Cloud Fusion:
Innovations in Cloud Computing

Dr. Hiro Kishimoto
Deputy General Manager,
Research Center for Cloud Computing,
Fujitsu Laboratories

16:15 h
Cloud Fusion: Innovation in Cloud Computing

Dr. Hiro Kishimoto
Deputy General Manager
Research Center for Cloud Computing
Fujitsu Laboratories
Agenda

- Cloud Vision and Challenges
- Cloud Fusion
  - Security
  - Data & event processing
  - System management
- Conclusion
Cloud Vision and Challenges

*Human centric intelligent society and Cloud*
Paradigm Shift to Human Centric Era

Creating Knowledge, Supporting Human Activities

Transforming Business Process

Network Centric

Human Centric

Improving Productivity

Computer Centric

Networking

Internet PC

Cloud Computing
Sensor Technology
Ubiquitous Terminals
Mobile Communications

VISIT 2010 – Fujitsu Forum Europe
Copyright 2010 FUJITSU
Practical Wisdom to Support People

Virtual World

Sense & Analyze

Real World

Data from sensors, devices, web, and corp. data

Virtual World

Simulations
Data Analysis
Context Analysis
Visualization
Optimization

Practical Wisdom

Appropriate Services

Food
Healthcare
Energy
Transport
Logistics
Environment
Who Wants What on Cloud?

- Most important issues for IT Execs when considering cloud services
  - Speed of deployment
  - Pay as you go
  - Lower overhead

- Top requirements by IT Execs for cloud service providers
  - Competitive costs
  - Comprehensive SLA
  - Understand my business (and industry)

- Top three challenges for the cloud service industry, according to IT Execs
  - Security
  - Performance
  - Lock in

- Top developer issues
  - Vendor lock in
  - Interoperability standards (cloud/cloud and cloud/legacy)
  - Service migration standards

Source: Coda research 2009 including 250 WW interviews
Cloud Fusion: innovations in cloud computing

Security
Data & event processing
System management
Progress in Cloud Computing Usage

From hybrid to “Cloud Fusion”

Realization of a world where multiple clouds are combined and used flexibly

Advanced Integrated = Fusion

Mono

Hybrid

On-premise

On-premise

Industry

Community

Media

Medical

Engineering
Cloud Fusion Advantages

- E2E manageability
- Info centric security
- Function combination
- Scalable data storage with encryption
- Scalability
- Pay-as-you-go

- Mono
- Hybrid
- Fusion
Cloud Fusion Technologies

Secure Data Framework
- Obscuring
- Traceability
- Sandbox
- Policy mgmt

Data & Event Proc
- Distributed Proc
  - Graph Fabric
  - Scalable CEP
  - Distributed KVS
  - Scalable batch
  - Simple Development

System Mgmt
- E2E mgmt
- Service Capability matching
- Visualization
- Managed network
- Troubleshooting
- Secure mgmt Framework
Cloud Security Technologies Overview

Legal Issue (Domestic & International)
Governance, Risk, Compliance

Security technologies
- Data Security (DLP, ERM)
- Application Security
- Virtual Machine Security
- Network Security
- Storage Security

Sec. Mgmt
- Trusted Boundary
- Monitoring
- ID Mng.
- Access Cntl.
- Key Mng.
- Vulnerability Mng.
- Incidents Mng.

SaaS

PaaS

IaaS

Audit by third party to the Security & IT system

- Legal Issue
  - Country Risk
  - National ID

- Technical Issue
  - Policy mediation
  - ID & Inter-service access control
  - Data protection
  - Data Masking /Obscuring

- Operations
  - Policy Integration

VISIT 2010 – Fujitsu Forum Europe
Information Centric Security

1. Data Masking

2. Logic Migration & Execution

App System

Public Cloud

Private Cloud

Confidential

Calculation

Analysis

Sandbox

Log

Trace monitor

Confidential

Table calculation without decryption

Key is needed to access results
Data & Event Processing Feature

Current Pattern

- Ad hoc query
- Data
- Result

New Pattern

- Continuous query
- Data
- Result

- High availability & reliability
- Optimization
- Massive parallel and distributed processing
- Data analysis integration

VISIT 2010 – Fujitsu Forum Europe
Copyright 2010 FUJITSU
Data & Event Processing Framework

Real World

Reality Mining
- Human Behavior Analysis etc.

Sensor Stream Processing
- Tag Attachment
- Timing Sync.
- Device Control
- Message Control

Text Mining
- Business Analysis etc.

IT World

Complex Event Processing
- Key Value

Transaction Texts

Business Process

Business Data

Web
Key Points
- Simply flat, distributed architecture
- Reduces turnaround time by minimizing node-to-node communications
- Executes Random Access and Batch Aggregation simultaneously

Advanced features
- Efficient Join Operation by pre-arranged data placement
- Eventually Consistent Transaction using distributed time-stamp
Cloud System Management

- **Traditional System Management**
  - *Infrastructure managers* construct and operate infrastructures of systems based on instructions of *service managers*

- **Cloud System Management**
  - *Service managers* construct and operate infrastructures of systems on a *self-service* basis through *Dashboard*
  - Data-center Managers construct and operate physical devices through *Cockpit*
Troubleshooting Framework

- **Accelerate troubleshooting process**
  - Detect trouble signature, determine the cause location and execute recovery actions automatically

- **Accumulate troubleshooting knowhow**
  - Learn from the results of the recovery actions automatically

Press release (Feb. 23): Troubleshooting technology for cloud computing
Operation and Management for Cloud Fusion

- **Issues**
  - Proper deployment of applications over heterogeneous cloud systems
  - SLA assurance of applications deployed over heterogeneous cloud systems

- **Cloud Benchmark**
  - Check capabilities of cloud systems with passive/active probes

- **Capability Matching**
  - Decide proper deployments by matching capabilities of cloud systems and applications

- **Policy-based Management**
  - Automated operation and management based on ‘policy’
Conclusion

- Comprehensive research works along with Fujitsu cloud strategy

- **Security**: Flexible and diverse information centric security services

- **Data & Event Processing**: Massive data & event processing framework with scalable Key-Value-Store

- **System Management**: Cloud troubleshooting technologies and inter-cloud system integration