



The Three Phases of a Successful Cloud Migration

Whitepaper

Hitachi Vantara Federal

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1. EXECUTIVE SUMMARY

Hitachi Vantara Federal (HVF) merges 100+ years of operational and information technology experience. As a global leader in end-to-end data strategies, our solutions strengthen the efficiency, agility, and mission responsiveness of the U.S. government while improving total cost of ownership.

HVF implements data and analytics solutions that meet the federal government's needs. We provide pathways to the cloud and converged IT systems through virtualization, storage and DCC to reduce IT complexity and increase the efficiency of the U.S. government. Hitachi Vantara Federal offers the best information and operation technology from across Hitachi to provide exceptional value to government agencies. Hitachi Vantara Federal is headquartered in Reston, Virginia.

Helping organizations accelerate cloud projects through a model that automates much of the process resulting in reduced labor costs is what we do. We offer consulting and professional services including, but not limited to: cloud strategy, cloud environment, application assessment, secure cloud foundation implementation, application migration to cloud, redevelop application redevelopment for cloud leveraging micro services, assessment & authorization (A&A), manage cloud services leveraging secure, compliant managed services framework to provide dashboard, and monitoring, control of cloud infrastructure for customers. In 2018, REÁN Cloud was merged into Hitachi Vantara Federal (HVF). HVF operates under a Department of Defense (DoD) Top Secret facility clearance (FCL) with all Key Management cleared at the level of the FCL. The majority of HVF's board consists of former seniors from the U.S. Intelligence Community.

HVF has been on the forefront of helping organizations improve their cloud migration efforts through specializing in helping enterprises use the cloud to become agile, realize cost savings, and enhance security and performance. For the second consecutive year, HVF has been recognized in Gartner's 2018 Magic Quadrant for Public Cloud Infrastructure Managed Services Provider (MSP). The Magic Quadrant recognized HVF as a global cloud systems integrator, which has positioned the company at the top of the list in the niche player quadrant for our ability to execute. HVF has supported application migration activities for the USTRANSCOM and provided Managed Services of USTRANSCOM's assets hosted on the AWS GovCloud. Using REÁN Cloud Accelerators, HVF provided a robust and scalable software development environment using REÁN Cloud Accelerators and migrated over 20 migrated applications at an Impact Level 4 (IL4) environment within the AWS GovCloud. HVF is a Microsoft Silver Cloud Platform Partner and a Microsoft Azure Government CSP and Reseller.

2. 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**.

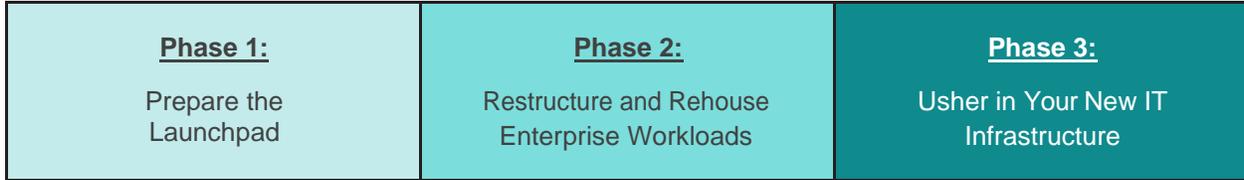


Figure 1. Three Phases of a Successful Cloud Migration

3. PHASE 1: PREPARE THE LAUNCHPAD

3.1 Assess and Architect a Solid Foundation

Determining where you stand ahead of a migration allows you to launch with sturdy footing. You must understand what constitutes your existing IT infrastructure and determine the gaps that need to be resolved to create secure, reusable cloud foundation, 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

As part of REAN Cloud Migration Services, now offered by Hitachi Vantara Federal, we have delivered end-to-end cloud solutions. 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 non-disruptively migrate to the cloud to overcome key challenges and realize more predictable cost structures, better use of modern technologies, greater innovation, increased productivity, and an improved security posture.

3.3 Define Migration and Deployment Options

To ensure a smooth migration, enterprises must consider application development life cycles, core mission 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 and application road map. By developing discovery and dependency maps, you can decide whether the application architecture 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 DevSecOps life cycle maximizes efficiency and streamlines key processes. With this in mind, we offer leading practice methodologies for DevSecOps migration, as shown in **Figure 5**.



