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CliQr CloudCenter™ with Cisco ACI

Common Use Cases

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1 Executive Summary

CliQr CloudCenter™ is an application-centric hybrid cloud management platform that securely provisions infrastructure resources and deploys application components to more than 19 datacenter, private cloud, and public cloud environments. CloudCenter's application-centric hybrid cloud management is an ideal fit with Cisco Application Centric Infrastructure (ACI) and policy-based network management.

IT organizations pursuing a Hybrid IT strategy need flexibility in how and where applications are deployed in datacenter, private, and public cloud environments. CloudCenter users can self-service, on-demand deploy applications to any environment. But when they choose to deploy an entire application or just a single tier to an environment with ACI managed network, they get public cloud agility with greater network security, and more cost effective deployment options than public cloud alone.

CloudCenter and Cisco ACI together provide a single solution that gives IT organizations ultimate flexibility to choose the best deployment option for a wide variety of enterprise IT workloads. CloudCenter with Cisco ACI provisions infrastructure and securely deploys applications based on the desired end state and needs of the application. CloudCenter automates the entire application deployment process and communicates directly with Cisco ACI's APIs to automate creation of ACI policy objects including Application Network Profiles, End Point Groups, Contracts, Filters and any other objects required for micro-segmented secure communications.

IT gets optimal network security and operational efficiency without having to manually create and maintain policies, and without having to learn new programming languages. Users get self-service on demand flexibility, without needing any network skills or knowledge of cloud environment details. Scaling and end-of life actions are automated as well, resulting in updates and termination of network policies.

This paper summarizes three powerful uses cases enabled by CloudCenter and Cisco ACI deployments.

2 Introduction

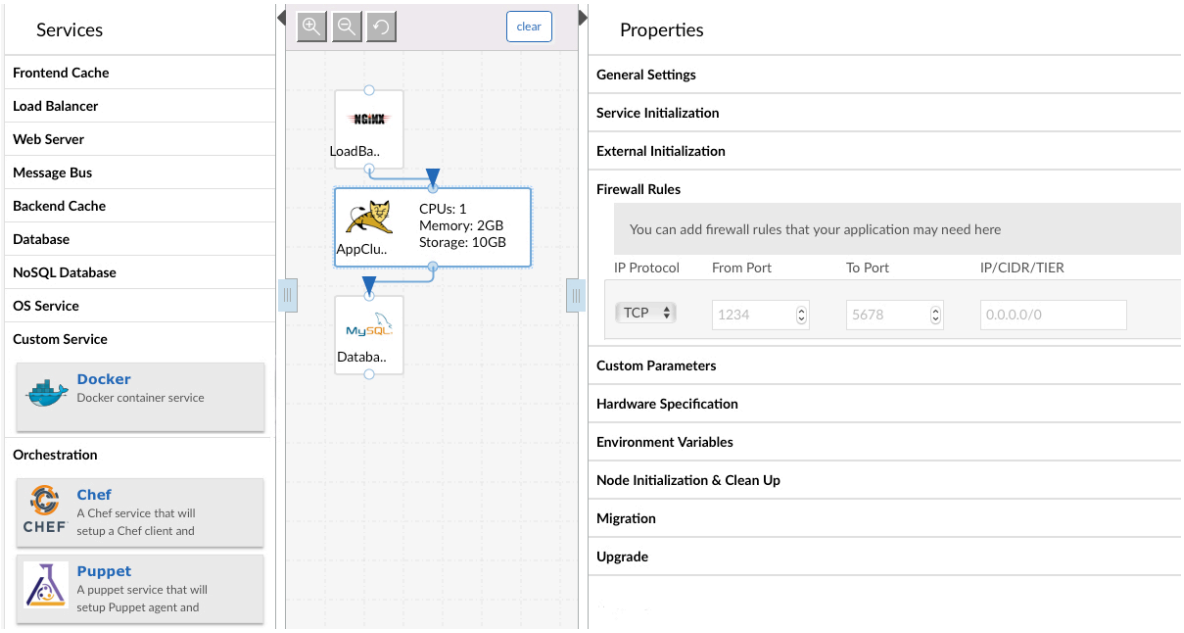
Cisco Application Centric Infrastructure (ACI) increases network security, automates communication policies based on business-relevant application requirements, and decreases developer wait time to accelerate application deployment in the next-generation Data Center.

