

{KODE {KLOUD

September 2021

Exam Updates



20% - Application Design and Build

- Define, build and modify container images
- Understand Jobs and CronJobs
- Understand multi-container Pod design patterns (e.g. sidecar, init and others)
- Utilize persistent and ephemeral volumes

20% - Application Deployment

- Use Kubernetes primitives to implement common deployment strategies (e.g. blue/green or canary)
- Understand Deployments and how to perform rolling updates
- Use the Helm package manager to deploy existing packages

15% - Application observability and maintenance

- Understand API deprecations
- Implement probes and health checks
- Use provided tools to monitor Kubernetes applications
- Utilize container logs
- Debugging in Kubernetes

25% - Application Environment, Configuration and Security

- Discover and use resources that extend Kubernetes (CRD)
- Understand authentication, authorization and admission control **(CKA)**
- Understanding and defining resource requirements, limits and quotas
- Understand ConfigMaps
- Create & consume Secrets
- Understand ServiceAccounts
- Understand SecurityContexts

20% - Services & Networking

- Demonstrate basic understanding of NetworkPolicies
- Provide and troubleshoot access to applications via services
- Use Ingress rules to expose applications

13% - Core Concepts

- Understand Kubernetes API primitives
- Create and configure basic Pods

10% Multi-Container Pods

- Understand Multi-Container Pod design patterns (e.g. ambassador, adapter, sidecar)

20% - Pod Design

- Understand Deployments and how to perform rolling updates
- Understand Deployments and how to perform rollbacks
- Understand Jobs and CronJobs
- Understand how to use Labels, Selectors, and Annotations

8% - State Persistence

- Understand PersistentVolumeClaims for storage

18% - Configuration

- Understand ConfigMaps
- Understand SecurityContexts
- Define an application's resource requirements
- Create & consume Secrets
- Understand ServiceAccounts

18% - Observability

- Understand LivenessProbes and ReadinessProbes
- Understand container logging
- Understand how to monitor applications in Kubernetes
- Understand debugging in Kubernetes

13% - Services & Networking

- Understand Services
- Demonstrate basic understanding of NetworkPolicies

{KODE {KLOUD

API Groups

Pre-Requisite

```
curl https://kube-master:6443/version
```

```
{
  "major": "1",
  "minor": "13",
  "gitVersion": "v1.13.0",
  "gitCommit": "ddf47ac13c1a9483ea035a79cd7c10005ff21a6d",
  "gitTreeState": "clean",
  "buildDate": "2018-12-03T20:56:12Z",
  "goVersion": "go1.11.2",
  "compiler": "gc",
  "platform": "linux/amd64"
}
```

```
curl https://kube-master:6443/api/v1/pods
```

```
{
  "kind": "PodList",
  "apiVersion": "v1",
  "metadata": {
    "selfLink": "/api/v1/pods",
    "resourceVersion": "153068"
  },
  "items": [
    {
      "metadata": {
        "name": "nginx-5c7588df-ghsbd",
        "generateName": "nginx-5c7588df-",
        "namespace": "default",
        "creationTimestamp": "2019-03-20T10:57:48Z",
        "labels": {
          "app": "nginx",
          "pod-template-hash": "5c7588df"
        }
      },
      "ownerReferences": [
        {
          "apiVersion": "apps/v1",
          "kind": "ReplicaSet",
          "name": "nginx-5c7588df",
          "uid": "398ce179-4af9-11e9-beb6-020d3114c7a7",
          "controller": true,
          "blockOwnerDeletion": true
        }
      ]
    }
  ]
},
```

/metrics

/healthz

/version

/api

/apis

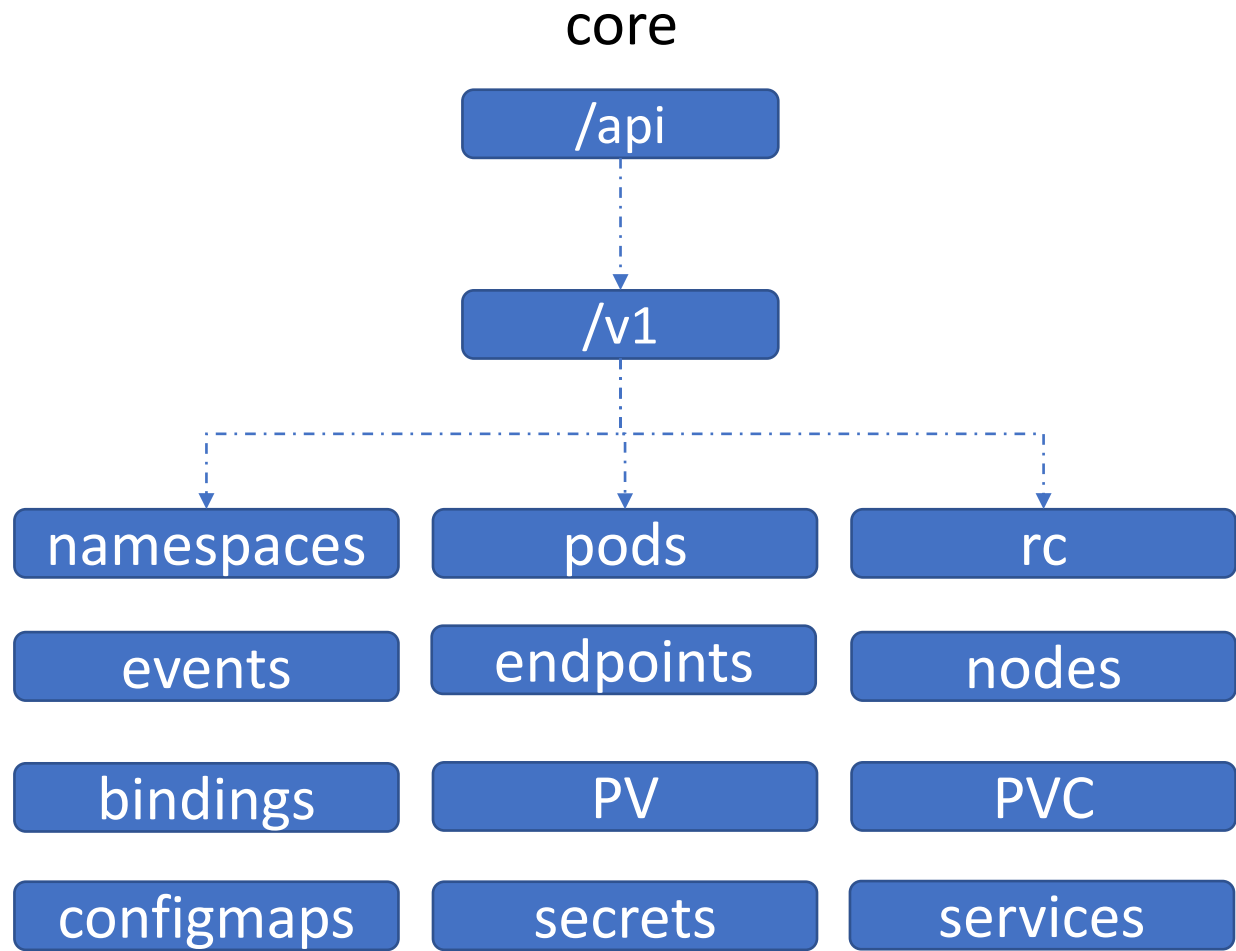
/logs

core

/api

named

/apis



named

/apis

API Groups

/apps

/extensions

/networking.k8s.io

/storage.k8s.io

/authentication.k8s.io

/certificates.k8s.io

/v1

/v1

/v1

/deployments

/replicasets

/statefulsets

list

get

create

delete

update

watch

/networkpolicies

/certificatesigningrequests

Resources

Verbs

Overview

WORKLOADS APIS

- Container v1 core
- CronJob v1beta1 batch
- DaemonSet v1 apps
- Deployment v1 apps
- Job v1 batch
- Pod v1 core**
- Write Operations
- Read Operations
- Status Operations
- Proxy Operations
- Misc Operations
- ReplicaSet v1 apps
- ReplicationController v1 core
- StatefulSet v1 apps

Pod v1 core

[kubectl example](#) [curl example](#)

Group	Version
core	v1

⚠️ Warning:
It is recommended that users create Pods only through a Controller, and not directly. See Controllers: [Deploy](#)

ℹ️ Appears In:

- PodList [core/v1]

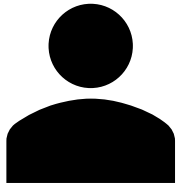
Field	Description
apiVersion string	APIVersion defines the versioned schema of this representation of an object. Servers should... https://git.k8s.io/community/contributors/devel/api-conventions.md#resources

```
▶ curl http://localhost:6443 -k
```

```
{  
  "paths": [  
    "/api",  
    "/api/v1",  
    "/apis",  
    "/apis/",  
    "/healthz",  
    "/logs",  
    "/metrics",  
    "/openapi/v2",  
    "/swagger-2.0.0.json",  
  ]  
}
```

```
▶ curl http://localhost:6443/apis -k | grep "name"
```

```
"name": "extensions",  
"name": "apps",  
"name": "events.k8s.io",  
"name": "authentication.k8s.io",  
"name": "authorization.k8s.io",  
"name": "autoscaling",  
"name": "batch",  
"name": "certificates.k8s.io",  
"name": "networking.k8s.io",  
"name": "policy",  
"name": "rbac.authorization.k8s.io",  
"name": "storage.k8s.io",  
"name": "admissionregistration.k8s.io",  
"name": "apiextensions.k8s.io",  
"name": "scheduling.k8s.io",
```



Kube ApiServer



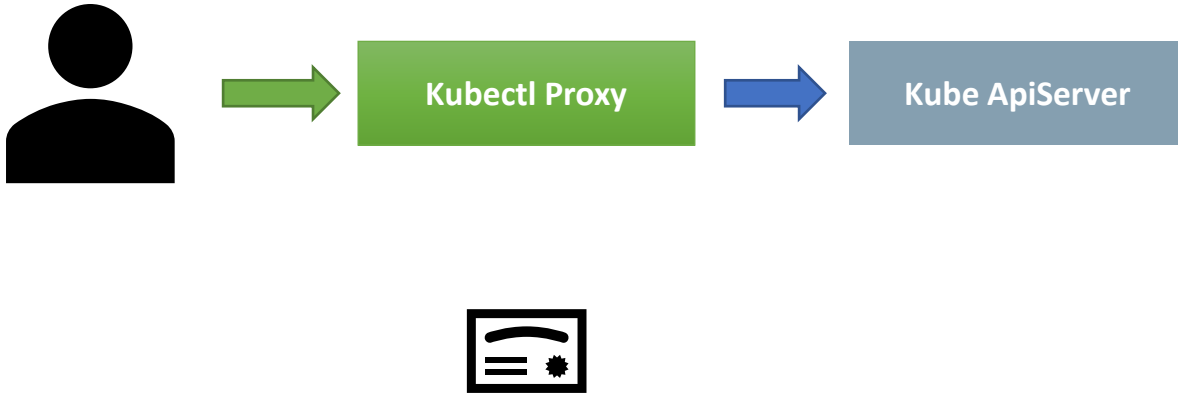
```
▶ curl http://localhost:6443 -k
```

```
{  
  "kind": "Status",  
  "apiVersion": "v1",  
  "metadata": {  
  
  },  
  "status": "Failure",  
  "message": "forbidden: User \"system:anonymous\" cannot get path \"/\"",  
  "reason": "Forbidden",  
  "details": {  
  
  },  
  "code": 403  
}
```

```
▶ curl http://localhost:6443 -k  
  --key admin.key  
  --cert admin.crt  
  --cacert ca.crt
```

```
{  
  "paths": [  
    "/api",  
    "/api/v1",  
    "/apis",  
    "/apis/",  
    "/healthz",  
    "/logs",  
    "/metrics"
```

kubectl proxy



```
▶ kubectl proxy
```

```
Starting to serve on 127.0.0.1:8001
```

```
▶ curl http://localhost:8001 -k
```

```
{
  "paths": [
    "/api",
    "/api/v1",
    "/apis",
    "/apis/",
    "/healthz",
    "/logs",
    "/metrics",
    "/openapi/v2",
    "/swagger-2.0.0.json",
```

{KODE {KLOUD

API Versions

API

named

/apis

API Groups

/apps

/extensions

/networking.k8s.io

/storage.k8s.io

/authentication.k8s.io

/certificates.k8s.io

Versions

/v1

/v1

/v1

/deployments

/replicasets

/statefulsets

Resources

list

get

create

delete

update

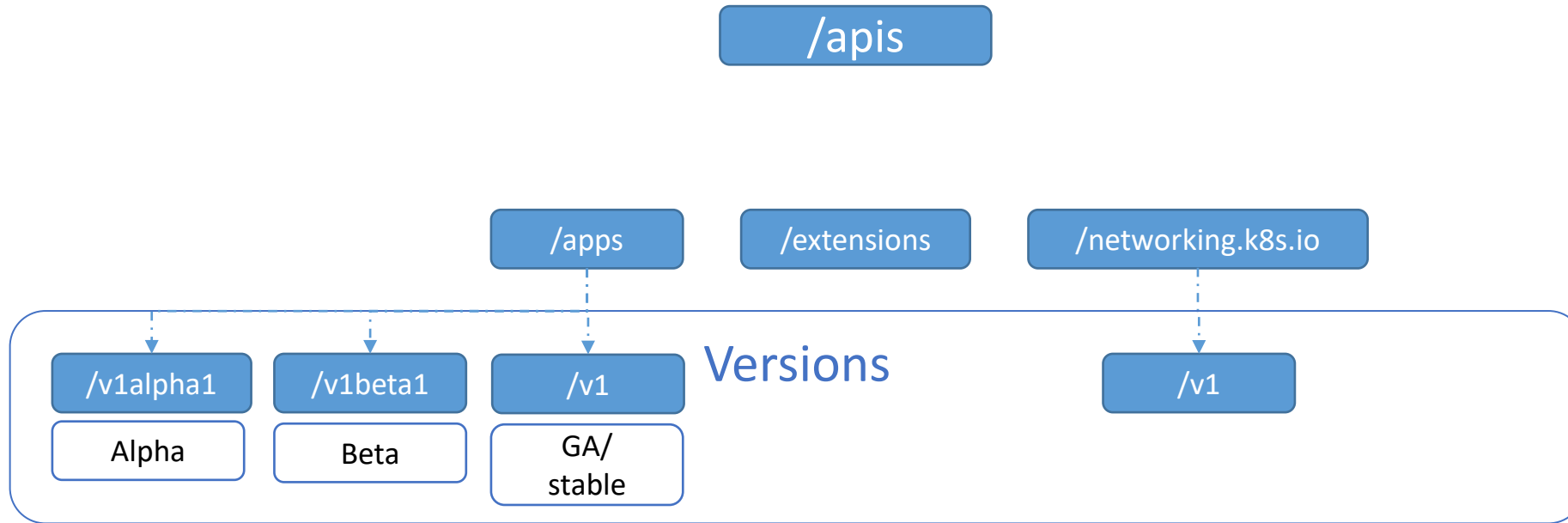
watch

Verbs

/networkpolicies

/certificatesigningrequests

API



API Groups

API

The API Groups and their versions are summarized in the following table.

