



Your 360° Introduction to VMware Aria Central

A collection of blogs to unify your multi-cloud environment with a single platform and a common data model

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VMware Aria Central: An Overview

VMware Aria Central is a transformational multi-cloud management solution unifying cost, performance, and delivery automation in a single platform with a common control plane and data model for any cloud, any platform, any tool, and every persona.

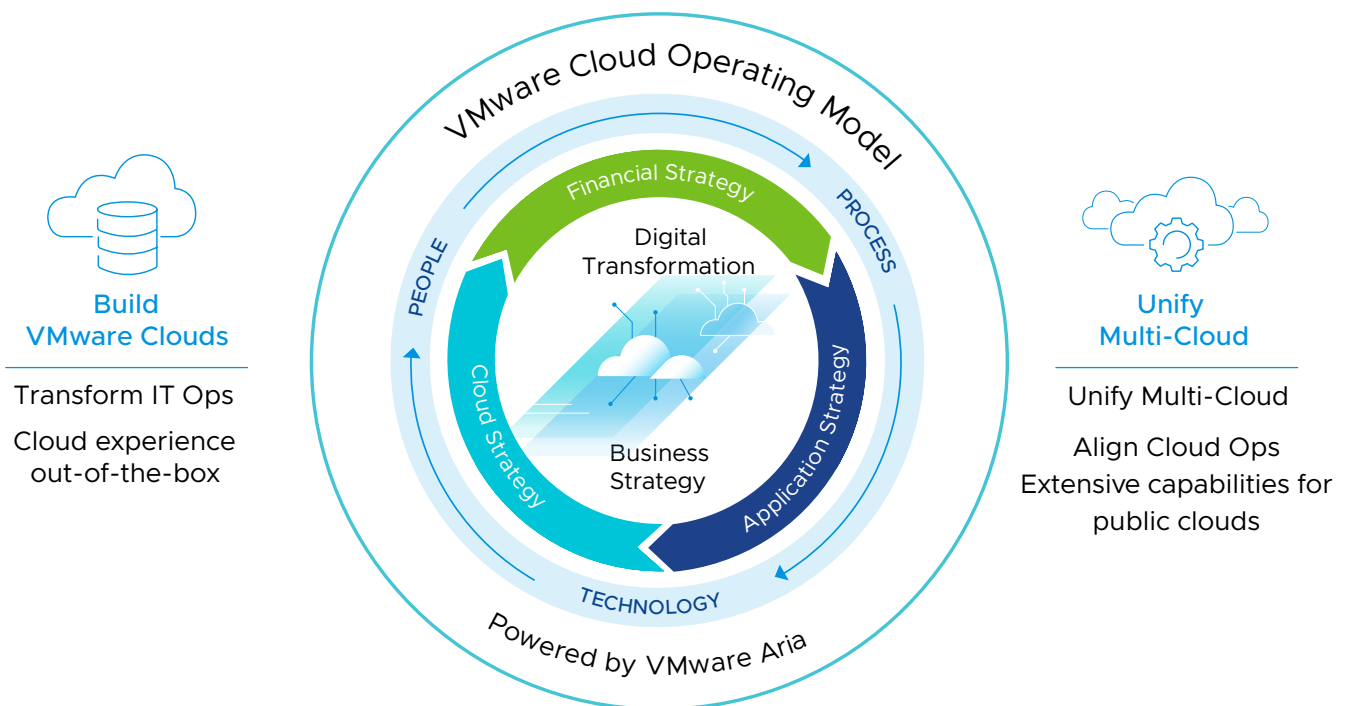
VMware Aria Central was designed to provide single-source-of-truth visibility through a common object model for IT and app owners to drive greater business insights and innovation. It increases the productivity of technical teams by converging contextualized information across core management practices in a single interface for greater business agility. In addition, it delivers operational assurance to DevSecOps through the consistent application of governance and security policies that mitigate risk, all in a single platform.

Having such a platform unleashes the potential for so many other services and capabilities. And that is the idea behind VMware Aria Central. It will be available in the VMware Aria Universal Suite (formerly vRealize Cloud Universal), and it will unify all the VMware cloud management services in a way not previously possible. In this document, we're excited to introduce VMware Aria Central and examine the core capabilities of an API-first approach, platform architecture, and single UI, which were first shared as VMware Project Ensemble blogs authored by John Dias.

Why VMware Aria Central?

The cloud era introduces boundless possibilities for businesses and organizations to innovate and scale faster than ever before. However, it seems that the trade-off is increasing complexity for operations, loss of control, and runaway costs, but that does not have to be the case. Many infrastructure and operations teams are adopting a cloud operating model to help transform how multi-clouds are managed by becoming service providers and brokers of cloud services.

A cloud operating model combines people, process, and technology and provides an operational framework for key decisions on where your applications need to live, how to help them perform and be more secure, and how to optimize the efficiency of these environments and your overall cloud budget. This model allows for more easily adopting new clouds and managing existing ones with the same staff, tools, and governance policies. VMware Aria Central supports the cloud operating model and supports private, public, multi-, hybrid, and edge clouds in any combination.

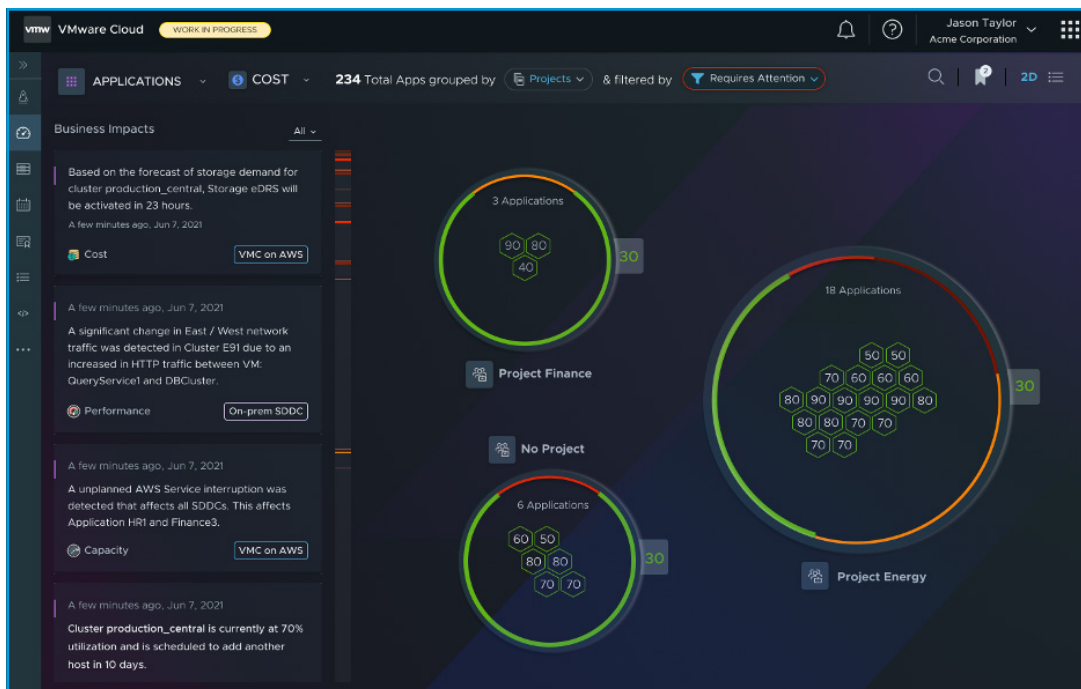


Our customers are looking for ways to streamline multi-cloud operations further, provide app-centric self-service and predictive support to deal with data growth and complexity. They also want to increase automation and predictively support applications. What is needed is a new way to consume clouds in a cohesive and simplified manner.

