



# Red Hat OpenShift Dev Spaces 3.1

## Administration guide

Administering Red Hat OpenShift Dev Spaces 3.1



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Robert Kratky  
rkratky@redhat.com

Fabrice Flore-Thébault  
ffloreth@redhat.com

Jana Vrbkova  
jvrbkova@redhat.com

Max Leonov  
mleonov@redhat.com

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## Abstract

Information for administrators operating Red Hat OpenShift Dev Spaces.

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# CHAPTER 1. PREPARING THE INSTALLATION

To prepare a OpenShift Dev Spaces installation, learn about OpenShift Dev Spaces ecosystem and deployment constraints:

- [Section 1.1, "Supported platforms"](#)
- [Section 1.2, "OpenShift Dev Spaces architecture"](#)
- [Section 1.3, "Calculating OpenShift Dev Spaces resource requirements"](#)
- [Section 3.1, "Understanding the \*\*CheCluster\*\* Custom Resource"](#)

## 1.1. SUPPORTED PLATFORMS

OpenShift Dev Spaces 3.1 is available on the listed platforms with the listed supported installation methods:

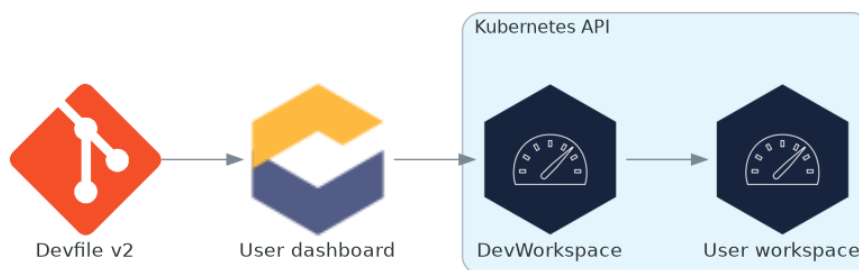
**Table 1.1. Supported deployment environments for OpenShift Dev Spaces 3.1**

Platform	Architectures	Deployment method
OpenShift Container Platform 4.10	<ul style="list-style-type: none"> <li>• AMD64 and Intel 64 (<b>x86_64</b>)</li> <li>• IBM Power (<b>ppc64le</b>)</li> <li>• IBM Z (<b>s390x</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OpenShift web console</a></li> <li>• <a href="#">dsc management tool</a></li> </ul>
OpenShift Container Platform 4.11	<ul style="list-style-type: none"> <li>• AMD64 and Intel 64 (<b>x86_64</b>)</li> <li>• IBM Power (<b>ppc64le</b>)</li> <li>• IBM Z (<b>s390x</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OpenShift web console</a></li> <li>• <a href="#">dsc management tool</a></li> </ul>
OpenShift Dedicated 4.10	<ul style="list-style-type: none"> <li>• AMD64 and Intel 64 (<b>x86_64</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OpenShift web console</a></li> </ul>
OpenShift Dedicated 4.11	<ul style="list-style-type: none"> <li>• AMD64 and Intel 64 (<b>x86_64</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OpenShift web console</a></li> </ul>
Red Hat OpenShift Service on AWS (ROSA) 4.10	<ul style="list-style-type: none"> <li>• AMD64 and Intel 64 (<b>x86_64</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OpenShift web console</a></li> </ul>

Platform	Architectures	Deployment method
Red Hat OpenShift Service on AWS (ROSA) 4.11	<ul style="list-style-type: none"> <li>AMD64 and Intel 64 (<b>x86_64</b>)</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">OpenShift web console</a></li> </ul>

## 1.2. OPENSIFT DEV SPACES ARCHITECTURE

Figure 1.1. High-level OpenShift Dev Spaces architecture with the DevWorkspace operator



OpenShift Dev Spaces runs on three groups of components:

### OpenShift Dev Spaces server components

Manage User project and workspaces. The main component is the User dashboard, from which users control their workspaces.

### DevWorkspace operator

Creates and controls the necessary OpenShift objects to run User workspaces. Including **Pods**, **Services**, and **PeristentVolumes**.

### User workspaces

Container-based development environments, the IDE included.

The role of these OpenShift features is central:

### DevWorkspace Custom Resources

Valid OpenShift objects representing the User workspaces and manipulated by OpenShift Dev Spaces. It is the communication channel for the three groups of components.

### OpenShift role-based access control (RBAC)

Controls access to all resources.

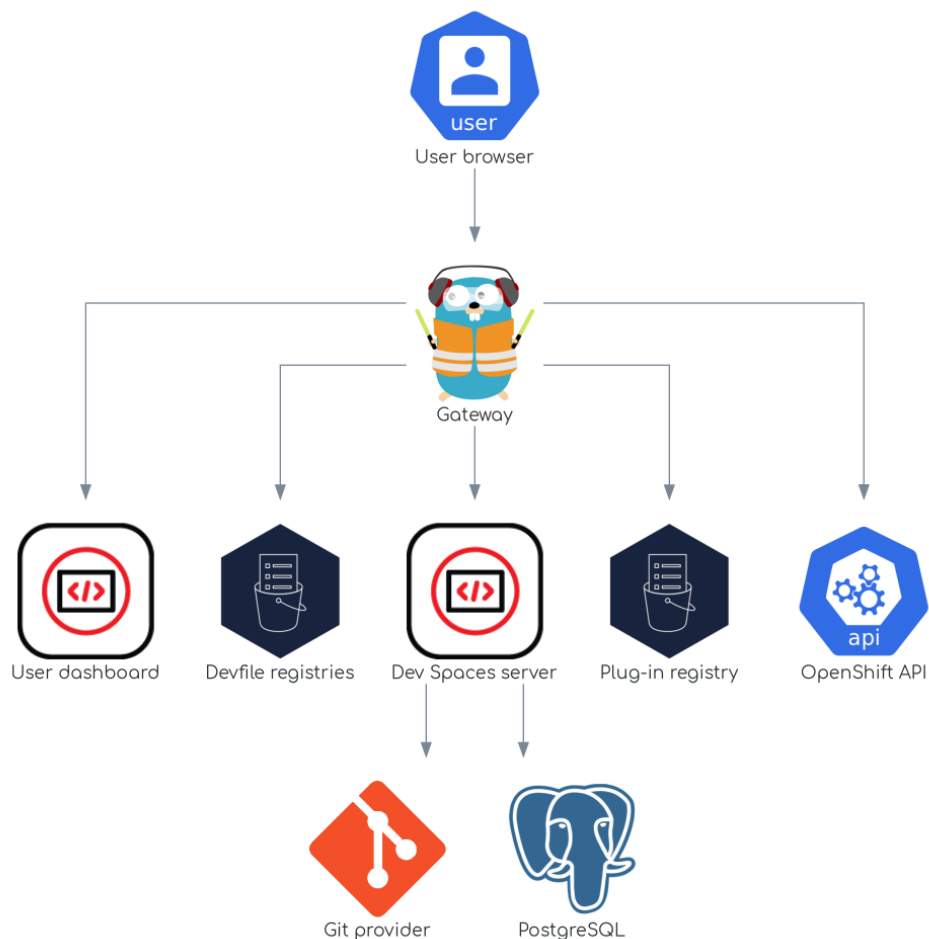
### Additional resources

- [Section 1.2.1, “OpenShift Dev Spaces server components”](#)
- [Section 1.2.1.2, “DevWorkspace operator”](#)
- [Section 1.2.2, “User workspaces”](#)
- [DevWorkspace Operator repository](#)
- [Kubernetes documentation - Custom Resources](#)

## 1.2.1. OpenShift Dev Spaces server components

The OpenShift Dev Spaces server components ensure multi-tenancy and workspaces management.

Figure 1.2. OpenShift Dev Spaces server components interacting with the DevWorkspace operator



### Additional resources

- [Section 1.2.1.1, "OpenShift Dev Spaces operator"](#)
- [Section 1.2.1.2, "DevWorkspace operator"](#)
- [Section 1.2.1.3, "Gateway"](#)
- [Section 1.2.1.4, "User dashboard"](#)
- [Section 1.2.1.5, "Devfile registries"](#)
- [Section 1.2.1.6, "OpenShift Dev Spaces server"](#)
- [Section 1.2.1.7, "PostgreSQL"](#)
- [Section 1.2.1.8, "Plug-in registry"](#)

### 1.2.1.1. OpenShift Dev Spaces operator

The OpenShift Dev Spaces operator ensure full lifecycle management of the OpenShift Dev Spaces server components. It introduces:

#### **CheCluster** custom resource definition (CRD)

Defines the **CheCluster** OpenShift object.

#### OpenShift Dev Spaces controller

Creates and controls the necessary OpenShift objects to run a OpenShift Dev Spaces instance, such as pods, services, and persistent volumes.

#### **CheCluster** custom resource (CR)

On a cluster with the OpenShift Dev Spaces operator, it is possible to create a **CheCluster** custom resource (CR). The OpenShift Dev Spaces operator ensures the full lifecycle management of the OpenShift Dev Spaces server components on this OpenShift Dev Spaces instance:

- [Section 1.2.1.2, "DevWorkspace operator"](#)
- [Section 1.2.1.3, "Gateway"](#)
- [Section 1.2.1.4, "User dashboard"](#)
- [Section 1.2.1.5, "Devfile registries"](#)
- [Section 1.2.1.6, "OpenShift Dev Spaces server"](#)
- [Section 1.2.1.7, "PostgreSQL"](#)
- [Section 1.2.1.8, "Plug-in registry"](#)

#### Additional resources

- [Section 3.1, "Understanding the \*\*CheCluster\*\* Custom Resource"](#)
- [Chapter 2, \*Installing OpenShift Dev Spaces\*](#)

### 1.2.1.2. DevWorkspace operator

The DevWorkspace operator extends OpenShift to provide DevWorkspace support. It introduces:



### DevWorkspace custom resource definition

Defines the DevWorkspace OpenShift object from the Devfile v2 specification.

### DevWorkspace controller

Creates and controls the necessary OpenShift objects to run a DevWorkspace, such as pods, services, and persistent volumes.

### DevWorkspace custom resource

On a cluster with the DevWorkspace operator, it is possible to create DevWorkspace custom resources (CR). A DevWorkspace CR is an OpenShift representation of a Devfile. It defines a User workspace in an OpenShift cluster.

### Additional resources

- [Devfile API repository](#)

#### 1.2.1.3. Gateway

The OpenShift Dev Spaces gateway has the following roles:

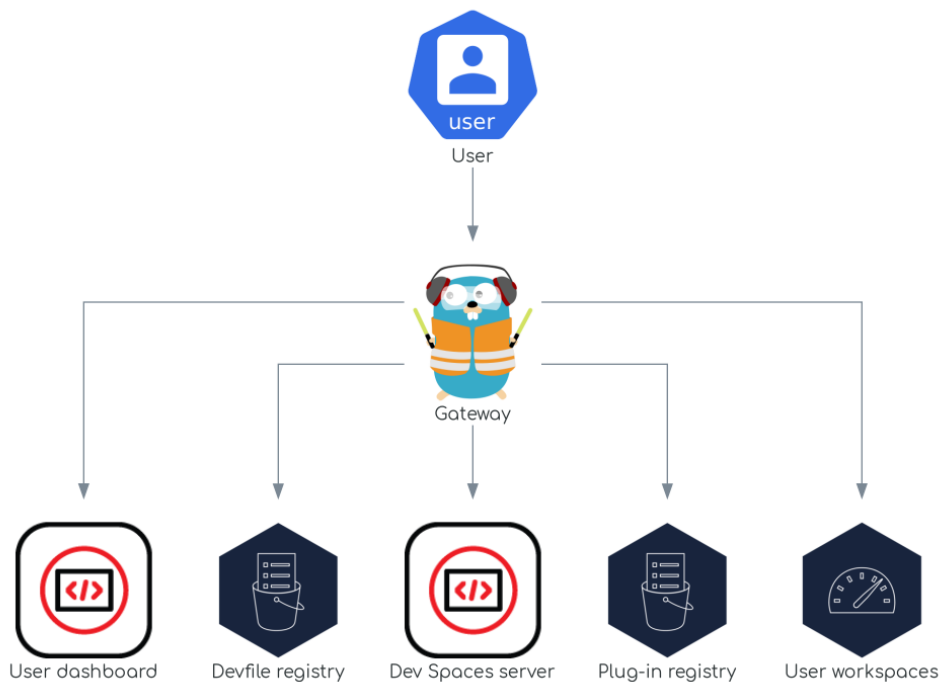
- Routing requests. It uses [Traefik](#).
- Authenticating users with OpenID Connect (OIDC). It uses [OpenShift OAuth2 proxy](#).
- Applying OpenShift Role based access control (RBAC) policies to control access to any OpenShift Dev Spaces resource. It uses ``kube-rbac-proxy``.

The OpenShift Dev Spaces operator manages it as the **che-gateway** Deployment.

It controls access to:

- [Section 1.2.1.4, "User dashboard"](#)
- [Section 1.2.1.5, "Devfile registries"](#)
- [Section 1.2.1.6, "OpenShift Dev Spaces server"](#)
- [Section 1.2.1.8, "Plug-in registry"](#)
- [Section 1.2.2, "User workspaces"](#)

Figure 1.3. OpenShift Dev Spaces gateway interactions with other components



### Additional resources

- [Section 3.10, "Managing identities and authorizations"](#)

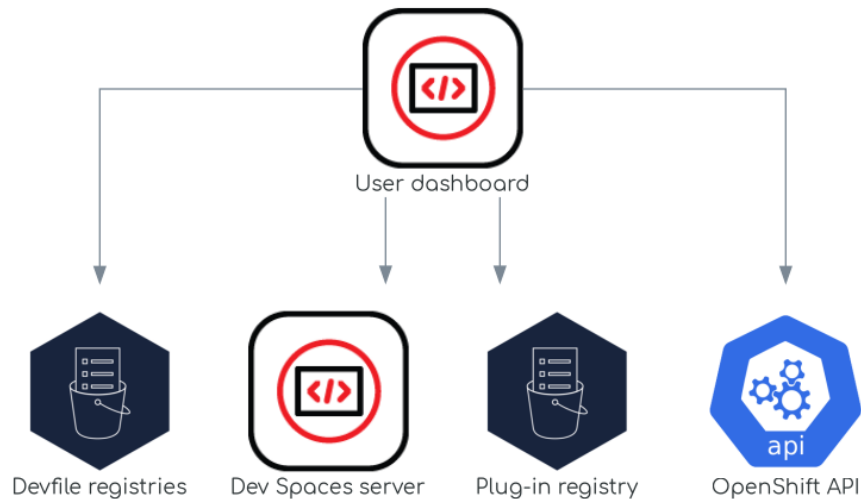
#### 1.2.1.4. User dashboard

The user dashboard is the landing page of Red Hat OpenShift Dev Spaces. OpenShift Dev Spaces users browse the user dashboard to access and manage their workspaces. It is a React application. The OpenShift Dev Spaces deployment starts it in the **devspaces-dashboard** Deployment.

It need access to:

- [Section 1.2.1.5, "Devfile registries"](#)
- [Section 1.2.1.6, "OpenShift Dev Spaces server"](#)
- [Section 1.2.1.8, "Plug-in registry"](#)
- OpenShift API

Figure 1.4. User dashboard interactions with other components



When the user requests the user dashboard to start a workspace, the user dashboard executes this sequence of actions:

1. Collects the devfile from the [Section 1.2.1.5, "Devfile registries"](#), when the user is creating a workspace from a code sample.
2. Sends the repository URL to [Section 1.2.1.6, "OpenShift Dev Spaces server"](#) and expects a devfile in return, when the user is creating a workspace from a remote devfile.
3. Reads the devfile describing the workspace.
4. Collects the additional metadata from the [Section 1.2.1.8, "Plug-in registry"](#).
5. Converts the information into a DevWorkspace Custom Resource.
6. Creates the DevWorkspace Custom Resource in the user project using the OpenShift API.
7. Watches the DevWorkspace Custom Resource status.
8. Redirects the user to the running workspace IDE.

### 1.2.1.5. Devfile registries

#### Additional resources

The OpenShift Dev Spaces devfile registries are services providing a list of sample devfiles to create ready-to-use workspaces. The [Section 1.2.1.4, "User dashboard"](#) displays the samples list on the

**Dashboard** → **Create Workspace** page. Each sample includes a Devfile v2. The OpenShift Dev Spaces deployment starts one devfile registry instance in the **devfile-registry** deployment.

Figure 1.5. Devfile registries interactions with other components



### Additional resources

- [Devfile v2 documentation](#)
- [devfile registry latest community version online instance](#)
- [OpenShift Dev Spaces devfile registry repository](#)

#### 1.2.1.6. OpenShift Dev Spaces server

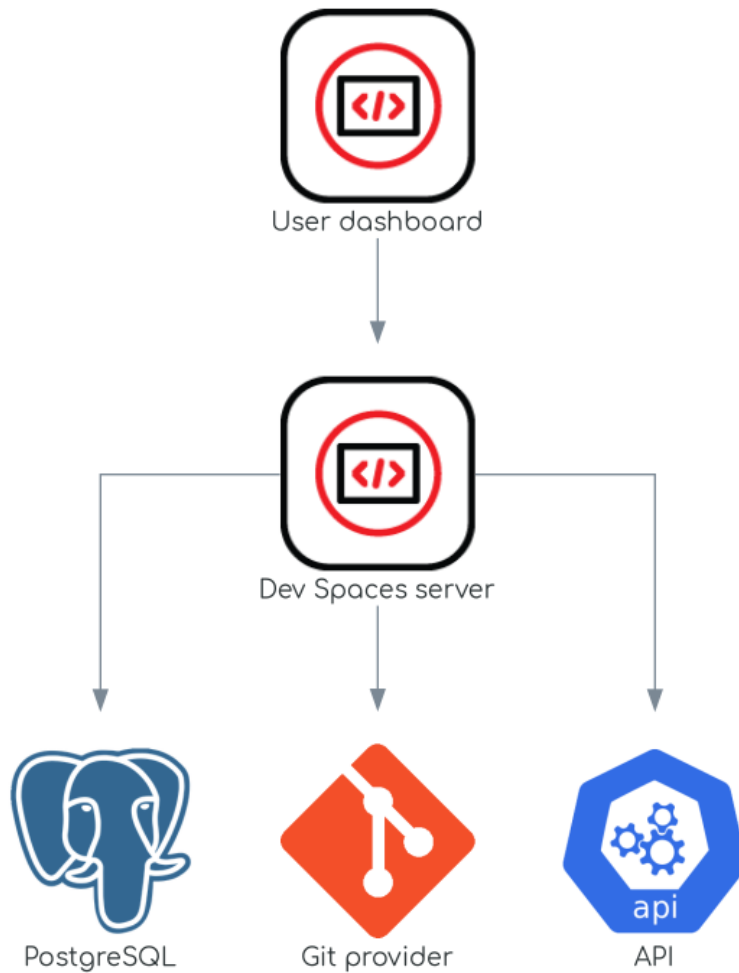
The OpenShift Dev Spaces server main functions are:

- Creating user namespaces.
- Provisioning user namespaces with required secrets and config maps.
- Integrating with Git services providers, to fetch and validate devfiles and authentication.

The OpenShift Dev Spaces server is a Java web service exposing an HTTP REST API and needs access to:

- [Section 1.2.1.7, "PostgreSQL"](#)
- Git service providers
- OpenShift API

Figure 1.6. OpenShift Dev Spaces server interactions with other components



### Additional resources

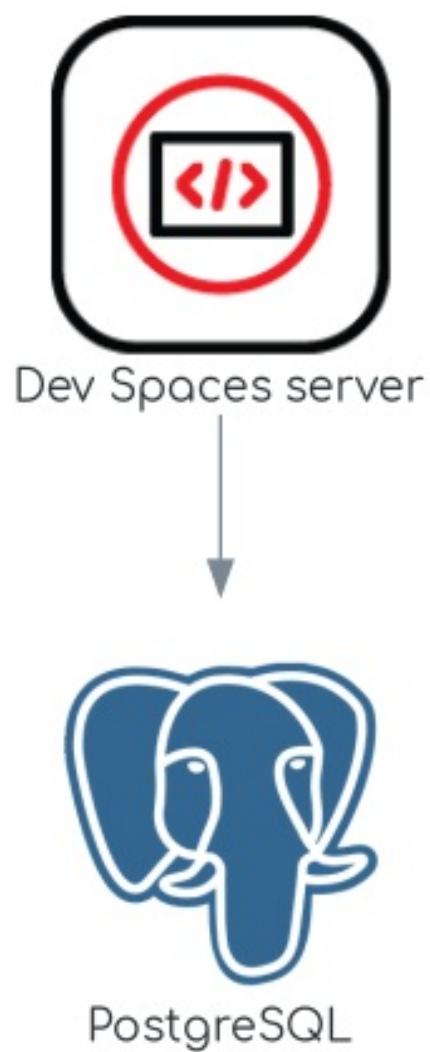
- [Section 3.3.2, “Advanced configuration options for the OpenShift Dev Spaces server component”](#)

### 1.2.1.7. PostgreSQL

OpenShift Dev Spaces server uses the PostgreSQL database to persist user configurations such as workspaces metadata.

The OpenShift Dev Spaces deployment starts a dedicated PostgreSQL instance in the **postgres** Deployment. You can use an external database instead.

Figure 1.7. PostgreSQL interactions with other components



### Additional resources

- [quay.io/eclipse/che-centos-postgresql-96-centos7](https://quay.io/repository/eclipse/che-centos-postgresql-96-centos7) container image
- [quay.io/eclipse/che-centos-postgresql-13-centos7](https://quay.io/repository/eclipse/che-centos-postgresql-13-centos7) container image

### 1.2.1.8. Plug-in registry

Each OpenShift Dev Spaces workspace starts with a specific editor and set of associated extensions. The OpenShift Dev Spaces plug-in registry provides the list of available editors and editor extensions. A Devfile v2 describes each editor or extension.

The [Section 1.2.1.4, "User dashboard"](#) is reading the content of the registry.

**Figure 1.8. Plug-in registries interactions with other components**







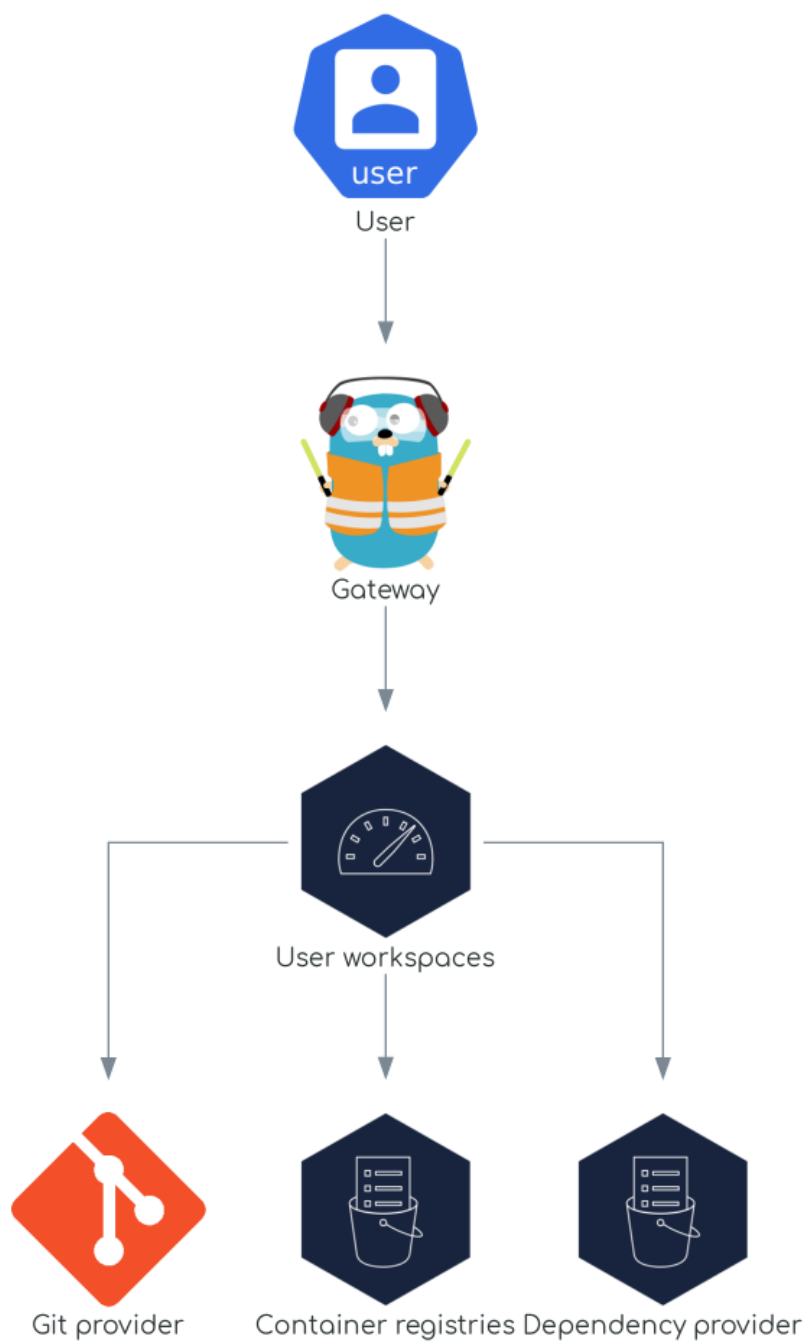
## Plug-in registry

### Additional resources

- [Editors definitions in the OpenShift Dev Spaces plug-in registry repository](#)
- [Plug-ins definitions in the OpenShift Dev Spaces plug-in registry repository](#)
- [Plug-in registry latest community version online instance](#)

### 1.2.2. User workspaces

Figure 1.9. User workspaces interactions with other components



User workspaces are web IDEs running in containers.

A User workspace is a web application. It consists of microservices running in containers providing all the services of a modern IDE running in your browser:

- Editor
- Language auto-completion
- Language server
- Debugging tools
- Plug-ins
- Application runtimes

A workspace is one OpenShift Deployment containing the workspace containers and enabled plug-ins, plus related OpenShift components:

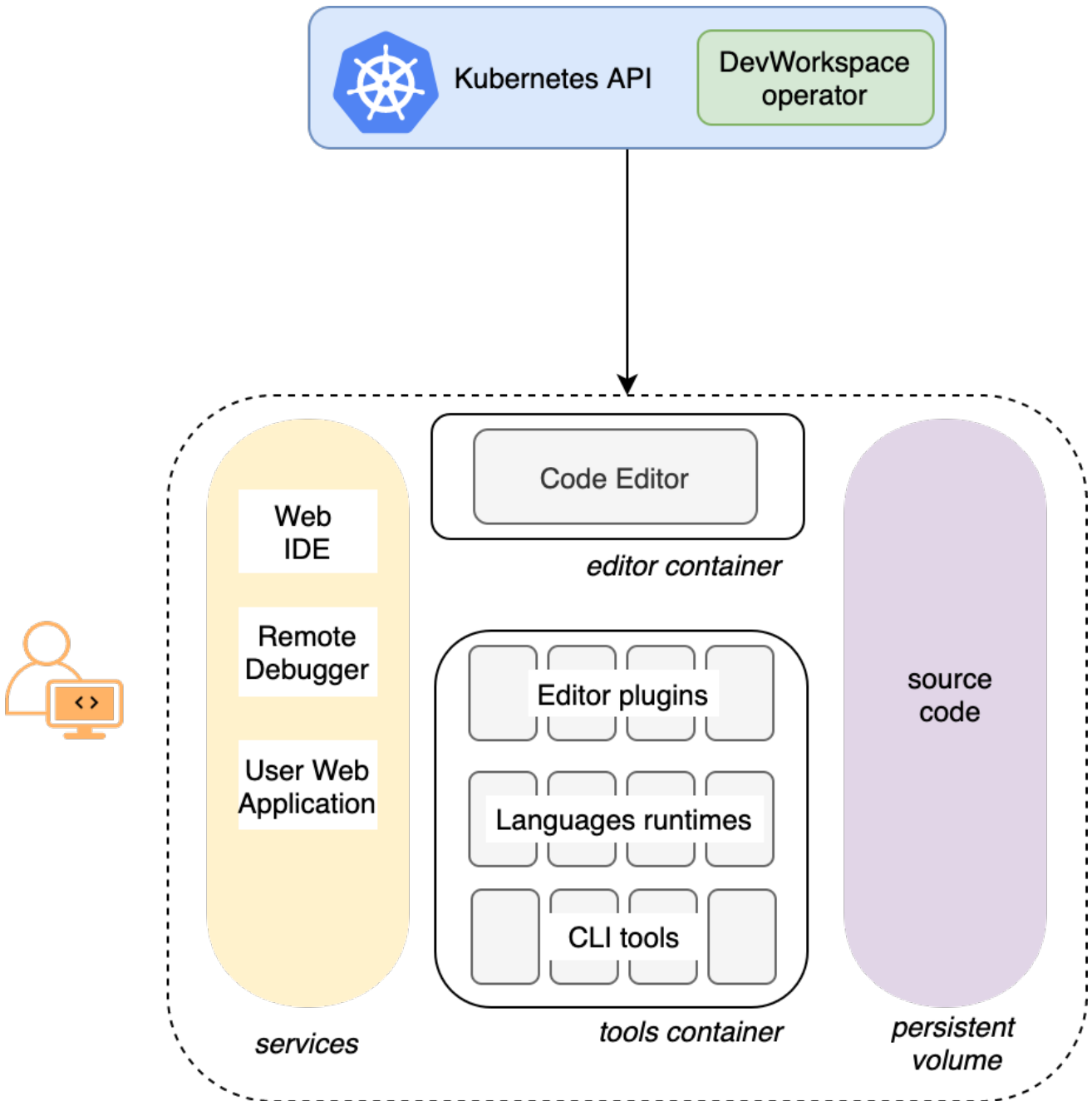
- Containers
- ConfigMaps
- Services
- Endpoints
- Ingresses or Routes
- Secrets
- Persistent Volumes (PVs)

A OpenShift Dev Spaces workspace contains the source code of the projects, persisted in a OpenShift Persistent Volume (PV). Microservices have read-write access to this shared directory.

Use the devfile v2 format to specify the tools and runtime applications of a OpenShift Dev Spaces workspace.

The following diagram shows one running OpenShift Dev Spaces workspace and its components.

Figure 1.10. OpenShift Dev Spaces workspace components



In the diagram, there is one running workspaces.

### 1.3. CALCULATING OPENSIFT DEV SPACES RESOURCE REQUIREMENTS

The OpenShift Dev Spaces Operator, DevWorkspace Controller, and user workspaces consist of a set of pods. The pods contribute to the resource consumption in terms of CPU and RAM limits and requests. Learn how to calculate resources, such as memory and CPU, required to run Red Hat OpenShift Dev Spaces.

#### 1.3.1. OpenShift Dev Spaces Operator requirements

The OpenShift Dev Spaces Operator manages six operands running in six distinct pods. The following table presents the default resource requirements of each of these operands.

Table 1.2. OpenShift Dev Spaces operator operands

Pod	Container names	Default memory limit	Default memory request
OpenShift Dev Spaces Server	OpenShift Dev Spaces	1 Gi	512 MiB
OpenShift Dev Spaces Gateway	<b>gateway, configbump, oauth-proxy, kube-rbac-proxy</b>	4 Gi, 256Mi, 512Mi, 512Mi	128 Mi, 64Mi, 64Mi, 64Mi
OpenShift Dev Spaces Dashboard	<b>OpenShift Dev Spaces-dashboard</b>	256 Mi	32 Mi
PostgreSQL	<b>postgres</b>	1 Gi	512 Mi
Devfile registry	<b>che-devfile-registry</b>	256 Mi	32 Mi
Plug-in registry	<b>che-plugin-registry</b>	256 Mi	32 Mi

The OpenShift Dev Spaces Operator, which powers all the operands, consists of a single container with the **64Mi** memory request and **256Mi** limit. These default values are sufficient when the OpenShift Dev Spaces Operator manages a relatively big amount of OpenShift Dev Spaces workspaces. For even larger deployments, consider increasing the defaults.

#### Additional resources

- [Section 1.2, “OpenShift Dev Spaces architecture”](#).

### 1.3.2. DevWorkspace Operator requirements

The DevWorkspace Operator consists of 3 pods. The following table presents the default resource requirements of each of these pods.

