

WHITE PAPER

The Three Phases of a Successful Cloud Migration

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Executive Summary

Hitachi Vantara has worked with hundreds of clients across diverse industries to help them migrate to the cloud. This white paper highlights our knowledge and insights for implementing and executing successful cloud and hybrid cloud migrations on AWS (Amazon Web Services), MS Azure, and GCP (Google Cloud Platform). We outline each phase of the migration, what IT teams need to consider at each step, the business impact of different design decisions, best practices for implementing a migration, and how we achieve successful migrations for our clients.

Migrate to the Cloud: Introduction

Enterprises everywhere are moving to the cloud to reap the financial, operational and technical benefits. However, their cloud objectives may range from reducing operational costs, increasing agility and improving productivity, to powering back-end engines with artificial intelligence (AI) and machine learning, or fostering a culture of innovation. To extract value from these cloud initiatives, it is imperative that organizations ensure their cloud projects are well structured and tied to specific results or outcomes. We consider three phases to be vital to a successful cloud migration, as shown in Figure 1.

Figure 1. Three Phases of a Successful Cloud Migration

Phase 1: Prepare the Launchpad	Phase 2: Restructure and Rehouse Enterprise Workloads	Phase 3: Usher in Your New IT Infrastructure
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Phase 1: Prepare the Launchpad

Assess and Architect a Solid Foundation

Determining where you stand ahead of a migration allows you to launch with sturdy footing. Understand what constitutes your existing IT infrastructure, and determine the gaps that need to be resolved to create secure, reusable landing zones, or templates and automation rules.

In addition to an audit, it is important to gain a good understanding of the technical challenges that may arise throughout the migration. Common technical challenges that a solid cloud foundation should address are shown in Figure 2.

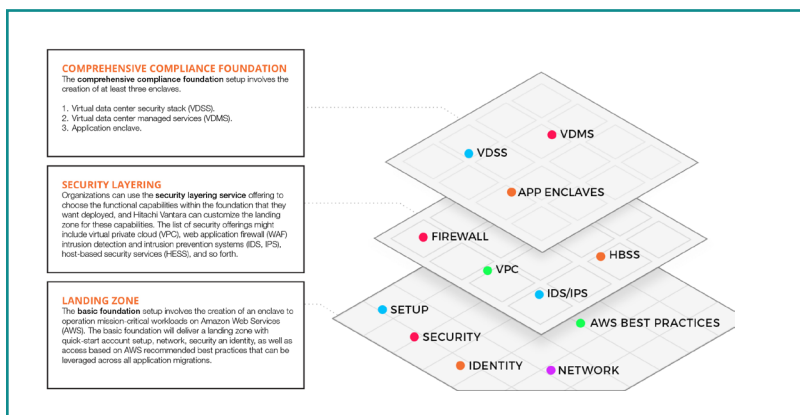
Figure 2. Common Technical Migration Challenges

<ul style="list-style-type: none">■ Tagging■ Automation■ Logging■ Training■ Workload Placement■ Amazon Web Services (AWS) Service Vetting	<ul style="list-style-type: none">■ Cost Management■ Security Tool Selection■ Identity Management■ Monitoring■ AWS Account Strategy■ Network Design	<ul style="list-style-type: none">■ Governance■ Support Planning■ Hybrid Strategies■ Security Scanning■ Compliance■ Image Bakery
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Cloud Migration Services from Hitachi Vantara have delivered end-to-end cloud strategies. We have architected and implemented solid cloud foundations for a number of large enterprise customers across a variety of federal government agencies and other highly regulated industries. These engagements have helped these organizations to smoothly migrate to the cloud to overcome key challenges and realize more predictable cost structures, better use of modern technologies, greater innovation and increased productivity.

In our migration work we have developed three layers to consider when developing a cloud migration, as shown in Figure 3.

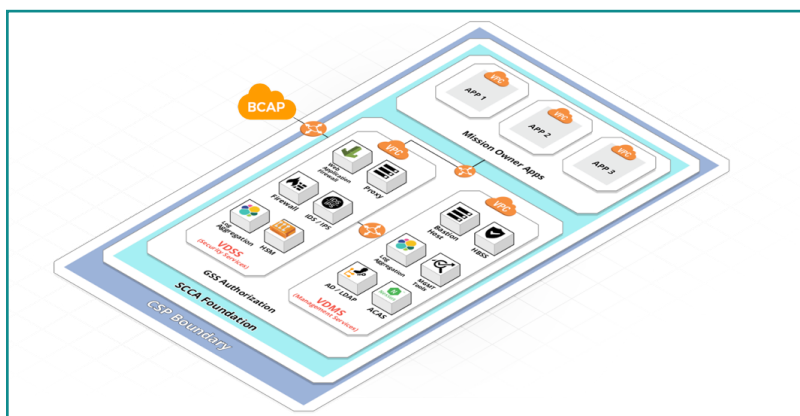
Figure 3. Considerations for Creating a Successful Migration Foundation



Address Security Requirements

We recommend that every migration use the Secure Cloud Computing Architecture (SCCA) published by the Defense Information Systems Agency (DISA) as a benchmark reference (see Figure 4). This framework covers all aspects of a public cloud implementation and helps prioritize security concerns inherent in today’s infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) and software-as-a-service (SaaS) industry offerings.