At the core, ACI application policies are whitelists within a zero-trust model ensuring that no communication is allowed between application tiers, unless a policy specifies that an object can be on the network, which other objects it can talk to, and what it can talk about. Cisco ACI translates and applies the logical business driven policy definitions into concrete infrastructure configuration.

CloudCenter™ is an application-centric hybrid cloud management platform that provisions infrastructure resources and securely deploys application components to more than 19 datacenter, private cloud, and public cloud environments. Users can easily model, self-service deploy, and then manage both new and existing applications without detailed knowledge of the underlying environment, cloud services, or APIs.

Users work in CloudCenter's drag-and-drop modeler as seen in Figure 1 to create a cloud agnostic and portable application profiles that can be deployed to any environment. Users can choose from a flexible mix of easily customized OS images, application or cloud services, containers, or configuration management tools, to model new or existing, simple or complex applications.

Figure 1. Application profile topology modeler



Each application profile combines infrastructure automation and application automation layers into a single deployable blueprint. With CloudCenter application profile, one CloudCenter platform can be used to deploy and manage any modeled application in any datacenter or cloud environment in a consistent and predictable way.

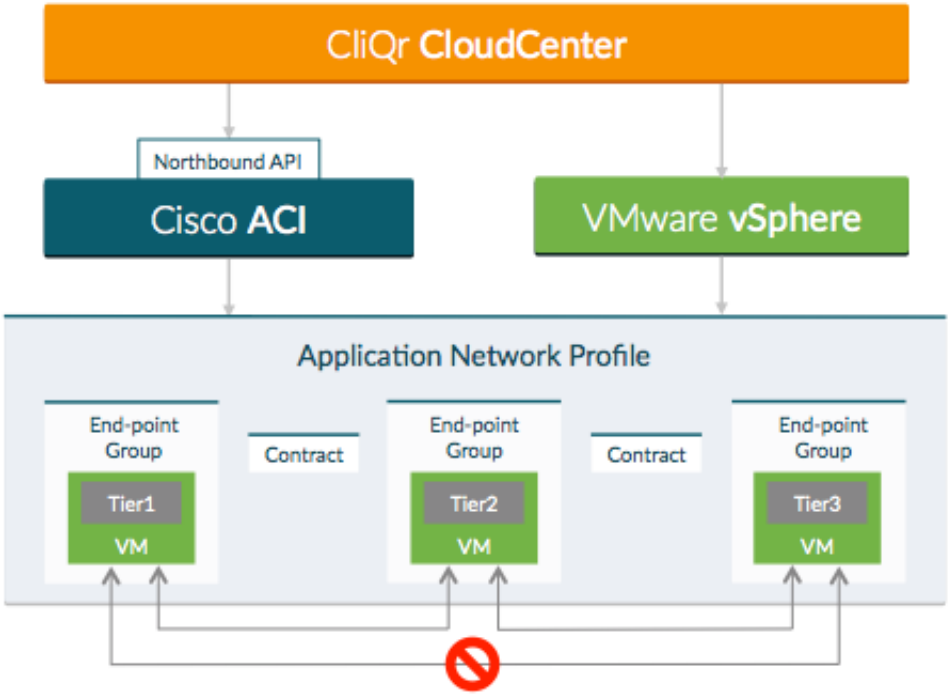
CloudCenter's cloud-agnostic application profile coupled with cloud-specific Orchestrator, abstracts the application from the cloud, by interpreting the needs of the application and translating those needs into cloud specific API calls. As a result, CloudCenter eliminates cloud-specific scripting and cloud lock-in that often reduce both developer and IT operations efficiency.

Working with Cisco ACI

CloudCenter works seamlessly with Cisco ACI. If a user chooses to deploy the application profile to an environment managed by Cisco ACI, nothing additional is required by the user or network administrator. CloudCenter interprets the needs of the application, calls Cisco ACI northbound API to automate network policy objects that deliver the full power of a software defined network.

