Red Hat OpenShift Pipelines 1.13

Creating CI/CD pipelines

Getting started with creating and running tasks and pipelines in OpenShift Pipelines

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Legal Notice

Abstract

This document provides information about creating and running tasks and pipelines in OpenShift Pipelines.

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CHAPTER 1. CREATING CI/CD SOLUTIONS FOR APPLICATIONS USING OPENSHIFT PIPELINES

With Red Hat OpenShift Pipelines, you can create a customized CI/CD solution to build, test, and deploy your application.

To create a full-fledged, self-serving CI/CD pipeline for an application, perform the following tasks:

- Create custom tasks, or install existing reusable tasks.
- Create and define the delivery pipeline for your application.
- Provide a storage volume or filesystem that is attached to a workspace for the pipeline execution, using one of the following approaches:
  - Specify a volume claim template that creates a persistent volume claim
  - Specify a persistent volume claim
- Create a **PipelineRun** object to instantiate and invoke the pipeline.
- Add triggers to capture events in the source repository.

This section uses the **pipelines-tutorial** example to demonstrate the preceding tasks. The example uses a simple application which consists of:

- A front-end interface, **pipelines-vote-ui**, with the source code in the **pipelines-vote-ui** Git repository.
- A back-end interface, **pipelines-vote-api**, with the source code in the **pipelines-vote-api** Git repository.
- The **apply-manifests** and **update-deployment** tasks in the **pipelines-tutorial** Git repository.

1.1. PREREQUISITES

- You have access to an OpenShift Container Platform cluster.
- You have installed OpenShift Pipelines using the Red Hat OpenShift Pipelines Operator listed in the OpenShift OperatorHub. After it is installed, it is applicable to the entire cluster.
- You have installed OpenShift Pipelines CLI.
- You have forked the front-end **pipelines-vote-ui** and back-end **pipelines-vote-api** Git repositories using your GitHub ID, and have administrator access to these repositories.
- Optional: You have cloned the **pipelines-tutorial** Git repository.

1.2. CREATING A PROJECT AND CHECKING YOUR PIPELINE SERVICE ACCOUNT

Procedure

1. Log in to your OpenShift Container Platform cluster:
   -

```
$ oc login -u <login> -p <password> https://openshift.example.com:6443
```

2. Create a project for the sample application. For this example workflow, create the **pipelines-tutorial** project:

```
$ oc new-project pipelines-tutorial
```

NOTE

If you create a project with a different name, be sure to update the resource URLs used in the example with your project name.

3. View the **pipeline** service account:
Red Hat OpenShift Pipelines Operator adds and configures a service account named **pipeline** that has sufficient permissions to build and push an image. This service account is used by the **PipelineRun** object.

```
$ oc get serviceaccount pipeline
```

1.3. CREATING PIPELINE TASKS

Procedure

1. Install the **apply-manifests** and **update-deployment** task resources from the **pipelines-tutorial** repository, which contains a list of reusable tasks for pipelines:

```
$ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/01_pipeline/01_apply_manifest_task.yaml
$ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/01_pipeline/02_update_deployment_task.yaml
```

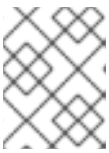
2. Use the **tkn task list** command to list the tasks you created:

```
$ tkn task list
```

The output verifies that the **apply-manifests** and **update-deployment** task resources were created:

```
NAME                DESCRIPTION   AGE
apply-manifests                   1 minute ago
update-deployment                 48 seconds ago
```

3. Use the **tkn clustertasks list** command to list the Operator-installed additional cluster tasks such as **buildah** and **s2i-python**:



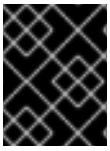
NOTE

To use the **buildah** cluster task in a restricted environment, you must ensure that the Dockerfile uses an internal image stream as the base image.

```
$ tkn clustertasks list
```

The output lists the Operator-installed **ClusterTask** resources:

```
NAME                DESCRIPTION   AGE
buildah                           1 day ago
git-clone                         1 day ago
s2i-python                         1 day ago
tkn                              1 day ago
```



IMPORTANT

In Red Hat OpenShift Pipelines 1.10, cluster task functionality is deprecated and is planned to be removed in a future release.

Additional resources

- Managing non-versioned and versioned cluster tasks

1.4. ASSEMBLING A PIPELINE

A pipeline represents a CI/CD flow and is defined by the tasks to be executed. It is designed to be generic and reusable in multiple applications and environments.

A pipeline specifies how the tasks interact with each other and their order of execution using the **from** and **runAfter** parameters. It uses the **workspaces** field to specify one or more volumes that each task in the pipeline requires during execution.

In this section, you will create a pipeline that takes the source code of the application from GitHub, and then builds and deploys it on OpenShift Container Platform.

The pipeline performs the following tasks for the back-end application **pipelines-vote-api** and front-end application **pipelines-vote-ui**:

- Clones the source code of the application from the Git repository by referring to the **git-url** and **git-revision** parameters.
- Builds the container image using the **buildah** cluster task.
- Pushes the image to the OpenShift image registry by referring to the **image** parameter.
- Deploys the new image on OpenShift Container Platform by using the **apply-manifests** and **update-deployment** tasks.

Procedure

1. Copy the contents of the following sample pipeline YAML file and save it:

```
apiVersion: tekton.dev/v1beta1
kind: Pipeline
metadata:
  name: build-and-deploy
spec:
  workspaces:
```

```
  - name: shared-workspace
 params:
 - name: deployment-name
   type: string
   description: name of the deployment to be patched
 - name: git-url
   type: string
   description: url of the git repo for the code of deployment
 - name: git-revision
   type: string
   description: revision to be used from repo of the code for deployment
   default: "pipelines-1.13"
 - name: IMAGE
   type: string
   description: image to be built from the code
 tasks:
 - name: fetch-repository
   taskRef:
     name: git-clone
     kind: ClusterTask
   workspaces:
   - name: output
     workspace: shared-workspace
   params:
   - name: url
     value: $(params.git-url)
   - name: subdirectory
     value: ""
   - name: deleteExisting
     value: "true"
   - name: revision
     value: $(params.git-revision)
 - name: build-image
   taskRef:
     name: buildah
     kind: ClusterTask
   params:
   - name: IMAGE
     value: $(params.IMAGE)
   workspaces:
   - name: source
     workspace: shared-workspace
   runAfter:
   - fetch-repository
 - name: apply-manifests
   taskRef:
     name: apply-manifests
   workspaces:
   - name: source
     workspace: shared-workspace
   runAfter:
   - build-image
 - name: update-deployment
   taskRef:
     name: update-deployment
   params:
```

```
    - name: deployment
      value: $(params.deployment-name)
    - name: IMAGE
      value: $(params.IMAGE)
    runAfter:
    - apply-manifests
```

The pipeline definition abstracts away the specifics of the Git source repository and image registries. These details are added as **params** when a pipeline is triggered and executed.

2. Create the pipeline:

```
$ oc create -f <pipeline-yaml-file-name.yaml>
```

Alternatively, you can also execute the YAML file directly from the Git repository:

```
$ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/01_pipeline/04_pipeline.yaml
```

3. Use the **tkn pipeline list** command to verify that the pipeline is added to the application:

```
$ tkn pipeline list
```

The output verifies that the **build-and-deploy** pipeline was created:

```
NAME              AGE            LAST RUN   STARTED   DURATION   STATUS
build-and-deploy  1 minute ago   ---        ---       ---        ---
```

1.5. MIRRORING IMAGES TO RUN PIPELINES IN A RESTRICTED ENVIRONMENT

To run OpenShift Pipelines in a disconnected cluster or a cluster provisioned in a restricted environment, ensure that either the Samples Operator is configured for a restricted network, or a cluster administrator has created a cluster with a mirrored registry.

The following procedure uses the **pipelines-tutorial** example to create a pipeline for an application in a restricted environment using a cluster with a mirrored registry. To ensure that the **pipelines-tutorial** example works in a restricted environment, you must mirror the respective builder images from the mirror registry for the front-end interface, **pipelines-vote-ui**; back-end interface, **pipelines-vote-api**; and the **cli**.

Procedure

1. Mirror the builder image from the mirror registry for the front-end interface, **pipelines-vote-ui**.
   a. Verify that the required images tag is not imported:

```
$ oc describe imagestream python -n openshift
```

Example output

```
Name:   python
Namespace:  openshift
```

```
[...]

3.8-ubi9 (latest)
  tagged from registry.redhat.io/ubi9/python-38:latest
    prefer registry pullthrough when referencing this tag

  Build and run Python 3.8 applications on UBI 8. For more information about using this
builder image, including OpenShift considerations, see https://github.com/sclorg/s2i-
python-container/blob/master/3.8/README.md.
  Tags: builder, python
  Supports: python:3.8, python
  Example Repo: https://github.com/sclorg/django-ex.git

[...]
```

b. Mirror the supported image tag to the private registry:

```
$ oc image mirror registry.redhat.io/ubi9/python-39:latest <mirror-registry>:
<port>/ubi9/python-39
```

c. Import the image:

```
$ oc tag <mirror-registry>:<port>/ubi9/python-39 python:latest --scheduled -n openshift
```

You must periodically re-import the image. The **--scheduled** flag enables automatic re-import of the image.

d. Verify that the images with the given tag have been imported:

```
$ oc describe imagestream python -n openshift
```

Example output

```
Name:   python
Namespace:  openshift
[...]

latest
  updates automatically from registry  <mirror-registry>:<port>/ubi9/python-39

  *  <mirror-registry>:<port>/ubi9/python-39@sha256:3ee...

[...]
```

2. Mirror the builder image from the mirror registry for the back-end interface, **pipelines-vote-api**.

a. Verify that the required images tag is not imported:

```
$ oc describe imagestream golang -n openshift
```

Example output

```
Name:   golang
Namespace:  openshift
```

```
[...]

1.14.7-ubi8 (latest)
  tagged from registry.redhat.io/ubi8/go-toolset:1.14.7
    prefer registry pullthrough when referencing this tag

  Build and run Go applications on UBI 8. For more information about using this builder
image, including OpenShift considerations, see https://github.com/sclorg/golang-
container/blob/master/README.md.
  Tags: builder, golang, go
  Supports: golang
  Example Repo: https://github.com/sclorg/golang-ex.git

[...]
```

b. Mirror the supported image tag to the private registry:

```
$ oc image mirror registry.redhat.io/ubi9/go-toolset:latest <mirror-registry>:
<port>/ubi9/go-toolset
```

c. Import the image:

```
$ oc tag <mirror-registry>:<port>/ubi9/go-toolset golang:latest --scheduled -n openshift
```

You must periodically re-import the image. The **--scheduled** flag enables automatic re-import of the image.

d. Verify that the images with the given tag have been imported:

```
$ oc describe imagestream golang -n openshift
```

Example output

```
Name:   golang
Namespace:  openshift
[...]

latest
  updates automatically from registry <mirror-registry>:<port>/ubi9/go-toolset

  * <mirror-registry>:<port>/ubi9/go-
toolset@sha256:59a74d581df3a2bd63ab55f7ac106677694bf612a1fe9e7e3e1487f55c421
b37

[...]
```

3. Mirror the builder image from the mirror registry for the **cli**.

a. Verify that the required images tag is not imported:

```
$ oc describe imagestream cli -n openshift
```

Example output

```
Name:                   cli
Namespace:              openshift
[...]

latest
  updates automatically from registry quay.io/openshift-release-dev/ocp-v4.0-art-
dev@sha256:65c68e8c22487375c4c6ce6f18ed5485915f2bf612e41fef6d41cbfcdb143551


  * quay.io/openshift-release-dev/ocp-v4.0-art-
dev@sha256:65c68e8c22487375c4c6ce6f18ed5485915f2bf612e41fef6d41cbfcdb143551


[...]
```

b. Mirror the supported image tag to the private registry:

```
$ oc image mirror quay.io/openshift-release-dev/ocp-v4.0-art-
dev@sha256:65c68e8c22487375c4c6ce6f18ed5485915f2bf612e41fef6d41cbfcdb143551
<mirror-registry>:<port>/openshift-release-dev/ocp-v4.0-art-dev:latest
```

c. Import the image:

```
$ oc tag <mirror-registry>:<port>/openshift-release-dev/ocp-v4.0-art-dev cli:latest --
scheduled -n openshift
```

You must periodically re-import the image. The **--scheduled** flag enables automatic re-import of the image.

d. Verify that the images with the given tag have been imported:

```
$ oc describe imagestream cli -n openshift
```

Example output

```
Name:                   cli
Namespace:              openshift
[...]

latest
  updates automatically from registry <mirror-registry>:<port>/openshift-release-dev/ocp-
v4.0-art-dev

  * <mirror-registry>:<port>/openshift-release-dev/ocp-v4.0-art-
dev@sha256:65c68e8c22487375c4c6ce6f18ed5485915f2bf612e41fef6d41cbfcdb143551


[...]
```

Additional resources

- Configuring Samples Operator for a restricted cluster
- Creating a cluster with a mirrored registry

1.6. RUNNING A PIPELINE

A **PipelineRun** resource starts a pipeline and ties it to the Git and image resources that should be used for the specific invocation. It automatically creates and starts the **TaskRun** resources for each task in the pipeline.

