Start part 3

sas.com

Copyright © SAS Institute Inc. All rights reserved.

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

Copyright © SAS Institute Inc. All rights reserved.

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

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

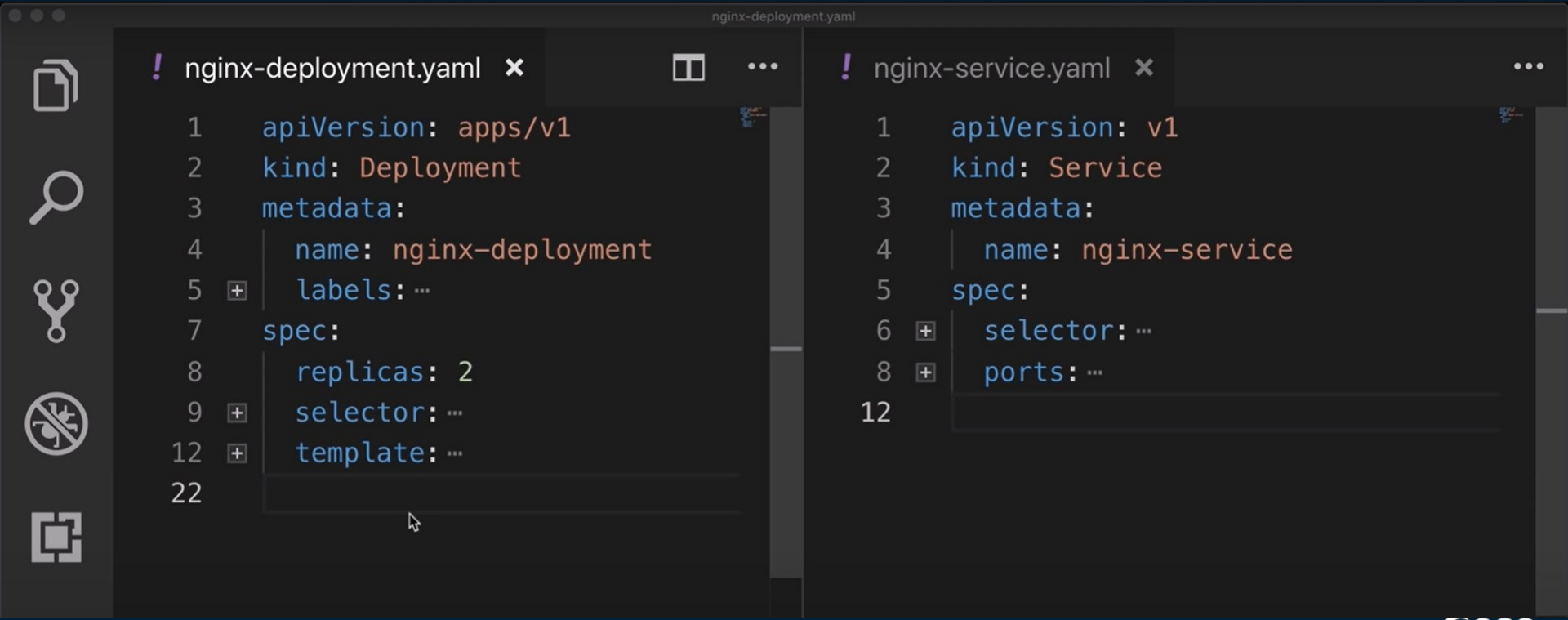
- Overview:
  - The 3 parts of configuration file
  - Connecting Deployments to Service to Pods
  - Demo

```yaml
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: crdatasvrop
        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
            scheme: HTTP
          initialDelaySeconds: 15
          periodSeconds: 5
        livenessProbe:
          httpGet:
            path: "/healthz"
            port: 8443
            scheme: HTTP
```

