CloudCenter™ Product Overview

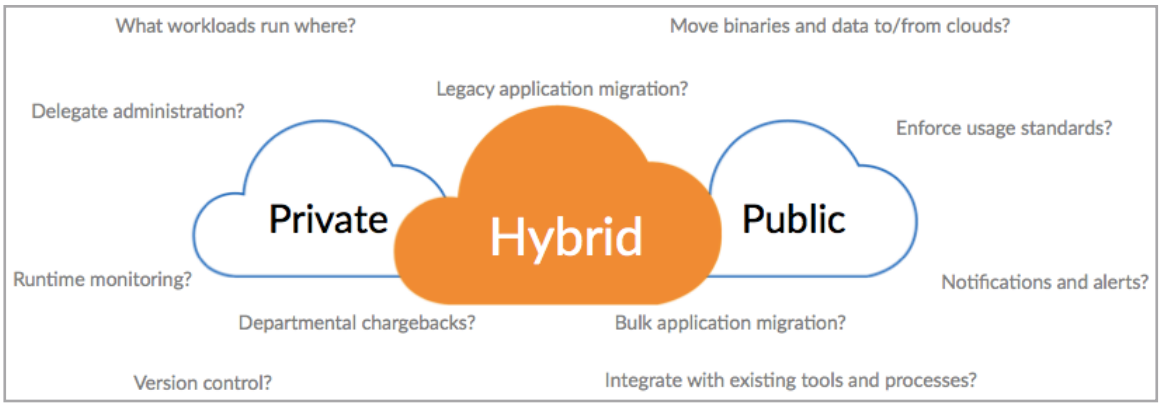
Enterprise Cloud Adoption: Hybrid Wins

Rising out of the virtualization revolution of the early 2000s, Cloud computing has grown rapidly and promises to becoming one of the most important shifts in the way information technology is delivered and managed. At first however, enterprises were skeptical due to a number of questions and concerns around security, unknown and changing costs, and performance inconsistencies. These concerns made it difficult to address business decisions about moving to this new computing paradigm. Despite these natural concerns, experimentation on both private and public clouds became popular. Fast to follow was the debate about the best type of clouds considering the choices that spanned multiple private, managed private, and public clouds.

Through this evolution, users became more educated about natural cloud-based use cases including, but not limited to, Dev/Test, bursting, disaster recovery, and a realization that different applications and workloads perform more ideally on different cloud environments. Factors like price, performance, geographic influence, security characteristics dictated the cloud environment. This market education led to the natural adoption of using the right cloud for the right application.

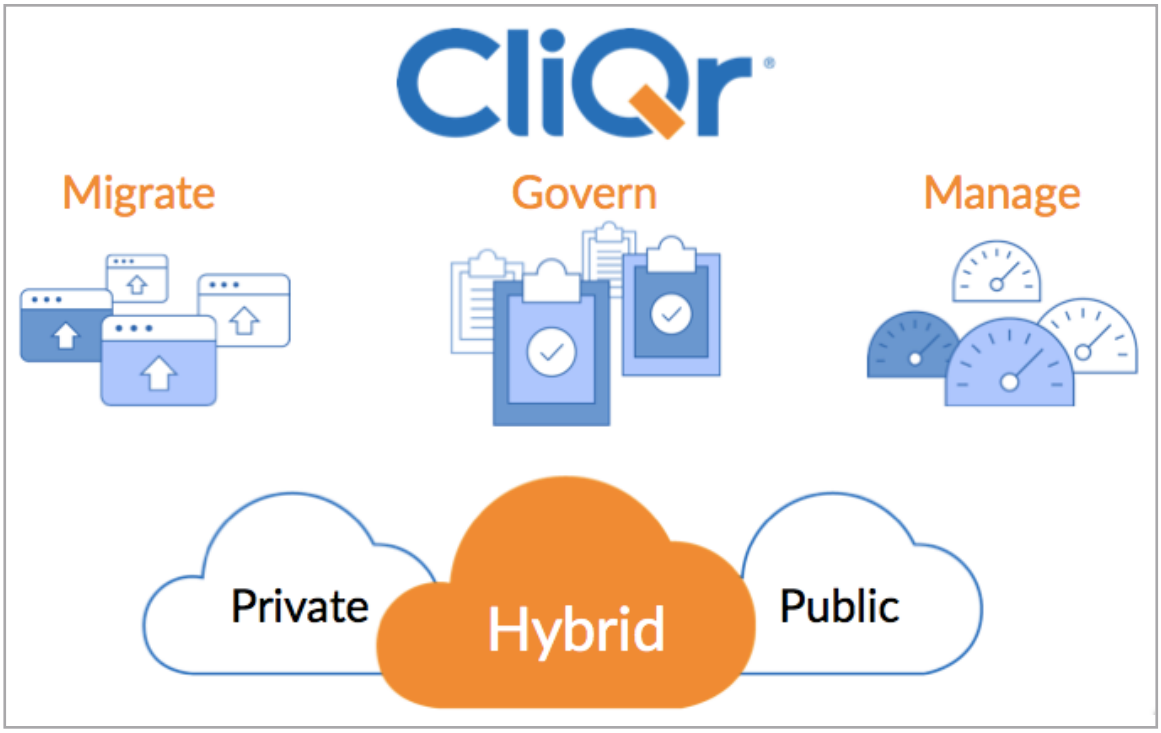
Now What?

Even after secting public and private clouds for a hybrid solution, enterprise were left to deal with a long list of questions around efficiently using cloud implementation.



While cloud vendors provide mechanisms to launch Virtual Machines (VM), what is needed is a hybrid cloud management platform that can help administrators with the full lifecycle that hybrid cloud usage dictates—everything from migrating applications from their current source to governing usage of the new solution so that standards can be enforced, and workloads can be managed in the long term.

CliQr CloudCenter



CliQr CloudCenter effectively answers all these questions, while providing a true enterprise-class hybrid cloud management platform based on these key attributes include:

- Full Lifecycle Management: Migrate, govern, and manage one or many new or existing applications.
- Cloud-Independence: Deploy to physical, private, and public clouds via unique application-centric technology.
- Enterprise-Class: Scalable along multiple axes, integrates with existing tools and processes, extensible with RESTful API and end-to-end data and network security.
- Fast Time to Value: Delivered as a packaged, intuitive platform—NOT a long services project.

With CloudCenter, organizations can get started in a matter of days, not weeks as implemented by other professional services-intensive Cloud Management Platforms. Enterprises can migrate, govern, and manage new and existing applications with broad application-type coverage to straddle all potential needs. They can also maintain portability across physical, private, and public clouds without requiring expertize in each cloud infrastructure.

CloudCenter delivers a single pane of glass that businesses can use to maintain visibility and control over multiple clouds, applications, and users. CloudCenter's policy-based governance allows businesses to determine who can use what on which environment along with monitoring and metering applications, infrastructure, VM, and user control.