**Table 1.3. DevWorkspace Operator Pods**

Pod	Container name	Default memory limit	Default memory request
DevWorkspace Controller Manager	<b>DevWorkspace-controller, kube-rbac-proxy</b>	1 Gi	100 Mi
DevWorkspace Operator Catalog	<b>registry-server</b>	N/A	50 Mi
DevWorkspace Webhook Server	<b>webhook-server</b> , kube-rbac-proxy	300 Mi	20 Mi

These default values are sufficient when the DevWorkspace Controller manages a relatively big amount of OpenShift Dev Spaces workspaces. For larger deployments, consider increasing the defaults.

## Additional resources

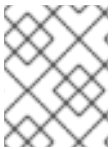
- [Section 1.2, "OpenShift Dev Spaces architecture"](#).

### 1.3.3. Workspaces requirements

This section describes how to calculate the resources required for a workspace. That is the sum of the resources required for each container of the workspace.

#### Procedure

1. Identify the workspace components explicitly specified in the **components** section of the devfile.
2. Identify the implicit workspace components.



#### NOTE

OpenShift Dev Spaces implicitly loads the default **theia-ide**, **che-machine-exec**, **che-gateway** containers.

1. Calculate the requirements for each component.

## Additional resources

- [Section 1.2, "OpenShift Dev Spaces architecture"](#).

### 1.3.4. A workspace example

This section describes a OpenShift Dev Spaces workspace example.

The following devfile defines the OpenShift Dev Spaces workspace:

```

schemaVersion: 2.1.0
metadata:
  name: bash
components:
- name: tools
  container:
    image: quay.io/devfile/universal-developer-image:ubi8-0e189d9
    memoryLimit: 4Gi

commands:
- id: run-main-script
  exec:
    label: "Run main.sh script"
    component: tools
    workingDir: '${PROJECT_SOURCE}'
    commandLine: |
      ./main.sh
  group:
    kind: run
    isDefault: true

```

This table provides the memory requirements for each workspace component:

**Table 1.4. Total workspace memory requirement and limit**

Pod	Container name	Default memory limit	Default memory request
Workspace	<b>theia-ide</b>	512 Mi	64 Mi
Workspace	<b>machine-exec</b>	128 Mi	32 Mi
Workspace	<b>tools</b>	4 Gi	64 Mi
Workspace	<b>che-gateway</b>	256 Mi	64 Mi
<b>Total</b>		<b>4.9 Gi</b>	<b>224 Mi</b>

#### Additional resources

- [Section 1.2, “OpenShift Dev Spaces architecture”](#)
- [Section 3.1, “Understanding the \*\*CheCluster\*\* Custom Resource”](#)
- [OpenShift Dev Spaces plug-ins registry repository](#)
- [Kubernetes resource management for pods and containers](#)

## CHAPTER 2. INSTALLING OPENSIFT DEV SPACES

This section contains instructions to install Red Hat OpenShift Dev Spaces.

You can deploy only one instance of OpenShift Dev Spaces per cluster.

- [Section 2.3, “Installing OpenShift Dev Spaces on OpenShift using the web console”](#)
- [Section 2.2, “Installing OpenShift Dev Spaces on OpenShift using the \*\*dsc\*\* management tool”](#)
- [Section 2.4, “Installing OpenShift Dev Spaces in a restricted environment on OpenShift”](#)

### 2.1. INSTALL THE DSC MANAGEMENT TOOL

You can install **dsc**, the Red Hat OpenShift Dev Spaces command-line management tool, on Microsoft Windows, Apple MacOS, and Linux. With **dsc**, you can perform operations the OpenShift Dev Spaces server such as starting, stopping, updating, and deleting the server.

#### Prerequisites

- Linux or macOS.



#### NOTE

For installing **dsc** on Windows, see the following pages:

- <https://developers.redhat.com/products/openshift-dev-spaces/download>
- <https://github.com/redhat-developer/devspaces-checkl>

#### Procedure

1. Download the archive from <https://developers.redhat.com/products/openshift-dev-spaces/download> to a directory such as **\$HOME**.
2. Run **tar xvzf** on the archive to extract the **/dsc** directory.
3. Add the extracted **/dsc/bin** subdirectory to **\$PATH**.

#### Verification

- Run **dsc** to view information about it.

```
$ dsc
```

#### Additional resources

- ["dsc reference documentation"](#)

### 2.2. INSTALLING OPENSIFT DEV SPACES ON OPENSIFT USING THE **dsc** MANAGEMENT TOOL

You can install OpenShift Dev Spaces on OpenShift.



## Prerequisites

- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).
- **dsc**. See: [Section 2.1, “Install the dsc management tool”](#).

## Procedure

- Create the OpenShift Dev Spaces instance:

```
$ dsc server:deploy --platform openshift
```

## Verification steps

1. Verify the OpenShift Dev Spaces instance status:

```
$ dsc server:status
```

2. Navigate to the OpenShift Dev Spaces cluster instance:

```
$ dsc dashboard:open
```

## 2.3. INSTALLING OPENSIFT DEV SPACES ON OPENSIFT USING THE WEB CONSOLE

This section describes how to install OpenShift Dev Spaces using the OpenShift web console. Consider [Section 2.2, “Installing OpenShift Dev Spaces on OpenShift using the \*\*dsc\*\* management tool”](#) instead.

## Prerequisites

- An OpenShift web console session by a cluster administrator. See [Accessing the web console](#).

## Procedure

1. Install the Red Hat OpenShift Dev Spaces Operator. See [Installing from OperatorHub using the web console](#).
2. Create a OpenShift Dev Spaces instance from the Red Hat OpenShift Dev Spaces Operator. See [Creating applications from installed Operators](#).

## Verification

1. To verify that the OpenShift Dev Spaces instance has installed correctly, navigate to the **Dev Spaces Cluster** tab of the **Operator details** page. The **Red Hat OpenShift Dev Spaces instance Specification** page displays the list of Red Hat OpenShift Dev Spaces instances and their status.
2. Click **devspaces CheCluster** and navigate to the **Details** tab.
3. See the content of the following fields:
  - The **Message** field contains error messages. The expected content is **None**.

- The **Red Hat OpenShift Dev Spaces URL** field contains the URL of the Red Hat OpenShift Dev Spaces instance. The URL appears when the deployment finishes successfully.
4. Navigate to the **Resources** tab. View the list of resources assigned to the OpenShift Dev Spaces deployment and their status.

## 2.4. INSTALLING OPENSIFT DEV SPACES IN A RESTRICTED ENVIRONMENT ON OPENSIFT

On an OpenShift cluster operating in a restricted network, public resources are not available.

However, deploying OpenShift Dev Spaces and running workspaces requires the following public resources:

- Operator catalog
- Container images
- Sample projects

To make these resources available, you can replace them with their copy in a registry accessible by the OpenShift cluster.

### Prerequisites

- The OpenShift cluster has at least 64 GB of disk space.
- The OpenShift cluster is ready to operate on a restricted network, and the OpenShift control plane has access to the public internet. See [About disconnected installation mirroring](#) and [Using Operator Lifecycle Manager on restricted networks](#).
- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).
- An active **oc registry** session to the **registry.redhat.io** Red Hat Ecosystem Catalog. See: [Red Hat Container Registry authentication](#).
- **opm**. See [Installing the opm CLI](#).
- **jq**. See [Downloading jq](#).
- **podman**. See [Installing Podman](#).
- An active **skopeo** session with administrative access to the `<my_registry>` registry. See [Installing Skopeo](#), [Authenticating to a registry](#), and [Mirroring images for a disconnected installation](#).
- **dsc** for OpenShift Dev Spaces version 3.1. See [Section 2.1, "Install the dsc management tool"](#).

### Procedure

1. Download and execute the mirroring script to install a custom Operator catalog and mirror the related images: [prepare-restricted-environment.sh](#).

```
$ bash prepare-restricted-environment.sh \  
--ocp_ver "4.11" \  
--devworkspace_operator_index "registry.redhat.io/redhat/redhat-operator-index:v4.10" \  

```

```
--devworkspace_operator_version "v0.15.2" \  
--prod_operator_index "registry.redhat.io/redhat/redhat-operator-index:v4.10" \  
--prod_operator_bundle_name "devspacesoperator" \  
--prod_operator_package_name "devspaces-operator" \  
--prod_operator_version "v3.1.0" \  
--my_registry "<my_registry>"
```

2. Install OpenShift Dev Spaces with the configuration set in the **che-operator-cr-patch.yaml** during the previous step:

```
$ dsc server:deploy --platform=openshift \  
--che-operator-cr-patch-yaml=che-operator-cr-patch.yaml
```

3. Allow incoming traffic from the OpenShift Dev Spaces namespace to all Pods in the user projects. See: [Section 3.7.1, "Configuring network policies"](#).

### Additional resources

- [Red Hat-provided Operator catalogs](#)
- [Managing custom catalogs](#)

## CHAPTER 3. CONFIGURING OPENSIFT DEV SPACES

This section describes configuration methods and options for Red Hat OpenShift Dev Spaces.

### 3.1. UNDERSTANDING THE CHECLUSTER CUSTOM RESOURCE

A default deployment of OpenShift Dev Spaces consists of a **CheCluster** Custom Resource parameterized by the Red Hat OpenShift Dev Spaces Operator.

The **CheCluster** Custom Resource is a Kubernetes object. You can configure it by editing the **CheCluster** Custom Resource YAML file. This file contains sections to configure each component: **devWorkspace**, **cheServer**, **pluginRegistry**, **devfileRegistry**, **database**, **dashboard** and **imagePuller**.

The Red Hat OpenShift Dev Spaces Operator translates the **CheCluster** Custom Resource into a config map usable by each component of the OpenShift Dev Spaces installation.

The OpenShift platform applies the configuration to each component, and creates the necessary Pods. When OpenShift detects changes in the configuration of a component, it restarts the Pods accordingly.

#### Example 3.1. Configuring the main properties of the OpenShift Dev Spaces server component

1. Apply the **CheCluster** Custom Resource YAML file with suitable modifications in the **cheServer** component section.
2. The Operator generates the **che ConfigMap**.
3. OpenShift detects changes in the **ConfigMap** and triggers a restart of the OpenShift Dev Spaces Pod.

#### Additional resources

- [Understanding Operators](#)
- ["Understanding Custom Resources"](#)

#### 3.1.1. Using dsc to configure the CheCluster Custom Resource during installation

To deploy OpenShift Dev Spaces with a suitable configuration, edit the **CheCluster** Custom Resource YAML file during the installation of OpenShift Dev Spaces. Otherwise, the OpenShift Dev Spaces deployment uses the default configuration parameterized by the Operator.

#### Prerequisites

- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).
- **dsc**. See: [Section 2.1, "Install the dsc management tool"](#).

#### Procedure

- Create a **che-operator-cr-patch.yaml** YAML file that contains the subset of the **CheCluster** Custom Resource to configure:

```
spec:
  <component>:
    <property-to-configure>: <value>
```

- Deploy OpenShift Dev Spaces and apply the changes described in **che-operator-cr-patch.yaml** file:

```
$ dsc server:deploy \
--che-operator-cr-patch-yaml=che-operator-cr-patch.yaml \
--platform <chosen-platform>
```

## Verification

1. Verify the value of the configured property:

```
$ oc get configmap che -o jsonpath='{.data.<configured-property>}' \
-n openshift-devspaces
```

## Additional resources

- [Section 3.1.3, “CheCluster Custom Resource fields reference”](#).
- [Section 3.3.2, “Advanced configuration options for the OpenShift Dev Spaces server component”](#).

## 3.1.2. Using the CLI to configure the CheCluster Custom Resource

To configure a running instance of OpenShift Dev Spaces, edit the **CheCluster** Custom Resource YAML file.

### Prerequisites

- An instance of OpenShift Dev Spaces on OpenShift.
- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).

### Procedure

1. Edit the CheCluster Custom Resource on the cluster:

```
$ oc edit checluster/devspaces -n openshift-devspaces
```

2. Save and close the file to apply the changes.

## Verification

1. Verify the value of the configured property:

```
$ oc get configmap che -o jsonpath='{.data.<configured-property>}' \
-n openshift-devspaces
```

## Additional resources

## Additional resources

- [Section 3.1.3, “CheCluster Custom Resource fields reference”](#).
- [Section 3.3.2, “Advanced configuration options for the OpenShift Dev Spaces server component”](#).

### 3.1.3. CheCluster Custom Resource fields reference

This section describes all fields available to customize the **CheCluster** Custom Resource.

- [Example 3.2, “A minimal CheCluster Custom Resource example.”](#)
- [Table 3.1, “Development environment configuration options.”](#)
- [Table 3.2, “OpenShift Dev Spaces components configuration.”](#)
- [Table 3.3, “DevWorkspace operator component configuration.”](#)
- [Table 3.4, “General configuration settings related to the OpenShift Dev Spaces server component.”](#)
- [Table 3.5, “Configuration settings related to the Plug-in registry component used by the OpenShift Dev Spaces installation.”](#)
- [Table 3.6, “Configuration settings related to the Devfile registry component used by the OpenShift Dev Spaces installation.”](#)
- [Table 3.7, “Configuration settings related to the Database component used by the OpenShift Dev Spaces installation.”](#)
- [Table 3.8, “Configuration settings related to the Dashboard component used by the OpenShift Dev Spaces installation.”](#)
- [Table 3.9, “Kubernetes Image Puller component configuration.”](#)
- [Table 3.10, “OpenShift Dev Spaces server metrics component configuration.”](#)
- [Table 3.11, “Networking, OpenShift Dev Spaces authentication and TLS configuration.”](#)
- [Table 3.12, “Configuration of an alternative registry that stores OpenShift Dev Spaces images.”](#)
- [Table 3.13, “CheCluster Custom Resource \*\*status\*\* defines the observed state of OpenShift Dev Spaces installation”](#)

#### Example 3.2. A minimal CheCluster Custom Resource example.

```
apiVersion: org.eclipse.che/v2
kind: CheCluster
metadata:
  name: devspaces
spec:
  devEnvironments:
    defaultNamespace:
      template: '<username>-che'
  storage:
    pvcStrategy: 'common'
```

```

components:
  database:
    externalDb: false
  metrics:
    enable: true

```

Table 3.1. Development environment configuration options.

Property	Description
defaultComponents	Default components applied to DevWorkspaces. These default components are meant to be used when a Devfile, that does not contain any components.
defaultEditor	The default editor to workspace create with. It could be a plugin ID or a URI. The plugin ID must have <b>publisher/plugin/version</b> format. The URI must start from <b>http://</b> or <b>https://</b> .
defaultNamespace	User's default namespace.
defaultPlugins	Default plug-ins applied to DevWorkspaces.
nodeSelector	The node selector limits the nodes that can run the workspace pods.
storage	Workspaces persistent storage.
tolerations	The pod tolerations of the workspace pods limit where the workspace pods can run.
trustedCerts	Trusted certificate settings.

Table 3.2. OpenShift Dev Spaces components configuration.

Property	Description
cheServer	General configuration settings related to the Che server.
dashboard	Configuration settings related to the dashboard used by the Che installation.
database	Configuration settings related to the database used by the Che installation.
devWorkspace	DevWorkspace Operator configuration.
devfileRegistry	Configuration settings related to the devfile registry used by the Che installation.
imagePuller	Kubernetes Image Puller configuration.

Property	Description
metrics	Che server metrics configuration.
pluginRegistry	Configuration settings related to the plug-in registry used by the Che installation.

Table 3.3. DevWorkspace operator component configuration.

Property	Description
deployment	Deployment override options.
runningLimit	The maximum number of running workspaces per user.

Table 3.4. General configuration settings related to the OpenShift Dev Spaces server component.

Property	Description
clusterRoles	ClusterRoles assigned to Che ServiceAccount. The defaults roles are: - <b>&lt;che-namespace&gt;-cheworkspaces-namespaces-clusterrole</b> - <b>&lt;che-namespace&gt;-cheworkspaces-clusterrole</b> - <b>&lt;che-namespace&gt;-cheworkspaces-devworkspace-clusterrole</b> where the <b>&lt;che-namespace&gt;</b> is the namespace where the CheCluster CRD is created. Each role must have a <b>app.kubernetes.io/part-of=che.eclipse.org</b> label. The Che Operator must already have all permissions in these ClusterRoles to grant them.
debug	Enables the debug mode for Che server.
deployment	Deployment override options.
extraProperties	A map of additional environment variables applied in the generated <b>che</b> ConfigMap to be used by the Che server in addition to the values already generated from other fields of the <b>CheCluster</b> custom resource (CR). If the <b>extraProperties</b> field contains a property normally generated in <b>che</b> ConfigMap from other CR fields, the value defined in the <b>extraProperties</b> is used instead.
logLevel	The log level for the Che server: <b>INFO</b> or <b>DEBUG</b> .
proxy	Proxy server settings for Kubernetes cluster. No additional configuration is required for OpenShift cluster. By specifying these settings for the OpenShift cluster, you override the OpenShift proxy configuration.

Table 3.5. Configuration settings related to the Plug-in registry component used by the OpenShift Dev Spaces installation.



Property	Description
deployment	Deployment override options.
disableInternalRegistry	Disables internal plug-in registry.
externalPluginRegistries	External plugin registries.

**Table 3.6. Configuration settings related to the Devfile registry component used by the OpenShift Dev Spaces installation.**

Property	Description
deployment	Deployment override options.
disableInternalRegistry	Disables internal devfile registry.
externalDevfileRegistries	External devfile registries serving sample ready-to-use devfiles.

**Table 3.7. Configuration settings related to the Database component used by the OpenShift Dev Spaces installation.**

Property	Description
credentialsSecretName	The secret that contains PostgreSQL <b>user</b> and <b>password</b> that the Che server uses to connect to the database. The secret must have a <b>app.kubernetes.io/part-of=che.eclipse.org</b> label.
deployment	Deployment override options.
externalDb	Instructs the Operator to deploy a dedicated database. By default, a dedicated PostgreSQL database is deployed as part of the Che installation. When <b>externalDb</b> is set as <b>true</b> , no dedicated database is deployed by the Operator and you need to provide connection details about the external database you want to use.
postgresDb	PostgreSQL database name that the Che server uses to connect to the database.
postgresHostName	PostgreSQL database hostname that the Che server connects to. Override this value only when using an external database. See field <b>externalDb</b> .
postgresPort	PostgreSQL Database port the Che server connects to. Override this value only when using an external database. See field <b>externalDb</b> .
pvc	PVC settings for PostgreSQL database.

**Table 3.8. Configuration settings related to the Dashboard component used by the OpenShift Dev Spaces installation.**

Property	Description
deployment	Deployment override options.
headerMessage	Dashboard header message.

**Table 3.9. Kubernetes Image Puller component configuration.**

Property	Description
enable	Install and configure the community supported Kubernetes Image Puller Operator. When you set the value to <b>true</b> without providing any specs, it creates a default Kubernetes Image Puller object managed by the Operator. When you set the value to <b>false</b> , the Kubernetes Image Puller object is deleted, and the Operator uninstalled, regardless of whether a spec is provided. If you leave the <b>spec.images</b> field empty, a set of recommended workspace-related images is automatically detected and pre-pulled after installation. Note that while this Operator and its behavior is community-supported, its payload may be commercially-supported for pulling commercially-supported images.
spec	A Kubernetes Image Puller spec to configure the image puller in the CheCluster.

**Table 3.10. OpenShift Dev Spaces server metrics component configuration.**

Property	Description
enable	Enables <b>metrics</b> for the Che server endpoint.

**Table 3.11. Networking, OpenShift Dev Spaces authentication and TLS configuration.**

Property	Description
annotations	Defines annotations which will be set for an Ingress (a route for OpenShift platform). The defaults for kubernetes platforms are: kubernetes.io/ingress.class: \nginx\ nginx.ingress.kubernetes.io/proxy-read-timeout: \3600\ nginx.ingress.kubernetes.io/proxy-connect-timeout: \3600\ nginx.ingress.kubernetes.io/ssl-redirect: \true\ \
auth	Authentication settings.

Property	Description
domain	For an OpenShift cluster, the Operator uses the domain to generate a hostname for the route. The generated hostname follows this pattern: che- <che-namespace>.<domain>. The <che-namespace> is the namespace where the CheCluster CRD is created. In conjunction with labels, it creates a route served by a non-default Ingress controller. For a Kubernetes cluster, it contains a global ingress domain. There are no default values: you must specify them.
hostname	The public hostname of the installed Che server.
labels	Defines labels which will be set for an Ingress (a route for OpenShift platform).
tlsSecretName	The name of the secret used to set up Ingress TLS termination. If the field is an empty string, the default cluster certificate is used. The secret must have a <b>app.kubernetes.io/part-of=che.eclipse.org</b> label.

**Table 3.12. Configuration of an alternative registry that stores OpenShift Dev Spaces images.**

Property	Description
hostname	An optional hostname or URL of an alternative container registry to pull images from. This value overrides the container registry hostname defined in all the default container images involved in a Che deployment. This is particularly useful for installing Che in a restricted environment.
organization	An optional repository name of an alternative registry to pull images from. This value overrides the container registry organization defined in all the default container images involved in a Che deployment. This is particularly useful for installing OpenShift Dev Spaces in a restricted environment.

**Table 3.13. CheCluster Custom Resourcestatus defines the observed state of OpenShift Dev Spaces installation**

Property	Description
chePhase	Specifies the current phase of the Che deployment.
cheURL	Public URL of the Che server.
cheVersion	Currently installed Che version.
devfileRegistryURL	The public URL of the internal devfile registry.
gatewayPhase	Specifies the current phase of the gateway deployment.

Property	Description
message	A human readable message indicating details about why the Che deployment is in the current phase.
pluginRegistryURL	The public URL of the internal plug-in registry.
postgresVersion	The PostgreSQL version of the image in use.
reason	A brief CamelCase message indicating details about why the Che deployment is in the current phase.
workspaceBaseDomain	The resolved workspace base domain. This is either the copy of the explicitly defined property of the same name in the spec or, if it is undefined in the spec and we're running on OpenShift, the automatically resolved basedomain for routes.

## 3.2. CONFIGURING USER PROJECT PROVISIONING

For each user, OpenShift Dev Spaces isolates workspaces in a project. OpenShift Dev Spaces identifies the user project by the presence of labels and annotations. When starting a workspace, if the required project doesn't exist, OpenShift Dev Spaces creates the project using a template name.

You can modify OpenShift Dev Spaces behavior by:

- [Section 3.2.1, "Configuring a user project name for automatic provisioning"](#)
- [Section 3.2.2, "Provisioning projects in advance"](#)

### 3.2.1. Configuring a user project name for automatic provisioning

You can configure the project name template that OpenShift Dev Spaces uses to create the required project when starting a workspace.

A valid project name template follows these conventions:

- The **<username>** or **<userid>** placeholder is mandatory.
- Usernames and IDs cannot contain invalid characters. If the formatting of a username or ID is incompatible with the naming conventions for OpenShift objects, OpenShift Dev Spaces changes the username or ID to a valid name by replacing incompatible characters with the **-** symbol.
- OpenShift Dev Spaces evaluates the **<userid>** placeholder into a 14 character long string, and adds a random six character long suffix to prevent IDs from colliding. The result is stored in the user preferences for reuse.
- Kubernetes limits the length of a project name to 63 characters.
- OpenShift limits the length further to 49 characters.

#### Procedure

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#).

```
spec:
  components:
    devEnvironments:
      defaultNamespace:
        template: <workspace_namespace_template_>
```

### Example 3.3. User workspaces project name template examples

User workspaces project name template	Resulting project example
<b>&lt;username&gt;-devspaces</b> (default)	user1-devspaces
<b>&lt;userid&gt;-namespace</b>	<b>cge1egvsb2nhba-namespace-ul1411</b>
<b>&lt;userid&gt;-aka-&lt;username&gt;-namespace</b>	<b>cgezegvsb2nhba-aka-user1-namespace-6m2w2b</b>

#### Additional resources

- [Section 3.1.1, “Using dsc to configure the CheCluster Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.2.2. Provisioning projects in advance

You can provision workspaces projects in advance, rather than relying on automatic provisioning. Repeat the procedure for each user.

#### Procedure

- Create the *<project\_name>* project for *<username>* user with the following labels and annotations:

```
kind: Namespace
apiVersion: v1
metadata:
  name: <project_name> 1
  labels:
    app.kubernetes.io/part-of: che.eclipse.org
    app.kubernetes.io/component: workspaces-namespace
  annotations:
    che.eclipse.org/username: <username>
```

- 1** Use a project name of your choosing.

#### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

## 3.3. CONFIGURING SERVER COMPONENTS

- [Section 3.3.1, “Mounting a Secret or a ConfigMap as a file or an environment variable into a OpenShift Dev Spaces container”](#)

### 3.3.1. Mounting a Secret or a ConfigMap as a file or an environment variable into a OpenShift Dev Spaces container

Secrets are OpenShift objects that store sensitive data such as:

- usernames
- passwords
- authentication tokens

in an encrypted form.

Users can mount a OpenShift Secret that contains sensitive data or a ConfigMap that contains configuration in a OpenShift Dev Spaces managed containers as:

- a file
- an environment variable

The mounting process uses the standard OpenShift mounting mechanism, but it requires additional annotations and labeling.

#### 3.3.1.1. Mounting a Secret or a ConfigMap as a file into a OpenShift Dev Spaces container

##### Prerequisites

- A running instance of Red Hat OpenShift Dev Spaces.

##### Procedure

1. Create a new OpenShift Secret or a ConfigMap in the OpenShift project where a OpenShift Dev Spaces is deployed. The labels of the object that is about to be created must match the set of labels:
  - **app.kubernetes.io/part-of: che.eclipse.org**
  - **app.kubernetes.io/component: <DEPLOYMENT\_NAME>-<OBJECT\_KIND>**
  - The **<DEPLOYMENT\_NAME>** corresponds to the one following deployments:
    - **postgres**
    - **keycloak**
    - **devfile-registry**

- **plugin-registry**
- **devspaces**  
and
- **<OBJECT\_KIND>** is either:
  - **secret**  
or
  - **configmap**

#### Example 3.4. Example:

```
apiVersion: v1
kind: Secret
metadata:
  name: custom-settings
labels:
  app.kubernetes.io/part-of: che.eclipse.org
  app.kubernetes.io/component: devspaces-secret
...
```

or

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: custom-settings
labels:
  app.kubernetes.io/part-of: che.eclipse.org
  app.kubernetes.io/component: devspaces-configmap
...
```

Annotations must indicate that the given object is mounted as a file.

1. Configure the annotation values:

- **che.eclipse.org/mount-as: file** - To indicate that a object is mounted as a file.
- **che.eclipse.org/mount-path: <TARGET\_PATH>** - To provide a required mount path.

#### Example 3.5. Example:

```
apiVersion: v1
kind: Secret
metadata:
  name: custom-data
annotations:
  che.eclipse.org/mount-as: file
  che.eclipse.org/mount-path: /data
labels:
...
```

or

```

apiVersion: v1
kind: ConfigMap
metadata:
  name: custom-data
  annotations:
    che.eclipse.org/mount-as: file
    che.eclipse.org/mount-path: /data
  labels:
  ...

```

The OpenShift object may contain several items whose names must match the desired file name mounted into the container.

### Example 3.6. Example:

```

apiVersion: v1
kind: Secret
metadata:
  name: custom-data
  labels:
    app.kubernetes.io/part-of: che.eclipse.org
    app.kubernetes.io/component: devspaces-secret
  annotations:
    che.eclipse.org/mount-as: file
    che.eclipse.org/mount-path: /data
data:
  ca.crt: <base64 encoded data content here>

```

or

```

apiVersion: v1
kind: ConfigMap
metadata:
  name: custom-data
  labels:
    app.kubernetes.io/part-of: che.eclipse.org
    app.kubernetes.io/component: devspaces-configmap
  annotations:
    che.eclipse.org/mount-as: file
    che.eclipse.org/mount-path: /data
data:
  ca.crt: <data content here>

```

This results in a file named **ca.crt** being mounted at the **/data** path of OpenShift Dev Spaces container.



### IMPORTANT

To make the changes in a OpenShift Dev Spaces container visible, recreate the object entirely.



## Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.3.1.2. Mounting a Secret or a ConfigMap as an environment variable into a OpenShift Dev Spaces container

#### Prerequisites

- A running instance of Red Hat OpenShift Dev Spaces.

#### Procedure

1. Create a new OpenShift Secret or a ConfigMap in the OpenShift project where a OpenShift Dev Spaces is deployed. The labels of the object that is about to be created must match the set of labels:
  - **app.kubernetes.io/part-of: che.eclipse.org**
  - **app.kubernetes.io/component: <DEPLOYMENT\_NAME>-<OBJECT\_KIND>**
  - The **<DEPLOYMENT\_NAME>** corresponds to the one following deployments:
    - **postgres**
    - **keycloak**
    - **devfile-registry**
    - **plugin-registry**
    - **devspaces**  
and
  - **<OBJECT\_KIND>** is either:
    - **secret**  
or
    - **configmap**

#### Example 3.7. Example:

```

apiVersion: v1
kind: Secret
metadata:
  name: custom-settings
labels:
  app.kubernetes.io/part-of: che.eclipse.org
  app.kubernetes.io/component: devspaces-secret
...

```

or

```

apiVersion: v1
kind: ConfigMap
metadata:
  name: custom-settings
labels:
  app.kubernetes.io/part-of: che.eclipse.org
  app.kubernetes.io/component: devspaces-configmap
...

```

Annotations must indicate that the given object is mounted as an environment variable.

1. Configure the annotation values:

- **che.eclipse.org/mount-as: env** - to indicate that a object is mounted as an environment variable
- **che.eclipse.org/env-name: <FOO\_ENV>** - to provide an environment variable name, which is required to mount a object key value

### Example 3.8. Example:

```

apiVersion: v1
kind: Secret
metadata:
  name: custom-settings
annotations:
  che.eclipse.org/env-name: FOO_ENV
  che.eclipse.org/mount-as: env
labels:
  ...
data:
  mykey: myvalue

```

or

```

apiVersion: v1
kind: ConfigMap
metadata:
  name: custom-settings
annotations:
  che.eclipse.org/env-name: FOO_ENV
  che.eclipse.org/mount-as: env
labels:
  ...
data:
  mykey: myvalue

```

This results in two environment variables:

- **FOO\_ENV**
- **myvalue**

being provisioned into a OpenShift Dev Spaces container.

If the object provides more than one data item, the environment variable name must be provided for each of the data keys as follows:

### Example 3.9. Example:

```

apiVersion: v1
kind: Secret
metadata:
  name: custom-settings
annotations:
  che.eclipse.org/mount-as: env
  che.eclipse.org/mykey_env-name: FOO_ENV
  che.eclipse.org/otherkey_env-name: OTHER_ENV
labels:
  ...
data:
  mykey: __<base64 encoded data content here>__
  otherkey: __<base64 encoded data content here>__

```

or

```

apiVersion: v1
kind: ConfigMap
metadata:
  name: custom-settings
annotations:
  che.eclipse.org/mount-as: env
  che.eclipse.org/mykey_env-name: FOO_ENV
  che.eclipse.org/otherkey_env-name: OTHER_ENV
labels:
  ...
data:
  mykey: __<data content here>__
  otherkey: __<data content here>__

```

This results in two environment variables:

- **FOO\_ENV**
- **OTHER\_ENV**

being provisioned into a OpenShift Dev Spaces container.



### NOTE

The maximum length of annotation names in a OpenShift object is 63 characters, where 9 characters are reserved for a prefix that ends with /. This acts as a restriction for the maximum length of the key that can be used for the object.

**IMPORTANT**

To make the changes in a OpenShift Dev Spaces container visible, recreate the object entirely.

**Additional resources**

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the \*\*CheCluster\*\* Custom Resource”](#)

### 3.3.2. Advanced configuration options for the OpenShift Dev Spaces server component

The following section describes advanced deployment and configuration methods for the OpenShift Dev Spaces server component.

#### 3.3.2.1. Understanding OpenShift Dev Spaces server advanced configuration

The following section describes the OpenShift Dev Spaces server component advanced configuration method for a deployment.

Advanced configuration is necessary to:

- Add environment variables not automatically generated by the Operator from the standard **CheCluster** Custom Resource fields.
- Override the properties automatically generated by the Operator from the standard **CheCluster** Custom Resource fields.

The **customCheProperties** field, part of the **CheCluster** Custom Resource **server** settings, contains a map of additional environment variables to apply to the OpenShift Dev Spaces server component.

#### Example 3.10. Override the default memory limit for workspaces

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, “Using the CLI to configure the \*\*CheCluster\*\* Custom Resource”](#).

