
AWS
re:Invent
DECEMBER 2 – 6, 2024 | LAS VEGAS, NV

KUB310

Amazon EKS for edge and hybrid use cases

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AWS

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Agenda

01 Hybrid environment challenges

02 Standardizing across environments

03 How Amazon EKS can help

04 EKS hybrid deep-dive

05 Next steps

Hybrid environment challenges

Common hybrid challenges

Operational overhead

Common hybrid challenges

Operational overhead

Technology sprawl

Common hybrid challenges

Operational overhead

Technology sprawl

Difficult to make changes

Common hybrid challenges

Operational overhead

Technology sprawl

Difficult to make changes

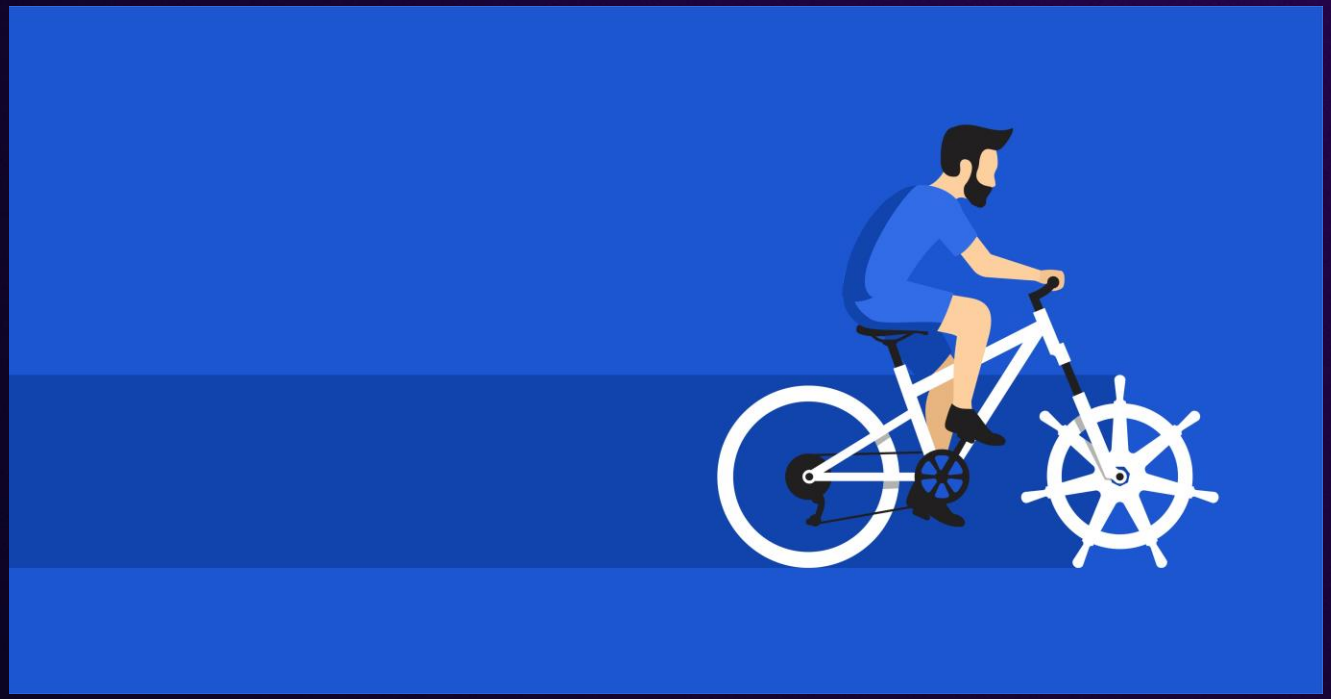
Limited skillsets

Standardizing across environments

Why Kubernetes

Benefits

- Align with open standards
- Portability
- Community innovation
- Flexibility/ecosystem
- Declarative operations



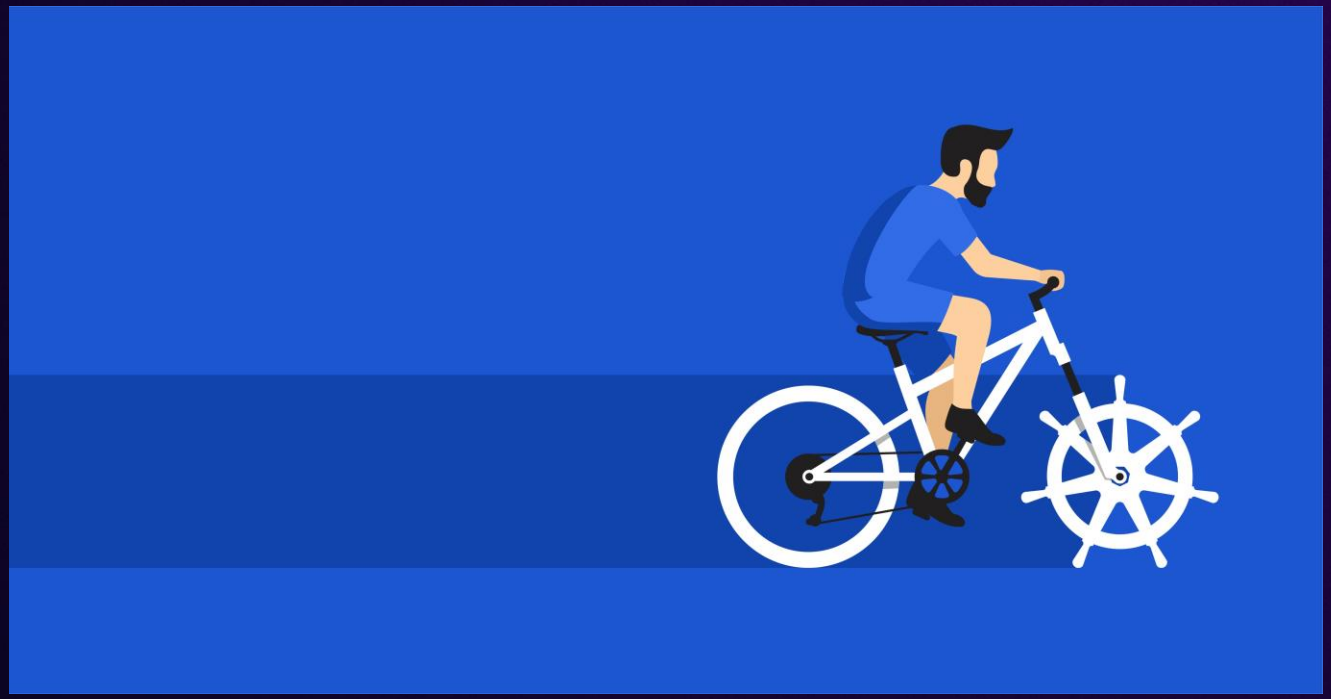
Why Kubernetes

Benefits

- Align with open standards
- Portability
- Community innovation
- Flexibility/ecosystem
- Declarative operations

Challenges

- Learning curve
- Operational complexity
- Scaling challenges



Choosing the best EKS architecture for your use case

Amazon EKS hybrid/edge overview

Cloud-connected use cases

Amazon EKS on
AWS Outposts

2019

AWS-MANAGED KUBERNETES CONTROL PLANE

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2019

Enterprise
Modernization

Local Data
Processing

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Cloud-disconnected use cases

Amazon EKS Anywhere

2021

CUSTOMER-MANAGED CLUSTER OPERATIONS

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2021

Air-gapped Environments

Telco

Financial Services

Travel

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NEW

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NEW

Enterprise Modernization

Local Data Processing

Machine Learning

Manufacturing

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2021

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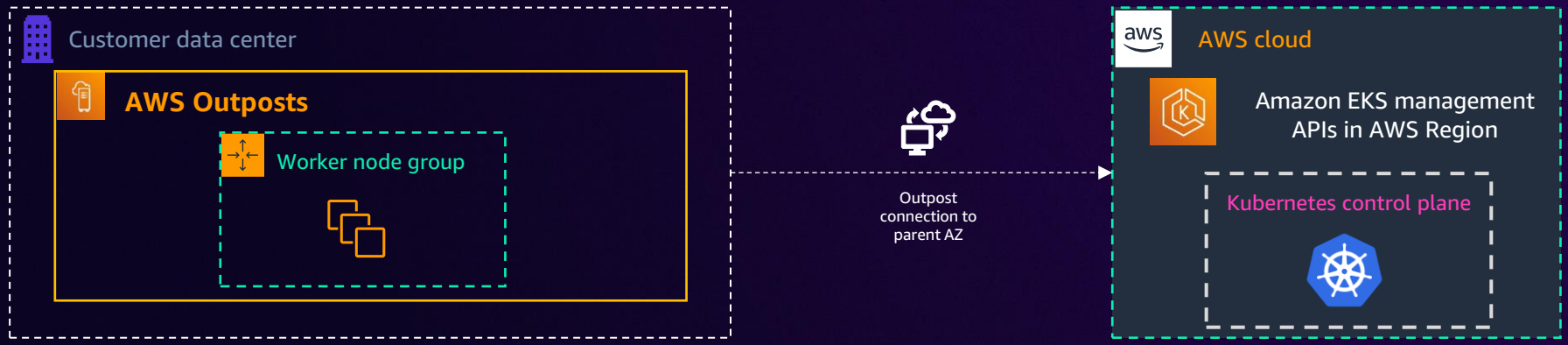
CUSTOMER-MANAGED CLUSTER OPERATIONS

Amazon EKS on AWS Outposts overview and architecture

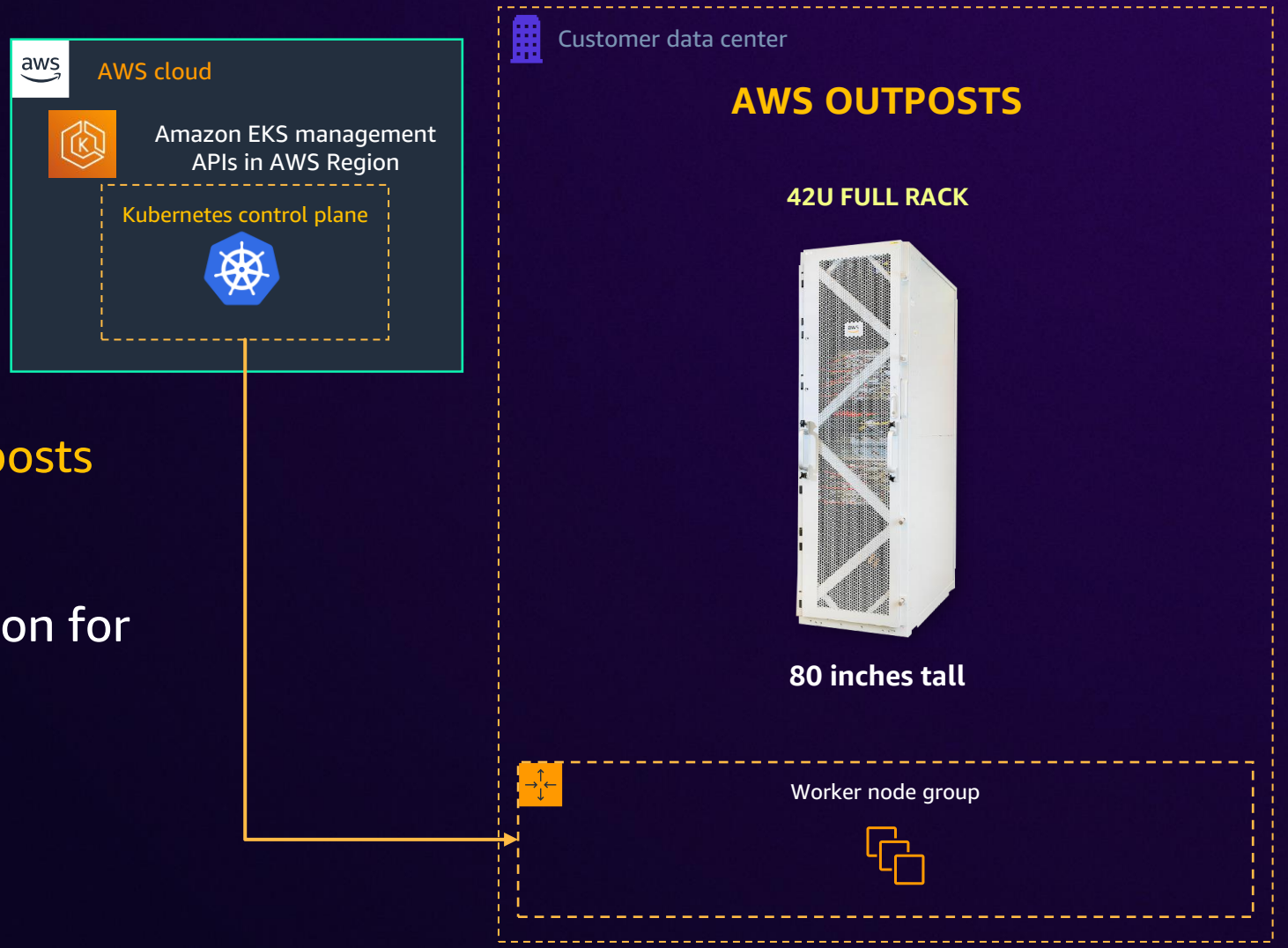
Amazon EKS on AWS Outposts deployment options

