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Server Virtualization Creates New Opportunities for Fault-Tolerant Servers



The Bottom Line:	Fault-tolerant servers have a new market opportunity as enterprise consolidate more mission-critical servers and applications.
Key Concepts:	Server virtualization, data center architecture, fault-tolerant systems, high availability
Who Should Read:	Data center managers, CIOs, VP of operations, systems administrators

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Putting all Your Eggs in One Fault-Tolerant Basket

According to Yankee Group research, the worldwide market for servers in 2006 will be \$53 billion, growing to \$58 billion in 2007. Fault-tolerant servers and two-way failover systems constitute approximately 15% (\$8.7 billion) of the worldwide market, but that percentage is growing. Several major trends present favorable conditions for growth in continuous computing:

- **Virtualization has become a mainstream technology.** According to the Yankee Group *2006 Server Virtualization Survey*, 78% of respondents currently use server virtualization technology. IT managers use virtualization software to run multiple instances of an operating system on a single machine. This enables systems administrators to deploy the same number of business applications on fewer servers. The servers become logical rather than just physical machines. Running more virtual machines on fewer physical servers requires higher reliability of the physical server because an outage in the physical infrastructure will now affect more applications.
- **The telecommunications and service provider markets have grown.** Fixed-mobile convergence (FMC) and triple-play services (e.g., voice, video and broadband internet access) represent significant growth opportunities for telecommunications service providers. The Yankee Group *Global Consumer Fixed-Line & Media Forecast, September 2006*, forecasts triple-play service revenue will grow 30% by 2010. In addition, service providers are exploring ways of using virtualization software to deliver more services from less hardware, which would enable them to deliver more services while simultaneously lowering infrastructure costs.
- **Enterprise infrastructure has consolidated.** Yankee Group research shows 85% of virtualization software purchased by enterprises is dedicated to server consolidation projects. Enterprises can see tremendous cost savings by reducing the amount of their data center infrastructure. They are also consolidating many of the servers located in distributed branch offices and delivering branch office services from their central data center. In some instances, enterprise data center managers have improved server utilization rates from 10% to a robust 80%. It's possible to support the same business systems with half the number of previous servers.

These key trends are prompting a fresh look at fault-tolerant servers for data center and server infrastructure. Common wisdom says not to put all of your eggs in one basket for fear of something happening to that basket. Similarly, data center managers built distributed systems to minimize single points of failure. The drawback of this approach is cost and excess capacity. Companies are now consolidating their infrastructure using virtualization technology.

However, the fear is that by reducing hardware and running many critical applications on fewer machines, single points of failure may be reintroduced. This brings to mind the famous adage, "put all your eggs in one basket, and watch that basket!" This is precisely the value proposition of fault-tolerant servers. In essence, they are very resilient, highly available baskets. As more customers consolidate their servers, they'll be running many critical applications and supporting critical business processes with fewer servers. Fault-tolerant servers give these customers a consolidated infrastructure without sacrificing availability and resiliency.

Company Profile: Stratus Technologies

Stratus Technologies, headquartered in Maynard, Mass., is a leading vendor of fault-tolerant computer systems. Founded in 1980 as Stratus Computer, it produced fault-tolerant minicomputers that competed with Tandem Computers and Digital Equipment Corporation (DEC). Stratus sold its fault-tolerant servers primarily in the financial services market, although it also sold to governments and other industries. For financial services firms—both then and now—time is literally money. Therefore, financial concerns have always required the zero downtime that fault-tolerant systems deliver.

Stratus also recently acquired Emergent Network Solutions, a Texas-based provider of telecommunications software and services that enable carriers and service providers to converge networks. This acquisition will give Stratus additional revenue streams in the high-growth VoIP and IP multimedia subsystem (IMS) technology markets.

Product/Service Profile

Stratus Technologies specializes in fault-tolerant enterprise servers. Stratus also sells storage solutions and offers managed services. Stratus calls itself the “availability company.” Its server products utilize a true, fault-tolerant systems architecture rather than the more commonplace, simple failover server technologies that rely on redundant backups or server mirroring.

A fault-tolerant server is designed for continuous operation despite the failure of any single component. This is particularly attractive to financial services companies that face significant revenue loss or regulatory penalties if they experience even a few minutes of system downtime. But Stratus also serves other markets such as manufacturing, public safety, transportation and logistics, and telecommunications.

Stratus based its original product line on Motorola processors, but migrated to Intel and eventually HP processors. Today, Stratus bases its servers on Intel processors as well as Windows and Linux. Stratus also has its own Unix product called FTX (fault-tolerant Unix). Stratus began supporting Linux in 2006, and it is now a key growth area. Exhibit 1 summarizes the Stratus family of server products.

