Red Hat
Runtimes

Red Hat Runtimes

Overview

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Sections

- Red Hat Runtimes Overview
- MicroProfile & Jakarta EE Products
  - JBoss EAP, JBoss EAP XP
- Lightweight Java Runtimes
  - Quarkus, OpenJDK, Spring Boot, JBoss Web Server (Tomcat)
- Reactive & Event-Driven Runtimes
  - Node.js, Eclipse Vert.x
- Runtimes Services
  - Red Hat Data Grid, Red Hat SSO, Red Hat AMQ (Broker)
- Migration Tooling
  - Red Hat Migration Toolkit for Applications

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Red Hat Runtimes Overview

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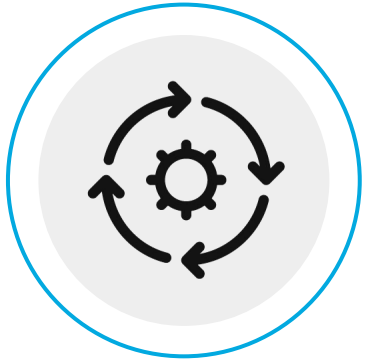
Red Hat customers have common needs & challenges

Hybrid cloud infrastructure

Build the foundation for the future, while managing costs to speed progress

Cloud-native development

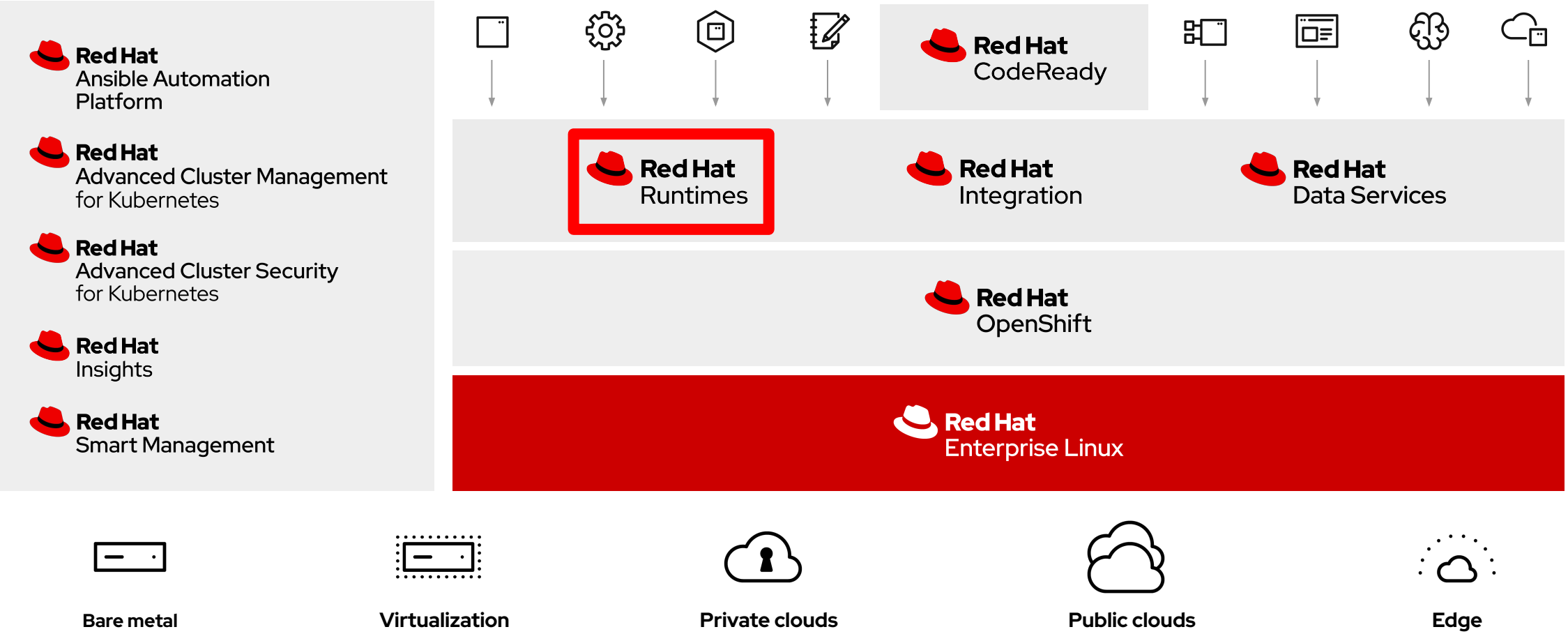
Accelerate application development, innovation, & delivery



IT automation & management

Automate infrastructure & applications so you can do more without sacrificing stability

Addressing these challenges with a broad portfolio



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Red Hat Cloud-Native Application Platform

Our vision is to simplify the creation of cloud-native services and serverless functions with a rich set of components and tools to match the **workloads** of modern cloud native apps.

Automate Kubernetes application operations with DevOps in mind

Red Hat OpenShift

Runtimes, frameworks and services to build applications natively on Kubernetes

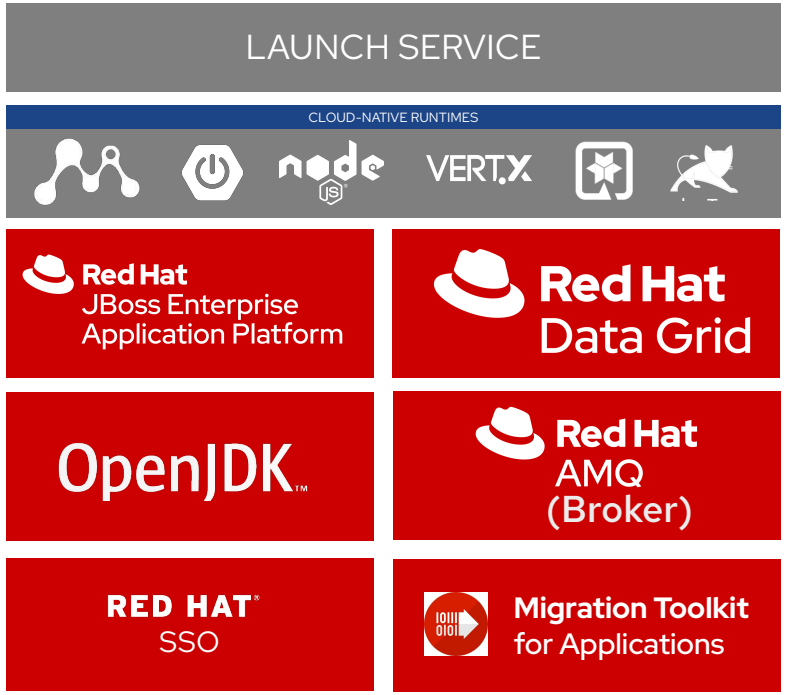
Red Hat Application Services

Tools and standard processes to increase developer productivity on Kubernetes

Red Hat OpenShift Dev Spaces

Red Hat Runtimes

Offering lightweight runtimes and frameworks for highly-distributed **cloud native** architectures such as microservices or serverless, with distributed in-memory caching for fast data access, single sign-on for authentication and authorization, and durable messaging for reliable data transfer between existing and new applications.



