the *Availability Digest*

Stratus Puts $50,000 Where Its Mouth Is - Again
December 2011

Two years ago, Stratus Technologies (www.stratus.com) bet $50,000 that its fault-tolerant ftServer would not go down in the first six months of operation. If you bought a system by the end of February, 2010, and if it failed in its first six months of operation, Stratus would pay you $50,000 in cash (or in product credit if you wanted).[1]

How did it do on this wager? It didn't pay out a cent, thus illustrating its claim to six 9s of availability.

Stratus' vSphere Guarantee

Stratus is now doing it again, but with a slightly different twist – virtualization. Stratus is betting $50,000 that Tier 1 enterprise applications are virtualization-ready and will not fail – provided they are running on Stratus ftServers and VMware's vSphere cloud operating system.

Critical virtualized applications depend upon an extremely reliable infrastructure on which to run. If a server goes down, not just one application is lost. All applications running on that server are down until they can be failed over to another server – a process that can take an hour or more for large, complex applications. The impact of a failed server is amplified many fold in a virtualized environment.

Stratus supports VMware on their ftServers to provide fault tolerance to virtualized environments. Stratus has worked closely with VMware to harden the virtualized environment and to protect it against both hardware (Stratus) and software (VMware) failures. They feel so confident in the results that they are once again betting $50,000 against a failure. But this time, they are not wagering on only their ftServer. They are betting that the entire hardware/software virtualized environment will not fail.[2]

The Stratus ftServer

Achieving Six 9s Availability

We have described the ftServer in some detail in a previous product review.[3] In review, ftServer uses dual modular redundancy to provide plug-and-play fault tolerance to Windows and Linux applications. To measure the availability of its servers in the field, Stratus monitors its service incident

UPTIME METER

99.99990%
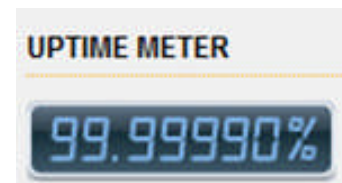
**Stratus ftServer Uptime Meter
as of December 14, 2011**

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[1] Stratus Bets $50,000 That You Won't Be Down, *Availability Digest*; January 2010.
http://www.availabilitydigest.com/public_articles/0501/stratus_guarantee.pdf
[2] Unfortunately, the Availability Digest did not get work of this offer until recently. It applies to orders placed on or before December 31, 2011. Sorry.
[3] Fault-Tolerant Windows and Linux from Stratus, *Availability Digest*; September 2007.
http://www.availabilitydigest.com/public_articles/0209/stratus.pdf

reports and updates an Uptime Meter daily, which it displays on its ftServer home page. The Uptime Meter consistently shows an availability of six 9s or more (32 seconds of downtime per year or less).
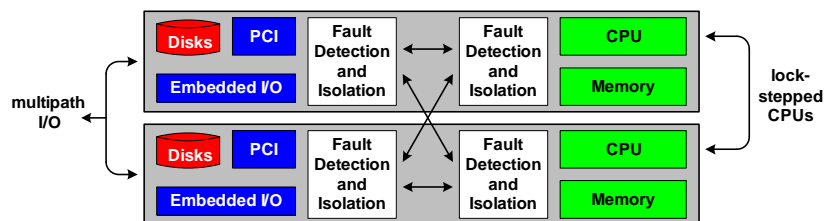
ftServer Architecture

The high availability of the Stratus ftServer product line is achieved by running all applications on dual processors that are lockstepped at the memory access level. Should there be a disagreement between the processors, one of the processors has suffered a fault. If the faulty processor has detected its own fault, that processor is taken out of service. Otherwise, each processor enters a self-test mode; and the processor in error is taken out of service.

The Stratus ftServer

Each processor contains its own I/O subsystem. In normal operation, peripheral devices are driven by both I/O subsystems via a multi-path connection. However, if an I/O subsystem detects a malfunction, it will remove itself from service.

