White Paper

Meeting Your Federal Cloud Initiatives Using Akamai's Cloud Services

Akamai

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Executive Summary

This paper describes how Akamai's cloud services can help customers drive down costs, improve sustainability and provide an enhanced level of service, performance, availability and security for your web programs. It demonstrates how Akamai is a key component to your Federal cloud initiatives.

Moving to the cloud can provide numerous benefits; including cost savings, efficiency improvements and sustainability. Rather than building your own infrastructure, you can leverage a shared pool of resources to maximize efficiency and lower your overall operating costs, all while paying for only what you use. Shifting Information Technology (IT) investments to more efficient computing platforms promotes the use of Green IT by reducing the overall energy and real estate footprint of the IT industry; an industry with a current carbon footprint equal to that of the Airline industry.

Federal CIO Vivek Kundra rolled out the Federal Data Center Consolidation Initiative (FDDCI) and the Federal Cloud Computing Strategy with a "Cloud First" policy as a part of the Office of Management and Budget's (OMB's) plan to reform federal IT management. Going forward, *Federal agencies are required to evaluate safe, secure cloud computing options before making any new investments and are directed to identify three "must move" services and fully migrate one to a cloud solution within 12 months,* plus another two within 18 months.

As the world's largest globally distributed content and application delivery platform, *Akamai's cloud services are uniquely positioned as a key component supporting the Federal cloud initiative*. Not only does Akamai provide services in the three main cloud service groups (IaaS, PaaS, SaaS), but Akamai's robust cloud optimization services are designed to enable a secure, high-performing, reliable, and scalable public cloud that improves application owner control and visibility. In addition, Akamai's ongoing sustainability initiative is focused on helping our customers minimize carbon output while maximizing capability.

Akamai has been providing cloud services for over 10 years and is trusted by top government, civilian and Department of Defense (DoD) agencies. Akamai's team of professionals is ready to help you identify Akamai cloud solutions that are designed to not only enable the success of your current mission, but allow you to do more than ever before without an investment in new IT resources. In addition, Akamai's best in class professional services experts can help your organization smoothly transition to leveraging cloud capabilities designed to meet, and exceed, your current business needs, while remaining flexible enough to easily adapt to future mission objectives.

By leveraging trusted Akamai cloud solutions to deliver your Federal web application(s), *Akamai can help you meet your Federal cloud initiatives while delivering your agency's content with the security, performance, scalability, and availability that your constituents and the war fighters demand.*

Akamai Background

The Akamai "Cloud" is the world's largest globally distributed content and application delivery platform. It is a platform of more than 85,000 servers in 70 countries around the globe. Akamai's servers are co-located with the largest ISP's, enabling Akamai to sit at the edge of the cloud close to end-users. At its core, the Akamai platform relies on applied mathematics and algorithms to help avoid congestion and availability problems on the Internet.

If you use the Internet for anything - to download music or software, check the headlines, or book a flight - you're using Akamai services without even knowing it. Akamai plays a critical role in getting content from providers to consumers. The Akamai cloud is a digital operating environment for the Web. Its global platform helps the Internet withstand the crush of daily requests for rich, dynamic, and interactive content, transactions, and applications. When delivering on these requests, Akamai detects and avoids Internet problem spots and vulnerabilities, to help Websites perform optimally, media and software download flawlessly, and applications perform reliably.

Hundreds of enterprises worldwide use Akamai's global platform to sell, inform, entertain, advertise, deliver software, and conduct mission critical business online. Through the EdgeControl portal, customers gain insight into worldwide Internet conditions and access to tools to manage their online business. With Akamai's managed services, there's no infrastructure to build or deploy. Akamai can integrate new customers onto the platform in just a few days.

The Federal Cloud Initiative

As a part of the Office of Management and Budget's (OMB's) plan to reform federal Information Technology (IT) and promote sustainability, Federal CIO Vivek Kundra has developed several Federal cloud initiatives; including the Federal Data Center Consolidation Initiative (FDCCI), the Federal Cloud Computing Strategy and an actionable 25-Point Implementation plan.