VMware Aria Central Goals and Vision

Consider all the rich, powerful capabilities of VMware cloud management services, including self-service for cloud consumption with day-2 automation, application discovery, monitoring, troubleshooting, capacity analysis, configuration changes, cost visibility, and more.

Now, what if you could see all of those in a simple, meaningful way?



VMware Aria Central focuses on how different personas, such as cloud providers and cloud consumers, in your organization interact with those applications. This will be driven by a user experience customized by learning users' needs made possible with machine learning.

Additionally, VMware Aria Central features:

- Business insights for curated use cases will help identify and guide users through identifying and resolving problems that impact their applications in any cloud
- A unified configuration and change history will allow users to view what has changed, rewind in time to the point of change, and completely reassemble snapshots of topologies
- Global search across all VMware Aria (formerly vRealize) services will provide access to all relevant information in a single UI
- In-context switching to VMware Aria (formerly vRealize) services for deeper investigation and analysis

Supporting the VMware Cloud

Initially, VMware Aria Central will directly support our customers who are starting or are already underway on the journey to hybrid cloud with VMware Cloud on AWS. The VMware Aria Central UI will be built seamlessly into the VMware Cloud on AWS console, providing zero-touch setup of VMware Aria (formerly vRealize) services to onboard and support customer deployed SDDCs. Adding and consuming cloud management should not be a daunting task and VMware Aria Central strives to make this as easy as clicking a button.

VMware Aria Central will also help with VMware Cloud on AWS migration planning, further enabling customers to adopt hybrid cloud quickly and confidently. Also, the user experience will focus on hybrid cloud use cases with actionable recommendations to resolve or prevent issues with performance, availability, and capacity.

Helping You Simplify Complexity

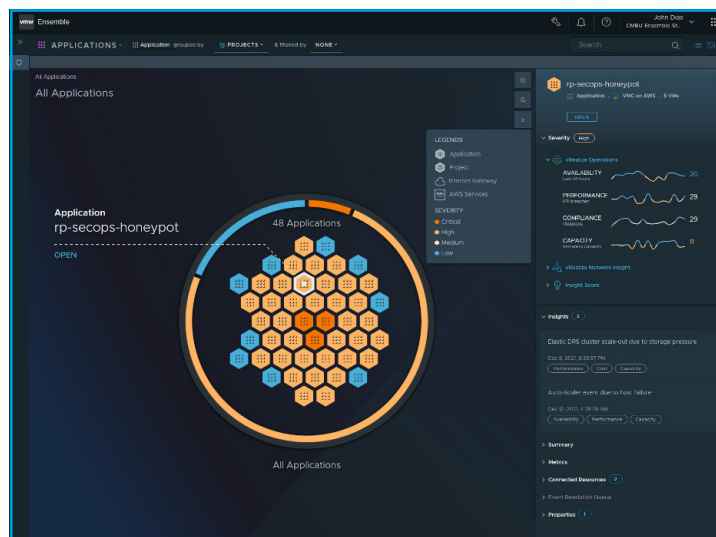
Our mission is to provide a holistic, high-value view of all of your clouds and applications. We will do this by unifying the underlying power of the underlying cloud management services. Put another way; VMware Aria Central will make clouds simple by sifting through the sea of data feeds and figuring out what you need to know about your apps.

Alert storms, combing through and correlating metrics and logs, tracking change events, and determining the impact of outages will all become relics of the previous era of cloud management.

Simplicity in managing your clouds also means spending less time, or no time, managing the tools you use to keep your apps running in those clouds. Customers will benefit by having faster time-to-value via zero-touch setup and configuration. Time should be spent managing clouds, not managing the cloud management tools. With VMware Aria, all cloud management services will be ready for use, gathering insights, and presenting them to users, within hours.

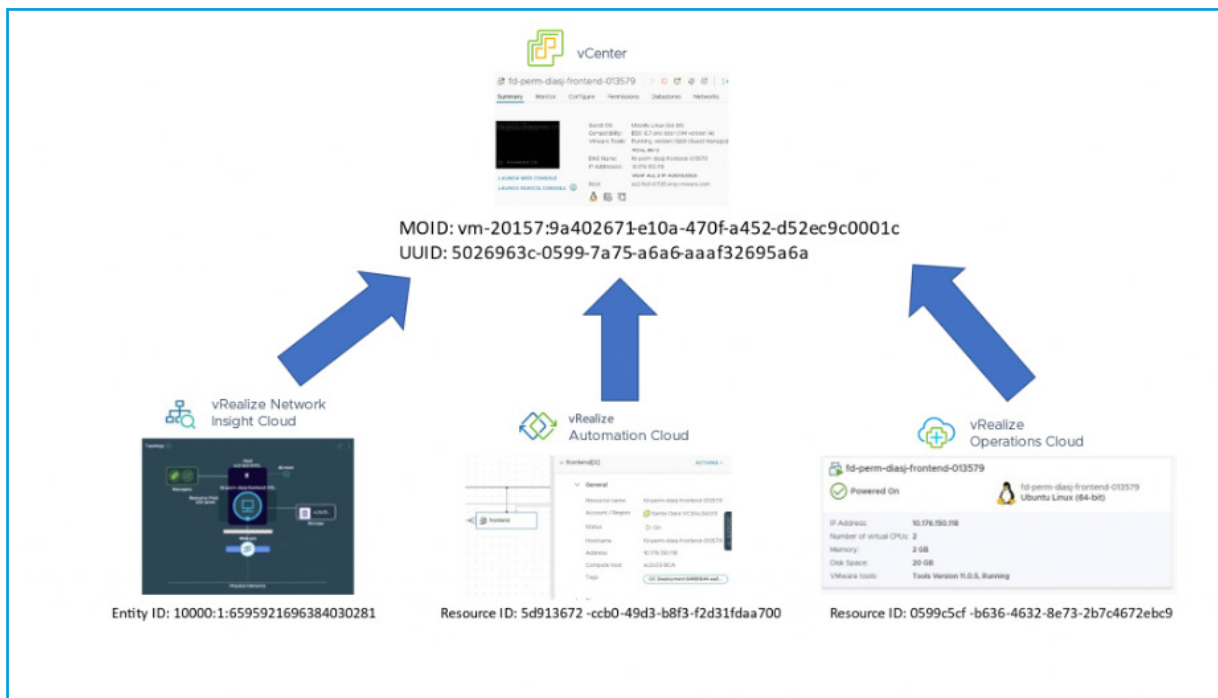
Previewing VMware Aria Central's API-First Approach

Let's discuss some of the customer use cases and go deeper into the technology and capabilities.



The Challenge: One VM, Many Truths

When a virtual machine is created in vCenter, it is assigned an identifier, and metadata about that virtual machine is stored in the vCenter database. Now, if VMware Aria Automation (formerly vRealize Automation) was used to create the virtual machine, it is also assigned an identifier and stored in the VMware Aria Automation database with metadata unique to VMware Aria Automation. So, now you have a single object with two sources of information about the state and attributes of that object.



Begin to add more services, VMware Aria Operations (formerly vRealize Operations) for monitoring performance and capacity, VMware Aria Operations for Network (formerly vRealize Network Insight) for connectivity, application discovery, and flows. All this information is useful in the context of each of these services, but there may be information in VMware Aria Operations (vRealize Operations) that would be important to know in VMware Aria Automation (vRealize Automation).

Practically this presents some challenges. For example, to verify whether an application deployment from VMware Aria Automation (vRealize Automation) is healthy in VMware Aria Operations (vRealize Operations) or not, two different APIs need to be understood and accessed. Then, we need to correlate the information from both services to get the required information.

