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The Impact of Cloud and SOA on an IT Organization

From Service Delivery to Business Transformation

September 1, 2009
Presentation Agenda

- Virtualization technology studies and approach
  - Benefits and case studies
  - Layers of virtualization

- Cloud Computing overview and case study
  - Definitions and use cases
  - Case study

- SOA Governance challenges
  - SOA and alignment with Virtualization and Cloud

- Time permitting – Cloud TCO study
Cloud Computing – a Disruptive New Paradigm

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

- Provides massively scalable computing resources from anywhere
- Simplifies services delivery
- Enables rapid innovation of new business models
- Dynamic Infrastructure for next generation data centers

1990

Utility Computing

Grid Computing

2009

Cloud Computing

Software as a Service

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Dynamic Infrastructure – Benefits Reported from study of 45 implementations of virtualization

89% improved service

45% reduced risk

2/3 reduced costs

1/2 Virtualization efforts were driven by business resiliency requirements

1/45 Project was only driven by a desire to virtualize

Virtualization Provides Significant Simplification

- Rigid configurations
- Fixed resources per server
- Low server utilization
- Wasted energy and floor space
- HW changes impact SW assets
- Servers managed individually

**Virtual Environment**
- Virtual resources are easier to deploy, grow, move, ...
- Virtual resources, configurations, and workloads are decoupled and insulated from physical environment

**Virtualization Layer**
Decouples Virtual and Physical Environments

**Physical Environment**
- Physical resource changes can be made without impact to running IT workloads
- Improved HW utilization and energy efficiency

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Virtualization Functions and Benefits

Sharing
- Examples: LPARs, VMs, virtual disks, VLANs
- Benefits: Resource utilization, workload manageability, flexibility, isolation

Aggregation
- Examples: Virtual disks, IP routing to clones
- Benefits: Management simplification, investment protection, scalability

Emulation
- Examples: Arch. emulators, iSCSI, virtual tape
- Benefits: Compatibility, software investment protection, interoperability, flexibility

Insulation
- Examples: Spare CPU subst., CUoD, SAN-VC
- Benefits: Continuous availability, flexibility, software investment protection

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Virtualization Strategy for Layered Hypervisors

Resilience: the ability to be ready – to take advantage of good changes and bounce back from bad changes

- **Business resilience**
- **Application resilience**
- **Infrastructure resilience**

Diagram:
- IT Processes and Services
- Application and Middleware SW
- Servers, Storage, and Network HW/SW/FW
Technologies that Matter for Virtualization

- Hot-swap SATA Drives
- Hot-swap fans in 1U servers
- On board diagnostics
- Hot-spare / mirrored memory
- Blade chassis redundancy

HIGH AVAILABILITY Features

- Performance
- Redundancy
- Virtualiation
- Failure Isolation
- Scalability
- Serviceability
- Manageability
- Flexibility
Reduce cost with increased performance

2005
9 x346 Servers
Single-Core processor

2009
1 x3650 M2 Server
Quad-Core processor

50% lower annual energy costs\(^1\)
8.8\(\times\) more performance per server\(^2\)
89% floor space reduction

\(^{1}\) IBM Engineering Research Study, Feb'09
\(^{2}\) Based on Intel performance data, 2009
What is Cloud Computing?

A user experience and a business model
- Cloud computing is an emerging style of IT delivery in which applications, data, and IT resources are **rapidly provisioned** and provided as **standardized offerings** to users over the web in a **flexible pricing model**.

An infrastructure management and services delivery 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 with **elastic scaling**.

![Diagram of Cloud Computing System](image)
Typical Scenario for Cloud use in the Enterprise

**Development environment**
- Acquisition at a project level
- Availability of components
- Set-up of environment

**Deployment and Testing**
- Multiple dedicated test environments
- Multiple versions of software
- Reacquisition at end of projects
New consumption and delivery models drive new sourcing options and business flexibility

**Flexible Delivery Models**

**Public**
- Service provider owned and managed.
- Access by subscription.
- Delivers select set of standardized business process, application and/or infrastructure services on a flexible price per use basis.

**Private**
- Privately owned and managed.
- Access limited to client and its partner network.
- Drives efficiency, standardization and best practices while retaining greater customization and control.

