

Rehosting Mainframe Applications on the Sun Platform

*How to Reuse Your Mainframe Applications, Data,
and Skills in the Solaris Operating Environment to
Reduce the Cost of Operation and Increase Flexibility*



THE NETWORK IS THE COMPETITOR

A Sun Microsystems, Inc. Business
901 San Antonio Road
Palo Alto, CA 94303 USA
650 960-1300 fax 650 969-9131

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901 San Antonio Road, Palo Alto, California 94303 U.S.A

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Executive Summary

Today's economic conditions dictate that all businesses must drive down costs, even in strategically critical departments such as IT. But for businesses with large investments in mainframes, cutting costs without sacrificing service levels can be all but impossible. Since IBM became the only remaining mainframe vendor, the cost of mainframe hardware, maintenance and software has been increasing.

At the same time, fewer new applications are being written for mainframes; knowledgeable mainframe programmers are a scarcer resource; and mainframe maintenance costs are sharply higher, limiting your company's ability to respond quickly to competitive offerings or to create and deploy new services. And rewriting mainframe applications for more agile platforms is not always a practical option, given that re-engineering projects can take years and may require changes in business practices. We believe that many mainframe applications still meet the needs of the businesses they serve, but that running these applications on a mainframe computer is the most expensive and least flexible way to execute these processes.

Sun's solution is to reuse—not replace—your mainframe application assets. We have built a mainframe environment that enables you to run most popular mainframe applications on Sun servers with little or no change. Therefore, we can protect and maximize the mainframe applications, data, and IT skills you have developed by **rehosting** them on a more cost-effective, flexible, net-enabled platform: the Solaris™ Operating Environment (Solaris OE) and Sun servers, running Sun's mainframe rehosting software.

Through rehosting, you can significantly reduce your cost of operation and increase efficiency at the same time. And you can increase your business agility because you have a broader range of development and deployment options for your network services.

This paper describes the new demands on the high-end data center in today's business climate, the new realities and limitations of mainframe-only environments, and the business case for rehosting mainframe applications on cost-efficient, reliable, flexible Sun servers.

New Realities, New Requirements for the Glass House

Traditional mainframe-dominated data centers focused on predictability and controlled access to services. In the era of e-business, the core requirements are flexibility and ubiquitous, continuous access to information. At the same time, today's economic conditions have made cost-cutting a high priority, creating a pressing need for cost-efficient alternatives to current data center operations.

Cost Crisis

With the recent exit of both Amdahl and Hitachi from the mainframe market, IBM is now the only source of mainframe hardware. This may help to explain the recent increase in the price of mainframe hardware—the first increase since the introduction of CMOS in 1994. In addition, the price/performance of mainframes is now degrading, with mainframe software prices growing by up to 17% per year. For most corporations, mainframe software license fees are four to seven times greater than hardware costs, according to recent studies. By comparison, open platforms continue to drive down costs and improve price/performance by up to 30% each year.

Development Crisis

In today's business climate, no company can afford lengthy architecture/ development/ deployment cycles. The multi-year timeframes typical of mainframe application development do not provide the level of flexibility organizations need to drive innovation or respond to competitive offerings. This fact is underscored by the rapid growth of packaged applications and hosted application providers. Packaged applications enable new business practices; yet many of the most popular packaged applications are simply not available on the mainframe, and the mainframe is not a target platform for many new packaged applications under development by Independent Software Vendors (ISVs). Sun's research shows that roughly 1,700 applications are available for the S/390 mainframe; but more than 12,700 applications are now available for the Solaris Operating Environment. And for ISVs, the key criterion for choosing a target platform is market share.

Operational Crisis

Companies with mainframes are finding it increasingly expensive to retain personnel with mainframe skills. According to one recent study, 60% of IT professionals with mainframe skills are older than 50, while 60% of personnel with UNIX® operating system skills are younger than 35. That is a key reason 85% of new IT professionals are targeting non-mainframe skills in their education and training. At the same time, the complexity of the mainframe environment and interoperation with other platforms continues to grow, making education and training more difficult and expensive. It is important to note that while mainframe skills are no longer a focus for universities, the Solaris Operating Environment and end-user partner community are growing.