Extended clusters
*Recommended



Local clusters

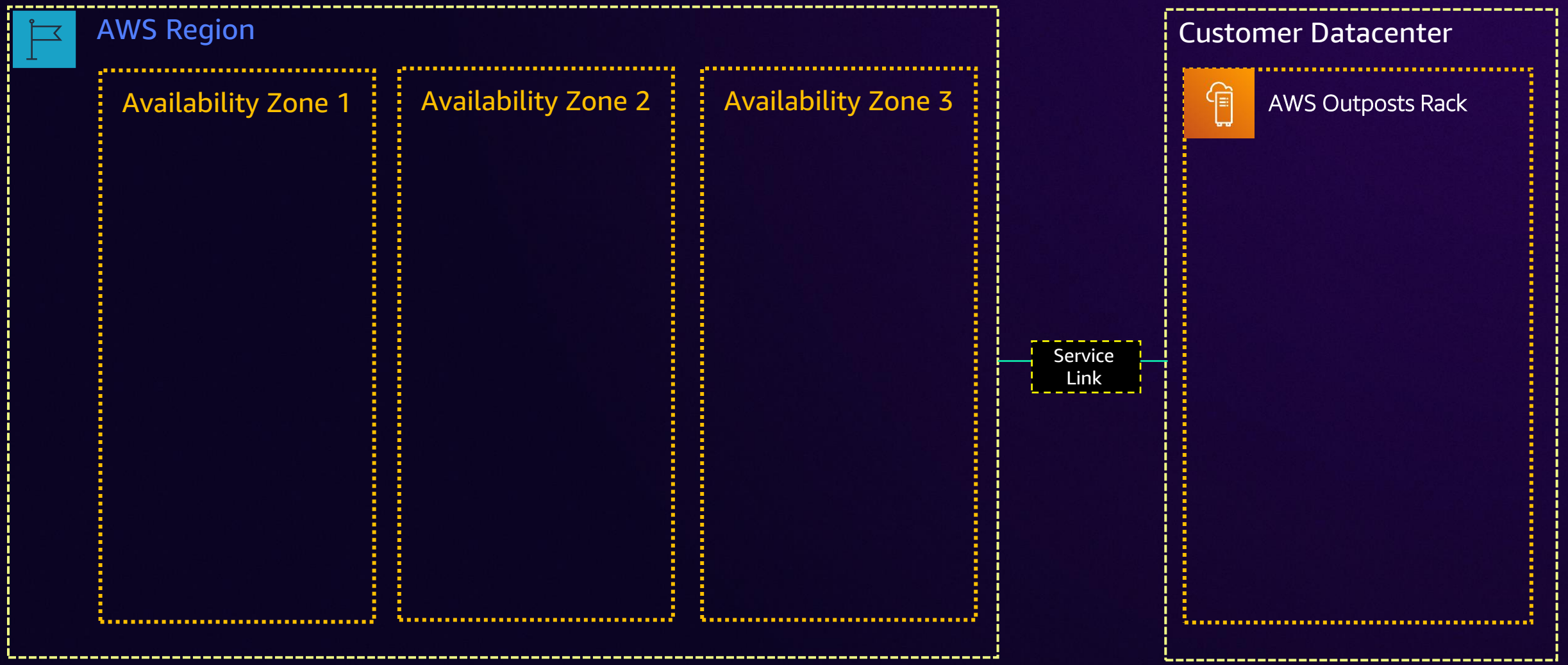
Amazon EKS on AWS Outposts (extended clusters)



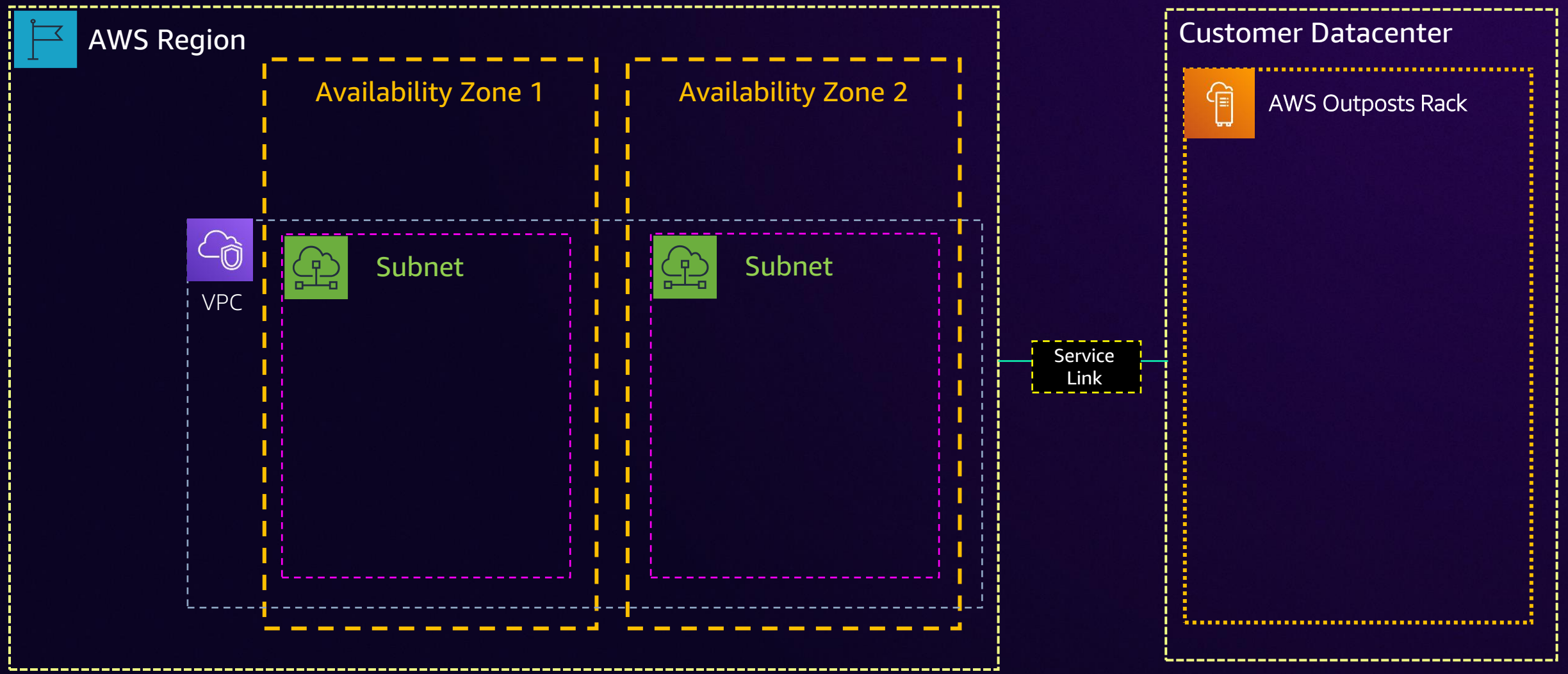
Extend Amazon EKS to run on AWS Outposts

- Managed cloud-based control plane
- Requires connectivity to the AWS Region for management

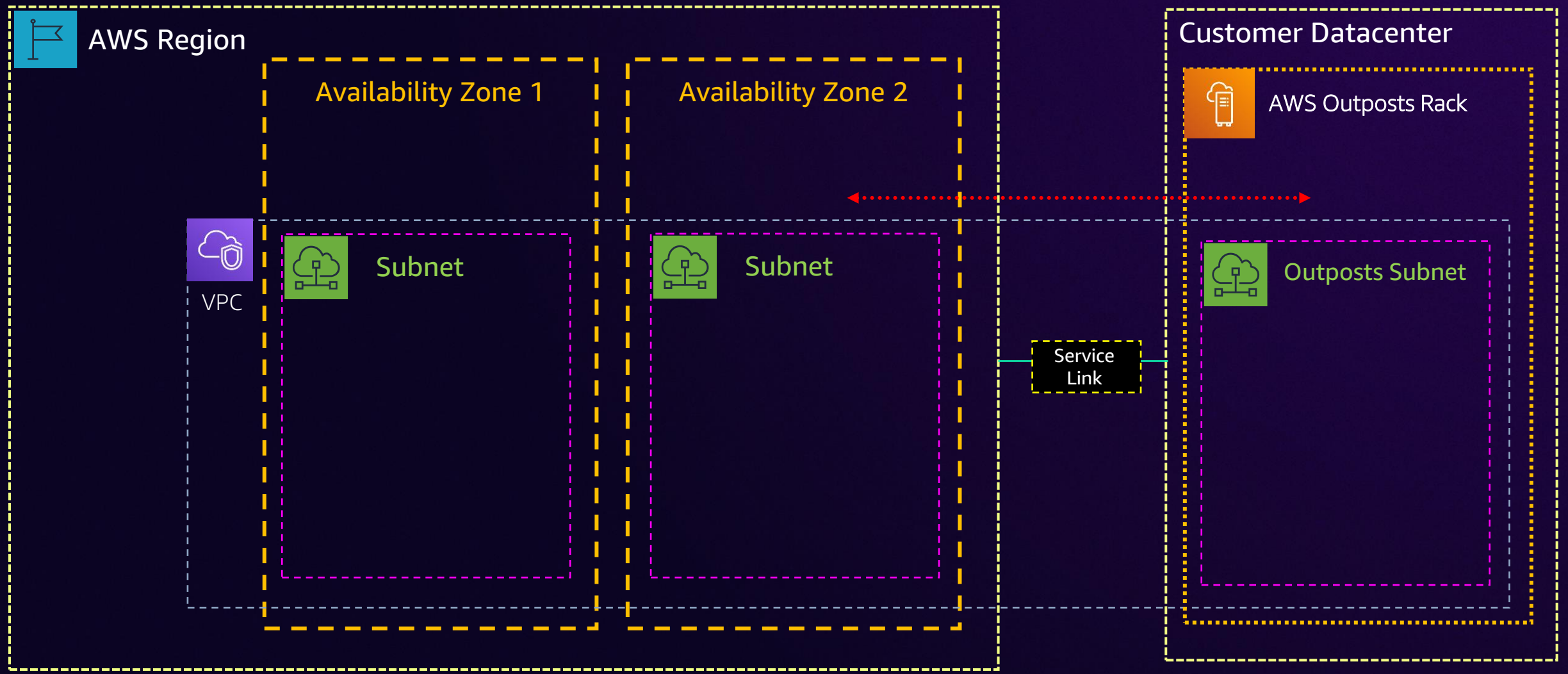
Amazon EKS on AWS Outposts



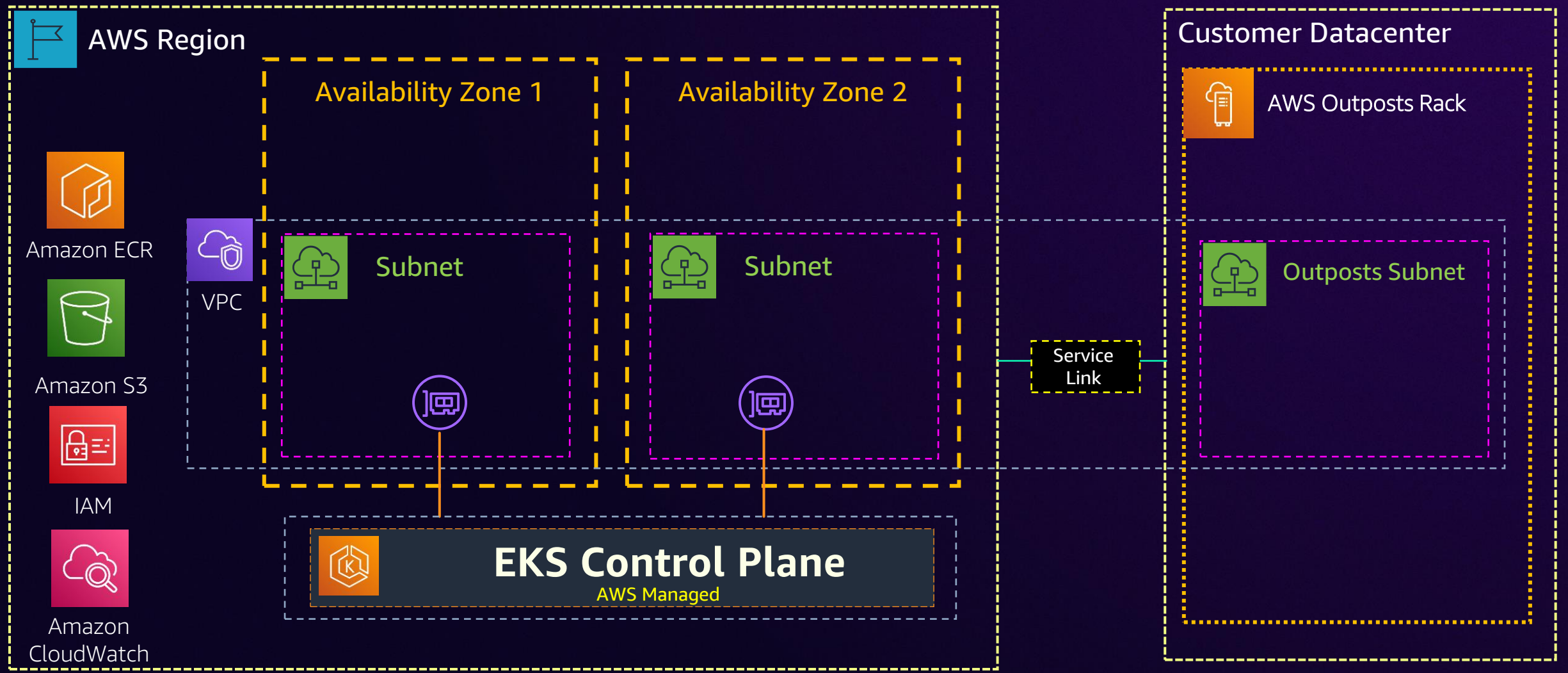
Amazon EKS on AWS Outposts



Amazon EKS on AWS Outposts



Amazon EKS on AWS Outposts



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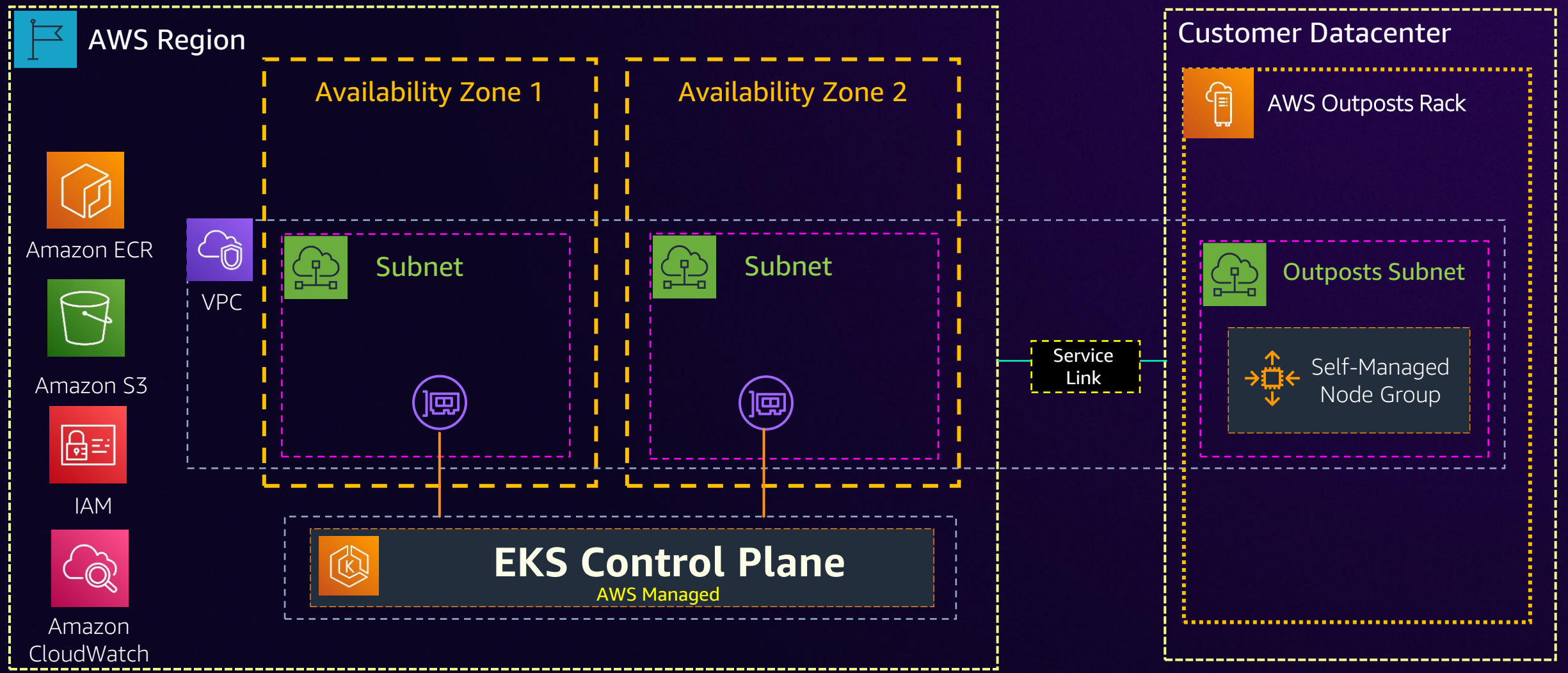

