Red Hat OpenShift Dev Spaces 3.3

User guide

Using Red Hat OpenShift Dev Spaces 3.3

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Abstract

Information for users using Red Hat OpenShift Dev Spaces.

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CHAPTER 1. ADOPTING DEV SPACES

To get started with adopting OpenShift Dev Spaces for your organization, you can read the following:

- Section 1.1, “Developer workspaces”
- Section 1.3, “Badge for first-time contributors”
- Section 1.4, “Reviewing pull and merge requests”
- Section 1.2, “Stack samples”

1.1. DEVELOPER WORKSPACES

Red Hat OpenShift Dev Spaces provides developer workspaces with everything you need to code, build, test, run, and debug applications:

- Project source code
- Web-based integrated development environment (IDE)
- Tool dependencies needed by developers to work on a project
- Application runtime: a replica of the environment where the application runs in production

Pods manage each component of a OpenShift Dev Spaces workspace. Therefore, everything running in a OpenShift Dev Spaces workspace is running inside containers. This makes a OpenShift Dev Spaces workspace highly portable.

The embedded browser-based IDE is the point of access for everything running in a OpenShift Dev Spaces workspace.

1.1.1. Microsoft Visual Studio Code - Open Source

Microsoft Visual Studio Code - Open Source is the default browser-based IDE.

OpenShift Dev Spaces adds these features:

Open VSX registry

The IDE uses the Open VSX registry to list and download extensions. The OpenShift Dev Spaces administrator can configure the Open VSX registry URL .

Recommended extensions

The IDE installs automatically the recommended extensions.

OpenShift Dev Spaces adds these extensions:

Commands

Translates Devfile commands to Microsoft Visual Studio Code - Open Source tasks.

Procedure

- To see the drop-down list of available tasks, type: **F1 Tasks: Run Task Enter che**.

Activity tracker

Tracks events provided by the Microsoft Visual Studio Code - Open Source to determine and stop inactive workspaces. This extension does not save, collect, or store data.

API

Provides helpers to interact with Dev Workspace and OpenShift Dev Spaces.

GitHub authentication

Provides support for authenticating to GitHub. It registers the **github** Authentication Provider that can be leveraged by other extensions. This also provides the GitHub authentication used by Settings Sync.

Port

Detects opening ports and provides redirect URI. When a process starts listening to a port, OpenShift Dev Spaces displays a notification with a link to open the resulting resource.

Procedure

- To display the endpoint list, type: **F1 Explorer: Focus on endpoints View Enter**.

Remote

Provides commands for the remote authority.

Resource monitor

Monitors resources such as CPU and RAM.

Telemetry

Detects and sends the following events to a backend telemetry plugin listening on **http://localhost:${DEVWORKSPACE_TELEMETRY_BACKEND_PORT}**:

WORKSPACE_OPENED

Sent when the telemetry extension activates

EDITOR_USED

Sent on the **vscode.workspace.onDidChangeTextDocument** event

Terminal

Opens a terminal to a Dev Workspace container.

1.2. STACK SAMPLES

To demonstrate the capabilities of Red Hat OpenShift Dev Spaces as remote development environment, Red Hat OpenShift Dev Spaces contains stack samples using various programming languages. Each sample includes a devfile and you can use them as a reference to bootstrap a new project. You can customize the samples if you are a OpenShift Dev Spaces administrator.

Table 1.1. Supported languages

Language	Builders, runtimes, and databases	Maturity
Apache Camel K	• Red Hat Fuse	GA

Language	Builders, runtimes, and databases	Maturity
Java	• OpenJDK 11 • Maven 3.6 • Gradle 6.1 • Quarkus Tools • Lombok 1.18 • JBoss EAP 7.4 • JBoss EAP XP 3.0	GA
Node.js	• Node.js 16 • NPM 8 • Express • MongoDB 3.6	GA
Python	• Python 3.8 • Pip 22.2	GA
C/C++	• GCC • cmake • make	Technology preview
C#	• Dotnet 3.1 on AMD64 and Intel 64 (**x86_64**) • Dotnet 6.0 on AMD64 and Intel 64 (**x86_64**), and IBM Z (**s390x**)	Technology preview
Go	• Golang	Technology preview
PHP	• CakePHP • Composer	Technology preview

1.3. BADGE FOR FIRST-TIME CONTRIBUTORS

To enable a first-time contributor to start a workspace with a project, add a badge with a link to your OpenShift Dev Spaces instance.

Figure 1.1. Factory badge

Procedure

1. Substitute your OpenShift Dev Spaces URL (**"https://devspaces-*<openshift_deployment_name>*.*<domain_name>*"**) and repository URL (***<your_repository_url>***), and add the link to your repository in the project **README.md** file.

   ```
   [![Contribute](https://www.eclipse.org/che/contribute.svg)]
   ("https://devspaces-&lt;openshift_deployment_name&gt;.&lt;domain_name&gt;"/#https://<your_repository_url>)
   ```

2. The **README.md** file in your Git provider web interface displays the

   factory badge. Click the badge to open a workspace with your project in your OpenShift Dev Spaces instance.

1.4. REVIEWING PULL AND MERGE REQUESTS

Red Hat OpenShift Dev Spaces workspace contains all tools you need to review pull and merge requests from start to finish. By clicking a OpenShift Dev Spaces link, you get access to Red Hat OpenShift Dev Spaces-supported web IDE with a ready-to-use workspace where you can run a linter, unit tests, the build and more.

Prerequisites

- You have access to the repository hosted by your Git provider.

- You use a Red Hat OpenShift Dev Spaces-supported browser: Google Chrome or Mozilla Firefox.
- You have access to a OpenShift Dev Spaces instance.

Procedure

1. Open the feature branch to review in OpenShift Dev Spaces. A clone of the branch opens in a workspace with tools for debugging and testing.
2. Check the pull or merge request changes.
3. Run your desired debugging and testing tools:
   - Run a linter.
   - Run unit tests.
   - Run the build.
   - Run the application to check for problems.
4. Navigate to UI of your Git provider to leave comment and pull or merge your assigned request.

Verification

- (optional) Open a second workspace using the main branch of the repository to reproduce a problem.

CHAPTER 2. USER ONBOARDING

If your organization is already running a OpenShift Dev Spaces instance, you can get started as a new user by learning how to start a new workspace, manage your workspaces, and authenticate yourself to a Git server from a workspace:

1. Section 2.1, “Starting a new workspace with a clone of a Git repository”
2. Section 2.2, “Optional parameters for the URLs for starting a new workspace”
3. Section 2.3, “Basic actions you can perform on a workspace”
4. Section 2.4, “Authenticating to a Git server from a workspace”

2.1. STARTING A NEW WORKSPACE WITH A CLONE OF A GIT REPOSITORY

Working with OpenShift Dev Spaces in your browser involves multiple URLs:

- The URL of your organization’s OpenShift Dev Spaces instance, used as part of all the following URLs
- The URL of the **Workspaces** page of your OpenShift Dev Spaces dashboard with the workspace control panel
- The URLs for starting a new workspace
- The URLs of your workspaces in use

With OpenShift Dev Spaces, you can visit a URL in your browser to start a new workspace that contains a clone of a Git repository. This way, you can clone a Git repository that is hosted on GitHub, a GitLab instance, or a Bitbucket server.

TIP

You can also use the **Git Repo URL *** field on the **Create Workspace** page of your OpenShift Dev Spaces dashboard to enter the URL of a Git repository to start a new workspace.

Prerequisites

- Your organization has a running instance of OpenShift Dev Spaces.
- You know the FQDN URL of your organization’s OpenShift Dev Spaces instance: **"https://devspaces-*<openshift_deployment_name>.<domain_name>*"**.
- Optional: You have authentication to the Git server configured.
- Your Git repository maintainer keeps the **devfile.yaml** or **.devfile.yaml** file in the root directory of the Git repository. (For alternative file names and file paths, see Section 2.2, “Optional parameters for the URLs for starting a new workspace”.)

TIP

You can also start a new workspace by supplying the URL of a Git repository that contains no devfile. Doing so results in a workspace with Universal Developer Image and with Microsoft Visual Studio Code - Open Source as the workspace IDE.

Procedure

To start a new workspace with a clone of a Git repository:

1. Optional: Visit your OpenShift Dev Spaces dashboard pages to authenticate to your organization's instance of OpenShift Dev Spaces.
2. Visit the URL to start a new workspace using the basic syntax:

> "https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*

TIP

You can extend this URL with optional parameters:

> "https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*?*<optional_parameters>* (1)

(1) See Section 2.2, "Optional parameters for the URLs for starting a new workspace" .

