

fans*

Start part 3

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Agenda

Kubernetes and components with SAS Viya4 in a Cloud environment

- What is Kubernetes (K8s)
- Main K8s Components
- K8s Architecture
- **K8s YAML Configuration File(s)**
- Organizing your components with K8s Namespaces
- SAS Viya in Kubernetes – helpful tools

K8s YAML Configuration File

YAML Configuration File in Kubernetes

- Overview:
 - The 3 parts of the YAML configuration file
 - Connecting Deployments to Service to Pods
 - Demo



K8s YAML Configuration File

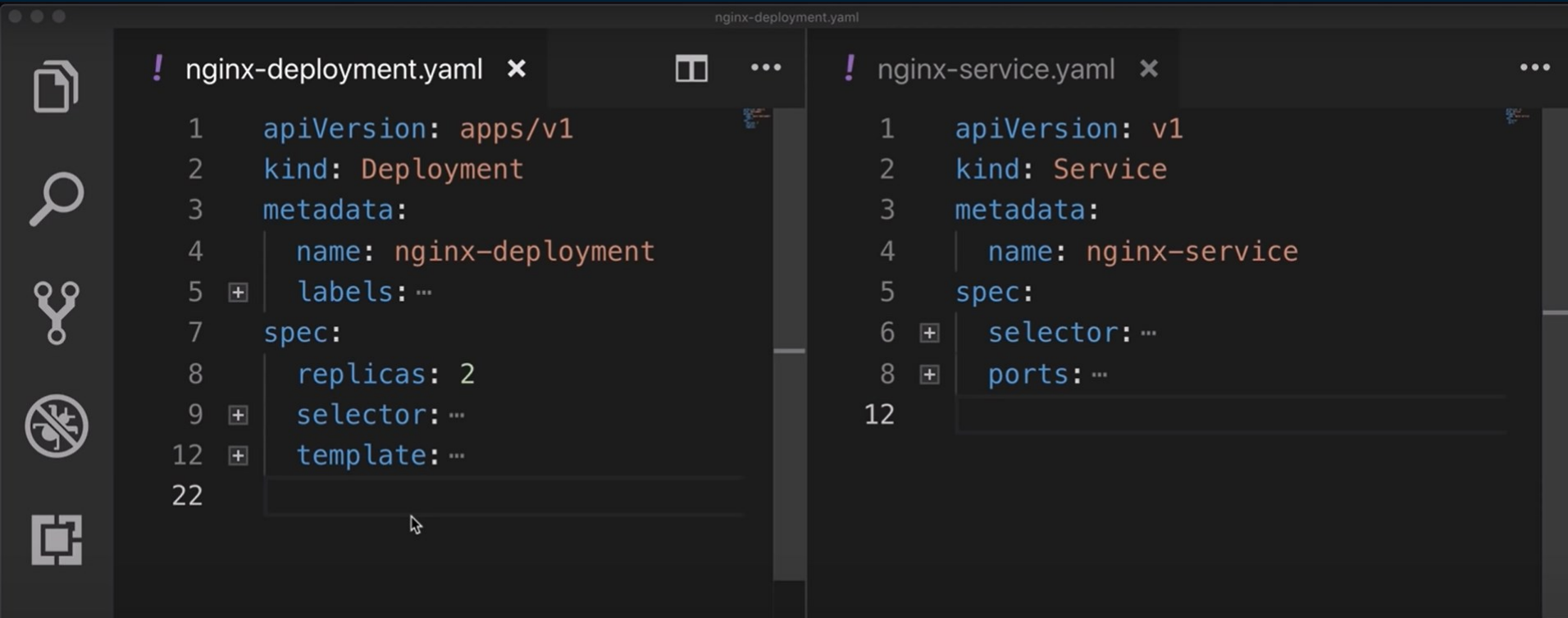
YAML Configuration File in Kubernetes

- Overview:
 - The 3 parts of configuration file
 - Connecting Deployments to Service to Pods
 - Demo

```
apiVersion: apps/v1
kind: Deployment
metadata:
  annotations:
    sas.com/certificate-file-format: pem
    sas.com/component-name: sas-crunchy-data-postgres-operator
    sas.com/component-version: 11.5.250040-20200211.1581446422678
    sas.com/duname: sas-crunchy-data-postgres-operator
    sas.com/version: 11.5.250040
    sidecar.istio.io/inject: "false"
  labels:
    app.kubernetes.io/name: sas-crunchy-data-postgres-operator
    sas.com/deployment: sas-viya
    vendor: crunchydata
    sas.com/zero-scale-phase: "1"
    post-data-server-operator: crunchydata
    name: sas-crunchy-data-postgres-operator
spec:
  replicas: 1
  selector:
    matchLabels:
      name: sas-crunchy-data-postgres-operator
      sas.com/deployment: sas-viya
      vendor: crunchydata
  template:
    metadata:
      annotations:
        sas.com/certificate-file-format: pem
        sas.com/component-name: sas-crunchy-data-postgres-operator
        sas.com/component-version: 11.5.250040-20200211.1581446422678
        sas.com/duname: crdatasrvop
        sas.com/version: 11.5.250040
        seccomp.security.alpha.kubernetes.io/pod: runtime/default
        sidecar.istio.io/inject: "false"
        creationTimestamp: null
      labels:
        app.kubernetes.io/name: sas-crunchy-data-postgres-operator
        name: sas-crunchy-data-postgres-operator
        sas.com/deployment: sas-viya
        vendor: crunchydata
        sas.com/zero-scale-phase: "1"
        post-data-server-operator: crunchydata
    spec:
      serviceAccountName: postgres-operator
      securityContext:
        runAsNonRoot: true
        supplementalGroups: []
        sysctls: []
      containers:
        - name: apiserver
          image: sas-crunchy-data-operator-api-server
          imagePullPolicy: IfNotPresent
