Driving Digital Transformation: Optimizing Your Cloud Infrastructure

Masaya Nakahara
Executive Vice President
Fujitsu Technology and Business of America
Partnership with Oracle

- Enterprise Cloud
- Oracle Database Cloud
- Fujitsu M10 SPARC

Fujitsu Chairman Yamamoto (left) and President Tanaka (right) together with Mr. Larry Ellison (Tokyo, April 2015)
Oracle/Sun & Fujitsu Partnership: 30 Years Strong

1983
- Sales collaboration with Sun Microsystems

1985
- Agreed on development of the first SPARC chip

1992
- Entered into partnership memorandum

1993
- Announced Strategic Partnership

1994
- Agreed on co-development of the next generation SPARC/Solaris server

2004
- Announced strategic partnership

2007
- Announced performance enhancements for "SPARC Enterprise M-Series"

2010
- Released the co-developed Fujitsu-Sun "SPARC Enterprise M-Series" server with Fujitsu SPARC64® Processor

2013
- Released "Enhanced Fujitsu M10" sold by Oracle and Fujitsu

2014
- Released "Enhanced Fujitsu M10" sold by Oracle and Fujitsu

2017
- Announced Oracle Database Cloud collaboration in Japan

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Today, I would like to talk about...

1. Digital Transformation

2. Cloud Infrastructure for Digital Transformation

3. Leading Edge Technology supporting Cloud Infrastructure: Fujitsu M10 SPARC Server
Digital Transformation
Digital Transformation
Waves of Digital Technology

1st Wave
Internet
1B In 2000

2nd Wave
Mobile Internet
10B In 2010

3rd Wave
Internet of Things / 50B+ In 2020

4th Wave
AI and Robotics
Digital Transformation

Digital World

Sense → Recognize → Decision → Actuate

IoT → Analytics → AI → Robotics

Cloud → Social → Mobile

Digital Business Platform

Security

Physical World

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A new industrial revolution

- Changes empowered with digital

- Smart factory
- Maintenance of facility and equipment
- Mobility
- Logistics
- Digital Marketing
- Food & Agriculture
- Safety
- Work & Lifestyle
Smart Agriculture in Iwata, Japan

- Bringing ICT to agriculture through providing "Akisai" – Cloud for Food and Agriculture industry
- Established a company with ORIX and Masuda Seed, co-creating a new business model with partners.
Smart Agriculture with ICT

- Grow vegetables with ICT in an 8.5 hectares site
- Sense the growth environment
- Control the growth environment
Urban mobility platform SPATIOWL

Fujitsu’s real-time location data cloud service

- People: Drivers, Pedestrians, Service Providers...
- Information: Location, Weather, Social, Public & Commerce...
- Infrastructure: Autos, Roads, Railways, Energy...

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Digital Ecosystem for Mobility

- Hydrogen station management service
- Telematics
- Congestion management
- Government road planning
- Citizens services
- Personal safety services
- Smart city
Human Centric Innovation

Human Empowerment

- Better Experience
- Decision support
- Quality of Life
- Acquiring of knowledge and skill
- Creative work

Connected Infrastructure

- Sensors
- Smart Home
- Smart Cars
- Smart Factory
- Smart Agriculture
- Smart Healthcare
- Smart City
- Robots

Creative Intelligence

- Information from people and things
- Information Analysis
- Algorithms and AI
- Business and social information
- Security and Privacy

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Cloud Infrastructure for Digital Transformation
FUJITSU Digital Business Platform

MetaArc

Digital Business (Fast IT)  Align-ment  Existing Business (Robust IT)

Mobile  IoT  Analytics  AI  Security

Cloud
MetaArc K5 combined open technologies

- Using open sources, combine the leading technologies into K5
- Contribute mission-critical functions in major communities

**OpenStack Foundation**
- Gold Member (July 2015)
- Board Member (January 2016)

**Cloud Foundry Foundation**
- Silver Member (December 2014)
- First project manager elected from Japanese vendors (October 2015)

**Product**
- Cloud OS for IaaS: OpenStack
- Cloud-based application for PaaS: Cloud Foundry
Oracle Database Cloud Collaboration in Japan

Oracle Database Cloud in Fujitsu’s Datacenter

Security

Provide Oracle Database Cloud from a secured datacenter in Japan

One-stop support by Fujitsu

Fujitsu provides support services both for infrastructure and database
Leading Edge Technology supporting Cloud Infrastructure
© RIKEN

*K computer was developed by RIKEN, Japan's leading research institute, and Fujitsu.
A digital twin for a higher quality of life