> **Example 2.1. A URL for starting a new workspace**
>
> **"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#https://github.com/che-samples/cpp-hello-world**

> **Example 2.2. The URL syntax for starting a new workspace with a clone of a GitHub-hosted repository**
>
> With GitHub and GitLab, you can even use the URL of a specific branch of the repository to be cloned:
>
> - **"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#https://github.com/*<user_or_org>*/*<repository>*** starts a new workspace with a clone of the default branch.
> - **"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#https://github.com/*<user_or_org>*/*<repository>*/tree/*<branch_name>*** starts a new workspace with a clone of the specified branch.
> - **"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#https://github.com/*<user_or_org>*/*<repository>*/pull/*<pull_request_id>*** starts a new workspace with a clone of the branch of the pull request.

After you enter the URL to start a new workspace in a browser tab, it renders the workspace-starting page.

When the new workspace is ready, the workspace IDE loads in the browser tab.

A clone of the Git repository is present in the filesystem of the new workspace.

The workspace has a unique URL: **"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#workspace*<unique_url>***.

TIP

Although this is not possible in the address bar, you can add a URL for starting a new workspace as a bookmark by using the browser bookmark manager:

- In Mozilla Firefox, go to ☰ > **Bookmarks** > **Manage bookmarks Ctrl+Shift+O** > **Bookmarks Toolbar** > **Organize** > **Add bookmark**.
- In Google Chrome, go to ⋮ > **Bookmarks** > **Bookmark manager** > **Bookmarks bar** > ⋮ > **Add new bookmark**.

Additional resources

- Section 2.2, “Optional parameters for the URLs for starting a new workspace”
- Section 2.3, “Basic actions you can perform on a workspace”

2.2. OPTIONAL PARAMETERS FOR THE URLS FOR STARTING A NEW WORKSPACE

When you start a new workspace, OpenShift Dev Spaces configures the workspace according to the instructions in the devfile. When you use a URL to start a new workspace, you can append optional parameters to the URL that further configure the workspace. You can use these parameters to specify a workspace IDE, start duplicate workspaces, and specify a devfile file name or path.

- Section 2.2.1, “URL parameter concatenation”
- Section 2.2.2, “URL parameter for the workspace IDE”
- Section 2.2.3, “URL parameter for starting duplicate workspaces”
- Section 2.2.4, “URL parameter for the devfile file name”
- Section 2.2.5, “URL parameter for the devfile file path”
- Section 2.2.6, “URL parameter for the workspace storage”

2.2.1. URL parameter concatenation

The URL for starting a new workspace supports concatenation of multiple optional URL parameters by using **&** with the following URL syntax:

"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*?*<url_parameter_1>*&*<url_parameter_2>*&*<url_parameter_3>*

> **Example 2.3. A URL for starting a new workspace with the URL of a Git repository and optional URL parameters**

The complete URL for the browser:

"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#https://github.com/che-samples/cpp-hello-world?new&che-editor=che-incubator/intellij-community/latest&devfilePath=tests/testdevfile.yaml

Explanation of the parts of the URL:

"https://devspaces-*<openshift_deployment_name>.<domain_name>*" (1)
#https://github.com/che-samples/cpp-hello-world (2)
?new&che-editor=che-incubator/intellij-community/latest&devfilePath=tests/testdevfile.yaml (3)

1. OpenShift Dev Spaces URL.
2. The URL of the Git repository to be cloned into the new workspace.
3. The concatenated optional URL parameters.

2.2.2. URL parameter for the workspace IDE

If the URL for starting a new workspace doesn't contain a URL parameter specifying the integrated development environment (IDE), the workspace loads with the default in-browser IDE, which is Microsoft Visual Studio Code - Open Source.

The URL parameter for specifying another supported IDE is **che-editor=*<editor_key>***:

"https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*?
che-editor=*<editor_key>*

NOTE

The workspace IDE might be already set for a remote Git repository in the **che-editor.yaml** file of the repository.

Table 2.1. The URL parameter *<editor_key>* values for supported IDEs

IDE	*<editor_key>* value	Note
Microsoft Visual Studio Code - Open Source	**che-incubator/che-code/insiders**	This is the default IDE that loads in a new workspace when the URL parameter or **che-editor.yaml** is not used.
JetBrains IntelliJ IDEA Community Edition	**che-incubator/che-idea/latest**	Technology Preview.
Eclipse Theia	**eclipse/che-theia/latest**	Stable version. Planned for deprecation and removal in future releases.

2.2.3. URL parameter for starting duplicate workspaces

Visiting a URL for starting a new workspace results in a new workspace according to the devfile and with a clone of the linked Git repository.

In some situations, you may need to have multiple workspaces that are duplicates in terms of the devfile and the linked Git repository. You can do this by visiting the same URL for starting a new workspace with a URL parameter.

The URL parameter for starting a duplicate workspace is **new**:

> "https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*?new

NOTE

If you currently have a workspace that you started using a URL, then visiting the URL again without the **new** URL parameter results in an error message.

2.2.4. URL parameter for the devfile file name

When you visit a URL for starting a new workspace, OpenShift Dev Spaces searches the linked Git repository for a devfile with the file name **.devfile.yaml** or **devfile.yaml**. The devfile in the linked Git repository must follow this file-naming convention.

In some situations, you may need to specify a different, unconventional file name for the devfile.

The URL parameter for specifying an unconventional file name of the devfile is **df=*<filename>*.yaml**:

> "https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*?df=*<filename>*.yaml (1)

(1) ***<filename>*.yaml** is an unconventional file name of the devfile in the linked Git repository.

TIP

The **df=*<filename>*.yaml** parameter also has a long version: **devfilePath=*<filename>*.yaml**.

2.2.5. URL parameter for the devfile file path

When you visit a URL for starting a new workspace, OpenShift Dev Spaces searches the root directory of the linked Git repository for a devfile with the file name **.devfile.yaml** or **devfile.yaml**. The file path of the devfile in the linked Git repository must follow this path convention.

In some situations, you may need to specify a different, unconventional file path for the devfile in the linked Git repository.

The URL parameter for specifying an unconventional file path of the devfile is **devfilePath=*<relative_file_path>***:

> "https://devspaces-*<openshift_deployment_name>.<domain_name>*"#*<git_repository_url>*?devfilePath=*<relative_file_path>* (1)

1 ***<relative_file_path>*** is an unconventional file path of the devfile in the linked Git repository.

2.2.6. URL parameter for the workspace storage

If the URL for starting a new workspace does not contain a URL parameter specifying the storage type, the new workspace is created in ephemeral or persistent storage, whichever is defined as the default storage type in the **CheCluster** Custom Resource.

The URL parameter for specifying a storage type for a workspace is **storageType=*<storage_type>***:

> "https://devspaces-*<openshift_deployment_name>*.*<domain_name>*"#*<git_repository_url>*?storageType=*<storage_type>* 1

1 Possible ***<storage_type>*** values:

- **ephemeral**
- **per-user** (persistent)
- **per-workspace** (persistent)

TIP

With the **ephemeral** or **per-workspace** storage type, you can run multiple workspaces concurrently, which is not possible with the default **per-user** storage type.

Additional resources

- Chapter 7, *Requesting persistent storage for workspaces*

2.3. BASIC ACTIONS YOU CAN PERFORM ON A WORKSPACE

You manage your workspaces and verify their current states in the **Workspaces** page (**"https://devspaces-*<openshift_deployment_name>*.*<domain_name>*"/dashboard/#/workspaces**) of your OpenShift Dev Spaces dashboard.

After you start a new workspace, you can perform the following actions on it in the **Workspaces** page:

Table 2.2. Basic actions you can perform on a workspace

Action	GUI steps in the Workspaces page
Reopen a running workspace	Click **Open**.
Restart a running workspace	Go to ⋮ > **Restart Workspace**.
Stop a running workspace	Go to ⋮ > **Stop Workspace**.
Start a stopped workspace	Click **Open**.

Action	GUI steps in the Workspaces page
Delete a workspace	Go to ⋮ > **Delete Workspace**.

2.4. AUTHENTICATING TO A GIT SERVER FROM A WORKSPACE

In a workspace, you can run Git commands that require user authentication like cloning a remote private Git repository or pushing to a remote public or private Git repository.

User authentication to a Git server from a workspace can be configured by the administrator or user:

- Your administrator sets up an OAuth application on GitHub, GitLab, or Bitbucket for your organization's Red Hat OpenShift Dev Spaces instance.
- As a user, you create and apply your own Kubernetes Secrets for your Git credentials store and access token.

Additional resources

- Administration Guide: OAuth for GitHub, GitLab, or Bitbucket
- User Guide: Using Git credentials

CHAPTER 3. CUSTOMIZING WORKSPACE COMPONENTS

To customize workspace components:

- Choose a Git repository for your workspace .
- Use a devfile
- Select and customize your in-browser IDE .
- Add OpenShift Dev Spaces specific attributes in addition to the generic devfile specification.

CHAPTER 4. INTRODUCTION TO DEVFILE IN RED HAT OPENSHIFT DEV SPACES

Devfiles are **yaml** text files used for development environment customization. Use them to configure a devfile to suit your specific needs and share the customized devfile across multiple workspaces to ensure identical user experience and build, run, and deploy behaviours across your team.

