



Getting the most out of Kubernetes management across Amazon EKS and your on-premises environment

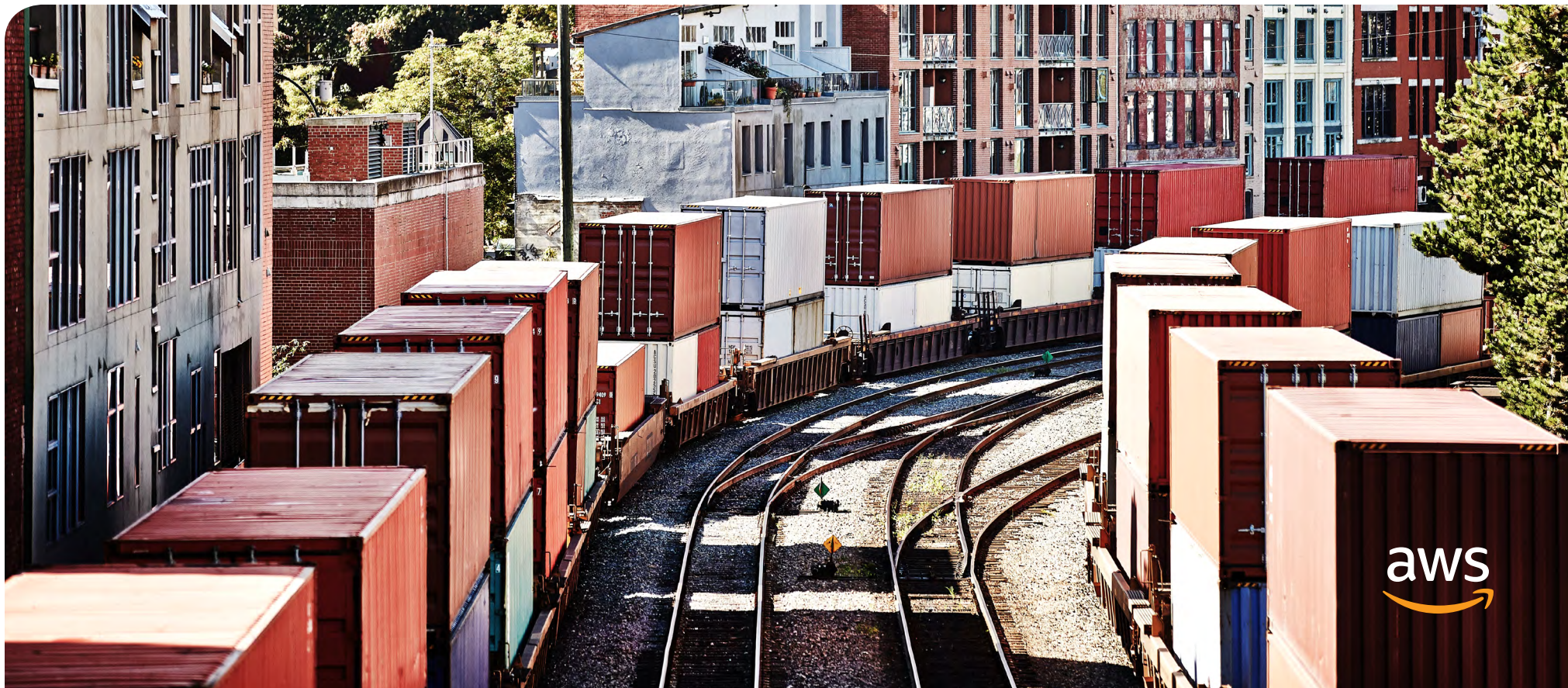


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Introduction

Market Trends: Containers are emerging as a core part of technology strategy

Containers have become the new infrastructure standard for development teams. While the “DIY container approach” (un-orchestrated containers) still has its use cases (e.g. low latency, longer compute jobs, predictable traffic), production-grade deployments require orchestration. DevOps teams are increasingly leveraging the benefits of Kubernetes and accelerating its adoption, taking it from a 27% adoption rate in 2018 to a 48% adoption rate in 2019 according to the RightScale “[2019 State of the Cloud Report](#),” from Flexera. The same report also positions

Amazon Elastic Kubernetes Service (Amazon EKS) as one of the fastest-growing managed Kubernetes offerings available, with a 44% adoption rate.

Previously, containers were a technology deployed by individual teams – and were typically used for “application testing” in the enterprise world. Today, many organizations are now not only seeing the benefits of operationalizing containers to deploy production applications, but also re-positioning containers as a core part of their technology strategy.