- Best-of-breed runtimes, frameworks and languages
- OpenShift & Kubernetes Services native integration
- Modernization and optimization initiatives
- Established middleware technologies (EAP)
- In-memory data grid
- Standards-based enterprise messaging
- SSO authentication

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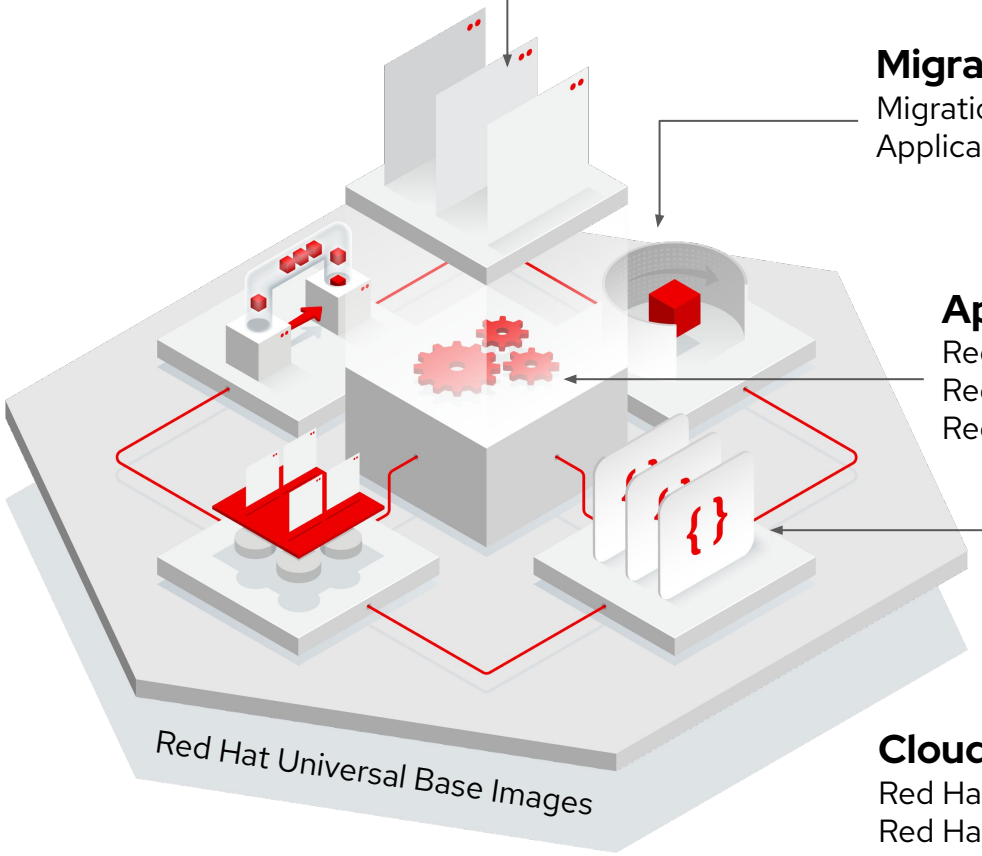
Red Hat Runtimes

- **Best-of-breed** language runtimes, frameworks and supporting services
- Developer-level and production support
- Supports legacy migrations & net-new applications
- OpenShift & Kubernetes Services native integration
- Foundational application development technology, **best on Red Hat platforms**



Runtimes
JBoss EAP (Jakarta EE) & XP (Microprofile)
JBoss Web Server (Apache Tomcat)
Red Hat build of OpenJDK
.NET Core for RHEL support

Migration
Migration Toolkit for Applications

Application Services
Red Hat Single Sign-On
Red Hat AMQ Broker
Red Hat Data Grid

Cloud-native Runtimes
Red Hat build of Quarkus
Red Hat support for Spring-Boot
Eclipse Vert.x
Node.js

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Red Hat Runtimes Benefits

Create Flexible, Portable, Open And Cost Effective Applications For Better Business Outcomes & Sustained Success.

Flexibility to choose the right tools

Collaboration across teams

Simplify application development

Increase efficiencies with innovation

Accelerate applications time to market

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MicroProfile & Jakarta EE

JBoss EAP - Java EE lift/shift from WAS/WLS, transactional apps
JBoss EAP XP - Transition to MicroProfile-based microservices leveraging existing Jakarta EE / JBoss EAP experience

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JBoss Enterprise Application Platform

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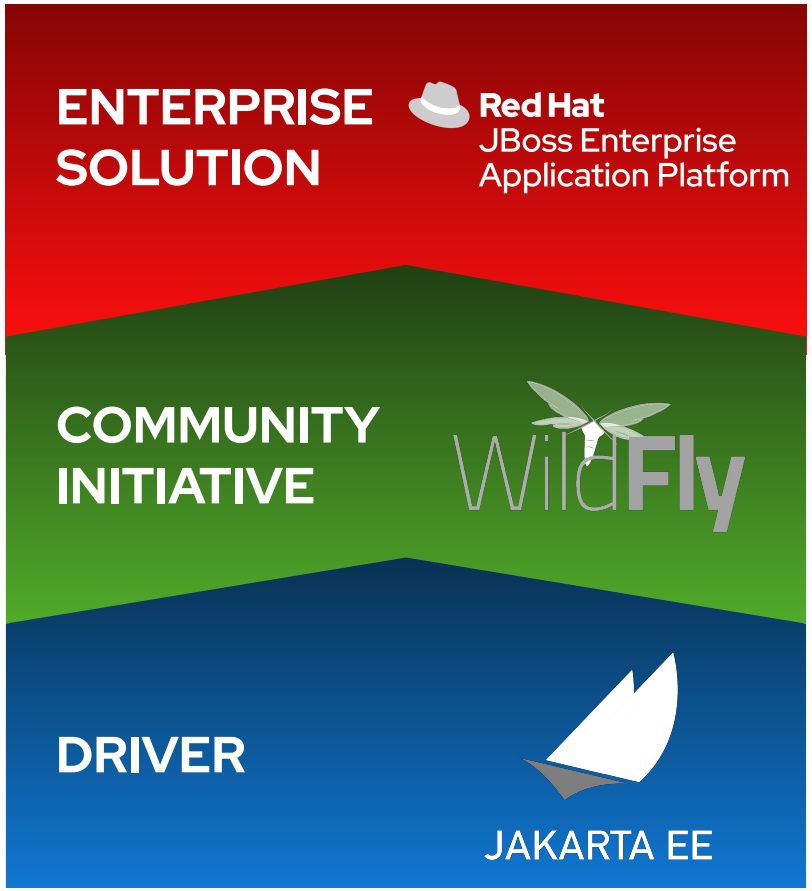
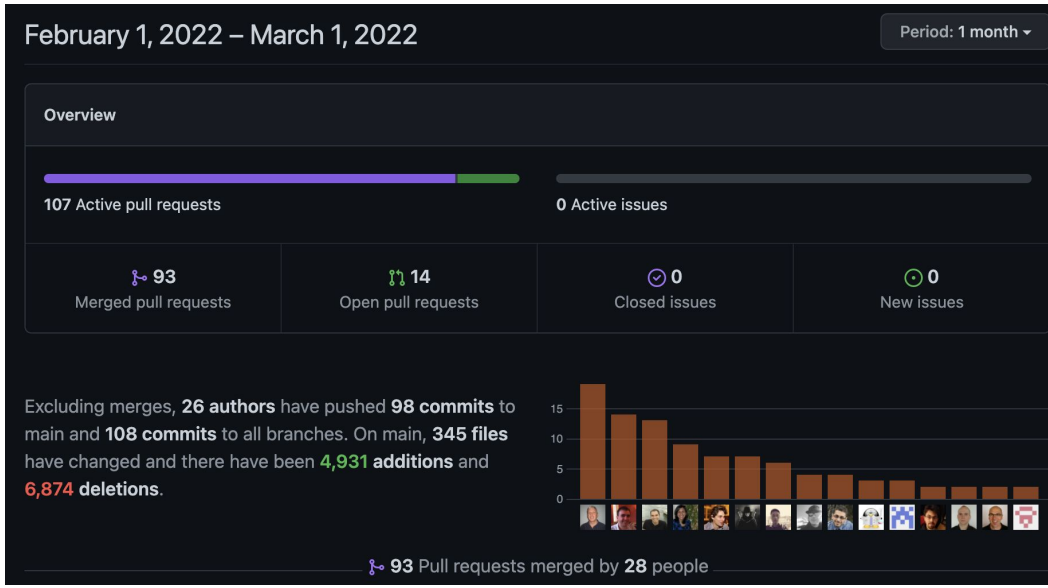
Quick EAP Recap



JBoss EAP is the leading enterprise-grade cloud-native, secure, performant, and scalable App Server for JEE workloads.

