



Implement a Hybrid Cloud Strategy with Cisco CloudCenter and FlashStack

June 2017

Contents

Executive Summary

Rise of the Hybrid Cloud Model

FlashStack- All-Flash Converged Infrastructure for Cloud IT

- VMware vSphere provides the virtualization technology.
- FlashStack Program Benefits
- FlashStack Resources

Cisco CloudCenter Overview

- Model
- Deploy
- Manage
- Administer and Govern
- Benefits

Cisco CloudCenter Advanced Features

- Easy Application Deployment
- Centralized Governance and Security
- Application Benchmarking
- Dashboard
- Cost Controls and Reporting

Cisco CloudCenter and FlashStack Hybrid Cloud Use Cases

- Cloud Bursting by Deploying Application Tiers Across Multiple Clouds Using FlashStack and Cisco CloudCenter
- Implementing an N-Tier Application in Cisco CloudCenter on FlashStack

Conclusion

For More Information

Executive Summary

Cloud computing has been one of the most disruptive IT trends of recent times. With the proven benefits of cloud computing, many enterprises are now moving aggressively toward a cloud-first strategy. While the benefits of the public cloud for certain workloads and use cases are clear, however, this approach can require trade-offs in areas such as availability, performance, customization, and security.

A hybrid cloud model gives organizations the flexibility to put their workloads and data where it makes most sense, deploying the right blend of public and private cloud services while addressing the availability, performance, and security challenges. This model also often requires IT organizations to reduce complexity and manage strategic, financial, operational, and security risks that result from the need to manage multiple applications across multiple environments for multiple users.

A hybrid cloud platform consisting of a combination of FlashStack and a public cloud solution of choice, orchestrated by Cisco CloudCenter™, offers enterprises the flexibility to put their workloads and data where it makes the most sense while addressing the performance, security, availability challenges and offering cloudlike agility, burst capabilities, and cost efficiencies.

Furthermore, Cisco CloudCenter allows enterprises to deploy an application-centric hybrid cloud management platform that securely provisions infrastructure resources and deploys applications across more than 20 data center, private cloud, and public cloud environments. It provides a single-platform solution with unique hybrid cloud technology that abstracts the application from the underlying cloud environment and helps ensure that the infrastructure adapts to meet the deployment and management needs of each application.

Rise of the Hybrid Cloud Model

A hybrid cloud model offers enterprises a more holistic approach in which a public cloud and private cloud deployment work together as one combined platform to reduce the need for trade-offs and get the most value and effectiveness from each component of a workload.

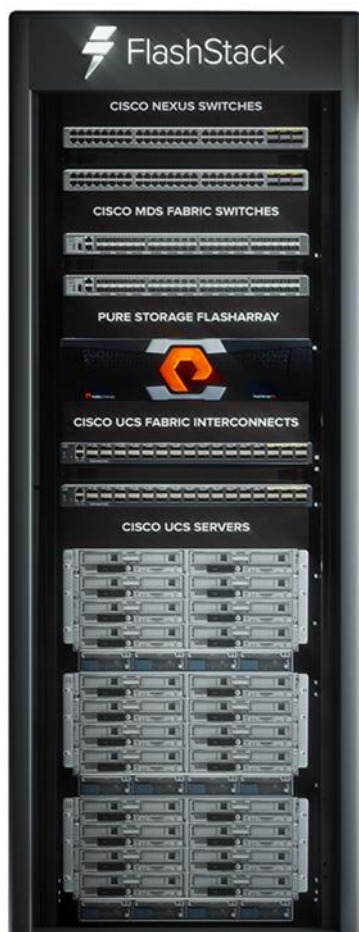
Enterprises have different sets of requirements for different types of workloads, and hybrid cloud solutions offer the flexibility to meet these requirements. In the hybrid cloud model, workloads reside where it makes the most sense for them, on an organization's premises or in a public cloud, and running on bare-metal or virtualized devices.

These are some of the benefits of a hybrid cloud model:

- **Provides a platform for gradual cloud adoption:** Cloud adoption is a multistep journey. Designing workloads for the public cloud often requires organizations to redesign applications, understand new models and new terminology, and modify code to allow applications to control resources. A hybrid cloud allows customers to start by taking advantage of dedicated servers and virtualization using existing applications and resources, eventually evolving the infrastructure by moving the right workloads to a public cloud over time as needed. The flexibility to move specific applications between platforms enables IT organizations to transition to the cloud at their own pace and only with the workloads that make sense.
- **Provides a platform for rapid innovation:** A hybrid cloud allows organizations to move at the speed of DevOps. With access to massive public cloud computing power fully integrated into existing infrastructure, new system enhancements and application updates proceed more quickly through the software lifecycle, allowing businesses to get products to market faster. Developers can focus on developing products instead of waiting for IT to provision resources. IT can access resources as needed rather than tying up huge amounts of IT budget in seasonal projects.
- **Supports performance, security, and availability:** A successful hybrid cloud model addresses the performance, security, and availability limitations often experienced in public cloud services. An on-premises private cloud powered by all-flash storage eliminates performance and availability concerns while putting the IT department in control of data security and governance.
- **Reduces total cost of ownership (TCO):** Although the public cloud offers a lower-cost entry point, it is often not the most cost-effective approach at scale. A hybrid cloud model can weave cloud efficiencies into existing IT investments that aren't quite cloud ready yet while providing the flexibility to tap into public cloud resources as needed.
- **Avoids vendor lock-in:** With so many vendors now offering public cloud services at various levels and prices, portability of workloads across the cloud is critical. The right hybrid cloud model has workload portability built in.

FlashStack- All-Flash Converged Infrastructure for Cloud IT

Figure 1. FlashStack Solution



FlashStack (Figure 1) stands as a perfect foundation for the private cloud extending into a hybrid cloud implementation. FlashStack is a flexible, all-flash converged-infrastructure solution that brings the benefits of flash memory to your data center and accelerates your transition to a cloud-centric IT model. It combines the latest computing, networking, and storage hardware and virtualization software into a single, integrated architecture that shortens the time to deployment, lowers overall IT costs, and reduces deployment risk. Highly efficient components reduce the costs associated with power, cooling, and data center space. Based on 100 percent flash storage, FlashStack converged infrastructure provides the performance and reliability that business-critical applications demand.

The hardware foundation of FlashStack includes the following:

- Pure Storage [FlashArrays](#)
- Cisco [Unified Computing System™ \(Cisco UCS®\) servers](#)
- Cisco [Nexus® switches](#)
- Cisco® [MDS 9000 Family multilayer switches](#)

VMware vSphere provides the virtualization technology.

FlashStack is available from qualified FlashStack partners, who help provide an excellent converged infrastructure ownership experience. FlashStack partners have the knowledge and experience necessary to help simplify the sizing, procurement, and delivery of your entire system.

Both the hardware and software components are combined into a single integrated unit that helps accelerate deployment and lower overall IT costs.