Procedure

1. Start the pipeline for the back-end application:

```
$ tkn pipeline start build-and-deploy \
    -w name=shared-
workspace,volumeClaimTemplateFile=https://raw.githubusercontent.com/openshift/pipelines-
tutorial/pipelines-1.13/01_pipeline/03_persistent_volume_claim.yaml \
    -p deployment-name=pipelines-vote-api \
    -p git-url=https://github.com/openshift/pipelines-vote-api.git \
    -p IMAGE='image-registry.openshift-image-registry.svc:5000/pipelines-tutorial/pipelines-
vote-api' \
    --use-param-defaults
```

   The previous command uses a volume claim template, which creates a persistent volume claim for the pipeline execution.

2. To track the progress of the pipeline run, enter the following command::

```
$ tkn pipelinerun logs <pipelinerun_id> -f
```

   The <pipelinerun_id> in the above command is the ID for the **PipelineRun** that was returned in the output of the previous command.

3. Start the pipeline for the front-end application:

```
$ tkn pipeline start build-and-deploy \
    -w name=shared-
workspace,volumeClaimTemplateFile=https://raw.githubusercontent.com/openshift/pipelines-
tutorial/pipelines-1.13/01_pipeline/03_persistent_volume_claim.yaml \
    -p deployment-name=pipelines-vote-ui \
    -p git-url=https://github.com/openshift/pipelines-vote-ui.git \
    -p IMAGE='image-registry.openshift-image-registry.svc:5000/pipelines-tutorial/pipelines-
vote-ui' \
    --use-param-defaults
```

4. To track the progress of the pipeline run, enter the following command:

```
$ tkn pipelinerun logs <pipelinerun_id> -f
```

   The <pipelinerun_id> in the above command is the ID for the **PipelineRun** that was returned in the output of the previous command.

5. After a few minutes, use **tkn pipelinerun list** command to verify that the pipeline ran successfully by listing all the pipeline runs:

```
$ tkn pipelinerun list
```

The output lists the pipeline runs:

```
NAME                          STARTED      DURATION     STATUS
build-and-deploy-run-xy7rw    1 hour ago   2 minutes    Succeeded
build-and-deploy-run-z2rz8    1 hour ago   19 minutes   Succeeded
```

6. Get the application route:

```
$ oc get route pipelines-vote-ui --template='http://{{.spec.host}}'
```

Note the output of the previous command. You can access the application using this route.

7. To rerun the last pipeline run, using the pipeline resources and service account of the previous pipeline, run:

```
$ tkn pipeline start build-and-deploy --last
```

Additional resources

- Authenticating pipelines using git secret

1.7. ADDING TRIGGERS TO A PIPELINE

Triggers enable pipelines to respond to external GitHub events, such as push events and pull requests. After you assemble and start a pipeline for the application, add the **TriggerBinding**, **TriggerTemplate**, **Trigger**, and **EventListener** resources to capture the GitHub events.

Procedure

1. Copy the content of the following sample **TriggerBinding** YAML file and save it:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: TriggerBinding
metadata:
  name: vote-app
spec:
  params:
  - name: git-repo-url
    value: $(body.repository.url)
  - name: git-repo-name
    value: $(body.repository.name)
  - name: git-revision
    value: $(body.head_commit.id)
```

2. Create the **TriggerBinding** resource:

```
$ oc create -f <triggerbinding-yaml-file-name.yaml>
```

Alternatively, you can create the **TriggerBinding** resource directly from the **pipelines-tutorial** Git repository:

```
$ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/03_triggers/01_binding.yaml
```

3. Copy the content of the following sample **TriggerTemplate** YAML file and save it:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: TriggerTemplate
metadata:
  name: vote-app
spec:
  params:
  - name: git-repo-url
    description: The git repository url
  - name: git-revision
    description: The git revision
    default: pipelines-1.13
  - name: git-repo-name
    description: The name of the deployment to be created / patched

  resourcetemplates:
  - apiVersion: tekton.dev/v1beta1
    kind: PipelineRun
    metadata:
      generateName: build-deploy-$(tt.params.git-repo-name)-
    spec:
      serviceAccountName: pipeline
      pipelineRef:
        name: build-and-deploy
      params:
      - name: deployment-name
        value: $(tt.params.git-repo-name)
      - name: git-url
        value: $(tt.params.git-repo-url)
      - name: git-revision
        value: $(tt.params.git-revision)
      - name: IMAGE
        value: image-registry.openshift-image-registry.svc:5000/pipelines-
tutorial/$(tt.params.git-repo-name)
      workspaces:
      - name: shared-workspace
        volumeClaimTemplate:
          spec:
            accessModes:
              - ReadWriteOnce
            resources:
              requests:
                storage: 500Mi
```

The template specifies a volume claim template to create a persistent volume claim for defining the storage volume for the workspace. Therefore, you do not need to create a persistent volume claim to provide data storage.

4. Create the **TriggerTemplate** resource:

```
$ oc create -f <triggertemplate-yaml-file-name.yaml>
```

Alternatively, you can create the **TriggerTemplate** resource directly from the **pipelines-tutorial** Git repository:

```
$ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/03_triggers/02_template.yaml
```

5. Copy the contents of the following sample **Trigger** YAML file and save it:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: Trigger
metadata:
  name: vote-trigger
spec:
  serviceAccountName: pipeline
  bindings:
    - ref: vote-app
  template:
    ref: vote-app
```

6. Create the **Trigger** resource:

```
$ oc create -f <trigger-yaml-file-name.yaml>
```

Alternatively, you can create the **Trigger** resource directly from the **pipelines-tutorial** Git repository:

```
$ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/03_triggers/03_trigger.yaml
```

7. Copy the contents of the following sample **EventListener** YAML file and save it:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: vote-app
spec:
  serviceAccountName: pipeline
  triggers:
    - triggerRef: vote-trigger
```

Alternatively, if you have not defined a trigger custom resource, add the binding and template spec to the **EventListener** YAML file, instead of referring to the name of the trigger:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: vote-app
spec:
  serviceAccountName: pipeline
  triggers:
  - bindings:
    - ref: vote-app
    template:
      ref: vote-app
```

8. Create the **EventListener** resource by performing the following steps:

- To create an **EventListener** resource using a secure HTTPS connection:

  a. Add a label to enable the secure HTTPS connection to the **Eventlistener** resource:

  ```
  $ oc label namespace <ns-name> operator.tekton.dev/enable-annotation=enabled
  ```

  b. Create the **EventListener** resource:

  ```
  $ oc create -f <eventlistener-yaml-file-name.yaml>
  ```

  Alternatively, you can create the **EvenListener** resource directly from the **pipelines-tutorial** Git repository:

  ```
  $ oc create -f https://raw.githubusercontent.com/openshift/pipelines-tutorial/pipelines-1.13/03_triggers/04_event_listener.yaml
  ```

  c. Create a route with the re-encrypt TLS termination:

  ```
  $ oc create route reencrypt --service=<svc-name> --cert=tls.crt --key=tls.key --ca-cert=ca.crt --hostname=<hostname>
  ```

  Alternatively, you can create a re-encrypt TLS termination YAML file to create a secured route.

  Example Re-encrypt TLS Termination YAML of the Secured Route

  ```
  apiVersion: route.openshift.io/v1
  kind: Route
  metadata:
    name: route-passthrough-secured 1
  spec:
    host: <hostname>
    to:
      kind: Service
      name: frontend 2
    tls:
      termination: reencrypt 3
      key: [as in edge termination]
      certificate: [as in edge termination]
      caCertificate: [as in edge termination]
      destinationCACertificate: |- 4
        -----BEGIN CERTIFICATE-----
        [...]
        -----END CERTIFICATE-----
  ```

  1 2 The name of the object, which is limited to 63 characters.

  3 The **termination** field is set to **reencrypt**. This is the only required **tls** field.

  4 Required for re-encryption. **destinationCACertificate** specifies a CA certificate to validate the endpoint certificate, securing the connection from the router to the destination pods. If the service is using a service signing certificate, or the administrator has specified a default CA certificate for the router and the service has a certificate signed by that CA, this field can be omitted.

See **oc create route reencrypt --help** for more options.

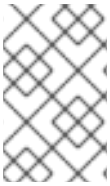
- To create an **EventListener** resource using an insecure HTTP connection:

  a. Create the **EventListener** resource.

  b. Expose the **EventListener** service as an OpenShift Container Platform route to make it publicly accessible:

```
$ oc expose svc el-vote-app
```

1.8. CONFIGURING EVENT LISTENERS TO SERVE MULTIPLE NAMESPACES



NOTE

You can skip this section if you want to create a basic CI/CD pipeline. However, if your deployment strategy involves multiple namespaces, you can configure event listeners to serve multiple namespaces.

To increase reusability of **EvenListener** objects, cluster administrators can configure and deploy them as multi-tenant event listeners that serve multiple namespaces.

Procedure

1. Configure cluster-wide fetch permission for the event listener.

   a. Set a service account name to be used in the **ClusterRoleBinding** and **EventListener** objects. For example, **el-sa**.

   Example ServiceAccount.yaml

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: el-sa
---
```

   b. In the **rules** section of the **ClusterRole.yaml** file, set appropriate permissions for every event listener deployment to function cluster-wide.

   Example ClusterRole.yaml

```
kind: ClusterRole
apiVersion: rbac.authorization.k8s.io/v1
metadata:
  name: el-sel-clusterrole
rules:
- apiGroups: ["triggers.tekton.dev"]
  resources: ["eventlisteners", "clustertriggerbindings", "clusterinterceptors",
"triggerbindings", "triggertemplates", "triggers"]
  verbs: ["get", "list", "watch"]
- apiGroups: [""]
```

```
    resources: ["configmaps", "secrets"]
    verbs: ["get", "list", "watch"]
  - apiGroups: [""]
    resources: ["serviceaccounts"]
    verbs: ["impersonate"]
  ...
```

c. Configure cluster role binding with the appropriate service account name and cluster role name.

Example ClusterRoleBinding.yaml

```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: el-mul-clusterrolebinding
subjects:
- kind: ServiceAccount
  name: el-sa
  namespace: default
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: el-sel-clusterrole
...
```

2. In the **spec** parameter of the event listener, add the service account name, for example **el-sa**. Fill the **namespaceSelector** parameter with names of namespaces where event listener is intended to serve.

