Cloud Computing
An IBM Perspective

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Evolution of Cloud Computing

Grid Computing
- Solving large problems with parallel computing

Utility Computing
- Offering computing resources as a metered service

Software as a Service
- Network-based subscriptions to applications

Cloud Computing
- Anytime, anywhere access to information delivered dynamically as a service
Defining Cloud – National Institute Standards and Technology

- **Private cloud**  The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.

- **Community cloud**  The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (for example: mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.

- **Public cloud**  The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

- **Hybrid cloud**  The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (for example: cloud bursting for load-balancing between clouds).

**Common Attributes of Clouds**
- Elastic scaling
- Rapid provisioning
- Advanced virtualization
- Flexible pricing

**On-demand self-service**
- Ubiquitous network access
- Location independent resource pooling
- Rapid elasticity Scale up and **DOWN**
- Pay-per-use
IBM Cloud Delivery Models

**IBM Smart Business Services – Private Cloud Services, behind your firewall**

1. **Enterprise owned and operated**
   - Enterprise Data Center
   - Private Cloud

2. **Enterprise owned and IBM operated**
   - Enterprise Data Center
   - Managed Private Cloud
   - IBM Operated

3. **Private Hosted**
   - Enterprise
   - Hosted Private Cloud
   - IBM Hosting Center

4. **Shared Private Cloud**
   - IBM owned and operated
     - (single tenant)

5. **Public Cloud**
   - IBM owned and operated
     - (multi-tenant)

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**IBM Smart Business Services - Standardized Services on the IBM Cloud**

1. **Enterprise owned and operated**
   - Customer owns and pays for infrastructure and has unlimited exclusive access

2. **Enterprise owned and IBM operated**
   - IBM owns infrastructure and customer has shared access and pays by usage

3. **Private Hosted**
   - IBM Smart Business Services – Standardized Services on the IBM Cloud
   - Cloud Services delivered privately to Enterprises / virtual separation of tenants

4. **Shared Private Cloud**
   - IBM Smart Business Services – Standardized Services on the IBM Cloud
   - Cloud Services delivered publicly to end users / secure, enterprise-class

5. **Public Cloud**
   - IBM Smart Business Services – Standardized Services on the IBM Cloud
   - Cloud Services delivered publicly to end users / secure, enterprise-class
An Effective Cloud Deployment is Built on a Dynamic Infrastructure

...leveraging **virtualization, standardization and automation** to free up operational budget for new investment.
So what’s different about Cloud?

<table>
<thead>
<tr>
<th>Capability</th>
<th>From</th>
<th>To</th>
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<tbody>
<tr>
<td>Server/Storage Utilization</td>
<td>10-20%</td>
<td>70-90%</td>
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<tr>
<td>Self service</td>
<td>None</td>
<td>Unlimited</td>
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<td>Test Provisioning</td>
<td>Weeks</td>
<td>Minutes</td>
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<tr>
<td>Change Management</td>
<td>Months</td>
<td>Days/Hours</td>
</tr>
<tr>
<td>Release Management</td>
<td>Weeks</td>
<td>Minutes</td>
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<tr>
<td>Metering/Billing</td>
<td>Fixed cost model</td>
<td>Granular</td>
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<tr>
<td>Payback period for new services</td>
<td>Years</td>
<td>Months</td>
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Cloud is a synergistic fusion which accelerates business value across a wide variety of domains.
The layers of IT-as-a-Service

**Software as a Service**
- Collaboration
- Industry Applications
- CRM/ERP/HR

**Platform as a Service**
- Middleware
- Web 2.0 Application Runtime
- Java Runtime
- Database
- Development Tooling

**Infrastructure as a Service**
- Servers
- Networking
- Data Center Fabric
- Storage

Shared virtualized, dynamic provisioning
IBM Cloud Services Portfolio

Enabling New Delivery Models

<table>
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<tr>
<th>Smart Business on the IBM Cloud</th>
<th>Smart Business Services</th>
<th>Smart Business Systems</th>
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<tr>
<td>Standardized services on the IBM cloud</td>
<td>Private cloud services, behind your firewall, built and/or managed by IBM</td>
<td>Preintegrated, workload-optimized systems</td>
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<thead>
<tr>
<th>Analytics</th>
<th>Collaboration</th>
<th>Dev &amp; Test</th>
<th>Desktop &amp; Devices</th>
<th>Infrastructure Compute</th>
<th>Infrastructure Storage</th>
<th>Business Services</th>
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<tr>
<td>IBM LotusLive, IBM Lotus® iNotes®</td>
<td>Smart Business Development and Test on the IBM Cloud (Beta)</td>
<td>IBM Smart Business Desktop Cloud</td>
<td>IBM Smart Business End User Support</td>
<td>IBM Computing on Demand</td>
<td>IBM Information Protection Services</td>
<td>BPM BlueWorks (design tools)</td>
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<tr>
<td>IBM Smart Analytics Cloud</td>
<td>IBM Smart Business Test Cloud</td>
<td>IBM Smart Business Desktop Cloud</td>
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<td>IBM Smart Business Storage Cloud</td>
<td>Smart Business Expense Reporting</td>
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<tr>
<td>IBM Smart Analytics System</td>
<td>IBM CloudBurst™ Family</td>
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<td>IBM Information Archive</td>
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Developing the Cloud strategy and implementation plan is the first step