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file



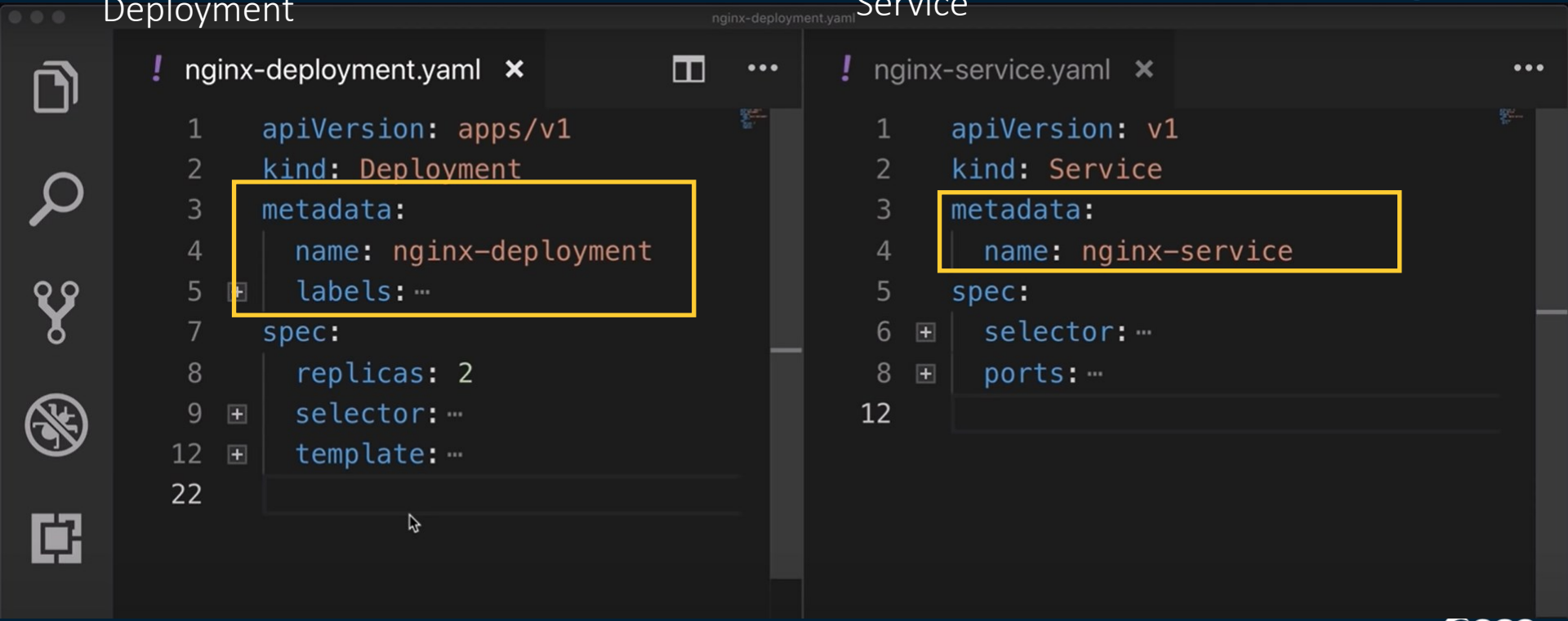
Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service



