

# Data lake: how Red Hat maintains data quality across multiple Drupal sites

DrupalCon Pittsburgh 2023

Melissa Bent

Senior Software Engineer

April Sides

Senior Software Engineer

Hi Everyone 🖐️



Melissa Bent (she/her)  
Senior Software Engineer



April Sides (she/they)  
Senior Software Engineer



July 7-9, 2023  
[DrupalAsheville.com](https://DrupalAsheville.com)

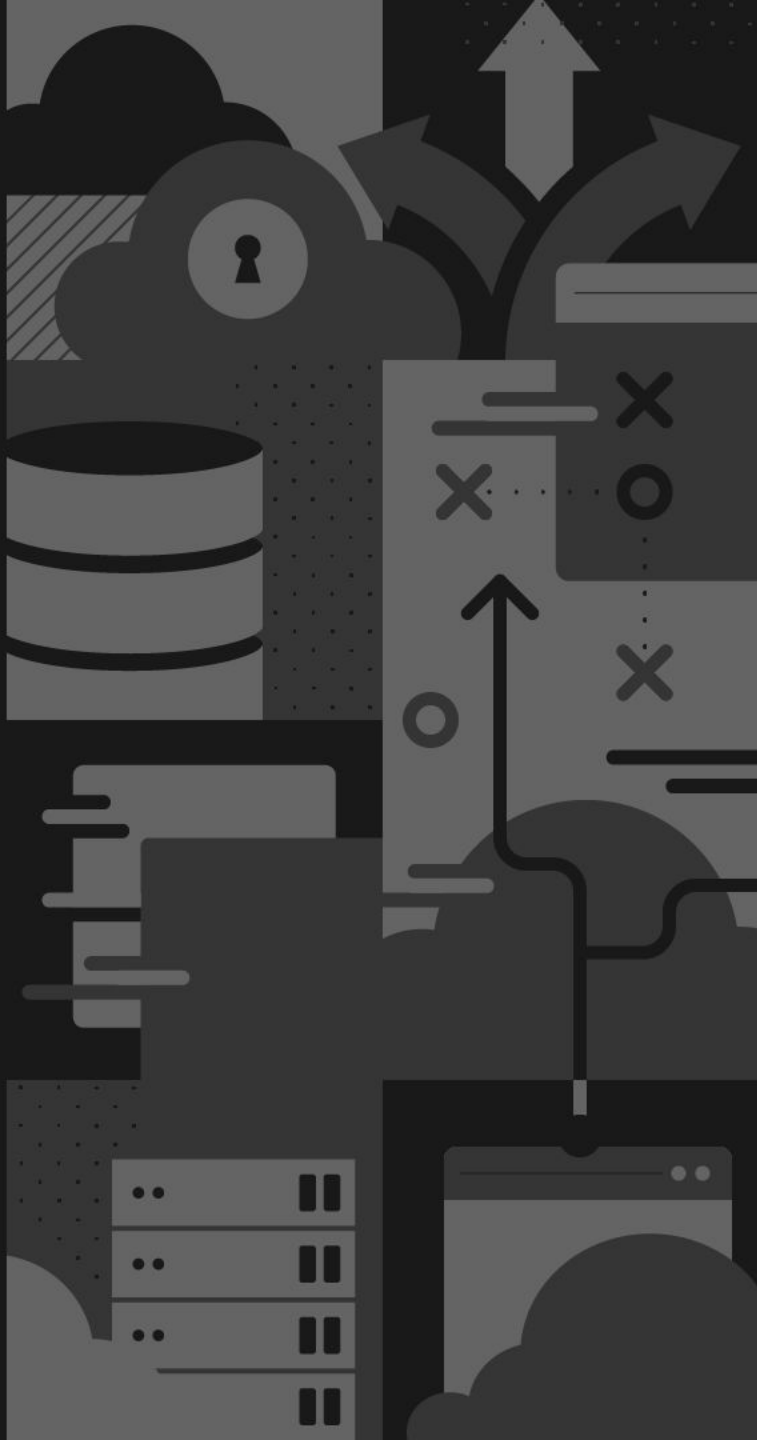
Problem

Solution

Future Plans

Discovery

Implementations



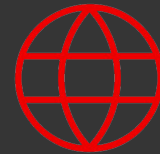
# Problem

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# Red Hat is big. **Really big.**



19,000+  
Employees



35+  
Countries

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We use a lot of **different technologies** across our company to serve our customers.

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Redhat.com is built on  
**Drupal and single-page  
applications.**