Figure 5. Best Practice DevSecOps-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.

3.4 Define Application Portfolio Assessment Factors

We capture and analyze a variety of a factors as part of the application portfolio assessment to help us determine the migration path that best aligns with business and organizational needs, as show in **Figure 6** below:

Strategic Value	<ul style="list-style-type: none"> ▪ Growth Forecasts ▪ Corporate Alignment
Resource Utilization	<ul style="list-style-type: none"> ▪ Infrastructure Utilization ▪ Licensing Utilization
Pipeline Capability	<ul style="list-style-type: none"> ▪ Application Configuration Management ▪ Automation and orchestration
Modernization	<ul style="list-style-type: none"> ▪ Advanced Analytics ▪ API-driven Service Oriented Architecture
Agility	<ul style="list-style-type: none"> ▪ Variability ▪ Elasticity (Responsiveness to demand)
Security and Compliance	<ul style="list-style-type: none"> ▪ Compliance ▪ Assurance ▪ Resilience ▪ Continuity
Application Architecture, Integration, and Dependencies	<ul style="list-style-type: none"> ▪ Architectural Suitability ▪ Application Dependencies ▪ Interoperability ▪ Performance

Figure 6. Application Portfolio Assessment Factors

4. 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. DevSecOps principles are also a crucial factor in ensuring a successful migration.

During migrations, Hitachi Vantara Federal 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.

5. PHASE 3: USHER IN YOUR NEW IT INFRASTRUCTURE

5.1 Post Migration Business Continuity, and other Operational Considerations

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 - Local/Metro Area Redundancy:** leverages multi-availability set or multi-AZ (availability zone) architectures that deploy applications in a highly available fashion across fault-isolated infrastructure solutions within a single CSP region. This approach meets DR and business continuity requirements.
- **Tier 2 – Geo Redundancy:** introduces architectures that include a second CSP region actively (application nodes actively running in the second CSP 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 | ▪ Network management |
| ▪ Remote monitoring | ▪ Change management |
| ▪ Routine maintenance | ▪ Problem management |
| ▪ Access 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.

6. HITACHI VANTARA FEDERAL: YOUR CLOUD MIGRATION PARTNER

Hitachi Vantara Federal 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, efficient, and secure methodology to successfully implement complex, scalable architectures for numerous commercial and government customers.

We provide a unique approach to migrating and managing workloads in the cloud typically leveraging the Firm Fixed Price (FFP) contract type. We base our FFP contract on the number of compute nodes we are assessing, migrating and managing in the cloud. This demonstrates to the customer that HVF is willing to share the risk and has a vested interest in delivering results that meet the scope and schedule requirements. Our customers have found this to be a significant advantage over the cost plus or the time and material delivery models where the focus is on hours spent rather than results achieved.

REAN Cloud Migration Services, now provided by Hitachi Vantara Federal, 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.

In our REAN Cloud Migration Services from Hitachi Vantara Federal, we bring together all of the components and companies needed 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. REAN Cloud Migration Services from Hitachi Vantara Federal significantly improves time to value enabling cloud migrations to be completed in weeks vs months.

The Hitachi Accelerators provide an end-to-end solution to address the various stages of the customer cloud adoption lifecycle such as pre-migration assessment, migration, deployment automation, test automation, compliance documentation, operations automation, and visualization of transformation metrics. Each Accelerator within the platform is designed to address a specific use case in the cloud adoption process. Hitachi Accelerators are designed to operate as loosely coupled pluggable components to enable automation across a range of cloud deployment activities. Accelerators allow migration and development teams to innovate quickly and respond to the business demands of their stakeholders without worrying about the non-functional aspects of the migration and deployment process. To facilitate turnkey integrations with migration and DevOps tools, the Accelerators are designed to support a wide range of leading third-3rd party tools.

Hitachi Accelerators provide out-of-the-box blueprints for migration, deployment, verification, post-deployment assessment and ops while providing insights into the cost, security, and operation metrics required for delivering business value.

