



## Server Clustering is Tailor-Made for **Burlington Coat Factory**

Scale out using cost-effective, high-performance Intel® Xeon™ processor-based servers

### CHALLENGE

A retailer needs to migrate 40 Oracle-based applications from a proprietary UNIX platform to a lower-cost, highly scalable, available, flexible and manageable IT infrastructure using Intel architecture-based servers and Linux.

### SOLUTION

PolyServe® Matrix Server shared-data clustering software enables Intel architecture-based servers to share storage area network (SAN) data in a configuration that can be managed as a single unit with no single point of failure.

### BENEFIT

Burlington Coat Factory gains a cost-effective computing platform with the fault tolerance and flexibility to meet the needs of a retailer with a high-volume, low-margin business model.

### BUSINESS CHALLENGE

Burlington Coat Factory Warehouse Corporation is a U.S. retail chain offering high-quality merchandise at prices up to 60 percent less than competitors. Its stores feature outerwear, apparel, shoes and accessories for the entire family as well as furniture, toys, home decor items and gifts. More than 325 stores are located in 42 states nationwide.

Low-cost operations are clearly essential to the success of Burlington Coat Factory. The implications for IT are that not only its own internal costs must be low, but also that IT capabilities must be harnessed to streamline the entire corporation. The IT department has long used Intel® architecture-based servers from Sequent, but in 2003 these servers were reaching their end of life. Burlington Coat Factory's business-critical applications include more than 40 instances of Oracle\* databases to support product catalogs and order-entry systems essential to the business.

Besides low cost, any new system would need the following characteristics:

- Scalability to keep pace with the variability of retail volume
- High performance to aid productivity
- Fault tolerance to guarantee system uptime
- Flexibility to adapt as the business changes
- Simple manageability to keep administrative costs low

Sequent servers had two key characteristics: they were scalable simply by adding processors and they were manageable as one unit. Bill Ubelacker, director of system services for Burlington Coat Factory, did not want to lose those advantages. "Sequent servers are Intel architecture-based and we wanted to continue using that processor family."

Ubelacker adds, "We clearly want to move away from proprietary systems to Linux\*. By deploying open standards-based servers and scalable software, we can dramatically reduce our IT costs, while creating a systems environment that is more scalable and manageable than ever before."

### BUSINESS SOLUTION

Founded in 1999, PolyServe helps companies drastically reduce IT costs by providing system software that enables the use of highly available shared-data clusters of cost-effective Intel architecture-based servers. PolyServe's management and engineering team has a broad range of experience in the enterprise software industry. The core development team pioneered ways to tightly couple distributed computers, including significant advances in NUMA, multi-path I/O and SAN deployment.

Ubelacker knew that some of the people who founded PolyServe came from Sequent. The idea that he could achieve several advantages on cost-effective Intel architecture-based servers running Linux was very attractive.

*“With PolyServe Matrix Server, we can chain together less expensive Intel architecture-based servers and get more processing power at a much lower cost... than previous proprietary hardware.”*

—Bill Ubelacker  
Director of System Services  
Burlington Coat Factory

Ubelacker asked Intel® Solution Services consultants to work with PolyServe to evaluate how to deploy the 40 instances of Oracle databases on an open platform using PolyServe Matrix Server software. After researching options, the consultants recommended consolidating the applications onto multiple Oracle9i\* Real Application Cluster (RAC) databases running on Matrix Server clusters of Intel architecture-based servers with Linux. The SuSE Linux Enterprise Server (SLES) operating system and IBM eServer xSeries\* servers were selected.

To prove the validity of their recommended approach, Intel Solution Services consultants migrated one of the most critical applications to Matrix Server and Oracle 9i RAC. Once that system was validated, the Intel consultants assisted Ubelacker’s team in creating a production testing plan. Says Ubelacker, “Not only did the experience of the Intel Solutions Services consultants help speed up the project and give us confidence the approach, they also passed that knowledge along to our people so we can better manage the new environment going forward.”

### **PolyServe provides a unique shared-data clustering platform**

Typically, clustering is used to create active/passive pairs of servers that can fail over to increase availability. But PolyServe Matrix Server provides much more: the ability to connect multiple Intel architecture-based servers (running Linux or Microsoft Windows\*) to a SAN, all managed together as a single unit. As shown in Figure 1, all nodes in a cluster can share the same SAN data and storage through a common cluster-wide file system with multipath I/O. The cluster can scale out dynamically by adding more nodes and SAN stor-

age while still functioning like a single, large system. Matrix Server enables the deployment of clusters that have no single points of failure, which helps maintain high availability for applications, middleware, servers, networking fabric and file system storage. The fully symmetric cluster file system is important for application scalability and performance. It has no centralized metadata or centralized locking.