Federal Data Center Consolidation Initiative (FDCCI)

The FDCCI is aligned with the White House's efforts to promote sustainability across the Federal government and addresses the growth of data centers in order to:

- Promote the use of Green IT by reducing the overall energy and real estate footprint of government data centers;
- Reduce the cost of data center hardware, software and operations;
- Increase the overall IT security posture of the government; and,
- Shift IT investments to more efficient computing platforms and technologies.

In order to support a target of 800 data center closures by 2015, each agency will provide a data center consolidation plan based on several factors; including, alternatives to in-house implementation, such as, leveraging valid commercial options to reduce costs of IT services (IaaS, PaaS, and/or SaaS).

Reference: http://www.cio.gov/pages.cfm/page/FDCCI

Federal Cloud Computing Strategy

The Federal cloud computing strategy is intended to enable the Federal government to quickly develop highly reliable and innovative services by moving to cloud computing. Agencies will be able to launch new programs without having to acquire significant hardware, which will:

- Reduce time to deployment;
- Maximize capacity utilization;
- Improve IT flexibility and responsiveness; and,
- Minimize cost.

As a result, Federal agencies are now required to evaluate safe, secure cloud computing options before making any new investments.

EFFICIENCY	
Cloud Benefits	Current Environment
• Improved asset utilization (server utlization > 60–70%) • Aggregated demand and accelerated system consolidation (e.g., Federal Data Center Consolidation inititative) • Improved productivity in application developement, application management, network, and end-user	• Low asset utilization (service utilization <30% typical) • Fragmented demand and duplicative system • Difficult-to-manage system
AGILITY	
Cloud Benefits	Current Environment
• Purchase "as-a-service" from trusted cloud providers • Near-instantaneous increases and reductions in capacity • More responsive to urgent agency needs	• Years required to build data centers for new services • Months required to increase capacity of existing services
INNOVATION	
Cloud Benefits	Current Environment
• Shift focus from asset ownership to service management • Tap into private sector innovation • Encourges entrepreneurial culture • Better linked to emerging technologies (e.g.,device)	• Burdened by asset management • De-coupled from private sector innovation engines • Risk-adverse culture

Figure 2: 25 Point Plan - Part 1
Reference: http://www.cio.gov/documents/Federal-Cloud-Computing-Strategy.pdf

25 Point Implementation Plan

The 25-point implementation plan provides actionable steps to accelerate the pace at which the federal government moves to cloud computing; including the use of:

- Commercial cloud technologies; and,
- Private government clouds.

	Action Item	Owner(s)	Within 6 mos.	6-12 mos	12-18 mos
1	Complete detailed implementation plans to consolidate 800 data centers by 2015	OMB, Agencies	•		
2	Create a government-wide marketplace for data center availability	OMB, GSA			•
3	Shift to a "Cloud First"policy	OMB, Agencies	•		
4	Stand-up contract vehicles for secure IaaS solutions	GSA	•		
5	Stand-up contract vehicles for "commodity"services	GSA		•	
6	Develop a strategy for shared services	Federal CIO		•	

Figure 2: 25 Point Plan - Part 1

Reference: http://www.cio.gov/documents/25-Point-Implementation-Plan-to-Reform-Federal%20IT.pdf

Part 1 of this action plan focuses on achieving operational efficiency by adopting shared IT services. It calls for a shift to a "Cloud First" policy and directs agencies to identify three "must move" services, which are to be fully migrated to a cloud solution; one within 12 months and another two within 18 months.

Understanding The Cloud

To understand how Akamai can help meet your Federal cloud initiatives described above, we first lay a foundation for the various components of the cloud and then highlight some of the challenges.

As defined by the National Institute of Standards and Technology (NIST), "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."

For many people, cloud computing can be thought of as a general term for anything that involves delivering hosted services over the Internet. Although definitions of the cloud can vary, the primary goal and principal components of the cloud remain the same. The goal is to reduce costs by no longer owning your own hardware and in some cases, software; rather you will buy it as a managed service and utilize a pay-as-you-go model.