This is just for a single object. If you need information about related objects such as the host, datastore, networking, and so forth you can see that the complexity scales rapidly as more services are added.

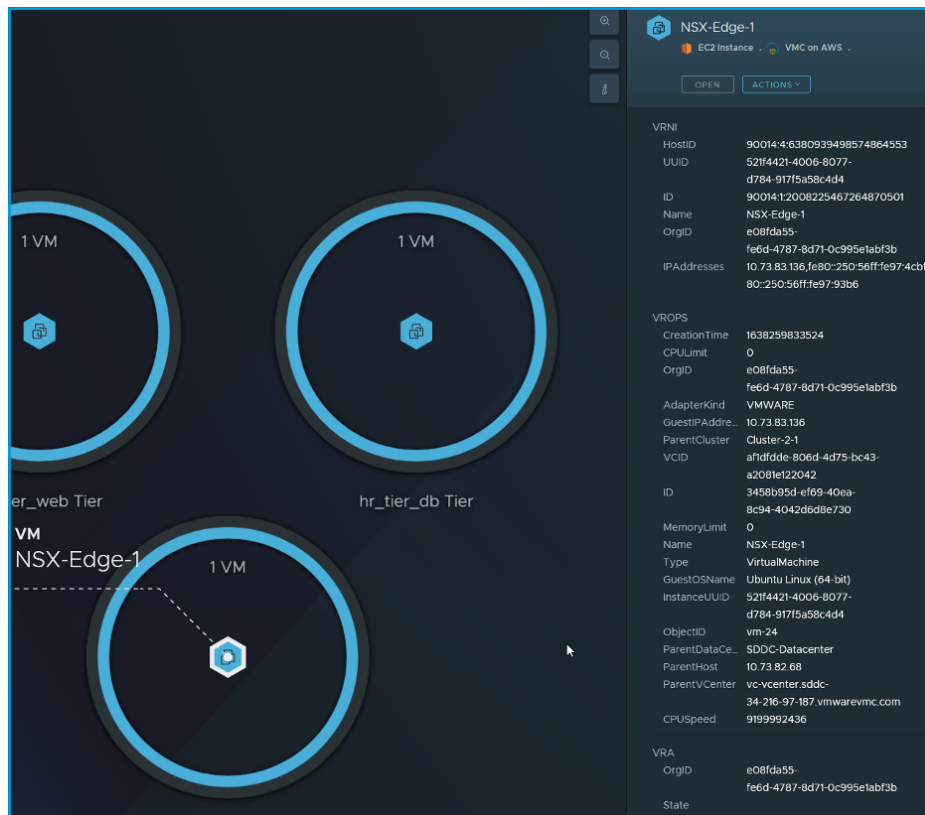
The Solution: Unified Data and a Common Object Model

VMware Aria Central will deliver a unified consumption surface that meets the unique needs of the cloud administrator and SRE alike. From an architectural perspective, this means creating a platform designed for programmatic consumption and a firm “API First” approach. Once you go through this introduction, you will agree that VMware Aria Central’s APIs raise the stakes for what is required for management APIs.

As mentioned earlier, VMware Aria Central will bring in data from multiple management services (i.e., formerly vRealize Operations, vRealize Automation, and vRealize Network Insight) and normalize the data into a single, common object model. This will allow the AI capabilities within VMware Aria Central to identify, recommend and broker automated actions to improve performance and efficiency and do so proactively.

However, there is another key capability that this will deliver: the ability to reference any object from any management service from a single API call.

Below is an example of what this metadata will look like in VMware Aria Central (in this case an NSX Edge, not a virtual machine, but it applies to any object). Notice the unique properties from each VMware Aria (vRealize) service are listed here.



So, every bit of information from multiple services about any object will be available. Let us now look at how we can access this information programmatically using the API.

Meet GraphQL

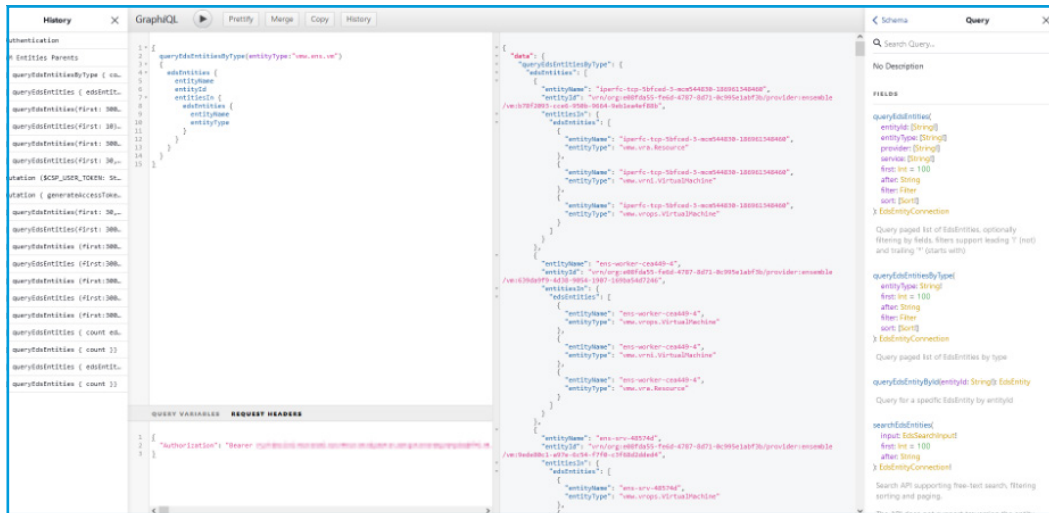
If you are used to working with VMware Aria (vRealize) APIs, you are familiar with RESTful APIs and our Swagger documentation which makes it easy to learn and test. Instead of REST, VMware Aria Central uses GraphQL for data retrieval. This allows for more powerful and easier content retrieval. If you have not been exposed to GraphQL, you will find it even easier to use than REST and Swagger. For more information about [GraphQL](#), visit their website. For purposes of this introduction, let us dive into how GraphQL works with VMware Aria Central.

First, GraphQL is a query language and there are essentially only three types of request operations:

- Queries are the essence of GraphQL, fetching information about specific objects
- Mutations provide the ability to request the server to perform an action on objects
- Subscriptions provide the ability to track changes in the system as they occur

See, already simpler than the REST! Seriously though, GraphQL is ideal for solutions like VMware Aria Central where the goal is to consolidate, normalize and simplify data from multiple systems. VMware Aria Central will provide a web IDE for GraphQL, [based on GraphiQL](#), but what you really need to know is that this will be an easy tool to use and familiarize yourself with the API.

Below is a current development version of the VMware Aria Central API GraphQL interface. This will likely change before it is publicly available, but here we will showcase some concepts using this current state so that you can understand the power behind this API approach.



You can learn more by using the [GitHub GraphQL, API](#) but there are many more you can find from [this link from APIs.guru](#).

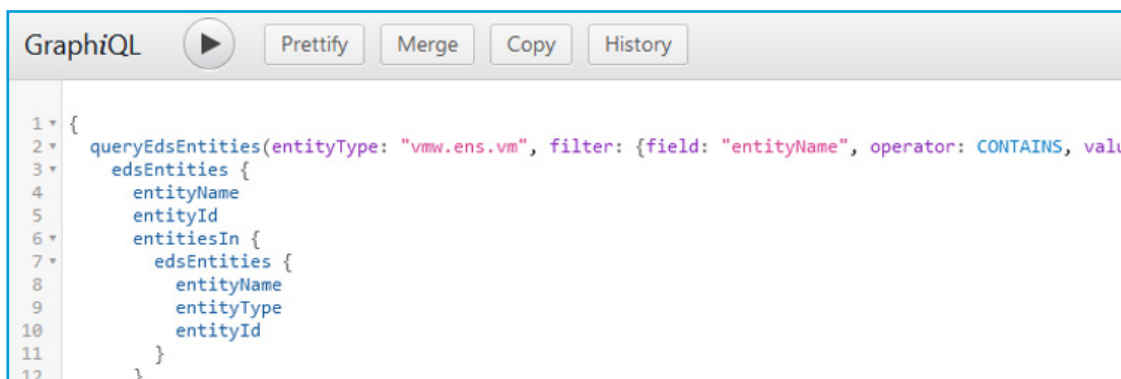
Examples of API Usage

Now, that we have covered the background, let's show some examples of how this will work with VMware Aria Central. Remember, this could change a bit before it is available to customers, but the essentials should give you a solid understanding of the proposed API capability.

