Red Hat Quay 3.11

About Quay IO

About Quay IO

Last Updated: 2024-06-04

Red Hat Quay 3.11 About Quay IO

About Quay IO

Legal Notice

Abstract

About Quay IO

Table of Contents

PREFACE 5

CHAPTER 1. QUAY.IO OVERVIEW 6

CHAPTER 2. QUAY.IO SUPPORT 7

CHAPTER 3. CLAIR SECURITY SCANNER 8
3.1. ABOUT CLAIR 8
3.1.1. Clair vulnerability databases 8
3.1.2. Clair supported dependencies 9
3.2. CLAIR SEVERITY MAPPING 9
3.2.1. Clair severity strings 10
Alpine mapping 10
AWS mapping 10
Debian mapping 10
Oracle mapping 11
RHEL mapping 11
SUSE mapping 11
Ubuntu mapping 12
OSV mapping 12

CHAPTER 4. QUAY.IO USER INTERFACE OVERVIEW 14
4.1. QUAY.IO LANDING PAGE 14
4.1.1. Creating a Quay.io account 15
4.1.1.1. Registering for a Red Hat Account 15
4.1.1.2. Creating a Quay.io user account 16
4.1.1.3. Quay.io Single Sign On support 16
Additional resources 17
4.1.2. Exploring Quay.io 17
4.1.3. Trying Quay.io (deprecated) 17
4.1.4. Information about Quay.io pricing 18

CHAPTER 5. USERS AND ORGANIZATIONS 20
5.1. TENANCY MODEL 20
5.2. LOGGING INTO QUAY 20
5.2.1. Logging into Quay.io 21
5.2.2. Logging into Quay through the Hybrid Cloud Console 21
5.3. CREATING A REPOSITORY 22
5.3.1. Creating an image repository by using the UI 22
5.3.2. Creating an image repository by using the CLI 23
5.4. MANAGING ACCESS TO REPOSITORIES 24
5.4.1. Allowing access to user repositories 24
5.4.1.1. Allowing user access to a user repository 24
5.4.1.2. Allowing robot access to a user repository 25
5.4.2. Organization repositories 27
5.4.2.1. Creating an Organization 28
5.4.2.1.1. Creating another Organization by using the API 28
5.4.2.2. Adding a team to an organization 29
5.4.2.3. Setting a Team role 29
5.4.2.4. Adding users to a Team 30
5.5. USER SETTINGS 31
5.5.1. Navigating to the User Settings page 31

5.5.2. Adjusting user settings 31
5.5.3. Billing information 32

CHAPTER 6. WORKING WITH TAGS 33
6.1. VIEWING AND MODIFYING TAGS 33
6.1.1. Adding a new image tag to an image 34
6.1.2. Moving an image tag 34
6.1.3. Deleting an image tag 34
6.1.3.1. Viewing tag history 35
6.1.3.2. Reverting tag changes 35
6.1.4. Fetching an image by tag or digest 35
6.2. TAG EXPIRATION 35
6.2.1. Setting tag expiration from a Dockerfile 36
6.2.2. Setting tag expiration from the repository 36
6.3. VIEWING CLAIR SECURITY SCANS 37

CHAPTER 7. VIEWING AND EXPORTING LOGS 38
7.1. VIEWING LOGS USING THE UI 38
7.2. EXPORTING REPOSITORY LOGS 39

CHAPTER 8. BUILDING CONTAINER IMAGES 41
8.1. BUILD CONTEXTS 41
8.2. TAG NAMING FOR BUILD TRIGGERS 42
8.3. SKIPPING A SOURCE CONTROL-TRIGGERED BUILD 42
8.4. VIEWING AND MANAGING BUILDS 43
8.5. CREATING A NEW BUILD 43
8.6. BUILD TRIGGERS 43
8.6.1. Creating a Build trigger 43
8.6.2. Manually triggering a Build 45
8.7. SETTING UP A CUSTOM GIT TRIGGER 45
8.7.1. Creating a trigger 45
8.7.2. Custom trigger creation setup 45
8.7.2.1. SSH public key access 46
8.7.2.2. Webhook 46

CHAPTER 9. REPOSITORY NOTIFICATIONS 48
9.1. CREATING NOTIFICATIONS 48
9.2. REPOSITORY EVENTS DESCRIPTION 49
9.2.1. Repository Push 49
9.2.2. Dockerfile Build Queued 49
9.2.3. Dockerfile Build started 50
9.2.4. Dockerfile Build successfully completed 51
9.2.5. Dockerfile Build failed 52
9.2.6. Dockerfile Build cancelled 53
9.2.7. Vulnerability detected 53
9.3. NOTIFICATION ACTIONS 54
9.3.1. Notifications added 54
9.3.2. E-mail notifications 54
9.3.3. Webhook POST notifications 54
9.3.4. Flowdock notifications 54
9.3.5. Hipchat notifications 54
9.3.6. Slack notifications 54

CHAPTER 10. OPEN CONTAINER INITIATIVE SUPPORT 55

10.1. HELM AND OCI PREREQUISITES 55
10.1.1. Installing Helm 55
10.1.2. Upgrading to Helm 3.8 56
10.2. USING HELM CHARTS 56
10.3. COSIGN OCI SUPPORT 57
10.4. INSTALLING AND USING COSIGN 58

PREFACE

This comprehensive guide provides users with the knowledge and tools needed to make the most of our robust and feature-rich container registry service, Quay.io.

CHAPTER 1. QUAY.IO OVERVIEW

Quay.io is a registry for storing, building, and distributing container images and other OCI artifacts. This robust and feature-rich container registry service has gained widespread popularity among developers, organizations, and enterprises, for establishing itself as one of the pioneering platforms in the containerization ecosystem. It offers both free and paid tiers to cater to various user needs.

At its core, Quay.io serves as a centralized repository for storing, managing, and distributing container images. One primary advantage of Quay.io is its flexibility and ease of use. It offers an intuitive web interface that allows users to quickly upload and manage their container images. Developers can create private repositories, ensuring sensitive or proprietary code remains secure within their organization. Additionally, users can set up access controls and manage team collaboration, enabling seamless sharing of container images among designated team members.

Quay.io addresses container security concerns through its integrated image scanner, Clair. The service automatically scans container images for known vulnerabilities and security issues, providing developers with valuable insights into potential risks and suggesting remediation steps.

Quay.io excels in automation, and supports integration with popular Continuous Integration/Continuous Deployment (CI/CD) tools and platforms, enabling seamless automation of the container build and deployment processes. As a result, developers can streamline their workflows, significantly reducing manual intervention and improving overall development efficiency.

Quay.io caters to the needs of both large and small-scale deployments. Its robust architecture and support for high availability ensures that organizations can rely on it for mission-critical applications. The platform can handle significant container image traffic and offers efficient replication and distribution mechanisms to deliver container images to various geographical locations.

Quay.io has established itself as an active hub for container enthusiasts. Developers can discover a vast collection of pre-built, public container images shared by other users, making it easier to find useful tools, applications, and services for their projects. This open sharing ecosystem fosters collaboration and accelerates software development within the container community.

As containerization continues to gain momentum in the software development landscape, Quay.io remains at the forefront, continually improving and expanding its services. The platform's commitment to security, ease of use, automation, and community engagement has solidified its position as a preferred container registry service for both individual developers and large organizations alike.

As technology evolves, it is crucial to verify the latest features and updates on the Quay.io platform through its official website or other reliable sources. Whether you are an individual developer, part of a team, or representing an enterprise, Quay.io can enhance your containerization experience and streamline your journey towards building and deploying modern applications with ease.

CHAPTER 2. QUAY.IO SUPPORT

Technical support is a crucial aspect of the Quay.io container registry service, providing assistance not only in managing container images but also ensuring the functionality and availability of the hosted platform.

To help users with functionality-related issues, Red Hat offers Quay.io customers access to several resources. The Red Hat Knowledgebase contains valuable content to maximize the potential of Red Hat's products and technologies. Users can find articles, product documentation, and videos that outline best practices for installing, configuring, and utilizing Red Hat products. It also serves as a hub for solutions to known issues, providing concise root cause descriptions and remedial steps.

Additionally, Quay.io customers can count on the technical support team to address questions, troubleshoot problems, and provide solutions for an optimized experience with the platform. Whether it involves understanding specific features, customizing configurations, or resolving container image build issues, the support team is dedicated to guiding users through each step with clarity and expertise.

For incidents related to service disruptions or performance issues not listed on the Quay.io status page, which includes availability and functionality concerns, paying customers can raise a technical support ticket using the Red Hat Customer Portal . A service incident is defined as an unplanned interruption of service or reduction in service quality, affecting multiple users of the platform.

With this comprehensive technical support system in place, Quay.io ensures that users can confidently manage their container images, optimize their platform experience, and overcome any challenges that might arise.

Additional resources

Current Red Hat Quay and Quay.io users can find more information about troubleshooting and support in the Red Hat Quay Troubleshooting guide .

CHAPTER 3. CLAIR SECURITY SCANNER

Clair v4 (Clair) is an open source application that leverages static code analyses for parsing image content and reporting vulnerabilities affecting the content. Clair is packaged with Quay.io, is automatically enabled, and is managed by the Red Hat Quay development team.

For Quay.io users, images are automatically indexed after they are pushed to your repository. Reports are then fetched from Clair, which matches images against its CVE's database to report security information. This process happens automatically on Quay.io, and manual recans are not required.

3.1. ABOUT CLAIR

Clair uses Common Vulnerability Scoring System (CVSS) data from the National Vulnerability Database (NVD) to enrich vulnerability data, which is a United States government repository of security-related information, including known vulnerabilities and security issues in various software components and systems. Using scores from the NVD provides Clair the following benefits:

- **Data synchronization**. Clair can periodically synchronize its vulnerability database with the NVD. This ensures that it has the latest vulnerability data.
- **Matching and enrichment**. Clair compares the metadata and identifiers of vulnerabilities it discovers in container images with the data from the NVD. This process involves matching the unique identifiers, such as Common Vulnerabilities and Exposures (CVE) IDs, to the entries in the NVD. When a match is found, Clair can enrich its vulnerability information with additional details from NVD, such as severity scores, descriptions, and references.
- **Severity Scores**. The NVD assigns severity scores to vulnerabilities, such as the Common Vulnerability Scoring System (CVSS) score, to indicate the potential impact and risk associated with each vulnerability. By incorporating NVD's severity scores, Clair can provide more context on the seriousness of the vulnerabilities it detects.

If Clair finds vulnerabilities from NVD, a detailed and standardized assessment of the severity and potential impact of vulnerabilities detected within container images is reported to users on the UI. CVSS enrichment data provides Clair the following benefits:

- **Vulnerability prioritization**. By utilizing CVSS scores, users can prioritize vulnerabilities based on their severity, helping them address the most critical issues first.
- **Assess Risk**. CVSS scores can help Clair users understand the potential risk a vulnerability poses to their containerized applications.
- **Communicate Severity**. CVSS scores provide Clair users a standardized way to communicate the severity of vulnerabilities across teams and organizations.
- **Inform Remediation Strategies**. CVSS enrichment data can guide Quay.io users in developing appropriate remediation strategies.
- **Compliance and Reporting**. Integrating CVSS data into reports generated by Clair can help organizations demonstrate their commitment to addressing security vulnerabilities and complying with industry standards and regulations.

3.1.1. Clair vulnerability databases

Clair uses the following vulnerability databases to report for issues in your images:

- Ubuntu Oval database

- Debian Security Tracker
- Red Hat Enterprise Linux (RHEL) Oval database
- SUSE Oval database
- Oracle Oval database
- Alpine SecDB database
- VMware Photon OS database
- Amazon Web Services (AWS) UpdateInfo
- Open Source Vulnerability (OSV) Database

3.1.2. Clair supported dependencies

Clair supports identifying and managing the following dependencies:

- Java
- Golang
- Python
- Ruby

This means that it can analyze and report on the third-party libraries and packages that a project in these languages relies on to work correctly.

When an image that contains packages from a language unsupported by Clair is pushed to your repository, a vulnerability scan cannot be performed on those packages. Users do not receive an analysis or security report for unsupported dependencies or packages. As a result, the following consequences should be considered:

- **Security risks**. Dependencies or packages that are not scanned for vulnerability might pose security risks to your organization.
- **Compliance issues**. If your organization has specific security or compliance requirements, unscanned, or partially scanned, container images might result in non-compliance with certain regulations.

> NOTE
>
> Scanned images are indexed, and a vulnerability report is created, but it might omit data from certain unsupported languages. For example, if your container image contains a Lua application, feedback from Clair is not provided because Clair does not detect it. It can detect other languages used in the container image, and shows detected CVEs for those languages. As a result, Clair images are *fully scanned* based on what it supported by Clair.

3.2. CLAIR SEVERITY MAPPING

Clair offers a comprehensive approach to vulnerability assessment and management. One of its essential features is the normalization of security databases' severity strings. This process streamlines the assessment of vulnerability severities by mapping them to a predefined set of values. Through this mapping, clients can efficiently react to vulnerability severities without the need to decipher the intricacies of each security database’s unique severity strings. These mapped severity strings align with those found within the respective security databases, ensuring consistency and accuracy in vulnerability assessment.

3.2.1. Clair severity strings

Clair alerts users with the following severity strings:

- Unknown
- Negligible
- Low
- Medium
- High
- Critical

These severity strings are similar to the strings found within the relevant security database.

Alpine mapping
Alpine SecDB database does not provide severity information. All vulnerability severities will be Unknown.

Alpine Severity	Clair Severity
*	Unknown

AWS mapping
AWS UpdateInfo database provides severity information.

AWS Severity	Clair Severity
low	Low
medium	Medium
important	High
critical	Critical

Debian mapping
Debian Oval database provides severity information.

Debian Severity	Clair Severity
*	Unknown
Unimportant	Low
Low	Medium
Medium	High
High	Critical

Oracle mapping

Oracle Oval database provides severity information.

Oracle Severity	Clair Severity
N/A	Unknown
LOW	Low
MODERATE	Medium
IMPORTANT	High
CRITICAL	Critical

RHEL mapping

RHEL Oval database provides severity information.

