July 2022

Playbook to Managing a Multi-Cloud Environment

A practical review of how to use a multi-cloud management solution

vmware®

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What is a cloud operating model?

The operational framework that binds your business, application, and cloud strategies together from a people, process, and technology perspective.

Why does multi-cloud management matter?

Modern business must run on modern apps. Modern apps need to run on a mix of clouds. And multi-cloud management is the enabling technology that powers your cloud operating model. It gives you consistency and control across clouds and accelerates your people and process transformation.

Transforming the promise of multi-cloud into real results

A practical example of how to adopt a cloud operating model

Multi-cloud is no longer a hypothetical concept. There is now a very real opportunity for organizations to improve agility, innovation, cost efficiency, and resilience by adopting a cloud operating model that can truly deliver on the promise of multi-cloud.

The new question is how to plan and operate a cloud operating model, and how to effectively implement and use a comprehensive cloud management solution to bring control and consistency to multi-cloud environments.

Primary benefits of consistency across multi-cloud environments

Improved responsiveness to customers and lines of business

Reduced IT operating costs

Faster delivery of application features and releases

This paper provides practical guidance by highlighting a realistic example of MOAD (Massachusetts Omni Automated Devices). MOAD exemplifies the challenges and objectives expressed by real customers, and helps illustrate the practical implications of adopting a cloud operating model—to the people and teams involved and to the business as a whole.

Meet MOAD: Poised for rapid growth

A composite of real-world challenges, plans, and expectations for multi-cloud management

To be clear, MOAD is a fictional company. Providing a realistic yet genericized example helps illustrate how modern cloud management benefits a broad spectrum of personas and teams—without the particulars of one customer's unique situation.

To create the full context, we'll suppose that MOAD is an MIT-funded, high-end robotics firm, founded in 1983 in Boston by MIT graduates. The company builds robots and the associated software for a wide range of industrial assembly lines, designs self-driving farm equipment, creates assistance tools for people with disabilities, and performs R&D on the use of AI in robotics and IoT use cases.

In 2019, MOAD added commercial online sales of home-programmable robots to its portfolio, and re-branded itself as MOAD.io. This transformation has been extremely successful but has resulted in a few new challenges in terms of scalability and accessibility of people, processes, and technologies throughout the company.

A representation of MOAD.io's product portfolio.

Business and technical challenges

MOAD.io is growing fast and was experiencing many of the challenges that come with the need to scale resources on demand. With the global rollout of its new consumer-based shopping cart application and expansion into new geographic regions, the company found itself increasingly dependent on clouds—both public and private. For example:

Developers needed public cloud services to keep up with rising demand for compute power and data storage resources

The web team needed both the agility and the advanced capabilities of cloud solutions to ramp up its ability to meet ever-increasing demand for robotics products and services

IT needed to expand its cloud consumption to quickly support the growing needs of multiple business functions

As a result, the total cloud footprint and cloud costs were constantly increasing, and the business needed to cost-optimize and increase efficiency among a mix of public cloud providers.

Multi-cloud vision: efficiency and consistency across cloud infrastructure

To address the challenges of rapid growth, MOAD.io decided to implement a multi-cloud model, managed by a single management control plane. More specifically, the company wanted to leverage Amazon Web Services (AWS) to simplify its expansion into new regions; expand application components to AWS; and integrate private, public, and hybrid cloud services into a multi-cloud environment.

To accomplish this, MOAD.io created a Cloud Center of Excellence (CCoE), whose team was responsible for defining and creating a consistent cloud operating model across all its cloud types.

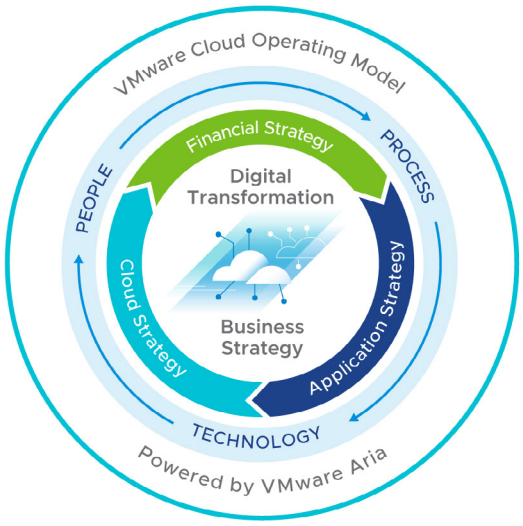
An early, critical decision made by the CCoE team was to harness VMware Aria to meet its business and technology challenges. After rigorous analysis of competitive options, the team selected VMware cloud management because of its unique ability to increase visibility across cloud environments, support consistent operations and thereby reduce complexity, ensure optimal use of a variety of public cloud services, and increase agility in order to meet the needs of developers and other constituents across the company.

