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*Environmental Systems Research Institute, Inc.*

# **Stratus Server Technology Evaluation and Performance Validation Testing**

## **Enterprise Systems Lab Test Report**

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## Test Objective

The objective of the testing was to perform a technical evaluation, including application installation and performance validation, of a Stratus FT4300 server using ESRI based server products including ArcSDE, ArcIMS, ArcGIS Server, and Tracking Server.

## Introduction

The FT line of Stratus servers are based on “Five Nines” of availability and are intended to provide an alternative to traditional clustering. They achieve this high level of availability by effectively clustering two servers together into a single unit and by performing parallel processing with redundant hardware components. This allows for any failure of any component, and even the failure of multiple unlike components, while maintaining server integrity and the ability to continue processing without any interruption to running applications. For example, a typical dual processor system will actually contain four physical processors, but only two are realized as each set of CPUs processes instructions in parallel. If one of the CPUs fails, integrity is maintained since the same instruction is being processed by one of the redundant sets of CPUs. Additional information regarding how these servers function can be found at the Stratus web site at [www.stratus.com](http://www.stratus.com).

**Figure 1**  
**Stratus FT Series Server**



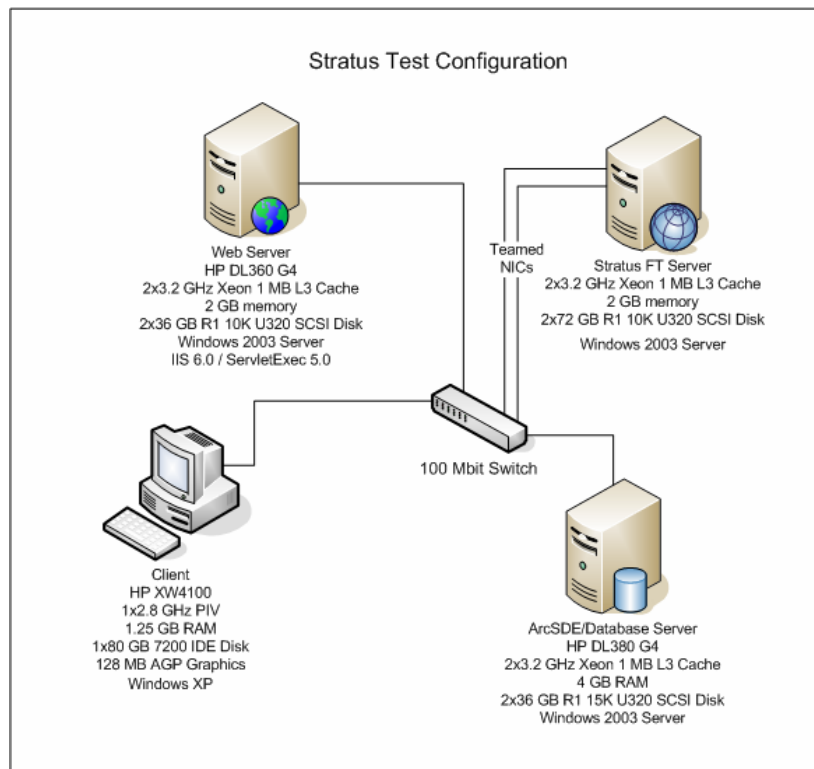
## Test Hypothesis

Though the system under test was a four-CPU system, only two of the CPUs are effectively available since the other two CPUs are acting as parallel backups to the primary set of CPUs. The same high-availability architecture applies to disks, memory, etc. Because of this, the performance of the Stratus server should be comparable to a similar server with similar CPU processing capability, etc. Also, during a failure, applications should continue to run without interruption, though there may be some minor degradation as the system makes necessary adjustments as a result of the failure.

## Test Hardware and Software Configuration

Figure 2 shows the test configuration for the Stratus FT4300 server testing. For the client/server test, the Stratus server was the database server. For the Web tests, a separate database server was used. Also, the test results were compared to a similar dual 3.2 GHz system, much like the Web Server in the configuration, with a SPECint\_rate2000 of 28. The number of CPUs, type, and speed were identical on the comparison systems and therefore performance should be comparable.