Finding and Exploring Objects

We discussed how VMware Aria Central would consolidate and organize data from other systems using a common object model, for example, a virtual machine. These objects are referred to as "entities" within VMware Aria Central.

Here, we have queried the API for any virtual machine entity with the string "Dina" in the name (and limited to the first 10 occurrences that match). We would also want to know the services that are contributing data to the entity using the "entitiesIn" field.



The response includes the VMware Aria Central virtual machine entities from VMware Aria cloud management products (vRealize Automation, vRealize Operations, and vRealize Network Insight).


```
{
  "data": {
    "queryEdsEntities": {
      "edsEntities": [
        {
          "entityName": "Dina Ubuntu20 Test VM CMBU Net",
          "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:ensemble/vm:25f7bec2-0f20-3957-f589-606eaa1d811",
          "entitiesIn": {
            "edsEntities": [
              {
                "entityName": "Dina Ubuntu20 Test VM CMBU Net",
                "entityType": "vmw.vrops.VirtualMachine",
                "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:vrops/VirtualMachine:e0a4041c-b209-4fc6-a70b-35ed41e55e83"
              },
              {
                "entityName": "Dina Ubuntu20 Test VM CMBU Net",
                "entityType": "vmw.vra.Resource",
                "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:vra/Resource:155f860d-aec0-38d3-a2ff-80595b5ed7ec"
              },
              {
                "entityName": "Dina Ubuntu20 Test VM CMBU Net",
                "entityType": "vmw.vrni.VirtualMachine",
                "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:vrni/VirtualMachine:90014%3A1%3A5811748746832717863"
              }
            ]
          }
        }
      ]
    }
  },
}
```

Above, you can see the unique ID assign to this virtual machine in each of the VMware Aria (vRealize) services. But what is great is that we do not actually need to know those IDs to get information about the virtual machines from each service. That can be done solely with the VMware Aria Central entity ID.

For example, we can form a query as below if we would want to know the CPU usage from VMware Aria Operations (vRealize Operations) for this virtual machine.



```
GraphQL
1 {
2   queryEdsEntities(entityId: "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:ensemble/vm:25f7bec2-0f20-3957-f589-606eaa1d811") {
3     edsEntities {
4       entityName
5       entitiesIn(service: "vrops") {
6         edsEntities {
7           stats(input: {statKeys: ["cpu|usage|hz_average", "cpu|usage_average"]}) {
8             key
9             data
10          }
11        }
12      }
13    }
14  }
15 }
16
```

We are using the entity ID but specifically asking for data from VMware Aria Operations (vRealize Operations). This returns the “latest” metric values, but can optionally add begin and end timestamps, rollup type, and other options as will be using the VMware Aria Operations (vRealize Operations) REST API.

```
{
  "data": {
    "queryEdsEntities": {
      "edsEntities": [
        {
          "entityName": "Dina Ubuntu20 Test VM CMBU Net",
          "entitiesIn": {
            "edsEntities": [
              {
                "stats": [
                  {
                    "key": "cpu|usagemhz_average",
                    "data": [
                      19.266666412353516
                    ]
                  },
                  {
                    "key": "cpu|usage_average",
                    "data": [
                      0.42399999499320984
                    ]
                  }
                ]
              }
            ]
          }
        }
      ]
    }
  }
}
```

Now let us look at how you can perform actions on entities with the API.

Taking Action with Mutations

In REST, you typically use methods like PUT or POST to trigger some activity via API requests. In GraphQL, this is an operation type of mutation. First, we need to know what actions are available. This query is used to find the actions to use for an entity.

The screenshot shows a GraphQL IDE interface with a query editor. The query is as follows:

```
1 {
2   queryEdsEntities(filter: {field: "entityName", operator: STARTSWITH, values: "iperf"})
3   edsEntities {
4     entityName
5     entityId
6     actions {
7       actionDefinitions {
8         definitions {
9           actionDefinitionId
10        }
11      }
12     actionRequests {
13       actionRequests {
14         actionRequestId
15         requestedBy
16         createdOn
17         actionRequestStatus
18       }
19     }
20   }
21 }
22 }
23 }
24 }
```

VMware Aria Central responds with the available actions, and the availability depends on the state of the entity. For example, this virtual machine is powered on, so we see there is an action for power off, but not for power on – like how the vCenter UI would show power on actions as unavailable.

```

{
  "entityName": "iperfc-tcp-5bfced-3-mcm544830-186961348460",
  "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:ensemble/vm:b78f2093-cce6-950b-9664-9eb1ea4ef88b",
  "actions": {
    "actionDefinitions": {
      "definitions": [
        {
          "actionDefinitionId": "vra.vm.power.off"
        },
        {
          "actionDefinitionId": "vra.vm.remote.console"
        }
      ]
    }
  }
},

```

You may have noticed that we have queried for “actionRequests” and that returns a list of actions taken on this entity. That’s a way to audit activity.

```

},
"actionRequests": {
  "actionRequests": [
    {
      "actionRequestId": "5a5d6cd4-98b9-57f1-7ebd-67abd8f48f6a",
      "requestedBy": "nicks@vmware.com",
      "createdOn": "2021-12-14T18:23:42.697891Z",
      "actionRequestStatus": "SUCCESSFUL"
    },
    {
      "actionRequestId": "7626b38f-153e-5525-f66a-fc5994d24d7f",
      "requestedBy": "nicks@vmware.com",
      "createdOn": "2021-12-14T16:40:25.222427Z",
      "actionRequestStatus": "SUCCESSFUL"
    },
    {
      "actionRequestId": "a83f564e-a2f4-22ea-a7ec-101626b4d3b5",
      "requestedBy": "nicks@vmware.com",
      "createdOn": "2021-12-13T18:16:08.015041Z",
      "actionRequestStatus": "SUCCESSFUL"
    },
    {
      "actionRequestId": "5084351d-edfe-8475-1f97-23ed2e2892a5",
      "requestedBy": "nicks@vmware.com",
      "createdOn": "2021-12-13T16:14:15.38996Z",
      "actionRequestStatus": "SUCCESSFUL"
    }
  ]
}

```

To start the power off action, we send a mutation request and provide the entityId and actionDefinitionId from the query above. Let us also request the actionRequestId and Status to make sure the action was successful.

```
GraphiQL ▶ Prettify Merge Copy History
1 mutation {
2   createActionRequest(actionRequestInput: {
3     entityId: "vnn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:ensemble/vm:b78f2093-cce6-950b-9664-9eb1ea4ef88b",
4     actionDefinitionId: "vra.vm.power.off"})
5   {
6     actionRequestId
7     actionRequestStatus
8   }
9 }
10
```

We see the action was started.

```
{
  "data": {
    "createActionRequest": {
      "actionRequestId": "b9b6da49-674e-0ee7-0b3a-55ad5d514cd5",
      "actionRequestStatus": "INPROGRESS"
    }
  }
}
```

Now, we can check a few minutes later to confirm that it is completed.

```
{
  "data": {
    "queryEdsEntityById": {
      "actions": {
        "actionRequests": {
          "actionRequests": [
            {
              "actionRequestId": "b9b6da49-674e-0ee7-0b3a-55ad5d514cd5",
              "requestedBy": "jelzein@vmware.com",
              "createdOn": "2022-02-24T22:01:23.399545Z",
              "actionRequestStatus": "SUCCESSFUL",
              "actionDefinition": {
                "actionDefinitionId": "vra.vm.power.off"
              }
            }
          ]
        }
      }
    }
  }
}
```

Success! You may have noticed that the action is taken through the VMware Aria Automation (vRealize Automation) service so that actions are committed within the policy and governance set by Cloud Administrators.