```
spec:
  components:
    cheServer:
      extraProperties:
        CHE_WORKSPACE_DEFAULT__MEMORY__LIMIT__MB: "2048"
```

**NOTE**

Previous versions of the OpenShift Dev Spaces Operator had a ConfigMap named **custom** to fulfill this role. If the OpenShift Dev Spaces Operator finds a **configMap** with the name **custom**, it adds the data it contains into the **customCheProperties** field, redeploys OpenShift Dev Spaces, and deletes the **custom configMap**.

**Additional resources**

- [Section 3.1.3, “CheCluster Custom Resource fields reference”](#).
- [Section 3.3.2.2, “OpenShift Dev Spaces server component system properties reference”](#).

### 3.3.2.2. OpenShift Dev Spaces server component system properties reference

The following document describes all possible configuration properties of the OpenShift Dev Spaces server component.

#### 3.3.2.2.1. OpenShift Dev Spaces server

##### 3.3.2.2.1.1. CHE\_API

API service. Browsers initiate REST communications to OpenShift Dev Spaces server with this URL.

###### Default

**`http://${CHE_HOST}:${CHE_PORT}/api`**

##### 3.3.2.2.1.2. CHE\_API\_INTERNAL

API service internal network URL. Back-end services should initiate REST communications to OpenShift Dev Spaces server with this URL

###### Default

**NULL**

##### 3.3.2.2.1.3. CHE\_WEBSOCKET\_ENDPOINT

OpenShift Dev Spaces WebSocket major endpoint. Provides basic communication endpoint for major WebSocket interactions and messaging.

###### Default

**`ws://${CHE_HOST}:${CHE_PORT}/api/websocket`**

##### 3.3.2.2.1.4. CHE\_WEBSOCKET\_INTERNAL\_ENDPOINT

OpenShift Dev Spaces WebSocket major internal endpoint. Provides basic communication endpoint for major WebSocket interactions and messaging.

###### Default

**NULL**

##### 3.3.2.2.1.5. CHE\_WORKSPACE\_PROJECTS\_STORAGE

Your projects are synchronized from the OpenShift Dev Spaces server into the machine running each workspace. This is the directory in the machine where your projects are placed.

###### Default

**`/projects`**

##### 3.3.2.2.1.6. CHE\_WORKSPACE\_PROJECTS\_STORAGE\_DEFAULT\_SIZE

Used when OpenShift-type components in a devfile request project PVC creation (Applied in case of **unique** and **per workspace** PVC strategy. In case of the **common** PVC strategy, it is rewritten with the value of the **che.infra.kubernetes.pvc.quantity** property.)

**Default****1Gi****3.3.2.2.1.7. CHE\_WORKSPACE\_LOGS\_ROOT\_\_DIR**

Defines the directory inside the machine where all the workspace logs are placed. Provide this value into the machine, for example, as an environment variable. This is to ensure that agent developers can use this directory to back up agent logs.

**Default****/workspace\_logs****3.3.2.2.1.8. CHE\_WORKSPACE\_HTTP\_\_PROXY**

Configures environment variable HTTP\_PROXY to a specified value in containers powering workspaces.

**Default**

empty

**3.3.2.2.1.9. CHE\_WORKSPACE\_HTTPS\_\_PROXY**

Configures environment variable HTTPS\_PROXY to a specified value in containers powering workspaces.

**Default**

empty

**3.3.2.2.1.10. CHE\_WORKSPACE\_NO\_\_PROXY**

Configures environment variable NO\_PROXY to a specified value in containers powering workspaces.

**Default**

empty

**3.3.2.2.1.11. CHE\_WORKSPACE\_AUTO\_\_START**

By default, when users access a workspace with its URL, the workspace automatically starts (if currently stopped). Set this to **false** to disable this behavior.

**Default****true****3.3.2.2.1.12. CHE\_WORKSPACE\_POOL\_TYPE**

Workspace threads pool configuration. This pool is used for workspace-related operations that require asynchronous execution, for example, starting and stopping. Possible values are **fixed** and **cached**.

**Default****fixed**

**3.3.2.2.13. CHE\_WORKSPACE\_POOL\_EXACT\_\_SIZE**

This property is ignored when pool type is different from **fixed**. It configures the exact size of the pool. When set, the **multiplier** property is ignored. If this property is not set ( **0**, **<0**, **NULL**), then the pool size equals the number of cores. See also **che.workspace.pool.cores\_multiplier**.

Default

**30**

**3.3.2.2.14. CHE\_WORKSPACE\_POOL\_CORES\_\_MULTIPLIER**

This property is ignored when pool type is not set to **fixed**, **che.workspace.pool.exact\_size** is set. When set, the pool size is **N\_CORES \* multiplier**.

Default

**2**

**3.3.2.2.15. CHE\_WORKSPACE\_PROBE\_\_POOL\_\_SIZE**

This property specifies how many threads to use for workspace server liveness probes.

Default

**10**

**3.3.2.2.16. CHE\_WORKSPACE\_HTTP\_\_PROXY\_\_JAVA\_\_OPTIONS**

HTTP proxy setting for workspace JVM.

Default

**NULL**

**3.3.2.2.17. CHE\_WORKSPACE\_JAVA\_\_OPTIONS**

Java command-line options added to JVMs running in workspaces.

Default

**-XX:MaxRAM=150m-XX:MaxRAMFraction=2 -XX:+UseParallelGC -XX:MinHeapFreeRatio=10 -XX:MaxHeapFreeRatio=20 -XX:GCTimeRatio=4 -XX:AdaptiveSizePolicyWeight=90 -Dsun.zip.disableMemoryMapping=true -Xms20m -Djava.security.egd=file:/dev/./urandom**

**3.3.2.2.18. CHE\_WORKSPACE\_MAVEN\_\_OPTIONS**

Maven command-line options added to JVMs running agents in workspaces.

Default

**-XX:MaxRAM=150m-XX:MaxRAMFraction=2 -XX:+UseParallelGC -XX:MinHeapFreeRatio=10 -XX:MaxHeapFreeRatio=20 -XX:GCTimeRatio=4 -XX:AdaptiveSizePolicyWeight=90 -Dsun.zip.disableMemoryMapping=true -Xms20m -Djava.security.egd=file:/dev/./urandom**

**3.3.2.2.19. CHE\_WORKSPACE\_DEFAULT\_\_MEMORY\_\_LIMIT\_\_MB**

RAM limit default for each machine that has no RAM settings in its environment. Value less or equal to 0 is interpreted as disabling the limit.

**Default****1024****3.3.2.2.1.20. CHE\_WORKSPACE\_DEFAULT\_MEMORY\_REQUEST\_MB**

RAM request for each container that has no explicit RAM settings in its environment. This amount is allocated when the workspace container is created. This property may not be supported by all infrastructure implementations. Currently it is supported by OpenShift. A memory request exceeding the memory limit is ignored, and only the limit size is used. Value less or equal to 0 is interpreted as disabling the limit.

**Default****200****3.3.2.2.1.21. CHE\_WORKSPACE\_DEFAULT\_CPU\_LIMIT\_CORES**

CPU limit for each container that has no CPU settings in its environment. Specify either in floating point cores number, for example, **0.125**, or using the Kubernetes format, integer millicores, for example, **125m**. Value less or equal to 0 is interpreted as disabling the limit.

**Default****-1****3.3.2.2.1.22. CHE\_WORKSPACE\_DEFAULT\_CPU\_REQUEST\_CORES**

CPU request for each container that has no CPU settings in environment. A CPU request exceeding the CPU limit is ignored, and only limit number is used. Value less or equal to 0 is interpreted as disabling the limit.

**Default****-1****3.3.2.2.1.23. CHE\_WORKSPACE\_SIDECAR\_DEFAULT\_MEMORY\_LIMIT\_MB**

RAM limit for each sidecar that has no RAM settings in the OpenShift Dev Spaces plug-in configuration. Value less or equal to 0 is interpreted as disabling the limit.

**Default****128****3.3.2.2.1.24. CHE\_WORKSPACE\_SIDECAR\_DEFAULT\_MEMORY\_REQUEST\_MB**

RAM request for each sidecar that has no RAM settings in the OpenShift Dev Spaces plug-in configuration.

**Default****64****3.3.2.2.1.25. CHE\_WORKSPACE\_SIDECAR\_DEFAULT\_CPU\_LIMIT\_CORES**

CPU limit default for each sidecar that has no CPU settings in the OpenShift Dev Spaces plug-in configuration. Specify either in floating point cores number, for example, **0.125**, or using the Kubernetes format, integer millicores, for example, **125m**. Value less or equal to 0 is interpreted as disabling the limit.



**Default****-1****3.3.2.2.1.26. CHE\_WORKSPACE\_SIDECAR\_DEFAULT\_CPU\_REQUEST\_CORES**

CPU request default for each sidecar that has no CPU settings in the OpenShift Dev Spaces plug-in configuration. Specify either in floating point cores number, for example, **0.125**, or using the Kubernetes format, integer millicores, for example, **125m**.

**Default****-1****3.3.2.2.1.27. CHE\_WORKSPACE\_SIDECAR\_IMAGE\_PULL\_POLICY**

Defines image-pulling strategy for sidecars. Possible values are: **Always**, **Never**, **IfNotPresent**. For any other value, **Always** is assumed for images with the **:latest** tag, or **IfNotPresent** for all other cases.

**Default****Always****3.3.2.2.1.28. CHE\_WORKSPACE\_ACTIVITY\_CHECK\_SCHEDULER\_PERIOD\_S**

Period of inactive workspaces suspend job execution.

**Default****60****3.3.2.2.1.29. CHE\_WORKSPACE\_ACTIVITY\_CLEANUP\_SCHEDULER\_PERIOD\_S**

The period of the cleanup of the activity table. The activity table can contain invalid or stale data if some unforeseen errors happen, as a server failure at a peculiar point in time. The default is to run the cleanup job every hour.

**Default****3600****3.3.2.2.1.30. CHE\_WORKSPACE\_ACTIVITY\_CLEANUP\_SCHEDULER\_INITIAL\_DELAY\_S**

The delay after server startup to start the first activity clean up job.

**Default****60****3.3.2.2.1.31. CHE\_WORKSPACE\_ACTIVITY\_CHECK\_SCHEDULER\_DELAY\_S**

Delay before first workspace idleness check job started to avoid mass suspend if OpenShift Dev Spaces server was unavailable for period close to inactivity timeout.

**Default****180****3.3.2.2.1.32. CHE\_WORKSPACE\_CLEANUP\_TEMPORARY\_INITIAL\_DELAY\_MIN**

Time to delay the first execution of temporary workspaces cleanup job.

**Default**

**5**

**3.3.2.2.1.33. CHE\_WORKSPACE\_CLEANUP\_TEMPORARY\_PERIOD\_MIN**

Time to delay between the termination of one execution and the commencement of the next execution of temporary workspaces cleanup job

**Default**

**180**

**3.3.2.2.1.34. CHE\_WORKSPACE\_SERVER\_PING\_SUCCESS\_THRESHOLD**

Number of sequential successful pings to server after which it is treated as available. the OpenShift Dev Spaces Operator: the property is common for all servers, for example, workspace agent, terminal, exec.

**Default**

**1**

**3.3.2.2.1.35. CHE\_WORKSPACE\_SERVER\_PING\_INTERVAL\_MILLISECONDS**

Interval, in milliseconds, between successive pings to workspace server.

**Default**

**3000**

**3.3.2.2.1.36. CHE\_WORKSPACE\_SERVER\_LIVENESS\_PROBES**

List of servers names which require liveness probes

**Default**

**wsagent/http,exec-agent/http,terminal,theia,jupyter,dirigible,cloud-shell,intellij**

**3.3.2.2.1.37. CHE\_WORKSPACE\_STARTUP\_DEBUG\_LOG\_LIMIT\_BYTES**

Limit size of the logs collected from single container that can be observed by che-server when debugging workspace startup. default 10MB=10485760

**Default**

**10485760**

**3.3.2.2.1.38. CHE\_WORKSPACE\_STOP\_ROLE\_ENABLED**

If true, 'stop-workspace' role with the edit privileges will be granted to the 'che' ServiceAccount if OpenShift OAuth is enabled. This configuration is mainly required for workspace idling when the OpenShift OAuth is enabled.

**Default**

**true**

### 3.3.2.2.139. CHE\_DEVWORKSPACES\_ENABLED

Specifies whether OpenShift Dev Spaces is deployed with DevWorkspaces enabled. This property is set by the OpenShift Dev Spaces Operator if it also installed the support for DevWorkspaces. This property is used to advertise this fact to the OpenShift Dev Spaces dashboard. It does not make sense to change the value of this property manually.

#### Default

**false**

### 3.3.2.2.2. Authentication parameters

#### 3.3.2.2.2.1. CHE\_AUTH\_USER\_SELF\_CREATION

OpenShift Dev Spaces has a single identity implementation, so this does not change the user experience. If true, enables user creation at API level

#### Default

**false**

#### 3.3.2.2.2.2. CHE\_AUTH\_ACCESS\_DENIED\_ERROR\_PAGE

Authentication error page address

#### Default

**/error-oauth**

#### 3.3.2.2.2.3. CHE\_AUTH\_RESERVED\_USER\_NAMES

Reserved user names

#### Default

empty

#### 3.3.2.2.2.4. CHE\_OAUTH2\_GITHUB\_CLIENTID\_FILEPATH

Configuration of GitHub OAuth2 client. Used to obtain Personal access tokens. Location of the file with GitHub client id.

#### Default

**NULL**

#### 3.3.2.2.2.5. CHE\_OAUTH2\_GITHUB\_CLIENTSECRET\_FILEPATH

Location of the file with GitHub client secret.

#### Default

**NULL**

#### 3.3.2.2.2.6. CHE\_OAUTH\_GITHUB\_AUTHURI

GitHub OAuth authorization URI.

**Default****`https://github.com/login/oauth/authorize`****3.3.2.2.2.7. CHE\_OAUTH\_GITHUB\_TOKENURI**

GitHub OAuth token URI.

**Default****`https://github.com/login/oauth/access_token`****3.3.2.2.2.8. CHE\_OAUTH\_GITHUB\_REDIRECTURIS**

GitHub OAuth redirect URIs. Separate multiple values with comma, for example: URI,URI,URI

**Default****`http://localhost:${CHE_PORT}/api/oauth/callback`****3.3.2.2.2.9. CHE\_OAUTH\_OPENSIFT\_CLIENTID**

Configuration of OpenShift OAuth client. Used to obtain OpenShift OAuth token. OpenShift OAuth client ID.

**Default****NULL****3.3.2.2.2.10. CHE\_OAUTH\_OPENSIFT\_CLIENTSECRET**

Configuration of OpenShift OAuth client. Used to obtain OpenShift OAuth token. OpenShift OAuth client ID. OpenShift OAuth client secret.

**Default****NULL****3.3.2.2.2.11. CHE\_OAUTH\_OPENSIFT\_OAUTH\_\_ENDPOINT**

Configuration of OpenShift OAuth client. Used to obtain OpenShift OAuth token. OpenShift OAuth client ID. OpenShift OAuth client secret. OpenShift OAuth endpoint.

**Default****NULL****3.3.2.2.2.12. CHE\_OAUTH\_OPENSIFT\_VERIFY\_\_TOKEN\_\_URL**

Configuration of OpenShift OAuth client. Used to obtain OpenShift OAuth token. OpenShift OAuth client ID. OpenShift OAuth client secret. OpenShift OAuth endpoint. OpenShift OAuth verification token URL.

**Default****NULL****3.3.2.2.2.13. CHE\_OAUTH1\_BITBUCKET\_CONSUMERKEYPATH**

Configuration of Bitbucket Server OAuth1 client. Used to obtain Personal access tokens. Location of the file with Bitbucket Server application consumer key (equivalent to a username).

**Default****NULL****3.3.2.2.2.14. CHE\_OAUTH1\_BITBUCKET\_PRIVATEKEYPATH**

Configuration of Bitbucket Server OAuth1 client. Used to obtain Personal access tokens. Location of the file with Bitbucket Server application consumer key (equivalent to a username). Location of the file with Bitbucket Server application private key

**Default****NULL****3.3.2.2.2.15. CHE\_OAUTH1\_BITBUCKET\_ENDPOINT**

Configuration of Bitbucket Server OAuth1 client. Used to obtain Personal access tokens. Location of the file with Bitbucket Server application consumer key (equivalent to a username). Location of the file with Bitbucket Server application private key Bitbucket Server URL. To work correctly with factories the same URL has to be part of **che.integration.bitbucket.server\_endpoints** too.

**Default****NULL****3.3.2.2.3. Internal****3.3.2.2.3.1. SCHEDULE\_CORE\_POOL\_SIZE**

OpenShift Dev Spaces extensions can be scheduled executions on a time basis. This configures the size of the thread pool allocated to extensions that are launched on a recurring schedule.

**Default****10****3.3.2.2.3.2. DB\_SCHEMA\_FLYWAY\_BASELINE\_ENABLED**

DB initialization and migration configuration If true, ignore scripts up to the version configured by baseline.version.

**Default****true****3.3.2.2.3.3. DB\_SCHEMA\_FLYWAY\_BASELINE\_VERSION**

Scripts with version up to this are ignored. Note that scripts with version equal to baseline version are also ignored.

**Default****5.0.0.8.1****3.3.2.2.3.4. DB\_SCHEMA\_FLYWAY\_SCRIPTS\_PREFIX**

Prefix of migration scripts.

**Default**

empty

#### 3.3.2.2.3.5. **DB\_SCHEMA\_FLYWAY\_SCRIPTS\_SUFFIX**

Suffix of migration scripts.

**Default**

**.sql**

#### 3.3.2.2.3.6. **DB\_SCHEMA\_FLYWAY\_SCRIPTS\_VERSION\_\_SEPARATOR**

Separator of version from the other part of script name.

**Default**

**—**

#### 3.3.2.2.3.7. **DB\_SCHEMA\_FLYWAY\_SCRIPTS\_LOCATIONS**

Locations where to search migration scripts.

**Default**

**classpath:che-schema**

### 3.3.2.2.4. Kubernetes Infra parameters

#### 3.3.2.2.4.1. **CHE\_INFRA\_KUBERNETES\_MASTER\_\_URL**

Configuration of Kubernetes client master URL that Infra will use.

**Default**

empty

#### 3.3.2.2.4.2. **CHE\_INFRA\_KUBERNETES\_TRUST\_\_CERTS**

Boolean to configure Kubernetes client to use trusted certificates.

**Default**

**false**

#### 3.3.2.2.4.3. **CHE\_INFRA\_KUBERNETES\_CLUSTER\_\_DOMAIN**

Kubernetes cluster domain. If not set, svc names will not contain information about the cluster domain.

**Default**

**NULL**

#### 3.3.2.2.4.4. **CHE\_INFRA\_KUBERNETES\_SERVER\_\_STRATEGY**

Defines the way how servers are exposed to the world in Kubernetes infra. List of strategies implemented in OpenShift Dev Spaces: **default-host**, **multi-host**, **single-host**.

**Default**

**multi-host****3.3.2.2.4.5. CHE\_INFRA\_KUBERNETES\_SINGLEHOST\_WORKSPACE\_EXPOSURE**

Defines the way in which the workspace plugins and editors are exposed in the single-host mode.

Supported exposures: **native**: Exposes servers using Kubernetes Ingresses. Works only on Kubernetes.

**gateway**: Exposes servers using reverse-proxy gateway.

**Default****native****3.3.2.2.4.6. CHE\_INFRA\_KUBERNETES\_SINGLEHOST\_WORKSPACE\_DEVFILE\_\_ENDPOINT\_\_EXPOSURE**

Defines the way how to expose devfile endpoints, as end-user's applications, in single-host server strategy. They can either follow the single-host strategy and be exposed on subpaths, or they can be exposed on subdomains. **multi-host**: expose on subdomains **single-host**: expose on subpaths

**Default****multi-host****3.3.2.2.4.7. CHE\_INFRA\_KUBERNETES\_SINGLEHOST\_GATEWAY\_CONFIGMAP\_\_LABELS**

Defines labels which will be set to ConfigMaps configuring single-host gateway.

**Default****app=che,component=che-gateway-config****3.3.2.2.4.8. CHE\_INFRA\_KUBERNETES\_INGRESS\_DOMAIN**

Used to generate domain for a server in a workspace in case property

**che.infra.kubernetes.server\_strategy** is set to **multi-host**

**Default**

empty

**3.3.2.2.4.9. CHE\_INFRA\_KUBERNETES\_NAMESPACE\_CREATION\_\_ALLOWED**

Indicates whether OpenShift Dev Spaces server is allowed to create project for user workspaces, or they're intended to be created manually by cluster administrator. This property is also used by the OpenShift infra.

**Default****true****3.3.2.2.4.10. CHE\_INFRA\_KUBERNETES\_NAMESPACE\_DEFAULT**

Defines Kubernetes default namespace in which user's workspaces are created if user does not override it. It's possible to use **<username>** and **<userid>** placeholders (for example: **che-workspace-<username>**). In that case, new namespace will be created for each user. Used by OpenShift infra as well to specify a Project. The **<username>** or **<userid>** placeholder is mandatory.

**Default**

`<username>-che`

#### 3.3.2.2.4.11. CHE\_INFRA\_KUBERNETES\_NAMESPACE\_LABEL

Defines whether che-server should try to label the workspace namespaces. NOTE: It is strongly recommended to keep the value of this property set to true. If false, the new workspace namespaces will not be labeled automatically and therefore not recognized by the OpenShift Dev Spaces operator making some features of DevWorkspaces not working. If false, an administrator is required to label the namespaces manually using the labels specified in `che.infra.kubernetes.namespace.labels`. If you want to manage the namespaces yourself, make sure to follow <https://www.eclipse.org/che/docs/stable/administration-guide/provisioning-namespaces-in-advance/>. Any additional labels present on the namespace are kept in place and do not affect the functionality. Also note that the administrator is free to pre-create and label the namespaces manually even if this property is true. No updates to the namespaces are done if they already conform to the labeling requirements.

##### Default

`true`

#### 3.3.2.2.4.12. CHE\_INFRA\_KUBERNETES\_NAMESPACE\_ANNOTATE

Defines whether che-server should try to annotate the workspace namespaces.

##### Default

`true`

#### 3.3.2.2.4.13. CHE\_INFRA\_KUBERNETES\_NAMESPACE\_LABELS

List of labels to find project that are used for OpenShift Dev Spaces Workspaces. They are used to: - find prepared project for users in combination with **`che.infra.kubernetes.namespace.annotations`**. - actively label project with any workspace. NOTE: It is strongly recommended not to change the value of this property because the OpenShift Dev Spaces operator relies on these labels and their precise values when reconciling DevWorkspaces. If this configuration is changed, the namespaces will not be automatically recognized by the OpenShift Dev Spaces operator as workspace namespaces unless manually labeled as such using the default labels and values. Additional labels on the namespace do not affect the functionality.

##### Default

`app.kubernetes.io/part-of=che.eclipse.org,app.kubernetes.io/component=workspaces-namespace`

#### 3.3.2.2.4.14. CHE\_INFRA\_KUBERNETES\_NAMESPACE\_ANNOTATIONS

List of annotations to find project prepared for OpenShift Dev Spaces users workspaces. Only project matching the **`che.infra.kubernetes.namespace.labels`** will be matched against these annotations. project that matches both **`che.infra.kubernetes.namespace.labels`** and **`che.infra.kubernetes.namespace.annotations`** will be preferentially used for User's workspaces. It's possible to use `<username>` placeholder to specify the project to concrete user. They are used to: - find prepared project for users in combination with **`che.infra.kubernetes.namespace.labels`**. - actively annotate project with any workspace.

##### Default

`che.eclipse.org/username=<username>`



**3.3.2.2.4.15. CHE\_INFRA\_KUBERNETES\_SERVICE\_\_ACCOUNT\_\_NAME**

Defines Kubernetes Service Account name which should be specified to be bound to all workspaces Pods. the OpenShift Dev Spaces Operator that Kubernetes Infrastructure will not create the service account and it should exist. OpenShift infrastructure will check if project is predefined(if **che.infra.openshift.project** is not empty): - if it is predefined then service account must exist there - if it is 'NULL' or empty string then infrastructure will create new OpenShift project per workspace and prepare workspace service account with needed roles there

Default

**NULL**

**3.3.2.2.4.16. CHE\_INFRA\_KUBERNETES\_WORKSPACE\_\_SA\_\_CLUSTER\_\_ROLES**

Specifies optional, additional cluster roles to use with the workspace service account. the OpenShift Dev Spaces Operator that the cluster role names must already exist, and the OpenShift Dev Spaces service account needs to be able to create a Role Binding to associate these cluster roles with the workspace service account. The names are comma separated. This property deprecates **che.infra.kubernetes.cluster\_role\_name**.

Default

**NULL**

**3.3.2.2.4.17. CHE\_INFRA\_KUBERNETES\_USER\_\_CLUSTER\_\_ROLES**

Cluster roles to assign to user in his namespace

Default

**NULL**

**3.3.2.2.4.18. CHE\_INFRA\_KUBERNETES\_WORKSPACE\_\_START\_\_TIMEOUT\_\_MIN**

Defines wait time that limits the Kubernetes workspace start time.

Default

**8**

**3.3.2.2.4.19. CHE\_INFRA\_KUBERNETES\_INGRESS\_\_START\_\_TIMEOUT\_\_MIN**

Defines the timeout in minutes that limits the period for which Kubernetes Ingress become ready

Default

**5**

**3.3.2.2.4.20. CHE\_INFRA\_KUBERNETES\_WORKSPACE\_\_UNRECOVERABLE\_\_EVENTS**

If during workspace startup an unrecoverable event defined in the property occurs, stop the workspace immediately rather than waiting until timeout. the OpenShift Dev Spaces Operator that this SHOULD NOT include a mere "Failed" reason, because that might catch events that are not unrecoverable. A failed container startup is handled explicitly by OpenShift Dev Spaces server.

Default

**FailedMount,FailedScheduling,MountVolume.SetUpfailed,Failed to pull image,FailedCreate,ReplicaSetCreateError**

#### 3.3.2.2.4.21. CHE\_INFRA\_KUBERNETES\_PVC\_ENABLED

Defines whether use the Persistent Volume Claim for OpenShift Dev Spaces workspace needs, for example: backup projects, logs, or disable it.

##### Default

**true**

#### 3.3.2.2.4.22. CHE\_INFRA\_KUBERNETES\_PVC\_STRATEGY

Defined which strategy will be used while choosing PVC for workspaces. Supported strategies: **common**: All workspaces in the same project will reuse the same PVC. Name of PVC may be configured with **che.infra.kubernetes.pvc.name**. Existing PVC will be used or a new one will be created if it does not exist. **unique**: Separate PVC for each workspace's volume will be used. Name of PVC is evaluated as **'{che.infra.kubernetes.pvc.name} + '-' + {generated\_8\_chars}'**. Existing PVC will be used or a new one will be created if it does not exist. **per-workspace**: Separate PVC for each workspace will be used. Name of PVC is evaluated as **'{che.infra.kubernetes.pvc.name} + '-' + {WORKSPACE\_ID}'**. Existing PVC will be used or a new one will be created if it doesn't exist.

##### Default

**common**

#### 3.3.2.2.4.23. CHE\_INFRA\_KUBERNETES\_PVC\_PRECREATE\_\_SUBPATHS

Defines whether to run a job that creates workspace's subpath directories in persistent volume for the **common** strategy before launching a workspace. Necessary in some versions of OpenShift as workspace subpath volume mounts are created with root permissions, and therefore cannot be modified by workspaces running as a user (presents an error importing projects into a workspace in OpenShift Dev Spaces). The default is **true**, but should be set to **false** if the version of OpenShift creates subdirectories with user permissions. See: [subPath in volumeMount is not writable for non-root users #41638](#) the OpenShift Dev Spaces Operator that this property has effect only if the **common** PVC strategy used.

##### Default

**true**

#### 3.3.2.2.4.24. CHE\_INFRA\_KUBERNETES\_PVC\_NAME

Defines the settings of PVC name for OpenShift Dev Spaces workspaces. Each PVC strategy supplies this value differently. See documentation for **che.infra.kubernetes.pvc.strategy** property

##### Default

**claim-che-workspace**

#### 3.3.2.2.4.25. CHE\_INFRA\_KUBERNETES\_PVC\_STORAGE\_\_CLASS\_\_NAME

Defines the storage class of Persistent Volume Claim for the workspaces. Empty strings means "use default".

##### Default

empty

#### 3.3.2.2.4.26. CHE\_INFRA\_KUBERNETES\_PVC\_QUANTITY

Defines the size of Persistent Volume Claim of OpenShift Dev Spaces workspace. See: [Understanding persistent storage](#)

**Default**

**10Gi**

#### 3.3.2.2.4.27. CHE\_INFRA\_KUBERNETES\_PVC\_JOBS\_IMAGE

Pod that is launched when performing persistent volume claim maintenance jobs on OpenShift

**Default**

**registry.access.redhat.com/ubi8-minimal:8.3-230**

#### 3.3.2.2.4.28. CHE\_INFRA\_KUBERNETES\_PVC\_JOBS\_IMAGE\_PULL\_POLICY

Image pull policy of container that used for the maintenance jobs on OpenShift cluster

**Default**

**IfNotPresent**

#### 3.3.2.2.4.29. CHE\_INFRA\_KUBERNETES\_PVC\_JOBS\_MEMORYLIMIT

Defines Pod memory limit for persistent volume claim maintenance jobs

**Default**

**250Mi**

#### 3.3.2.2.4.30. CHE\_INFRA\_KUBERNETES\_PVC\_ACCESS\_MODE

Defines Persistent Volume Claim access mode. the OpenShift Dev Spaces Operator that for common PVC strategy changing of access mode affects the number of simultaneously running workspaces. If the OpenShift instance running OpenShift Dev Spaces is using Persistent Volumes with RWX access mode, then a limit of running workspaces at the same time is bounded only by OpenShift Dev Spaces limits configuration: RAM, CPU, and so on. See: [Understanding persistent storage](#)

**Default**

**ReadWriteOnce**

#### 3.3.2.2.4.31. CHE\_INFRA\_KUBERNETES\_PVC\_WAIT\_BOUND

Defines if OpenShift Dev Spaces Server should wait workspaces Persistent Volume Claims to become bound after creating. Default value is **true**. The parameter is used by all Persistent Volume Claim strategies. It should be set to **false** when **volumeBindingMode** is configured to **WaitForFirstConsumer** otherwise workspace starts will hangs up on phase of waiting PVCs.

**Default**

**true**

#### 3.3.2.2.4.32. CHE\_INFRA\_KUBERNETES\_INGRESS\_ANNOTATIONS\_JSON

Defines annotations for ingresses which are used for servers exposing. Value depends on the kind of ingress controller. OpenShift infrastructure ignores this property because it uses Routes rather than Ingresses. the OpenShift Dev Spaces Operator that for a single-host deployment strategy to work, a

controller supporting URL rewriting has to be used (so that URLs can point to different servers while the servers do not need to support changing the app root). The

**che.infra.kubernetes.ingress.path.rewrite\_transform** property defines how the path of the ingress should be transformed to support the URL rewriting and this property defines the set of annotations on the ingress itself that instruct the chosen ingress controller to actually do the URL rewriting, potentially building on the path transformation (if required by the chosen ingress controller). For example for Nginx ingress controller 0.22.0 and later the following value is recommended:

```
{"ingress.kubernetes.io/rewrite-target": "/$1","ingress.kubernetes.io/ssl-redirect": "false",\
"ingress.kubernetes.io/proxy-connect-timeout": "3600","ingress.kubernetes.io/proxy-read-
timeout": "3600", "nginx.org/websocket-services": "<service-name>"} and the
```

**che.infra.kubernetes.ingress.path.rewrite\_transform** should be set to **"%s(.\*)"**. For nginx ingress controller older than 0.22.0, the rewrite-target should be set to merely / and the path transform to **%s** (see the **che.infra.kubernetes.ingress.path.rewrite\_transform** property). See the Nginx ingress controller documentation for the explanation of how the ingress controller uses the regular expression available in the ingress path and how it achieves the URL rewriting.

Default

**NULL**

#### 3.3.2.2.4.33. CHE\_INFRA\_KUBERNETES\_INGRESS\_PATH\_TRANSFORM

Defines a recipe on how to declare the path of the ingress that should expose a server. The **%s** represents the base public URL of the server and is guaranteed to end with a forward slash. This property must be a valid input to the **String.format()** method and contain exactly one reference to **%s**. See the description of the **che.infra.kubernetes.ingress.annotations\_json** property to see how these two properties interplay when specifying the ingress annotations and path. If not defined, this property defaults to **%s** (without the quotes) which means that the path is not transformed in any way for use with the ingress controller.

Default

**NULL**

#### 3.3.2.2.4.34. CHE\_INFRA\_KUBERNETES\_INGRESS\_LABELS

Additional labels to add into every Ingress created by OpenShift Dev Spaces server to allow clear identification.

Default

**NULL**

#### 3.3.2.2.4.35. CHE\_INFRA\_KUBERNETES\_POD\_SECURITY\_CONTEXT\_RUN\_AS\_USER

Defines security context for Pods that will be created by Kubernetes Infra This is ignored by OpenShift infra

Default

**NULL**

#### 3.3.2.2.4.36. CHE\_INFRA\_KUBERNETES\_POD\_SECURITY\_CONTEXT\_FS\_GROUP

Defines security context for Pods that will be created by Kubernetes Infra. A special supplemental group that applies to all containers in a Pod. This is ignored by OpenShift infra.

Default

**NULL****3.3.2.2.4.37. CHE\_INFRA\_KUBERNETES\_POD\_TERMINATION\_\_GRACE\_\_PERIOD\_\_SEC**

Defines grace termination period for Pods that will be created by OpenShift infrastructures. Default value: **0**. It allows to stop Pods quickly and significantly decrease the time required for stopping a workspace. the OpenShift Dev Spaces Operator: if **terminationGracePeriodSeconds** have been explicitly set in OpenShift recipe it will not be overridden.

**Default****0****3.3.2.2.4.38. CHE\_INFRA\_KUBERNETES\_TLS\_\_ENABLED**

Creates Ingresses with Transport Layer Security (TLS) enabled. In OpenShift infrastructure, Routes will be TLS-enabled.

**Default****false****3.3.2.2.4.39. CHE\_INFRA\_KUBERNETES\_TLS\_\_SECRET**

Name of a secret that should be used when creating workspace ingresses with TLS. This property is ignored by OpenShift infrastructure.

**Default**

empty

**3.3.2.2.4.40. CHE\_INFRA\_KUBERNETES\_TLS\_\_KEY**

Data for TLS Secret that should be used for workspaces Ingresses. **cert** and **key** should be encoded with Base64 algorithm. These properties are ignored by OpenShift infrastructure.

**Default****NULL****3.3.2.2.4.41. CHE\_INFRA\_KUBERNETES\_TLS\_\_CERT**

Certificate data for TLS Secret that should be used for workspaces Ingresses. Certificate should be encoded with Base64 algorithm. This property is ignored by OpenShift infrastructure.

**Default****NULL****3.3.2.2.4.42. CHE\_INFRA\_KUBERNETES\_RUNTIMES\_\_CONSISTENCY\_\_CHECK\_\_PERIOD\_\_MIN**

Defines the period with which runtimes consistency checks will be performed. If runtime has inconsistent state then runtime will be stopped automatically. Value must be more than 0 or **-1**, where **-1** means that checks won't be performed at all. It is disabled by default because there is possible OpenShift Dev Spaces Server configuration when OpenShift Dev Spaces Server doesn't have an ability to interact with Kubernetes API when operation is not invoked by user. It DOES work on the following configurations: - workspaces objects are created in the same namespace where OpenShift Dev Spaces Server is located;

- **cluster-admin** service account token is mounted to OpenShift Dev Spaces Server Pod. It DOES NOT work on the following configurations: - OpenShift Dev Spaces Server communicates with Kubernetes API using token from OAuth provider.

#### Default

-1

#### 3.3.2.2.4.43. CHE\_INFRA\_KUBERNETES\_TRUSTED\_\_CA\_SRC\_\_CONFIGMAP

Name of the ConfigMap in OpenShift Dev Spaces server namespace with additional CA TLS certificates to be propagated into all user's workspaces. If the property is set on OpenShift 4 infrastructure, and **che.infra.openshift.trusted\_ca.dest\_configmap\_labels** includes the **config.openshift.io/inject-trusted-cabundle=true** label, then cluster CA bundle will be propagated too.

#### Default

NULL

#### 3.3.2.2.4.44. CHE\_INFRA\_KUBERNETES\_TRUSTED\_\_CA\_DEST\_\_CONFIGMAP

Name of the ConfigMap in a workspace namespace with additional CA TLS certificates. Holds the copy of **che.infra.kubernetes.trusted\_ca.src\_configmap** but in a workspace namespace. Content of this ConfigMap is mounted into all workspace containers including plugin brokers. Do not change the ConfigMap name unless it conflicts with the already existing ConfigMap. the OpenShift Dev Spaces Operator that the resulting ConfigMap name can be adjusted eventually to make it unique in project. The original name would be stored in **che.original\_name** label.

#### Default

ca-certs

#### 3.3.2.2.4.45. CHE\_INFRA\_KUBERNETES\_TRUSTED\_\_CA\_MOUNT\_\_PATH

Configures path on workspace containers where the CA bundle should be mounted. Content of ConfigMap specified by **che.infra.kubernetes.trusted\_ca.dest\_configmap** is mounted.

#### Default

/public-certs

#### 3.3.2.2.4.46. CHE\_INFRA\_KUBERNETES\_TRUSTED\_\_CA\_DEST\_\_CONFIGMAP\_\_LABELS

Comma separated list of labels to add to the CA certificates ConfigMap in user workspace. See the **che.infra.kubernetes.trusted\_ca.dest\_configmap** property.

#### Default

empty

### 3.3.2.2.5. OpenShift Infra parameters

#### 3.3.2.2.5.1. CHE\_INFRA\_OPENSIFT\_TRUSTED\_\_CA\_DEST\_\_CONFIGMAP\_\_LABELS

Comma separated list of labels to add to the CA certificates ConfigMap in user workspace. See **che.infra.kubernetes.trusted\_ca.dest\_configmap** property. This default value is used for automatic cluster CA bundle injection in OpenShift 4.

**Default****config.openshift.io/inject-trusted-cabundle=true****3.3.2.2.5.2. CHE\_INFRA\_OPENSIFT\_ROUTE\_LABELS**

Additional labels to add into every Route created by OpenShift Dev Spaces server to allow clear identification.

**Default****NULL****3.3.2.2.5.3. CHE\_INFRA\_OPENSIFT\_ROUTE\_HOST\_DOMAIN\_SUFFIX**

The hostname that should be used as a suffix for the workspace routes. For example: Using **domain\_suffix=<devspaces-\_\_<openshift\_deployment\_name>\_\_.<domain\_name>\_\_>**, the route resembles: **routed3qrtk.<devspaces-\_\_<openshift\_deployment\_name>\_\_.<domain\_name>\_\_>**. It has to be a valid DNS name.

**Default****NULL****3.3.2.2.5.4. CHE\_INFRA\_OPENSIFT\_PROJECT\_INIT\_WITH\_SERVER\_SA**

Initialize OpenShift project with OpenShift Dev Spaces server's service account if OpenShift OAuth is enabled.

**Default****true****3.3.2.2.6. Experimental properties****3.3.2.2.6.1. CHE\_WORKSPACE\_PLUGIN\_BROKER\_METADATA\_IMAGE**

Docker image of OpenShift Dev Spaces plugin broker app that resolves workspace tools configuration and copies plugins dependencies to a workspace. The OpenShift Dev Spaces Operator overrides these images by default. Changing the images here will not have an effect if OpenShift Dev Spaces is installed using the Operator.

**Default****quay.io/eclipse/che-plugin-metadata-broker:v3.4.0****3.3.2.2.6.2. CHE\_WORKSPACE\_PLUGIN\_BROKER\_ARTIFACTS\_IMAGE**

Docker image of OpenShift Dev Spaces plugin artifacts broker. This broker runs as an init container on the workspace Pod. Its job is to take in a list of plugin identifiers (either references to a plugin in the registry or a link to a plugin meta.yaml) and ensure that the correct .vsix and .theia extensions are downloaded into the /plugins directory, for each plugin requested for the workspace.

**Default****quay.io/eclipse/che-plugin-artifacts-broker:v3.4.0****3.3.2.2.6.3. CHE\_WORKSPACE\_PLUGIN\_BROKER\_DEFAULT\_MERGE\_PLUGINS**

Configures the default behavior of the plugin brokers when provisioning plugins into a workspace. If set to true, the plugin brokers will attempt to merge plugins when possible: they run in the same sidecar image and do not have conflicting settings. This value is the default setting used when the devfile does not specify the **mergePlugins** attribute.

**Default****false****3.3.2.2.6.4. CHE\_WORKSPACE\_PLUGIN\_BROKER\_PULL\_POLICY**

Docker image of OpenShift Dev Spaces plugin broker app that resolves workspace tools configuration and copies plugins dependencies to a workspace

**Default****Always****3.3.2.2.6.5. CHE\_WORKSPACE\_PLUGIN\_BROKER\_WAIT\_TIMEOUT\_MIN**

Defines the timeout in minutes that limits the max period of result waiting for plugin broker.

**Default****3****3.3.2.2.6.6. CHE\_WORKSPACE\_PLUGIN\_REGISTRY\_URL**

Workspace plug-ins registry endpoint. Should be a valid HTTP URL. Example: `http://che-plugin-registry-eclipse-che.192.168.65.2.nip.io` In case OpenShift Dev Spaces plug-ins registry is not needed value 'NULL' should be used

**Default****`https://che-plugin-registry.prod-preview.openshift.io/v3`****3.3.2.2.6.7. CHE\_WORKSPACE\_PLUGIN\_REGISTRY\_INTERNAL\_URL**

Workspace plugins registry internal endpoint. Should be a valid HTTP URL. Example: `http://devfile-registry.che.svc.cluster.local:8080` In case OpenShift Dev Spaces plug-ins registry is not needed value 'NULL' should be used

**Default****NULL****3.3.2.2.6.8. CHE\_WORKSPACE\_DEVFILE\_REGISTRY\_URL**

Devfile Registry endpoint. Should be a valid HTTP URL. Example: `http://che-devfile-registry-eclipse-che.192.168.65.2.nip.io` In case OpenShift Dev Spaces plug-ins registry is not needed value 'NULL' should be used

**Default****`https://che-devfile-registry.prod-preview.openshift.io/`****3.3.2.2.6.9. CHE\_WORKSPACE\_DEVFILE\_REGISTRY\_INTERNAL\_URL**

Devfile Registry "internal" endpoint. Should be a valid HTTP URL. Example: `http://che-`



Devfile Registry internal endpoint. Should be a valid HTTP URL. Example: `http://plugin-registry.che.svc.cluster.local:8080` In case OpenShift Dev Spaces plug-ins registry is not needed value 'NULL' should be used

Default

**NULL**

### 3.3.2.2.6.10. CHE\_WORKSPACE\_STORAGE\_AVAILABLE\_TYPES

The configuration property that defines available values for storage types that clients such as the Dashboard should propose to users during workspace creation and update. Available values: - **persistent**: Persistent Storage slow I/O but persistent. - **ephemeral**: Ephemeral Storage allows for faster I/O but may have limited storage and is not persistent. - **async**: Experimental feature: Asynchronous storage is combination of Ephemeral and Persistent storage. Allows for faster I/O and keep your changes, will backup on stop and restore on start workspace. Will work only if: - **che.infra.kubernetes.pvc.strategy='common'** - **che.limits.user.workspaces.run.count=1** - **che.infra.kubernetes.namespace.default** contains `<username>` in other cases remove **async** from the list.

Default

**persistent,ephemeral,async**

### 3.3.2.2.6.11. CHE\_WORKSPACE\_STORAGE\_PREFERRED\_TYPE

The configuration property that defines a default value for storage type that clients such as the Dashboard should propose to users during workspace creation and update. The **async** value is an experimental feature, not recommended as default type.

Default

**persistent**

### 3.3.2.2.6.12. CHE\_SERVER\_SECURE\_EXPOSER

Configures in which way secure servers will be protected with authentication. Suitable values: - **default**: **jwtproxy** is configured in a pass-through mode. Servers should authenticate requests themselves. - **jwtproxy**: **jwtproxy** will authenticate requests. Servers will receive only authenticated requests.

Default

**jwtproxy**

### 3.3.2.2.6.13. CHE\_SERVER\_SECURE\_EXPOSER\_JWTPROXY\_TOKEN\_ISSUER

**Jwtproxy** issuer string, token lifetime, and optional auth page path to route unsigned requests to.

Default

**wsmaster**

### 3.3.2.2.6.14. CHE\_SERVER\_SECURE\_EXPOSER\_JWTPROXY\_TOKEN\_TTL

JWTProxy issuer token lifetime.

Default

**8800h**

### 3.3.2.2.6.15. CHE\_SERVER\_SECURE\_\_EXPOSER\_JWTPROXY\_AUTH\_LOADER\_PATH

Optional authentication page path to route unsigned requests to.

#### Default

**`/_app/loader.html`**

### 3.3.2.2.6.16. CHE\_SERVER\_SECURE\_\_EXPOSER\_JWTPROXY\_IMAGE

JWTProxy image.

#### Default

**`quay.io/eclipse/che-jwtproxy:0.10.0`**

### 3.3.2.2.6.17. CHE\_SERVER\_SECURE\_\_EXPOSER\_JWTPROXY\_MEMORY\_\_REQUEST

JWTProxy memory request.

#### Default

**`15mb`**

### 3.3.2.2.6.18. CHE\_SERVER\_SECURE\_\_EXPOSER\_JWTPROXY\_MEMORY\_\_LIMIT

JWTProxy memory limit.

#### Default

**`128mb`**

### 3.3.2.2.6.19. CHE\_SERVER\_SECURE\_\_EXPOSER\_JWTPROXY\_CPU\_\_REQUEST

JWTProxy CPU request.

#### Default

**`0.03`**

### 3.3.2.2.6.20. CHE\_SERVER\_SECURE\_\_EXPOSER\_JWTPROXY\_CPU\_\_LIMIT

JWTProxy CPU limit.

#### Default

**`0.5`**

## 3.3.2.2.7. Configuration of the major WebSocket endpoint

### 3.3.2.2.7.1. CHE\_CORE\_JSONRPC\_PROCESSOR\_\_MAX\_\_POOL\_\_SIZE

Maximum size of the JSON RPC processing pool in case if pool size would be exceeded message execution will be rejected

#### Default

**`50`**

### 3.3.2.2.7.2. CHE\_CORE\_JSONRPC\_PROCESSOR\_\_CORE\_\_POOL\_\_SIZE

Initial JSON processing pool. Minimum number of threads that used to process major JSON RPC messages.

**Default**

**5**

### 3.3.2.2.7.3. CHE\_CORE\_JSONRPC\_PROCESSOR\_\_QUEUE\_\_CAPACITY

Configuration of queue used to process JSON RPC messages.

**Default**

**100000**

### 3.3.2.2.7.4. CHE\_METRICS\_PORT

Port the HTTP server endpoint that would be exposed with Prometheus metrics.

**Default**

**8087**

### 3.3.2.2.8. CORS settings

#### 3.3.2.2.8.1. CHE\_CORS\_ALLOWED\_\_ORIGINS

Indicates which request origins are allowed. CORS filter on WS Master is turned off by default. Use environment variable "CHE\_CORS\_ENABLED=true" to turn it on.

**Default**

**\***

#### 3.3.2.2.8.2. CHE\_CORS\_ALLOW\_\_CREDENTIALS

Indicates if it allows processing of requests with credentials (in cookies, headers, TLS client certificates).

**Default**

**false**

### 3.3.2.2.9. Factory defaults

#### 3.3.2.2.9.1. CHE\_FACTORY\_DEFAULT\_\_PLUGINS

Editor and plugin which will be used for factories that are created from a remote Git repository which does not contain any OpenShift Dev Spaces-specific workspace descriptor Multiple plugins must be comma-separated, for example:

**pluginFooPublisher/pluginFooName/pluginFooVersion,pluginBarPublisher/pluginBarName/pluginBarVersion**

**Default**

**redhat/vscode-commons/latest**

### 3.3.2.2.9.2. CHE\_FACTORY\_DEFAULT\_DEVFILE\_FILENAMES

Devfile filenames to look on repository-based factories (for example GitHub). Factory will try to locate those files in the order they enumerated in the property.

#### Default

**devfile.yaml,.devfile.yaml**

### 3.3.2.2.10. Devfile defaults

#### 3.3.2.2.10.1. CHE\_FACTORY\_DEFAULT\_EDITOR

Editor that will be used for factories that are created from a remote Git repository which does not contain any OpenShift Dev Spaces-specific workspace descriptor.

#### Default

**eclipse/che-theia/latest**

#### 3.3.2.2.10.2. CHE\_FACTORY\_SCM\_FILE\_FETCHER\_LIMIT\_BYTES

File size limit for the URL fetcher which fetch files from the SCM repository.

#### Default

**102400**

#### 3.3.2.2.10.3. CHE\_FACTORY\_DEVFILE2\_FILES\_RESOLUTION\_LIST

Additional files which may be present in repository to complement devfile v2, and should be referenced as links to SCM resolver service in factory to retrieve them.

#### Default

**.che/che-editor.yaml,.che/che-theia-plugins.yaml,.vscode/extensions.json**

#### 3.3.2.2.10.4. CHE\_WORKSPACE\_DEVFILE\_DEFAULT\_EDITOR

Default Editor that should be provisioned into Devfile if there is no specified Editor Format is **editorPublisher/editorName/editorVersion** value. **NULL** or absence of value means that default editor should not be provisioned.

#### Default

**eclipse/che-theia/latest**

#### 3.3.2.2.10.5. CHE\_WORKSPACE\_DEVFILE\_DEFAULT\_EDITOR\_PLUGINS

Default Plug-ins which should be provisioned for Default Editor. All the plugins from this list that are not explicitly mentioned in the user-defined devfile will be provisioned but only when the default editor is used or if the user-defined editor is the same as the default one (even if in different version). Format is comma-separated **pluginPublisher/pluginName/pluginVersion** values, and URLs. For example: **eclipse/che-theia-exec-plugin/0.0.1,eclipse/che-theia-terminal-plugin/0.0.1,https://cdn.pluginregistry.com/vi-mode/meta.yaml** If the plugin is a URL, the plugin's **meta.yaml** is retrieved from that URL.

#### Default

**NULL****3.3.2.2.10.6. CHE\_WORKSPACE\_PROVISION\_SECRET\_LABELS**

Defines comma-separated list of labels for selecting secrets from a user namespace, which will be mount into workspace containers as a files or environment variables. Only secrets that match ALL given labels will be selected.

**Default****app.kubernetes.io/part-of=che.eclipse.org,app.kubernetes.io/component=workspace-secret****3.3.2.2.10.7. CHE\_WORKSPACE\_DEVFILE\_ASYNC\_STORAGE\_PLUGIN**

Plugin is added in case asynchronous storage feature will be enabled in workspace configuration and supported by environment

**Default****eclipse/che-async-pv-plugin/latest****3.3.2.2.10.8. CHE\_INFRA\_KUBERNETES\_ASYNC\_STORAGE\_IMAGE**

Docker image for the OpenShift Dev Spaces asynchronous storage

**Default****quay.io/eclipse/che-workspace-data-sync-storage:0.0.1****3.3.2.2.10.9. CHE\_WORKSPACE\_POD\_NODE\_SELECTOR**

Optionally configures node selector for workspace Pod. Format is comma-separated key=value pairs, for example: **disktype=ssd,cpu=xlarge,foo=bar**

**Default****NULL****3.3.2.2.10.10. CHE\_WORKSPACE\_POD\_TOLERATIONS\_\_JSON**

Optionally configures tolerations for workspace Pod. Format is a string representing a JSON Array of taint tolerations, or **NULL** to disable it. The objects contained in the array have to follow the [toleration v1 core specifications](#). Example:

**[{"effect":"NoExecute","key":"aNodeTaint","operator":"Equal","value":"aValue"}]****Default****NULL****3.3.2.2.10.11. CHE\_INFRA\_KUBERNETES\_ASYNC\_STORAGE\_SHUTDOWN\_\_TIMEOUT\_\_MIN**

The timeout for the Asynchronous Storage Pod shutdown after stopping the last used workspace. Value less or equal to 0 interpreted as disabling shutdown ability.

**Default****120**

**3.3.2.2.10.12. CHE\_INFRA\_KUBERNETES\_ASYNC\_STORAGE\_SHUTDOWN\_CHECK\_PERIOD\_MIN**

Defines the period with which the Asynchronous Storage Pod stopping ability will be performed (once in 30 minutes by default)

**Default****30****3.3.2.2.10.13. CHE\_INTEGRATION\_BITBUCKET\_SERVER\_ENDPOINTS**

Bitbucket endpoints used for factory integrations. Comma separated list of Bitbucket server URLs or NULL if no integration expected.

**Default****NULL****3.3.2.2.10.14. CHE\_INTEGRATION\_GITLAB\_SERVER\_ENDPOINTS**

GitLab endpoints used for factory integrations. Comma separated list of GitLab server URLs or NULL if no integration expected.

**Default****NULL****3.3.2.2.10.15. CHE\_INTEGRATION\_GITLAB\_OAUTH\_ENDPOINT**

Address of the GitLab server with configured OAuth 2 integration

**Default****NULL****3.3.2.2.10.16. CHE\_OAUTH2\_GITLAB\_CLIENTID\_FILEPATH**

Configuration of GitLab OAuth2 client. Used to obtain Personal access tokens. Location of the file with GitLab client id.

**Default****NULL****3.3.2.2.10.17. CHE\_OAUTH2\_GITLAB\_CLIENTSECRET\_FILEPATH**

Location of the file with GitLab client secret.

**Default****NULL#****3.3.2.2.11. Che system****3.3.2.2.11.1. CHE\_SYSTEM\_SUPER\_PRIVILEGED\_MODE**

System Super Privileged Mode. Grants users with the manageSystem permission additional permissions for getByKey, getByNameSpace, stopWorkspaces, and getResourcesInformation. These are not given

to admins by default and these permissions allow admins gain visibility to any workspace along with naming themselves with administrator privileges to those workspaces.

**Default****false****3.3.2.2.11.2. CHE\_SYSTEM\_ADMIN\_\_NAME**

Grant system permission for **che.admin.name** user. If the user already exists it'll happen on component startup, if not - during the first login when user is persisted in the database.

**Default****admin****3.3.2.2.12. Workspace limits****3.3.2.2.12.1. CHE\_LIMITS\_WORKSPACE\_ENV\_RAM**

Workspaces are the fundamental runtime for users when doing development. You can set parameters that limit how workspaces are created and the resources that are consumed. The maximum amount of RAM that a user can allocate to a workspace when they create a new workspace. The RAM slider is adjusted to this maximum value.

**Default****16gb****3.3.2.2.12.2. CHE\_LIMITS\_WORKSPACE\_IDLE\_TIMEOUT**

The length of time in milliseconds that a user is idle with their workspace when the system will suspend the workspace and then stopping it. Idleness is the length of time that the user has not interacted with the workspace, meaning that one of the agents has not received interaction. Leaving a browser window open counts toward idleness.

**Default****1800000****3.3.2.2.12.3. CHE\_LIMITS\_WORKSPACE\_RUN\_TIMEOUT**

The length of time in milliseconds that a workspace will run, regardless of activity, before the system will suspend it. Set this property if you want to automatically stop workspaces after a period of time. The default is zero, meaning that there is no run timeout.

**Default****0****3.3.2.2.13. Users workspace limits****3.3.2.2.13.1. CHE\_LIMITS\_USER\_WORKSPACES\_RAM**

The total amount of RAM that a single user is allowed to allocate to running workspaces. A user can allocate this RAM to a single workspace or spread it across multiple workspaces.

**Default**

-1

#### 3.3.2.2.13.2. CHE\_LIMITS\_USER\_WORKSPACES\_COUNT

The maximum number of workspaces that a user is allowed to create. The user will be presented with an error message if they try to create additional workspaces. This applies to the total number of both running and stopped workspaces.

##### Default

-1

#### 3.3.2.2.13.3. CHE\_LIMITS\_USER\_WORKSPACES\_RUN\_COUNT

The maximum number of running workspaces that a single user is allowed to have. If the user has reached this threshold and they try to start an additional workspace, they will be prompted with an error message. The user will need to stop a running workspace to activate another.

##### Default

1

#### 3.3.2.2.14. Organizations workspace limits

##### 3.3.2.2.14.1. CHE\_LIMITS\_ORGANIZATION\_WORKSPACES\_RAM

The total amount of RAM that a single organization (team) is allowed to allocate to running workspaces. An organization owner can allocate this RAM however they see fit across the team's workspaces.

##### Default

-1

##### 3.3.2.2.14.2. CHE\_LIMITS\_ORGANIZATION\_WORKSPACES\_COUNT

The maximum number of workspaces that a organization is allowed to own. The organization will be presented an error message if they try to create additional workspaces. This applies to the total number of both running and stopped workspaces.

##### Default

-1

##### 3.3.2.2.14.3. CHE\_LIMITS\_ORGANIZATION\_WORKSPACES\_RUN\_COUNT

The maximum number of running workspaces that a single organization is allowed. If the organization has reached this threshold and they try to start an additional workspace, they will be prompted with an error message. The organization will need to stop a running workspace to activate another.

##### Default

-1

#### 3.3.2.2.15. Multi-user-specific OpenShift infrastructure configuration

##### 3.3.2.2.15.1. CHE\_INFRA\_OPENSHIFT\_OAUTH\_IDENTITY\_PROVIDER

Alias of the OpenShift identity provider registered in Keycloak, that should be used to create workspace



OpenShift resources in OpenShift namespaces owned by the current OpenShift Dev Spaces user. Should be set to NULL if **che.infra.openshift.project** is set to a non-empty value. See: [OpenShift identity provider](#)

Default

NULL

### 3.3.2.2.16. OIDC configuration

#### 3.3.2.2.16.1. CHE\_OIDC\_AUTH\_SERVER\_URL

Url to OIDC identity provider server Can be set to NULL only if **che.oidc.oidcProvider** is used

Default

`http://${CHE_HOST}:5050/auth`

#### 3.3.2.2.16.2. CHE\_OIDC\_AUTH\_INTERNAL\_SERVER\_URL

Internal network service Url to OIDC identity provider server

Default

NULL

#### 3.3.2.2.16.3. CHE\_OIDC\_ALLOWED\_CLOCK\_SKEW\_SEC

The number of seconds to tolerate for clock skew when verifying **exp** or **nbf** claims.

Default

3

#### 3.3.2.2.16.4. CHE\_OIDC\_USERNAME\_CLAIM

Username claim to be used as user display name when parsing JWT token if not defined the fallback value is 'preferred\_username' in Keycloak installations and **name** in Dex installations.

Default

NULL

#### 3.3.2.2.16.5. CHE\_OIDC\_OIDC\_PROVIDER

Base URL of an alternate OIDC provider that provides a discovery endpoint as detailed in the following specification [Obtaining OpenID Provider Configuration Information](#) Deprecated, use **che.oidc.auth\_server\_url** and **che.oidc.auth\_internal\_server\_url** instead.

Default

NULL

### 3.3.2.2.17. Keycloak configuration

#### 3.3.2.2.17.1. CHE\_KEYCLOAK\_REALM

Keycloak realm is used to authenticate users Can be set to NULL only if **che.keycloak.oidcProvider** is used

**Default****che****3.3.2.2.17.2. CHE\_KEYCLOAK\_CLIENT\_ID**

Keycloak client identifier in **che.keycloak.realm** to authenticate users in the dashboard, the IDE, and the CLI.

**Default****che-public****3.3.2.2.17.3. CHE\_KEYCLOAK\_OSO\_ENDPOINT**

URL to access OSO OAuth tokens

**Default****NULL****3.3.2.2.17.4. CHE\_KEYCLOAK\_GITHUB\_ENDPOINT**

URL to access Github OAuth tokens

**Default****NULL****3.3.2.2.17.5. CHE\_KEYCLOAK\_USE\_NONCE**

Use the OIDC optional **nonce** feature to increase security.

**Default****true****3.3.2.2.17.6. CHE\_KEYCLOAK\_JS\_ADAPTER\_URL**

URL to the Keycloak Javascript adapter to use. if set to NULL, then the default used value is **`\${che.keycloak.auth\_server\_url}/js/keycloak.js**, or **<che-server>/api/keycloak/OIDCKeycloak.js** if an alternate **oidc\_provider** is used

**Default****NULL****3.3.2.2.17.7. CHE\_KEYCLOAK\_USE\_FIXED\_REDIRECT\_URLS**

Set to true when using an alternate OIDC provider that only supports fixed redirect Urls This property is ignored when **che.keycloak.oidc\_provider** is NULL

**Default****false****3.3.2.2.17.8. CHE\_OAUTH\_SERVICE\_MODE**

Configuration of OAuth Authentication Service that can be used in "embedded" or "delegated" mode. If set to "embedded", then the service work as a wrapper to OpenShift Dev Spaces's OAuthAuthenticator ( as in Single User mode). If set to "delegated", then the service will use Keycloak IdentityProvider mechanism. Runtime Exception **wii** be thrown, in case if this property is not set properly.

#### Default

**delegated**

#### 3.3.2.2.17.9. CHE\_KEYCLOAK\_CASCADE\_USER\_REMOVAL\_ENABLED

Configuration for enabling removing user from Keycloak server on removing user from OpenShift Dev Spaces database. By default it's disabled. Can be enabled in some special cases when deleting a user in OpenShift Dev Spaces database should execute removing related-user from Keycloak. For correct work need to set administrator username `${che.keycloak.admin_username}` and password `${che.keycloak.admin_password}`.

#### Default

**false**

#### 3.3.2.2.17.10. CHE\_KEYCLOAK\_ADMIN\_USERNAME

Keycloak administrator username. Will be used for deleting user from Keycloak on removing user from OpenShift Dev Spaces database. Make sense only in case `${che.keycloak.cascade_user_removal_enabled}` set to 'true'

#### Default

**NULL**

#### 3.3.2.2.17.11. CHE\_KEYCLOAK\_ADMIN\_PASSWORD

Keycloak administrator password. Will be used for deleting user from Keycloak on removing user from OpenShift Dev Spaces database. Make sense only in case `${che.keycloak.cascade_user_removal_enabled}` set to 'true'

#### Default

**NULL**

#### 3.3.2.2.17.12. CHE\_KEYCLOAK\_USERNAME\_REPLACEMENT\_PATTERNS

User name adjustment configuration. OpenShift Dev Spaces needs to use the usernames as part of Kubernetes object names and labels and therefore has stricter requirements on their format than the identity providers usually allow (it needs them to be DNS-compliant). The adjustment is represented by comma-separated key-value pairs. These are sequentially used as arguments to the `String.replaceAll` function on the original username. The keys are regular expressions, values are replacement strings that replace the characters in the username that match the regular expression. The modified username will only be stored in the OpenShift Dev Spaces database and will not be advertised back to the identity provider. It is recommended to use DNS-compliant characters as replacement strings (values in the key-value pairs). Example: `\\=-,@=-at-` changes `\` to `-` and `@` to `-at-` so the username `org\user@com` becomes `org-user-at-com`.

#### Default

**NULL**

## 3.4. CONFIGURING WORKSPACES GLOBALLY

This section describes how an administrator can configure workspaces globally.

- [Section 3.4.1, “Limiting the number of workspaces that a user can keep”](#)
- [Section 3.4.2, “Enabling users to run multiple workspaces simultaneously”](#)
- [Section 3.4.3, “Deploying OpenShift Dev Spaces with support for Git repositories with self-signed certificates”](#)
- [Section 3.4.4, “Configuring workspaces nodeSelector”](#)

### 3.4.1. Limiting the number of workspaces that a user can keep

By default, users can keep an unlimited number of workspaces in the dashboard, but you can limit this number to reduce demand on the cluster.

This configuration is part of the **CheCluster** Custom Resource:

```
spec:
  components:
    cheServer:
      extraProperties:
        CHE_LIMITS_USER_WORKSPACES_COUNT: "<kept_workspaces_limit>" 1
```

- 1** Sets the maximum number of workspaces per user. The default value, **-1**, allows users to keep an unlimited number of workspaces. Use a positive integer to set the maximum number of workspaces per user.

#### Procedure

1. Get the name of the OpenShift Dev Spaces namespace:

```
$ oc get checluster --all-namespaces \
  -o=jsonpath="{.items[*].metadata.namespace}"
```

The default is **openshift-operators**.

2. Configure the **CHE\_LIMITS\_USER\_WORKSPACES\_COUNT**:

```
$ oc patch checluster/devspaces -n openshift-operators \ 1
--type='merge' -p \
'{"spec":{"components":{"cheServer":{"extraProperties":
{"CHE_LIMITS_USER_WORKSPACES_COUNT": "<kept_workspaces_limit>"}}}}' 2
```

- 1** The OpenShift Dev Spaces namespace that you got in step 1.
- 2** Your choice of the **<kept\_workspaces\_limit>** value.

#### Additional resources

- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.4.2. Enabling users to run multiple workspaces simultaneously

By default, a user can run only one workspace at a time. You can enable users to run multiple workspaces simultaneously.



#### NOTE

If using the default storage method, users might experience problems when concurrently running workspaces if pods are distributed across nodes in a multi-node cluster. Switching from the per-user **common** storage strategy to the **per-workspace** storage strategy or using the **ephemeral** storage type can avoid or solve those problems.

This configuration is part of the **CheCluster** Custom Resource:

```
spec:
  components:
    devWorkspace:
      runningLimit: "<running_workspaces_limit>" 1
```

- 1 Sets the maximum number of simultaneously running workspaces per user. The default value is **1**.

#### Procedure

1. Get the name of the OpenShift Dev Spaces namespace:

```
$ oc get checluster --all-namespaces \
  -o=jsonpath="{.items[*].metadata.namespace}"
```

The default is **openshift-operators**.

2. Configure the **runningLimit**:

```
$ oc patch checluster/devspaces -n openshift-operators \ 1
--type='merge' -p \
'{"spec":{"components":{"devWorkspace":{"runningLimit": "<running_workspaces_limit>"}}}' 2
```

- 1 The OpenShift Dev Spaces namespace that you got in step 1.

- 2 Your choice of the **<running\_workspaces\_limit>** value.

#### Additional resources

- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.4.3. Deploying OpenShift Dev Spaces with support for Git repositories with self-signed certificates

You can configure OpenShift Dev Spaces to support operations on Git providers that use self-signed certificates.

## Prerequisites

- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).
- Git version 2 or later

## Procedure

1. Create a new **ConfigMap** with details about the Git server:

```
$ oc create configmap che-git-self-signed-cert \
  --from-file=ca.crt=<path_to_certificate> \ 1
  --from-literal=githost=<host:port> -n openshift-devspaces 2
```

1 Path to self-signed certificate

2 The host and port of the HTTPS connection on the Git server (optional).



### NOTE

- When **githost** is not specified, the given certificate is used for all HTTPS repositories.
- Certificate files are typically stored as Base64 ASCII files, such as **.pem**, **.crt**, **.ca-bundle**. Also, they can be encoded as binary data, for example, **.cer**. All **Secrets** that hold certificate files should use the Base64 ASCII certificate rather than the binary data certificate.

2. Add the required labels to the ConfigMap:

```
$ oc label configmap che-git-self-signed-cert \
  app.kubernetes.io/part-of=che.eclipse.org -n openshift-devspaces
```

3. Configure OpenShift Dev Spaces operand to use self-signed certificates for Git repositories. See [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#).