FlashStack Program Benefits

The FlashStack solution is jointly supported by Cisco and Pure Storage. It offers a carefully validated architecture built on superior computing, world-class networking, and the leading innovations in all-flash storage. FlashStack includes the following validated features:

- **Consistent performance:** FlashStack provides higher, more consistent performance than disk-based solutions and delivers a converged infrastructure based on all-flash storage that enables nondisruptive upgrades and scalability.
- **Cost savings:** FlashStack uses less power, cooling resources, and data center space than traditional disk and hybrid storage. It provides industry-leading storage data reduction and exceptional storage density.
- **Simplicity:** FlashStack requires little ongoing maintenance and reduces operational overhead. It scales simply and smoothly in line with business requirements.
- **Deployment choices:** FlashStack is available as a custom-built single unit from FlashStack partners. Organizations can also deploy FlashStack using equipment from multiple sources, including equipment they already own.
- **Unique business model:** The Pure Storage Evergreen Storage Model enables organizations to keep their storage investments indefinitely, eliminating the need for major equipment upgrades and downtime.
- **Mission-critical resiliency:** FlashStack offers best-in-class performance with active-active resiliency, no single point of failure, and nondisruptive operations, enabling organizations to increase productivity.
- **Support choices:** Focused, high-quality single-number FlashStack support is available from FlashStack Authorized Support Partners. Single-number support is also available directly from Cisco as part of the Cisco Data Center Critical Infrastructure services offering. Support for FlashStack components is available from Cisco, VMware, and Pure Storage individually, with TSA net used to resolve support queries between vendors.

FlashStack Resources

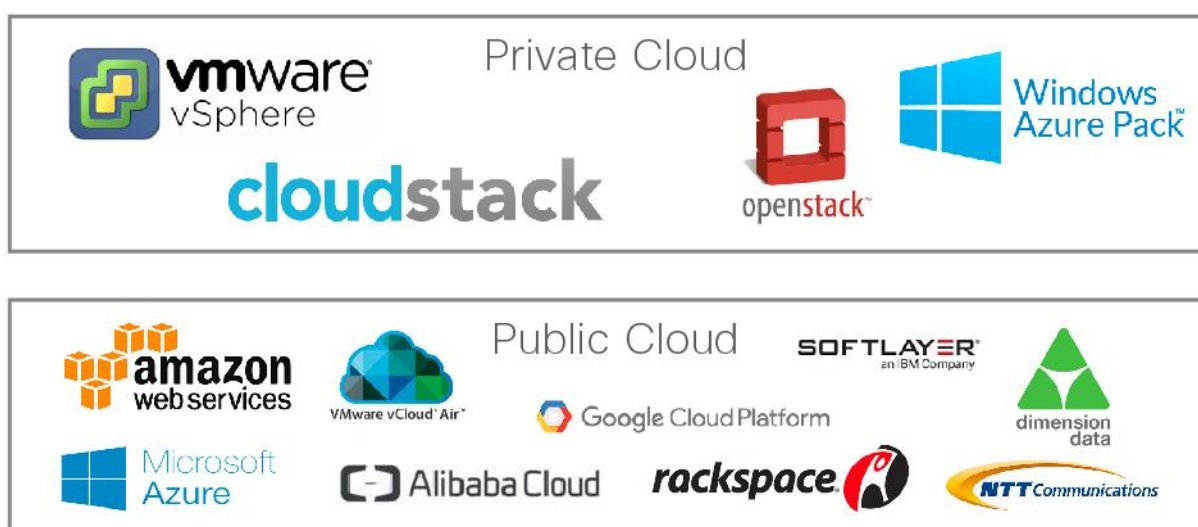
For additional information about FlashStack, see the following:

- [FlashStack Virtual Server Infrastructure for VMware vSphere 6.0 U2 Design Guide](#)
- [FlashStack Virtual Server Infrastructure for VMware vSphere 6.0 U2 Deployment Guide](#)

Cisco CloudCenter Overview

Cisco CloudCenter is an application-centric hybrid cloud management platform that securely provisions infrastructure resources and deploys applications across more than 20 data center, private cloud, and public cloud environments, including those shown in Figure 2. Cisco CloudCenter also improves IT speed and agility, optimizing work for users, who can quickly and easily model, deploy, and manage applications in any environment. And Cisco CloudCenter delivers IT control for administrators, who gain visibility and governance across boundaries of applications, clouds, and users.

Figure 2. Cisco CloudCenter Securely Provisions Infrastructure Resources and Deploys Applications Across More Than 20 Data Center, Private Cloud, and Public Cloud Environments



Cisco CloudCenter provides a single-platform solution with unique hybrid cloud technology that abstracts the application from the underlying cloud environment and helps ensure that the infrastructure adapts to meet the deployment and management needs of each application. With Cisco CloudCenter, IT organizations can start with one application in one cloud or manage multiple applications across multiple environments. It works with a simple virtual machine or with complex, multitier application stacks. With an application-centric management platform, enterprise IT organizations can pursue a range of powerful use cases such as on-demand hybrid IT as a service (ITaaS), automated DevOps and continuous delivery, capacity augmentation including bursting and high availability and disaster recovery, and permanent application migration.

What differentiates Cisco CloudCenter is its simple approach to application-centric multicloud management. The solution combines a cloud-independent application profile, which defines deployment and management requirements for the application stack as a reusable blue print, with a cloud-specific orchestrator, which deploys both the infrastructure and the application using the best practices for each environment.

Cisco CloudCenter offers single-click automated end-to-end provisioning of computing, storage, network, and security resources, as well as deployment of your application stack components and data. Cisco CloudCenter enables users to deploy it in any of its supported environments, while not forcing applications to adapt to infrastructure (Figure 3).

Figure 3. Cisco CloudCenter Offers Single-Click Automated Provisioning of Computing, Storage, Network, and Security Resources and Deployment of Application Stack Components and Data



Model

Cisco CloudCenter provides organizations with the process and tools for building and managing a cloud-independent application profile. One profile can be used in any environment without modifying deployment scripts or changing application code. The application profile defines the deployment and management requirements for the application in five main areas:

- Application topology and dependencies
- Infrastructure resource and cloud service requirements
- Description of deployment artifacts, consisting of packages, binaries, scripts, and optional data
- Orchestration procedures needed to deploy, configure, and secure the application
- Run-time policies that guide ongoing management

Deploy

Cisco CloudCenter enables organizations to migrate and install applications on cloud infrastructure. In this phase, users deploy the application profile to the target deployment environment of their choice. Cisco CloudCenter helps you:

- Create a cloud management profile for any application
- Drag and drop the required tiers for each application
- Graphically view the topology for each application
- Isolate an application's requirements from the cloud dependencies
- Try out an application on multiple clouds
- Deploy new and existing applications (with or without data)

Manage

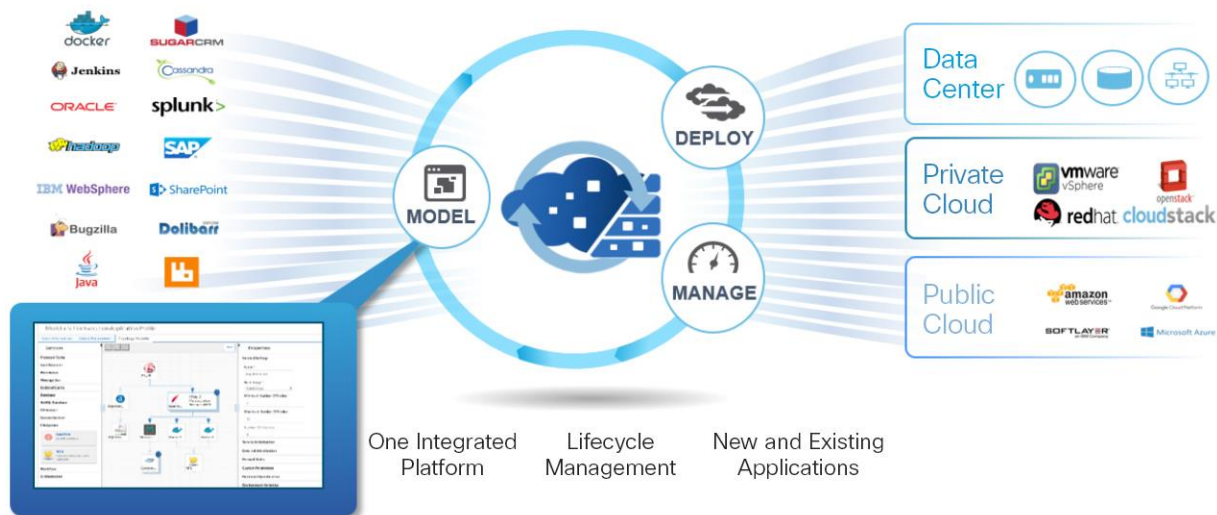
After applications are deployed, Cisco CloudCenter helps organizations manage deployments and perform ongoing operations. Users can monitor the applications and use a range of lifecycle management actions or specify automated responses using preconfigured policies. Unlike cloud management platforms that focus on managing infrastructure, Cisco CloudCenter application-centric management integrates the management of the application with the management of the underlying cloud resources. Cisco CloudCenter helps you:

- Measure price, performance, and other factors to choose the best cloud for your application
- Perform cross-cloud release management tasks
- Manage the application's lifecycle management activities
- Implement policy-based automation for each deployment
- Perform batch computing tasks
- Upgrade deployments

Administer and Govern

Cisco CloudCenter eases cloud governance by providing a single management platform with powerful administration and governance capabilities for data center, private cloud, and public cloud environments. It enables organizations to manage and administer multiple tenants (organizations) and multiple users (or groups of users), as shown in Figure 4.

Figure 4. Model, Deploy, and Manage Applications from a Single Integrated Platform



Benefits

Cisco CloudCenter meets the needs of the most demanding service providers and enterprise IT organizations. It includes these benefits:

- Capability to model once and then deploy many times
- Flexibility to choose the best cloud run-time environment
- Capability to deploy anywhere
- Management using run-time policies
- Unified administration and governance
- Tag-based governance
- Exceptional security
- Financial controls
- Customizable service library
- Application marketplace

Cisco CloudCenter Advanced Features

Cisco CloudCenter ships with several powerful features that help organizations accelerate business processes, deploy applications securely, determine the best cloud on which to deploy applications based on price and performance, and view application and cloud provider health. The main advanced features are:

- Easy application deployment
- Centralized governance and security
- Application benchmarking
- Dashboard

Easy Application Deployment

Cisco CloudCenter is unique in the today's market. It creates a single profile that combines application and infrastructure automation directives and eliminates environment-specific automation that locks workloads into a single environment. Some simple selections and two clicks deploys the application profile and related components to any data center or cloud environment.

Cisco CloudCenter makes it easy for IT departments to deploy and manage an extensive variety of applications across massive and diverse environments. Using simple, preconfigured application profiles, you can easily create infrastructure-independent models of new or existing and simple or complex applications. Cisco CloudCenter then uses your models to provide automated, end-to-end provisioning of computing, storage, and application-centric infrastructure network configurations. With a simple streamlined interface, you can deploy the application and its set of required components, including middleware and application data and packages, in any physical, virtual, or cloud environment.

The application profile, a critical part of the unique Cisco CloudCenter application-centric cloud management solution, is a cloud-independent portable model that defines each application's deployment and management requirements. Applications ranging in complexity from a single virtual machine to multiple virtual machines can be deployed to any cloud provider quickly and easily, as shown in figures 5 and 6 below.

Figure 5. First Screen of Application Deployment Specifying of the Deployment Name and Any Optional Tags and Settings

Deploy CentOS-Test CentOS6 ✕

* DEPLOYMENT NAME

* APPLICATION VERSION

TAGS ⓘ

SECURITY PROFILES

TERMINATE PROTECTION
☐ OFF

AGING POLICY

Tier Settings

CentOS_1

TAGS ⓘ

SECURITY PROFILES

* NUMBER OF NODES
 max:2

NEXT

Figure 6. Second Screen of Application Deployment, Setting Cloud Source and Any Tier Settings Beyond Defaults

Deploy CentOS-Test
CentOS6
\$0.01 /hour approx \$7.3/month

General Cloud Settings

* DEPLOYMENT ENVIRONMENT
FlashStack

SELECT A CLOUD

FlashStack_Primary
FlashStack_Primary

FlashStack_Branch
FlashStack_Branch

AWS
US East (Virginia)

Hybrid
Deploy Tiers on different clouds

* CLOUD ACCOUNT
FlashStack-Primary

Tier Settings

CentOS_1
\$0.01 /hour

Filter Instance Types / [SHOW](#)

AVAILABLE INSTANCE TYPES (3)

SMALL
MEDIUM
LARGE

RESTFUL JSON PREVIOUS DEPLOY

Cisco CloudCenter enables you to perform the following tasks when an application is submitted, providing fast and easy deployments:

- Provision and configure cloud infrastructure and services based on the computing, storage, and networking requirements of the application profile.
- Launch virtual machines to access the application packages, data, and scripts referenced in the profile and mount them in the storage repository of the selected cloud.
- Deploy the application components for the various tiers and steps as determined in the application profile.
- Start each application service in the correct order based on service dependencies.

Centralized Governance and Security

Tags associate rules using resource types such as deployment environment, scaling profile, and job aging profile. Cisco CloudCenter administrators can use tags to create predefined governance policies to administer deployments (Figure 5 from above).

The Cisco CloudCenter solution includes extensive administrative and governance features. Tag-based deployment and run-time automation, role-based access control (RBAC), and detailed usage reporting give IT visibility and control across environments. Cisco CloudCenter tag-based governance enables administrators to centrally manage cloud accounts, control costs with financial plans, and report on usage.

With Cisco CloudCenter, administrators gain a powerful set of capabilities to simplify and automate user placement, deployment, and run-time decisions. The Cisco CloudCenter solution uses rules-based automation that can guide placement decisions, deployment decisions, and run-time decisions for each application migration.

RBAC separates user actions from administration and governance of clouds, tenants, and users accounts, as well as financial controls. Tag-based governance gives users the flexibility to add tags to their deployments based on use, without needing to understand the underlying policy details.

When you deploy an application profile, you simply add the required tags as specified by the administrator's instructions. The solution automatically deploys all rules associated with the tags you include:

- Placement decisions: Tags can specify deployment in the appropriate deployment environment.
- Deployment decisions: Tags can specify firewall rules and port settings. A tag can be linked to a security profile and applied to a specific tier or to an entire deployment.
- Run-time decisions: Tags can specify day-two operations. For example, tags can be used to specify aging and scaling policies that are monitored and enforced over time. By linking tags to run-time policies, administrators can control ongoing management of the workloads deployed by Cisco CloudCenter.

Application Benchmarking

Every cloud is built, sized, and priced differently. Thus, application price and performance vary significantly for each cloud and cloud configuration. With Cisco CloudCenter, you can benchmark your application against numerous clouds and cloud instances and sizes to derive the best price and performance to determine the best trade-offs for your deployment. This benchmarking provides information critical to optimizing application deployments in the cloud.

The Cisco CloudCenter benchmark feature deploys an application profile across multiple cloud providers or across cloud regions from a single cloud provider. It then produces a report that helps customers optimize price and performance and make informed placement decisions.

The Cisco CloudCenter solution automates the process of benchmarking the price, performance, and price-performance index of each actual application simultaneously across any cloud, instance type, or provider, helping you choose your target before you migrate. You can use storage as a service to write output files when benchmarking applications or to run job-based applications.