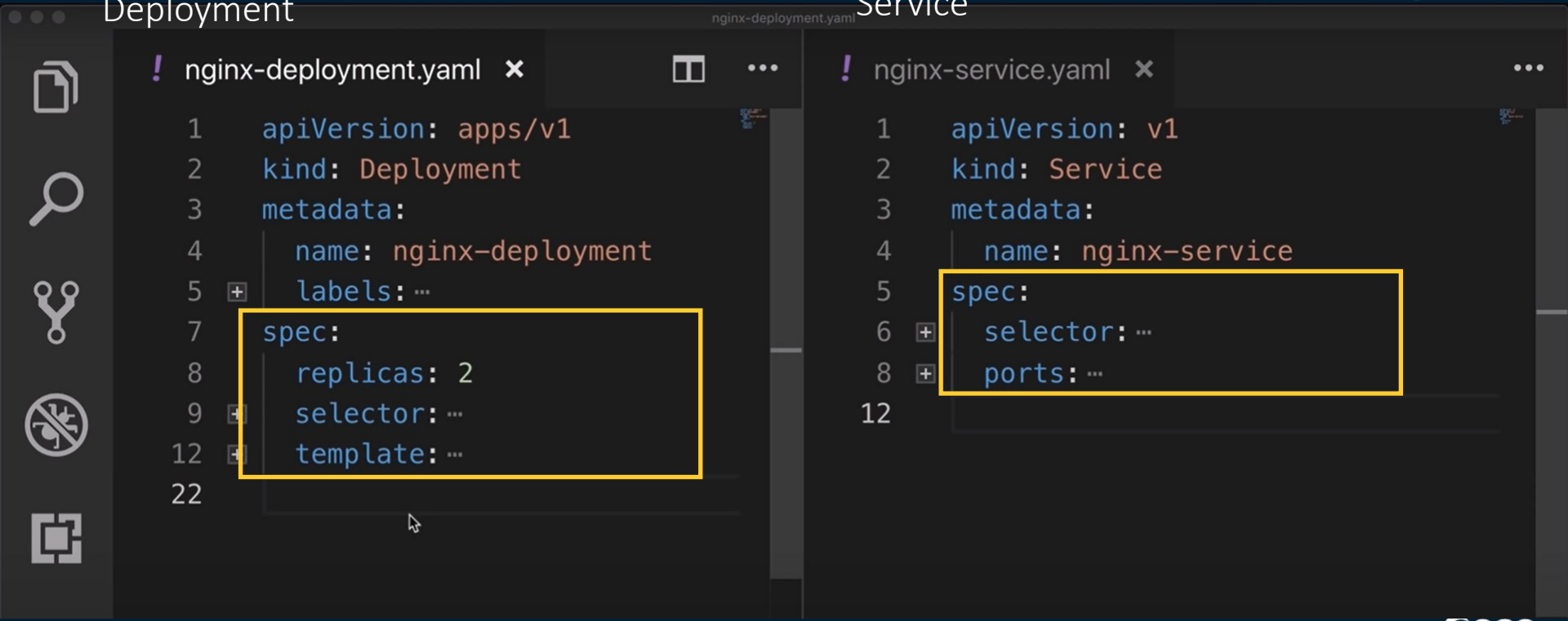
Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service



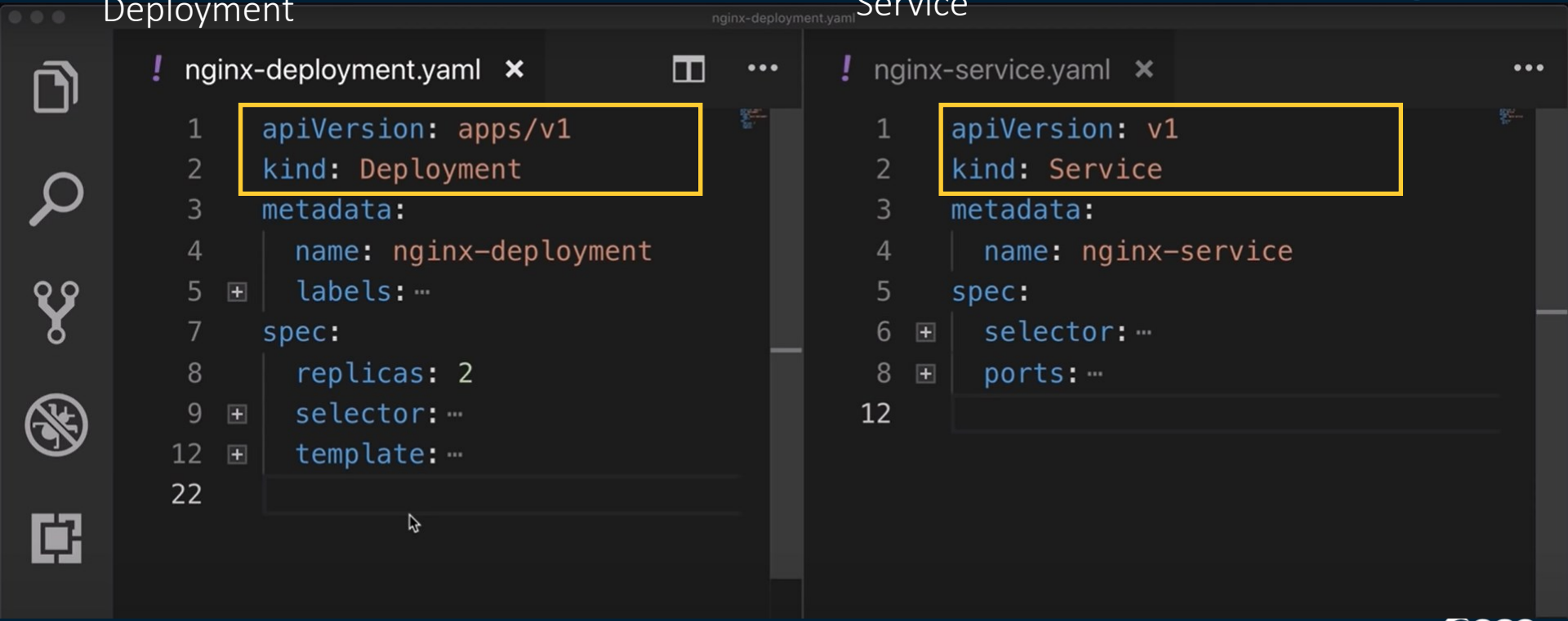
Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment

Service



Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

- 1. Metadata
- 2. Specification
- 3. Status

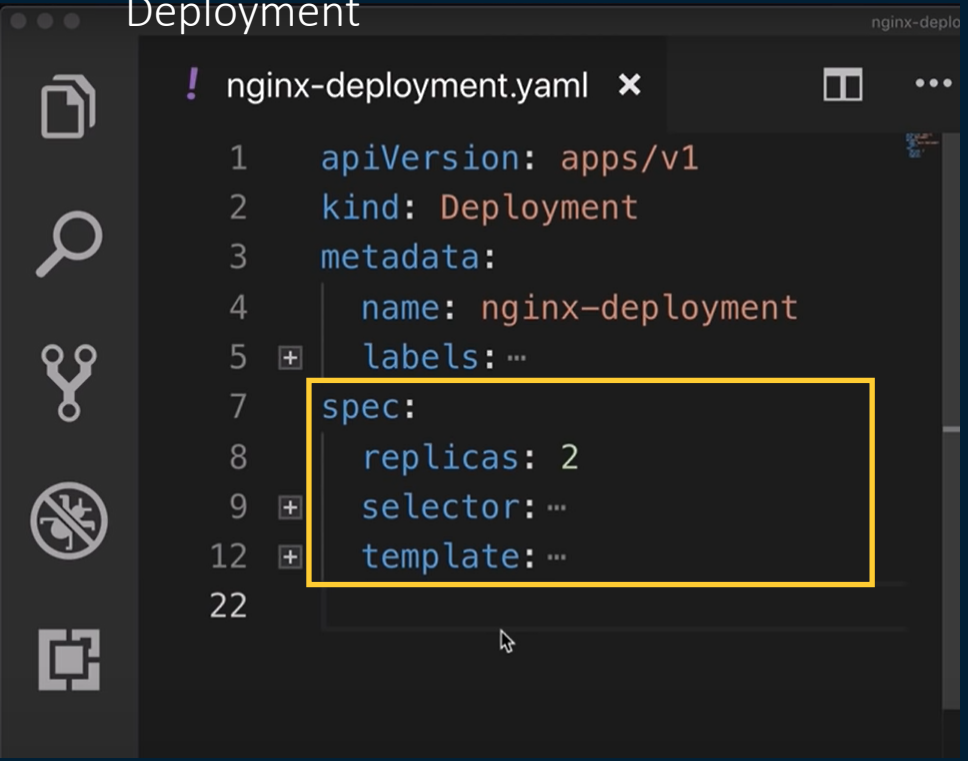
- Status: Automatically generated and added by Kubernetes.