Example EventListener.yaml

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: namespace-selector-listener
spec:
  serviceAccountName: el-sa
  namespaceSelector:
    matchNames:
    - default
    - foo
...
```

3. Create a service account with the necessary permissions, for example **foo-trigger-sa**. Use it for role binding the triggers.

Example ServiceAccount.yaml

```
apiVersion: v1
kind: ServiceAccount
metadata:
```

```
  name: foo-trigger-sa
  namespace: foo
...
```

Example RoleBinding.yaml

```
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: triggercr-rolebinding
  namespace: foo
subjects:
- kind: ServiceAccount
  name: foo-trigger-sa
  namespace: foo
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: tekton-triggers-eventlistener-roles
...
```

4. Create a trigger with the appropriate trigger template, trigger binding, and service account name.

Example Trigger.yaml

```
apiVersion: triggers.tekton.dev/v1beta1
kind: Trigger
metadata:
  name: trigger
  namespace: foo
spec:
  serviceAccountName: foo-trigger-sa
  interceptors:
    - ref:
        name: "github"
      params:
        - name: "secretRef"
          value:
            secretName: github-secret
            secretKey: secretToken
        - name: "eventTypes"
          value: ["push"]
  bindings:
    - ref: vote-app
  template:
    ref: vote-app
...
```

1.9. CREATING WEBHOOKS

Webhooks are HTTP POST messages that are received by the event listeners whenever a configured event occurs in your repository. The event payload is then mapped to trigger bindings, and processed by trigger templates. The trigger templates eventually start one or more pipeline runs, leading to the

creation and deployment of Kubernetes resources.

In this section, you will configure a webhook URL on your forked Git repositories **pipelines-vote-ui** and **pipelines-vote-api**. This URL points to the publicly accessible **EventListener** service route.

NOTE

Adding webhooks requires administrative privileges to the repository. If you do not have administrative access to your repository, contact your system administrator for adding webhooks.

Procedure

1. Get the webhook URL:
   - For a secure HTTPS connection:

     ```
     $ echo "URL: $(oc  get route el-vote-app --template='https://{{.spec.host}}')"
     ```

   - For an HTTP (insecure) connection:

     ```
     $ echo "URL: $(oc  get route el-vote-app --template='http://{{.spec.host}}')"
     ```

     Note the URL obtained in the output.
2. Configure webhooks manually on the front-end repository:
   a. Open the front-end Git repository **pipelines-vote-ui** in your browser.
   b. Click **Settings → Webhooks → Add Webhook**
   c. On the **Webhooks/Add Webhook** page:
      i. Enter the webhook URL from step 1 in **Payload URL** field
      ii. Select **application/json** for the **Content type**
      iii. Specify the secret in the **Secret** field
      iv. Ensure that the **Just the push event**is selected
      v. Select **Active**
      vi. Click **Add Webhook**
3. Repeat step 2 for the back-end repository **pipelines-vote-api**.

1.10. TRIGGERING A PIPELINE RUN

Whenever a **push** event occurs in the Git repository, the configured webhook sends an event payload to the publicly exposed **EventListener** service route. The **EventListener** service of the application processes the payload, and passes it to the relevant **TriggerBinding** and **TriggerTemplate** resource pairs. The **TriggerBinding** resource extracts the parameters, and the **TriggerTemplate** resource uses these parameters and specifies the way the resources must be created. This may rebuild and redeploy the application.

In this section, you push an empty commit to the front-end **pipelines-vote-ui** repository, which then triggers the pipeline run.

Procedure

1. From the terminal, clone your forked Git repository **pipelines-vote-ui**:

```
$ git clone git@github.com:<your GitHub ID>/pipelines-vote-ui.git -b pipelines-1.13
```

2. Push an empty commit:

```
$ git commit -m "empty-commit" --allow-empty && git push origin pipelines-1.13
```

3. Check if the pipeline run was triggered:

```
$ tkn pipelinerun list
```

   Notice that a new pipeline run was initiated.

1.11. ENABLING MONITORING OF EVENT LISTENERS FOR TRIGGERS FOR USER-DEFINED PROJECTS

As a cluster administrator, to gather event listener metrics for the **Triggers** service in a user-defined project and display them in the OpenShift Container Platform web console, you can create a service monitor for each event listener. On receiving an HTTP request, event listeners for the **Triggers** service return three metrics – **eventlistener_http_duration_seconds**, **eventlistener_event_count**, and **eventlistener_triggered_resources**.

Prerequisites

- You have logged in to the OpenShift Container Platform web console.
- You have installed the Red Hat OpenShift Pipelines Operator.
- You have enabled monitoring for user-defined projects.

Procedure

1. For each event listener, create a service monitor. For example, to view the metrics for the **github-listener** event listener in the **test** namespace, create the following service monitor:

```
apiVersion: monitoring.coreos.com/v1
kind: ServiceMonitor
metadata:
  labels:
    app.kubernetes.io/managed-by: EventListener
    app.kubernetes.io/part-of: Triggers
    eventlistener: github-listener
  annotations:
    networkoperator.openshift.io/ignore-errors: ""
  name: el-monitor
  namespace: test
spec:
```

```
    endpoints:
      - interval: 10s
        port: http-metrics
    jobLabel: name
    namespaceSelector:
      matchNames:
        - test
    selector:
      matchLabels:
        app.kubernetes.io/managed-by: EventListener
        app.kubernetes.io/part-of: Triggers
        eventlistener: github-listener
...
```

2. Test the service monitor by sending a request to the event listener. For example, push an empty commit:

```
$ git commit -m "empty-commit" --allow-empty && git push origin main
```

3. On the OpenShift Container Platform web console, navigate to **Administrator → Observe → Metrics**.

4. To view a metric, search by its name. For example, to view the details of the **eventlistener_http_resources** metric for the **github-listener** event listener, search using the **eventlistener_http_resources** keyword.

Additional resources

- Enabling monitoring for user-defined projects

1.12. CONFIGURING PULL REQUEST CAPABILITIES IN GITHUB INTERCEPTOR

With GitHub Interceptor, you can create logic that validates and filters GitHub webhooks. For example, you can validate the webhook's origin and filter incoming events based on specified criteria. When you use GitHub Interceptor to filter event data, you can specify the event types that Interceptor can accept in a field. In Red Hat OpenShift Pipelines, you can use the following capabilities of GitHub Interceptor:

- Filter pull request events based on the files that have been changed
- Validate pull requests based on configured GitHub owners

1.12.1. Filtering pull requests using GitHub Interceptor

You can filter GitHub events based on the files that have been changed for push and pull events. This helps you to execute a pipeline for only relevant changes in your Git repository. GitHub Interceptor adds a comma delimited list of all files that have been changed and uses the CEL Interceptor to filter incoming events based on the changed files. The list of changed files is added to the **changed_files** property of the event payload in the top-level **extensions** field.

Prerequisites

- You have installed the Red Hat OpenShift Pipelines Operator.

Procedure

1. Perform one of the following steps:

   - For a public GitHub repository, set the value of the **addChangedFiles** parameter to **true** in the YAML configuration file shown below:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: github-add-changed-files-pr-listener
spec:
  triggers:
    - name: github-listener
      interceptors:
        - ref:
            name: "github"
            kind: ClusterInterceptor
            apiVersion: triggers.tekton.dev
          params:
          - name: "secretRef"
            value:
              secretName: github-secret
              secretKey: secretToken
          - name: "eventTypes"
            value: ["pull_request", "push"]
          - name: "addChangedFiles"
            value:
              enabled: true
        - ref:
            name: cel
          params:
          - name: filter
            value: extensions.changed_files.matches('controllers/')
...
```

   - For a private GitHub repository, set the value of the **addChangedFiles** parameter to **true** and provide the access token details, **secretName** and **secretKey** in the YAML configuration file shown below:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: github-add-changed-files-pr-listener
spec:
  triggers:
    - name: github-listener
      interceptors:
        - ref:
            name: "github"
            kind: ClusterInterceptor
            apiVersion: triggers.tekton.dev
          params:
          - name: "secretRef"
            value:
              secretName: github-secret
```

```
            secretKey: secretToken
        - name: "eventTypes"
          value: ["pull_request", "push"]
        - name: "addChangedFiles"
          value:
            enabled: true
            personalAccessToken:
              secretName: github-pat
              secretKey: token
      - ref:
          name: cel
        params:
        - name: filter
          value: extensions.changed_files.matches('controllers/')
...
```

2. Save the configuration file.

1.12.2. Validating pull requests using GitHub Interceptors

You can use GitHub Interceptor to validate the processing of pull requests based on the GitHub owners configured for a repository. This validation helps you to prevent unnecessary execution of a **PipelineRun** or **TaskRun** object. GitHub Interceptor processes a pull request only if the user name is listed as an owner or if a configurable comment is issued by an owner of the repository. For example, when you comment /**ok-to-test** on a pull request as an owner, a **PipelineRun** or **TaskRun** is triggered.

NOTE

Owners are configured in an **OWNERS** file at the root of the repository.

Prerequisites

- You have installed the Red Hat OpenShift Pipelines Operator.

Procedure

1. Create a secret string value.
2. Configure the GitHub webhook with that value.
3. Create a Kubernetes secret named **secretRef** that contains your secret value.
4. Pass the Kubernetes secret as a reference to your GitHub Interceptor.
5. Create an **owners** file and add the list of approvers into the **approvers** section.
6. Perform one of the following steps:
   - For a public GitHub repository, set the value of the **githubOwners** parameter to **true** in the YAML configuration file shown below:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: github-owners-listener
```

```
spec:
  triggers:
    - name: github-listener
      interceptors:
        - ref:
            name: "github"
            kind: ClusterInterceptor
            apiVersion: triggers.tekton.dev
          params:
            - name: "secretRef"
              value:
                secretName: github-secret
                secretKey: secretToken
            - name: "eventTypes"
              value: ["pull_request", "issue_comment"]
            - name: "githubOwners"
              value:
                enabled: true
                checkType: none
...
```

- For a private GitHub repository, set the value of the **githubOwners** parameter to **true** and provide the access token details, **secretName** and **secretKey** in the YAML configuration file shown below:

```
apiVersion: triggers.tekton.dev/v1beta1
kind: EventListener
metadata:
  name: github-owners-listener
spec:
  triggers:
    - name: github-listener
      interceptors:
        - ref:
            name: "github"
            kind: ClusterInterceptor
            apiVersion: triggers.tekton.dev
          params:
            - name: "secretRef"
              value:
                secretName: github-secret
                secretKey: secretToken
            - name: "eventTypes"
              value: ["pull_request", "issue_comment"]
            - name: "githubOwners"
              value:
                enabled: true
                personalAccessToken:
                  secretName: github-token
                  secretKey: secretToken
                checkType: all
...
```

NOTE

The **checkType** parameter is used to specify the GitHub owners who need authentication. You can set its value to **orgMembers**, **repoMembers**, or **all**.

7. Save the configuration file.

1.13. ADDITIONAL RESOURCES

- To include Pipelines as Code along with the application source code in the same repository, see About Pipelines as Code.
- For more details on pipelines in the **Developer** perspective, see the Working with OpenShift Pipelines in the web console section.
- To learn more about Security Context Constraints (SCCs), see the Managing Security Context Constraints section.
- For more examples of reusable tasks, see the OpenShift Catalog repository. Additionally, you can also see the Tekton Catalog in the Tekton project.
- To install and deploy a custom instance of Tekton Hub for reusable tasks and pipelines, see Using Tekton Hub with Red Hat OpenShift Pipelines .
- For more details on re-encrypt TLS termination, see Re-encryption Termination.
- For more details on secured routes, see the Secured routes section.

CHAPTER 2. WORKING WITH RED HAT OPENSHIFT PIPELINES IN THE WEB CONSOLE

You can use the **Administrator** or **Developer** perspective to create and modify **Pipeline**, **PipelineRun**, and **Repository** objects from the **Pipelines** page in the OpenShift Container Platform web console. You can also use the **+Add** page in the **Developer** perspective of the web console to create CI/CD pipelines for your software delivery process.

2.1. WORKING WITH RED HAT OPENSHIFT PIPELINES IN THE DEVELOPER PERSPECTIVE

In the **Developer** perspective, you can access the following options for creating pipelines from the **+Add** page:

- Use the **+Add → Pipelines → Pipeline builder** option to create customized pipelines for your application.
- Use the **+Add → From Git** option to create pipelines using pipeline templates and resources while creating an application.

After you create the pipelines for your application, you can view and visually interact with the deployed pipelines in the **Pipelines** view. You can also use the **Topology** view to interact with the pipelines created using the **From Git** option. You must apply custom labels to pipelines created using the **Pipeline builder** to see them in the **Topology** view.

Prerequisites

- You have access to an OpenShift Container Platform cluster and have switched to the **Developer** perspective.
- You have the OpenShift Pipelines Operator installed in your cluster.
- You are a cluster administrator or a user with create and edit permissions.
- You have created a project.

2.1.1. Constructing pipelines using the Pipeline builder

In the **Developer** perspective of the console, you can use the **+Add → Pipeline → Pipeline builder** option to:

- Configure pipelines using either the **Pipeline builder** or the **YAML view**.
- Construct a pipeline flow using existing tasks and cluster tasks. When you install the OpenShift Pipelines Operator, it adds reusable pipeline cluster tasks to your cluster.