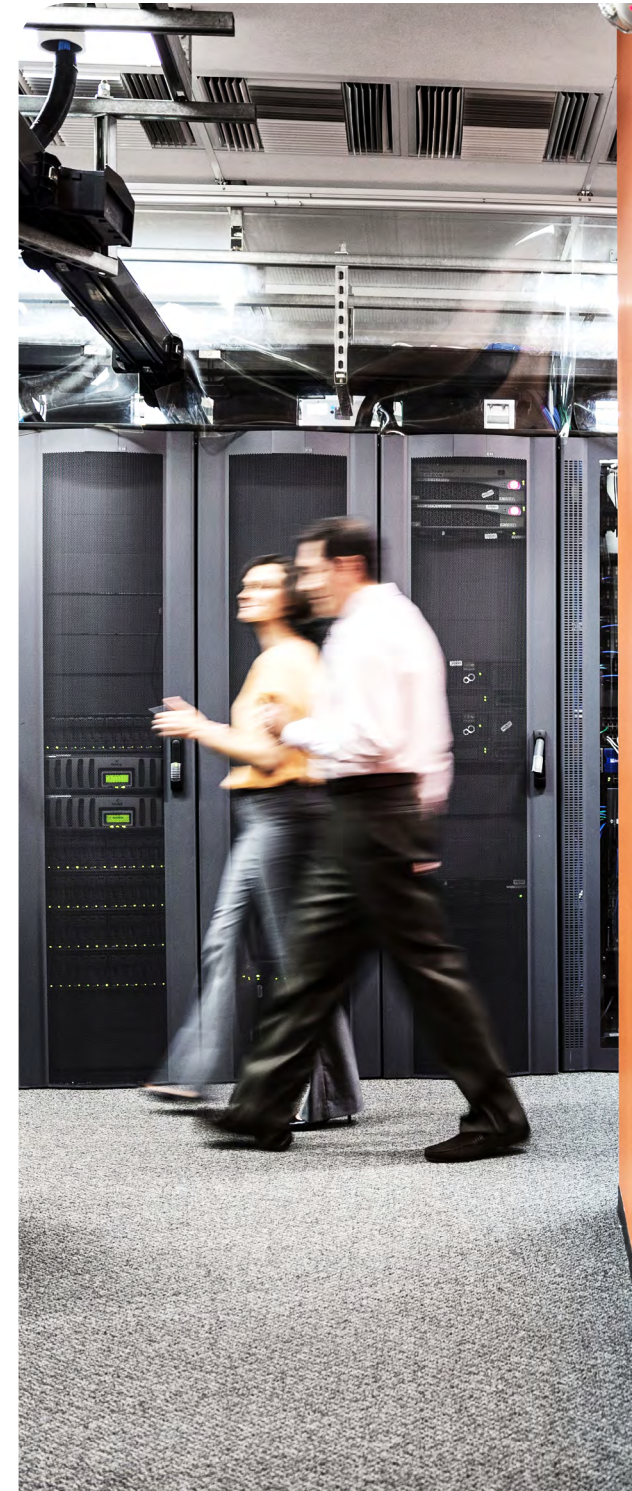
The need for hybrid container deployments

With application modernization currently emerging as a priority for organizations, the need to evolve on-premises infrastructure to support containers and Kubernetes is urgent. Some applications will remain hosted entirely in private data centers. The common practice will be to re-platform them there, while still leveraging the agility of cloud development tools and platforms.

Other reasons for hybrid application use cases are industry or government regulations that require specific data to remain on-premises or latency-sensitive workloads with extremely high throughput requirements. As a result, hybrid application deployments that span on-premises and cloud environments are increasing.

Amazon EKS makes it easy to deploy, manage, and scale containerized applications using Kubernetes on Amazon Web Services (AWS). Amazon EKS is certified Kubernetes conformant so you can use existing tooling and plugins from partners and the Kubernetes community. This means you can maintain compatibility with on-premises Kubernetes deployments, leveraging just one set of skills when it comes to infrastructure. Now, your workloads running on Amazon EKS are fully compatible with the workloads on your on-premises environment.

But how can you manage a hybrid Kubernetes across on-premises and the cloud?





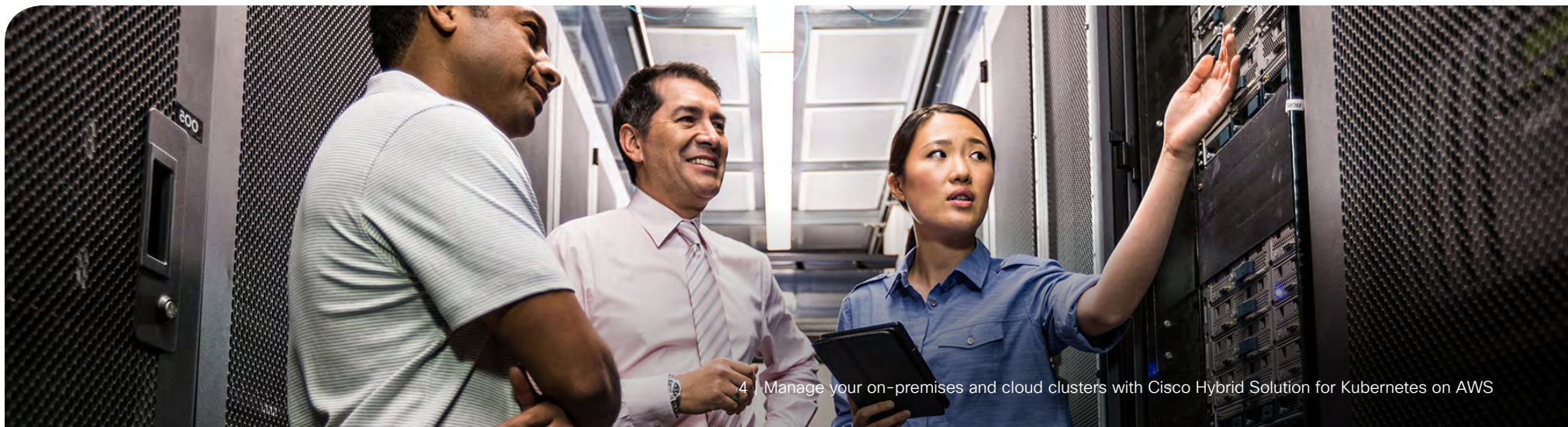
Why better hybrid container management is key