RHEL Severity	Clair Severity
None	Unknown
Low	Low
Moderate	Medium
Important	High
Critical	Critical

SUSE mapping

SUSE Oval database provides severity information.

Severity	Clair Severity
None	Unknown
Low	Low
Moderate	Medium
Important	High
Critical	Critical

Ubuntu mapping
Ubuntu Oval database provides severity information.

Severity	Clair Severity
Untriaged	Unknown
Negligible	Negligible
Low	Low
Medium	Medium
High	High
Critical	Critical

OSV mapping

Table 3.1. CVSSv3

Base Score	Clair Severity
0.0	Negligible
0.1-3.9	Low
4.0-6.9	Medium
7.0-8.9	High
9.0-10.0	Critical

Table 3.2. CVSSv2

Base Score	Clair Severity
0.0-3.9	Low
4.0-6.9	Medium
7.0-10	High

CHAPTER 4. QUAY.IO USER INTERFACE OVERVIEW

The user interface (UI) of Quay.io is a fundamental component that serves as the user's gateway to managing and interacting with container images within the platform's ecosystem. Quay.io's UI is designed to provide an intuitive and user-friendly interface, making it easy for users of all skill levels to navigate and harness Quay.io's features and functionalities.

This documentation section aims to introduce users to the key elements and functionalities of Quay.io's UI. It will cover essential aspects such as the UI's layout, navigation, and key features, providing a solid foundation for users to explore and make the most of Quay.io's container registry service.

Throughout this documentation, step-by-step instructions, visual aids, and practical examples are provided on the following topics:

- Exploring applications and repositories
- Using the Quay.io tutorial
- Pricing and Quay.io plans
- Signing in and using Quay.io features

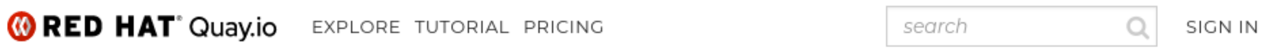
Collectively, this document ensures that users can quickly grasp the UI's nuances and successfully navigate their containerization journey with Quay.io.

4.1. QUAY.IO LANDING PAGE

The Quay.io landing page serves as the central hub for users to access the container registry services offered. This page provides essential information and links to guide users in securely storing, building, and deploying container images effortlessly.

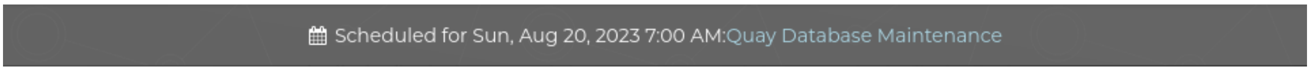
The landing page of Quay.io includes links to the following resources:

- Explore. On this page, you can search the Quay.io database for various applications and repositories.
- Tutorial. On this page, you can take a step-by-step walkthrough that shows you how to use Quay.io.
- Pricing. On this page, you can learn about the various pricing tiers offered for Quay.io. There are also various FAQs addressed on this page.
- Sign in. By clicking this link, you are re-directed to sign into your Quay.io repository.



.

The landing page also includes information about scheduled maintenance. During scheduled maintenance, Quay.io is operational in read-only mode, and pulls function as normal. Pushes and builds are non-operational during scheduled maintenance. You can subscribe to updates regarding Quay.io maintenance by navigating to Quay.io **Status** page and clicking **Subscribe To Updates**.



Scheduled for Sun, Aug 20, 2023 7:00 AM:Quay Database Maintenance

The landing page also includes links to the following resources:

- Documentation. This page provides documentation for using Quay.io.
- Terms. This page provides legal information about Red Hat Online Services.
- Privacy. This page provides information about Red Hat's Privacy Statement.
- Security. this page provides information about Quay.io security, including SSL/TLS, encryption, passwords, access controls, firewalls, and data resilience.
- About. This page includes information about packages and projects used and a brief history of the product.
- Contact. This page includes information about support and contacting the Red Hat Support Team.
- All Systems Operational. This page includes information the status of Quay.io and a brief history of maintenance.
- Cookies. By clicking this link, a popup box appears that allows you to set your cookie preferences.

.

You can also find information about Trying Red Hat Quay on premise or Trying Red Hat Quay on the cloud, which redirects you to the **Pricing** page. Each option offers a free trial.

4.1.1. Creating a Quay.io account

New users of Quay.io are required to both Register for a Red Hat account and create a Quay.io username. These accounts are correlated, with two distinct differences:

- The Quay.io account can be used to push and pull container images or Open Container Initiative images to Quay.io to store images.
- The Red Hat account provides users access to the Quay.io user interface. For paying customers, this account can also be used to access images from the Red Hat Ecosystem Catalog, which can be pushed to their Quay.io repository.

Users must first register for a Red Hat account, and then create a Quay.io account. Users need both accounts to properly use all features of Quay.io.

4.1.1.1. Registering for a Red Hat Account

Use the following procedure to register for a Red Hat account for Quay.io.

Procedure

1. Navigate to the Red Hat Customer Portal .
2. In navigation pane, click **Log In**.
3. When navigated to the log in page, click **Register for a Red Hat Account**

4. Enter a Red Hat login ID.
5. Enter a password.
6. Enter the following personal information:
   - **First name**
   - **Last name**
   - **Email address**
   - **Phone number**
7. Enter the following contact information that is relative to your country or region. For example:
   - **Country/region**
   - **Address**
   - **Postal code**
   - **City**
   - **County**
8. Select and agree to Red Hat's terms and conditions.
9. Click **Create my account**
10. Navigate to Quay.io and log in.

4.1.1.2. Creating a Quay.io user account

Use the following procedure to create a Quay.io user account.

Prerequisites

- You have created a Red Hat account.

Procedure

1. If required, resolve the captcha by clicking **I am not a robot** and confirming. You are redirected to a **Confirm Username** page.
2. On the **Confirm Username** page, enter a username. By default, a username is generated. If the same username already exists, a number is added at the end to make it unique. This username is be used as a namespace in the Quay Container Registry.
3. After deciding on a username, click **Confirm Username**. You are redirected to the Quay.io **Repositories** page, which serves as a dedicated hub where users can access and manage their repositories with ease. From this page, users can efficiently organize, navigate, and interact with their container images and related resources.

4.1.1.3. Quay.io Single Sign On support

Red Hat Single Sign On (SSO) can be used with Quay.io. Use the following procedure to set up Red Hat SSO with Quay.io. For most users, these accounts are already linked. However, for some legacy Quay.io users, this procedure might be required.

Prerequisites

- You have created a Quay.io account.

Procedure

1. Navigate to to the Quay.io **Recovery** page.
2. Enter your username and password, then click **Sign in to Quay Container Registry**
3. In the navigation pane, click your username → **Account Settings**.
4. In the navigation pane, click **External Logins and Applications**.
5. Click **Attach to Red Hat**
6. If you are already signed into Red Hat SSO, your account is automatically linked. Otherwise, you are prompted to sign into Red Hat SSO by entering your Red Hat login or email, and the password. Alternatively, you might need to create a new account first.
   After signing into Red Hat SSO, you can choose to authenticate against Quay.io using your Red Hat account from the login page.

Additional resources

- For more information, see Quay.io Now Supports Red Hat Single Sign On .

4.1.2. Exploring Quay.io

The Quay.io **Explore** page is a valuable hub that allows users to delve into a vast collection of container images, applications, and repositories shared by the Quay.io community. With its intuitive and user-friendly design, the **Explore** page offers a powerful search function, enabling users to effortlessly discover containerized applications and resources.

4.1.3. Trying Quay.io (deprecated)

NOTE

The Red Hat Quay tutorial is currently deprecated and will be removed when the v2 UI goes generally available (GA).

The Quay.io **Tutorial** page offers users and introduction to the Quay.io container registry service. By clicking **Continue Tutorial** users learn how to perform the following features on Quay.io:

- Logging into Quay Container Registry from the Docker CLI
- Starting a container
- Creating images from a container
- Pushing a repository to Quay Container Registry

- Viewing a repository
- Setting up build triggers
- Changing a repository's permissions

4.1.4. Information about Quay.io pricing

In addition to a free tier, Quay.io also offers several paid plans that have enhanced benefits.

The Quay.io **Pricing** page offers information about Quay.io plans and the associated prices of each plan. The cost of each tier can be found on the **Pricing** page. All Quay.io plans include the following benefits:

- Continuous integration
- Public repositories
- Robot accounts
- Teams
- SSL/TLS encryption
- Logging and auditing
- Invoice history

Quay.io subscriptions are handled by the Stripe payment processing platform. A valid credit card is required to sign up for Quay.io.

To sign up for Quay.io, use the following procedure.

Procedure

1. Navigate to the Quay.io **Pricing** page.
2. Decide on a plan, for example, **Small**, and click **Buy Now**. You are redirected to the **Create New Organization** page. Enter the following information:
   - **Organization Name**
   - **Organization Email**
   - Optional. You can select a different plan if you want a plan larger, than, for example, **Small**.
3. Resolve that captcha, and select **Create Organization**.
4. You are redirected to Stripe. Enter the following information:
   - **Card information**, including **MM/YY** and the **CVC**
   - **Name on card**
   - **Country or region**
   - **ZIP** (if applicable)

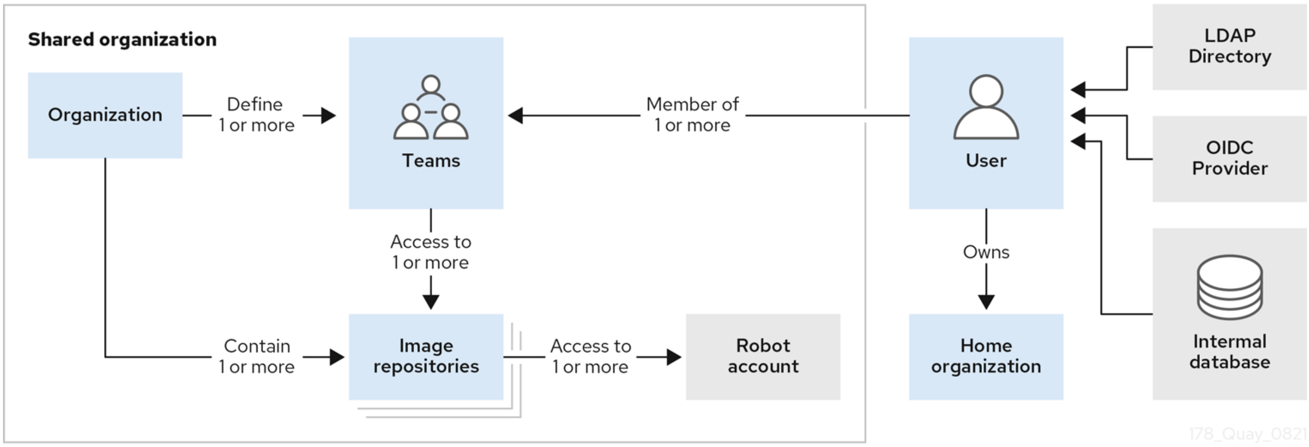
- Check the box if you want your information to be saved.
- **Phone Number**

5. Click **Subscribe** after all boxes have been filled.

CHAPTER 5. USERS AND ORGANIZATIONS

Before creating repositories to contain your container images in Quay.io, you should consider how these repositories will be structured. With Quay.io, each repository requires a connection with either an *Organization* or a *User*. This affiliation defines ownership and access control for the repositories.

5.1. TENANCY MODEL



- **Organizations** provide a way of sharing repositories under a common namespace that does not belong to a single user. Instead, these repositories belong to several users in a shared setting, such as a company.

- **Teams** provide a way for an Organization to delegate permissions. Permissions can be set at the global level (for example, across all repositories), or on specific repositories. They can also be set for specific sets, or groups, of users.

- **Users** can log in to a registry through the web UI or a by using a client, such as Podman or Docker, using their respective login commands, for example, **$ podman login**. Each user automatically gets a user namespace, for example, **<quay-server.example.com>/<user>/<username>**, or **quay.io/<username>**.

- **Robot accounts** provide automated access to repositories for non-human users like pipeline tools. Robot accounts are similar to OpenShift Container Platform **Service Accounts**. Permissions can be granted to a robot account in a repository by adding that account like you would another user or team.

5.2. LOGGING INTO QUAY

A user account for Quay.io represents an individual with authenticated access to the platform's features and functionalities. Through this account, you gain the capability to create and manage repositories, upload and retrieve container images, and control access permissions for these resources. This account is pivotal for organizing and overseeing your container image management within Quay.io.

NOTE

Not all features on Quay.io require that users be logged in. For example, you can anonymously pull an image from Quay.io without being logged in, so long as the image you are pulling comes from a public repository.

Users have two options for logging into Quay.io:

- By logging in through Quay.io.
  This option provides users with the legacy UI, as well as an option to user the beta UI environment, which adheres to PatternFly UI principles.

- By logging in through the Red Hat Hybrid Cloud Console .
  This option uses Red Hat SSO for authentication, and is a public managed service offering by Red Hat. This option *always* requires users to login. Like other managed services, Quay on the Red Hat Hybrid Cloud Console enhances the user experience by adhering to PatternFly UI principles.

Differences between using Quay.io directly and Quay on the Red Hat Hybrid Cloud Console are negligible, including for users on the free tier. Whether you are using Quay.io directly, on the Hybrid Cloud Console, features that require login, such as pushing to a repository, use your Quay.io username specifications.

5.2.1. Logging into Quay.io

Use the following procedure to log into Quay.io.