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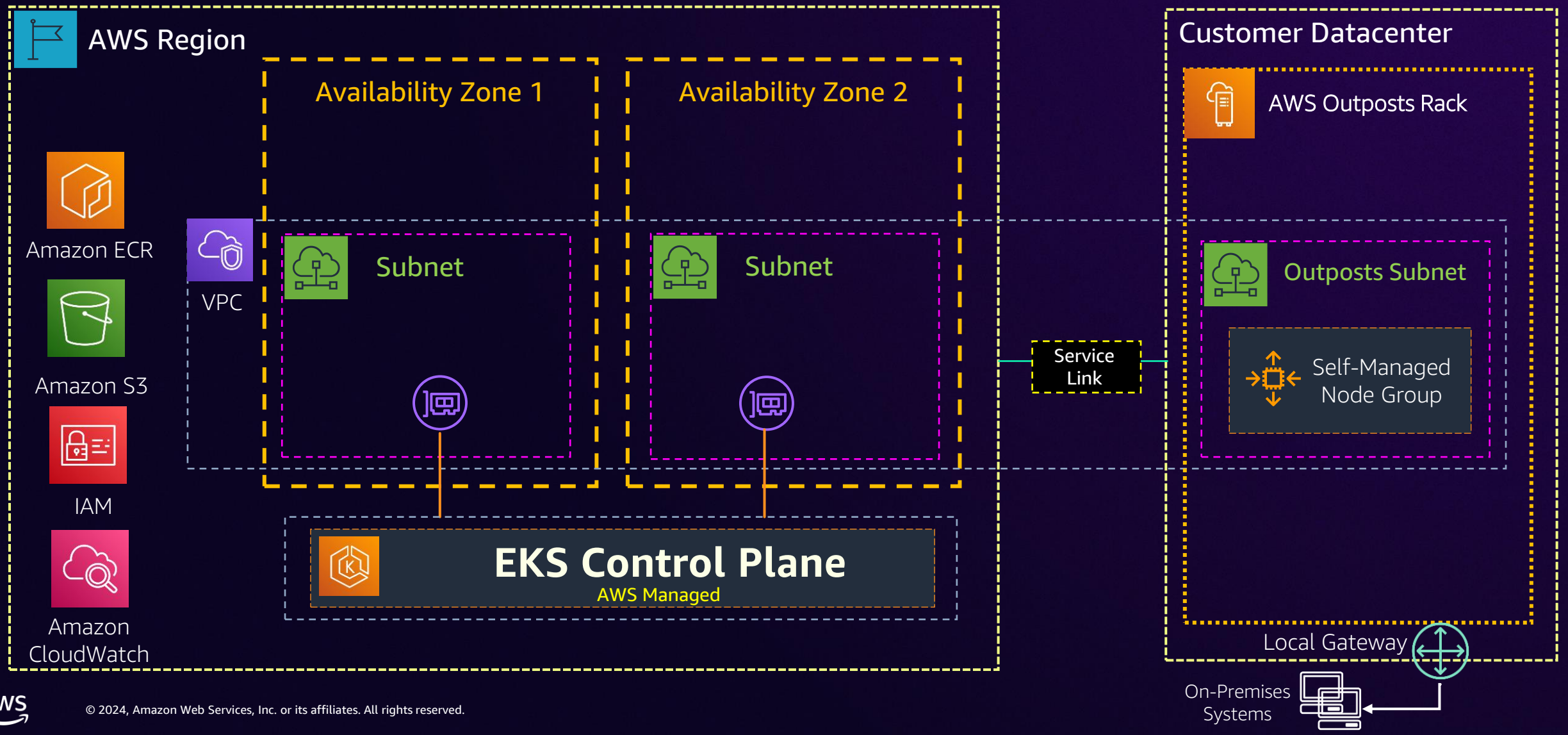