Heterogeneous infrastructure often means greater complexity for DevOps teams. It also means having to manage individual clustering, networking, security, and identity settings from an operational perspective, as well as deploying applications with multiple configurations from a development perspective. Combined, these can ultimately result in lengthier time-to-market for applications.

In addition, the lack of consistency and common governance across different environments increases risk from a security and networking perspective, forcing relevant teams to use multiple tools.

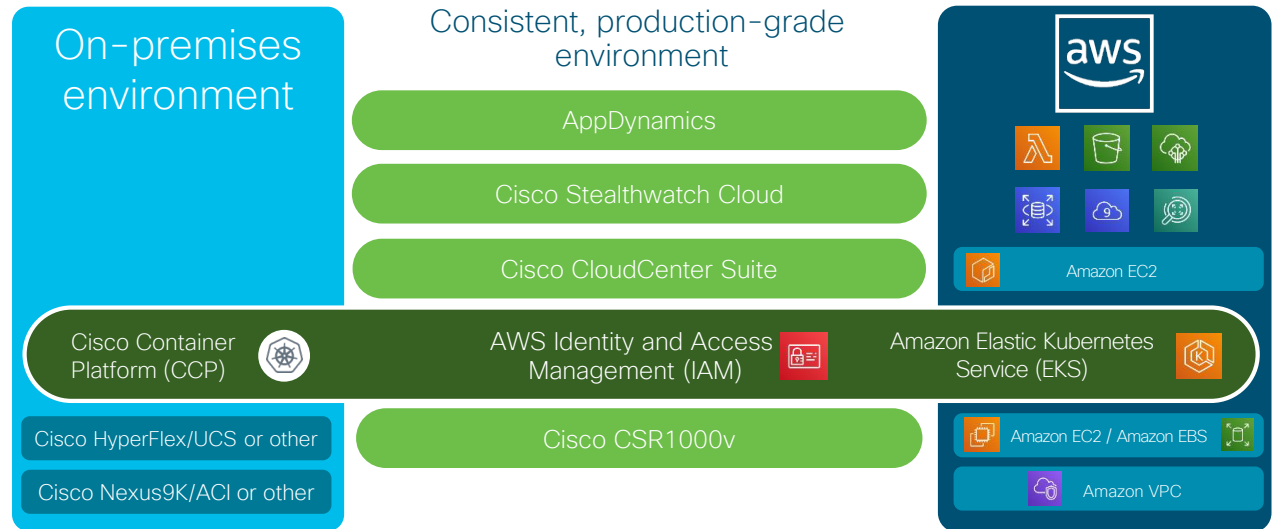
Container management is currently a top priority, with 92.5% of large enterprises in an IDC study expecting to invest in container management software by 2023 (IDC Technology Spotlight, sponsored by Cisco, “Why Container Management Platforms Are a Top Enterprise Investment Priority”, July 2019), and the need to manage hybrid containerized infrastructure with common processes and tooling is a primary driver behind that effort.

Acknowledging the market gap, AWS has collaborated with Cisco to develop the industry’s first hybrid solution for Kubernetes on AWS.





The Cisco Hybrid Solution for Kubernetes on AWS enables you to deploy and manage Kubernetes-based infrastructure on-premises and in Amazon EKS. It is a comprehensive solution with optional components that you can use not only to quickly deploy Kubernetes clusters with consistency, but also to support the full lifecycle of containerized and non-containerized hybrid applications.



With the *Cisco Hybrid Solution for Kubernetes on AWS*, you can:

Deploy applications with a simplified and consistent CI/CD experience, consistent authentication policies, and Role-Based Access Control enforcement.

Connect containers, applications and infrastructure with enterprise-class functionality.

Secure applications with proactive monitoring and threat detection across your entire hybrid infrastructure landscape.

