Expected Social and Economic Impact and Application of Cloud Computing in Japan

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Focused Issues

- Different Styles of Clouds
- Cloud Markets in Japan
- Issues of Cloud Computing on Advanced Networked Society
Different styles of Clouds

- **Cost Benefit by Scale**
  - Why use Cloud?

- **Layered Business Model**
  - Cross Cutting the “Cloud”
  - How to Earn Sufficient Scale of Cloud to be Cost Efficient?

- **Roadmaps**
Cross Layer Convergence among Software Industry

*Sector-independent Horizontal Cloud*

*Vertical Cloud*
# Cloud Computing Roadmap

### How to find the “Best Optimized Sharing of IT functions”
- Horizontal?
- Vertical?
- Granularity?

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<th>Year</th>
<th>Market</th>
<th>SaaS</th>
<th>PaaS, HaaS</th>
<th>More Industry Use</th>
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### SaaS Applications
- CRM/SFA
- HR/Finance/BI
- Google Gears
- SAP Sector Use of Cloud

### PaaS HaaS
- Amazon EC2
- Google
- IBM Blue Cloud
- Microsoft
- Yahoo!
- Development Tools
- SLA

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**Inter-Cloud Platform**

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**Inter-Cloud Platform**
Cloud Market in Japan

Overall
- Cloud Computing will be the next innovation in ICT based Society and IT industry in Japan
- Applications are expected in 1) Anti-Global-Warming, 2) e-Governments, 3) Energy (Smart Power Grid), 4) Intelligent Traffic Systems and Other Society-based Information Systems

Market Forecasts
- Expected market growth to be ~20B USD by 2012 (~ 100B USD Global Market Forecasted)
- Core Cloud Business will be, 1) Data Center, 2) ASP-Saas Application, 3) Shared Outsourcing and 4) Server/Storage/Middleware/Network Services

Public Service Clouds for everyone and Digital ID issues
- The Kasumigaseki Cloud for Ministries and Agencies
- National e-P.O. Box
- Clouds for SMEs
The global cloud computing service market projected to reach *approx. ¥10 trillion* in value in 2011 (Merrill Lynch estimated)

Reference: Global Internet router market forecast

Global router market expected to triple between 2007 to 2013

Source: RHK forecast, 2008

Data Center Services
Server/Storage/Middleware + Network
Shared Use Outsourcing
ASP/SaaS Applications

Domestic market will grow to *nearly 2 trillion yen* by 2012

Source: ASPIC
Gradually migrate to e-government using cloud computing technologies

- Drastic reduction of administrative costs and elimination of waste
  (Drastic reduction of operational costs and developmental costs for government information systems)

Kasumigaseki Cloud

- Do not need to maintain each system individually
- Computer resources can be used as much as needed

Ministry A

Ministry B

Ministry C

Ministry D
The National Electronic Post Office Box Plan

What is the National Electronic Post Office Box Plan?

Upon request, individuals (or businesses) are provided with a secure, exclusive account (electronic post office box) that can be used to view and manage personal information (e.g., pension records) in cyberspace and access a wide range of convenient, one-stop government services, achieving the world’s most effective “personal e-government.”

Now

- Numerous administrative procedures for major life events
  - Moving house: Up to 26 procedures & visits to 7 organizations
  - Retirement: Up to 10 procedures & visits to 6 organizations
- Pension records, etc. checked on paper
- Submit documents for employee tax or employment procedures for each relevant local government or place of business

Improved convenience

- Local government office
- School
- Regional transport bureau etc.
- Pensioner
- Company A
- City A
- City B
- City C

Future

- One-stop services
  - Procedures completed with one click
  - No need submit documents
  - Cost reduction (total for private/public sectors):
    - Approx. ¥100 million for moving
    - Approx. ¥120 million for retirement

- Records can be checked at any time
- Eliminating social security/public services notifications would reduce costs by 460 billion yen

- Bulk transmission of employee data
- One-stop processing of income tax filing would reduce costs by approx. ¥170 million

- Development of necessary infrastructure
- National and local governments given equal to discussion development of a plan for unified action
- BPR of administrative procedures (general optimization)

- Establish a government CIO
  - To oversee all aspects of e-government
  (The US Obama administration has established the position of Chief Technology Officer)

- Develop shared infrastructures
  - Infrastructure using cloud technologies to be shared by the central and local governments

Source: Outline of New Strategies for New Digital Age: Three-Year Emergency Plan (IT Strategic HQ, April 9, 2009)
Public-use Cloud Cases in Japan

- Kofu-City’s Taxpayers Refunding Management System
- Japan Post Office’s Customer’s Inquiry Response System
- Japan Government’s “Eco-POINT” Application System

UI
Business Logics
Database

Force.com
(Platform as a Service)
Usability/Scalability/Security/Productivity/Integrity
Maturity Model of Business IT Utilization

Cloud Computing Service for SMEs Expected

Difficulties in Cross-Company Collaboration

Difficulty in Cross-Division Communication

Stage 1
Primary usage of IT

Stage 2
Partial optimization by IT within each division

Stage 3
Partial optimization by IT across a company

Stage 4
Total optimization across industry

Productivity Gain by IT usage

70% of companies in Stage 1-2

30% of companies in Stage 3 and 4

Source) METI Japan
Issues of Cloud Computing on Advanced Networked Society

- (Technology) NGN / Mobile Cloud
- (System) Dependable Clouds
- (Institutional) Law Systems and Rules
Establish a new market as early as possible to achieve high-security, high-speed and advanced interoperability between clouds by addressing various issues that currently exist in today’s cloud market.
R&D on Dependable Data Center and Related Technology

Conduct empirical research and develop various technologies for the next generation data centers which achieve higher dependability and security for business uses.

(example)

- **Air conditioning using the open air**
  - Verify dependability, cooling capacity and factors for the stable operation
- **UPS with Photovoltaics**
  - Verify energy saving and performance of battery under photovoltaics
- **Real time geographically distributed data back up**
  - Verify the load factor of network, usability and security
- **Visualization and integration of log data of servers**
  - Verify security of user data
- **Resource balancing technology**
  - Control and re-arrangement of resource
- **Virtual resource management system**
  - Maximize resource usage while keeping service level
Software System Dependability and Cloud Computing

"Dependable Cloud"

Traceability for Problem Determination

Base feature

Monitor/Measurement
Authentication / Authorization
Secure Logging
Secure Boot
Secure Storage
Notes for the Future

Global Rules need to be established

- Relationship between corporate compliance (auditing procedures) and external storage of data, etc.
- Ownership of intellectual property rights (e.g., data, service, log) on clouds
- Advance notification of termination (cancellation) of services, return of data to owners, proof of data deletion
- Need for the establishment of global rules on personal information protection (e.g., operations based on the relevant use of personal information policy)

Reference:
- It is very important to enhance the SLA for cloud computing to be fully utilized in enterprise activities in the future.
- It is important to form a certain social consensus on to what extent dependability/security is ensured or accountability is fulfilled by the service providers in accordance with the application of cloud computing, while considering to what extent risks are accepted by the users.
■ Harmonizing with Domestic Rules

How should we understand the relationship between global rules and domestic laws, considering that data centers established to provide cloud services are subject to the laws of the countries in which they are located?

■ Other Important Issues

• Interoperability
• Dependability
• Capacity Building (Fix/Wireless Broadband Network)