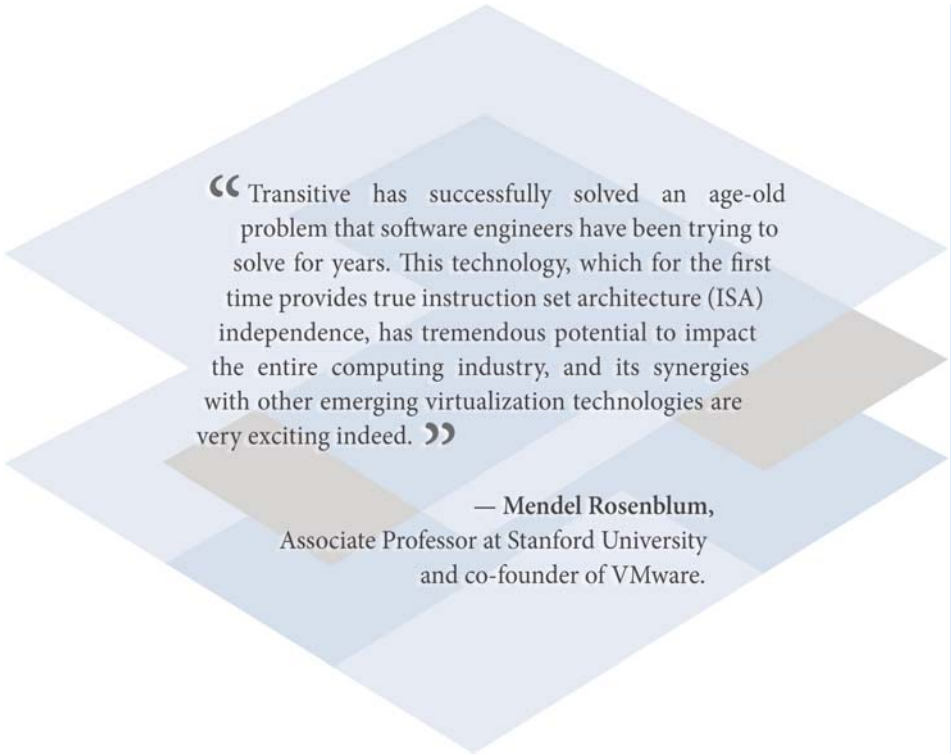
Rapid Consolidation: Virtualize Solaris™/SPARC® on x86 Servers with QuickTransit®



QuickTransit® for Solaris™/SPARC®-to-Linux®/x86-64 allows Solaris/SPARC application software to run on Linux/x86 systems with no source or binary changes to the applications. This white paper examines how QuickTransit can unlock the benefits of consolidating workloads that currently use Solaris/SPARC onto Linux/x86 systems.

Today's Datacenter

Today's datacenter is a huge and complex operation. It typically includes many different server types from many different product families supported by many different manufacturers or service organizations. As these systems have been acquired over a period of time they are often grossly inefficient by today's standards in their use of electrical power, their waste heat output and their physical size and space requirements. Furthermore, individual servers are frequently underutilized, often below 20%.

These many different server types demand individual management of both software and hardware features. Many datacenter managers are coming under pressure from CIOs and CFOs to rationalize their datacenters to respond to a number of today's business pressures.

Lifecycle Pressures

The first pressure on IT systems is to reduce costs by every available means. Any CIO who surveys a long-running IT organization will identify significant costs incurred by legacy systems. Older systems tend to have higher maintenance costs and the threat of loss of vendor support hanging over them. These costs escalate rapidly with older servers. In extreme cases the supply of spare parts becomes problematic and the available maintenance expertise disappears. Developers who understand the internals of legacy applications and who could undertake or supervise a port to a modern system may be redeployed elsewhere or lost to the organization.

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As the pace of innovation in computer hardware increases, the older servers in a datacenter begin to look very unattractive. They consume more floor space and power, and generate more heat than the equivalent computing capacity delivered with modern technology.

At the same time, enterprise infrastructure packages such as standard RDBMS, CRM and application server packages are becoming increasingly pervasive, capturing the niche previously occupied by custom-made applications written specifically for a customer's needs. There is a significant mismatch between the lifecycles of enterprise infrastructure software and enterprise hardware: software systems have lifetimes expressed often in decades with only incremental changes carried out during that period, while hardware systems have a typical refresh period of 3-5 years and are completely obsolete in 7 years. The requirements for enhancing and upgrading enterprise software should be driven by business needs, not gated or prevented by the availability timetable of hardware, operating systems or infrastructure software suppliers.