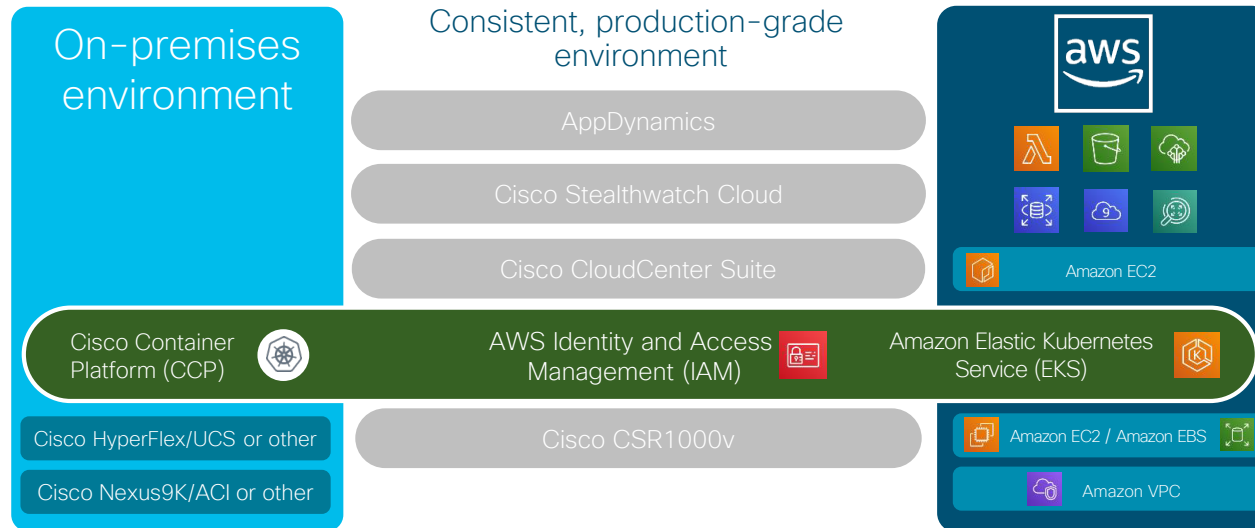
Monitor both application and infrastructure performance.

How it works

Setting up and configuring hybrid Kubernetes clusters with Cisco Container Platform

The centerpiece of the Cisco Hybrid Solution for Kubernetes on AWS is the unique integration of the Cisco Container Platform (CCP) with Amazon EKS, leveraging the AWS Identity and Access Management (IAM) feature across both environments. This allows you to deploy

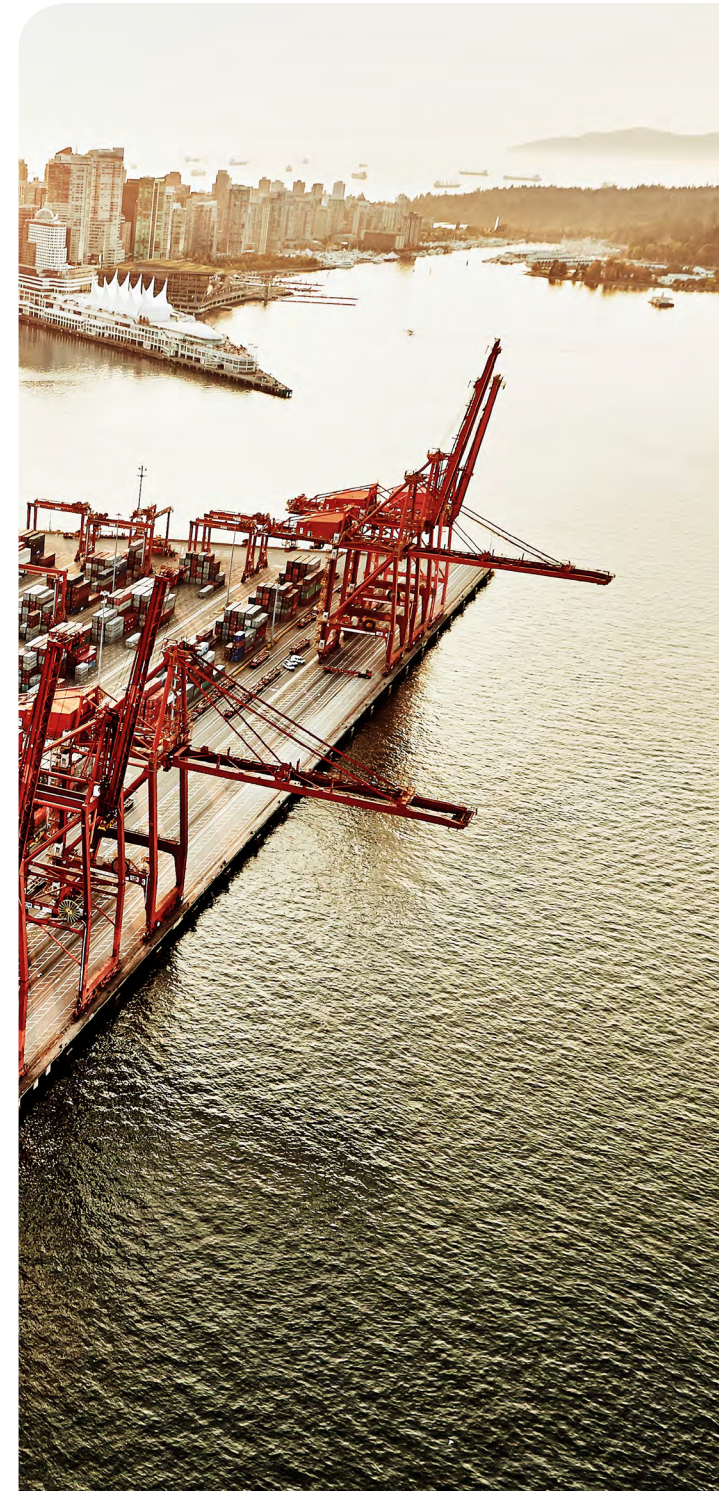
container clusters using CCP with the same identity, authorization, and access control policies across your on-premises and AWS environments, allowing developers to run applications faster using a common framework.



