x86 시대, RISC Migration?
Scalable platform for business-critical and mission-critical apps

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홍 윤기
Fujitsu Korea Limited
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I. x86 Generation (IT Trend)
II. RISC Migration
III. Fujitsu PRIMEQUEST
I. x86 Generation (IT Trend)

II. RISC Migration

III. Fujitsu PRIMEQUEST
IT Market Trend

Provision of a wide variety of services

Agile provision of new service based on results of data analysis

Mobile/Social Network/Sensor

Ecosystem

• Real time response
• Low latency
• High availability of processing

Provision of a wide variety of services

• Optimal resource allocation appropriate to various workload

Cloud

Big Data

• High throughput / and bunch of data
• Isolation for security, compliance regulation

Data Analysis for drastically increasing data

Ecosystem

Energy, Smart Cities

Auto Transportation

Food, Retail, Primary Industry

Healthcare, Welfare

Environment

Healthcare, Welfare

Food, Retail, Primary Industry

Auto Transportation

Energy, Smart Cities
Platform History

"The 1st Platform"

"The 2nd Platform"

"The 3rd Platform"

ICT use

~1990

2000

2010

2020 ~

Human Centric

x86 Server

Network Centric

Unix Server

Cloud Mobile
Big Data Social

Computer Centric

Mainframe

Centralization

Client/Server
Internet

"The 1st Platform"

"The 2nd Platform"

"The 3rd Platform"
Non-x86 server revenue declines of **-12.4%** respectively in 2013 (3Q13).

On a year-over-year basis, x86 server systems experienced revenue growth, achieved **57.2%** factory revenue share.
Two-socket servers remain the dominant socket capability with 75% revenue share. Eight-socket servers continued to grow in the third quarter of the year, recording year-on-year revenue increases of 64.6% respectively.
Server Positioning

Mission-Critical Business

Mainframe/Unix Server
- High Reliability · Availability
- Mass Data DB, DB+AP Appliance
- Scale Up System

Scale-Up

Volume Business

x86 Server
- Flexible . Integrity, Cost Down
- Web/Application, General DB
- Scale Out System

Scale-Out
Requires

### Mission-Critical Business Goals

- Increase enterprise growth
- Provide operational results
- Optimize cost structure
- Be attractive for new customers
- Reduced risks

### Applications must deliver the RIGHT

The right INFORMATION
To the right PEOPLE
At the right TIME
What IT Infrastructure Must Do

- Accelerate processing
- Handle massive amounts of data
- Deliver near-real-time response
- Flex to meet dynamic business priorities
- Support rapid growth
Fujitsu is well prepared to meet these challenges

**Computing Technology**
- Industry Standard
- Mission Critical
- Mainframe

**Computing Solutions & Reference Architectures**
- Infrastructure
- Application-specific
- Branch-specific

**Computing Consumption Options**
- Outsourcing
- as-a-Service
- Managed
- Co-Location
- Maintenance

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**Project and Consulting Services**
Assess, Design, Build, Deploy
I. x86 Generation (IT Trend)

II. RISC Migration

III. Fujitsu PRIMEQUEST
Migration Key Point

Analysis
As-Is & To-Be Business, The Possibility of Migration

Analysis

(1) Business & Data
- Business Rule
- Data Flow
- Database Structure
- Specified Business

Classification

(2) Reuse & Rebuild
- Specified To-Be’s Goal
- Estimate Cost
- Classification

Verification

(3) Proof of Concept
- Resource Sizing
- Technology
- Method
- Equipment
- Personnel & Cost
Migration Pattern

Succeed Business

Succeed
OS/Middleware

Rehost

Platform Replacement
OS/Middleware Upgrade

Resource Migration

Modify Application to Run

Rebuild

Develop New Application

Apply Package

Change Business

Change
OS/Middleware
## Pattern Comparison

<table>
<thead>
<tr>
<th></th>
<th>Rehost</th>
<th>Rewrite</th>
<th>Rewrite + Rebuild</th>
<th>Rebuild</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Migration Cost</strong></td>
<td>VG</td>
<td>G</td>
<td>N</td>
<td>NG</td>
</tr>
<tr>
<td><strong>Operation Cost</strong></td>
<td>NG</td>
<td>OSS</td>
<td>OSS</td>
<td>G OSS</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>NG</td>
<td>N</td>
<td>G</td>
<td>VG</td>
</tr>
<tr>
<td><strong>Skill / Know How</strong></td>
<td>N</td>
<td>G</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