Exhibit 1.
Stratus Technologies Server Products

	ftServer Systems	ftServer T Series Systems	ftServer V Series Systems	Continuum Systems
Product Summary	Windows and Linux computing with continuous processing technology	Fault-tolerant Linux for telecommunications solutions	High-volume VOS applications. V Series is the hardware migration path for mission-critical VOS applications now running on Continuum.	Mission-critical, transaction-intensive applications and telecommunications applications
Operating System Support	Microsoft Windows operating system and Red Hat Enterprise Linux operating system (2400, 4300, 5700 models only)	Red Hat Enterprise Linux operating system	VOS	VOS, HP-UX, FTX (Stratus Unix)

Source: Stratus Technologies International, 2007

ftServer for Windows and Linux uses the same common Intel processor-based hardware platform as the V Series and can handle equally demanding mission-critical applications. In addition, the V Series outperforms Continuum by orders of magnitude. It accommodates transaction volume growth, greater I/O bandwidth, new and more storage options, and a healthy processor road map. The V Series and Continuum systems will continue as solid-core offerings; newly announced V Series models include the V Series 250, 300 and 500. They are primarily for their installed base but are also attracting some new customers.

Stratus is experiencing growth in its newer ftServer and ftServer T Series systems, which are based on x86 Windows and Linux platforms. These platforms will experience additional growth when Stratus introduces new offerings in the first half of 2007 that will support virtual server technology from VMware and XenSource. In December 2006, Stratus announced a collaborative development agreement with XenSource. Stratus currently supports Microsoft Virtual Server and VMware Server. The Windows and Linux ftServer platforms also will benefit greatly from the adoption of virtualization by companies of all sizes and segments.

In addition, Stratus' ftServer does not require a storage-area network (SAN). In fact, 70% of Stratus' servers ship without a SAN. This removes an additional cost and expands Stratus' addressable market to include many firm sizes and vertical industries.

Stratus also has key partnerships with leading vendors such as Dell and NEC, which are both resellers of Stratus. In addition to being a reseller, NEC will be the primary manufacturer of fault-tolerant hardware for the x86 platforms. Stratus will still develop the high-availability software, while NEC focuses on the hardware design and manufacturing the common hardware platform. The joint development work will result in each vendor building on the common hardware and software and marketing their own fault-tolerant systems under their own brands in the Windows and Linux markets.

Competitive Analysis

Stratus' direct competitors include Hewlett-Packard with its NonStop product line. However, the bigger competitive threat comes not from other vendors of fault-tolerant systems but rather from conventional server vendors that position high availability and clustering technology. Hewlett-Packard, IBM, Dell, Sun and others position clustering and high availability as a viable solution instead of fault tolerance.

High availability and clustering build in redundant components that take over a computing function when one component fails. A monitor constantly listens to the components and initiates failover in the event of a component failure. The distinction between high availability and fault-tolerant servers is that there is always some latency in the failover within a high-availability environment. It may be short, but critical data or transactions can get lost during the failover.

The true fault-tolerant design in a Stratus server environment will not experience any downtime or data loss. A key part of its technological differentiation is the VOS operating system. VOS is noted for its transactional design. The entire operating system—including the file system—is transactional, whereas most operating systems will only be transactional at the database or application server level.

In the last year, Stratus has enhanced its growth prospects and competitive positioning by rapidly targeting the Windows and Linux server markets. Stratus has 25 years of experience building fault-tolerant systems and its experience is evident in some recent product releases. For example, the newer chipsets in the ftServer series have shown significant performance improvements.

Conclusions

For vendors of fault-tolerant servers such as Stratus Technologies, the market conditions are favorable. The enterprise infrastructure consolidation wave is just building. Many enterprises first consolidated noncritical applications and other services such as e-mail that don't require the most resilient infrastructure possible.

The next stages of the consolidation trend will target more mission-critical and high-performance applications for more efficient infrastructure. This will behoove fault-tolerant server vendors to evangelize solutions and make clear distinctions from high availability and clustering.

But the trend is clear: Enterprises and service providers are rapidly adopting virtualization and delivering more critical applications with less and more efficient server infrastructure. This is clearly expanding the market for fault-tolerant systems.

Recommendations for Enterprises

- **Account for your eggs and your baskets.** As you pursue the consolidation of more mission-critical applications and servers, pay strict attention to the server load and availability requirements. Be careful not to reintroduce single points of failure. Go ahead and put your eggs in one basket; just make sure you have a very resilient basket.
- **Perform a risk analysis to compare high availability and fault tolerance.** Many enterprises will assume that high-availability architectures are sufficient. Determine the true cost of downtime. Simple, planned tasks such as patching and upgrades can result in unacceptable downtime in high-availability environments. If your application truly has zero-downtime requirements, high availability may not be enough.

Recommendations for Vendors

- **Repurpose fault tolerance for today's virtual data centers.** The go-to-market message for fault tolerance has always focused on delivering zero downtime for mission-critical applications such as financial services and emergency response. Take advantage of server consolidation efforts to reintroduce fault tolerance and their value for enabling stable consolidation. Distinguish between high availability and fault tolerance, particularly for planned downtime events. The ability to run mission-critical applications from fewer servers will justify the additional investment.
- **Plan for the disaggregation of computing resources.** Build, flexible, open architectures that can embrace the trend to disaggregate computing resources. Whether the network or server infrastructure eventually acts as the data center operating system, plan for a future where a big box is no longer needed to house compute resources. Be prepared for whether the network or server infrastructure orchestrates virtual resources.