

On-Memory database enhances responsiveness and decreases large scale batch processing time

### Solution

- Server Integration

### Industry

- Retail

### Products

- PRIMEQUEST 480

### Overview

Circle K Sunkus started operation of their new information system with the introduction of PRIMEQUEST Linux servers in September, 2006. This was used to consolidate their database and datamarts (subsets of their data warehouse) which were formerly dispersed across individual organizations and operations. Introduced at the same time was a mobile web based application and an “On memory database” which, by holding all data in memory, enables higher speed and large scale batch processing. Circle K Sunkus will also realize a 30% reduction in system development and maintenance costs over the next 3 years by the introduction of “storage on demand.”

### Circle K Sunkus

Circle K Sunkus is one of the largest convenience store chains in Japan, with 6300 shops(Pic.1). Circle K and Sunkus commenced their planning for a consolidated system when the 2 companies merged in Sep.,2004. In Sep.2006, they commenced their new POS information system which enabled cost reductions and raised the speed of information provision by consolidating multiple databases into one system.

All sales data from the convenience stores is aggregated to the back-end systems via the POS system. This enables mission critical operations such as sales management and accounting.

This also allows Circle K Sunkus to plan for new products and proposals by analyzing their business environment, such as the relationship between sales and seasonal changes. For this reason, it was critical that the new product system provided multiple data analysis.

### Different users, different roles

Product information system users can be divided into 2 categories. One is Supervisors (SV) who are responsible for lead management of shops. The other is Merchandisers(MD) who are responsible for developing new products and product purchasing.

Each SV is responsible for 7-8 shops. They propose sales promotion plans and advise order plans. “Not many



Picture 1 : Circle K(Upper) and Sunkus stores

information patterns are needed for each SV, but they need to refer to quite an amount of information. Typically this includes sales figures that clarify issues in each shop. Speed of system response is crucial, too.”(Pic.2 Mr.Watanabe, Manager, System development department)



Picture 2 :  
Mr.Watanabe  
(Manager, System  
development  
department)

Each MD is responsible for the development and provision of new products. They need to foresee business climate changes by analyzing data. Each MD will now provide information on recommended products by using a computer installed in each shop. “We kept providing information, but now the system is required to have more flexibility.” (Pic.3 Ms.Itakura, Manager, System development department)

The former system consisted of 1) “Central Data Warehouse(DWH) server” to store the entire POS data, 2) “Product/Sales information server” to store product and sales information, 3) “New department information server” to store sales and a proportion of the POS

information, 4) "Mining server" for high level analysis and sales information creation.

There were 2 critical issues, however.

One was that the client application was configured using Visual Basic. Since these systems were configured as 16 bit applications they had to use OS (Windows 95/98/Me), on which support had already expired. Also, only a few screens were available and multiple analyses were difficult.

Another was the lack of database consolidation. In the former system, multiple databases and datamarts were distributed. These distributed systems caused data duplication and discordance between servers. "There were problems in that different figures were calculated due to differences in calculation rules. The existence of 2 different systems from the 2 different companies (Circle K and Sunkus) was one cause of this problem. Data distribution was caused by server division. For this reason, we decided to consolidate data and integrate the calculation methods."(Ms.Itakura)

### High speed batch processing with "On memory DB"

In the new system, all servers are consolidated into a Central Data Warehouse, "Central CWH server". However, since it is difficult to perform large scale and high speed batch processing with a Central DWH server, Circle K Sunkus decided to introduce a "Front-end DB/batch server" which includes Fujitsu BSC's on-memory database "Oh-Pa 1/3". PRIMEQUEST 480 was introduced for both of these systems .

On-memory databases require large amounts of memory in order to raise performance. PRIMEQUEST meets this requirement as it can support up to 2TB. Circle K Sunkus also responded to PRIMEQUEST's 24H/365 day reliability and high transaction performance.

There are 2 major roles for the front-end DB/batch server. One is to load large amounts of data onto the Central DWH by batch processing. The other is to configure datamarts that can promptly respond to inquiries from SVs.

The Central DWH server receives volumes of POS data from the mission critical system overnight. It performs data cleansing and then sends the results to the front-end DB/batch server. Oh-Pa 1/3 then aggregates data and configures data marts. More than 10,000,000 data transactions(1GB-2GB) are transmitted on a daily basis. This batch processing needs to be done in under 4 hours. The former Solaris system took almost 4 hours. Now the new system based on PRIMEQUEST has more than a 50% time margin compared to the former system.



**Picture 3 :**  
**Ms.Itakura**  
**(Manager, System**  
**development**  
**department)**

In a normal database management system, data stored on disk is processed in cache. For this reason, performance decreases if data doesn't make it into cache. Oh-Pa 1/3 doesn't use cache but deploys all data in memory. As a result, Oh-Pa 1/3 processes data much faster than normal databases. For this reason, 128GB memory is installed in the front-end DB/batch server.

Up to 800 day's worth of data, sent from 6300 shops, can be stored in the Central DWH server. Summary data will be stored for 2-3 years. This data aggregates to almost 10TB.

Inquiries from SVs and MDs are sent via Web application servers based on PRIMERGY BX620. Interstage Application Server was introduced for the application server.

Most SV inquiries are standardized. Data for such retrieval is pre-processed in the front DB/batch server. This allows it to search tables in memory and return the required information. This has increased the performance of sending the most required data."