          ports:
            - containerPort: 8443
          readinessProbe:
            httpGet:
              path: "/healthz"
              port: 8443
              schema: HTTP
            initialDelaySeconds: 15
            periodSeconds: 5
          livenessProbe:
            httpGet:
              path: "/healthz"
              port: 8443
              schema: HTTP
```

K8s YAML Configuration File

3 parts of K8s configuration file



The image shows a code editor with two tabs open: 'nginx-deployment.yaml' and 'nginx-service.yaml'. The left tab contains the following YAML content:

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5  + labels: ...
7  spec:
8    replicas: 2
9  + selector: ...
12 + template: ...
22
```

The right tab contains the following YAML content:

```
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6  + selector: ...
8  + ports: ...
12
```

On the left side of the editor, there is a vertical toolbar with icons for file operations (document, search, branching, undo, redo) and a window management icon.

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service

```
! nginx-deployment.yaml x
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels: ...
7  spec:
8    replicas: 2
9    selector: ...
12   template: ...
22
```

```
! nginx-service.yaml x
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6    selector: ...
8    ports: ...
12
```

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service

```
! nginx-deployment.yaml x
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5  labels: ...
7  spec:
8    replicas: 2
9    selector: ...
12  template: ...
22
```

```
! nginx-service.yaml x
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6    selector: ...
8    ports: ...
12
```

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service

```
! nginx-deployment.yaml x
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5  labels: ...
7  spec:
8    replicas: 2
9  selector: ...
12 template: ...
22
```

```
! nginx-service.yaml x
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6  selector: ...
8  ports: ...
12
```


K8s YAML Configuration File

3 parts of K8s configuration file

- 1. Metadata
 - 2. Specification
 - 3. Status
-
- Status: Automatically generated and added by Kubernetes.

K8s YAML Configuration File

3 parts of K8s configuration file

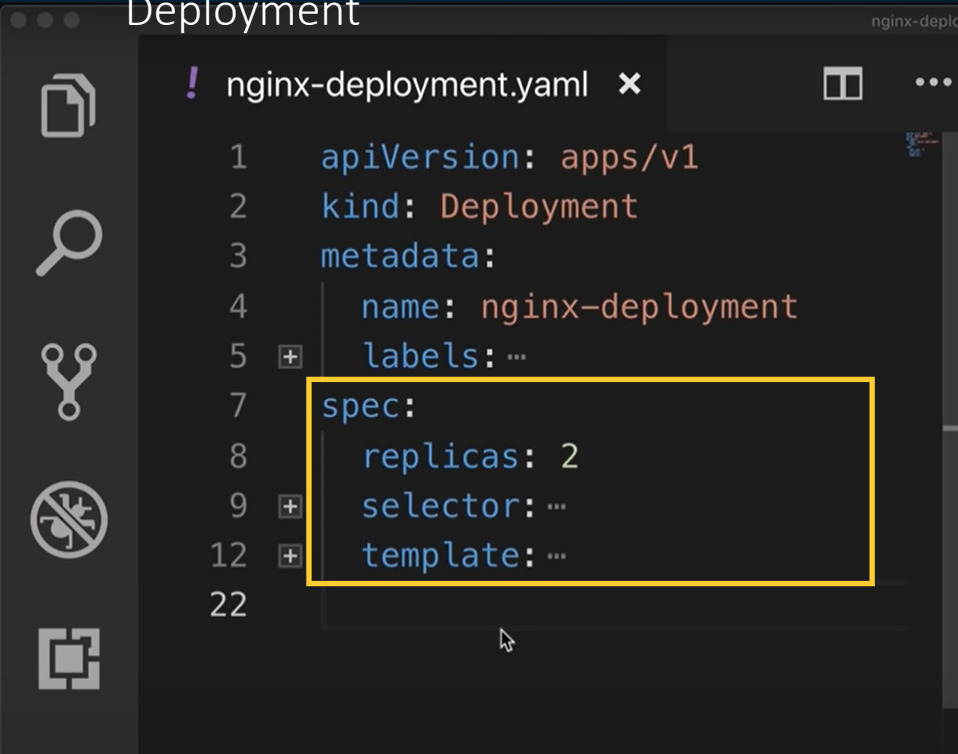
Deployment

Service

3rd part: Status

- Desired state
- Actual state

Comparison -> not alike -> K8s fix it