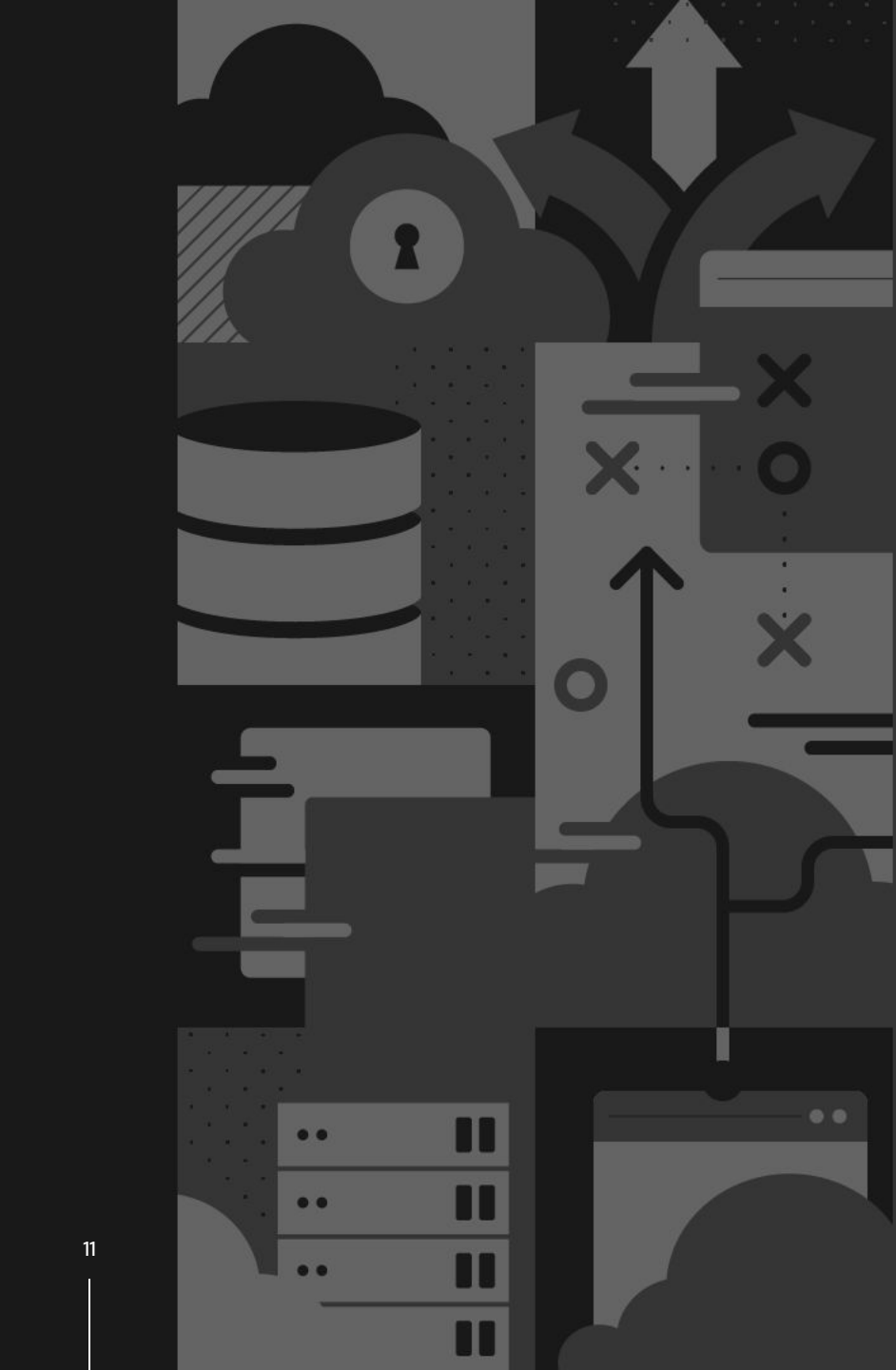
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# Organizational data



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There has to be a **better way to share data** across the redhat.com ecosystem.



# Discovery



# Red Hat Customer Portal

Product Experience  
[access.redhat.com/products](https://access.redhat.com/products)

# Customer Portal



Helps our customers get the most out of their subscriptions



Product information is core to our data organization



Multiple teams and sites combine to make the Customer Portal

# Product Experience



Manual content management process



Duplication of content across platforms



Risk of outdated, inaccurate product information across redhat.com



Lost time maintaining an imperfect system

# Requirements



Share data in a scalable/maintainable way



Provide flexible data model/schema



Connect with current tech stacks



Serve as a single source of truth



# Solution





# Data Lake



Share data in a  
scalable/maintainable way

**Scalable, low-maintenance**



Provide flexible data  
model/schema

**Flexible structure,  
schema-on-read option**



Connect with current  
tech stacks

**Drupal module, GraphQL,  
PHP Driver**



Serve as a single source  
of truth

**Bring your own governance**

# Challenges



Protect against  
"data rot"



Establish  
governance plan



Security and privacy  
compliance

# Advantages



Scalability



Simple architecture



Additional  
"caching" layer



# Indexing



Custom Search API  
Backend



Search API's index  
management



Flexible schema  
for each  
data source



Drupal's access  
control, data model,  
and editorial  
experience

# Retrieval



Single-page applications  
GraphQL



Drupal  
PHP MongoDB Driver



# Implementations





# Red Hat Customer Portal

Product Experience  
[access.redhat.com/products](https://access.redhat.com/products)

# Index page

- ▶ All data pulled via GraphQL from the Data Lake
- ▶ Statically generated via a GitLab build pipeline
- ▶ No more manual maintenance by a developer in a Drupal node
- ▶ Prevents accidental removal of the page in the Drupal UI

Red Hat Customer Portal - Acc. x +

access.redhat.com/products/

Subscriptions Downloads Containers Support Cases

Red Hat Customer Portal Products & Services Tools Security Community

Search English All Red Hat

## Red Hat Products and Documentation

A-Z Categories

# A C D E F G H I J M N O P Q R S U V W

#

Red Hat 3scale API Management [Product Info](#) [Documentation](#)

A

Red Hat Advanced Cluster Management for Kubernetes [Product Info](#) [Documentation](#)

Red Hat Advanced Cluster Security for Kubernetes [Product Info](#) [Documentation](#)

Red Hat AMQ [Product Info](#) [Documentation](#)

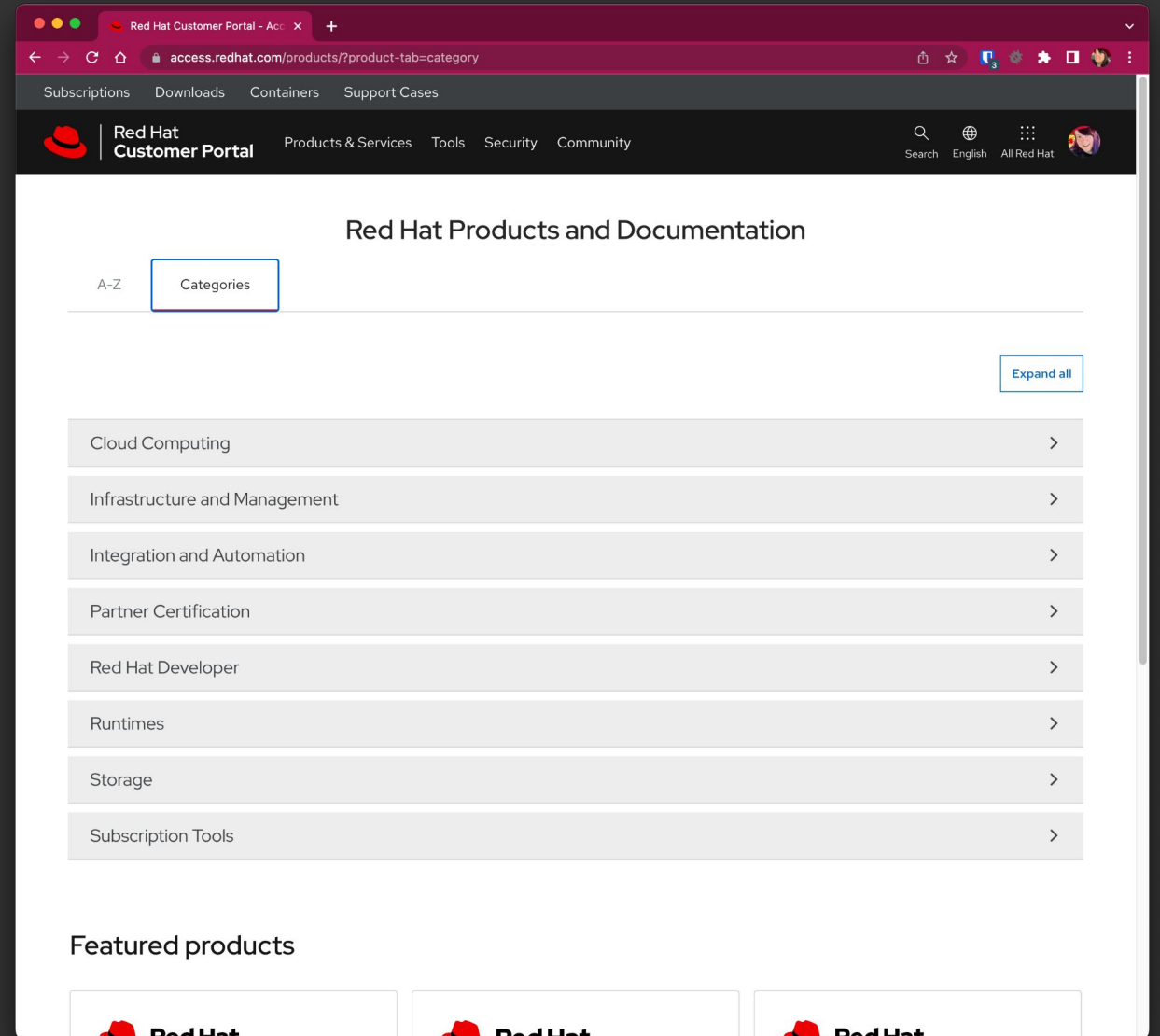
Red Hat AMQ Broker [Product Info](#) [Documentation](#)

