NetApp®

5 phases for migrating healthcare workloads to Amazon Web Services

Develop a strategic and comprehensive migration plan

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Executive summary

Healthcare organizations migrating to the cloud need a strategy that assesses risks and considers all the possibilities. Moving an entire healthcare service to a new IT environment means deciding how to migrate all three subsystems—compute, storage, and networking—and identifying the right components, capabilities, and tools for the job.

In this eBook we share information about data migration and protection. You'll learn how to anticipate, avoid, and manage challenges during your journey to the cloud. You can also use the cloud migration checklist, included on page 5, to track your progress.

1.
The discovery phase

2.
The assessment phase

3.
The proof of concept phase

4.
The migration plan phase

5.
The cloud operations phase

1.

The discovery phase

Healthcare organizations share common drivers for migrating to cloud environments: scalability, enhanced data protection and security, cost efficiency, and regulatory compliance.

In the discovery phase, you must consider the following:
› Which applications and workloads can be moved and which cannot
› Who uses which application, and how often
› Network configurations, interdependencies, and integration with external systems
› SLA requirements for recovery time objective (RTO) and recovery point objective (RPO)
› Healthcare compliance standards and regulations, including:
  › Health Insurance Portability and Accountability Act (HIPAA)
  › Health Information Technology for Economic and Clinical Health Act (HITECH)
  › General Data Protection Regulation (GDPR)
  › Federal Information Security Management Act (FISMA)

In the discovery phase, it is recommended that you have a complete and accurate understanding of your role in the AWS Shared Responsibility Model. It is important to note that healthcare users' responsibilities and liabilities do not vanish in the cloud. In fact, healthcare organizations must retain ownership and an active role guarding electronic protected health information (PHI), whether it is stored on-premises or on AWS.

It is also important to regularly review the latest revisions to HIPAA guidelines and mandates about data privacy and security, and consider these when planning your migration to AWS. You can review which Amazon Web Services (AWS) offerings are eligible for applicable compliance standards that satisfy both U.S. and global regulations (for example, HIPAA and GDPR).

The cloud migration discussion is no longer about *if* it will happen, but rather about what is already happening. Be sure you have the resources, skills, and procedures for transitioning smoothly to best fit a cloud integration to your needs.

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2.

The assessment phase

In the assessment phase, select your migration method:

› Redeploying applications on an infrastructure as a service (IaaS) without making changes
› Modifying or extending the existing code to fit the cloud environment

This is also the time to build your migration team and identify the appropriate resources, considering:

› In-house migration versus outsourcing to a cloud-managed service provider
› Communication processes between your on-premises administrators and AWS team
› Training and tools that can help you acquire the necessary skills

AWS solutions architects can provide guidance about cloud architecture topology, security, and compliance requirements, and evaluate third-party solutions already in use on-premises and licensing options.

NetApp can also provide valuable cloud migration services, including workshops, which help you accurately assess your environment and develop a valuable roadmap that complements AWS recommendations.

3.

The proof of concept (POC) phase

The POC phase focuses on testing, including validating workload performance, determining capacity requirements including amount and size of Amazon Elastic Compute Cloud (EC2) instances, and projecting costs for running on AWS.

Be aware that some healthcare applications are not designed for the cloud, which can lead to performance issues, including latency. The POC phase is your opportunity to identify and develop a plan to resolve those issues.

During this phase, be sure you understand the benefits of AWS storage solutions and determine how or if to:

› Replace or fit in your on-premises data repositories.
› Leverage Amazon Relational Database Services (RDS) to run your SQL database.
› Use Amazon Glacier to keep your archived data.

Data protection and security

During the POC phase of a migration project, it is important that your healthcare organization test its physical, cyber, and cloud security procedures and systems. Although it might not be possible to test every layer of the security model before going live on AWS, it is critical that both your health organization and AWS take time to review security compliance guidelines and best practices, including the following:

› Review current security and privacy audits.
› Address any required remediation tasks.
› Double-check security controls for on-premises defenses to the AWS equivalents.

If the security layers are not revised accurately and completely during the migration phase, your organization could be at greater risk for privacy and security breaches and might also be fined for HIPAA compliance violations.

Additional considerations:

› Necessary network and security controls
› How to leverage built-in AWS firewalls for basic-level intrusion protection
› Building a layered approach with Security Groups, Amazon Virtual Private Cloud (VPC), and dedicated tunnels such as AWS Direct Connect to protect your AWS network and securely move applications and data in and out of your on-premises data center.

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4.

The migration plan phase

Once you have decided which applications to migrate, it is time to move forward with a complete plan. Consider the amount of data involved, as well as its synchronization with your on-premises data repositories.