**Hybrid**
- Access to client, partner network, and third party resources.

...Standardization, capital preservation, flexibility and time to deploy

...Customization, efficiency, availability, resiliency, security and privacy

...service sourcing and service value
Service Oriented Architecture

- Development and deployment checkpoints non-existent
- Massive service redundancy
- Multiple sectors each developing services as needed
  - Redundant service development

- Typical Causes leading to isolated development and lack of governance
  - Requirements are not well documented with frequent requirement changes
  - Requirements captured in context of existing application
    - No business or enterprise Focus
  - Lack of re-usable Business Processes
    - Existing processes from one tool cannot be used by other tool
  - Different software development lifecycles used without a selection process (e.g. Agile and Waterfall)
  - Collaboration between in house and external development is limited
  - Process compliance reporting challenges with manual maintenance of spreadsheets – 10-20% overhead on project managers and project leads
A Service Oriented Architecture complements Cloud ...

Both require similar capabilities:
- Architectural and organizational models
- Optimization, Innovation and Value Delivery
- Flexibility and Agility
- Secure, reuse and sharing of ‘services’
- Separation of Concerns (Requestors, Providers, Creators, Brokers, etc.)
- Improved Administration

Virtualization at all layers of the architecture

SOA provides flexibility, reuse, separation of concerns, etc.

Exploit a dynamic and elastic environment to enable innovation and to get optimum use from resources
SOA Characteristics

- Applications reused in new dynamic ways
- Services combined from multiple sources
- Rapid deployment
- Services route to any available resource
- Distributed access

... and provides layers of abstraction that enable Cloud delivery.
SOA Governance – Client Challenges

- Development and deployment checkpoints non-existent
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SOA Governance Approach to Client Challenges

- Promote consistent service life cycle management methodology across all sectors
- Need Processes to manage various stages of service life cycle such as:
  - Portfolio Rationalization
  - Creation a New Service
  - Implementation of Service
  - Certification
  - Deployment
  - Publishing of Service
  - Subscription to a Service
  - Creation of New Service Version
  - Retirement of Service
When deploying services on cloud architectural model that includes standards based interfaces is key ...

Cloud Services

- Application, Process and Information Services
- Software Platform Services
- Infrastructure Services

Cloud Platform

- Business Support Systems
- Operational Support Systems

Service Request & Operations

- Role-based Access
- End Users, Operators

Service Provider

- Tools

Service Creation & Deployment

- Tools

Service Planning

- Tools

Service Fulfillment & Configuration

- Tools

Service Reporting & Analytics

STANDARD INTERFACE

Operational Support Systems

Service Catalog

Operational Console
... as well as identifying workloads with affinity for Cloud.

- Risk and migration cost may be too high today
  - Database
  - Transaction processing
  - ERP workloads
  - Highly regulated workloads

- Can be standardized for cloud
  - Web infrastructure applications
  - Collaboration infrastructure
  - Development and test
  - High Performance Computing

- Made possible by cloud
  - High volume, low cost analytics
  - Collaborative Business Networks
  - Industry scale “smart” applications
SOA Governance + Cloud Approach to Client Challenges

- Focus on the right workloads for Cloud
- For those projects, also use Cloud for shared implementation environments that can be deployed, and removed, as needed on the Cloud for some key steps in the SOA Governance processes
  - Creation a New Service
  - Implementation of Service
  - Certification
  - Deployment
  - Publishing of Service
  - Creation of New Service Version
- Hands-on live environment is better than review on paper
- Should also provide a collaborative environment on the same network so all stakeholders can communicate
Financial Services Company using Cloud

Goal:
- Automate clustered deployment of SOA / BPM processing rollouts to:
  1. Accelerate time to market
  2. Reduce cost

Pain Points:
- 2 weeks to setup a single test configuration of an SOA process (there are 200 processes to automate)
- 6 – 8 weeks to deploy images across 5 environments
- Multiple teams involved in each build: Systems Management, Runtime, Application, Database and Operating System teams.

Key Benefits with Cloud
- Accelerates business transformation
- $10x$ reduction in deployment time → 3 hour deployments
- Optimized resource utilization & improved turnaround time for project development and deployment

"Previously, we had to spend a lot of time supporting projects and while we're doing that, projects are suffering... (Now), we can provision the environment overnight."

Cloud-in-a-Box

System p 595
IBM CloudBurst
System p 570

IBM CloudBurst System p 570

WEBSPHERE PROCESS SERVER 6.0 (CLUSTER)
WEBSPHERE APPLICATION SERVER 6.0 (CLUSTER)
WEBSPHERE MQ 6.0.2.2 (HACMP)
IBM HTTP SERVER 6.0 (LOAD BALANCED)
ITCAM for SOA 6.1
WEBSPHERE EDGE SERVER 6.0
DB2 7.2 (HACMP)
WEBSPHERE MESSAGE BROKER 6.1 (HACMP)
Where’s the challenge and why aren’t we all doing SOA on Cloud today?