Cisco Hybrid Solution for Kubernetes on AWS

CCP is a turnkey, open, production-grade, software solution that helps simplify the deployment and management of container clusters, based on native Kubernetes (100% upstream). It is built on industry standards with an open architecture and open source components

to avoid lock-in. It provides a comprehensive stack for creating and managing Kubernetes subscription-based clusters, and it includes networking, load balancing, persistent storage, security, monitoring, analytics, and optimization.



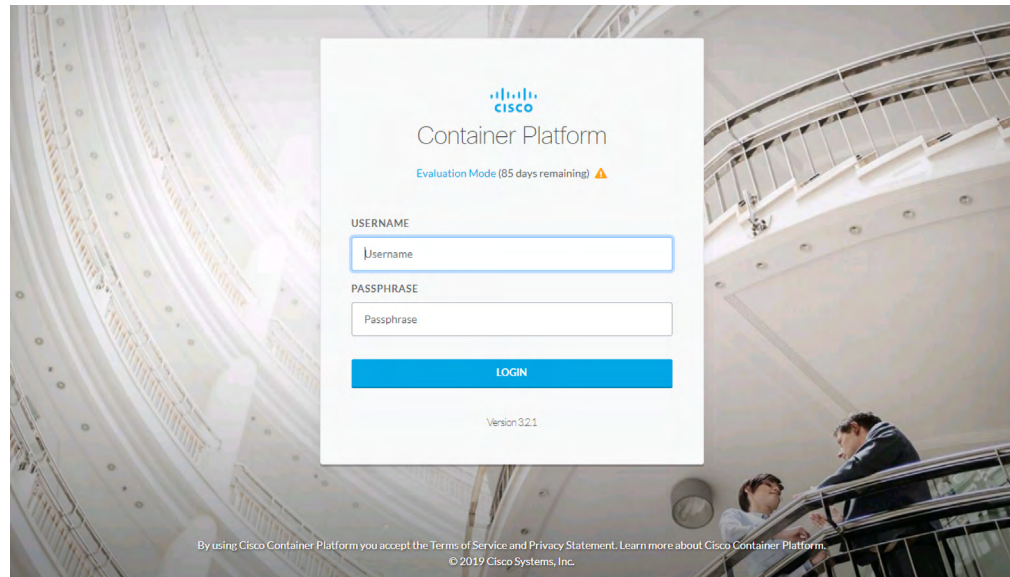


It is infrastructure-agnostic and can work across any infrastructure (any Intel Ivy Bridge or later hardware that has VMware). Existing Cisco data center customers will benefit from the native integration with Cisco HyperFlex/UCS and Cisco's Application Centric Interface (ACI) plug-in.

CCP has a strong focus on layered security with hardening features (TLS, ECDSA/ED25119, Kubernetes dashboard authorization, protection certification manager, internal vulnerability scanning, pod security policies, and AppArmor). It also provides continuous monitoring of industry-

standard vulnerability intelligence streams with rapid turnaround of patch releases. Other integrations include service mesh support with pre-installed Istio, the industry standard Container Networking Interface, and native GPU support for automating AI/ML workload deployment and scaling.

Cisco Container Platform can be downloaded and installed locally in less than 30 minutes. Simply import the tenant images and the platform's installer virtual machine, which will then create the runtime instance.



Cisco Container Platform Login Screen

Using your local Active Directory or LDAP system, you can log into the Cisco Container Platform console and configure the locations where you'd like to create Kubernetes clusters. This can be in one or more on-premises data centers, and/

or one or more AWS Regions and Availability Zones (AZs) where Amazon EKS is available. The platform provides options to configure Kubernetes networking, user management, and role-based access control.



When you're ready to create Kubernetes clusters, all you have to do is select the deployment target. Cisco Container Platform will create the master and worker nodes in your on-premises data centers and/or on AWS.

In the on-premises scenario, Cisco Container Platform will create the necessary virtual machines in the designated VMware cluster to run the master and worker Kubernetes nodes using the tenant images.