Prerequisites

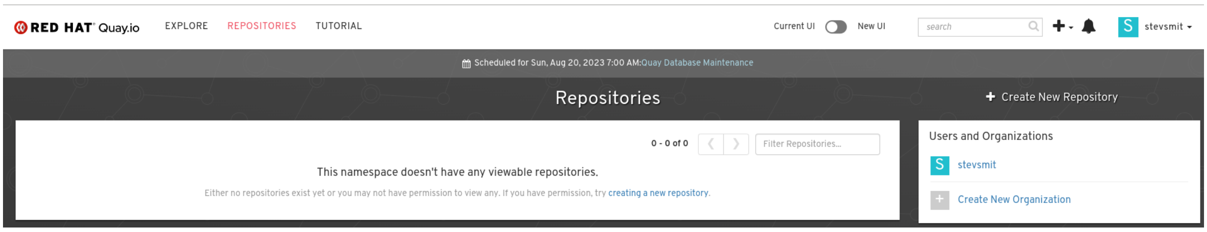
- You have created a Red Hat account and a Quay.io account. For more information, see "Creating a Quay.io account".

Procedure

1. Navigate to Quay.io.

2. In the navigation pane, select **Sign In** and log in using your Red Hat credentials.

3. If it is your first time logging in, you must confirm the automatically-generated username. Click **Confirm Username** to log in.
   You are redirected to the Quay.io repository landing page.



Scheduled for Sun, Aug 20, 2023 7:00 AM:Quay Database Maintenance

Repositories

+ Create New Repository

0 - 0 of 0

Filter Repositories...

This namespace doesn't have any viewable repositories.

Either no repositories exist yet or you may not have permission to view any. If you have permission, try creating a new repository.

Users and Organizations

S stevsmit

+ Create New Organization

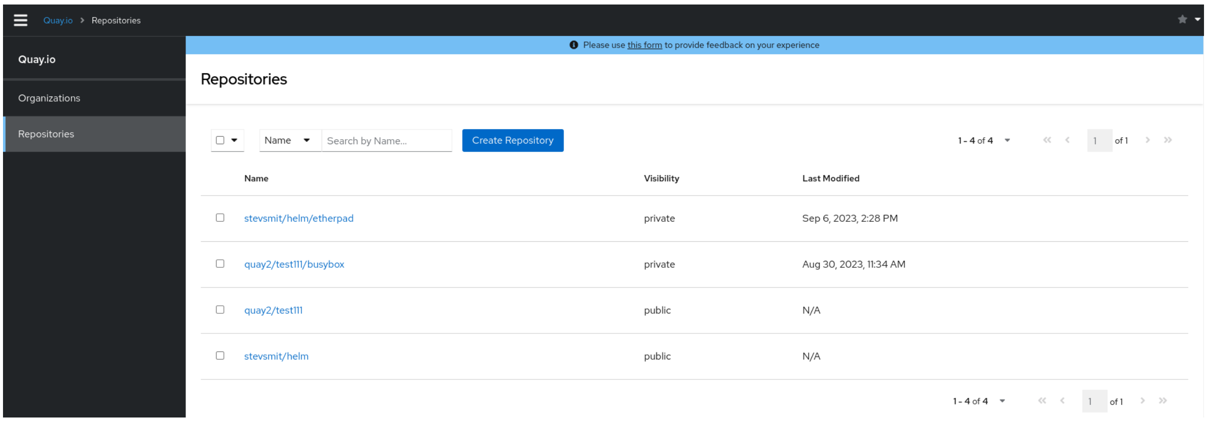
5.2.2. Logging into Quay through the Hybrid Cloud Console

Prerequisites

- You have created a Red Hat account and a Quay.io account. For more information, see "Creating a Quay.io account".

Procedure

1. Navigate to the Quay on the Red Hat Hybrid Cloud Console and log in using your Red Hat account. You are redirected to the Quay repository landing page:



Name	Visibility	Last Modified
stevsmit/helm/etherpad	private	Sep 6, 2023, 2:28 PM
quay2/test111/busybox	private	Aug 30, 2023, 11:34 AM
quay2/test111	public	N/A
stevsmit/helm	public	N/A

5.3. CREATING A REPOSITORY

A repository provides a central location for storing a related set of container images. These images can be used to build applications along with their dependencies in a standardized format.

Repositories are organized by namespaces. Each namespace can have multiple repositories. For example, you might have a namespace for your personal projects, one for your company, or one for a specific team within your organization.

With a paid plan, Quay.io provides users with access controls for their repositories. Users can make a repository public, meaning that anyone can pull, or download, the images from it, or users can make it private, restricting access to authorized users or teams.

NOTE

The free tier of Quay.io does not allow for private repositories. You must upgrade to a paid tier of Quay.io to create a private repository. For more information, see "Information about Quay.io pricing".

There are two ways to create a repository in Quay.io: by pushing an image with the relevant **docker** or **podman** command, or by using the Quay.io UI.

If you push an image through the command-line interface (CLI) without first creating a repository on the UI, the created repository is set to **Private**, regardless of the plan you have.

NOTE

It is recommended that you create a repository on the Quay.io UI before pushing an image. Quay.io checks the plan status and does not allow creation of a private repository if a plan is not active.

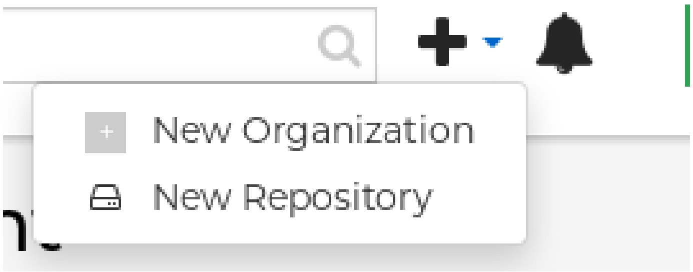
5.3.1. Creating an image repository by using the UI

Use the following procedure to create a repository using the Quay.io UI.

Procedure

1. Log in to your user account through the web UI.

2. On the Quay.io landing page, click **Create New Repository**. Alternatively, you can click the **+** icon → **New Repository**. For example:



3. On the **Create New Repository** page:

   a. Append a **Repository Name** to your username or to the Organization that you wish to use.

   > IMPORTANT
   >
   > Do not use the following words in your repository name: * **build** * **trigger** * **tag**
   >
   > When these words are used for repository names, users are unable access the repository, and are unable to permanently delete the repository. Attempting to delete these repositories returns the following error: **Failed to delete repository <repository_name>, HTTP404 - Not Found.**

   b. Optional. Click **Click to set repository description** to add a description of the repository.

   c. Click **Public** or **Private** depending on your needs.

   d. Optional. Select the desired repository initialization.

4. Click **Create Private Repository** to create a new, empty repository.

5.3.2. Creating an image repository by using the CLI

With the proper credentials, you can *push* an image to a repository using either Docker or Podman that does not yet exist in your Quay.io instance. Pushing an image refers to the process of uploading a container image from your local system or development environment to a container registry like Quay.io. After pushing an image to Quay.io, a repository is created.

If you push an image through the command-line interface (CLI) without first creating a repository on the UI, the created repository is set to **Private**, regardless of the plan you have.

> NOTE
>
> It is recommended that you create a repository on the Quay.io UI before pushing an image. Quay.io checks the plan status and does not allow creation of a private repository if a plan is not active.

Use the following procedure to create an image repository by pushing an image.

Prerequisites

- You have download and installed the **podman** CLI.

- You have logged into Quay.io.

- You have pulled an image, for example, busybox.

Procedure

1. Pull a sample page from an example registry. For example:

```
$ podman pull busybox
```

Example output

```
Trying to pull docker.io/library/busybox...
Getting image source signatures
Copying blob 4c892f00285e done
Copying config 22667f5368 done
Writing manifest to image destination
Storing signatures
22667f53682a2920948d19c7133ab1c9c3f745805c14125859d20cede07f11f9
```

2. Tag the image on your local system with the new repository and image name. For example:

```
$ podman tag docker.io/library/busybox quay.io/quayadmin/busybox:test
```

3. Push the image to the registry. Following this step, you can use your browser to see the tagged image in your repository.

```
$ podman push --tls-verify=false quay.io/quayadmin/busybox:test
```

Example output

```
Getting image source signatures
Copying blob 6b245f040973 done
Copying config 22667f5368 done
Writing manifest to image destination
Storing signatures
```

5.4. MANAGING ACCESS TO REPOSITORIES

As a Quay.io user, you can create your own repositories and make them accessible to other users that are part of your instance. Alternatively, you can create a specific Organization to allow access to repositories based on defined teams.

In both User and Organization repositories, you can allow access to those repositories by creating credentials associated with Robot Accounts. Robot Accounts make it easy for a variety of container clients, such as Docker or Podman, to access your repositories without requiring that the client have a Quay.io user account.

5.4.1. Allowing access to user repositories

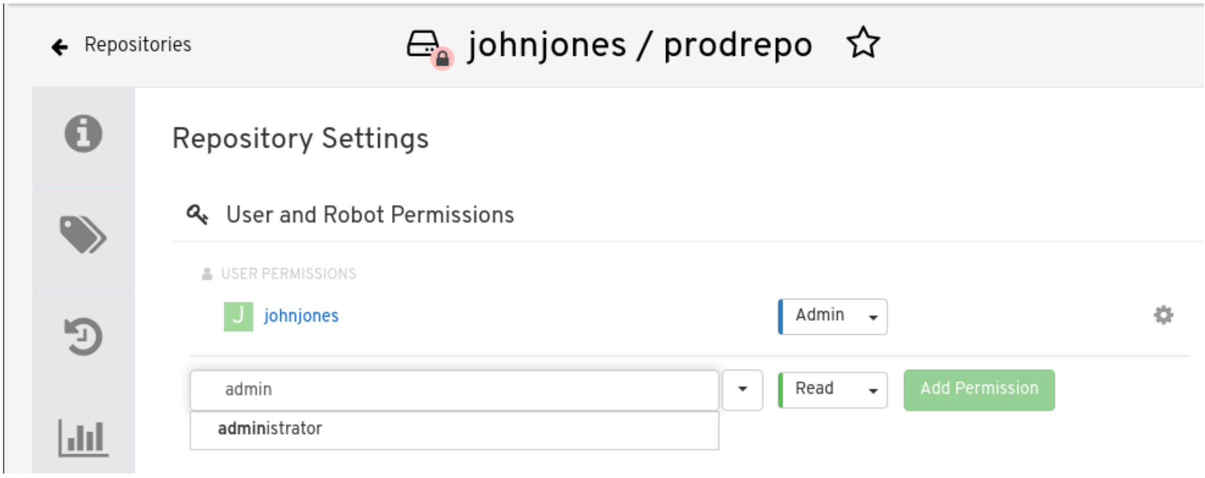
When you create a repository in a user namespace, you can add access to that repository to user accounts or through Robot Accounts.

5.4.1.1. Allowing user access to a user repository

Use the following procedure to allow access to a repository associated with a user account.

Procedure

1. Log into Quay.io with your user account.
2. Select a repository under your user namespace that will be shared across multiple users.
3. Select **Settings** in the navigation pane.
4. Type the name of the user to which you want to grant access to your repository. As you type, the name should appear. For example:



5. In the permissions box, select one of the following:
   - **Read**. Allows the user to view and pull from the repository.
   - **Write**. Allows the user to view the repository, pull images from the repository, or push images to the repository.
   - **Admin**. Provides the user with all administrative settings to the repository, as well as all **Read** and **Write** permissions.
6. Select the **Add Permission** button. The user now has the assigned permission.
7. Optional. You can remove or change user permissions to the repository by selecting the **Options** icon, and then selecting **Delete Permission**.

5.4.1.2. Allowing robot access to a user repository

Robot Accounts are used to set up automated access to the repositories in your Quay.io registry. They are similar to OpenShift Container Platform service accounts.

Setting up a Robot Account results in the following:

- Credentials are generated that are associated with the Robot Account.
- Repositories and images that the Robot Account can push and pull images from are identified.
- Generated credentials can be copied and pasted to use with different container clients, such as Docker, Podman, Kubernetes, Mesos, and so on, to access each defined repository.

Each Robot Account is limited to a single user namespace or Organization. For example, the Robot Account could provide access to all repositories for the user **jsmith**. However, it cannot provide access to repositories that are not in the user's list of repositories.

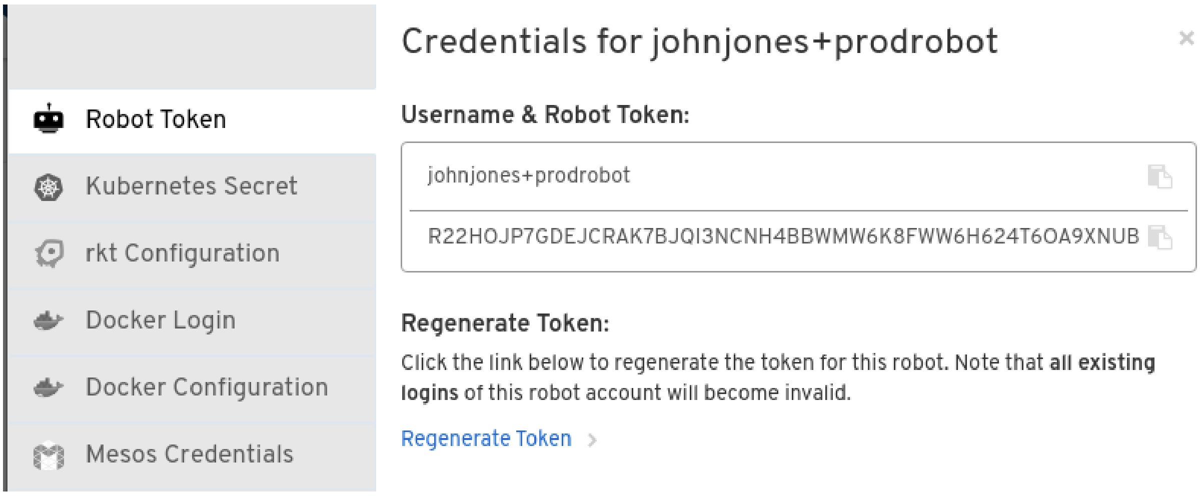
Use the following procedure to set up a Robot Account that can allow access to your repositories.