```
nginx-deplo
! nginx-deployment.yaml x
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels: ...
7  spec:
8    replicas: 2
9    selector: ...
12  template: ...
22
```

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service

3rd part: Status

- Desired state
- Actual state added by K8s

Comparison -> not alike -> K8s fix it

```
nginx-deplo
! nginx-deployment.yaml x
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels: ...
7  spec:
8    replicas: 2
9    selector: ...
12   template: ...
22  status:
    availableReplicas: 1
    conditions:
      - lastTransitionTime: "2020-01-24T10:54:59Z"
        lastUpdateTime: "2020-01-24T10:54:59Z"
        message: Deployment has minimum availability.
        reason: MinimumReplicasAvailable
        status: "True"
        type: Available
      - lastTransitionTime: "2020-01-24T10:54:56Z"
```

K8s YAML Configuration File

3 parts of K8s configuration file

Where does K8s get this status data from?

```
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2020-01-24T10:54:59Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2020-01-24T10:54:56Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: ReplicaSet "nginx-deployment-7d64f4b"
    reason: MinimumReplicasNotAvailable
```

K8s YAML Configuration File

3 parts of K8s configuration file

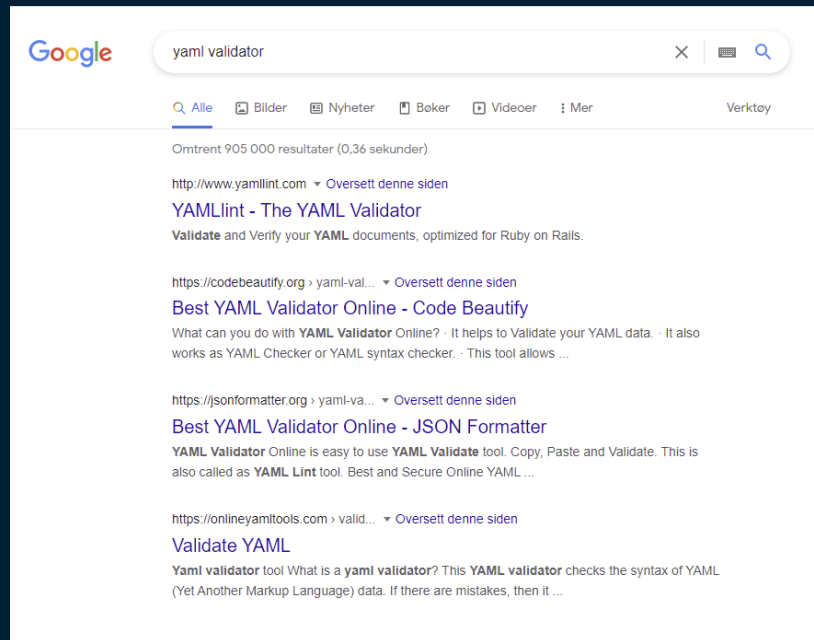
```
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2020-01-24T10:54:59Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2020-01-24T10:54:56Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: ReplicaSet "nginx-deployment-7d64f4b"
    reason: MinimumReplicasNotAvailable
```

- “human friendly data serialization standard for all programming languages”
- Syntax: Very strict indentation rules – must comply to rules
- Pro tip: Use a YAML online validator to check for syntax errors

K8s YAML Configuration File

3 parts of K8s configuration file