The ftServer Architecture

Each logical processor is connected to each of the I/O subsystems. In this way, any combination of one logical processor failure and one I/O subsystem failure will not render the system inoperable.

Each processor contains not only its logical microprocessor cores, memory, and I/O subsystem but also three 500 gigabyte integrated disks. Thus, each logical processor has direct access to 1.5 terabytes of local storage. This storage is mirrored between the slices, providing fault-tolerant storage within the ftServer itself.

Hardened Commodity Operating Systems

The Windows and Red Hat Linux operating systems that Stratus supports are those that are commercially available to anyone. Therefore, the ftServers are application binary interface (ABI) compatible with Windows and Linux applications. Any application that can run under Windows or Red Hat Linux on an industry-standard server can run on an ftServer without modification. The installation and administration procedures are identical. The user should see no difference except for downtime – and that is the big difference.

When a new operating system version is about to be released, Stratus engineers do everything that they can to break it. Stratus engineers claim that they have not yet found a device driver that they could not break. Faults that involve the operating system are reported back to Microsoft and Red Hat, who make corrections to eliminate the sources of those failures. Everyone benefits from this effort because it is the hardened version that is released for public use. The Windows and Red Hat Linux operating systems that Stratus runs are the standard commercially available versions.

Stratus Call Home

All Stratus servers monitor themselves for faults. If a problem of any kind is detected, the system will automatically call a Stratus support facility (provided customer permission has been granted to do so); and action is immediately taken to diagnose the problem.

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If it is decided that a component needs to be replaced, Stratus will immediately send the component to the customer's site. There are many cases in which the first sign of a problem to the customer is when he receives the replacement part in the mail.

Virtualization

Virtualization technology allows many virtual machines to run on a single server. Virtualization is an important technique for getting full utilization out of large server farms.

A problem faced with virtualization technology is that availability becomes far more important. One particular application may not have a high value and can suffer some downtime without serious consequence. However, run many of these as virtual machines on a single server, and a server failure becomes much more costly.

Stratus has integrated the ftServer with VMware's vSphere to allow ftServers to host many virtual Windows and Linux machines in any combination. vSphere sits on top of the ftServer hardware and supports multiple instances of different operating systems running as if they were in their own physical server.

As a result, it is very simple to add a fault-tolerant pool of servers to a virtualized server farm. It is this integration of ftServer with VMware's vSphere that Stratus is wagering will not fail.

The Fine Print

This guarantee is a bold offer from Stratus. But what about the fine print? It seems that the terms and conditions of the wager are straight forward. The terms include the following definitions and requirements:

- Orders must be accepted by Stratus by December 31, 2011, and scheduled for delivery within 90 days.

- A Stratus ftServer 4500 or 6310 must be purchased with Stratus' Total Assurance Service.

- The covered components include the Stratus hardware, Stratus system software, and VMware's Enterprise and Enterprise Plus Edition Operating System.

- The system must be installed within one year of delivery using Stratus' installation services.

- The system cannot be used for development within the guarantee period.

- The customer must maintain an active modem or Internet connection between the system and Stratus Active Service Network (referred to above as Stratus Call Home).

- The customer must replace customer-replaceable units within one business day of receipt of the unit.

- The determination of the failure cause is determined by Stratus' root cause analysis.

- The failure of non-fault-tolerant components such as USB ports, keyboards, or monitors is not covered.

- The guarantee period begins on the first day of production deployment by the customer.

Summary

The impact on system availability of fault-tolerant, vendor-supplied hardware and software is rapidly diminishing to the point that it is no longer a significant factor. Systems such as Stratus' ftServer effectively take these systems out of the availability equation. Rather, availability is determined today by application bugs, operator errors, and environmental faults such as power, cooling, and data-center destruction.

Continuous availability is no longer a technological problem. It is an exercise in balancing system cost with downtime cost. Stratus' ftServer is an affordable starting point to achieve extreme availabilities. Stratus says so – with its wallet.