Procedure

1. On the **Repositories** landing page, click the name of a user.
2. Click **Robot Accounts** on the navigation pane.
3. Click **Create Robot Account**
4. Provide a name for your Robot Account.
5. Optional. Provide a description for your Robot Account.
6. Click **Create Robot Account**. The name of your Robot Account becomes a combination of your username plus the name of the robot, for example, **jsmith+robot**
7. Select the repositories that you want the Robot Account to be associated with.
8. Set the permissions of the Robot Account to one of the following:
   - **None**. The Robot Account has no permission to the repository.
   - **Read**. The Robot Account can view and pull from the repository.
   - **Write**. The Robot Account can read (pull) from and write (push) to the repository.
   - **Admin**. Full access to pull from, and push to, the repository, plus the ability to do administrative tasks associated with the repository.
9. Click the **Add permissions** button to apply the settings.
10. On the **Robot Accounts** page, select the Robot Account to see credential information for that robot.
11. Under the **Robot Account** option, copy the generated token for the robot by clicking **Copy to Clipboard**. To generate a new token, you can click **Regenerate Token**.

NOTE

Regenerating a token makes any previous tokens for this robot invalid.



Credentials for johnjones+prodrobot

Username & Robot Token:

johnjones+prodrobot

R22HOJP7GDEJCRAK7BJQI3NCNH4BBWMW6K8FWW6H624T6OA9XNUB

Regenerate Token:

Click the link below to regenerate the token for this robot. Note that **all existing logins** of this robot account will become invalid.

Regenerate Token

12. Obtain the resulting credentials in the following ways:

    - **Kubernetes Secret**: Select this to download credentials in the form of a Kubernetes pull secret yaml file.

    - **rkt Configuration**: Select this to download credentials for the rkt container runtime in the form of a **.json** file.

    - **Docker Login**: Select this to copy a full **docker login** command line that includes the credentials.

    - **Docker Configuration**: Select this to download a file to use as a Docker **config.json** file, to permanently store the credentials on your client system.

    - **Mesos Credentials**: Select this to download a tarball that provides the credentials that can be identified in the URI field of a Mesos configuration file.

5.4.2. Organization repositories

After you have created an Organization, you can associate a set of repositories directly to that Organization. An Organization's repository differs from a basic repository in that the Organization is intended to set up shared repositories through groups of users. In Quay.io, groups of users can be either *Teams*, or sets of users with the same permissions, or *individual users*.

Other useful information about Organizations includes the following:

- You cannot have an Organization embedded within another Organization. To subdivide an Organization, you use teams.

- Organizations cannot contain users directly. You must first add a team, and then add one or more users to each team.

NOTE

Individual users can be added to specific repositories inside of an organization. Consequently, those users are not members of any team on the **Repository Settings** page. The **Collaborators View** on the **Teams and Memberships** page shows users who have direct access to specific repositories within the organization without needing to be part of that organization specifically.

- Teams can be set up in Organizations as just members who use the repositories and associated images, or as administrators with special privileges for managing the Organization.

5.4.2.1. Creating an Organization

Use the following procedure to create an Organization.

Procedure

1. On the **Repositories** landing page, click **Create New Organization**.
2. Under **Organization Name**, enter a name that is at least 2 characters long, and less than 225 characters long.
3. Under **Organization Email**, enter an email that is different from your account's email.
4. Choose a plan for your Organization, selecting either the free plan, or one of the paid plans.
5. Click **Create Organization** to finalize creation.

5.4.2.1.1. Creating another Organization by using the API

You can create another Organization by using the API. To do this, you must have created the first Organization by using the UI. You must also have generated an OAuth Access Token.

Use the following procedure to create another Organization by using the Red Hat Quay API endpoint.

Prerequisites

- You have already created at least one Organization by using the UI.
- You have generated an OAuth Access Token. For more information, see "Creating an OAuth Access Token".

Procedure

1. Create a file named **data.json** by entering the following command:

   ```
   $ touch data.json
   ```

2. Add the following content to the file, which will be the name of the new Organization:

   ```
   {"name":"testorg1"}
   ```

3. Enter the following command to create the new Organization using the API endpoint, passing in your OAuth Access Token and Red Hat Quay registry endpoint:

   ```
   $ curl -X POST -k -d @data.json -H "Authorization: Bearer <access_token>" -H "Content-Type: application/json" http://<quay-server.example.com>/api/v1/organization/
   ```

   Example output

   ```
   "Created"
   ```

5.4.2.2. Adding a team to an organization

When you create a team for your Organization you can select the team name, choose which repositories to make available to the team, and decide the level of access to the team.

Use the following procedure to create a team for your Organization.

Prerequisites

- You have created an organization.

Procedure

1. On the **Repositories** landing page, select an Organization to add teams to.

2. In the navigation pane, select **Teams and Membership**. By default, an **owners** team exists with **Admin** privileges for the user who created the Organization.

3. Click **Create New Team**.

4. Enter a name for your new team. Note that the team must start with a lowercase letter. It can also only use lowercase letters and numbers. Capital letters or special characters are not allowed.

5. Click **Create team**.

6. Click the name of your team to be redirected to the **Team** page. Here, you can add a description of the team, and add team members, like registered users, robots, or email addresses. For more information, see "Adding users to a team".

7. Click the **No repositories** text to bring up a list of available repositories. Select the box of each repository you will provide the team access to.

8. Select the appropriate permissions that you want the team to have:

   - **None**. Team members have no permission to the repository.

   - **Read**. Team members can view and pull from the repository.

   - **Write**. Team members can read (pull) from and write (push) to the repository.

   - **Admin**. Full access to pull from, and push to, the repository, plus the ability to do administrative tasks associated with the repository.

9. Click **Add permissions** to save the repository permissions for the team.

5.4.2.3. Setting a Team role

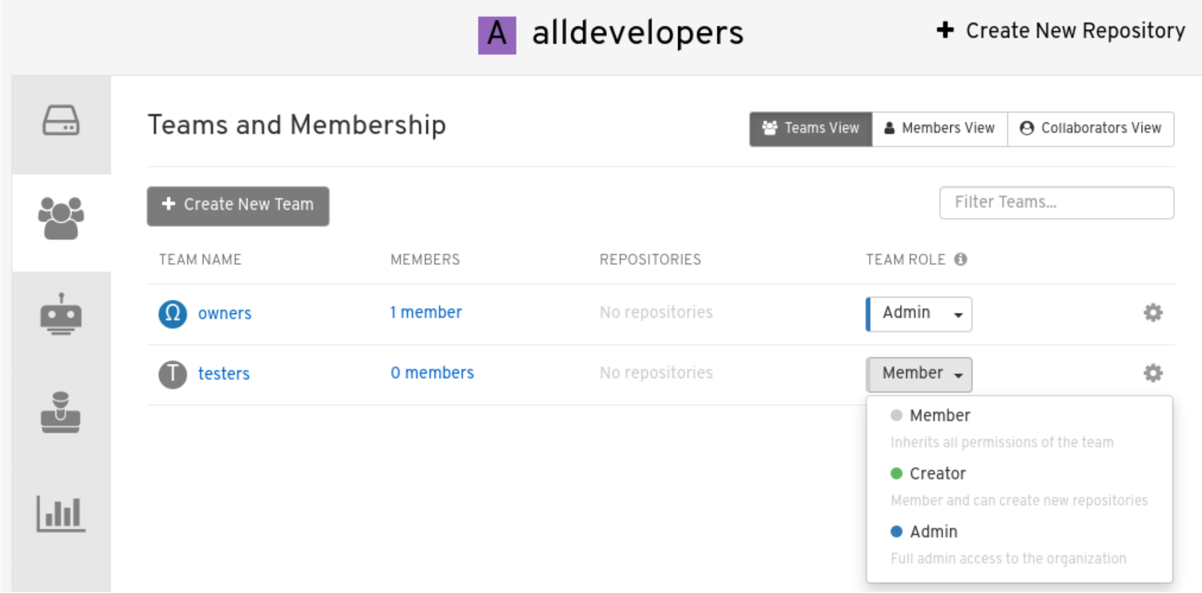
After you have added a team, you can set the role of that team within the Organization.

Prerequisites

- You have created a team.

Procedure

1. On the **Repository** landing page, click the name of your Organization.
2. In the navigation pane, click **Teams and Membership**.
3. Select the **TEAM ROLE** drop-down menu, as shown in the following figure:



TEAM NAME	MEMBERS	REPOSITORIES	TEAM ROLE
owners	1 member	No repositories	Admin
testers	0 members	No repositories	Member

4. For the selected team, choose one of the following roles:
   - **Member**. Inherits all permissions set for the team.
   - **Creator**. All member permissions, plus the ability to create new repositories.
   - **Admin**. Full administrative access to the organization, including the ability to create teams, add members, and set permissions.

5.4.2.4. Adding users to a Team

With administrative privileges to an Organization, you can add users and robot accounts to a team. When you add a user, Quay.io sends an email to that user. The user remains pending until they accept the invitation.

Use the following procedure to add users or robot accounts to a team.

Procedure

1. On the **Repository** landing page, click the name of your Organization.
2. In the navigation pane, click **Teams and Membership**.
3. Select the team you want to add users or robot accounts to.
4. In the **Team Members** box, enter information for one of the following:
   - A username from an account on the registry.
   - The email address for a user account on the registry.
   - The name of a robot account. The name must be in the form of <organization_name>+<robot_name>.

NOTE

Robot Accounts are immediately added to the team. For user accounts, an invitation to join is mailed to the user. Until the user accepts that invitation, the user remains in the **INVITED TO JOIN** state. After the user accepts the email invitation to join the team, they move from the **INVITED TO JOIN** list to the **MEMBERS** list for the Organization.

5.5. USER SETTINGS

The **User Settings** page provides users a way to set their email address, password, account type, set up desktop notifications, select an avatar, delete an account, adjust the *time machine* setting, and view billing information.

5.5.1. Navigating to the User Settings page

Use the following procedure to navigate to the **User Settings** page.

Procedure

1. On Quay.io, click your username in the header.
2. Select **Account Settings**. You are redirected to the **User Settings** page.

5.5.2. Adjusting user settings

Use the following procedure to adjust user settings.

Procedure

- To change your email address, select the current email address for **Email Address**. In the pop-up window, enter a new email address, then, click **Change Email**. A verification email will be sent before the change is applied.
- To change your password, click **Change password**. Enter the new password in both boxes, then click **Change Password**.
- Change the account type by clicking **Individual Account**, or the option next to **Account Type**. In some cases, you might have to leave an organization prior to changing the account type.
- Adjust your desktop notifications by clicking the option next to **Desktop Notifications**. Users can either enable, or disable, this feature.
- You can delete an account by clicking **Begin deletion**. You cannot delete an account if you have an active plan, or if you are a member of an organization where you are the only administrator. You must confirm deletion by entering the namespace.

  IMPORTANT

  Deleting an account is not reversible and will delete all of the account’s data including repositories, created build triggers, and notifications.

- You can set the *time machine* feature by clicking the drop-box next to **Time Machine**. This feature dictates the amount of time after a tag is deleted that the tag is accessible in time machine before being garbage collected. After selecting a time, click **Save Expiration Time**.

5.5.3. Billing information

You can view billing information on the **User Settings**. In this section, the following information is available:

- **Current Plan**. This section denotes the current plan Quay.io plan that you are signed up for. It also shows the amount of private repositories you have.

- **Invoices**. If you are on a paid plan, you can click **View Invoices** to view a list of invoices.

- **Receipts**. If you are on a paid plan, you can select whether to have receipts for payment emailed to you, another user, or to opt out of receipts altogether.

CHAPTER 6. WORKING WITH TAGS

An *image tag* refers to a label or identifier assigned to a specific version or variant of a container image. Container images are typically composed of multiple layers that represent different parts of the image. Image tags are used to differentiate between different versions of an image or to provide additional information about the image.

Image tags have the following benefits:

- **Versioning and Releases**: Image tags allow you to denote different versions or releases of an application or software. For example, you might have an image tagged as *v1.0* to represent the initial release and *v1.1* for an updated version. This helps in maintaining a clear record of image versions.

- **Rollbacks and Testing**: If you encounter issues with a new image version, you can easily revert to a previous version by specifying its tag. This is particularly helpful during debugging and testing phases.

- **Development Environments**: Image tags are beneficial when working with different environments. You might use a *dev* tag for a development version, *qa* for quality assurance testing, and *prod* for production, each with their respective features and configurations.

- **Continuous Integration/Continuous Deployment (CI/CD)**: CI/CD pipelines often utilize image tags to automate the deployment process. New code changes can trigger the creation of a new image with a specific tag, enabling seamless updates.

- **Feature Branches**: When multiple developers are working on different features or bug fixes, they can create distinct image tags for their changes. This helps in isolating and testing individual features.

- **Customization**: You can use image tags to customize images with different configurations, dependencies, or optimizations, while keeping track of each variant.

- **Security and Patching**: When security vulnerabilities are discovered, you can create patched versions of images with updated tags, ensuring that your systems are using the latest secure versions.

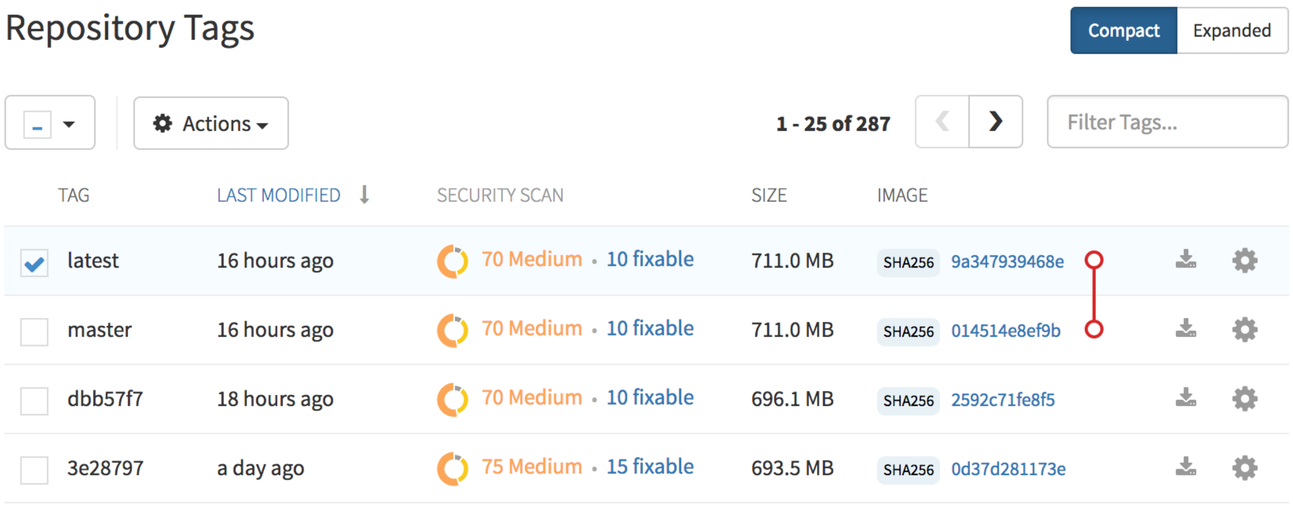
- **Dockerfile Changes**: If you modify the Dockerfile or build process, you can use image tags to differentiate between images built from the previous and updated Dockerfiles.