### **PolyServe Matrix Server offers features to host business-critical applications**

Because Burlington Coat Factory workloads are business critical, Ubelacker and his team evaluated several key areas of the clustering platform

#### **Integrated cluster file system and streamlined administration.**

Matrix Server has a unique cluster file system: All nodes in a cluster of servers have the same view of SAN storage. Each server in the cluster can access all storage subsystems, file systems and data on a SAN. Having a common cluster-wide file system also enables administrators to put applications, middleware and data in one place, making them available to any node in the cluster. “We have to deploy new applications only once. Our administrators install new applications in one place; they can then be shared throughout the cluster. The PolyServe environment is just as manageable as a large UNIX\* server,” says Ubelacker.

Ubelacker describes an example of this use of the Matrix Server cluster file system. “Since Matrix Server supports a single, shared Oracle home, more than 70,000 files that are associated with Oracle9i RAC can be installed in one location and then mounted on all nodes in the cluster. Our administrators can

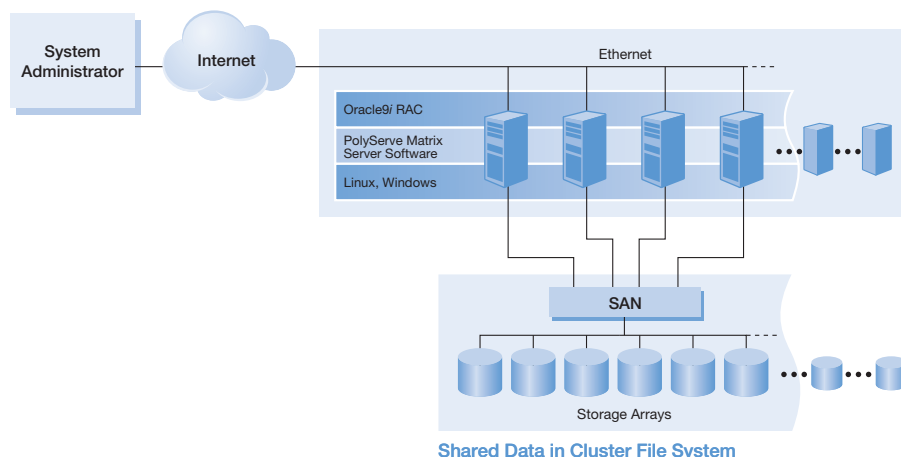


Figure 1. Overview of a typical PolyServe Matrix Server cluster used by Burlington Coat Factory

run and update Oracle—all from one location. This reduces the chance for errors and can even increase our administrators' productivity"

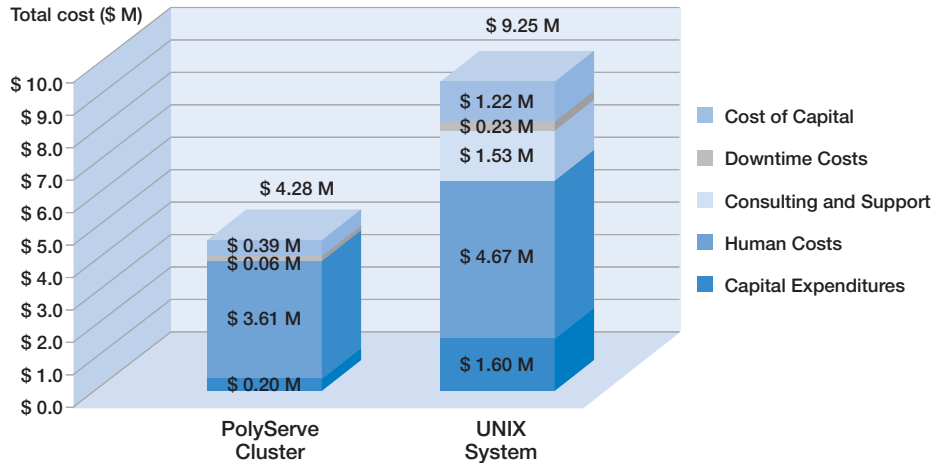
**Easy deployment.** Applications that run on Linux or Windows will run unchanged when using PolyServe Matrix Server. Says Ubelacker, "Migrating to a PolyServe Linux cluster is much the same as migrating straight to Linux. The PolyServe cluster file system, although similar to a standard Linux file system, has the added ability for all nodes to concurrently share all SAN storage."

PolyServe Matrix Server can provide efficiencies in several situations. For example, several independent applications that need to share data can be moved to a Matrix Server cluster. The applications do not need any changes, yet they can share data in this cluster environment.

PolyServe Matrix Server is also beneficial for running applications and middleware that are designed to scale out; for example, applications for highly available file serving, Web serving, media serving and database serving. When Burlington Coat Factory moved its older Oracle database applications to Oracle9i RAC running with PolyServe Matrix Server, they did not need to make any changes to the Oracle applications.