Sun's Value Propositions:

- Steadily decreasing hardware costs and binary compatibility from \$1K to \$1M+ systems.
- Price/performance increases up to 30% each year.
- ISV enthusiasm: nearly 10-to-1 availability of packaged applications for Solaris.
- Broad and growing base of skilled Solaris OE and Java™ technology programmers.

Sun: The Mainframe Alternative

Mainframe customers who want to cut operations costs without sacrificing service levels or legacy investments must find a new alternative for their applications. There are three choices: replace the applications with packaged software, which typically requires changes in business practices and time with no immediate cost saving benefits; rewrite the applications with new tools, which can be extremely time-consuming and risky; or rehost existing assets on the Solaris Operating Environment. Simply put, Sun provides a low-risk option to keep existing business rules while reducing TCO. Sun is now the mainframe alternative.

Rehosting Defined

Rehosting mainframe applications on the Solaris Operating Environment is possible because Sun has replicated the mainframe CICS and Batch environment on the Solaris platform, enabling mainframe applications and data to run on the Solaris OE with few or no changes. Rehosting is NOT rewriting applications or rearchitecting the mainframe environment. The rehosting process reuses existing mainframe data, application code, and IT skills in the Solaris OE. Qualified mainframe applications include CICS/DB2 and VSAM (COBOL, PL/1) and BATCH.

Sun's Rehosting Strategy: No Changes to Applications, Data, Files, or Business Rules

Sun believes that a critical requirement for rehosting is minimizing business disruption. Therefore, Sun's rehosting solutions are designed to reuse existing applications, data, and source files with few or no changes. The embedded business rules of the customer's mainframe applications, which define the business processes and provide competitive differentiation, are completely preserved, so no changes to business processes or practices are required.

With Sun rehosting solutions, end users typically experience no change to their interaction with familiar applications. The application interface usually remains the same. And since the development staff continues to use COBOL, PL/1, C, maps, JCL, and so on, their current skills are a valuable asset leveraged in the Sun environment. In short, Sun's solutions are low-risk with minimal disruption.

Sun also recognizes that many mainframes still interconnect using SNA networks. Sun's mainframe rehosting solution also includes full support for SNA, enabling Sun servers with rehosted applications to appear as an SNA domain in a mainframe network.

Sun's Value Propositions

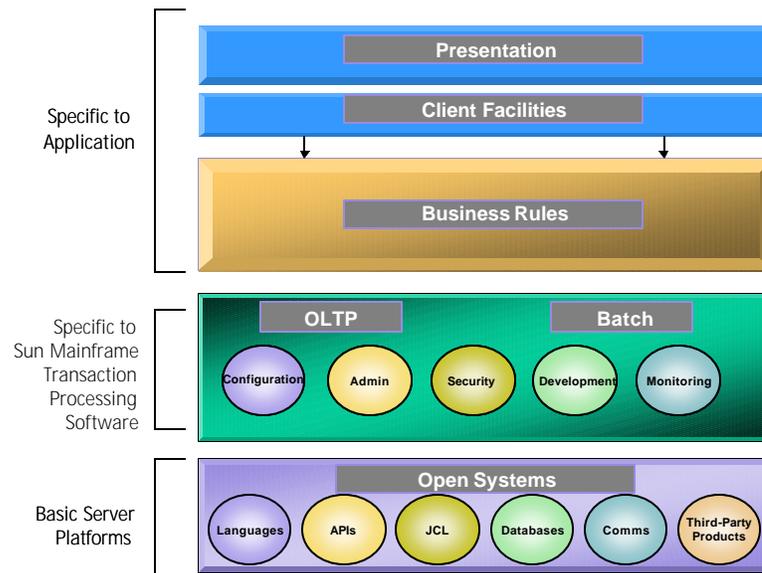
- No changes to business processes or practices
- Immediate cost reduction by cutting high mainframe hardware cost & software license monthly fees
- Equal or better performance, availability, and scalability for mainframe applications
- Pathway to the new technologies and capabilities without sacrificing existing investments in hardware, software, and training
- Reduced costs, risks, and time-to-service for implementing new applications

Sun's Mainframe Rehosting Solutions

Sun offers the full range of products, tools, and services mainframe customers require to quickly and successfully rehost applications on the Solaris environment. With Sun Mainframe Transaction Processing and Sun Mainframe Batch Manager software, you can cost-efficiently minimize the risk, duration, and cost of transitioning to a more flexible, agile environment.

