



GemStone and Orient Overseas Container Lines: A Shipping Industry Case Study

1.5 billion data objects.

That's a lot of information to keep track of in an online system; information that is shared and accessed by more than 5,800 people in 150 offices around the globe. It is information that affects departments as diverse as Financial Accounting, Customer Service, Vendor Management, Legal, and Sales. It is information that changes and requires attention from minute to minute, directly affecting revenue opportunities and profitability of operations. Welcome to the world of Orient Overseas Container Lines Ltd. (OOCL).

Hong Kong-based OOCL is an International Container Transport and Logistics service provider. OOCL provides transportation services to companies throughout Asia, Europe, North America, the Mediterranean, the Indian sub-continent, the Middle East, and Australia/New Zealand, and is also an industry leader in the use of information technology and e-commerce to manage the entire cargo process.

OOCL has used GemStone/S to create a unique shipping management application that makes data instantly available to employees anywhere in the world; integrating business functions and providing superior

customer service. The *Integrated Regional Information System*, known as IRIS-2, coordinates all facets of OOCL's core business from the initial order placement to moving goods and reconciling accounting.

OOCL had impressive goals when creating IRIS-2. The software had to be able to coordinate information used by employees and business applications across the entire company. Tracking container movements and costs was necessary in order to make operations more efficient. Enabling rapid customer response was critical in growing revenue opportunities and winning business from competitors.

Romney Wong is Director of Architecture and Technology Framework for the IRIS-2 system at OOCL. He explains the origins of the system:

"We began planning a next-generation system in the 1990's. At that time, we were using a central mainframe-based system with multiple relational databases and separate business applications supporting different groups and functional activities throughout the company. We were able to identify a number of weaknesses that we wanted to address. Chief among these were

TECHNICAL SIDEBAR

USER: Orient Overseas Container Line Ltd. (OOCL)
PARENT COMPANY: Orient Overseas (International) Ltd.

DATA MANAGEMENT SOFTWARE: GemStone/S, from GemStone Systems, Inc.

FRONT END DEVELOPMENT SOFTWARE: Cincom Smalltalk VisualWorks

HARDWARE: HP and Sun servers
OPERATING SYSTEMS: HP-UX and Solaris

ARCHIVAL DATABASE: Sybase
INTEGRATED THIRD-PARTY APPLICATIONS: mySAP ERP Financials

SYSTEM LOAD:

- 2700 end users
- 150 offices worldwide
- 1600 concurrent users at peak times
- 4000-5000 new shipment bookings per day
- 10,000 data updates per day
- 50-70 TPS for data reads/searches/updates
- 4-5 commits per second
- 1.9 billion objects persisted in GemStone database

PROJECTED GROWTH:
Expected rate: 15% annually
64-bit system capacity: 500% growth without performance degradation

RESULTS:

- US\$50-\$100 million cost savings annually
- 20% increase in employee efficiency (TEU per headcount)
- Consistent growth in corporate profitability

COMMENTS:
"Our IT system has given us better information exchange within the company, more flexibility to meet customer needs and a higher level of automation, which have all translated into cost efficiencies."

Dr. Ken Chih
Director and CIO of OOCL



problems of data latency as information moved between databases and applications. Departments or regional offices might have data that was out of synch with the master records. Coordinating application maintenance was difficult between the various systems and simple mechanical tasks such as daily updates used too much time and reduced our ability to operate on a global schedule. When we added in the looming demands of Y2K testing, certification, and upgrades it became clear that we had a perfect opportunity to construct a new system that could meet the company's rapid growth and operational maturity."

SOLUTION STRATEGY

OOCL's plans called for moving to a distributed network of computing hardware that could spread the processing load and keep data accessible and coordinated across its worldwide organizational structure. A strategic decision was made to keep as much data as possible in its native object format, rather than mapping requests for information to database storage formats. The company looked at a number of vendors and technology products and chose GemStone/S for its scalability and technical capabilities. As a pure object-oriented database and object server, GemStone/S was able to extend programmer productivity by removing many mapping concerns.