A mature platform supported by a vibrant community



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JBoss EAP on OpenShift

Key features of OpenShift as a host for JBoss EAP applications

Path toward cloud native development - Introduction to cloud native development techniques e.g. MicroProfile, 12 factor principles

Auto-scaling - Take advantage of OpenShift's built in auto scaling based on resource usage

Multiple build and deploy options -

- Template
- Helm chart
- JBoss EAP Operator
- Custom

Graceful shutdown - In-flight messages and transactions are completed or rolled back before shutdown operation*

Clustering support - JGroups configuration to use kubernetes api for cluster member discovery

HTTPS configuration - HTTPS configuration automated by template or helm chart at runtime

* Functionality provided by JBoss EAP Operator

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EAP on Hyperscalers

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Why JBoss EAP on hyperscalers is important

PLANS TO REHOST

Significant number of customers planning to rehost their Java workloads to non-containerized environments

CLOUD MANDATES

Companies are often mandated to move workloads to the cloud

COMMITTED SPEND

Marketplace offers utilize committed spend

CONSUMPTION BASED PRICING

Customers expect consumption based pricing for cloud services

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Amazon Web Services

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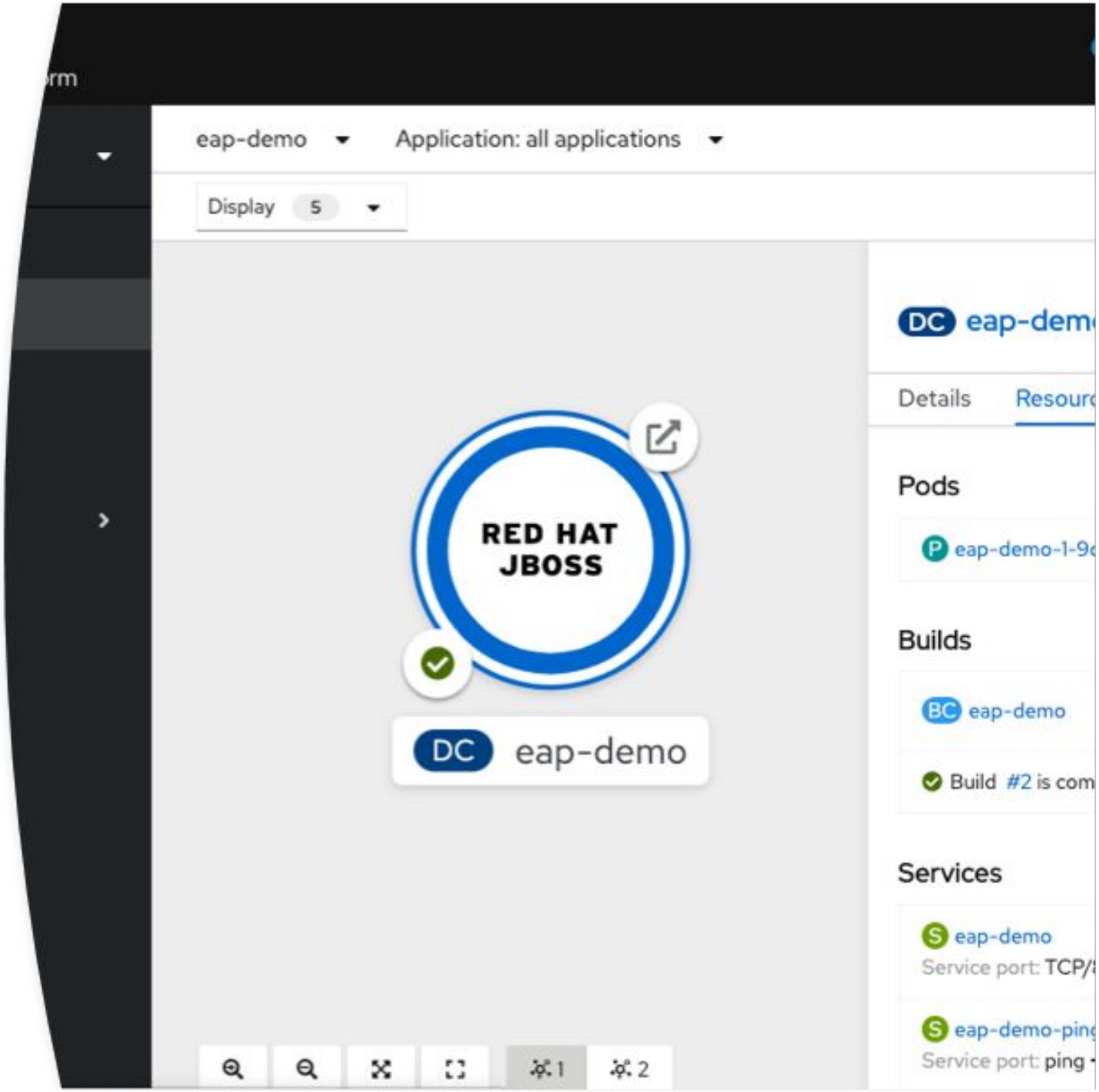
JBoss EAP on ROSA - Available Now

- EAP 7.x fully supported (same scope of support as OCP)
- EAP Templates
- EAP Operator
- ROSA pricing does *not* include EAP
  - Separate EAP subscription required