Non-standard data inquiries are sent to the Oracle Database 10g on the Central DWH server via a Web application server. Search and aggregation occurs and the results sent back to the point of inquiry.

### Adobe Flex used to configure User Interface

A web based system was introduced as the user interface, replacing the former Visual Basic system.

However, the Web application couldn't improve on the Visual Basic user interface. For this reason, Adobe's "Flex" is introduced to provide for a rich client environment. "The screens have changed slightly but we can use them comfortably."(Mr.Watanabe). "By introducing the Web application, we can now refer to data outside the office."

(Pic.4) A remote access server is installed for the connection from mobiles via PHS. "We used to prepare the data in the office before going to a store. The new system enables us to prepare data in the shop. We can prepare data even after we have realized the lack of data in the shop. It enables us to use our time efficiently."(Mr.Watanabe)

Meanwhile, the user interface of Oracle's BI tool "Oracle Discoverer" is available for MDs. "Our MDs required such a tool for new analysis and the referencing of long term information. We decided to introduce Oracle Discoverer which enables such flexible analysis." (Ms.Itakura)

### 30% cost reduction in 3 years

Circle K Sunkus have outsourced their system maintenance to Fujitsu's "Tatebayashi system center." It was seen as difficult for them to have enough technology and budget to maintain their system by themselves. Currently, Circle K Sunkus has approximately 20 employees in their system department. "Outsource is indispensable for our department. Also, we see that one of the advantages of outsourcing is that the latest technology will become available."(Ms.Itakura)

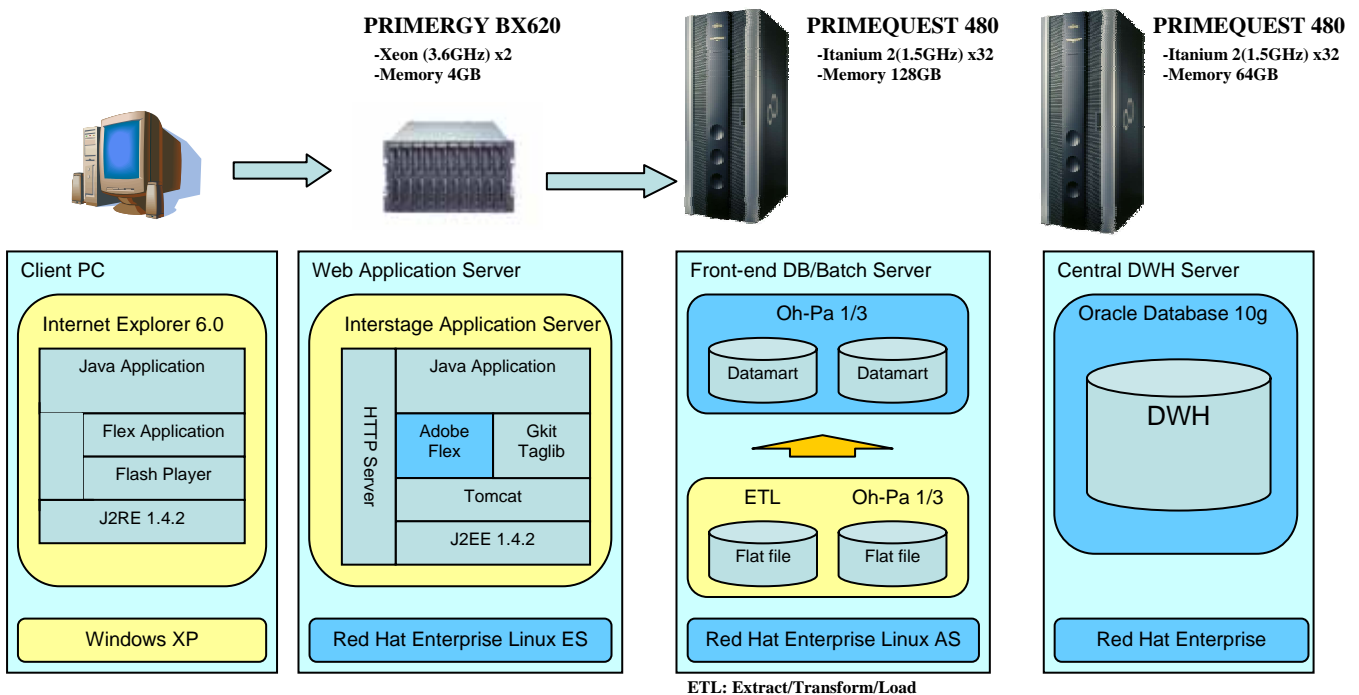


Circle K Sunkus decided to choose a “Storage on demand” contract which will charge service fees depending on the required capacity. This will achieve optimization of the operation cost.

The high reliability of the former system was based on SPARC Solaris servers. In that sense there were few reasons to change CPUs from SPARC to Itanium 2, or to change OS from Solaris to Linux. But by introducing PRIMEQUEST with its combination of mainframe reliability and open system flexibility, Circle K Sunkus realized cost reductions and improvements in performance. “We are planning to reduce 30% of our current operation/development cost by this system replacement; we should accomplish this target.”(Ms.Itakura)



**Picture 4 : Supervisor accessing “Updated information” via PHS.**



**Diagram 1 : New system configuration diagram**

Web Application Server transfers requests from SV and MD to Front-end DB/Batch server and Central DWH server. Overnight, Front-end DB/Batch server and Central DWH server process all POS data and create datamarts.