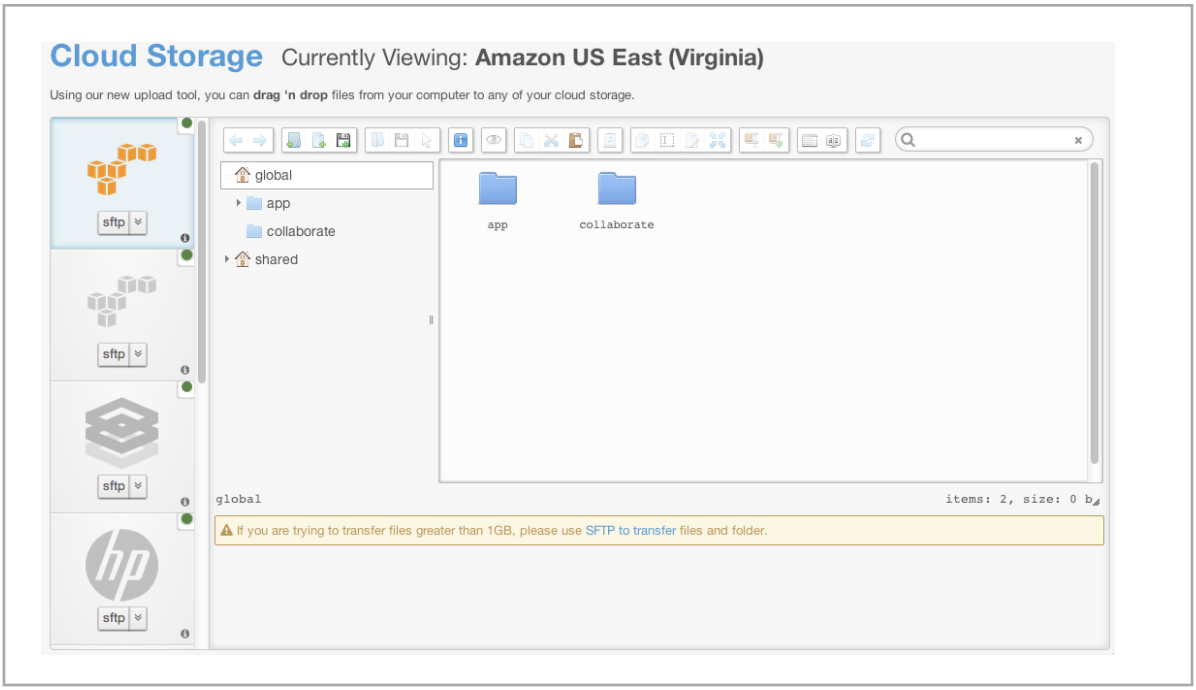
CloudCenter's modular architecture is easy to extend and integrate with existing tools and processes. It is already being used by large organizations along with the capability to efficiently add clouds, applications, and users as needed.

Hybrid Cloud Lifecycle: Migrate

The first step in adopting a hybrid cloud is to migrate applications from wherever they are running currently. CloudCenter recognizes that organizations have different starting points for different applications and as such provides a variety of options to create vendor-independent Application Profiles. Once created, the Application Profile not only makes it easy to move an application onto a target cloud, but as circumstances change, it also makes it simple to move applications to different clouds after the initial Application Profile creation.

Multi-Cloud Storage Management

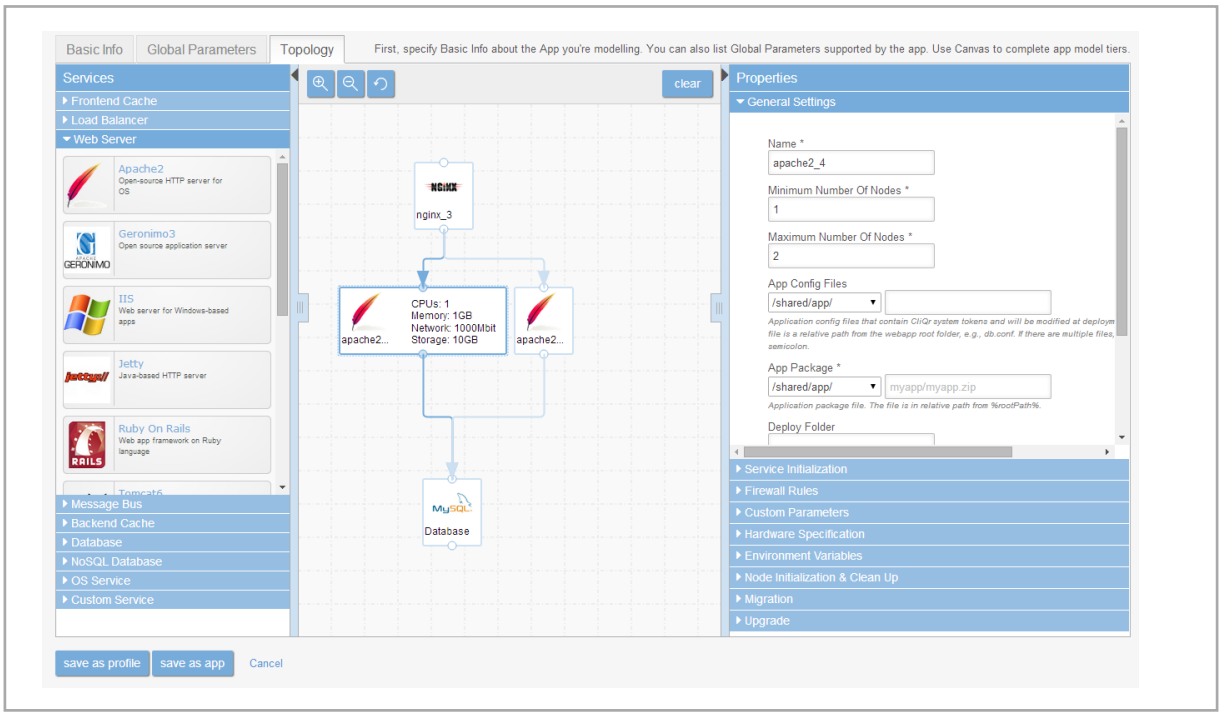
Regardless of the creation method chosen for a particular Application Profile, all binaries and data associated with it are stored in CloudCenter's Multi-Cloud Storage Management repository.



Featuring a drag-and-drop graphical user interface that makes it easy to browse files as well as an SFTP interface for large files, this storage facility contains military-grade encryption while in transit as well as at rest. Each VM created by CloudCenter during a deployment gets this storage mounted on it for easy access to the files. Synchronizing files between clouds simplifies the migration process.

