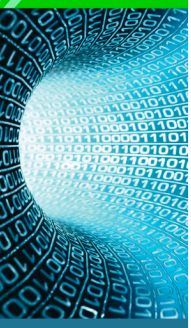
virtensys

What It Takes to Make Stateless Computing a Reality in Your Data Center *Today*

MARKETING BRIEF



The standalone capital cost of compute capacity (CPU cores, MIPS, FLOPS and RAM) has dropped precipitously – enabled by the economic implications of Moore's Law. However, the total cost (TCO) of adding a server is now dominated by the incremental operating expense required to manage it, cool it, and supply reliable power to it – much more than the capital acquisition cost(s) for the server.

One of the latest approaches to help out the beleaguered CIO is called "Stateless Computing" – a concept related to many other terms in common use (such as adaptive, utility, and even cloud computing). At its core, Stateless Computing is the notion that hardware servers in your environment can be managed as completely fungible commodities.

In pure theoretical Stateless Computing, the software applications and the underlying infrastructure are all architected in a manner that there is no persistent information stored on the server between transactions – Applications can in theory be moved or served from any server transparently. The HTTP protocol at the heart of the web is an example of a *stateless application*: once a web page has been delivered to the client, the connection is closed and the next transaction can be fulfilled by an alternative server.

Legacy applications were not architected to be stateless, and making them so is a significant undertaking. Fortunately, many of the benefits of a purely stateless environment are able to be realized by applying the concepts to the underlying server and virtualization infrastructure.

Unfortunately, vendors playing in the domain are confusing the issue with expensive and disruptive rip-and-replace solutions that lock you into a single-vendor for most of your computing infrastructure (servers, networking, I/O, etc.). Vendor lock-in is good for a given vendor, but not necessarily good for you, and forklift upgrades are costly and disruptive.

Fortunately, it doesn't have to be this way…

Stateless Computing Implementation

The Virtensys I/O virtualization solutions – in combination with enterprise-class compute virtualization deployment – empower you to realize benefits of Stateless Computing without wholesale disruption of your existing infrastructure and application environment.

"Server Personality" Management

Stateless Computing today relies on abstracting the application execution environment away from the underlying hardware, and storing and managing the abstracted environments separately from the applications. The elements of an application's operating environment are called the "personalities," and include:

- **Software personalities**: Includes the OS, application settings and configurations, and user data that may be on a given virtual machine or hardware instance.
  Enterprise-class compute virtualization solutions today (VMware®, Hyper-V®, etc.) provide rich environments to manage software personalities. Enterprise-class compute virtualization, therefore, is critical to realizing the full benefits of Stateless Computing, and its now-widespread adoption is a necessary step in the right direction.
  So: Enterprise-class compute virtualization is necessary to include, but not alone

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sufficient to implement Stateless Computing – in addition to the application's Software Personality, you also must be concerned with managing:

- **Hardware & I/O personalities:** Includes the I/O configuration, the memory, and CPU characteristics of the underlying host server(s). For instance, if an application relies on Fibre Channel connectivity to your SAN, you cannot successfully migrate its VM to a server that lacks FC connectivity.
- **Storage personalities:** Enterprise applications often have specific storage profiles – To what LUNs does the application require access? Does the application require Direct-attached storage (DAS), and if so, what is the RAID configuration for the DAS?
- **Network personalities:** The network topology and configuration is also very relevant. The specific net/subnet, and VLAN that an application requires, as well as its required DNS and DHCP services, etc., must be managed similar to the other Personalities.

Managing these Personalities and storing them separately from the underlying hardware servers themselves is the State-of-the-Art for Stateless Computing in the enterprise today. Deciding how – and where – you store and manage personalities is a critical part of your Stateless Computing strategy.

Further, for non-virtualizable applications, the management of the I/O, Storage, and Network personalities also enables many of the benefits of full Stateless Computing is also enabled.

Stateless Computing philosophies and approaches

A well-architected Stateless Computing environment provides profound benefits:

- Transparent provisioning;
- HA (High Availability) by design;
- Simplified server consolidation and optimization;
- Trivial resource re-provisioning;
- Application portability.

Not surprisingly, specific vendors are advocating approaches that serve their needs better than yours: A network-centric vendor will approach Stateless Computing from a network-centric point of view, and a server vendor will advocate a server-centric view.

The approach you take to commence implementing Stateless Computing needs to work for you, however, and not for the vendor(s).

The Virtensys Approach

The Virtensys I/O Virtualization solutions are based on the PCI Express (PCIe®) standard interface native in every common server platform today.

The Virtensys VIO-4001 10GbE & FC I/O Virtualization Appliance

The Virtensys VIO-4008 10GbE & Storage I/O Virtualization Appliance

The Virtensys I/O Virtualization Appliances consolidate and virtualize 10GbE NICs, RAID storage, and Fibre Channel Host Bus Adapters. They each connect directly to the native PCIe bus in up to 16 servers using an industry-standard PCIe cable. The Appliances provide fully switched non-blocking PCIe- sharing of physical NICs and/or FC HBAs as virtual I/O devices between the servers without requiring any changes to the servers, OS, applications or I/O device drivers. The Appliances provide up to eight 10GbE uplinks to connect the attached

servers to your network without an additional layer of network switching.

The VIO-4008 also virtualizes up to two RAID controllers and internal arrays – up to 8 disks – as virtualized Direct Attached Storage ("vDAS") which is shared between the servers, thus eliminating the internal drives from the servers. The VIO-4008 supports traditional and SSD drives with different levels of RAID.

The Virtensys Appliances attach to each server using a single PCIe® (PCI-Express) cable that connects to the standard server-native PCIe bus, and each provides 20Gbps bandwidth, and multiple PCIe cables can be ganged in a server for high-performance and/or high-availability applications.