VG : Very Good, G : Good, N : Normal, NG : No Good
The review of total system

- Total System

<table>
<thead>
<tr>
<th>As-Is</th>
<th>To-Be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application (C, Java, COBOL, etc.)</td>
<td>Application (C, Java, COBOL, etc.)</td>
</tr>
<tr>
<td>Biz Data</td>
<td>Biz Data</td>
</tr>
<tr>
<td>Database</td>
<td>Database</td>
</tr>
<tr>
<td>Middleware</td>
<td>Middleware</td>
</tr>
<tr>
<td>System Software</td>
<td>System Software</td>
</tr>
<tr>
<td>OS (Unix)</td>
<td>OS (Linux)</td>
</tr>
<tr>
<td>Hardware (RISK)</td>
<td>Hardware (X86)</td>
</tr>
</tbody>
</table>

- Resource Succession
- Incompatibility
- S/R Product Migration
## The review of total system

<table>
<thead>
<tr>
<th>Item</th>
<th>Point</th>
</tr>
</thead>
</table>
| **H/W**               | • IA Architecture System Replacement (System Sizing, RAS Feature, Clustering, Virtualization)  
                        • Peripheral device (Storage/Network/Print) Review                   |
| **OS**                | • OS Compatibility (C Language Program SHEE SCRIPT ...)              |
| **Middleware**        | • Check for New H/W and OS, Upgrade, Replacement                     |
| **Application/Data**  | • Apply for New Platform                                             |
| **Operation/People**  | • Operational Rule  
                        • Development of Human resource                                    |
Contents

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Market trend for Mission Critical Systems

Mainframe/UNIX Market is declining, while Linux and Windows market is growing worldwide.

Gartner says that...

2014~2015

- Migration from HP-UX/Itanium will be steepest.

~2017

- 65% of applications running on UNIX in 2012 will have been migrated to x86
Fujitsu PRIMEQUEST is targeted to Mainframe/UNIX customers’ mission critical systems and x86 customers’ highly reliable platform for server consolidation.
Long track record in mission-critical computing

1959
The world’s oldest computer that still runs is FACOM 128B

1974
First mainframe system introduced (FACOM M-190)

1976
Delivers AMDAHL 470V/6 Mainframe to NASA

1990
Introduces M-1800, the world’s largest general purpose Computer

1995
Introduces new GS8000 series, world’s fastest CMOS Global Server technology

1999
Introduces new GS2000 series

2002
Releases GS21 600, the world’s fastest mainframe

2004
Releases PRIMEPOWER, the world’s first UNIX servers using 90-nm semiconductor technology

2005
Releases PRIMEQUEST, the world’s most powerful Mission-Critical Server

2007
Releases Solaris/SPARC servers

2010
Releases PRIMEQUEST 1000 Series:

2014
Launch of PRIMEQUEST 2000 series: Mission-Critical x86 Enterprise Server
Mission-Critical IA Server
New PRIMEQUEST 2000 Series

- Intel New Xeon E7 v2 Processor
- Max 12TB Mass Memory
- Mainframe RAS
- Physical Partitioning
- Dynamic Reconfiguration

Highest availability value in the x86 platform
- Almost everything is redundant
- Flexible I/O + Reserved SB

Open Standard technology
- Intel® Xeon® processor
- Red Hat® Enterprise Linux
- Microsoft® Windows Server®
# PRIMEQUEST: Trusted around the world