```
spec:
  devEnvironments:
    trustedCerts:
      gitTrustedCertsConfigMapName: che-git-self-signed-cert
```

## Verification steps

- Create and start a new workspace. Every container used by the workspace mounts a special volume that contains a file with the self-signed certificate. The repository's **.git/config** file contains information about the Git server host (its URL) and the path to the certificate in the **http** section (see Git documentation about [git-config](#)).

**Example 3.11. A .git/config file example**

```
[http "https://10.33.177.118:3000"]
sslCAInfo = /etc/che/git/cert/ca.crt
```

#### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the \*\*CheCluster\*\* Custom Resource”](#)

### 3.4.4. Configuring workspaces nodeSelector

This section describes how to configure **nodeSelector** for Pods of OpenShift Dev Spaces workspaces.

#### Procedure

OpenShift Dev Spaces uses the **CHE\_WORKSPACE\_POD\_NODE\_SELECTOR** environment variable to configure **nodeSelector**. This variable may contain a set of comma-separated **key=value** pairs to form the nodeSelector rule, or **NULL** to disable it.

```
CHE_WORKSPACE_POD_NODE_SELECTOR=disktype=ssd,cpu=xlarge,[key=value]
```

#### IMPORTANT

**nodeSelector** must be configured during OpenShift Dev Spaces installation. This prevents existing workspaces from failing to run due to volumes affinity conflict caused by existing workspace PVC and Pod being scheduled in different zones.

To avoid Pods and PVCs to be scheduled in different zones on large, multizone clusters, create an additional **StorageClass** object (pay attention to the **allowedTopologies** field), which will coordinate the PVC creation process.

Pass the name of this newly created **StorageClass** to OpenShift Dev Spaces through the **CHE\_INFRA\_KUBERNETES\_PVC\_STORAGE\_CLASS\_NAME** environment variable. A default empty value of this variable instructs OpenShift Dev Spaces to use the cluster’s default **StorageClass**.

#### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the \*\*CheCluster\*\* Custom Resource”](#)

## 3.5. CACHING IMAGES FOR FASTER WORKSPACE START

To improve the start time performance of OpenShift Dev Spaces workspaces, use the Image Puller, a OpenShift Dev Spaces-agnostic component that can be used to pre-pull images for OpenShift clusters. The Image Puller is an additional OpenShift deployment which creates a *DaemonSet* that can be configured to pre-pull relevant OpenShift Dev Spaces workspace images on each node. These images would already be available when a OpenShift Dev Spaces workspace starts, therefore improving the workspace start time.

The Image Puller provides the following parameters for configuration.

Table 3.14. Image Puller parameters

Parameter	Usage	Default
<b>CACHING_INTERVAL_HOURS</b>	DaemonSets health checks interval in hours	<b>"1"</b>
<b>CACHING_MEMORY_REQUEST</b>	The memory request for each cached image while the puller is running. See <a href="#">Section 3.5.2, "Defining the memory parameters for the Image Puller"</a> .	<b>10Mi</b>
<b>CACHING_MEMORY_LIMIT</b>	The memory limit for each cached image while the puller is running. See <a href="#">Section 3.5.2, "Defining the memory parameters for the Image Puller"</a> .	<b>20Mi</b>
<b>CACHING_CPU_REQUEST</b>	The processor request for each cached image while the puller is running	<b>.05</b> or 50 millicores
<b>CACHING_CPU_LIMIT</b>	The processor limit for each cached image while the puller is running	<b>.2</b> or 200 millicores
<b>DAEMONSET_NAME</b>	Name of DaemonSet to create	<b>kubernetes-image-puller</b>
<b>DEPLOYMENT_NAME</b>	Name of the Deployment to create	<b>kubernetes-image-puller</b>
<b>NAMESPACE</b>	OpenShift project containing DaemonSet to create	<b>k8s-image-puller</b>
<b>IMAGES</b>	Semicolon-separated list of images to pull, in the format <b>&lt;name1&gt;=&lt;image1&gt;;&lt;name2&gt;=&lt;image2&gt;</b> . See <a href="#">Section 3.5.1, "Defining the list of images to pull"</a> .	
<b>NODE_SELECTOR</b>	Node selector to apply to the pods created by the DaemonSet	<b>'{}'</b>
<b>AFFINITY</b>	Affinity applied to pods created by the DaemonSet	<b>'{}'</b>



Parameter	Usage	Default
<b>IMAGE_PULL_SECRETS</b>	List of image pull secrets, in the format <b>pullsecret1</b> ; <b>...</b> to add to pods created by the DaemonSet. Those secrets need to be in the image puller's namespace and a cluster administrator must create them.	""

### Additional resources

- [Section 3.5.1, "Defining the list of images to pull"](#)
- [Section 3.5.2, "Defining the memory parameters for the Image Puller"](#).
- [Section 3.5.3, "Installing Image Puller on OpenShift by using the web console"](#)
- [Section 3.5.4, "Installing Image Puller on OpenShift by using the CLI"](#)
- [Kubernetes Image Puller source code repository](#)

### 3.5.1. Defining the list of images to pull

The Image Puller can pre-pull most images, including scratch images such as **che-machine-exec**. However, images that mount volumes in the Dockerfile, such as **traefik**, are not supported for pre-pulling on OpenShift 3.11.

#### Procedure

1. Gather a list of relevant container images for prepulling by navigating to the **[https://devspaces-<openshift\\_deployment\\_name>.<domain\\_name>/plugin-registry/v3/external\\_images.txt](https://devspaces-<openshift_deployment_name>.<domain_name>/plugin-registry/v3/external_images.txt)** URL.
2. Determine images from the list for pre-pulling. For faster workspace startup times, consider pre-pulling workspace related images such as **che-theia**, **che-machine-exec**, **che-theia-endpoint-runtime-binary**, and plug-in sidecar images.

### Additional resources

- [Section 3.5.3, "Installing Image Puller on OpenShift by using the web console"](#)
- [Section 3.5.4, "Installing Image Puller on OpenShift by using the CLI"](#)

### 3.5.2. Defining the memory parameters for the Image Puller

Define the memory requests and limits parameters to ensure pulled containers and the platform have enough memory to run.

#### Prerequisites

- [Section 3.5.1, "Defining the list of images to pull"](#)

## Procedure

1. To define the minimal value for **CACHING\_MEMORY\_REQUEST** or **CACHING\_MEMORY\_LIMIT**, consider the necessary amount of memory required to run each of the container images to pull.
2. To define the maximal value for **CACHING\_MEMORY\_REQUEST** or **CACHING\_MEMORY\_LIMIT**, consider the total memory allocated to the DaemonSet Pods in the cluster:

$$\text{(memory limit)} * \text{(number of images)} * \text{(number of nodes in the cluster)}$$

Pulling 5 images on 20 nodes, with a container memory limit of **20Mi** requires **2000Mi** of memory.

## Additional resources

- [Section 3.5.3, “Installing Image Puller on OpenShift by using the web console”](#)
- [Section 3.5.4, “Installing Image Puller on OpenShift by using the CLI”](#)

### 3.5.3. Installing Image Puller on OpenShift by using the web console

You can install the community supported Kubernetes Image Puller Operator on OpenShift using the OpenShift web console.

#### Prerequisites

- [Section 3.5.1, “Defining the list of images to pull”](#)
- [Section 3.5.2, “Defining the memory parameters for the Image Puller”](#).
- An OpenShift web console session by a cluster administrator. See [Accessing the web console](#).

## Procedure

1. Install the community supported Kubernetes Image Puller Operator. See [Installing from OperatorHub using the web console](#).
2. Create a kubernetes-image-puller **KubernetesImagePuller** operand from the community supported Kubernetes Image Puller Operator. See [Creating applications from installed Operators](#).

### 3.5.4. Installing Image Puller on OpenShift by using the CLI

You can install the Kubernetes Image Puller on OpenShift by using OpenShift **oc** management tool.

#### Prerequisites

- [Section 3.5.1, “Defining the list of images to pull”](#) .
- [Section 3.5.2, “Defining the memory parameters for the Image Puller”](#).
- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).

## Procedure

1. Clone the Image Puller repository and get in the directory containing the OpenShift templates:

```
$ git clone https://github.com/che-incubator/kubernetes-image-puller
$ cd kubernetes-image-puller/deploy/openshift
```

2. Configure the **app.yaml**, **configmap.yaml** and **serviceaccount.yaml** OpenShift templates using following parameters:

Table 3.15. Image Puller OpenShift templates parameters in **app.yaml**

Value	Usage	Default
<b>DEPLOYMENT_NAME</b>	The value of <b>DEPLOYMENT_NAME</b> in the ConfigMap	<b>kubernetes-image-puller</b>
<b>IMAGE</b>	Image used for the <b>kubernetes-image-puller</b> deployment	<b>registry.redhat.io/devspaces/imagepuller-rhel8:3.1</b>
<b>IMAGE_TAG</b>	The image tag to pull	<b>latest</b>
<b>SERVICEACCOUNT_NAME</b>	The name of the ServiceAccount created and used by the deployment	<b>kubernetes-image-puller</b>

Table 3.16. Image Puller OpenShift templates parameters in **configmap.yaml**

Value	Usage	Default
<b>CACHING_CPU_LIMIT</b>	The value of <b>CACHING_CPU_LIMIT</b> in the ConfigMap	<b>.2</b>
<b>CACHING_CPU_REQUEST</b>	The value of <b>CACHING_CPU_REQUEST</b> in the ConfigMap	<b>.05</b>
<b>CACHING_INTERVAL_HOURS</b>	The value of <b>CACHING_INTERVAL_HOURS</b> in the ConfigMap	<b>"1"</b>
<b>CACHING_MEMORY_LIMIT</b>	The value of <b>CACHING_MEMORY_LIMIT</b> in the ConfigMap	<b>"20Mi"</b>
<b>CACHING_MEMORY_REQUEST</b>	The value of <b>CACHING_MEMORY_REQUEST</b> in the ConfigMap	<b>"10Mi"</b>

Value	Usage	Default
<b>DAEMONSET_NAME</b>	The value of <b>DAEMONSET_NAME</b> in the ConfigMap	<b>kubernetes-image-puller</b>
<b>DEPLOYMENT_NAME</b>	The value of <b>DEPLOYMENT_NAME</b> in the ConfigMap	<b>kubernetes-image-puller</b>
<b>IMAGES</b>	The value of <b>IMAGES</b> in the ConfigMap	<b>"undefined"</b>
<b>NAMESPACE</b>	The value of <b>NAMESPACE</b> in the ConfigMap	<b>k8s-image-puller</b>
<b>NODE_SELECTOR</b>	The value of <b>NODE_SELECTOR</b> in the ConfigMap	<b>"{}"</b>

Table 3.17. Image Puller OpenShift templates parameters inserviceaccount.yaml

Value	Usage	Default
<b>SERVICEACCOUNT_NAME</b>	The name of the ServiceAccount created and used by the deployment	<b>kubernetes-image-puller</b>

3. Create an OpenShift project to host the Image Puller:

```
$ oc new-project <k8s-image-puller>
```

4. Process and apply the templates to install the puller:

```
$ oc process -f serviceaccount.yaml | oc apply -f -
$ oc process -f configmap.yaml | oc apply -f -
$ oc process -f app.yaml | oc apply -f -
```

### Verification steps

1. Verify the existence of a *<kubernetes-image-puller>* deployment and a *<kubernetes-image-puller>* DaemonSet. The DaemonSet needs to have a Pod for each node in the cluster:

```
$ oc get deployment,daemonset,pod --namespace <k8s-image-puller>
```

2. Verify the values of the *<kubernetes-image-puller>* **ConfigMap**.

```
$ oc get configmap <kubernetes-image-puller> --output yaml
```

## 3.6. CONFIGURING OBSERVABILITY

To configure OpenShift Dev Spaces observability features, see:

- [Section 3.6.1, “Che-Theia workspaces”](#)
- [Section 3.6.2, “Configuring server logging”](#)
- [Section 3.6.3, “Collecting logs using dsc”](#)
- [Section 3.6.4.2, “Monitoring the DevWorkspace Operator”](#)
- [Section 3.6.4.3, “Monitoring OpenShift Dev Spaces Server”](#)

### 3.6.1. Che-Theia workspaces

#### 3.6.1.1. Telemetry overview

Telemetry is the explicit and ethical collection of operation data. By default, telemetry is not available in Red Hat OpenShift Dev Spaces, but in the Che-Theia editor there is an abstract API that allows enabling telemetry using the plug-in mechanism and in the **chectl** command line tool usage data can be collected using segment. This approach is used in the [“Eclipse Che hosted by Red Hat”](#) service where telemetry is enabled for every Che-Theia workspace.

This documentation includes a guide describing how to make your own telemetry client for Red Hat OpenShift Dev Spaces, followed by an overview of the [Red Hat OpenShift Dev Spaces Woopra Telemetry Plugin](#).

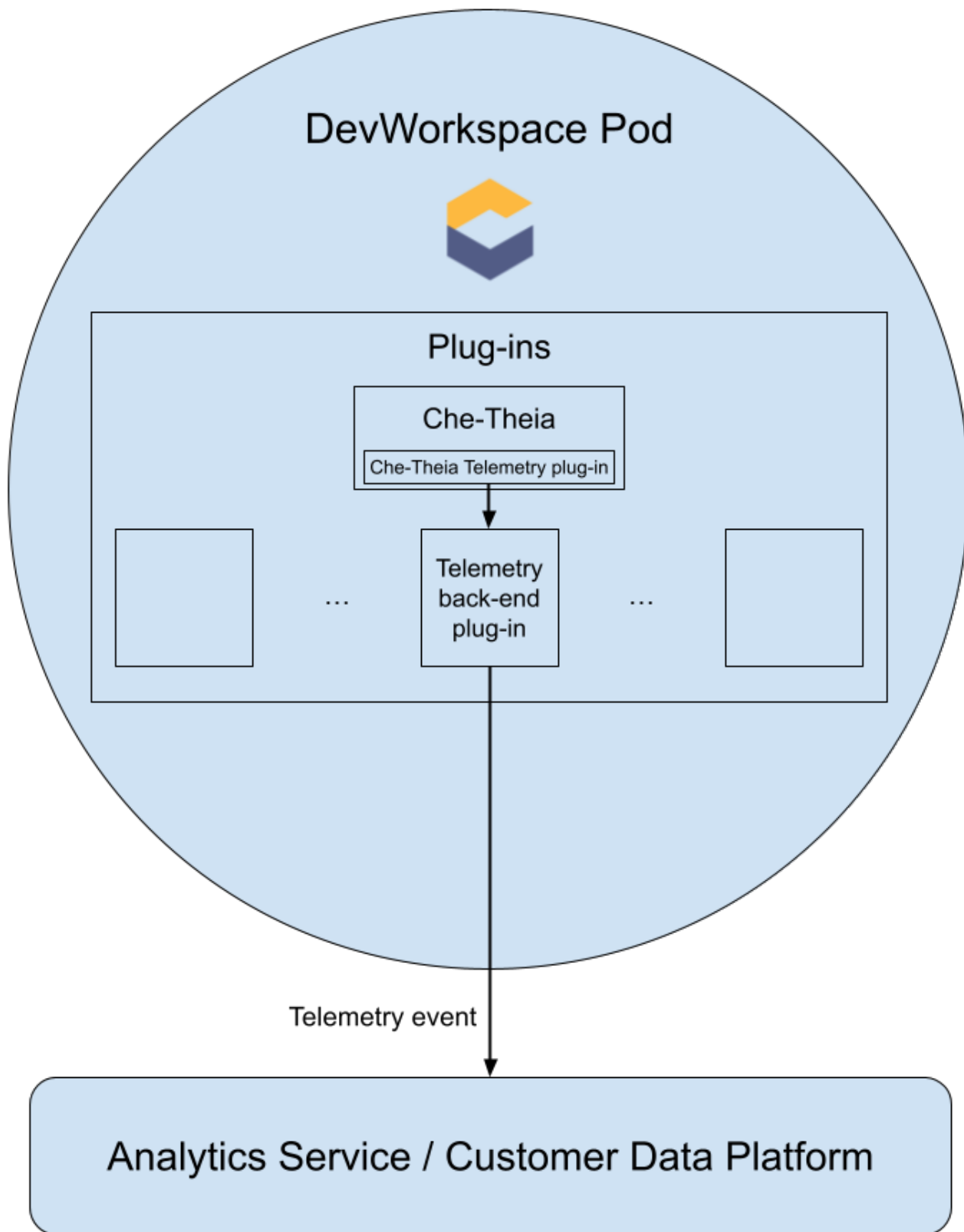
#### 3.6.1.2. Use cases

Red Hat OpenShift Dev Spaces telemetry API allows tracking:

- Duration of a workspace utilization
- User-driven actions such as file editing, committing, and pushing to remote repositories.
- Programming languages and devfiles used in workspaces.

#### 3.6.1.3. How it works

When a DevWorkspace starts, the **che-theia** container starts the telemetry plug-in which is responsible for sending telemetry events to a backend. If the **\$DEVWORKSPACE\_TELEMETRY\_BACKEND\_PORT** environment variable is set in the DevWorkspace Pod, the telemetry plug-in sends events to a backend listening at that port. The backend turns received events into a backend-specific representation of the events and sends them to the configured analytics backend (for example, Segment or Woopra).



#### 3.6.1.4. Events sent to the backend by the Che-Theia telemetry plug-in

Event	Description
WORKSPACE_OPENED	Sent when Che-Theia starts running

Event	Description
COMMIT_LOCALLY	Sent when a commit was made locally with the <b>git.commit</b> Theia command
PUSH_TO_REMOTE	Sent when a Git push was made with the <b>git.push</b> Theia command
EDITOR_USED	Sent when a file was changed within the editor

Other events such as **WORKSPACE\_INACTIVE** and **WORKSPACE\_STOPPED** can be detected within the back-end plug-in.

### 3.6.1.5. The Woopra telemetry plug-in

The [Woopra Telemetry Plugin](#) is a plug-in built to send telemetry from a Red Hat OpenShift Dev Spaces installation to Segment and Woopra. This plug-in is used by [Eclipse Che hosted by Red Hat](#), but any Red Hat OpenShift Dev Spaces deployment can take advantage of this plug-in. There are no dependencies other than a valid Woopra domain and Segment Write key. The devfile v2 for the plug-in, [plugin.yaml](#), has four environment variables that can be passed to the plug-in:

- **WOOPRA\_DOMAIN** - The Woopra domain to send events to.
- **SEGMENT\_WRITE\_KEY** - The write key to send events to Segment and Woopra.
- **WOOPRA\_DOMAIN\_ENDPOINT** - If you prefer not to pass in the Woopra domain directly, the plug-in will get it from a supplied HTTP endpoint that returns the Woopra Domain.
- **SEGMENT\_WRITE\_KEY\_ENDPOINT** - If you prefer not to pass in the Segment write key directly, the plug-in will get it from a supplied HTTP endpoint that returns the Segment write key.

To enable the Woopra plug-in on the Red Hat OpenShift Dev Spaces installation:

#### Procedure

- Deploy the **plugin.yaml** devfile v2 file to an HTTP server with the environment variables set correctly.
  1. Configure the **CheCluster** Custom Resource. See [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#).

```
spec:
  devEnvironments:
  defaultPlugins:
  - editor: eclipse/che-theia/next 1
  plugins: 2
  - 'https://your-web-server/plugin.yaml'
```

- 1** The **editorId** to set the telemetry plug-in for.
- 2** The URL to the telemetry plug-in's devfile v2 definition.

#### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.6.1.6. Creating a telemetry plug-in

This section shows how to create an **AnalyticsManager** class that extends **AbstractAnalyticsManager** and implements the following methods:

- **isEnabled()** - determines whether the telemetry backend is functioning correctly. This can mean always returning **true**, or have more complex checks, for example, returning **false** when a connection property is missing.
- **destroy()** - cleanup method that is run before shutting down the telemetry backend. This method sends the **WORKSPACE\_STOPPED** event.
- **onActivity()** - notifies that some activity is still happening for a given user. This is mainly used to send **WORKSPACE\_INACTIVE** events.
- **onEvent()** - submits telemetry events to the telemetry server, such as **WORKSPACE\_USED** or **WORKSPACE\_STARTED**.
- **increaseDuration()** - increases the duration of a current event rather than sending many events in a small frame of time.

The following sections cover:

- Creating a telemetry server to echo events to standard output.
- Extending the OpenShift Dev Spaces telemetry client and implementing a user’s custom backend.
- Creating a **plugin.yaml** file representing a DevWorkspace plug-in for the custom backend.
- Specifying of a location of a custom plug-in to OpenShift Dev Spaces by setting the **workspacesDefaultPlugins** attribute from the **CheCluster** custom resource.

#### 3.6.1.6.1. Getting started

This document describes the steps required to extend the OpenShift Dev Spaces telemetry system to communicate with to a custom backend:

1. Creating a server process that receives events
2. Extending OpenShift Dev Spaces libraries to create a backend that sends events to the server
3. Packaging the telemetry backend in a container and deploying it to an image registry
4. Adding a plug-in for your backend and instructing OpenShift Dev Spaces to load the plug-in in your DevWorkspaces

A finished example of the telemetry backend is available [here](#).

#### Creating a server that receives events

For demonstration purposes, this example shows how to create a server that receives events from our telemetry plug-in and writes them to standard output.



For production use cases, consider integrating with a third-party telemetry system (for example, Segment, Woopra) rather than creating your own telemetry server. In this case, use your provider's APIs to send events from your custom backend to their system.

The following Go code starts a server on port **8080** and writes events to standard output:

### Example 3.12. main.go

```
package main

import (
    "io/ioutil"
    "net/http"

    "go.uber.org/zap"
)

var logger *zap.SugaredLogger

func event(w http.ResponseWriter, req *http.Request) {
    switch req.Method {
    case "GET":
        logger.Info("GET /event")
    case "POST":
        logger.Info("POST /event")
    }
    body, err := req.GetBody()
    if err != nil {
        logger.With("err", err).Info("error getting body")
        return
    }
    responseBody, err := ioutil.ReadAll(body)
    if err != nil {
        logger.With("error", err).Info("error reading response body")
        return
    }
    logger.With("body", string(responseBody)).Info("got event")
}

func activity(w http.ResponseWriter, req *http.Request) {
    switch req.Method {
    case "GET":
        logger.Info("GET /activity, doing nothing")
    case "POST":
        logger.Info("POST /activity")
        body, err := req.GetBody()
        if err != nil {
            logger.With("error", err).Info("error getting body")
            return
        }
        responseBody, err := ioutil.ReadAll(body)
        if err != nil {
            logger.With("error", err).Info("error reading response body")
            return
        }
        logger.With("body", string(responseBody)).Info("got activity")
    }
}
```

```

    }
  }

  func main() {

    log, _ := zap.NewProduction()
    logger = log.Sugar()

    http.HandleFunc("/event", event)
    http.HandleFunc("/activity", activity)
    logger.Info("Added Handlers")

    logger.Info("Starting to serve")
    http.ListenAndServe(":8080", nil)
  }

```

Create a container image based on this code and expose it as a deployment in OpenShift in the openshift-devspaces project. The code for the example telemetry server is available at [telemetry-server-example](#). To deploy the telemetry server, clone the repository and build the container:

```

$ git clone https://github.com/che-incubator/telemetry-server-example
$ cd telemetry-server-example
$ podman build -t registry/organization/telemetry-server-example:latest .
$ podman push registry/organization/telemetry-server-example:latest

```

Both **manifest\_with\_ingress.yaml** and **manifest\_with\_route** contain definitions for a Deployment and Service. The former also defines a Kubernetes Ingress, while the latter defines an OpenShift Route.

In the manifest file, replace the **image** and **host** fields to match the image you pushed, and the public hostname of your OpenShift cluster. Then run:

```

$ kubectl apply -f manifest_with_[ingress|route].yaml -n {prod-namespace}

```

### 3.6.1.6.2. Creating the back-end project



#### NOTE

For fast feedback when developing, it is recommended to do development inside a DevWorkspace. This way, you can run the application in a cluster and receive events from the front-end telemetry plug-in.

1. Maven Quarkus project scaffolding:

```

mvn io.quarkus:quarkus-maven-plugin:2.7.1.Final:create \
  -DprojectId=mygroup -DprojectArtifactId=devworkspace-telemetry-example-plugin \
  -DprojectVersion=1.0.0-SNAPSHOT

```

2. Remove the files under **src/main/java/mygroup** and **src/test/java/mygroup**.
3. Consult the [GitHub packages](#) for the latest version and Maven coordinates of **backend-base**.
4. Add the following dependencies to your **pom.xml**:

**Example 3.13. pom.xml**

```

<!-- Required -->
<dependency>
  <groupId>org.eclipse.che.incubator.workspace-telemetry</groupId>
  <artifactId>backend-base</artifactId>
  <version>LATEST VERSION FROM PREVIOUS STEP</version>
</dependency>

<!-- Used to make http requests to the telemetry server -->
<dependency>
  <groupId>io.quarkus</groupId>
  <artifactId>quarkus-rest-client</artifactId>
</dependency>
<dependency>
  <groupId>io.quarkus</groupId>
  <artifactId>quarkus-rest-client-jackson</artifactId>
</dependency>

```

5. Create a personal access token with **read:packages** permissions to download the **org.eclipse.che.incubator.workspace-telemetry:backend-base** dependency from [GitHub packages](#).
6. Add your GitHub username, personal access token and **che-incubator** repository details in your `~/.m2/settings.xml` file:

**Example 3.14. settings.xml**

```

<settings xmlns="http://maven.apache.org/SETTINGS/1.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/SETTINGS/1.0.0
  http://maven.apache.org/xsd/settings-1.0.0.xsd">
  <servers>
    <server>
      <id>che-incubator</id>
      <username>YOUR GITHUB USERNAME</username>
      <password>YOUR GITHUB TOKEN</password>
    </server>
  </servers>

  <profiles>
    <profile>
      <id>github</id>
      <activation>
        <activeByDefault>true</activeByDefault>
      </activation>
      <repositories>
        <repository>
          <id>central</id>
          <url>https://repo1.maven.org/maven2</url>
          <releases><enabled>true</enabled></releases>
          <snapshots><enabled>>false</enabled></snapshots>
        </repository>
        <repository>

```

```

        <id>che-incubator</id>
        <url>https://maven.pkg.github.com/che-incubator/che-workspace-telemetry-
client</url>
        </repository>
    </repositories>
</profile>
</profiles>
</settings>

```

### 3.6.1.6.3. Creating a concrete implementation of AnalyticsManager and adding specialized logic

Create two files in your project under **src/main/java/mygroup**:

- **MainConfiguration.java** - contains configuration provided to **AnalyticsManager**.
- **AnalyticsManager.java** - contains logic specific to the telemetry system.

#### Example 3.15. MainConfiguration.java

```

package org.my.group;

import java.util.Optional;

import javax.enterprise.context.Dependent;
import javax.enterprise.inject.Alternative;

import org.eclipse.che.incubator.workspace.telemetry.base.BaseConfiguration;
import org.eclipse.microprofile.config.inject.ConfigProperty;

@Dependent
@Alternative
public class MainConfiguration extends BaseConfiguration {
    @ConfigProperty(name = "welcome.message") 1
    Optional<String> welcomeMessage; 2
}

```

- 1 A MicroProfile configuration annotation is used to inject the **welcome.message** configuration.

For more details on how to set configuration properties specific to your backend, see the [Quarkus Configuration Reference Guide](#).

#### Example 3.16. AnalyticsManager.java

```

package org.my.group;

import java.util.HashMap;
import java.util.Map;

import javax.enterprise.context.Dependent;
import javax.enterprise.inject.Alternative;
import javax.inject.Inject;

```

```

import org.eclipse.che.incubator.workspace.telemetry.base.AbstractAnalyticsManager;
import org.eclipse.che.incubator.workspace.telemetry.base.AnalyticsEvent;
import org.eclipse.che.incubator.workspace.telemetry.finder.DevWorkspaceFinder;
import org.eclipse.che.incubator.workspace.telemetry.finder.UsernameFinder;
import org.eclipse.microprofile.rest.client.inject.RestClient;
import org.slf4j.Logger;

import static org.slf4j.LoggerFactory.getLogger;

@Dependent
@Alternative
public class AnalyticsManager extends AbstractAnalyticsManager {

    private static final Logger LOG = getLogger(AbstractAnalyticsManager.class);

    public AnalyticsManager(MainConfiguration mainConfiguration, DevWorkspaceFinder
devworkspaceFinder, UsernameFinder usernameFinder) {
        super(mainConfiguration, devworkspaceFinder, usernameFinder);

        mainConfiguration.welcomeMessage.ifPresentOrElse( 1
            (str) -> LOG.info("The welcome message is: {}", str),
            () -> LOG.info("No welcome message provided")
        );
    }

    @Override
    public boolean isEnabled() {
        return true;
    }

    @Override
    public void destroy() {}

    @Override
    public void onEvent(AnalyticsEvent event, String ownerId, String ip, String userAgent, String
resolution, Map<String, Object> properties) {
        LOG.info("The received event is: {}", event); 2
    }

    @Override
    public void increaseDuration(AnalyticsEvent event, Map<String, Object> properties) {}

    @Override
    public void onActivity() {}
}

```

- 1** Log the welcome message if it was provided.
- 2** Log the event received from the front-end plug-in.

Since **org.my.group.AnalyticsManager** and **org.my.group.MainConfiguration** are alternative beans, specify them using the **quarkus.arc.selected-alternatives** property in **src/main/resources/application.properties**.

### Example 3.17. application.properties

```
quarkus.arc.selected-alternatives=MainConfiguration,AnalyticsManager
```

#### 3.6.1.6.4. Running the application within a DevWorkspace

1. Set the **DEVWORKSPACE\_TELEMETRY\_BACKEND\_PORT** environment variable in the DevWorkspace. Here, the value is set to **4167**.

```
spec:
  template:
    attributes:
      workspaceEnv:
        - name: DEVWORKSPACE_TELEMETRY_BACKEND_PORT
          value: '4167'
```

2. Restart the DevWorkspace from the Red Hat OpenShift Dev Spaces dashboard.
3. Run the following command within a DevWorkspace's terminal window to start the application. Use the **--settings** flag to specify path to the location of the **settings.xml** file that contains the GitHub access token.