Group	Version
<code>admissionregistration.k8s.io</code>	<code>v1</code>
<code>apiextensions.k8s.io</code>	<code>v1</code>
<code>apiregistration.k8s.io</code>	<code>v1</code>
<code>apps</code>	<code>v1</code>
<code>authentication.k8s.io</code>	<code>v1</code>
<code>authorization.k8s.io</code>	<code>v1</code>
<code>autoscaling</code>	<code>v1, v2beta2, v2beta1</code>
<code>batch</code>	<code>v1, v1beta1</code>
<code>certificates.k8s.io</code>	<code>v1</code>
<code>coordination.k8s.io</code>	<code>v1</code>
<code>core</code>	<code>v1</code>
<code>discovery.k8s.io</code>	<code>v1, v1beta1</code>
<code>events.k8s.io</code>	<code>v1, v1beta1</code>
<code>flowcontrol.apiserver.k8s.io</code>	<code>v1beta1</code>
<code>internal.apiserver.k8s.io</code>	<code>v1alpha1</code>
<code>networking.k8s.io</code>	<code>v1</code>
<code>node.k8s.io</code>	<code>v1, v1beta1, v1alpha1</code>
<code>policy</code>	<code>v1, v1beta1</code>
<code>rbac.authorization.k8s.io</code>	<code>v1, v1alpha1</code>
<code>scheduling.k8s.io</code>	<code>v1, v1alpha1</code>
<code>storage.k8s.io</code>	<code>v1, v1beta1, v1alpha1</code>

`/v1alpha1`
Alpha

`server.k8s.io`

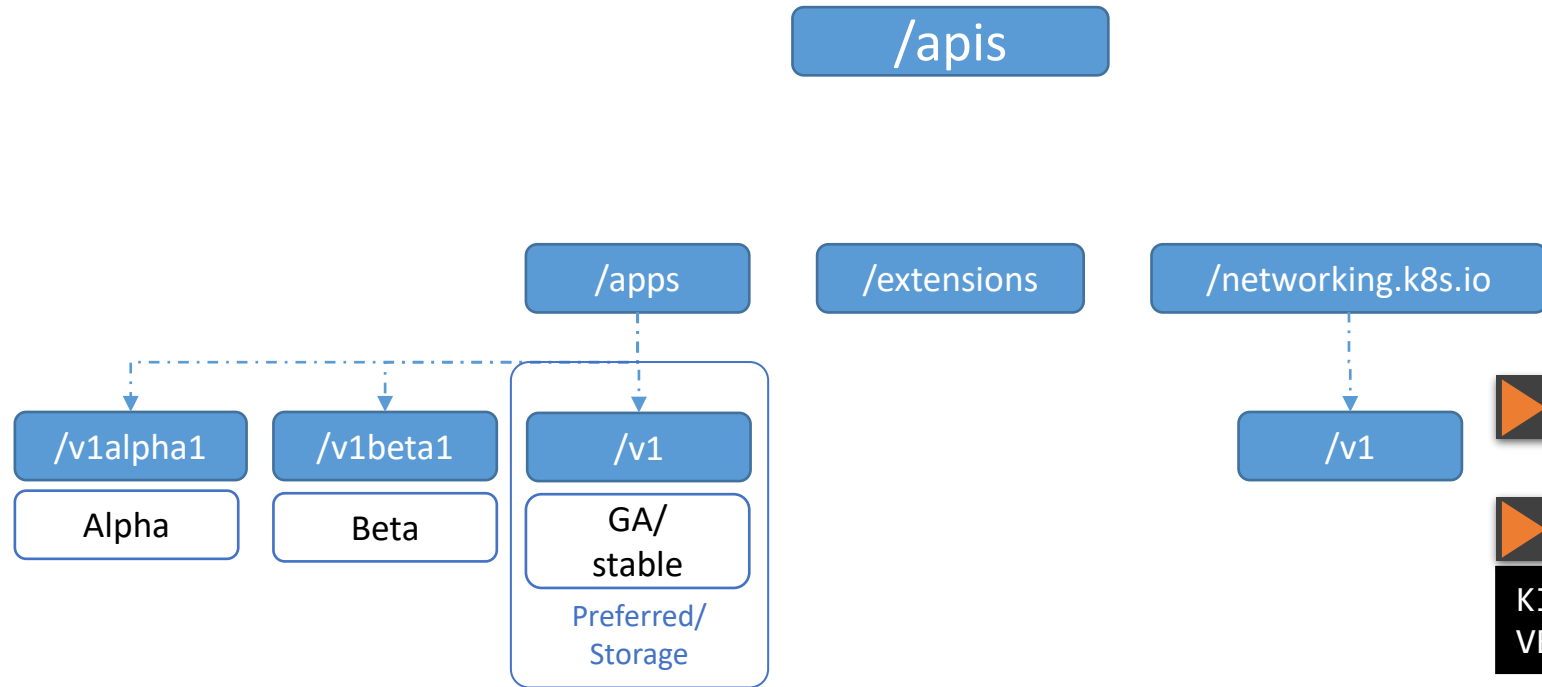
`pha1`

`er.k8s.io/v1alpha1`

- Version Name
- Enabled
- Tests
- Reliability
- Support
- Audience

- sts
- any

API



▶ `kubectl get deployment`

▶ `kubectl explain deployment`

```
KIND:      Deployment
VERSION:   apps/v1
```

nginx.yaml

```
apiVersion: apps/v1alpha1
kind: Deployment
metadata:
  name: nginx
spec:
```

nginx.yaml

```
apiVersion: apps/v1beta1
kind: Deployment
metadata:
  name: nginx
spec:
```

nginx.yaml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx
spec:
```

Preferred Version

← → ↻ 🏠 ⓘ 127.0.0.1:8001/apis/batch/

```
{
  "kind": "APIGroup",
  "apiVersion": "v1",
  "name": "batch",
  "versions": [
    {
      "groupVersion": "batch/v1",
      "version": "v1"
    },
    {
      "groupVersion": "batch/v1beta1",
      "version": "v1beta1"
    }
  ],
  "preferredVersion": {
    "groupVersion": "batch/v1",
    "version": "v1"
  }
}
```

Storage Version

```
ETCDCTL_API=3 etcdctl
--endpoints=https://[127.0.0.1]:2379
--cacert=/etc/kubernetes/pki/etcd/ca.crt
--cert=/etc/kubernetes/pki/etcd/server.crt
--key=/etc/kubernetes/pki/etcd/server.key
get "/registry/deployments/default/blue" --print-value-only
```

k8s

apps/v1

Deployment

```
bluedefault"*$cf8dcd55-8819-4be2-85e7-bb71665c2ddf2ZB
successfully progresse8"2
```

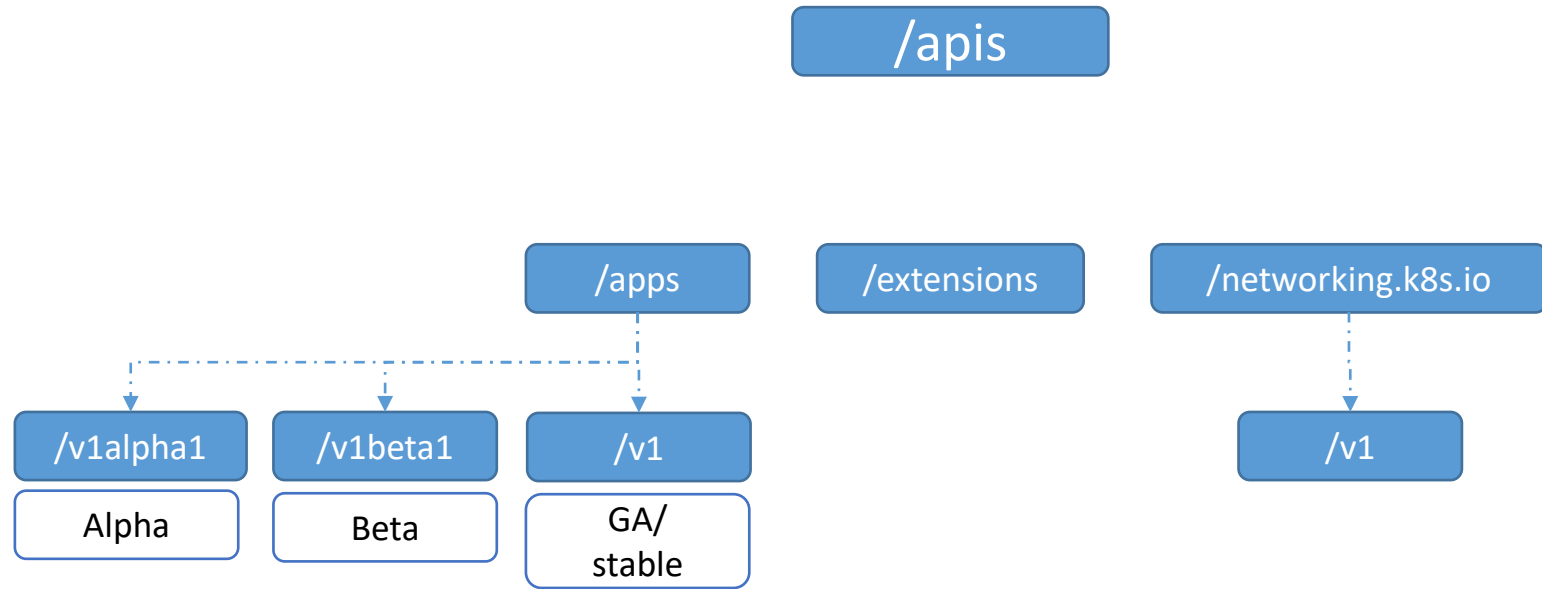
Enabling/Disabling API groups

```
ExecStart=/usr/local/bin/kube-apiserver \\  
  --advertise-address=${INTERNAL_IP} \\  
  --allow-privileged=true \\  
  --apiserver-count=3 \\  
  --authorization-mode=Node,RBAC \\  
  --bind-address=0.0.0.0 \\  
  --enable-swagger-ui=true \\  
  --etcd-cafile=/var/lib/kubernetes/ca.pem \\  
  --etcd-certfile=/var/lib/kubernetes/apiserver-etcd-client.crt \\  
  --etcd-keyfile=/var/lib/kubernetes/apiserver-etcd-client.key \\  
  --etcd-servers=https://127.0.0.1:2379 \\  
  --event-ttl=1h \\  
  --kubelet-certificate-authority=/var/lib/kubernetes/ca.pem \\  
  --kubelet-client-certificate=/var/lib/kubernetes/apiserver-etcd-client.crt \\  
  --kubelet-client-key=/var/lib/kubernetes/apiserver-etcd-client.key \\  
  --kubelet-https=true \\  
  --runtime-config=batch/v2alpha1 \\  
  --service-account-key-file=/var/lib/kubernetes/service-account.pem \\  
  --service-cluster-ip-range=10.32.0.0/24 \\  
  --service-node-port-range=30000-32767 \\  
  --client-ca-file=/var/lib/kubernetes/ca.pem \\  
  --tls-cert-file=/var/lib/kubernetes/apiserver.crt \\  
  --tls-private-key-file=/var/lib/kubernetes/apiserver.key \\  
  --v=2
```

{KODE {KLOUD

API Deprecations

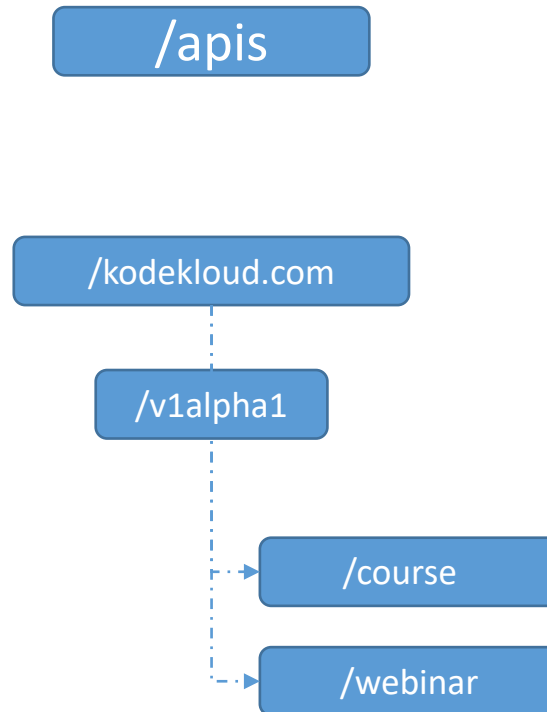
API



API

ckad-course.yaml

```
apiVersion: kodekloud.com/v1alpha1
kind: Course
metadata:
  name: ckad
spec:
```



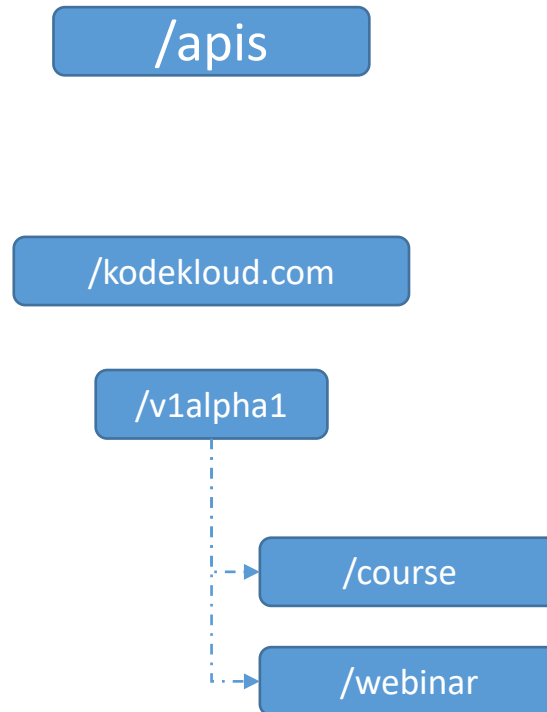
API Deprecation Policy Rule #1

API elements may only be removed by incrementing the version of the API group.

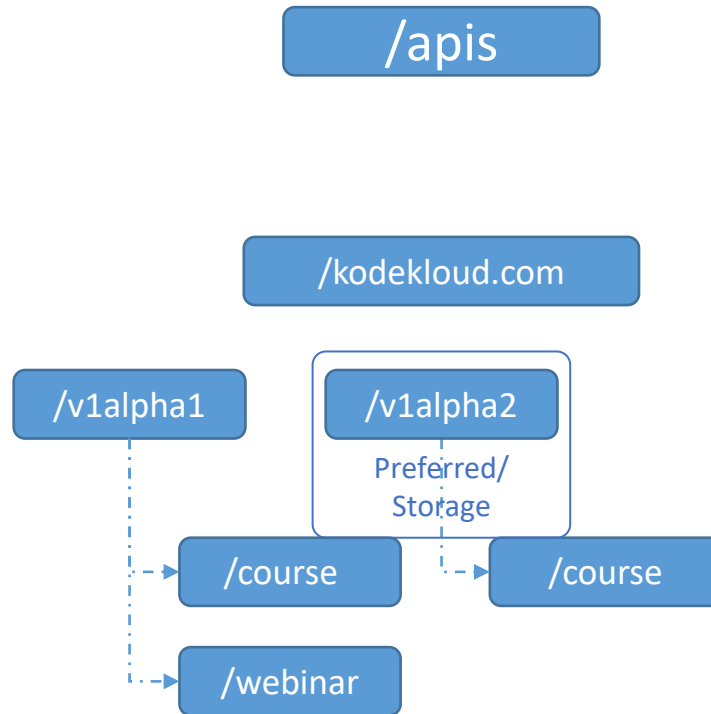
API

ckad-course.yaml