The three principal service groups include Infrastructure-as-a-Service, Platform-as-a-Service and Software-as-a-Service, supported by Server Virtualization and Cloud Optimization Services, all of which are described below.

Components of The Cloud

The first three components of the cloud are split into three service groups: Infrastructure-as-a-Service, Platform-as-a-Service and Software-as-a-Service. Each category is provided as a managed service and leverages a pay-as-you-go approach.

- **Infrastructure-as-a-Service (IaaS)** refers to outsourced equipment used to support operations, including storage, hardware, servers and networking components. The provider owns the equipment and is responsible for housing, running and maintaining it.
- **Platform-as-a-Service (PaaS)** refers to out sourced hardware and software used to support development and deployment of Web applications. The provider facilitates deployment of applications without the cost and complexity of buying and managing the underlying hardware and software.
- **Software-as-a-Service (SaaS)** refers to complete end-user applications that are deployed, managed, and delivered over the Web. SaaS provides low-cost, off-premise systems and on-demand, pay-per-use models, while further eliminating development costs and lag time.

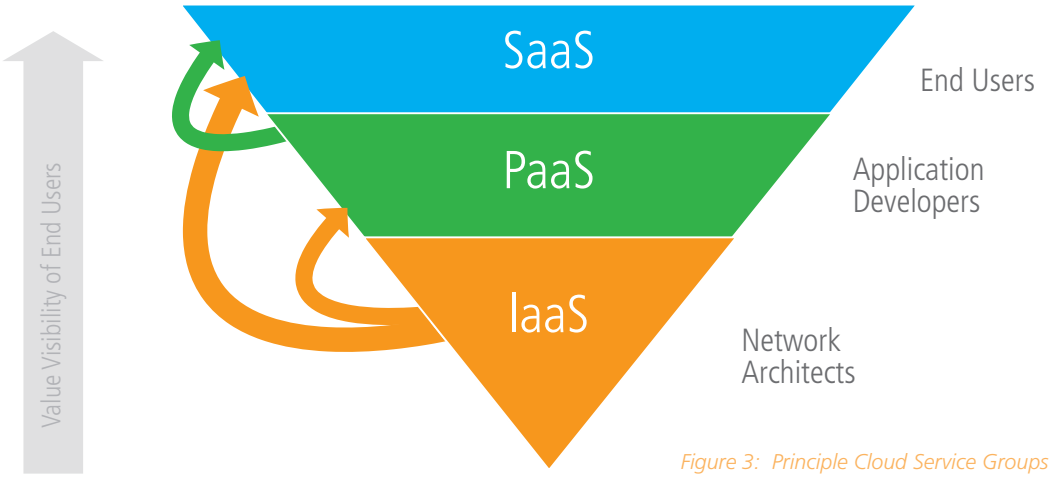

Figure 3: Principle Cloud Service Groups

To complete the cloud framework, two additional components are added to the distributed cloud stack: virtualization and cloud optimization services.

- **Server virtualization** is the underlying cloud technology that improves the efficiency and availability of resources and applications running on servers. Taking virtualization to the cloud means extending it to the aggregation of computing resources across multiple data centers and applications, allowing each to scale up or down on demand. This enables cloud providers to efficiently manage and offer on-demand storage, server and software resources for many different customers simultaneously.
- **Cloud Optimization** services provide security, performance, scale and reliability for all of the previously described components of cloud computing. These services allow cloud offerings to operate across an unpredictable and unreliable Internet while delivering the robust levels of service required by the enterprise