Microsoft Azure

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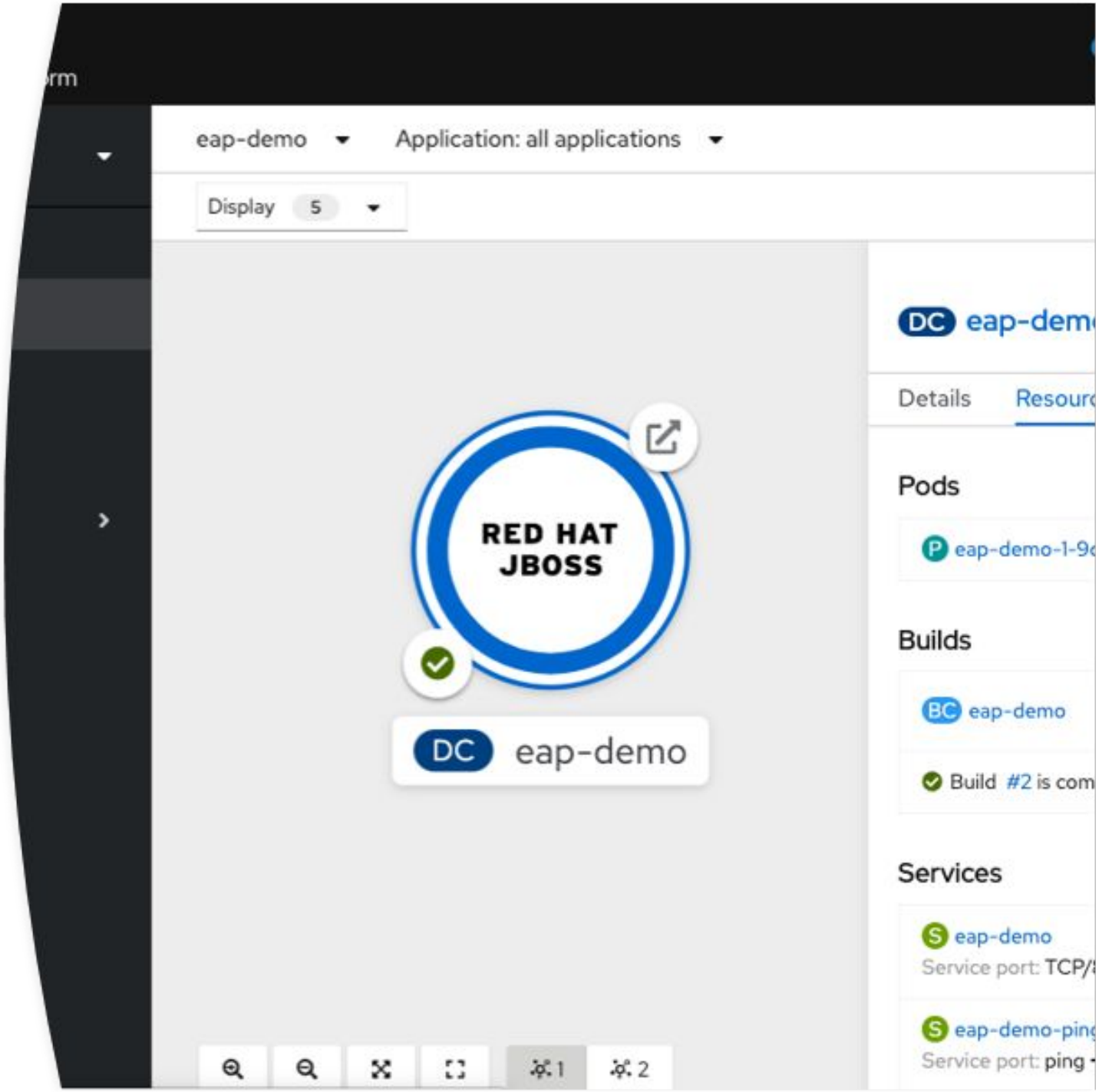
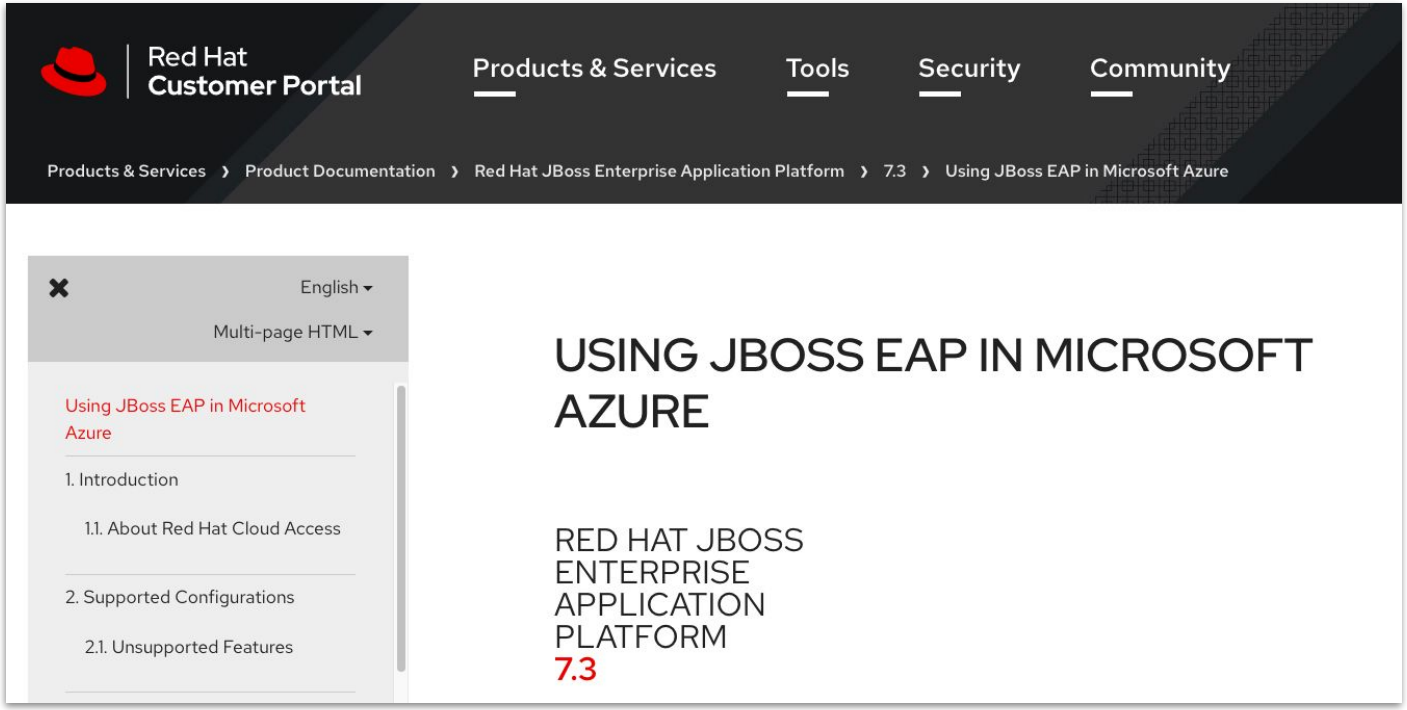
JBoss EAP on ARO - Available Now

- EAP 7.x fully supported (same scope of support as OCP)
- EAP Templates
- EAP Operator
- ARO pricing does *not* include EAP
  - Separate EAP subscription required



JBoss EAP on Azure - Available Now

- DIY Solution based on supported RHEL VMs
- Requires manual installation of EAP (ZIP or installer)
- Requires EAP subscription (aka BYOS)



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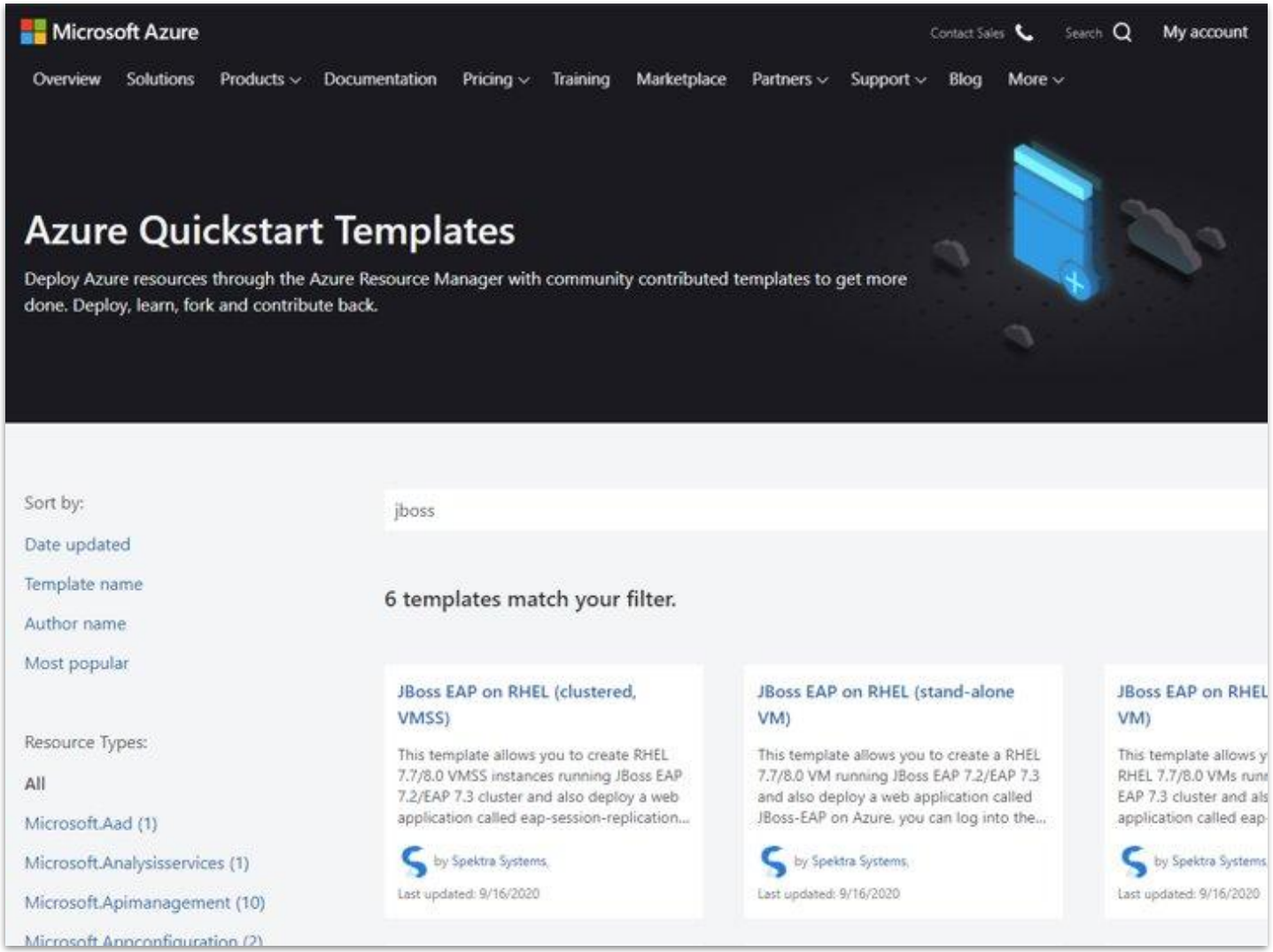
JBoss EAP on Azure *Quickstart Templates* - Available Now