IMPORTANT

In Red Hat OpenShift Pipelines 1.10, cluster task functionality is deprecated and is planned to be removed in a future release.

- Specify the type of resources required for the pipeline run, and if required, add additional parameters to the pipeline.

- Reference these pipeline resources in each of the tasks in the pipeline as input and output resources.
- If required, reference any additional parameters added to the pipeline in the task. The parameters for a task are prepopulated based on the specifications of the task.
- Use the Operator-installed, reusable snippets and samples to create detailed pipelines.
- Search and add tasks from your configured local Tekton Hub instance.

IMPORTANT

In the developer perspective, you can create a customized pipeline using your own set of curated tasks. To search, install, and upgrade your tasks directly from the developer console, your cluster administrator needs to install and deploy a local Tekton Hub instance and link that hub to the OpenShift Container Platform cluster. For more details, see *Using Tekton Hub with OpenShift Pipelines* in the *Additional resources* section. If you do not deploy any local Tekton Hub instance, by default, you can only access the cluster tasks, namespace tasks and public Tekton Hub tasks.

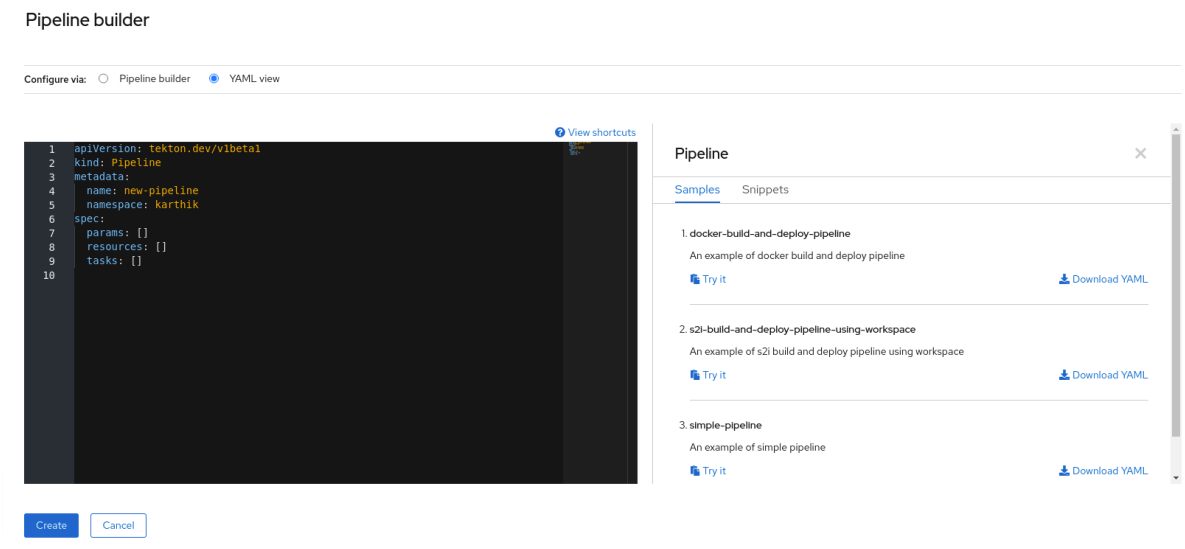
Procedure

1. In the **+Add** view of the **Developer** perspective, click the **Pipeline** tile to see the **Pipeline builder** page.
2. Configure the pipeline using either the **Pipeline builder** view or the **YAML view**.

NOTE

The **Pipeline builder** view supports a limited number of fields whereas the **YAML view** supports all available fields. Optionally, you can also use the Operator-installed, reusable snippets and samples to create detailed pipelines.

Figure 2.1. YAML view



3. Configure your pipeline by using **Pipeline builder**:
   a. In the **Name** field, enter a unique name for the pipeline.

b. In the **Tasks** section:

i. Click **Add task**.

ii. Search for a task using the quick search field and select the required task from the displayed list.

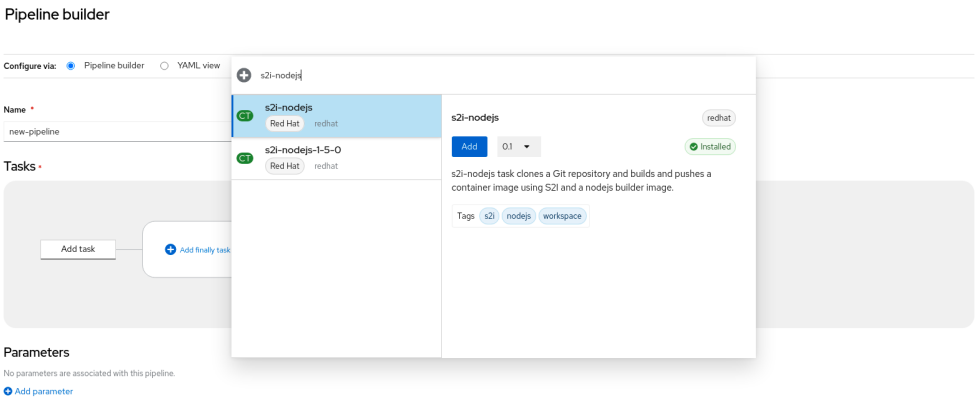
iii. Click **Add** or **Install and add**. In this example, use the **s2i-nodejs** task.

NOTE

The search list contains all the Tekton Hub tasks and tasks available in the cluster. Also, if a task is already installed it will show **Add** to add the task whereas it will show **Install and add** to install and add the task. It will show **Update and add** when you add the same task with an updated version.

- To add sequential tasks to the pipeline:
  - Click the plus icon to the right or left of the task → click **Add task**.
  - Search for a task using the quick search field and select the required task from the displayed list.
  - Click **Add** or **Install and add**.

Figure 2.2. Pipeline builder



- To add a final task:
  - Click the **Add finally task** → Click **Add task**.
  - Search for a task using the quick search field and select the required task from the displayed list.
  - Click **Add** or **Install and add**.

c. In the **Resources** section, click **Add Resources** to specify the name and type of resources for the pipeline run. These resources are then used by the tasks in the pipeline as inputs and outputs. For this example:

i. Add an input resource. In the **Name** field, enter **Source**, and then from the **Resource Type** drop-down list, select **Git**.

ii. Add an output resource. In the **Name** field, enter **Img**, and then from the **Resource Type** drop-down list, select **Image**.

NOTE

A red icon appears next to the task if a resource is missing.

d. Optional: The **Parameters** for a task are pre-populated based on the specifications of the task. If required, use the **Add Parameters** link in the **Parameters** section to add additional parameters.

e. In the **Workspaces** section, click **Add workspace** and enter a unique workspace name in the **Name** field. You can add multiple workspaces to the pipeline.

f. In the **Tasks** section, click the **s2i-nodejs** task to see the side panel with details for the task. In the task side panel, specify the resources and parameters for the **s2i-nodejs** task:

i. If required, in the **Parameters** section, add more parameters to the default ones, by using the $(params.<param-name>) syntax.

ii. In the **Image** section, enter **Img** as specified in the **Resources** section.

iii. Select a workspace from the **source** drop-down under **Workspaces** section.

g. Add resources, parameters, and workspaces to the **openshift-client** task.

4. Click **Create** to create and view the pipeline in the **Pipeline Details** page.

5. Click the **Actions** drop-down menu then click **Start**, to see the **Start Pipeline** page.

6. The **Workspaces** section lists the workspaces you created earlier. Use the respective drop-down to specify the volume source for your workspace. You have the following options: **Empty Directory**, **Config Map**, **Secret**, **PersistentVolumeClaim**, or **VolumeClaimTemplate**.

2.1.2. Creating OpenShift Pipelines along with applications

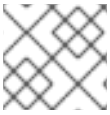
To create pipelines along with applications, use the **From Git** option in the **Add+** view of the **Developer** perspective. You can view all of your available pipelines and select the pipelines you want to use to create applications while importing your code or deploying an image.

The Tekton Hub Integration is enabled by default and you can see tasks from the Tekton Hub that are supported by your cluster. Administrators can opt out of the Tekton Hub Integration and the Tekton Hub tasks will no longer be displayed. You can also check whether a webhook URL exists for a generated pipeline. Default webhooks are added for the pipelines that are created using the **+Add** flow and the URL is visible in the side panel of the selected resources in the Topology view.

For more information, see Creating applications using the Developer perspective .

2.1.3. Adding a GitHub repository containing pipelines

In the **Developer** perspective, you can add your GitHub repository containing pipelines to the OpenShift Container Platform cluster. This allows you to run pipelines and tasks from your GitHub repository on the cluster when relevant Git events, such as push or pull requests, are triggered.



NOTE

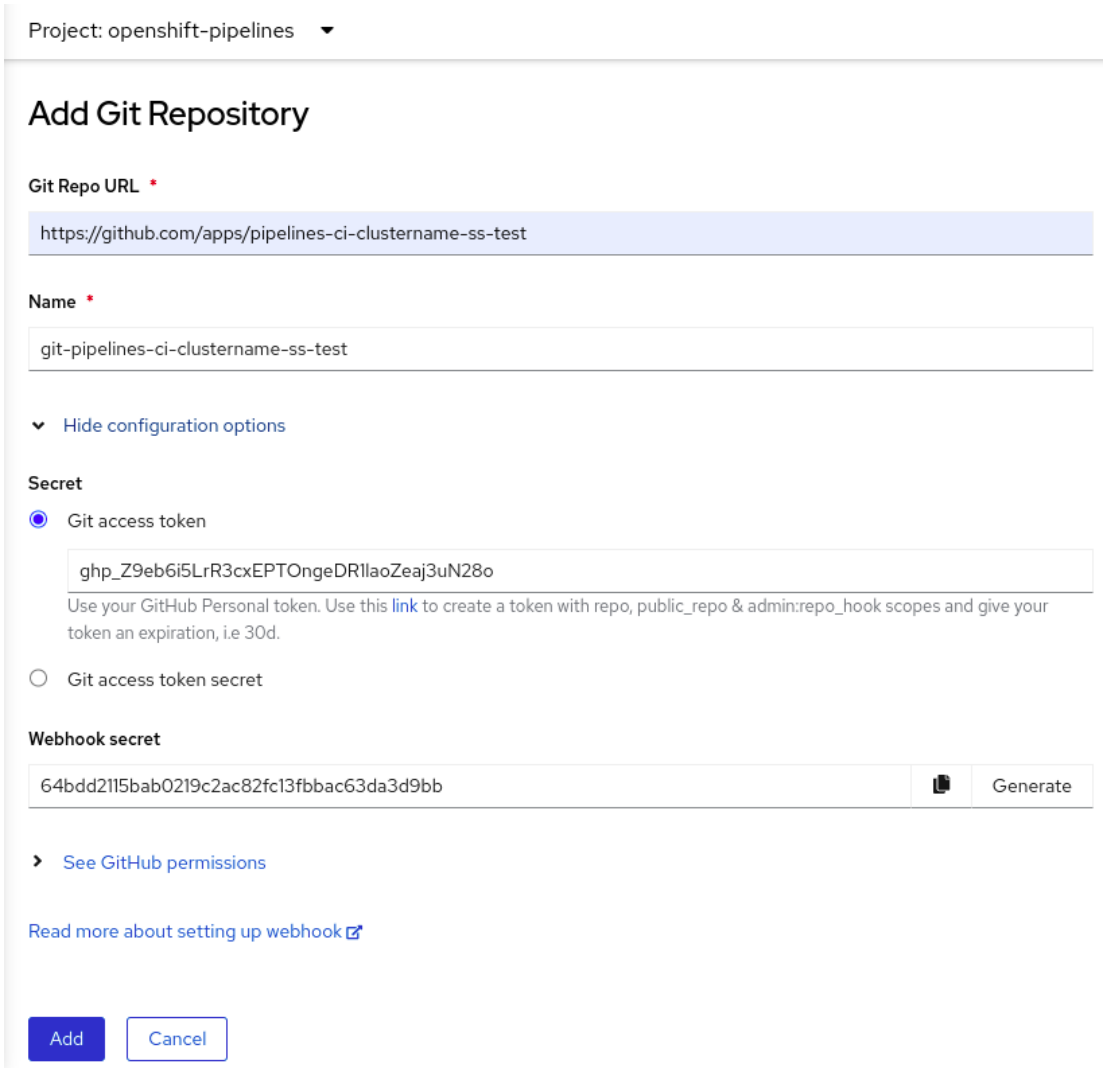
You can add both public and private GitHub repositories.