MOAD.io saw that VMware Aria could deliver three key capabilities for all workloads, wherever they reside, with a single toolset:

Cloud Service Delivery
Deliver services faster, support DevOps principles, and broker native services

Cloud Operations
Unify operations, accelerate modernization, and streamline migrations

Cloud Governance
Optimize cloud costs, lower risk, and drive accountability



Meeting MOAD.io's cloud requirements

How MOAD.io's cloud team is organized to deliver on ever-expanding expectations

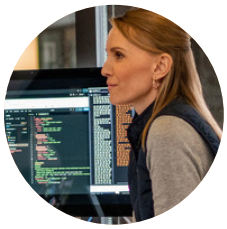
Like any large and growing organization, MOAD.io found that multiple stakeholders had their own requirements and expectations for using the cloud model to meet business goals—from development and testing of new applications to virtual desktop delivery to security analytics to automated data backup.

To accommodate these diverse goals, MOAD.io's Cloud Center of Excellence team combines cloud expertise, engineering skill and experience, and business acumen. The organization of the CCoE is described below.

CCoE team members and core objectives

The CCoE team is composed of two primary groups: providers or cloud services or resources, and consumers of those resources. There are many roles and personas within each category, of course; for the purposes of this case review we will focus on three roles within each category. Below is a summary of each persona's role and objective:

Providers



"My goal is to ensure that the MOAD public cloud network is solid and applications perform as expected."

Network Architect

"I'm here to ensure that the MOAD public cloud environment is healthy and meets the application's performance and scalability needs."

Platform Engineer

"My job is to help application developers and MOAD consume the public cloud with an unmatched experience."

Cloud Architect

Why a Cloud Center of Excellence (CCoE)?

The CCoE brings together the skills and services required to deliver on the cloud operating model. It provides a structured environment for delivering on multiple cloud use cases and a unified organization with CXO-level support and cross-organizstional visibility.

Consumers

"I deploy applications across multiple clouds and regions, and I need assurance of performance and availability in any cloud."

App Developer

"My job is to define security process and deploy them once across all clouds. The goal is to protect our business and customer data no matter where applications run."

Senior Security Manager

"I need to forecast accurately, get visibility into pockets of spending, and make sure we get the highest value from our technology investments."

Financial Analyst

Using modern cloud management to execute on the vision

Three examples of how VMware Aria gets people working better, together

To illustrate how the CCoE team uses VMware cloud management to deliver on MOAD.io's diverse and complex cloud requirements, we will focus on three primary public cloud use cases:

- Creation of **self-service public cloud capabilities** for internal consumers
- **Cost optimization and security**, maximizing efficiency while minimizing risk
- **Managing cloud environments** with an app-centric view

Self-service	Cost optimization and security	Managing applications
• How do I prepare templates for public cloud deployments?	• How do we manage public cloud cost, usage and capacity?	• Can we see and manage applications in the public cloud?
• What does self-service provisioning look like for public cloud?	• How can we assure that our public cloud workloads are secure and compliant?	• How do we monitor and troubleshoot public cloud deployments?
• What day 2 self-service actions are available for public cloud?	• How can we ensure health and performance of public cloud deployments?	• Can we collect logs from public cloud deployments?