**Simple management.** Ubelacker sees some significant benefits of PolyServe Matrix Server in the area of administration. "I have a staff of only five system administrators. They are responsible for the care and maintenance of all our systems—from allocating storage to ensuring that we have enough server power to get the job done to making sure that backups occur. The easier I can make it for them, the more productive they become and the less likely they will be overlooked."

PolyServe provides one graphical control point for all servers and storage in a cluster. Ubelacker believes that makes his entire team more efficient. "For example, we can use the Matrix Server control point to diagnose performance issues or other problems. Then we can fix the problem without taking down the entire application. With Matrix Server, we can provide many more services to the business with our existing IT staff."



Source: PolyServe TCO model.

Figure 2. Representative TCO comparison between an Intel® architecture-based PolyServe cluster and a large UNIX system<sup>1</sup>

Each node in a cluster has the same system environment because each server sees and shares the same storage, binaries and configuration information. Thus, moving applications from one node to another, even for failover, is very straightforward.

**Integrated high availability for critical applications.**

The failover capability of Matrix Server is pervasive—covering applications, middleware, servers and networking fabric—all the way out to file system storage. When an application fails or becomes unavailable, PolyServe Matrix Server automatically restarts the application on an available node. Clusters can easily be configured with redundant components so there is no single point of failure. In addition, repairs can be made online without taking down the entire cluster.

**LESSONS LEARNED**

- **You do not have to give up manageability, availability, scalability or performance to gain the economic benefits of clusters.** PolyServe has proven that servers and storage in a cluster can be managed in a very homogeneous, straightforward manner.
- **Scaling out is better than scaling up.** Moving up in a server family can be expensive. Clustering enables scaling out by adding more servers, which involves lower incremental costs. And because Matrix Server supports servers with any number of processors, you can scale up while you scale out.
- **Ride the Intel TCO curve.** Because of the vast ecosystem of software companies and systems builders working with Intel® architecture, there is tremendous competition and innovation. Using these products in the data center opens the potential for ongoing savings as both Intel architecture capabilities and price/performance continue to improve.

<sup>1</sup> Costs are projected for a typical PolyServe customer based on actual customer experiences. Your results may vary.

**Capacity on demand using Intel Xeon processor-based servers.** With Matrix Server, IT administrators can easily add server nodes to a cluster, providing capacity on demand for increased throughput and improved response times. Incremental increases in performance and capacity are possible without a significant increase in cost. Servers with any number of the latest Intel® Xeon™ processors can be added to a cluster on a pay-as-you-grow basis. Likewise, with equal ease, servers can be removed dynamically from a running cluster.

System administrators can add or remove nodes without having to make physical changes to the rest of the cluster. Says Ubelacker, "If I want to go from a 1.2 GHz processor to an Intel Xeon processor MP at 2.4 GHz, for example, I simply add the new server with the faster processors and take the old machine offline. There is no disruption in service to either applications or users. Now, I have total control and the flexibility to drive down total cost of ownership (TCO) by using the latest technology."

Thanksgiving and Christmas are busy times for retailers. If the heavy load on Burlington Coat Factory's Oracle databases in these busy periods begins to slow response times, IT administrators can help alleviate the strain by either increasing the number of servers in the cluster or adding larger servers to the cluster. "PolyServe Matrix Server gives me capacity on demand. I feel so confident in this capability that I would not hesitate to add resources to the cluster during the height of the busy season. And we can redeploy them later if they are no longer needed," says Ubelacker.

**Reduced infrastructure costs and TCO.** By deploying clusters of Intel Xeon processor-based IBM eServer xSeries servers running Linux, Burlington Coat Factory is lowering TCO while increasing system availability. TCO benefits result from cost-effective

servers, simplified manageability, increased availability and low-cost scalability.

Says Steve Norall, General Manager of Linux Solutions at PolyServe, "Proprietary UNIX platforms can cost ten times as much as clusters of Intel architecture-based servers. In addition, UNIX often brings high software licensing fees." Ubelacker adds, "With Matrix Server, we can chain together these less expensive Intel architecture-based servers and get more processing power at a much lower cost than possible with the previous proprietary hardware."

Based on PolyServe's TCO model shown in Figure 2, a cluster of Intel architecture-based servers with PolyServe Matrix Server software can be less than half the three-year TCO of a proprietary UNIX system—including the cost of capital, downtime, consulting and support, personnel and capital equipment.

### Company-wide rollout is planned

After extensive testing, Burlington Coat Factory has one PolyServe Matrix Server cluster in production today. During the next 18 months, the IT team plans to move the remaining Oracle database instances to Oracle9i RAC on Matrix Server. Says Ubelacker, "Ultimately, we will have more than 40 Oracle instances on PolyServe Matrix Server. As we migrate to Matrix Server, we will determine empirically how many nodes and clusters are required. The IBM eServer xSeries hardware is probably four times faster than the Sequent servers and the xSeries also has a lot more memory. So there is not much downside risk in this!"

### Intel Technology

Intel® Xeon™ Processor Family



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