A Practical Guide to Cloud Migration

Migrating Services to AWS

December 2015

Notices

This document is provided for informational purposes only. It represents AWS's current product offerings and practices as of the date of issue of this document, which are subject to change without notice. Customers are responsible for making their own independent assessment of the information in this document and any use of AWS's products or services, each of which is provided "as is" without warranty of any kind, whether express or implied. This document does not create any warranties, representations, contractual commitments, conditions or assurances from AWS, its affiliates, suppliers or licensors. The responsibilities and liabilities of AWS to its customers are controlled by AWS agreements, and this document is not part of, nor does it modify, any agreement between AWS and its customers.

Contents

Abstract

To achieve full benefits of moving applications to the Amazon Web Services (AWS) platform, it is critical to design a cloud migration model that delivers optimal cost efficiency. This includes establishing a compelling business case, acquiring new skills within the IT organization, implementing new business processes, and defining the application migration methodology to transform your business model from a traditional on-premises computing platform to a cloud infrastructure.

Introduction

Cloud-based computing introduces a radical shift in how technology is obtained, used and managed, as well as how organizations budget and pay for technology services. With the AWS cloud platform, project teams can easily configure the virtual network using their AWS account to launch new computing environments in a matter of minutes. Organizations can optimize spending with the ability to quickly reconfigure the computing environment to adapt to changing business requirements. Capacity can be automatically scaled—up or down—to meet fluctuating usage patterns. Services can be temporarily taken offline, or shut down permanently as business demands dictate. In addition, with pay-per-use billing, AWS services become an operational expense rather than a capital expense.

AWS Cloud Adoption Framework

Each organization will experience a unique cloud adoption journey, but benefit from a structured framework that guides them through the process of transforming their people, processes, and technology. The AWS Cloud Adoption Framework (AWS CAF) offers structure to help organizations develop an efficient and effective plan for their cloud adoption journey. Guidance and best practices prescribed within the framework can help you build a comprehensive approach to cloud computing across your organization, throughout your IT lifecycle.

Manageable Areas of Focus

The AWS CAF breaks down the complicated planning process into manageable areas of focus. Perspectives represent top-level areas of focus spanning people, process, and technology. Components identify specific aspects within each Perspective that require attention, while Activities provide prescriptive guidance to help build actionable plans. The AWS Cloud Adoption Framework is flexible and adaptable, allowing organizations to use Perspectives, Components, and Activities as building blocks for their unique journey.

Perspective	Areas of Focus
Business Perspective	Focuses on identifying, measuring, and creating business value using technology services. The Components and Activities within the Business Perspective can help you develop a business case for cloud, align

Perspective	Areas of Focus
	business and technology strategy, and support stakeholder engagement.
Platform Perspective	Focuses on describing the structure and relationship of technology elements and services in complex IT environments. Components and Activities within the Perspective can help you develop conceptual and functional models of your IT environment.
Maturity Perspective	Focuses on defining the target state of an organization's capabilities, measuring maturity, and optimizing resources. Components within Maturity Perspective can help assess the organization's maturity level, develop a heat map to prioritize initiatives, and sequence initiatives to develop the roadmap for execution.
People Perspective	Focuses on organizational capacity, capability, and change management functions required to implement change throughout the organization. Components and Activities in the Perspective assist with defining capability and skill requirements, assessing current organizational state, acquiring necessary skills, and organizational re-alignment.
Process Perspective	Focuses on managing portfolios, programs, and projects to deliver expected business outcome on time and within budget, while keeping risks at acceptable levels.
Operations Perspective	Focuses on enabling the ongoing operation of IT environments. Components and Activities guide operating procedures, service management, change management, and recovery.
Security Perspective	Focuses on helping organizations achieve risk management and compliance goals with guidance enabling rigorous methods to describe structure of security and compliance processes, systems, and personnel. Components and Activities assist with assessment, control selection, and compliance validation with DevSecOps principles and automation.

Successful Migrations

The path to the cloud is a journey to business results. AWS has helped hundreds of customers achieve their business goals at every stage of their journey. While every organization's path will be unique, there are common patterns, approaches, and best practices that can be implemented to streamline the process.

