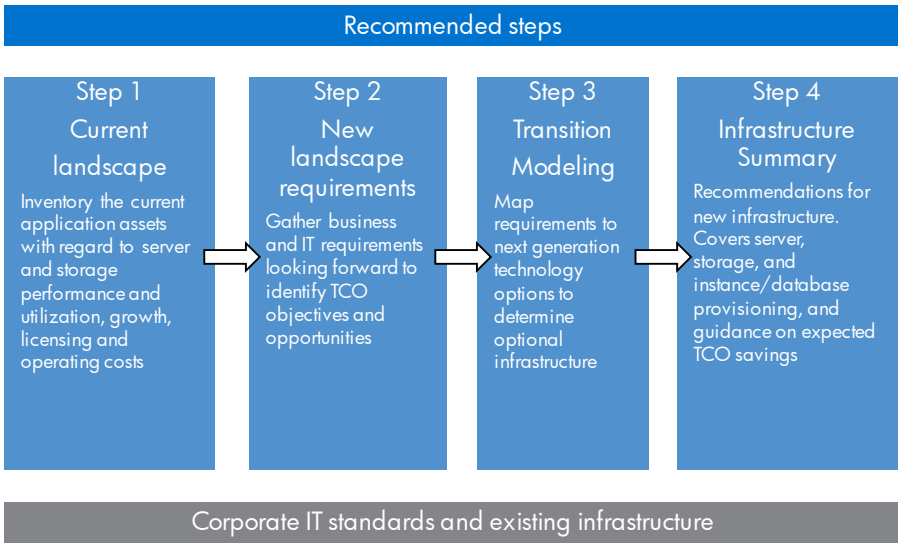
Role	Project mgmt office	Infrastructure consolidation	Custom application migration	Commercial application porting	Database consolidation and migration
Solution Lead	Project Manager	Infrastructure architect	Migration architect	Application Lead	Database architect
Engineering & Development	Application Owner or Manager	Infrastructure specialist	Migration specialist	Application specialist	Database migration specialist
Test Environment	Test/QA Manager	QA Engineer	QA Engineer	QA engineer	QA engineer

In the project kickoff, the teams must agree on specifics for the development, test and QA processes and environment, as well as common tools to facilitate information sharing and documentation. HP and authorized partners can work with the customer to understand their staffing requirements, and provide specialists to meet business objectives.

Infrastructure and workload migration planning

A key element of infrastructure planning is migration of workloads to a consolidated and virtualized server environment. Creating the design is typically a four step process, as shown in Figure B–2. The first step involves sizing the current application environment. This includes gathering an inventory of the current applications, databases, servers, and storage systems. The second step involves determining the required performance workload, based on current peak and average workloads, and projected future requirements. The third step defines the opportunities for virtualization, and the fourth step documents the approach and potential for hardware and software cost savings.

Figure B-2: Process model for infrastructure migration planning



Server and application management

Standards-based servers from HP with Intel processors are designed for performance, reliability, flexibility, and operational efficiency, all at lower overall cost. A major benefit of migration is converting the silo of SPARC server management into a unified, standards-based management environment. Because of greater efficiencies and skill sharing, IT can reallocate duplicate resources to other tasks such as:

- Capacity planning: Managing workloads, servers, and storage under the umbrella of HP Systems Insight Manager enables data center managers to make much more efficient use of resources. Tools such as Matrix Operating Environment enable operations staff to track resource loading, while also tracking power usage. HP Capacity Advisor, with Smart Solver technology, lets planners create workload scenarios to identify best-fit options. HP Global Workload Manager enables performance to be adjusted based on business priorities. Putting these tools together lowers data center costs while keeping service and performance levels up.
- Provisioning: For blade environments, HP Virtual Connect simplifies workload provisioning and access to storage resources. Workloads are defined as "logical servers" within the HP BladeSystem environment. They can be moved to wherever spare blade capacity resides. The workload can then occupy either a full blade or a virtual machine. Storage access is virtualized, so that servers can be assigned storage resource without making cabling changes.
- Remote or Branch Server Management: In many cases, consolidation eliminates the need for remote data centers or branch servers. However, if there is a need for remote servers, HP Integrated Lights-Out (iLO 3), lets data center staff manage the servers remotely, including troubleshooting boot sequences and updating applications. These capabilities are consistent across HP ProLiant and Integrity servers, and take advantage of the same browser-based user interface.

SAP's liveCache Technology

SAP liveCache technology is an object-based enhancement of the SAP MaxDB database system and was developed to manage complex objects (e.g. in logistic solutions like SAP SCM/APO).

For solutions of this type, large volumes of data must be permanently available. Unlike SAP MaxDB, a SAP liveCache instance keeps all data that the system needs to access in memory. It provides data structures and methods for high speed processing of networks, as for example Available-to-Promise (ATP) and Production-Planning-and-Control (PPS). SAP liveCache is patented SAP technology. It can only be used with SAP applications.

Today, about 15,000 SAP customer installations run on SAP MaxDB and SAP liveCache technology proving SAP MaxDB's reliability, scalability and availability for configurations of all sizes. SAP MaxDB is also widely used within SAP, for example for the Service Marketplace, the documentation development in Knowledge Warehouse, and also the SAP Developer Network (SDN) runs on SAP MaxDB. SDN currently is one of the largest SAP NetWeaver Portal implementation with over 1,000,000 named users.

SAP's MaxDB advantages

MaxDB is a database for OLTP and OLAP usage that offers good reliability, availability, scalability based on a very comprehensive feature set. MaxDB offers easy administration and automatic space management—making scheduling of downtimes an easy process. Thus MaxDB, with the lowest license and maintenance fees of all the, reduces TCO of each of its SAP installations.

What users like about MaxDB is that it is completely integrated into the SAP support infrastructure from system monitoring through to issue resolution.

MaxDB license costs

If your SAP solution will run on MaxDB, the current license fee is 5% of the SAP application value (SAV). If MaxDB technology is part of a bundled offering for instance like the NetWeaver Full Use License or as SAP liveCache technology as part of SAP Supply Chain Management it comes without additional license costs.

Why HP?

Adopting standards-based infrastructure from HP and Intel enable you to cut fixed costs and apply that savings to business-focused innovation. With HP, you get a rich set of operating environments irrespective of the database choice being made. For enterprises that are modernizing their infrastructure, HP provides a broad range of tools and services available to support customers.

HP's experience in helping customers transition, run, and optimize all of the major databases that run with SAP applications. HP's experience ensures rapid application porting or database migration with minimal risk. Moving to standards-based infrastructure enables you to consolidate workloads and simplify administration, while delivering a platform for growth and innovation. Contact your HP account manager or authorized reseller to arrange for a TCO analysis or migration assessment.

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