CloudCenter and ACI are often deployed in an environment that has VMware or OpenStack APIs as seen in Figure 2.

Figure 2. CloudCenter with Cisco ACI and VMware vCenter



CloudCenter and ACI work together without installing plugins, without creating environment specific scripting, or modifying any application code. Network administrators don't need to learn programming languages to get the most out of the ACI programmatic interface.

The flow of orchestration managed by CloudCenter includes:

1. **Model Application Profile**—A service manager can use the CloudCenter graphical UI to create a cloud agnostic application profile and then share with specific users or publish to a marketplace.
2. Self-Service Deploy—role and user-based access controls, paired with tag-based

governance, help users choose appropriate deployment environment that optionally includes ACI.

3. Create and Deploy APIC Policy Objects—If a user chooses an environment that is part of an ACI fabric, CloudCenter automates creation of the appropriate policy objects and calls APIC northbound REST API to create networks specifically for the application.
4. Provision Infrastructure—CloudCenter calls infrastructure APIs (for example, OpenStack, vCenter) to provision compute, memory, and storage in the appropriate network segment.
5. Deploy Application Tiers – CloudCenter deploys and orchestrates all application components based on the topology and dependencies modeled in the application profile.
6. Ongoing management – Both user and admins can review the deployment progress and take action to ensure proper configuration.
7. Block East-West Traffic—if a tier is manually or auto-scaled, CloudCenter updates ACI policies to block east-west traffic and confine breaches to a single machine if compromised.
8. End-of-life - Infrastructure and network policy objects are automatically deleted, preserving the integrity of the network as well as conserving infrastructure resources.

With CloudCenter and Cisco ACI, IT gets a powerful solution that improves security, streamlines application deployment, and increases Dev, Ops and network admin efficiency.

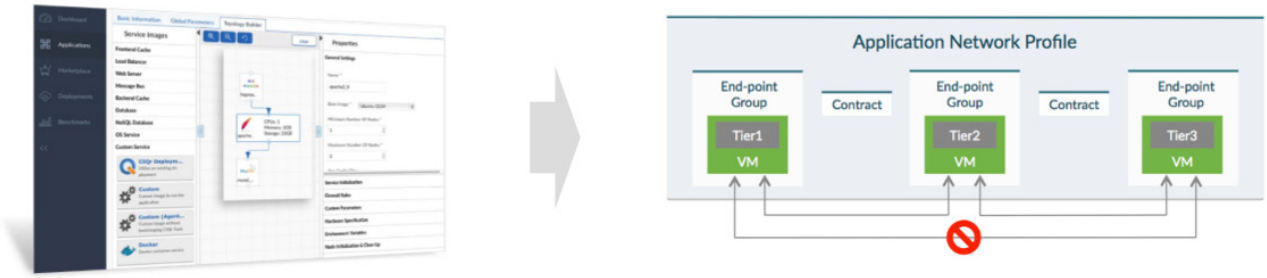
The remainder of this paper outlines three primary use cases for CloudCenter with Cisco ACI.

3 Use Case 1: Securely deploy N-tier application

CloudCenter simplifies and expedites the deployment of an application by programming governance rules, which dictate policies such as infrastructure placement and security profiles. These help to obscure the complexity of increasingly diverse infrastructure environments.

Users get the flexibility of self-service on demand deployment, while network admins are able to control port settings and other security configuration parameters. Security and network directives are included in each CloudCenter application profile that is published or shared with users.