This enables servers to be wired once and dynamically reprovisioned via an intuitive web-based GUI with different Ethernet, FC, and DAS profiles, without making any physical changes to the servers. The I/O and storage capacity can be dynamically allocated and shared between servers.

This means applications, operating systems, and the virtualization hypervisors on the servers all work without modification – They see the server I/O resources the Virtensys environment has virtualized as if they are installed locally, natively.

You truly CAN finally

"Wire Once and Re-configure At Will".

Virtensys-enabled Stateless Computing in action:

Virtensys allows you to cleanly extend enterprise-class compute virtualization to realize the benefits of Stateless Computing – agility, reduced operating complexity and OpEx, etc. – working with the industry-standard, x86 servers from any vendor you choose, with no vendor lock-in, without having to replace the server and networking infrastructure you have in place, and without making obsolete the investments in experience, training and infrastructure you have already made.

Virtensys' I/O virtualization enables Stateless Computing transparently, and without the need to add expensive, non-standard I/O cards and cabling. The applications, the operating systems, and the hypervisors already know how to interface with the PCIe bus.

The I/O and DAS are abstracted by the Virtensys I/O Virtualization Appliances transparently, and the server and I/O personalities can be stored on the Virtualization Appliance, while the software personalities are managed by the Enterprise-class compute virtualization you are currently using.

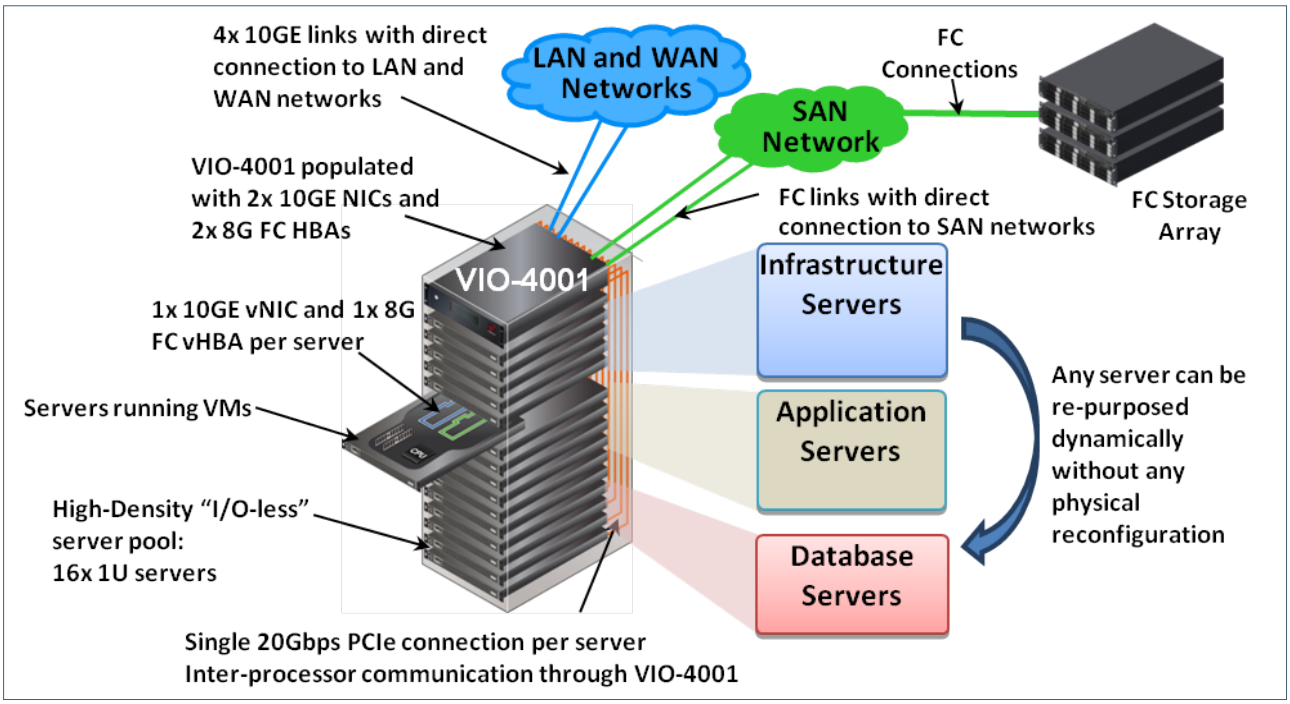
In addition to facilitating your transition to Stateless Computing openly, with familiar, industry-standard servers from any vendor, the Virtensys approach also allows you to migrate to 10GbE and to extend your investment in FC while saving you money and reducing your power costs.

All with no vendor lock-in – openly.

Virtensys I/O Virtualization-based Stateless Computing: The Open Approach

Implementing Stateless Computing requires a new paradigm for server deployment that is flexible and agile. The Virtensys VIO-400x I/O Virtualization Appliances allow I/O to be allocated on demand to servers. Server I/O profiles can be modified on demand, allowing server re-provisioning and seamless VM application migration between servers.

Please contact Virtensys for more information, and to discuss your unique requirements, such that we can advise how best to configure and deploy our solution to address your needs.



About Virtensys

Virtensys develops industry-leading, patented PCI Express®-based I/O virtualization technologies for servers and storage platforms, revolutionizing the way I/O infrastructures are deployed and used in data centers, and delivering significant improvements in I/O utilization, cost, performance, power consumption, and management. The deployment of the IOV switches is totally non-disruptive and dramatically reduces IT complexity and expenses. The company was founded in December 2005 by leading technologists in the fields of high-performance switching, networking, and systems design, and is backed by several premier technology venture capital firms.

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