Cloud Computing Technology and Practice

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Auckland, NZ
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Agenda

• What is Cloud Computing
• Cloud Computing ROI and Benefits
• CIO Perspective: How to Implement Cloud
• Success stories
Cloud Computing – a Disruptive New Paradigm

“The Clouds will transform the information technology (IT) industry... profoundly change the way people work and companies operate.”

- The hottest word in IT community
- Match business requirement to IT
- Service oriented infrastructure
- Profit from new technologies: virtualization, automation...

“By 2012, 80% of Fortune 1000 enterprises will use some Cloud Computing services”

- Gartner
# Cloud computing – Foundation in “Smarter Planet”

<table>
<thead>
<tr>
<th>I Need Insight</th>
<th>I Need to Work Smart</th>
<th>I need to respond quickly</th>
<th>I Need Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“Data is exploding and it’s in silos”</strong></td>
<td><strong>“New business &amp; process demands”</strong></td>
<td><strong>“My infrastructure is inflexible and costly”</strong></td>
<td><strong>“Our resources are limited”</strong></td>
</tr>
<tr>
<td>How can we take advantage of the wealth of information available in real time from a multitude of sources to make more intelligent choices?</td>
<td>How can we work smarter supported by flexible and dynamic processes modeled for the new way people buy, live &amp; work?</td>
<td>How do we create an infrastructure that drives down cost, is intelligent and secure, and is just as dynamic as today’s business climate?</td>
<td>How do we drive greater efficiencies, compete more effectively, and respond more quickly by taking action now on energy, the environment, and sustainability?</td>
</tr>
</tbody>
</table>

**New Intelligence**

**Smart Work**

**Dynamic Infrastructure**

**Green & Beyond**
Cloud Computing Benefits

- **Individual**
  - New method to use hardware and software
  - Get enterprise level IT service

- **Enterprise**
  - Accelerated business innovation
  - Service oriented datacenter
  - Cost effectiveness

- **Government**
  - Transformation to services
  - Green computing
What is Cloud Computing?

*It is a user experience and a business model*

- Cloud computing is an emerging style of computing in which applications, data, and *IT resources are provided as services* to users over the web.

*It is a infrastructure management methodology*

- Cloud computing is a way of *managing large numbers of highly virtualized resources* such that from a management perspective, they resemble a single large resource. This can then be used to deliver services.
The future: Three co-existing delivery models

IT portfolio aspects migrating to cloud today:

- Mission Critical
- Packaged Apps
- High Compliancy
- Test Systems
- Pre-production
- Developer Platform
- Variable Storage
- Software as a Service
- Web Hosting
On-ramps to Cloud Computing Services

Software as a Service

- Industry specific services (Partners)
- Cross industry services (SO)

Platform as a Service

- SOA – componentized & flexible
- Cloud middleware

Infrastructure as a Service

- Dynamic Infrastructure
- Green, virtualized & scalable
- Optimized for security, transactions, data integrity
### New Project Request

1. Browse available infrastructure and choose dates
2. Select servers and configure software
3. Submit request

### Select Reservation Dates

Start date: 04/16/2008  
End date: 04/30/2008  
Duration: 14 days

### Available Resources

#### Xen System x Cloud Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>Total</th>
<th>Max for single VM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>15 / 20</td>
<td>4</td>
</tr>
<tr>
<td>Memory</td>
<td>12.20GB / 17.20GB</td>
<td>3.44GB</td>
</tr>
<tr>
<td>Storage</td>
<td>235GB / 305GB</td>
<td>61GB</td>
</tr>
</tbody>
</table>

#### System p LPAR Cloud Resources

- **Availability by number of VM CPUs**

<table>
<thead>
<tr>
<th>VM CPUs</th>
<th>Available VM Locations</th>
<th>Max Mem (max corresponding storage)</th>
<th>Max Storage (max corresponding mem)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>3.44GB (51GB)</td>
<td>61GB (3.44GB)</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>3.44GB (51GB)</td>
<td>61GB (3.44GB)</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3.44GB (51GB)</td>
<td>61GB (3.44GB)</td>
</tr>
</tbody>
</table>
1. Choose a Virtual Resource Cloud
   - Xen System x

