CLABBY ANALYTICS

Advisory

Are You Considering Migrating Away From Your Sun Servers?

Executive Summary

As Oracle moves to acquire Sun Microsystems, several Sun server owners and many information technology (IT) research analysts have expressed doubt over whether Oracle will continue to invest heavily in Sun's UltraSPARC-based reduced instruction set computing (RISC) servers. Reasons for this doubt include:

- *Margins* — Sun RISC/CMP server margins are substantially lower than the software margins that Oracle is used to obtaining for its database, middleware, management, and applications products (Oracle software operating margins are currently in the 46% range; Sun server margins are in the 15% range).
- *The High Cost of Continued R&D Investment* — In order for UltraSPARC-based servers to stay competitive with servers from Hewlett-Packard (HP) and IBM, Oracle will need to invest heavily in microprocessor research and development.

  Note: Sun recently announced that it is dumping its advanced, cellular multiprocessing (CMP) microprocessor development (codenamed "Rock"). When Oracle acquires Sun, will the plug also be pulled on UltraSPARC development?

- *Channel Conflict* — Oracle currently has strong business partnerships with Dell, Hewlett-Packard, and IBM. By entering the server business, Oracle would become a direct competitor of these business partners.

Given these concerns, Sun owners are now considering moving away from Sun server platforms to other server vendor's servers. And typically they see their options as:

- Move from Sun Solaris (Unix)/RISC to another Unix/RISC platform — more specifically, to IBM AIX/POWER servers. Using advanced migration tools and its Migration Factory services, IBM has helped 1600 HP/Sun server users migrate to IBM servers over the past 3 years;
- Move from Sun Solaris (Unix)/RISC to HP/UX/Itanium (EPIC) platforms — a move *Clabby Analytics* would strongly NOT recommend due to Itanium's consistent record for being late to market, its benchmark performance, etc.;
- Move from Sun Solaris/RISC to Solaris on x86 architecture (but note: RISC and x86 architectures are significantly different from a reliability, availability, and security (RAS) perspective — as well as from a virtualization and provisioning features/functions perspective);
- Move from Sun Solaris/RISC to *Linux* on POWER, Itanium, or x86; or,
- Move from Sun Solaris RISC to an IBM mainframe architecture.

If your organization is considering any of these migration options, *Clabby Analytics* suggests that you start by examining the characteristics and the amount of the work you're asking your new server platform(s) to perform. If your workloads dictate very high performance and a high degree of RAS — then consider migrating to an alternative Unix/Linux RISC platform. If your applications are parsed into many distinct threads and don't require a lot of memory or a high degree of RAS, consider moving to x86 platforms. And if your organization runs a variety of batch, interactive, and transactional applications (generalized workloads) — and if you have a lot of work to process — consider moving your applications to a general purpose computing mainframe environment.

> ***When you do your application inventory, Clabby Analytics believes that you will find that there are needs for multiple, different server types within your organization. And you will also likely find that mainframes are ideal for processing high-volume, large, general workloads. And mainframes are perfect hubs for virtualization, provisioning, management and service-oriented architecture. Further, mainframes run Linux, making mainframes an excellent choice for Linux consolidation (250 Linux servers can run simultaneously on a mainframe — using only 1/12 the power of the equivalent number of Linux towers).***

In this *Advisory*, *Clabby Analytics* provides guidance that should help Sun owners make the right platform choice — RISC, EPIC, x86 or mainframe — when replacing Sun servers.

Migrating From Sun: Start by Examining Your Workload Characteristics

In order to determine which systems architecture is the best fit for your organization's computing needs, ***start by examining the types of applications that your organization runs***. Look closely at the threading characteristics of your applications (the number of independent processes and their memory requirements). And also examine the impact of constantly driving messages and threads over a network (as opposed to driving them over a large, high-speed internal bus).

So, for instance:

- If an application is parsed into many distinct threads that can be processed on separate servers and the results can then be easily reassembled to produce a final outcome − and if each of those threads does not require greater than four gigabytes of memory to execute − then that application is a candidate for a scale-out computing design (such as x86 blades, racks, or towers).
- If an application consists of numerous, tightly-coupled threads (threaded with a threading library) and can benefit from sharing large amounts of memory, then that application should be run in a scale-up design (such as high-end Unix/Linux server environments or a mainframe). Memory use is important because the more data that can be place in memory, the faster it will get processed.
- From a network design perspective, consider the impact of deploying your applications in a distributed computing design versus a self-contained, scale-up design. If you choose a distributed computing design, be prepared for increased networking costs (for hubs, bridges, routers, NICs), and increased systems/network management costs (because it takes more people to manage distributed systems environments than scale-up environments.

