



### The Challenge

- Consolidate a Point Of Sales (POS) application consisting of an application server and two SQL Server database onto a single cluster
- Eliminate any single point of failure
- Achieve greater flexibility in cluster upgrades and maintenance
- Enable Server load balancing to handle peak loads

### The Solution

- Cluster of two Dell 4650 Servers, in active-active configuration with planned expansion to four nodes shortly
- POS middleware application
- Two Microsoft SQL Server Databases
- PolyServe Matrix Server
- Microsoft Windows 2000
- Dell EMCCX200 array with 1.5TB of storage

### Results

- Saved 50% from consolidating SQL Server deployment
- Dramatically increased server utilization
- Improved system administration with fewer servers to manage
- Reduce cluster downtime annually to four minutes or less
- Mixed hardware vendors in a single cluster
- Flexibility to perform maintenance during regular business hours
- Ability to balance load across cluster during peak transaction period
- No single point of failure

## Texas A&M's Department of Food Services Consolidates SQL Server onto a Highly Available PolyServe Cluster

Texas A&M University is a nationally ranked university and the first public higher education institution in Texas. It is one of the nation's largest universities with a campus size of 5200 acres and an annual enrollment of approximately 44,000 students studying for degrees in 10 academic colleges.

Texas A&M University is dedicated to the discovery, development, communication and application of knowledge in a wide range of academic and professional fields. Its mission of providing the highest quality undergraduate and graduate programs is inseparable from its mission of developing new understandings through research and creativity. It prepares students to assume roles of leadership, responsibility, and service to society. Texas A&M assumes as its historic trust the maintenance of freedom of inquiry and an intellectual environment nurturing the human mind and spirit. It welcomes and seeks to serve persons of all racial, ethnic, and geographic groups, women and men alike, as it addresses the needs of an increasingly diverse population and a global economy. In the twenty-first century, Texas A&M University seeks to

assume a place of preeminence among public universities while respecting its history and traditions.

## THE CHALLENGE

Texas A&M's Department of Food Services has deployed 55 point of sale (POS) terminals in stores across its campus. Transactions from these IBM- and Microsoft® Windows®-based terminals are fed through a middleware platform into one of two Microsoft SQL Server databases in the university's centralized data center. One of the databases houses all the terminals' touch-screen buttons (templates) and handles all transactions occurring at each cash register, including the use of Aggie Bucks debit cards. The other database contains all individual meal plan information, recording a transaction against a person's meal plan account each time he or she swipes a meal plan card on one of the terminals.

In order to obtain fault tolerance system-wide, the university would have needed to deploy six nodes – two active-passive clusters for each SQL server database and a pair for the POS middleware application – to safeguard the system from downtime and ensure that there was no single point of failure. Until recently, the two databases resided on two active-passive server pair and the POS middleware was a singleton server with no backup. If either of the databases or the POS middleware application failed, cash transactions could take place, but the terminals could not debit meal plan or Aggie Bucks accounts. Use of these accounts makes up a large percentage of the transactions during a typical day, so maintaining access to the SQL Server databases is extremely important.

Peak load during a typical day falls between 11:30 am and 2:30 pm when the campus is busiest and many students are using their debit cards for meals or other purchases. During the entire day 15,000 to

20,000 transactions hit the databases, with about 90 percent occurring during the peak hours. Before its recent upgrade, the data center frequently came close to overloading its one active database server as measured by CPU usage. Texas A&M wanted the ability to move its SQL Server instances to more powerful hardware to accommodate fluctuation in demand and increase utilization of its server resources, yet not over-provision the system to the peak performance requirements.

The active-passive database server configuration also lacked flexibility. Wanting to avoid server downtime during the day and evening, IT staff would usually wait until after the last campus store closed at 2 am to perform any upgrades or maintenance. Or the work was scheduled during one of the two or three weeks during the year that are considered slow times on campus. To do an upgrade or other maintenance, the SQL Server cluster had to be taken down for a couple of hours.

The data center decided to research alternatives to its SQL Server active-passive cluster that would eliminate single points of failure, provide greater capacity during peak load periods and give staff greater flexibility to perform maintenance during regular workday hours without taking down the database servers.

## THE SOLUTION

Following its research, Texas A&M's Food Services IT department chose the PolyServe Matrix Server™ shared data clustering software for Windows to implement a new platform for its SQL Server databases and POS middleware application. Matrix Server allowed Texas A&M to reduce their overall server count by collapsing two active-passive server pairs into a single two node active-active cluster. With plans to extend this clustered approach to the POS middleware and provide backup performance capacity for unforeseen demand, Texas A&M has deployed a new modularly scalable clustered approach that has driven up server utilization and decreased the number of servers under management.