1. Loss of control
   - Spend more time on designing containers, sandboxes

2. Data center automation is a new skill base
   - Spend more time on designing containers, sandboxes

3. Multi-tenant security concerns
   - Security is often improved if virtual secure networks are used, which isolate systems completely on to their own network

4. Complexity of new technology
   - Resource pools can lead to radical simplification

5. Reliability of shared systems
   - See hardware vendor studies
What are some better reasons to adopt incrementally

1. End to end service level agreements are hard to write
   - These will need to be understood and enforced by the underlying infrastructure

2. Support processes need to be updated
   - Systems supporting multiple business processes have multiple customer contracts – this is true of both Cloud and SOA
   - Completely public cloud, or SaaS, providers in handling problem resolution across organizations

3. Network traffic needs careful planning
   - The standardized network is a key enabler, but the network design was likely not built for the additional load
Summary

- SOA and Cloud adoption require similar organizational capabilities:
  - Improved Administration through architectural and organizational models
  - Focus on optimization, innovation and value delivery
  - Secure, reuse and sharing of ‘services’
  - Separation of Concerns (Requestors, Providers, Creators, Brokers, etc.)

- SOA and Cloud are targeting similar value propositions
  - Applications and resources can be reused in new dynamic ways
  - Services combined from multiple sources
  - Rapid deployment
  - Services route to any available resource
  - Distributed access

- Focus on workloads that can be standardized for cloud
  - Web infrastructure applications
  - Collaboration infrastructure
  - Development and test
  - High Performance Computing

- Use a cloud environment to test your service and process changes live
  and collaborate instead of trading paper
Thank you!

For more information, please visit:
ibm.com/cloud

Or contact:
hately@za.ibm.com
Cloud Computing Total Cost of Ownership study

TCO methodology approach
- Determine TCO over 5yr period
- Running 100 Linux images
- Deployed on 4 different platforms
- 24 x 7 Operation

Workload
- Core Banking Application (Java Based)
- Built on IBM WebSphere Application Server
- Connected to IBM DB2 Enterprise Database
- Running on Linux
- Monitored by IBM Tivoli Composite Application Manager

TCO Components included
- Hardware
- Software
- Maintenance
- Facilities (power / cooling)
- Administration
Cost per Image for Linux Workloads

- Buy Standalone Servers: $387K
- Public Cloud (Amazon): $289K
- Private Cloud X86 Hypervisor: $87.7K
- Private Cloud zLinux Add IFL's To z10 EC: $68.8K
- Private Cloud zLinux Buy New z10 BC: $90.9K

Private Cloud delivered at substantial savings over public cloud.
IBM Technical Adoption Program (TAP)—ROI Analysis

**Hardware Costs**
- Annualized: 89%

**Labor Costs**
- Operations and Maintenance: 81%

**Power Costs**
- Reduced by 89%

**Software Costs**

**Deployment (1-time)**

Liberated funding for new development, transformation investment or direct saving

Strategic Change Capacity

**New Development**

**Reduced Capital Expenditure**

**Reduced Operations Expenditure**

**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%
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<tr>
<th>Virtual Resources</th>
<th>Benefits</th>
<th>Issues</th>
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<tbody>
<tr>
<td>Virtual runtimes (application containers)</td>
<td>Virtual runtimes can be OS independent</td>
<td>Container management</td>
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<tr>
<td></td>
<td>Virtual file systems can span multiple host systems</td>
<td>All apps must like same middleware release</td>
</tr>
<tr>
<td>Virtual operating systems (application containers)</td>
<td>Fewer OS kernels</td>
<td>Container management</td>
</tr>
<tr>
<td></td>
<td>Extremely fine granularity</td>
<td>All apps must like same OS release</td>
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<td></td>
<td>Improved efficiency via single shared OS</td>
<td>OS service affects all apps</td>
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<td>Virtual servers (virtual machines / LPARs)</td>
<td>Increased hardware utilization =&gt; less HW cost,</td>
<td>Avail. &amp; security depends upon hypervisor</td>
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<td></td>
<td>power used, and floor space</td>
<td>design and integration</td>
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<td></td>
<td>Agility / flexibility</td>
<td>Doesn’t reduce # of OS images to be managed</td>
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<td>Fine granularity</td>
<td>Introduces licensing and usage accounting</td>
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<td>High efficiency</td>
<td>issues</td>
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</tbody>
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**Benefits and Issues at the different layers**

- **Applications**
  - Most general purpose
  - Most HW sensitive

- **Middleware**
  - Most special purpose
  - Most lightweight

- **Operating Systems**
  - Most lightweight
  - Most HW independent

- **Hardware**
  - Most HW sensitive
  - Most HW insensitive
IBM Cloud Solution Overview

• 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.