Graphical Topology Builder

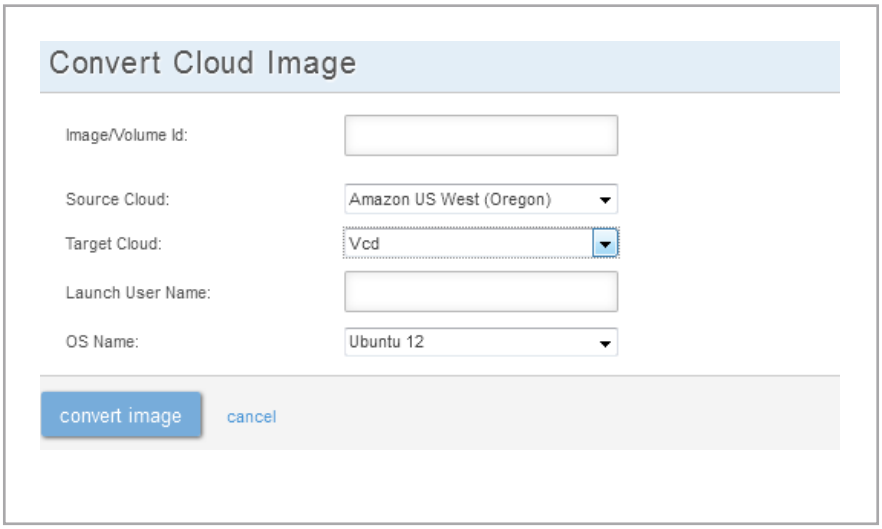
The easiest way to create an Application Profile is to manually create the profile using the graphical topology builder within CCM.



Reusable templates are available for popular application architectures like Java, .NET, LAMP, Ruby on Rails, Hadoop, High Performance Compute (HPC) jobs, and more. Generic templates can also be used to model any application, including parallel execution, multi-step execution, desktop applications, and more.

Image Ingestion and Transformation

For bulk creation of Application Profiles or for legacy applications whose inner workings are not well known, CloudCenter offers image import.



Using patent-pending image transformation technology, CloudCenter can take an image intended for one cloud and transform it into a format that can run on another cloud. For example, taking an image in the popular Amazon Web Services AMI format and converting it to an image that can run on vSphere or vCloud Director.

Importing Application Profiles From Other Formats

CliQr also supports creation of Application Profiles from other widely-used formats like AWS CloudFormation, OpenStack Heat templates, and TOSCA. Application metadata from discovery engines and Configuration Management Databases (CMDBs) are also acceptable options to create Application Profiles.

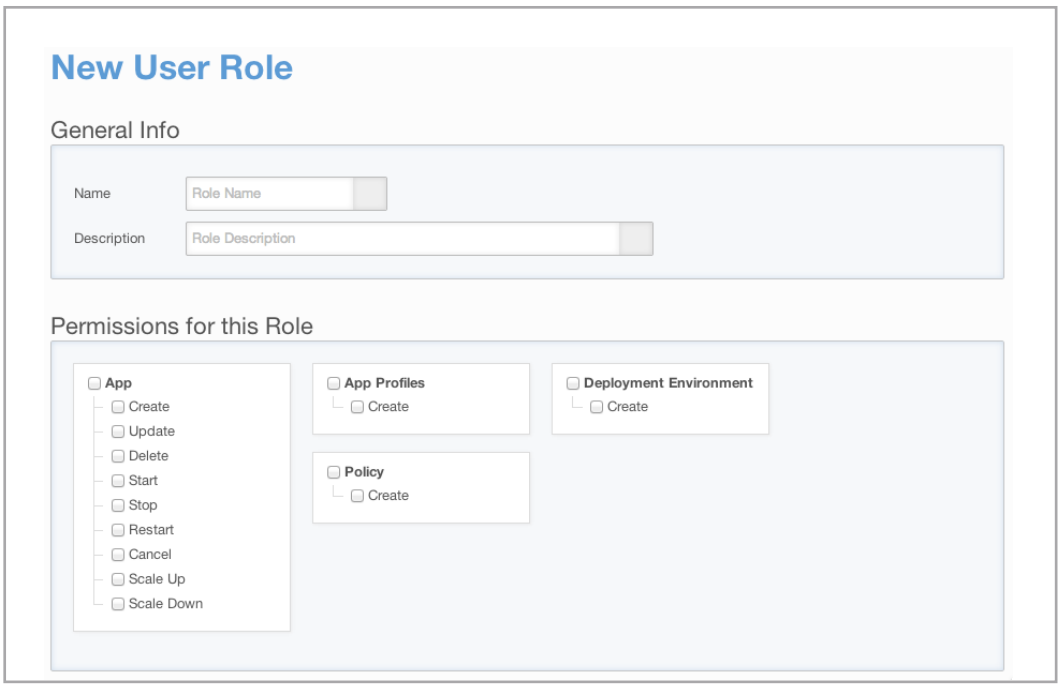
Hybrid Cloud Lifecycle: Govern

A key concern when implementing a hybrid cloud is how a central authority, typically an Enterprise IT department, can grant and restrict various aspects of the power of on-demand self-service provisioning that cloud technology provides. Fortunately, CloudCenter offers a set

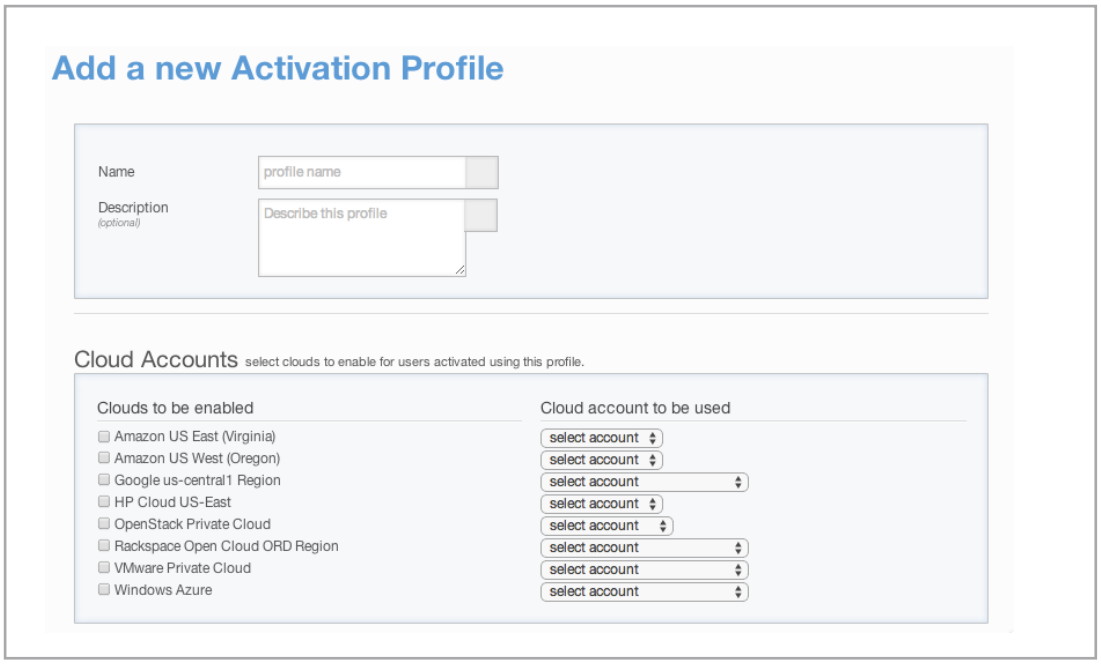
of powerful governance features that allows administrators to set up multiple tenants, groups of users, and a set of tools that can enforce standardized usage.