Recommended plan elements:

› Blueprint design
› Assignment list with roles and responsibilities clearly identified
› Rollback and "what if" procedures
› AWS migration tools to help automate the move:
  › AWS Import/Export disk, which accelerates moving large amounts of data into and out of AWS using portable storage devices for transport.
  › AWS Management Portal for vCenter, which facilitates migration of VMWare resources.
  › AWS Database Migration Service (DMS) for relational databases (Microsoft SQL Server, MySQL, PostgreSQL)
  › AWS Schema Conversion Tool for different database platforms
  › AWS Snowball and AWS Snowball Edge for large-volume data
› Migration tools for NetApp users:
  › NetApp Cloud Volumes ONTAP: based on NetApp SnapMirror® technology, enables you to replicate on-premises data to AWS
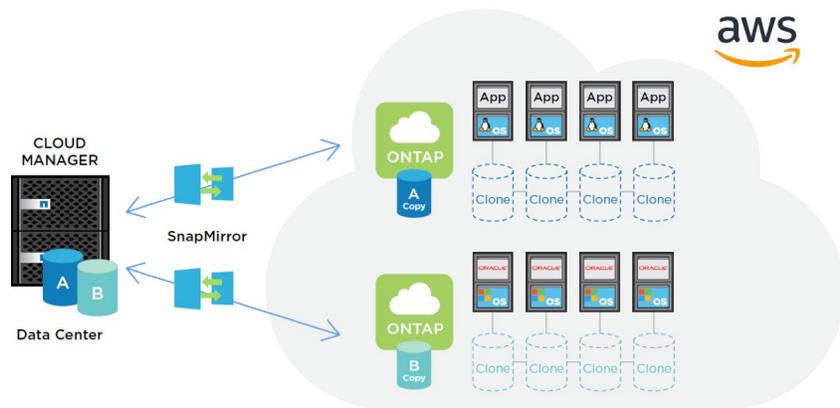 › NetApp Cloud Sync: use to quickly and securely migrate data and workloads to AWS

Figure 1: NetApp Cloning reduces footprint, cost. Create a cloned image, and deploy all working environments off of clones without expanding your storage footprint.

Learning from past AWS migrations

Healthcare and enterprise institutions have successfully achieved AWS migrations and are seeing measurable improvements in performance, outcomes, and efficiency.

NetApp customer Healthix, one of the largest public health information exchanges in the United States, has seen its data grow at the rate of 100 TB per year, necessitating a migration of its digital archive and disaster recovery to AWS for scalability and cost efficiency. Today, Healthix reconciles real-time data from over 70 million provider and payer patient record numbers to create composite profiles for more than 25 million unique patients. Healthix uses NetApp® Cloud Volumes ONTAP® software and is looking to more fully leverage AWS in the near future. Participating providers use aggregated data to manage patient populations and measure performance. Healthix projects a significant savings on digital data backup, and more than half a million dollars of cost avoidance on upfront investment in disaster recovery services on AWS.

5.

The cloud operations phase

Make sure your migration plan extends to operations. Consider the following:

› 24x7 support for applications using resources equipped with the AWS skills required to troubleshoot infrastructure issues.

› Maintenance, including ongoing system maintenance and upgrades.

› SLA requirements, including governance, security, compliance, performance, and uptime.

› Optimization, leveraging AWS Trusted Advisor to analyze your cloud environment and optimize deployment cost and security.

Review, test, and practice your cloud operations tasks with your internal AWS expert resources who manage daily operations. Specifically, it is important to document which tasks are assigned to which party so everyone knows what to do when a planned or unplanned issue arises.

Remember, the cloud brings with it significant and frequent changes. Keeping up with the rapid pace of innovation and change is especially important and should be considered an ongoing task.

Your cloud migration checklist

PHASE 1 - DISCOVERY

☐ Itemize your applications.

☐ Define your users and usage.

☐ Identify network interdependencies.

☐ Consider security and compliance regulations.

☐ Gather a clear definition of your systems' RTO and RPO.

PHASE 2 - ASSESSMENT

☐ Understand the methods for migrating apps to IaaS.

☐ Build your team—considering internal resources and/or outsourcing.

☐ Utilize Amazon resources for specific skillsets.

☐ Map on-premises third party solutions to determine how easily they will migrate.

PHASE 3 - PROOF OF CONCEPT

☐ Test your workload: Start small and prove value with a phased approach.

☐ Estimate cloud costs.

☐ Determine the amount and size of your compute and storage requirements.

☐ Understand security requirements, and the need for network and security controls.

☐ Assess network performance.

☐ Qualify tools and solutions needed for the migration.