```
$ mvn --settings=settings.xml quarkus:dev -
  Dquarkus.http.port=${DEVWORKSPACE_TELEMETRY_BACKEND_PORT}
```

The application now receives telemetry events through port **4167** from the front-end plug-in.

#### Verification steps

1. Verify that the following output is logged:

```
INFO [org.ecl.che.inc.AnalyticsManager] (Quarkus Main Thread) No welcome message
provided
INFO [io.quarkus] (Quarkus Main Thread) devworkspace-telemetry-example-plugin 1.0.0-
SNAPSHOT on JVM (powered by Quarkus 2.7.2.Final) started in 0.323s. Listening on:
http://localhost:4167
INFO [io.quarkus] (Quarkus Main Thread) Profile dev activated. Live Coding activated.
INFO [io.quarkus] (Quarkus Main Thread) Installed features: [cdi, kubernetes-client, rest-
client, rest-client-jackson, resteasy, resteasy-jsonb, smallrye-context-propagation, smallrye-
openapi, swagger-ui, vertx]
```

2. To verify that the **onEvent()** method of **AnalyticsManager** receives events from the front-end plug-in, press the **I** key to disable Quarkus live coding and edit any file within the IDE. The following output should be logged:

```
INFO [io.qua.dep.dev.RuntimeUpdatesProcessor] (Aesh InputStream Reader) Live reload
disabled
INFO [org.ecl.che.inc.AnalyticsManager] (executor-thread-2) The received event is: Edit
Workspace File in Che
```

#### 3.6.1.6.5. Implementing isEnabled()

For the purposes of the example, this method always returns **true** whenever it is called.

### Example 3.18. AnalyticsManager.java

```
@Override
public boolean isEnabled() {
    return true;
}
```

It is possible to put more complex logic in **isEnabled()**. For example, the [hosted OpenShift Dev Spaces Woopra backend](#) checks that a configuration property exists before determining if the backend is enabled.

#### 3.6.1.6.6. Implementing onEvent()

**onEvent()** sends the event received by the backend to the telemetry system. For the example application, it sends an HTTP POST payload to the **/event** endpoint from the telemetry server.

##### 3.6.1.6.6.1. Sending a POST request to the example telemetry server

For the following example, the telemetry server application is deployed to OpenShift at the following URL: **http://little-telemetry-server-che.apps-crc.testing**, where **apps-crc.testing** is the ingress domain name of the OpenShift cluster.

1. Set up the RESTEasy REST Client by creating **TelemetryService.java**

### Example 3.19. TelemetryService.java

```
package org.my.group;

import java.util.Map;

import javax.ws.rs.Consumes;
import javax.ws.rs.POST;
import javax.ws.rs.Path;
import javax.ws.rs.core.MediaType;
import javax.ws.rs.core.Response;

import org.eclipse.microprofile.rest.client.inject.RegisterRestClient;

@RegisterRestClient
public interface TelemetryService {
    @POST
    @Path("/event") 1
    @Consumes(MediaType.APPLICATION_JSON)
    Response sendEvent(Map<String, Object> payload);
}
```

- 1** The endpoint to make the **POST** request to.

2. Specify the base URL for **TelemetryService** in the **src/main/resources/application.properties** file:

**Example 3.20. application.properties**

```
org.my.group.TelemetryService/mp-rest/url=http://little-telemetry-server-che.apps-
crc.testing
```

- Inject **TelemetryService** into **AnalyticsManager** and send a **POST** request in **onEvent()**

**Example 3.21. AnalyticsManager.java**

```
@Dependent
@Alternative
public class AnalyticsManager extends AbstractAnalyticsManager {
    @Inject
    @RestClient
    TelemetryService telemetryService;

    ...

    @Override
    public void onEvent(AnalyticsEvent event, String ownerId, String ip, String userAgent,
String resolution, Map<String, Object> properties) {
        Map<String, Object> payload = new HashMap<String, Object>(properties);
        payload.put("event", event);
        telemetryService.sendEvent(payload);
    }
}
```

This sends an HTTP request to the telemetry server and automatically delays identical events for a small period of time. The default duration is 1500 milliseconds.

**3.6.1.6.7. Implementing `increaseDuration()`**

Many telemetry systems recognize event duration. The **AbstractAnalyticsManager** merges similar events that happen in the same frame of time into one event. This implementation of **increaseDuration()** is a no-op. This method uses the APIs of the user's telemetry provider to alter the event or event properties to reflect the increased duration of an event.

**Example 3.22. AnalyticsManager.java**

```
@Override
public void increaseDuration(AnalyticsEvent event, Map<String, Object> properties) {}
```

**3.6.1.6.8. Implementing `onActivity()`**

Set an inactive timeout limit, and use **onActivity()** to send a **WORKSPACE\_INACTIVE** event if the last event time is longer than the timeout.

**Example 3.23. AnalyticsManager.java**

```
public class AnalyticsManager extends AbstractAnalyticsManager {
```



```

...

private long inactiveTimeLimit = 60000 * 3;

...

@Override
public void onActivity() {
    if (System.currentTimeMillis() - lastEventTime >= inactiveTimeLimit) {
        onEvent(WORKSPACE_INACTIVE, lastOwnerId, lastIp, lastUserAgent, lastResolution,
commonProperties);
    }
}

```

### 3.6.1.6.9. Implementing `destroy()`

When `destroy()` is called, send a **WORKSPACE\_STOPPED** event and shutdown any resources such as connection pools.

#### Example 3.24. `AnalyticsManager.java`

```

@Override
public void destroy() {
    onEvent(WORKSPACE_STOPPED, lastOwnerId, lastIp, lastUserAgent, lastResolution,
commonProperties);
}

```

Running `mvn quarkus:dev` as described in [Section 3.6.1.6.4, “Running the application within a DevWorkspace”](#) and terminating the application with **Ctrl+C** sends a **WORKSPACE\_STOPPED** event to the server.

### 3.6.1.6.10. Packaging the Quarkus application

See [the Quarkus documentation](#) for the best instructions to package the application in a container. Build and push the container to a container registry of your choice.

#### 3.6.1.6.10.1. Sample Dockerfile for building a Quarkus image running with JVM

##### Example 3.25. `Dockerfile.jvm`

```

FROM registry.access.redhat.com/ubi8/openjdk-11:1.11

ENV LANG='en_US.UTF-8' LANGUAGE='en_US:en'

COPY --chown=185 target/quarkus-app/lib/ /deployments/lib/
COPY --chown=185 target/quarkus-app/*.jar /deployments/
COPY --chown=185 target/quarkus-app/app/ /deployments/app/
COPY --chown=185 target/quarkus-app/quarkus/ /deployments/quarkus/

EXPOSE 8080
USER 185

```

```
ENTRYPOINT ["java", "-Dquarkus.http.host=0.0.0.0", "-Djava.util.logging.manager=org.jboss.logmanager.LogManager", "-Dquarkus.http.port=${DEVWORKSPACE_TELEMETRY_BACKEND_PORT}", "-jar", "/deployments/quarkus-run.jar"]
```

To build the image, run:

```
mvn package && \
podman build -f src/main/docker/Dockerfile.jvm -t image:tag .
```

### 3.6.1.6.10.2. Sample Dockerfile for building a Quarkus native image

#### Example 3.26. Dockerfile.native

```
FROM registry.access.redhat.com/ubi8/ubi-minimal:8.5
WORKDIR /work/
RUN chown 1001 /work \
    && chmod "g+rwX" /work \
    && chown 1001:root /work
COPY --chown=1001:root target/*-runner /work/application

EXPOSE 8080
USER 1001

CMD ["/application", "-Dquarkus.http.host=0.0.0.0", "-Dquarkus.http.port=${DEVWORKSPACE_TELEMETRY_BACKEND_PORT}"]
```

To build the image, run:

```
mvn package -Pnative -Dquarkus.native.container-build=true && \
podman build -f src/main/docker/Dockerfile.native -t image:tag .
```

### 3.6.1.6.11. Creating a plugin.yaml for your plug-in

Create a **plugin.yaml** devfile v2 file representing a DevWorkspace plug-in that runs your custom backend in a DevWorkspace Pod. For more information about devfile v2, see [Devfile v2 documentation](#)

#### Example 3.27. plugin.yaml

```
schemaVersion: 2.1.0
metadata:
  name: devworkspace-telemetry-backend-plugin
  version: 0.0.1
  description: A Demo telemetry backend
  displayName: Devworkspace Telemetry Backend
components:
  - name: devworkspace-telemetry-backend-plugin
    attributes:
      workspaceEnv:
```

```

- name: DEVWORKSPACE_TELEMETRY_BACKEND_PORT
  value: '4167'
container:
  image: YOUR IMAGE      1
  env:
    - name: WELCOME_MESSAGE  2
      value: 'hello world!'

```

- 1 Specify the container image built from [Section 3.6.1.6.10, “Packaging the Quarkus application”](#).
- 2 Set the value for the **welcome.message** optional configuration property from Example 4.

Typically, the user deploys this file to a corporate web server. This guide demonstrates how to create an Apache web server on OpenShift and host the plug-in there.

Create a ConfigMap referencing the new **plugin.yaml** file.

```
$ oc create configmap --from-file=plugin.yaml -n openshift-devspaces telemetry-plugin-yaml
```

Create a deployment, a service, and a route to expose the web server. The deployment references this ConfigMap and places it in the **/var/www/html** directory.

### Example 3.28. manifest.yaml

```

kind: Deployment
apiVersion: apps/v1
metadata:
  name: apache
spec:
  replicas: 1
  selector:
    matchLabels:
      app: apache
  template:
    metadata:
      labels:
        app: apache
    spec:
      volumes:
        - name: plugin-yaml
          configMap:
            name: telemetry-plugin-yaml
            defaultMode: 420
      containers:
        - name: apache
          image: 'registry.redhat.io/rhsc1/httpd-24-rhel7:latest'
          ports:
            - containerPort: 8080
              protocol: TCP
          resources: {}
          volumeMounts:
            - name: plugin-yaml
              mountPath: /var/www/html

```

```

strategy:
  type: RollingUpdate
  rollingUpdate:
    maxUnavailable: 25%
    maxSurge: 25%
  revisionHistoryLimit: 10
  progressDeadlineSeconds: 600
---
kind: Service
apiVersion: v1
metadata:
  name: apache
spec:
  ports:
    - protocol: TCP
      port: 8080
      targetPort: 8080
  selector:
    app: apache
    type: ClusterIP
---
kind: Route
apiVersion: route.openshift.io/v1
metadata:
  name: apache
spec:
  host: apache-che.apps-crc.testing
  to:
    kind: Service
    name: apache
    weight: 100
  port:
    targetPort: 8080
  wildcardPolicy: None

```

```
$ oc apply -f manifest.yaml
```

### Verification steps

After the deployment has started, confirm that **plugin.yaml** is available in the web server:

```
$ curl apache-che.apps-crc.testing/plugin.yaml
```

#### 3.6.1.6.12. Specifying the telemetry plug-in in a DevWorkspace

1. Add the following to the **components** field of an existing DevWorkspace:

```

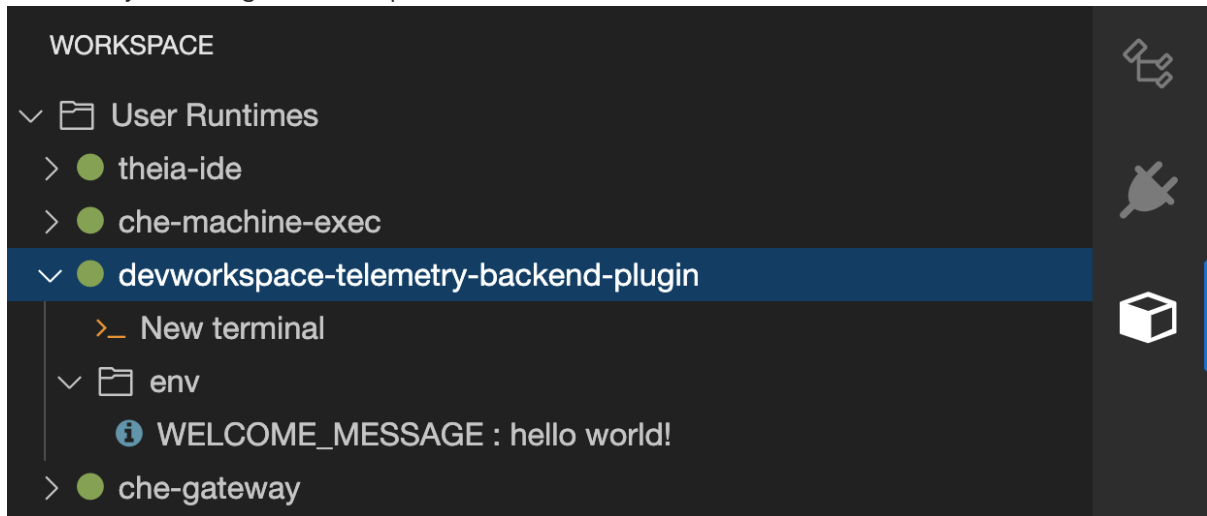
components:
  ...
  - name: telemetry-plug-in
    plugin:
      uri: http://apache-che.apps-crc.testing/plugin.yaml

```

2. Start the DevWorkspace from the OpenShift Dev Spaces dashboard.

### Verification steps

1. Verify that the **telemetry-plugin-in** container is running in the DevWorkspace pod. Here, this is verified by checking the Workspace view within the editor.



2. Edit files within the editor and observe their events in the example telemetry server's logs.

### 3.6.1.6.13. Applying the telemetry plug-in for all DevWorkspaces

Set the telemetry plug-in as a default plug-in. Default plug-ins are applied on DevWorkspace startup for new and existing DevWorkspaces.

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#).

```
spec:
  devEnvironments:
    defaultPlugins:
      - editor: eclipse/che-theia/next 1
      plugins: 2
      - 'http://apache-che.apps-crc.testing/plugin.yaml'
```

- 1** The editorId to set default plug-ins for.
- 2** List of URLs to devfile v2 plug-ins.

### Additional resources

- [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#) .

### Verification steps

1. Start a new or existing DevWorkspace from the Red Hat OpenShift Dev Spaces dashboard.
2. Verify that the telemetry plug-in is working by following the verification steps for [Section 3.6.1.6.12, "Specifying the telemetry plug-in in a DevWorkspace"](#) .

## 3.6.2. Configuring server logging

It is possible to fine-tune the log levels of individual loggers available in the OpenShift Dev Spaces server.

The log level of the whole OpenShift Dev Spaces server is configured globally using the **cheLogLevel** configuration property of the Operator. See [Section 3.1.3, “CheCluster Custom Resource fields reference”](#). To set the global log level in installations not managed by the Operator, specify the **CHE\_LOG\_LEVEL** environment variable in the **che** ConfigMap.

It is possible to configure the log levels of the individual loggers in the OpenShift Dev Spaces server using the **CHE\_LOGGER\_CONFIG** environment variable.

### 3.6.2.1. Configuring log levels

#### Procedure

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#).

```
spec:
  components:
    cheServer:
      extraProperties:
        CHE_LOGGER_CONFIG: "<key1=value1,key2=value2>" 1
```

- 1 Comma-separated list of key-value pairs, where keys are the names of the loggers as seen in the OpenShift Dev Spaces server log output and values are the required log levels.

#### Example 3.29. Configuring debug mode for theWorkspaceManager

```
spec:
  components:
    cheServer:
      extraProperties:
        CHE_LOGGER_CONFIG:
          "org.eclipse.che.api.workspace.server.WorkspaceManager=DEBUG"
```

#### Additional resources

- [Section 3.1.1, “Using dsc to configure the CheCluster Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.6.2.2. Logger naming

The names of the loggers follow the class names of the internal server classes that use those loggers.

### 3.6.2.3. Logging HTTP traffic

#### Procedure

- To log the HTTP traffic between the OpenShift Dev Spaces server and the API server of the Kubernetes or OpenShift cluster, configure the **CheCluster** Custom Resource. See [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#) .

```
spec:
  components:
    cheServer:
      extraProperties:
        CHE_LOGGER_CONFIG: "che.infra.request-logging=TRACE"
```

#### Additional resources

- [Section 3.1.1, "Using dsc to configure the CheCluster Custom Resource during installation"](#)
- [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#)

### 3.6.3. Collecting logs using dsc

An installation of Red Hat OpenShift Dev Spaces consists of several containers running in the OpenShift cluster. While it is possible to manually collect logs from each running container, **dsc** provides commands which automate the process.

Following commands are available to collect Red Hat OpenShift Dev Spaces logs from the OpenShift cluster using the **dsc** tool:

#### **dsc server:logs**

Collects existing Red Hat OpenShift Dev Spaces server logs and stores them in a directory on the local machine. By default, logs are downloaded to a temporary directory on the machine. However, this can be overwritten by specifying the **-d** parameter. For example, to download Che logs to the **/home/user/che-logs/** directory, use the command

```
dsc server:logs -d /home/user/che-logs/
```

When run, **dsc server:logs** prints a message in the console specifying the directory that will store the log files:

```
Red Hat OpenShift Dev Spaces logs will be available in '/tmp/chectl-logs/1648575098344'
```

If Red Hat OpenShift Dev Spaces is installed in a non-default project, **dsc server:logs** requires the **-n <NAMESPACE>** parameter, where **<NAMESPACE>** is the OpenShift project in which Red Hat OpenShift Dev Spaces was installed. For example, to get logs from OpenShift Dev Spaces in the **my-namespace** project, use the command

```
dsc server:logs -n my-namespace
```

#### **dsc server:deploy**

Logs are automatically collected during the OpenShift Dev Spaces installation when installed using **dsc**. As with **dsc server:logs**, the directory logs are stored in can be specified using the **-d** parameter.

#### Additional resources

- ["dsc reference documentation"](#)

### 3.6.4. Monitoring OpenShift Dev Spaces with Prometheus and Grafana

You can collect and view the OpenShift Dev Spaces metrics with a running instance of Prometheus and Grafana on the cluster.

- [Section 3.6.4.1, “Installing Prometheus and Grafana”](#)
- [Section 3.6.4.2, “Monitoring the DevWorkspace Operator”](#)
- [Section 3.6.4.3, “Monitoring OpenShift Dev Spaces Server”](#)

#### 3.6.4.1. Installing Prometheus and Grafana

You can install Prometheus and Grafana by applying **template.yaml**. The **template.yaml** file in this example provides a monitoring stack of basic configuration, Deployments and Services to get started with Prometheus and Grafana.

Alternatively, you can use the [Prometheus Operator](#) and [Grafana Operator](#).

#### Prerequisites

- oc

#### Procedure

To install Prometheus and Grafana by using **template.yaml**:

1. Create a new project, **monitoring**, for Prometheus and Grafana:

```
$ oc new-project monitoring
```

2. Apply **template.yaml** in the **monitoring** project:

```
$ oc apply -f template.yaml -n monitoring
```

#### Example 3.30. **template.yaml**

```
---
apiVersion: v1
kind: Service
metadata:
  name: grafana
  labels:
    app: grafana
spec:
  ports:
  - name: 3000-tcp
    port: 3000
    protocol: TCP
    targetPort: 3000
  selector:
    app: grafana
---
apiVersion: v1
kind: Service
```



```
metadata:
  name: prometheus
  labels:
    app: prometheus
spec:
  ports:
  - name: 9090-tcp
    port: 9090
    protocol: TCP
    targetPort: 9090
  selector:
    app: prometheus
---
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: grafana
    name: grafana
spec:
  selector:
    matchLabels:
      app: grafana
  template:
    metadata:
      labels:
        app: grafana
    spec:
      containers:
      - image: registry.redhat.io/rhel8/grafana:7
        name: grafana
        ports:
        - containerPort: 3000
          protocol: TCP
---
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: prometheus
    name: prometheus
spec:
  selector:
    matchLabels:
      app: prometheus
  template:
    metadata:
      labels:
        app: prometheus
    spec:
      serviceAccountName: prometheus
      containers:
      - image: quay.io/prometheus/prometheus:v2.36.0
        name: prometheus
        ports:
        - containerPort: 9090
```

```

    protocol: TCP
    volumeMounts:
    - mountPath: /prometheus
      name: volume-data
    - mountPath: /etc/prometheus/prometheus.yml
      name: volume-config
      subPath: prometheus.yml
    volumes:
    - emptyDir: {}
      name: volume-data
    - configMap:
        defaultMode: 420
        name: prometheus-config
        name: volume-config
  ---
  apiVersion: v1
  kind: ConfigMap
  metadata:
    name: prometheus-config
  data:
    prometheus.yml: ""
  ---
  apiVersion: v1
  kind: ServiceAccount
  metadata:
    name: prometheus
  ---

```

### Additional resources

- [First steps with Prometheus](#)
- [Installing Grafana](#)

### 3.6.4.2. Monitoring the DevWorkspace Operator

You can configure an example monitoring stack to process metrics exposed by the DevWorkspace Operator.

#### 3.6.4.2.1. Collecting DevWorkspace Operator metrics with Prometheus

To use Prometheus to collect, store, and query metrics about the DevWorkspace Operator:

#### Prerequisites

- The **devworkspace-controller-metrics** Service is exposing metrics on port **8443**. This is preconfigured by default.
- The **devworkspace-webhookserver** Service is exposing metrics on port **9443**. This is preconfigured by default.
- Prometheus 2.26.0 or later is running. The Prometheus console is running on port **9090** with a corresponding Service. See [First steps with Prometheus](#).

## Procedure

1. Create a ClusterRoleBinding to bind the ServiceAccount associated with Prometheus to the `devworkspace-controller-metrics-reader` ClusterRole. For the [example monitoring stack](#), the name of the ServiceAccount to be used is **prometheus**.



### NOTE

Without the ClusterRoleBinding, you cannot access DevWorkspace metrics because access is protected with role-based access control (RBAC).

#### Example 3.31. ClusterRoleBinding

```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: devworkspace-controller-metrics-binding
subjects:
  - kind: ServiceAccount
    name: prometheus
    namespace: monitoring
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: devworkspace-controller-metrics-reader
```

2. Configure Prometheus to scrape metrics from port **8443** exposed by the `devworkspace-controller-metrics` Service and from port **9443** exposed by the `devworkspace-webhookserver` Service.



### NOTE

The [example monitoring stack](#) already creates the `prometheus-config` ConfigMap with an empty configuration. To provide the Prometheus configuration details, edit the `data` field of the ConfigMap.

#### Example 3.32. Prometheus configuration

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: prometheus-config
  namespace: monitoring
data:
  prometheus.yml: |-
    global:
      scrape_interval: 5s 1
      evaluation_interval: 5s 2
    scrape_configs: 3
      - job_name: 'DevWorkspace'
        scheme: https
        authorization:
```

```

    type: Bearer
    credentials_file: '/var/run/secrets/kubernetes.io/serviceaccount/token'
  tls_config:
    insecure_skip_verify: true
  static_configs:
    - targets: ['devworkspace-controller-metrics.<DWO_project>:8443'] 4
- job_name: 'DevWorkspace webhooks'
  scheme: https
  authorization:
    type: Bearer
    credentials_file: '/var/run/secrets/kubernetes.io/serviceaccount/token'
  tls_config:
    insecure_skip_verify: true
  static_configs:
    - targets: ['devworkspace-webhookserver.<DWO_project>:9443'] 5

```

- 1 The rate at which a target is scraped.
  - 2 The rate at which the recording and alerting rules are re-checked.
  - 3 The resources that Prometheus monitors. In the default configuration, two jobs, **DevWorkspace** and **DevWorkspace webhooks**, scrape the time series data exposed by the **devworkspace-controller-metrics** and **devworkspace-webhookserver** Services.
  - 4 The scrape target for the metrics from port **8443**. Replace **<DWO\_project>** with the project where the **devworkspace-controller-metrics Service** is located.
  - 5 The scrape target for the metrics from port **9443**. Replace **<DWO\_project>** with the project where the **devworkspace-webhookserver Service** is located.
3. Scale the **Prometheus** Deployment down and up to read the updated ConfigMap from the previous step.

```
$ oc scale --replicas=0 deployment/prometheus -n monitoring && oc scale --replicas=1 deployment/prometheus -n monitoring
```

## Verification

1. Use port forwarding to access the **Prometheus** Service locally:

```
$ oc port-forward svc/prometheus 9090:9090 -n monitoring
```

2. Verify that all targets are up by viewing the targets endpoint at **localhost:9090/targets**.
3. Use the Prometheus console to view and query metrics:
  - View metrics at **localhost:9090/metrics**.
  - Query metrics from **localhost:9090/graph**.  
For more information, see [Using the expression browser](#).

## Additional resources

- [Configuring Prometheus](#)
- [Querying Prometheus](#)
- [Prometheus metric types](#)

### 3.6.4.2.2. DevWorkspace-specific metrics

The following tables describe the DevWorkspace-specific metrics exposed by the **devworkspace-controller-metrics** Service.

Table 3.18. Metrics

Name	Type	Description	Labels
<b>devworkspace_started_total</b>	Counter	Number of DevWorkspace starting events.	<b>source, routingclass</b>
<b>devworkspace_started_success_total</b>	Counter	Number of DevWorkspaces successfully entering the <b>Running</b> phase.	<b>source, routingclass</b>
<b>devworkspace_failed_total</b>	Counter	Number of failed DevWorkspaces.	<b>source, reason</b>
<b>devworkspace_startup_time</b>	Histogram	Total time taken to start a DevWorkspace, in seconds.	<b>source, routingclass</b>

Table 3.19. Labels

Name	Description	Values
<b>source</b>	The <b>controller.devfile.io/devworkspace-source</b> label of the DevWorkspace.	<b>string</b>
<b>routingclass</b>	The <b>spec.routingclass</b> of the DevWorkspace.	<b>"basic cluster cluster-tls web-terminal"</b>
<b>reason</b>	The workspace startup failure reason.	<b>"BadRequest InfrastructureFailure Unknown"</b>

Table 3.20. Startup failure reasons

Name	Description
<b>BadRequest</b>	Startup failure due to an invalid devfile used to create a DevWorkspace.
<b>InfrastructureFailure</b>	Startup failure due to the following errors: <b>CreateContainerError, RunContainerError, FailedScheduling, FailedMount.</b>
<b>Unknown</b>	Unknown failure reason.

### 3.6.4.2.3. Viewing DevWorkspace Operator metrics on Grafana dashboards

To view the DevWorkspace Operator metrics on Grafana with the example dashboard:

#### Prerequisites

- Prometheus is collecting metrics. See [Section 3.6.4.2.1, “Collecting DevWorkspace Operator metrics with Prometheus”](#).
- Grafana version 7.5.3 or later.
- Grafana is running on port **3000** with a corresponding Service. See [Installing Grafana](#).

#### Procedure

1. Add the data source for the Prometheus instance. See [Creating a Prometheus data source](#).
2. Import the [example grafana-dashboard.json](#) dashboard.

#### Verification steps

- Use the Grafana console to view the DevWorkspace Operator metrics dashboard. See [Section 3.6.4.2.4, “Grafana dashboard for the DevWorkspace Operator”](#).

#### Additional resources

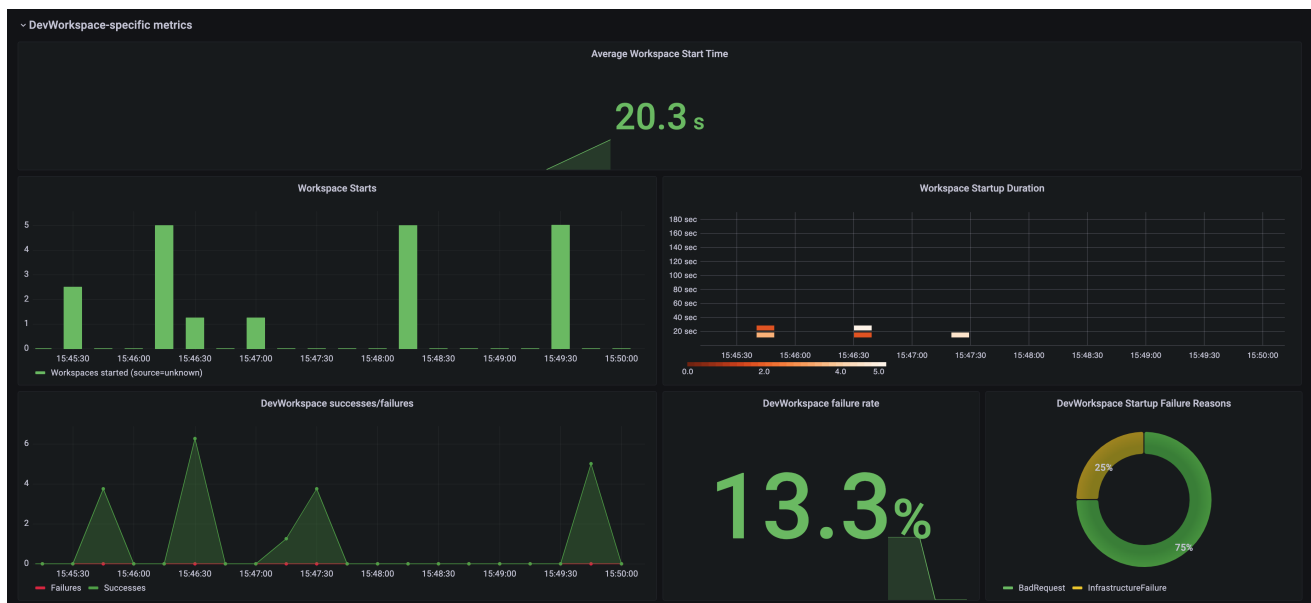
- [Prometheus data source](#)
- [Import dashboard](#)

### 3.6.4.2.4. Grafana dashboard for the DevWorkspace Operator

The example Grafana dashboard [based on grafana-dashboard.json](#) displays the following metrics from the DevWorkspace Operator.

#### 3.6.4.2.4.1. The DevWorkspace-specific metrics panel

Figure 3.1. The DevWorkspace-specific metrics panel



### Average workspace start time

The average workspace startup duration.

### Workspace starts

The number of successful and failed workspace startups.

### Workspace startup duration

A heatmap that displays workspace startup duration.

### DevWorkspace successes / failures

A comparison between successful and failed DevWorkspace startups.

### DevWorkspace failure rate

The ratio between the number of failed workspace startups and the number of total workspace startups.

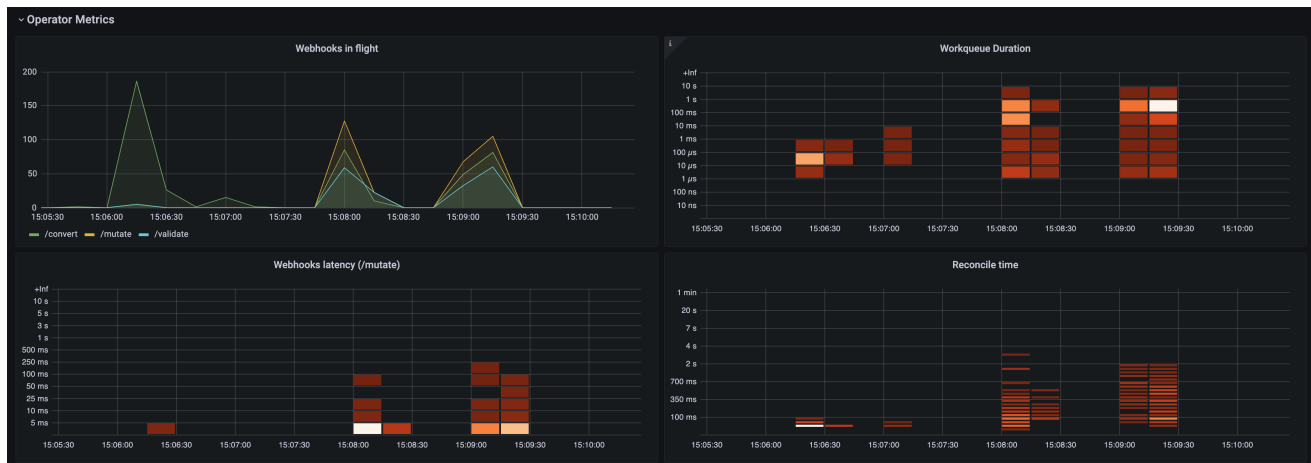
### DevWorkspace startup failure reasons

A pie chart that displays the distribution of workspace startup failures:

- **BadRequest**
- **InfrastructureFailure**
- **Unknown**

### 3.6.4.2.4.2. The Operator metrics panel (part 1)

Figure 3.2. The Operator metrics panel (part 1)



### Webhooks in flight

A comparison between the number of different webhook requests.