**Figure 2**  
**Test Configuration**



## Test Data and Tools

The test data used was an ESRI standard test data set consisting of 9 vector layers and one raster layer with close to 1 million total features. ESRI's performance tools and Microsoft's Application Center Test (ACT) were used for the testing.

## Test Plan

The following tests were performed to validate the installation and performance of various ESRI server products.

- ArcSDE 9.1
- ArcIMS 9.1
- ArcGIS Server 9.1
- Tracking Server 1.0
- ESRI License Manager 9.1 (USB)

Further, failure tests such as power loss to one side of the cluster was performed during testing to ensure continuous operations and to determine if any degradation in performance was occurring.

## Test Results and Analysis

### ESRI Software Installation

No installation problems were noted for any of the ESRI products. The installation experience was exactly like any other Windows 2003 server.

### Performance

As expected, performance in all areas was statistically identical to the comparable 3.2 GHz dual CPU system. For ArcMap client/server testing, typical client/server CPU loads were observed along with near or sub-second response times. ArcIMS load tests resulted in nearly 24,000 transactions per hour (TPH) for mixed vector and raster data and over 40,000 TPH for vector-only testing. ArcGIS Server and Tracking Server performance was comparable as well. Capacity planning for most of the applications tested are addressed in the System Design Strategies Technical Reference Document (<http://www.esri.com/systemsint/kbase/strategies.html>)

### Failure Simulation and Recovery

During various load tests, power was removed from either side of the cluster. As a result, applications continued to run without any interruption. The only noticeable affect was a slight temporary slow down in response time as the system internally dealt with the failed node in the cluster. Also, once power was reapplied, there was a slight impact to performance for a short time as the system resynchronized the two sides of the cluster.

### Performance Issues Observed

It was noticed that during the afternoon the "System" process would start up and consume nearly an entire CPU. This was tracked down to server disk integrity checks which take approximately 1 hour to complete. By default, the server was set to do this check every 24 hours. This setting was changed to only run once a week instead per Stratus recommendation.

A network performance issue was identified using Direct Connect and SQL Server through the teamed network adapters. The issue turned out to be related to the use of named pipes for the connection as opposed to TCP-I/P. For some reason, when using Direct Connect, the ArcMap client would connect using named pipes as opposed to TCP-I/P. This was easily corrected by

setting the client MDAC (the DBMS client s/w used for SQL Server Direct Connect) to default to TCP-I/P.

### Competing Technology Comparison

The Stratus FT servers are intended to replace the functions provided by traditional fail-over clusters, such as Microsoft Cluster Services. In fact, the availability of the Stratus FT servers is reported as being even higher than a traditional fail-over cluster due to ability to maintain applications during the failure (Stratus advertises “five nines” of availability). With traditional fail-over clusters, there is some system downtime and subsequent client application session loss during a failure as server-side application services fail-over from the failed node to the surviving node. A failure on a Stratus FT server is transparent to users and applications since all the server components and application processing are redundant.

Operating the Stratus server was very similar to operating any other Windows server and is much less labor intensive and less complex as compared to a traditional cluster. This can provide savings in the areas of training and personnel. Furthermore, there are potential cost savings as compared to a traditional cluster since standard operating systems and database software can be used as compared to the traditional cluster which requires the higher-tiered and more expensive versions. The server uses an intuitive management interface for monitoring and maintaining the health of the system. And finally, one difference that will require some additional administrative labor is configuration and control with patch management. The servers can use the Microsoft update web site, however, patches need to be verified via information posted on Stratus’ web site prior to installation. This is because Stratus validates each released patch to ensure system compatibility, etc.

## Conclusions

The Stratus server performed as expected based on comparing performance to a commercial server with similar components and CPU speeds. No installation issues were encountered and operating the server was straight-forward. The server maintained performance well during a simulated failure event and no application failures were encountered. The Stratus FT series of servers appear to offer a viable alternative to traditional clustering and in the long run may prove to be much easier and more cost effective to operate while providing higher availability than traditional clusters.

## Configuration Support

It is important to realize that for enterprise configurations such as the one described in this report, ESRI Support will typically be limited to supporting only the ESRI software components (ArcIMS, ArcSDE, etc.). ESRI Support strives to provide the best assistance possible, but problems or questions regarding third-party applications and components may require you to contact the support services provided by the respective vendor.

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