Prerequisites

- Ensure that your cluster administrator has configured the required GitHub applications in the administrator perspective.

Procedure

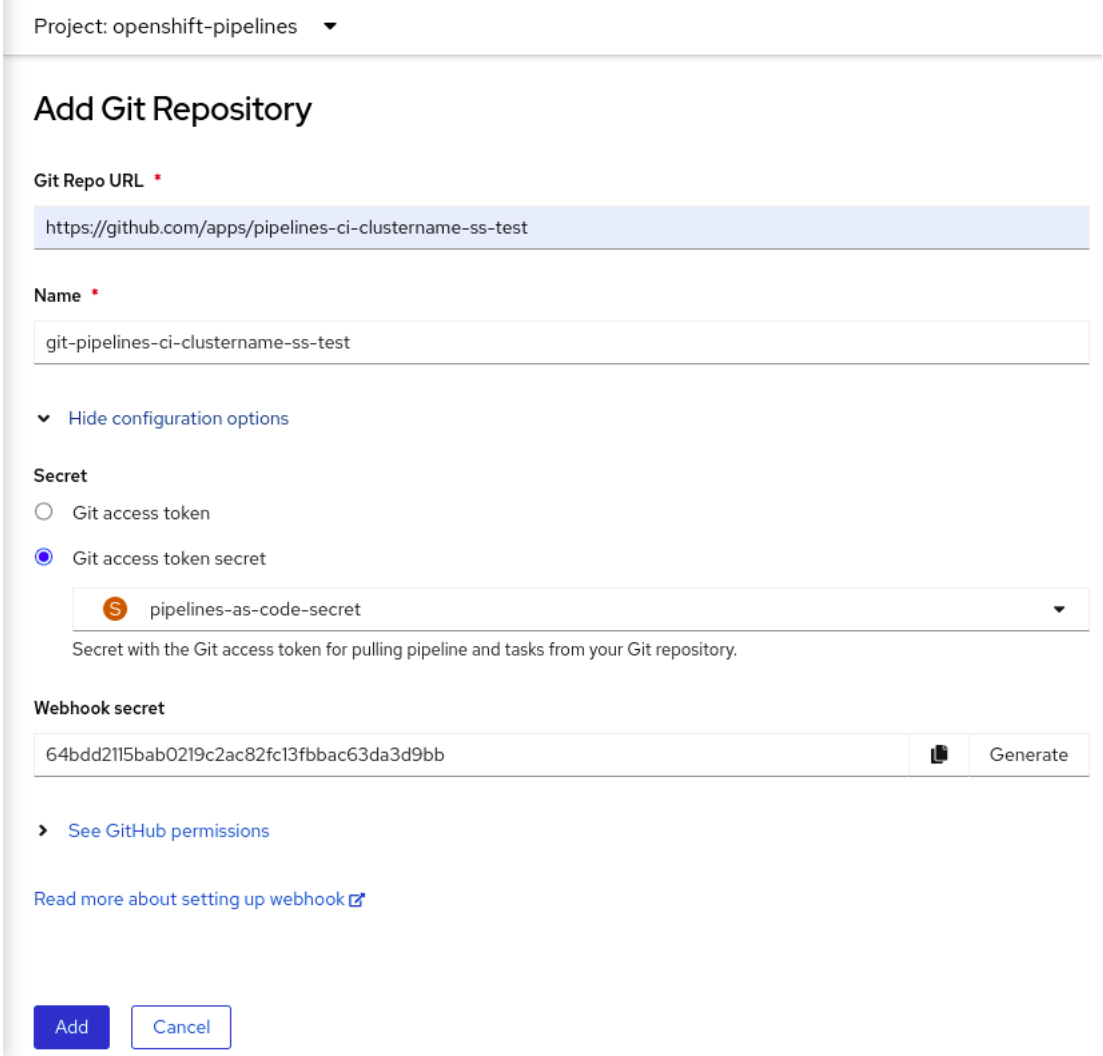
1. In the **Developer** perspective, choose the namespace or project in which you want to add your GitHub repository.
2. Navigate to **Pipelines** using the left navigation pane.
3. Click **Create → Repository** on the right side of the **Pipelines** page.
4. Enter your **Git Repo URL** and the console automatically fetches the repository name.
5. Click **Show configuration options**. By default, you see only one option **Setup a webhook**. If you have a GitHub application configured, you see two options:
   - **Use GitHub App**: Select this option to install your GitHub application in your repository.
   - **Setup a webhook**: Select this option to add a webhook to your GitHub application.
6. Set up a webhook using one of the following options in the **Secret** section:
   - Setup a webhook using **Git access token**:
     a. Enter your personal access token.
     b. Click **Generate** corresponding to the **Webhook secret** field to generate a new webhook secret.



NOTE

You can click the link below the **Git access token** field if you do not have a personal access token and want to create a new one.

- Setup a webhook using **Git access token secret**
    - Select a secret in your namespace from the dropdown list. Depending on the secret you selected, a webhook secret is automatically generated.



7. Add the webhook secret details to your GitHub repository:
    a. Copy the **webhook URL** and navigate to your GitHub repository settings.
    b. Click **Webhooks → Add webhook**.
    c. Copy the **Webhook URL** from the developer console and paste it in the **Payload URL** field of the GitHub repository settings.
    d. Select the **Content type**.
    e. Copy the **Webhook secret** from the developer console and paste it in the **Secret** field of the GitHub repository settings.
    f. Select one of the **SSL verification** options.
    g. Select the events to trigger this webhook.
    h. Click **Add webhook**.
8. Navigate back to the developer console and click **Add**.
9. Read the details of the steps that you have to perform and click **Close**.
10. View the details of the repository you just created.

NOTE

When importing an application using **Import from Git** and the Git repository has a **.tekton** directory, you can configure **pipelines-as-code** for your application.

2.1.4. Interacting with pipelines using the Developer perspective

The **Pipelines** view in the **Developer** perspective lists all the pipelines in a project, along with the following details:

- The namespace in which the pipeline was created
- The last pipeline run
- The status of the tasks in the pipeline run
- The status of the pipeline run
- The creation time of the last pipeline run

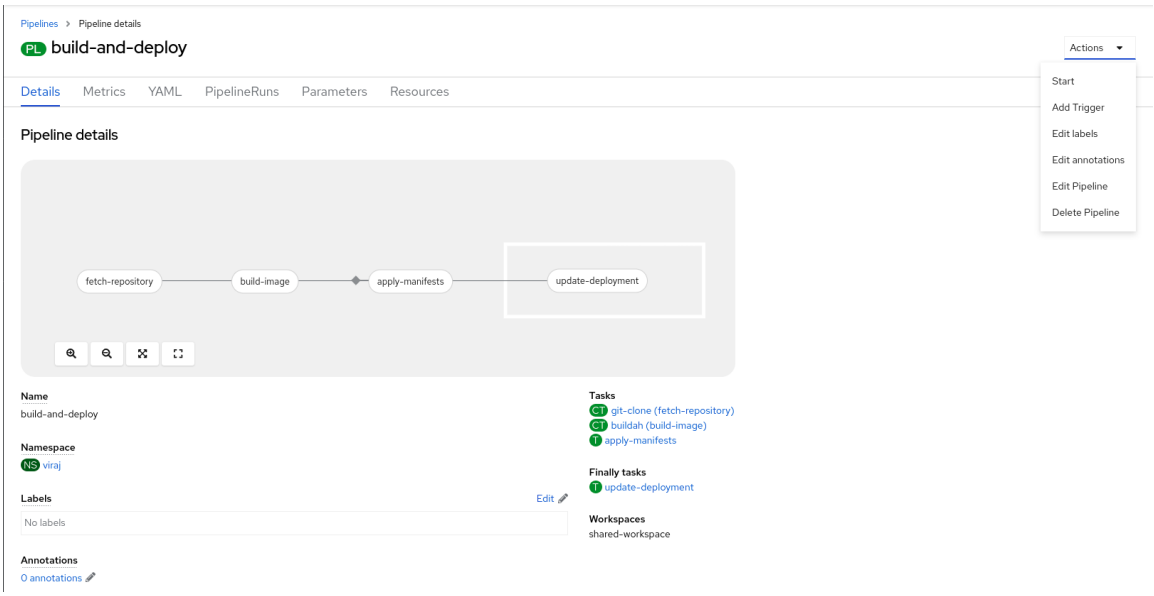
Procedure

1. In the **Pipelines** view of the **Developer** perspective, select a project from the **Project** drop-down list to see the pipelines in that project.
2. Click the required pipeline to see the **Pipeline details** page.
   By default, the **Details** tab displays a visual representation of all the **serial** tasks, **parallel** tasks, **finally** tasks, and **when** expressions in the pipeline. The tasks and the **finally** tasks are listed in the lower right portion of the page.

   To view the task details, click the listed **Tasks** and **Finally** tasks. In addition, you can do the following:

   - Use the zoom in, zoom out, fit to screen, and reset view features using the standard icons displayed in the lower left corner of the **Pipeline details** visualization.
   - Change the zoom factor of the pipeline visualization using the mouse wheel.
   - Hover over the tasks and see the task details.

Figure 2.3. Pipeline details



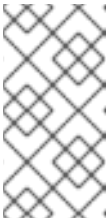
3. Optional: On the **Pipeline details** page, click the **Metrics** tab to see the following information about pipelines:

   - **Pipeline Success Ratio**
   - **Number of Pipeline Runs**
   - **Pipeline Run Duration**
   - **Task Run Duration**
     You can use this information to improve the pipeline workflow and eliminate issues early in the pipeline lifecycle.

4. Optional: Click the **YAML** tab to edit the YAML file for the pipeline.

5. Optional: Click the **Pipeline Runs** tab to see the completed, running, or failed runs for the pipeline.
   The **Pipeline Runs** tab provides details about the pipeline run, the status of the task, and a link to debug failed pipeline runs. Use the Options menu ⋮ to stop a running pipeline, to rerun a pipeline using the same parameters and resources as that of the previous pipeline execution, or to delete a pipeline run.

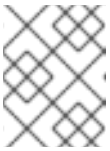
   - Click the required pipeline run to see the **Pipeline Run details** page. By default, the **Details** tab displays a visual representation of all the serial tasks, parallel tasks, **finally** tasks, and when expressions in the pipeline run. The results for successful runs are displayed under the **Pipeline Run results** pane at the bottom of the page. Additionally, you would only be able to see tasks from Tekton Hub which are supported by the cluster. While looking at a task, you can click the link beside it to jump to the task documentation.



NOTE

The **Details** section of the **Pipeline Run Details** page displays a **Log Snippet** of the failed pipeline run. **Log Snippet** provides a general error message and a snippet of the log. A link to the **Logs** section provides quick access to the details about the failed run.

- On the **Pipeline Run details** page, click the **Task Runs** tab to see the completed, running, and failed runs for the task.
  The **Task Runs** tab provides information about the task run along with the links to its task and pod, and also the status and duration of the task run. Use the Options menu to delete a task run.



NOTE

The **TaskRuns** list page features a **Manage columns** button, which you can also use to add a **Duration** column.

- Click the required task run to see the **Task Run details** page. The results for successful runs are displayed under the **Task Run results** pane at the bottom of the page.

NOTE

The **Details** section of the **Task Run details** page displays a **Log Snippet** of the failed task run. **Log Snippet** provides a general error message and a snippet of the log. A link to the **Logs** section provides quick access to the details about the failed task run.

6. Click the **Parameters** tab to see the parameters defined in the pipeline. You can also add or edit additional parameters, as required.
7. Click the **Resources** tab to see the resources defined in the pipeline. You can also add or edit additional resources, as required.

2.1.5. Starting pipelines from Pipelines view

After you create a pipeline, you need to start it to execute the included tasks in the defined sequence. You can start a pipeline from the **Pipelines** view, the **Pipeline Details** page, or the **Topology** view.