VMware Aria Central API will allow you to simplify automation by using a single API to retrieve information about and take action on business applications and workloads.

Previewing VMware Aria Central's Platform Architecture

As every IT organization is confronted by a universal problem of specialized management tools that do not share a common language, it needs a real solution. This is challenging even when the tools are provided by the same vendor.

For the individual practitioner within an IT domain (networking, security, development, etc.) this lack of commonality may not always be an obstacle to day-to-day operations. However, for cross-team productivity the need for quick access to and understanding of the domain-level information is critical to reduce time spent on discovering, diagnosing, and resolving application performance and availability issues.

Consider an application such as a CRM system. These can be complex behemoths with hundreds of interconnected and interdependent services. Likewise, there are multiple teams supporting this application and its components – and each of the teams likely has multiple tools for monitoring the application's performance, availability, security, capacity, and more.

Thus, there exist pockets of valuable information that, in an urgent situation, need to be compiled and collated in a meaningful way. Traditionally, this results in the infamous 'bridge line' or 'situation room' where an incident manager assembles the experts for all teams that they believe need to be involved just to collect and analyze this dispersed data. A lot of time has already been lost between the start of the problem and the start of problem resolution.

Now, imagine a world where teams maintain their own tools, and nobody needs to learn to work differently. Instead, the various data pools are connected to a single service. This service would:

1. Ingest inventories from all tools and normalize them under a federated model
2. Fetch minimal data to understand critical information from each tool about the entity
3. As needed, fetch additional information, or request appropriate actions from each tool
4. Discover and document relationships between entities as a source-of-truth
5. Provide a federated API for any tool to request information from any other tool

Having such a platform unleashes the potential for so many other services and capabilities. And that is the idea behind VMware Aria Central. It will unify all the VMware cloud management services in a way not previously possible.

A Federated Data Model

VMware Aria Central will be offered as a service and is being built upon a modern application framework of micro-services. It will not inherit legacy constructs or limitations that would constrain or prohibit integration with any cloud management tool.

At the core of the platform is a proven technology used by VMware CloudHealth Secure State, the Entity Data Service (EDS). This is a [graph database](#) that can scale large customers with over 200 million virtual machines plus related objects (around 1 billion graph entities).

As inventory is collected from each VMware Aria provider service (vRealize Operations, vRealize Automation, vRealize Network Insight, etc.) and constructs a non-opinionated model of the cloud inventory. Let us clarify, "non-opinionated" means that EDS makes no assumptions and does not specify how things should look. Essentially, EDS is not limited to VMware architecture constructs. It can (and does in CloudHealth Secure State) consume native public cloud inventory. There is no practical limitation on extensibility.

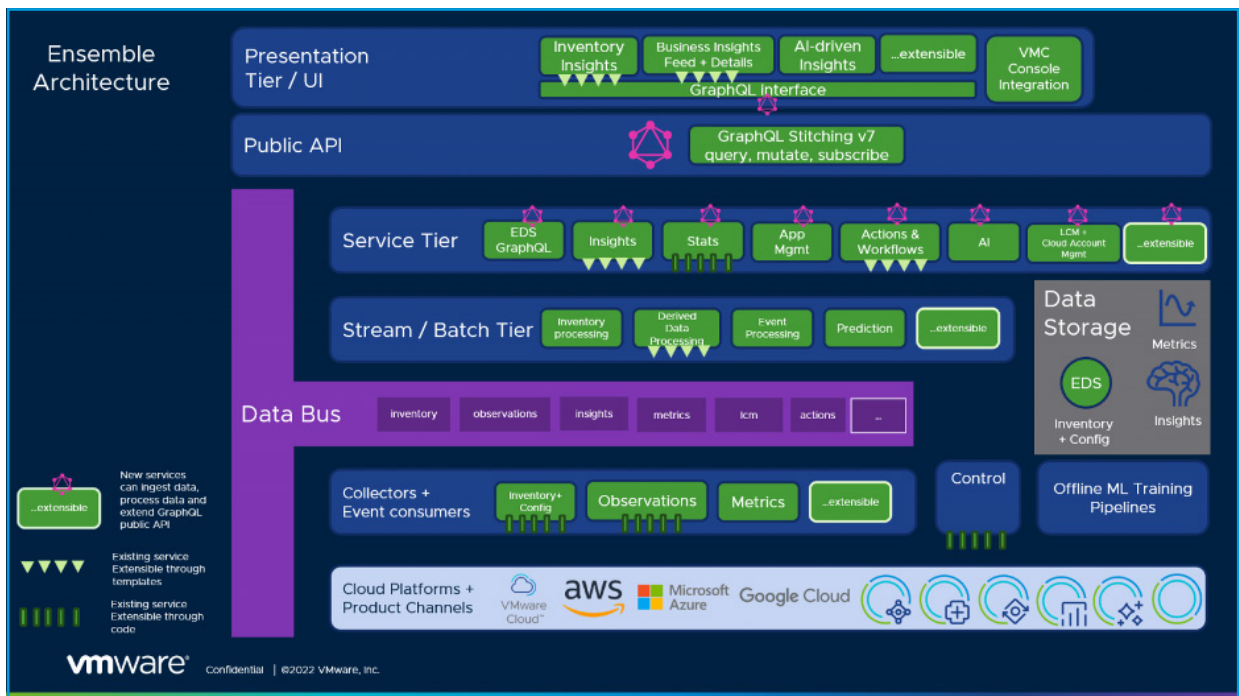
The entities in EDS are assigned a unique and canonical resource identifier that embeds within them the location, type, and instance identity of the underlying managed resource. This format allows EDS and its collectors to normalize the different data models from different providers and merge the different views obtained from different providers, joining together those separate product namespaces into a common entity in EDS. The screenshot below shows an example of the identifier for a virtual machine.

```

{
  "data": {
    "queryEdsEntities": {
      "edsEntities": [
        {
          "entityName": "Dina Ubuntu20 Test VM CMBU Net",
          "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:ensemble/vm:25f7bec2-0f20-3957-f589-606eeaa1d811",
          "entitiesIn": {
            "edsEntities": [
              {
                "entityName": "Dina Ubuntu20 Test VM CMBU Net",
                "entityType": "vmw.vrops.VirtualMachine",
                "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:vrops/VirtualMachine:e0a4041c-b209-4fc6-a70b-35ed41e55e83"
              },
              {
                "entityName": "Dina Ubuntu20 Test VM CMBU Net",
                "entityType": "vmw.vra.Resource",
                "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:vra/Resource:155f860d-aec0-38d3-a2ff-80595b5ed7ec"
              },
              {
                "entityName": "Dina Ubuntu20 Test VM CMBU Net",
                "entityType": "vmw.vrni.VirtualMachine",
                "entityId": "vrn/org:e08fda55-fe6d-4787-8d71-0c995e1abf3b/provider:vrni/VirtualMachine:90014%3A1%3A5811748746832717863"
              }
            ]
          }
        }
      ]
    }
  }
}

```

While EDS provides a CMDB-type organization of the cloud infrastructure and workloads, there are other services that enhance this data. More importantly, the presentation layer (e.g. the graphical user interface) will be leveraged and extended by other products for cloud management, migration, and governance.