Devfile and Universal Developer Image

You do not need a devfile to start a workspace. If you do not include a devfile in your project repository, Red Hat OpenShift Dev Spaces automatically loads a default devfile with a Universal Developer Image (UDI).

OpenShift Dev Spaces devfile registry

OpenShift Dev Spaces devfile registry contains ready-to-use devfiles for different languages and technologies.

NOTE

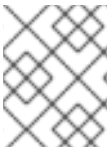
Devfiles included in the registry are specific to Red Hat OpenShift Dev Spaces and should be treated as samples rather than templates. They might require updates to work with other versions of the components featured in the samples.

Additional resources

- What is a devfile
- Benefits of devfile
- Devfile customization overview

CHAPTER 5. SELECTING A WORKSPACE IDE

The default in-browser IDE in a new workspace is Microsoft Visual Studio Code - Open Source.



NOTE

Because the OpenShift Dev Spaces build of Microsoft Visual Studio Code - Open Source supports custom branding, your organization might be using a branded build.

You can select another supported in-browser IDE by either method:

- When you start a new workspace by visiting a URL, you can choose an IDE for that workspace by adding the **che-editor** parameter to the URL. See Section 5.1, "Selecting an in-browser IDE for one new workspace".
- You can specify an IDE in the **.che/che-editor.yaml** file of the Git repository for all new workspaces that will feature a clone of that repository. See Section 5.2, "Selecting an in-browser IDE for all workspaces that clone the same Git repository".

Table 5.1. Supported in-browser IDEs

IDE	id	Note
Microsoft Visual Studio Code - Open Source	**che-incubator/che-code/insiders**	This is the default IDE that loads in a new workspace when the URL parameter or **che-editor.yaml** is not used.
JetBrains IntelliJ IDEA Community Edition	**che-incubator/che-idea/latest**	Technology Preview.
Eclipse Theia	**eclipse/che-theia/latest**	Stable version. Planned for deprecation and removal in future releases.

5.1. SELECTING AN IN-BROWSER IDE FOR ONE NEW WORKSPACE

You can select your preferred in-browser IDE when using a URL for starting a new workspace. This way, each developer using OpenShift Dev Spaces can start a workspace with a clone of the same project repository and the personal choice of the in-browser IDE.

Procedure

1. Include the Section 2.2.2, "URL parameter for the workspace IDE" in the URL for starting a new workspace.
2. Visit the URL in the browser.

Verification

- Verify that the selected in-browser IDE loads in the browser tab of the started workspace.

5.2. SELECTING AN IN-BROWSER IDE FOR ALL WORKSPACES THAT CLONE THE SAME GIT REPOSITORY

5.2.1. Setting up che-editor.yaml

To define the same in-browser IDE for all workspaces that will clone the same remote Git repository of your project, you can use the **che-editor.yaml** file.

This way, you can set a common default editor for your team and provide new contributors with the most suitable editor for your project. You can also use the **che-editor.yaml** file when you need to set a different IDE default for a particular project repository rather than the default IDE of your organization's OpenShift Dev Spaces instance.

Procedure

- In the remote Git repository of your project, create a **/.che/che-editor.yaml** file with lines that specify the relevant parameter, as described in the next section.

Verification

1. Visit the URL for starting a new workspace .
2. Verify that the selected in-browser IDE loads in the browser tab of the started workspace.

5.2.2. Parameters for che-editor.yaml

The simplest way to select an IDE in the **che-editor.yaml** is to specify the **id** of an IDE that is available in the table of supported in-browser IDEs in Chapter 5, *Selecting a workspace IDE*:

Example 5.1. id selects an IDE from the plug-in registry

```
id: che-incubator/che-idea/latest
```

As alternatives to providing the **id** parameter, the **che-editor.yaml** file supports a **reference** to the URL of another **che-editor.yaml** file or an **inline** definition for an IDE outside of a plug-in registry:

Example 5.2. reference points to a remoteche-editor.yaml file

```
reference: https://<hostname_and_path_to_a_remote_file>/che-editor.yaml
```

Example 5.3. inline specifies a complete definition for a customized IDE without a plug-in registry

```
inline:
  schemaVersion: 2.1.0
  metadata:
    name: JetBrains IntelliJ IDEA Community IDE
  components:
    - name: intellij
      container:
```

```
      image: 'quay.io/che-incubator/che-idea:next'
      volumeMounts:
        - name: projector-user
          path: /home/projector-user
      mountSources: true
      memoryLimit: 2048M
      memoryRequest: 32Mi
      cpuLimit: 1500m
      cpuRequest: 100m
      endpoints:
        - name: intellij
          attributes:
            type: main
            cookiesAuthEnabled: true
            urlRewriteSupported: true
            discoverable: false
            path: /?backgroundColor=434343&wss
          targetPort: 8887
          exposure: public
          secure: false
          protocol: https
    attributes: {}
  - name: projector-user
    volume: {}
```

For more complex scenarios, the **che-editor.yaml** file supports the **registryUrl** and **override** parameters:

Example 5.4. registryUrl points to a custom plug-in registry rather than to the default OpenShift Dev Spaces plug-in registry

```
id: <editor_id> (1)
registryUrl: <url_of_custom_plug-in_registry>
```

(1) The **id** of the IDE in the custom plug-in registry.

Example 5.5. override of the default value of one or more defined properties of the IDE

```
... (1)
override:
  containers:
    - name: che-idea
      memoryLimit: 1280Mi
      cpuLimit: 1510m
      cpuRequest: 102m
      ...
```

(1) **id:**, **registryUrl:**, or **reference:**.

CHAPTER 6. USING CREDENTIALS AND CONFIGURATIONS IN WORKSPACES

You can use your credentials and configurations in your workspaces.

To do so, mount your credentials and configurations to the **Dev Workspace** containers in the OpenShift cluster of your organization's OpenShift Dev Spaces instance:

- Mount your credentials and sensitive configurations as Kubernetes Secrets.
- Mount your non-sensitve configurations as Kubernetes ConfigMaps.

If you need to allow the **Dev Workspace** Pods in the cluster to access container registries that require authentication, create an image pull Secret for the **Dev Workspace** Pods.

The mounting process uses the standard Kubernetes mounting mechanism and requires applying additional labels and annotations to your existing resources. Resources are mounted when starting a new workspace or restarting an existing one.

You can create permanent mount points for various components:

- Maven configuration, such as the user-specific **settings.xml** file
- SSH key pairs
- AWS authorization tokens
- Configuration files
- Persistent storage
- Git credentials

Additional resources

- Kubernetes Documentation: Secrets
- Kubernetes Documentation: ConfigMaps

6.1. USING GIT CREDENTIALS

As an alternative to the OAuth for GitHub, GitLab, or Bitbucket that is configured by the administrator of your organization's OpenShift Dev Spaces instance, you can apply your Git credentials, a credentials store and access token, as Kubernetes Secrets.

6.1.1. Using a Git credentials store

If the administrator of your organization's OpenShift Dev Spaces instance has not configured OAuth for GitHub, GitLab, or Bitbucket, you can apply your Git credentials store as a Kubernetes Secret.

Mounting your Git credentials store as a Secret results in the Dev Workspace Operator applying your Git credentials to the **.gitconfig** file in the workspace container.

Apply the Kubernetes Secret in your user project of the OpenShift cluster of your organization's OpenShift Dev Spaces instance.

When you apply the Secret, a Git configuration file with the path to the mounted Git credentials store is automatically configured and mounted to the **Dev Workspace** containers in the cluster at **/etc/gitconfig**. This makes your Git credentials store available in your workspaces.

Prerequisites

- An active **oc** session, with administrative permissions, to the OpenShift cluster. See Getting started with the CLI.
- The **base64** command line tools are installed in the operating system you are using.

Procedure

1. In your home directory, locate and open your **.git-credentials** file if you already have it. Alternatively, if you do not have this file, save a new **.git-credentials** file, using the Git credentials storage format. Each credential is stored on its own line in the file:

   ```
   https://<username>:<token>@<git_server_hostname>
   ```

   Example 6.1. A line in a.git-credentials file

   ```
   https://trailblazer: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@github.com
   ```

2. Select credentials from your **.git-credentials** file for the Secret. Encode the selected credentials to Base64 for the next step.

   TIP

   - To encode all lines in the file:
     $ cat .git-credentials | base64 | tr -d '\n'
   - To encode a selected line:
     $ echo -n '*<copied_and_pasted_line_from_.git-credentials>*' | base64

3. Create a new OpenShift Secret in your user project.

   ```
   apiVersion: v1
   kind: Secret
   metadata:
     name: git-credentials-secret
     labels:
       controller.devfile.io/git-credential: 'true' (1)
       controller.devfile.io/watch-secret: 'true'
     annotations:
       controller.devfile.io/mount-path: /etc/secret (2)
   data:
     credentials: <Base64_content_of_.git-credentials> (3)
   ```

   (1) The **controller.devfile.io/git-credential** label marks the Secret as containing Git credentials.