Red Hat AMQ Interconnect [Product Info](#) [Documentation](#)

Red Hat AMQ Streams [Product Info](#) [Documentation](#)

# Index page

- ▶ All data pulled via GraphQL from the Data Lake
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- ▶ No more manual maintenance by a developer in a Drupal node
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# Index page

- ▶ Translations are managed through Drupal and indexed into the Data Lake

Red Hat Customer Portal

모든 Red Hat 제품 및 문서

A-Z 카테고리

모두 펼치기

클라우드 컴퓨팅

Red Hat Advanced Cluster Management for Kubernetes

Red Hat® Advanced Cluster Management for Kubernetes controls clusters and applications from a single console, with built-in security policies. Extend the value of Red Hat OpenShift® by deploying apps, managing multiple clusters, and enforcing policies across multiple clusters at scale. Red Hat's solution ensures compliance, monitors usage, and maintains consistency.

설명서 제품 정보

Red Hat Advanced Cluster Security for Kubernetes

Cost Management

Red Hat Hybrid Cloud Console

Red Hat build of MicroShift - Developer Preview

Migration Toolkit for Containers

Migration Toolkit for Virtualization

Red Hat OpenShift API Management

# Product page

- ▶ Launched April 3, 2023! 🎉
- ▶ Product names ingested from our Product Life Cycle API
- ▶ Canonical links are managed by Drupal
- ▶ Displays data from other systems (non-Drupal) such as:
  - Documentation
  - Security advisories

The screenshot shows the Red Hat Customer Portal interface for the Red Hat Enterprise Linux product page. The browser address bar shows the URL `access.redhat.com/products/red-hat-enterprise-linux/`. The navigation bar includes links for Subscriptions, Downloads, Containers, and Support Cases. The main content area features the Red Hat logo and the text "Red Hat Enterprise Linux". Below this, there is a blue "Downloads" button and a link to the "Ecosystem Catalog". A section titled "Browse the latest documentation" includes a "Select a version" dropdown menu and a grid of eight documentation cards. The cards are: "9.2 Release Notes" (Release Notes), "Considerations in adopting RHEL 9" (Planning), "Performing a standard RHEL 9 installation" (Installing RHEL), "Upgrading from RHEL 8 to RHEL 9" (Upgrading RHEL), "Composing a customized RHEL system image" (Builder), "Configuring basic system settings" (System Administration), "Managing and monitoring security updates" (Security), and "Configuring and managing networking" (Networking). A link to "View all product documentation" is located at the bottom of the grid.

# Product page

- ▶ Product bundles managed in Drupal
- ▶ Indexed into the Data Lake using predefined schema
- ▶ All data (including resource links) pulled from child product data in the Data Lake

The screenshot shows a web browser window displaying the Red Hat Customer Portal page for Red Hat AMQ. The browser's address bar shows the URL `access.redhat.com/products/red-hat-amq/`. The page header includes navigation links for Subscriptions, Downloads, Containers, and Support Cases, along with the Red Hat Customer Portal logo and navigation links for Products & Services, Tools, Security, and Community. A search bar and language selection options (English, All Red Hat) are also visible.

## Red Hat AMQ

Red Hat AMQ—based on open source communities like Apache ActiveMQ and Apache Kafka—is a flexible messaging platform that delivers information reliably, enabling real-time integration and connecting the Internet of Things (IoT).

[Downloads](#)

[Ecosystem Catalog](#) →

### Included with Red Hat AMQ

Red Hat AMQ Broker

A flexible messaging platform that delivers information reliably, enabling real-time integration and connecting the Internet of Things (IoT).

**Resources**

<a href="#">Learn about Red Hat AMQ Broker</a>	<a href="#">View documentation</a>	<a href="#">View Product Life Cycle</a>	<a href="#">dl_latest_version</a>
Product info	Documentation	Lifecycle	Downloads

Red Hat AMQ Interconnect

# Drupal backend

- ▶ Standard UI using Claro
- ▶ Custom Product Bundles entity

The screenshot displays the Drupal administration interface for the 'Content' entity. At the top, there are navigation links for 'Home > Administration' and 'Content'. Below this, there are tabs for 'Content', 'Files', 'Action Items', and 'Product Bundles'. A blue '+ Add content' button is visible. The search and filter section includes input fields for 'Title' (containing 'amq'), 'UUID', 'Content type' (set to '- Any -'), and 'Language' (set to '- Any -'). There is also a 'Published status' dropdown set to '- Any -' and 'Filter' and 'Reset' buttons. An 'Action' dropdown is set to 'Delete content'. Below the filters is an 'Apply to selected items' button. The main content area features a table with the following columns: Title, Content type, Author, Language, Status, Updated, and Operations. The table contains four rows of content items, all of which are 'Product' type and 'Published' status.