Sun Mainframe Rehosting Software

Sun Mainframe Transaction Processing (Sun MTP) software is CICS-compatible software system for the Solaris OE. It enables you to reuse your well-tested application code, data files, and expertise of your staff in the Solaris Operating Environment. The software implements a high-performance, highly reliable application management system for executing CICS applications on the Solaris platform. Sun MTP software supports COBOL or PL/1 CICS applications and includes a full VSAM indexed sequential file system as well as interfaces to DB2 or Oracle databases. It provides access to data and services across CICS systems via various standard communication protocols. Primary functions include application transaction management, resource and session management, interoperability and distribution, security, and administration. Sun MTP software also includes a real-time graphical performance monitor to manage all the CICS application workload, as well as a mainframe-style application security system similar to RACF.



Sun Mainframe Batch Manager Software

Sun Mainframe Batch Manager (Sun MBM) software is a Batch job execution system modeled on mainframe Batch and containing most of the features of the rich mainframe Batch environment. Sun MBM software includes the concept of job step processing and recovery, similar to the mainframe. It also includes automatic translation of mainframe Job Control Language (JCL), and supports a wide range of mainframe-

like features. Sun MBM software is designed to scale to the full range of Sun servers and is capable of running hundreds of job streams, leveraging the power of up to 72 processors in Sun's new Sun Fire™ 15K server.

Key capabilities include:

- Submit/Cancel/Suspend jobs
- List status and execution report of specific job
- Monitor active jobs and job classes
- Recovery at the job step level
- Support for Generation Data Groups

Sun offers additional product features to provide a basis for application evolution in end-user presentation, coexistence in a Java technology based environment, and integration with de facto standards.

Through Sun's professional services organization, customers can arrange for Sun and Sun-authorized consultants to provide expert assistance with any facet of the rehosting process. These services are very flexible in allowing customer participation on various tasks to offset costs and expedite knowledge transfer.

Rehosting Cost Reduction Example

The Sun mainframe rehosting solution enables enterprises to dramatically cut costs of running mainframe applications while still preserving those application assets on Sun servers. The three key contributors to cost reduction through a Sun rehosting solution are:

- System hardware: Much lower cost/MIPS for Sun servers
- System software: The Sun rehosting software is sold using a one-time payment license that is much less expensive than IBM's annual license fee for software
- System maintenance: These costs are directly tied to the software license costs, so are proportionally lower with the Sun rehosting approach

A Sun rehosting customer in the federal government provides an illustration of the cost savings. This customer ran a large CICS/DB2 application on an outsourced mainframe with a total outsourced cost of about \$15 million per year. The application was a combination of batch and CICS transaction processing mainly developed in COBOL.

The agency decided to rehost on the Sun platform and purchased two top-of-the line Sun servers and Sun's rehosting software to run the application. Running costs for that application have now been reduced by almost \$10 million per year, a savings of more than 60 percent. These savings are in line with other customer experiences. Highlights of this successful rehosting project include:

- Immediate ROI
- No change for end-users
- Better performance
- No IT disruption
- Mainframe phased out ahead of schedule

The Role of Java Technology in Application Evolution

Rehosting can provide immediate ROI, freeing up both financial and staff resources to enable you to consider new options for aligning your business rules with newer technologies such as the Java software platform. Sun's mainframe rehosting solutions position legacy mainframe applications to take full advantage of the latest Java technology innovations.

Java technology is widely used in networked data centers to link heterogeneous platforms, access legacy information, and provide a closer tie to daily business operations. Sun Mainframe Transaction Processing (Sun MTP) software complements the inherent cross-platform capabilities of Java technology, creating the following synergies:

- *Integration with new applications:* Sun MTP software provides the ability for you to create new applications in Java technology and access your legacy applications through the standard Java connectors. Over time, you can migrate parts of your legacy application to Java technology without having to change your original Java application.
- *Extend legacy applications:* Sun MTP software allows you to extend your current COBOL application using Java technology classes. You can call a Java technology class from a COBOL program or call a COBOL program from a Java class. The COBOL program uses the standard CICS API (.LINK). Entire new transactions can also be written in the Java programming language.
- *Risk-free migration to new environment:* Sun MTP software provides an evolutionary path to the new environment of Java technology, not a revolutionary path. This means the risk is greatly reduced, since you implement and change the application in small increments as opposed to the revolutionary approach of doing it all at once.
- *Maintain necessary business logic:* Sun MTP software allows you to maintain logic that is critical to the business and not supplied by other packages or architectures, but also lets you interoperate with new technologies and applications.