Amazon EKS Anywhere overview and architecture patterns

Amazon EKS Anywhere overview

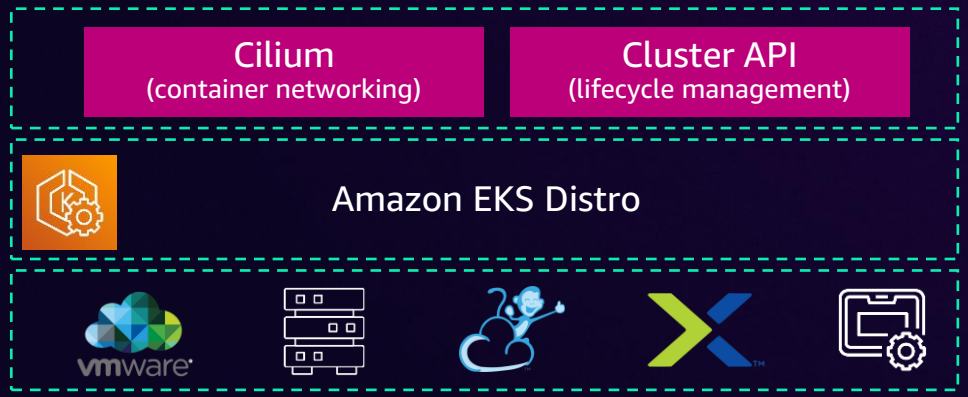
Infrastructure Providers

Amazon EKS Anywhere overview

Kubernetes Distribution

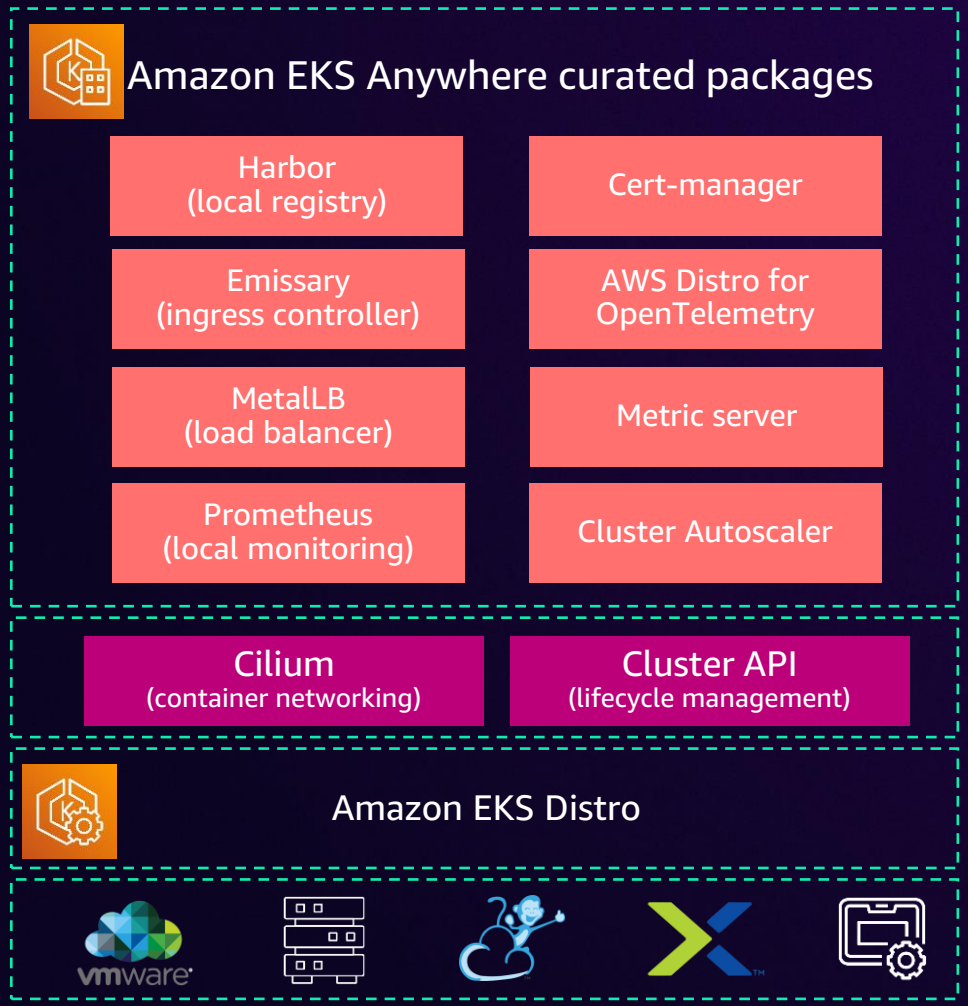
Amazon EKS Anywhere overview

Management Components and CNI

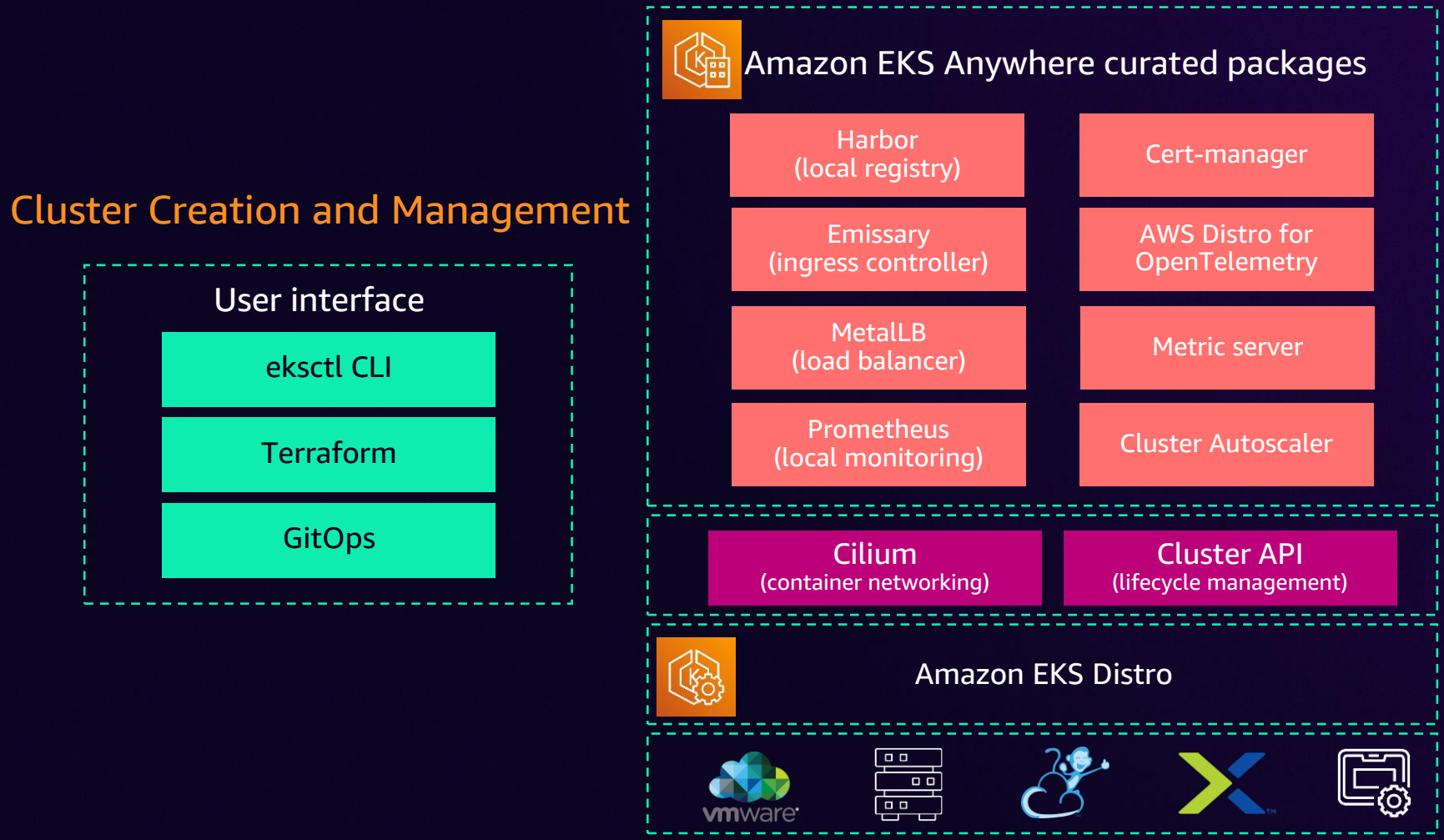


Amazon EKS Anywhere overview

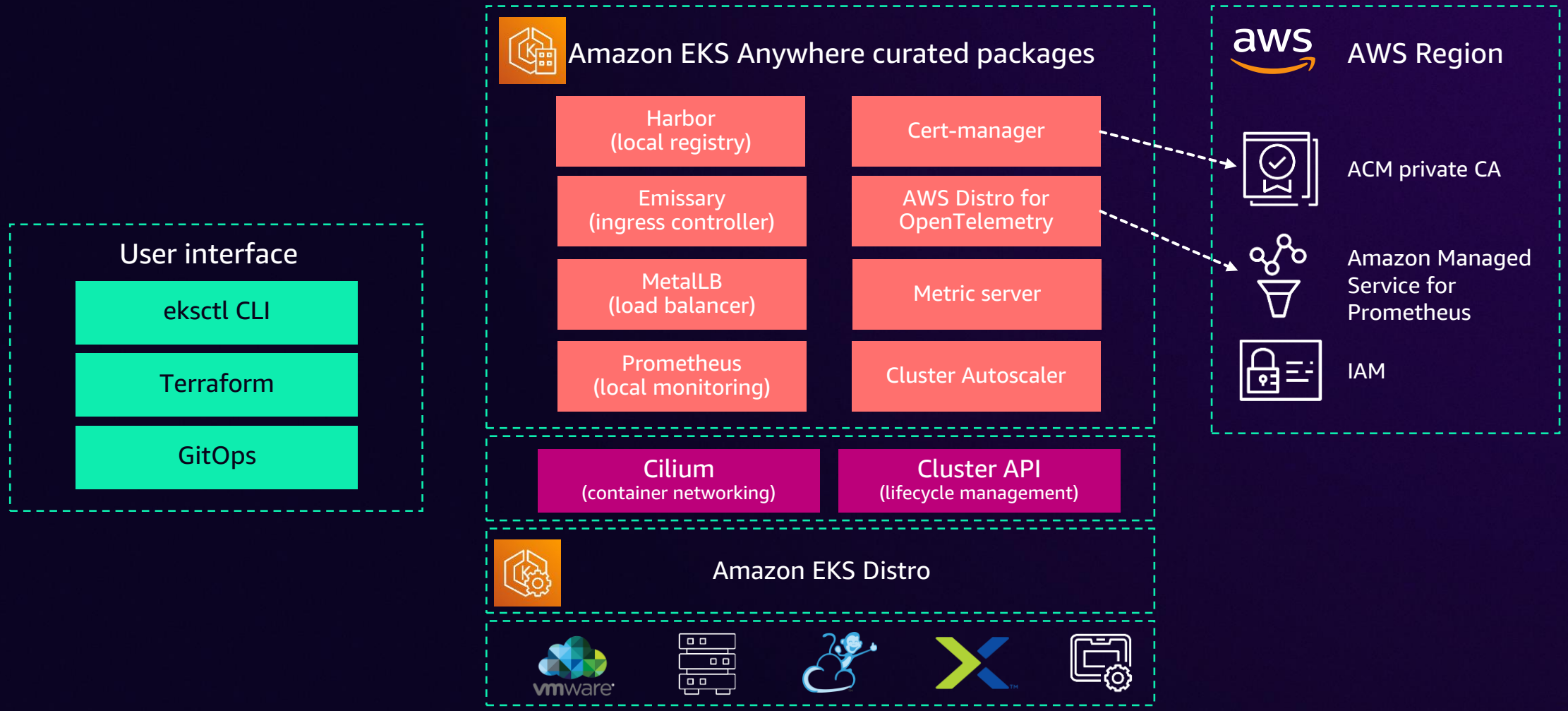
Amazon EKS Anywhere Curated Packages



Amazon EKS Anywhere overview

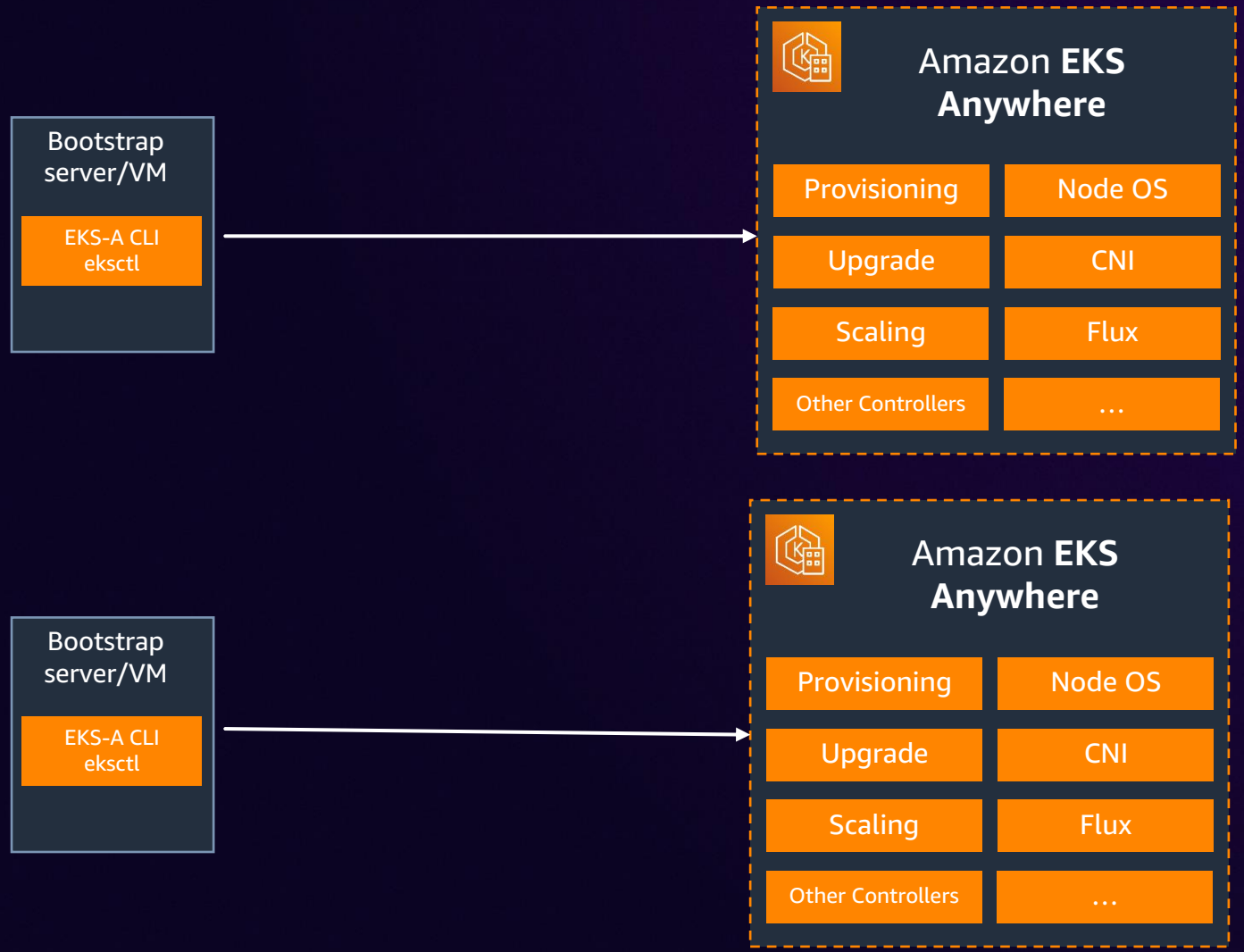


Amazon EKS Anywhere overview



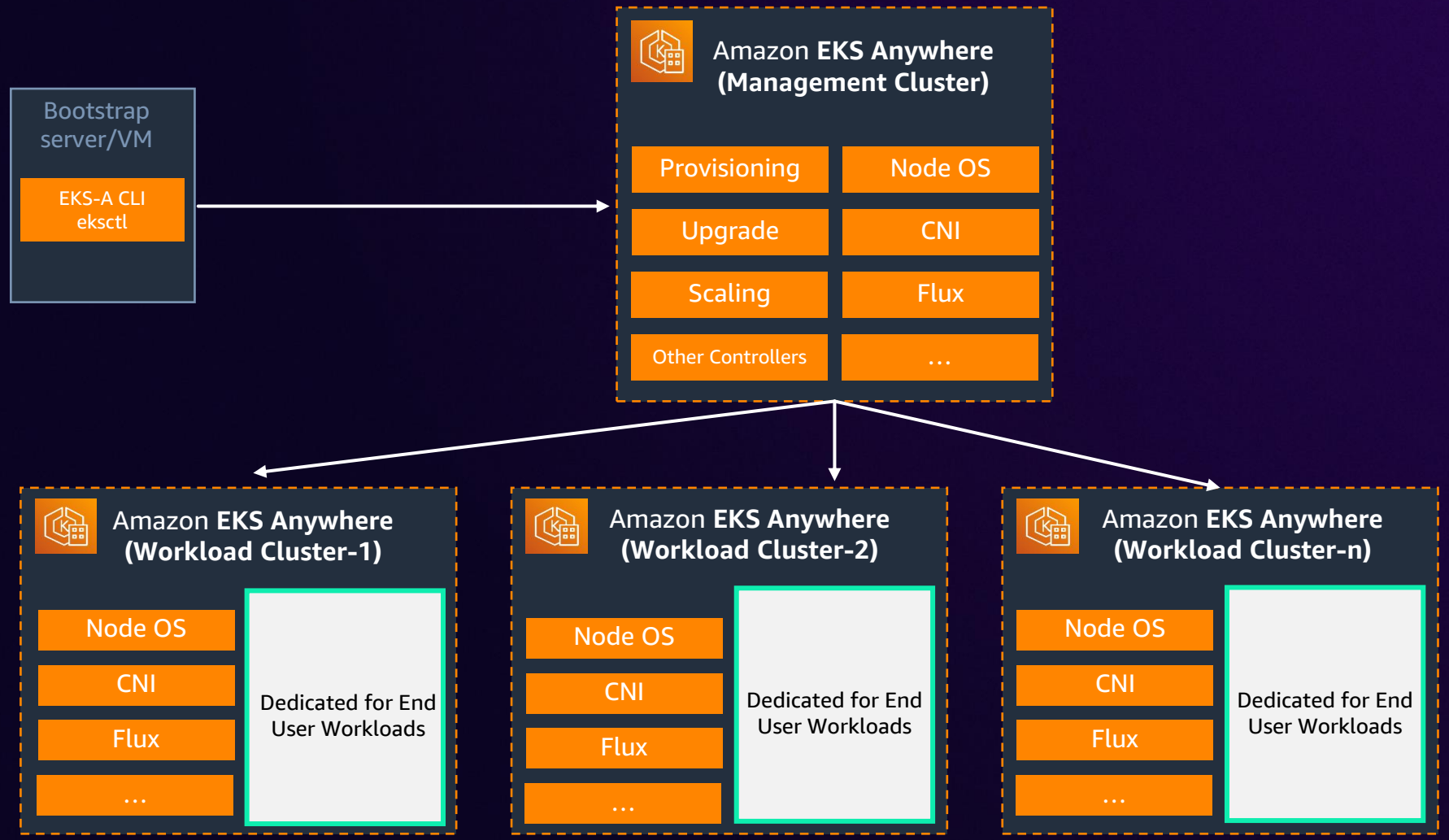
Amazon EKS-A – Deployment Topology

Standalone Clusters



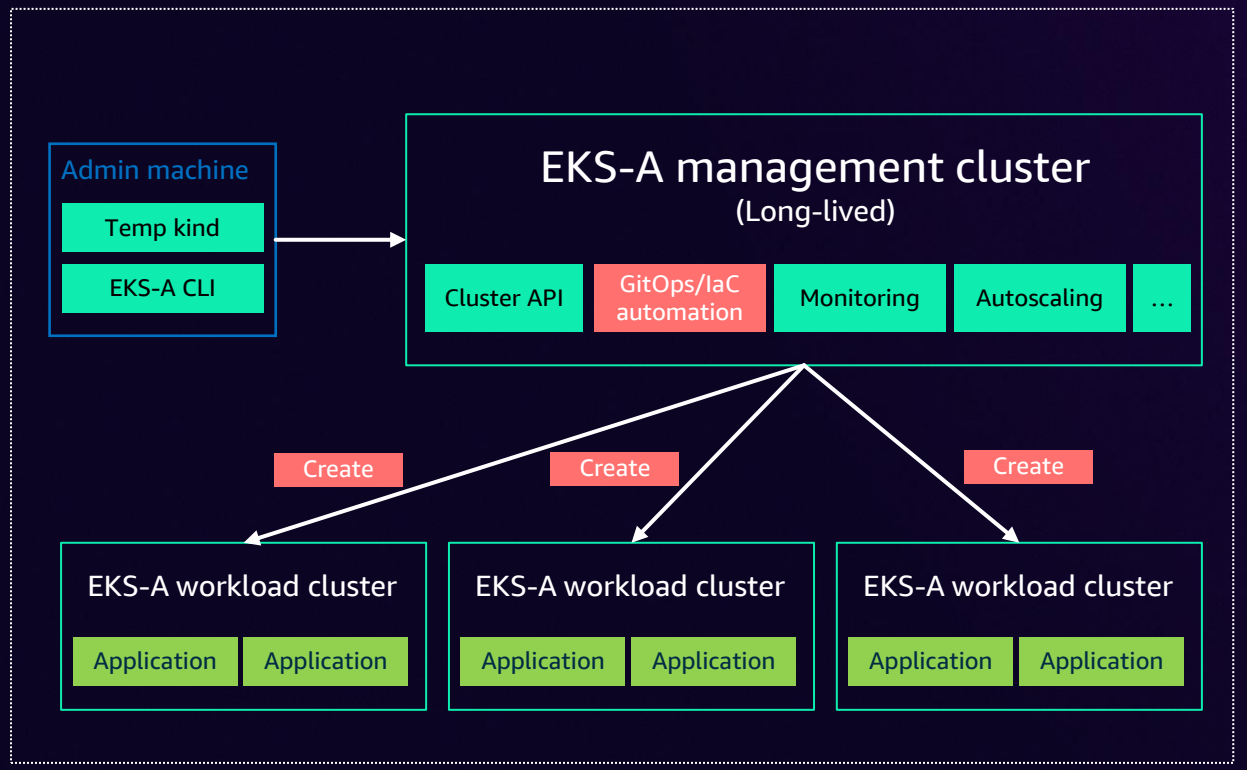
Amazon EKS-A – Deployment Topology

Management/Workload Clusters



Amazon EKS Anywhere declarative operations

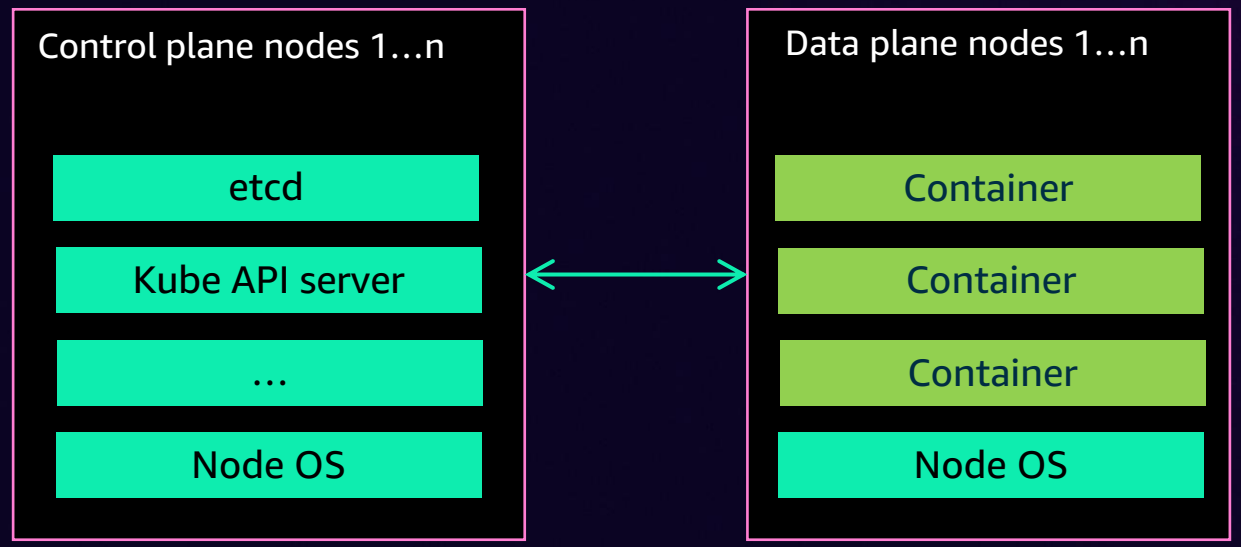
Cellular cluster management



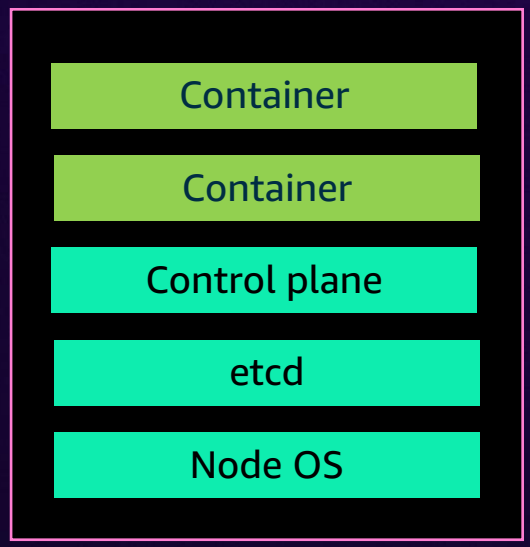

```yaml
apiVersion: anywhere.eks.amazonaws.com/v1alpha1
kind: Cluster
metadata:
  name: my-cluster-name
spec:
  clusterNetwork:
    cniConfig:
      cilium: {}
