



Posit Connect with Kubernetes

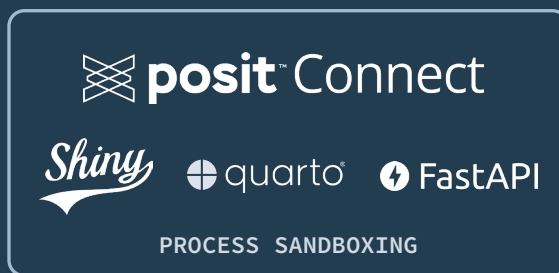
Off-Host (Containerized) Content Execution

For organizations who want content-level containerization for strict process isolation and control over resource utilization, Posit Connect supports off-host execution on Kubernetes. This feature set does not require R and Python users to build and manage their own containers.

When Connect launches a process to prepare a build environment, render a document, or run an interactive application, it uses a Kubernetes container instead of a local process. These jobs are external to the container running Connect. All content types (R, Python, Quarto) are supported.

- Best suited for organizations already heavily invested in using Kubernetes with IT administrators who have a working knowledge of Helm
- Requires an Enterprise Posit Connect (or Posit Team) license
- Generally available in Posit connect 2023.05.0 and above

LOCAL CONTENT EXECUTION



PRODUCT-LEVEL CONTAINERIZATION

Local Execution

Overview

The Connect application service and all published content execute on the same host

Process Isolation

Process Sandboxing provides partial isolation. Containers must run in privileged mode (docker run --privileged)

Environment Management

Administrators install one or more versions of R, Python, and Quarto. Connect attempts to match published content with an available runtime

Resource Utilization Controls

Content-level controls for RAM

OFF-HOST CONTENT EXECUTION



CONTENT-LEVEL CONTAINERIZATION

Off-Host Execution

Content processes are started in isolated Pods on Kubernetes, external to the server container

Content-level isolation with separate containers and Kubernetes VolumeMounts, and no privileged execution requirement

Administrators control available images. Publishers can choose a specific image for executing their content or allow Connect to pick one automatically

Content-level controls for CPU and RAM

Off-Host Execution FAQs

Q: WHAT DO DATA SCIENCE PUBLISHERS NEED TO KNOW ABOUT OFF-HOST EXECUTION?

Data scientists are not required to have knowledge of containers to publish content. Advanced Publishers can target a specific image for their deployments, change the execution environment after content is deployed, and set content-level memory and CPU requests and limits.

Q: CAN I RUN POSIT CONNECT IN A CONTAINER ON KUBERNETES WITHOUT OFF-HOST EXECUTION?

Yes, definitely. The difference comes down to deciding which kind of process isolation and content execution you want to enable (refer back to the Local vs. Off-Host Execution table).

Q: IS OFF-HOST EXECUTION FULLY SUPPORTED AND APPROVED FOR USE IN PRODUCTION ENVIRONMENTS?

Yes, starting with Posit Connect 2023.05.0 Off-Host Execution is generally available (GA).

Q: WHAT CAN ADMINISTRATORS DO WITH OFF-HOST EXECUTION?

Administrators can:

- Manage content execution environments (images) through the new Environments dashboard UI or programmatically using the Connect Server API
- Configure and set content-level Kubernetes service accounts to facilitate access to external resources without sharing secrets through environment variables
- Configure global optima (min and max) for content-level memory and CPU requests and limits

Q: WHAT ARE THE REQUIREMENTS FOR RUNNING POSIT CONNECT WITH OFF-HOST EXECUTION?

- Posit Connect \geq v2023.05.0
- A valid Posit Connect enterprise license
- Kubernetes
 - A working Kubernetes cluster
 - kubectl
 - Helm v3
- PostgreSQL
- NFS

Q: ARE THERE ANY ADDITIONAL CONSIDERATIONS?

- Posit Connect must run either in local mode or off-host execution mode; it is not possible to run in both modes at once.
- Processes take longer to launch when using Kubernetes than with local processes. Image size and Kubernetes scheduler overhead can contribute to slower process startup.
- The Posit Connect dashboard Admin>Metrics view shows CPU/RAM for the Connect container and does not graph CPU/RAM for the content jobs. Current CPU/RAM for each job is listed in the Processes table.
- Off-host execution is currently only available for Kubernetes.

LEARN MORE at posit.it/connect-docs