## Installation in 28* countries around 3,000 units

### Mission Critical Databases
- TIS (Linux)
- Nikken Gakuin/
  - Kenchiku Shiyori Kenkyusha Co., Ltd. (Windows)
- Shibaura Institute of Technology (Windows)
- Daiwa Securities Co. Ltd. (Linux)
- Daiwa Next Bank (Linux)
- To Solutions Co., Ltd. (Windows)
- Nagoya University Hospital (Linux)
- The Banshu Shikin Bank (Windows)
- Tsu Municipal Office (Windows)
- Yamazaki Baking Co., Ltd. (Windows)
- Yamato System Development (Linux)
- Inje University Paik Hospital (Korea) (Windows)
- Sejoong Namo Tour (Korea) (Linux/Windows)
- Seoul National University (Korea) (Linux)
- Sung-Ae Hospital (Korea) (Windows)
- Severance Hospital (Korea) (Windows)
- Lotte World (Korea) (Windows)
- Jiangyin Software Park (China) (Linux)
- YTO (China) (Linux)
- Baoji High-tech Development Zone People’s Hospital (China) (Linux)
- Eastern Asia Commercial Bank (Vietnam) (Linux)
- Banco Popular (Spain) (Windows)
- Coput (Spain/Bureau of transportation) (Linux)
- Portugal Telecom (Portugal) (Linux)
- Meditel (Morocco) (Linux)
- The Anthony Marano Company (USA) (Windows)
- Fulton County, Georgia (USA) (Linux)
- SICOOB (Brazil) (Windows)
- Vivo (Brazil) (Linux)

### MC Consolidation
- Obama Prefectural government (VMware)
- Kansai University (VMware/Windows)
- Doshisha University (VMware)
- Toshiba Ward Office (VMware)
- Board of Education of Nara City (VMware)
- Ziarre Limited (Hong Kong) (Linux)

### UNIX Migration
- NTT Data Corporation (Linux)
- TKC Corporation (Windows)
- Gunma Bank (Linux)
- Shiga Bank (Linux)
- Shizuoka Bank (Linux)
- Shizuoka City (XSP)
- Tokyo Stock Exchange (Linux)
- Nagata City (Fukuoka) City Hall (XSP)
- Ministry of Justice (Linux)

### MC ERP
- KONICA MINOLTA HOLDINGS, INC. (Windows)
- Daiichi Sankyo, Inc. (Windows)
- Toray Engineering Co., Ltd. (Windows)
- Naganoken Kyodo Densan Co., Ltd. (Windows)
- JAPAN VILENE COMPANY, LTD. (Windows)
- KDN (Germany) Linux

### HPC
- Institute for Cosmic Ray Research, University of Tokyo (Linux)
- National Institute of Occupational Safety and Health (Linux)

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As of September 2013 (PRIMEQUEST 1000/500A/500/400)
Fujitsu Server PRIMEQUEST 2000 series based on Intel® Xeon® processors

Fujitsu’s Mission Critical portfolio of services and tools

PRIMEQUEST 2800B
Advanced x86 platform with enhanced RAS features

Outstanding platform reliability: Reserved SB built-in mission critical features for error preventions/corrections

Non-stop flexible:
Dynamic Reconfiguration enables HW re-partitioning without downtimes

Unprecedented performance: up to 158% more performance

Support of large scale solutions and applications by offering up to 12TB RAM on x86 platform

Deliver the right information for decision-making

Ensure availability of mission-critical information and business processes
Fujitsu Server PRIMEQUEST 2000 series
based on Intel® Xeon® processors

Unprecedented performance – Intel confirms new benchmark records

For more information, please visit


Enterprise Version: Built-in Mission-Critical

Dynamic platform for demanding workloads

Ensure business continuity

Operational efficiency with mission-critical uptime
Dynamic Reconfiguration enables

- Dynamic resource balancing without stopping application
- Hardware resources are moved dynamically between partitions
- Adjust partition configuration to meet various workloads by moving hardware resources without stopping applications.

