The Silver Lining of Cloud Computing

Maja Lee, Branch Chief,
Application Solutions Branch

Wayne Eason, Acting Branch Chief,
Hosting and Storage Solutions Branch

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Agenda

• What is Cloud Computing?
• Characteristics
• Service and Deployment Models
• Advantages and Disadvantages
• Planning for a Cloudy Day
According to NIST

- Cloud computing is still an evolving paradigm
- Definitions, attributes, and characteristics will evolve and change over time
Evolution of the Cloud Concept

• Idea of a public utility computing model first suggested in 1960

• Telecommunications providers migrated circuits to virtual private networks in the 1990s
  – Routed traffic to balance network load as needed
  – Comparable service at lower cost
  – Cloud symbol used to identify the VPN portion of the network

• Cloud computing expanded the concept to servers
NIST Defined Cloud Model

- Promotes Availability
- Composed of:
  - Five essential characteristics
  - Three service models
  - Four deployment models
NIST Essential Characteristics

• On-demand Self Service
• Broad Network Access
• Shared Resource Pool
• Rapid Elasticity
• Measured Service
NIST Service Models

• **Software as a Service (SaaS)**
  – Customer use of a provider’s application via thin client interfaces

• **Platform as a Service (PaaS)**
  – Customer deployment of an application using the provider’s application platform

• **Infrastructure as a Service (IaaS)**
  – Customer access to processing, storage, networks
  – Customer may control operating systems and applications
NIST Deployment Models

- Private cloud
- Community cloud
- Public cloud
- Hybrid cloud
Private Cloud

- Operated solely for an organization
- Management
  - Managed by the organization or by a third party
- Location
  - On-site or off-site
Community Cloud

• Shared by several organizations
• Supports a specific with shared concerns
  – Mission, security requirements, policy, compliance
• Management
  – Managed by the organization or by a third party
• Location
  – On-site or off-site
Public Cloud

• Provided for the general public or a large industry group
• Owned and managed by a vendor selling cloud services
Hybrid Cloud

- Composed of two or more clouds based on different models (private, community, or public)
- Clouds remain unique entities
- Clouds linked by technology enabling data or application portability
  - Load balancing between clouds
Cloud Advantages

• Defers and avoids costs
• Consumption-based pricing model
  – Pay only for used services
• Increases IT agility and return on investment
• Public cloud support for mobile workforce
• Lower cost disaster recovery option
Cloud Disadvantages - Burton Group

- Inadequate, inflexible, or nonexistent cloud service level agreements
- Poor vendor transparency
  - Inability to assess risks or audit cloud security
- Vendor lock-in due to lack of interoperability
- Market immaturity
Will It Be a Cloudy Day?

• Factors for determining where to run your application
  – Performance, storage, security, availability and data transfer requirements
  – Service level agreements
  – Mission criticality
  – Internal resource availability
  – Cost
Foundation of the NCC Cloud

- Shared application platforms since 1997
  - Supporting 100s of national applications
  - Shared resource pools to reduce costs
- Mid-range modernization 2005 - 2007
  - IBM P Series server virtualization
  - 3PAR SAN storage virtualization
- Akamai public access failover capability in 2007
- x86 server virtualization initiated in 2009
- WAN2010 implementation broadens network access in 2010

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NCC Cloud Futures

• Multi-pronged approach
  – NCC hosted Infrastructure as a Service (IaaS) private cloud
  – NCC hosted Platform as a Service (PaaS) private cloud
  – Public and community cloud partnerships

• On-demand self service ordering interface

• Rapid elasticity based on server virtualization

• Measured services include monitoring and reporting of resource usage for customers
NCC Infrastructure as a Service (IaaS)

- Web ordering interface
  - # processors, GB memory, GB disk
- Rapid provisioning of FISMA compliant virtual server
- Customer administered server
- Customer ISO responsible for security certification
- Lowest cost option with minimal support
  - Consulting support provided at additional cost
NCC Cloud Pilot

• VMWare Server Virtualization
  – Eliminates cost, time, and effort required to provision new servers associated with each new requirement
  – Increases utilization and efficiency of server operations

• Cloud Management Software
  – Web-based menu of standard packages and options
  – Self-service ordering
  – Coordination and automation for faster provisioning
  – Greater visibility

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Service Offerings

- Server Management
- Storage Management
- Supporting Services
Platform, OS, or Function

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Service Offerings by Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud</td>
<td>Cloud computing provides a pool of virtualized resources within a datacenter - an internal cloud, or federated on-demand to external clouds. They deliver IT infrastructure as an easily accessible service.</td>
</tr>
<tr>
<td>Physical</td>
<td>Physical hardware provides robust, dedicated environments for requirements.</td>
</tr>
<tr>
<td>Virtual</td>
<td>Virtual servers provide low-cost web hosting services. Instead of requiring a separate computer for each server, dozens of virtual servers can co-reside on the same computer, providing fast time to value and cost savings.</td>
</tr>
</tbody>
</table>
### VM Template Selection

**Virtual machine template selection**

- **Select the data center where the virtual machine will be deployed**
  - *Datacenter-SanMateo*
  - For optimal network performance, select a data center location nearest to your worksite.
  - *Not seen by customer*

- **Select a template group**
  - *Medium Windows*
  - VM Template options are available for multiple environments.