2. Choose an Image
   - Xen RedHat Linux 5.1

Image Details
   - Operating System: RedHat 5.1
   - Recommended Resources:
     - CPUs: 2
     - Mem: 1024MB
     - Disk: 10GB

3. Choose resources for your virtual machine(s)
   - 1 CPU
   - Memory: 1024 MB
   - Storage: 10 GB
   - Swap partition size: 2.50 GB

4. Choose any software or additional options (* = required)
   - Enable Monitoring (installs agent)
   - IBM Rational Clear Case
   - IBM Rational Performance Tester
   - WebSphere Application Server v6.1 for Linux
   - IBM Rational Clear Quest
   - IBM Rational PurifyPlus
   - IBM Rational Functional Tester
   - DB2 Server V9.1 For Linux

(Use the VM configurator to add servers to the project)
## Project Report

<table>
<thead>
<tr>
<th>Customer</th>
<th>Project Name</th>
<th>Server Name</th>
<th>Server IP</th>
<th>Start Date</th>
<th>Duration</th>
<th>Software List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>vm-10-176-4-4</td>
<td>10.176.4.4</td>
<td>2008-04-16 15:31:06</td>
<td></td>
<td>Xen Linux_0</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>vm-10-176-4-2</td>
<td>10.176.4.2</td>
<td>2008-04-16 15:31:06</td>
<td></td>
<td>Xen Linux_0</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>vm-10-176-4-6</td>
<td>10.176.4.6</td>
<td>2008-04-16 15:31:06</td>
<td></td>
<td>PPC Linux_0</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>vm-10-176-4-3</td>
<td>10.176.4.3</td>
<td>2008-04-16 15:31:06</td>
<td></td>
<td>Xen Linux_0</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>vm-10-176-4-5</td>
<td>10.176.4.5</td>
<td>2008-04-16 15:31:06</td>
<td></td>
<td>Xen Linux_0</td>
</tr>
<tr>
<td>Customer C</td>
<td>Blue Ocean Application</td>
<td>vm-10-176-0-2</td>
<td>10.176.0.2</td>
<td>2008-04-16 15:07:29</td>
<td>1 hr</td>
<td>Xen Linux_0</td>
</tr>
<tr>
<td>Customer C</td>
<td>Blue Ocean Application</td>
<td>vm-10-176-0-3</td>
<td>10.176.0.3</td>
<td>2008-04-16 15:07:29</td>
<td>1 hr</td>
<td>PPC Linux_0</td>
</tr>
</tbody>
</table>

## Summary Of License

<table>
<thead>
<tr>
<th>Customer</th>
<th>Project Name</th>
<th>Software</th>
<th>#License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>Xen Linux</td>
<td>4</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>IBM Rational Functional Tester</td>
<td>2</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>IBM Rational Software Architect</td>
<td>2</td>
</tr>
<tr>
<td>Customer B</td>
<td>Green River Application</td>
<td>IBM Rational Clear Quest</td>
<td>1</td>
</tr>
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Business Needs

Every business has a fluctuating capacity requirement

- Business Capacity
- Required Capacity
**ROI Analysis**

<table>
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<tr>
<th>Without Cloud</th>
<th>With Cloud</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Development</strong></td>
<td>Liberated funding for new development, transformation investment or direct saving</td>
</tr>
<tr>
<td><strong>Software Costs</strong></td>
<td><strong>Deployment (1-time)</strong></td>
</tr>
<tr>
<td><strong>Power Costs</strong></td>
<td><strong>Software Costs</strong></td>
</tr>
<tr>
<td><strong>Labor Costs (Operations and Maintenance)</strong></td>
<td><strong>Power Costs (88.8%)</strong></td>
</tr>
<tr>
<td><strong>Hardware Costs (annualized)</strong></td>
<td><strong>Labor Costs (- 80.7%)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Hardware Costs (- 88.7%)</strong></td>
</tr>
</tbody>
</table>