Benefits

- Efficient usage of available resources
- No downtime
- Simplify resource management
Ensure business continuity

Reserved System Board

Mission-critical features

- Replace defective hardware unit without stopping applications
- Enable maintenance “on-the-fly”
- Reserved SB can be used for other workloads (training / tests)
- Isolated hardware partitions: Failures in a partition do not affect other partitions

Benefits

- Outstanding platform reliability
- Automatically recovery of resources, applications & services
- System maintenance without downtime
Itanium Migration to PRIMEQUEST

- 69%

If using Itanium, customers have to pay twice the DB license and maintenance costs
- Oracle core factor for Itanium2 increases to 1.0 from 0.5

Customers choices
- PRIMEQUEST 2400E (40 cores) 20 licenses
- Itanium-based server (64 cores) 64 licenses

Migration to PRIMEQUEST 2400E offer huge cost reduction amount of up to 69% in a typical case

Price and maintenance are based on Fujitsu’s estimation

Oracle support charge
H/W charge
Oracle license charge

Itanium-based system
PRIMEQUEST

Price and maintenance are based on Fujitsu’s estimation

Oracle support charge
H/W charge
Oracle license charge
Cluster Configuration

Redundancy and reliability

1 Step
- Single Mission Critical System
  - Redundant PSU and FAN
  - Redundant GSPB
- Almost all the Component redundant

2 Step
- Memory Mirror Flexible I/O Reserved SB Against SB and CPU failure

3 Step
- In-house Clustering Against a failure in one partition

4 Step
- Clustering between servers for full availability

Mission Critical feature for Availability
- Flexible I/O
- Reserved SB

99.999% Availability HA Cluster

Cluster Configuration
Case study
국내 A유통사의 기간계 DB서버

■ 발권, 레스토랑, 선물Shop, 스포츠 시설 등의 확장에 의한 처리 능력 부족 및 피크시 장애 건수 증가
■ 확장성, 안정성, 보수성, 기존 자산 (Windows)의 계승 등을 위하여 PRIMEQUEST를 도입
■ 서버의 SAN 부트와 클러스터 구성으로 24시간 365일 연속 운전의 신뢰성을 확보

DB서버
Windows

※SAN 부트
국내 B관광사의 통합 DB서버

■ 이전 UNIX 서버 (노후화), PC서버 (I/O처리 증대)로 성능 저하의 문제점으로 서버 통합 추진
■ 복수의 OS (Linux/Windows), DBMS (Oracle/SQL)가 동작하는 서버로서 PRIMEQUEST를 도입 ※이전 UNIX는 Linux에 이행
■ Flexible I/O + 예비 시스템 보드에 의한 시스템의 가용성 향상

■ 복수의 OS (Linux/Windows), DBMS (Oracle/SQL)가 동작하는 서버로서 PRIMEQUEST를 도입 ※이전 UNIX는 Linux에 이행

Flexible I/O + 예비 시스템 보드에 의한 시스템의 가용성 향상

국내 B사(관광) 통합 DB서버

DB서버
Linux Win

국내 B관광사의 통합 DB서버

• Red Hat Enterprise Linux AS v.4
• Oracle Database 10g
• Windows Server 2003
• SQL Server 2005

-Core Network
- Partition #0
- ERP(DB) Linux + Oracle
- SB #0
- Red Hat

- Partition #1
- Group Server (DB)
- Linux + Oracle
- SB #1
- Red Hat

- Partition #2
- BTMS(DB)
- Windows + SQL
- SB #2
- Windows Server

- 운영 대기
- Core Network
- FC Switch

- Online Data
- SAN Boot
- System OS
- Tape Library
해외 도쿄 증권거래소 매매 시스템

■ 2 millisecond의 주문 응답 시간, 3 millisecond의 정보 전달 Speed를 실현
  <이전의 시스템의 1,000 배 이상의 고속성>
■ 글로벌 도쿄 증권시장을 지탱하는 높은 신뢰성
  <오픈 서버로 Mainframe과 동등의 가용성>
■ 손쉽고 빠른 확장성을 실현
  <2배 이상의 Capacity, 1주간 이내의 확장>

차세대 주식매매 시스템
「arrowhead」
고신뢰 데이터베이스
초고속 데이터 관리 소프트

PRIMEQUEST
For more information, go to:

> http://www.fujitsu.com/kr/products/storage/