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Cloud Computing

A Transition Methodology

Cloud Computing

Cloud computing refers to the practice of leveraging third-party computing resources, such as network grids and server farms, to extend IT capabilities and reduce costs of ownership. This practice offers numerous potential benefits to organizations that want to centralize software and data storage management while eliminating the costly overhead of in-house hardware and software maintenance and the personnel required to build, support, and maintain enterprise computing solutions.

Cloud computing has emerged as a new computing paradigm that gathers massive numbers of computers in centralized data centers to deliver web-based applications, application platforms, and services via a utility model. The primary difference between the service models of cloud computing and previous software (e.g., outsourcing or data center consolidation) is scale. The premise is that as the scale of the cloud infrastructure increases, the incremental time and cost of application delivery trends toward zero.

Cloud computing allows users to dynamically and remotely control processing, memory, data storage, network bandwidth, and specialized business services from pools of resources, providing the ability to specify and deploy computing capacity on demand. If there is a need to scale up to accommodate sudden demand, users can add the necessary resources using a web browser. The large data center can provide similar services to multiple external customers (multi-tenancy), leveraging its shared resources to increase economies of scale and reducing service costs.

Cloud computing technologies consistently include the following:

- **Grid Computing—**A form of distributed, parallel computing wherein processes are divided to leverage the available computing power of multiple CPUs acting in concert
- **Utility Computing—**A model of purchasing computing capacity—such as CPU, storage, and bandwidth—from an IT service provider and paying based on consumption
- **Virtualization Technologies—**Virtual servers and virtual private networks with the ability to quickly reconfigure available resources on demand and provide the necessary security assurance

Booz Allen Understands Cloud Computing

Booz Allen Hamilton, a leading strategy and technology consulting firm, recognizes the potential benefits of cloud computing and has made a significant investment in developing a deep understanding of the crowded cloud computing environment. We deliver quality products on time and within budget, while ensuring profitability for our clients with resources designed to meet their requirements. With project management concepts and strategies that use the most current methodologies, standards, and processes, we have helped hundreds of clients maintain an advantage in their industries.

Booz Allen recognizes that the transition to a cloud computing paradigm presents a number of challenges to federal agencies. Issues associated with information security, reliability, and service-level agreements challenge mission-critical systems. However, Booz Allen's experience creating a cloud computing solution for the FBI and building multiple pilots using different cloud providers has given us early, valuable experience overcoming typical cloud computing obstacles and positions us to advise on implementation options. Through this experience, we have identified what we consider the key characteristics of a cloud computing environment:

- Minimized capital expenditure—infrastructure is provider owned
- Device and location independence
- Multi-tenancy—enables resource and cost sharing among a large pool of users
- Monitored and consistent performance—can be affected by high network load
- Reliability via redundant sites—allows for business continuity and disaster recovery
- Scalability to ever-changing user demands—results in lower costs
- Improved security from centralized data and increased security-focused resources

Booz Allen's experience has emphasized the importance of "architecting for the cloud" versus simply deploying system components to the cloud to ensure organizations meet business requirements. Typical software and systems that are not designed to take advantage of the cloud's scalability and parallelism will likely not achieve the full benefit of the cloud computing environment. Our experience has also highlighted the need to transition the role of IT managers to brokers and negotiators of IT services rather than managers of the day-to-day operating platform.

Though many cloud providers proclaim that moving existing applications to the cloud is seamless and does not require code changes, our experience has shown that greater analysis and re-engineering are required to achieve the full benefits of a cloud computing environment. Complexities remain that organizations must consider when moving to the cloud, and

careful planning is essential. Booz Allen offers an independent perspective on the potential and challenges of migrating to the cloud, and we have refined our core service offerings to address these complexities.

Our Cloud Computing Service Offering and Transition Methodology

Booz Allen's cloud computing offerings focus on the following areas:

- **Cloud Strategy and Planning—**Includes portfolio management, transition plans and sequencing, return on investment and risk management, cloud policy consulting, cloud governance policies, cloud strategic planning, cloud data strategies, technology forecasting, and a range of related strategy services
- **Cloud Application Development—**Includes the development, deployment, and management of applications in the cloud; the re-engineering of legacy systems so they are cloud enabled; data management; and application and service integration
- **Cloud Infrastructure Services—**Includes infrastructure assessment and analysis, design consultation, and private cloud building
- **Cloud Security—**Includes certification and accreditation of cloud solutions, identity management, cloud segmentation, security audit, application and data obfuscation, and security integration

Booz Allen has also developed a phased Cloud Computing Transition Methodology designed to address the issues and risks associated with migrating an existing system to the cloud.