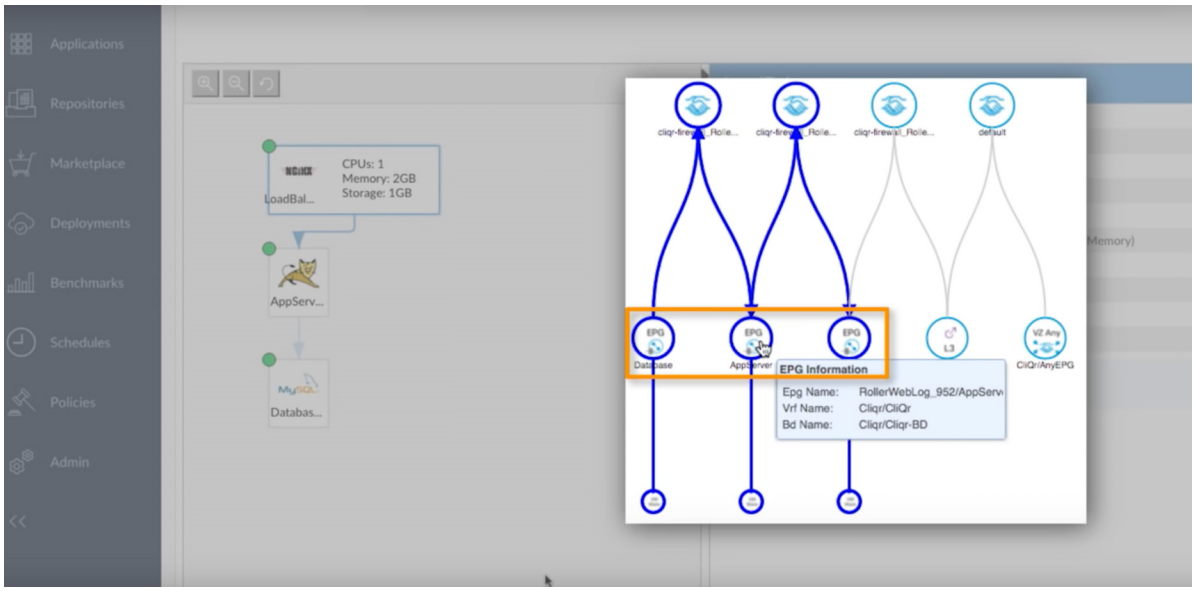
Figure 3. CloudCenter application profile determine ACI application network profile objects



When a user initiates deployment via the CloudCenter Manager as displayed in Figure 3, CloudCenter Orchestrator uses topology and network setting information in the CloudCenter application profile, to automate creation of policy objects for Cisco ACI. CloudCenter Orchestrator calls the local APIC API to instantiate the ACI Application Network Profile (AP), the Endpoint Groups (EPGs) and the Consumer and Provider Contracts based on the topology and security requirements of the CloudCenter application profile. Each application tier is placed in a unique and isolated application tier network. The connectivity between the application tier networks is automatically driven by the application topology.

As seen in Figure 4, the ACI user interface that shows a deployed three-tier application, compared to the CloudCenter interface that shows the same application deployment. The side-by-side diagrams highlight three EPGs as well as contracts that mange network traffic between them.

Figure 4. CloudCenter Orchestration and ACI segmentation



CloudCenter automatically generates Contracts and Filters that restrict the protocol and port access on application tier network based on application stack service requirements contained in the CloudCenter application profile.

Combining CloudCenter and Cisco ACI couples the application topology, the application stack services, the network configurations, and the end-to-end network isolation for both application deployment and individual application tiers. The combined solution provides an intuitive interface to allow both users and admins to review the progress of the deployment. It also ensures that naming conventions are consistent across both platforms.

Once the application is terminated, the auto-provisioned infrastructure objects that are associated with the application are deleted, thereby preserving the integrity of the app lifecycle, minimizing remnant policies that can cause security threat, and utilize valuable memory resources.

4 Use Case 2: Stretched Application Deployment

CloudCenter supports deploying applications with different tiers deployed in different environments. When users deploy, they normally choose a single deployment target datacenter, private or public cloud location that is available to them based on role, governance rules, and other controls. But they also have the option to choose a stretched deployment, and that provides users the ability to select specific target sites for each tier within the application.

Several reasons justify a stretched application deployment:

Reason 1 – Cost. Cloud pay-per-use and scalability is ideal for transitory workloads. But renting infrastructure may not be the best option for long running workloads. As a result, the UI tier of web application or mobile applications may be a great fit for a pay per use environment like a public cloud. But more stable and long running tiers such as application server or database server may be more cost effectively deployed back in ACI managed network in private cloud or datacenter.