REAN Deploy - A deployment automation platform to configure complex environments reliably and consistently with the click of a button. Application deployment lead time is reduced from weeks to minutes through the automation provided by REAN Deploy. It consists of a visual tool to generate "infrastructure as code" and enables customers to deploy application stacks to any provider and provision applications using any technology (Ansible, Chef, or Puppet).

REAN Test - A cloud-based DevOps centric test automation accelerator which can be leveraged to perform both infrastructure and application testing. With the ability to integrate with market leading testing tools such as UFT, Cucumber, Nessus, etc., REAN Test creates dynamic testing infrastructure to perform rapid, parallel and cross-browser functional, performance, load, security and scale testing. REAN Test, as a continuous testing (CT) tool, provides customers the ability to test web applications using true (rather than emulated) multiple browsers and runs tests (either URL, Functional or Manual) and provides state-of-the-art test result data analytics.

REAN Assess - When run post deployment, this accelerator allows customer applications and systems to be evaluated against relevant security and compliance frameworks such as CIS benchmarks. It also provides a DevOps maturity assessment service to highlight the current state of DevOps and cloud readiness within customer environments, helping to bridge the gap to the next level of maturity using appropriate tools and processes. The results of the assessment are captured in an auto-generated document that can be saved to track the compliance state.

REAN Radar - These persona-based dashboards visualize the key financial, operations and security metrics from the different stages of the DevOps process to provide a holistic picture. It supports the construction of custom visualizations for historical and real-time information with the help of data that is collected and analyzed from development, testing, deployment, cost, operation, security, and compliance metrics and logs. With proper tagging in place, REAN Radar can provide cost per application for chargeback purposes.

REAN Managed Cloud ("Ops") - This allows HVF to manage environments (Development, Test, Staging, Pre-Production, Production, DR, etc.) 24x7x365 and provide end-to-end support for all cloud infrastructure requirements. Based on scope of support the REAN Ops team leverages other Hitachi Accelerators such as REAN Deploy, REAN Radar, REAN Assess and REAN Heal internally to support customers.

REAN DevOps Pipelines - Part of refactor and redevelop migration, HVF provides out-of-the-box automation pipelines. These pipelines help customers accelerate the adoption of DevOps processes by using a framework that can be customized to meet their Continuous Integration (CI) and Continuous Delivery (CD) goals.

Hitachi Vantara Federal delivers a stable, secure, and comprehensive platform for optimizing cloud workloads, as shown in **Figure 7**.

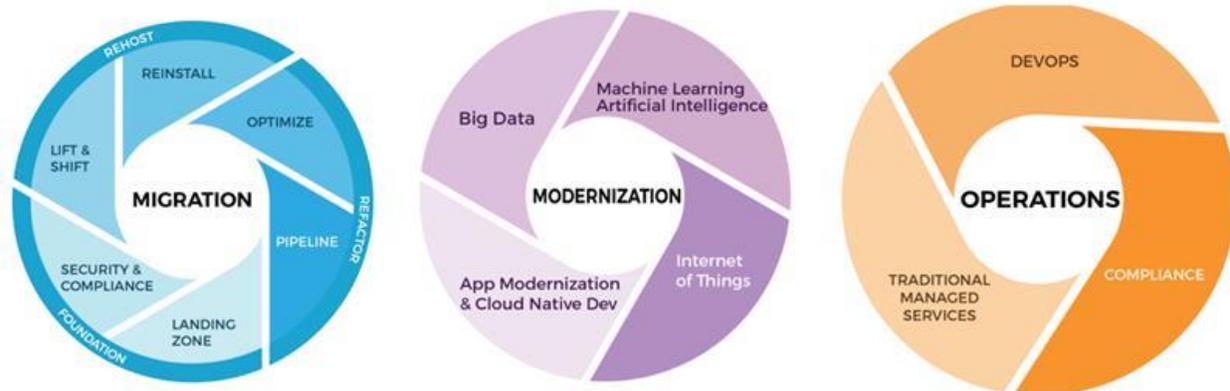


Figure 7. Outcome-Based Service Offering for Successful Cloud Deployments

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

Your data is the key to more effective and efficient service delivery across your agency’s mission areas. With technology and expertise, Hitachi Vantara Federal drives data to meaningful outcomes.