Cincom, one of GemStone's partners, was selected for use in building the front end for the IRIS-2 system. By combining Cincom's VisualWorks development environment with the GemStone/S data fabric, all operations could be maintained in a Smalltalk object framework, speeding application development and integration, while providing maximum performance for end users of the system.

GemStone consultants and engineers were an integral part of the OOCL team throughout the multi-year phased implementation of IRIS-2. OOCL was able to call on expert assistance to fine tune performance of the system as they tried different technical architectures and get help in integrating data access

for a wide variety of application needs. By the time the system moved into full production status throughout the company in 1999, OOCL had eliminated the need for separate business applications, mainframe dependence, and multiple relational databases. GemStone/S managed all active data with links to a Sybase database for long term archival, analytics, and electronic data interchange.

RESULTS

With IRIS-2 as the backbone of OOCL's enterprise-wide information processing architecture, the company was able to add user interface applications such as *CargoSmart*, *OperationSmart*, *DepotSmart*, and *SchedulingSmart* to facilitate interactions with customers, partners, and vendors. Real-time information is always available to the various interface applications, enabling greater self-service opportunities and automation of operations — which translates directly to cost savings and increased profitability.

Results from a bottom-line revenue standpoint have been dramatic. Fewer employees are needed to handle call-center and customer-inquiry support operations. Demurrage and detention collection (fees for late customer pickups and returns of containers) have increased remarkably, spurred by better, more coordinated tracking and billing. Employee efficiency has risen 20 percent since implementation of IRIS-2, as measured by shipping tonnage per headcount. During the worldwide economic slowdown of the early 2000's, while many shipping companies were losing vast amounts of money, OOCL was able to maintain and grow profitability.

THE CASE FOR 64-BIT

OOCL did not stop their technical innovation in 1999. Their business continues to grow, with operations in liner services, container terminals and depots, intermodal connections (barges, trucks, trains, and feeder services), freight consolidation and logistics. GemStone's architecture was chosen to meet the challenges of continued growth with an eye towards flexibility and performance. Since the original implementa-

tion, GemStone/S has evolved to work in a pure 64-bit operating mode, opening the door to virtually unlimited growth and capacity.

As advanced 64-bit computing platforms became available, OOCL and GemStone worked together to take full advantage of the new operating systems. OOCL put a phased implementation plan in place to manage conversion of their operations to 64-bit. The first phase concentrated on improving in-memory speed, reduction in system downtime, and access to data. This upgrade was rolled out to users in May of 2005.

The Phase One conversion of IRIS-2 to 64-bit was installed in less than a single weekend. The technical migration, final testing in place, and ties to user interfaces were smoothly accomplished with a user-transparent upgrade providing improved performance (measured as a 30-50% reduction in average transaction response times), increased data accuracy and synchronization, and easier and faster scheduled maintenance requirements. Technical capabilities inherent in the 64-bit implementation allow OOCL to reduce system downtimes and approach nonstop operating status during normal week-day business. The ability to integrate necessary functions such as data backups and archives into ongoing operations, promises to create even more business gains and efficiency improvements that translate to bottom line savings.

The second phase was deployed in May 2006. This implementation will increase the number of data objects that can be stored and referenced in the database. With direct addressing of more than one trillion objects, OOCL will be able to meet the demands of future growth and functionality for years to come.

A PRACTICAL VIEW

Many people are surprised to learn that OOCL makes IRIS-2 available to other shipping companies in addition to using it internally. The company has already licensed IRIS-2 to other major transportation and shipping companies; for the first time creating a proven and tested industry standard for management of container operations. Software sales have allowed the company to devote more resources to development and ongoing improvements and enhancements to the system. As new developments such as 64-bit operation are introduced, all companies can benefit from the gains that are possible.

The OOCL implementation has also proven interesting to companies outside the shipping industry. Many organizations currently using Cincom's Smalltalk VisualWorks development environment have used the OOCL integration as a proof point for the benefits of native object oriented data integration with GemStone/S. The new 64-bit features give IT organizations more flexibility in planning and developing large scale systems that support enterprise-wide operations.



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