Configuring clusters on-premises





In the AWS scenario, Cisco Container Platform will leverage the AWS Identity and Access Management user and role, to create a virtual private cloud in the preferred region. It will then

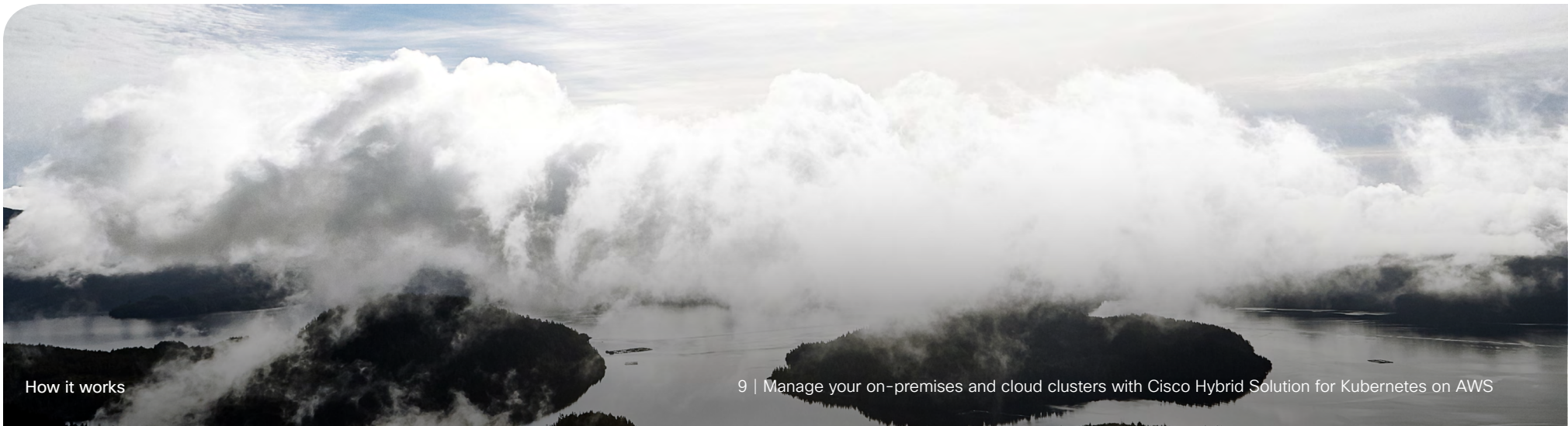
trigger Amazon EKS to create master nodes. Finally, Cisco Container Platform will create worker nodes in that virtual private cloud and make them available to users.

The screenshot shows a 'Create AWS Cluster' wizard. On the left, a navigation pane lists four steps: 01 Basic Information (selected), 02 Node Configuration, 03 VPC Configuration, and 04 Summary. The main area is titled 'Basic Information' and contains three input fields: '* INFRASTRUCTURE PROVIDER' (a dropdown menu), '* AWS REGION' (a text input field), and '* KUBERNETES CLUSTER NAME' (a text input field). To the right of these fields is a summary panel with three rows: 'INFRASTRUCTURE PROVIDER', 'REGION', and 'INSTANCE TYPE', each followed by three dots indicating a value to be populated.

Configuring clusters on Amazon EKS

IAM can be used as a common authentication mechanism, so that the cluster administrator is free to apply the same Role-Based Access Control (RBAC) policies across both

environments. These are integrated with Amazon Elastic Container Registry (Amazon ECR) to provide a secure, single repository for all the container images.