```
apiVersion: kodekloud.com/v1alpha1
kind: Course
metadata:
  name: ckad
spec:
```



API



ckad-course.yaml

```
apiVersion: kodekloud.com/v1alpha1
kind: Course
metadata:
  name: ckad
spec:
```

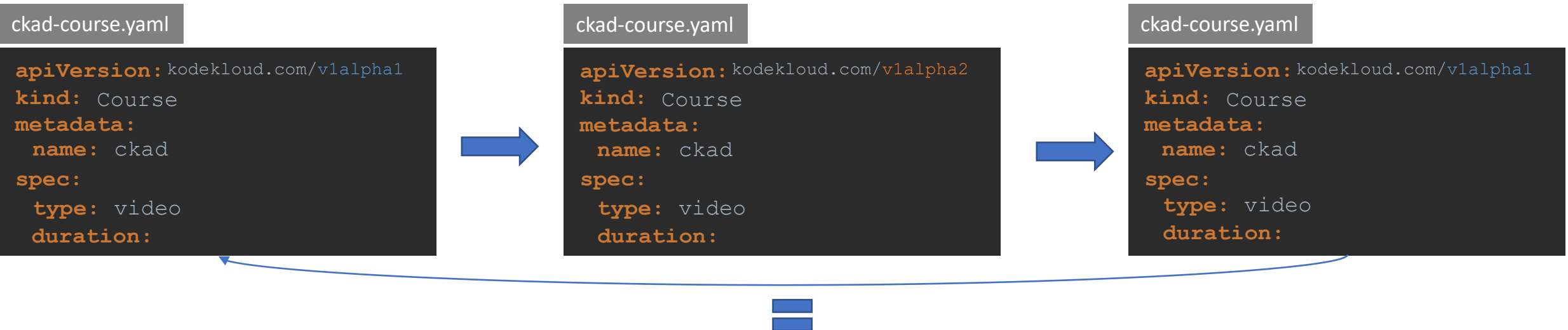


ckad-course.yaml

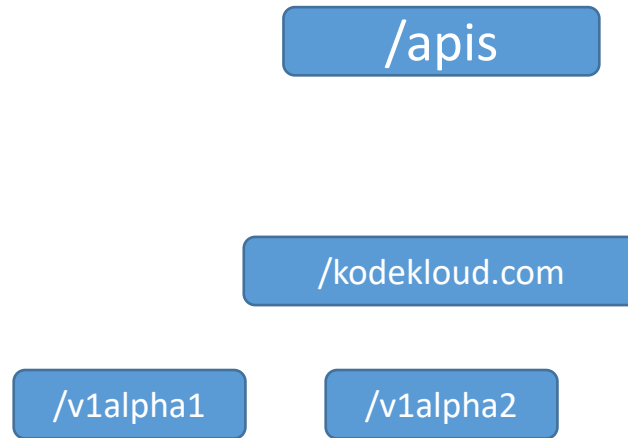
```
apiVersion: kodekloud.com/v1alpha2
kind: Course
metadata:
  name: ckad
spec:
```

API Deprecation Policy Rule #2

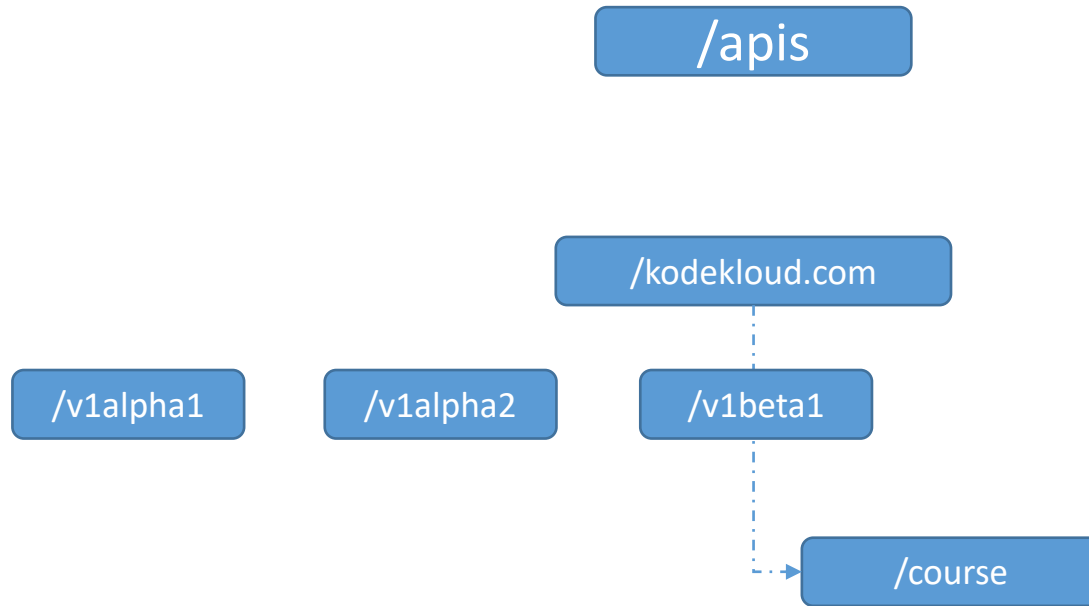
API objects must be able to round-trip between API versions in a given release without information loss, with the exception of whole REST resources that do not exist in some versions.



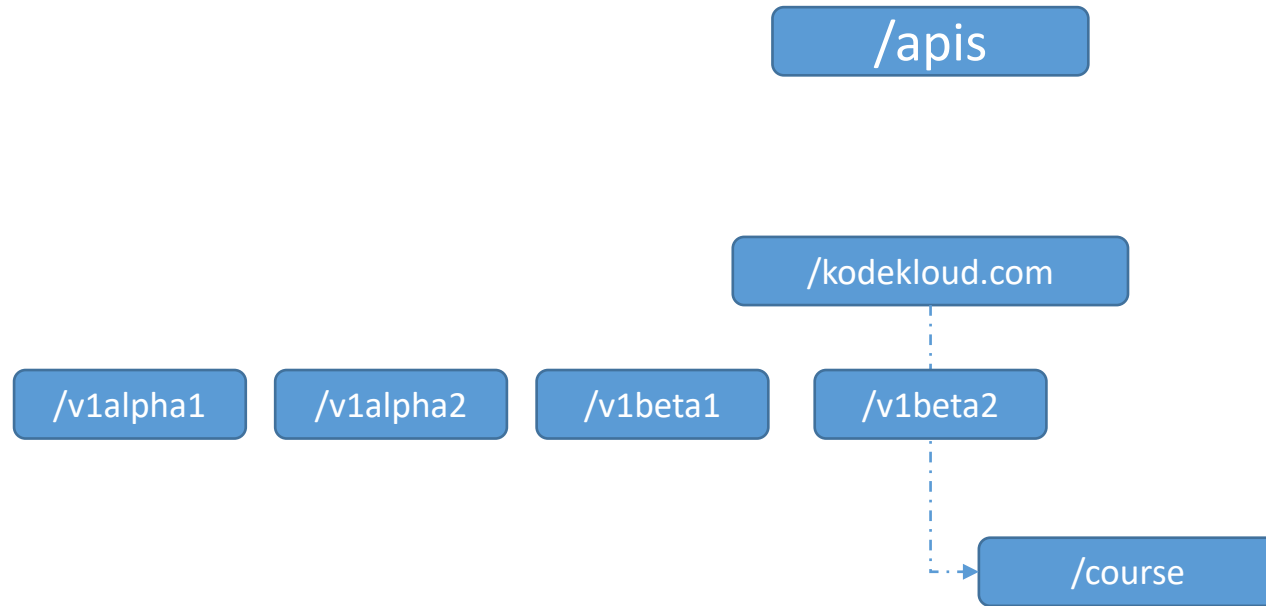
| API



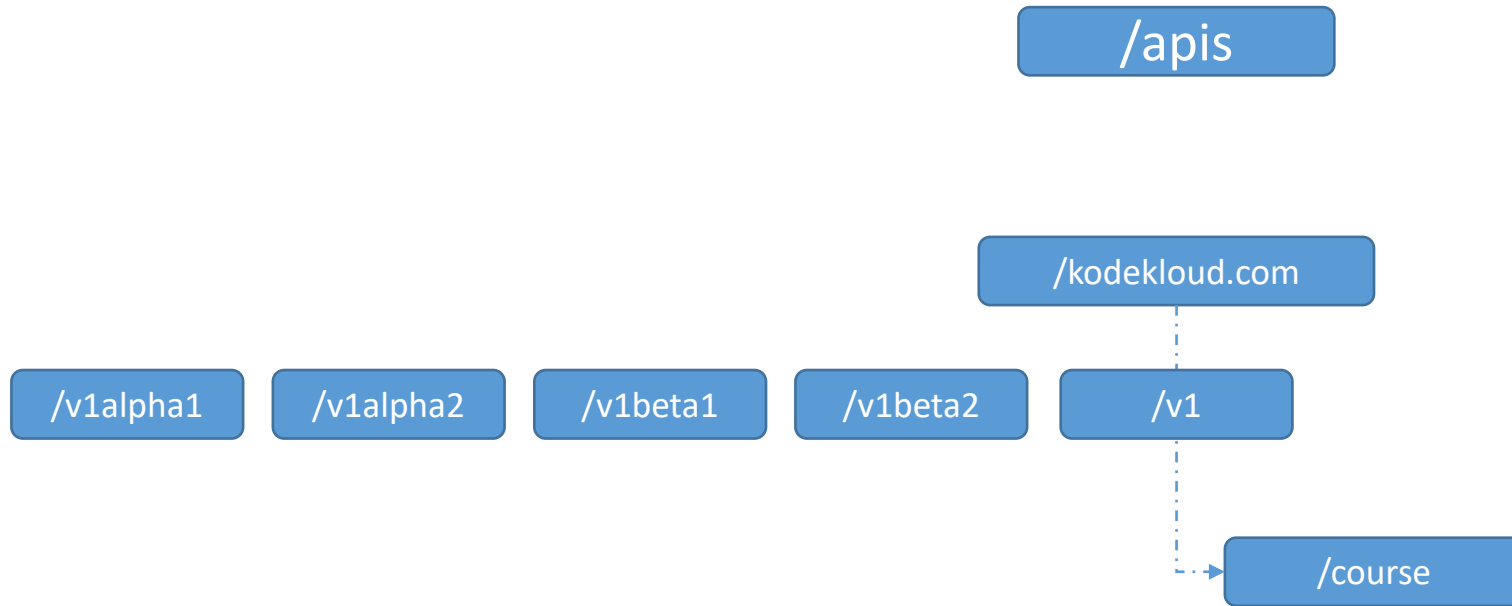
API



API



API



API

API Group
Version

Preferred/
storage
version

/v1alpha1



Kubernetes
Release
Version

API

API Group
Version



X + 1

X

Kubernetes
Release
Version

API Deprecation Policy Rule #4a

Other than the most recent API versions in each track, older API versions must be supported after their announced deprecation for a duration of no less than:

- **GA: 12 months or 3 releases (whichever is longer)**
- **Beta: 9 months or 3 releases (whichever is longer)**
- **Alpha: 0 releases**

API

API Group
Version

Preferred/
storage
version

/v1alpha2

X + 1

/v1alpha1

X

Kubernetes
Release
Version

Changelog since v1.12.0

Action Required

- kube-apiserver: the deprecated `--etcd-quorum-read` flag has been removed, and quorum read data from etcd. (#69527, @liggitt)
- Moved staging/src/k8s.io/client-go/tools/bootstrap to staging/src/k8s... (#67356, @yiliaog)
- [action required] kubeadm: The `v1alpha2` config API has been removed. (#69055, @fabrizio)
 - Please convert your `v1alpha2` configuration files to `v1alpha3` using the `kubeadm config migrate` command of kubeadm v1.12.x

API

API Group
Version



X + 2

X + 1

X

Kubernetes
Release
Version

API Deprecation Policy Rule #4a

Other than the most recent API versions in each track, older API versions must be supported after their announced deprecation for a duration of no less than:

- **GA: 12 months or 3 releases (whichever is longer)**
- **Beta: 9 months or 3 releases (whichever is longer)**
- **Alpha: 0 releases**

API

API Group
Version



X + 2

X + 1

X

Kubernetes
Release
Version

API

API Group
Version



Kubernetes
Release
Version

API

API Group
Version