<input type="checkbox"/>	Title	Content type	Author	Language	Status	Updated	Operations
<input type="checkbox"/>	<a href="#">Red Hat AMQ Broker</a>	Product	<a href="#">admin</a>	English	Published	05/17/2023 - 14:27	Edit
<input type="checkbox"/>	<a href="#">Red Hat AMQ Streams</a>	Product	<a href="#">admin</a>	English	Published	05/17/2023 - 14:26	Edit
<input type="checkbox"/>	<a href="#">Red Hat AMQ Streams</a>	Product	<a href="#">rhn-support-mbent</a>	Japanese	Published	05/17/2023 - 14:26	Edit
<input type="checkbox"/>	<a href="#">Red Hat AMQ Streams</a>	Product	<a href="#">admin</a>	Korean	Published	05/17/2023 - 14:26	Edit

# Drupal backend

- ▶ Standard UI using Claro
- ▶ Custom Product Bundles entity

Home > Administration > Content

## Product Bundles

Content Files Action Items **Product Bundles**

[+ Add product bundle](#)

Product	Published	Author	Created	Updated	Operations
<a href="#">Red Hat AMQ</a>	Yes	<a href="#">rhn-support-stummulw</a>	Thu, 03/23/2023 - 13:14	Thu, 03/23/2023 - 18:03	Edit <input type="checkbox"/>
<a href="#">Red Hat Runtimes</a>	Yes	<a href="#">rhn-support-mbent</a>	Thu, 03/23/2023 - 14:48	Thu, 03/23/2023 - 18:06	Edit <input type="checkbox"/>
<a href="#">Red Hat Application Foundations</a>	Yes	<a href="#">rhn-support-mbent</a>	Thu, 03/23/2023 - 14:51	Fri, 05/05/2023 - 13:32	Edit <input type="checkbox"/>
<a href="#">Red Hat OpenShift Platform Plus</a>	Yes	<a href="#">rhn-support-mbent</a>	Thu, 03/23/2023 - 14:54	Thu, 04/20/2023 - 20:08	Edit <input type="checkbox"/>
<a href="#">Red Hat Integration</a>	Yes	<a href="#">rhn-support-mbent</a>	Thu, 03/23/2023 - 14:56	Fri, 05/05/2023 - 13:31	Edit <input type="checkbox"/>
<a href="#">Red Hat Hybrid Cloud Console</a>	Yes	<a href="#">aheslin@redhat.com</a>	Wed, 04/12/2023 - 14:44	Wed, 05/03/2023 - 18:08	Edit <input type="checkbox"/>

Total product bundles: 6



# Drupal backend

- ▶ Standard UI using Claro
- ▶ Custom Product Bundles entity

Home > Administration > Content > Product Bundles

## Edit Red Hat AMQ

[Edit](#) [Delete](#)

**Product \***

Red Hat AMQ (84)

The product (or products) to which this bundle applies. *Normally there will be only a single product associated with a bundle.*

[Show row weights](#)

**Bundled Products \***

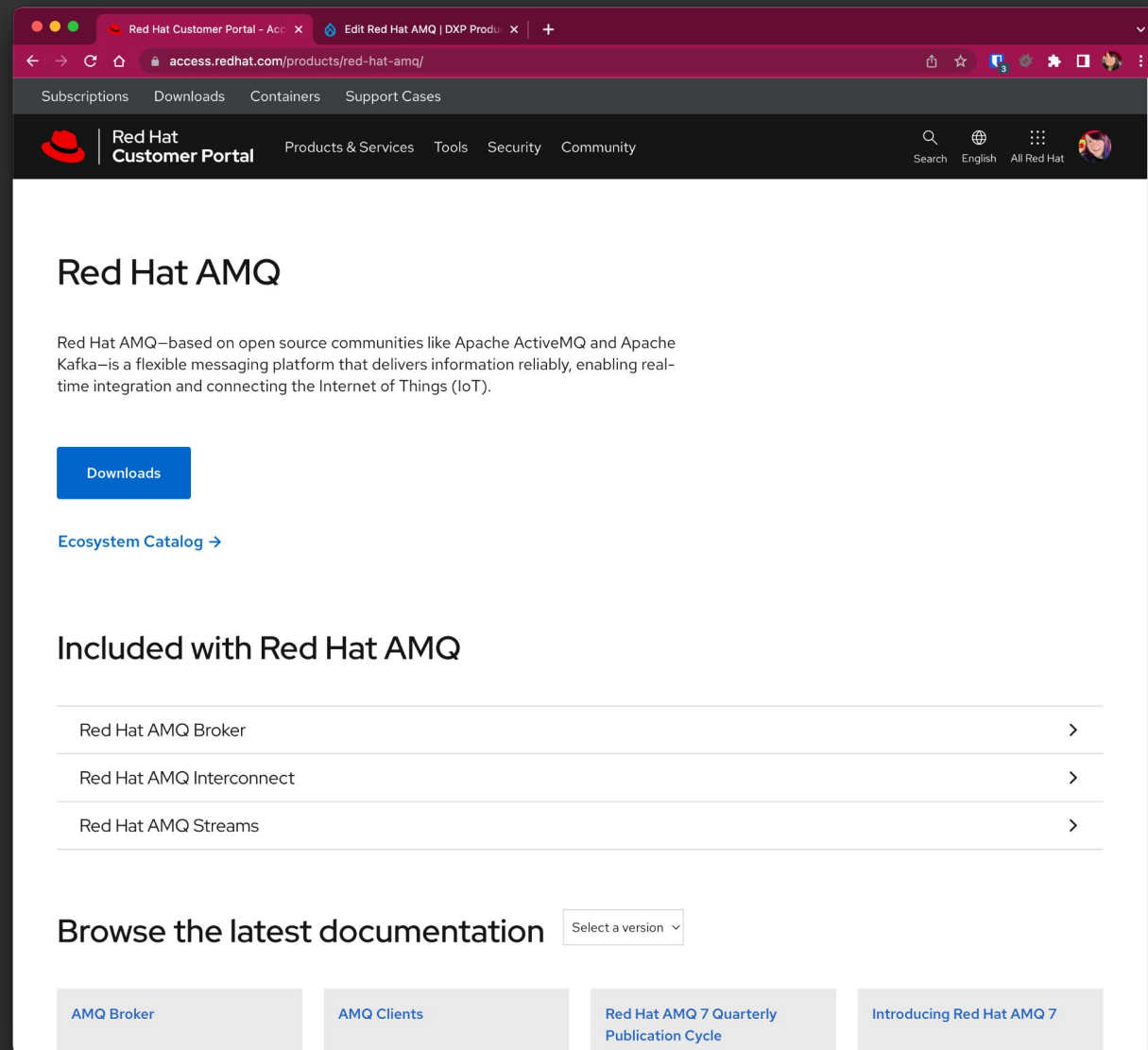
<input type="text"/>	Red Hat AMQ Broker (21) <input type="text"/>	<input type="text"/>
<input type="text"/>	Red Hat AMQ Interconnect (85) <input type="text"/>	<input type="text"/>
<input type="text"/>	Red Hat AMQ Streams (86) <input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Products that should be associated with the above product. These values are used to populate the "included" products on the automated product pages. Note: The order the products are listed here is the order they will be listed on the customer-facing product pages.