    pods:
      cidrBlocks:
      - 192.168.0.0/16
    services:
      cidrBlocks:
      - 10.96.0.0/12
  controlPlaneConfiguration:
    count: 1
    endpoint:
      host: "<Control Plane Endpoint IP>"
    machineGroupRef:
      kind: TinkerbellMachineConfig
      name: my-cluster-name-cp
  datacenterRef:
    kind: TinkerbellDatacenterConfig
    name: my-cluster-name
  kubernetesVersion: "1.27"
  managementCluster:
    name: my-cluster-name
  workerNodeGroupConfigurations:
  - count: 1
    machineGroupRef:
      kind: TinkerbellMachineConfig
      name: my-cluster-name
    name: md-0
```

Amazon EKS-A – Deployment Options

Multi-node Clusters



Single-node Clusters

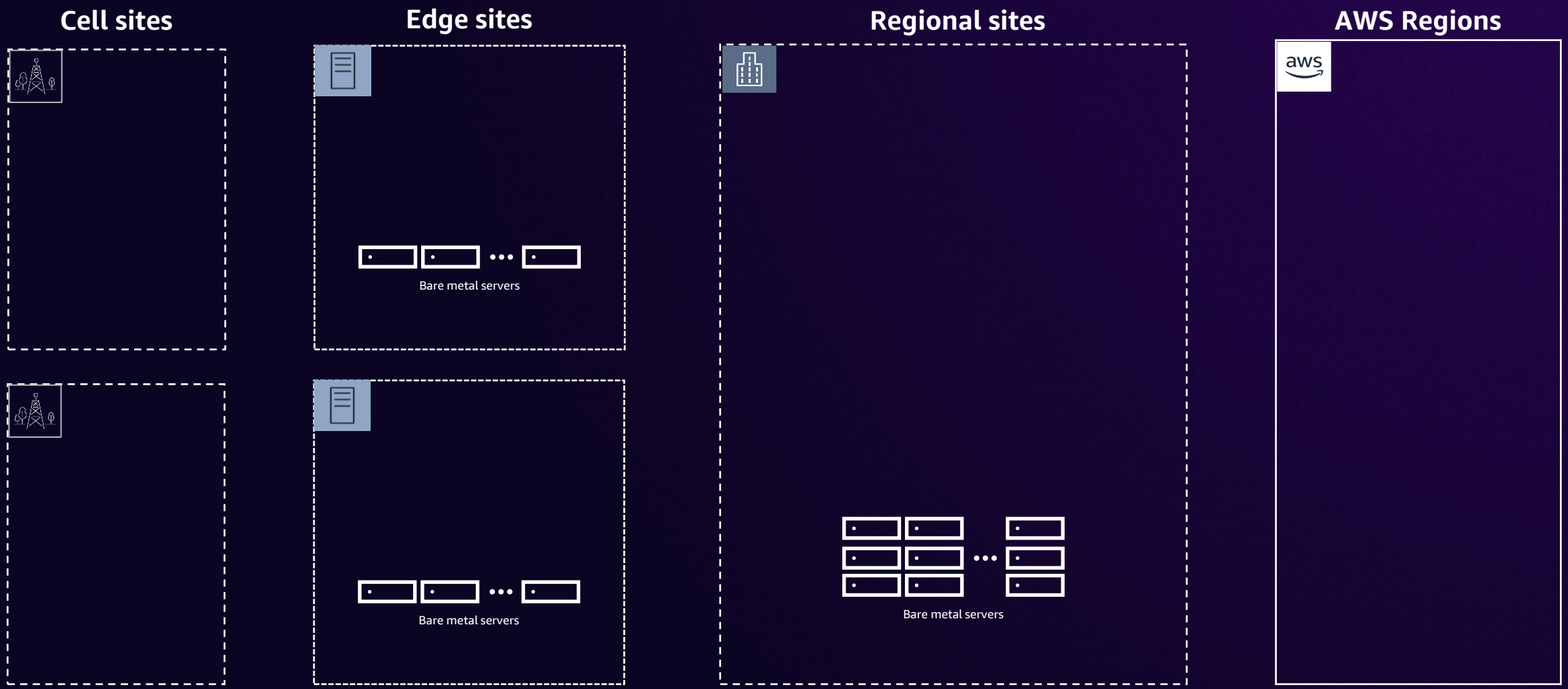


Amazon EKS Anywhere for telco architecture

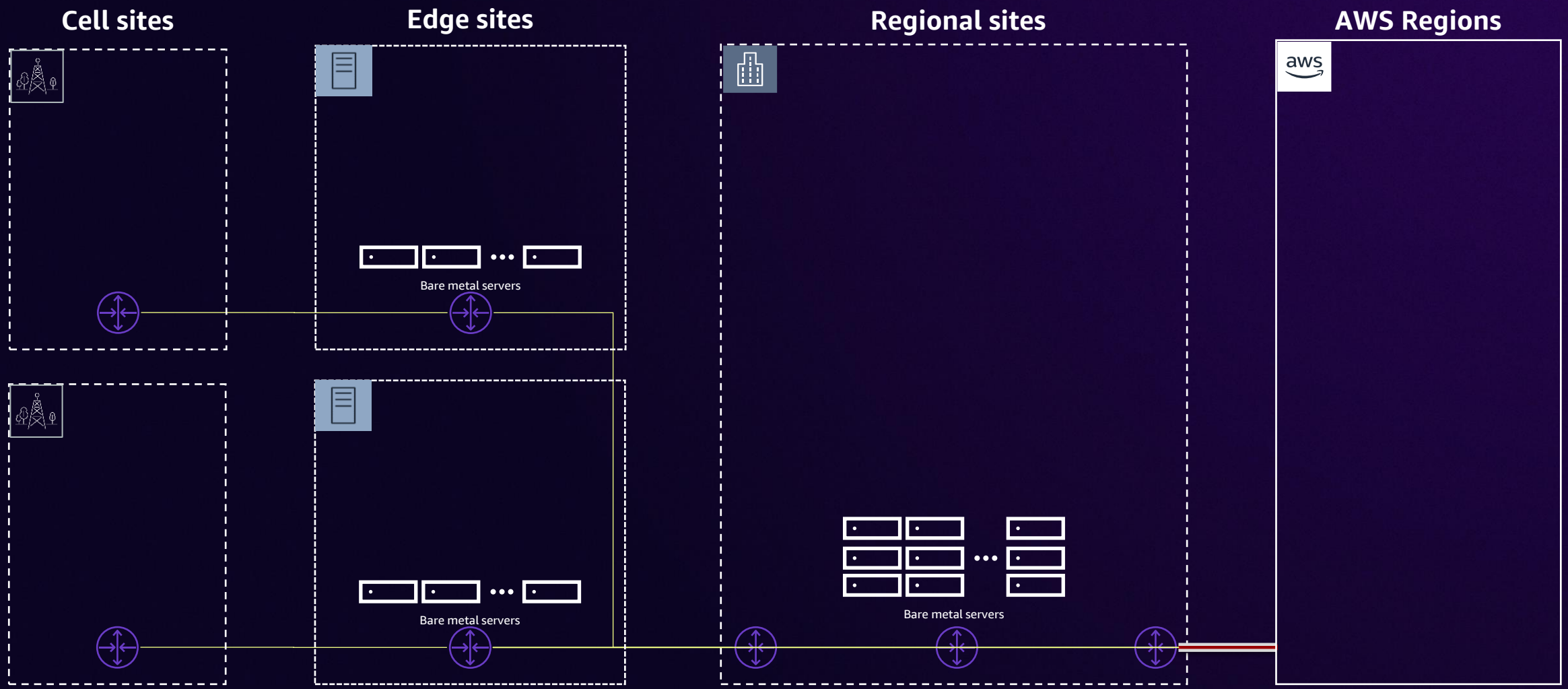
NTT DOCOMO - Nationwide Open Radio Access Network (O-RAN)

- AWS as nationwide 5G O-RAN infrastructure supplier serving 90M subscribers
- Large-scale nationwide O-RAN deployment for commercial traffic by a key member of the O-RAN foundation
- 14,850 cell sites with 35,696 bare metal servers