Overall, image tags provide a structured way to manage and organize container images, enabling efficient development, deployment, and maintenance workflows.

6.1. VIEWING AND MODIFYING TAGS

To view image tags on Quay.io, navigate to a repository and click on the **Tags** tab. For example:

View and modify tags from your repository



Repository Tags

	TAG	LAST MODIFIED	SECURITY SCAN	SIZE	IMAGE
☑	latest	16 hours ago	70 Medium · 10 fixable	711.0 MB	SHA256 9a347939468e
□	master	16 hours ago	70 Medium · 10 fixable	711.0 MB	SHA256 014514e8ef9b
□	dbb57f7	18 hours ago	70 Medium · 10 fixable	696.1 MB	SHA256 2592c71fe8f5
□	3e28797	a day ago	75 Medium · 15 fixable	693.5 MB	SHA256 0d37d281173e

6.1.1. Adding a new image tag to an image

You can add a new tag to an image in Quay.io.

Procedure

1. Click the **Settings**, or *gear*, icon next to the tag and clicking **Add New Tag**.
2. Enter a name for the tag, then, click **Create Tag**.
   The new tag is now listed on the **Repository Tags** page.

6.1.2. Moving an image tag

You can move a tag to a different image if desired.

Procedure

- Click the **Settings**, or *gear*, icon next to the tag and clicking **Add New Tag** and enter an existing tag name. Quay.io confirms that you want the tag moved instead of added.

6.1.3. Deleting an image tag

Deleting an image tag effectively removes that specific version of the image from the registry.

To delete an image tag, use the following procedure.

Procedure

1. Navigate to the **Tags** page of a repository.
2. Click **Delete Tag**. This deletes the tag and any images unique to it.

NOTE

Deleting an image tag can be reverted based on the amount of time allotted assigned to the *time machine* feature. For more information, see "Reverting tag changes".

6.1.3.1. Viewing tag history

Quay.io offers a comprehensive history of images and their respective image tags.

Procedure

- Navigate to the **Tag History** page of a repository to view the image tag history.

6.1.3.2. Reverting tag changes

Quay.io offers a comprehensive *time machine* feature that allows older images tags to remain in the repository for set periods of time so that they can revert changes made to tags. This feature allows users to revert tag changes, like tag deletions.

Procedure

1. Navigate to the **Tag History** page of a repository.
2. Find the point in the timeline at which image tags were changed or removed. Next, click the option under **Revert** to restore a tag to its image, or click the option under **Permanently Delete** to permanently delete the image tag.

6.1.4. Fetching an image by tag or digest

Quay.io offers multiple ways of pulling images using Docker and Podman clients.

Procedure

1. Navigate to the **Tags** page of a repository.
2. Under **Manifest**, click the **Fetch Tag** icon.
3. When the popup box appears, users are presented with the following options:
   - Podman Pull (by tag)
   - Docker Pull (by tag)
   - Podman Pull (by digest)
   - Docker Pull (by digest)
     Selecting any one of the four options returns a command for the respective client that allows users to pull the image.
4. Click **Copy Command** to copy the command, which can be used on the command-line interface (CLI). For example:

```
$ podman pull quay.io/quayadmin/busybox:test2
```

6.2. TAG EXPIRATION

Images can be set to expire from a Quay.io repository at a chosen date and time using the *tag expiration* feature. This feature includes the following characteristics:

- When an image tag expires, it is deleted from the repository. If it is the last tag for a specific image, the image is also set to be deleted.

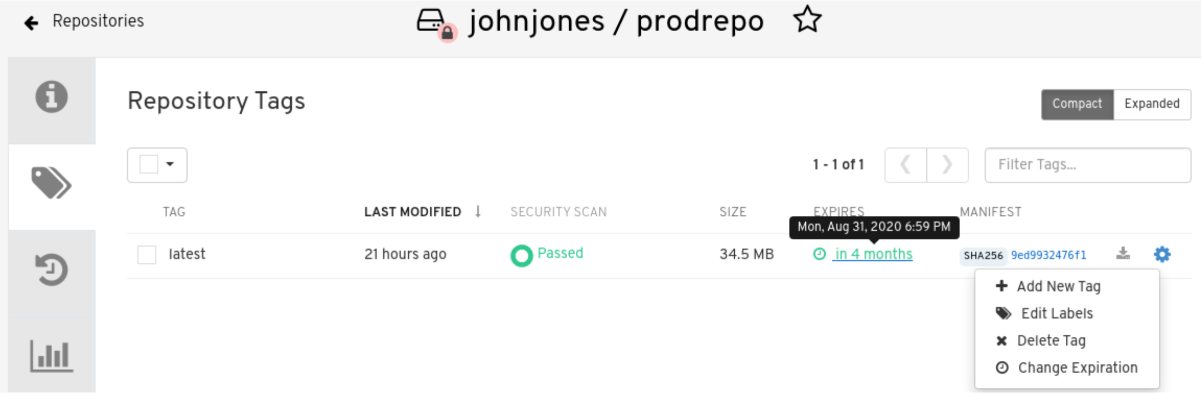
- Expiration is set on a per-tag basis. It is not set for a repository as a whole.

- After a tag is expired or deleted, it is not immediately removed from the registry. This is contingent upon the allotted time designed in the *time machine* feature, which defines when the tag is permanently deleted, or garbage collected. By default, this value is set at *14 days*, however the administrator can adjust this time to one of multiple options. Up until the point that garbage collection occurs, tags changes can be reverted.

Tag expiration can be set up in one of two ways:

- By setting the **quay.expires-after=** LABEL in the Dockerfile when the image is created. This sets a time to expire from when the image is built.

- By selecting an expiration date on the Quay.io UI. For example:



	TAG	LAST MODIFIED ↓	SECURITY SCAN	SIZE	EXPIRES	MANIFEST
□	latest	21 hours ago	Passed	34.5 MB	in 4 months	SHA256 9ed9932476f1

6.2.1. Setting tag expiration from a Dockerfile

Adding a label, for example, **quay.expires-after=20h** by using the **docker label** command causes a tag to automatically expire after the time indicated. The following values for hours, days, or weeks are accepted:

- **1h**

- **2d**

- **3w**

Expiration begins from the time that the image is pushed to the registry.

6.2.2. Setting tag expiration from the repository

Tag expiration can be set on the Quay.io UI.

Procedure

1. Navigate to a repository and click **Tags** in the navigation pane.

2. Click the **Settings**, or *gear* icon, for an image tag and select **Change Expiration**.

3. Select the date and time when prompted, and select **Change Expiration**. The tag is set to be deleted from the repository when the expiration time is reached.

6.3. VIEWING CLAIR SECURITY SCANS

Quay.io comes equipped with Clair security scanner. For more information about Clair on Quay.io, see "Clair security scanner."

Procedure

1. Navigate to a repository and click **Tags** in the navigation pane. This page shows the results of the security scan.

2. To reveal more information about multi-architecture images, click **See Child Manifests** to see the list of manifests in extended view.

3. Click a relevant link under **See Child Manifests**, for example, **1 Unknown** to be redirected to the **Security Scanner** page.

4. The **Security Scanner** page provides information for the tag, such as which CVEs the image is susceptible to, and what remediation options you might have available.

NOTE

Image scanning only lists vulnerabilities found by Clair security scanner. What users do about the vulnerabilities are uncovered is up to said user.

CHAPTER 7. VIEWING AND EXPORTING LOGS

Activity logs are gathered for all repositories and namespace in Quay.io.

Viewing usage logs of Quay.io. can provide valuable insights and benefits for both operational and security purposes. Usage logs might reveal the following information:

- **Resource Planning**: Usage logs can provide data on the number of image pulls, pushes, and overall traffic to your registry.
- **User Activity**: Logs can help you track user activity, showing which users are accessing and interacting with images in the registry. This can be useful for auditing, understanding user behavior, and managing access controls.
- **Usage Patterns**: By studying usage patterns, you can gain insights into which images are popular, which versions are frequently used, and which images are rarely accessed. This information can help prioritize image maintenance and cleanup efforts.
- **Security Auditing**: Usage logs enable you to track who is accessing images and when. This is crucial for security auditing, compliance, and investigating any unauthorized or suspicious activity.
- **Image Lifecycle Management**: Logs can reveal which images are being pulled, pushed, and deleted. This information is essential for managing image lifecycles, including deprecating old images and ensuring that only authorized images are used.
- **Compliance and Regulatory Requirements**: Many industries have compliance requirements that mandate tracking and auditing of access to sensitive resources. Usage logs can help you demonstrate compliance with such regulations.
- **Identifying Abnormal Behavior**: Unusual or abnormal patterns in usage logs can indicate potential security breaches or malicious activity. Monitoring these logs can help you detect and respond to security incidents more effectively.
- **Trend Analysis**: Over time, usage logs can provide trends and insights into how your registry is being used. This can help you make informed decisions about resource allocation, access controls, and image management strategies.

There are multiple ways of accessing log files:

- Viewing logs through the web UI.
- Exporting logs so that they can be saved externally.
- Accessing log entries using the API.

To access logs, you must have administrative privileges for the selected repository or namespace.

NOTE

A maximum of 100 log results are available at a time via the API. To gather more results that that, you must use the log exporter feature described in this chapter.

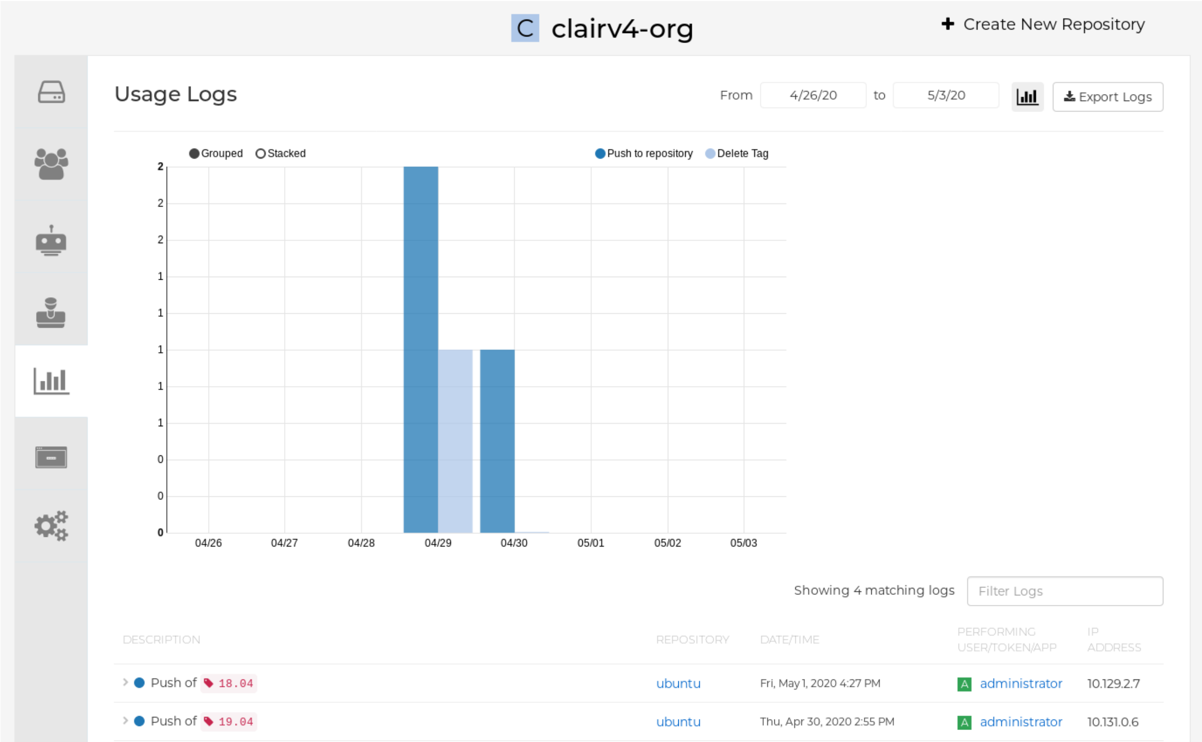
7.1. VIEWING LOGS USING THE UI

Use the following procedure to view log entries for a repository or namespace using the web UI.

Procedure

1. Navigate to a repository or namespace for which you are an administrator of.

2. In the navigation pane, select **Usage Logs**.



From 4/26/20 to 5/3/20

Showing 4 matching logs   Filter Logs

DESCRIPTION	REPOSITORY	DATE/TIME	PERFORMING USER/TOKEN/APP	IP ADDRESS
› ● Push of 18.04	ubuntu	Fri, May 1, 2020 4:27 PM	A administrator	10.129.2.7
› ● Push of 19.04	ubuntu	Thu, Apr 30, 2020 2:55 PM	A administrator	10.131.0.6

3. Optional. On the usage logs page:

   a. Set the date range for viewing log entries by adding dates to the **From** and **to** boxes. By default, the UI shows you the most recent week of log entries.

   b. Type a string into the **Filter Logs** box to display log entries that of the specified keyword. For example, you can type **delete** to filter the logs to show deleted tags.

   c. Under **Description**, toggle the arrow of a log entry to see more, or less, text associated with a specific log entry.