Role-Based Access Control

At the core of CliQr's governance features is a role-based authorization mechanism.



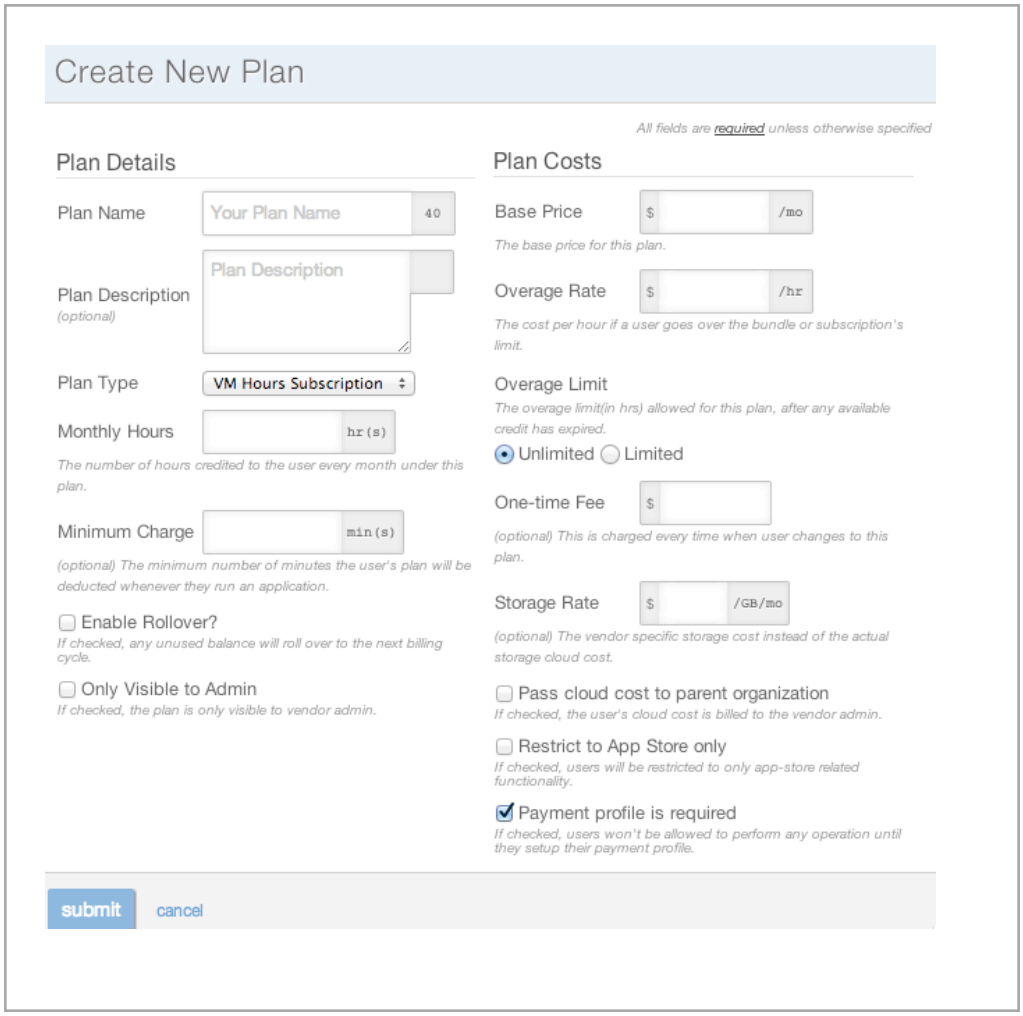
From here, key features of CloudCenter are granted or denied to particular groups of users. Further, each group can be associated with Activation Profiles that govern the allowed set of clouds, including the ability to select different accounts on cloud providers for different groups of users.



In addition, an event-access framework called Global Policies is available to administrators for enforcing runtime behaviors and triggering notifications. This gives administrators control over the affinity of clouds to applications and users based on a set of rules and tags.

Financial Controls

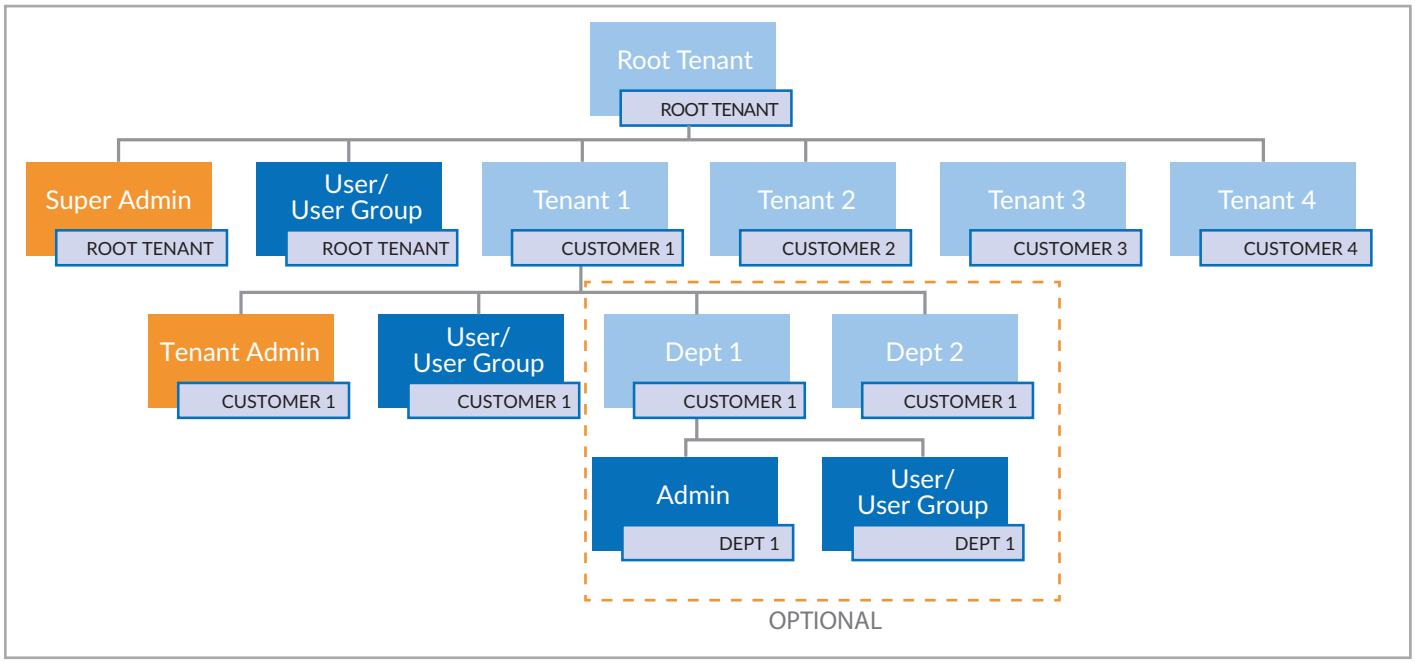
A powerful function for administrators is the set of Financial Controls. All VM usage is reported back to the CloudCenter Manager (CCM) through the lightweight agent that runs on all VMs deployed with the platform. Based on that information and a set of fully customizable pricing data (beyond what CloudCenter imports from published public cloud pricing), financial usage can be tracked across multiple organizations and also be subject to payment plans for departmental showbacks or chargebacks.