Sun's Value Propositions

- Portable, cross-platform, "future-ready" applications: applications written in the Java programming language can run it on any platform.
- Comprehensive software platform provides interoperability with enterprise databases, transaction services, naming and directory services and other enterprise systems.
- Strong industry acceptance and adoption

Sun's High-End Data Center Systems

Sun's high-end servers and storage systems combine the power of mainframe-like technology with the availability, scalability, and manageability you need to harness the benefits of rehosting.

Sun Fire 15K Server

The Sun Fire 15K server is the ultimate system for minimizing total cost of ownership (TCO) while maximizing service-level availability and performance. This highly scalable 72-CPU system offers industry-leading availability and resource management capabilities, such as online maintenance and fault-isolated Dynamic System Domains. With its ability to deliver a high return on investment and low TCO, the Sun Fire 15K server is ideal for mainframe application rehosting.

Sun Enterprise 10000 Server

The original UNIX mainframe is a proven, rock-solid, 64-way rehosting and server consolidation platform. The Sun Enterprise™ 10000 server is now at work in thousands of data centers worldwide. The Sun Fire 15K server and Sun Enterprise 10000 server share a number of unique features that make them ideal platforms for mainframe application rehosting and server consolidation:

- *Dynamic System Domains for mainframe-like partitioning:* A single Sun Fire 15K or Sun Enterprise 10000 server can be shared by multiple departments or projects simultaneously, simplifying capacity planning and reducing total cost of ownership.
- *High-end Reliability, Availability, and Serviceability (RAS) features* such as Automatic Dynamic Reconfiguration (ADR) for online repair, Automatic System Recovery (ASR) for sustained uptime in the event of a failed component, IP Multipathing for enhanced connection reliability, and redundant, hot-swappable components.
- *Sun Cluster 3.x software* extends the inherent reliability of the systems, enabling devices, file systems and networks to operate seamlessly across a tightly coupled clusters of up to eight nodes.

Sun StorEdge 9900 Series Storage Systems

The Sun StorEdge™ 9900 series is the data center storage platform of choice for customers who require extreme levels of availability, performance, scalability, and manageability. The systems combine a revolutionary Fibre Channel (FC) switched non-blocking architecture with sophisticated RAS functionality to provide truly non-disruptive performance and availability. They are specifically tailored to the demands of the glass house, where mainframe connectivity, storage consolidation, and availability levels approaching 99.999% are required.

Sun's Value Propositions

- Leading-edge, mainframe-like server technology in a flexible, cost-efficient system
- Sophisticated RAS features in hardware and system software
- Technology leading storage solutions tailored to the needs of the glass house
- Proven at thousands of customer sites worldwide

Running Mixed Workloads in the Solaris Operating Environment

The Solaris Operating Environment accommodates mixed batch and transaction processing workloads of traditional mainframe environments with high reliability, availability, and scalability. In addition to the mainframe-like capabilities of its high-end data center server and storage systems, Sun delivers an array of proven, robust technologies and services for running mixed workloads, including:

- *Solaris Resource Manager Software for Managing Single-OS Workloads:* Solaris Resource Manager software helps administrators control resource access, ensure that critical applications are allocated their share of available system resources, and consolidate multiple applications on a single Solaris Operating Environment server.
- *Solaris Bandwidth Manager Software for Bandwidth Allocation:* Co-packaged with Solaris Resource Manager software, Solaris Bandwidth Manager software enables administrators to allocate and prioritize the bandwidth used by IP traffic in LANs and WANs.
- *Dynamic System Domains for Workload Isolation and Deployment:* Dynamic System Domains offer mainframe-like partitioning capabilities. Now in their fifth generation, Dynamic System Domains enable you to resize your system resources without downtime—dynamically and on the fly.
- *Automated Dynamic Reconfiguration for Capacity Adjustment:* Used in conjunction with Dynamic System Domains, Sun's ADR technology also gives administrators the ability to optimize throughput and response times and adjust the application architecture and configuration to meet unexpected requirements.
- *Sun Cluster Software for Tightly Coupled Resource Pools:* With Sun Cluster 3.X software, you can create tightly coupled pools of resources to deliver more scalable services.
- *Sun Management Center Software for Integrated Management:* Sun Management Center software brings together the best technology for managing Sun systems, instant integration with industry-leading management platforms, and a powerful development environment that makes it easy to unite thousands of system components under a single management console.