### Work queue duration

A heatmap that displays how long the reconcile requests stay in the work queue before they are handled.

### Webhooks latency (/mutate)

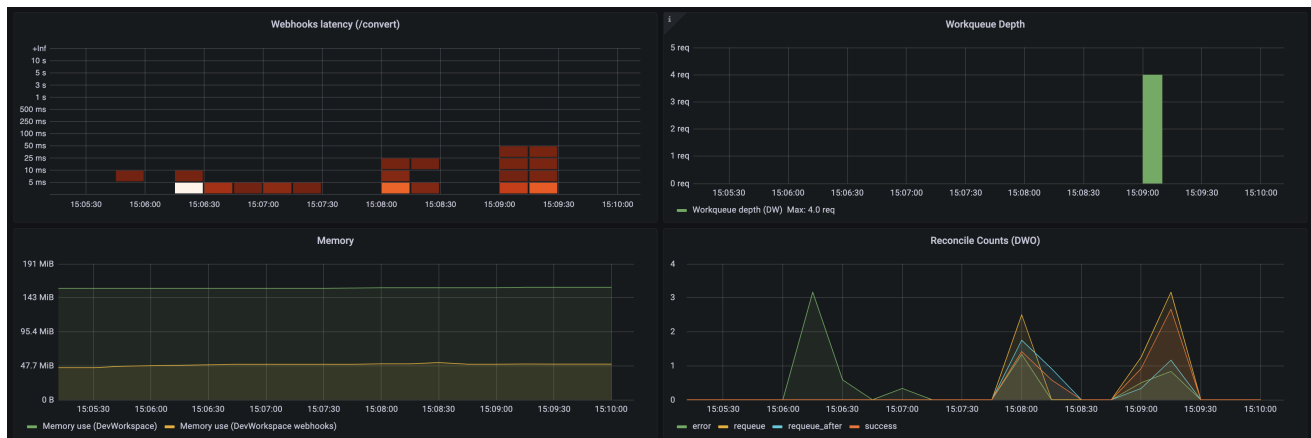
A heatmap that displays the **/mutate** webhook latency.

### Reconcile time

A heatmap that displays the reconcile duration.

## 3.6.4.2.4.3. The Operator metrics panel (part 2)

Figure 3.3. The Operator metrics panel (part 2)



### Webhooks latency (/convert)

A heatmap that displays the **/convert** webhook latency.

### Work queue depth

The number of reconcile requests that are in the work queue.

### Memory

Memory usage for the DevWorkspace controller and the DevWorkspace webhook server.

### Reconcile counts (DWO)

The average per-second number of reconcile counts for the DevWorkspace controller.



### 3.6.4.3. Monitoring OpenShift Dev Spaces Server

You can configure OpenShift Dev Spaces to expose JVM metrics such as JVM memory and class loading for OpenShift Dev Spaces Server.

#### 3.6.4.3.1. Enabling and exposing OpenShift Dev Spaces Server metrics

OpenShift Dev Spaces exposes the JVM metrics on port **8087** of the **che-host** Service. You can configure this behaviour.

##### Procedure

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#).

```
spec:
  components:
    metrics:
      enable: <boolean> 1
```

- 1 **true** to enable, **false** to disable.

#### 3.6.4.3.2. Collecting OpenShift Dev Spaces Server metrics with Prometheus

To use Prometheus to collect, store, and query JVM metrics for OpenShift Dev Spaces Server:

##### Prerequisites

- OpenShift Dev Spaces is exposing metrics on port **8087**. See [Enabling and exposing OpenShift Dev Spaces server JVM metrics](#).
- Prometheus 2.26.0 or later is running. The Prometheus console is running on port **9090** with a corresponding Service. See [First steps with Prometheus](#).

##### Procedure

1. Configure Prometheus to scrape metrics from port **8087**.



##### NOTE

The [example monitoring stack](#) already creates the **prometheus-config** ConfigMap with an empty configuration. To provide the Prometheus configuration details, edit the **data** field of the ConfigMap.

##### Example 3.33. Prometheus configuration

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: prometheus-config
data:
  prometheus.yml: |-
    global:
```

```

scrape_interval: 5s
evaluation_interval: 5s
scrape_configs:
  - job_name: 'Che Server'
    static_configs:
      - targets: ['che-host.<OpenShift Dev Spaces_project>:8087']

```

- 1 The rate at which a target is scraped.
- 2 The rate at which the recording and alerting rules are re-checked.
- 3 The resources that Prometheus monitors. In the default configuration, a single job, **Che Server**, scrapes the time series data exposed by OpenShift Dev Spaces Server.
- 4 The scrape target for the metrics from port **8087**. Replace **<OpenShift Dev Spaces\_project>** with the OpenShift Dev Spaces project. The default OpenShift Dev Spaces project is **openshift-devspaces**.

2. Scale the **Prometheus** Deployment down and up to read the updated ConfigMap from the previous step.

```
$ oc scale --replicas=0 deployment/prometheus -n monitoring && oc scale --replicas=1 deployment/prometheus -n monitoring
```

### Verification

1. Use port forwarding to access the **Prometheus** Service locally:

```
$ oc port-forward svc/prometheus 9090:9090 -n monitoring
```

2. Verify that all targets are up by viewing the **targets** endpoint at **localhost:9090/targets**.
3. Use the Prometheus console to view and query metrics:
  - View metrics at **localhost:9090/metrics**.
  - Query metrics from **localhost:9090/graph**.  
For more information, see [Using the expression browser](#).

### Additional resources

- [Configuring Prometheus](#)
- [Querying Prometheus](#)
- [Prometheus metric types](#)

#### 3.6.4.3.3. Viewing OpenShift Dev Spaces Server metrics on Grafana dashboards

To view the OpenShift Dev Spaces Server metrics on Grafana:

### Prerequisites

- Prometheus is collecting metrics on the OpenShift Dev Spaces cluster. See [Section 3.6.4, “Monitoring OpenShift Dev Spaces with Prometheus and Grafana”](#).
- Grafana 6.0 or later is running on port **3000** with a corresponding Service. See [Installing Grafana](#).

## Procedure

1. Add the data source for the Prometheus instance. See [Creating a Prometheus data source](#).
2. Import the example [dashboard](#). See [Import dashboard](#).
3. View the OpenShift Dev Spaces JVM metrics in the Grafana console:

Figure 3.4. OpenShift Dev Spaces server JVM dashboard

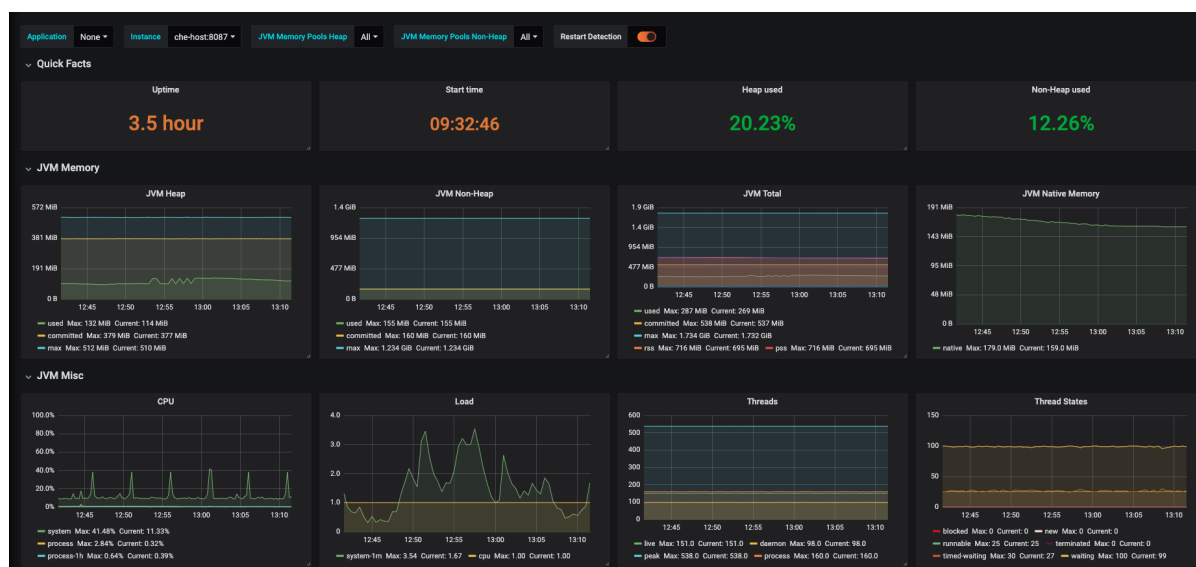


Figure 3.5. Quick Facts



Figure 3.6. JVM Memory

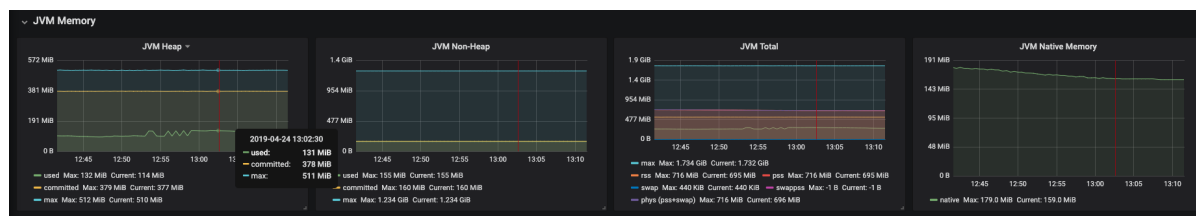


Figure 3.7. JVM Misc

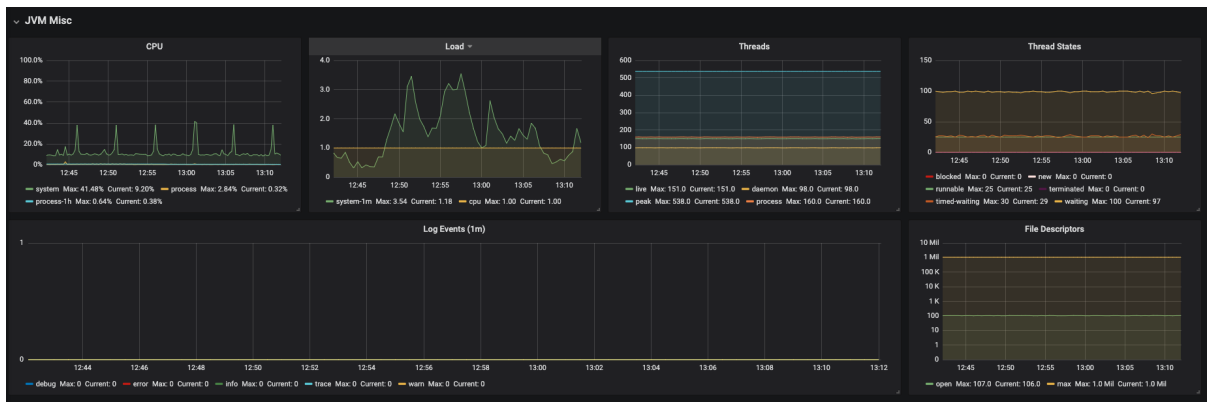


Figure 3.8. JVM Memory Pools (heap)

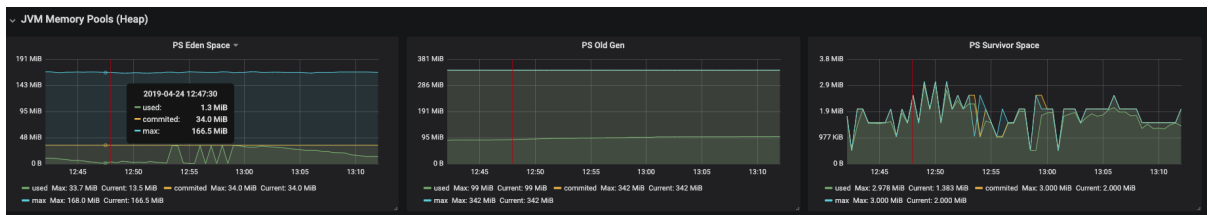


Figure 3.9. JVM Memory Pools (Non-Heap)

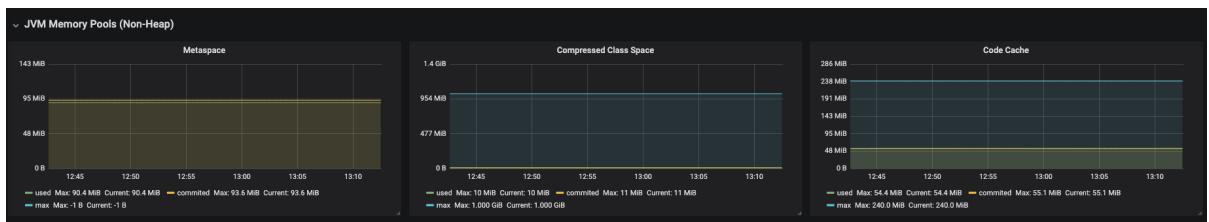


Figure 3.10. Garbage Collection

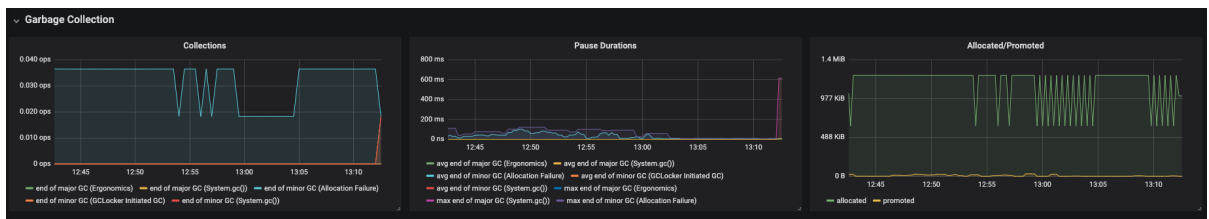
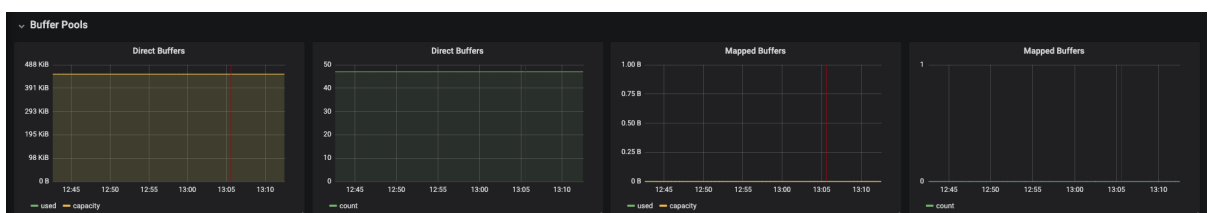


Figure 3.11. Class loading



Figure 3.12. Buffer Pools



## 3.7. CONFIGURING NETWORKING

- [Section 3.7.1, “Configuring network policies”](#)
- [Section 3.7.2, “Configuring Red Hat OpenShift Dev Spaces server hostname”](#)
- [Section 3.7.3, “Importing untrusted TLS certificates to OpenShift Dev Spaces”](#)
- [Section 3.7.4, “Adding labels and annotations to OpenShift Route”](#)
- [Section 3.7.5, “Configuring OpenShift Route to work with Router Sharding”](#)

### 3.7.1. Configuring network policies

By default, all Pods in a OpenShift cluster can communicate with each other even if they are in different namespaces. In the context of OpenShift Dev Spaces, this makes it possible for a workspace Pod in one user project to send traffic to another workspace Pod in a different user project.

For security, multitenant isolation could be configured by using NetworkPolicy objects to restrict all incoming communication to Pods in a user project. However, Pods in the OpenShift Dev Spaces project must be able to communicate with Pods in user projects.

#### Prerequisites

- The OpenShift cluster has network restrictions such as multitenant isolation.

#### Procedure

- Apply the **allow-from-openshift-devspaces** NetworkPolicy to each user project. The **allow-from-openshift-devspaces** NetworkPolicy allows incoming traffic from the OpenShift Dev Spaces namespace to all Pods in the user project.

#### Example 3.34. allow-from-openshift-devspaces.yaml

```
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: allow-from-openshift-devspaces
spec:
  ingress:
  - from:
    - namespaceSelector:
        matchLabels:
          kubernetes.io/metadata.name: openshift-devspaces 1
  podSelector: {} 2
  policyTypes:
  - Ingress
```

**1** The OpenShift Dev Spaces namespace. The default is **openshift-devspaces**.

**2** The empty **podSelector** selects all Pods in the project.

#### Additional resources

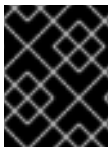
- [Section 3.2, “Configuring user project provisioning”](#)
- [Network isolation](#)
- [Configuring multitenant isolation with network policy](#)

### 3.7.2. Configuring Red Hat OpenShift Dev Spaces server hostname

This procedure describes how to configure OpenShift Dev Spaces to use custom hostname.

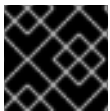
#### Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).
- The certificate and the private key files are generated.



#### IMPORTANT

To generate the pair of a private key and certificate, the same certification authority (CA) must be used as for other OpenShift Dev Spaces hosts.



#### IMPORTANT

Ask a DNS provider to point the custom hostname to the cluster ingress.

#### Procedure

1. Pre-create a project for OpenShift Dev Spaces:

```
$ oc create project openshift-devspaces
```

2. Create a TLS secret:

```
$ oc create secret TLS <tls-secret-name> \ 1
--key <key-file> \ 2
--cert <cert-file> \ 3
-n openshift-devspaces
```

- 1** The TLS secret name
- 2** A file with the private key
- 3** A file with the certificate

3. Add the required labels to the secret:

```
$ oc label secret <tls-secret-name> \ 1
app.kubernetes.io/part-of=che.eclipse.org -n openshift-devspaces
```

- 1** The TLS secret name

4. Configure the **CheCluster** Custom Resource. See [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#).

```
spec:
  networking:
    hostname: <hostname> 1
    tlsSecretName: <secret> 2
```

- 1** Custom Red Hat OpenShift Dev Spaces server hostname
- 2** The TLS secret name

5. If OpenShift Dev Spaces has been already deployed, wait until the rollout of all OpenShift Dev Spaces components finishes.

### Additional resources

- [Section 3.1.1, “Using dsc to configure the CheCluster Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.7.3. Importing untrusted TLS certificates to OpenShift Dev Spaces

By default, external communications between OpenShift Dev Spaces components are encrypted with TLS. Communications of OpenShift Dev Spaces components with external services such as proxies, source code repositories, and identity provider might also require TLS. All communications encrypted with TLS require the use of TLS certificates signed by trusted Certificate Authorities (CA).

When the certificates used by OpenShift Dev Spaces components or by an external service are signed by an untrusted CA, you must import the CA certificate into the OpenShift Dev Spaces instance so that every OpenShift Dev Spaces component treats the certificates as signed by a trusted CA. You have to do this in the following cases:

- The underlying OpenShift cluster uses TLS certificates signed by an untrusted CA. OpenShift Dev Spaces server or workspace components connect to external OIDC providers or a Git server that use TLS certificates signed by an untrusted CA.

OpenShift Dev Spaces uses labeled ConfigMaps in project as sources for TLS certificates. The ConfigMaps can have an arbitrary number of keys with a random number of certificates each.



#### NOTE

When an OpenShift cluster contains cluster-wide trusted CA certificates added through the [cluster-wide-proxy configuration](#), OpenShift Dev Spaces Operator detects them and automatically injects them into a ConfigMap. OpenShift Dev Spaces automatically labels the ConfigMap with the **config.openshift.io/inject-trusted-cabundle="true"** label. Based on this annotation, OpenShift automatically injects the cluster-wide trusted CA certificates inside the **ca-bundle.crt** key of ConfigMap.



#### IMPORTANT

Some OpenShift Dev Spaces components require a full certificate chain to trust the endpoint. If the cluster is configured with an intermediate certificate, add the whole chain, including self-signed root, to OpenShift Dev Spaces.

### 3.7.3.1. Adding new CA certificates into OpenShift Dev Spaces

The following procedure is applicable for already installed and running instances and for instances that are to be installed.

#### Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).
- Namespace for OpenShift Dev Spaces exists.

#### Procedure

1. Save the certificates you need to import to a local file system.

#### CAUTION

- A certificate with the introductory phrase **BEGIN TRUSTED CERTIFICATE** is likely in the PEM **TRUSTED CERTIFICATE** format, which is not supported by Java. Convert it to the supported **CERTIFICATE** format with the following command:
    - **openssl x509 -in cert.pem -out cert.cer**
2. Create a new ConfigMap with the required TLS certificates:

```
$ oc create configmap custom-certs --from-file=<bundle-file-path> -n=openshift-devspaces
```

To apply more than one bundle, add another **-from-file=<bundle-file-path>**. Alternatively, create another ConfigMap.

3. Label created ConfigMaps with the **app.kubernetes.io/part-of=che.eclipse.org** and **app.kubernetes.io/component=ca-bundle** labels:

```
$ oc label configmap custom-certs app.kubernetes.io/part-of=che.eclipse.org
app.kubernetes.io/component=ca-bundle -n <devspaces-namespace>
```

4. Deploy OpenShift Dev Spaces if it hasn't been deployed before. Otherwise wait until the rollout of OpenShift Dev Spaces components finishes.
5. Restart running workspaces for the changes to take effect.

### 3.7.3.2. Troubleshooting imported certificate issues

If issues occur after adding the certificates, verify the specified values at the OpenShift Dev Spaces instance level and workspace level.

#### Verifying imported certificates at the OpenShift Dev Spaces instance level

- In case of a OpenShift Dev Spaces [Operator](#) deployment, the namespace where the **CheCluster** is located contains labeled ConfigMaps with the correct content:

```
$ oc get cm --selector=app.kubernetes.io/component=ca-bundle,app.kubernetes.io/part-of=che.eclipse.org -n openshift-devspaces
```



Check the content of ConfigMap by entering:

```
$ oc get cm <name> -n openshift-devspaces -o yaml
```

- OpenShift Dev Spaces Pod Volumes list contains a volume that uses **ca-certs-merged** ConfigMap as data-source. To get the list of Volumes of the OpenShift Dev Spaces Pod, run:

```
$ oc get pod -o json <devspaces-pod-name> -n openshift-devspaces | jq .spec.volumes
```

- OpenShift Dev Spaces mounts certificates in the **/public-certs/** folder of the OpenShift Dev Spaces server container. To view the list of files in this folder, enter:

```
$ oc exec -t <devspaces-pod-name> -n openshift-devspaces -- ls /public-certs/
```

- In the OpenShift Dev Spaces server logs, there is a line for every certificate added to the Java truststore, including configured OpenShift Dev Spaces certificates. View them:

```
$ oc logs <devspaces-pod-name> -n openshift-devspaces
```

- OpenShift Dev Spaces server Java truststore contains the certificates. The certificates SHA1 fingerprints are among the list of the SHA1 of the certificates included in the truststore. View the list:

```
$ oc exec -t <devspaces-pod-name> -n openshift-devspaces -- keytool -list -keystore
/home/user/cacerts
Your keystore contains 141 entries:
+
(...)
```

To get the SHA1 hash of a certificate on the local filesystem, run:

```
$ openssl x509 -in <certificate-file-path> -fingerprint -noout
SHA1 Fingerprint=3F:DA:BF:E7:A7:A7:90:62:CA:CF:C7:55:0E:1D:7D:05:16:7D:45:60
```

### Verifying imported certificates at the workspace level

- Start a workspace, obtain the project name in which it has been created and wait for the workspace to be started.
- Get the name of the workspace Pod:

```
$ oc get pods -o=jsonpath='{.items[0].metadata.name}' -n <workspace namespace> | grep
'^workspace.*'
```

- Get the name of the Che-Theia IDE container in the workspace Pod:

```
$ oc get -o json pod <workspace pod name> -n <workspace namespace> | \
jq -r '.spec.containers[] | select(.name | startswith("theia-ide")).name'
```

- Look for a **ca-certs** ConfigMap inside the workspace namespace:

```
$ oc get cm ca-certs <workspace namespace>
```

- Check that the entries in the **ca-certs** ConfigMap contain all the additional entries you added before. In addition, it can contain **ca-bundle.crt** reserved entry. View the entries:

```
$ oc get cm ca-certs -n <workspace namespace> -o json | jq -r '.data | keys[]'
ca-bundle.crt
source-config-map-name.data-key.crt
```

- Confirm that the **ca-certs** ConfigMap is added as a volume in the workspace Pod:

```
$ oc get -o json pod <workspace pod name> -n <workspace namespace> | \
jq '.spec.volumes[] | select(.configMap.name == "ca-certs")'
{
  "configMap": {
    "defaultMode": 420,
    "name": "ca-certs"
  },
  "name": "che-self-signed-certs"
}
```

- Confirm that the volume is mounted into containers, especially in the Che-Theia IDE container:

```
$ oc get -o json pod <workspace pod name> -n <workspace namespace> | \
jq '.spec.containers[] | select(.name == "<theia ide container name>").volumeMounts[] | \
select(.name == "che-self-signed-certs")'
{
  "mountPath": "/public-certs",
  "name": "che-self-signed-certs",
  "readOnly": true
}
```

- Inspect the **/public-certs** folder in the Che-Theia IDE container and check if its contents match the list of entries in the **ca-certs** ConfigMap:

```
$ oc exec <workspace pod name> -c <theia ide container name> -n <workspace namespace> -- ls /public-certs
ca-bundle.crt
source-config-map-name.data-key.crt
```

### 3.7.4. Adding labels and annotations to OpenShift Route

You can configure OpenShift Route labels and annotations, if your organization requires them.

#### Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).
- An instance of OpenShift Dev Spaces running in OpenShift.

#### Procedure

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#).

■

```

spec:
  components:
    cheServer:
      extraProperties:
        CHE_INFRA_KUBERNETES_INGRESS_LABELS: <labels> 1
        CHE_INFRA_KUBERNETES_INGRESS_ANNOTATIONS__JSON: "<annotations>" 2
      networking:
        labels: <labels> 3
        annotations: <annotations> 4

```

1 3 A comma-separated list of labels for OpenShift Route: **key1=value1,key2=value2**.

2 4 Annotations for OpenShift Route in JSON format: **{"key1": "value1", "key2": "value2"}**.

### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

### 3.7.5. Configuring OpenShift Route to work with Router Sharding

You can configure labels, annotations, and domains for OpenShift Route to work with [Router Sharding](#).

#### Prerequisites

- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).
- **dsc**. See: [Section 2.1, “Install the dsc management tool”](#).

#### Procedure

- Configure the **CheCluster** Custom Resource. See [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#).

```

spec:
  components:
    cheServer:
      extraProperties:
        CHE_INFRA_OPENSIFT_ROUTE_LABELS: <labels> 1
        CHE_INFRA_OPENSIFT_ROUTE_HOST_DOMAINSUFFIX: <domain> 2
      networking: labels: <labels> 3 domain: <domain> 4 annotations: <annotations>__ 5

```

1 3 A comma-separated list of labels that the target ingress controller uses to filter the set of Routes to service.

2 4 The DNS name serviced by the target ingress controller.

5 An unstructured key value map stored with a resource.

### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

## 3.8. CONFIGURING STORAGE

- [Section 3.8.1, “Configuring storage classes”](#)

### 3.8.1. Configuring storage classes

To configure OpenShift Dev Spaces to use a configured infrastructure storage, install OpenShift Dev Spaces using storage classes. This is especially useful when a user wants to bind a persistent volume provided by a non-default provisioner. To do so, a user binds this storage for the OpenShift Dev Spaces data saving and sets the parameters for that storage. These parameters can determine the following:

- A special host path
- A storage capacity
- A volume mod
- Mount options
- A file system
- An access mode
- A storage type
- And many others

OpenShift Dev Spaces has two components that require persistent volumes to store data:

- A PostgreSQL database.
- A OpenShift Dev Spaces workspaces. OpenShift Dev Spaces workspaces store source code using volumes, for example **/projects** volume.



#### NOTE

OpenShift Dev Spaces workspaces source code is stored in the persistent volume only if a workspace is not ephemeral.

#### Persistent volume claims facts:

- OpenShift Dev Spaces does not create persistent volumes in the infrastructure.
- OpenShift Dev Spaces uses persistent volume claims (PVC) to mount persistent volumes.
- The OpenShift Dev Spaces server creates persistent volume claims.  
A user defines a storage class name in the OpenShift Dev Spaces configuration to use the storage classes feature in the OpenShift Dev Spaces PVC. With storage classes, a user configures infrastructure storage in a flexible way with additional storage parameters. It is also possible to bind a static provisioned persistent volumes to the OpenShift Dev Spaces PVC using the class name.

## Procedure

Use CheCluster Custom Resource definition to define storage classes:

1. Define storage class names: configure the **CheCluster** Custom Resource, and install OpenShift Dev Spaces. See [Section 3.1.1, "Using dsc to configure the CheCluster Custom Resource during installation"](#).