```
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2020-01-24T10:54:59Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2020-01-24T10:54:56Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: ReplicaSet "nginx-deployment-7d64f4b...
```



The screenshot shows a Google search for "yaml validator". The search bar contains the text "yaml validator". Below the search bar, there are several search results:

- <http://www.yamllint.com> - Oversett denne siden
YAMLint - The YAML Validator
Validate and Verify your **YAML** documents, optimized for Ruby on Rails.
- <https://codebeautify.org/yaml-val...> - Oversett denne siden
Best YAML Validator Online - Code Beautify
What can you do with **YAML Validator** Online? - It helps to Validate your **YAML** data. - It also works as **YAML** Checker or **YAML** syntax checker. - This tool allows ...
- <https://jsonformatter.org/yaml-va...> - Oversett denne siden
Best YAML Validator Online - JSON Formatter
YAML Validator Online is easy to use **YAML Validator** tool. Copy, Paste and Validate. This is also called as **YAML** Lint tool. Best and Secure Online **YAML** ...
- <https://onlineyamitools.com/valid...> - Oversett denne siden
Validate YAML
Yami validator tool What is a **yami validator**? This **YAML validator** checks the syntax of **YAML** (Yet Another Markup Language) data. If there are mistakes, then it ...

K8s YAML Configuration File

3 parts of K8s configuration file

```
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2020-01-24T10:54:59Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2020-01-24T10:54:56Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: ReplicaSet "nginx-deployment-7d64f4b"
      has minimum replicas available.
```

- “human friendly data serialization standard for all programming languages”
- Syntax: Very strict indentation rules – must comply to rules
- Store the configuration files with your code
- Use GIT or other CI/CD versioning system

K8s YAML Configuration File

3 parts of K8s configuration file

- Blueprint for pods
 - (Templates)

Layer of Abstraction



Deployment manages a ..



ReplicaSet manages a ..



Pod is an abstraction of ..



Container

K8s YAML Configuration File

3 parts of K8s configuration file

- Deployment manages Pods

Layer of Abstraction



Deployment manages a ..



ReplicaSet manages a ..



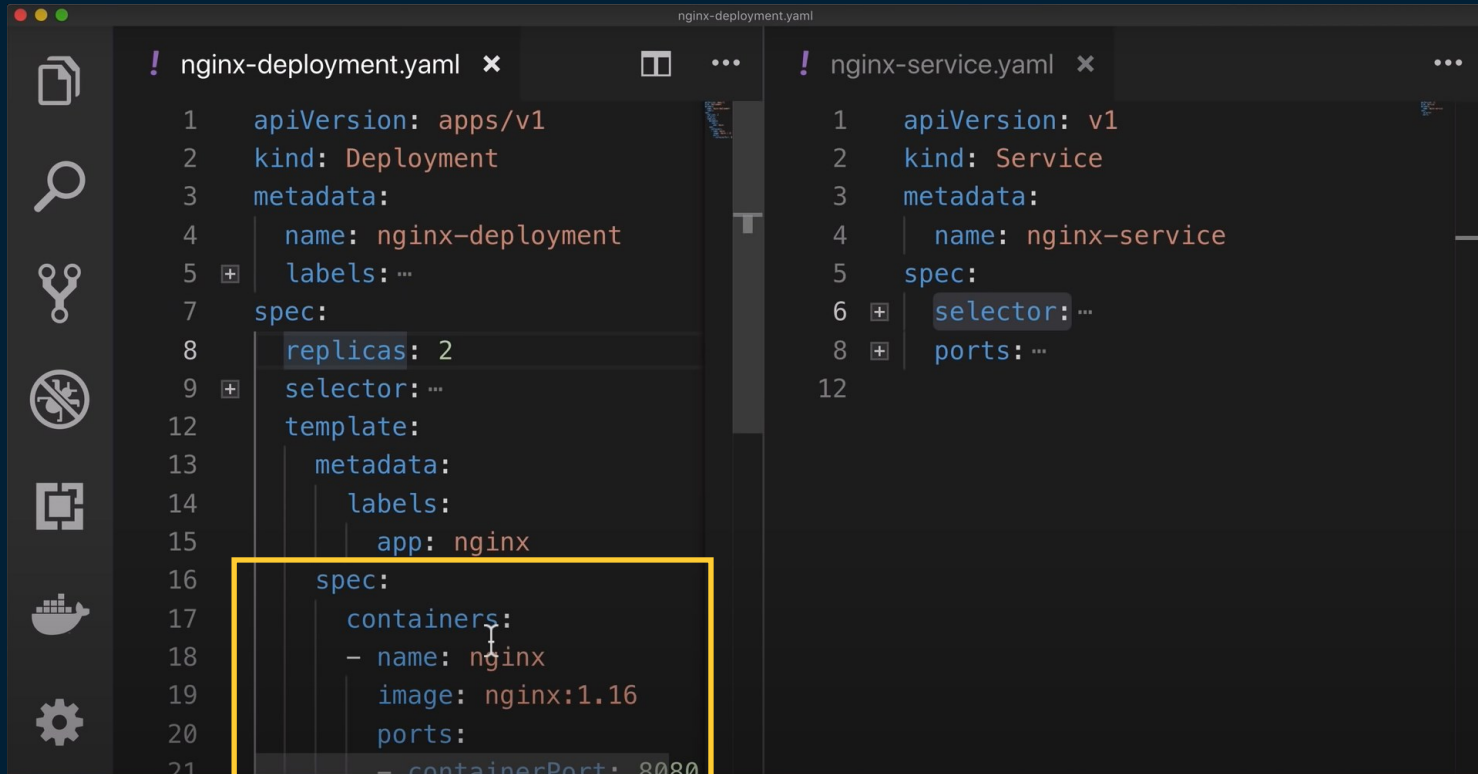
Pod is an abstraction of ..



Container

K8s YAML Configuration File

3 parts of K8s configuration file