[Add another item](#)

# Drupal backend

- ▶ Order of product bundles controlled by Drupal



The screenshot shows a web browser window displaying the Red Hat Customer Portal for Red Hat AMQ. The browser tabs include "Red Hat Customer Portal - Acc..." and "Edit Red Hat AMQ | DXP Produ...". The address bar shows "access.redhat.com/products/red-hat-amq/". The navigation bar includes "Subscriptions", "Downloads", "Containers", and "Support Cases". The main header features the Red Hat logo, "Red Hat Customer Portal", and links for "Products & Services", "Tools", "Security", and "Community". There are also search, language, and user profile icons.

## Red Hat AMQ

Red Hat AMQ—based on open source communities like Apache ActiveMQ and Apache Kafka—is a flexible messaging platform that delivers information reliably, enabling real-time integration and connecting the Internet of Things (IoT).

[Downloads](#)

[Ecosystem Catalog](#) →

### Included with Red Hat AMQ

Red Hat AMQ Broker	→
Red Hat AMQ Interconnect	→
Red Hat AMQ Streams	→

**Browse the latest documentation**

[AMQ Broker](#) [AMQ Clients](#) [Red Hat AMQ 7 Quarterly Publication Cycle](#) [Introducing Red Hat AMQ 7](#)

After all that. Now you...

Manage data in Drupal

Index the data to the Data Lake

Query the Data Lake with GraphQL

Build the page via GitLab pipeline

Set your refresh every 30 minutes

Enjoy your newly automated life



# Red Hat Developer

The Red Hat logo is positioned to the right of the text. It consists of a red fedora hat icon above a circular emblem. The emblem is composed of several colored segments: a red arc at the top, an orange arc at the top-right, a blue arc at the bottom-right, a light blue arc at the bottom, and a green arc at the bottom-left. A diagonal line, colored green and blue, crosses the emblem from the top-left to the bottom-right.

[developers.redhat.com](https://developers.redhat.com)

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A **Learning Path** is a curated collection of content, directing users to learn more about a particular topic or product.

# developers.redhat.com

The screenshot shows a browser window with the URL `developers.redhat.com/blog/2020/12/08/spring-boot-to-quarkus-migrations-and-more...`. The page features the Red Hat Developer logo and navigation links. The article title is "Spring Boot to Quarkus migrations and more in Red Hat's migration toolkit for applications 5.1.0", dated December 8, 2020, by Miguel Pérez Colino, Product Manager. A "Table of contents" dropdown is visible. The main text discusses the migration toolkit for applications 5.1.0, which includes user interface improvements and new rules for migrating from Spring Boot to Quarkus. A "Recent Articles" sidebar lists other content like "How to run Camel on Spring Boot in Red Hat Developer Sandbox" and "How JBoss EAP 8-Beta makes deployment on OpenShift easier".

Article

The screenshot shows a browser window with the URL `developers.redhat.com/cheat-sheets/quarkus-kubernetes-i`. The page features the Red Hat Developer logo and navigation links. The cheat sheet title is "Quarkus & Kubernetes I Cheat Sheet", dated April 30, 2020, by Alex Soto Bueno. A "Download now" button is prominent. The "About" section states that the cheat sheet covers integrations between Quarkus and Kubernetes. A list of topics covered includes: "Creating a project", "Native executable support", "container image creation", and "Kubernetes". A "Comments" section is also visible at the bottom.

Cheat Sheet

# developers.redhat.com

The screenshot shows a browser window with the URL `developers.redhat.com/learning/devnation:kubernetes-and-friends/resource/resources...`. The page header includes the Red Hat Developer logo and navigation links. The breadcrumb trail is `DevNation > Kubernetes and friends > Spring Boot to Quarkus migrations and more in Red Hat's migration toolkit for applications 5.1.0`. The main heading is **Kubernetes and friends**, with a sub-heading **Spring Boot to Quarkus migrations and more in Red Hat's migration toolkit for applications 5.1.0**. The article is by Miguel Pérez Colino, published on December 8, 2020. The content discusses the Red Hat migration toolkit for applications (formerly Red Hat Application Migration Toolkit) and its support for Spring Boot to Spring Boot migrations. A sidebar on the left lists a learning path with six items, where the current article is the third item.

Article in Learning Path

The screenshot shows a browser window with the URL `developers.redhat.com/learning/devnation:kubernetes-and-friends/resource/resources...`. The breadcrumb trail is `DevNation > Kubernetes and friends > Quarkus & Kubernetes I Cheat Sheet`. The main heading is **Kubernetes and friends**, with a sub-heading **Quarkus & Kubernetes I Cheat Sheet**. The cheat sheet is by Alex Soto Bueno, published on April 30, 2020. The content covers integrations between Quarkus and Kubernetes. A red **Download now** button is visible. The sidebar on the left lists a learning path with six items, where the current cheat sheet is the third item.

Cheat Sheet in Learning Path



# Learning Path content type

The screenshot displays the Workbench interface for a Learning Path. The main area shows a list of resources under the heading "Resources". A modal window titled "Add resource" is open, allowing the user to add a new resource to the path. The modal includes a "Product" dropdown menu set to "Red Hat OpenShift API Management" and a "Topics" dropdown menu set to "- Any -". Below these are a "Title" input field, "Apply" and "Reset" buttons, and a preview of three resource cards. The first card is titled "Getting started with the workshop" and is 15 minutes long. The second card is titled "Set up your instance of Red Hat's single sign-on technology on the Red Hat OpenShift API Management Developer Sandbox". The third card is titled "What is Red Hat OpenShift API Management?".