Hardware refreshes are typically driven by substantial hardware improvements: modern server systems are cheaper to acquire, to power, to cool, to operate, to maintain and to house than systems of only 5 years ago. This is particularly true when measured by performance per cost unit because the effect described by Moore's Law has driven performance so much higher in that period.

Lastly, a common business requirement for new IT systems is to increase their ability to react to changing business needs through higher agility and responsiveness than has been traditionally expected. This means that datacenter managers should be able to provision new servers or repurpose existing ones in minutes rather than in days

Today's IT Infrastructure Goals

The first step in reducing costs in a complex datacenter is to consolidate workloads on modern servers. This reduces direct running costs by reducing power consumption per unit of computing power, reducing air-conditioning requirements, reducing floor space and reducing maintenance costs. Most servers in current datacenters are dramatically underutilized, with usage factors commonly below 20%. Consolidating these server workloads onto a small number of modern servers raises the utilization above 50% and reaps benefits from the efficiency of the latest CPU chips. Future datacenter architectures are increasingly based on running entire workloads within virtual machines on a single type of small-footprint blade system.

Forward thinking datacenter managers are also setting themselves the strategic goal of radically simplifying their datacenters to increase flexibility and reduce management cost. For example, deploying a standardized hardware platform increases flexibility in the datacenter if every server could run every application, easing the task of matching server resources with ever-changing workload demands.

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Once a virtualization solution, using VMware® infrastructure or Xen® hypervisor, is put in place, a number of additional benefits become available: the virtualization can offer flexible, rapid provisioning remotely over a network by migrating already-provisioned virtual machines between physical servers. The same approach can be used to provide dynamic load balancing of applications workloads. Disaster recovery can be made an integral part of the infrastructure, using virtual machine tools such as VMware® HA to allow soft-failover of services, even across different geographical sites.

Tomorrow's Ideal Datacenter

Transitive believes that best practices in tomorrow's datacenter will include:

- Homogeneous, single industry-standard system architecture and operating system
- Fully virtualized operating system environment with unified management tools for:
  - Provisioning
  - Monitoring
  - Load balancing
  - Failover

Given today's heterogeneous configurations, the task facing IT systems architects and datacenter managers is Herculean. To express the obvious problems simply, the major systems vendors each have their own preferred consolidation architectures and each offers a (more-or-less) clear migration route between server types within their own product lines. However, migrating applications and workloads between vendor product lines is a special-case activity, involving high-touch consultancy work, with a correspondingly high price point.

Even in the instance where an application has been developed in-house and the development team is still available, porting the application to a new CPU architecture is time-consuming and risky. The application code needs to be altered to account for differences in data representation on the two platforms (such as field widths, alignment requirements, endian-ness), differing layouts of file store structures, differences in the availability of system services and related applications, etc. As a result, porting software is a demanding and error prone activity requiring iterative cycles of testing and bug-fixing. Once all of these changes have been carried out, it is necessary to execute a full system validation of the ported software to ensure that every necessary change has been carried out successfully and that no defects have been introduced to the code during the port.

The upshot of these difficulties is that even in a commercial environment carrying out software ports on a regular basis, each port can cost upwards of 40% of the original cost of developing the software, while an organization that is not used to software porting can expect to spend significantly more.

QuickTransit Solution

QuickTransit® for Solaris™/SPARC®-to-Linux®/x86-64 is a product which allows different types of workloads to be consolidated onto standard Intel® or AMD-based servers, running Linux. QuickTransit allows Solaris/SPARC applications to run on the Linux/x86 servers with no source or binary changes, eliminating the need for the source port normally required.