```
nginx-deployment.yaml
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels: ...
7  spec:
8    replicas: 2
9    selector: ...
12  template:
13    metadata:
14      labels:
15        app: nginx
16    spec:
17      containers:
18        - name: nginx
19          image: nginx:1.16
20          ports:
21            - containerPort: 8080

nginx-service.yaml
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6    selector: ...
8    ports: ...
12
```

K8s YAML Configuration File

3 parts of K8s configuration file

```
nginx-deplo
! nginx-deployment.yaml x
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels: ...
7  spec:
8    replicas: 2
9    selector: ...
12   template:
13     metadata:
14       labels:
15         app: nginx
16     spec:
17       containers:
18         - name: nginx
19           image: nginx:1.16
20           ports:
21             - containerPort: 8080
```

- Has its own “metadata” and “spec” section
- Applies to Pod
- Blueprint for a Pod
- Which image (version) from the Container registry to pull
- Ports needed to be opened
- Name of container
- Etc.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

- Connecting components
- (Labels & Selectors & Ports)

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Labels & Selectors

- Deployment

- Service

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12   template:
13     metadata:
14       labels:
15         app: nginx
16 >  spec: ...
```

```
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6    selector:
7      app: nginx
8 >  ports: ...
12
```

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Labels & Selectors

- Deployment

- Service

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12   template:
13     metadata:
14       labels:
15         app: nginx
16 > spec: ...
```

```
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6    selector:
7      app: nginx
8 > ports: ...
12
```

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Labels & Selectors

- Deployment

- Service

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12  template:
13    metadata:
14     labels:
15       app: nginx
16 > spec: ...
```

```
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginx-service
5  spec:
6    selector:
7      app: nginx
8 > ports: ...
12
```

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12   template:
13     metadata:
14       labels:
15         app: nginx
16 > spec: ...
```


K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

Any key-value pair for component

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12   template:
13     metadata:
14       labels:
15         app: nginx
16 > spec: ...
```

```
labels:
  app: nginx
```

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12     template:
13       metadata:
14         labels:
15           app: nginx
16 > spec: ...
```

Pods get the label through the template blueprint

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12   template:
13     metadata:
14       labels:
15         app: nginx
16 > spec: ...
```

Pods get the label through the template blueprint

This label is matched by the selector

```
selector:
  matchLabels:
    app: nginx
```

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5    labels:
6      app: nginx
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: nginx
12   template:
13     metadata:
14       labels:
15         app: nginx
16 > spec: ...
```

Pods get the label through the
template blueprint

This label is matched by the
selector

```
selector:
  matchLabels:
    app: nginx
```

The end part 3
Pause for 10 min.

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