

A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is a light teal color. They are set against a black background with diagonal grey bands.

CAPI and Why We Need It!

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About Me



First Of My Name



First Born



Rugby



CloudStack Committer



Developer @ ShapeBlue





Run-Down



What is CAPI ?



How we did it !



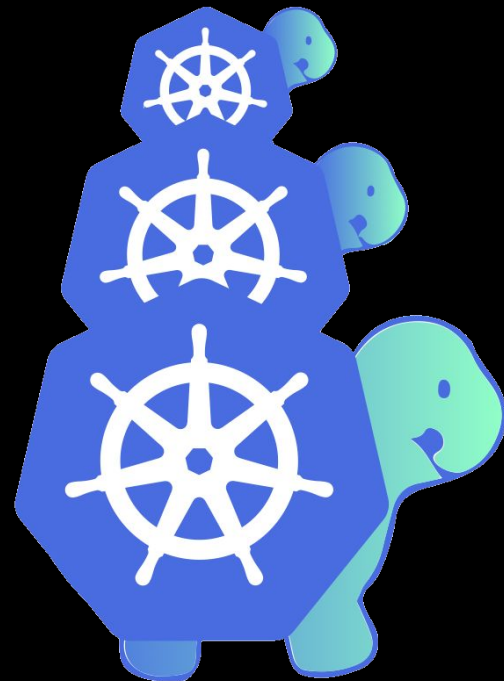
How does it work ?



Demo



Q&A





What is CAPI ?

- Kubernetes Cluster API
- Standardize, Declarative
- Defining Kubernetes Clusters
- Kubernetes-style APIs and patterns
- Way too many!! (100+ distro / installers)
- Consistency
- Simplify Kubernetes management
- Everywhere !!

JUST BECAUSE YOU ARE UNIQUE



DOES NOT MEAN YOU ARE USEFUL



What is CAPI?

```
apiVersion: cluster.x-k8s.io/v1alpha4
kind: Cluster
metadata:
  name: acs-cluster
spec:
  clusterNetwork:
    pods:
      cidrBlocks: ["192.168.0.0/16"]
      serviceDomain: "cluster.local"
  infrastructureRef:
    apiVersion: infrastructure.cluster.x-k8s.io/v1alpha4
    kind: CloudStackCluster
    name: acs-cluster
  controlPlaneRef:
    kind: KubeadmControlPlane
    apiVersion: controlplane.cluster.x-k8s.io/v1alpha4
    name: acs-cluster-control-plane
```

```
apiVersion: infrastructure.cluster.x-k8s.io/v1alpha4
kind: CloudStackCluster
metadata:
  name: acs-cluster
spec:
  zone: ref-trl-2220-k-M7-david-jumani
  network: acs-cluster-network
  controlPlaneEndpoint:
    host: 10.0.57.23
    port: 7443
```



What is CAPI?

```
apiVersion: cluster.x-k8s.io/v1alpha4
kind: MachineDeployment
metadata:
  name: acs-cluster-md-0
spec:
  clusterName: acs-cluster
  replicas: 1
  selector:
    matchLabels:
  template:
    spec:
      clusterName: acs-cluster
      version: v1.20.10
      bootstrap:
        configRef:
          name: acs-cluster-md-0
          apiVersion: bootstrap.cluster.x-k8s.io/v1alpha4
          kind: KubeadmConfigTemplate
      infrastructureRef:
        name: "acs-cluster-md-0"
        apiVersion: infrastructure.cluster.x-k8s.io/v1alpha4
        kind: CloudStackMachineTemplate
```

```
apiVersion: infrastructure.cluster.x-k8s.io/v1alpha4
kind: CloudStackMachineTemplate
metadata:
  name: acs-cluster-md-0
spec:
  template:
    spec:
      offering: kube
      template: rhel-8-kube-v1.20.10-kvm
      sshkey: mine
```



Why we need CAPI ?

- Everyone is a provider !!!
- Standardize Operations
- Unified Cluster Management
- Across Infra (private / public / technologies)
- Define common operations - CSUD
- Default implementation
- Simplify Lifecycle management
- Under one hood