PHASE 4 - MIGRATION

☐ Create a blueprint of your desired cloud environment.

☐ Establish a rollback plan.

☐ Identify tools for automating migration and syncing data.

☐ Understand the implications of the production day data move.

PHASE 5 - CLOUD OPERATIONS

☐ Keep up with the pace of innovation.

☐ Utilize 24x7 support via skilled AWS resources.

☐ Stay on top of system maintenance and upgrades.

☐ Consider SLA requirements and take into account governance, security, compliance, performance, and uptime.

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About NetApp® Cloud Volumes ONTAP data management services

You need to control what happens to your data, no matter where it resides. When you migrate your applications to the cloud, you are still responsible for managing and protecting your business data. Organizations have spent years controlling and aligning the appropriate levels of data performance, protection, and security in the data center to support their applications. As you move to the cloud, you must maintain the same level of control over your data that you have in an on-premises environment.

OnCommand Cloud Manager handles deployment and management of Cloud Volumes ONTAP, giving you a simple point-and-click environment to manage your storage and ease control of your data.

Cloud Volumes ONTAP helps you manage your data while reducing your cloud storage spend by up to 70%. A software-only storage service running NetApp ONTAP software, Cloud Volumes ONTAP combines data control with enterprise-class storage features—such as data deduplication and compression—to minimize your Amazon Elastic Block Store (Amazon EBS) storage footprint. To enhance your data security, Cloud Volumes ONTAP offers encryption managed by NetApp of your at-rest storage, while you retain the encryption keys. OnCommand Cloud Manager handles deployment and management of Cloud Volumes ONTAP, giving you a simple point-and-click environment to manage your storage and ease control of your data.
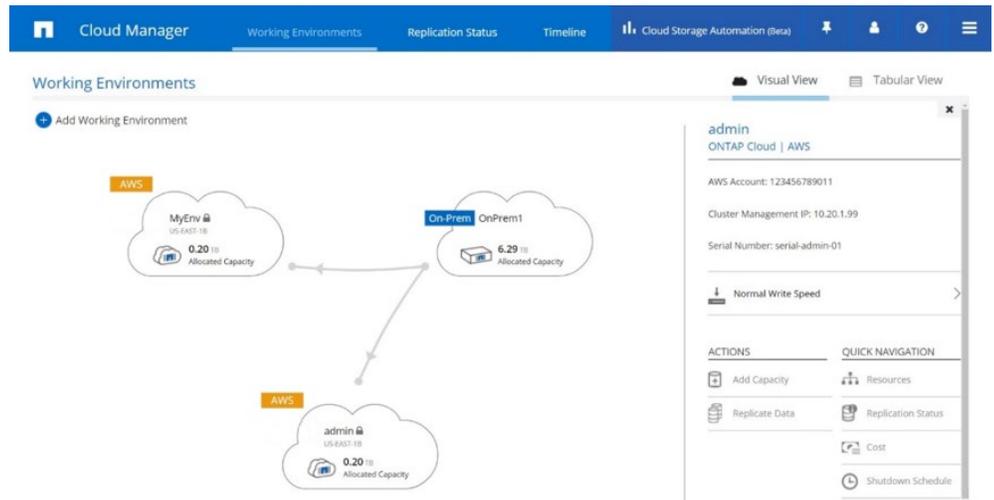
NetApp Cloud Volumes ONTAP:
› Creates a virtual NetApp appliance with advanced data management capabilities.
› Runs on Amazon EC2.
› Uses Amazon EBS as the underlying disk layer.
› Is deployed using OnCommand® Cloud Manager to deliver secure, proven NFS, CIFS, and iSCSI data management for Amazon EBS storage.

Control what happens to your data, no matter where it resides.

About NetApp® Cloud Sync

Automate the data migration processes on-premises or on AWS. Cloud Sync enables rapid, secure migration of network-attached storage (NAS) data from any source to any target and between different servers, platforms, formats, and structures. Continuously synchronize data with Amazon S3 to reduce upload times. Scale out compute resources nearly instantaneously. Up to 10 times faster than in-house-developed or traditional tools[1], Cloud Sync provides continuous sync and replicates only the deltas after the baseline, helping minimize transfer time and costs. You control how frequently you schedule synchronizations and pay only for what you need when you need it. Cloud Sync supports electronic medical record platforms and cloud-based analytics services and helps you monitor and optimize your operations with reliable enterprise-class reporting.

[1] Based on internal data https://cloud.netapp.com/blog/rsync-or-cloud-sync-data-migration-tools

| **Start your 30-day NetApp Cloud Volumes ONTAP trial.** | **Start your free 14-day Cloud Sync trial.** | **Explore all NetApp solutions in AWS Marketplace.** |

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