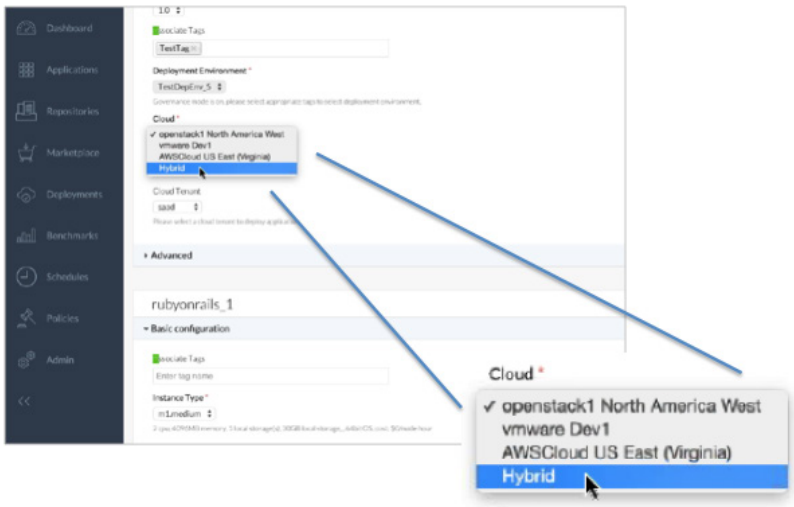
Reason 2 – Security and compliance. Even if the application server or load balancer tiers can be deployed in various other environments, the database tier is a good fit for an ACI managed network environment in the private cloud or datacenter in order to address security and compliance requirements..

Reason 3 – HA/DR master slave configuration. Users can model an application profile that contains both master and slave components that get deployed in different cloud availability

zones, or different datacenter and cloud. If users can one-click deploy full application stack with HA/DR setup in different availability zones or even different datacenter and cloud, they can easily and cost effectively test various failover scenarios and delete the whole setup when done. And, get the same fully-tested configuration automatically deployed for production workloads as well.

With CloudCenter, deploying a stretched application topology is easy when multiple deployment environments are available. At deployment time, the user just selects Hybrid as the target cloud as displayed in Figure 4, and then the UI exposes a separate cloud deployment dropdown for each tier modeled in the application profile.

Figure 5. User selects Hybrid to activate the stretched application deployment feature



Placement decisions for the entire stack or individual tiers can be guided by CloudCenter tagging and rules engine. For example, a HIPPA compliant application can be tagged so users can only choose an ACI managed datacenter for the database tier, regardless of where other tiers are deployed.

CloudCenter with Cisco ACI enables three stretched application deployment topologies. In each case, the user can select the appropriate deployment environment for each application tier, without being required to change the application's architecture or attributes, or have any domain knowledge about ACI or software defined networking. There are no environment specific scripts or workflows that lock any tier into any environment.

Multi-Pod

CloudCenter can deploy N-Tiered applications to a datacenter with multiple Cisco ACI pods. I this scenario, the application can be distributed across different pods in a single datacenter. Different tiers of an enterprise web application can be placed in different networks with different VLANs. ACI's unique label-based, dynamic directional routing ensures that the only the consumer VMs connect to the provider VMs with matching labels. This provides a truly isolated network for each tier in the application.

Stretched Fabric

CloudCenter can deploy N-Tiered applications to a Cisco ACI fabric that is stretched across geographically dispersed sites and over long distances. In this scenario, the application can be distributed to different pods in separate datacenters while taking advantage of the network services provided by the single stretched network fabric. For example the load balancer and the application server can be in Datacenter A and the database can be in Datacenter B. The stretched fabric topology extends the capabilities of Cisco ACI's integration with L4-L7 services.

Multi-Cloud

CloudCenter can deploy N-Tiered applications across a Cisco ACI pod and a public cloud. Part of the application can be deployed a datacenter or private cloud with ACI managed network, and part of the application can be deployed to public cloud. This scenario works for web applications that have edge caching in multiple distributed cloud locations, or mobile aps that have the application tier or database tier back in secure datacenter.