#1: Self-Service Cloud Provisioning

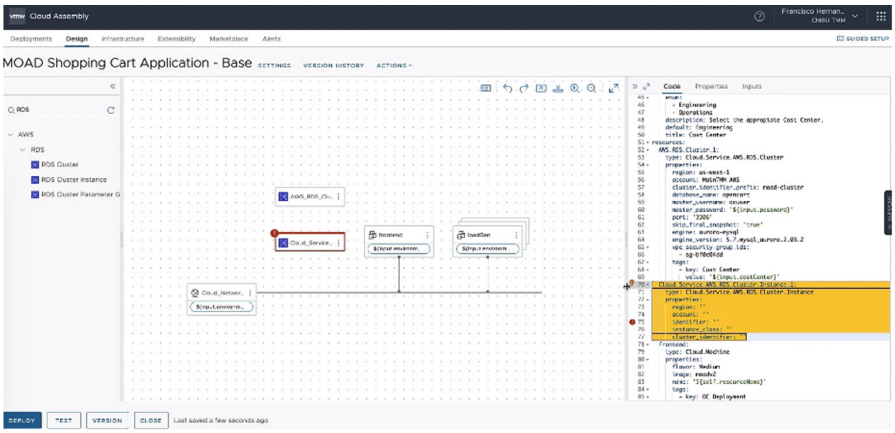
At MOAD.io, cloud consumers want fast access to the resources they need without having to jump through hoops or find technical specialists. Fortunately, the creation of self-service cloud provisioning capabilities was simplified and accelerated by the use of VMware Aria.

With VMware cloud management, providers such as network architects and platform engineers can quickly define templates that specify the set of cloud resources that can be provisioned—for specific consumers, groups of consumers, regions, or business units—using Cloud Zones.

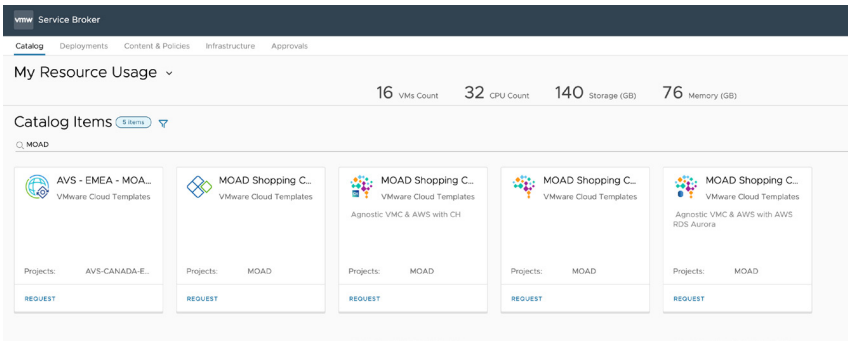
With Cloud Zones the providers can set up cloud accounts with fine granularity about which cloud capabilities to make available, down to the number of instances, memory, or CPU limits within each Cloud Zone. This in turn makes it easier for consumers to access exactly what they need, when they need it. For example:

- App developers working on the MOAD.io Shopping Cart application can go to the Cloud Assembly Design Canvas, pull up cloud-specific versions of the app, quickly identify any differences in code among multiple clouds, and make any needed changes to ensure the app is working as expected in all cloud environments.

- Testing and deployment specialists can quickly and easily provide input to development teams to expedite performance, security, and scalability testing.
- For Day 2 operations, developers can see all cluster and instance properties and coordinate them with security and compliance teams to ensure the app is fully performant, protected, and compliant.



Finally, version and then expose it to the Service Catalog for easy consumption.

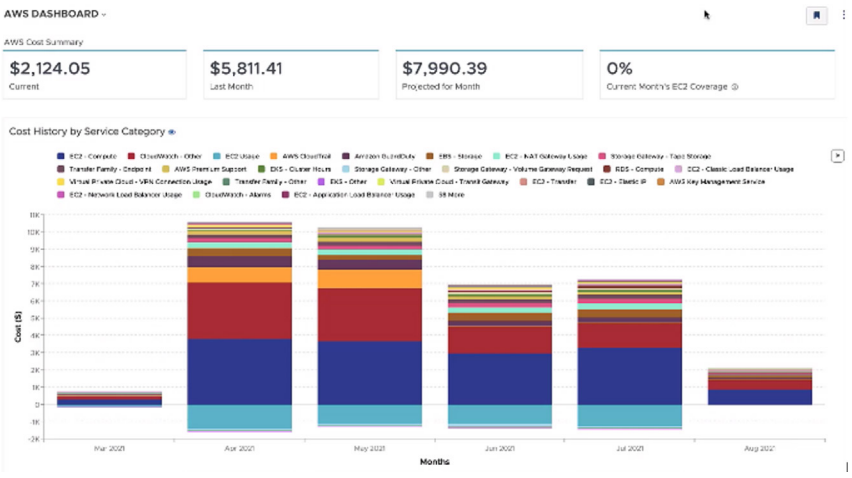


#2: Cost Optimization and Security

With VMware Aria, financial analysts and security specialists have instant access to the detailed information they need to do their jobs with extreme efficiency. For example:

Cloud cost visibility and optimization

- Financial decision makers can instantly access granular information about all resources deployed—filtered by total cost, product type, account, instance, project, owner, service type, and more.
- Multiple types of reports are available for both C-level decision makers or financial analysts, including cost histories by cloud provider, time period, or service item; actual spending vs. budget; spending by category of apps deployed; cost amortization; and more. Multi-cloud reports also show costs by cost center, projects and more across multiple cloud providers, along with the line items from the cloud service provider invoices.

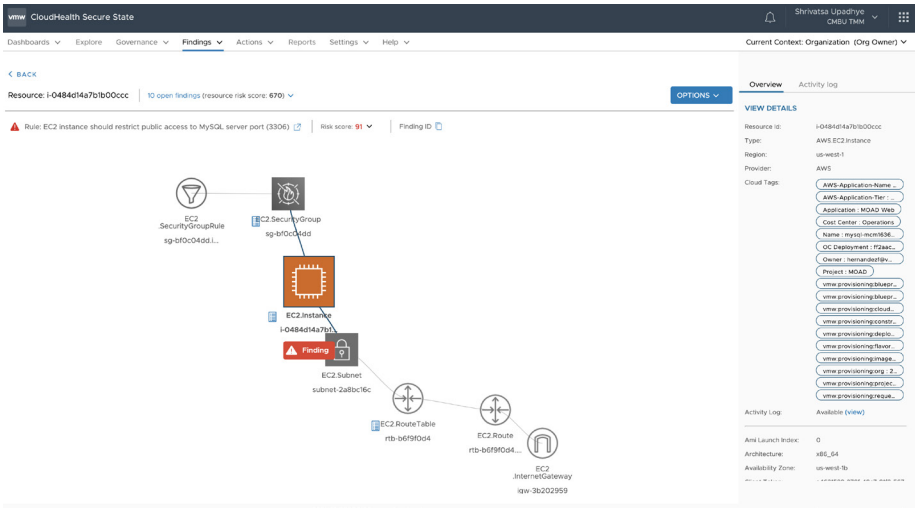


The AWS dashboard makes it easy to identify opportunities to optimize spending and curtail overprovisioning.

- For security and financial professionals, cloud management provides a graphical, 360-degree overview of what's happening in each cloud environment or in all cloud environments, along with detailed information and recommendations about how to cost-optimize and strengthen security. For example, the Health Check report highlights specific opportunities to save money by eliminating overprovisioning, as well as areas where risk mitigation could be improved.
- Cloud management provides a Savings Plan that highlights opportunities to cut costs by changing the service plan. It illustrates which plans would be more cost-effective based on usage patterns, and even allows the new plan to be purchased directly from the dashboard without having to go to the public cloud provider.

Cloud security and compliance

- Security analysts can quickly and visually identify vulnerabilities, see the threat level, and automatically remediate the issue.
- Cloud management allows providers to easily monitor the health, performance, and compliance of multiple public cloud deployments over any given time period, and make improvements quickly as needed.



Visualize cloud resource relationships and associated misconfigurations, threats, meta data, and change activity.

#3: Managing applications

With VMware Aria, cloud service providers can monitor the entire network, including the public cloud, so they can see and manage applications in the public cloud. For each application, they can view metrics and configuration data, including number of tiers, VMs, Kubernetes instances, and more, so they can quickly understand and troubleshoot issues that may emerge. More specifically:

Automatic application discovery

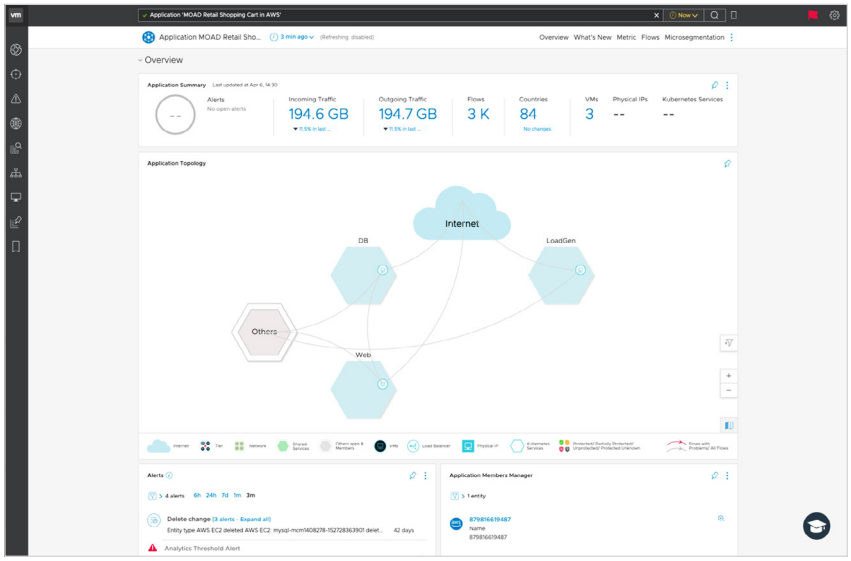
- All apps within the infrastructure can be discovered and identified through multiple means, including via tags or by examining network flows, based on machine learning.

Application troubleshooting

- Administrators can open an app, such as the MOAD.io Shopping Cart app, via a visual dashboard that displays the topology and summary information about app behavior, based on analytics. CCoE teams can quickly see changes in traffic related to the app, so they can diagnose and remediate latencies and other performance issues.

Security planning and visibility

- Security teams can drill down into traffic flows so they can identify which countries or regions are accessing the app the most, see potential security threats or vulnerabilities, and take remedial action quickly. They can then do security planning; for example they can get specific information about traffic flows and trends, external services accessed, and so on, so they can refine security policies accordingly. For example, they can spot connectivity issues that could lead to unauthorized access, and address them by adjusting policies to route certain types of traffic to on-premises firewalls so that only authorized users are connected to the MOAD.io app.
- App developers and security teams can get access to logs from public cloud deployments to get a full understanding of the apps and any changes that may have been made to them.



Opening an app opens a dashboard with a visual topology and summary information.

In short, VMware Aria gives teams fast, easy access to the cloud resources they need, granular information to help them cost-optimize and secure those cloud resources, and metrics to quickly see and manage their applications in the cloud.

The net result

The net result for MOAD.io is a more efficient and productive CCoE, staffed by skilled professionals who are empowered to perform their jobs better individually and together to create superior business outcomes.

"I have visibility into the entire multi-cloud network, including all infrastructure, connectivity, and apps, so I can validate the performance and security of our public cloud operations continuously, with confidence."

Network Architect

"I have the detailed metrics and reporting I need to ensure the MOAD.io public cloud environment is meeting or exceeding our performance and scalability requirements."

Platform Engineer

"I have been able to combine the cloud services our app developers need with a quality of experience they never expected, and the result is more innovative products and services for our end customers."

Cloud Architect

"Finally—I can get the cloud resources I need without delays or red tape, without worrying about performance issues or security policies—so I can focus on apps rather than infrastructure."

App Developer

"Now I have the information I need to see and remediate security vulnerabilities quickly, refine our security policies in minutes rather than days, and keep up with compliance requirements painlessly. Our customers are better protected, and our business is better able to mitigate risks."

Senior Security Manager

"There's no more guesswork. I have the detailed analysis and reporting I need to identify opportunities to save money and I can align our budgets with reality."

Financial Analyst

VMware: Comprehensive multi-cloud management

Making it easy for MOAD.io to operationalize multi-cloud

VMware multi-cloud management: Areas of excellence

For MOAD.io, VMware Aria is the unified solution that delivers visibility into cloud infrastructure and consistent deployment and operations of apps, infrastructure, and platform services across multiple clouds. Its key features and capabilities include:

Automated cloud delivery

MOAD.io has accelerated service delivery with a modern developer platform that provides a self-service consumption experience across a multi-cloud environment. Using VMware Aria, the company has provided self-service access to infrastructure that supports Infrastructure as Code (IaC) and pipelining capabilities and enables Kubernetes automation and management through a central management plane.