Deploying cloud computing solutions requires both a short-term and a long-term strategy. For example, in addition to the improved scalability and reliability provided by the cloud, which organizations may achieve through the initial transition, re-engineering some components to take advantage of the parallelism provided by the cloud could further improve system performance and overall scalability.

Booz Allen realized the potential of cloud technology early in its evolution and initiated internal pilot studies and prototype projects to further investigate its implications. Based on lessons learned from these efforts, we have identified several dimensions for consideration when determining a cloud computing strategy—each of which presents a number of challenges an organization should address before adopting a particular solution. Dimensions of cloud computing include policy and governance, economics, technology, security and privacy, and organization impact.

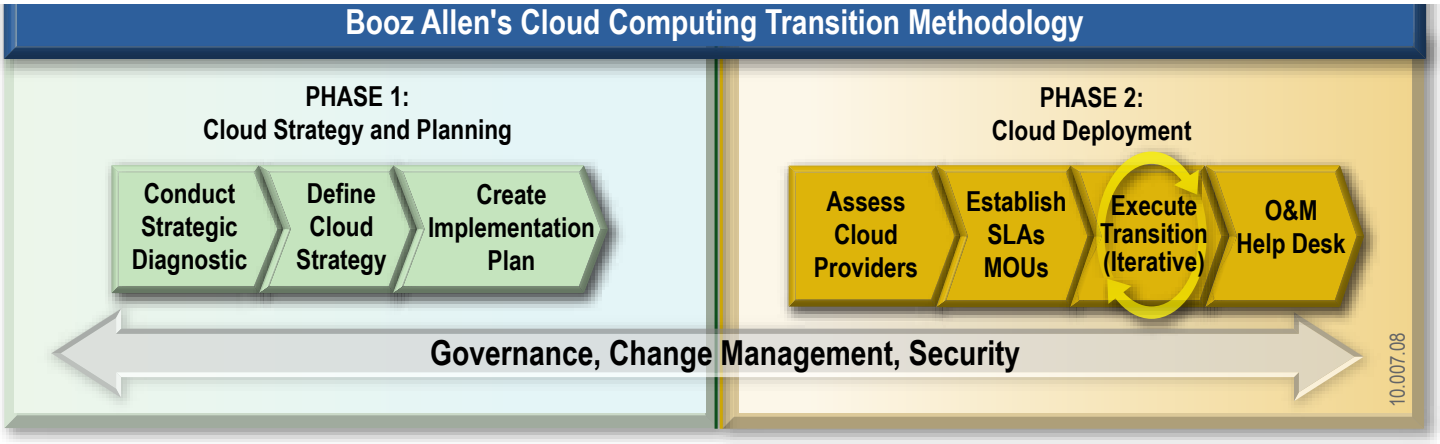
As an experienced cloud computing strategist, Booz Allen is prepared to consider the complexities of cloud computing technologies. Our service offerings directly reflect and respond to the potential barriers, challenges, and costs associated with cloud computing.

Representative Successes

Booz Allen's Amazon pilot for the intelligence community and our internal Google pilot have proven to be valuable experiences in utilizing cloud architectures and cloud-oriented computing environments.

Our Amazon cloud implementation for the intelligence community demonstrated the effectiveness of not only Amazon's EC2—using Amazon S3 and Amazon Simple Queue Service (SQS) elements—but also our methodology in the planning and implementation of a real-world solution.

Our internal Google cloud implementation demonstrated this capability and provided valuable lessons learned for the Google suite of cloud services, including the Google App Engine, Google Groups, and Google Sites. It also revealed the ability to use Google's application programming interfaces to create reusable browser "gadgets." We successfully mimicked Booz Allen's internal social networking site (hello.bah.com), providing blogs, wikis, communities, and other collaboration tools using only Google cloud computing components.



About Booz Allen

Booz Allen Hamilton has been at the forefront of strategy and technology consulting for 95 years. Providing a broad range of services in strategy, operations, organization and change, information technology, systems engineering, and program management, Booz Allen is committed to delivering results that endure. To learn more, visit www.boozallen.com.

To find out more about Booz Allen's commitment to cloud computing solutions for the federal government, please contact:

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