Notable Platform Services

The diagram above should help in understanding where the services (explained here) are situated within the platform

- **Stats Service and Derived Data Service:** The Stats service allows providers to integrate their own time-series metric data for each entity. The metric data is not copied or stored within EDS, but rather is fetched as needed via the providers' APIs. The Stats service also provides some forecasting functionality. The Derived Data service listens for events, alerts, and notifications from the providers. It also can create platform-specific metrics which are stored within the VMware Aria Central data store. Essentially, these two services work together to provide metrics and observations based on trending and forecasting to feed the Business Insights service.
- **Business Insights Service:** This service federates the observations generated from the Derived Data service, through a template-driven framework, to create insights. Insights identify the impacts of the observations on performance, capacity, cost, security, availability, and connectivity. More importantly, these insights consider the reach of the issue and the associated entities that may be impacted.
- **Data Bus:** The superhighway for data exchange, the event-driven data bus supports not only ingestion of inventory, alerts, events, metrics, and more, but also provides data feeds for updates to the different models. This can be tapped into by the user through the GraphQL API to subscribe to selected change feeds in real-time.
- **Lifecycle Management:** This service supports onboarding (and offboarding) for customers to provide very fast time-to-value by deploying and configuring VMware Aria (vRealize) services to begin feeding the platform with inventory data.

Foundational Architecture for the Future

The architecture of VMware Aria Central is modern, scalable, and extensible. It provides a non-opinionated, graph database to normalize inventory data along with additional services to decorate this data with actionable business insights, making it the perfect choice for your cloud needs.

Deep Diving into the VMware Aria User Interface

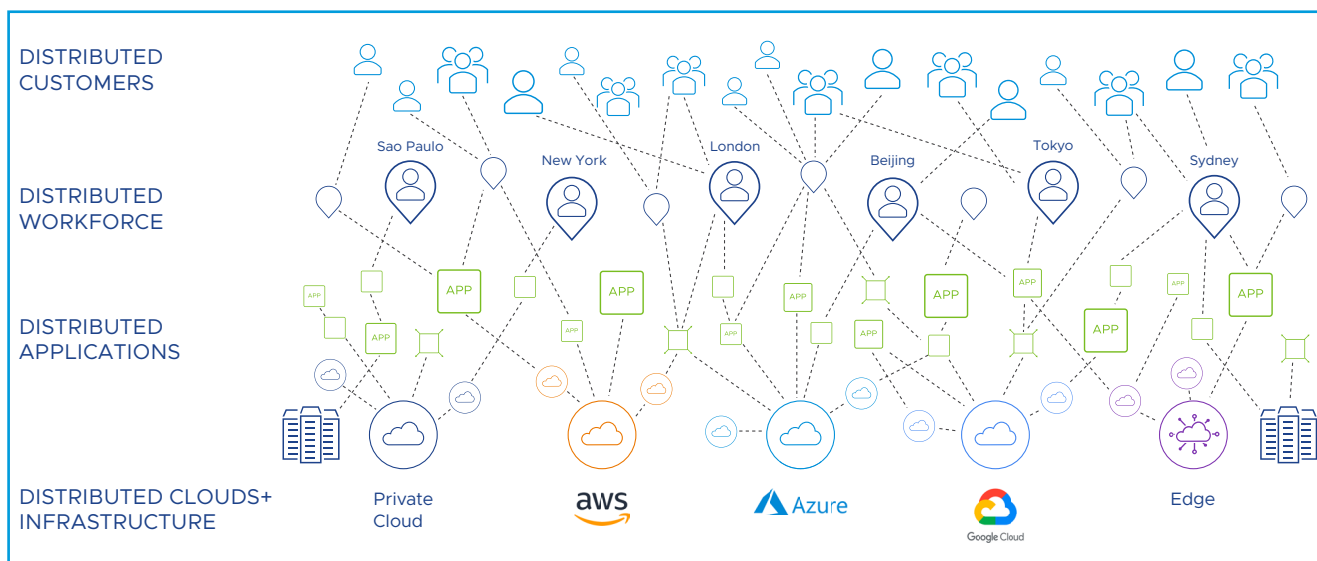
In this part of the *VMware Aria Central series*, let's take a tour of the new user interface in development. In the *first part, we discussed the API first approach for VMware Aria Central* and in the *second part, you learned about the platform architecture*. In both parts, we discussed the federated data model used by VMware Aria Central to collect and rationalize cloud management inventory and configuration data into a single, extensible Entity Data Service, upon which other services and capabilities can be added. In this part, you will see how this federated view is surfaced to the user.

Information Overload

A common problem faced by users of any management console is how to find important information quickly and then act on that information. Some user interfaces do a better job than others and the experience can differ vastly from product to product.

Considering that most IT user interfaces are designed for a trained or experienced practitioner, it is not surprising that many first-time users feel lost and spend much of their time just learning to navigate and explore. Compound that by the number of tools that a practitioner uses daily. Introducing a new tool, interface or service increases the difficulty in getting to the information needed to perform common, daily tasks.

Nowadays, the developers have access to the tools IT typically restricted them from in the past. Thanks to public cloud services, developers are free to deploy and manage their own platforms and even infrastructure as a service without the need to wait on IT. The trouble is that IT has lost governance and control over security, performance, capacity, and cost. The problem has essentially flipped. Controlling and managing resources, users, applications, workloads, and policies across multiple clouds is practically impossible to do without a common, federated view.



What would a singular user interface look like with the following capabilities:

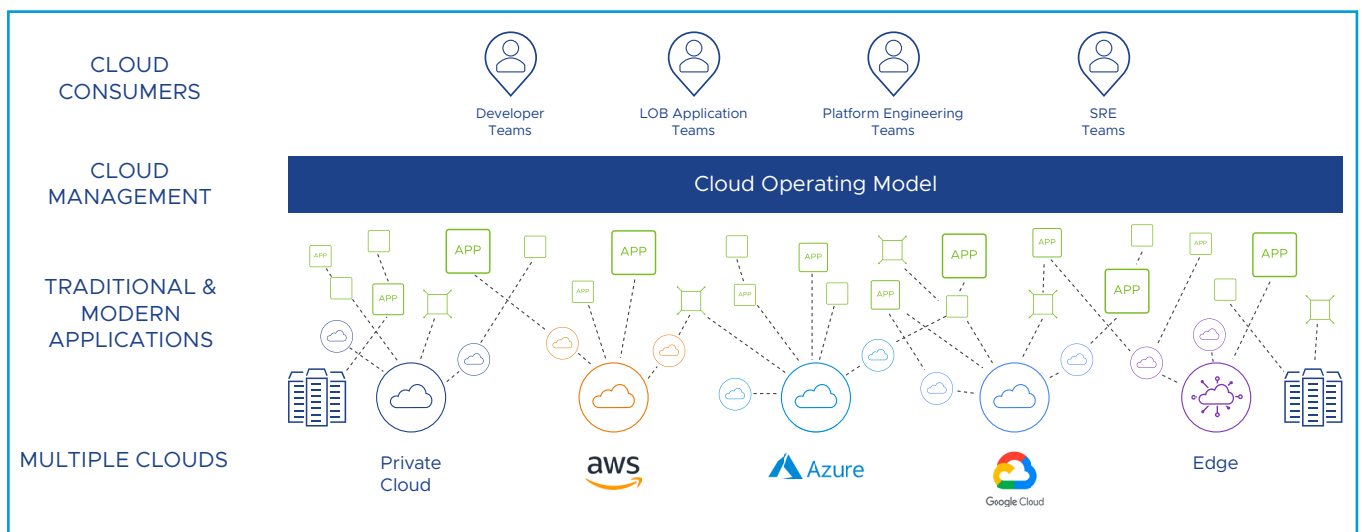
- Customized visualization of a user's applications in a way that intuitively shows the information they care about most
- Consolidation of IT tool data into a higher-level view with the ability to launch, in context, into specialized tools and services
- Global search capabilities across all environments and clouds
- Self-service for consumers from cradle to grave for their applications and workloads

These features would finally address an age-old problem most organizations face, which in essence boils down to the unification of IT and business to accelerate growth, adopt new technologies, and mature operations at a scale not possible previously.