The units of measurement can be VM hours, number of VMs under management, budget that burns down over time, and other options. Each plan can have roll over, overage charges, and roll up into a larger organizational budget. Report generation is easy and all information can also be exported for offline access.

Multi Tenancy

Multi Tenancy is a feature that straddles across all governance functions in CloudCenter. A single CCM installation can be split into multiple tenants to completely separate organizational units from one another.



Optionally, the central IT department can federate administration to each internal customer by setting up a Tenant Admin, so individual organizations can establish specific rules of engagement. Within each tenant, separate groups and users can be established and be subject to governance as before.

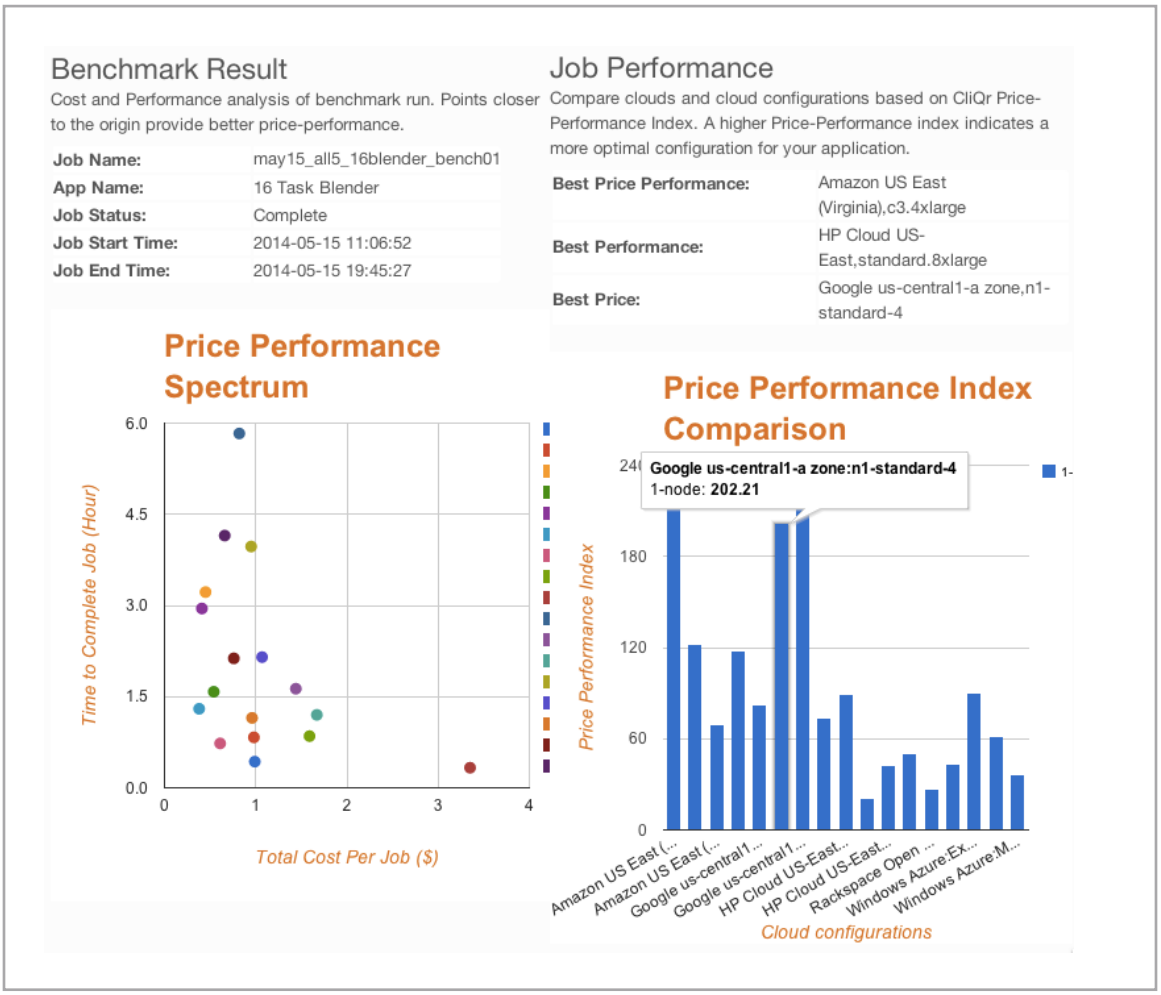
Hybrid Cloud Lifecycle: Manage

With applications migrated and central governance in place to enforce standards, ongoing workload management is the last phase of the CloudCenter lifecycle. Despite its immense power, cloud technology remains new with constant price adjustment from vendors and the increasing capabilities of instance types. Given that, how does an organization know which cloud is the best target for each workload? And how does that change as cloud offerings change dynamically?

Benchmarking

The answer is to test your actual application with benchmarking, a facility that is built right into CloudCenter. Once an Application Profile is created, any application can be benchmarked on

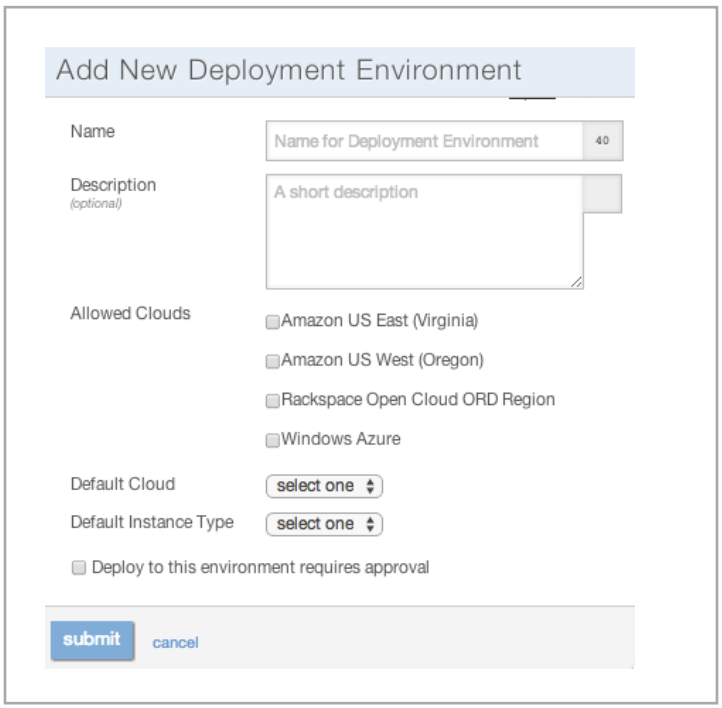
any number of clouds and any number of instance types with a few clicks. What comes back when the tests have executed is a graph indicating both the price and performance of each test.