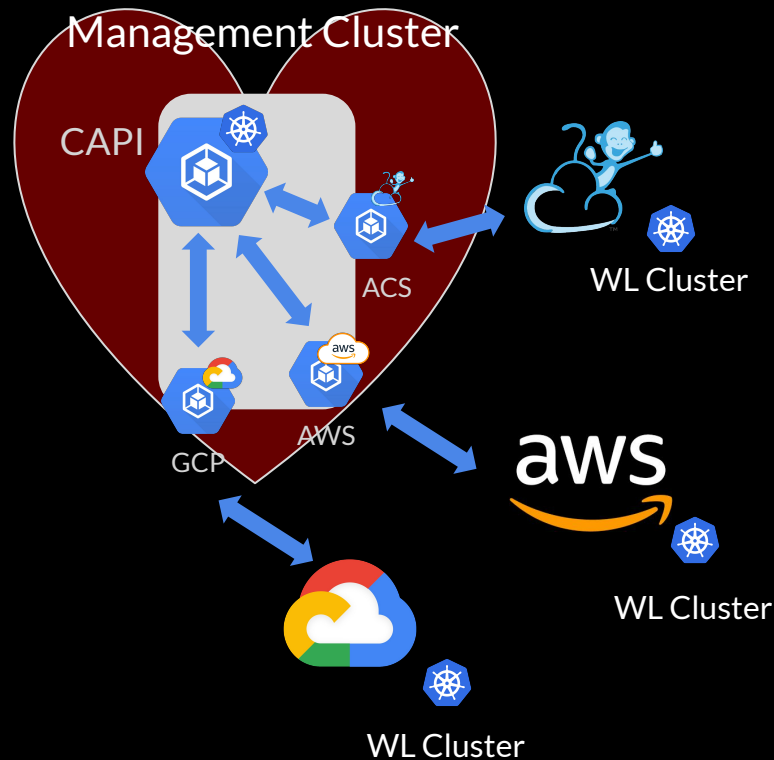


PROVIDERS EVERYWHERE !!



How does CAPI work ?

- Kubernetes Manages Kubernetes
- Management Cluster
 - Anywhere - local, cloud, CKS
- Workload Cluster - Infra specific
 - Target, End user
- Custom Resource Definitions
 - Infra specific - CloudStack Cluster, AWS Cluster, GCP Cluster
- Interacts with the provider



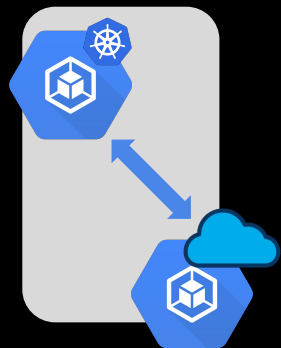


How does CAPI work ?

Components :

- CAPI Controller
 - Orchestrator
- Control Plane Provider (kubeadm)
 - Alive? Kubeconfig
- Bootstrap Provider (kubeadm)
 - Bootstrap - userdata, etc
- Infrastructure Provider

CAPI



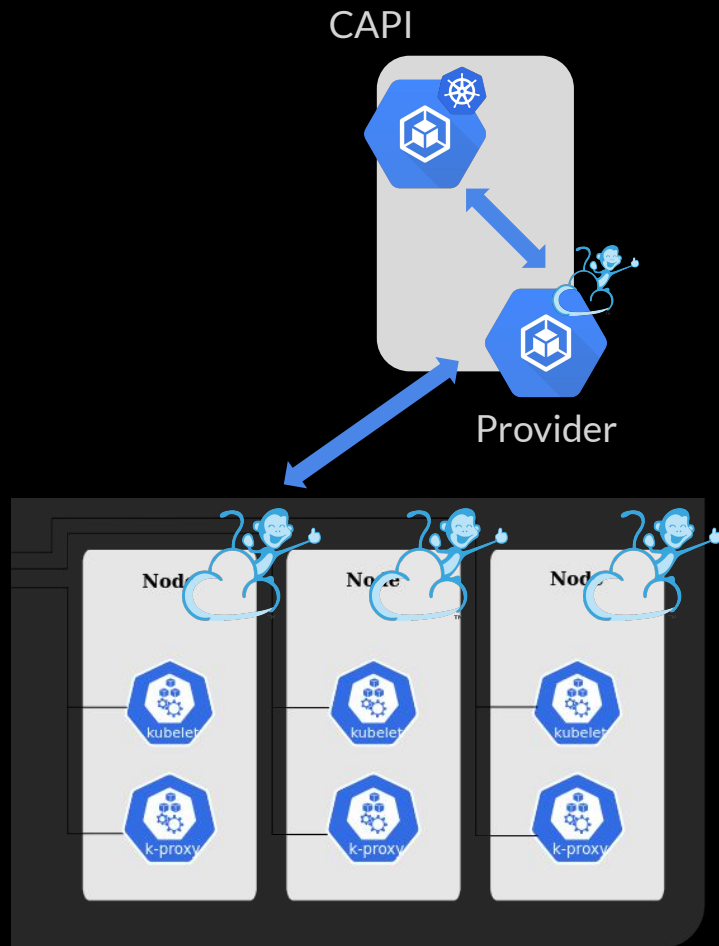
Provider





How does CAPC work ?