Cisco CloudCenter benchmarking measures important variables, which differ by application type. It provides a detailed report showing the cost to run a job, the application performance, and the best value, which is a combination of price and performance. Measuring and reporting each of these variables separately enables businesses to make decisions that are aligned with a specific application's economic or performance objectives. Each report presents comparative results in an easy-to-understand graphical form. You can also benchmark an application using multiple combinations of instance sizes in a single cloud.

With the Cisco CloudCenter benchmark capability, IT can deploy variations of a single application to compare the resulting price-to-performance metrics and determine the optimum configuration.

Figure 7 shows the start of a Cisco CloudCenter benchmark test that reveals the price-to-performance characteristics for different cloud virtual machine instance sizes. Application and cloud regions are selected to run against each other to produce metrics about the time to completion compared to the cost for the time that the virtual machine is run in that region.

Figure 7. Example of Price-to-Performance Characteristics for Different Cloud Virtual Machine Instance Sizes

Benchmarks

☐ Show hidden benchmarks

filter by application

Name	Application	Status	Version	Start Time	End Time	Result	Actions
Cent6-Benchmark	CentOS6	Submitted	7.0	6/01/17 13:28:59	Not Available		Select one ▾
Job Name		Job Status		Start Time		End Time	
Cent6-Benchmark_Ntier_0_FlashSta...		Starting		6/01/17 13:29:03		Not Available	
Job Name		Job Status		Start Time		End Time	
LoadGenerator		Starting		6/01/17 13:29:06		Not Available	
CentOS_1		Pending		Not Available		Not Available	
				Page 1 of 1		View 1 - 2 of 2	
Cent6-Benchmark_Ntier_1_FlashSta...		Starting		6/01/17 13:29:05		Not Available	
Job Name		Job Status		Start Time		End Time	
LoadGenerator		Starting		6/01/17 13:29:08		Not Available	
CentOS_1		Pending		Not Available		Not Available	
				Page 1 of 1		View 1 - 2 of 2	
Cent6-Benchmark_Ntier_2_AWS-us...		Submitted		Not Available		Not Available	
Job Name		Job Status		Start Time		End Time	
LoadGenerator		Starting		6/01/17 13:29:08		Not Available	
CentOS_1		Pending		Not Available		Not Available	

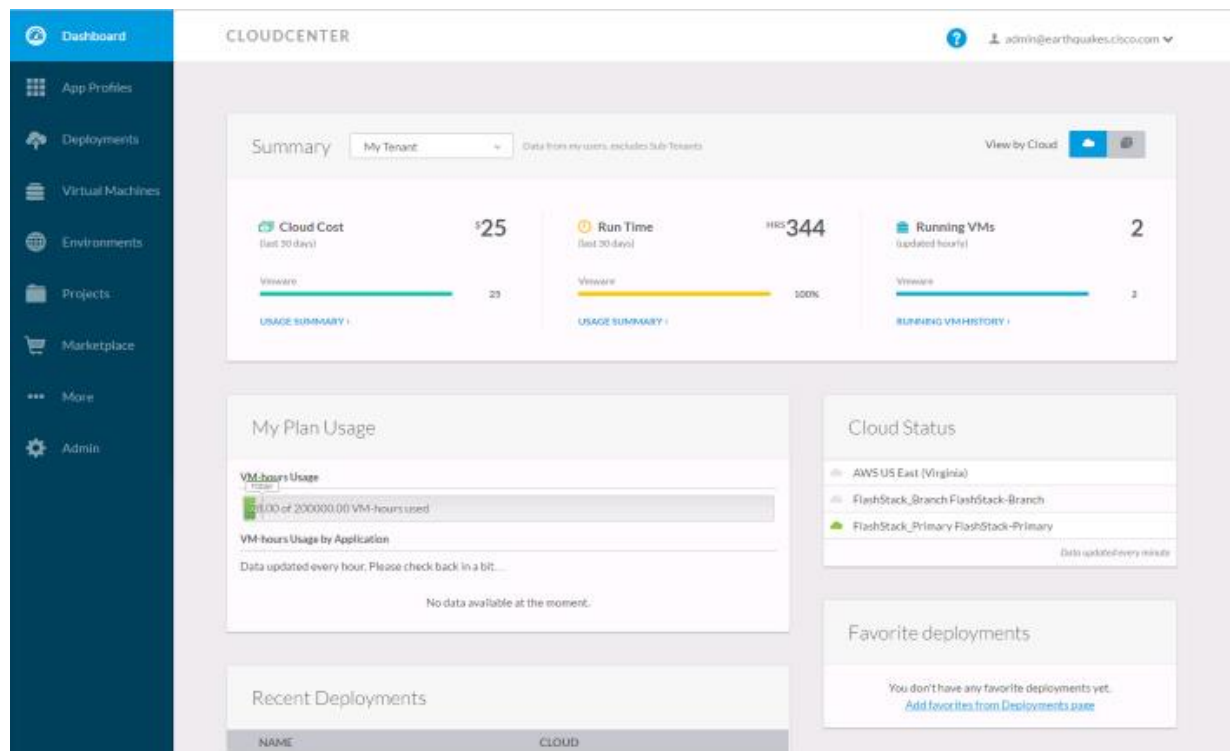
Dashboard

The Cisco CloudCenter solution gives administrators a consolidated view of all application deployment activity across all data center, private cloud, and public cloud environments. The Cisco CloudCenter dashboard provides an at-a-glance view of the cloud status and the active virtual machines in each environment. It enables the administrator to view the deployment status and virtual machine use by application. The dashboard provides hover-over and drill-down capabilities for retrieving additional details about items of interest.

You get comprehensive governance control over all applications, clouds, and users from one intuitive dashboard. You can use the dashboard to access and manage all your deployments.

Figure 8 provides a consolidated view of the data center, private clouds, and public clouds.

Figure 8. Cisco CloudCenter Dashboard: Consolidated View



Cisco CloudCenter helps you gain insight and control with a single graphic dashboard that gives you end-to-end visibility from the application to the network infrastructure in one logical environment.

Cost Controls and Reporting

The Cisco CloudCenter solution provides effective cost controls supported by comprehensive usage and cost reporting. It can apply a broad mix of cost- and usage-based plans and bundles that help ensure that self-service capabilities do not result in cost overruns that undermine the value of your ITaaS strategy. It can generate usage and cost reports for specific users, groups, and business units, and for specific applications, clouds, and cloud accounts.

You get end-to-end visibility and control that is delivered on a single graphical dashboard in one logical environment. By gathering infrastructure, network, and application-specific performance and cost metrics, the solution provides visibility into the application health status and specific management capabilities along with alerts and financial controls.

Cisco CloudCenter and FlashStack Hybrid Cloud Use Cases

IT organizations moving toward a hybrid IT strategy need flexibility in the ways and the places that applications are deployed: whether entirely within a public cloud, entirely within a private cloud, or across both private and public clouds. Cisco CloudCenter supports numerous combinations of private cloud, branch location, and public cloud resources, keeping applications consistent regardless of their placement.