1. Define your approach to cloud computing from business case to strategy to change management to technology.
2. Build a solid foundation for your enterprise workloads on AWS by assessing and validating your application portfolio, and integrating your unique IT environment with solutions based on AWS cloud services.

3. Design and optimize your business applications to be cloud-aware, taking direct advantage of the benefits of AWS services.
4. Meet your internal and external compliance requirements by developing and implementing automated security policies and controls based on proven, validated designs.

Early planning, communication, and buy-in are essential. Understanding the forcing function (time, cost, availability, etc.) is key and will be different for each organization. When defining the migration model, organizations must have a clear strategy, map out a realistic project timeline, and limit the number of variables and dependencies for transitioning on-premises applications to the cloud. Throughout the project, build momentum with key constituents with regular meetings and reporting to review progress and status of the migration project to keep people enthused, while also setting realistic expectations about the availability timeframe.

Breaking Down the Economics

Understand On-Premises Costs

Having a clear understanding of your current costs is an important first step of your journey. This provides the baseline for defining the migration model that delivers optimal cost efficiency.

Understanding Costs

To build a migration model for optimal efficiency, it is important to accurately understand the current costs of running on-premises applications, as well as the interim costs incurred during the transition.

On-premises data centers have costs associated with the servers, storage, networking, power, cooling, physical space, and IT labor required to support applications and services running in the production environment. Although many of these costs will be eliminated or reduced after applications and infrastructure are moved to the AWS platform, knowing your current run rate will help determine which applications are good candidates to move to AWS, which applications need to be rewritten to benefit from cloud efficiencies, and which applications should be retired. The following questions should be evaluated when calculating the cost of on-premises computing:

- **Labor.** How much do you spend on maintaining your environment (broken disks, patching hosts, servers going offline, etc.)?
- **Network.** How much bandwidth do you need? What is your bandwidth peak to average ratio? What are you assuming for network gear? What if you need to scale beyond a single rack?
- **Capacity.** What is the cost of over-provisioning for peak capacity? How do you plan for capacity? How much buffer capacity are you planning on carrying? If small, what is your plan if you need to add more? What if you need less capacity? What is your plan to be able to scale down costs? How many servers have you added in the past year? Anticipating next year?
- **Availability / Power.** Do you have a disaster recovery (DR) facility? What was your power utility bill for your data center(s) last year? Have you budgeted for both average and peak power requirements? Do you have separate costs for cooling/ HVAC? Are you accounting for 2N power? If not, what happens when you have a power issue to your rack?
- **Servers.** What is your average server utilization? How much do you overprovision for peak load? What is the cost of over-provisioning?
- **Space.** Will you run out of data center space? When is your lease up?

> "Georgetown's modernization strategy is not just about upgrading old systems; it is about changing the way we do business, building new partnerships with the community, and working to embrace innovation. Cloud has been an important component of this. Although we thought the primary driver would be cost savings, we have found that agility, innovation and the opportunity to change paths is where the true value of the cloud has impacted our environment.
>
> "Traditional IT models with heavy customization and sunk costs in capital infrastructures—where 90% of spend is just to keep the trains running—does not give you the opportunity to keep up and grow."
>
> **Beth Ann Bergsmark**
> **Interim Deputy CIO and AVP Chief Enterprise Architect**
> **Georgetown University**

Migration Cost Considerations

To achieve the maximum benefits of adopting the AWS cloud platform, new work practices that drive efficiency and agility will need to be implemented:

- IT staff will need to acquire new skills.
- New business processes will need to be defined.
- Existing business processes will need to be modified.

Migration Bubble

AWS uses the term "migration bubble" to describe the time and cost of moving applications and infrastructure from on-premises data centers to the AWS platform. Although the cloud can provide significant savings, costs may increase as you move into the migration bubble. It is important to plan the migration to coincide with hardware retirement, license and maintenance expiration, and other opportunities to reduce cost. The savings and cost avoidance associated with a full all-in migration to AWS will allow you to fund the migration bubble and even shorten the duration by applying more resources when appropriate.