Empowering a Cloud Operating Model

If you are not familiar with the concept of a Cloud Operating Model, [you can read more about it here](#). To summarize, a Cloud Operating Model allows customers to move from a traditional IT operating model and accelerate digital transformation in three key areas:

- Automated Service Delivery to increase speed and agility.
- Performance Management to optimize and drive efficient operations
- Cost and Capacity Management to govern and optimize spend and drive accountability

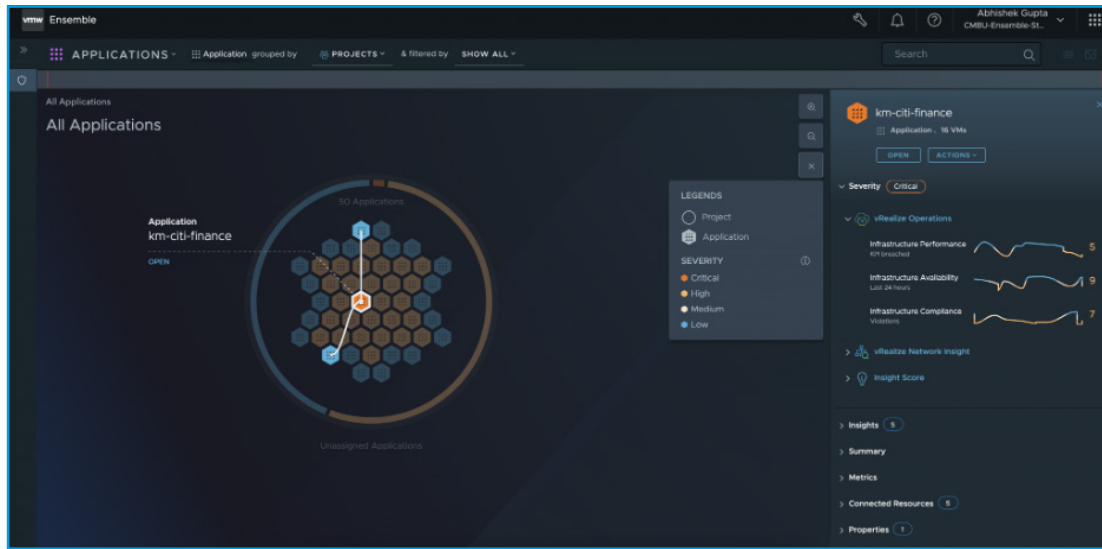


This means customers will need insights into many datapoints for their applications as well as day-to-day lifecycle management. This is all possible within VMware Aria Central's user interface, which is both persona and application-centric in presentation of the information required to adopt a Cloud Operating Model.

Persona and Application Centric

Two key principles guide the VMware Aria Central user interface: Personalized user experience and application-focused views and analysis. This means that both cloud consumers such as developers and application owners and cloud providers such as cloud administrators and network engineers can all use VMware Aria Central in a way that is meaningful to each of them. And it further means that the most important part of the cloud, the applications which run on them, is the focus of everyone.

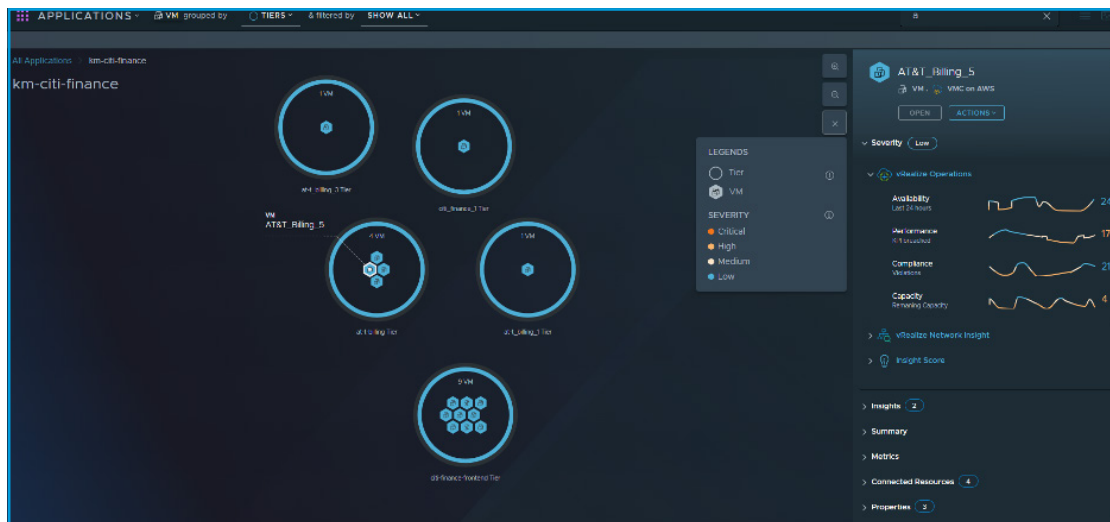
Upon login to the VMware Aria Central user interface, it is easy to see that this is not your typical, legacy IT view. Instead of focusing on infrastructure, cloud resources, or networks, a user is presented with all the applications associated with project membership. Right away, they can see their applications and the workloads that comprise them.



Applications are discovered by VMware Aria (vRealize) services, such as VMware Aria Operations for Network (formerly vRealize Network Insight Cloud), and are curated in VMware Aria Central. Relationships between applications and application components are also derived from the underlying services feeding VMware Aria Central.

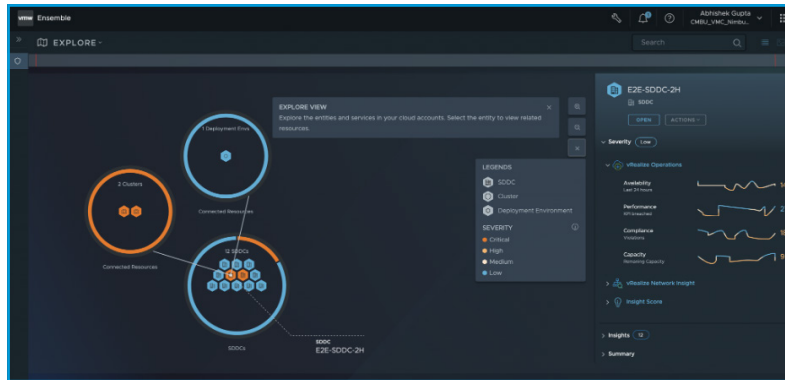
Note the additional details, actions, and insights for the selected application on the right side of the screen. This provides a consolidated view from all VMware Aria (vRealize) services feeding VMware Aria Central which reduces “mouse click fatigue” for the user. All practical information is exposed within a single view.

From this view, the user can click into applications for more detail.



