Cloud Computing Overview: A Federal Government and Agency Perspective


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- Chair, Federal Cloud Computing Advisory Council (CCAC)
- Chair, Federal CIO Council IPv6 Working Group
"The Federal technology environment requires a fundamental reexamination of investments in technology infrastructure."

"The Infrastructure Modernization Program will be taking on new challenges and responsibilities. Pilot projects will be implemented to offer an opportunity to utilize more fully and broadly departmental and agency architectures to identify enterprise-wide common services and solutions with a new emphasis on cloud computing."

"The Federal Government will transform its Information Technology Infrastructure by virtualizing data centers, consolidating data centers and operations, and ultimately adopting a cloud-computing business model."

FY2010 Federal Budget
Analytical Perspectives
Cross Cutting Programs
“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three delivery models, and four deployment models”.

NIST
Definition of Cloud Computing, Draft version 14
http://csrc.nist.gov/groups/SNS/cloud-computing/index.html
Five Characteristics:
- On Demand Service
- Ubiquitous Network Access
- Location Independent Resource Pooling
- Rapid Elasticity
- Measured Service

Delivery Models
- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Deployment Models
- Private Cloud
- Community Cloud
- Public Cloud
- Hybrid Cloud
To support the Federal Cloud Computing Direction and Deployment Approach, the ITI Line of Business PMO has been refocused as the Cloud Computing PMO

Building on ITI LoB Initiative:

- Continue the migration towards a services-based environment that is technology and vendor-agnostic
- Enable rapid deployment of technology solutions for the Federal government without developing stove-pipes
- Enable scalability for existing and new capabilities
- Increase savings through virtualization
- Potentially reduce cost of infrastructure, buildings, power, and staffing
- Improve the government's ability to create a transparent, open and participatory government
Building Upon the ITILoB Effort

<table>
<thead>
<tr>
<th>ITILoB</th>
<th>Cloud Computing</th>
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<td><strong>GOAL:</strong> To achieve an optimized, cost-effective, government-wide information technology infrastructure that supports agency mission, while providing reliability and security in service delivery.</td>
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<tr>
<td>- Established a vision for Government-wide ITI Optimization</td>
<td>- Will use the information gathered through the ITILoB effort to deploy “Common Solutions” using a Cloud Computing technology platform</td>
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<td>- Created a collaborative governance framework involving 23 Federal Agencies</td>
<td>- This initiative will:</td>
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<td>- Captured and analyzed critical information in terms of:</td>
<td>- Follow a service oriented approach</td>
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<td>- Optimization strategies</td>
<td>- Be based on agency business needs</td>
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<td>- Common Solutions</td>
<td>- Maintain a collaborative governance framework</td>
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<td>- Performance Metrics</td>
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<td>- IT Infrastructure Tools used across Government</td>
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<td>- Benchmarked Federal ITI Data</td>
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## Cloud Computing Delivery Model Overview

<table>
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<tr>
<th>Model</th>
<th>Capability Provided</th>
<th>Example Services</th>
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</table>
| **SaaS** | To use the provider’s applications running on a cloud infrastructure and accessible from various client devices through a thin client interface such as a Web browser | - Citizen Engagement (Wikis, Blogs, Data.gov)  
- Government Productivity (Cloud based tools)  
- Business Enablement (Salesforce.com)  
- Enterprise Applications (Core Mission & Business Svcs) |
| **PaaS** | To deploy onto the cloud infrastructure consumer-created applications using programming languages and tools supported by the provider (e.g., java, python, .Net) | - Database and Database Management Systems  
- Developer / Testing Tools  
- Virtual Environments |
| **IaaS** | To provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications | - Computing  
- Storage  
- Application hosting |
Deployment Model Overview

PRIVATE CLOUD
Operated solely for an organization.

COMMUNITY CLOUD
Shared by several organizations and supports a specific community that has shared concerns.

PUBLIC CLOUD
Made available to the general public or a large industry group and is owned by an organization selling cloud services.

HYBRID CLOUD
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.
## Phased Approach for Delivering Cloud Computing

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<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
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<tr>
<td><strong>Target Apps</strong></td>
<td>Light-weight collaboration &amp; productivity tools and basic infrastructure / platform</td>
<td>Rich productivity tools, enhanced platform capabilities</td>
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<tr>
<td><strong>Cloud Delivery Models</strong></td>
<td>Commercially Available Public Clouds</td>
<td>Public and Outsourced Private Clouds</td>
</tr>
<tr>
<td><strong>Procurement</strong></td>
<td>Advantage, BPA</td>
<td>Smart-Buy, BPA, Directed RFP</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>Low-Impact FISMA Security</td>
<td>Low and Medium Impact FISMA Security</td>
</tr>
<tr>
<td><strong>Software as a Service (SaaS)</strong></td>
<td>TARGET AVAIL: Aug 2009 SERVICES (5-10 vendors):</td>
<td>TARGET AVAIL: Nov 2009 SERVICES (30-50 vendors):</td>
</tr>
<tr>
<td><strong>Infrastructure as a Service (IaaS)</strong></td>
<td>TARGET AVAIL: Sep 2009 SERVICES (3-5 vendors)</td>
<td>TARGET AVAIL: Feb 2010 SERVICES (5-10 vendors):</td>
</tr>
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</table>
Anticipated Benefits

- Rapid provisioning and deployment of services
- On-demand scalability and elasticity for new services and capabilities
- Creation of a services-based environment that is interoperable and standards-based

Opportunity for Cost Savings
- Leverages economies of scale
- Promotes innovation and service sharing
- Allows for “Measured” Payment (Pay per Use)

- Enables agencies to reinvest in, and concentrate on, core mission objective
Deployment is Only Possible through Effective IT Planning

Driven By:
- Strategic Goals
- Mission Objectives
- Business Need

- Architect
- Invest
- Implement
Do not use Enterprise Architecture as a compliance or reporting exercise. Use it as a management tool to achieve true business transformation.