- Also from a network perspective consider this: computing infrastructure is standardizing on service-oriented architecture (Web services standards-based program-to-program communications). Service oriented architecture is a message-passing architecture that generates a lot of network traffic. Clogging you network with all of this traffic creates latency issues. Scale-up designs, however, have very high speed internal busses that don't get clogged — even with high volumes of message passing. Most Sun users have heavily deployed distributed computing environments. Now, during a migration, it may be time to rethink whether distributed computing is really the best design point for your data center of the future.

The way your applications are loosely-coupled, and the amount of memory that those applications use, should help you determine which platform architecture to choose. In general, if your applications consist of many distinct threads and require less than 4Gb of memory, you should consider using x86-based hardware (blades, racks, towers). If your applications are tightly-coupled and benefit from access to large amounts of memory, you should consider deploying on another RISC architecture, or EPIC (not a favorite choice of Clabby Analytics), or mainframes. And if you have a mixed workload consisting of both types of application environments, you may be best served by deploying on a server designed for general purpose processing (a mainframe).

What Most Sun Owners Fail to Consider About Mainframes

There is a huge difference between the design point of distributed servers and the design point of a centralized mainframe:

- Distributed servers (like most existing Sun environments) have largely been *designed and optimized to run one application environment very well* — but lack the advanced workload management characteristics to drive multiple, general applications really well.
- Mainframes have the most advanced virtualization, provisioning and workload management features in the industry — *and can thus drive generalized workloads extremely well*. (The converse, however, is likely true: if you servers designed and optimized to run one application really well, you should be looking more closely at RISC or x86 alternatives).

As you think through the implications of the previous two points, *Clabby Analytics* also suggests that you think about your future IT strategy. Over time, whether you want to or not, you will either consolidate/virtualize/provision your computer environment — or you will buy services from someone who is running a consolidated, virtualized, provisioned environment. (Another name for these consolidated/virtualized/automatically provisioned environments is "cloud computing").

If you choose to go the x86 path as your next platform choice, you need to bear in mind that you will have to buy x86 server hardware (blades, racks, or towers) — and you will have to use virtualization and provisioning software for that hardware (available from Microsoft, EMC [VMware], Citrix, and many other sources). Further, you will end up buying virtualization infrastructure from those vendors. And you will end up buying virtualization management from those vendors — or any of a number of other virtualization/provisioning management software providers. The point is that your original

investment in x86 hardware will end up looking awfully cheap when compared to the bill you're going to get when you buy and integrate the virtualization/provisioning software that you're going to need to build your own IT cloud.

If you choose to go the RISC or EPIC route, you'll get more advanced virtualization and provisioning software (if running Unix environments) — but you'll still end up doing a fair amount of workload balancing/workload management to drive workloads across these distributed computing environments.

If you choose to go with a mainframe, you get all of the software needed to deploy the most advanced virtualization/provisioning/workload management environment in the industry — and it is extremely well integrated and highly secure.

Before you reject the idea of replacing your Sun environment with a mainframe, you should:

1. ***Understand that distributed computing environments have a completely different design point as compared with mainframes (optimized, single application servers versus general purpose, highly-automated workload balancing centralized servers) — and you should think carefully about which type of environment is best suited to your workload. And you should;***
2. ***Reconsider your IT strategy. You can continue to struggle build your own consolidated,virtualized, provisioning environment on distributed architecture — or you can use a mainframe that has advanced virtualization, advanced provisioning, and advanced workload management already integrated with the operating environment.***

Other Important Platform Considerations

When evaluating your new platform, also consider:

- RAS (reliability, availability, security);
- CPU processing power; and,
- Manageability.

From a RAS perspective, both scale-up systems and scale-out blades are known to be reliable. And should a failure occur, both systems have the ability to failover either to other servers or to virtual workspaces within the same scale-up platform or blade enclosure. In the area of security, there are distinct advantages to scale-up security because most program-to-program communications take place within the same box (meaning that, from a physical system security perspective there are fewer access points that need to be guarded ─ and also meaning that less data is sent over a network where it has the potential to be intercepted).