/v1beta2

/v1beta1
(Deprecated)

/v1beta1

/v1alpha2

/v1alpha1

Preferred/
storage
version

● X + 3

● X + 2

● X + 1

● X

Kubernetes
Release
Version

| API Deprecation Policy Rule #4b

The "preferred" API version and the "storage version" for a given group may not advance until after a release has been made that supports both the new version and the previous version

API

API Group
Version

/v1beta2

/v1beta1
(Deprecated)

/v1beta1

/v1alpha2

/v1alpha1

Preferred/
storage
version

● X + 3

● X + 2

● X + 1

● X

Kubernetes
Release
Version

API

API Group
Version

/v1beta2

/v1beta2

/v1beta1

/v1beta1

/v1beta1

/v1alpha2

Preferred/
storage
version

(Deprecated)

(Deprecated)

X + 4

X + 3

X + 2

X + 1

Kubernetes
Release
Version

API

API Group
Version

/v1beta1
(Deprecated)

/v1beta2

/v1beta2

/v1beta1
(Deprecated)

/v1beta1

/v1alpha2

Preferred/
storage
version

X + 4

X + 3

X + 2

X + 1

Kubernetes
Release
Version

API

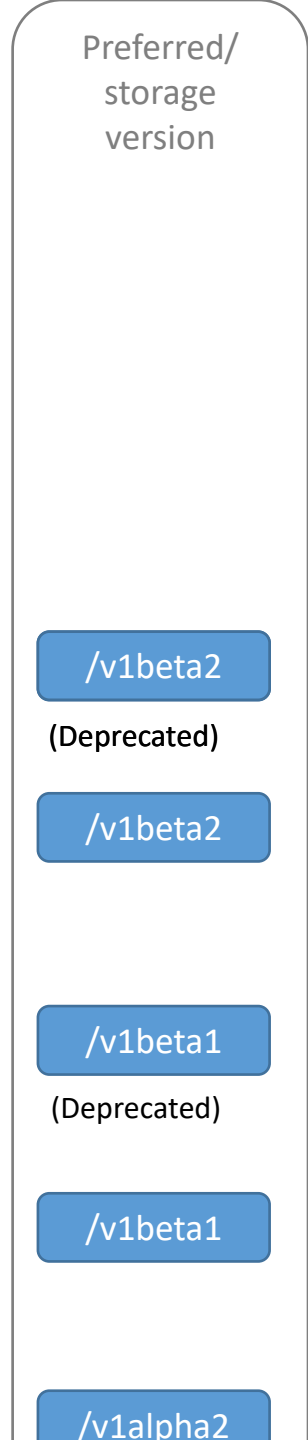
API Group
Version

/v1

/v1beta1
(Deprecated)

/v1beta1
(Deprecated)

/v1beta2



/v1beta2
(Deprecated)

/v1beta2

/v1beta1
(Deprecated)

/v1beta1

/v1alpha2

X + 5

X + 4

X + 3

X + 2

X + 1

Kubernetes
Release
Version

API

API Group
Version

/v1

/v1

/v1beta1

/v1beta1

/v1beta2

Preferred/
storage
version

/v1beta2

(Deprecated)

/v1beta2

(Deprecated)

/v1beta2

/v1beta1

(Deprecated)

/v1beta1

X + 6

X + 5

X + 4

X + 3

X + 2

Kubernetes
Release
Version

API

API Group
Version

/v1

/v1beta2
(Deprecated)

/v1beta1
(Deprecated)

/v1beta1
(Deprecated)

/v1beta2

Preferred/
storage
version

/v1

/v1beta2
(Deprecated)

/v1beta2

/v1beta1
(Deprecated)

/v1beta1

● X + 6

● X + 5

● X + 4

● X + 3

● X + 2

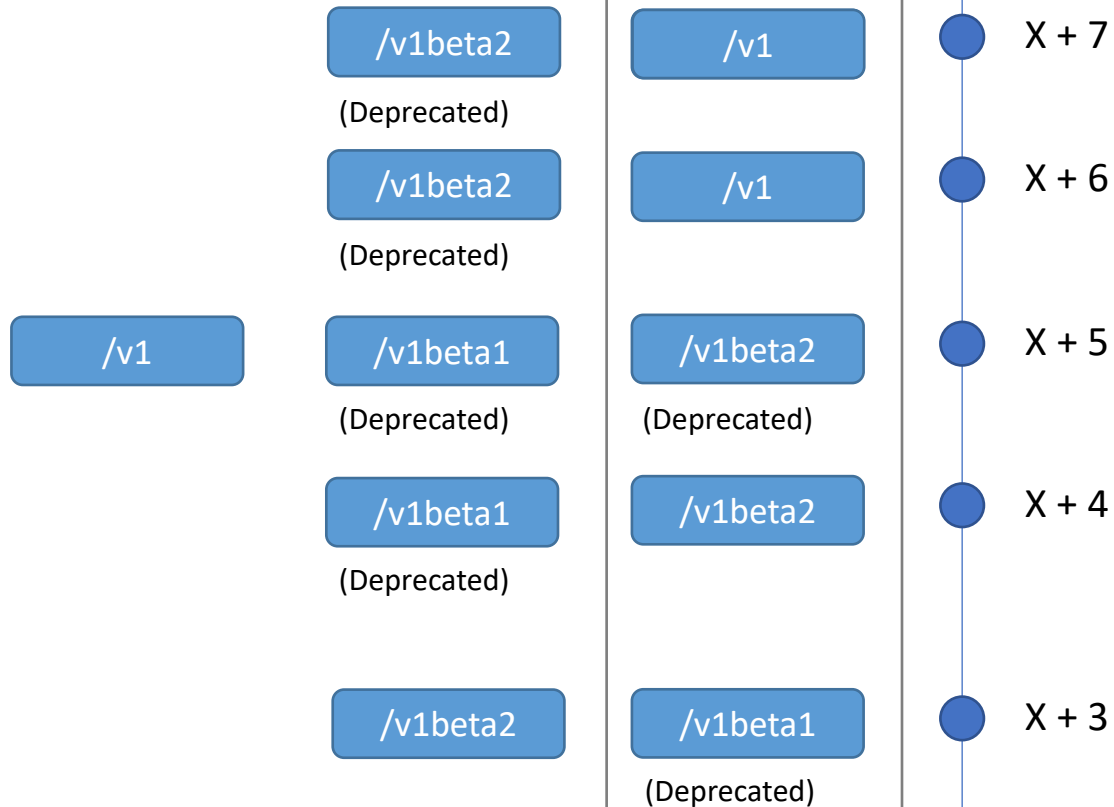
Kubernetes
Release
Version

API

API Group
Version

Preferred/
storage
version

Kubernetes
Release
Version

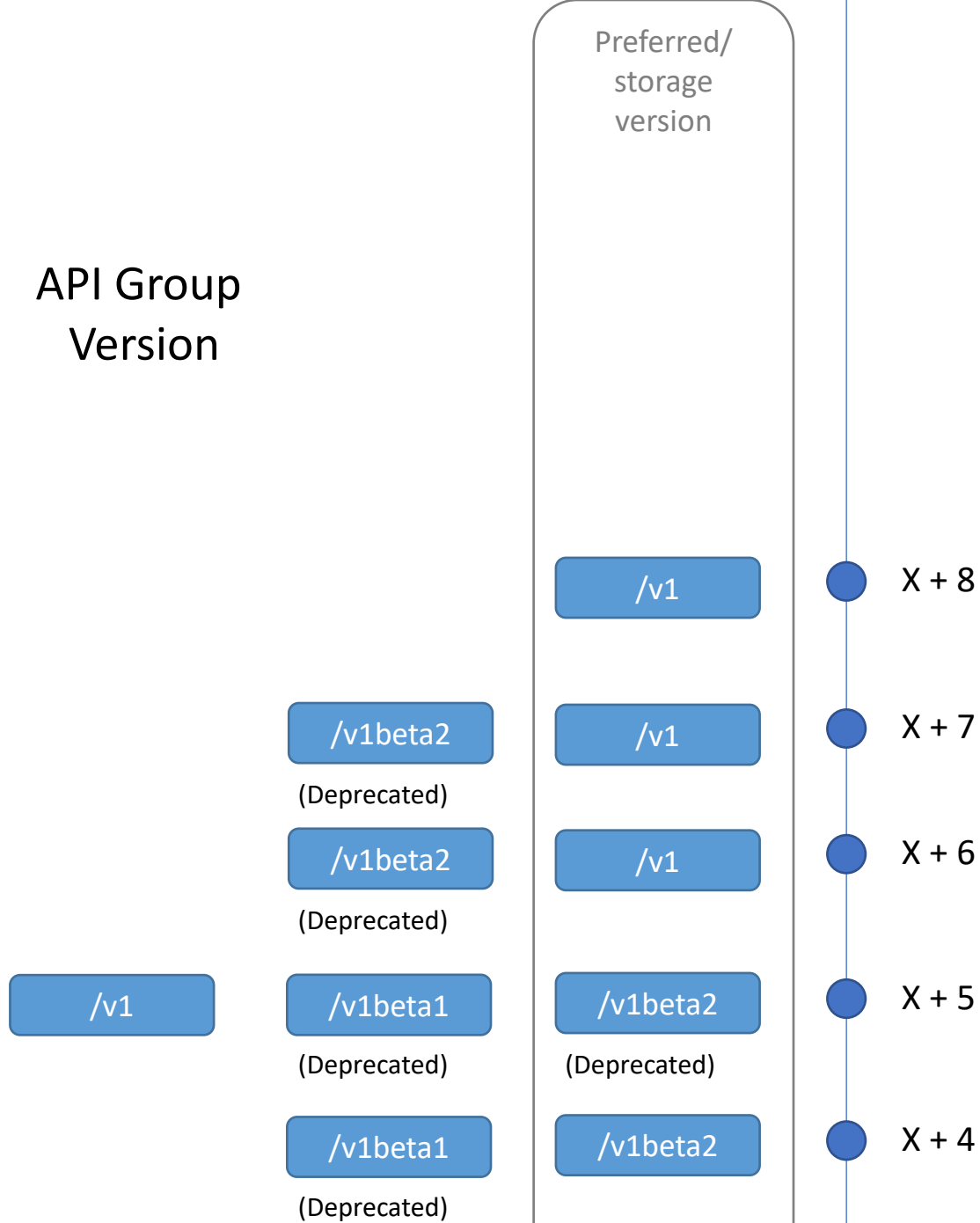


API

API Group
Version

Preferred/
storage
version

Kubernetes
Release
Version

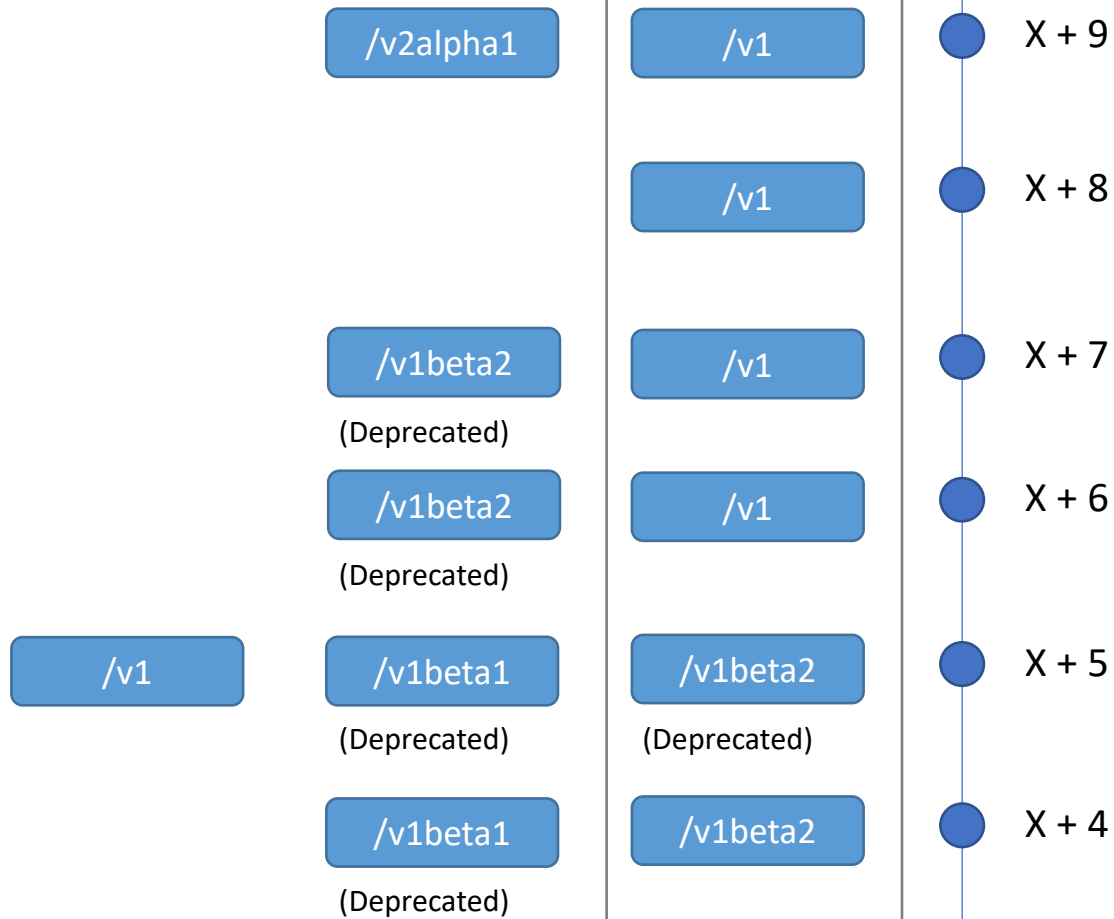


API

API Group
Version

Preferred/
storage
version

Kubernetes
Release
Version



| API Deprecation Policy Rule #3

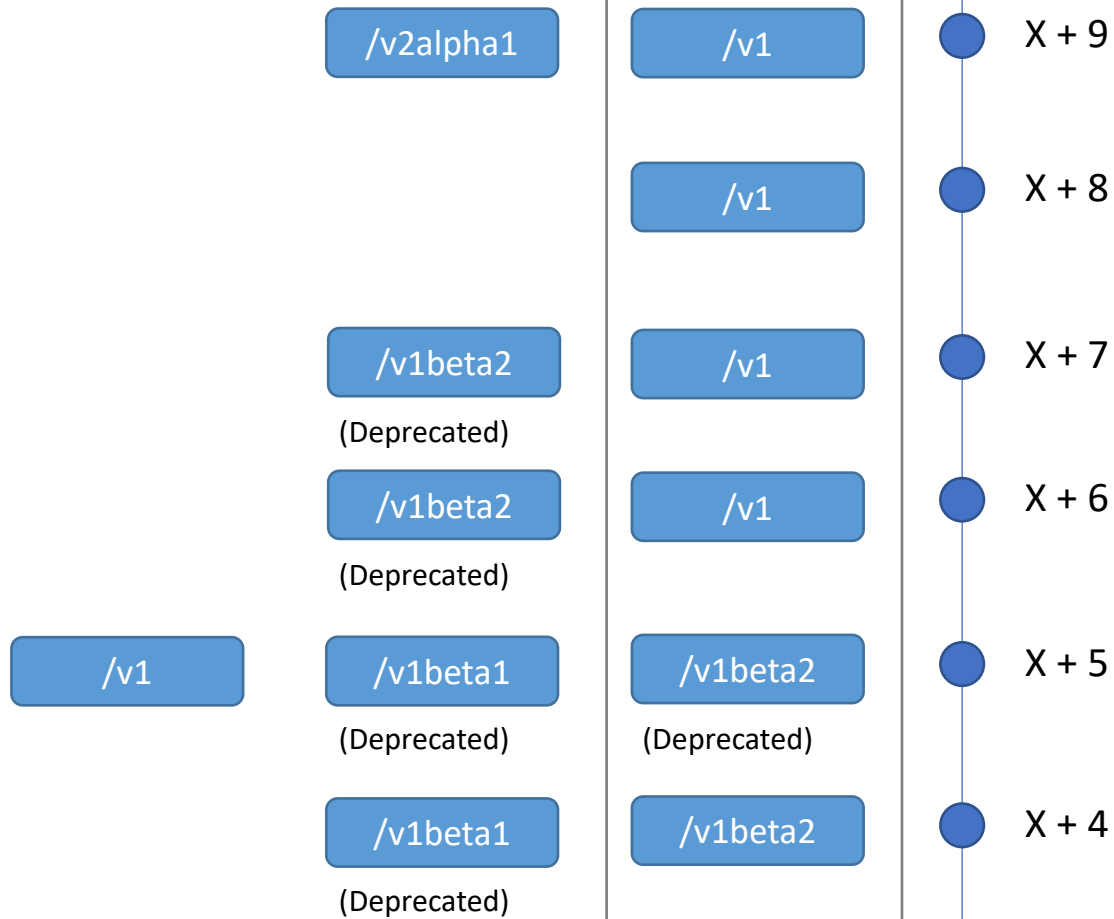
An API version in a given track may not be deprecated until a new API version at least as stable is released.

API

API Group
Version

Preferred/
storage
version

Kubernetes
Release
Version



Kubectl Convert

nginx.yaml