7.2. EXPORTING REPOSITORY LOGS

You can obtain a larger number of log files and save them outside of Quay.io by using the **Export Logs** feature. This feature has the following benefits and constraints:

- You can choose a range of dates for the logs you want to gather from a repository.

- You can request that the logs be sent to you by an email attachment or directed to a callback URL.

- To export logs, you must be an administrator of the repository or namespace.

- 30 days worth of logs are retained for all users.

- Export logs only gathers log data that was previously produced. It does not stream logging data.

- When logs are gathered and made available to you, you should immediately copy that data if you want to save it. By default, the data expires after one hour.

Use the following procedure to export logs.

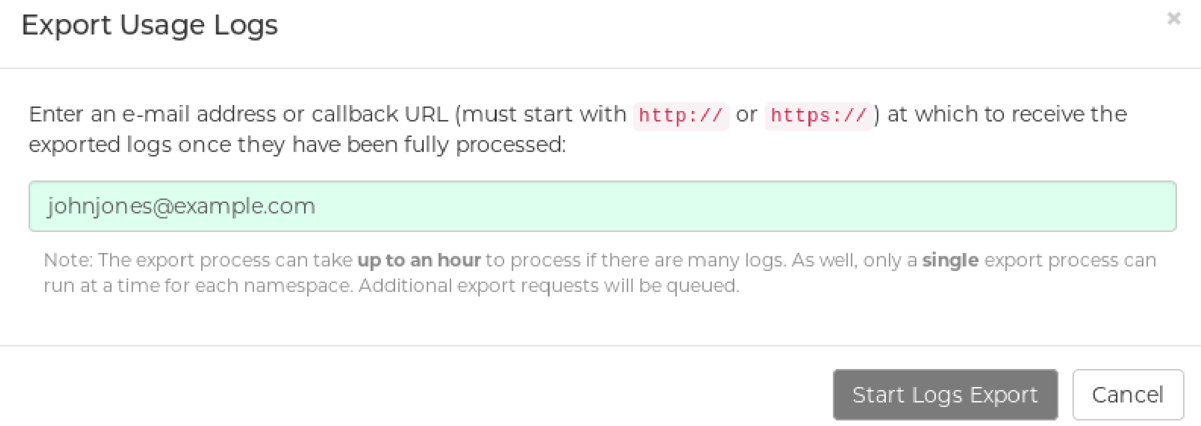
Procedure

1. Select a repository for which you have administrator privileges.

2. In the navigation pane, select **Usage Logs**.

3. Optional. If you want to specify specific dates, enter the range in the **From** and **to** boxes.

4. Click the **Export Logs** button. An Export Usage Logs pop-up appears, as shown



Export Usage Logs

Enter an e-mail address or callback URL (must start with `http://` or `https://`) at which to receive the exported logs once they have been fully processed:

johnjones@example.com

Note: The export process can take **up to an hour** to process if there are many logs. As well, only a **single** export process can run at a time for each namespace. Additional export requests will be queued.

5. Enter an email address or callback URL to receive the exported log. For the callback URL, you can use a URL to a specified domain, for example, <webhook.site>.

6. Select **Start Logs Export** to start the process for gather the selected log entries. Depending on the amount of logging data being gathered, this can take anywhere from a few minutes to several hours to complete.

7. When the log export is completed, the one of following two events happens:

   - An email is received, alerting you to the available of your requested exported log entries.

   - A successful status of your log export request from the webhook URL is returned. Additionally, a link to the exported data is made available for you to delete to download the logs.

CHAPTER 8. BUILDING CONTAINER IMAGES

Building container images involves creating a blueprint for a containerized application. Blueprints rely on base images from other public repositories that define how the application should be installed and configured.

NOTE

Because blueprints rely on images from other public repositories, they might be subject to rate limiting. Consequently, your build *could* fail.

Quay.io supports the ability to build Docker and Podman container images. This functionality is valuable for developers and organizations who rely on container and container orchestration.

On Quay.io, this feature works the same across both free, and paid, tier plans.

NOTE

Quay.io limits the number of simultaneous builds that a single user can submit at one time.

8.1. BUILD CONTEXTS

When building an image with Docker or Podman, a directory is specified to become the *build context*. This is true for both manual Builds and Build triggers, because the Build that is created by Quay.io is not different than running **docker build** or **podman build** on your local machine.

Quay.io Build contexts are always specified in the *subdirectory* from the Build setup, and fallback to the root of the Build source if a directory is not specified.

When a build is triggered, Quay.io Build workers clone the Git repository to the worker machine, and then enter the Build context before conducting a Build.

For Builds based on **.tar** archives, Build workers extract the archive and enter the Build context. For example:

Extracted Build archive

```
example
├── .git
├── Dockerfile
├── file
└── subdir
    └── Dockerfile
```

Imagine that the *Extracted Build archive* is the directory structure got a Github repository called **example.** If no subdirectory is specified in the Build trigger setup, or when manually starting the Build, the Build operates in the example directory.

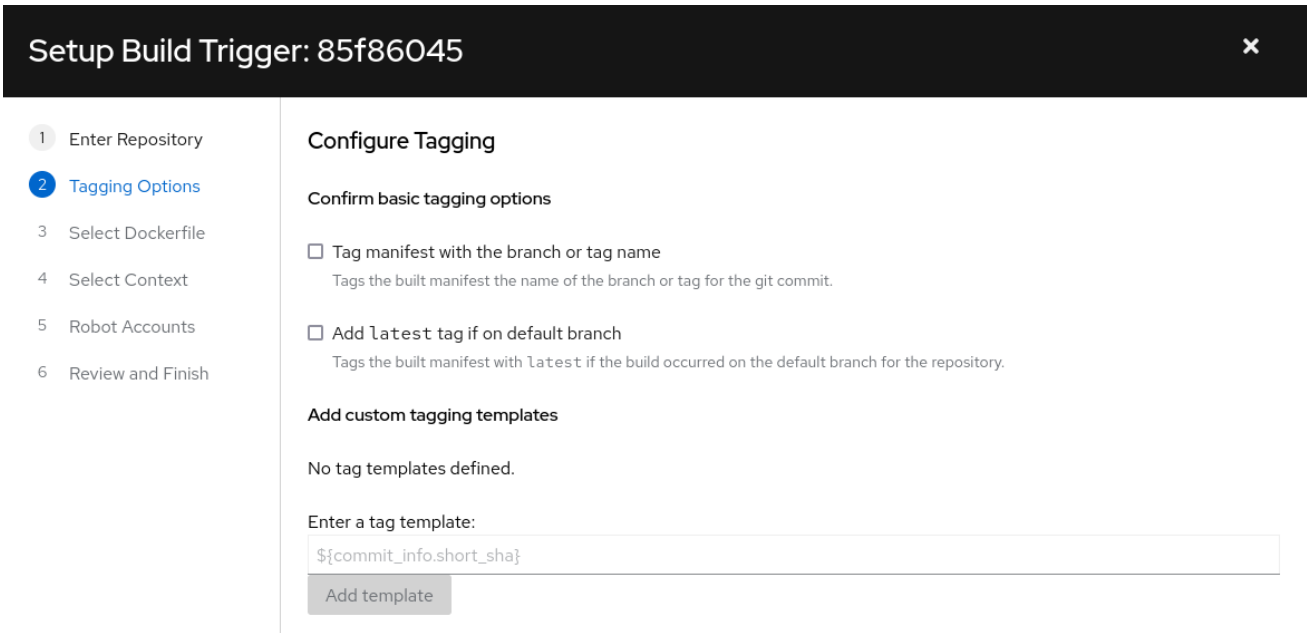
If a subdirectory is specified in the Build trigger setup, for example, **subdir**, only the Dockerfile within it is visible to the Build. This means that you cannot use the **ADD** command in the Dockerfile to add **file**, because it is outside of the Build context.

Unlike Docker Hub, the Dockerfile is part of the Build context on Quay.io. As a result, it must not appear in the **.dockerignore** file.

8.2. TAG NAMING FOR BUILD TRIGGERS

Custom tags are available for use in Quay.io.

One option is to include any string of characters assigned as a tag for each built image. Alternatively, you can use the following tag templates on the **Configure Tagging** section of the build trigger to tag images with information from each commit:



Setup Build Trigger: 85f86045 ×

1 Enter Repository
2 Tagging Options
3 Select Dockerfile
4 Select Context
5 Robot Accounts
6 Review and Finish

Configure Tagging

Confirm basic tagging options

□ Tag manifest with the branch or tag name
Tags the built manifest the name of the branch or tag for the git commit.

□ Add `latest` tag if on default branch
Tags the built manifest with `latest` if the build occurred on the default branch for the repository.

Add custom tagging templates

No tag templates defined.

Enter a tag template:
${commit_info.short_sha}

Add template

- **${commit}**: Full SHA of the issued commit
- **${parsed_ref.branch}**: Branch information (if available)
- **${parsed_ref.tag}**: Tag information (if available)
- **${parsed_ref.remote}**: The remote name
- **${commit_info.date}**: Date when the commit was issued
- **${commit_info.author.username}**: Username of the author of the commit
- **${commit_info.short_sha}**: First 7 characters of the commit SHA
- **${committer.properties.username}**: Username of the committer

This list is not complete, but does contain the most useful options for tagging purposes. You can find the complete tag template schema on this page.

For more information, see Set up custom tag templates in build triggers for Red Hat Quay and Quay.io

8.3. SKIPPING A SOURCE CONTROL-TRIGGERED BUILD

To specify that a commit should be ignored by the Quay.io build system, add the text **[skip build]** or **[build skip]** anywhere in your commit message.

8.4. VIEWING AND MANAGING BUILDS

Repository Builds can be viewed and managed on the Quay.io UI.

Procedure

1. Navigate to Quay.io and select a repository.
2. In the navigation pane, select **Builds**.

8.5. CREATING A NEW BUILD

By default, Quay.io users can create new Builds out-of-the-box.

Prerequisites

- You have navigated to the **Builds** page of your repository.

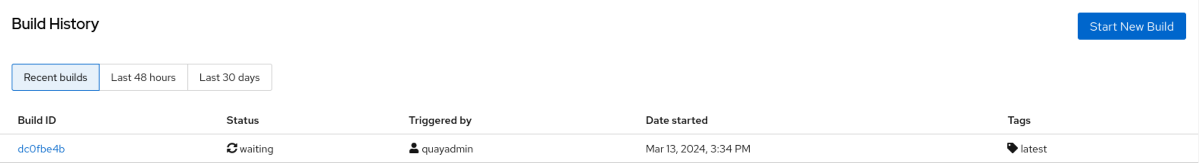
Procedure

1. On the **Builds** page, click **Start New Build**.
2. When prompted, click **Upload Dockerfile** to upload a Dockerfile or an archive that contains a Dockerfile at the root directory.
3. Click **Start Build**.

NOTE

- Currently, users cannot specify the Docker build context when manually starting a build.
- Currently, BitBucket is unsupported on the Red Hat Quay v2 UI.

4. You are redirected to the Build, which can be viewed in real-time. Wait for the Dockerfile Build to be completed and pushed.
5. Optional. you can click **Download Logs** to download the logs, or **Copy Logs** to copy the logs.
6. Click the back button to return to the **Repository Builds** page, where you can view the Build History.



Build ID	Status	Triggered by	Date started	Tags
dc0fbe4b	waiting	quayadmin	Mar 13, 2024, 3:34 PM	latest

8.6. BUILD TRIGGERS

Build triggers invoke builds whenever the triggered condition is met, for example, a source control push, creating a webhook call, and so on.

8.6.1. Creating a Build trigger

Use the following procedure to create a Build trigger using a custom Git repository.

NOTE

The following procedure assumes that you have not included Github credentials in your **config.yaml** file.

Prerequisites

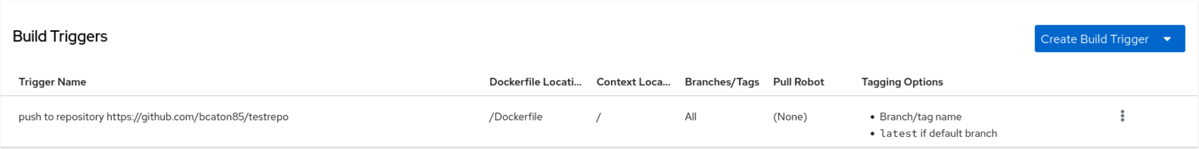
- You have navigated to the **Builds** page of your repository.

Procedure

1. On the **Builds** page, click **Create Build Trigger**.
2. Select the desired platform, for example, Github, BitBucket, Gitlab, or use a custom Git repository. For this example, we are using a custom Git repository from Github.
3. Enter a custom Git repository name, for example, **git@github.com:<username>/<repo>.git**. Then, click **Next**.
4. When prompted, configure the tagging options by selecting one of, or both of, the following options:
    - **Tag manifest with the branch or tag name** When selecting this option, the built manifest the name of the branch or tag for the git commit are tagged.
    - **Add latest tag if on default branch** When selecting this option, the built manifest with latest if the build occurred on the default branch for the repository are tagged. Optionally, you can add a custom tagging template. There are multiple tag templates that you can enter here, including using short SHA IDs, timestamps, author names, committer, and branch names from the commit as tags. For more information, see "Tag naming for Build triggers".

      After you have configured tagging, click **Next**.
5. When prompted, select the location of the Dockerfile to be built when the trigger is invoked. If the Dockerfile is located at the root of the git repository and named Dockerfile, enter **/Dockerfile** as the Dockerfile path. Then, click **Next**.
6. When prompted, select the context for the Docker build. If the Dockerfile is located at the root of the Git repository, enter / as the build context directory. Then, click **Next**.
7. Optional. Choose an optional robot account. This allows you to pull a private base image during the build process. If you know that a private base image is not used, you can skip this step.
8. Click **Next**. Check for any verification warnings. If necessary, fix the issues before clicking **Finish**.
9. You are alerted that the trigger has been successfully activated. Note that using this trigger requires the following actions:
    - You must give the following public key read access to the git repository.
    - You must set your repository to **POST** to the following URL to trigger a build. Save the SSH Public Key, then click **Return to <organization_name>/<repository_name>**. You are redirected to the **Builds** page of your repository.