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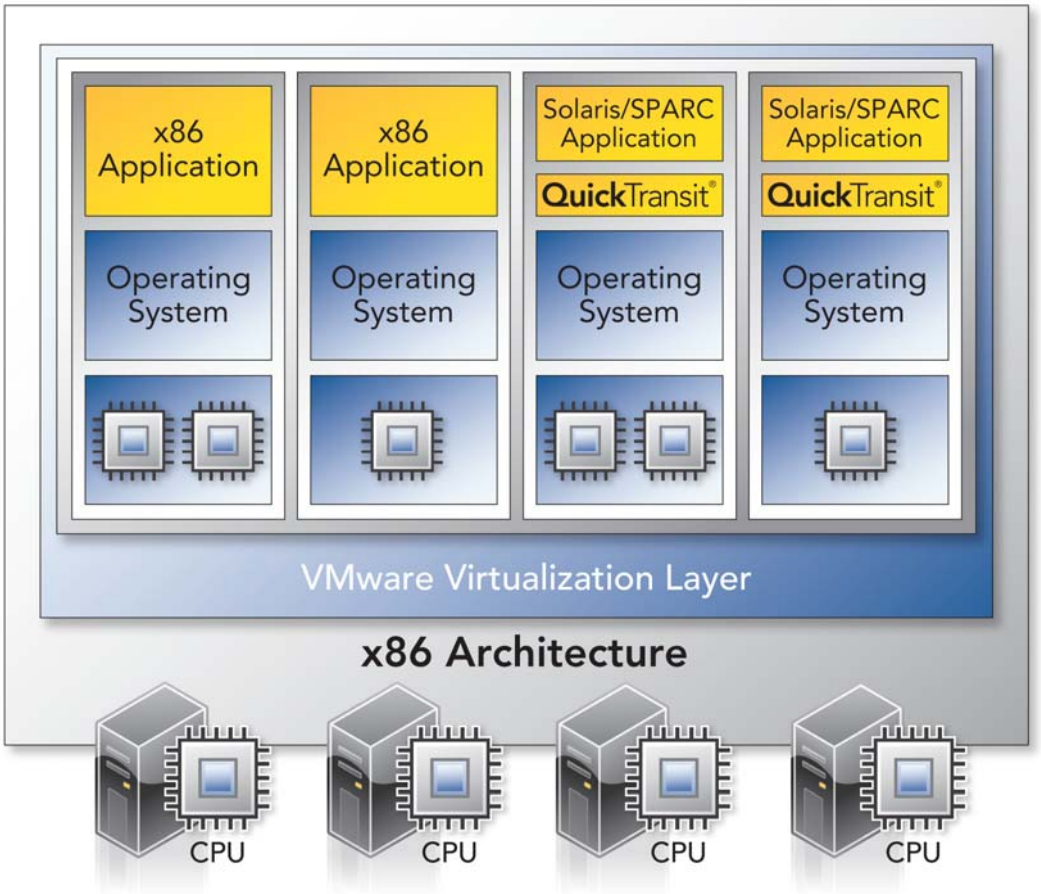
QuickTransit can be used to:

- scale-out Solaris/SPARC applications during heavy usage periods (year-end processing, holiday shopping, etc.) on industry standard systems
- create a disaster recovery environment in a separate location without duplicating expensive or out-of-date hardware
- run applications in production on new platforms while a more time-consuming port is being done
- run a subset of difficult-to-port code, interoperating with standard ISV applications running natively on the Linux platform
- migrate an entire server workload to a modern industry standard server without expensive, error-prone porting

QuickTransit Operation in VMware and Xen

As QuickTransit operates as a regular Linux application itself, it can be rapidly deployed within a server virtualization project using VMware or Xen. As a result, deploying Solaris/SPARC applications within a virtual machine is not significantly different from deploying a native application. Tools provided with VMware or Xen can be used to provision further instances of the Solaris/SPARC application with all of the advantages and benefits of these virtualization management tools.



Deploying QuickTransit within VMware or Xen consists of:

1. installing the VMware or Xen system on your hardware
2. installing your preferred version of Linux (QuickTransit can be installed on Red Hat® Enterprise Linux® 4 or 5 or Novell® SUSE® Linux Enterprise Server 9 or 10) in a virtual machine. At this point you may find it convenient to keep a clone of this initial virtual machine as a suitable starting point for provisioning native x86 applications.
3. in a Linux virtual machine, installing QuickTransit and the Solaris Environment. Depending on your chosen license handling strategy, you may also install the FlexLM license manager. At this point you may find it convenient to clone this VM (with QuickTransit installed), as this represents your Solaris infrastructure starting point
4. within this QuickTransit equipped VM, installing your first Solaris/SPARC application. Again, this VM may be cloned if you intend to provision multiple copies of this Solaris/SPARC application in your datacenter configuration.

In this way, the datacenter manager can set up a fully virtualized deployment of their Solaris/SPARC applications using the very latest of convenient VMware or Xen-related management tools.

Consolidating Solaris/SPARC Applications with QuickTransit in VMware Infrastructure

QuickTransit and a virtualization technology, VMware or Xen, can be used as the centerpiece of a consolidation of many SPARC workloads onto a small number of x86 Linux systems. For example, a major US telecommunications company is redeploying an internally developed production application that runs today on 150 UltraSPARC® II systems to virtual machines running on 32 Intel® Xeon® blades, reducing the floor space requirement by 95% and power consumption by 80%.