From a CPU power perspective, it can easily be successfully argued that scale-up mainframe and RISC designs offer more computing power (capacity) than industry-

standard x86 scale-up architectures. Most of the major advances in computing architecture happen first on mainframe designs, cascade to RISC/EPIC designs, and ultimately wind up on x86 designs (examples: multi-core/multi-threading, virtualization, and advanced memory management). Further, combining very powerful CPUs with the ability to add terabytes of memory gives a strong edge to scale-up designs when it comes to processing large amounts of data.

From a manageability perspective, it can be argued that having fewer servers to manage is easier than having many servers to manage. And as proof, large, scale-up mainframes require significantly fewer managers than scale-out environments consisting of hundreds of servers. But again, it should be noted that blade architectures consolidate many servers into single enclosures – so if you've got to manage a distributed server environment, blade architecture is probably the best choice if simplified management is an objective.

> ***Be aware, however, that vendors are working very hard to build systems using Intel's new Nehalem 8-core processors that will greatly increase overall x86 scale-up computing capacity. But, also weigh this — it will take years or even a decade for x86 architecture to match the virtualization/provisioning/workload balancing environment that a mainframe offers today. So yes, you can march down the Nehalem path (and if you're a Windows users, that is a good path to go down), but you may find that you're going to end up doing a lot of integration work and buying a lot of software licenses — and still not be able to get to where mainframe architecture is today from a RAS, security, computing capacity, and manageability perspective.***

Migration Can Be Painful — Or Not…

Migration can be an expensive undertaking ─ and often yields little improvement in the IT services. In many cases, migration is tantamount to simply running the same applications on different hardware. However, in cases such as this Oracle/Sun acquisition, a migration may become necessary.

When migrating to another systems platform, IT planners usually examine:

- *Other application characteristics and requirements*. Earlier in this advisory I suggested that you look at application threads to determine your platform choice. Now that you understand your workload requirements better, you need to evaluate how hard it will be to move your applications to another platform. First, consider whether your applications custom or packaged (it is easier to move custom applications to a like platform ─ for instance, from Sun Solaris (Unix)/RISC to IBM AIX (Unix)/RISC than it is to move to completely different operating environments on completely different underlying hardware architecture. Second, application "bittedness" also dictates which new platform should be chosen (for instance, if an application is 64-bit, then a 64-bit platform needs to be chosen; or if an application is a 32-bit Microsoft Windows application, then an Intel-based architecture needs to be chosen).
- *Operating environments*. Because Unix operating systems employ a lot of the same system calls and controls, moving from one Unix to another Unix operating system (OS) is usually straightforward from an administrative/management point-of-view. (There are, however, some unique characteristics between operating environments that may have to be assuaged ─ such as the Sun container concept versus other methods of virtualization on other systems). The key question to ask when

evaluating a move to another operating environment is how similar is the new OS to the OS that I have now? If not similar, how hard will it be to "train-up" on the new environment?

- *Hardware characteristics*. It is usually easier to move applications to similar architectures (for instance, from Sun RISC to another RISC platform (such as IBM's Power systems). Moving to a completely different architecture (such as HP's explicitly parallel instruction computing ─ EPIC) can involve significant application rewriting/recompile work ─ as can moving to an x86 CISC (complex instruction set computing) architecture, or even a mainframe. If the amount of custom code an organization runs is minimal, this is a moot point. But if the amount of custom code and organization runs is substantial, the cost involved in porting code needs to be closely weighed.
- *Systems characteristics*. System characteristics such as reliability, availability, and security need to be closely considered in any migration. Failure to pick the right systems environment can result in increased risk (security, compliance, business continuity); and reduced reliability/availability (resulting in failure to meet agreed-to service levels).
- *Middleware.* In medium and large enterprises, systems environments are usually heterogeneous. Hence, how well a new platform/OS works with other, dissimilar servers and programs is critically important. Accordingly, IT planners look for commitments to open standards, and particularly seek to learn whether the new platform supports open program-to-program communications [Web services, SOA] as well as open standards-based data interchange [XML]).

Scott McNealy, Sun's former president and CEO, used to refer to migration as a "switching cost" ─ and constantly held that moving to open standards would help mitigate switching costs in the future. Make no mistake, there will be switching costs involved in migrating to another platform ─ often for very little payback if a similar environment is chosen. But if a completely new environment, like a mainframe environment is chosen, the payback can be enormous from an operational cost perspective.