10. On the **Builds** page, you now have a Build trigger. For example:



Build Triggers

Trigger Name	Dockerfile Locati...	Context Loca...	Branches/Tags	Pull Robot	Tagging Options
push to repository https://github.com/bcaton85/testrepo	/Dockerfile	/	All	(None)	• Branch/tag name • `latest` if default branch

8.6.2. Manually triggering a Build

Builds can be triggered manually by using the following procedure.

Procedure

1. On the **Builds** page, **Start new build**.

2. When prompted, select **Invoke Build Trigger**.

3. Click **Run Trigger Now** to manually start the process.
   After the build starts, you can see the Build ID on the **Repository Builds** page.

8.7. SETTING UP A CUSTOM GIT TRIGGER

A *custom Git trigger* is a generic way for any Git server to act as a Build trigger. It relies solely on SSH keys and webhook endpoints. Everything else is left for the user to implement.

8.7.1. Creating a trigger

Creating a custom Git trigger is similar to the creation of any other trigger, with the exception of the following:

- Quay.io cannot automatically detect the proper Robot Account to use with the trigger. This must be done manually during the creation process.

- There are extra steps after the creation of the trigger that must be done. These steps are detailed in the following sections.

8.7.2. Custom trigger creation setup

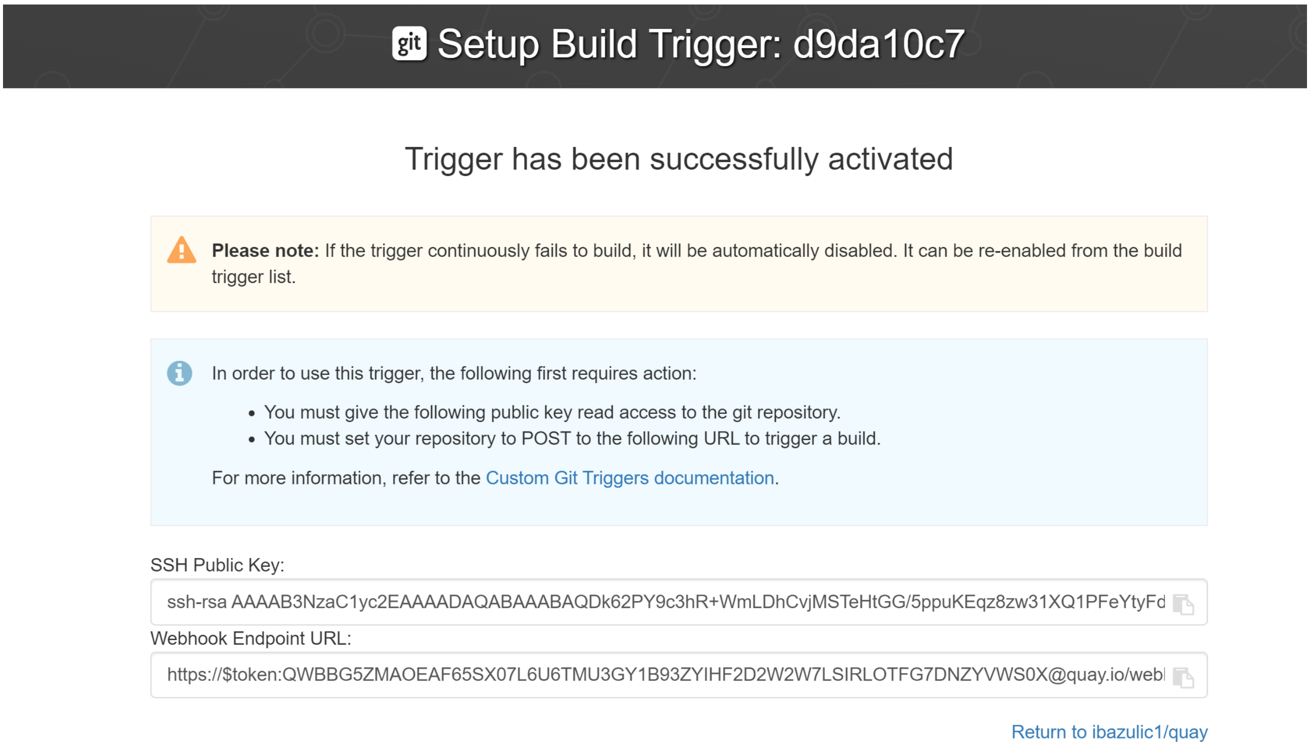
When creating a custom Git trigger, two additional steps are required:

1. You must provide read access to the SSH public key that is generated when creating the trigger.

2. You must setup a webhook that POSTs to the Quay.io endpoint to trigger the build.

The key and the URL are available by selecting **View Credentials** from the **Settings**, or *gear* icon.

View and modify tags from your repository



Setup Build Trigger: d9da10c7

Trigger has been successfully activated

Please note: If the trigger continuously fails to build, it will be automatically disabled. It can be re-enabled from the build trigger list.

In order to use this trigger, the following first requires action:

- You must give the following public key read access to the git repository.
- You must set your repository to POST to the following URL to trigger a build.

For more information, refer to the Custom Git Triggers documentation.

SSH Public Key:

ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDk62PY9c3hR+WmLDhCvjMSTeHtGG/5ppuKEqz8zw31XQ1PFeYtyFd

Webhook Endpoint URL:

https://$token:QWBBG5ZMAOEAF65SX07L6U6TMU3GY1B93ZYIHF2D2W2W7LSIRLOTFG7DNZYVWS0X@quay.io/webl

Return to ibazulic1/quay

8.7.2.1. SSH public key access

Depending on the Git server configuration, there are multiple ways to install the SSH public key that Quay.io generates for a custom Git trigger.

For example, Git documentation describes a small server setup in which adding the key to **$HOME/.ssh/authorize_keys** would provide access for Builders to clone the repository. For any git repository management software that is not officially supported, there is usually a location to input the key often labeled as **Deploy Keys**.

8.7.2.2. Webhook

To automatically trigger a build, one must **POST** a **.json** payload to the webhook URL using the following format.

This can be accomplished in various ways depending on the server setup, but for most cases can be done with a **post-receive** Git Hook.

NOTE

This request requires a **Content-Type** header containing **application/json** in order to be valid.

Example webhook

```
{
  "commit": "1c002dd",                                  // required
  "ref": "refs/heads/master",                            // required
  "default_branch": "master",                             // required
  "commit_info": {                                     // optional
    "url": "gitsoftware.com/repository/commits/1234567", // required
    "message": "initial commit",                        // required
  "date": "timestamp",                               // required
  "author": {                                      // optional
   "username": "user",                              // required
   "avatar_url": "gravatar.com/user.png",             // required
   "url": "gitsoftware.com/users/user"               // required
  },
  "committer": {                                     // optional
   "username": "user",                              // required
   "avatar_url": "gravatar.com/user.png",             // required
   "url": "gitsoftware.com/users/user"               // required
  }
 }
}
```

CHAPTER 9. REPOSITORY NOTIFICATIONS

Quay.io supports adding *notifications* to a repository for various events that occur in the repository's lifecycle.

9.1. CREATING NOTIFICATIONS

Use the following procedure to add notifications.

Prerequisites

- You have created a repository.
- You have administrative privileges for the repository.

Procedure

1. Navigate to a repository on Quay.io.
2. In the navigation pane, click **Settings**.
3. In the **Events and Notifications** category, click **Create Notification** to add a new notification for a repository event. You are redirected to a **Create repository notification** page.
4. On the **Create repository notification** page, select the drop-down menu to reveal a list of events. You can select a notification for the following types of events:
   - Push to Repository
   - Dockerfile Build Queued
   - Dockerfile Build Started
   - Dockerfile Build Successfully Completed
   - Docker Build Cancelled
   - Package Vulnerability Found
5. After you have selected the event type, select the notification method. The following methods are supported:
   - Quay Notification
   - E-mail
   - Webhook POST
   - Flowdock Team Notification
   - HipChat Room Notification
   - Slack Room Notification
     Depending on the method that you choose, you must include additional information. For example, if you select **E-mail**, you are required to include an e-mail address and an optional notification title.

6. After selecting an event and notification method, click **Create Notification**.

9.2. REPOSITORY EVENTS DESCRIPTION

The following sections detail repository events.

9.2.1. Repository Push

A successful push of one or more images was made to the repository:

```
{
  "name": "repository",
  "repository": "dgangaia/test",
  "namespace": "dgangaia",
  "docker_url": "quay.io/dgangaia/test",
  "homepage": "https://quay.io/repository/dgangaia/repository",
  "updated_tags": [
    "latest"
  ]
}
```

9.2.2. Dockerfile Build Queued

The following example is a response from a Dockerfile Build that has been queued into the Build system.

NOTE

Responses can differ based on the use of optional attributes.

```
{
  "build_id": "296ec063-5f86-4706-a469-f0a400bf9df2",
  "trigger_kind": "github",                                  //Optional
  "name": "test",
  "repository": "dgangaia/test",
  "namespace": "dgangaia",
  "docker_url": "quay.io/dgangaia/test",
  "trigger_id": "38b6e180-9521-4ff7-9844-acf371340b9e",                 //Optional
  "docker_tags": [
    "master",
    "latest"
  ],
  "repo": "test",
  "trigger_metadata": {
    "default_branch": "master",
    "commit": "b7f7d2b948aacbe844ee465122a85a9368b2b735",
    "ref": "refs/heads/master",
    "git_url": "git@github.com:dgangaia/test.git",
    "commit_info": {                                         //Optional
      "url": "https://github.com/dgangaia/test/commit/b7f7d2b948aacbe844ee465122a85a9368b2b735",
      "date": "2019-03-06T12:48:24+11:00",
      "message": "adding 5",
      "author": {                                            //Optional
        "username": "dgangaia",
        "url": "https://github.com/dgangaia",                 //Optional
        "avatar_url": "https://avatars1.githubusercontent.com/u/43594254?v=4"    //Optional
      },
      "committer": {
        "username": "web-flow",
        "url": "https://github.com/web-flow",
        "avatar_url": "https://avatars3.githubusercontent.com/u/19864447?v=4"
      }
    }
  },
  "is_manual": false,
  "manual_user": null,
  "homepage": "https://quay.io/repository/dgangaia/test/build/296ec063-5f86-4706-a469-
f0a400bf9df2"
}
```

9.2.3. Dockerfile Build started

The following example is a response from a Dockerfile Build that has been queued into the Build system.

NOTE

Responses can differ based on the use of optional attributes.

```
{
  "build_id": "a8cc247a-a662-4fee-8dcb-7d7e822b71ba",
  "trigger_kind": "github",                                 //Optional
  "name": "test",
  "repository": "dgangaia/test",
  "namespace": "dgangaia",
  "docker_url": "quay.io/dgangaia/test",
  "trigger_id": "38b6e180-9521-4ff7-9844-acf371340b9e",              //Optional
  "docker_tags": [
    "master",
    "latest"
  ],
  "build_name": "50bc599",
  "trigger_metadata": {                                     //Optional
    "commit": "50bc5996d4587fd4b2d8edc4af652d4cec293c42",
    "ref": "refs/heads/master",
    "default_branch": "master",
    "git_url": "git@github.com:dgangaia/test.git",
    "commit_info": {                                      //Optional
      "url": "https://github.com/dgangaia/test/commit/50bc5996d4587fd4b2d8edc4af652d4cec293c42",
      "date": "2019-03-06T14:10:14+11:00",
      "message": "test build",
      "committer": {                                     //Optional
        "username": "web-flow",
        "url": "https://github.com/web-flow",                  //Optional
        "avatar_url": "https://avatars3.githubusercontent.com/u/19864447?v=4"   //Optional
      },
      "author": {                                        //Optional
        "username": "dgangaia",
        "url": "https://github.com/dgangaia",                  //Optional
        "avatar_url": "https://avatars1.githubusercontent.com/u/43594254?v=4"    //Optional
      }
    }
  },
  "homepage": "https://quay.io/repository/dgangaia/test/build/a8cc247a-a662-4fee-8dcb-
7d7e822b71ba"
}
```

9.2.4. Dockerfile Build successfully completed

The following example is a response from a Dockerfile Build that has been successfully completed by the Build system.