```
apiVersion: apps/v1beta1
kind: Deployment
metadata:
  name: nginx
spec:
```



nginx.yaml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx
spec:
```

```
▶ kubectl convert -f <old-file> --output-version <new-api>
```

```
▶ kubectl convert -f nginx.yaml --output-version apps/v1
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  creationTimestamp: null
  labels:
    app: nginx
  name: nginx
```

Installing Kubectl Convert

Install `kubectl convert` plugin

A plugin for Kubernetes command-line tool `kubectl`, which allows you to convert manifests between different API versions. This can be particularly helpful to migrate manifests to a non-deprecated api version with newer Kubernetes release. For more info, visit [migrate to non deprecated apis](#)

1. Download the latest release with the command:

```
curl -LO https://dl.k8s.io/release/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl-convert
```

2. Validate the binary (optional)

Download the kubectl-convert checksum file:

```
curl -LO "https://dl.k8s.io/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl-convert.sha256"
```

Validate the kubectl-convert binary against the checksum file:

```
echo "$(cat kubectl-convert.sha256) kubectl-convert" | sha256sum --check
```

<https://kubernetes.io/docs/tasks/tools/install-kubectl-linux/#install-kubectl-convert-plugin>

{KODE {KLOUD

Custom Resource Definitions (CRD)

Resource

```
deployment.yml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-deployment
spec:
  template:
    metadata:
      name: myapp-pod
      labels:
        type: front-end
    spec:
      containers:
        - image: nginx
      replicas: 3
      selector:
        matchLabels:
          type: front-end
```

```
> kubectl create -f deployment.yml
```

```
deployment "myapp-deployment" created
```

```
> kubectl get deployments
```

NAME	DESIRED	CURRENT	UP-TO-DATE	AVAILABLE	AGE
myapp-deployment	3	3	3	3	21s

```
> kubectl delete -f deployment.yml
```

```
deployment "myapp-deployment" deleted
```

ETCD

Controller

```
deployment_controller.go
package deployment

var controllerKind =
  apps.SchemeGroupVersion.WithKind("Deployment")

//< Code hidden >

// Run begins watching and syncing.
func (dc *DeploymentController) Run(workers int,
  stopCh <-chan struct{})

//< Code hidden >
// Add ReplicaSet
func (dc *DeploymentController) addReplicaSet(obj
  interface{})

//< A lot of code hidden >
```

Resource

ReplicaSet

Deployment

Job

CronJob

Statefulset

Namespace

ETCD

Controller

ReplicaSet

Deployment

Job

CronJob

Statefulset

Namespace

CustomResource

```
flightticket.yml
apiVersion: flights.com/v1
kind: FlightTicket
metadata:
  name: my-flight-ticket
spec:
  from: Mumbai
  to: London
  number: 2
```

```
> kubectl create -f flightticket.yml
flightticket "my-flight-ticket" created
```

```
> kubectl get flightticket
NAME           STATUS
my-flight-ticket Pending
```

```
> kubectl delete -f flightticket.yml
flightticket "my-flight-ticket" deleted
```

CustomController

```
flightticket_controller.go
package flightticket

var controllerKind =
apps.SchemeGroupVersion.WithKind("FlightTicket")

//< Code hidden >

// Run begins watching and syncing.
func (dc *FlightTicketController) Run(workers int,
stopCh <-chan struct{})

//< Code hidden >
// Call BookFlightAPIReplicaSet
func (dc *FlightTicketController) callBookFlightAPI(obj
interface{})

//< A lot of code hidden >
```



API

<https://book-flight.com/api>



CustomResource

```
flightticket.yml
apiVersion: flights.com/v1
kind: FlightTicket
metadata:
  name: my-flight-ticket
spec:
  from: Mumbai
  to: London
  number: 2
```

```
> kubectl create -f flightticket.yml
no matches for kind "FlightTicket" in version "flights.com/v1"
```

```
> kubectl api-resources
```

NAME	SHORTNAMES	APIGROUP	NAMESPACED	KIND
bindings			true	Binding
flighttickets	ft	flights.com	true	FlightTicket

```
> kubectl get ft
```

NAME	AGE
my-flight-ticket	24m

Custom Resource Definition (CRD)

```
flightticket-custom-definition.yml
apiVersion: apiextensions.k8s.io/v1
kind: CustomResourceDefinition
metadata:
  name: flighttickets.flights.com
spec:
  scope: Namespaced
  group: flights.com
  names:
    kind: FlightTicket
    singular: flightticket
    plural: flighttickets
    shortNames:
      - ft
  versions:
    - name: v1
      served: true
      storage: true
  schema:
    openAPIV3Schema:
```


CustomResource

```
flightticket.yml
apiVersion: flights.com/v1
kind: FlightTicket
metadata:
  name: my-flight-ticket
spec:
  from: Mumbai
  to: London
  number: 2
```

```
> kubectl create -f flightticket.yml
```

```
flightticket "my-flight-ticket" created
```

```
> kubectl get flightticket
```

NAME	STATUS
my-flight-ticket	Pending

```
> kubectl delete -f flightticket.yml
```

```
flightticket "my-flight-ticket" deleted
```

```
plural: flighttickets
shortNames:
  - ft
versions:
  - name: v1
    served: true
    storage: true
  schema:
    openAPIV3Schema:
      type: object
      properties:
        spec:
          type: object
          properties:
            from:
              type: string
            to:
              type: string
            number:
              type: integer
              minimum: 1
              maximum: 10
```

```
> kubectl create -f flightticket-custom-definition.yml
```

```
customresourcedefinition created
```

{KODE {KLOUD

Custom Controllers

CustomResource

```
flightticket.yml
apiVersion: flights.com/v1
kind: FlightTicket
metadata:
  name: my-flight-ticket
spec:
  from: Mumbai
  to: London
  number: 2
```

```
> kubectl create -f flightticket.yml
flightticket "my-flight-ticket" created
```

```
> kubectl get flightticket
NAME          STATUS
my-flight-ticket Pending
```

CustomController



```
flightticket_controller.go
package flightticket

var controllerKind =
apps.SchemeGroupVersion.WithKind("FlightTicket")

//< Code hidden >

// Run begins watching and syncing.
func (dc *FlightTicketController) Run(workers int,
stopCh <-chan struct{})

//< Code hidden >
// Call BookFlightAPIReplicaSet
func (dc *FlightTicketController) callBookFlightAPI(obj
interface{})

//< A lot of code hidden >
```



API

<https://book-flight.com/api>



Custom Controller

kubernetes / **sample-controller** Public

Watch 77 Star 1.9k Fork 705

Code Issues 2 Pull requests Actions Projects Wiki Security Insights

master 15 branches 725 tags

Go to file Add file Code

k8s-publishing-bot Merge pull request #105372 from MadhavJivrajani/vendo... a21ce62 12 days ago 1,246 commits

.github	delete all duplicate empty blanks	3 years ago
artifacts/examples	Change apiversion of CRD from v1beta1 to v1	5 months ago
docs	delete all duplicate empty blanks	3 years ago
hack	generated: Run hack/update-gofmt.sh	2 months ago
pkg	generated: Run hack/update-gofmt.sh	2 months ago
CONTRIBUTING.md	delete all duplicate empty blanks	3 years ago
LICENSE	Add sample CustomResourceDefinition controller	4 years ago
OWNERS	Revert "Merge pull request #93156 from logicalhan/triage-api-machi..."	15 months ago
README.md	Change apiversion of CRD from v1beta1 to v1	5 months ago
SECURITY_CONTACTS	update security contacts for apimachinery repos	16 months ago
code-of-conduct.md	Add code-of-conduct.md to staging repos	4 years ago
controller.go	Fix double formatting on error message	17 days ago
controller_test.go	fix static check failures in staging pkg	2 years ago
go.mod	Merge pull request #105372 from MadhavJivrajani/vendor-clock-utils	12 days ago
go.sum	Merge pull request #105372 from MadhavJivrajani/vendor-clock-utils	12 days ago
main.go	switch over k/k to use klog v2	2 years ago

About
Repository for sample controller.
Complements sample-apiserver

k8s-staging

Readme

Apache-2.0 License

Releases
725 tags

Packages
No packages published

Contributors 152

+ 141 contributors

Languages

<https://github.com/kubernetes/sample-controller>

Custom Controller

```
> go
```

Go is a tool for managing Go source code.

```
go <command> [arguments]
```

```
> git clone https://github.com/kubernetes/sample-controller.git
```

Cloning into 'sample-controller'...

Resolving deltas: 100% (15787/15787), done.

```
> cd sample-controller
```

Customize controller.go with our custom logic

```
> go build -o sample-controller .
```

go: downloading k8s.io/client-go v0.0.0-20211001003700-dbfa30b9d908

go: downloading golang.org/x/text v0.3.6

```
> ./sample-controller -kubeconfig=$HOME/.kube/config
```

I1013 02:11:07.489479 40117 controller.go:115] Setting up event handlers

I1013 02:11:07.489701 40117 controller.go:156] Starting FlightTicket controller

```
controller.go
```

```
package flightticket
```

```
var controllerKind =  
apps.SchemeGroupVersion.WithKind("FlightTicket")
```

```
//< Code hidden >
```

```
// Run begins watching and syncing.
```

```
func (dc *FlightTicketController) Run(workers int,  
stopCh <-chan struct{})
```

```
//< Code hidden >
```

```
// Call BookFlightAPIReplicaSet
```

```
func (dc *FlightTicketController) callBookFlightAPI(obj  
interface{})
```

```
//< A lot of code hidden >
```

Custom Controller



```
controller.go
package flightticket

var controllerKind =
apps.SchemeGroupVersion.WithKind("FlightTicket")

//< Code hidden >

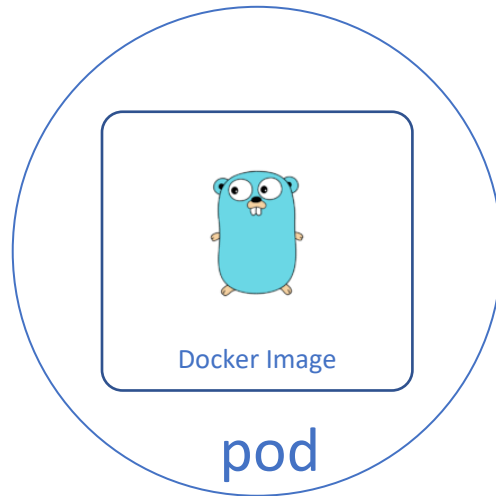
// Run begins watching and syncing.
func (dc *FlightTicketController) Run(workers int, stopCh <-chan
struct{})

//< Code hidden >
// Call BookFlightAPIReplicaSet
func (dc *FlightTicketController) callBookFlightAPI(obj
interface{})

//< A lot of code hidden >
```

Docker Image

Custom Controller



{KODE {KLOUD

Operator Framework

CustomResource Definition (CRD)

```
flightticket-custom-definition.yml

apiVersion: apiextensions.k8s.io/v1
kind: CustomResourceDefinition
metadata:
  name: flighttickets.flights.com
spec:
  scope: Namespaced
  group: flights.com
  names:
    kind: FlightTicket
    singular: flightticket
    plural: flighttickets
    shortnames:
      - ft
  versions:
    - name: v1
      served: true
      storage: true
```

CustomController

```
flightticket_controller.go

package flightticket

var controllerKind =
  apps.SchemeGroupVersion.WithKind("FlightTicket")

//< Code hidden >

// Run begins watching and syncing.
func (dc *FlightTicketController) Run(workers int,
  stopCh <-chan struct{})

//< Code hidden >
// Call BookFlightAPIReplicaSet
func (dc *FlightTicketController) callBookFlightAPI(obj
  interface{})

//< A lot of code hidden >
```

CustomResource Definition (CRD)

```
flightticket-custom-definition.yml
apiVersion: apiextensions.k8s.io/v1
kind: CustomResourceDefinition
metadata:
  name: flighttickets.flights.com
spec:
  scope: Namespaced
  group: flights.com
  names:
    kind: FlightTicket
    singular: flightticket
    plural: flighttickets
    shortnames:
      - ft
  versions:
    - name: v1
      served: true
      storage: true
```

CustomController

```
flightticket_controller.go
package flightticket

var controllerKind =
  apps.SchemeGroupVersion.WithKind("FlightTicket")

//< Code hidden >

// Run begins watching and syncing.
func (dc *FlightTicketController) Run(workers int,
  stopCh <-chan struct{})

//< Code hidden >
// Call BookFlightAPIReplicaSet
func (dc *FlightTicketController) callBookFlightAPI(obj
  interface{})

//< A lot of code hidden >
```

Operator Framework

```
> kubectl create -f flight-operator.yaml
```

Custom Resource Definition (CRD)

EtcdCluster

EtcdBackup

EtcdRestore

Custom Controller

ETCD Controller

Backup Operator

Restore Operator

Operator Framework

Welcome to OperatorHub.io

OperatorHub.io is a new home for the Kubernetes community to share Operators. Find an existing Operator or list your own today.

CATEGORIES

- AI/Machine Learning
- Application Runtime
- Big Data
- Cloud Provider
- Database
- Developer Tools
- Drivers and plugins
- Integration & Delivery
- Logging & Tracing
- Modernization & Migration
- Monitoring
- Networking
- OpenShift Optional
- Security
- Storage
- Streaming & Messaging

PROVIDER
















- Absa Group (1)
- aiven (1)
- alauda (1)
- Alibaba Cloud (1)
- Altinity (1)
- [Show 139 more](#)

CAPABILITY LEVEL

- Basic Install (96)
- Seamless Upgrades (49)
- Full Lifecycle (34)

209 ITEMS

VIEW ▣ ▼ SORT A-Z ▼

 <p>Aiven Operator provided by aiven</p> <p>Manage your https://aiven.io resources with Kubernetes.</p>	 <p>Akka Cluster Operator provided by Lightbend, Inc.</p> <p>Run Akka Cluster applications on Kubernetes.</p>	 <p>Altinity ClickHouse Operator provided by Altinity</p> <p>ClickHouse Operator manages full lifecycle of ClickHouse</p>	 <p>Alvearie Imaging Ingestion Operator provided by Alvearie</p> <p>The Alvearie Imaging Ingestion provides a collection of</p>	 <p>Anchore Engine Operator provided by Anchore Inc.</p> <p>Anchore Engine - container image scanning service for policy-based security, best</p>
 <p>Apache Spark Operator provided by radanalytics.io</p> <p>An operator for managing the Apache Spark clusters and intelligent applications that</p>	 <p>API Operator for Kubernetes provided by WSO2</p> <p>API Operator provides a fully automated experience for</p>	 <p>APIcast provided by Red Hat</p> <p>APIcast is an API gateway built on top of NGINX. It is part of the 3scale API Management</p>	 <p>Apicurio Registry Operator provided by Apicurio</p> <p>Deploy and manage Apicurio Registry on Kubernetes.</p>	 <p>APIMatic Operator provided by APIMatic.io</p> <p>Generate client SDKs and interactive Documentation for your APIs in minutes</p>
 <p>Appdynamics Operator provided by AppDynamics LLC</p> <p>End to end monitoring of applications on Kubernetes and OpenShift clusters with</p>	 <p>Application Services Metering Operator provided by Red Hat</p> <p>Collect the core usage of products from the Applicat</p>	 <p>Appratrix CPS Operator provided by Appratrix, Inc</p> <p>The Appratrix CPS operator enables you to back up and restore your</p>	 <p>Appsody Operator provided by Appsody</p> <p>Deploys Appsody based applications</p>	 <p>Aqua Security Operator provided by Aqua Security, Inc.</p> <p>The Aqua Security Operator runs within a Openshift cluster and provides a means to</p>



etcd

0.9.4 provided by CNCF



[Home](#) > [etcd](#)

etcd

The etcd Operator
etcd is a distributed key-value store that handles leader election and consensus.

Reading :
Communication

```
$ kubectl  
$ etcdctl
```

Or directly to

```
$ etcdctl
```

Install on Kubernetes

1. Install Operator Lifecycle Manager (OLM), a tool to help manage the Operators running on your cluster.

```
$ curl -sL https://github.com/operator-framework/operator-lifecycle-manager/releases/download/v0.19.1/install.sh | bash -s v0.19.1
```



2. Install the operator by running the following command:

[What happens when I execute this command?](#)

```
$ kubectl create -f https://operatorhub.io/install/etcd.yaml
```



This Operator will be installed in the "my-etcd" namespace and will be usable from this namespace only.