How Mainframes Will Help You Reduce IT Operating Costs

From an operating cost perspective, most IT strategic planners fail to take the opportunity to reevaluate their systems deployment situation when undertaking a migration. The 1980s and 1990s gave rise to the growth of distributed computing architecture ─ where millions of servers have been distributed worldwide as dedicated application servers (and these servers are frequently provisioned to only 10-15% of their overall computing capacity ─ and are hence severely underutilized). These millions of servers require a lot of administrators and managers to help configure, troubleshoot, and manage not only systems, but related storage and networking (incidentally, huge savings can result by eliminating costs related to networking [cables, NICs, switches, deployment and management costs, et al] by moving to a centralized architecture).

Mark Shackelford, Baldor Electric VP of Information Services, told me that his organization ***has now reduced its IT costs down to 1% of the company's sales revenue ─*** and that moving to mainframe architecture had a big role in helping drive down his

operational costs. (A complete case study write-up of Baldor Electric can be found at http://gomainframe.com/uploads/BaldorFINAL.pdf).

Bank of New Zealand (BNZ) moved to mainframe architecture and has reduced its power consumption by 38%; it generates 33% less heat; uses 31% less space ─ and has reduced its carbon emissions by 39% ─ by adopting mainframe architecture (see Chart 1).

Chart 1 ─ Bank of New Zealand Mainframe Environmental Savings

Power (kWhr)	36	22	38% less
Heat (kBTUs/hr)	110	74	33% less
Space (Racks)	6.5	4.5	31% less
Carbon (Tonnes)	66	40	39% less

Source: Bank of New Zealand ─ May, 2009

IBM itself has a major migration from older Unix- and Windows-based servers to mainframe architecture underway. As part of a move to reduce operating costs and consolidate its server environments, IBM is in the process of migrating 3900 distributed servers onto 30 (or fewer) mainframes. IBM expects to achieve cost savings in licensing costs, # of ports to deploy/secure, physical cabling (and related labor) and physical network connections (see Chart 2).

Chart 2: IBM's Expected Cost Saving By Migrating to Mainframe Architecture

Dramatic Simplification

Unit	Distributed	System z Linux	% Reduction
Software Licenses	26,700	1,800	93%
Ports	31,300	960	97%
Cables	19,500	700	96%
Physical Network Connections	15,700	7,000	55%

Results will vary based on several factors including # of servers and work load types

Source: IBM Corporation ─ December, 2008

How IBM Will Help You Migrate From Sun Servers to a Mainframe

Make no mistake about this — IBM's System z server organization wants Sun users to migrate to IBM's System z mainframe. And to aid in this migration, IBM provides Sun migration services under the auspices of its Migration Factory (a professional service organization). Further, IBM's System z organization has introduced a new program known as "zRewards".

Clabby Analytics has, in the past, described in detail what IBM's Migration Factory is and the types of services that it offers. In short, this organization has a five step process for performing end-to-end migrations from Unix-based servers to other Unix environments, or to Linux, or to mainframes. For enterprises with large amounts of Solaris C/C++ applications, the Migration Factory has a C/C++ porting service. For organizations that need to migrate data, the Migration Factory provides a comprehensive suite of tools coupled with specialists who can help migrate data from one platform to another. Comprehensive, in-depth, well-tested services are also available to help rebuild systems infrastructure as well as to migrate enterprise resource planning applications.

IBM's zRewards program has been designed to help simplify application migration from HP, SUN and other competitive servers to IBM System z10. It allows clients who purchase new System z10 capacity to reward points that can be redeemed for high value IBM migration expertise and services. The amount of rewards earned is based on the number of competitive cores that the workloads run on before they are moved to System z. IBM migration services are delivered by experienced IBM and System z Authorized Business Partner consultants who have experience in helping clients move up to a mainframe.

Summary Observations

Sun users need to closely examine the characteristics of their applications — and consider their future IT strategy — before migrating to another systems platform.

When evaluating other platforms, you can continue down your current course of building highly-underutilized distributed systems environments — or you can move to highly-efficient mainframe architecture. If your applications must have optimized servers — or if they use many, loosely-coupled threads and small amounts of memory — then you should probably continue on the distributed systems course (although, note that mainframes run Linux and can also accommodate loosely-coupled environments quite easily). But if your organization runs generalized workloads (batch, interactive, transactional) — and if you don't want to spend the next five to ten years trying to build a consolidated, virtualized, provisioned, workload-balanced computing environment — then you should consider the mainframe as your next platform choice.

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