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*"We dramatically increased our server utilization and decreased our number of servers under management with the PolyServe approach. That means lower costs and simplified system administration for us."*

**Steve Stone**  
**IT Associate, Dept. of Food Services**  
**Texas A&M University**

Matrix Server is a cost-effective solution for enabling multiple Windows-based servers to function as a single, easy-to-use, highly available system. It comprises a true symmetric cluster file system (CFS) that enables scalable data sharing, high availability services that increase system uptime, and cluster and storage management capabilities for managing servers and storage as one. Matrix Server delivers an unparalleled level of scalability, availability and manageability in support of SQL Server and other Windows-based applications.

Matrix Server is based on several distributed computing breakthroughs. At the center of Matrix Server is a fully distributed, fully journaled CFS that supports online additions and deletions of nodes and concurrent multi-node access to shared data. It also includes a completely symmetric, distributed lock manager that eliminates master/slave relationships among servers. Texas A&M chose to deploy its modular cluster architecture for its POS system in a two phase approach. The first phase consolidated its active-passive Windows server pairs with a two node active-active cluster running Matrix Server software. The PolyServe cluster provides the fault tolerance required of the new database platform. Unlike the previous active-passive configuration, all servers in the PolyServe cluster provide active access to both databases and provide failover backup to each other to ensure database access should either server fail. An administrator can add or delete a node from the cluster without pausing or halting the processing of other nodes in the system, preventing downtime. Integrated and customizable monitors assess the health of applications, operating system, servers, network and storage throughout the cluster and will initiate and oversee failover and fail back.

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*"The university stores cannot afford to have our SQL Server databases down at any point during the day. Deploying a shared data cluster including PolyServe Matrix Server gives us the high availability protection we require and the operational flexibility that we crave."*

**Steve Stone**  
**IT Associate, Dept. of Food Services**  
**Texas A&M University**

With both nodes in the cluster active and able to read and write to the same data concurrently, loads against the SQL Server databases can be balanced

across two servers during peak periods and moved to larger more powerful machines if demand warrants. This “shared data” capability doubles the CPU capacity available from the single active server in the previous “shared nothing” pair. Matrix Server provides a single management console that lets administrators easily balance loads, as demand dictates, while the SQL Server application is operating.

In the second phase of the project, Texas A&M will expand the cluster to include high availability for the POS middleware, video recording and capture software, and add at least one four-way server as a hot spare for the entire cluster. Matrix Server also provides the flexibility data center administrators sought for performing upgrades and maintenance. Because all nodes in a PolyServe cluster share simultaneous read and write access to data across a storage area network (SAN), individual server hardware and software can be upgraded or modified without taking the cluster down. This gives the university staff the opportunity to do cluster maintenance at any point during the day and keep access to the databases available at all times to the POS terminals across campus. Plans call for a server to be added to the cluster, for additional high availability protection, during the next budget cycle. At that time, either SQL server workload can be moved to the four-way at peak times without service disruption.

With the realization of the second phase of the project, Texas A&M will have created a highly flexible clustered system that provides high availability protection for all applications running on it. Moreover, the cluster can be scaled in a modular, cost-effective manner.

## RESULTS

The cluster is now in production. As one early indication of simplified cluster management, the data center staff experienced a smooth upgrade of the Matrix Server software shortly after going into production. And the twin goals of getting SQL Server databases out of failure and protecting against loss of data have been accomplished. Administrators enjoy confidence from knowing that if they need to upgrade software or add storage disks or if a server fails, Matrix Server simply shuts down one server and fails over to the other seamlessly.

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*“There’s one benefit to using PolyServe Matrix Server that has special appeal to me personally: I no longer have to come in to the office after 2 am to do maintenance on my SQL Server cluster. I now have the flexibility to do what I need to do during normal business hours and not have to take the whole cluster down.”*

**Steve Stone**  
**IT Associate, Dept. of Food Services**  
**Texas A&M University**

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The data center’s goal is to have no more than four minutes of downtime on the SQL Server cluster in a 12-month period, a small fraction of the downtime experienced with the previous active-passive platform. With something as common as an operating system fix, the old cluster had to be taken down for two hours or more. With its failover features, Matrix Server is expected to help the data center achieve the four-minute goal. During any failover, there’s no downtime because the backup server takes over the work of the first, the administrators can do their upgrades or repairs, during which all meal plan and Aggie Buck transactions continue uninterrupted.

**CONFIGURATION**

The new server cluster consists of two dual-processor, 3 MHz Dell 6650 servers with two gigabytes each of RAM, running Microsoft Windows 2000, Microsoft SQL Server and PolyServe Matrix Server software. The servers access a Dell EMC

CX200 storage array with 1.5 terabyte capacity across a fibre channel SAN with a Brocade switch. Plans call for adding up to two Dell 6400 servers to the cluster during the next budget cycle.

Read the [Infrastructure Consolidation in the Windows Data Center Whitepaper](#) to learn more.

PolyServe, Inc.  
20400 NW Amberwood Drive, Suite 150  
Beaverton, OR 97006  
Toll Free: 877-765-7378  
Tel: 503-617-7574  
Fax: 503-617-7592

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