Figure 4. Secure Cloud Computing Architecture



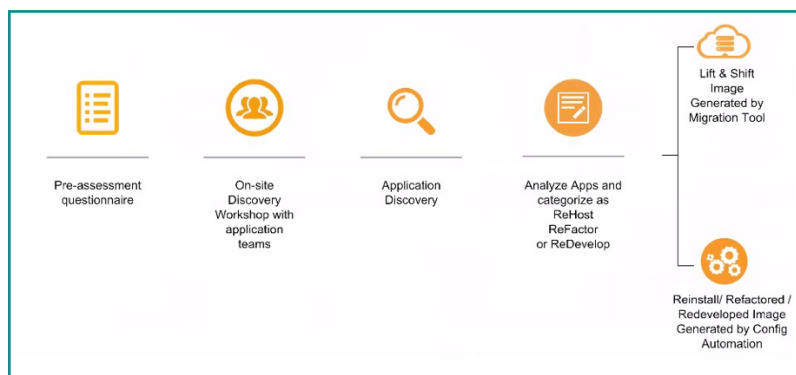
Define Migration and Deployment Options

To ensure a smooth migration, enterprises must consider application development life cycles, business relevance, security impacts, organizational roles, financial aspects of cloud service delivery, and other operational variables.

Bearing these in mind, organizations can create a detailed migration plan for each application to understand how best to factor it into the potential architecture and application road map. By developing discovery and dependency maps, you can decide whether the application is ready to migrate to the cloud. At the same time, you can also determine the application's disposition to minimize errors in future stages of the migration.

Synchronizing migration timelines with the DevOps life cycle maximizes efficiency and streamlines key processes. With this in mind, we offer best practice methodologies for DevOps migration, as shown in Figure 5.

Figure 5. Best Practice DevOps-Based Migration Methodologies



A proven approach to application portfolio assessment includes:

- **Pre-assessment information gathering**, where a refined set of cloud migration questionnaires are shared with each application owner.
- **On-site discovery workshops**, to walk through the as-is application details and understand application architecture, dependencies and requirements.
- **Automated infrastructure application discovery** (on-premises or data center) is a critical step that allows discovery of technical interdependencies, interfaces and complexities.
- **Collating information and analyzing all artifacts** helps gain insight into the application portfolio. The importance of this step cannot be overemphasized and proper execution helps determine the success of the overall migration.

Phase 2: Restructure and Rehouse the Enterprise Workloads That Deploy Applications Into the Cloud

Once your foundation is in place, it's time to focus on deploying the enterprise's workloads. By using cloud-certified resources, you can help to maximize efficiency and minimize downtime. DevOps principles are also a crucial factor in ensuring a successful migration.

During migrations, Hitachi Vantara leverages its accelerator migration methodology, allowing development teams to innovate quickly and respond to the business demands of their stakeholders without worrying about nonfunctional aspects of the deployment process. This approach is based on the principles of test-driven development and integrates testing throughout the application life cycle.

Different types of migration schemes need to be applied to each application. The type of the application determines the migration pattern. These patterns include:

- **Rehost** (lift and shift), a common cloud migration option that replicates in-house apps in the cloud without redesign.
- **Reinstall**, an option to create and deploy machine images of the application or workload and then provide a fresh installation of the application.
- **Refactor**, a method that involves cost and performance optimizations.
- **Redevelopment**, an approach that involves redevelopment of the source code through to the use of cloud-native microservices reference architectures.

To ensure the consistency of application deployments, Hitachi Vantara recommends performing a series of tests to validate the workload migration infrastructure. This testing includes vulnerability assessment and appropriate security testing prior to production deployment.

Plan and Execute Data Transfer

During migration, data transfer, database backup and disaster recovery planning need to be carefully considered. Depending on how critical the application and data are, a separate stream of effort to cover data (database and storage) migration and testing may be warranted. For certain applications, data transfer becomes a dependency for application migration. Successful deployments leverage best practices of the data governance industry and dedicate ample time to manage data migration nuances.

Prioritize Security During Application Data Transfer

Protecting data in transit to the cloud from on-premises environments is key to migration success. Successful deployments utilize a data security framework that leverages industry best practices and robust security technology to ensure customer data is safeguarded throughout the process. Here are a few best practices to use when creating this blueprint:

- **Network Security.** Use IPSec or AWS Direct Connect for trusted connections from on-premises data centers. Hitachi Vantara uses Amazon virtual private gateway (VGW) where Amazon virtual private cloud (VPC) based resources require remote network connectivity.
- **Online or Offline Data Migration.** Based on the use case and data size, Hitachi Vantara recommends leveraging different AWS managed and unmanaged data migration options: Use multiple storage services to move data in large batches or chunks from on-premises storage to AWS to solve data migrations securely.
- **Code Migration.** Protect code in transit to ensure confidentiality and integrity by using secure channels and authenticating entities of the communicating parties.
- **Business Continuity and Disaster Recovery.** Ensure your solution implementation guidelines are documented, tested and validated when they're incorporated for complete disaster recovery and business continuity in the cloud.