Procedure

To start a pipeline using the **Pipelines** view:

1. In the **Pipelines** view of the **Developer** perspective, click the **Options** menu adjoining a pipeline, and select **Start**.
2. The **Start Pipeline** dialog box displays the **Git Resources** and the **Image Resources** based on the pipeline definition.

NOTE

For pipelines created using the **From Git** option, the **Start Pipeline** dialog box also displays an **APP_NAME** field in the **Parameters** section, and all the fields in the dialog box are prepopulated by the pipeline template.

   a. If you have resources in your namespace, the **Git Resources** and the **Image Resources** fields are prepopulated with those resources. If required, use the drop-downs to select or create the required resources and customize the pipeline run instance.

3. Optional: Modify the **Advanced Options** to add the credentials that authenticate the specified private Git server or the image registry.

   a. Under **Advanced Options**, click **Show Credentials Options** and select **Add Secret**.

   b. In the **Create Source Secret** section, specify the following:

      i. A unique **Secret Name** for the secret.

      ii. In the **Designated provider to be authenticated** section, specify the provider to be authenticated in the **Access to** field, and the base **Server URL**.

      iii. Select the **Authentication Type** and provide the credentials:

      - For the **Authentication Type Image Registry Credentials**, specify the **Registry Server Address** that you want to authenticate, and provide your credentials in the **Username**, **Password**, and **Email** fields.
        Select **Add Credentials** if you want to specify an additional **Registry Server Address**.
      - For the **Authentication Type Basic Authentication**, specify the values for the **UserName** and **Password or Token** fields.
      - For the **Authentication Type SSH Keys**, specify the value of the **SSH Private Key** field.

      NOTE

      For basic authentication and SSH authentication, you can use annotations such as:

      - **tekton.dev/git-0: https://github.com**
      - **tekton.dev/git-1: https://gitlab.com**.

      iv. Select the check mark to add the secret.

   You can add multiple secrets based upon the number of resources in your pipeline.

4. Click **Start** to start the pipeline.

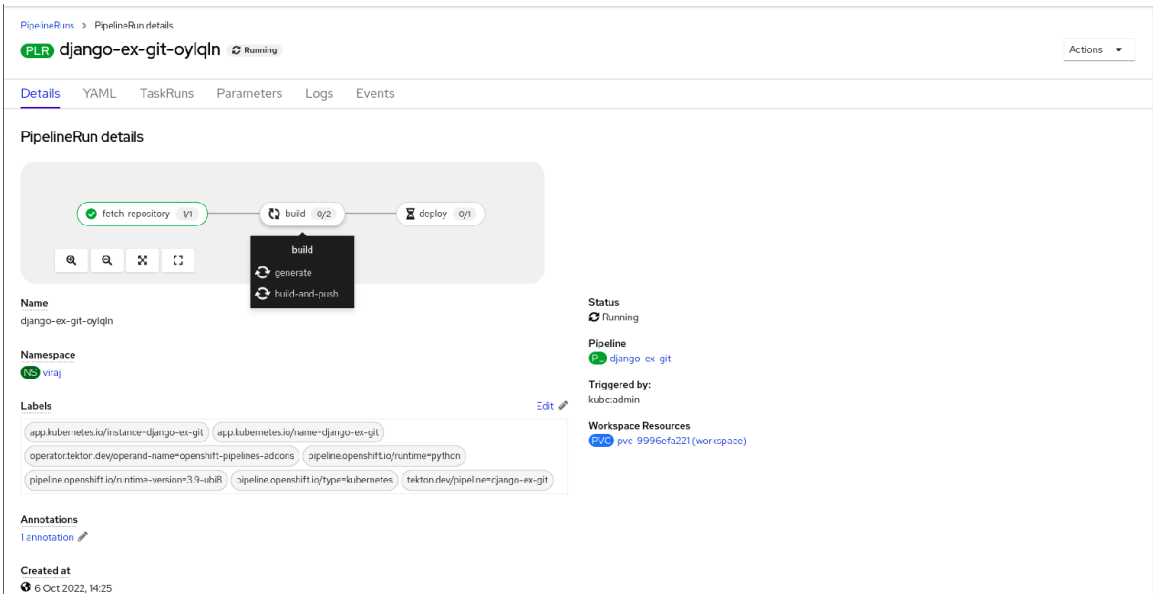
5. The **PipelineRun details** page displays the pipeline being executed. After the pipeline starts, the tasks and steps within each task are executed. You can:

   - Use the zoom in, zoom out, fit to screen, and reset view features using the standard icons, which are in the lower left corner of the **PipelineRun details** page visualization.
   - Change the zoom factor of the pipelinerun visualization using the mouse wheel. At specific zoom factors, the background color of the tasks changes to indicate the error or warning status.
   - Hover over the tasks to see the details, such as the time taken to execute each step, task name, and task status.
   - Hover over the tasks badge to see the total number of tasks and tasks completed.
   - Click on a task to see the logs for each step in the task.

- Click the **Logs** tab to see the logs relating to the execution sequence of the tasks. You can also expand the pane and download the logs individually or in bulk, by using the relevant button.

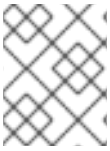
- Click the **Events** tab to see the stream of events generated by a pipeline run.
  You can use the **Task Runs**, **Logs**, and **Events** tabs to assist in debugging a failed pipeline run or a failed task run.

Figure 2.4. Pipeline run details



2.1.6. Starting pipelines from Topology view

For pipelines created using the **From Git** option, you can use the **Topology** view to interact with pipelines after you start them:



NOTE

To see the pipelines created using **Pipeline builder** in the **Topology** view, customize the pipeline labels to link the pipeline with the application workload.

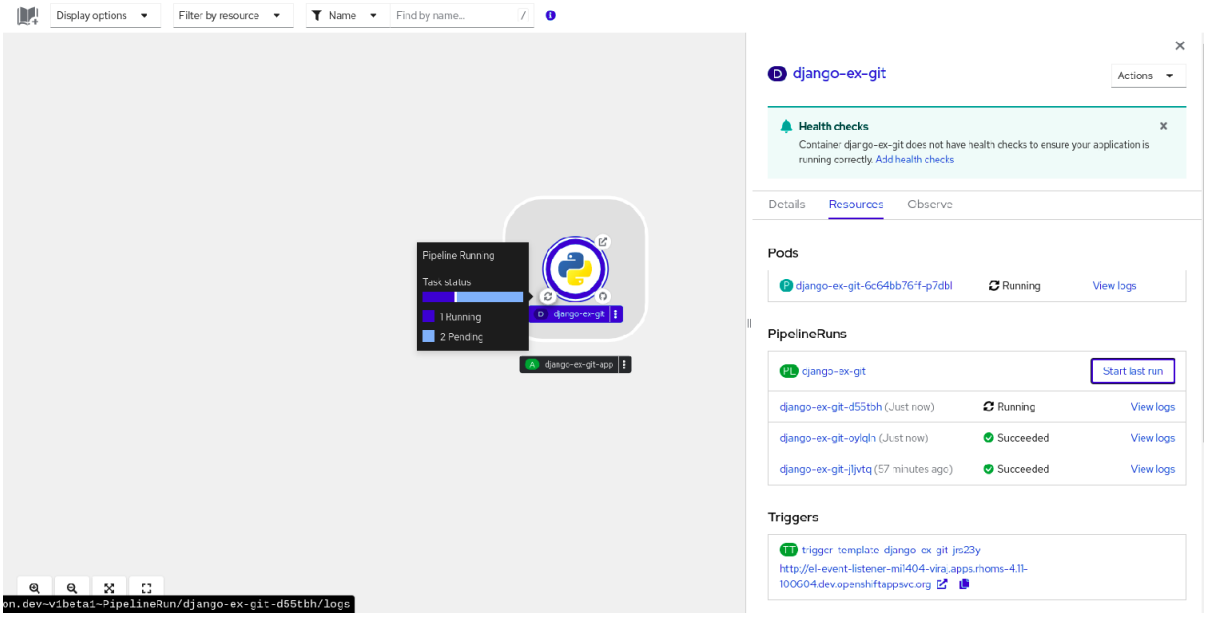
Procedure

1. Click **Topology** in the left navigation panel.

2. Click the application to display **Pipeline Runs** in the side panel.

3. In **Pipeline Runs**, click **Start Last Run** to start a new pipeline run with the same parameters and resources as the previous one. This option is disabled if a pipeline run has not been initiated. You can also start a pipeline run when you create it.

Figure 2.5. Pipelines in Topology view



In the **Topology** page, hover to the left of the application to see the status of its pipeline run. After a pipeline is added, a bottom left icon indicates that there is an associated pipeline.

2.1.7. Interacting with pipelines from Topology view

The side panel of the application node in the **Topology** page displays the status of a pipeline run and you can interact with it.

- If a pipeline run does not start automatically, the side panel displays a message that the pipeline cannot be automatically started, hence it would need to be started manually.
- If a pipeline is created but the user has not started the pipeline, its status is not started. When the user clicks the **Not started** status icon, the start dialog box opens in the **Topology** view.
- If the pipeline has no build or build config, the **Builds** section is not visible. If there is a pipeline and build config, the **Builds section** is visible.
- The side panel displays a **Log Snippet** when a pipeline run fails on a specific task run. You can view the **Log Snippet** in the **Pipeline Runs** section, under the **Resources** tab. It provides a general error message and a snippet of the log. A link to the **Logs** section provides quick access to the details about the failed run.

2.1.8. Editing pipelines

You can edit the pipelines in your cluster using the **Developer** perspective of the web console:

Procedure

1. In the **Pipelines** view of the **Developer** perspective, select the pipeline you want to edit to see the details of the pipeline. In the **Pipeline Details** page, click **Actions** and select **Edit Pipeline**.
2. On the **Pipeline builder** page, you can perform the following tasks:
   - Add additional tasks, parameters, or resources to the pipeline.

- Click the task you want to modify to see the task details in the side panel and modify the required task details, such as the display name, parameters, and resources.
- Alternatively, to delete the task, click the task, and in the side panel, click **Actions** and select **Remove Task**.

3. Click **Save** to save the modified pipeline.

2.1.9. Deleting pipelines

You can delete the pipelines in your cluster using the **Developer** perspective of the web console.

Procedure

1. In the **Pipelines** view of the **Developer** perspective, click the **Options** menu adjoining a Pipeline, and select **Delete Pipeline**.
2. In the **Delete Pipeline** confirmation prompt, click **Delete** to confirm the deletion.

2.2. ADDITIONAL RESOURCES

- Using Tekton Hub with OpenShift Pipelines

2.3. CREATING PIPELINE TEMPLATES IN THE ADMINISTRATOR PERSPECTIVE

As a cluster administrator, you can create pipeline templates that developers can reuse when they create a pipeline on the cluster.

Prerequisites

- You have access to an OpenShift Container Platform cluster with cluster administrator permissions, and have switched to the **Administrator** perspective.
- You have installed the OpenShift Pipelines Operator in your cluster.

Procedure

1. Navigate to the **Pipelines** page to view existing pipeline templates.
2. Click the icon to go to the **Import YAML** page.
3. Add the YAML for your pipeline template. The template must include the following information:

```
apiVersion: tekton.dev/v1beta1
kind: Pipeline
metadata:
# ...
 namespace: openshift 1
 labels:
```

```
    pipeline.openshift.io/runtime: <runtime> 2
    pipeline.openshift.io/type: <pipeline-type> 3
# ...
```

1. The template must be created in the **openshift** namespace.
2. The template must contain the **pipeline.openshift.io/runtime** label. The accepted runtime values for this label are **nodejs**, **golang**, **dotnet**, **java**, **php**, **ruby**, **perl**, **python**, **nginx**, and **httpd**.
3. The template must contain the **pipeline.openshift.io/type:** label. The accepted type values for this label are **openshift**, **knative**, and **kubernetes**.

4. Click **Create**. After the pipeline has been created, you are taken to the **Pipeline details** page, where you can view information about or edit your pipeline.

CHAPTER 3. SPECIFYING REMOTE PIPELINES AND TASKS USING RESOLVERS

Pipelines and tasks are reusable blocks for your CI/CD processes. You can reuse pipelines or tasks that you previously developed, or that were developed by others, without having to copy and paste their definitions. These pipelines or tasks can be available from several types of sources, from other namespaces on your cluster to public catalogs.