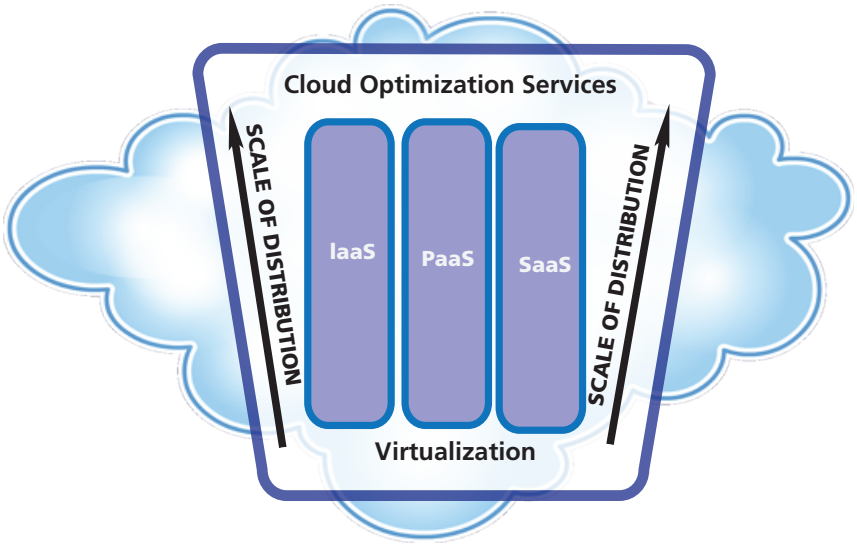

Figure 4: Cloud Computing Framework

As you can see in Figure 4, there are many components to cloud computing, and it is common for web applications to utilize more than one cloud service. Akamai provides cloud services in the three main service groups; however, depending on your business requirements, you may utilize only one or many. Akamai's Cloud Optimization (including Security and Business Continuity) services compliment all three cloud service groups, even if you are leveraging another vendor to meet a specific business requirement (e.g., SalesForce.com).

Challenges of The Cloud

Cloud computing often relies on the Internet, where inefficiencies can adversely impact the performance, reliability, and scalability of applications and services running on top of it. Network outages, peering point congestion, routing inefficiencies, and other middle mile bottlenecks will frequently cause application performance and reliability to fall short of expectations. Additionally, the increase in distributed denial-of-service (DDoS) attacks severely impacts the availability of web applications.

- **Security – How do you keep the bad guys out?**

  The Internet is vulnerable to threats and service attacks; more new malicious code vulnerabilities were introduced in 2008 than in the previous 20 years combined. That number was surpassed again in just the first half of 2009, with a new threat signature appearing every eight seconds. Such is the challenge IT organizations face today: while their businesses are relying more and more on the Internet for mission-critical communications and operations, serious security risks are proliferating and causing greater enterprise-wide impact.

- **Performance – How do you ensure fast performance?**

  Poor performance affects the end user experience in a very significant way. With the increased popularity and prevalence of web applications on the Internet, users expect sub-second response times from all web applications. For an agency on a tight budget and limited resources, meeting these expectations is not an easy challenge to address. Even if a web application has unlimited computing resources and bandwidth at its hosting facility, end users and application owners are still at the mercy of the Internet's "middle-mile" and the various network providers that make up the backbone of the Internet. With unpredictable network conditions, backbone fiber cuts, or other unknown factors, the user's performance can suffer due to no fault of the application owner.

- **Availability & Scalability – How do you ensure availability during events?**

  Federal government traffic can be very event and/or crisis driven. During normal conditions, a web application may see a normal baseline of traffic from every day users that consume data. However, situations such as natural disasters and political events often drive large, unpredictable, traffic spikes. At these times, it's critical that users are able to access the relevant data.

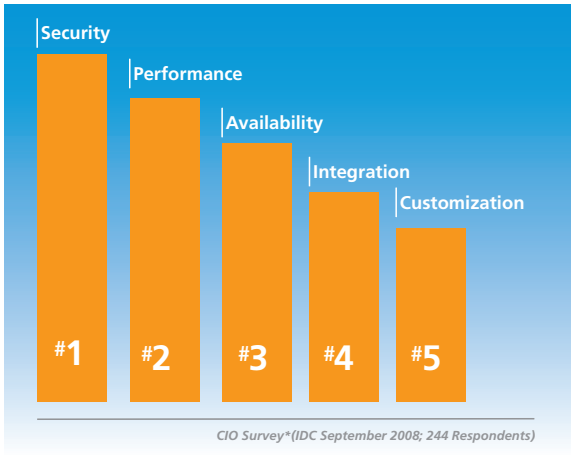

Figure 5: Top CIO Concerns with Cloud Computing

As enterprises shift their computing from on-premises systems to the cloud, ensuring the reliability of their platform suddenly becomes far more complex. Internet failures can happen on several different levels — from a single router malfunction to a data center blackout to an entire network going offline. Unfortunately, large scale outages happen more often than one might expect. With causes that vary from trans-oceanic cable cuts and power outages to DDoS attacks and natural disasters, wide-scale network problems can severely disrupt communications across large regions of the globe.