- Pre-configured Azure ARM templates deployed from GitHub
- Deploys VMs, virtual networking, EAP
- Requires EAP subscription
- EAP 7.3, RHEL 8.x
- Standalone/Clustered/Clustered VMSS



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Google Cloud Platform

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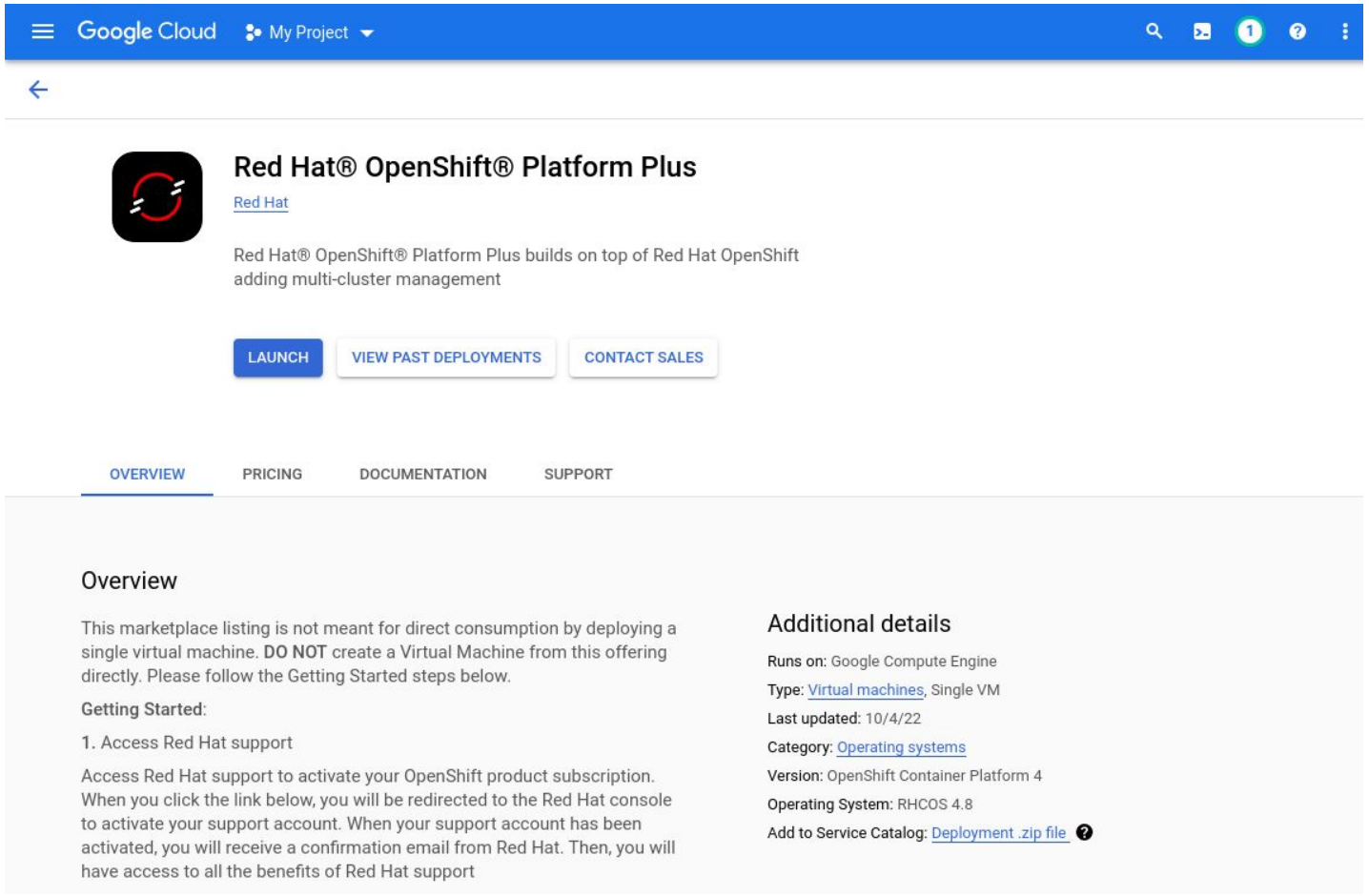
JBoss EAP OpenShift Platform Plus- Available Now

- OPP: PAYG
- EAP 7.x fully supported (same scope of support as OCP)
- EAP Templates
- EAP Operator
- OPP pricing does *not* include EAP
  - Separate EAP subscription required