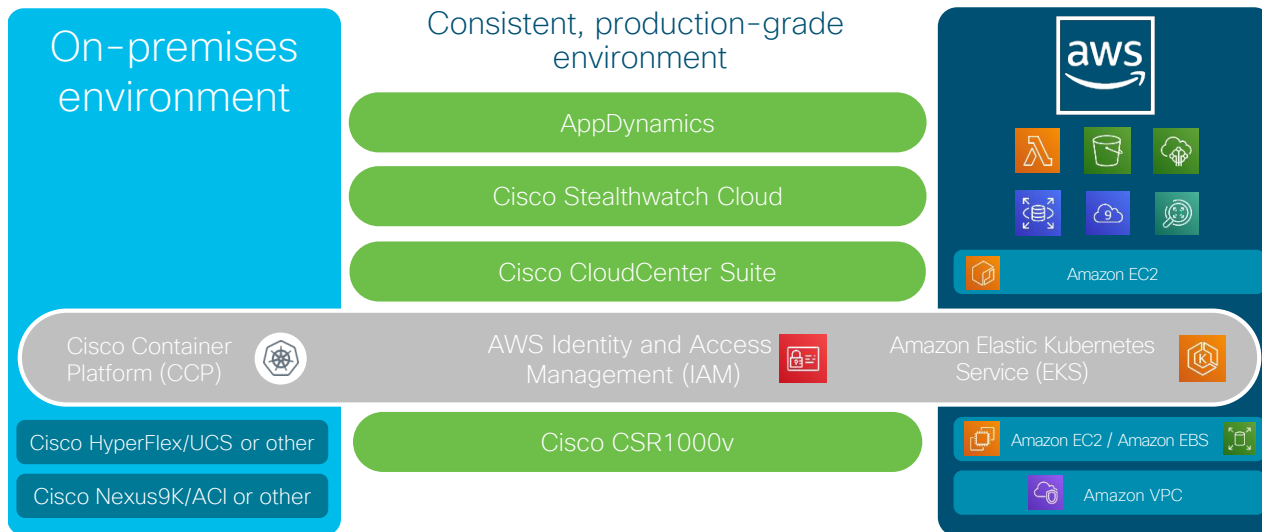




Supporting the full lifecycle of your applications

The optional components of the Cisco Hybrid Solution for Kubernetes on AWS cover application deployment and management, security, additional monitoring capabilities, and provide enterprise-grade connectivity. In addition to the applications

and infrastructure deployed on CCP and Amazon EKS, these components can support your existing applications and infrastructure across both on-premises and cloud environments.



Cisco Hybrid Solution for Kubernetes on AWS

Connecting applications: Cisco’s Cloud Services Router 1000V (CSR1000v) optimizes connectivity by creating a unified and secure environment that includes your private network and AWS. Now your deployed applications can globally scale with automated and robust connectivity as they take off, bringing them closer to their users.

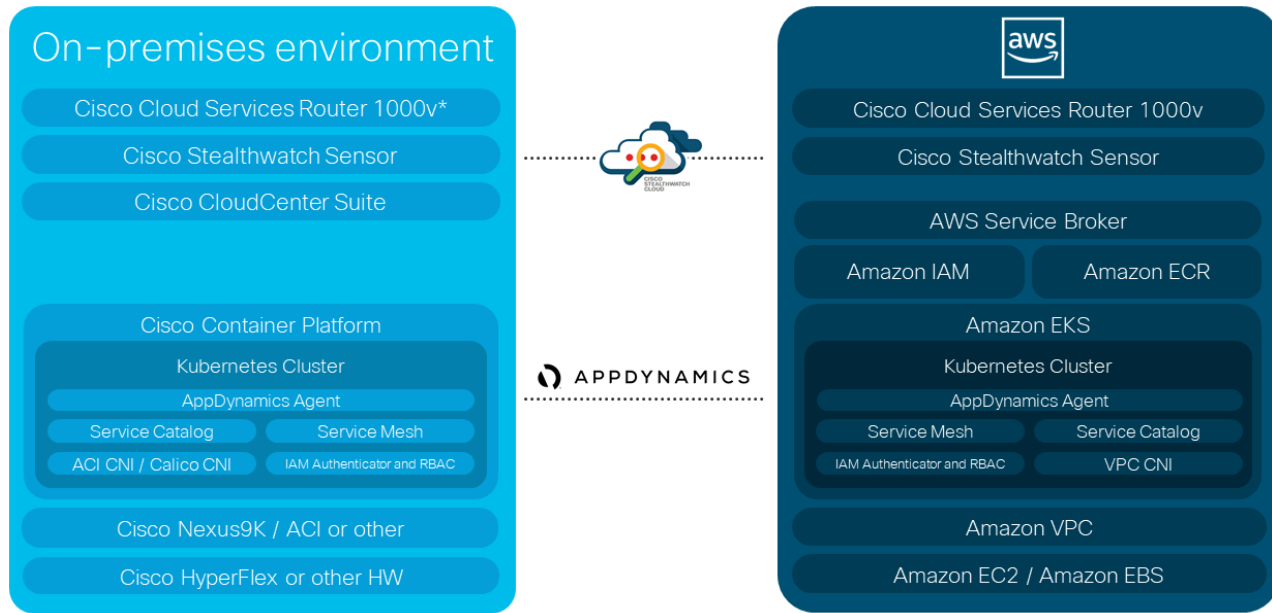
Deploying applications: Cisco CloudCenter Suite offers further automation of application deployment to multiple targets, without the need to remodel them. It also includes cost monitoring and reporting and workflow orchestration.

Securing applications: Cisco Stealthwatch Cloud offers proactive security and threat detection, integrating with Amazon Virtual Private Cloud (Amazon VPC) and your on-premises environment to protect the access of users, devices, and workloads with policy enforcement.

Monitoring applications: AppDynamics offers end-to-end visibility of the entire application and infrastructure ecosystem to accelerate migration validation and improve error detection and problem resolution.



Detailed Architecture



*or any other existing physical/virtual router





Benefits

Now you can use a single, integrated solution to quickly deploy Kubernetes-based applications anywhere with a consistent experience both on-premises and on AWS. And you can get started in a matter of hours!

Accelerate innovation

with reduced time-to-market for applications and faster adoption of native AWS services

Securely deploy, connect, manage, and monitor

applications and infrastructure with one integrated solution

Provide

customers and end-users the flexibility to manage cost on-premises and in the cloud

Maintain visibility

and control across your hybrid environment without slowing innovation with end-to-end protection and common identity and authentication.