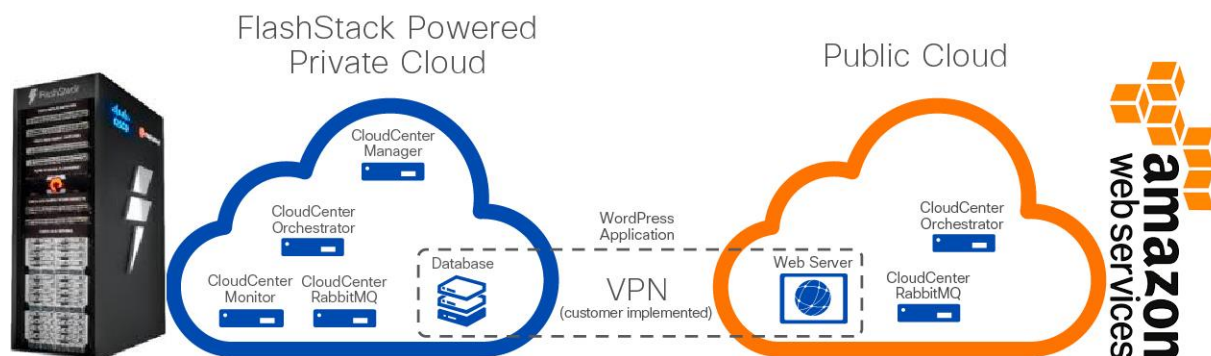
This section presents two sample use cases:

- Cloud bursting by deploying application tiers across multiple clouds using FlashStack and Cisco CloudCenter
- Implementing an N-tier application in Cisco CloudCenter on FlashStack

Cloud Bursting by Deploying Application Tiers Across Multiple Clouds Using FlashStack and Cisco CloudCenter

To deploy applications entirely within a public cloud, the Cisco CloudCenter solution uses proprietary orchestrator software that runs in the public cloud. The orchestrator translates the application profiles defined by the Cisco CloudCenter administrator into API calls specific to the public cloud. These calls communicate with the public cloud provider to instantiate public cloud services such as virtual machine instances, database servers, load balancers, firewalls, and networking components (for example, virtual private clouds, IP subnets, and network access lists).

Figure 9. Cisco CloudCenter Components



When Cisco CloudCenter is deployed, specific components are required in each cloud region, including a central Cisco CloudCenter Manager (Figure 9):

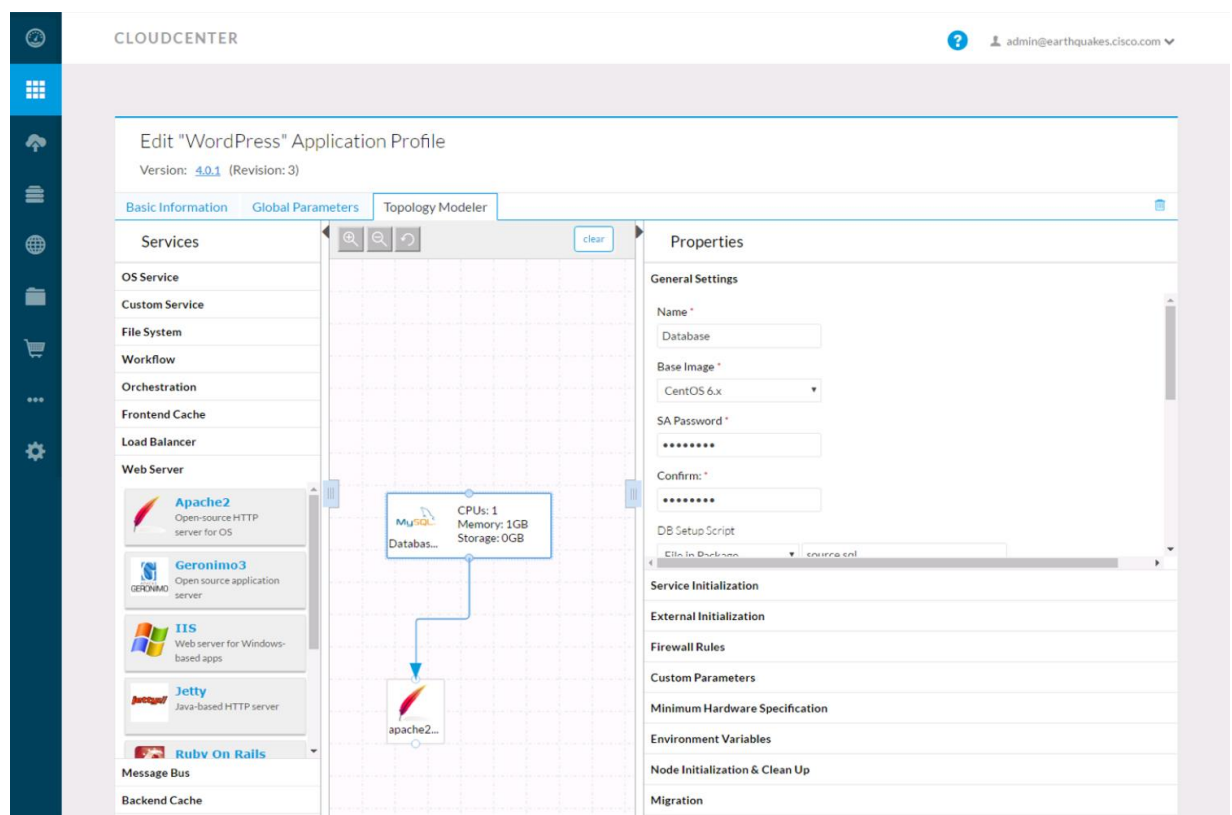
- **Cisco CloudCenter Manager:** Centralized management console; one needed; can be deployed in high-availability mode
- **Cisco CloudCenter Monitor:** Independent cloud monitoring feature; one needed; can be deployed in high-availability mode
- **Cisco CloudCenter Orchestrator:** Back-end server for interacting with cloud-provisioning APIs; one needed per cloud region; can be deployed in high-availability mode in the region
- **Cisco CloudCenter RabbitMQ (Advanced Message Queuing Protocol [AMQP]):** Message broker for interacting with application virtual machines; one needed per cloud region

Communication is needed between the manager and monitor servers and the remote cloud region components across specific ports. Intracloud communication also is needed between the remote managers and AMQP. For the complete requirements, see the [installation instructions](#). Additionally, the private or public cloud environment must provide the Domain Host Configuration Protocol (DHCP) and Domain Name System (DNS) to the deployed components and applications.

Deploying an application in a private cloud with FlashStack is similar to deploying an application with general-purpose storage in a public cloud in that Cisco CloudCenter Manager pushes an application profile to a virtual machine manager (VMM) such as VMware vCenter or Microsoft System Center VMM (SCVMM).

Figure 10 shows an example of a two-tier WordPress application that consists of a single Apache web server and a single Microsoft MySQL database server.

Figure 10. Sample Application Profile



With Cisco CloudCenter, you can deploy multitiered applications in a hybrid model in which the application's database stays on premises using FlashStack and the web components reside in the public cloud using public cloud computing instances. This approach allows users to use public cloud computing for burst capabilities.

Figure 11 shows an application deployed entirely to private cloud resources from an application profile. Figure 12 shows a deployment from the same application profile positioned with tiers in different cloud locations.