**Resources**

The resources within this learning path. They will be listed in the order in which they are added.

**Add resource**

**Title**

- Red Hat OpenShift architecture
- Explore Red Hat OpenShift
- Create your first project
- Deploy an application using a pre-existing container image
- Work with application labels to identify component parts

**Add resource**

**Library** **Create resource**

**Product** Red Hat OpenShift API Management **Topics** - Any -

**Title**

**Apply** **Reset**

**Page 1**

**Getting started with the workshop**

15 minutes

Learn how to consume and produce Kafka messages.

**Page 2**

**Set up your instance of Red Hat's single sign-on technology on the Red Hat OpenShift API Management Developer Sandbox**

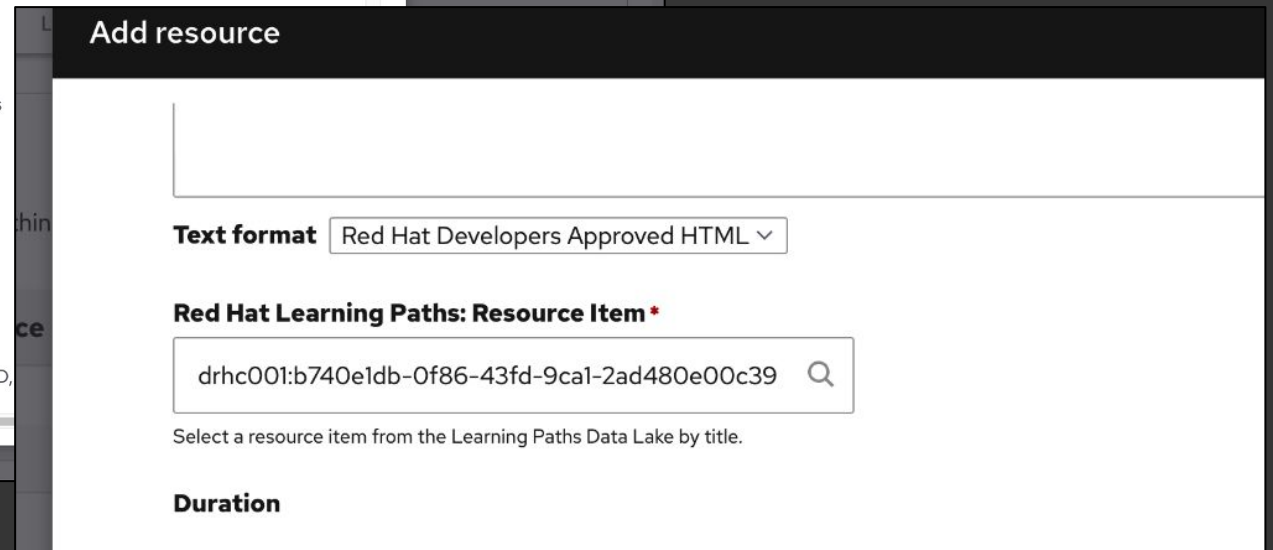
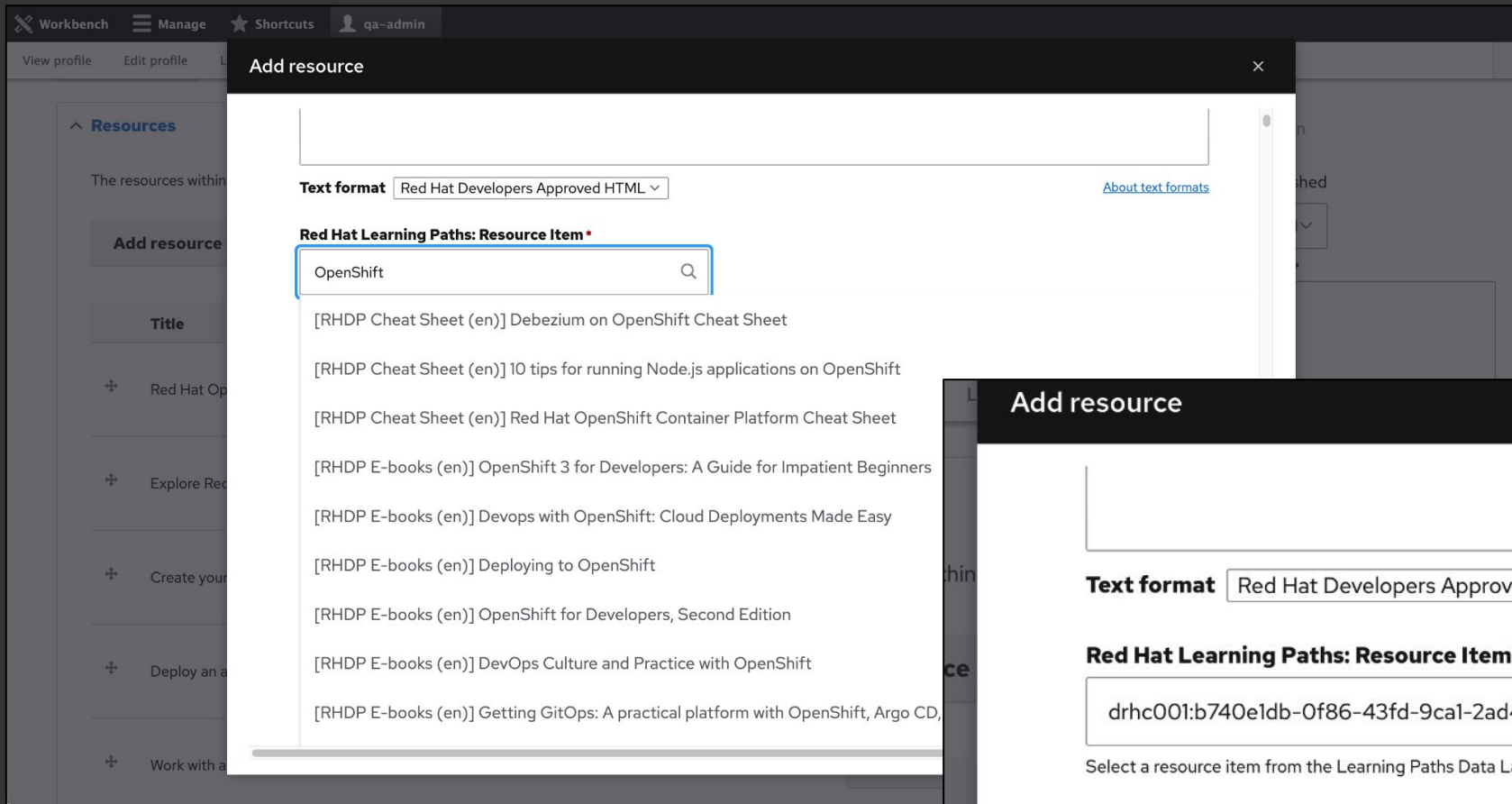
Set up your instance of Follow these steps only if you are using the OpenShift API Management Developer Sandbox. Red Hat's single sign-on technology on the Red Hat OpenShift API Management Developer Sandbox.

