

## GemFire Data Management for the Healthcare Industry

The healthcare industry is dependent on the effective use of data in every aspect of operations. Whether guiding clinical and diagnostic support programs and assistance or managing non-clinical functions such as patient admission, billing, and claims submissions, enterprises must integrate and consider data from many disparate sources. Data drives functions from new patient applications processing to drug interaction monitoring to HIPAA compliance requirements.

Consumer, payer and provider demands for better information to guide decision-making, compliance regulations like HIPAA and complex medical data processing needs have renewed the importance of information management in the healthcare industry. IT systems, especially data infrastructures in most healthcare organizations today cannot scale to data management needs of medical practitioners, who now require the ability to access complex and large data objects like MRI scans and other patient records over a distributed network. Further, the popularity of consumer-defined health plans and increased online processing of claims and services are placing increased demands on IT web infrastructures with a consequent need to scale and maintain a high quality of service.

Many applications attempt to overcome the latency issue by calling for their needed data from locally-created data stores. They periodically refresh their data from the master enterprise records, retrieve the elements of use in their processing, transform it into a format that is expected by the program code, and keep the results in a specialized dataset referenced only by that one application. The computer-based patient records system has demographics and account status information; the computerized physician order entry system has detailed prescription histories.

Unfortunately, this arrangement creates difficulties at the enterprise level. Each application has unique code that manages local data access and update. If master data record formats or locations are altered, each component application must be reprogrammed. Data in local stores is redundant to master records and may not be synchronized with recent events, transactions, or data updates. As data volumes increase, the load on the processing and re-purposing of data elements for individual application uses goes up as well.

The GemFire suite of products provides a distributed operational data fabric that acts as a high-performance information access and real-time analysis mechanism for applications and systems throughout the business. GemFire Enterprise, the data platform in the GemFire data fabric, enables large amounts of data to be held in memory, ready for low-latency retrieval and analysis by multiple programs. It also manages data redundancy by automatically synchronizing distributed data caches stored physically closer to the applications that call on them. Each application refers to the data source as if it were in one centralized location, using standardized access calls that are consistent with other enterprise applications. Client requests are virtualized to find the proper physical location and format for the data.

In healthcare, reliability of systems and nonstop access to data at all times is not merely a business concern, it is a safety concern. GemFire helps to ensure uninterrupted processing by managing fail-over situations in the event of a lost connection to a local data source. Distributed memory data caches with disk backup and recovery allow systems to continue their work transparently, unaware that data may be coming from an alternate location. In the case of handling a claim for services, this may mean faster and easier payment - but in the case of computer assisted medical diagnosis it can mean patient recovery and well being.

The GemFire product suite's Complex Event Processing (CEP) solution, GemFire Real-Time Events, serves a dual role for financial institutions. It monitors transactions as and when they occur to enable real-time decision making and identification of opportunities, exceptions, and warning signs. It also supports correlation with historical data records to find significant events that affect operations. As a patient is admitted, information can instantly be compared to data such as past admissions, prescription history, and billing records to look for potential fraud, special care needs, and many other operational necessities.

The GemFire data fabric is a key foundation component for managing and running effective healthcare processes. GemFire works with industry-standard infrastructure software such as databases, messaging systems, application servers, and XML data. Initiatives such as SOA and Web Services can greatly benefit from a data backbone like GemFire.

## SAMPLE APPLICATIONS OF GEMFIRE IN HEALTHCARE

### *Online Services/Portals:*

- Improve scalability and performance of web applications
- Synchronize web-based transactions with data updates in all affected applications
- Manage data for online benefits services and self-service patient information updates

### *Patient Records Management*

- Integrate data from patient forms, insurance records, prescription histories, resource availability databases, insurance payment systems
- Guarantee on-time reliable data delivery to practitioners
- Share data between diagnosis and associated systems such as billing

### *Compliance and Auditing*

- Allow high performance access to all decision criteria and information used in diagnosis and treatment
- Aggregate data from multiple data sources in memory for faster access and use by auditing, reporting, and compliance systems
- Facilitate document exchange between providers and payers for HIPAA compliance
- Aggregate and permit virtual access to patient records protected and regulated by HIPAA and other mandates

### *Growth Management*

- Allow growth of business infrastructure and transaction load volumes by supporting grid and distributed network architectures with no limits on data sizes
- Plan for mergers and acquisitions or technology changes by establishing a standards-based data access strategy that serves applications written in a variety of computer languages
- Enhance reliability and availability of systems by ensuring that data is available in the event of a source access failure. Reduce lost time and potential for catastrophic errors

### *Diagnosis and Treatment*

- Quickly access data from institutional records and external sources to account for patient facts and history
- Target prescriptions and care products based on eligibility factors, insurance requirements and other data analysis
- Access and manage large amounts of up-to-date information on drug interactions and advisories before issuing new prescriptions

### *Patient Care Management*

- Share patient information instantaneously and transparently between healthcare organizations
- Collect and track drug usage, symptoms reports, and visit information to allow intelligent patient data analytics

### *Claims Processing*

- Collect and share patient and treatment data in a universal format for use by insurance claims systems
- Manage treatments and prescriptions in accord with insurer guidelines

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