

THE CORNERSTONE OF CLUSTERED SYSTEMS

The GemFire Enterprise Data Fabric (EDF) has become an essential component of cluster systems. It's a highly efficient and cost-effective solution for addressing a lack of shared-memory based distributed caching and tendency to overload databases and message oriented middleware, dragging down performance.

In essence, GemFire virtualizes tightly coupled clusters into a single system image as a massively scalable distributed shared memory based system with continuous uptime.

GemFire virtualization allows collections of objects to be transparently shared across clusters, and in fact, across any physically heterogeneous topology. By controlling how objects are loaded, distributed, cached, invalidated, and synchronized to back-end systems, GemFire delivers exceptionally high throughput performance by reducing I/O latency, ultimately reducing round trips to databases and other underlying external data sources.

Throughout the entire single system image network, GemFire improves data diffusion, data availability, data sharing, data partitioning, load balancing, and system reliability. For almost any blade system, it serves as a high-throughput, scalable distributed shared-memory resource that is universally accessible to all business processes.

GemFire Enterprise Data Fabric for Blade Servers: High Performance Data Virtualization

Blade servers are proving themselves to be a flexible, cost-efficient complement to traditional SMP server architectures. CIOs are rapidly deploying them strategically for data center optimization. A combination of blade servers and high performance data virtualization from GemFire Data Fabric enables organizations to extend the applicability of this low cost architecture to a new class of critical data intensive applications not possible before.

Blade servers are designed to provide performance and density, but currently lack support for distributed, shared-memory based caching across the blades in a cluster. As a result, blade servers excel at stateless applications, which do not need to share application data or state at the speed of memory across process and blade boundaries. However, as an application's data intensity increases, issues of state management and data sharing across blades introduce internode latencies that dramatically slow data access and thereby application performance.

The GemFire Enterprise Data Fabric (EDF) solves this problem by powering a collection of blade servers with a distributed, memory-based data backplane that virtualizes data access, caching and distribution across the entire cluster of blades.

This global data virtualization scheme allows any application running on any blade to access relevant application data at the speed of memory without regard to where the data actually resides, thereby providing the ability to process even the most demanding stateful applications.

While grid engines "virtualize" access to compute resources, GemFire virtualizes data access in a similar way. A distributed, data fabric that runs across all of your blade servers, GemFire delivers high-throughput, high-availability data on demand at in-memory speeds, independent of where the data is stored. GemFire takes advantage of the built-in high-speed interconnect capabilities that bypass network and disk bottlenecks to take cluster-based applications to an all-new level of performance, with virtually unlimited scalability. This makes GemFire for Blades the enabling

solution for a broad range of cluster-based application scenarios, including:

- Trading exchange systems, including high data-rate market feeds
- Financial and scientific simulations, such as Monte Carlo scenarios, modeling, and analytics
- Banking systems
- Data-intensive applications, such as interactive data mining, remote visualization, computer-aided collaboration, and intelligent environments
- Retail Store and Supply Chain Planning
- Reference data
- High-volume billing
- Network management

The GemFire suite of products support heterogeneous environment, directing data, regardless of whether it's written in Java, C, C++, or XML, across a single system image, at in-memory speeds, with complete fault tolerance. It also gives you the flexibility to scale your cluster capacity on an as-needed basis by simply adding blades, while maintaining full performance. As a result, rapidly growing numbers of users enjoy extremely responsive application performance with high availability.

BENEFITS

GemFire takes the low cost/high performance advantages of blade servers to the next level of true business-level benefits.

Virtualize All of Your Blade Resources

Creates a true virtualized environment by transparently combining tightly connected clusters into a distributed high-throughput, highly reliable shared memory network managed by a single system image.

Achieve High Speed Data on Demand

Distributes data at memory speeds, optimized to enable high application concurrency while minimizing global locking requirements.

Improve Your Data Resiliency

Caches and integrates dynamic enterprise events and static data from multiple sources, reliably storing synchronized copies near the data consumers.

Conserve Storage Resources and Lower Your Database Costs

Transparently distributes/mirrors live, stateful data and events impacted by data changes while reducing database round trips, eliminating the inefficiency of using databases and message buses to share data.

Grow Your Cluster Strategy

Allows you to scale with low-cost, low-maintenance clusters one blade at a time with virtually no upper limit.

Optimize Your Network Performance

Monitors system statistics across blade clusters, applications, storage systems, geographic regions, and lines of business in real time for integrated system tuning and accurate decision making.

Evolve Your Network of IT Assets

Allows you to take full advantage of applying blade servers to get more for less from your existing IT infrastructure, making global data virtualization across heterogeneous platforms a cost-saving, performance-enhancing strategy.

CUSTOMER APPLICATION SCENARIO

IMEX predicts that by 2007 25% of servers shipped will be blade servers, with an absolute number of 8 million blades being sold.. Organizations of all sizes in manufacturing and service industries are migrating from traditional SMP (symmetrical multi-processing) servers to clusters of 4-way blade servers, and 8-way blades are on their way. Each organization has its own mix of reasons, but in general, IT departments are attracted to blade servers for their high-performance, space-saving, cost-efficient architectural benefits, including massive integration and scalability, simplified manageability, improved security, and a lower cost of ownership.

Two key components of a clustered network that blade servers cannot provide on their own, however, are distributed shared-memory based caching and virtualization of all of the clusters in a network. These capabilities are essential for gaining the full benefits of blade servers, and GemFire delivers both. That makes it an ideal data management fabric for networks of blade clusters running a wide range of demanding, high-performance applications.

FINANCIAL APPLICATIONS

Problem: Securities trading institutions push their databases, processors, and applications to provide maximum throughput and speed -- a two second response delay can result in a trade failure. Yet, a single trade can require four database joins and 20 SQL statements. This redundant process repeated 200,000 times a day, drags performance well below acceptable limits. The database becomes the performance choke point, and adding processors only makes the situation worse. Solutions that include message-oriented middleware and extra databases add unnecessary complexity and worsen response times, often making the adoption of central securities reference data repositories difficult.

Solution: GemFire provides immediate, low-cost performance relief and a way to reduce the cost of scalability. By caching transaction data for the most popular securities, GemFire for

Blades serves up frequently accessed data straight from memory. GemFire "listeners" monitor any changes to the data and continually refresh it with background updates. With just a single processor modeling 10,000 users, GemFire for Blades can boost performance from 20 transactions per second to 1000 per second. As a result, fewer processors are required to serve the same data and responsiveness to end users is significantly faster, which means more transactions are completed and profit per processor is improved.

REFERENCE DATA PROJECTS

Problem: Enterprise data distributed throughout an array of departmental database silos is being consolidated into a centralized, monolithic database. But the conversion will be time consuming and expensive, and the finished database will be subject to data access bottlenecks from a growing number of distributed processors, limiting scalability.

Opportunity: Augment the database consolidation with GemFire technology to provide a consistent data fabric of high-speed access for every cluster on the network. The physical securities master repository gains a logical/virtual mirror in memory. Scalability becomes virtually unlimited, provisioning is simplified, and network growth options remain flexible.



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