For some workloads, price is the key concern over performance. For others, the opposite is true with speed being the only aspect that matters regardless of price. Most workloads fall somewhere in between and CloudCenter provides the required data that can help enterprises make an informed decision.

Software Lifecycle Management

Enterprise IT organizations often create custom applications whose development adheres to a particular lifecycle methodology. CloudCenter's Software Release Management feature enforces adherence to a methodology with central control of environmental usage. Typically, this feature is used by administrators to set up environments for different stages of software development like "dev" and "test", each of which can span multiple clouds.



An administrator might set up “dev” to reside on a public cloud and allow developers to deploy to it without approval. However for “test” the administrator might require approval before deploying to the environment to ensure that the developers are adhering to the software development methodology.

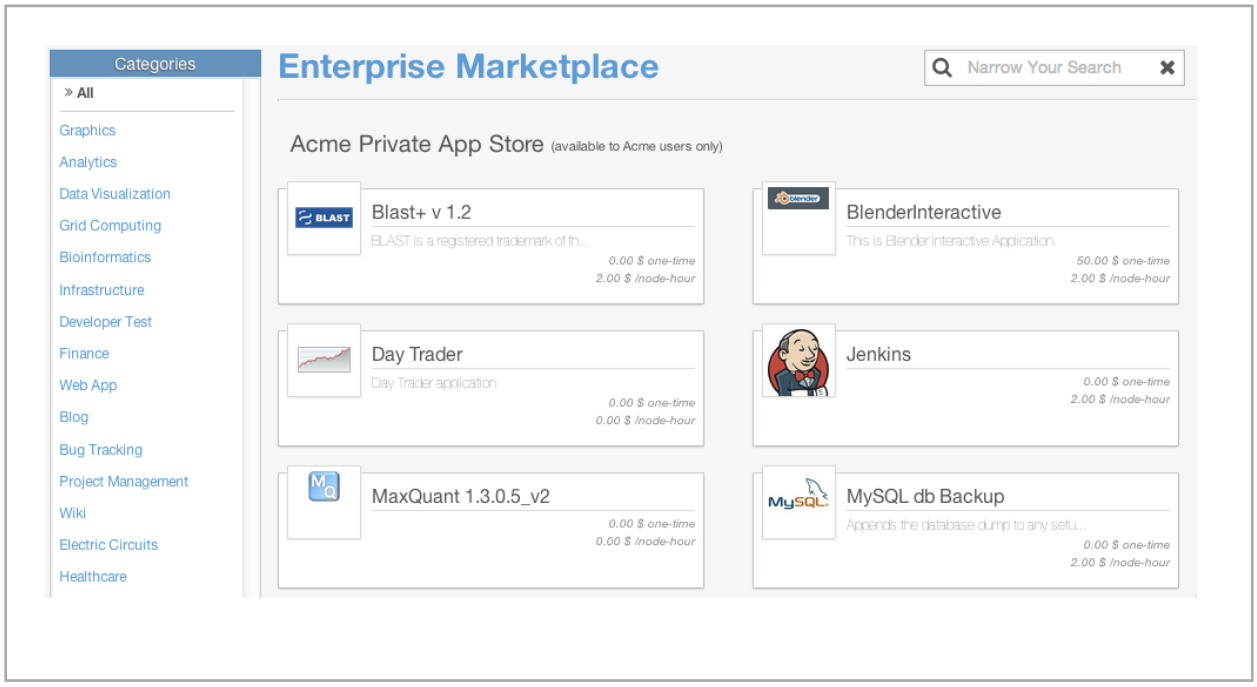
Management Dashboard

With a set of applications deployed, CloudCenter offers a single pane of glass that straddles all boundaries for applications, users, and clouds.

Details like CPU utilization, memory utilization, disk usage, and overall costs are also available as is the possibility to move applications from one cloud to another and the ability to patch or upgrade applications as needed.

Enterprise Marketplace

Finally, Enterprise IT organizations implementing a full IT-as-a-Service model can expose on-demand self-service provisioning to non-technical users in line-of-business teams with the Application Marketplace.

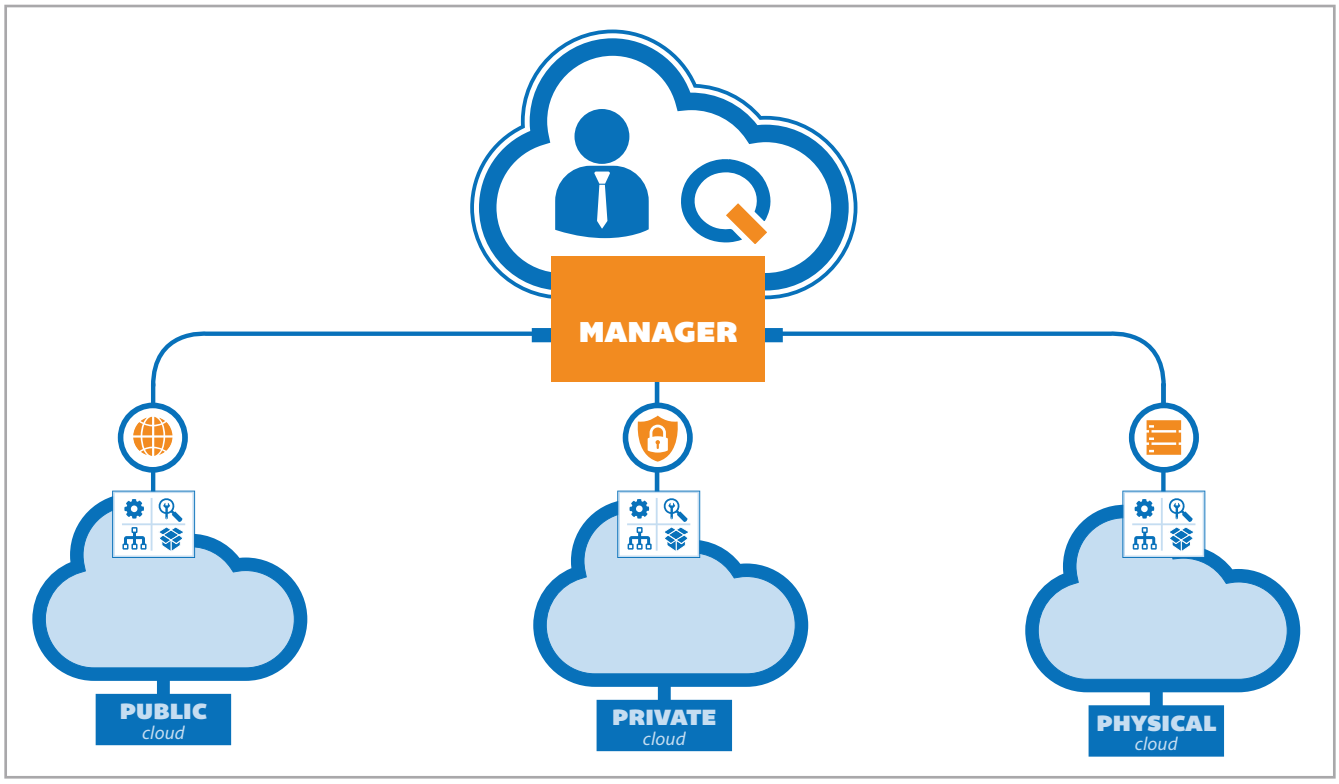


Populated with commonly-used applications selected by IT administrators, including custom applications, this online shopping metaphor makes it easy for the least technical of users to find the applications they need to assist in their day-to-day functions like blogs, wikis, and calendar sharing.