3. After install, watch your operator come up using next command.

```
$ kubectl get csv -n my-etcd
```



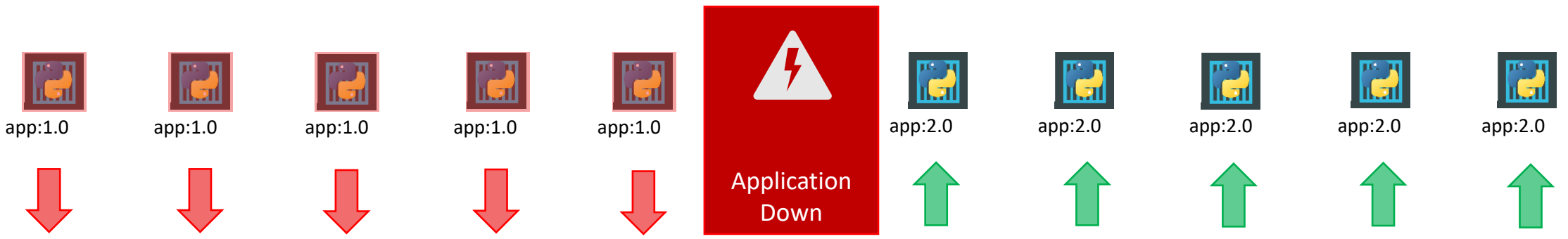
To use it, checkout the custom resource definitions (CRDs) introduced by this operator to start using it.

{KODE {KLOUD

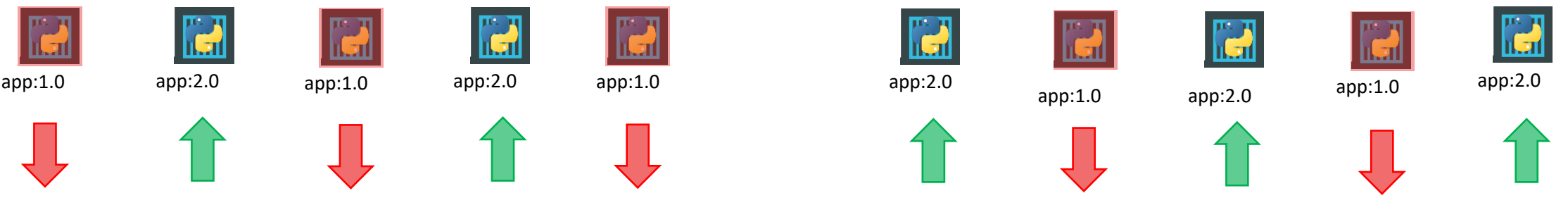
Blue/Green Deployments

Deployment Strategy

Recreate



Rolling Update



Deployment Strategy



app:1.0 app:1.0 app:1.0 app:1.0 app:1.0

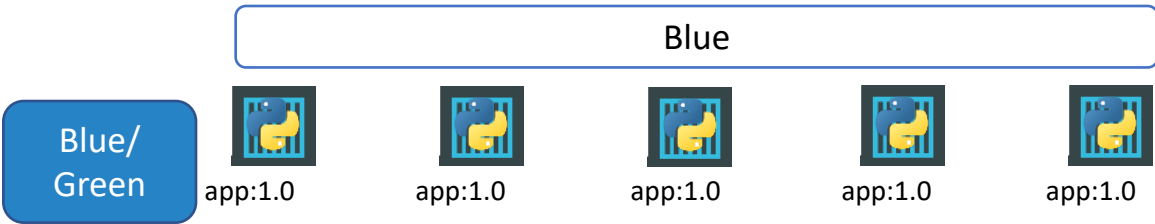
Blue/
Green

Canary

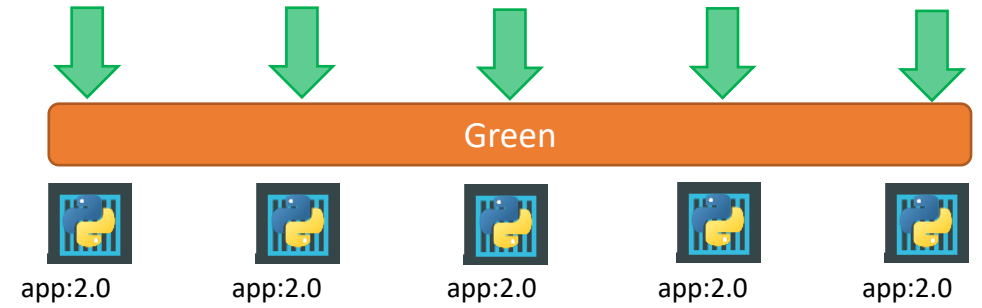


app:2.0 app:2.0 app:2.0 app:2.0 app:2.0

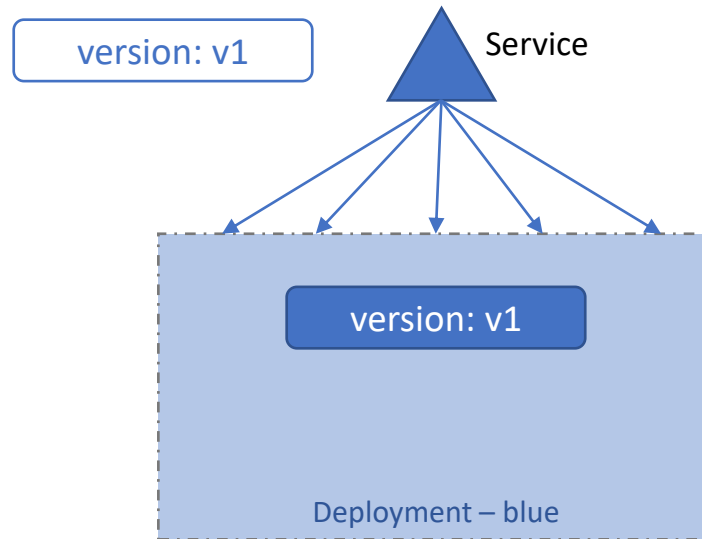
Deployment Strategy



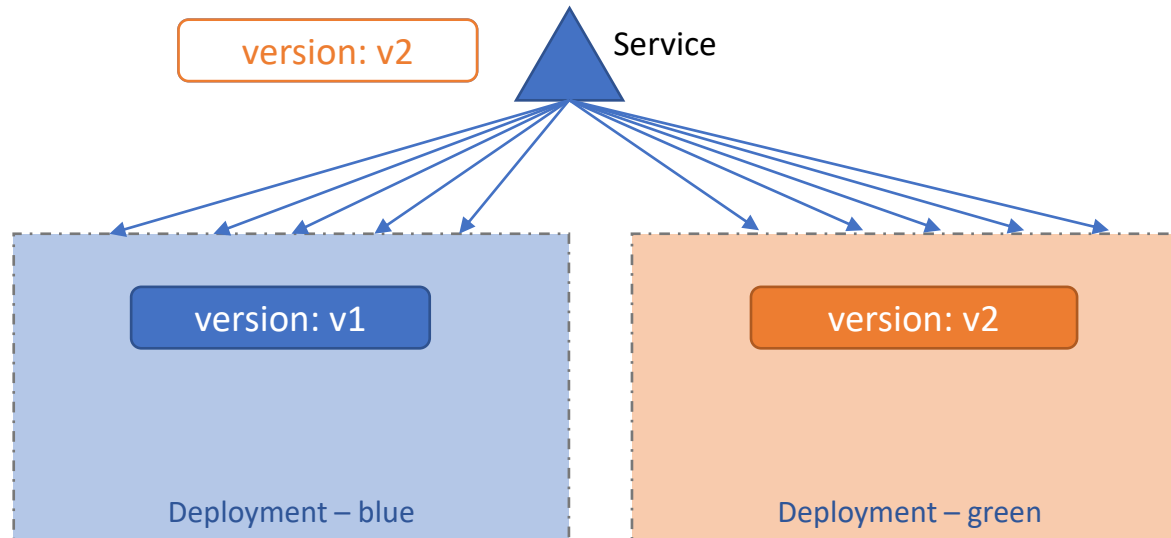
Canary



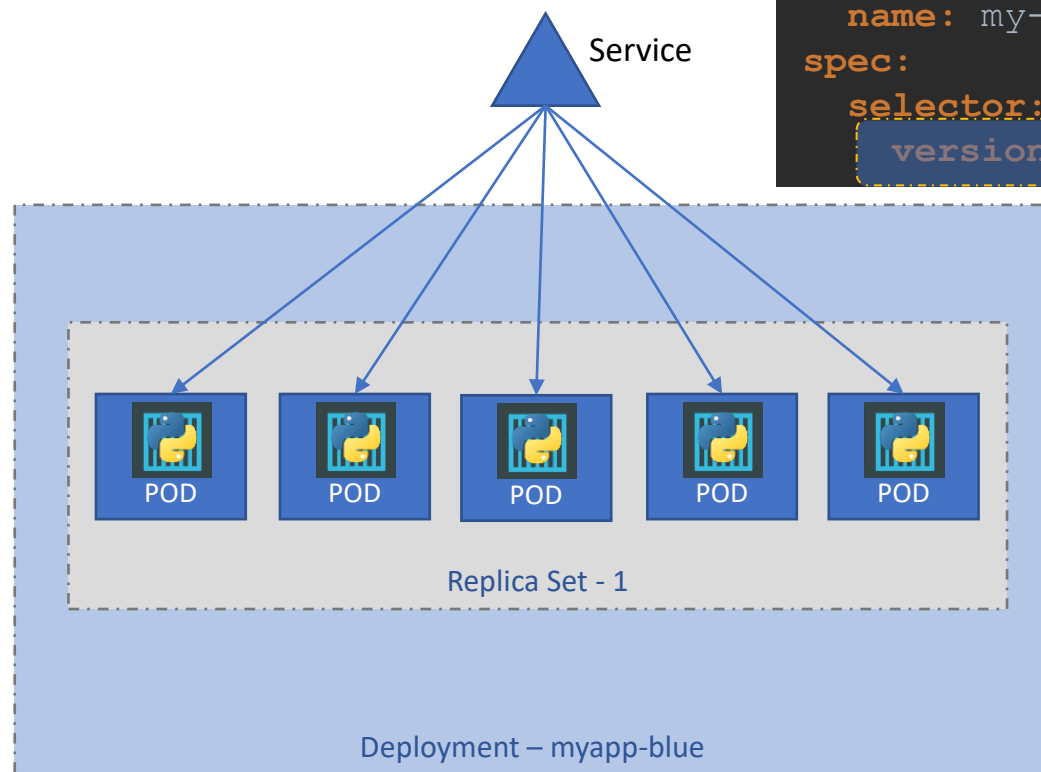
Blue/Green



Blue/Green



Blue/Green



service-definition.yaml

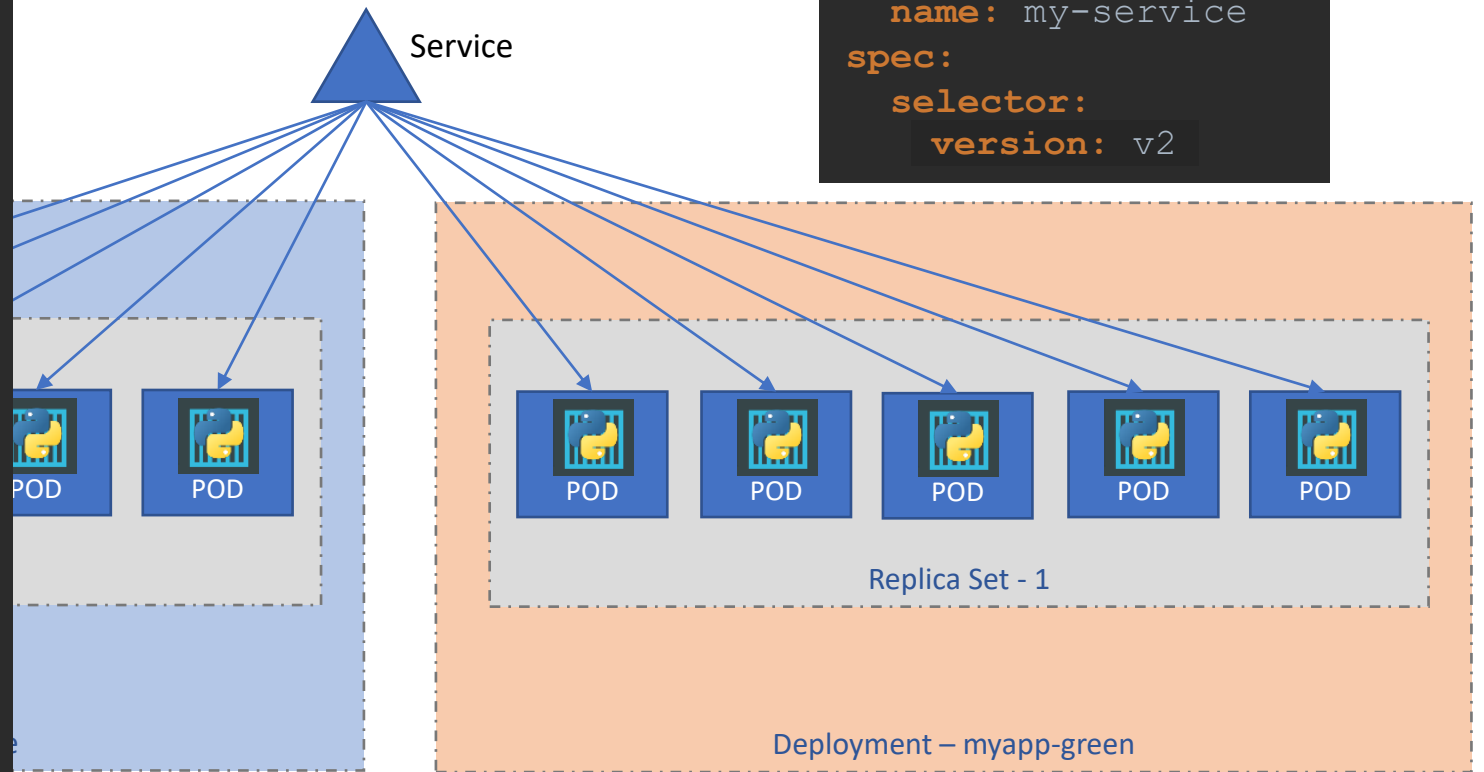
```
apiVersion: v1
kind: Service
metadata:
  name: my-service
spec:
  selector:
    version: v1
```

myapp-blue.yml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-blue
labels:
  app: myapp
  type: front-end
spec:
  template:
    metadata:
      name: myapp-pod
    labels:
      version: v1
    spec:
      containers:
        - name: app-container
          image: myapp-image:1.0
  replicas: 5
  selector:
    matchLabels:
      type: front-end
```