Figure 11. An Application Deployed Entirely to Private Cloud Resources from an Application Profile

"WP_FlashStack_Demo" Deployment Details

Auto refresh every 30 seconds

Name	WP_FlashStack_Demo	Start Time	2017-06-05 14:22:07
Application	WordPress (V4.0.1)	End Time	N/A
Deployment Environment	FlashStack	Cloud	FlashStack_Primary FlashStack-Primary
Status	Deployed	Status Message	N/A
Aging Policy		Last Update Time	2017-06-05 14:26:28
Promoted from	-	Deployment Initiated by	Flash (admin@earthquakes.cisco.com)
Approved/Rejected by	Flash (admin@earthquakes.cisco.com)	Approval Requested on	2017-06-05 14:22:04
Approved/Rejected on	2017-06-05 14:22:04	Approval Status	AUTO_APPROVED
Approval/Rejection Comment	Auto-Approved		
Terminate Protection	Disabled		
Project Name	Phase Name		
Description	N/A		

[Download logs](#)

[Access WordPress](#)

Associate Tags

Enter tag name [Update](#)

apache2_2

Status	JobRunning
Status Message	N/A
Start Time	2017-06-05 14:23:10
End Time	N/A
Cloud Name	FlashStack_Primary FlashStack-Primary
Cloud Account	FlashStack-Primary
Instance Type	Small (10 GB Local Storage, 1 CPU, 1024 MB Memory)
Scaling Policy	N/A
Security Profiles	N/A
Storage	N/A
Storage IP	N/A

Associate Tags

Enter tag name [Upd](#)

Figure 12. Deployment of an Application Profile Positioned with Tiers in Different Cloud Locations

The screenshot displays the Cisco CloudCenter interface for the deployment of an application profile. The top section, titled '"WP_Hybrid_Demo" Deployment Details', provides a comprehensive overview of the deployment process. Below this, a diagram illustrates the application architecture, showing a 'Database' component connected to an 'apache2' component, with arrows indicating data flow between a 'Private Cloud' and a 'Public Cloud'.

"WP_Hybrid_Demo" Deployment Details			
Name	WP_Hybrid_Demo	Start Time	2017-06-05 14:23:28
Application	WordPress (V4.0.1)	End Time	N/A
Deployment Environment	FlashStack	Cloud	AWS US East (Virginia)
Status	In Progress	Status Message	N/A
Aging Policy	-	Last Update Time	2017-06-05 14:23:28
Promoted from	-	Deployment Initiated by	Flash (admin@earthquakes.cisco.com)
Approved/Rejected by	Flash (admin@earthquakes.cisco.com)	Approval Requested on	2017-06-05 14:23:24
Approved/Rejected on	2017-06-05 14:23:24	Approval Status	AUTO_APPROVED
Approval/Rejection Comment	Auto-Approved		
Terminate Protection	Disabled		
Project Name	Phase Name		
Description	N/A		

Below the deployment details, a diagram shows the application architecture. A 'Database' component is connected to an 'apache2' component. The 'Database' is located in the 'Private Cloud', and the 'apache2' component is located in the 'Public Cloud'. Arrows indicate the data flow between the two clouds.

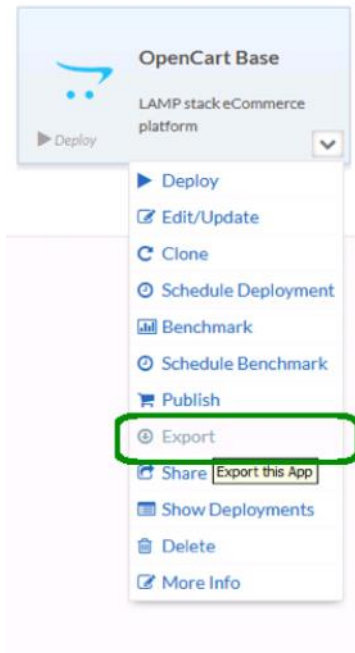
The 'apache2_2' component details are as follows:

apache2_2	
Status	JobStarting
Status Message	N/A
Start Time	2017-06-05 14:23:30
End Time	N/A
Cloud Name	AWS US East (Virginia)
Cloud Account	FlashStack-AWS
Instance Type	m1.small (160 GB Local Storage, 1 CPU, 1024 MB Memory)
VPC Identifier	vpc-5aeb3e23
Scaling Policy	N/A
Security Profiles	N/A
Storage	N/A
Storage IP	N/A

Implementing an N-Tier Application in Cisco CloudCenter on FlashStack

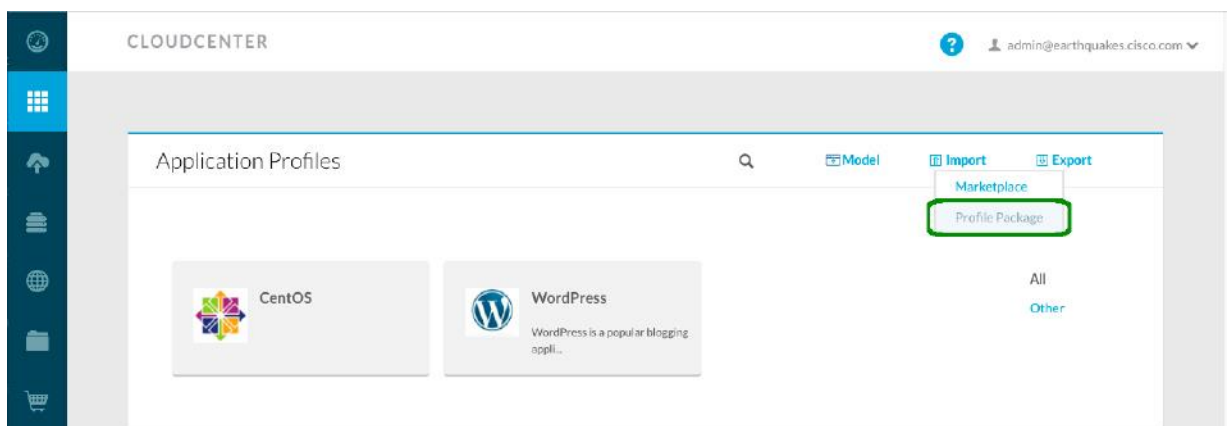
This section shows how to deploy a PHP-based N-tier application of OpenCart (www.opencart.com). This example illustrates the real-world use of Cisco CloudCenter in FlashStack. OpenCart uses an Apache front end coupled with a MySQL database to implement an e-commerce solution with a shopping cart function. OpenCart can be deployed from scratch as an application profile, but can also be shared by exporting it from another Cisco CloudCenter environment, as shown in Figure 13.

Figure 13. Exporting the OpenCart Application



Deploying the exported application profile is a simple import operation using a generated apps.zip file for the application profile package (Figure 14).

Figure 14. Importing the Application Profile



The import operation requires only the additional specification of an accessible repository (Figure 15).

Figure 15. Specifying an Accessible Repository for the Application Profile

Import Application Profile(s)