```
spec:
  components:
    database:
      pvc:
        # keep blank unless you need to use a non default storage class for PostgreSQL PVC
        storageClass: 'postgres-storage'
    devEnvironments:
      storage:
        pvc:
          # keep blank unless you need to use a non default storage class for workspace PVC(s)
          storageClass: 'workspace-storage'
```

2. Define the persistent volume for a PostgreSQL database in a **che-postgres-pv.yaml** file:

### che-postgres-pv.yaml file

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: postgres-pv-volume
  labels:
    type: local
spec:
  storageClassName: postgres-storage
  capacity:
    storage: 1Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: "/data/che/postgres"
```

3. Define the persistent volume for a OpenShift Dev Spaces workspace in a **che-postgres-pv.yaml** file:

### che-workspace-pv.yaml file

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: workspace-pv-volume
  labels:
    type: local
spec:
  storageClassName: workspace-storage
  capacity:
    storage: 10Gi
  accessModes:
```

```
- ReadWriteOnce
hostPath:
  path: "/data/che/workspace"
```

4. Bind the two persistent volumes:

```
$ kubectl apply -f che-workspace-pv.yaml -f che-postgres-pv.yaml
```



## NOTE

You must provide valid file permissions for volumes. You can do it using storage class configuration or manually. To manually define permissions, define **storageClass#mountOptions uid** and **gid**. PostgreSQL volume requires **uid=26** and **gid=26**.

### Additional resources

- [Section 3.1.1, "Using dsc to configure the CheCluster Custom Resource during installation"](#)
- [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#)

## 3.9. BRANDING

- [Section 3.9.1, "Branding Che-Theia"](#)

### 3.9.1. Branding Che-Theia

This chapter describes how to customize the Che-Theia interface and branding. Customization is possible for the following elements:

- **Welcome** page and **About** dialog:
  - Product name
  - Product logo
  - Description
  - List of helpful resources (**Help** section of the **Welcome** page)

To start using the customized Che-Theia:

1. Build a container image with the customized Che-Theia.
2. Define an editor **meta.yaml** that uses the custom image.
3. Create a workspace from a devfile using the custom editor.

#### 3.9.1.1. Defining custom branding values for Che-Theia

This section describes how to customize definitions of basic branding elements of Che-Theia.

### Procedure

Create a **product.json** file with a new name of the product, logo, description, and list of hyperlinks on the **Welcome** page (an example of **product.json**):

```
{
  "name": "Red Hat OpenShift Dev Spaces", 1
  "icon": "icon.png", 2
  "logo": { 3
    "dark": "logo-light.png",
    "light": "logo-dark.png"
  },
  "welcome": { 4
    "title": "Welcome to Your Workspace",
    "links": ["website", "documentation"]
  },
  "links": { 5
    "website": {
      "name": "Discover Red Hat OpenShift Dev Spaces",
      "url": "https://developers.redhat.com/products/openshift-dev-spaces/overview"
    },
    "documentation": {
      "name": "Browse Documentation",
      "url": "https://www.redhat.com/docs"
    }
  }
}
```

- 1 **name**: tab title for the **Welcome** page and the **About** dialog.
- 2 **icon**: icon for the **Welcome** page tab title.
- 3 **logo**: product logo for dark and light themes on the **Welcome** page (maximum height 80 pixels) and in the **About** dialog (maximum height 100 pixels). Use an image with a transparent background. Define a relative path, an absolute path, or a URL to an image.
- 4 **welcome**: the behavior of the **Welcome** page. Customize the invitation title and the links in the **Help** section. When the **welcome/links** property is not defined, the **Welcome** page displays the links from the **links** section.
- 5 **links**: list of helpful resources for the product. Use tags to group links to make them easier to find.



#### NOTE

To use only one logo image for both dark and light themes:

```
{
  ...
  "logo": "product-logo.png"
  ...
}
```

### 3.9.1.2. Building a Che-Theia container image with custom branding

This section describes how to build a Che-Theia container image with custom branding applied.

## Prerequisites

- A **product.json** file with custom branding definitions.

## Procedure

1. Download an example [Dockerfile](#).
2. In the **Dockerfile** directory, create a **branding/** sub-directory. Place the custom **product.json** file and logo images into the **branding/** directory.
3. Build the container image with Che-Theia and push the image to a container registry:

```
$ podman build -t username/che-theia-devspaces:next .  
$ podman push username/che-theia-devspaces:next
```

### 3.9.1.3. Testing Che-Theia with custom branding

This section describes how to test a customized Che-Theia by opening a new workspace with custom branding.

## Prerequisites

- Che-Theia container image built with custom branding definitions.

## Procedure

To test a custom Che-Theia image, create a new **meta.yaml** file describing a custom **cheEditor**, and use it in a devfile for the testing workspace.

1. Clone the **che-plugin-registry** repository and check out the version to deploy. See, [administration-guide:examples/snip\\_devspaces-clone-the-plug-in-registry-repository.adoc](#)
2. Open the **che-editors.yaml** file.
3. Edit the entry where **id** equals **eclipse/che-theia/next** and replace the **image** value in the **containers** section to point to the custom Che-Theia container image.
4. Build the registry:  
[administration-guide:examples/snip\\_devspaces-build-a-custom-plug-in-registry.adoc](#)
5. Navigate to the **./dependencies/che-plugin-registry/v3/plugins/eclipse/che-theia/next** directory.
6. Publish the **meta.yaml** file in this directory to a publicly accessible location where it can be used as an HTTP resource.
7. Create a workspace using the sample [che-theia-branding-example devfile](#) to apply the changes.  
Verify the **reference** field points to your published **meta.yaml** file:





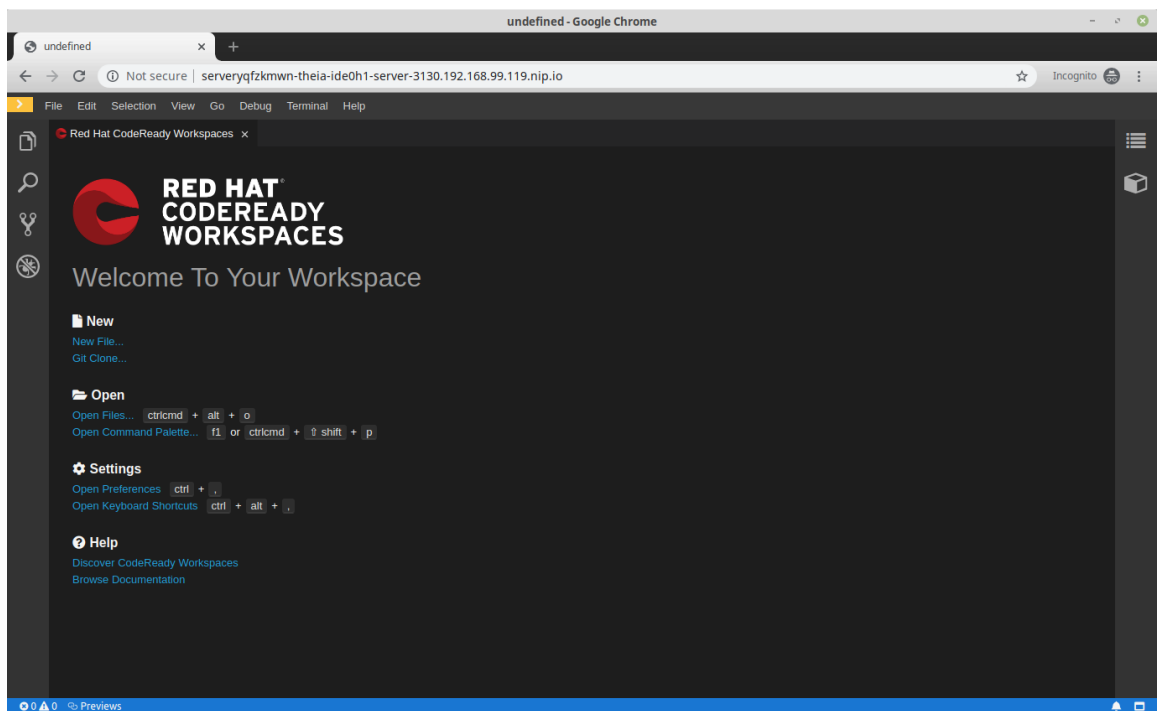
```

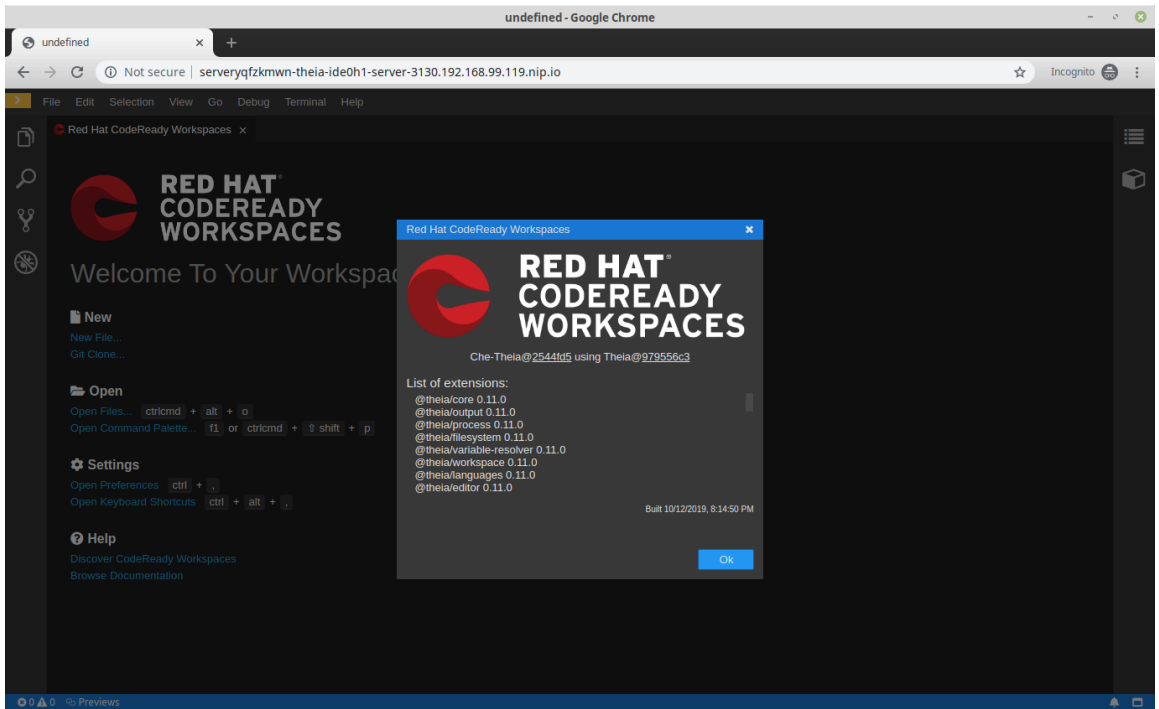
metadata:
  name: che-theia-all
projects:
  - name: che-cheia-branding-example
    source:
      location: 'https://github.com/che-samples/che-theia-branding-example.git'
      type: git
      branch: master
components:
  - type: cheEditor
    reference: >-
      https://raw.githubusercontent.com/che-samples/che-theia-branding-example/master/che-
editor.meta.yaml
apiVersion: 1.0.0

```

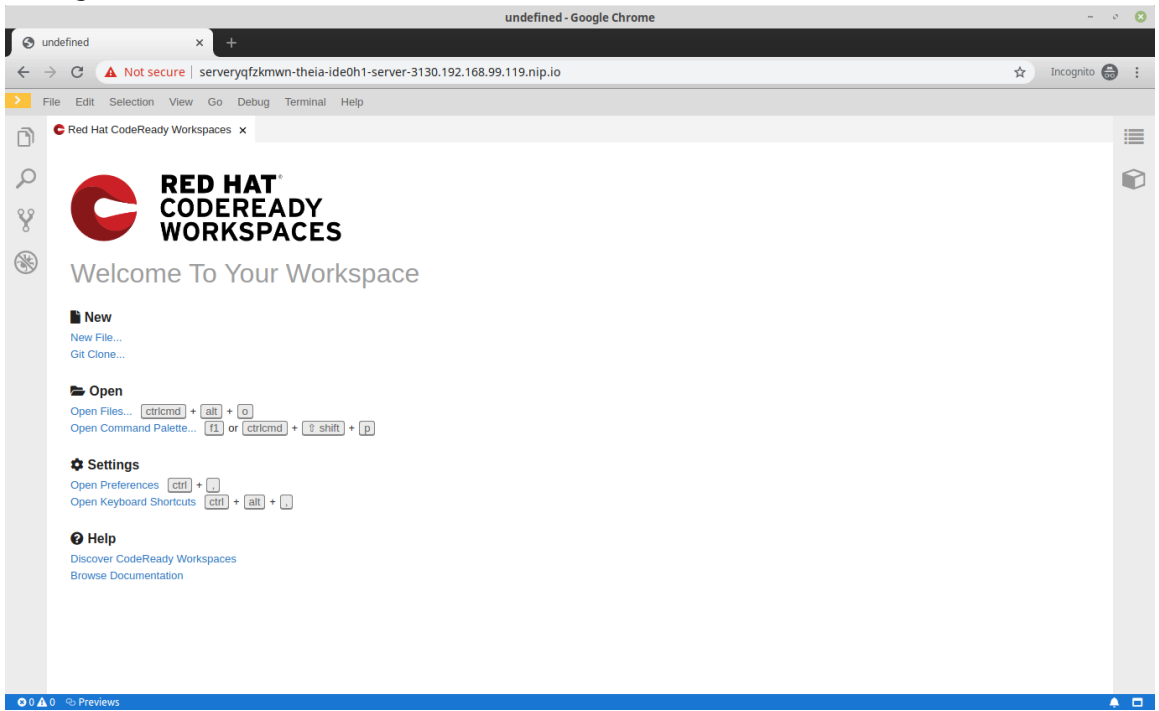
8. Run the workspace to see the changes:

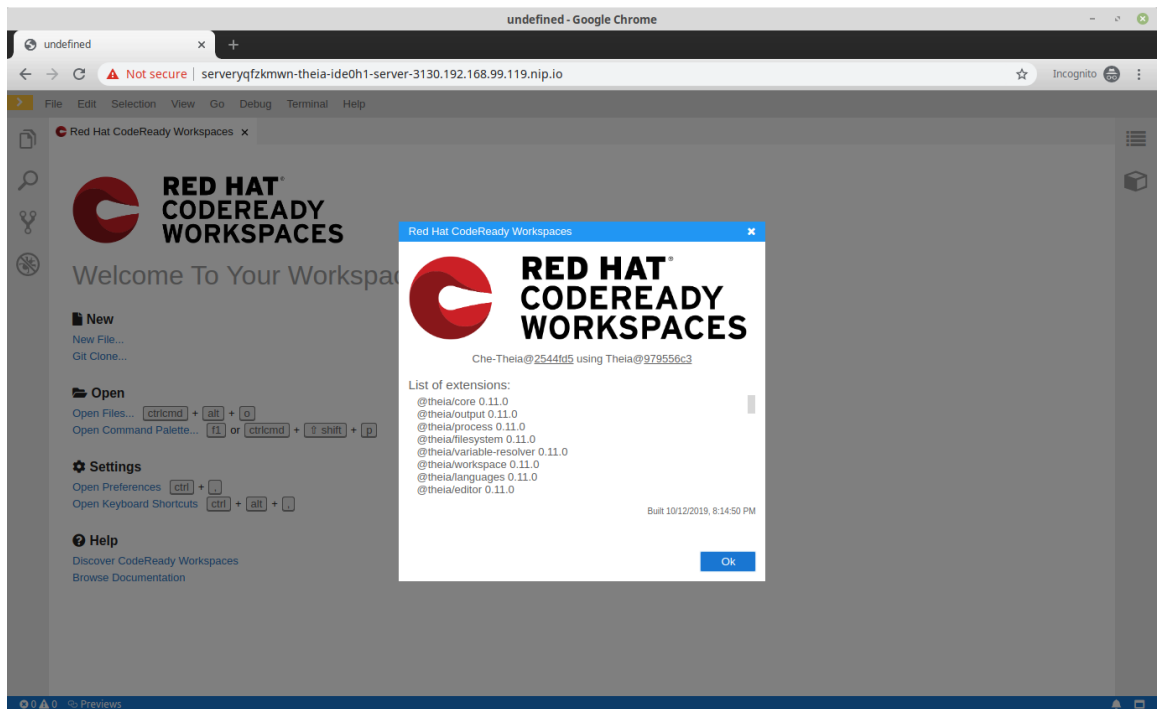
- The dark theme of Che-Theia:





- The light theme of Che-Theia:





## 3.10. MANAGING IDENTITIES AND AUTHORIZATIONS

This section describes different aspects of managing identities and authorizations of Red Hat OpenShift Dev Spaces.

- [Section 3.10.3, “Removing user data”](#)

### 3.10.1. OAuth for GitHub, GitLab, or Bitbucket

To enable users to work with remote Git repositories:

- [Section 3.10.1.1, “Configuring OAuth 2.0 for GitHub”](#)
- [Section 3.10.1.2, “Configuring OAuth 2.0 for GitLab”](#)
- [Section 3.10.1.3, “Configuring OAuth 1.0 for Bitbucket”](#)

#### 3.10.1.1. Configuring OAuth 2.0 for GitHub

To enable users to work with a remote Git repository that is hosted on GitHub:

1. Set up the GitHub OAuth App (OAuth 2.0).
2. Apply the GitHub OAuth App Secret.

##### 3.10.1.1.1. Setting up the GitHub OAuth App

Set up a GitHub OAuth App using OAuth 2.0.

#### Prerequisites

- You are logged in to GitHub.
- [base64](#) is installed in the operating system you are using.

## Procedure

1. Go to <https://github.com/settings/applications/new>.
2. Enter the following values:
  - a. **Application name:** **OpenShift Dev Spaces**.
  - b. **Homepage URL:** **`https://devspaces-<openshift_deployment_name>.<domain_name>/`**
  - c. **Authorization callback URL:**  
**`https://devspaces-<openshift_deployment_name>.<domain_name>/api/oauth/callback`**
3. Click **Register application**.
4. Click **Generate new client secret**
5. Copy the **GitHub OAuth Client ID** and encode it to Base64 for use when applying the GitHub OAuth App Secret:

```
$ echo -n '<github_oauth_client_id>' | base64
```

6. Copy the **GitHub OAuth Client Secret** and encode it to Base64 for use when applying the GitHub OAuth App Secret:

```
$ echo -n '<github_oauth_client_secret>' | base64
```

## Additional resources

- [GitHub Docs: Creating an OAuth App](#)

### 3.10.1.1.2. Applying the GitHub OAuth App Secret

Prepare and apply the GitHub OAuth App Secret.

## Prerequisites

- Setting up the GitHub OAuth App is completed.
- The Base64-encoded values, which were generated when setting up the GitHub OAuth App, are prepared:
  - **GitHub OAuth Client ID**
  - **GitHub OAuth Client Secret**
- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).

## Procedure

1. Prepare the Secret:

```
kind: Secret
apiVersion: v1
```

```

metadata:
  name: github-oauth-config
  namespace: openshift-devspaces 1
  labels:
    app.kubernetes.io/part-of: che.eclipse.org
    app.kubernetes.io/component: oauth-scm-configuration
  annotations:
    che.eclipse.org/oauth-scm-server: github
type: Opaque
data:
  id: <Base64_GitHub_OAuth_Client_ID> 2
  secret: <Base64_GitHub_OAuth_Client_Secret> 3

```

- 1** The OpenShift Dev Spaces namespace. The default is **openshift-devspaces**.
- 2** The Base64-encoded **GitHub OAuth Client ID**.
- 3** The Base64-encoded **GitHub OAuth Client Secret**

2. Apply the Secret:

```

$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF

```

3. Verify in the output that the Secret is created.

### 3.10.1.2. Configuring OAuth 2.0 for GitLab

To enable users to work with a remote Git repository that is hosted using a GitLab instance:

1. Set up the GitLab authorized application (OAuth 2.0).
2. Apply the GitLab authorized application Secret.

#### 3.10.1.2.1. Setting up the GitLab authorized application

Set up a GitLab authorized application using OAuth 2.0.

#### Prerequisites

- You are logged in to GitLab.
- **base64** is installed in the operating system you are using.

#### Procedure

1. Click your avatar and go to **Edit profile → Applications**.
2. Enter **OpenShift Dev Spaces** as the **Name**.
3. Enter **https://devspaces-<openshift\_deployment\_name>.<domain\_name>/api/oauth/callback** as the **Redirect URI**.

4. Check the **Confidential** and **Expire access tokens** checkboxes.
5. Under **Scopes**, check the **api**, **write\_repository**, and **openid** checkboxes.
6. Click **Save application**.
7. Copy the **GitLab Application ID** and encode it to Base64 for use when applying the GitLab-authorized application Secret:

```
$ echo -n '<gitlab_application_id>' | base64
```

8. Copy the **GitLab Client Secret** and encode it to Base64 for use when applying the GitLab-authorized application Secret:

```
$ echo -n '<gitlab_client_secret>' | base64
```

### Additional resources

- [GitLab Docs: Authorized applications](#)

#### 3.10.1.2.2. Applying the GitLab-authorized application Secret

Prepare and apply the GitLab-authorized application Secret.

### Prerequisites

- Setting up the GitLab authorized application is completed.
- The Base64-encoded values, which were generated when setting up the GitLab authorized application, are prepared:
  - **GitLab Application ID**
  - **GitLab Client Secret**
- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).

### Procedure

1. Prepare the Secret:

```
kind: Secret
apiVersion: v1
metadata:
  name: gitlab-oauth-config
  namespace: openshift-devspaces 1
labels:
  app.kubernetes.io/part-of: che.eclipse.org
  app.kubernetes.io/component: oauth-scm-configuration
annotations:
  che.eclipse.org/oauth-scm-server: gitlab
  che.eclipse.org/scm-server-endpoint: <gitlab_server_url> 2
type: Opaque
```

```
data:
  id: <Base64_GitLab_Application_ID> 3
  secret: <Base64_GitLab_Client_Secret> 4
```

- 1** The OpenShift Dev Spaces namespace. The default is **openshift-devspaces**.
- 2** The **GitLab** server URL Use <https://gitlab.com> for the **SAAS** version.
- 3** The Base64-encoded **GitLab Application ID**.
- 4** The Base64-encoded **GitLab Client Secret**.

2. Apply the Secret:

```
$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF
```

3. Verify in the output that the Secret is created.

### 3.10.1.3. Configuring OAuth 1.0 for Bitbucket

To enable users to work with a remote Git repository that is hosted on a Bitbucket server:

1. Set up the Bitbucket application link (OAuth 1.0).
2. Apply the Bitbucket application link Secret.

#### 3.10.1.3.1. Setting up the Bitbucket application link

Set up a Bitbucket application link using OAuth 1.0.

#### Prerequisites

- You are logged in to Bitbucket.
- **openssl** is installed in the operating system you are using.
- **base64** is installed in the operating system you are using.

#### Procedure

1. On a command line, run the commands to create the necessary files for the next steps and for use when applying the Bitbucket application link Secret:

```
$ openssl genrsa -out private.pem 2048 && \
openssl pkcs8 -topk8 -inform pem -outform pem -nocrypt -in private.pem -out
privatepkcs8.pem && \
cat privatepkcs8.pem | sed 's/-----BEGIN PRIVATE KEY-----//g' | sed 's/-----END PRIVATE
KEY-----//g' | tr -d '\n' | base64 | tr -d '\n' > privatepkcs8-stripped.pem && \
openssl rsa -in private.pem -pubout > public.pub && \
cat public.pub | sed 's/-----BEGIN PUBLIC KEY-----//g' | sed 's/-----END PUBLIC KEY-----//g'
```

```
| tr -d '\n' > public-stripped.pub && \
openssl rand -base64 24 > bitbucket-consumer-key && \
openssl rand -base64 24 > bitbucket-shared-secret
```

2. Go to **Administration** → **Application Links**.
3. Enter **https://devspaces-*<openshift\_deployment\_name>*.*<domain\_name>*/** into the URL field and click **Create new link**.
4. Under **The supplied Application URL has redirected once**, check the **Use this URL** checkbox and click **Continue**.
5. Enter **OpenShift Dev Spaces** as the **Application Name**.
6. Select **Generic Application** as the **Application Type**.
7. Enter **OpenShift Dev Spaces** as the **Service Provider Name**.
8. Paste the content of the **bitbucket-consumer-key** file as the **Consumer key**.
9. Paste the content of the **bitbucket-shared-secret** file as the **Shared secret**.
10. Enter ***<bitbucket\_server\_url>/plugins/servlet/oauth/request-token*** as the **Request Token URL**.
11. Enter ***<bitbucket\_server\_url>/plugins/servlet/oauth/access-token*** as the **Access token URL**.
12. Enter ***<bitbucket\_server\_url>/plugins/servlet/oauth/authorize*** as the **Authorize URL**.
13. Check the **Create incoming link** checkbox and click **Continue**.
14. Paste the content of the **bitbucket\_consumer\_key** file as the **Consumer Key**.
15. Enter **OpenShift Dev Spaces** as the **Consumer name**.
16. Paste the content of the **public-stripped.pub** file as the **Public Key** and click **Continue**.

#### Additional resources

- [Atlassian Documentation: Link to other applications](#)

#### 3.10.1.3.2. Applying the Bitbucket application link Secret

Prepare and apply the Bitbucket application link Secret.

#### Prerequisites

- Setting up the Bitbucket application link is completed.
- The following Base64-encoded files, which were created when setting up the Bitbucket application link, are prepared:
  - **privatepkcs8-stripped.pem**
  - **bitbucket\_consumer\_key**
  - **bitbucket-shared-secret**



- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).

## Procedure

1. Prepare the Secret:

```
kind: Secret
apiVersion: v1
metadata:
  name: bitbucket-oauth-config
  namespace: openshift-devspaces 1
  labels:
    app.kubernetes.io/component: oauth-scm-configuration
    app.kubernetes.io/part-of: che.eclipse.org
  annotations:
    che.eclipse.org/oauth-scm-server: bitbucket
    che.eclipse.org/scm-server-endpoint: <bitbucket_server_url> 2
type: Opaque
data:
  private.key: <Base64_content_of_privatepkcs8-stripped.pem> 3
  consumer.key: <Base64_content_of_bitbucket_server_consumer_key> 4
  shared_secret: <Base64_content_of_bitbucket-shared-secret> 5
```

- 1** The OpenShift Dev Spaces namespace. The default is **openshift-devspaces**.
- 2** The Bitbucket server URL.
- 3** The Base64-encoded content of the **privatepkcs8-stripped.pem** file.
- 4** The Base64-encoded content of the **bitbucket\_consumer\_key** file.
- 5** The Base64-encoded content of the **bitbucket-shared-secret** file.

2. Apply the Secret:

```
$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF
```

3. Verify in the output that the Secret is created.

### 3.10.2. Configuring the administrative user

To execute actions that require administrative privileges on OpenShift Dev Spaces server, such as deleting user data, activate a user with administrative privileges. The default installation enables the administrative privileges for the **admin** user, regardless of its existence on OpenShift.

## Procedure

- Configure the **CheCluster** Custom Resource to set the *<admin>* user with administrative privileges. See [Section 3.1.2, "Using the CLI to configure the CheCluster Custom Resource"](#).

```
spec:
  components:
    cheServer:
      extraProperties:
        CHE_SYSTEM_ADMIN__NAME: '<admin>'
```

### Additional resources

- [Section 3.1.1, “Using dsc to configure the \*\*CheCluster\*\* Custom Resource during installation”](#)
- [Section 3.1.2, “Using the CLI to configure the CheCluster Custom Resource”](#)

## 3.10.3. Removing user data

### 3.10.3.1. Removing user data according to GDPR

You can remove the OpenShift Dev Spaces user’s data using the OpenShift Dev Spaces API. Following this procedure makes the service compliant to EU General Data Protection Regulation ([GDPR](#)) that enforces the right for individuals to have personal data erased.

#### Prerequisites

- An active session with administrative permissions to OpenShift Dev Spaces. See [Section 3.10.2, “Configuring the administrative user”](#).
- An active **oc** session with administrative permissions to the OpenShift cluster. See [Getting started with the OpenShift CLI](#).

#### Procedure

1. Get the `<username>` user `<id>` **id**: navigate to `https://<devspaces-<openshift_deployment_name>.<domain_name>>/swagger/#/user/find_1`, click **Try it out**, set **name**: `<username>`, and click **Execute**. Scroll down the **Response body** to find the **id** value.
2. Remove the `<id>` user data that OpenShift Dev Spaces server manages, such as user preferences: navigate to `https://<devspaces-<openshift_deployment_name>.<domain_name>>/swagger/#/user/remove`, click **Try it out**, set **id**: `<id>`, and click **Execute**. Expect a **204** response code:
3. Delete the user project to remove all OpenShift resources bound to the user, such as workspaces, secrets, and configmaps.

```
$ oc delete namespace <username>-devspaces
```

#### Additional resources

- [Chapter 4, Managing OpenShift Dev Spaces server workloads using the OpenShift Dev Spaces server API](#).
- [Section 3.2.1, “Configuring a user project name for automatic provisioning”](#).
- To remove the data of all users, see [Chapter 6, Uninstalling OpenShift Dev Spaces](#).

## CHAPTER 4. MANAGING OPENSIFT DEV SPACES SERVER WORKLOADS USING THE OPENSIFT DEV SPACES SERVER API

To manage OpenShift Dev Spaces server workloads, use the Swagger web user interface to navigate OpenShift Dev Spaces server API.

### Procedure

- Navigate to the Swagger API web user interface:  
**`https://devspaces-<openshift_deployment_name>.<domain_name>/swagger.`**

### Additional resources

- [Swagger](#)

## CHAPTER 5. UPGRADING OPENSIFT DEV SPACES

This chapter describes how to upgrade from CodeReady Workspaces 2.15 to OpenShift Dev Spaces 3.1.

### 5.1. UPGRADING THE DSC MANAGEMENT TOOL

This section describes how to upgrade the **dsc** management tool.

#### Procedure

- [Section 2.1, “Install the dsc management tool”](#).

### 5.2. SPECIFYING THE UPDATE APPROVAL STRATEGY FOR THE RED HAT OPENSIFT DEV SPACES OPERATOR

The Red Hat OpenShift Dev Spaces Operator supports two upgrade strategies:

#### Automatic

The Operator installs new updates when they become available.

#### Manual

New updates need to be manually approved before installation begins.

You can specify the update approval strategy for the Red Hat OpenShift Dev Spaces Operator by using the OpenShift web console.

#### Prerequisites

- An OpenShift web console session by a cluster administrator. See [Accessing the web console](#).
- An instance of OpenShift Dev Spaces that was installed by using Red Hat Ecosystem Catalog.

#### Procedure

1. In the OpenShift web console, navigate to **Operators** → **Installed Operators**.
2. Click **Red Hat OpenShift Dev Spaces** in the list of installed Operators.
3. Navigate to the **Subscription** tab.
4. Configure the **Update approval** strategy to **Automatic** or **Manual**.

#### Additional resources

- [Changing the update channel for an Operator](#)

### 5.3. UPGRADING OPENSIFT DEV SPACES USING THE OPENSIFT WEB CONSOLE

You can manually approve an upgrade from an earlier minor version using the Red Hat OpenShift Dev Spaces Operator from the Red Hat Ecosystem Catalog in the OpenShift web console.

## Prerequisites

- An OpenShift web console session by a cluster administrator. See [Accessing the web console](#).
- An instance of OpenShift Dev Spaces that was installed by using the Red Hat Ecosystem Catalog.
- The approval strategy in the subscription is **Manual**. See [Section 5.2, “Specifying the update approval strategy for the Red Hat OpenShift Dev Spaces Operator”](#).

## Procedure

- Manually approve the pending Red Hat OpenShift Dev Spaces Operator upgrade. See [Manually approving a pending Operator upgrade](#).

## Verification steps

1. Navigate to the OpenShift Dev Spaces instance.
2. The 3.1 version number is visible at the bottom of the page.

## Additional resources

- [Manually approving a pending Operator upgrade](#)

## 5.4. REPAIRING THE DEVWORKSPACE OPERATOR ON OPENSIFT

Under certain conditions, such as [OLM](#) restart or cluster upgrade, the Dev Spaces Operator for OpenShift Dev Spaces might automatically install the DevWorkspace Operator even when it is already present on the cluster. In that case, you can repair the DevWorkspace Operator on OpenShift as follows:

## Prerequisites

- An active **oc** session as a cluster administrator to the destination OpenShift cluster. See [Getting started with the CLI](#).
- On the **Installed Operators** page of the OpenShift web console, you see multiple entries for the DevWorkspace Operator or one entry that is stuck in a loop of **Replacing** and **Pending**.

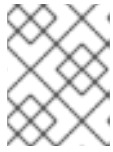
## Procedure

1. Delete the **devworkspace-controller** namespace that contains the failing pod.
2. Update **DevWorkspace** and **DevWorkspaceTemplate** Custom Resource Definitions (CRD) by setting the conversion strategy to **None** and removing the entire **webhook** section:

```
spec:
  ...
  conversion:
    strategy: None
  status:
  ...
```

**TIP**

You can find and edit the **DevWorkspace** and **DevWorkspaceTemplate** CRDs in the **Administrator** perspective of the OpenShift web console by searching for **DevWorkspace** in **Administration** → **CustomResourceDefinitions**.

**NOTE**

The **DevWorkspaceOperatorConfig** and **DevWorkspaceRouting** CRDs have the conversion strategy set to **None** by default.

- Remove the DevWorkspace Operator subscription:

```
$ oc delete sub devworkspace-operator \
-n openshift-operators 1
```

- 1** **openshift-operators** or an OpenShift project where the DevWorkspace Operator is installed.

- Get the DevWorkspace Operator CSVs in the `<devworkspace-operator.vX.Y.Z>` format:

```
$ oc get csv | grep devworkspace
```

- Remove each DevWorkspace Operator CSV:

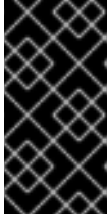
```
$ oc delete csv <devworkspace-operator.vX.Y.Z> \
-n openshift-operators 1
```

- 1** **openshift-operators** or an OpenShift project where the DevWorkspace Operator is installed.

- Re-create the DevWorkspace Operator subscription:

```
$ cat <<EOF | oc apply -f -
apiVersion: operators.coreos.com/v1alpha1
kind: Subscription
metadata:
  name: devworkspace-operator
  namespace: openshift-operators
spec:
  channel: fast
  name: devworkspace-operator
  source: redhat-operators
  sourceNamespace: openshift-marketplace
  installPlanApproval: Automatic 1
  startingCSV: devworkspace-operator.v0.15.2
EOF
```

- 1** **Automatic** or **Manual**.



## IMPORTANT

For **installPlanApproval: Manual**, in the **Administrator** perspective of the OpenShift web console, go to **Operators → Installed Operators** and select the following for the **DevWorkspace Operator: Upgrade available → Preview InstallPlan → Approve**.

7. In the **Administrator** perspective of the OpenShift web console, go to **Operators → Installed Operators** and verify the **Succeeded** status of the **DevWorkspace Operator**.

## CHAPTER 6. UNINSTALLING OPENSIFT DEV SPACES



### WARNING

Uninstalling OpenShift Dev Spaces removes all OpenShift Dev Spaces-related user data!

To uninstall an instance of Red Hat OpenShift Dev Spaces 3.1:

### Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See [Getting started with the CLI](#).
- **dsc**. See: [Section 2.1, "Install the dsc management tool"](#).

### Procedure

1. Obtain the name of the OpenShift Dev Spaces project (default: **openshift-devspaces**):

```
$ oc get checluster --all-namespaces \
  -o=jsonpath="{.items[*].metadata.namespace}"
```

2. Remove the OpenShift Dev Spaces instance from the `<openshift-devspaces>` project:

```
$ dsc server:delete -n <openshift-devspaces>
```



### NOTE

If OpenShift Dev Spaces was installed from the OpenShift web console, **dsc** will not uninstall the DevWorkspace operator. To uninstall the DevWorkspace Operator, see [Deleting the DevWorkspace Operator dependency](#).