**Impact:**
- **Reduction of Total Cost of Ownership of Data Center Infrastructure**
  - Reduced Capital Expenditure
    - Improved utilization reduces requirement for new capital purchases
  - Reduced Operations Expenditure
    - Lower facilities, maintenance, energy, IT service delivery and labor costs
- **Additional Benefits**
  - Reduced risk, less idle time, more efficient use of energy, acceleration of innovation projects, enhanced customer service

**Business Case Results**
- **Annual savings:** $3.3M (84%) from $3.9M to $0.6M
- Payback Period: 73 days
- Net Present Value (NPV): $7.5M
- Internal Rate of Return (IRR): 496%
- Return On Investment (ROI): 1039%

Note: 3-Year Depreciation Period with 10% Discount Rate
IBM Cloud Labs & HiPODS

Market Experiences

27% Software as a Service (SaaS)
- Accelerate time to market for new services
- New business models & opportunities
- Enable Service Innovation

18% Platform as a Service (PaaS)
- Open development platform
- Rapid services creation
- Expand developers eco system

55% Infrastructure as a Service (IaaS)
- Reduces IT resource allocation time by 3X
- Speeds on-boarding by 2X
- Increased hardware utilization by 4X
- Simplifies IT management by 7X
An effective Cloud Computing deployment is built on a Dynamic Infrastructure and is highly optimized to achieve more with less....

...leveraging virtualization, standardization and automation to free up operational budget for new investment.
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Developing the Cloud strategy and implementation plan is the first step for the CIO.

- Without a strategy, Cloud computing can be a threat to the CIO and the IT team
  - Reduced control of IT services delivered over the Internet
  - Perceived cost gap between a cloud service delivered by providers outside of the IT team and “traditional” services delivered by IT

- With a strategy, Cloud computing is a huge opportunity for the CIO
  - Lower costs, more responsive IT, optimized delivery
  - Greater range of services and capabilities
  - Greater visibility in billing / chargeback to LOBs
  - Better control of the users’ systems, desktops, and services access

5 Steps to Cloud based Services
New consumption and delivery models drive new sourcing options and business flexibility.

Private ...
- Client owned – managed by client or services provider.
- Access defined by client.

Public ...
- Standardized services on the provider’s cloud
- Access by subscription.

Considerations ...
- Security, privacy, resiliency
- Self-service
- Standardization

GOVERNANCE
Implement with the focus on the end user experience

- Easy to access, easy to use Service Request Catalog
- Hides underlying complex infrastructure from user and shifts focus to services provided
- Enables the ability to provide standardized and lower cost services
- Facilitates a granular level of services metering and billing
- Workload standardization eases complexity

Provisioning Engine
- Workflows
- Expert Systems
- Scripts

Optional Service Modules
- e.g. Metering/Usage Billing, Monitoring, etc.

Virtualized Cloud Infrastructure
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IBM Cloud Labs Accelerating Global Adoption

Silicon Valley
California

Dublin
Ireland

Beijing
China

Seoul
S. Korea

Tokyo
Japan

Bangalore
India

Hanoi
Vietnam

São Paulo
Brazil

Johannesburg
South Africa

IBM Cloud Labs

Other Cloud Centers
Common Use Cases for Cloud

- Domain-based Solution Architecture: Flexible product combination to meet business requirement
- On-Demand Delivery: Customized implementation
- Dedication: Support by experienced local team
IBM CloudBurst - Cloud Quickstart

- A service delivery platform that is pre-integrated at the factory
- Built-for-purpose based on the architectural requirement of specific workloads
- Delivered and supported as a single product
- Prepackaged, pre-configured servers, storage, software and installation services needed to stand up a private cloud

**Base Hardware Configuration***:
- 1 42U rack
- 1 3650M2 Mgmt Server, 8 cores, 32GB Ram
- 1 HS22 Blade for Thundercloud stack, 8 cores, 48GB RAM
- Base configuration:
  - 1x BladeCenter chassis
  - 3 managed H22 blades, 8 cores, 48GB RAM
- DS3400 FC attached storage, 5.4TB raw capacity