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

Deployment



Service

3rd part: Status

- Desired state
- Actual state

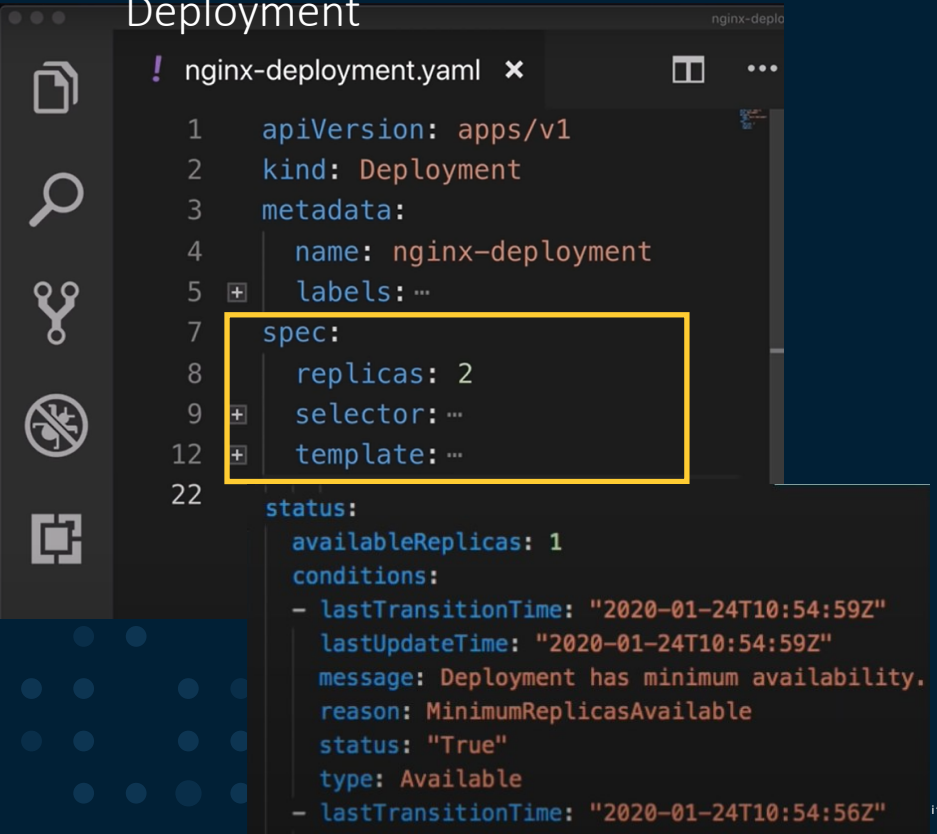
Comparison -> not alike -> K8s fix it

Copyright © SAS Institute Inc. All rights reserved.

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

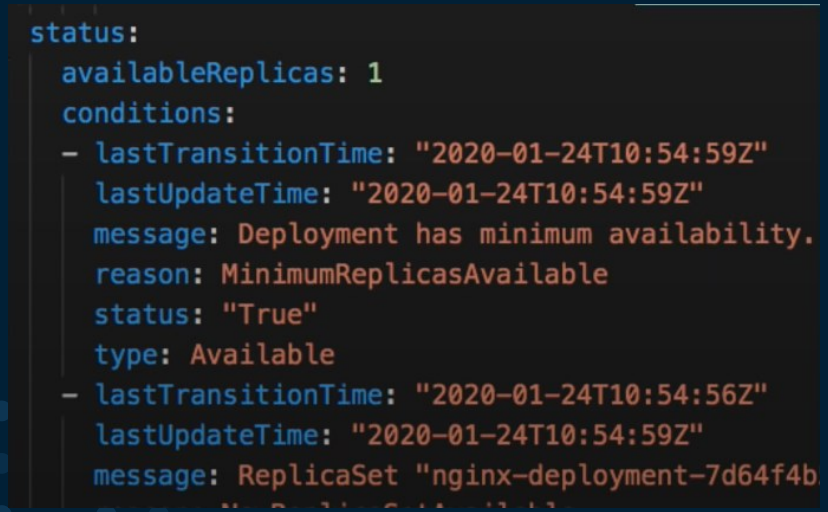
itute Inc. All rights reserved.