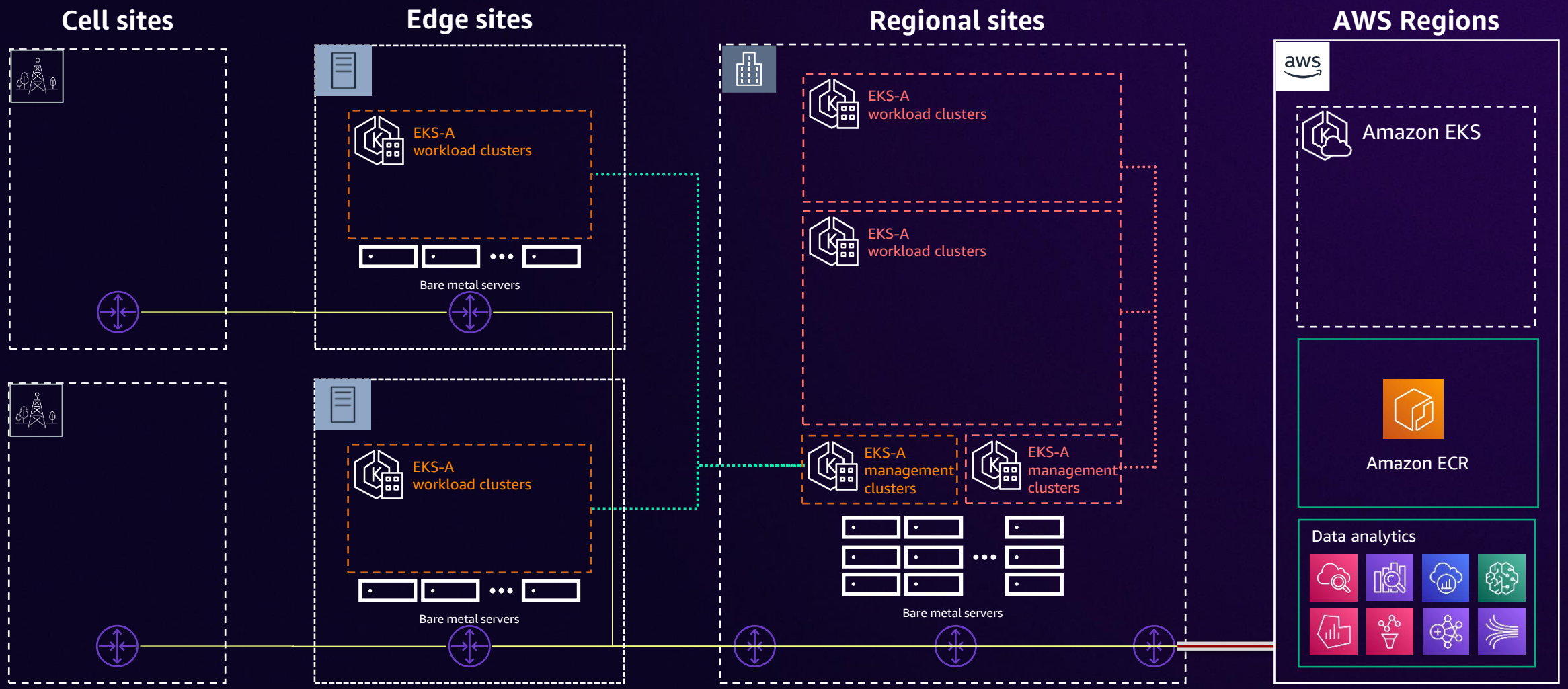
Amazon EKS Anywhere – NTT DOCOMO



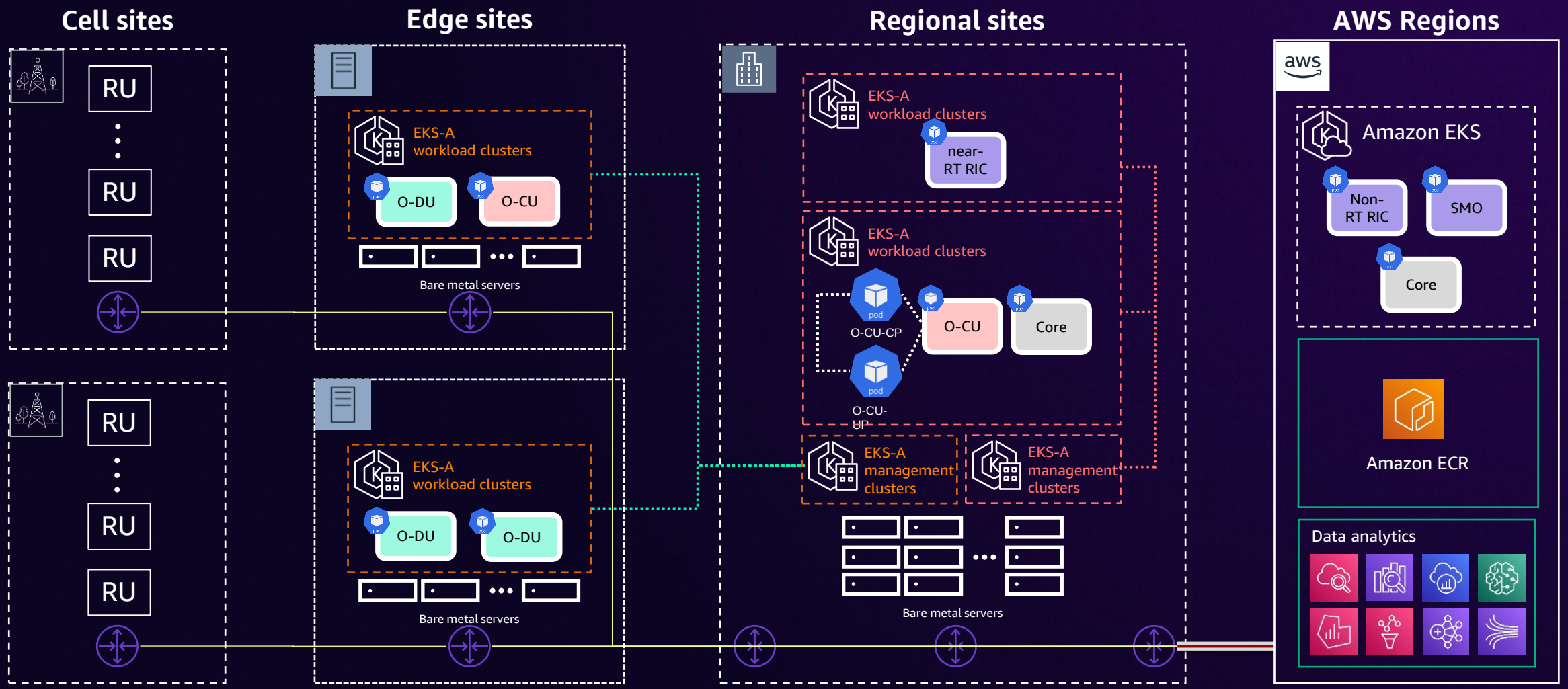
Amazon EKS Anywhere – NTT DOCOMO



Amazon EKS Anywhere – NTT DOCOMO

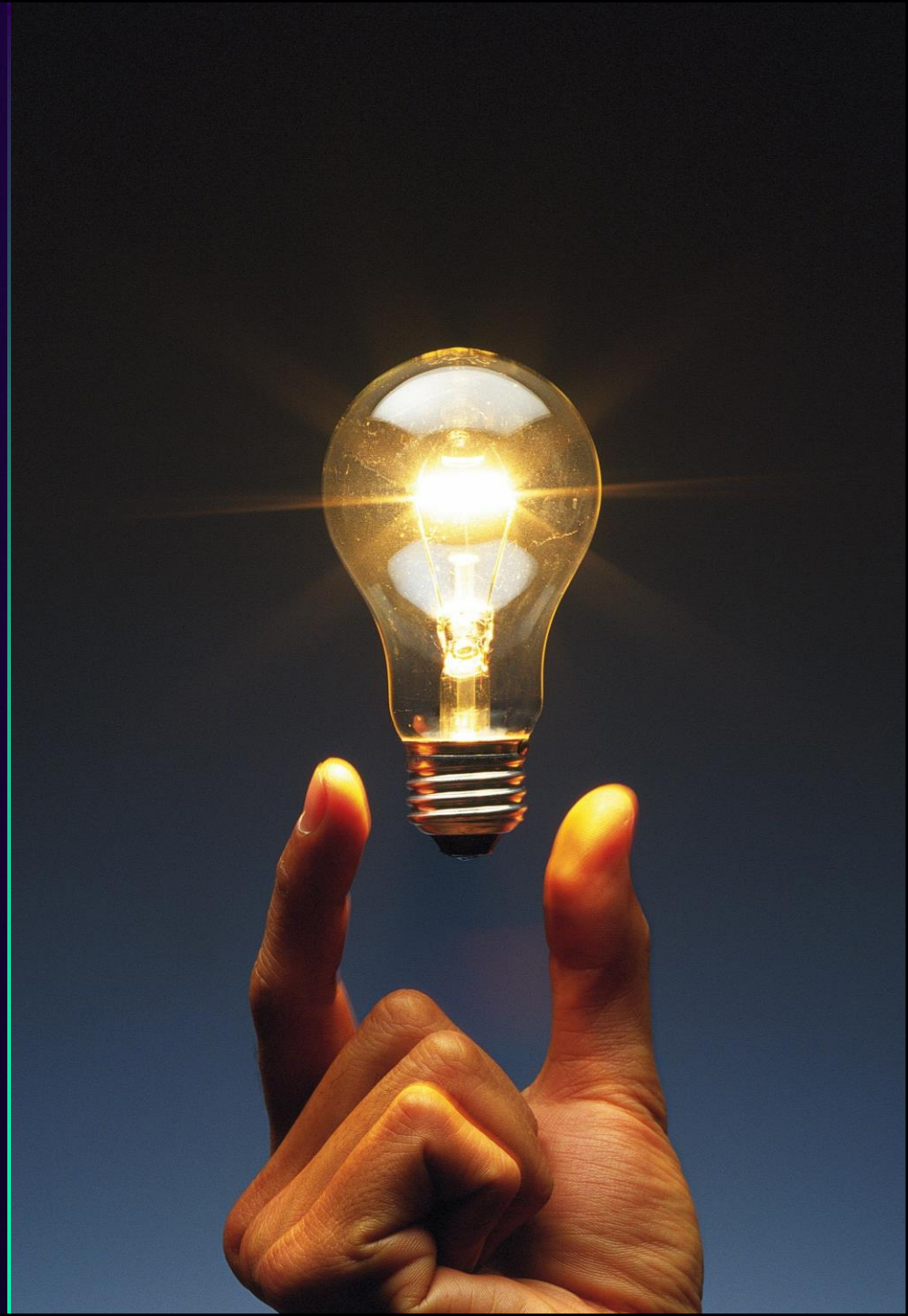


Amazon EKS Anywhere – NTT DOCOMO



Amazon EKS Anywhere best practices

1. Use GitOps for cluster management; store configs as code
2. Use curated packages - Amazon-built, secure, tested packages
3. Cluster upgrades (rolling/in-place) using AWS provided tooling
4. Integrate with LDAP or OIDC for authentication
5. Leverage Cilium (eBPF) for pod-level network control



Amazon EKS Hybrid Nodes overview and architecture

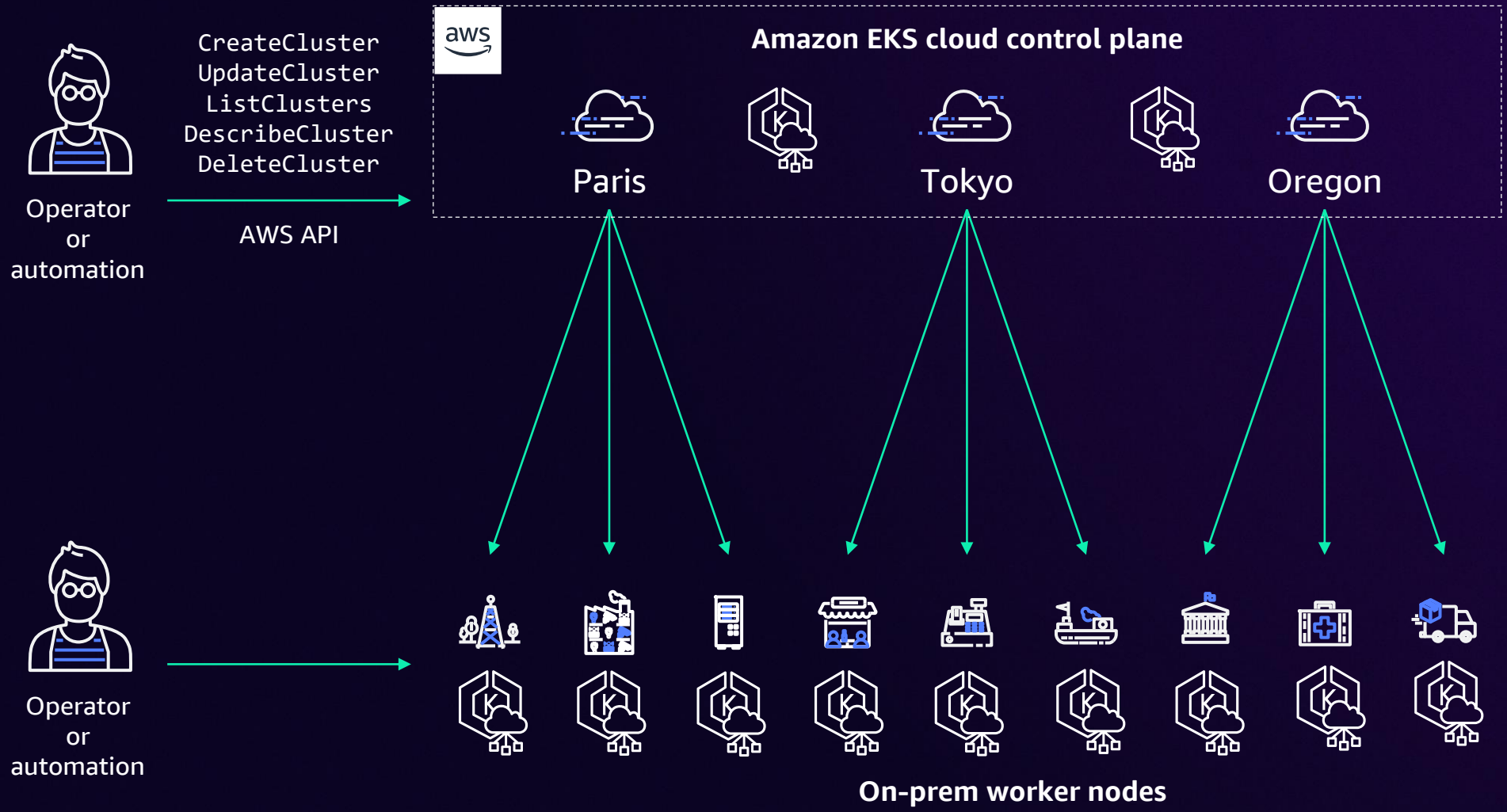
Amazon EKS Hybrid Nodes

BRING THE POWER OF AMAZON EKS TO YOUR ON-PREMISES APPLICATIONS

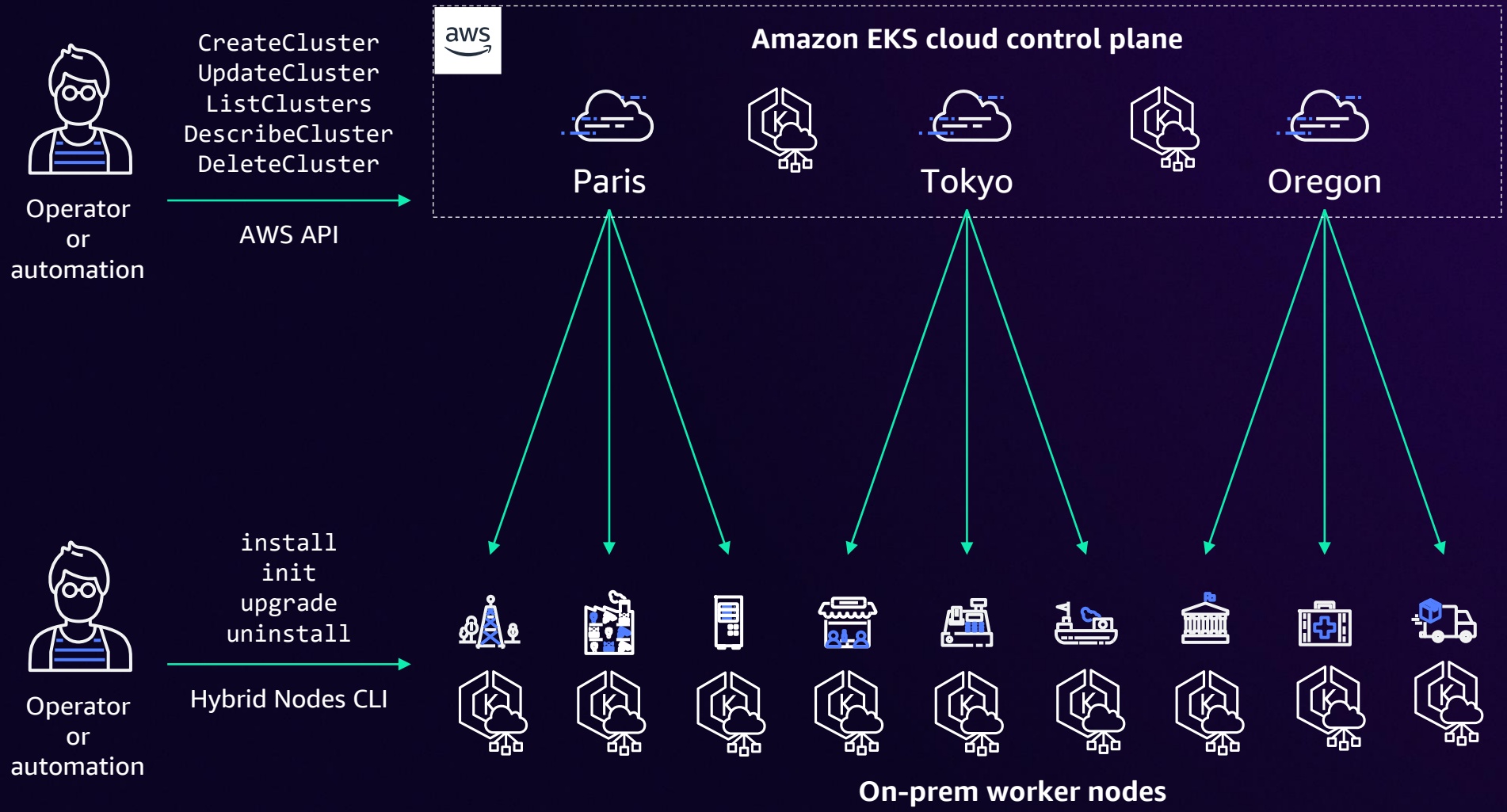
Customers can now use existing on-premises and edge infrastructure as nodes in Amazon EKS clusters for unified Kubernetes management across environments