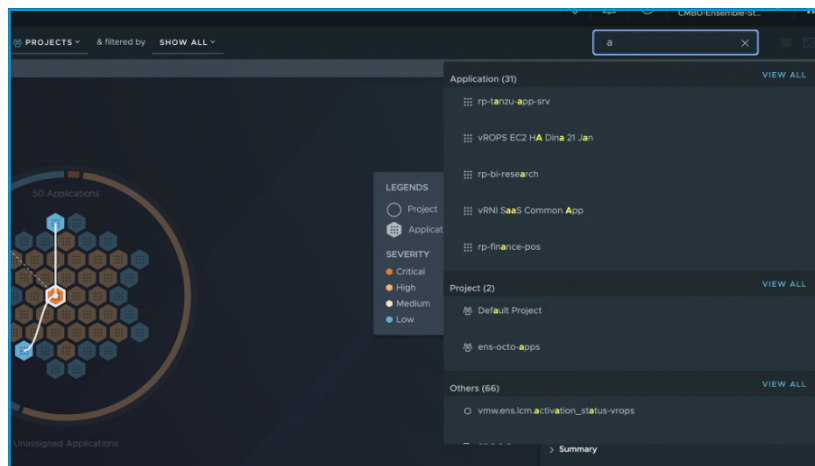
From here, the application tiers and tier membership can be explored. Again, these tiers are determined by data provided from services feeding VMware Aria Central and with additional insights from VMware Aria Central. The application owner can also further curate these tiers and add additional members or tiers as appropriate.

Now, let us consider the perspective of an IT practitioner. Cloud providers are most concerned with making sure the infrastructure and services are meeting SLAs for performance, availability, and security. Instead of a top-down view, they are more likely to start with a view of the infrastructure. In this screenshot, we can see such a view



The view is consistent with the application view and functions similarly drawing attention to problem areas, providing insights and available actions as well as summary information from VMware Aria services for each infrastructure entity. Of course, this view does allow the user to navigate to related applications. This is helpful in determining the potential impact of an infrastructure outage or problem on the hosted application workloads. Recall that VMware Aria Central knows which projects own which applications, so alerting application owners to potential issues is easy.

Of course, the cloud provider persona also needs to respond to the application owner's requests for help. Navigating to the application in question directly to start investigation of issues top-down is an important capability. For that, VMware Aria Central offers a global search, allowing users to enter a free text search for applications and other entities.

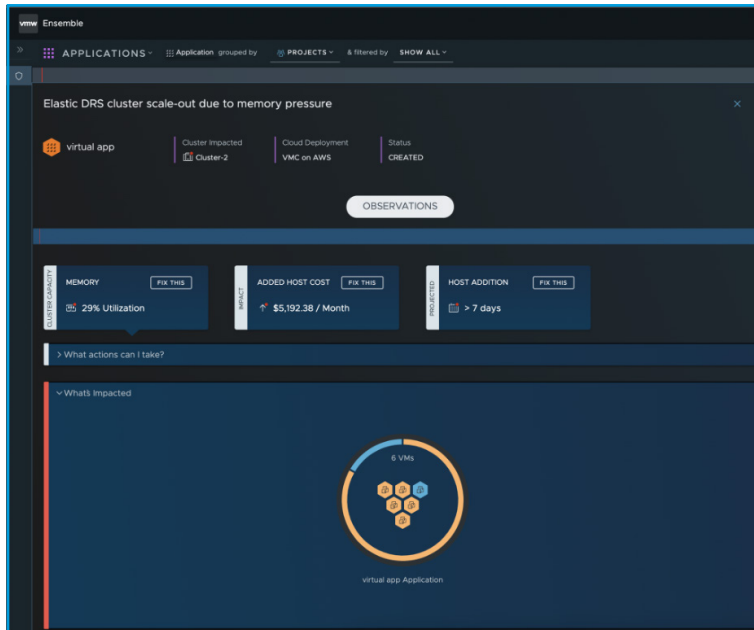


As shown in the screenshot above, the search function gives fast results with an auto-suggestion so that users do not have to complete a query to get results.

We have mentioned "insights" several times in this document, and you might be wondering what that means in VMware Aria Central. Simply put, insights help the user understand the problem and the context of the problem as well as likely outcomes if action is not taken.

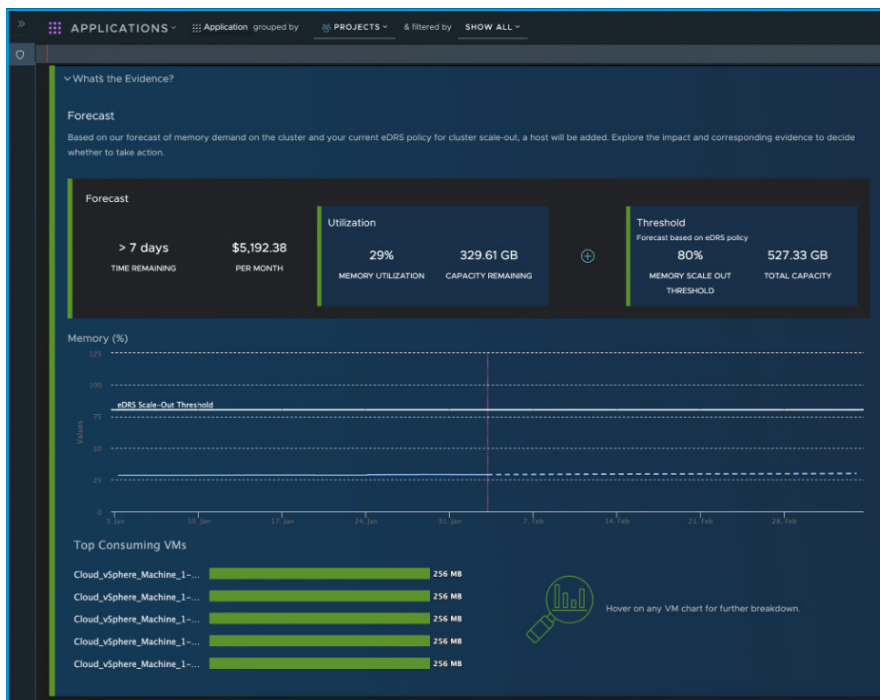
Insights are based on observations, which aggregate alerts, notifications, and other notable changes from the data feed from the underlying VMware Aria (vRealize) services.

For example, the insight shown below describes a memory pressure threshold violation on a VMware Cloud on AWS cluster, which will result in an Elastic DRS deployment of an additional host.



Included are the high-level details of the problem, the timeframe for any projected impact, and the cost of adding an additional host. Based on this, the user can take any of the actions presented to either reduce the memory pressure and avoid the automated scale-out or decide to increase capacity in the cluster right away.

Not shown in the screenshot above, but presented below, is an overview of the evidence gathered by VMware Aria Central to support the observation and insight.



You can see that the capacity forecast has predicted this eDRS action based on the eDRS policy settings, historic memory usage, and trends. Also provided are details on top consumers of memory, with optional details via a breakdown of resource usage for each virtual machine.

Keep in mind, as previously stated, that these screenshots and workflows are currently in development and may change significantly before availability. However, this will give you a solid understanding of the purpose and intent of the VMware Aria Central user interface.

In this series, you have learned about our *API First approach using GraphQL* to elegantly query VMware Aria Central and all cloud management services from a single API request. You also saw how *VMware Aria Central architecture is a foundational approach for a common data model* for existing and new services from VMware. And of course, this part explored the VMware Aria Central user interface which focused on persona and application-centric views and workflows.

Unify Your Multi-Cloud Environment

VMware Aria Central will be available within VMware Aria Universal Suite, which combines SaaS and on-premises capabilities into one license. With a unified platform and a unified license, you can unify your multi-cloud environment at any stage of your cloud journey.

Learn more at: <https://www.vmware.com/products/vrealize-cloud-universal.html>