File uploaded: apps.zip

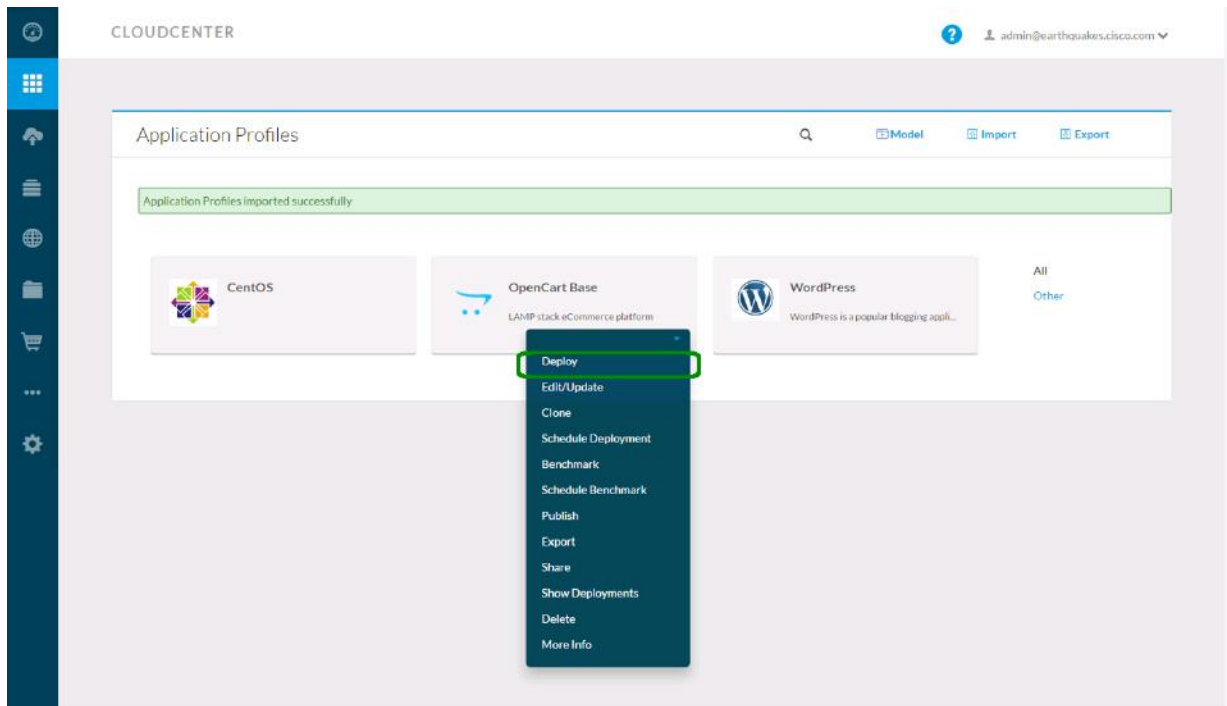
Uploaded apps require repository mappings. Add mappings here:

Repository used	Mapped repository
aws-http	----Select a Location---- ----Select a Location---- HTTP Repositories

Save Cancel

The application profile then is in place and available for deployment (Figure 16).

Figure 16. Imported Application Profile Ready for Deployment



Specify a deployment name for the application (Figure 17).

Figure 17. Specifying a Name for the Application

Deploy OpenCart-1
OpenCart Base

General Settings

* DEPLOYMENT NAME
OpenCart-1

* APPLICATION VERSION
2.0

TAGS ⓘ
Enter Tag Name

SECURITY PROFILES
Enter profile name

TERMINATE PROTECTION
☐ OFF

AGING POLICY
None

Tier Settings

NEXT

Select the cloud, or if the application will be split among multiple clouds, select the Hybrid option (Figure 18).

Figure 18. Selecting the Cloud for the Deployment

The screenshot displays the 'Deploy OpenCart-1' interface. At the top, a blue header bar contains the title 'Deploy OpenCart-1' and 'OpenCart Base' on the left, and a price indicator '\$ 0.02 /hour approx \$14.6/month' on the right. Below the header, the 'General Cloud Settings' section is visible. It includes a dropdown for '* DEPLOYMENT ENVIRONMENT' set to 'FlashStack'. Under 'SELECT A CLOUD', there are four options: 'FlashStack_Primary' (selected, with a blue border and 'FlashStack-Primary' dropdown), 'FlashStack_Branch' (with 'FlashStack-Branch' dropdown), 'AWS' (with 'US East (Virginia)' dropdown), and 'Hybrid' (with the description 'Deploy Tiers on different clouds'). Below these is a '* CLOUD ACCOUNT' dropdown set to 'FlashStack-Primary'. The 'Tier Settings' section at the bottom shows 'Apache' and a price of '\$ 0.01 /hour'.

Specify the basic required information components (data center, cluster, and network) for each component of the application profile. Then click Deploy to provision the application (Figure 19).

Figure 19. Deploying the Application

Deploy cartfoo
OpenCart Base

\$ 0.1 /hour
approx \$73/month

AVAILABLE INSTANCE TYPES (3)

SMALL	MEDIUM	LARGE
1 VIRTUAL CPU	1 VIRTUAL CPU	2 VIRTUAL CPU
1 GB MEMORY	2 GB MEMORY	4 GB MEMORY
10 GB STORAGE	10 GB STORAGE	10 GB STORAGE
\$ 0.05 /hour approx 36.5/month	\$ 0.1 /hour approx 73/month	\$ 0.15 /hour approx 109.5/month