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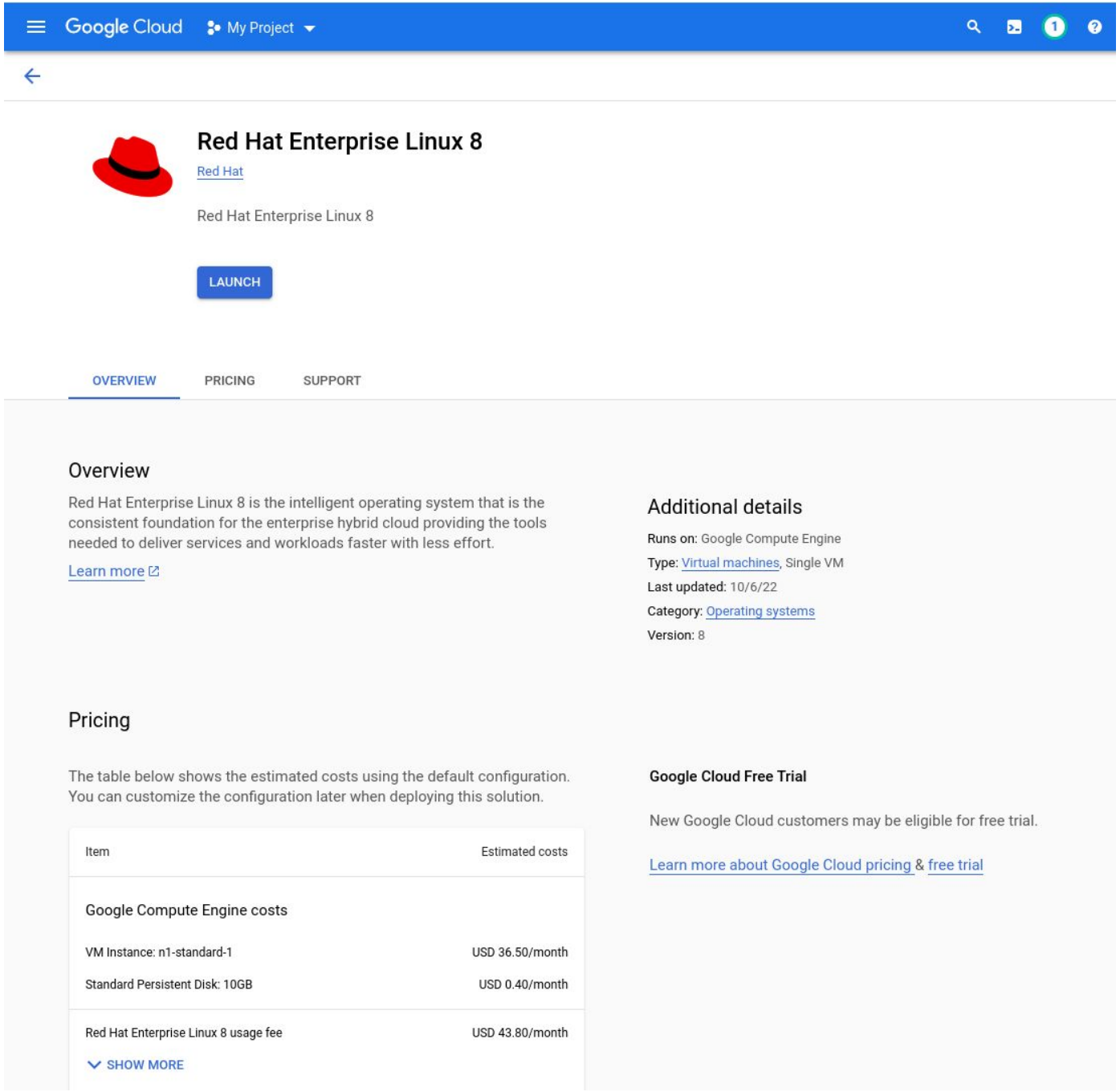
JBoss EAP on RHEL Google cloud – Available Now

- DIY Solution based on supported RHEL VMs
- Requires manual installation of EAP (ZIP or installer)
- RHEL (PAYG)
- Requires EAP subscription (aka BYOS)



OpenJDK

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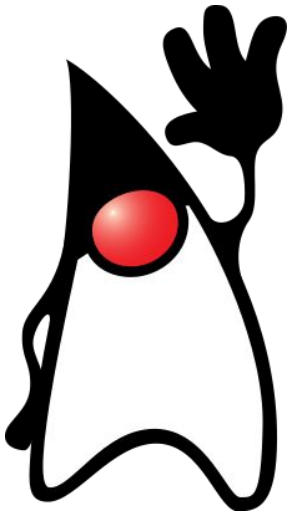
Red Hat has a deep vested interest in all things Java



Leadership
We are the Chair, or on the governance body, of all Java communities of note.

The Friend You Need, When it Matters Most … "Did someone say Log4J?"
Our business model is solely aimed at promoting, investing & code-contribution to Java and various open-source communities. Whereas the hyperscaler model is a passive packaging one.

Deeply Vested
Did you know that most of our Product Portfolio is written in Java and have a large consultancy team experienced in developing cloud-native Java apps for our customers.

Need Trained Java Developers?
We have a celebrated training curriculum. Alternatively we can help you vet new hires with our complimentary skills assessment.

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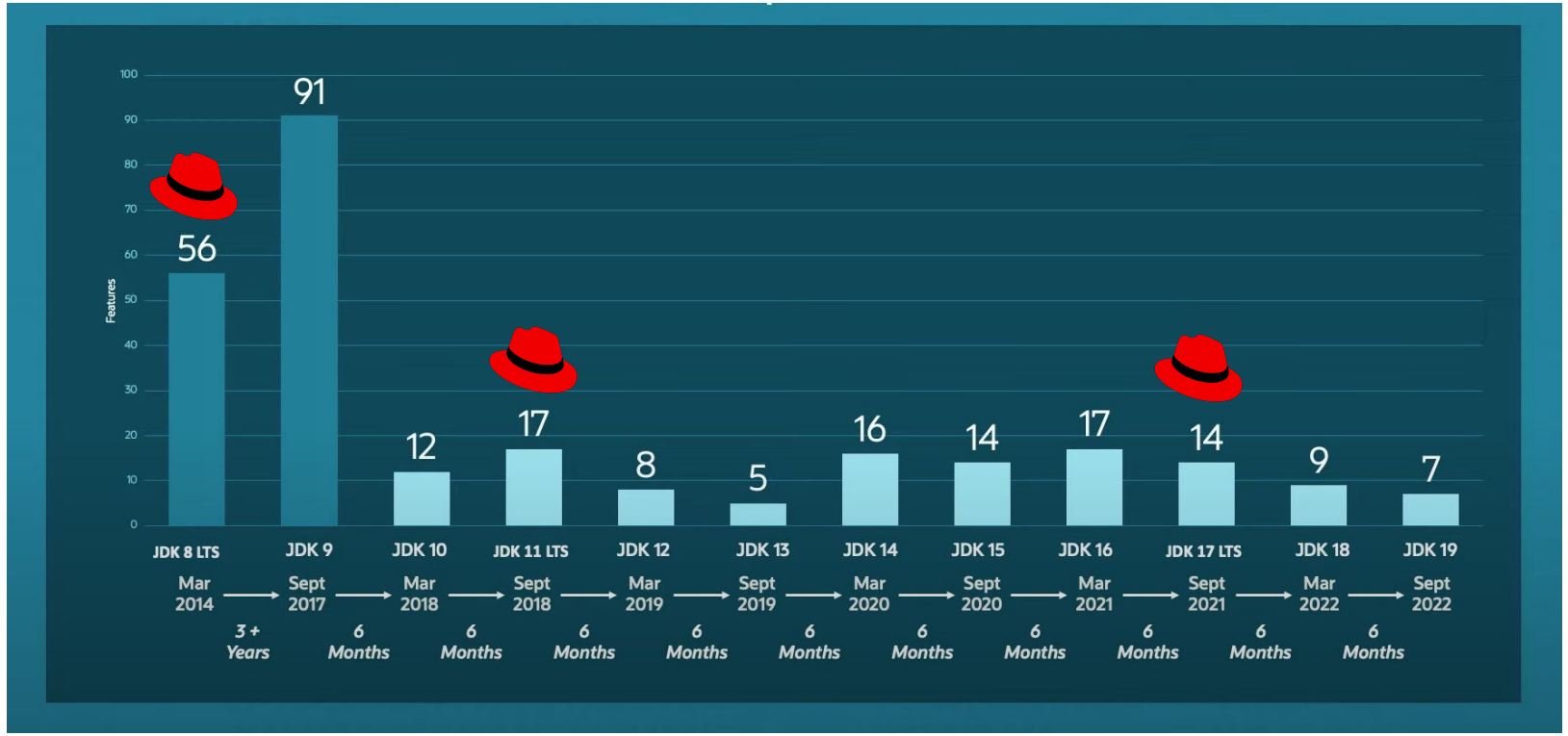
Upstream JDK Releases



- 6 month release cadence
- Red Hat supports each LTS release

Image courtesy of https://www.youtube.com/watch?v=g59PMSk1oAE

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Standardize Java Across Desktop, Server And Cloud With Openjdk

OpenJDK™

Free and open source implementation of the Java Platform for Red Hat Enterprise Linux and Windows for use across your enterprise

- Eliminate differences between Java platform used on developer desktops, in the datacenter and on the cloud
- Fully supported for production workloads on RHEL and Windows
- Long lifecycle to match your speed of innovation
- Red Hat a leading developer and contributor to OpenJDK

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RED HAT OPENJDK

OpenJDK

- RHEL users enjoy free Java support for all their subscribed RHEL systems. Red Hat Middleware application subscribers get full OpenJDK support for RHEL as well as for Windows for free for their subscribed applications. General OpenJDK Windows support is available as an add-on.