sas

K8s YAML Configuration File

3 parts of K8s configuration file

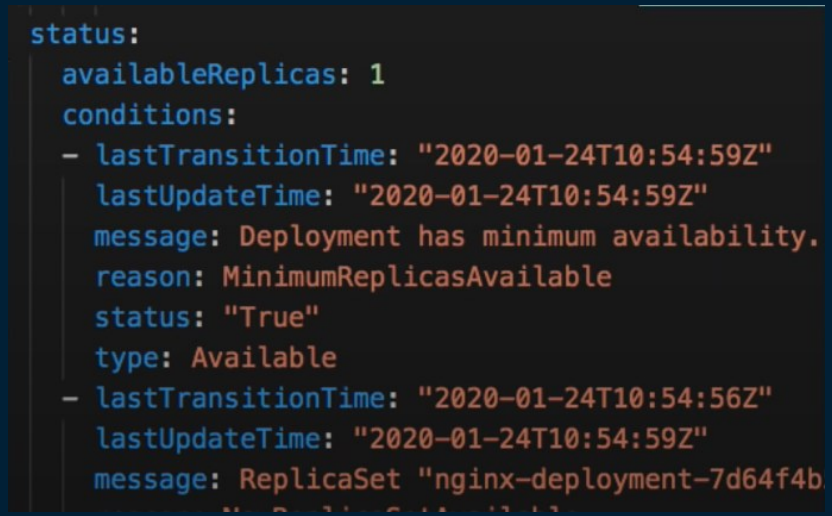
Where does K8s get this status data from?



Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file



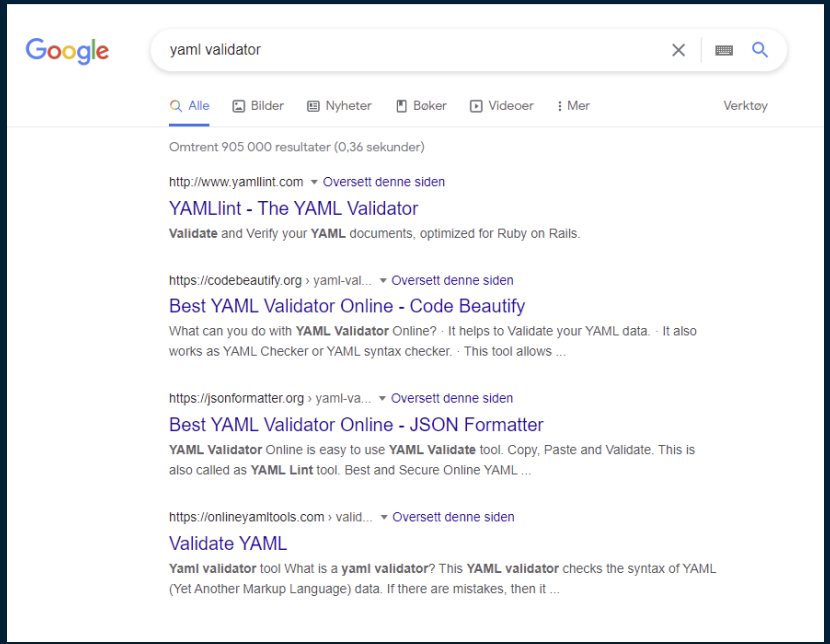
- "human friendly data serialization standard for all programming languages"
- Syntax: Very strict indentation rules – must comply to rules
- Pro tip: Use a YAML online validator to check for syntax errors

