

# Kubernetes Operators

Package, deploy, and manage with Red Hat Marketplace



## Key benefits

- ▶ Provide automation at every level of the stack.
- ▶ Reduce reliance on manual processes that do not scale.
- ▶ Ensure interoperability of cloud-native applications with Red Hat OpenShift.
- ▶ Support life-cycle commitment from the software provider.
- ▶ Encourage compliance to reduce risks during deployment with best practices.
- ▶ Help run Red Hat OpenShift autonomously while exposing configuration natively with Kubernetes objects.
- ▶ Allow for quick installation and frequent, wide-scale updates.
- ▶ Discover, try, buy, and manage all certified Kubernetes Operators with Red Hat Marketplace.

## Introduction

The automation of processes and applications has become an imperative for organizations. For developers and IT administrators, the ability to rapidly and more securely automate the life-cycle management of applications and supporting infrastructure software means that the burden of managing once manual tasks, such as deployment, upgrades, and backups, is alleviated.

With Kubernetes Operators, you can automate Day 1 and Day 2 operations across any environment—public cloud, private cloud, or on-premise—with Red Hat® OpenShift®. To improve the application automation experience for Red Hat OpenShift users, all Red Hat Marketplace offerings have a Kubernetes Operator.

## Kubernetes Operators defined

In Kubernetes, the use of controllers is a core concept. Kubernetes Operators are essentially custom controllers.

A domain- or application-specific controller, a Kubernetes Operator extends the Kubernetes application programming interface (API) to manage the packaging, deployment, and life cycle of the applications and infrastructure software that it manages. A Kubernetes Operator can provide agility, reliability, and simplicity for automating Day 1 and Day 2 operations across hybrid cloud.

One of the biggest benefits of Kubernetes Operators is that they simplify the automation of complex tasks and the process for users. Users do not need to be experts in either containerized applications or infrastructure software to run Kubernetes Operators because Kubernetes Operators use custom resource definitions (CRD) to automate tasks and simplify the user experience.

## How do Kubernetes Operators work?

Kubernetes controllers implement control loops that continuously compare the cluster's current state to the ideal state. If it detects that there is a discrepancy between the actual state and the ideal state, it takes action and solves the issue.

Kubernetes Operators extend this capability to specific applications and their components that run in a pod on the Kubernetes cluster using custom resources (CR). Essentially, the software runs on behalf of the Kubernetes user and manages what the user mandates. In cases where the cluster's actual state does not match the desired state, the Kubernetes Operator steps in and begins running a loop to ensure the issue is resolved. Additionally, Kubernetes Operators can include the business logic required to perform the necessary tasks to update software.

High-level directives, such as keeping infrastructure or automation application software versions updated, are inputted into the CR, which the Kubernetes Operator converts to low-level actions, based on what its logic deems is the best practice.

As the Kubernetes application runs, the Kubernetes Operator monitors continuously and automatically. It can back up data, recover from failures, and upgrade the application over time. Other actions could include scaling a complex application, or managing kernel modules for nodes in a cluster with specialized hardware.

## Red Hat OpenShift and Kubernetes Operators

Kubernetes Operators have been a part of the life-cycle management and deployment process of running workloads on Red Hat OpenShift since version 4. Together, they automate key Day 1 and Day 2 operations for infrastructure software and containerized applications.

When Kubernetes Operators are combined with Red Hat OpenShift tooling and management practices, developers are granted a convenient overview of entire ecosystems from a central dashboard.

### Features and benefits

Feature	Benefit
Installation	Automate application and infrastructure software provisioning and configuration management.
Upgrade	Seamlessly move from one version to the next when a new release is available.
Backup and recovery	Automatically back up and recover from failures.
Workload and log analysis	Analyze logs generated by the components of the application or software and act accordingly.
Custom application-defined scaling	Intelligently scale an application up or down as needed, based on any desired condition.
Auto tuning	Calibrate the components, such as connecting a database to the application, to help it perform better.

## How to get started

Visit Red Hat Marketplace to access, try, purchase, deploy, and manage Kubernetes Operators on any Red Hat OpenShift cluster. An open cloud virtual market, Red Hat Marketplace offers a wide range of container-based software from categories including databases, artificial intelligence, application development, and many others.

If you want to curate certified Kubernetes Operators to help speed up innovation and manage costs, Red Hat Marketplace Select is a premium, paid edition of Red Hat Marketplace. This option provides greater control and governance over what teams can select to help streamline software management and deployment across clouds.

Red Hat validates Kubernetes Operators through the Red Hat OpenShift certification process. This certification ensures that Kubernetes Operators are interoperable, prioritize security, and are supported by Red Hat. Additionally, this certification ensures that automation for tasks like updates and bug-fixes works effectively with Red Hat OpenShift.




## Try Red Hat Marketplace

Add trusted solutions and streamline their approval processes throughout your enterprise. [Red Hat Marketplace](#) offers interoperable and supported software to help optimize your environment, all in one portal.



### About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers integrate new and existing IT applications, develop cloud-native applications, standardize on our industry-leading operating system, and automate, secure, and manage complex environments. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500. As a strategic partner to cloud providers, system integrators, application vendors, customers, and open source communities, Red Hat can help organizations prepare for the digital future.

 facebook.com/redhatinc  
 @RedHat  
 linkedin.com/company/red-hat

**North America**  
 1 888 REDHAT1  
 www.redhat.com

**Europe, Middle East,  
and Africa**  
 00800 7334 2835  
 europe@redhat.com

**Asia Pacific**  
 +65 6490 4200  
 apac@redhat.com

**Latin America**  
 +54 11 4329 7300  
 info-latam@redhat.com