   (2) A custom absolute path in the **Dev Workspace** containers. The Secret is mounted as the

3 The selected content from **.git-credentials** that you encoded to Base64 in the previous step.

TIP

You can create and apply multiple Git credentials Secrets in your user project. All of them will be copied into one Secret that will be mounted to the **Dev Workspace** containers. For example, if you set the mount path to **/etc/secret**, then the one Secret with all of your Git credentials will be mounted at **/etc/secret/credentials**. You must set all Git credentials Secrets in your user project to the same mount path. You can set the mount path to an arbitrary path because the mount path will be automatically set in the Git configuration file configured at **/etc/gitconfig**.

4. Apply the Secret.

```
$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF
```

6.1.2. Using a Git provider access token

If the administrator of your organization's OpenShift Dev Spaces instance has not configured OAuth for GitHub, GitLab, or Bitbucket, you can apply your personal access token as a Kubernetes Secret.

Mounting your access token as a Secret enables the OpenShift Dev Spaces Server to access the remote repository that is cloned during workspace creation, including access to the repository's **/.che** and **/.vscode** folders.

Apply the Kubernetes Secret in your user project of the OpenShift cluster of your organization's OpenShift Dev Spaces instance.

After you have applied the Secret, you can create new workspaces from a private GitHub, GitLab, or Bitbucket-server repository.

TIP

In your user project, you can create and apply multiple access-token Secrets per a Git provider.

Prerequisites

- An active **oc** session, with administrative permissions, to the OpenShift cluster. See Getting started with the CLI.
- The **base64** command line tools are installed in the operating system you are using.

Procedure

1. Copy your access token and encode it to Base64.

```
$ echo -n '<your_access_token>' | base64
```

2. Prepare a new OpenShift Secret in your user project.

```
kind: Secret
apiVersion: v1
metadata:
  name: personal-access-token-<your_chosen_name_for_this_token>
  labels:
    app.kubernetes.io/component: scm-personal-access-token
    app.kubernetes.io/part-of: che.eclipse.org
  annotations:
    che.eclipse.org/che-userid: <devspaces_user_ID> 1
    che.eclipse.org/scm-personal-access-token-name: <git_provider_name> 2
    che.eclipse.org/scm-url: <Git_provider_endpoint> 3
    che.eclipse.org/scm-userid: <Git_provider_user_ID> 4
    che.eclipse.org/scm-username: <Git_provider_username>
data:
  token: <Base64_encoded_access_token>
type: Opaque
```

1. Your OpenShift Dev Spaces user ID. You can retrieve ***<che_endpoint>*/api/user** to get the OpenShift Dev Spaces user data.
2. The Git provider name: **github** or **gitlab** or **bitbucket-server**.
3. The Git provider URL.
4. Your Git provider user ID, follow the API documentation to retrieve the user object:
   - GitHub: Get a user. See the **id** value in the response.
   - GitLab: List users: For normal users, use the **username** filter: **/users?username=:username**. See the **id** value in the response.
   - Bitbucket Server: Get users. See the **id** value in the response.

3. Apply the Secret.

```
$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF
```

6.2. ENABLING ARTIFACT REPOSITORIES IN A RESTRICTED ENVIRONMENT

By configuring technology stacks, you can work with artifacts from in-house repositories using self-signed certificates:

- Maven
- Gradle
- npm
- Python
- Go

- NuGet

6.2.1. Maven

You can enable a Maven artifact repository in Maven workspaces that run in a restricted environment.

Prerequisites

- You are not running any Maven workspace.
- You know your user namespace, which is ***<username>*-devspaces** where ***<username>*** is your OpenShift Dev Spaces username.

Procedure

1. In the ***<username>*-devspaces** namespace, apply the Secret for the TLS certificate:

```
kind: Secret
apiVersion: v1
metadata:
  name: tls-cer
  annotations:
    controller.devfile.io/mount-path: /home/user/certs
    controller.devfile.io/mount-as: file
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  tls.cer: >-
    <Base64_encoded_content_of_public_cert> (1)
```

(1) Base64 encoding with disabled line wrapping.

2. In the ***<username>*-devspaces** namespace, apply the ConfigMap to create the **settings.xml** file:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: settings-xml
  annotations:
    controller.devfile.io/mount-as: subpath
    controller.devfile.io/mount-path: /home/user/.m2
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  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
https://maven.apache.org/xsd/settings-1.0.0.xsd">
      <localRepository/>
      <interactiveMode/>
```

```
    <offline/>
    <pluginGroups/>
    <servers/>
    <mirrors>
      <mirror>
        <id>redhat-ga-mirror</id>
        <name>Red Hat GA</name>
        <url>https://<maven_artifact_repository_route>/repository/redhat-ga/</url>
        <mirrorOf>redhat-ga</mirrorOf>
      </mirror>
      <mirror>
        <id>maven-central-mirror</id>
        <name>Maven Central</name>
        <url>https://<maven_artifact_repository_route>/repository/maven-central/</url>
        <mirrorOf>maven-central</mirrorOf>
      </mirror>
      <mirror>
        <id>jboss-public-repository-mirror</id>
        <name>JBoss Public Maven Repository</name>
        <url>https://<maven_artifact_repository_route>/repository/jboss-public/</url>
        <mirrorOf>jboss-public-repository</mirrorOf>
      </mirror>
    </mirrors>
    <proxies/>
    <profiles/>
    <activeProfiles/>
  </settings>
```

3. Optional: When using EAP-based devfiles, apply a second **settings-xml** ConfigMap in the ***<username>*-devspaces** namespace, and with the same content, a different name, and the **/home/jboss/.m2** mount path.

4. In the ***<username>*-devspaces** namespace, apply the ConfigMap for the TrustStore initialization script:

Java 8

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: init-truststore
  annotations:
    controller.devfile.io/mount-as: subpath
    controller.devfile.io/mount-path: /home/user/
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  init-java8-truststore.sh: |
    #!/usr/bin/env bash

    keytool -importcert -noprompt -file /home/user/certs/tls.cer -trustcacerts -keystore
~/.java/current/jre/lib/security/cacerts -storepass changeit
```

Java 11

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: init-truststore
  annotations:
    controller.devfile.io/mount-as: subpath
    controller.devfile.io/mount-path: /home/user/
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  init-java11-truststore.sh: |
    #!/usr/bin/env bash

    keytool -importcert -noprompt -file /home/user/certs/tls.cer -cacerts -storepass changeit
```

5. Start a Maven workspace.
6. Open a new terminal in the **tools** container.
7. Run **~/init-truststore.sh**.

6.2.2. Gradle

You can enable a Gradle artifact repository in Gradle workspaces that run in a restricted environment.

Prerequisites

- You are not running any Gradle workspace.

Procedure

1. Apply the Secret for the TLS certificate:

```
kind: Secret
apiVersion: v1
metadata:
  name: tls-cer
  annotations:
    controller.devfile.io/mount-path: /home/user/certs
    controller.devfile.io/mount-as: file
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  tls.cer: >-
    <Base64_encoded_content_of_public_cert> (1)
```

(1) Base64 encoding with disabled line wrapping.

2. Apply the ConfigMap for the TrustStore initialization script:

```
kind: ConfigMap
```

```
apiVersion: v1
metadata:
  name: init-truststore
  annotations:
    controller.devfile.io/mount-as: subpath
    controller.devfile.io/mount-path: /home/user/
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  init-truststore.sh: |
    #!/usr/bin/env bash

    keytool -importcert -noprompt -file /home/user/certs/tls.cer -cacerts -storepass changeit
```

3. Apply the ConfigMap for the Gradle init script:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: init-gradle
  annotations:
    controller.devfile.io/mount-as: subpath
    controller.devfile.io/mount-path: /home/user/.gradle
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  init.gradle: |
    allprojects {
      repositories {
        mavenLocal ()
        maven {
          url "https://<gradle_artifact_repository_route>/repository/maven-public/"
          credentials {
            username "admin"
            password "passwd"
          }
        }
      }
    }
```

4. Start a Gradle workspace.

5. Open a new terminal in the **tools** container.

6. Run **~/init-truststore.sh**.

6.2.3. npm

You can enable an npm artifact repository in npm workspaces that run in a restricted environment.

Prerequisites

- You are not running any npm workspace.

WARNING

Applying a ConfigMap that sets environment variables might cause a workspace boot loop.

If you encounter this behavior, remove the **ConfigMap** and edit the devfile directly.

Procedure

1. Apply the Secret for the TLS certificate:

```
kind: Secret
apiVersion: v1
metadata:
  name: tls-cer
  annotations:
    controller.devfile.io/mount-path: /home/user/certs
    controller.devfile.io/mount-as: file
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  tls.cer: >-
    <Base64_encoded_content_of_public_cert> (1)
```

(1) Base64 encoding with disabled line wrapping.