* DATA CENTER
FlashStack-VSI

* CLUSTER
Test-Harness 6.5

DATASTORE ⓘ
Please Select One

RESOURCE POOL
Please Select One

TARGET DEPLOYMENT FOLDER
Please Select One

☐ Enable Full Clone

☐ Root Disk Resizable

NIC 1

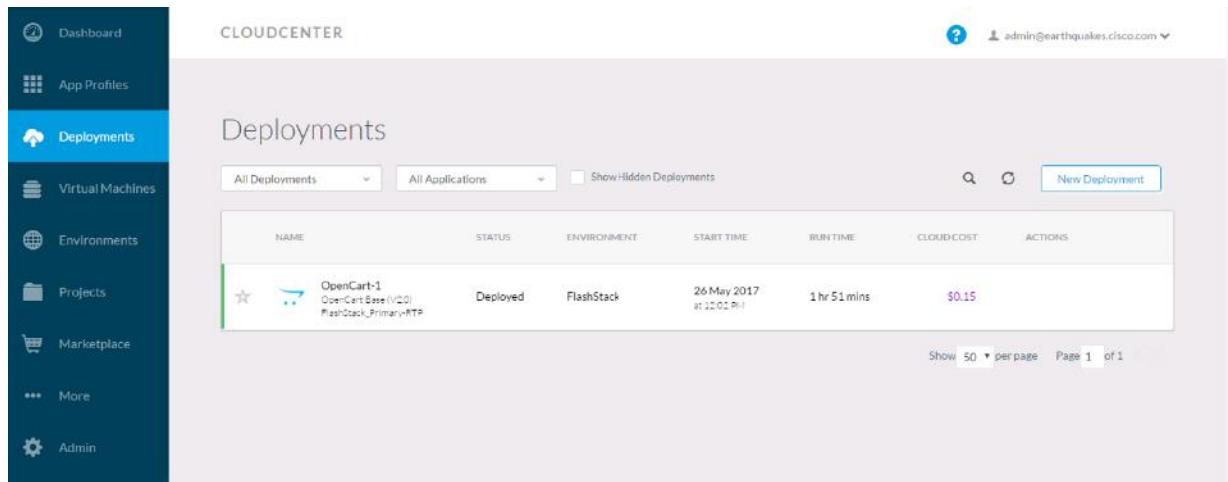
* NETWORK
IB-Mgmt

3 FIELDS MISSING

PREVIOUS DEPLOY

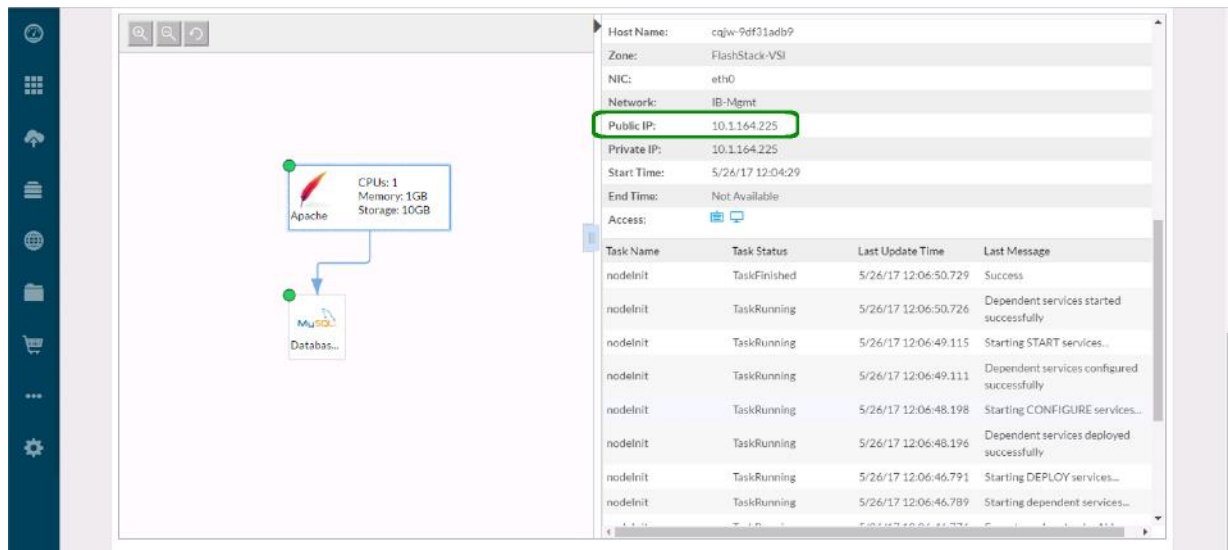
The application will appear in the Cisco CloudCenter Deployments section (Figure 20).

Figure 20. The Application Is Listed in the Deployments Section



Click within the details of the deployment to see the IP address of the Apache application (Figure 21).

Figure 21. Viewing the IP Address of the Application



You can directly pull up the application from the deployment details (Figure 22).

Figure 22. OpenCart Deployment Details Screen

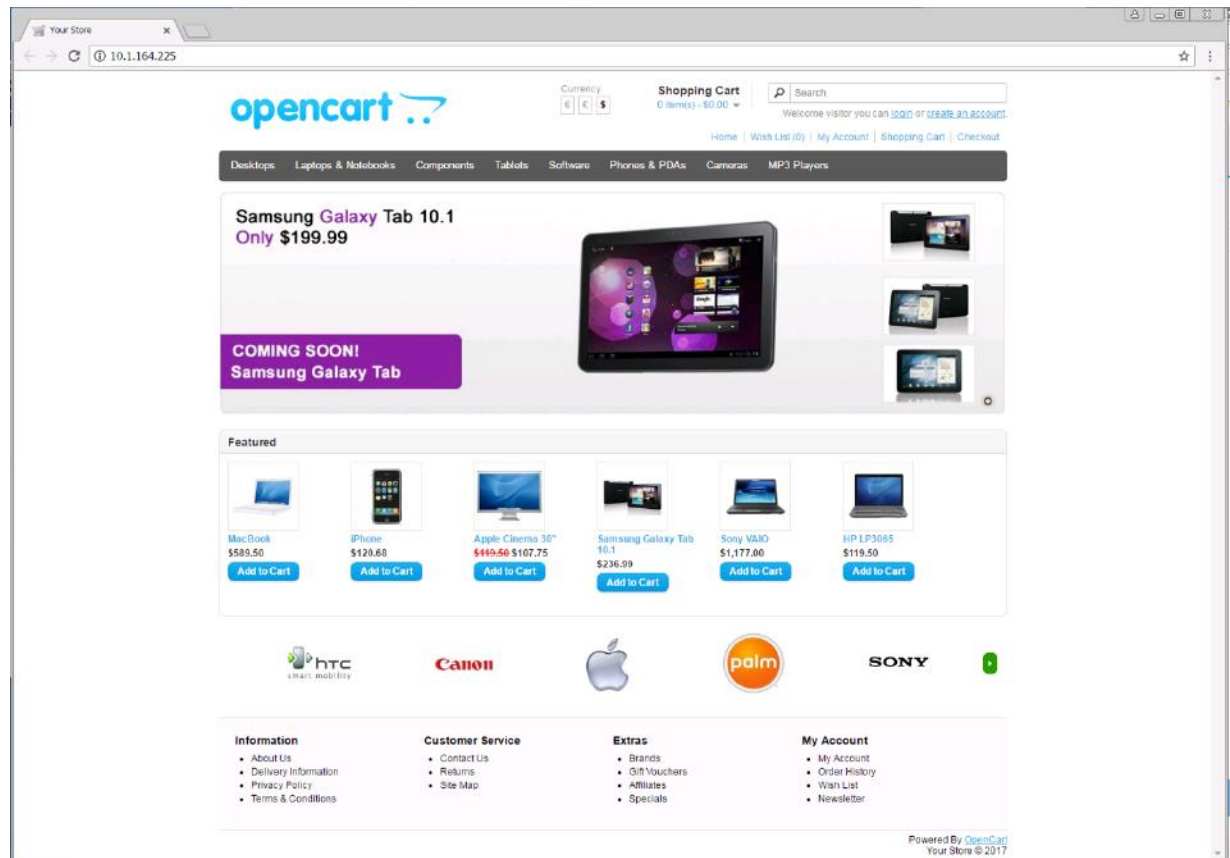
The screenshot displays the "OpenCart-1" Deployment Details screen in the CloudCenter interface. The page features a sidebar with navigation icons and a top header with the "CLOUDCENTER" logo and user information. The main content area shows a table of deployment details for "OpenCart-1".

Name	OpenCart-1	Start Time	2017-05-26 12:02:45
Application	OpenCart Base (V2.0)	End Time	N/A
Deployment Environment	FlashStack	Cloud	FlashStack_Primary FlashStack_Primary
Status	Deployed	Status Message	N/A
Aging Policy		Last Update Time	2017-05-26 12:06:55
Promoted from	-	Deployment Initiated by	Flash (admin@earthquakes.cisco.com)
Approved/Rejected by	Flash (admin@earthquakes.cisco.com)	Approval Requested on	2017-05-26 12:02:42
Approved/Rejected on	2017-05-26 12:02:42	Approval Status	AUTO_APPROVED
Approval/Rejection Comment	Auto-Approved		
Terminate Protection	Disabled		
Project Name		Phase Name	
Description	N/A		

Below the table, there is a "Download logs" link and a button labeled "Access OpenCart Base" which is highlighted with a green box. At the bottom, there is an "Associate Tags" section with a text input field "Enter tag name" and an "Update" button.

Figure 23 shows the deployed OpenCart instance.

Figure 23. Deployed OpenCart Instance



Conclusion

The Cisco CloudCenter solution is an application-centric hybrid cloud management platform that securely provisions infrastructure resources and deploys applications to more than 20 data center, private cloud, and public cloud environments. The combination of Cisco CloudCenter and FlashStack provides a versatile solution that delivers essentially limitless computing expandability in the public cloud together with best-in-class performance in the private cloud using FlashStack converged infrastructure.

For More Information

Cisco CloudCenter — <http://www.cisco.com/c/en/us/products/cloud-systems-management/cloudcenter/index.html>

FlashStack with Pure Storage — <https://www.purestorage.com/solutions/infrastructure/flashstack.html>

FlashStack Design Guides — <http://www.cisco.com/c/en/us/solutions/design-zone/data-center-design-guides/data-center-design-guides-all.html#FlashStack>



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Printed in USA

C11-739168-00 06/17

© 2017 Cisco and/or its affiliates. All rights reserved. This document is Cisco Public.

Page 29 of 29