- ✓ Improve operational efficiency by unifying Kubernetes operations across environments
- ✓ Reduce total cost of ownership of managing Kubernetes
- ✓ Get the benefits of AWS Cloud on premises
- ✓ Gain the flexibility to run your workloads anywhere

Amazon EKS Hybrid Nodes overview



Amazon EKS Hybrid Nodes overview

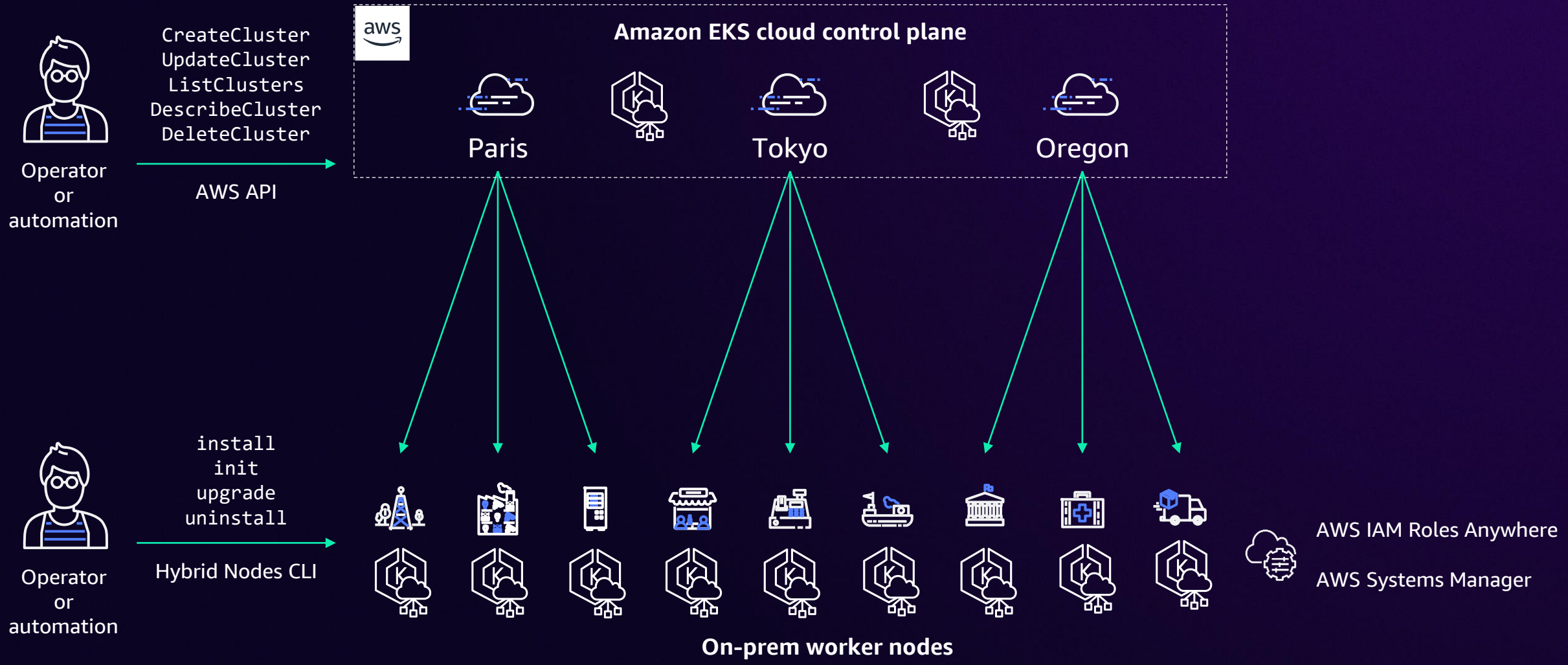


Amazon EKS Hybrid Nodes: How it works

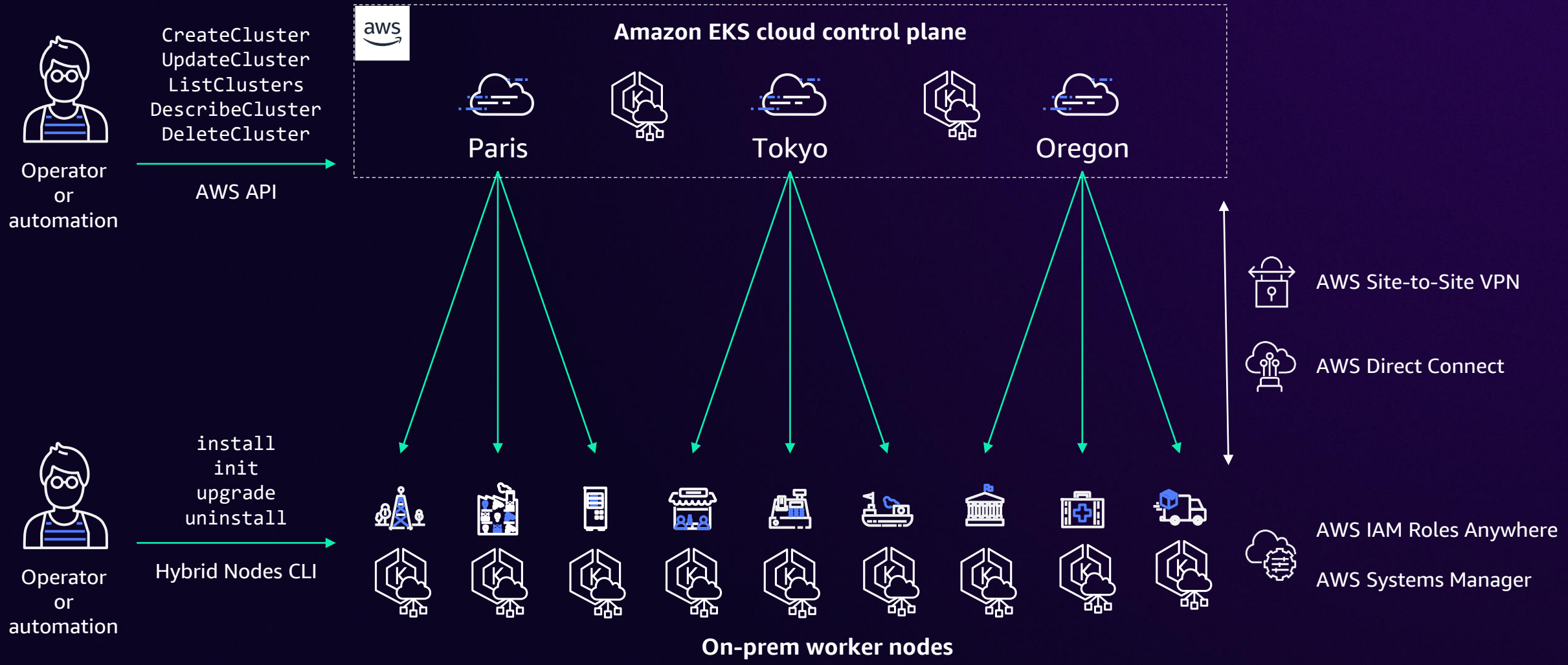
nodeadm: hybrid nodes command-line interface (CLI)

- The hybrid nodes CLI is run on each on-premises host
- Simplifies installation, configuration, registration, upgrade, and uninstallation
- Include the CLI in your operating system images to automate node bootstrap
- Invoke the CLI as a systemd service or with tools such as Ansible at host startup

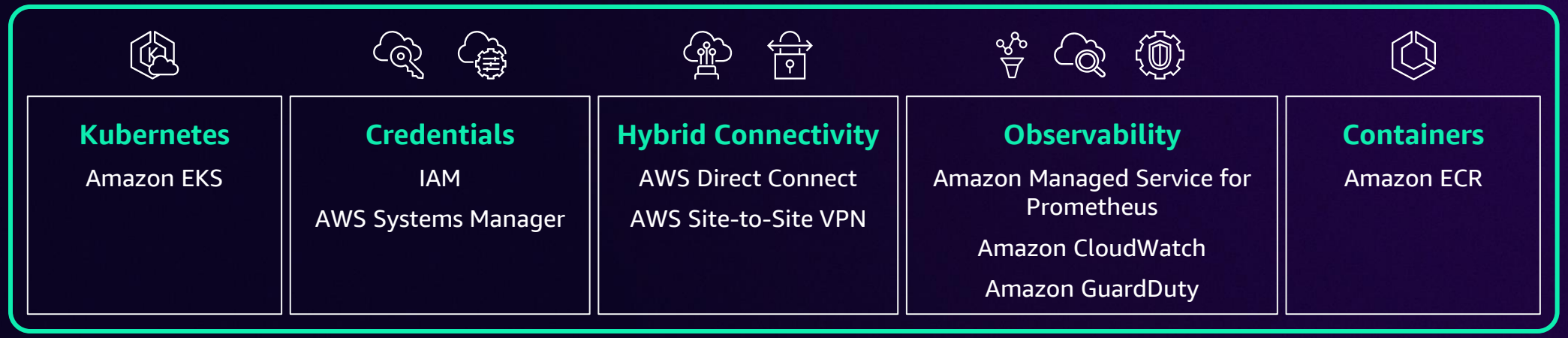
Amazon EKS Hybrid Nodes overview

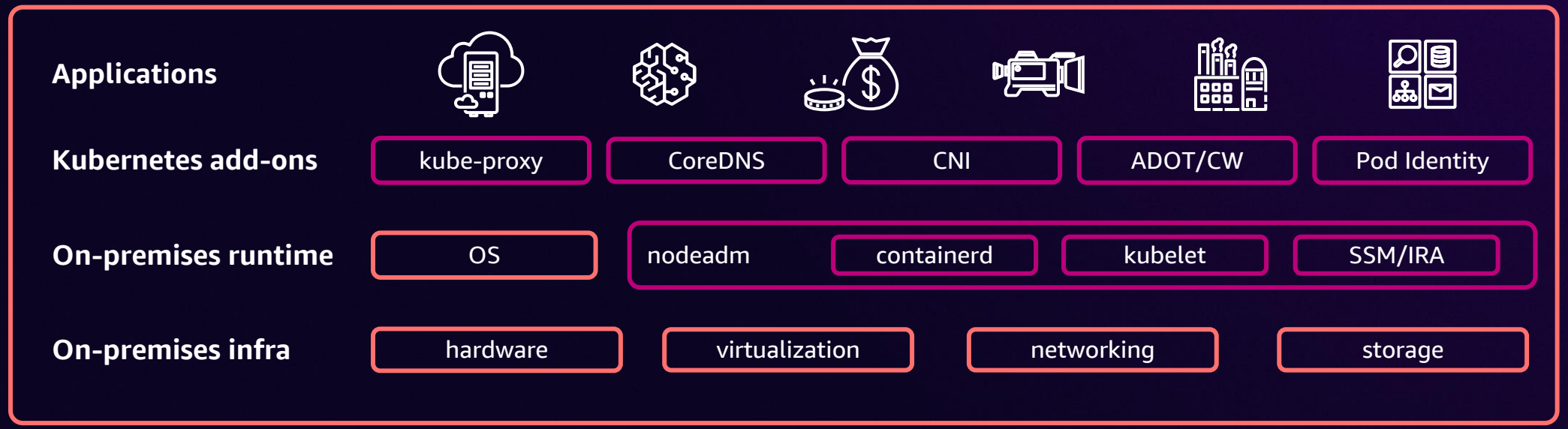


Amazon EKS Hybrid Nodes overview



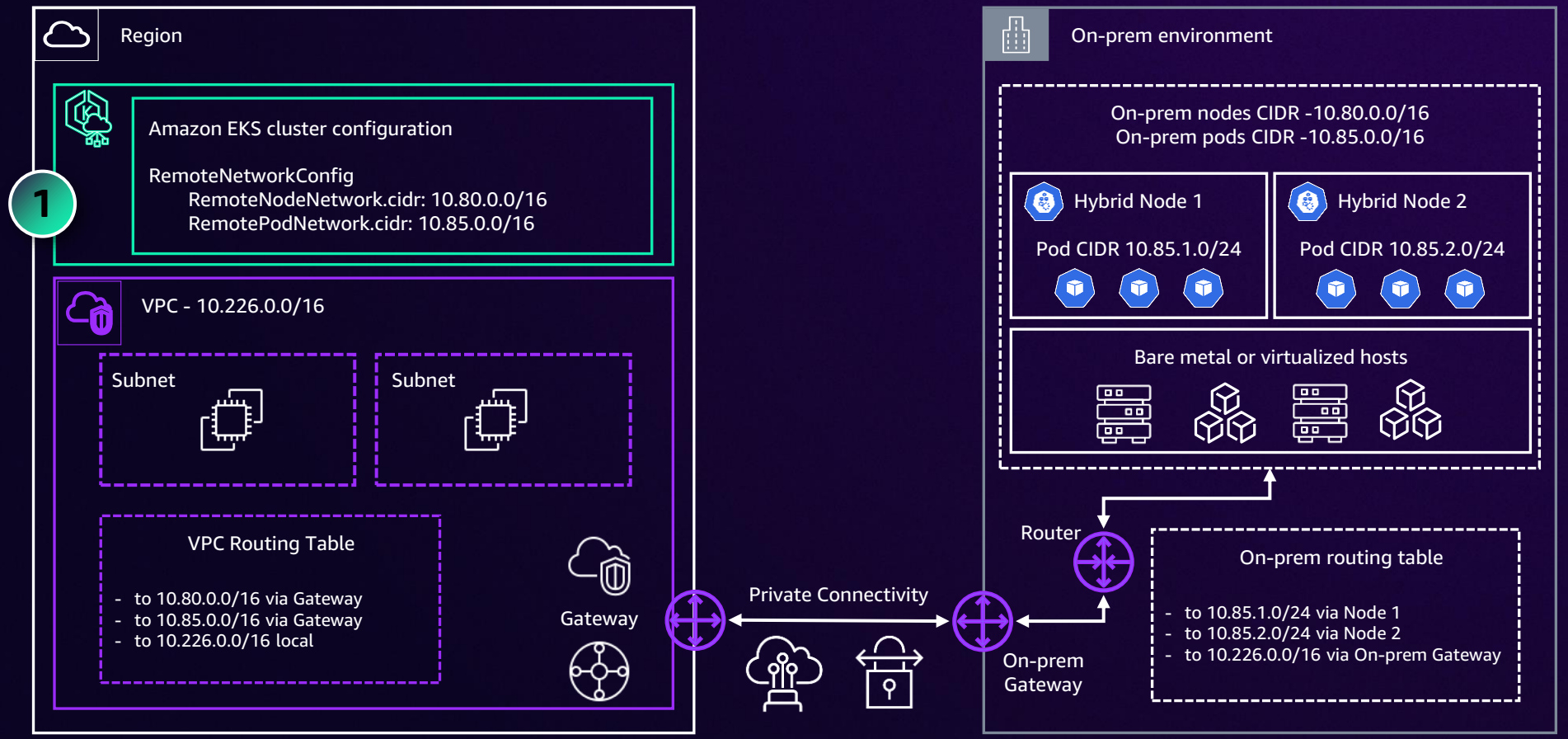
Amazon EKS Hybrid Nodes shared responsibility