- Mature development team with over a decade of experience working on OpenJDK

- We are upstream leads for 7, 8u and 11u and we have many authors/committers/reviewers upstream, allowing us to quickly fix issues

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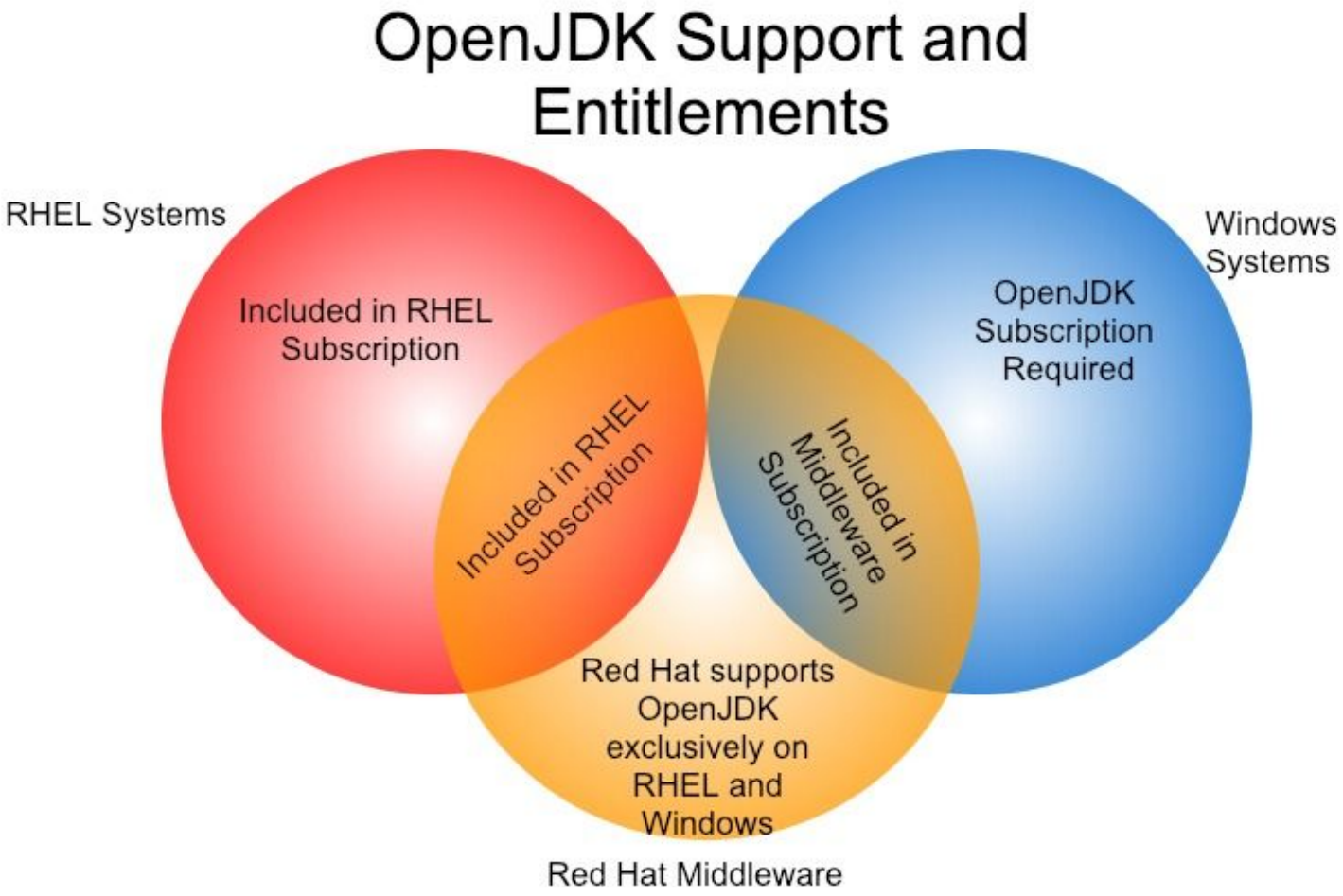
RED HAT OPENJDK ENTITLEMENTS

OpenJDK

Details



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Reactive & Event-Driven Runtimes

Eclipse Vert.x - Distributed/reactive applications with high concurrency and low latency. IoT.
Node.js - Reactive, event-driven, and non-blocking server-side JavaScript applications.

NODE.JS

OpenShift: the best place to run Enterprise Node.js workloads

- Most widely used language for cloud native and Serverless development (#1 on OpenShift Online)
- Improved first time development experience with NodeShift tool & Runtime starters

Consolidated Red Hat Node.js

- Previously multiple distributions of of Node.js offered by Red Hat
- Agreement with Software Collections team moves this to just one
  - Targeting November for full combined release
- Faster release cadence for OpenShift Images (6wks), and slower for RHEL (6months)
- Full development and production support via Middleware Runtimes product only

Futures

- Continue to be active in upstream (TSC, Committers)
- Red Hat-hosted NPM Registry with supported packages (Nodeshift, Opossum)
- Community Node.js 18 LTS and 19 released in October
- Red Hat build of Node.js 18 support added in RHEL 8.7 and 9.1
- Continued support for 16 and 14 along with security releases

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Node.js **Key Lifecycle Dates**

Red Hat build of Node.js

Version	General availability	Full support ends
Full support		
16.x LTS	December 21, 2021	April 30, 2024
14.x LTS	November 3, 2020	April 30, 2023
End of life		
12.x LTS	February 21, 2020	April 30, 2022
10.x LTS	April 1, 2018	April 30, 2021
8.9+	March 1, 2018	December 31, 2019

Node.js support aligns with the Node.js LTS life cycle dates defined by the Node.js Release Working Group, generally consisting of 18 months of full support followed by 12 months of maintenance support.