NOTE

This event occurs simultaneously with a *Repository Push* event for the built image or images.

```
{
  "build_id": "296ec063-5f86-4706-a469-f0a400bf9df2",
  "trigger_kind": "github",                                                     //Optional
  "name": "test",
  "repository": "dgangaia/test",
  "namespace": "dgangaia",
  "docker_url": "quay.io/dgangaia/test",
  "trigger_id": "38b6e180-9521-4ff7-9844-acf371340b9e",                         //Optional
  "docker_tags": [
    "master",
    "latest"
  ],
  "build_name": "b7f7d2b",
  "image_id": "sha256:0339f178f26ae24930e9ad32751d6839015109eabdf1c25b3b0f2abf8934f6cb",
  "trigger_metadata": {
    "commit": "b7f7d2b948aacbe844ee465122a85a9368b2b735",
    "ref": "refs/heads/master",
    "default_branch": "master",
    "git_url": "git@github.com:dgangaia/test.git",
    "commit_info": {                                                    //Optional
      "url": "https://github.com/dgangaia/test/commit/b7f7d2b948aacbe844ee465122a85a9368b2b735",
      "date": "2019-03-06T12:48:24+11:00",
      "message": "adding 5",
      "committer": {                                                    //Optional
        "username": "web-flow",
        "url": "https://github.com/web-flow",                                 //Optional
        "avatar_url": "https://avatars3.githubusercontent.com/u/19864447?v=4"
//Optional
      },
      "author": {                                                       //Optional
        "username": "dgangaia",
        "url": "https://github.com/dgangaia",                                 //Optional
        "avatar_url": "https://avatars1.githubusercontent.com/u/43594254?v=4"     //Optional
      }
    }
  },
  "homepage": "https://quay.io/repository/dgangaia/test/build/296ec063-5f86-4706-a469-
f0a400bf9df2",
  "manifest_digests": [

"quay.io/dgangaia/test@sha256:2a7af5265344cc3704d5d47c4604b1efcbd227a7a6a6ff73d6e4e08a27f
d7d99",

"quay.io/dgangaia/test@sha256:569e7db1a867069835e8e97d50c96eccafde65f08ea3e0d5debaf16e25
45d9d1"
  ]
}
```

9.2.5. Dockerfile Build failed

The following example is a response from a Dockerfile Build that has failed.

```
{
  "build_id": "5346a21d-3434-4764-85be-5be1296f293c",
  "trigger_kind": "github",                                      //Optional
  "name": "test",
  "repository": "dgangaia/test",
  "docker_url": "quay.io/dgangaia/test",
  "error_message": "Could not find or parse Dockerfile: unknown instruction: GIT",
  "namespace": "dgangaia",
  "trigger_id": "38b6e180-9521-4ff7-9844-acf371340b9e",                     //Optional
  "docker_tags": [
    "master",
    "latest"
  ],
  "build_name": "6ae9a86",
  "trigger_metadata": {                                          //Optional
    "commit": "6ae9a86930fc73dd07b02e4c5bf63ee60be180ad",
    "ref": "refs/heads/master",
    "default_branch": "master",
    "git_url": "git@github.com:dgangaia/test.git",
    "commit_info": {                                             //Optional
      "url": "https://github.com/dgangaia/test/commit/6ae9a86930fc73dd07b02e4c5bf63ee60be180ad",
      "date": "2019-03-06T14:18:16+11:00",
      "message": "failed build test",
      "committer": {                                             //Optional
        "username": "web-flow",
        "url": "https://github.com/web-flow",                         //Optional
        "avatar_url": "https://avatars3.githubusercontent.com/u/19864447?v=4"     //Optional
      },
      "author": {                                                //Optional
        "username": "dgangaia",
        "url": "https://github.com/dgangaia",                         //Optional
        "avatar_url": "https://avatars1.githubusercontent.com/u/43594254?v=4"     //Optional
      }
    }
  },
  "homepage": "https://quay.io/repository/dgangaia/test/build/5346a21d-3434-4764-85be-
5be1296f293c"
}
```

9.2.6. Dockerfile Build cancelled

The following example is a response from a Dockerfile Build that has been cancelled.

```
{
  "build_id": "cbd534c5-f1c0-4816-b4e3-55446b851e70",
  "trigger_kind": "github",
  "name": "test",
  "repository": "dgangaia/test",
  "namespace": "dgangaia",
  "docker_url": "quay.io/dgangaia/test",
  "trigger_id": "38b6e180-9521-4ff7-9844-acf371340b9e",
  "docker_tags": [
    "master",
    "latest"
  ],
  "build_name": "cbce83c",
  "trigger_metadata": {
    "commit": "cbce83c04bfb59734fc42a83aab738704ba7ec41",
    "ref": "refs/heads/master",
    "default_branch": "master",
    "git_url": "git@github.com:dgangaia/test.git",
    "commit_info": {
      "url": "https://github.com/dgangaia/test/commit/cbce83c04bfb59734fc42a83aab738704ba7ec41",
      "date": "2019-03-06T14:27:53+11:00",
      "message": "testing cancel build",
      "committer": {
        "username": "web-flow",
        "url": "https://github.com/web-flow",
        "avatar_url": "https://avatars3.githubusercontent.com/u/19864447?v=4"
      },
      "author": {
        "username": "dgangaia",
        "url": "https://github.com/dgangaia",
        "avatar_url": "https://avatars1.githubusercontent.com/u/43594254?v=4"
      }
    }
  },
  "homepage": "https://quay.io/repository/dgangaia/test/build/cbd534c5-f1c0-4816-b4e3-
55446b851e70"
}
```

9.2.7. Vulnerability detected

The following example is a response from a Dockerfile Build has detected a vulnerability in the repository.

```
{
  "repository": "dgangaia/repository",
  "namespace": "dgangaia",
  "name": "repository",
  "docker_url": "quay.io/dgangaia/repository",
  "homepage": "https://quay.io/repository/dgangaia/repository",

  "tags": ["latest", "othertag"],
    "vulnerability": {
      "id": "CVE-1234-5678",
      "description": "This is a bad vulnerability",
      "link": "http://url/to/vuln/info",
      "priority": "Critical",
      "has_fix": true
    }
  }
```

9.3. NOTIFICATION ACTIONS

9.3.1. Notifications added

Notifications are added to the **Events and Notifications** section of the **Repository Settings** page. They are also added to the **Notifications** window, which can be found by clicking the *bell* icon in the navigation pane of Quay.io.

Quay.io notifications can be setup to be sent to a *User*, *Team*, or the *organization* as a whole.

9.3.2. E-mail notifications

E-mails are sent to specified addresses that describe the specified event. E-mail addresses must be verified on a *per-repository* basis.

9.3.3. Webhook POST notifications

An HTTP **POST** call is made to the specified URL with the event's data. For more information about event data, see "Repository events description".

When the URL is HTTPS, the call has an SSL client certificate set from Quay.io. Verification of this certificate proves that the call originated from Quay.io. Responses with the status code in the **2xx** range are considered successful. Responses with any other status code are considered failures and result in a retry of the webhook notification.

9.3.4. Flowdock notifications

Posts a message to Flowdock.

9.3.5. Hipchat notifications

Posts a message to HipChat.

9.3.6. Slack notifications

Posts a message to Slack.

CHAPTER 10. OPEN CONTAINER INITIATIVE SUPPORT

Container registries were originally designed to support container images in the Docker image format. To promote the use of additional runtimes apart from Docker, the Open Container Initiative (OCI) was created to provide a standardization surrounding container runtimes and image formats. Most container registries support the OCI standardization as it is based on the Docker image manifest V2, Schema 2 format.

In addition to container images, a variety of artifacts have emerged that support not just individual applications, but also the Kubernetes platform as a whole. These range from Open Policy Agent (OPA) policies for security and governance to Helm charts and Operators that aid in application deployment.

Quay.io is a private container registry that not only stores container images, but also supports an entire ecosystem of tooling to aid in the management of containers. Quay.io strives to be as compatible as possible with the OCI 1.0 *Image and Distribution specifications*, and supports common media types like *Helm charts* (as long as they pushed with a version of Helm that supports OCI) and a variety of arbitrary media types within the manifest or layer components of container images. Support for such novel media types differs from previous iterations of Quay.io, when the registry was more strict about accepted media types. Because Quay.io now works with a wider array of media types, including those that were previously outside the scope of its support, it is now more versatile accommodating not only standard container image formats but also emerging or unconventional types.

In addition to its expanded support for novel media types, Quay.io ensures compatibility with Docker images, including V2_2 and V2_1 formats. This compatibility with Docker V2_2 and V2_1 images demonstrates Quay.io's commitment to providing a seamless experience for Docker users. Moreover, Quay.io continues to extend its support for Docker V1 pulls, catering to users who might still rely on this earlier version of Docker images.

Support for OCI artifacts are enabled by default.

10.1. HELM AND OCI PREREQUISITES

Helm simplifies how applications are packaged and deployed. Helm uses a packaging format called *Charts* which contain the Kubernetes resources representing an application. Quay.io supports Helm charts so long as they are a version supported by OCI.

Use the following procedures to pre-configure your system to use Helm and other OCI media types.

10.1.1. Installing Helm

Use the following procedure to install the Helm client.

Procedure

1. Download the latest version of Helm from the Helm releases page.

2. Enter the following command to unpack the Helm binary:

```
$ tar -zxvf helm-v3.8.2-linux-amd64.tar.gz
```

3. Move the Helm binary to the desired location:

```
$ mv linux-amd64/helm /usr/local/bin/helm
```

For more information about installing Helm, see the Installing Helm documentation.

10.1.2. Upgrading to Helm 3.8

Support for OCI registry charts requires that Helm has been upgraded to at least 3.8. If you have already downloaded Helm and need to upgrade to Helm 3.8, see the Helm Upgrade documentation.

10.2. USING HELM CHARTS

Use the following example to download and push an etherpad chart from the Red Hat Community of Practice (CoP) repository.

Prerequisites

- You have logged into Quay.io.

Procedure

1. Add a chart repository by entering the following command:

```
$ helm repo add redhat-cop https://redhat-cop.github.io/helm-charts
```

2. Enter the following command to update the information of available charts locally from the chart repository:

```
$ helm repo update
```

3. Enter the following command to pull a chart from a repository:

```
$ helm pull redhat-cop/etherpad --version=0.0.4 --untar
```

4. Enter the following command to package the chart into a chart archive:

```
$ helm package ./etherpad
```

Example output

```
Successfully packaged chart and saved it to: /home/user/linux-amd64/etherpad-0.0.4.tgz
```

5. Log in to Quay.io using **helm registry login**:

```
$ helm registry login quay.io
```

6. Push the chart to your repository using the **helm push** command:

```
helm push etherpad-0.0.4.tgz oci://quay.io/<organization_name>/helm
```

Example output:

```
Pushed: quay370.apps.quayperf370.perfscale.devcluster.openshift.com/etherpad:0.0.4
Digest: sha256:a6667ff2a0e2bd7aa4813db9ac854b5124ff1c458d170b70c2d2375325f2451b
```

7. Ensure that the push worked by deleting the local copy, and then pulling the chart from the repository:

   ```
   $ rm -rf etherpad-0.0.4.tgz
   ```

   ```
   $ helm pull oci://quay.io/<organization_name>/helm/etherpad --version 0.0.4
   ```

   Example output:

   ```
   Pulled: quay370.apps.quayperf370.perfscale.devcluster.openshift.com/etherpad:0.0.4
   Digest: sha256:4f627399685880daf30cf77b6026dc129034d68c7676c7e07020b70cf7130902
   ```

10.3. COSIGN OCI SUPPORT

Cosign is a tool that can be used to sign and verify container images. It uses the **ECDSA-P256** signature algorithm and Red Hat's Simple Signing payload format to create public keys that are stored in PKIX files. Private keys are stored as encrypted PEM files.

Cosign currently supports the following:

- Hardware and KMS Signing
- Bring-your-own PKI
- OIDC PKI
- Built-in binary transparency and timestamping service

Use the following procedure to directly install Cosign.

Prerequisites

- You have installed Go version 1.16 or later.

Procedure

1. Enter the following **go** command to directly install Cosign:

   ```
   $ go install github.com/sigstore/cosign/cmd/cosign@v1.0.0
   ```

   Example output

   ```
   go: downloading github.com/sigstore/cosign v1.0.0
   go: downloading github.com/peterbourgon/ff/v3 v3.1.0
   ```

2. Generate a key-value pair for Cosign by entering the following command:

   ```
   $ cosign generate-key-pair
   ```

   Example output

   ```
   Enter password for private key:
   ```

```
Enter again:
Private key written to cosign.key
Public key written to cosign.pub
```

3. Sign the key-value pair by entering the following command:

```
$ cosign sign -key cosign.key quay.io/user1/busybox:test
```

Example output

```
Enter password for private key:
Pushing signature to: quay-server.example.com/user1/busybox:sha256-
ff13b8f6f289b92ec2913fa57c5dd0a874c3a7f8f149aabee50e3d01546473e3.sig
```

If you experience the **error: signing quay-server.example.com/user1/busybox:test: getting remote image: GET https://quay-server.example.com/v2/user1/busybox/manifests/test: UNAUTHORIZED: access to the requested resource is not authorized; map[]** error, which occurs because Cosign relies on **~./docker/config.json** for authorization, you might need to execute the following command:

```
$ podman login --authfile ~/.docker/config.json quay.io
```

Example output

```
Username:
Password:
Login Succeeded!
```

4. Enter the following command to see the updated authorization configuration:

```
$ cat ~/.docker/config.json
{
 "auths": {
  "quay-server.example.com": {
   "auth": "cXVheWFkbWluOnBhc3N3b3Jk"
  }
 }
```

10.4. INSTALLING AND USING COSIGN

Use the following procedure to directly install Cosign.

Prerequisites

- You have installed Go version 1.16 or later.
- You have set **FEATURE_GENERAL_OCI_SUPPORT** to **true** in your **config.yaml** file.

Procedure

1. Enter the following **go** command to directly install Cosign:

```
$ go install github.com/sigstore/cosign/cmd/cosign@v1.0.0
```

Example output

```
go: downloading github.com/sigstore/cosign v1.0.0
go: downloading github.com/peterbourgon/ff/v3 v3.1.0
```

2. Generate a key-value pair for Cosign by entering the following command:

```
$ cosign generate-key-pair
```

Example output

```
Enter password for private key:
Enter again:
Private key written to cosign.key
Public key written to cosign.pub
```

3. Sign the key-value pair by entering the following command:

```
$ cosign sign -key cosign.key quay.io/user1/busybox:test
```

Example output

```
Enter password for private key:
Pushing signature to: quay-server.example.com/user1/busybox:sha256-
ff13b8f6f289b92ec2913fa57c5dd0a874c3a7f8f149aabee50e3d01546473e3.sig
```

If you experience the **error: signing quay-server.example.com/user1/busybox:test: getting remote image: GET https://quay-server.example.com/v2/user1/busybox/manifests/test: UNAUTHORIZED: access to the requested resource is not authorized; map[]** error, which occurs because Cosign relies on **~./docker/config.json** for authorization, you might need to execute the following command:

```
$ podman login --authfile ~/.docker/config.json quay.io
```

Example output

```
Username:
Password:
Login Succeeded!
```

4. Enter the following command to see the updated authorization configuration:

```
$ cat ~/.docker/config.json
{
 "auths": {
  "quay-server.example.com": {
   "auth": "cXVheWFkbWluOnBhc3N3b3Jk"
  }
 }
```