CloudCenter and ACI together offer a truly unique and flexible solution to address the cost, security, and agility requirements for increasingly complex enterprise workloads. The "Profile once, deploy anywhere" capabilities of CloudCenter extend to stretched deployment topologies.

In all these stretched application deployment topologies, the CloudCenter application profile doesn't need to be changed, no environment or topology specific scripting needs to be written and maintained, and the application remains portable.

5 Use Case 3: Migrate Application to ACI Environment

Users can take applications that were previously deployed to non-ACI datacenter and public cloud environments and migrate to a more secure ACI managed datacenter. The joint solution fully automates migration as well as creation of relevant ACI policy objects.

Application workloads that are deployed managed by CloudCenter are made portable across different clouds via the “Migrate” feature. CloudCenter application profiles are cloud agnostic and portable, not hard wired to a single environment. As a result, CloudCenter and ACI support a Hybrid IT strategy that allows users to optimize workload placement based on business need. And easily choose to migrate to, or from, or between different datacetner private and public clouds based on use, governance rules, cost and performance requirements, or application lifecycle phase.

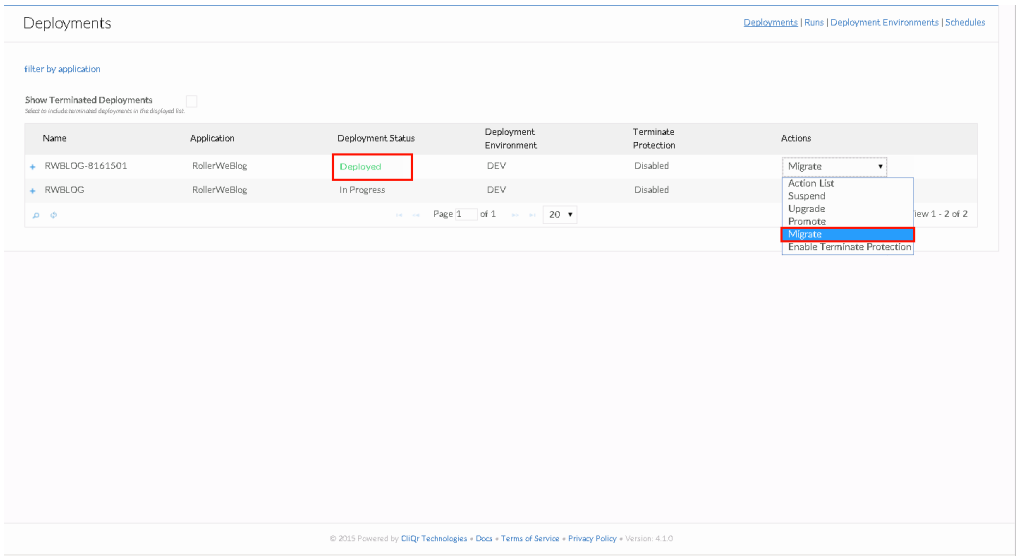
Three primary migration scenarios:

1 – Back from Cloud

Many IT organziatiosn have deplyed appliations as part of a cloud strategy, and are now having some sticker shock as monthly public cloud costs are added up. Or they have concerns about public cloud meets security and compliance requirements. With CloudCenter, users can chose to migrate an application from public cloud back to datacenter or private cloud with ACI managed network.

As seen in figure 6, users can select and existing deployment, and choose a range of management actions including migrate. If an ACI environment is selected as migration target, CloudCenter automates creation of policy objects and instantiates network configuration via APIC API.

