This version of GitHub Enterprise was discontinued on 2023-03-15. No patch releases will be made, even for critical security issues. For better performance, improved security, and new features, upgrade to the latest version of GitHub Enterprise. For help with the upgrade, contact GitHub Enterprise support.

Installing GitHub Enterprise Server on OpenStack KVM

In this article

To install GitHub Enterprise Server on OpenStack KVM, you must have OpenStack access and download the GitHub Enterprise Server QCOW2 image.

Prerequisites

- You must have a GitHub Enterprise license file. For more information, see "Setting up a trial of GitHub Enterprise Server" and "About licenses for GitHub Enterprise."
- You must have access to an installation of OpenStack Horizon, the web-based user interface to OpenStack services. For more information, see the Horizon documentation.

Hardware considerations

- Minimum requirements
- Storage
- CPU and memory

Minimum requirements

We recommend different hardware configurations depending on the number of user licenses for your GitHub Enterprise Server instance. If you provision more resources than the minimum requirements, your instance will perform and scale better.

User licenses	x86-64 vCPUs	Memory	Root storage	Attached (data) storage
Trial, demo, or 10 light users	4	32 GB	200 GB	150 GB
10 to 3,000	8	48 GB	200 GB	300 GB

3,000 to 5000	12	64 GB	200 GB	500 GB
5,000 to 8000	16	96 GB	200 GB	750 GB
8,000 to 10,000+	20	160 GB	200 GB	1000 GB

If you plan to enable GitHub Actions for the users of your instance, more resources are required.

vCPUs	Memory	Maximum Concurrency
8	64 GB	300 jobs
16	128 GB	700 jobs
32	160 GB	1500 jobs
64	256 GB	2500 jobs
96	384 GB	4500 jobs
128	550 GB	5000 jobs

For more information about these requirements, see "Getting started with GitHub Actions for GitHub Enterprise Server."

If you plan to enable Container registry for the users of your instance, more resources are required. For more information about these requirements, see "Getting started with GitHub Packages for your enterprise."

For more information about adjusting resources for an existing instance, see "Increasing storage capacity" and "Increasing CPU or memory resources."

Storage

We recommend a high-performance SSD with high input/output operations per second (IOPS) and low latency for GitHub Enterprise Server. Workloads are I/O intensive. If you use a bare metal hypervisor, we recommend directly attaching the disk or using a disk from a storage area network (SAN).

Your instance requires a persistent data disk separate from the root disk. For more information, see "System overview."

To configure GitHub Actions, you must provide external blob storage. For more information, see "Getting started with GitHub Actions for GitHub Enterprise Server."

The available space on the root filesystem will be 50% of the total disk size. You can resize your instance's root disk by building a new instance or using an existing instance. For more information, see "System overview" and "Increasing storage capacity."

CPU and memory

The CPU and memory resources that GitHub Enterprise Server requires depend on the levels of activity for users, automations, and integrations.

Any VMs you provision for your GitHub Enterprise Server instance must use the x86-64 CPU architecture. Other architectures are not supported, such as Aarch64 or arm64.

If you plan to enable GitHub Actions for the users of your GitHub Enterprise Server instance, you may need to provision additional CPU and memory resources for your

instance. For more information, see "Getting started with GitHub Actions for GitHub Enterprise Server."

When you increase CPU resources, we recommend adding at least 6.5 GB of memory for each vCPU (up to 16 vCPUs) that you provision for the instance. When you use more than 16 vCPUs, you don't need to add 6.5 GB of memory for each vCPU, but you should monitor your instance to ensure it has enough memory.

> **Warning:** We recommend that users configure webhook events to notify external systems of activity on GitHub Enterprise Server. Automated checks for changes, or *polling*, will negatively impact the performance and scalability of your instance. For more information, see "About webhooks."

For more information about monitoring the capacity and performance of GitHub Enterprise Server, see "Monitoring your appliance."

You can increase your instance's CPU or memory resources. For more information, see "Increasing CPU or memory resources."

Downloading the GitHub Enterprise Server image

1. Download your license. For more information, see "Downloading your license for GitHub Enterprise."
2. Navigate to the image you want to use for your new instance.
   - Navigate to Release notes.
   - In the right sidebar, click the version you want to download.
   - Click **Download GitHub Enterprise Server X.X.X**.
3. Under "GitHub On-premises", select the "Select your hypervisor" dropdown menu and click **OpenStack KVM (QCOW2)**.
4. Click **Download for OpenStack KVM (QCOW2)**.

Creating the GitHub Enterprise Server instance

To create the instance, you'll need to import the GitHub Enterprise Server image to your virtual machine and attach an additional storage volume for your instance data. For more information, see "Hardware considerations."

1. In OpenStack Horizon, upload the GitHub Enterprise Server image you downloaded. For instructions, see the "Upload an image" section of the OpenStack guide "Upload and manage images."
2. Create a new virtual disk to use as an attached storage volume for your instance data, and configure the size based on your user license count. If reusing an existing disk, ensure that the disk is empty and there are no partitions. For instructions, see the OpenStack guide "Create and manage volumes."
3. Create a security group, and add a new security group rule for each port in the table below. For instructions, see the OpenStack guide "Configure access and security for instances."

Port	Service	Description
22	SSH	Git over SSH access. Clone, fetch, and push operations to

		fetch, and push operations to public/private repositories supported.
25	SMTP	SMTP with encryption (STARTTLS) support.
80	HTTP	Web application access. *All requests are redirected to the HTTPS port when SSL is enabled.*
122	SSH	Instance shell access. *The default SSH port (22) is dedicated to application git+ssh network traffic.*
161/UDP	SNMP	Required for network monitoring protocol operation.
443	HTTPS	Web application and Git over HTTPS access.
1194/UDP	VPN	Secure replication network tunnel in high availability configuration.
8080	HTTP	Plain-text web based Management Console. *Not required unless SSL is disabled manually.*
8443	HTTPS	Secure web based Management Console. *Required for basic installation and configuration.*
9418	Git	Simple Git protocol port. Clone and fetch operations to public repositories only. *Unencrypted network communication.* If you have enabled private mode on your instance, then opening this port is only required if you also enabled anonymous Git read access. For more information, see "Enforcing repository management policies in your enterprise."

4. Optionally, associate a floating IP to the instance. Depending on your OpenStack setup, you may need to allocate a floating IP to the project and associate it to the instance. Contact your system administrator to determine if this is the case for you. For more information, see "Allocate a floating IP address to an instance" in the OpenStack documentation.
5. Launch your GitHub Enterprise Server instance using the image, data volume, and security group created in the previous steps. For instructions, see the OpenStack guide "Launch and manage instances."

Configuring the GitHub Enterprise Server instance

To configure the instance, you must upload a license file, set the Management Console password, configure the instance's settings, and restart the instance.

> **Warning**: To prevent an attacker from compromising the new instance, ensure that you personally set the Management Console password and create the first user as soon as possible.

1. Copy the virtual machine's public DNS name, and paste it into a web browser.
2. At the prompt, upload your license file and set a management console password. For more information, see "Managing your license for GitHub Enterprise."
3. In the Management Console, configure and save your desired settings. For more information, see "Configuring your enterprise."
4. The instance will restart automatically.
5. Click **Visit your instance**.

Further reading

- "System overview"
- "About upgrades to new releases"

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