**Quickstart Services**:
- CloudBurst provides rapid implementation of a turn-key cloud environment consisting of the cloud management infrastructure, including the cloud resources to be provisioned
  - Initial install, configuration and training services - * 5 days
  - Pre-engagement workshop for initial requirements
  - Post-engagement workshop for growth

**Cloud Software Configuration**:
- BladeCenter Foundation stack runs on 3650M2 management server
  - Windows 2003R2 Enterprise
  - Systems Director 6.1.1 with BOFM, AEM; ToolsCenter 1.0; DS Storage Manager for DS4000 v10.36; VMware VirtualCenter 2.5 U4; LSI SMI-S provider for DS3400
  - VMware ESXi 3.5 U4 hypervisor on all blades

Cloud software stack:
- BlueCloud v1.6.1 including appliance wizards
- Tivoli Provisioning Manager v7.1
  - DB2 ESE 9.1; WAS ND 6.1.0.13; TDS 6.1.0.1
- Tivoli Monitoring v6.2.1
  - OS pack
- SUSE Enterprise Linux 10 sp2
DongYing Yellow River Delta Cloud Center

Customer Requirements

- Establish cloud computing center in Dongying
- Provides the advanced public services platform for the Dongying economic development zone
- The cloud computing center will leads around cloud computing cluster and accelerate building modern service industries and information society in DongYing.
- Expand services to cover other cities and regions in the Shangdong province

DongYing Cloud Center will provide:

- Software development and Test platform
- IDC services
- Innovation platform
- Training center
- E-government
- Digital city
- Host of application services.
SinoChem Private Cloud

Customer requirement:
• Multiple data centers supporting worldwide business should be integrated
• Reserve system resources for top priority projects
• Increase resource utilization rate to reduce costs
• Maintain innovation speed

Blue cloud enterprise datacenter solution

- Business oriented IT service model
- To be a service oriented IT platform
- Shared IT resource usage model
- Dynamic create/configure/reclaim resources

Benefits
- Elevate business responsibility, catch marketing
- Boost IT efficiency, to be a GREEN datacenter
- Simplify IT management, reduce cost
- Provide a platform for business innovation
WuXi Software Park – a Development and Testing Platform on Cloud

Customer requirements
- Provide a common IT platform and tools for software outsourcing companies
- Differentiate from traditional software park model to provide more value added services
- Build a more green IT environment through resource sharing
- Enable collaboration and innovation among end clients

Blue Cloud development & testing solution
- Consolidated develop environment for software park
- Automated development platform
- Development management and quality management
- Collaboration development platform
- IT resource auto-management
- Pay-by-use charging model

Benefits
- Pay-by-use can reduces capex investment and operation cost
- Shared resource and power saving match China central government’s mandate for green IT
iTricity – Cloud based IDC

Customer requirements
- High maintenance costs for distributed data centers
- Renting/hosting services can’t satisfy customer requirements
- Cannot respond to customer requirement and set up environment quickly enough

Blue Cloud IDC solution
- All the resources managed by Blue Cloud
- Customer can pay per usage by the hour
- All data centers share a centralized service interface
- iTricity can define more services dynamically
- ISO27002 security rule compliance

Benefits
- Centralized management to allow control and saves costs
- More service mode to increase competitiveness
- Self service mode to simplify management
- Scalable infrastructure to allow expandability
To Get Started

A SMARTER PLANET...

WHAT IT MEANS FOR I.T.
Because I.T. itself is becoming instrumented, interconnected, and intelligent.

WHERE DO YOU START?

Select Workloads

Assess Delivery Options

REN ovate: Op-Ex Cost-Takeout

INNOVATE: New Value Creation

1. Deploy fit-for-purpose workload compute platform
   A private cloud built by IBM
2. Acquire Services thru IBM Cloud

Enabling new business models

Evolving a more dynamic infrastructure
**For More information**


http://www.ibm.com/cloud

**Email:** Andrew Fox, arfox@nz.ibm.com