- The University of Tokyo and Fujitsu
  - A heart simulator visualizes cardiac motion of 640,000 muscle cells
  - The K computer performed the modeling calculations
Preventing Weather Disaster

- Taiwan Central Weather Bureau uses Fujitsu’s Supercomputer
- Achieving a world-class performance over 1 peta flops
Human Centric AI “Zinrai”

Sensing and Recognition
- Image recognition
- Voice recognition
- Emotion/state recognition

Knowledge processing
- Natural-language processing
- Knowledge processing & discovery
- Pattern discovery

Decision and support
- Inference & planning
- Prediction & optimization
- Interactivity & recommendation

Learning
- Deep Learning
- Machine learning
- Reinforcement learning

Advanced research
- Neuroscience
- Social receptivity
- Simulation
Intelligent Dashboard
Traffic Monitoring
Vehicle Recognition by AI
Our unique AI detects unknown attacks
Processor for Deep Learning

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Apply K computer technologies

DLU Features

- Unique architecture newly developed for Deep Learning
- Energy saving design
  ➔ Goal: 10x better “performance per watt” compared to competitors
- Large scalability: Utilize interconnect technology of HPC
  ➔ Capable to handle very large scale neural network
DLU™ Future Roadmap

- DLU will achieve high performance per watt, by applying energy saving technology developed for HPC

**The 1st generation**
- Accelerator
- Needs separate Host CPU

**The 2nd generation**
- Embedded Host CPU
- Direct inter-CPU connection
- Large neural network

**Future**
- Non von Neumann type
- Neuro / Quantum computing

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High performance thanks to Fujitsu’s own HPC technologies
- K computer technologies
- Unique architecture for deep learning calculation
- Large scalability

- **Performance per watt**
  - **FY2018** ×10
  - **FY2021**
Fujitsu’s Processor Technology

**K-Computer**
- HPC version of SPARC64
- Large scale computing
- Low energy consumption
- 88,128CPU

**Fujitsu M10**
- SPARC64 processor
- Software on Chip
- Extreme core performance
- Absolute reliability

**AI processor**
- Deep Learning Unit
- Unique architecture for DL
- For large scale neural network

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Head of Processor & AI Platform Development

Takato Noda
Corporate Executive Officer
Fujitsu Limited
Leading Edge Technology supporting Cloud Infrastructure: Fujitsu M10 SPARC Server
Optimized Cloud Infrastructure

High Performance & High Reliability Technology cultivated over 50 years

Mainframe
GS21/BS2000

UNIX Server
SPARC

Storage
ETERNUS

x86 Server
PRIMEQUEST/PRIMERGY

Business Oriented Platform

Advanced Technology

Service Oriented Platform

DNA of Mainframe

Quality Management

Server + Storage + Middleware

Quality Improvement Cycle

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Oracle’s Complete SPARC Server Family Portfolio

Foundation for Mission Critical Computing
Fujitsu M10 Servers

Installed for mission critical usage in 79 countries, 1,587 customers worldwide

- Mission critical SPARC server inheriting SPARC Enterprise M series
- Fujitsu M10: COD and modular architecture
  - Core-based CPU activation
  - Scales from 4 CPUs to 64 CPUs (M10-4S)
- Dynamic reconfiguration
- External I/O option
- Mainframe class RAS capability
- Support native Solaris 10/11
Fujitsu M10 Use Case: Korea Appraisal Board

- High-performance & High-reliable database system
- 6 IBM servers
  ➔ 2 Fujitsu M10-4S
- Online migration from AIX to Oracle Solaris with Oracle GoldenGate
Fujitsu M10 Use Case: Major Bank (Japan)

- Private Cloud Infrastructure
- 80 non-Fujitsu Servers
- 6 Fujitsu M10-4S
- 20x Performance
Next Generation Fujitsu SPARC Server

At Booth!
SPARC64 XII Processor

Next Generation Fujitsu SPARC64

- **Architecture**
  - 20nm CMOS
  - Wider Instruction Pipeline
  - On-Chip Memory Controllers
  - On-Chip I/O Controllers (4 per socket)
  - SWoC++

- **Performance Improvements over SPARC64 X+**
  - 2x Chip Throughput
  - 2.5x Core Throughput
  - 1.5x Memory bandwidth: DDR4-2400
Next Generation Cooling Technology
VLLC: Vapor and Liquid Loop Cooling
We just need a slight modification to current air-cooled IT
A safer, more prosperous and sustainable world

Human Centric Intelligent Society
Human Centric Innovation
Driving Digital Transformation

We want to be your business partner, realizing a different future together.
FUJITSU

shaping tomorrow with you