2. Apply the ConfigMap to set the following environment variables in the **tools** container:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: disconnected-env
  annotations:
    controller.devfile.io/mount-as: env
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  NODE_EXTRA_CA_CERTS: /home/user/certs/tls.cer
  NPM_CONFIG_REGISTRY: >-
    https://<npm_artifact_repository_route>/repository/npm-all/
```

6.2.4. Python

You can enable a Python artifact repository in Python workspaces that run in a restricted environment.

Prerequisites

- You are not running any Python workspace.

WARNING

Applying a ConfigMap that sets environment variables might cause a workspace boot loop.

If you encounter this behavior, remove the **ConfigMap** and edit the devfile directly.

Procedure

1. Apply the Secret for the TLS certificate:

```
kind: Secret
apiVersion: v1
metadata:
  name: tls-cer
  annotations:
    controller.devfile.io/mount-path: /home/user/certs
    controller.devfile.io/mount-as: file
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  tls.cer: >-
    <Base64_encoded_content_of_public_cert> 1
```

1 Base64 encoding with disabled line wrapping.

2. Apply the ConfigMap to set the following environment variables in the **tools** container:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: disconnected-env
  annotations:
    controller.devfile.io/mount-as: env
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  PIP_INDEX_URL: >-
    https://<python_artifact_repository_route>/repository/pypi-all/
  PIP_CERT: /home/user/certs/tls.cer
```

6.2.5. Go

You can enable a Go artifact repository in Go workspaces that run in a restricted environment.

Prerequisites

- You are not running any Go workspace.

WARNING

Applying a ConfigMap that sets environment variables might cause a workspace boot loop.

If you encounter this behavior, remove the **ConfigMap** and edit the devfile directly.

Procedure

1. Apply the Secret for the TLS certificate:

```
kind: Secret
apiVersion: v1
metadata:
  name: tls-cer
  annotations:
    controller.devfile.io/mount-path: /home/user/certs
    controller.devfile.io/mount-as: file
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  tls.cer: >-
    <Base64_encoded_content_of_public_cert> 1
```

1 Base64 encoding with disabled line wrapping.

2. Apply the ConfigMap to set the following environment variables in the **tools** container:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: disconnected-env
  annotations:
    controller.devfile.io/mount-as: env
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  GOPROXY: >-
    http://<athens_proxy_route>
  SSL_CERT_FILE: /home/user/certs/tls.cer
```

6.2.6. NuGet

You can enable a NuGet artifact repository in NuGet workspaces that run in a restricted environment.

Prerequisites

- You are not running any NuGet workspace.

WARNING

Applying a ConfigMap that sets environment variables might cause a workspace boot loop.

If you encounter this behavior, remove the **ConfigMap** and edit the devfile directly.

Procedure

1. Apply the Secret for the TLS certificate:

```
kind: Secret
apiVersion: v1
metadata:
  name: tls-cer
  annotations:
    controller.devfile.io/mount-path: /home/user/certs
    controller.devfile.io/mount-as: file
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  tls.cer: >-
    <Base64_encoded_content_of_public_cert> (1)
```

(1) Base64 encoding with disabled line wrapping.

2. Apply the ConfigMap to set the environment variable for the path of the TLS certificate file in the **tools** container:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: disconnected-env
  annotations:
    controller.devfile.io/mount-as: env
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  SSL_CERT_FILE: /home/user/certs/tls.cer
```

3. Apply the ConfigMap to create the **nuget.config** file:

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: init-nuget
  annotations:
    controller.devfile.io/mount-as: subpath
    controller.devfile.io/mount-path: /projects
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
data:
  nuget.config: |
    <?xml version="1.0" encoding="UTF-8"?>
    <configuration>
      <packageSources>
        <add key="nexus2" value="https://<nuget_artifact_repository_route>/repository/nuget-
group/"/>
      </packageSources>
      <packageSourceCredentials>
        <nexus2>
          <add key="Username" value="admin" />
          <add key="Password" value="passwd" />
        </nexus2>
      </packageSourceCredentials>
    </configuration>
```

6.3. CREATING IMAGE PULL SECRETS

To allow the **Dev Workspace** Pods in the OpenShift cluster of your organization's OpenShift Dev Spaces instance to access container registries that require authentication, create an image pull Secret.

You can create image pull Secrets by using **oc** or a **.dockercfg** file or a **config.json** file.

6.3.1. Creating an image pull Secret with oc

Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See Getting started with the CLI.

Procedure

1. In your user project, create an image pull Secret with your private container registry details and credentials:

```
$ oc create secret docker-registry <Secret_name> \
    --docker-server=<registry_server> \
    --docker-username=<username> \
    --docker-password=<password> \
    --docker-email=<email_address>
```

2. Add the following label to the image pull Secret:

```
$ oc label secret <Secret_name> controller.devfile.io/devworkspace_pullsecret=true
controller.devfile.io/watch-secret=true
```

6.3.2. Creating an image pull Secret from a .dockercfg file

If you already store the credentials for the private container registry in a **.dockercfg** file, you can use that file to create an image pull Secret.

Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See Getting started with the CLI.
- **base64** command line tools are installed in the operating system you are using.

Procedure

1. Encode the **.dockercfg** file to Base64:

```
$ cat .dockercfg | base64 | tr -d '\n'
```

2. Create a new OpenShift Secret in your user project:

```
apiVersion: v1
kind: Secret
metadata:
  name: <Secret_name>
  labels:
    controller.devfile.io/devworkspace_pullsecret: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  .dockercfg: <Base64_content_of_.dockercfg>
type: kubernetes.io/dockercfg
```

3. Apply the Secret:

```
$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF
```

6.3.3. Creating an image pull Secret from a config.json file

If you already store the credentials for the private container registry in a **$HOME/.docker/config.json** file, you can use that file to create an image pull Secret.

Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See Getting started with the CLI.
- **base64** command line tools are installed in the operating system you are using.

Procedure

1. Encode the **$HOME/.docker/config.json** file to Base64.

```
$ cat config.json | base64 | tr -d '\n'
```

2. Create a new OpenShift Secret in your user project:

```
apiVersion: v1
kind: Secret
metadata:
  name: <Secret_name>
  labels:
    controller.devfile.io/devworkspace_pullsecret: 'true'
    controller.devfile.io/watch-secret: 'true'
data:
  .dockerconfigjson: <Base64_content_of_config.json>
type: kubernetes.io/dockerconfigjson
```

3. Apply the Secret:

```
$ oc apply -f - <<EOF
<Secret_prepared_in_the_previous_step>
EOF
```

6.4. MOUNTING SECRETS

To mount confidential data into your workspaces, use Kubernetes Secrets.

Using Kubernetes Secrets, you can mount usernames, passwords, SSH key pairs, authentication tokens (for example, for AWS), and sensitive configurations.

Mount Kubernetes Secrets to the **Dev Workspace** containers in the OpenShift cluster of your organization's OpenShift Dev Spaces instance.

Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See Getting started with the CLI.
- In your user project, you created a new Secret or determined an existing Secret to mount to all **Dev Workspace** containers.

Procedure

1. Add the labels, which are required for mounting the Secret, to the Secret.

```
$ oc label secret <Secret_name> \
      controller.devfile.io/mount-to-devworkspace=true \
      controller.devfile.io/watch-secret=true
```

2. Optional: Use the annotations to configure how the Secret is mounted.

Table 6.1. Optional annotations

Annotation	Description
controller.devfile.io/mount-path:	Specifies the mount path. Defaults to **/etc/secret/*<Secret_name>***.
controller.devfile.io/mount-as:	Specifies how the resource should be mounted: **file**, **subpath**, or **env**. Defaults to **file**. **mount-as: file** mounts the keys and values as files within the mount path. **mount-as: subpath** mounts the keys and values within the mount path using subpath volume mounts. **mount-as: env** mounts the keys and values as environment variables in all **Dev Workspace** containers.

Example 6.2. Mounting a Secret as a file

```
apiVersion: v1
kind: Secret
metadata:
  name: mvn-settings-secret
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-secret: 'true'
  annotations:
    controller.devfile.io/mount-path: '/home/user/.m2'
data:
  settings.xml: <Base64_encoded_content>
```

When you start a workspace, the **/home/user/.m2/settings.xml** file will be available in the **Dev Workspace** containers.

With Maven, you can set a custom path for the **settings.xml** file. For example:

```
$ mvn --settings /home/user/.m2/settings.xml clean install
```

6.5. MOUNTING CONFIGMAPS

To mount non-confidential configuration data into your workspaces, use Kubernetes ConfigMaps.

Using Kubernetes ConfigMaps, you can mount non-sensitive data such as configuration values for an application.

Mount Kubernetes ConfigMaps to the **Dev Workspace** containers in the OpenShift cluster of your organization's OpenShift Dev Spaces instance.

Prerequisites

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See Getting started with the CLI.
- In your user project, you created a new ConfigMap or determined an existing ConfigMap to mount to all **Dev Workspace** containers.

Procedure

1. Add the labels, which are required for mounting the ConfigMap, to the ConfigMap.