Mitigate risk

with a single point of contact for support across all solution components, provided by Cisco*

Reduce complexity and cost

by simplifying your Kubernetes-based infrastructure

**Cisco offers a single point of contact for support across all the components of this solution, including AWS and open source components.*

Consumer-Packaged Goods use case for Hybrid Kubernetes

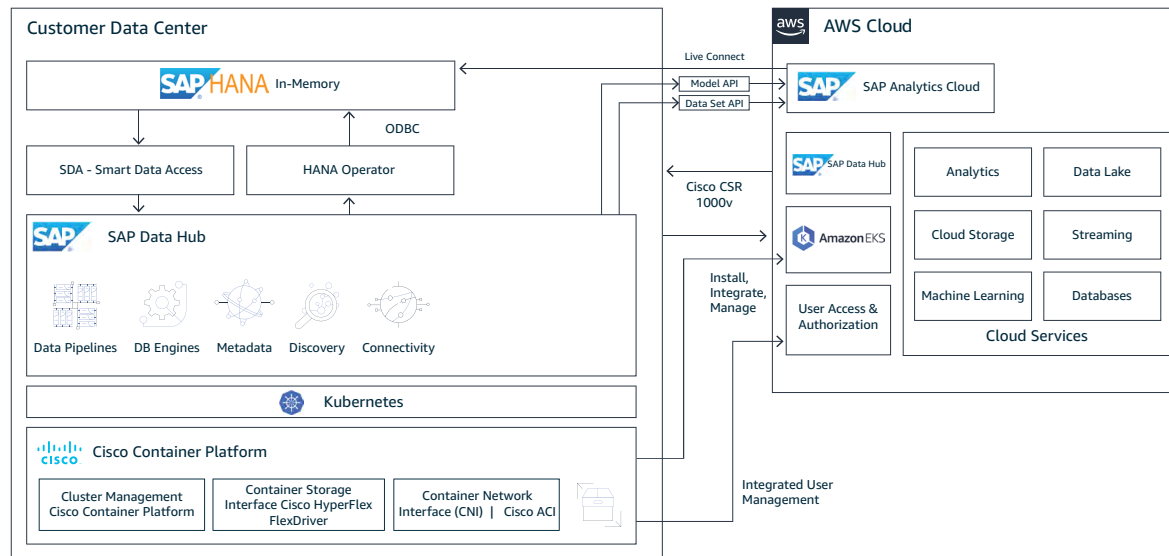
A typical requirement of many Consumer-Packaged Goods (CPG) organizations is to integrate and manage large sets of data across their entire landscape for processing, while ensuring that sensitive customer information is protected and only stored on-premises. As a result, CPG organizations sought enterprise solutions that would enable them to connect on-premises and cloud infrastructure in a secure and scalable way.

A good example of an enterprise data management and visualization solution is SAP

Data Hub. This offering allows data sharing, pipelining, and orchestration so that companies can accelerate and expand the flow of data across their modern, diverse data landscapes.

Cisco and SAP have worked together to build an end-to-end validated and tested architecture, based on the Cisco Hybrid Solution for Kubernetes on AWS, so you can run your production-grade SAP Data Hub environment safely on-premises with the option to also run it in hybrid mode on Amazon EKS.

Hybrid SAP Data Hub Across On-premises and AWS





This use case provides a mechanism for customers to create an on-premises version of a data lake that includes data ingestion, data storage, data security, data massaging/wrangling, data analysis, and data visualization. SAP Data Hub enables tokenizing and/or anonymizing of data that is required to protect sensitive customer information and transfer the tokenized data to be stored or archived by AWS.

The resulting data set stored in AWS can be seamlessly integrated with your on-premises data lake for further analysis and visualization, using SAP Data Hub to manage the data orchestration between your on-premises environment and AWS.

Cisco Container Platform provides a turn-key Kubernetes hybrid environment to deploy SAP Data Hub, while Cisco Cloud Services

Router 1000V, and Cisco Application-Centric Infrastructure (ACI) ensure the secure extension of your on-premises and data center network to AWS for data transfer with consistent policy enforcing. This way you can ensure data isolation for privacy and compliance, as well as minimize latency and inconsistent WAN connectivity.

Cisco Stealthwatch Cloud and AppDynamics can further enhance the use case by offering end-to-end proactive threat detection and monitoring across the complete SAP Data Hub application and infrastructure stack.

With SAP Data Hub and the Cisco Hybrid Solution for Kubernetes on AWS you can simplify complex data landscapes, easily integrate from multiple sources, and accelerate development by quickly getting data where it needs to be consumed to deliver business insights.

Simplify your development experience across your on-premises and AWS environments

[Learn more about the Cisco Hybrid Solution for Kubernetes on AWS](#)



Additional resources:

[Learn how to use Cisco Container Platform to set up Kubernetes clusters on-premises and on AWS](#)

[Try the solution out for yourself on the Cisco DevNet platform](#)