Unified operations

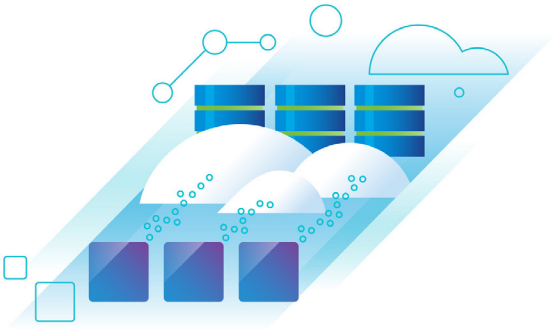
MOAD.io achieved unified visibility and consistent operations of its applications, infrastructure, and platform services. VMware Aria also enabled AI-powered continuous performance optimization, unified monitoring, capacity and cost management, migration planning, and network optimization across multiple clouds, as well as both traditional and modern container-based applications from a single source of truth.

Simplified financial management

With VMware cloud management, MOAD.io was able to continuously analyze and report cloud usage and spend by team, project, application, or cost center. The company was also able to drive accountability against budgets and quickly find opportunities to lower cloud spend via custom rightsizing recommendations, dynamic governance policies, and streamlined management of public cloud reservations and discount programs.

Strengthened security and compliance

MOAD.io improved its cloud security and compliance posture with real-time visibility into resource relationships, misconfigurations, risk scores, and activity logs across a multi-cloud environment, with the ability to quickly resolve security findings via alerts or automated remediation. The company also achieved continuous compliance with custom policies and out-of-the box security rules based on industry standards, such as DISA, FISMA, ISO, CIS, and PCI.



VMware: Maximize your success in managing multi-cloud models

Compelling competitive advantages

As MOAD.io discovered, VMware Aria is uniquely effective because it is comprehensive, integrated, and highly differentiated from competitive offerings. For example, ONLY VMware provides the combination of multi-cloud management capabilities that enable organizations to:

- **Manage private, public, and multi-cloud** environments with a single cloud management control plane.
- **Achieve excellence** in all areas with integrated capabilities for consistent operations.
- **Maintain freedom of choice** between SaaS and on-premises deployment, with the flexibility to move between them, all in one license.
- **Broadest ecosystem** with more than 220 hardware and service integrations.
- **Leading customer success** to inform, guide, and train organizations through their lifecycle.
- **Leverage VMware's experience** as a proven solution with an expanding number of customers in every industry sector.

VMware cloud management is also consistently recognized by leading analysts worldwide as a market leader. Recent ratings and rankings include:

- #1 IDC IT Automation and Configuration Management Market Share7
- #1 IDC WW Cloud Systems Service Management Market Share8
- A Leader in Forrester Hybrid Cloud Management Wave™9
- A Leader in Forrester Infrastructure Automation Wave™9
- A Leader in Forrester Cloud Cost Management and Optimization Wave™9
- Leader in Capabilities and Customer Service in OMDIA Universe

Benefits summary: Everyone wins

The business value takes many forms for many people

VMware has built the market's leading cloud management solution to make cloud complexity invisible in support of our customers' journey to the cloud. It improves virtual and cloud IT operations across all cloud environments to help you:

Accelerate agility by automating everywhere across infrastructure and application service delivery with a self-service consumption experience to unlock innovation

Optimize performance and manage resource utilization to cut costs and maximize efficiency at minimal cost

Control your clouds by simplifying financial management, strengthening security, and automating compliance to mitigate risk

With VMware Aria Universal Suite, the solution uniquely offers the flexibility to choose consumption options of on-premises or SaaS, along with a hybrid subscription of both in a single license. This enables organizations to adopt a cloud-first model at their own pace while protecting existing investments.

The comprehensive capabilities of VMware Aria can deliver tangible, measurable benefits to your Cloud Center of Excellence teams, to your lines of business, and to your organization as a whole—just as they have for MOAD.io and our ever-expanding global customer base.

Have your people contact our people

Get the details about VMware Aria

Take the next step in transforming the multi-cloud model into a practical solution with tangible business results. Learn more about VMware Aria.

- Watch a demo video of how MOAD.io can use VMware cloud management
- Learn more about VMware Aria on our website
- Request a meeting with our cloud management experts

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