Figure 6. User selects migrate for existing deployment. 2 – Cross-cloud SDLC

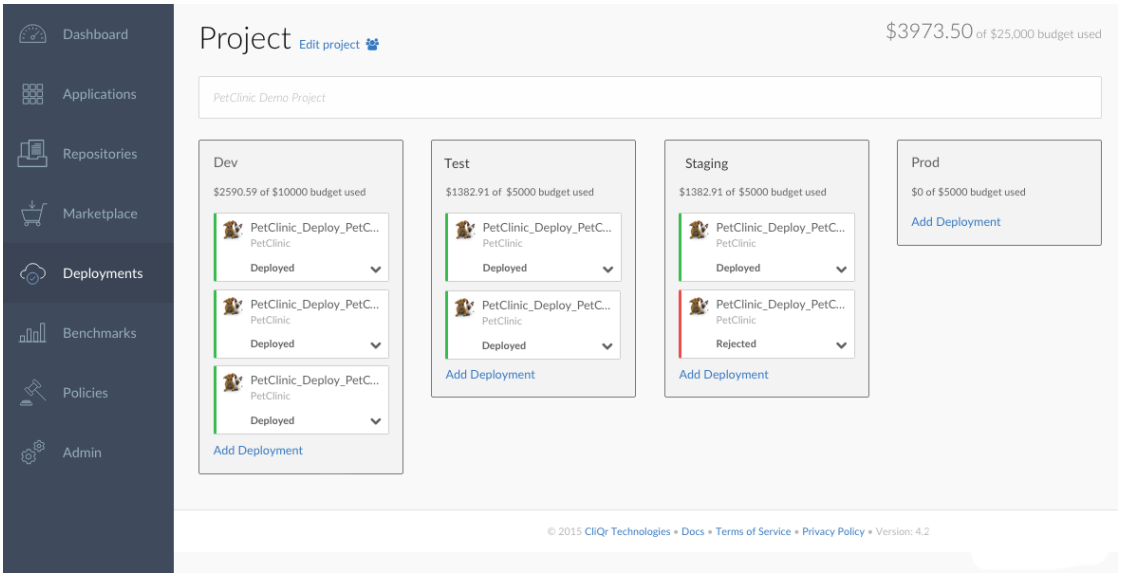


Using public cloud for Dev/Test activities, and production back in datacenter or private cloud, is the most common hybrid cloud use case. CloudCenter supports that scenario with a powerful and integrated CI/CD Project Board feature that manages the end-to-end Software Development Life Cycle (SDLC).

Managers create projects in CloudCenter that mirror their software development lifecycle. They can allocate resources or budget for the overall project or specific phases. User access controls and policies define who can promote code along stages of the lifecycle as well as which cloud is suitable for each phase.

Figure 7. shows CI/CD project board with different stages that each have different owners as well as project budget allocation

Figure 7. CI/CD project board – with ACI environment for production



For a DevOps scenario that includes a non ACI environment for Dev/Test and an ACI environment for production, the CI/CD project board can be set up with a cross environment workflow, that gives developers some choices in pre-production environments, but limits choices in more secure ACI managed network environment for the final production phase.

CloudCenter also includes powerful tagging and governance engine that can modify security settings based on phase. So deployment in a Dev phase might be set up to leave open certain ports. But when migrated to the Prod phase, would not only benefit from micro segmentation applied based on ACI policy, but cloud also automatically close those ports. Conversely, a promotion to Prod might open certain ports for network or security monitoring agents in production.

CloudCenter and ACI together provide unprecedented flexibility and security control not possible with deployments in public cloud environments.

3 - Datacenter Migration

Many IT organizations continue to modify their datacenter footprint as they evolve their Hybrid IT strategy, pursue mergers and acquisitions, and for a host of other business reasons. CloudCenter can streamline the process, and bring workloads into an ACI environment to gain the benefit of software defined networking.

In a migration scenario, IT organizations typically scope the move, then bring existing workloads into ACI environment in phases via a rolling upgrade. By profiling each application, CloudCenter can help convert VLAN ports to ACI managed ports, and get the ACI benefits of traffic monitoring, visibility into packet loss, latency and network loops.

6 Conclusion

CloudCenter is an application-centric hybrid cloud management platform that makes it easy to deploy and manage application datacenter, private cloud, and public cloud environments. However, CloudCenter and Cisco ACI together provide a single solution that gives IT organizations ultimate flexibility to choose the best deployment option for a wide variety of enterprise IT workloads. And, delivers agility, security and efficiency that is unmatched by public cloud alone.

CloudCenter and ACI offer the unmatched ability to security provision multi-tier applications, automate stretched application deployments without modifying application, blueprints, or deployment scripts, and efficiently migrate applications to ACI environments.

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