- clusterctl - tool
- Infrastructure (acs, aws, gcp)
- Network Resources
 - Public IP
 - FW / LB Rules
- Deploys VMs
- Bootstrap via userdata
- Cleanup

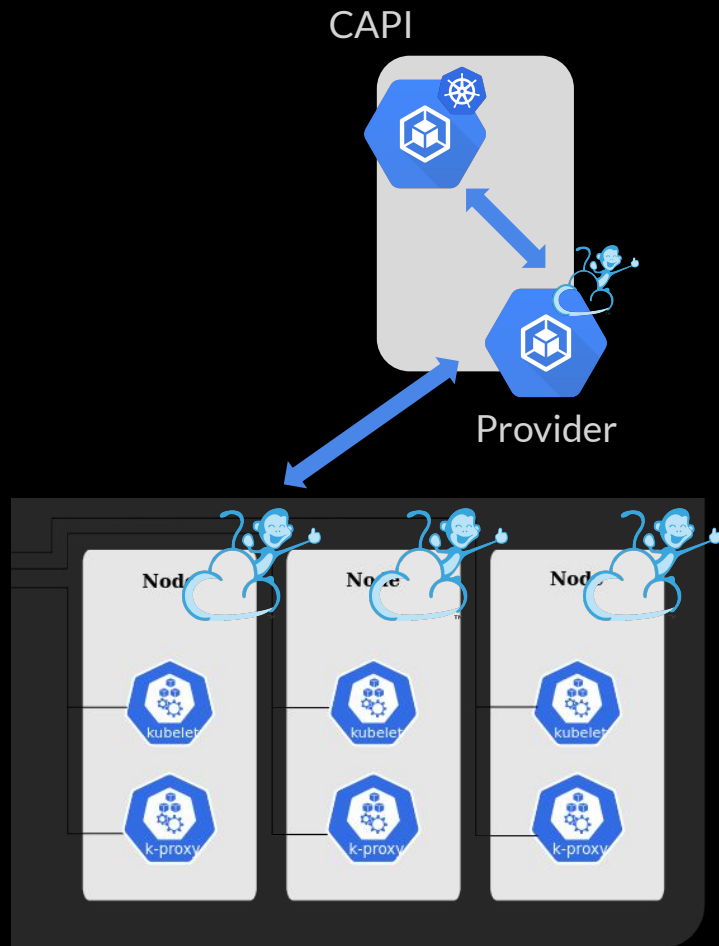




How does CAPC work ?

Requirements :

- Management Cluster
- Custom Provider
- Creds
- Templates with k8s baked in
- Resource Ready (Network, IP, etc)



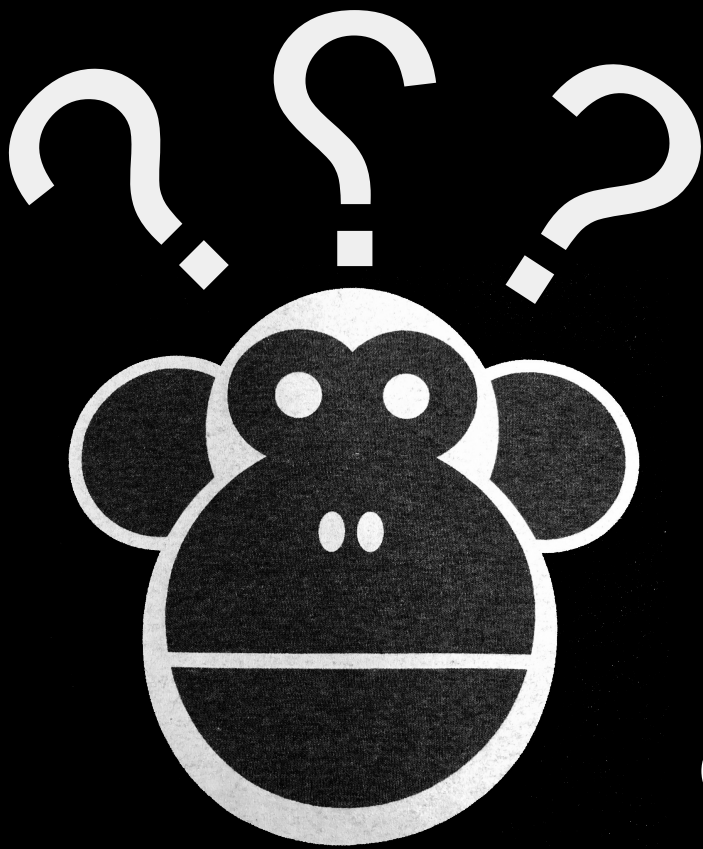


How we did it ?

- Weekend hack
- Prototype
- K8s SIG proposal
- K8s membership & pre-reqs
- Donation
- Release
- Learnings
-

Demo Time !





Questions?

Thank You !



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