- **Select a virtual machine template/image name**
  - *SampleVMTemplate3*
  - Select a pre-defined virtual machine template.
  - NOTE: If you require additional software to be installed on the VM environment, submit stuff has been provisioned.

<table>
<thead>
<tr>
<th>Virtual machine template/image description</th>
<th>Medium Windows Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guest operating system</td>
<td>winNetStandardGuest</td>
</tr>
<tr>
<td>Hard disk size</td>
<td>50000000 (KB)</td>
</tr>
<tr>
<td>Standard D: drives capacity on Windows; Standard /usr/Software file folder drives capacity</td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td>2000 (MB)</td>
</tr>
<tr>
<td>Additional memory may be requested after the VM Server has been provisioned.</td>
<td></td>
</tr>
</tbody>
</table>
MyServices Listing

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Component Menu

<table>
<thead>
<tr>
<th>Component Services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backup Snapshot for Virtual Machine</td>
<td>Request a running VM be saved and stopped.</td>
</tr>
<tr>
<td>Backup Snapshot for VM</td>
<td>Request a snapshot of a running VM.</td>
</tr>
<tr>
<td>Delete Existing Virtual Machine</td>
<td>Request a running Virtual Machine be deleted.</td>
</tr>
<tr>
<td>Modify CPU Allocation for Virtual Machine</td>
<td>Modify CPU allocation for an existing Virtual Machine.</td>
</tr>
<tr>
<td>Modify Memory Allocation for Virtual Machine</td>
<td>Modify memory allocation for an existing Virtual Machine.</td>
</tr>
<tr>
<td>Schedule Activity on Virtual Machine</td>
<td>Schedule an activity for an existing Virtual Machine.</td>
</tr>
<tr>
<td>Start a Stopped Server - Demo</td>
<td>Request a previously-stopped VM be restarted.</td>
</tr>
<tr>
<td>Start a Stopped Server</td>
<td>Request a previously-stopped VM be restarted.</td>
</tr>
<tr>
<td>Stop Virtual Machine</td>
<td>Request a running Virtual Machine be saved and stopped.</td>
</tr>
<tr>
<td>Take Snapshot and Modify Existing Virtual Machine</td>
<td>Request a snapshot be taken and modification made to an existing Virtual Machine.</td>
</tr>
</tbody>
</table>

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Server Administration

Virtual Server Administration

- Self-Service Administration
- Instant Access to Servers
- Simplified Server Management

Search for Services Available for Carol Manager

Search for services containing:  
[Search]

Select Services for Carol Manager by Category

- Manage Existing Virtual Machine Servers
  - Self-service management of basic systems administration functions for your virtual machines, including power cycle operations and back-up (snapshots).

- Modify Existing Virtual Machine Servers
  - Manage the service lifecycle of your existing virtual machines, including changes to memory and CPU allocation and the scheduling of other activities.

- Manage Virtual Machine Templates
  - Create and manage and remove virtual machine templates.

- Modify ESX Servers
  - Manage physical ESX servers and their related storage and memory requirements.
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NCC Platform as a Service (PaaS)

• Web ordering interface
  – Application platform (e.g., LAMP Domino, ColdFusion, etc.)
• Rapid provisioning of FISMA compliant virtual server
• NCC administered server, customer administered application environment
• Customer ISO responsible for application security certification
• Low cost option with minimal support for application platform
  – Consulting support provided at additional cost

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Public and Community Clouds

• Investigate customer interest in external hosting alternatives
• Identify cost effective solutions providing FISMA compliant options
• Implement contract vehicles as necessary
• Establish simplified ordering processes
The Clouds are Coming

- Building an internal cloud positions the organization to more easily migrate to external offerings
- Compare costs of internal and external clouds
- Consumer organizations must maintain responsibility
- Use the cloud to right-size IT and as reserve capacity
- Identify security risks before data goes in the cloud
Summary

• The silver lining
  – Scalable – Access to additional computing resources when needed
  – Agile – rapid provisioning
  – Reliable – Multiple servers provide cloud capacity
  – Utility-based – Pay for services used
  – Shared – Resources are shared to reduce costs
Questions and Contacts

• Maja Lee
  Branch Chief, Application Solutions Branch
  OEI/OTOP/NCC
  (202) 564-1436

• Wayne Eason
  Acting Branch Chief, Hosting and Storage Solutions Branch
  OEI/OTOP/NCC
  (919) 541-3082