In a pipeline run resource, you can specify a pipeline from an existing source. In a pipeline resource or a task run resource, you can specify a task from an existing source.

In these cases, the *resolvers* in Red Hat OpenShift Pipelines retrieve the pipeline or task definition from the specified source at run time.

The following resolvers are available in a default installaton of Red Hat OpenShift Pipelines:

Hub resolver

Retrieves a task or pipeline from the Pipelines Catalog available on Artifact Hub or Tekton Hub.

Bundles resolver

Retrieves a task or pipeline from a Tekton bundle, which is an OCI image available from any OCI repository, such as an OpenShift container repository.

Cluster resolver

Retrieves a task or pipeline that is already created on the same OpenShift Container Platform cluster in a specific namespace.

Git resolver

Retrieves a task or pipeline binding from a Git repository. You must specify the repository, the branch, and the path.

3.1. SPECIFYING A REMOTE PIPELINE OR TASK FROM A TEKTON CATALOG

You can use the hub resolver to specify a remote pipeline or task that is defined either in a public Tekton catalog of Artifact Hub or in an instance of Tekton Hub.

IMPORTANT

The Artifact Hub project is not supported with Red Hat OpenShift Pipelines. Only the configuration of Artifact Hub is supported.

3.1.1. Configuring the hub resolver

You can change the default hub for pulling a resource, and the default catalog settings, by configuring the hub resolver.

Procedure

1. To edit the **TektonConfig** custom resource, enter the following command:

```
$ oc edit TektonConfig config
```

2. In the **TektonConfig** custom resource, edit the **pipeline.hub-resolver-config** spec:

```
apiVersion: operator.tekton.dev/v1alpha1
kind: TektonConfig
metadata:
  name: config
spec:
  pipeline:
    hub-resolver-config:
      default-tekton-hub-catalog: Tekton (1)
      default-artifact-hub-task-catalog: tekton-catalog-tasks (2)
      default-artifact-hub-pipeline-catalog: tekton-catalog-pipelines (3)
      defailt-kind: pipeline (4)
      default-type: tekton (5)
      tekton-hub-api: "https://my-custom-tekton-hub.example.com" (6)
      artifact-hub-api: "https://my-custom-artifact-hub.example.com" (7)
```

1. The default Tekton Hub catalog for pulling a resource.
2. The default Artifact Hub catalog for pulling a task resource.
3. The default Artifact Hub catalog for pulling a pipeline resource.
4. The default object kind for references.
5. The default hub for pulling a resource, either **artifact** for Artifact Hub or **tekton** for Tekton Hub.
6. The Tekton Hub API used, if the **default-type** option is set to **tekton**.
7. Optional: The Artifact Hub API used, if the **default-type** option is set to **artifact**.

IMPORTANT

If you set the **default-type** option to **tekton**, you must configure your own instance of the Tekton Hub by setting the **tekton-hub-api** value.

If you set the **default-type** option to **artifact** then the resolver uses the public hub API at https://artifacthub.io/ by default. You can configure your own Artifact Hub API by setting the **artifact-hub-api** value.

3.1.2. Specifying a remote pipeline or task using the hub resolver

When creating a pipeline run, you can specify a remote pipeline from Artifact Hub or Tekton Hub. When creating a pipeline or a task run, you can specify a remote task from Artifact Hub or Tekton Hub.

Procedure

- To specify a remote pipeline or task from Artifact Hub or Tekton Hub, use the following reference format in the **pipelineRef** or **taskRef** spec:

```
# ...
  resolver: hub
  params:
  - name: catalog
```

```
    value: <catalog>
  - name: type
    value: <catalog_type>
  - name: kind
    value: [pipeline|task]
  - name: name
    value: <resource_name>
  - name: version
    value: <resource_version>
# ...
```

Table 3.1. Supported parameters for the hub resolver

Parameter	Description	Example value
catalog	The catalog for pulling the resource.	Default: **tekton-catalog-tasks** (for the **task** kind); **tekton-catalog-pipelines** (for the **pipeline** kind).
type	The type of the catalog for pulling the resource. Either **artifact** for Artifact Hub or **tekton** for Tekton Hub.	Default: **artifact**
kind	Either **task** or **pipeline**.	Default: **task**
name	The name of the task or pipeline to fetch from the hub.	**golang-build**
version	The version of the task or pipeline to fetch from the hub. You must use quotes (**"**) around the number.	**"0.5.0"**

If the pipeline or task requires additional parameters, provide these parameters in **params**.

The following example pipeline run references a remote pipeline from a catalog:

```
apiVersion: tekton.dev/v1beta1
kind: PipelineRun
metadata:
  name: hub-pipeline-reference-demo
spec:
  pipelineRef:
    resolver: hub
    params:
    - name: catalog
      value: tekton-catalog-pipelines
    - name: type
      value: artifact
    - name: kind
      value: pipeline
```

```
    - name: name
      value: example-pipeline
    - name: version
      value: "0.1"
    - name: sample-pipeline-parameter
      value: test
```

The following example pipeline that references a remote task from a catalog:

```
apiVersion: tekton.dev/v1
kind: Pipeline
metadata:
  name: pipeline-with-cluster-task-reference-demo
spec:
  tasks:
  - name: "cluster-task-reference-demo"
    taskRef:
      resolver: hub
      params:
      - name: catalog
        value: tekton-catalog-tasks
      - name: type
        value: artifact
      - name: kind
        value: task
      - name: name
        value: example-task
      - name: version
        value: "0.6"
      - name: sample-task-parameter
        value: test
```

The following example task run that references a remote task from a catalog:

```
apiVersion: tekton.dev/v1beta1
kind: TaskRun
metadata:
  name: cluster-task-reference-demo
spec:
  taskRef:
    resolver: hub
    params:
    - name: catalog
      value: tekton-catalog-tasks
    - name: type
      value: artifact
    - name: kind
      value: task
    - name: name
      value: example-task
    - name: version
      value: "0.6"
    - name: sample-task-parameter
      value: test
```

3.2. SPECIFYING A REMOTE PIPELINE OR TASK FROM A TEKTON BUNDLE

You can use the bundles resolver to specify a remote pipeline or task from a Tekton bundle. A Tekton bundle is an OCI image available from any OCI repository, such as an OpenShift container repository.

3.2.1. Configuring the bundles resolver

You can change the default service account name and the default kind for pulling resources from a Tekton bundle by configuring the bundles resolver.

Procedure

1. To edit the **TektonConfig** custom resource, enter the following command:

```
$ oc edit TektonConfig config
```

2. In the **TektonConfig** custom resource, edit the **pipeline.bundles-resolver-config** spec:

```
apiVersion: operator.tekton.dev/v1alpha1
kind: TektonConfig
metadata:
  name: config
spec:
  pipeline:
    bundles-resolver-config:
      default-service-account: pipelines 1
      default-kind: task 2
```

1. The default service account name to use for bundle requests.
2. The default layer kind in the bundle image.

3.2.2. Specifying a remote pipeline or task using the bundles resolver

When creating a pipeline run, you can specify a remote pipeline from a Tekton bundle. When creating a pipeline or a task run, you can specify a remote task from a Tekton bundle.

Procedure

- To specify a remote pipeline or task from a Tekton bundle, use the following reference format in the **pipelineRef** or **taskRef** spec:

```
# ...
  resolver: bundles
  params:
  - name: bundle
    value: <fully_qualified_image_name>
  - name: name
    value: <resource_name>
```

```
    - name: kind
      value: [pipeline|task]
  # ...
```

Table 3.2. Supported parameters for the bundles resolver

Parameter	Description	Example value
serviceAccount	The name of the service account to use when constructing registry credentials.	**default**
bundle	The bundle URL pointing at the image to fetch.	**gcr.io/tekton-releases/catalog/upstream/golang-build:0.1**
name	The name of the resource to pull out of the bundle.	**golang-build**
kind	The kind of the resource to pull out of the bundle.	**task**

If the pipeline or task requires additional parameters, provide these parameters in **params**.

The following example pipeline run references a remote pipeline from a Tekton bundle:

```
apiVersion: tekton.dev/v1beta1
kind: PipelineRun
metadata:
  name: bundle-pipeline-reference-demo
spec:
  pipelineRef:
    resolver: bundles
    params:
    - name: bundle
      value: registry.example.com:5000/simple/pipeline:latest
    - name: name
      value: hello-pipeline
    - name: kind
      value: pipeline
    - name: sample-pipeline-parameter
      value: test
  params:
  - name: username
    value: "pipelines"
```

The following example pipeline references a remote task from a Tekton bundle:

```
apiVersion: tekton.dev/v1
kind: Pipeline
metadata:
  name: pipeline-with-bundle-task-reference-demo
```

```
spec:
  tasks:
  - name: "bundle-task-demo"
    taskRef:
      resolver: bundles
      params:
      - name: bundle
        value: registry.example.com:5000/advanced/task:latest
      - name: name
        value: hello-world
      - name: kind
        value: task
      - name: sample-task-parameter
        value: test
```

The following example task run references a remote task from a Tekton bundle:

```
apiVersion: tekton.dev/v1beta1
kind: TaskRun
metadata:
  name: bundle-task-reference-demo
spec:
  taskRef:
    resolver: bundles
    params:
    - name: bundle
      value: registry.example.com:5000/simple/new_task:latest
    - name: name
      value: hello-world
    - name: kind
      value: task
    - name: sample-task-parameter
      value: test
```

3.3. SPECIFYING A REMOTE PIPELINE OR TASK FROM THE SAME CLUSTER

You can use the cluster resolver to specify a remote pipeline or task that is defined in a namespace on the OpenShift Container Platform cluster where Red Hat OpenShift Pipelines is running.

3.3.1. Configuring the cluster resolver

You can change the default kind and namespace for the cluster resolver, or limit the namespaces that the cluster resolver can use.

Procedure

1. To edit the **TektonConfig** custom resource, enter the following command:

```
$ oc edit TektonConfig config
```

2. In the **TektonConfig** custom resource, edit the **pipeline.cluster-resolver-config** spec:

```
apiVersion: operator.tekton.dev/v1alpha1
kind: TektonConfig
metadata:
  name: config
spec:
  pipeline:
    cluster-resolver-config:
      default-kind: pipeline (1)
      default-namespace: namespace1 (2)
      allowed-namespaces: namespace1, namespace2 (3)
      blocked-namespaces: namespace3, namespace4 (4)
```

1. The default resource kind to fetch, if not specified in parameters.
2. The default namespace for fetching resources, if not specified in parameters.
3. A comma-separated list of namespaces that the resolver is allowed to access. If this key is not defined, all namespaces are allowed.
4. An optional comma-separated list of namespaces which the resolver is blocked from accessing. If this key is not defined, all namespaces are allowed.

3.3.2. Specifying a remote pipeline or task using the cluster resolver

When creating a pipeline run, you can specify a remote pipeline from the same cluster. When creating a pipeline or a task run, you can specify a remote task from the same cluster.

Procedure

- To specify a remote pipeline or task from the same cluster, use the following reference format in the **pipelineRef** or **taskRef** spec:

```
# ...
  resolver: cluster
  params:
  - name: name
    value: <name>
  - name: namespace
    value: <namespace>
  - name: kind
    value: [pipeline|task]
# ...
```

Table 3.3. Supported parameters for the cluster resolver

Parameter	Description	Example value
name	The name of the resource to fetch.	**some-pipeline**
namespace	The namespace in the cluster containing the resource.	**other-namespace**

Parameter	Description	Example value
kind	The kind of the resource to fetch.	**pipeline**

If the pipeline or task requires additional parameters, provide these parameters in **params**.