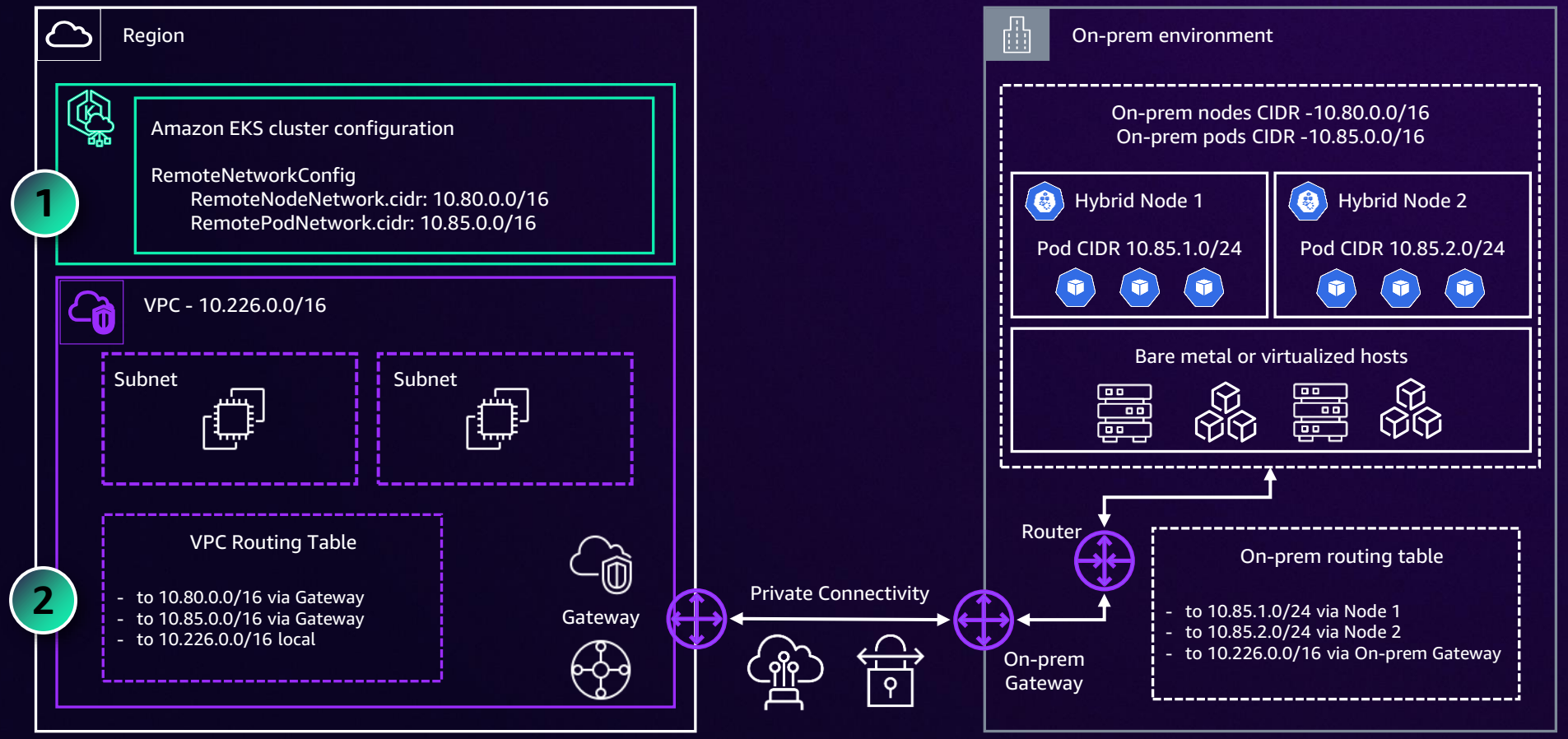
Amazon EKS Hybrid Nodes networking

1 Pass on premises node and pod CIDRs in EKS cluster config



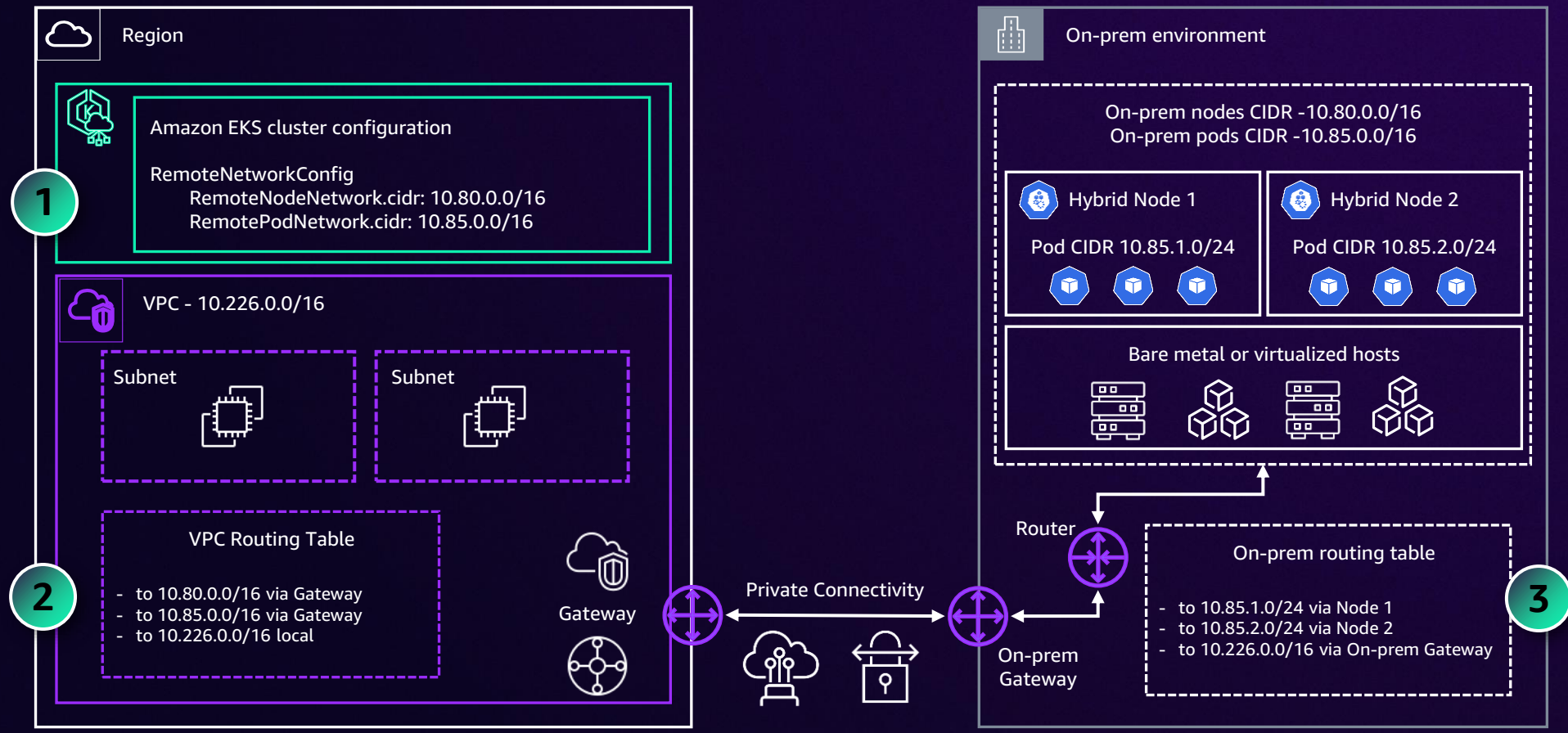
Amazon EKS Hybrid Nodes networking

1. Pass on premises node and pod CIDRs in EKS cluster config
2. Add routes in VPC routing table for on premises node and pod CIDRs



Amazon EKS Hybrid Nodes networking

1. Pass on premises node and pod CIDRs in EKS cluster config
2. Add routes in VPC routing table for on premises node and pod CIDRs
3. Configure on premises router with routes to node and pod CIDRs



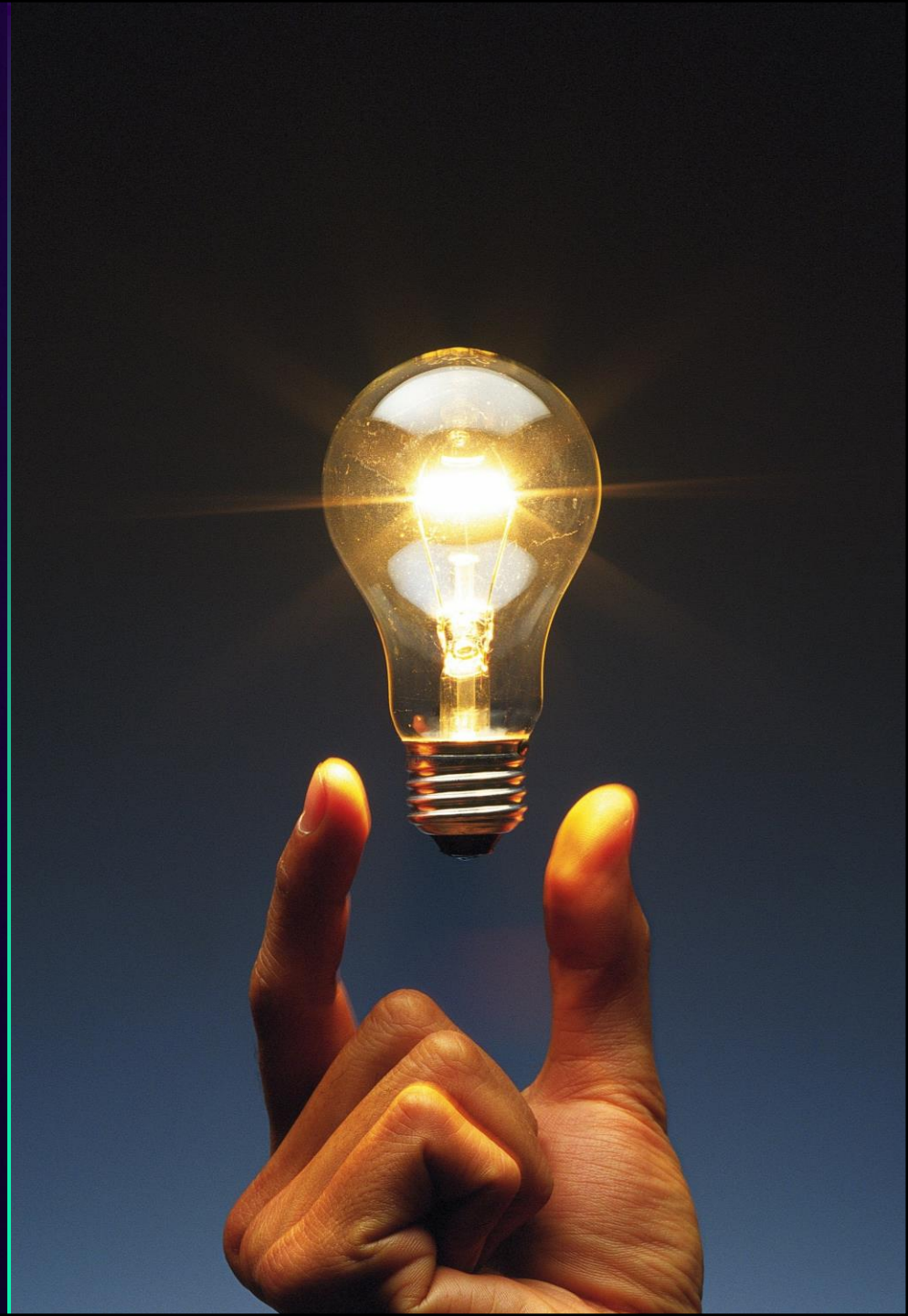
Amazon EKS Hybrid Nodes gives us an easy way to manage servers in our data centers. We don’t need to leverage our own resources to run a Kubernetes cluster ourselves; we can now lean on Amazon Web Services (AWS) expertise to manage and maintain our control plane while remaining on premises for sensitive workloads.

Alex Smith

Cloud Architect, Darktrace

Amazon EKS Hybrid Nodes best practices

1. Automate node bootstrap
2. Use AWS Region closest to on-premises environment
3. Leverage AWS integrations
4. Use compute-type for workload scheduling
5. Allow required endpoints/ports in firewall



Choosing the right EKS option for your hybrid environment

Refreshing on-premises infrastructure?

Yes

No

Amazon EKS on Outposts

Connecting on-premises to cloud?

Yes

No

Amazon EKS Hybrid Nodes

Amazon EKS Anywhere

Next steps

Check out these other sessions

KUB402: Amazon EKS: Infrastructure as code, GitOps, or CI/CD

Wednesday (Dec 4) @ 1:00pm – MGM, Level 3, 305

KUB320: Building modern data processing pipelines on Amazon EKS

Wednesday (Dec 4) @ 2:30pm – MGM, Boulevard 167

KUB201: The future of Kubernetes on AWS

Thursday (Dec 5) @ 11:30am – MGM, Grand 122

HYB301: Building highly available and fault-tolerant edge applications

Wednesday (Dec 4) @ 2:30pm – Wynn, Lafite 1

Continue your Amazon EKS learning

Learn at your own pace

Take the **Amazon EKS Workshop** to expand your EKS skills

Increase your knowledge

Use our **best practices guide** to build your Kubernetes knowledge

Earn Amazon EKS badge

Demonstrate your knowledge by achieving **digital badges**

https://github.com/aws-samples/reinvent24

Session resources

https://github.com/aws-samples/reinvent24/tree/main/sessions/KUB310

Thank you!

Please complete the session survey in the mobile app

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