14.x users should be updating to **16.x**

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VERT.X

VERT.X

- Event-driven, Async model
- Embedded in Quarkus, Spring Boot starters
- Natural integration with MW Portfolio (e.g. Data Grid, AMQ/Streams)
- High concurrency edge use cases (e.g. IoT, FinTech)
- Available Now: Red Hat build of Eclipse Vert.x 4.3.4
- Red Hat build of Vert.x 4.3.6 expected in Q1 2023

VERT.X EOL

- The Red Hat build of Eclipse Vert.x has a very limited customer base and because there is a significant overlap between the Red Hat build of Quarkus and the Red Hat build of Eclipse Vert.x we plan to end-of-life the Red Hat build of Eclipse Vert.x product.
- Vert.x product will move into **maintenance only releases** in May 2023
  - Current Vert.x 4.x product support will be extended until May 2023
  - EOL will coincide with the next Quarkus release in October/November 2023
  - This is only the product release, the community is unaffected
  - Will be offered as part of the Quarkus product release

Vert.x **Key Lifecycle Dates**

Red Hat build of Eclipse Vert.x

Version	General availability	Full support ends
Full support		
4.x	January 7, 2021	January 31, 2023
End of life		
3.x	November 1, 2017	March 31, 2021

This will likely be extended to May 2023 to coincide with EOL

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Runtimes Services

Data Grid – Performance, distributed compute on big data sets, lightweight NoSQL, reduce focus on DB
Red Hat Single Sign-On – AuthN/AuthZ across data center
AMQ Broker – Async messaging across multiple protocols, leads to cross-datacenter communication
Migration Toolkit for Applications – Migrate your workload to Red Hat supported offerings

Boost App Performance With In-memory Distributed Data

Red Hat Data Grid

Distributed in-memory data management system for application data, synchronizing data across multiple systems providing fast access to your data

- Container-optimized, cluster-aware, cross-datacenter
- Ideal for on-premise, web, cloud, big data and IoT applications
- Improved performance for data-driven apps with very little effort
- Familiar APIs for Java developers
- Allows legacy apps to scale

RED HAT DATA GRID

Elastic Distributed In-Memory Grid

Auto data rebalancing
and advanced clustering
High Availability

Key/Value Store

Transactions, Queries,
Persistence, Event
Listeners...

Clustered Execution

Code execution next to
the right data

Integrated w/ Portfolio

RH Runtimes
RH Integration
RH Automation
RH Openshift

Red Hat Runtimes

Documentation additions and improvements

Data Grid 8.4 provides new documentation as well as improvements to existing content. Highlights in this release include:

- Data Grid Operator Guide and Building and deploying Data Grid clusters with Helm (Published as a standalone guide)
- Descriptions for Cross-site log messages (Better descriptions for ISPN cross-site log messages)
- Embedding Data Grid in Java Applications (More content on how to use Data Grid in embedded mode)**(Coming soon!)**
- Hot Rod Java Client Guide (Now includes information on Using the JCache API)
- Data Grid Performance and Sizing Guide (Improvements and updates)
- Numerous fixes and additions based on direct feedback from Red Hat account teams and customers
- Updated code and configuration examples throughout documentation

Data Grid Documentation Overview

Release information

Red Hat Data Grid 8.4 Release Notes

Data Grid Operator 8.4 Release Notes

Deploying Data Grid on OpenShift

Data Grid Operator Guide

Building and deploying Data Grid clusters with Helm

Deployment Planning

Data Grid Performance and Sizing Guide

Developing

Configuring Data Grid Caches

Using the RESP protocol endpoint with Data Grid

Data Grid Cross-Site Replication

Cross-site replication log messages

Embedding Data Grid in Java Applications

Cache Encoding and Marshalling

Data Grid Code Tutorials

Querying Data Grid Caches (Coming soon!)

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Data Grid Documentation Overview

Data Grid Server

Using the Data Grid Command Line Interface

Data Grid Server Guide

Security

Data Grid Security Guide

Hot Rod Clients

Hot Rod Java Client Guide

Hot Rod Node.JS Client Guide

Hot Rod .NET Client Guide

More

Using Data Grid with Spring

Data Grid Spring Boot Starter

Documentation:

- Red Hat Data Grid Documentation

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Red Hat Data Grid vs Redis

DevNation Redis vs Infinispan Webcast

- Redis HA uses Master/Slave configuration with asynchronous replication.
  - Nodes must be added and removed from the cluster 'manually', DG nodes are 'discovered'
  - Administrator has to reshard in order to scale the cluster, Data Grid rebalances automatically
- Threading
  - Redis uses a single core, limiting the scaling on a host
- Management
  - Redis stores all data in a single cache, all data shares the same configuration
  - Data Grid can manage multiple caches in a cluster, with individual configurations for each cache
- Cross-Site
  - Closed source extension to available for Redis
- Transactions
  - Redis can do 'batches'. Doesn't work over atomically sharded clusters
- Server side scripting
  - Redis can run server side scripts but they are not cluster aware.

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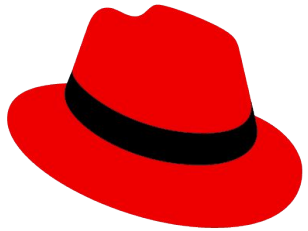
Enhance Security By Leaving Credential Management To The Experts



Red Hat
SSO

Secure web applications and provide single sign-on capabilities based on popular standards such as SAML 2.0, OpenID Connect and OAuth 2.0.

- Supports modern security standards for authentication and authorization
- Adapters for Red Hat Runtimes
- Optimized for OpenShift
- Integrated with existing systems of record (LDAP, AD, etc)
- Integrated with Data Grid for cross-datacenter security
- Foundation for securing integration and process automation projects

High-Level Architecture & Features

- Based on upstream Keycloak project
- Open source access & identity manager
- Identity Brokering
- User Federation with LDAP-based directory services
- Client libraries for Java EE, MicroProfile, Spring, Node.js, & more

Single-Sign On
Login once to multiple applications

Standard Protocols
OpenID Connect, OAuth 2.0 and SAML 2.0

Centralized Management
For admins and users

Adapters
Secure applications and services easily

LDAP and Active Directory
Connect to existing user directories

Social Login
Easily enable social login

Identity Brokering
OpenID Connect or SAML 2.0 IdPs

High Performance
Lightweight, fast and scalable

Clustering
For scalability and availability

Themes
Customize look and feel

Extensible
Customize through code

Password Policies
Customize password policies

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De-couple Your Applications With Red Hat AMQ

Red Hat AMQ

Flexible, standards-based messaging for the enterprise, cloud and the Internet of Things

- Reliable, durable messaging backbone for modern applications
- Async messaging a great solution for distributed microservices
- Multiple standard protocol support
- Fully supported alternative to RabbitMQ for Spring Apps
- Especially useful in IoT applications (compatible with Red Hat IoT Architecture)

Low-latency pub/sub

Multi-cloud backbone

Replayable streams

Load levelling

Enterprise application integration

Load balancing

IoT device connectivity

Messaging ≠ Messaging ≠ Messaging

Database change data capture

Geo-aware routing

Temporal decoupling

Long-term message storage

Message-driven beans

Event sourcing

Event-driven microservices

Red Hat

Red Hat AMQ

Standard Protocols

Polyglot Clients

Common Management

Flexible messaging for the enterprise, cloud and Internet of Things

Broker

- Queuing and pub/sub
- Rich feature set
- JMS 2.0 compliance
- Best-in-class perf
- Based on Apache ActiveMQ Artemis

Interconnect

- Message routing
- Secure messaging backbone for hybrid cloud
- Based on Apache Qpid Dispatch Router

Streams

- Durable pub/sub
- Replayable streams
- Highly scalable
- Based on Apache Kafka

Online

- Scalable, “self-service” messaging-as-a-service utility based on OpenShift
- Available for self-managed and Red Hat-managed deployments

Bring Existing Apps To The Cloud With Red Hat

Red Hat Migration Toolkit For Applications

Move off of your proprietary or outdated middleware platforms and onto state-of-the-art lightweight, modular and cloud-ready middleware application infrastructure.

- Controlled method to migrate legacy apps to the modern world
- Predictive ROI before migration projects begin
- Supports wide range of source and target platforms: App Servers, Integration Platforms, Cloud Readiness, and more
- Extensive application landscape visualizations and migration estimates

Migration Toolkit for Applications

Catalyze large scale application modernizations and migrations

- Automate application analysis
- Support effort estimation
- Accelerate code migration
- Support containerization

Proprietary Java EE runtimes	Java EE & JDK upgrades	JBoss EAP migrations
Spring Boot, Tomcat (JWS)	Cloud readiness, containerization	Pluggable: your own rules

Command line interface	Web console	IDE plugins	Maven plugin

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Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

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