The following example pipeline run references a remote pipeline from the same cluster:

```
apiVersion: tekton.dev/v1beta1
kind: PipelineRun
metadata:
  name: cluster-pipeline-reference-demo
spec:
  pipelineRef:
    resolver: cluster
    params:
    - name: name
      value: some-pipeline
    - name: namespace
      value: test-namespace
    - name: kind
      value: pipeline
    - name: sample-pipeline-parameter
      value: test
```

The following example pipeline references a remote task from the same cluster:

```
apiVersion: tekton.dev/v1
kind: Pipeline
metadata:
  name: pipeline-with-cluster-task-reference-demo
spec:
  tasks:
  - name: "cluster-task-reference-demo"
    taskRef:
      resolver: cluster
      params:
      - name: name
        value: some-task
      - name: namespace
        value: test-namespace
      - name: kind
        value: task
      - name: sample-task-parameter
        value: test
```

The following example task run references a remote task from the same cluster:

```
apiVersion: tekton.dev/v1beta1
kind: TaskRun
metadata:
  name: cluster-task-reference-demo
```

```
spec:
  taskRef:
    resolver: cluster
    params:
    - name: name
      value: some-task
    - name: namespace
      value: test-namespace
    - name: kind
      value: task
    - name: sample-task-parameter
      value: test
```

3.4. SPECIFYING A REMOTE PIPELINE OR TASK FROM A GIT REPOSITORY

You can use the Git resolver to specify a remote pipeline or task from a Git repostory. The repository must contain a YAML file that defines the pipeline or task. The Git resolver can access a repository either by cloning it anonymously or else by using the authenticated SCM API.

3.4.1. Configuring the Git resolver for anonymous Git cloning

If you want to use anonymous Git cloning, you can configure the default Git revision, fetch timeout, and default repository URL for pulling remote pipelines and tasks from a Git repository.

Procedure

1. To edit the **TektonConfig** custom resource, enter the following command:

```
$ oc edit TektonConfig config
```

2. In the **TektonConfig** custom resource, edit the **pipeline.git-resolver-config** spec:

```
apiVersion: operator.tekton.dev/v1alpha1
kind: TektonConfig
metadata:
  name: config
spec:
  pipeline:
    git-resolver-config:
      default-revision: main (1)
      fetch-timeout: 1m (2)
      default-url: https://github.com/tektoncd/catalog.git (3)
```

(1) The default Git revision to use if none is specified.

(2) The maximum time any single Git clone resolution may take, for example, **1m**, **2s**, **700ms**. Red Hat OpenShift Pipelines also enforces a global maximum timeout of 1 minute on all resolution requests.

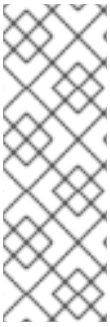
(3) The default Git repository URL for anonymous cloning if none is specified.

3.4.2. Configuring the Git resolver for the authenticated SCM API

For the authenticated SCM API, you must set the configuration for the authenticated Git connection.

You can use Git repository providers that are supported by the **go-scm** library. Not all **go-scm** implementations have been tested with the Git resolver, but the following providers are known to work:

- **github.com** and GitHub Enterprise
- **gitlab.com** and self-hosted Gitlab
- Gitea
- BitBucket Server
- BitBucket Cloud



NOTE

- You can configure only one Git connection using the authenticated SCM API for your cluster. This connection becomes available to all users of the cluster. All users of the cluster can access the repository using the security token that you configure for the connection.
- If you configure the Git resolver to use the authenticated SCM API, you can also use anonymous Git clone references to retrieve pipelines and tasks.

Procedure

1. To edit the **TektonConfig** custom resource, enter the following command:

```
$ oc edit TektonConfig config
```

2. In the **TektonConfig** custom resource, edit the **pipeline.git-resolver-config** spec:

```
apiVersion: operator.tekton.dev/v1alpha1
kind: TektonConfig
metadata:
  name: config
spec:
  pipeline:
    git-resolver-config:
      default-revision: main 1
      fetch-timeout: 1m 2
      scm-type: github 3
      server-url: api.internal-github.com 4
      api-token-secret-name: github-auth-secret 5
      api-token-secret-key: github-auth-key 6
      api-token-secret-namespace: github-auth-namespace 7
      default-org: tektoncd 8
```

1. The default Git revision to use if none is specified.
2. The maximum time any single Git clone resolution may take, for example, **1m**, **2s**, **700ms**. Red Hat OpenShift Pipelines also enforces a global maximum timeout of 1 minute on all

resolution requests.

3. The SCM provider type.
4. The base URL for use with the authenticated SCM API. This setting is not required if you are using **github.com**, **gitlab.com**, or BitBucket Cloud.
5. The name of the secret that contains the SCM provider API token.
6. The key within the token secret that contains the token.
7. The namespace containing the token secret, if not **default**.
8. Optional: The default organization for the repository, when using the authenticated API. This organization is used if you do not specify an organization in the resolver parameters.

NOTE

The **scm-type**, **api-token-secret-name**, and **api-token-secret-key** settings are required to use the authenticated SCM API.

3.4.3. Specifying a remote pipeline or task using the Git resolver

When creating a pipeline run, you can specify a remote pipeline from a Git repository. When creating a pipeline or a task run, you can specify a remote task from a Git repository.

Prerequisites

- If you want to use the authenticated SCM API, you must configure the authenticated Git connection for the Git resolver.

Procedure

1. To specify a remote pipeline or task from a Git repository, use the following reference format in the **pipelineRef** or **taskRef** spec:

```
# ...
  resolver: git
  params:
  - name: url
    value: <git_repository_url>
  - name: revision
    value: <branch_name>
  - name: pathInRepo
    value: <path_in_repository>
# ...
```

Table 3.4. Supported parameters for the Git resolver

Parameter	Description	Example value

Parameter	Description	Example value
url	The URL of the repository, when using anonymous cloning.	**https://github.com/tektoncd/catalog.git**
repo	The repository name, when using the authenticated SCM API.	**test-infra**
org	The organization for the repository, when using the authenticated SCM API.	**tektoncd**
revision	The Git revision in the repository. You can specify a branch name, a tag name, or a commit SHA hash.	**aeb957601cf41c012be462827053a21a420befca** **main** **v0.38.2**
pathInRepo	The path name of the YAML file in the repository.	**task/golang-build/0.3/golang-build.yaml**

NOTE

To clone and fetch the repository anonymously, use the **url** parameter. To use the authenticated SCM API, use the **repo** parameter. Do not specify the **url** parameter and the **repo** parameter together.

If the pipeline or task requires additional parameters, provide these parameters in **params**.

The following example pipeline run references a remote pipeline from a Git repository:

```
apiVersion: tekton.dev/v1beta1
kind: PipelineRun
metadata:
  name: git-pipeline-reference-demo
spec:
  pipelineRef:
    resolver: git
    params:
    - name: url
      value: https://github.com/tektoncd/catalog.git
    - name: revision
      value: main
    - name: pathInRepo
      value: pipeline/simple/0.1/simple.yaml
    - name: sample-pipeline-parameter
      value: test
```

```
  params:
  - name: name
    value: "testPipelineRun"
```

The following example pipeline references a remote task from a Git repository:

```
apiVersion: tekton.dev/v1
kind: Pipeline
metadata:
  name: pipeline-with-git-task-reference-demo
spec:
  tasks:
  - name: "git-task-reference-demo"
    taskRef:
      resolver: git
      params:
      - name: url
        value: https://github.com/tektoncd/catalog.git
      - name: revision
        value: main
      - name: pathInRepo
        value: task/git-clone/0.6/git-clone.yaml
      - name: sample-task-parameter
        value: test
```

The following example task run references a remote task from a Git repository:

```
apiVersion: tekton.dev/v1beta1
kind: TaskRun
metadata:
  name: git-task-reference-demo
spec:
  taskRef:
    resolver: git
    params:
    - name: url
      value: https://github.com/tektoncd/catalog.git
    - name: revision
      value: main
    - name: pathInRepo
      value: task/git-clone/0.6/git-clone.yaml
    - name: sample-task-parameter
      value: test
```

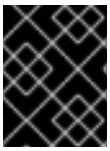
3.5. ADDITIONAL RESOURCES

- Using Tekton Hub with OpenShift Pipelines

CHAPTER 4. MANAGING NON-VERSIONED AND VERSIONED CLUSTER TASKS

As a cluster administrator, installing the Red Hat OpenShift Pipelines Operator creates variants of each default cluster task known as *versioned cluster tasks* (VCT) and *non-versioned cluster tasks* (NVCT). For example, installing the Red Hat OpenShift Pipelines Operator v1.7 creates a **buildah-1-7-0** VCT and a **buildah** NVCT.

Both NVCT and VCT have the same metadata, behavior, and specifications, including **params**, **workspaces**, and **steps**. However, they behave differently when you disable them or upgrade the Operator.



IMPORTANT

In Red Hat OpenShift Pipelines 1.10, cluster task functionality is deprecated and is planned to be removed in a future release.

4.1. DIFFERENCES BETWEEN NON-VERSIONED AND VERSIONED CLUSTER TASKS

Non-versioned and versioned cluster tasks have different naming conventions. And, the Red Hat OpenShift Pipelines Operator upgrades them differently.

Table 4.1. Differences between non-versioned and versioned cluster tasks

	Non-versioned cluster task	Versioned cluster task
Nomenclature	The NVCT only contains the name of the cluster task. For example, the name of the NVCT of Buildah installed with Operator v1.7 is **buildah**.	The VCT contains the name of the cluster task, followed by the version as a suffix. For example, the name of the VCT of Buildah installed with Operator v1.7 is **buildah-1-7-0**.
Upgrade	When you upgrade the Operator, it updates the non-versioned cluster task with the latest changes. The name of the NVCT remains unchanged.	Upgrading the Operator installs the latest version of the VCT and retains the earlier version. The latest version of a VCT corresponds to the upgraded Operator. For example, installing Operator 1.7 installs **buildah-1-7-0** and retains **buildah-1-6-0**.

4.2. ADVANTAGES AND DISADVANTAGES OF NON-VERSIONED AND VERSIONED CLUSTER TASKS

Before adopting non-versioned or versioned cluster tasks as a standard in production environments, cluster administrators might consider their advantages and disadvantages.

Table 4.2. Advantages and disadvantages of non-versioned and versioned cluster tasks

Cluster task	Advantages	Disadvantages
Non-versioned cluster task (NVCT)	• If you prefer deploying pipelines with the latest updates and bug fixes, use the NVCT. • Upgrading the Operator upgrades the non-versioned cluster tasks, which consume fewer resources than multiple versioned cluster tasks.	If you deploy pipelines that use NVCT, they might break after an Operator upgrade if the automatically upgraded cluster tasks are not backward-compatible.
Versioned cluster task (VCT)	• If you prefer stable pipelines in production, use the VCT. • The earlier version is retained on the cluster even after the later version of a cluster task is installed. You can continue using the earlier cluster tasks.	• If you continue using an earlier version of a cluster task, you might miss the latest features and critical security updates. • The earlier versions of cluster tasks that are not operational consume cluster resources. • * After it is upgraded, the Operator cannot manage the earlier VCT. You can delete the earlier VCT manually by using the **oc delete clustertask** command, but you cannot restore it.

4.3. DISABLING NON-VERSIONED AND VERSIONED CLUSTER TASKS

As a cluster administrator, you can disable cluster tasks that the OpenShift Pipelines Operator installed.

Procedure

1. To delete all non-versioned cluster tasks and latest versioned cluster tasks, edit the **TektonConfig** custom resource definition (CRD) and set the **clusterTasks** parameter in **spec.addon.params** to **false**.

   Example TektonConfig CR

```
apiVersion: operator.tekton.dev/v1alpha1
kind: TektonConfig
metadata:
  name: config
spec:
  params:
  - name: createRbacResource
```

```
    value: "false"
  profile: all
  targetNamespace: openshift-pipelines
  addon:
    params:
    - name: clusterTasks
      value: "false"
...
```

When you disable cluster tasks, the Operator removes all the non-versioned cluster tasks and only the latest version of the versioned cluster tasks from the cluster.

NOTE

Re-enabling cluster tasks installs the non-versioned cluster tasks.

2. Optional: To delete earlier versions of the versioned cluster tasks, use any one of the following methods:

   a. To delete individual earlier versioned cluster tasks, use the **oc delete clustertask** command followed by the versioned cluster task name. For example:

   ```
   $ oc delete clustertask buildah-1-6-0
   ```

   b. To delete all versioned cluster tasks created by an old version of the Operator, you can delete the corresponding installer set. For example:

   ```
   $ oc delete tektoninstallerset versioned-clustertask-1-6-k98as
   ```

   CAUTION

   If you delete an old versioned cluster task, you cannot restore it. You can only restore versioned and non-versioned cluster tasks that the current version of the Operator has created.