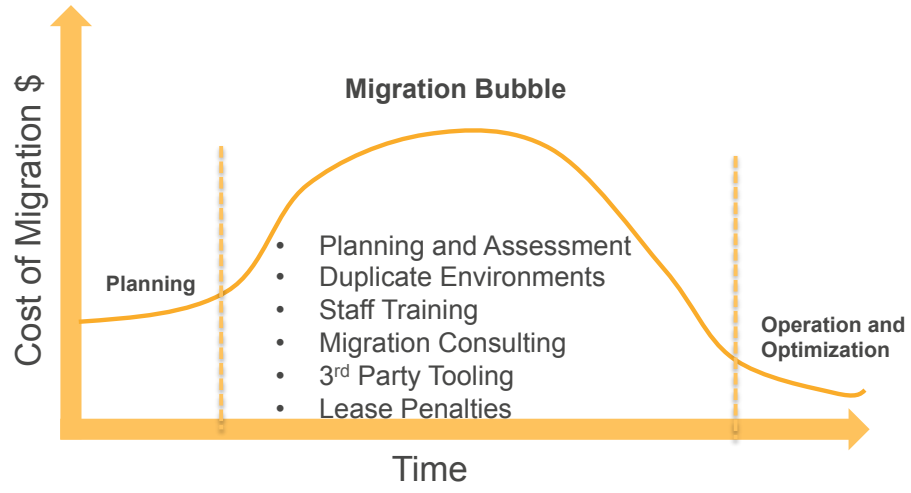

Figure 1: Migration Bubble

Level of Effort

The cost of migration has many levers that can be pulled in order to speed up or slow down the process, including labor, process, tooling, consulting, and technology. Each of these has a corresponding cost associated with it based on the level of effort required to move the application to the AWS platform.

To calculate a realistic total cost of ownership (TCO), you need to understand what these costs are and plan for them. Cost considerations include items, such as:

- **Labor.** During the transition, existing staff will need to continue to maintain the production environment, learn new skills, and decommission the old infrastructure once the migration is complete. Additional labor costs in the migration bubble include:
  - Staff time to plan and assess project scope and project plan to migrate applications and infrastructure.
  - Retaining consulting partners with the expertise to streamline migration of applications and infrastructure, as well as training staff with new skills.
  - Due to the general lack of cloud experience for most organizations, it is necessary to bring in outside consulting support to help guide the process.
- **Process.** Penalty fees associated with early termination of contracts may be incurred (facilities, software licenses, etc.) once applications or infrastructure are decommissioned.
  - The cost of tooling to automate the migration of data and virtual machines from on-premises to AWS.
- **Technology.** Duplicate environments will be required to keep production applications/infrastructure available while transitioning to the AWS platform. Cost considerations include:
  - Cost to maintain production environment during migration.
  - Cost of AWS platform components to run new cloud-based applications.
  - Licensing of automated migration tools license to accelerate the migration process.

City of McKinney

City of McKinney, Texas Turns to AWS to Deliver More Advanced Services for Less Money

The City of McKinney, Texas, about 15 miles north of Dallas and home to 155,000 people, was ranked the No. 1 Best Place to live in 2014 by Money Magazine. The city's IT department is going all-in on AWS and uses the platform to run a wide range of services and applications, such as its land-management and records-management systems. By using AWS, the city's IT department can focus on delivering new and better services for its fast-growing population and city employees instead of spending resources buying and maintaining IT infrastructure.

City of McKinney chose AWS for our ability to scale and grow with the needs of the city's IT department. AWS provides an easy fit for the way the city does business. Without having to own the infrastructure, the City of McKinney has the ability to use cloud resources to address business needs. By moving from a CapEx to an OpEx model, they can now return funds to critical city projects.

> "I wanted to move to a model where we can deliver more to our citizens and reduce the cost of delivering those services to them. I wanted a product line that has the ability to scale and grow with my department. AWS was an easy fit for us and the way we do business."
>
> **Chris Chiancone**
> **CIO**
> **City of McKinney**

Migration Options

Once you understand the current costs of an on-premises production system, the next step is to identify applications that will benefit from cloud cost and efficiencies. Applications are either critical or strategic. If they do not fit into either category, they should be taken off the priority list. Instead, categorize these as legacy applications, and determine if they need to be replaced, or in some cases eliminated. Figure 2 illustrates decision points that should be considered in

selecting applications to move to the AWS platform focusing on the "6 Rs" — retire, retain, re-host, re-platform, re-purchase, and re-factor.