The Cloud With Akamai

Akamai's cloud services address the top three CIO concerns with cloud computing by providing security, performance, scale and reliability for all of the components of the cloud. They enable cloud offerings (e.g., PaaS, IaaS, SaaS) to operate across an unpredictable and unreliable Internet while delivering the robust levels of service required by end users.

Cloud Component	Akamai	Sample Use Cases
Cloud Optimization Services	Application Performance Solutions Dynamic Site Solutions Digital Asset Solutions	Public Affairs Sites, Agency and Department Sites Collaboration and Portal Services Digital Media (Streaming, Mobile)
Infrastructure-as-a-Service	Akamai Cloud Storage (NetStorage)	Large Files Delivery (GIS Applications, Software Patches, PDFs)
Platform-as-a-Service	Akamai Cloud Computing (EdgeComputing)	CRL Validation, Knowledge Based Identity Assurance, Site Search
Software-as-a-Service	Akamai Cloud Applications (EdgeComputing)	CRL Validation, Knowledge Based Identity Assurance, Site Search
Cloud Security Service	Security and Proctection Solutions	Cyber Security (DDoS Protection, PKI - Client Certificates)

Cloud Optimization Services

Akamai's *Cloud Optimization Services* can dramatically improve web application performance. Akamai's vast cloud platform consists of over 85,000 servers world-wide, all deployed at the edge of the Internet network cloud. Akamai can leverage this computing power to deliver an agency's content to end users more efficiently. When a user makes a request to an agency's application that is integrated with Akamai, the request goes through an Akamai edge server, much like a reverse proxy. Akamai dynamically maps the user's request to an optimal edge server on its platform. That Edge server is able to serve the user non-dynamic data it holds in cache. Furthermore, using routing optimization technologies, Akamai can retrieve dynamic data from the origin, routing around latency and the congestion that is prevalent on the Internet.

In addition, Akamai's EdgeControl portal provides customers with browser-based access to critical information about the extended Akamai infrastructure in order to view, manage and leverage e-business processes efficiently. You can monitor traffic, usage, errors and alerts for your content with summarized page views. You can also leverage tools that provide an in-depth view of the network usage, with the control to manage both content and origin infrastructure. As you leverage cloud services, the EdgeControl portal provides you with information related to business continuity by giving you a full view of your web application traffic in the cloud. For example, you can access information about how much traffic your web application is serving in the cloud, who's requesting it, where they are coming from and what they are looking for.

Cloud Storage

With *NetStorage*, Akamai's persistent cloud storage solution, an application owner can upload an entire website's content into the cloud and deliver it to users without ever having to serve that data from its own servers. The savings in bandwidth and computing resources, coupled with the increased availability and performance in retrieving data, is a powerful solution that can help users become more productive.

Cloud Computing

Akamai's *EdgeComputing* service is designed to enable the rapid deployment of lite-weight J2EE On-Demand Internet applications. Because EdgeComputing globally distributes application processing, it creates a flexible pay per-use computing model that drives IT infrastructure efficiencies to new levels. In addition to using EdgeComputing as a more cost-effective deployment model for traditional Internet applications (new or existing), enterprises can leverage existing EdgeComputing applications to enable new functionality on the edge; such as Disaster Recovery Lite (deployment of high-availability Internet applications), Waiting Room (high-reliability order processing), Application Gatekeeper (identify and deflect malicious attacks to protect applications and databases), Knowledge-Based Identity Assurance and X.509 Client Certificate (CAC / PIV card) Validation.