Build a bridge between EA and IT Operations, fostering continuous collaboration.

Use EA analysis to drive the Capital Planning process by making specific investment recommendations that will result in cost savings and performance improvements.
Governance Structure

CIO Council
- Strategic Objective Definition
- Overall Guidance
- Adjudication

Cloud Computing Executive Steering Committee (ESC)
- Strategic Direction
- Priority Setting
- Issue Resolution
- Approval

PMO (GSA)
- Day to Day Management of the Federal Cloud Computing Initiative
- Development of required deliverables;
- Provide Technical Guidance and Subject Matter Expertise

Cloud Computing Advisory Council (AC)
- Provide Collaborative Federal Agency Input & Feedback for Cloud Computing Initiatives/Deliverables;
- Support the PMO and Cloud Computing Sub-Committee with Federal Subject Matter Expertise
- Approve Cloud Computing deliverables for submission to the Cloud Computing ESC;
- Cross Functional Collaboration;
# Executive Committee Roles and Membership

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<tr>
<th>Mission</th>
<th>Membership</th>
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| ✅ To provide executive level strategic guidance and direction for the Federal Cloud Computing Initiative | **Chairs:**
| ✅ To provide review and approval of Cloud Computing PMO and Working Group deliverables, as appropriate | Casey Coleman, GSA CIO  
| ✅ To provide a regular interface with OMB and the Federal CIO | Carl Staton, DOE Deputy CIO  
| ✅ To provide Executive-level sponsorship of the Cloud Computing initiative’s plans and direction so that they are effectively carried out at the Agency-level. | **Members:**
| ✅ To set priorities for the Federal Cloud Computing initiative, in consultation with OMB and the Federal CIO. | OMB  
| | Federal Agency CIOs & Executives |
### Advisory Council Roles and Membership

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<tr>
<td>To provide Federal Agency subject matter expertise in support of the Federal Cloud Computing initiative and the ESC’s strategic direction;</td>
<td><strong>Chair:</strong> Peter Tseronis, Deputy Associate CIO, DOE</td>
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<td>To provide/represent Federal Agency Cloud Computing issues, requirements, and business needs;</td>
<td><strong>Vice Chair:</strong> TBD</td>
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<td>To effectively disseminate the approved Federal Cloud Computing vision, strategy, and plans throughout their respective agencies. Facilitate Agency outreach activities;</td>
<td><strong>Membership:</strong></td>
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<tr>
<td>To review the Federal Cloud Computing PMO’s deliverables, as appropriate and to provide specific feedback;</td>
<td>- Federal Agency IT Infrastructure Representatives</td>
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<td>To execute specific tasks as assigned by the ESC and/or OMB.</td>
<td>- Federal Enterprise Architects</td>
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<td>To enable cross-functional collaboration with other related Federal initiatives – such as TIC, IPv6, FDCC, etc.</td>
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<td>To share best practices and current activities</td>
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Cloud Computing at DOE

- Federal Cloud Computing Services
- DOE Private Cloud Services
- Federal Supercomputing Community Cloud Services

DOE Cloud Computing
Supercomputing in the Cloud Objectives

- Establish a coordinated and collaborative approach to developing a common/shared supercomputing capability within the Federal Government
- Extend the Government’s supercomputing resources (through pooled investment and common capabilities), thus allowing US agencies to make supercomputers available to researchers.

Smart Grid and the Cloud Objectives

- Allow for the more efficient deployment of technologies used to save energy, reduce cost and increase reliability – including:
  - Integrated Communications
  - Sensing and measurement technologies,
  - Advanced control methods
IPv6 Defined

- **Internet Protocol version 6 (IPv6)**
  - The "next generation" protocol designed to replace the current version Internet Protocol, IP Version 4 ("IPv4").
  - Addresses the growing shortage of IPv4 addresses and improves areas such as routing and network auto-configuration.

- **The Federal Vision**
  - The deployment of secure, end-to-end, IPv6-enabled network services which support federal agency core missions and applications.

- **The Business Need**
  - Increased operational efficiencies, security, support for mobile devices, and agency collaboration;
  - Allows for future growth and enhancement to meet federal business needs. IPv4 address exhaustion (expected 2011-2012) will eventually break the ability to communicate effectively across the Internet core.
Cloud Computing & IPv6

IPv6:
- Is a necessary upgrade for applications that communicate across the Internet.
- Is critical to supporting the vast networks provided by cloud computing (which relies on the continued growth and operation of the Internet).
- Provides for continued growth and operations of the Internet.
IPv6 Impacts IaaS
Example: Effective IPv6 Investment Planning

1. Architect
   - Define Future Vision
   - Align IT to Strategic Goals/Business Objectives
   - Define IT Security Architecture
   - Transition Planning

Results/Features:
- Mobility
- Efficient Routing
- Reduced Management
- Increased Address Space
- Security
- Increased Quality of Service (QoS)

2. Invest
   - Develop IPv6 Business Case

3. Implement
   - Implement IPv6 Network Services to Support Core Mission Areas

Driver:
Agency Mission/Strategic Goals
Innovative and Collaborative Business Transformation