CliQr provides Application Profiles for over 100 popular open source applications to help an IT organization get started. This mechanism combines perfectly with Financial Controls to help line-of-business users provision applications exactly when they need them and get a monthly departmental bill. This strategy significantly reduces the temptation for these users to find similar, uncontrolled services via Internet and pay for them without considering IT concerns.

How CloudCenter Enables Cloud Independence with Application-Centric Technology

CloudCenter's fundamentally different approach is to focus on the application instead of on the infrastructure. This allows CloudCenter to de-couple an application from the complexities of the underlying cloud infrastructure, which is critical for hybrid clouds because of the inherent differences between different public and private cloud vendor offerings.



At the core of CloudCenter is the Application Profile, a cloud-agnostic description of an applications infrastructure needs. Created through the frontend CCM user interface, an Application Profile is sent to a backend component called the Cloud-Smart Orchestrator (CSO). In a patented design, the CSO has the best practices of each cloud built into it. For example, the Amazon Web Services CSO understands specific details of that public cloud while the VMware CSO has embedded knowledge of that private cloud. CSOs are available on a wide variety of public, private, and physical clouds.

When a CSO consumes an Application Profile, it provisions optimal virtual infrastructure based on its ingrained knowledge for the specific target cloud in question while the Application Profile itself retains its vendor independence. This enables unmatched portability and avoids costly vendor lock-in.

Each VM created with an Application Profile has a lightweight agent injected to make it governable and manageable by the administrative components of CloudCenter. With a basic understanding of its underlying components, the full lifecycle of hybrid cloud management explores these capabilities one phase at a time: migration, governance, and management.

Enterprise-Readiness

Just as it is critical to have a management platform for a hybrid cloud that assists with its full lifecycle usage and not just the initial migration is critical, it is equally important to meet the needs of an Enterprise IT department. Any large IT organization faces pressures to scale, provide security, and remain flexible, along with the ability to delegate administrative functions to other organizations within an Enterprise. Any platform that becomes part of a larger Enterprise IT ecosystem must not only meet these needs, but also be able to integrate seamlessly with existing tools and processes and be extendable over time.

Scalability

Scalability is often the first of these concerns due to the large number of constituents a hybrid cloud must service within an enterprise. CloudCenter is architected from the ground up with these exact concerns in mind, not relying on any runtime overhead like other cloud management platforms do. Instead, the notion of the Application Profile working in conjunction with the CSO allows applications to be deployed natively on any target cloud, relying only on a lightweight agent to make an application governable and manageable by other parts of CloudCenter.

With that design backbone in place, each CSO can manage up to 10,000 VMs. Multiple CSOs can be installed on target clouds for needs that scale beyond that number. As VMs only communicate with one another during deployment, a CSM is configured to work with any number of CSOs. If a CSO or CCM goes down, the lack of a runtime overhead does not have any effect on the uptime of deployed applications.

Federated Administration

Large organizations sometimes stipulate the ability to delegate responsibilities to individual departments while establishing central guidance to be enforced when necessary. The multi-tenancy model built within CloudCenter does exactly that. Not only are organizational units separated from one another down to a network security level but administrative tasks can be federated to tenants administrators who can further set up groups and users that are subject to granular role-based authorization control.

Global policies that span applications, clouds, and users can be created centrally, distributed to tenants, and used to govern users and groups. This includes the ability to assign capacity limits and enforce financial controls with showbacks and chargebacks.

Broad Application and Cloud Support

Some estimate that the average Fortune 500 Enterprise IT department manages 5000 applications. With that kind of volume, the variety of application types, and underlying architectural design patterns, some cloud management platforms only cover web applications which, while popular, do not fit the description of every application within a particular Enterprise.

CloudCenter supports a wide variety of application types, with Application Profile templates for common architectures like Hadoop, batch jobs, LAMP stacks, Ruby on Rails, .NET, and Java. For custom applications, more generalized templates for clustered computing, multi-step execution, or even thin-client desktop based applications can be migrated, governed, and managed using CliQr.

Contrary to what some cloud management platforms advocate, CliQr doesn't believe that any organization should be limited to specific clouds. CloudCenter can deploy workloads on a wide array of public, private, and physical clouds including Amazon Web Services, Google Cloud Platform, Microsoft Azure, HP Helion Cloud, Rackspace Cloud, Dimension Data, Cloud N, vCloud Air, vSphere, vCloud Director, OpenStack, CloudStack, Mirantis, Piston Cloud, Metacloud, Cisco UCS, and Rackspace OnMetal. Because of CloudCenter's modular architecture, additional clouds can be added as needed and have governable and manageable workloads within a short span of time.

Security

Almost all Enterprise's have critical business data that runs through their computing infrastructure for which security is a primary concern. CloudCenter meets those concerns with military-grade encryption on all data that moves to and from our Multi-Cloud Storage Management where it is also encrypted at rest.

Going beyond that, SSH keys, used to access VMs created on various clouds by CloudCenter, are secured in CliQr's key vault. All access is meticulously tracked with our audit logging procedures. A full InfoSec report, sample logs, and a security threat assessment are all available by request.

Integrate and Extend

An important milestone to indicate CliQr's success is highlighted when enterprises add an

extensive hybrid cloud management platform to their IT portfolio. CliQr provides the ability to integrate with existing tools and processes. Fortunately, CloudCenter's various hooks make it easy to integrate with pre-existing tools and processes within the Enterprise IT organization.