1. IT Roadmap

2. Architecture

3. Workload Assessment

4. Enterprise & Cloud Mix

5. ROI

6. Implementation

- **Enterprise & Cloud Mix**
  - Enterprise
    - Trad IT
    - Private
    - Public
    - Hybrid

- **Architecture**
  - End Users, Operators
  - Rate Based Access
  - Cloud Services
    - Software
    - Platform
    - Infrastructure
    - Cloud Platform
    - BSS
    - OSS
  - Service Planning
    - Service Delivery Tools
    - Service Publishing Tools
    - Service Fulfillment & Config Tools
    - Service Reporting & Analytics

- **Workload Assessment**
  - E-Mail Collaboration
  - Software Development
  - Test and Pre-Production
  - Data Intensive Processing
  - Database
  - ERP

- **ROI**

- **Implementation**
  - Platform & Applications
    - Email
    - Bus Apps
    - BPM
    - Sys Mgmt
    - Info Mgmt
    - Web Svr
  - Computing Infrastructure
    - Systems
    - Storage
    - Network
The IT Transformation Roadmap

- Simplified
- Consolidate
- Virtualize
- Dynamic
- Automate

- Reduce infrastructure complexity
- Reduce staffing requirements
- Improve business resilience (manage fewer things better)
- Improve operational costs/reduce TCO

- Remove physical resource boundaries
- Increased hardware utilization
- Allocate less than physical boundary
- Reduce hardware costs
- Simplify deployments

- Standardized Services
- Dramatically reduce deployment cycles
- Granular service metering and billing
- Massively scalable
- Autonomic
- Flexible delivery enables new processes and services

- Simplified
- Shared
- Virtualize
An architectural model that includes standards based interfaces is key
IBM has the experience and capabilities to deliver cloud solutions

| Robert R Taylor Network at Massachusetts Institute of Technology | IBM LotusLive | - A suite of collaboration capabilities that can help bring people and information together quickly and easily across boundaries.  
- SaaS negates need for new hardware and IT support staff.  
- Standards-based access via the Web eliminates connectivity barriers.  
- Ease and speed of setup enables fast mobilization.  
- Cost advantages accrue from savings on hardware, IT staffing, telephony and travel. |
|---|---|---|
| Pike County Schools | Smart Business Desktop Cloud | - Provides the latest education tools and software to students enrolled in the district, home-schooled students and staff working remotely.  
- Increases the effectiveness of instruction and encourages greater interaction between students and staff by delivering a more responsive environment.  
- Reduces the cost of modernizing the district’s desktop systems by roughly 64 percent through access to a virtual, desktop cloud environment. |
| Caritas Socialis | Life Sciences Cloud Computing | - Cloud computing environment based on a virtualized client, server and storage infrastructure for Life Sciences service organization Caritas Socialis  
- Utilizes service-oriented architecture (SOA) design to integrate end-to-end across the value chain  
- Systems were previously barely connected and are now aligned in an integrative approach that enables users to obtain the necessary data and access applications independent of workspace or location |
| WUXI - CHINA | Wuxi Cloud Computing Center | - Cloud environment built for the municipal government of Wuxi, China  
- Shared, cost efficient computing infrastructure and support services enable start-ups with limited financial capital to access enterprise-class resources  
- On-demand virtual computing resources allow 200,000 software developers to share an IT environment when they need it, for as long as they need it, from any device, anywhere that has network connectivity |
| IBM | Technology Adoption Program (TAP) | - Private IBM Cloud leveraging virtualization and automated provisioning  
- Community-driven IBM model for introducing and managing access to new technologies within the IBM enterprise by accelerating innovation and increasing speed to market  
- Saves IBM more than $2.5M per year and reduced number of administrators and servers by 87-88% |
| IBM | Research Compute Cloud | - Self-service, on demand IT delivery solution for requesting and provisioning cloud computing resources  
- Used by 3,000 IBM researchers across eight countries  
- Integrates many research technologies and products into a virtual data center and harnesses the value of Research’s “living lab” for high growth client driven value, with future plans for a highly distributed, globally accessible set of computing cloud resources  
- Supports both simple and complex business processes that can involve multiple levels of approvals |
Decide the right mix for your enterprise

Financial Models

Traditional IT

Managed Operations

Public Cloud Services

Private Cloud Services

Off Premises
  - Shared
  - Dedicated

On Premises
  - Utility

Fixed  Mixed  Variable
Thank you!