```
myapp-green.yml
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-green
  labels:
    app: myapp
    type: front-end
spec:
  replicas: 5
  selector:
    matchLabels:
      type: front-end
  template:
    metadata:
      name: myapp-pod
      labels:
        version: v2
    spec:
      containers:
        - name: app-container
          image: myapp-image:2.0
```



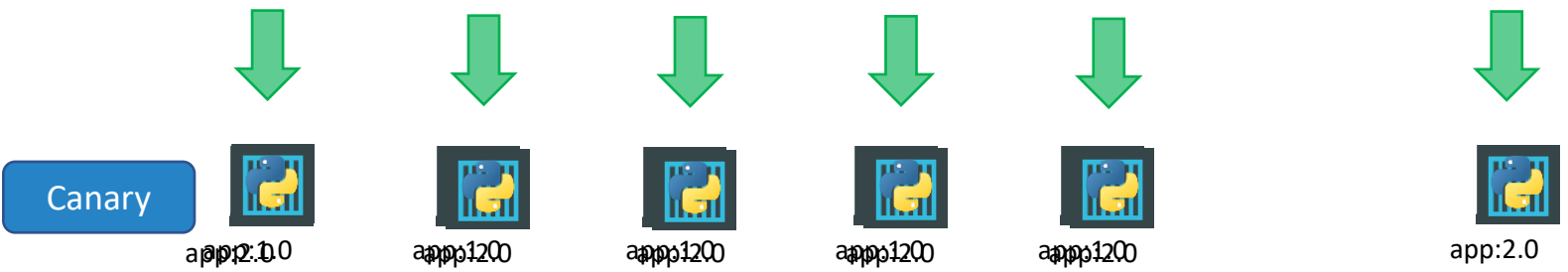
```
service-definition.yaml
```

```
apiVersion: v1
kind: Service
metadata:
  name: my-service
spec:
  selector:
    version: v2
```

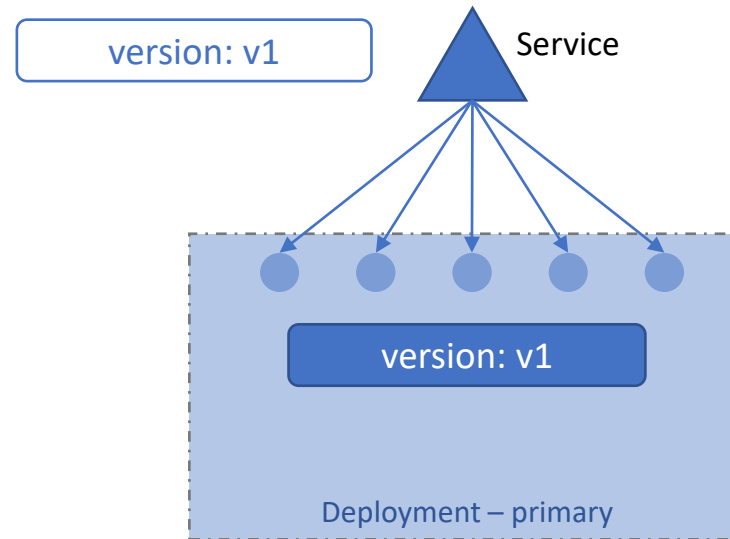

{KODE {KLOUD

Canary Updates

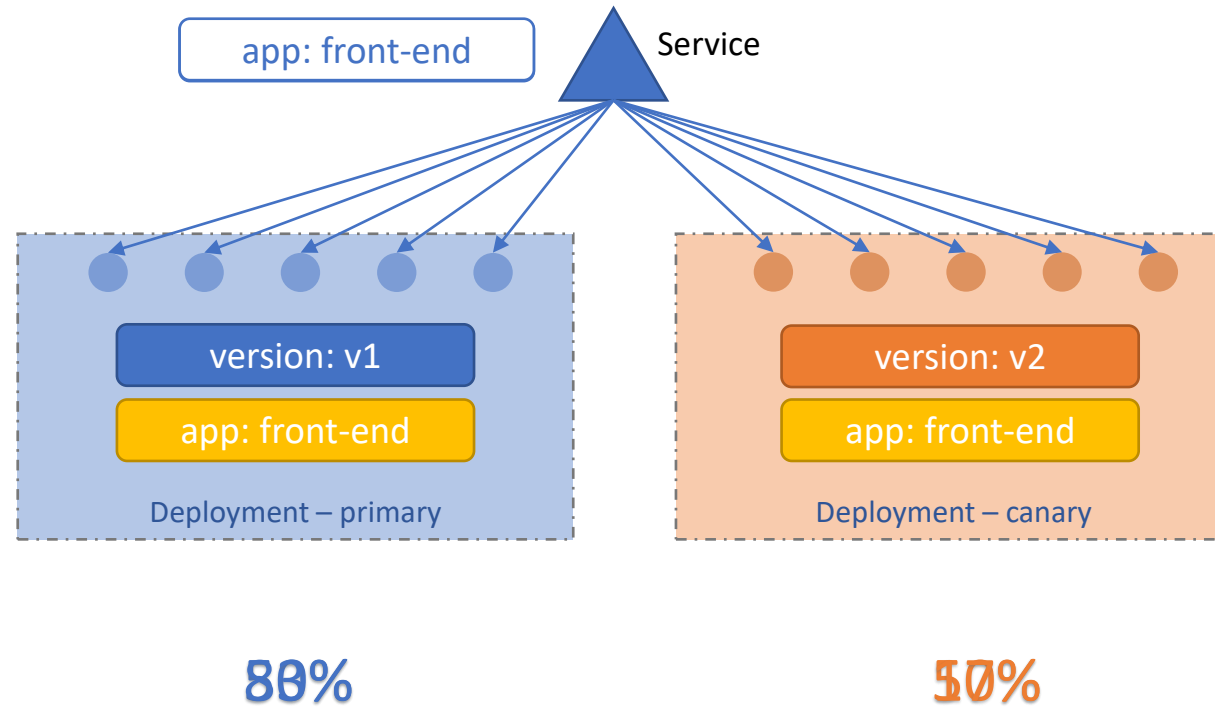
Deployment Strategy



Canary



Canary



1. Route traffic to both versions
2. Route a small percentage of traffic to Version 2

```
myapp-primary.yml
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-primary
  labels:
    app: myapp
    type: front-end
spec:
  template:
    metadata:
      name: myapp-pod
      labels:
        version: v1
        app: front-end
    spec:
      containers:
        - name: app-container
          image: myapp-image:1.0
replicas: 5
selector:
  matchLabels:
    type: front-end
```

```
service-definition.yaml
```

```
apiVersion: v1
kind: Service
metadata:
  name: my-service
spec:
  selector:
    app: front-end
```

```
myapp-canary.yml
```

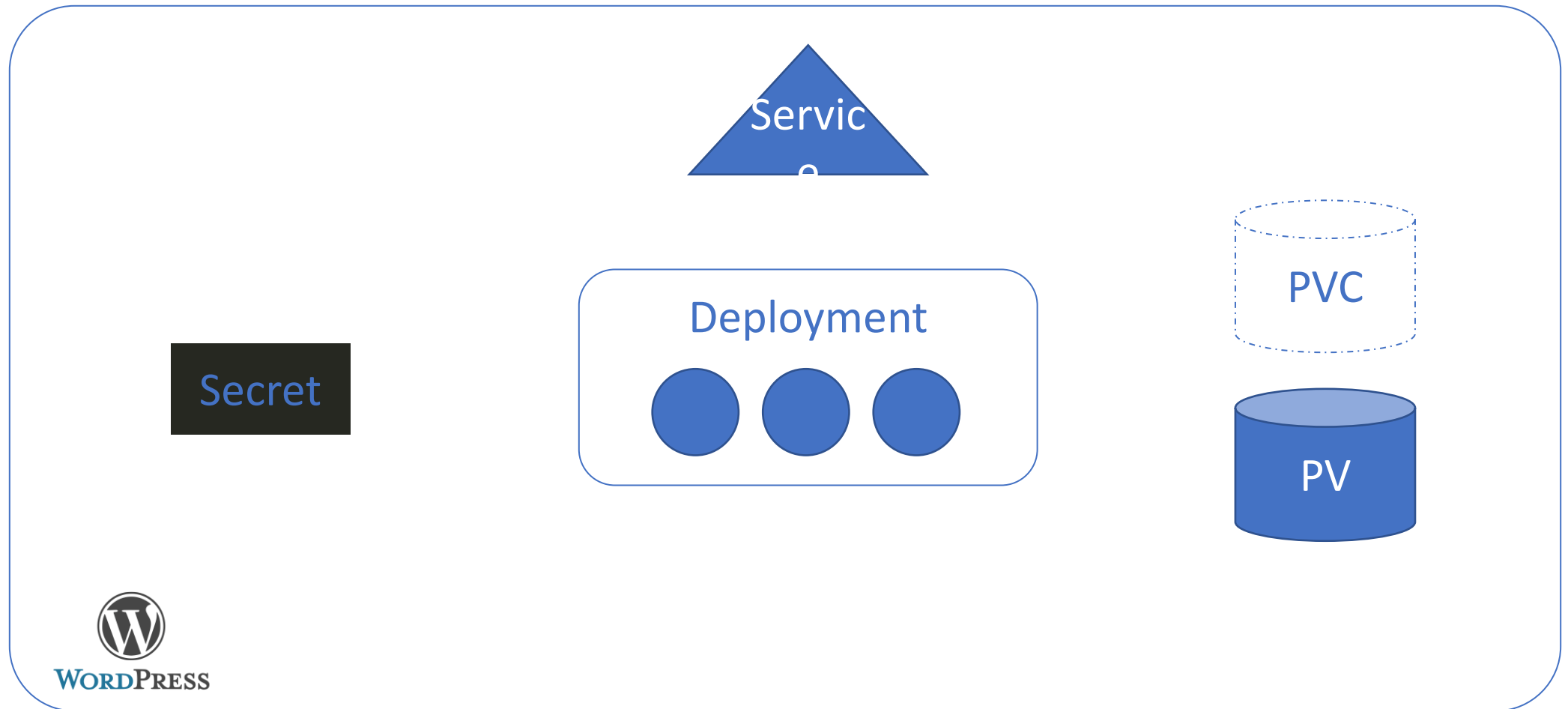
```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-canary
  labels:
    app: myapp
    type: front-end
spec:
  template:
    metadata:
      name: myapp-pod
      labels:
        version: v2
        app: front-end
    spec:
      containers:
        - name: app-container
          image: myapp-image:2.0
replicas: 1
selector:
  matchLabels:
    type: front-end
```

{KODE {KLOUD



Introduction

WordPress

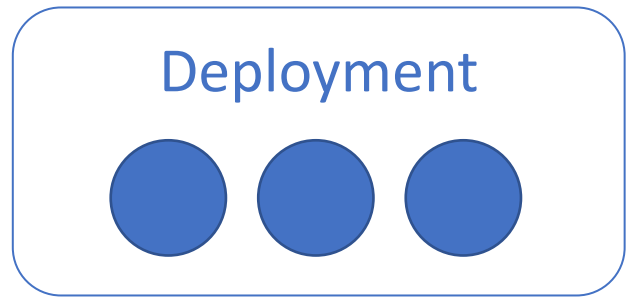


WordPress

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: frontend
    spec:
      containers:
        - image: wordpress:4.8-apache
          name: wordpress
```

```
▶ kubectl apply wp-deploy.yaml
```

```
apiVersion: v1
kind: Secret
metadata:
  name: wordpress-admin-password
data:
  key: CajhWVUxSdzI2Qzg0SERXhBQTVrQ1FzN2JE9PQ==
```



```
▶ kubectl delete wp-svc.yaml
```

```
▶ kubectl delete wp-deploy.yaml
```

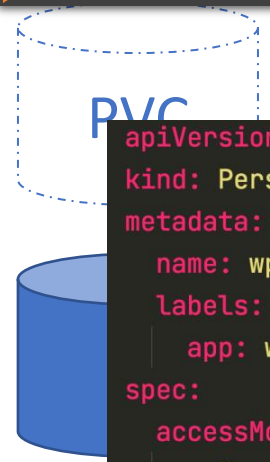
```
▶ kubectl delete wp-svc.yaml
```

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: wordpress-pv
spec:
  capacity:
    storage: 20Gi
  accessModes:
    - ReadWriteOnce
  gcePersistentDisk:
    pdName: wordpress-2
    fsType: ext4
```

```
▶ kubectl apply wp-pv.yaml
```

```
apiVersion: v1
kind: Service
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  ports:
    - port: 80
  selector:
    app: wordpress
    tier: frontend
  type: LoadBalancer
```

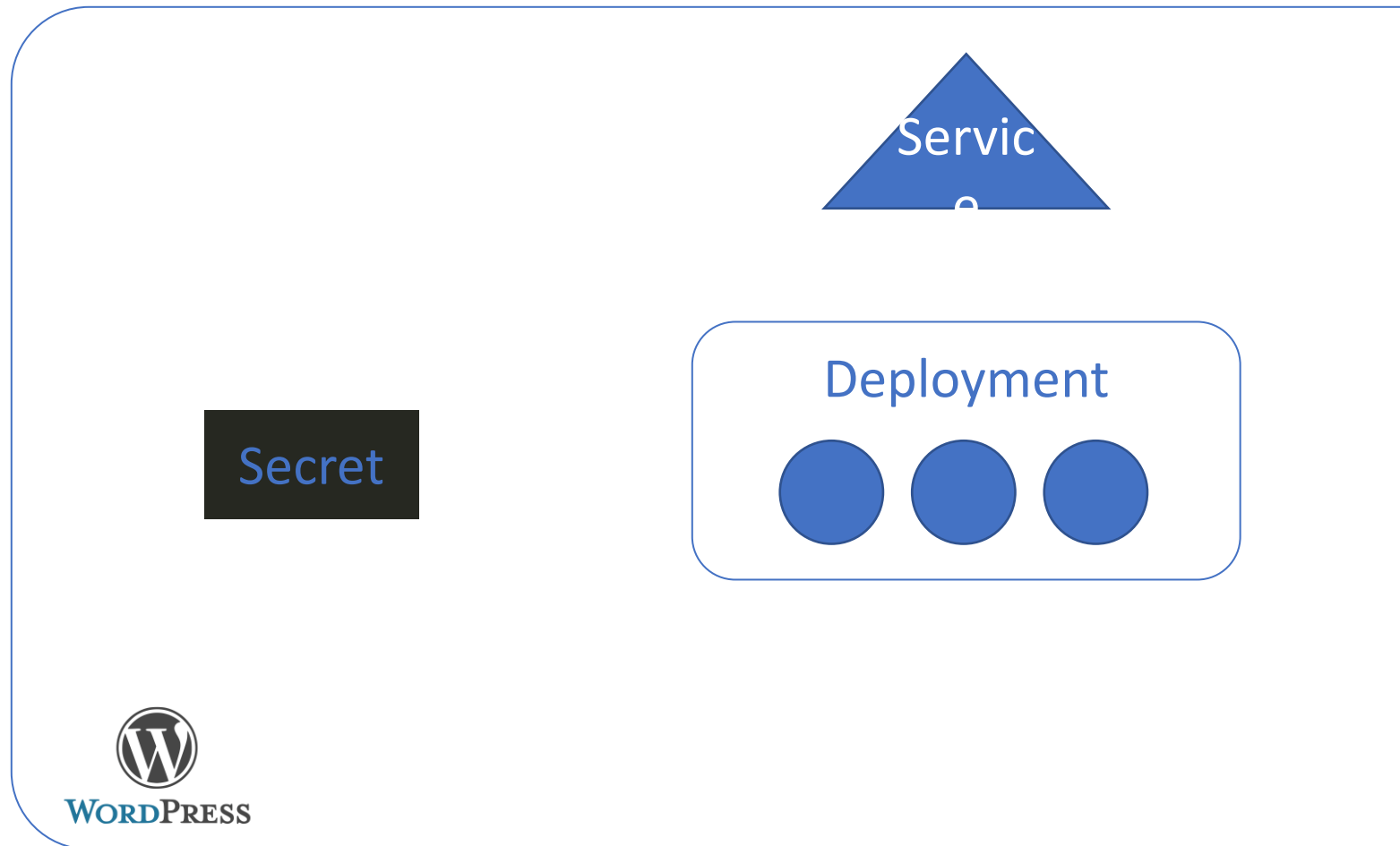
```
▶ kubectl apply wp-svc.yaml
```



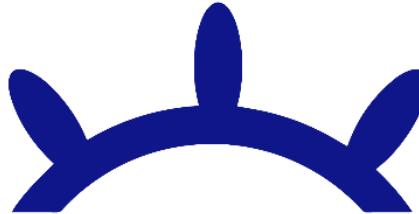
```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: wp-pv-claim
  labels:
    app: wordpress
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 20Gi
```