Phase 3: Usher in Your New IT Infrastructure

Post Migration Business Continuity, Operations and Compliance

Executing a successful move to the cloud requires a number of post-migration considerations and solutions. It is a common mistake to replicate on-premises deployment practices in cloud environments. To see the full benefits of the cloud, use processes and solutions designed for the cloud.

For example, cloud deployments inherently meet the disaster recovery (DR) requirements for recovery point objective (RPO) and recovery time objective (RTO). They also deliver latency- or geolocation-based routing and auto scaling to support high availability (HA) and demand bursts, which is different than on-premises peak capacity processes. Replicating on-premises peak capacity deployments could result in costly solutions that are not appropriately “adapted” for the cloud.

It is a best practice to implement a tiered approach to HA and DR workloads based on RPO and RTO requirements.

- **Tier 1** leverages multi-AZ (availability zone) architectures that deploy applications in a highly available fashion across fault-isolated availability zones within a single AWS region. This approach meets DR and business continuity requirements.
- **Tier 2** introduces architectures that include a second AWS region actively (application nodes actively running in the second AWS region) or passively (application nodes instantiated only during a disaster scenario) when RTOs require minimal downtime.

It is also important to determine the approach for ongoing operations of the new cloud environment. Developing a plan will help ensure successful cloud initiatives long after the migration has ended, while supporting initial cloud migration goals. Tasks involved in meeting these goals include:

- Incident management.
- Remote monitoring.
- Routine maintenance.
- Access management.
- Network management.
- Change management.
- Problem management.
- Service level reporting.
- Anti-virus and spam protection.
- Data backup.

Regardless of how you choose to manage your environment, automating tasks, such as those listed above, is a key factor for ongoing success.

How can you best monitor your cost optimization, security or other operational goals? Regularly collect information from your cloud instances and feed them into a data lake where data is aggregated and correlated into a central operations dashboard with an overview of the customer environment.

Ensuring constant compliance with industry regulations is also critical to continued cloud management and operations. By setting up vulnerability scanning and remediation, security technical implementation guides (STIGs), validation and implementation, and compliance management dashboards, you can help streamline and better manage compliance.

Hitachi Vantara: Your Cloud Migration Partner

Hitachi Vantara is a Global System Integrator and Premier Consulting Partner in the Amazon Web Services Partner Network (APN), and a Microsoft Silver Cloud Partner. The company assists organizations with setting up and managing secure cloud environments, migrating critical workloads, and ultimately establishing the proper framework for ongoing operations. Our expertise is illustrated by a long and growing roster of cloud competencies earned from our experience serving various industries and for our technical proficiency. We've leveraged our proven, secure and stress-free methodology to successfully implement complex, scalable architectures in the cloud for hundreds of businesses.

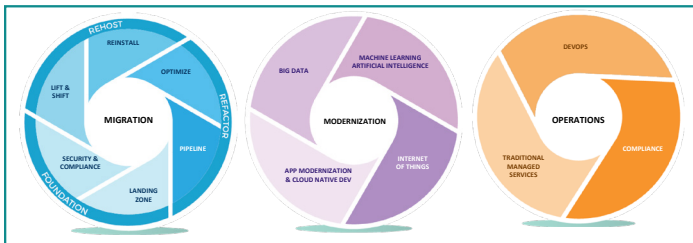
We provide a unique approach to migrating and managing workloads in the cloud. This model focuses on delivering business outcomes for customers. We start all engagements by collaborating with our customer to define the outcomes to be delivered and then we commit to delivering these outcomes. Our customers have found this to be a significant advantage over time and material delivery models where the focus is on hours spent rather than results achieved.

Cloud Migration Services from Hitachi Vantara have delivered end-to-end cloud strategies and architected and implemented solid cloud foundations for a number of large enterprise customers across a variety of regulated industries. These engagements have helped organizations overcome key challenges and realize more predictable cost structures, better use of modern technologies, greater innovation and increased productivity. The U.S. Transportation Command, SAP NS2, American Heart Association, Ditech and Radian Mortgage started their cloud journeys early on and have completely transformed their organizations by putting the right foundations in place.

Cloud Migration Services from Hitachi Vantara bring together all of the components companies need to launch a successful cloud migration. Created to deliver secure, agile and reliable cloud services, this offering helps to facilitate the consistent creation of infrastructure and application builds. Cloud Migration Services from Hitachi Vantara significantly reduce the time needed for cloud migration from weeks to days so that companies can realize the benefits of their cloud deployments faster.

Hitachi Vantara delivers a stable, secure and comprehensive platform for optimizing cloud workloads, as shown in Figure 6.

Figure 6. Outcome-Based Service Offering for Successful Cloud Deployments



For more information about Cloud Migration Services from Hitachi Vantara, visit hitachivantara.com or contact your Hitachi Vantara representative.

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