```
$ oc label configmap <ConfigMap_name> \
      controller.devfile.io/mount-to-devworkspace=true \
      controller.devfile.io/watch-configmap=true
```

2. Optional: Use the annotations to configure how the ConfigMap is mounted.

Table 6.2. Optional annotations

Annotation	Description
controller.devfile.io/mount-path:	Specifies the mount path. Defaults to **/etc/config/*<ConfigMap_name>***.
controller.devfile.io/mount-as:	Specifies how the resource should be mounted: **file**, **subpath**, or **env**. Defaults to **file**. **mount-as:file** mounts the keys and values as files within the mount path. **mount-as:subpath** mounts the keys and values within the mount path using subpath volume mounts. **mount-as:env** mounts the keys and values as environment variables in all **Dev Workspace** containers.

Example 6.3. Mounting a ConfigMap as environment variables

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: my-settings
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
    controller.devfile.io/watch-configmap: 'true'
  annotations:
    controller.devfile.io/mount-as: env
```

```
data:
  <env_var_1>: <value_1>
  <env_var_2>: <value_2>
```

When you start a workspace, the ***<env_var_1>*** and ***<env_var_2>*** environment variables will be available in the **Dev Workspace** containers.

CHAPTER 7. REQUESTING PERSISTENT STORAGE FOR WORKSPACES

OpenShift Dev Spaces workspaces and workspace data are ephemeral and are lost when the workspace stops.

To preserve the workspace state in persistent storage while the workspace is stopped, request a Kubernetes PersistentVolume (PV) for the **Dev Workspace** containers in the OpenShift cluster of your organization's OpenShift Dev Spaces instance.

You can request a PV by using the devfile or a Kubernetes PersistentVolumeClaim (PVC).

An example of a PV is the /**projects**/ directory of a workspace, which is mounted by default for non-ephemeral workspaces.

Persistent Volumes come at a cost: attaching a persistent volume slows workspace startup.

WARNING

Starting another, concurrently running workspace with a **ReadWriteOnce** PV may fail.

Additional resources

- Red Hat OpenShift Documentation: Understanding persistent storage
- Kubernetes Documentation: Persistent Volumes

7.1. REQUESTING PERSISTENT STORAGE IN A DEVFILE

When a workspace requires its own persistent storage, request a PersistentVolume (PV) in the devfile, and OpenShift Dev Spaces will automatically manage the necessary PersistentVolumeClaims.

Prerequisites

- You have not started the workspace.

Procedure

1. Add a **volume** component in the devfile:

```
...
components:
  ...
  - name: <chosen_volume_name>
    volume:
      size: <requested_volume_size>G
  ...
```

2. Add a **volumeMount** for the relevant **container** in the devfile:

```
...
components:
  - name: ...
    container:
      ...
      volumeMounts:
        - name: <chosen_volume_name_from_previous_step>
          path: <path_where_to_mount_the_PV>
      ...
```

Example 7.1. A devfile that provisions a PV for a workspace to a container

When a workspace is started with the following devfile, the **cache** PV is provisioned to the **golang** container in the **./cache** container path:

```
schemaVersion: 2.1.0
metadata:
  name: mydevfile
components:
  - name: golang
    container:
      image: golang
      memoryLimit: 512Mi
      mountSources: true
      command: ['sleep', 'infinity']
      volumeMounts:
        - name: cache
          path: /.cache
  - name: cache
    volume:
      size: 2Gi
```

7.2. REQUESTING PERSISTENT STORAGE IN A PVC

You may opt to apply a PersistentVolumeClaim (PVC) to request a PersistentVolume (PV) for your workspaces in the following cases:

- Not all developers of the project need the PV.
- The PV lifecycle goes beyond the lifecycle of a single workspace.
- The data included in the PV are shared across workspaces.

TIP

You can apply a PVC to the **Dev Workspace** containers even if the workspace is ephemeral and its devfile contains the **controller.devfile.io/storage-type: ephemeral** attribute.

Prerequisites

- You have not started the workspace.

- An active **oc** session with administrative permissions to the destination OpenShift cluster. See Getting started with the CLI.
- A PVC is created in your user project to mount to all **Dev Workspace** containers.

Procedure

1. Add the **controller.devfile.io/mount-to-devworkspace: true** label to the PVC.

```
$ oc label persistentvolumeclaim <PVC_name> \ controller.devfile.io/mount-to-devworkspace=true
```

2. Optional: Use the annotations to configure how the PVC is mounted:

Table 7.1. Optional annotations

Annotation	Description
controller.devfile.io/mount-path:	The mount path for the PVC. Defaults to **/tmp/*<PVC_name>***.
controller.devfile.io/read-only:	Set to **'true'** or **'false'** to specify whether the PVC is to be mounted as read-only. Defaults to **'false'**, resulting in the PVC mounted as read-write.