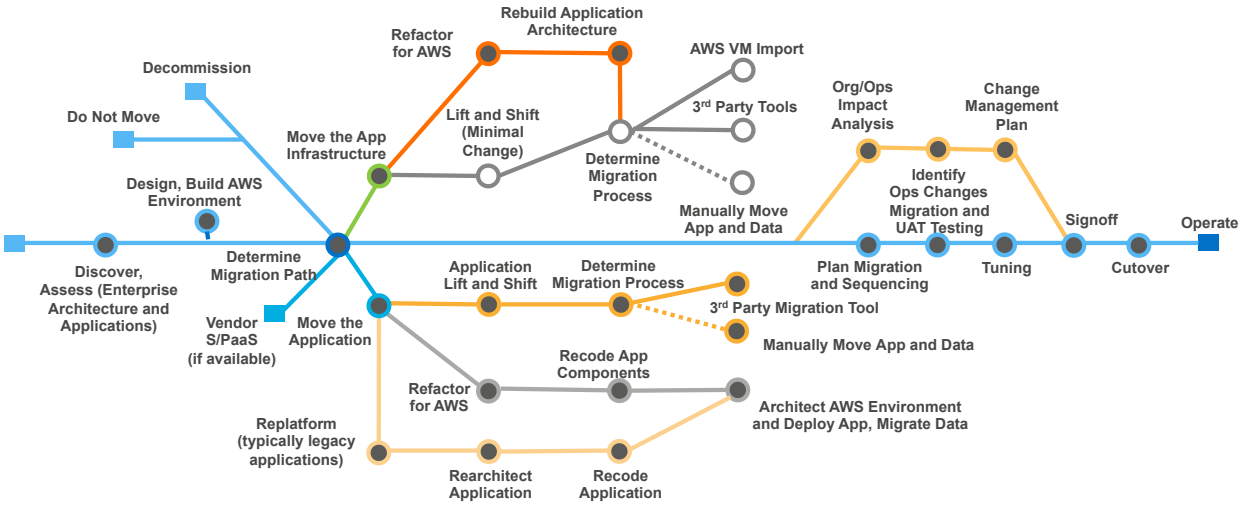

Figure 2: Migration Options

Applications that deliver increased ROI through reduced operation costs, or deliver increased business results should be at the top of the priority list. Then you can determine the best migration path for each workload to optimize cost in the migration process.

> "A university is really a small city, with departments running about 1000 diverse small services across at the university. We made the decision to go down the cloud journey, and have been working with AWS for the past 4 years. In building our business case, we wanted the ability to give our customers flexible IT services that were cost neutral.
>
> "We embraced a cloud first strategy, with all new services a built in the cloud. In parallel, we are migrating legacy services to the AWS platform, with the goal of moving 80% of these applications by the end of 2017."
>
> **Mike Chapple, Ph.D.**
> **Senior Director, IT Services Delivery**
> **University of Notre Dame**

Conclusion

Many organizations are extending or moving their business applications to AWS to simplify infrastructure management, deploy quicker, provide greater availability, increase agility, allow for faster innovation, and lower cost. Having a clear understanding of existing infrastructure costs, the components of your migration bubble and their corresponding costs, and projected savings will help you calculate payback time and projected ROI.

With a long history in enabling enterprises to successfully adopt cloud computing, Amazon Web Services delivers a mature set of services specifically designed for the unique security, compliance, privacy, and governance requirements of large organizations. With a technology platform that is both broad and deep, Professional Services and Support organizations, robust training programs, and an ecosystem tens-of-thousands strong, AWS can help you move faster and do more. With AWS you can:

- Take advantage of more services, storage options, and security controls than any other cloud platform.
- Deliver on stringent standards with the broadest set of certifications, accreditations, and controls in the industry.
- Get deep assistance with our global, cloud-focused enterprise professional services, support, and training teams.

Further Reading

For additional help, please consult the following sources:

- The AWS Cloud Adoption Framework http://do.awsstatic.com/whitepapers/aws_cloud_adoption_framework.pdf

Contributors

The following individuals and organizations contributed to this document:

- Blake Chism, Practice Manager, AWS Public Sector Sales-Var
- Carina Veksler, Public Sector Solutions, AWS Public Sector Sales-Var