Cloud Security Services

Akamai's *Cloud Security Services*, including our DDoS Readiness service and Web Application Firewall (WAF), are designed to offer protection from top to bottom, edge to origin, and everywhere in between. Akamai can play an integral role in your "defense-in-depth" strategy, thanks to the scale, power and flexibility of Akamai's global network. Designed with security, resilience and availability in mind, Akamai's EdgePlatform can deliver flexible, intelligent cloud-based defense capabilities to help your organization guard its perimeter and bolster security—without sacrificing performance. Akamai can act as a secure perimeter around your infrastructure to eliminate public entry points to your origin. Akamai can also help keep malicious DDoS attacks, Internet worms, hacker threats and attacks on application vulnerabilities outside your datacenter. It can apply technologies such as IP layer protection and access control. In addition, Akamai's in-cloud WAF can identify attacks in HTTP and SSL traffic before they get to the application servers. All of these cloud security services are designed to protect the web application right from the edge of the cloud.

Private Cloud Optimization

Akamai's *Managed Content Delivery Network (MCDN)* brings Akamai's cloud optimization services to your local infrastructure. By utilizing a distributed computing platform comprised of globally deployed servers throughout your local network, provided by Akamai as a complete managed service, the delivery of your web content and web-based applications can be optimized for your local users. This service is currently leveraged by Defense Information Systems Agency (DISA) on the Defense Information Systems Network (DISN), NIPRNet and SIPRNet, known as the Global Information Grid (GIG) Content Delivery Service (GCDS). *https://www.disa.mil/gcds*

Sustainability Initiative

The *Akamai Sustainability Initiative* strives to measure and mitigate the environmental impact of our business operations. One of the key focus areas is to continue improving the platforms carbon output to capability ratio, including the reduction of power consumption of our servers by utilizing more efficient technologies such as solid state drives, virtualizing servers, consolidating services, and an improvement to asset management and maintenance procedures. Key to this approach is a commitment to continue to innovate and deliver additional platform capabilities and solutions with a consistent focus on driving improved operational efficiencies.

FedRAMP Participation

The Federal Risk and Authorization Management Program (FedRAMP) has been established to provide a standard approach to Assessing and Authorizing (A&A) cloud computing services and products. A cloud service provider would receive one Authorization to Operate (ATO) under the FedRAMP program which could be leveraged by multiple tenant agencies, decreasing the time-to-deploy. Akamai is actively participating in FedRAMP and has already requested sponsorship from existing public sector customers. Akamai's goal is to receive authorization once the FedRAMP standard has been finalized, expected later iin 2011.

Akamai Cloud Case Studies

Akamai has been providing cloud services for over 10 years and is trusted by top government, civilian and Department of Defense agencies.

Several public sector cloud case studies that discuss Akamai's cloud services are available as a reference to see how Akamai's services have been used and the web program's potential return on investment.

Way Ahead With Akamai

Akamai's team of professionals is available to help you identify which Akamai cloud services are a fit for your web program by reviewing both your web application(s) and your business needs. Akamai can provide you with recommendations on which Akamai cloud services to leverage and Akamai's top-notch professional services team can assist with the smooth implementation of these services to help in your migration to greater cloud usage.

By leveraging trusted Akamai cloud solutions to deliver your Federal web application(s), Akamai can help you meet your Federal cloud initiatives while delivering your agency's content securely with the optimal performance, scalability and availability that your constituents and the warfighters demand.

Conclusion

Federal government applications are expected to provide high quality, relevant data, with unprecedented speed and availability while reducing costs and promoting Green IT. Akamai's cloud services are designed to provide a cost-effective, high-quality and efficient means to address the performance and business requirements of Federal web applications. Not only can you meet your Federal cloud initiatives, but you will be in a position to provide the best end user experience possible.

The Akamai Difference

Simply put, Akamai® makes the Internet work for business. By eliminating the challenges of the public Internet, Akamai guarantees its customers security, performance and scalability to make their enterprise cloud strategies, eCommerce, software downloads and HD video successful. At the center of it all is the Akamai Intelligent Internet Platform™, which sits on top of the public Internet and is made up of nearly one hundred thousand, globally distributed Akamai servers spanning most of the networks that make up the Internet. To learn more, please visit www.akamai.com or follow @Akamai on Twitter.

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