Example 7.2. Mounting a read-only PVC

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: <pvc_name>
  labels:
    controller.devfile.io/mount-to-devworkspace: 'true'
  annotations:
    controller.devfile.io/mount-path: </example/directory> (1)
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 3Gi (2)
  volumeName: <pv_name>
  storageClassName: manual
  volumeMode: Filesystem
```

1. The mounted PV is available at ***</example/directory>*** in the workspace.
2. Example size value of the requested storage.

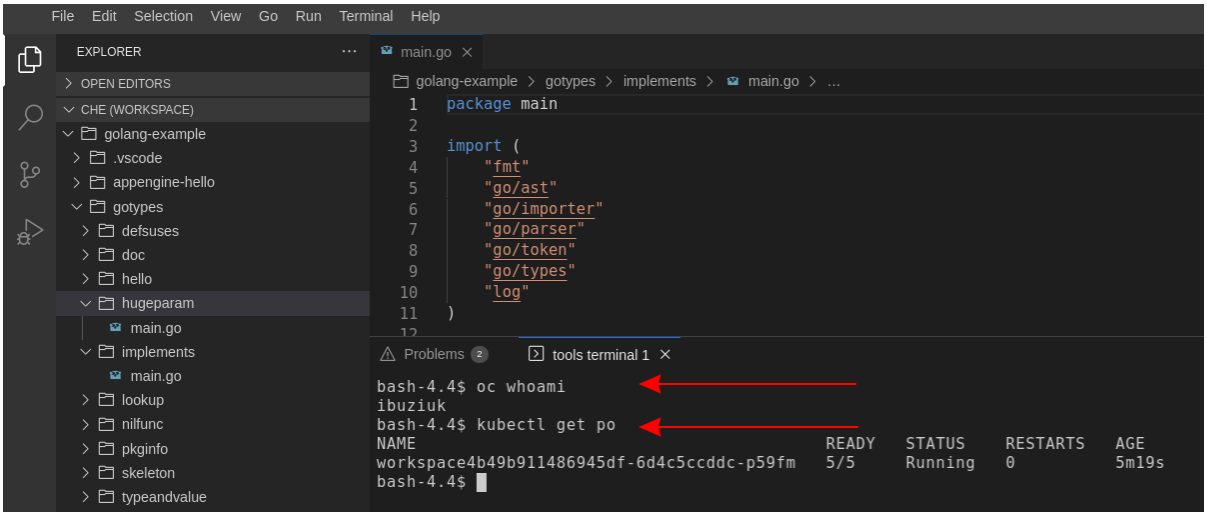
CHAPTER 8. INTEGRATING WITH OPENSHIFT

8.1. AUTOMATIC OPENSHIFT TOKEN INJECTION

This section describes how to use the OpenShift user token that is automatically injected into workspace containers which allows running OpenShift Dev Spaces CLI commands against OpenShift cluster.

Procedure

1. Open the OpenShift Dev Spaces dashboard and start a workspace.
2. Once the workspace is started, open a terminal in the container that contains the OpenShift Dev Spaces CLI.
3. Execute OpenShift Dev Spaces CLI commands which allow you to run commands against OpenShift cluster. CLI can be used for deploying applications, inspecting and managing cluster resources, and viewing logs. OpenShift user token will be used during the execution of the commands.



> **WARNING**
>
> The automatic token injection currently works only on the OpenShift infrastructure.

8.2. NAVIGATING DEV SPACES FROM OPENSHIFT DEVELOPER PERSPECTIVE

The OpenShift Container Platform web console provides two perspectives; the **Administrator** perspective and the **Developer** perspective.

The Developer perspective provides workflows specific to developer use cases, such as the ability to:

- Create and deploy applications on the OpenShift Container Platform by importing existing codebases, images, and Dockerfiles.
- Visually interact with applications, components, and services associated with them within a project and monitor their deployment and build status.
- Group components within an application and connect the components within and across applications.
- Integrate serverless capabilities (Technology Preview).
- Create workspaces to edit your application code using OpenShift Dev Spaces.

8.2.1. OpenShift Developer Perspective integration with OpenShift Dev Spaces

This section provides information about OpenShift Developer Perspective support for OpenShift Dev Spaces.

When the OpenShift Dev Spaces Operator is deployed into OpenShift Container Platform 4.2 and later, it creates a **ConsoleLink** Custom Resource (CR). This adds an interactive link to the **Red Hat Applications** menu for accessing the OpenShift Dev Spaces installation using the OpenShift Developer Perspective console.

To access the **Red Hat Applications** menu, click the three-by-three matrix icon on the main screen of the OpenShift web console. The OpenShift Dev Spaces **Console Link**, displayed in the drop-down menu, creates a new workspace or redirects the user to an existing one.

NOTE

OpenShift Container Platform console links are not created when OpenShift Dev Spaces is used with HTTP resources

When installing OpenShift Dev Spaces with the **From Git** option, the OpenShift Developer Perspective console link is only created if OpenShift Dev Spaces is deployed with HTTPS. The console link will not be created if an HTTP resource is used.

8.2.2. Editing the code of applications running in OpenShift Container Platform using OpenShift Dev Spaces

This section describes how to start editing the source code of applications running on OpenShift using OpenShift Dev Spaces.

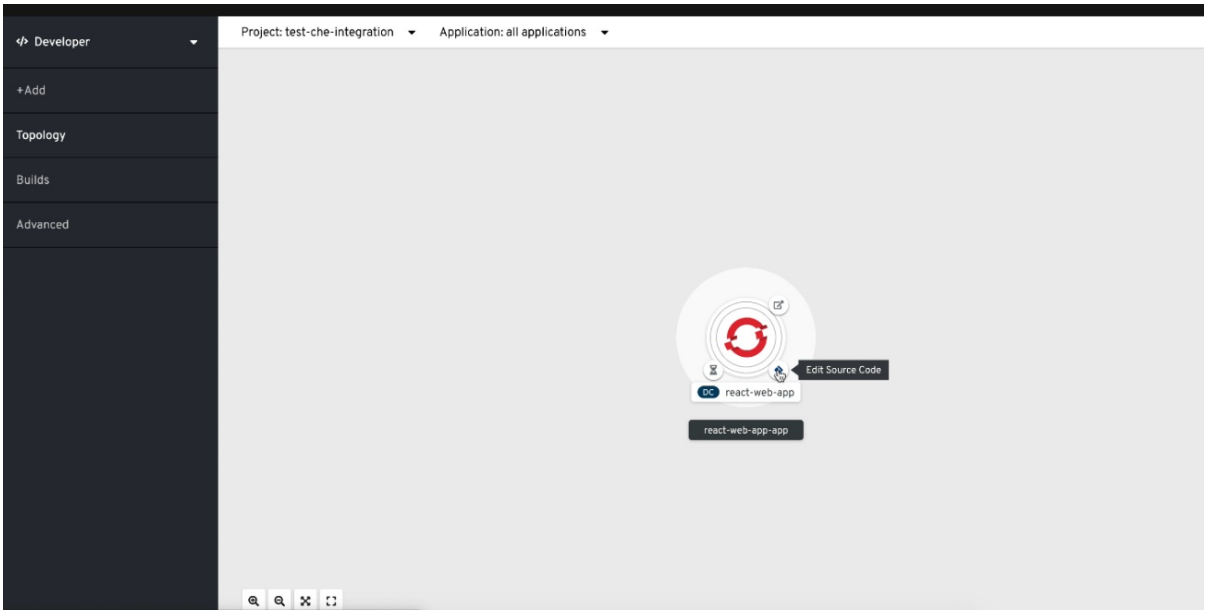
Prerequisites

- OpenShift Dev Spaces is deployed on the same OpenShift 4 cluster.

Procedure

1. Open the **Topology** view to list all projects.
2. In the **Select an Application** search field, type **workspace** to list all workspaces.
3. Click the workspace to edit.

The deployments are displayed as graphical circles surrounded by circular buttons. One of these buttons is **Edit Source Code**.



4. To edit the code of an application using OpenShift Dev Spaces, click the **Edit Source Code** button. This redirects to a workspace with the cloned source code of the application component.

8.2.3. Accessing OpenShift Dev Spaces from Red Hat Applications menu

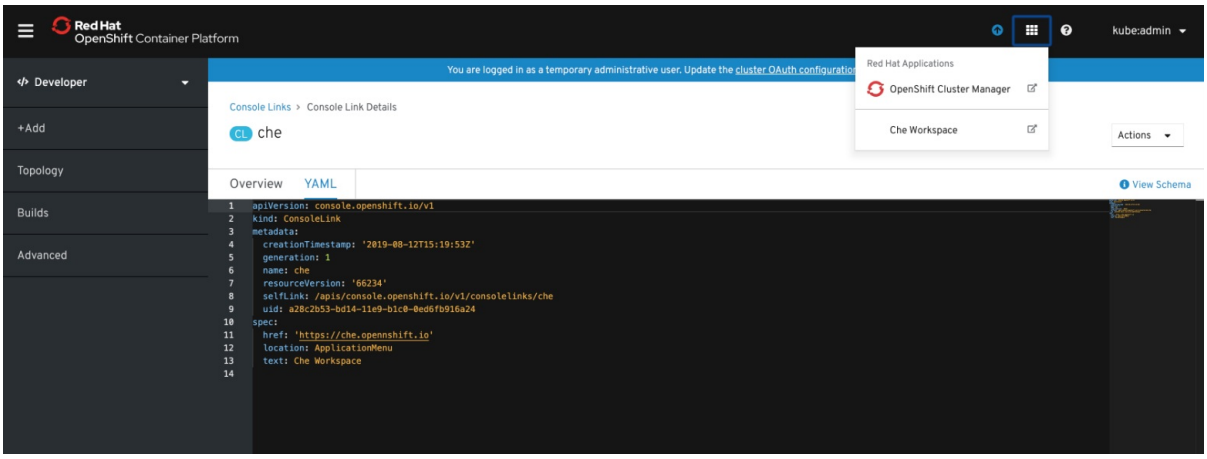
This section describes how to access OpenShift Dev Spaces workspaces from the **Red Hat Applications** menu on the OpenShift Container Platform.

Prerequisites

- The OpenShift Dev Spaces Operator is available in OpenShift 4.

Procedure

1. Open the **Red Hat Applications** menu by using the three-by-three matrix icon in the upper right corner of the main screen.
   The drop-down menu displays the available applications.



2. Click the **OpenShift Dev Spaces** link to open the Dev Spaces Dashboard.

8.3. NAVIGATING OPENSHIFT WEB CONSOLE FROM DEV SPACES

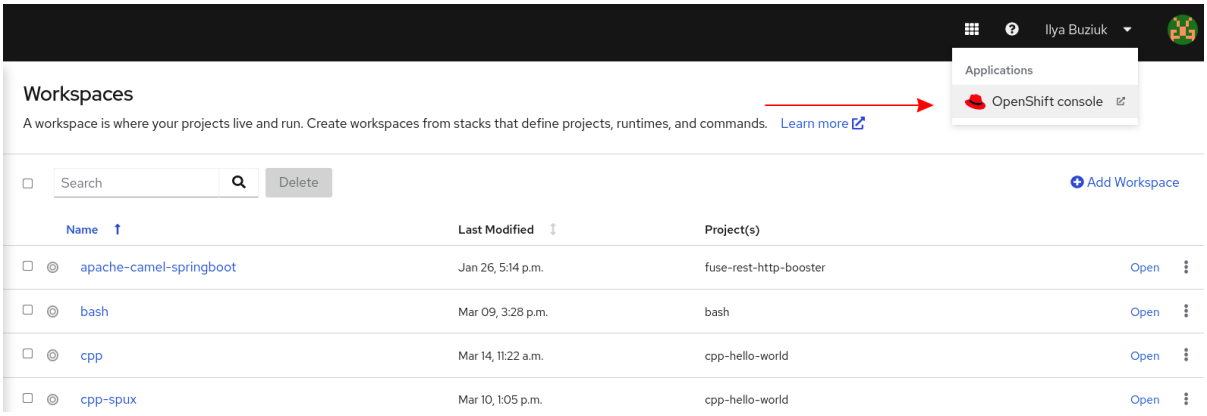
This section describes how to access OpenShift web console from OpenShift Dev Spaces.

Prerequisites

- The OpenShift Dev Spaces Operator is available in OpenShift 4.

Procedure

1. Open the OpenShift Dev Spaces dashboard and click the three-by-three matrix icon in the upper right corner of the main screen.
   The drop-down menu displays the available applications.



2. Click the **OpenShift console** link to open the OpenShift web console.

CHAPTER 9. TROUBLESHOOTING DEV SPACES

This section provides troubleshooting procedures for the most frequent issues a user can come in conflict with.

Additional resources

- Section 9.1, “Viewing Dev Spaces workspaces logs”
- Section 9.2, “Troubleshooting workspace start failures”
- Section 9.3, “Troubleshooting slow workspaces”
- Section 9.4, “Troubleshooting network problems”

9.1. VIEWING DEV SPACES WORKSPACES LOGS

You can view OpenShift Dev Spaces logs to better understand and debug background processes should a problem occur.

An IDE extension misbehaves or needs debugging

The logs list the plugins that have been loaded by the editor.

The container runs out of memory

The logs contain an **OOMKilled** error message. Processes running in the container attempted to request more memory than is configured to be available to the container.

A process runs out of memory

The logs contain an error message such as **OutOfMemoryException**. A process inside the container ran out of memory without the container noticing.

Additional resources

- Section 9.1.1, “Workspace logs in CLI”
- Section 9.1.2, “Workspace logs in OpenShift console”
- Section 9.1.3, “Language servers and debug adapters logs in the editor”

9.1.1. Workspace logs in CLI

You can use the OpenShift CLI to observe the OpenShift Dev Spaces workspace logs.

Prerequisites

- The OpenShift Dev Spaces workspace *<workspace_name>* is running.
- Your OpenShift CLI session has access to the OpenShift project *<namespace_name>* containing this workspace.

Procedure

- Get the logs from the pod running the *<workspace_name>* workspace in the *<namespace_name>* project:

```
$ oc logs --follow --namespace='<workspace_namespace>' \
  --selector='controller.devfile.io/devworkspace_name=<workspace_name>'
```

9.1.2. Workspace logs in OpenShift console

You can use the OpenShift console to observe the OpenShift Dev Spaces workspace logs.

Procedure

1. In the OpenShift Dev Spaces dashboard, go to **Workspaces**.
2. Click on a workspace name to display the workspace overview page. This page displays the OpenShift project name *<project_name>*.
3. Click on the upper right **Applications** menu, and click the OpenShift console link.
4. Run the next steps in the OpenShift console, in the **Administrator** perspective.
5. Click **Workloads** > **Pods** to see a list of all the active workspaces.
6. In the **Project** drop-down menu, select the *<project_name>* project to narrow the search.
7. Click on the name of the running pod that runs the workspace. The **Details** tab contains the list of all containers with additional information.
8. Go to the **Logs** tab.

9.1.3. Language servers and debug adapters logs in the editor

In the Visual Studio Code editor running in your workspace, you can configure the installed language server and debug adapter extensions to view their logs.

Procedure

1. Configure the extension: click **File** > **Preferences** > **Settings**, expand the **Extensions** section, search for your extension, and set the **trace.server** or similar configuration to **verbose**, if such configuration exists. Refer to the extension documentation for further configuration.
2. View your language server logs by clicking **View → Output**, and selecting your language server in the drop-down list for the Output view.

Additional resources

- Open VSX registry

9.2. TROUBLESHOOTING WORKSPACE START FAILURES

Verbose mode allows users to reach an enlarged log output, investigating failures at a workspace start.

In addition to usual log entries, the Verbose mode also lists the container logs of each workspace.

9.2.1. Restarting a OpenShift Dev Spaces workspace in Verbose mode after start failure

This section describes how to restart a OpenShift Dev Spaces workspace in the Verbose mode after a failure during the workspace start. Dashboard proposes the restart of a workspace in the Verbose mode once the workspace fails at its start.

Prerequisites

- A running instance of OpenShift Dev Spaces.
- An existing workspace that fails to start.

Procedure

1. Using Dashboard, try to start a workspace.
2. When it fails to start, click on the displayed **Open in Verbose mode**link.
3. Check the **Logs** tab to find a reason for the workspace failure.

9.2.2. Starting a OpenShift Dev Spaces workspace in Verbose mode

This section describes how to start the Red Hat OpenShift Dev Spaces workspace in Verbose mode.

Prerequisites

- A running instance of Red Hat OpenShift Dev Spaces.
- An existing workspace defined on this instance of OpenShift Dev Spaces.

Procedure

1. Open the **Workspaces** tab.
2. On the left side of a row dedicated to the workspace, access the drop-down menu displayed as three horizontal dots and select the **Open in Verbose mode**option. Alternatively, this option is also available in the workspace details, under the **Actions** drop-down menu.
3. Check the **Logs** tab to find a reason for the workspace failure.

9.3. TROUBLESHOOTING SLOW WORKSPACES

Sometimes, workspaces can take a long time to start. Tuning can reduce this start time. Depending on the options, administrators or users can do the tuning.

This section includes several tuning options for starting workspaces faster or improving workspace runtime performance.

9.3.1. Improving workspace start time

Caching images with Image Puller

Role: Administrator

When starting a workspace, OpenShift pulls the images from the registry. A workspace can include many containers meaning that OpenShift pulls Pod's images (one per container). Depending on the size of the image and the bandwidth, it can take a long time.

Image Puller is a tool that can cache images on each of OpenShift nodes. As such, pre-pulling images can improve start times. See https://access.redhat.com/documentation/en-us/red_hat_openshift_dev_spaces/3.3/html-single/administration_guide/index#administration-guide:caching-images-for-faster-workspace-start.

Choosing better storage type

Role: Administrator and user
Every workspace has a shared volume attached. This volume stores the project files, so that when restarting a workspace, changes are still available. Depending on the storage, attach time can take up to a few minutes, and I/O can be slow.

Installing offline

Role: Administrator
Components of OpenShift Dev Spaces are OCI images. Set up Red Hat OpenShift Dev Spaces in offline mode to reduce any extra download at runtime because everything needs to be available from the beginning. See https://access.redhat.com/documentation/en-us/red_hat_openshift_dev_spaces/3.3/html-single/administration_guide/index#administration-guide:installing-che-in-a-restricted-environment.

Optimizing workspace plug-ins

Role: User
When selecting various plug-ins, each plug-in can bring its own sidecar container, which is an OCI image. OpenShift pulls the images of these sidecar containers.

Reduce the number of plug-ins, or disable them to see if start time is faster. See also https://access.redhat.com/documentation/en-us/red_hat_openshift_dev_spaces/3.3/html-single/administration_guide/index#administration-guide:caching-images-for-faster-workspace-start.

Reducing the number of public endpoints

Role: Administrator
For each endpoint, OpenShift is creating OpenShift Route objects. Depending on the underlying configuration, this creation can be slow.

To avoid this problem, reduce the exposure. For example, to automatically detect a new port listening inside containers and redirect traffic for the processes using a local IP address (**127.0.0.1**), the Che-Theia IDE plug-in has three optional routes.

By reducing the number of endpoints and checking endpoints of all plug-ins, workspace start can be faster.

CDN configuration

The IDE editor uses a CDN (Content Delivery Network) to serve content. Check that the content uses a CDN to the client (or a local route for offline setup).
To check that, open Developer Tools in the browser and check for **vendors** in the **Network** tab. **vendors.<random_id>.js** or **editor.main.*** should come from CDN URLs.

9.3.2. Improving workspace runtime performance

Providing enough CPU resources

Plug-ins consume CPU resources. For example, when a plug-in provides IntelliSense features, adding more CPU resources may lead to better performance.
Ensure the CPU settings in the devfile definition, **devfile.yaml**, are correct:

```
apiVersion: 1.0.0

components:
  -
    type: chePlugin
    id: id/of/plug-in
    cpuLimit: 1360Mi (1)
    cpuRequest: 100m (2)
```

(1) Specifies the CPU limit for the plug-in.

(2) Specifies the CPU request for the plug-in.

Providing enough memory

Plug-ins consume CPU and memory resources. For example, when a plug-in provides IntelliSense features, collecting data can consume all the memory allocated to the container.
Providing more memory to the plug-in can increase performance. Ensure about the correctness of memory settings:

- in the plug-in definition - **meta.yaml** file
- in the devfile definition - **devfile.yaml** file

```
apiVersion: v2

spec:
  containers:
    - image: "quay.io/my-image"
      name: "vscode-plugin"
      memoryLimit: "512Mi" (1)
  extensions:
    - https://link.to/vsix
```

(1) Specifies the memory limit for the plug-in.

In the devfile definition (**devfile.yaml**):

```
apiVersion: 1.0.0

components:
  -
    type: chePlugin
    id: id/of/plug-in
    memoryLimit: 1048M (1)
    memoryRequest: 256M
```

(1) Specifies the memory limit for this plug-in.

9.4. TROUBLESHOOTING NETWORK PROBLEMS

This section describes how to prevent or resolve issues related to network policies. OpenShift Dev Spaces requires the availability of the WebSocket Secure (WSS) connections. Secure WebSocket connections improve confidentiality and also reliability because they reduce the risk of interference by bad proxies.

Prerequisites

- The WebSocket Secure (WSS) connections on port 443 must be available on the network. Firewall and proxy may need additional configuration.
- Use a supported web browser:
  - Google Chrome
  - Mozilla Firefox

Procedure

1. Verify the browser supports the WebSocket protocol. See: Searching a websocket test.
2. Verify firewalls settings: WebSocket Secure (WSS) connections on port 443 must be available.
3. Verify proxy servers settings: The proxy transmits and intercepts WebSocket Secure (WSS) connections on port 443.