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

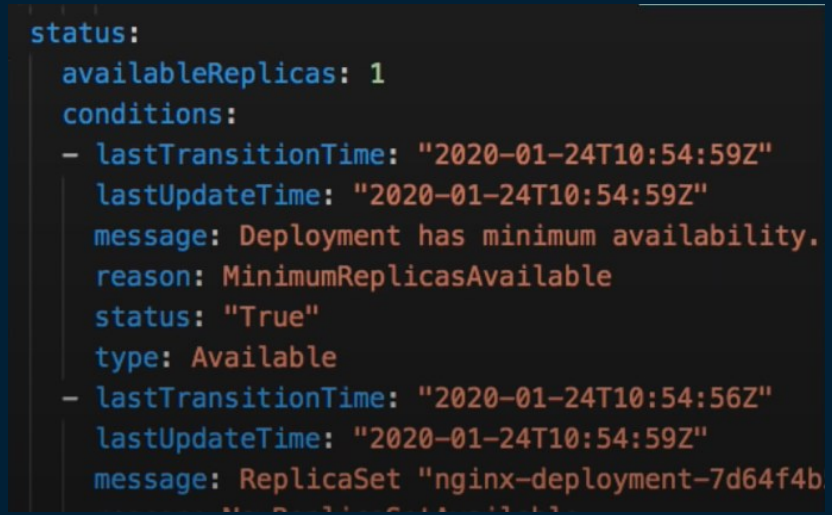
```
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2020-01-24T10:54:59Z"
    lastUpdateTime: "2020-01-24T10:54:59Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2020-01-24T10:54:56Z"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



Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file



- "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

Copyright © SAS Institute Inc. All rights reserved.

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

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file

- Deployment manages Pods

Layer of Abstraction

Deployment manages a ..

ReplicaSet manages a ..

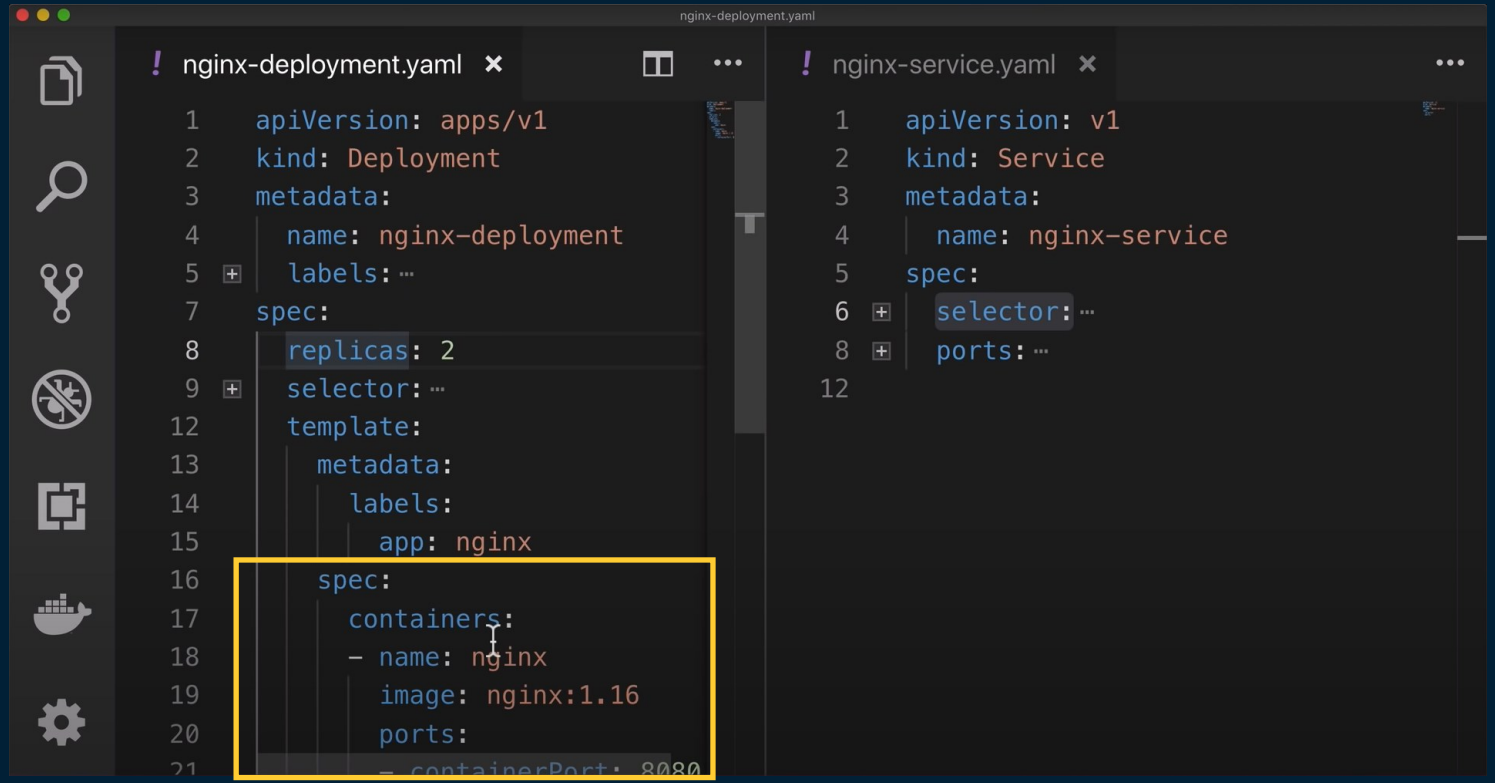
Pod is an abstraction of ..

Container

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

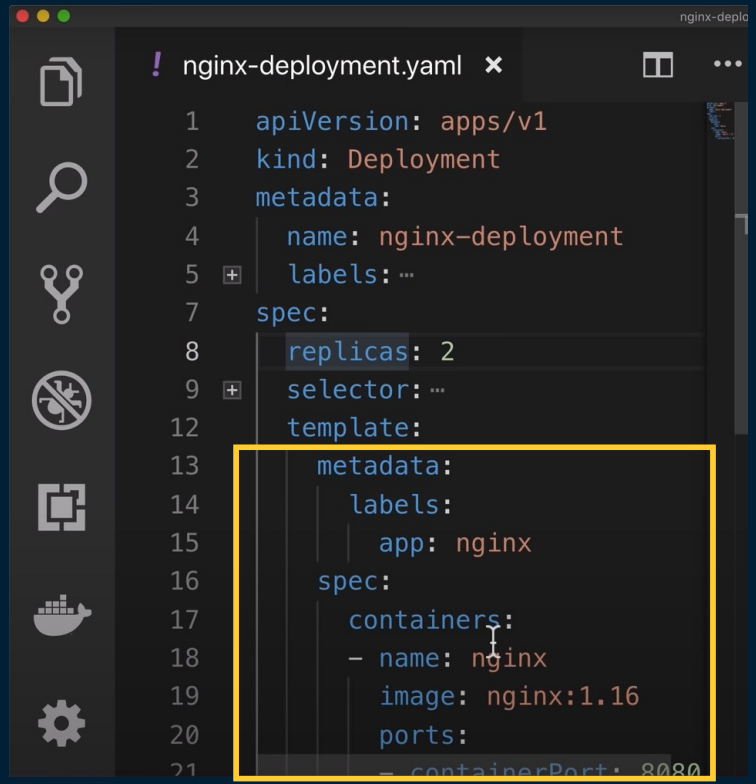
3 parts of K8s configuration file



Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

3 parts of K8s configuration file



- 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.

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

- Connecting components
- (Labels & Selectors & Ports)

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Labels & Selectors

- Deployment

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:…
```

- Service

```yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx-service
spec:
  selector:
    app: nginx
  ports:…
```

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Labels & Selectors

- Deployment

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:…
```

- Service

```yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx-service
spec:
  selector:
    app: nginx
  ports:…
```

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Labels & Selectors

- Deployment

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:…
```

- Service

```yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx-service
spec:
  selector:
    app: nginx
  ports:…
```

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec: …
```

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

Any key-value pair for component

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec: …
```

```yaml
labels:
  app: nginx
```

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec: …
```

Pods get the label through the template blueprint

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec: …
```

Pods get the label through the template blueprint

This label is matched by the selector

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

Copyright © SAS Institute Inc. All rights reserved.

K8s YAML Configuration File

YAML Configuration File in Kubernetes

Connecting Deployment to Pods

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec: …
```

Pods get the label through the template blueprint

This label is matched by the selector

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

Copyright © SAS Institute Inc. All rights reserved.

The end part 3
Pause for 10 min.

sas.com

Copyright © SAS Institute Inc. All rights reserved.