To illustrate the benefits of using management tools for virtualization, let us outline how a large and complex workload, currently running on many different servers, some Linux, some Windows, and some Solaris, can be successfully consolidated onto a single, homogeneous, virtualized infrastructure, using VMware® Infrastructure.

1. First, all x86 workloads, both Windows and Linux, are moved into virtual machines, using an approach which will depend on system tools and application requirements. (See, for example, VMware documentation for details.)
2. Once all the x86 workloads are running in the virtualized environment, the Solaris/SPARC workloads can be migrated into Linux VMs running QuickTransit. The way this can be approached will depend on the nature of the operations in the datacenter and the individual datacenter's threshold for change:

    - a "big bang" – where the entire set of Solaris/SPARC applications is migrated onto a new set of (virtualized) hardware as a whole. The applications are verified on test databases on the new hardware. When validation goals have been met the live databases are copied across and networks reconfigured to activate the new configuration, or

    - in other environments it may make sense to move individual applications tactically, one by one, into the new virtualized environment. This has the advantage that previous generation server hardware can be freed and decommissioned incrementally as the redeployment proceeds, reducing both floor space and power consumption.

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New Management Opportunities

Once Solaris/SPARC applications are running using QuickTransit inside a VM the benefits of the virtual machine management technology can be brought to bear. In many cases, the benefits of the additional management agility may actually exceed the cost savings benefits of running them on industry standard platforms, compelling though those may be.

In these examples, we will consider the management tools available using VMware Infrastructure, though the tools partnering with Xen virtualization technology are expected to rapidly reach a similar level of capability.

- Replicating Solaris/SPARC applications can be done by cloning their VM containers, allowing the roll-out of these applications at much lower cost than previously possible. This makes it economically feasible to provide applications to smaller departments or smaller branch offices which could not have previously supported the use of a whole SPARC server.

- Solaris/SPARC applications now become candidates for re-optimization; the memory and CPU power available to the application can be changed very quickly through VM management tools. The datacenter manager can specify a variety of configurations that much more closely match to the demand for the application, depending on the time of day, month or year. Resources that are unused as demand on the application varies can obviously be made available to other parts of the datacenter workload, whether Linux-, Windows-, or Solaris-based.
- The entire virtual infrastructure can be managed, automated and optimized using a single set of VMware® VirtualCenter tools. These can monitor the performance of virtual and physical machines, provision VMs to address capacity issues and automate the tasks necessary to match demand and capacity. Now for the first time, a single set of management tools can be used to manage Windows, Linux and Solaris workloads in a common hardware and software infrastructure.
- Live Solaris/SPARC applications and applications can be moved between different physical servers using VMware® VMotion™, thus maximizing the datacenter manager's ability to add physical resources, to balance load requirements or to schedule down time on physical systems for maintenance.
- Resource allocation may be automated using VMware® Distributed Resource Scheduler (DRS) which monitors the usage of key system resources defined by the datacenter manager into resource pools. VMware DRS uses VMotion to allocate available resources intelligently among active virtual machines based on pre-defined rules that reflect business needs and changing priorities. With Linux, Windows and SPARC workloads managed by VMware DRS, the infrastructure can dynamically re-allocate resources to differing mixtures of the workloads as demands vary by the hour or the day.
- Applications availability can be maximized using VMware HA, which monitors application availability using a heart-beat function. HA also monitors resource utilization, reserving capacity for mission-critical applications within the infrastructure, and can restart application VMs on different physical hardware almost instantly when it detects failure. Again, a single management tool can provide high availability for Linux, Windows and (using QuickTransit) Solaris workloads.

In each of these cases, the management tools are providing access to a single set of industry standard server resources, allowing the datacenter manager central control of a dramatically diverse workload.

"Management tools allow the data center manager central control of a dramatically diverse workload."

Conclusions

QuickTransit® for Solaris™/SPARC®-to-Linux®/x86-64 interoperates very conveniently with server virtualization software from standard industry suppliers. They serve to extend the virtualization tools and allow them to support Solaris/SPARC applications as first class objects, sharing resources dynamically with Windows and Linux workloads for the first time.

Next Steps

To learn more about QuickTransit, visit http://www.transitive.com

To evaluate QuickTransit for your own requirements, consult http://www.transitive.com/evaluate

QuickTransit is available in a VMware appliance (a pre-configured VM) for convenient evaluation.

To talk to a QuickTransit sales representative, contact Transitive at sales@transitive.com or you may call our offices at +1 877 399 6111 (US) or +44 (0) 20 7822 4366 (Europe)

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