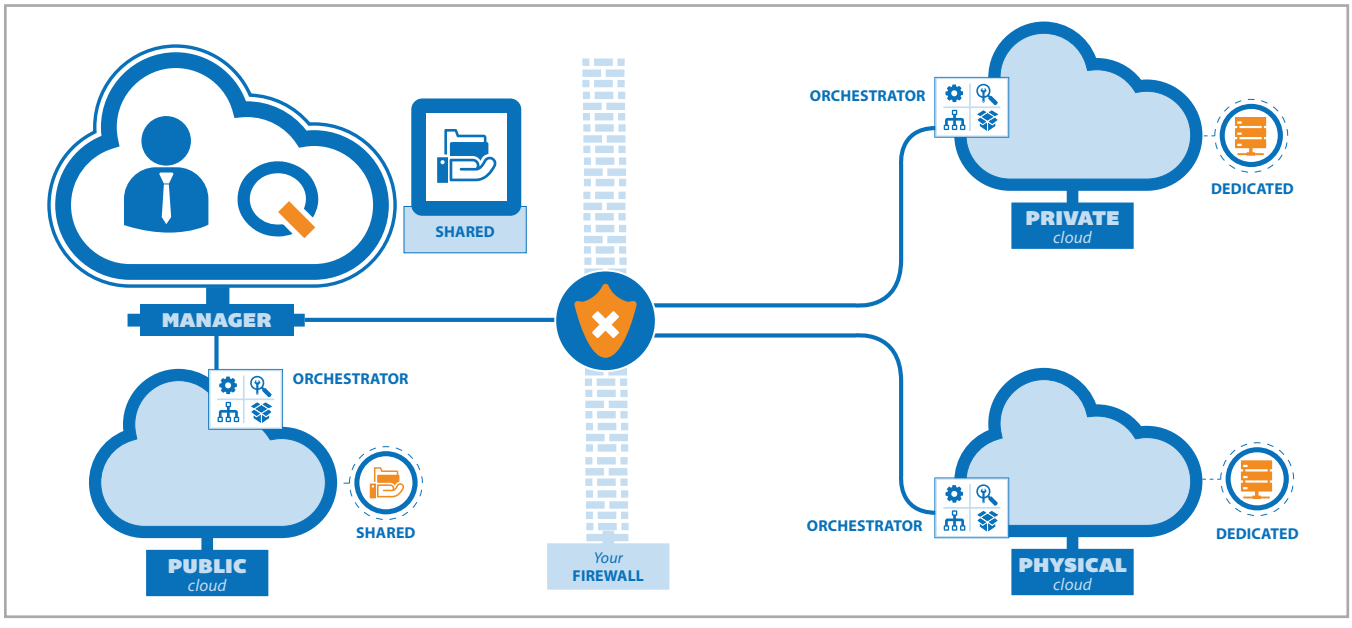
For our existing customer base, CliQr has integrated CloudCenter with single-sign on solutions over SAML, exported financial controls to billing/ERP systems, used thired-party monitoring platforms, and exchanged information with support ticketing systems. CloudCenter's RESTful API makes much of this possible and can be used to integrate with any number of tools.

Just as important is the notion of extending CloudCenter beyond its current feature set. The Application Profile design that enables unmatched portability between clouds is also extremely extensible to include additional application types, images, and services. Similarly, additional CSOs can be deployed to support additional clouds. While CloudCenter provides a default set of policies for organizations to govern and manage application usage, it is also equally easy to create new functions using the CloudCenter.

Fast Time To Value

CloudCenter's strengths lie in its ability to quickly deliver value to any organization. Application Profiles are easy to create and makes the onboarding process for new applications extremely fast. Implementing a new Application Profile on CloudCenter and deploying the resulting application on any CliQr-supported cloud is possible in a matter of hours with the shared CloudCenter-as-a-Service model or in a few days with the CloudCenter On-Premise model. The difference between those two delivery models is simple.

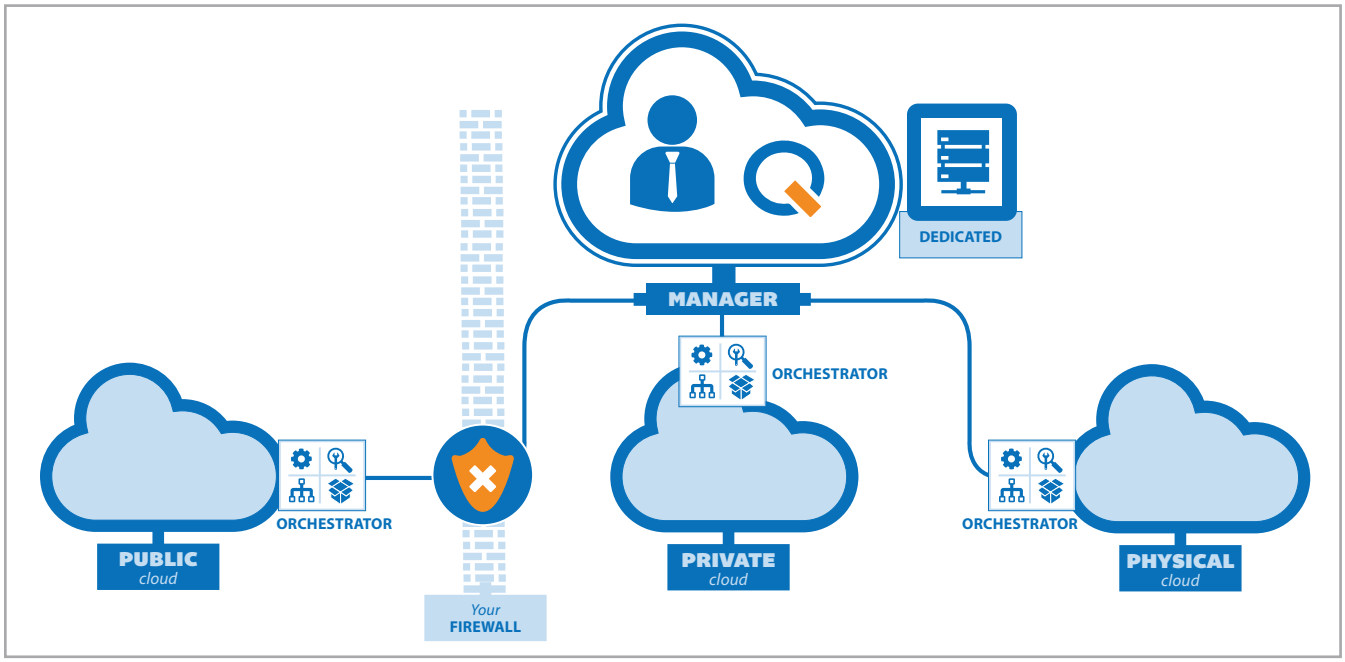
CloudCenter-as-a-Service



Typically used to quickly establish proof of concept and for smaller engagements, the CloudCenter-as-a-Service delivery model uses an instance of CCM that is maintained by CliQr and shared among many customers. CliQr also shares a CSO on each CliQr-supported public cloud.

Each CloudCenter-as-a-Service customer is set up as its own tenant, which creates a Virtual Private Cloud from a networking perspective for each customer as well as separates governance functions and management views. For private and physical clouds in this model, dedicated CSOs are installed as needed.

CloudCenter On-Premise



In the CloudCenter On-Premise model all components are dedicated to an individual CliQr customer with the CSM typically installed inside the customer's firewall and CSOs installed on clouds chosen by the customer. Each component is delivered as a virtual appliance and installed by CliQr personnel within a few days.

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