**Page 1**

**What is Red Hat OpenShift API Management?**

Red Hat OpenShift API Management is a cloud service for creating, securing, and publishing your APIs. Get an introduction to how it works.

# Resource content type



The screenshot shows a browser window with the URL `developers.redhat.com/learning/devnation:kubernetes-and-friends/resource/resources...`. The page title is "Kubernetes and friends". Below the title, it says "Learning path | 21 resources | 12 hrs and 45 mins | Published on August 10, 2021". The main content area features an article titled "Spring Boot to Quarkus migrations and more in Red Hat's migration toolkit for applications 5.1.0" by Miguel Pérez Colino, dated December 8, 2020. A sidebar on the left contains a table of contents for the learning path, with the current article highlighted.

**Overview: Kubernetes and friends**

- 1 **Beginner: Kubernetes I Tutorial** Website | 30 mins
- 2 **Kubernetes in the sandbox** Website | 1 hr
- 3 **Quarkus & Kubernetes I Cheat Sheet** Cheat Sheet | 1 hr
- 4 **Video: Kubernetes Fundamentals** Website | 1 hr
- 5 **Elementary: Kubernetes II Tutorial** Website | 30 mins
- 6 **OpenShift in the sandbox II** Website | 30 mins

**Article**  
**Spring Boot to Quarkus migrations and more in Red Hat's migration toolkit for applications 5.1.0**  
 Containers, Java, Linux, Kubernetes, Quarkus, Spring Boot  
 Miguel Pérez Colino | December 8, 2020

Red Hat's [migration toolkit for applications](#) (previously known as Red Hat Application Migration Toolkit) has reached version 5.1.0. This version includes user interface improvement, the new migration toolkit for applications Operator, and new rules to support development teams migrating from Spring Boot to Quarkus.

**About migration toolkit for applications**  
 Migration toolkit for applications originally was designed to support [JBoss Enterprise Application Platform](#) (JBoss EAP) upgrades and migrations from proprietary application servers such as Oracle WebLogic. It has evolved to support a wider variety of migration paths, including [containerization](#). Java developers use the toolkit to assist migrations from the Oracle Java Development Kit (JDK) to [OpenJDK](#), from Apache Camel 2 to Apache Camel 3, from Spring Boot to [Spring Boot](#) on Red Hat Runtimes, and more.

Article in Learning Path

The screenshot shows a browser window with the URL `developers.redhat.com/learning/devnation:kubernetes-and-friends/resource/resources...`. The page title is "Kubernetes and friends". Below the title, it says "Learning path | 21 resources | 12 hrs and 45 mins | Published on August 10, 2021". The main content area features a cheat sheet titled "Quarkus & Kubernetes I Cheat Sheet" by Alex Soto Bueno, dated April 30, 2020. A sidebar on the left contains a table of contents for the learning path, with the current cheat sheet highlighted.

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- 6 **OpenShift in the sandbox II** Website | 30 mins

**Cheat Sheet**  
**Quarkus & Kubernetes I Cheat Sheet**  
 Kubernetes, Quarkus  
 Alex Soto Bueno | April 30, 2020

**Get the cheatSheet**  
[Download now](#)

The Quarkus and Kubernetes I cheat sheet covers the integrations you can find in the form of extensions between Quarkus and Kubernetes.

This cheat sheet by Java Champion Alex Soto will help you get moving immediately. Topics covered include:

- Creating a project
- Native executable support
- container image creation
- Kubernetes

Cheat Sheet in Learning Path

# developers.redhat.com

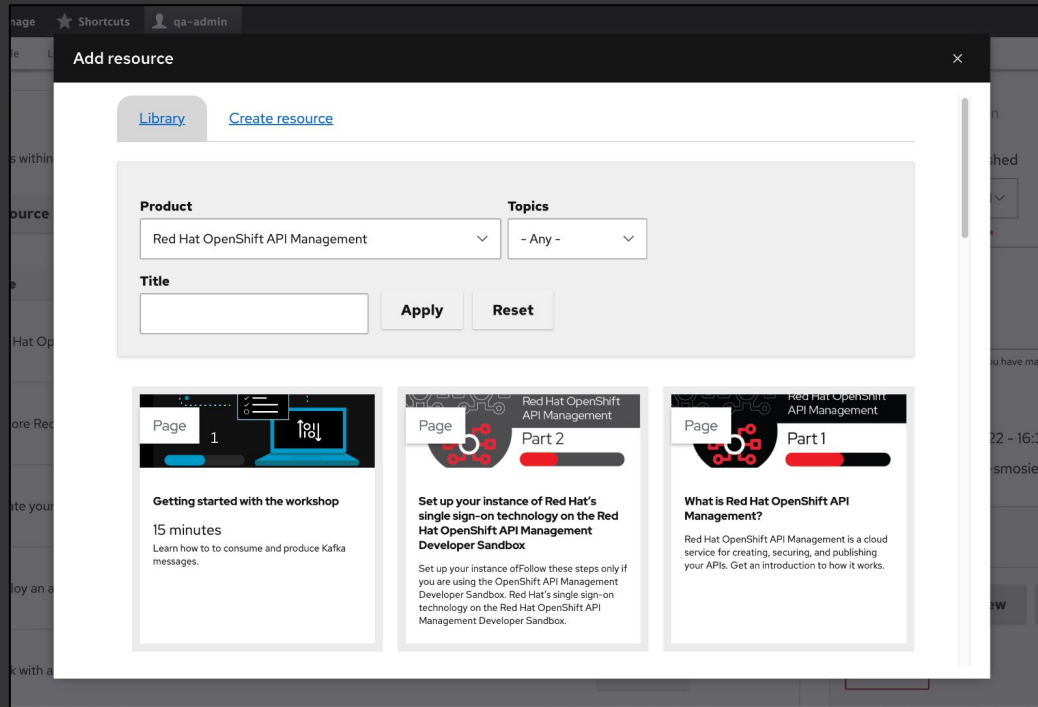
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Article in Learning Path

