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 Execution

- The Connect application service and all published content execute on the same host
- Process Sandboxing provides partial isolation. Containers must run in privileged mode (docker run --privileged)
- Administrators install one or more versions of R, Python, and Quarto. Connect attempts to match published content with an available runtime
- Content-level controls for RAM

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 >= 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 pos.it/connect-docs