```
▶ kubectl apply wp-pvc.yaml
```

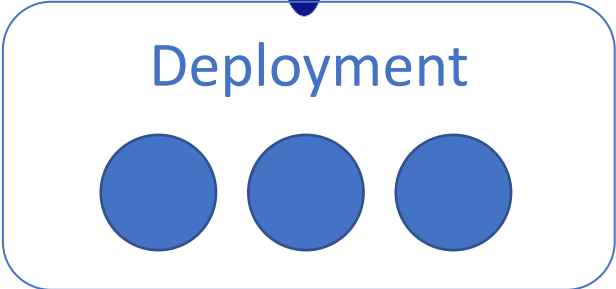
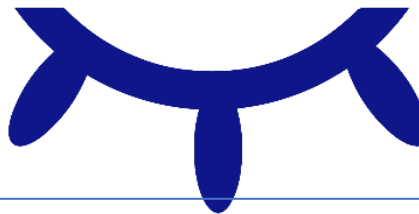
WordPress



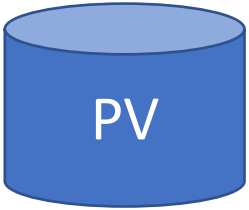
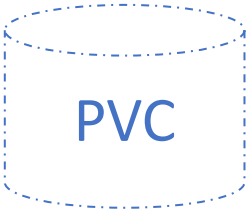
```
app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: frontend
    spec:
      containers:
        - image: wordpress:4.8-apache
          name: wordpress
apiVersion: v1
kind: Secret
metadata:
  name: wordpress-admin-password
data:
  key: CajhWVUxSdzI2Qzg0SERXhBQTVrQ1FzN2JE9PQ==
apiVersion: v1
kind: PersistentVolume
metadata:
  name: wordpress-pv
spec:
  capacity:
    storage: 20Gi
  accessModes:
    - ReadWriteOnce
  gcePersistentDisk:
    pdName: wordpress-2
    fsType: ext4
  labels:
    app: wordpress
```



HELM



Secret





INSTALL

Helm

▶ helm install wordpress ...

▶ helm upgrade wordpress ...

▶ helm rollback wordpress ...

▶ helm uninstall wordpress ...

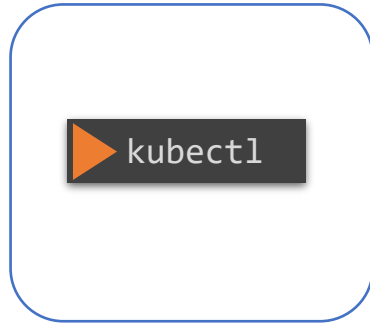
```
values.yaml x
40
41  ## User of the application
42  ## ref: https://github.com/bitnami/bitnami-docker-wordpress
43  ##
44  wordpressUsername: user
45
46  ## Application password
47  ## Defaults to a random 10-character alphanumeric string
48  ## ref: https://github.com/bitnami/bitnami-docker-wordpress
49  ##
50  # wordpressPassword:
51
52  ## Admin email
53  ## ref: https://github.com/bitnami/bitnami-docker-wordpress
54  ##
55  wordpressEmail: user@example.com
56
57  ## First name
58  ## ref: https://github.com/bitnami/bitnami-docker-wordpress
59  ##
60  wordpressFirstName: FirstName
61
62  ## Last name
63  ## ref: https://github.com/bitnami/bitnami-docker-wordpress
64  ##
65  wordpressLastName: LastName
```

{KODE {KLOUD



Install

Install



```
▶ sudo snap install helm --classic
```

```
▶ curl https://baltocdn.com/helm/signing.asc | sudo apt-key add -  
sudo apt-get install apt-transport-https --yes  
echo "deb https://baltocdn.com/helm/stable/debian/ all main" | sudo tee /etc/apt/sources.list.d/helm-stable-debian.list  
sudo apt-get update  
sudo apt-get install helm
```

```
▶ pkg install helm
```

<https://helm.sh/docs/intro/install/>

{KODE {KLOUD



Concepts

templates/deployment.yaml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: frontend
    spec:
      containers:
        - image: {{ .Values.image }}
          name: wordpress
```

templates/secret.yaml

```
apiVersion: v1
kind: Secret
metadata:
  name: wordpress-admin-password
data:
  key: {{ .Values.passwordEncoded }}
```

templates/pv.yaml

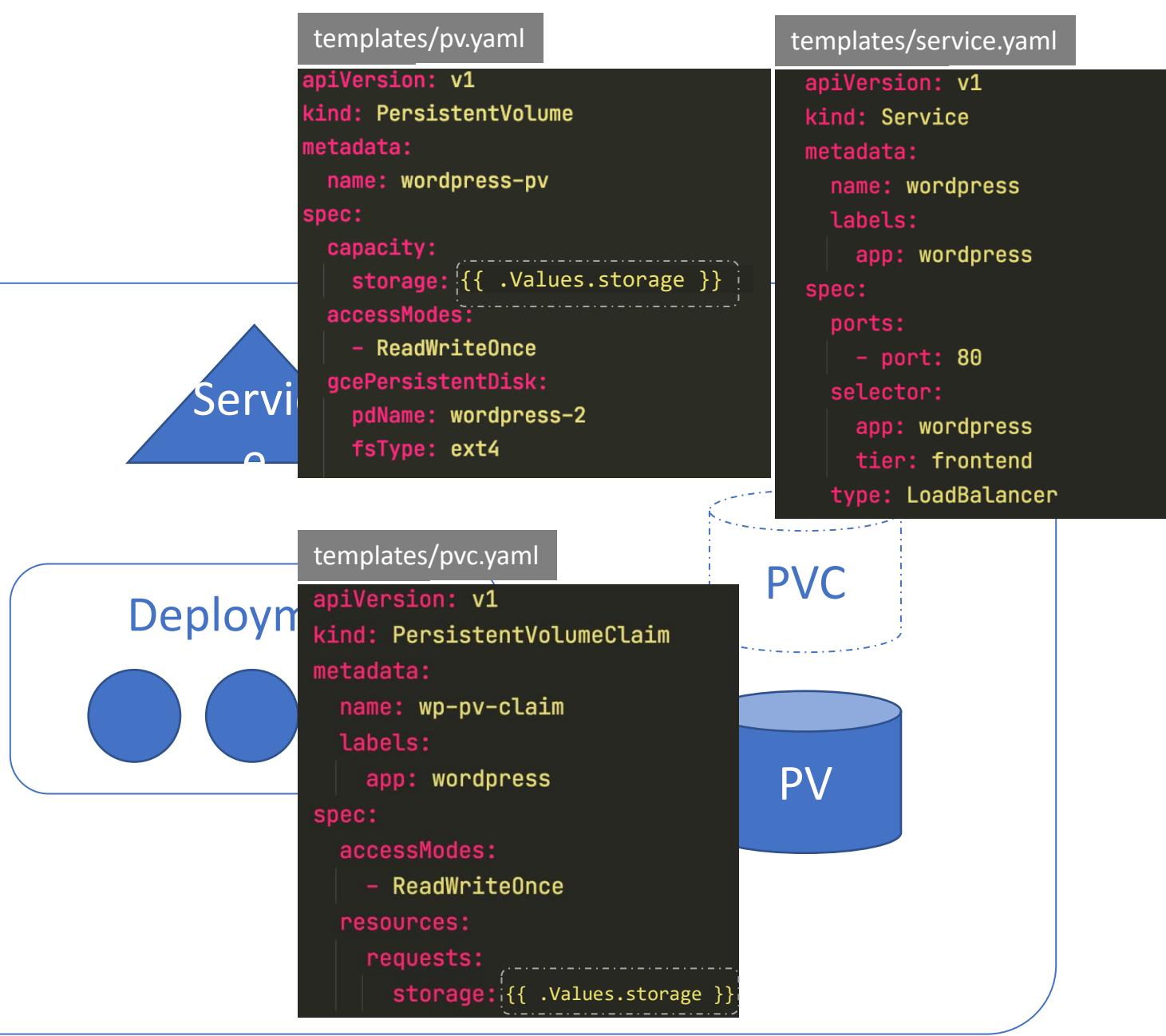
```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: wordpress-pv
spec:
  capacity:
    storage: {{ .Values.storage }}
  accessModes:
    - ReadWriteOnce
  gcePersistentDisk:
    pdName: wordpress-2
    fsType: ext4
```

templates/service.yaml

```
apiVersion: v1
kind: Service
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  ports:
    - port: 80
  selector:
    app: wordpress
    tier: frontend
  type: LoadBalancer
```

templates/pvc.yaml

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: wp-pv-claim
  labels:
    app: wordpress
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: {{ .Values.storage }}
```



values.yaml

```

image: wordpress:4.8-apache
storage: 20Gi
passwordEncoded: CajhWVUxSdzI2Qzgf

```

templates/deployment.yaml

```

apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: frontend
    spec:
      containers:
        - image: {{ .Values.image }}
          name: wordpress

```

templates/pv.yaml

```

apiVersion: v1
kind: PersistentVolume
metadata:
  name: wordpress-pv
spec:
  capacity:
    storage: {{ .Values.storage }}
  accessModes:
    - ReadWriteOnce
  gcePersistentDisk:
    pdName: wordpress-2
    fsType: ext4
  type: LoadBalancer

```

templates/service.yaml

```

apiVersion: v1
kind: Service
metadata:
  name: wordpress
spec:
  type: LoadBalancer

```

templates/pvc.yaml

```

apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: wp-pv-claim
  labels:
    app: wordpress
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: {{ .Values.storage }}

```

templates/secret.yaml

```

apiVersion: v1
kind: Secret
metadata:
  name: wordpress-admin-password
data:
  key: {{ .Values.passwordEncoded }}

```



```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: apiVersion: v1
    template: kind: PersistentVolume
      metadata:
        name: wordpress-pv
      spec:
        capacity:
          storage: 20Gi
        accessModes:
          - ReadWriteOnce
        gcePersistentDisk:
          pdName: wordpress-2
          fsType: ext4
```

values.yaml

```
image: wordpress:4.8-apache
storage: 20Gi
passwordEncoded: CajhWVUxSdzI2Qzg6
```



templates/deployment.yaml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: frontend
    spec:
      containers:
        - image: {{ .Values.image }}
          name: wordpress
```

templates/pv.yaml

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: wordpress-pv
spec:
  capacity:
    storage: {{ .Values.storage }}
  accessModes:
    - ReadWriteOnce
  gcePersistentDisk:
    pdName: wordpress-2
    fsType: ext4
```

templates/pvc.yaml

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: wp-pv-claim
  labels:
    app: wordpress
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: {{ .Values.storage }}
```

templates/secret.yaml

```
apiVersion: v1
kind: Secret
metadata:
  name: wordpress-admin-password
data:
  key: {{ .Values.passwordEncoded }}
```

```
apiVersion: v1
kind: Secret
metadata:
  name: wordpress-admin-password
data:
  key: CajhWVUxSdzI2Qzg6SERXhBQTVrQ1FzN2JE9PQ==
```

Helm Chart

Chart.yaml

```
apiVersion: v2
name: Wordpress
version: 9.0.3
description: Web publishing platform for building blogs and websites.
keywords:
  - wordpress
  - cms
  - blog
  - http
  - web
  - application
  - php
home: http://www.wordpress.com/
sources:
  - https://github.com/bitnami/bitnami-docker-wordpress
maintainers:
  - email: containers@bitnami.com
    name: Bitnami
```



Templates

values.yaml


Chart.yaml

Repository


https://artifacthub.io/


The screenshot shows the Artifact Hub homepage with a dark blue background. At the top left is the 'Artifact HUB' logo. On the top right are links for 'STATS', 'SIGN UP', and 'SIGN IN', along with a settings gear icon. The main heading reads 'Find, install and publish Kubernetes packages'. Below this is a search bar with a magnifying glass icon and a question mark icon. A tip below the search bar says 'Tip: Use multiple words to refine your search. Example: kafka operator'. Further down, it says 'You can also browse all packages - or - try one of the sample queries:'. There are five buttons for sample queries: 'Packages of any kind related to etcd', 'Packages with Apache-2.0 license', 'Official Prometheus packages', 'Helm Charts provided by Bitnami', and 'OPA policies with MIT license'. At the bottom, two statistics are shown: '5756 PACKAGES' and '91774 RELEASES'. The 'KLOUD' logo is in the bottom right corner.

Artifact **HUB**

STATS SIGN UP SIGN IN 

Find, install and publish Kubernetes packages




 **Tip:** Use **multiple words** to refine your search. Example: [kafka operator](#)

You can also [browse all packages](#) - or - try one of the sample queries:

[Packages of any kind related to etcd](#) [Packages with Apache-2.0 license](#) [Official Prometheus packages](#)
[Helm Charts provided by Bitnami](#) [OPA policies with MIT license](#)

5756
PACKAGES

91774
RELEASES



Helm Search

```
helm search hub wordpress
```

```
https://hub.helm.sh/charts/kube-wordpress/wordp... 0
https://hub.helm.sh/charts/groundhog2k/wordpress 0.
https://hub.helm.sh/charts/bitnami-aks/wordpress 12
```



```
helm repo add bitnami https://charts.bitnami.com/bitnami
```

```
helm search repo wordpress
```

NAME	CHART VERSION	APP VERSION	DESCRIPTION
bitnami/wordpress	12.1.14	5.8.1	Web publishing platform for building blogs and ...

Win / Mac / Linux





Virtual Machines

```
helm repo list
```

NAME	URL
bitnami	https://charts.bitnami.com/bitnami

Search applications

WordPress, MongoDB, TensorFlow

			
	Joomla!	DokuWiki	WordPress
		Wiki	4.5 ★ Blog

Release



```
helm install [release-name] [chart-name]
```

```
▶ helm install release-1 bitnami/wordpress
```

```
▶ helm install release-2 bitnami/wordpress
```

```
▶ helm install release-3 bitnami/wordpress
```



Helm commands

```
▶ helm list
```

NAME	NAMESPACE	REVISION	UPDATED	STATUS	CHART	APP VERSION
my-release	default	1	2021-05-30 09:52:38.33818569 -0400 EDT	deployed	wordpress-11.0.12	5.7.2

```
▶ helm uninstall my-release
```

```
▶ helm pull --untar bitnami/wordpress
```

```
▶ ls wordpress
```

Chart.lock	README.md	ci	values.schema.json
Chart.yaml	charts	templates	values.yaml

```
▶ helm install release-4 ./wordpress
```