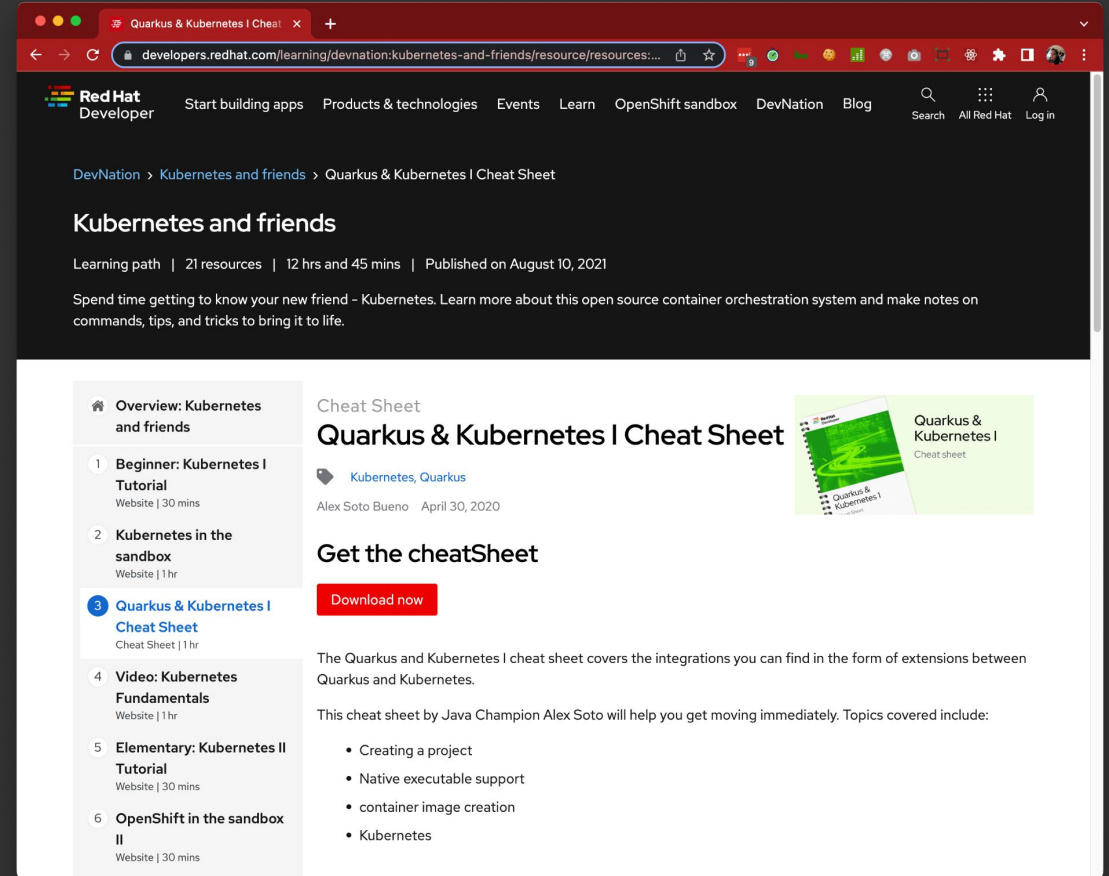
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Cheat Sheet in Learning Path

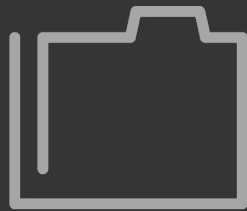
# Resource displays



`hook_preprocess_node()`



# Shared module



## Learning Paths shared module

- Data Lake Learning Paths schema
- Data Lake query service
- Reusable code:
  - Services
  - Controller
  - EventSubscriber
  - Blocks
  - Constraints/Validators

Red Hat  
Developer



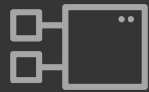
Red Hat  
Hybrid Cloud



# Future Plans



# Customer Portal

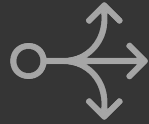


Standardizing Product taxonomy across Customer Portal microsites and beyond



Integrating with other systems at Red Hat

# Content Syndicated Patterns



“Shared patterns” with embedded content for banners, footers, marketing content, etc.

# Learning Paths



Learning Path discovery



# Wrap up

# Code Repository



## MongoDB Data Lake

<https://red.ht/dc2023>

*URL is shortened to make it easier to find the sandbox project.*

**Full URL:**

<https://www.drupal.org/sandbox/merauluka/3363610>

# Resources

## Drupal Contrib Modules

Allow Only One

[https://www.drupal.org/project/allow\\_only\\_one](https://www.drupal.org/project/allow_only_one)

Automatic Entity Label

[https://www.drupal.org/project/auto\\_entitylabel](https://www.drupal.org/project/auto_entitylabel)

Entity Browser

[https://www.drupal.org/project/entity\\_browser](https://www.drupal.org/project/entity_browser)

# Resources

## Drupal Contrib Modules

External Data Source

[https://www.drupal.org/project/external\\_data\\_source](https://www.drupal.org/project/external_data_source)

MongoDB

<https://www.drupal.org/project/mongodb>

Search API

[https://www.drupal.org/project/search\\_api](https://www.drupal.org/project/search_api)

# Thank you

Questions?

## Melissa Bent



[linkedin.com/in/melissabent](https://www.linkedin.com/in/melissabent)



[twitter.com/merauluka](https://twitter.com/merauluka)

## April Sides



[linkedin.com/in/aprilsides](https://www.linkedin.com/in/aprilsides)



[twitter.com/weekbeforenext](https://twitter.com/weekbeforenext)

## Red Hat



[linkedin.com/company/red-hat](https://www.linkedin.com/company/red-hat)



[youtube.com/user/RedHatVideos](https://www.youtube.com/user/RedHatVideos)



[facebook.com/redhatinc](https://www.facebook.com/redhatinc)



[twitter.com/RedHat](https://twitter.com/RedHat)