Sun's Value Propositions

- Consistently meet SLAs by dynamically managing resources, transparent to the application. The Solaris Operating Environment provides the key hooks to advanced system management tools, enabling you to manage the complex workloads of e-business with maximum efficiency and minimal cost, complexity, and risk.
- Full complement of sophisticated workload management technologies within domains, outside domains, and beyond a single system.
- Proven technologies with many years of development, refinement, and enhancement.

Mainframe Affinity Program and Support Services

Sun has an extensive track record of delivering high-quality, comprehensive, worldwide service and support. To provide an understanding of how Sun servers coexist with, interoperate with, or offload legacy systems in the data center, Sun has created the Mainframe Affinity program. The program includes:

- **Mainframe Affinity Centers**, which provide a forum for testing and validating cross-platform solutions that combine data center and Web-centric technology. The scope includes infrastructure, management, and middleware solutions. We examine how to integrate new applications and mainframe computing while gaining a better understanding of the resources needed in the data center.
- **Sun Blueprints** On best practices for implementing the networked data center, guided by mainframe disciplines and attitudes (similar to IBM's Redbooks).
- **Mainframe Affinity Services**, which help you with all facets of rehosting applications, including consulting services, education and training, and system support.
- **A partners program** for vendors with hardware, software, or services that contribute to smoother data center operations to perform system administration, printing, backup, disaster recovery services, user accounting etc.

Sun Support Services for the Mission-Critical Data Center

Sun offers comprehensive service and support to help ensure that your mission-critical environment is fully capable of meeting your service-level availability and performance requirements. We offer you the combined experience and expertise of:

- **Sun Professional Services** consultants, who provide Server Consolidation and Data Center Services, new Sun High Availability Services packages, and customized, expert consulting services to meet your specific requirements.
- **Sun education and training** professionals, leading providers of Solaris-based system education and customized training programs
- **Sun support service** specialists, who can provide mission-critical systems support, remote monitoring services, and knowledge-based services to proactively prevent outages
- **Additional Mainframe Services:** Where additional services are required, Sun Enterprise Services provides the third-party packages, tools, and recommendations of system integration partners to meet the customer's system specifications.

Sun's Value Propositions

- Focused Mainframe Affinity programs and services for mainframe customers who are integrating mainframe assets into the Sun environment.
- Comprehensive mission-critical services designed specifically for the high-end data center.
- Expert consulting services for any facet of the rehosting process, anywhere in the world.

Conclusion

Mainframes have long been the systems supporting large Fortune 2000 companies, and the value of the embedded business rules developed over many years is still considerable. Organizations have spent much of the past few years remediating these applications so that they could continue serving the business for years to come. Rehosting the applications to the Solaris Operating Environment, using the combination of Sun Mainframe Transaction Processing software and Sun Mainframe Batch Processing software allows some re-capitalization of the expense of the remediation while lowering the risk associated with unknown new business practices. And, once on the Solaris Operating Environment, the applications can be more easily integrated with new initiatives such as data warehousing, supply chain management (SCM), enterprise resource planning (ERP), and e-commerce solutions, which run primarily on Sun servers.

With the tremendous data center experience gathered by the success of the high-end server line, combined with the proven Mainframe Rehosting technology, Sun can provide a real alternative to mainframes for running your in-house applications at a lower cost while maximizing the ROI of your mainframe assets: business practices, data, application, IT skills—all without sacrificing business agility.

For More Information

For details about any of the products, services, and programs mentioned in this paper, please visit <http://www.sun.com>.

About Sun Microsystems, Inc.

Since its inception in 1982, a singular vision, “The Network Is The Computer” has propelled Sun Microsystems, Inc. to its position as a leading provider of industrial-strength hardware, software, and services that power the Internet and allow companies worldwide to take their businesses to the nth. Sun can be found in more than 170 countries and on the Web at <http://www.sun.com>.

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