GitHub Enterprise on the AWS Cloud

Quick Start Reference Deployment

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This Quick Start deployment guide was created by Amazon Web Services (AWS) in partnership with GitHub, Inc.

Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying GitHub Enterprise on the Amazon Web Services (AWS) Cloud. Quick Starts are automated reference deployments that use AWS CloudFormation templates to launch, configure, and run the AWS compute, network, storage, and other services required to deploy a specific workload on AWS.

GitHub Enterprise is a development and collaboration platform that enables developers to build and share software easily and effectively. Development teams of all sizes, from small startups to teams of thousands, use GitHub Enterprise to facilitate their software development and deployment tasks.

GitHub Enterprise provides the following features:

- **The GitHub Flow**: Developers can use the same asynchronous workflow created by the open source community to collaborate on projects. This workflow encourages a culture of experimentation without risk. For more information about the GitHub Flow, see the [GitHub Enterprise website](#).

- **Integrated platform**: At GitHub, we use GitHub Enterprise across the entire development process, which enables us to release and deploy our code dozens of times per day. This platform for continuous integration and deployment enables you to build and ship better software faster.

- **Transparent collaboration**: Pull requests let developers interactively learn from one another during the development process. Whether they’re discussing the whole project or a single line of code, GitHub Enterprise displays the relevant information in a clean, timeline-style interface.

- **Advanced monitoring**: You can use GitHub Pulse to see a snapshot of everything that’s happened in your project repository during the past week, or visit the Activity Dashboard to view graphs that illustrate work across projects. Advanced monitoring can include Simple Network Management Protocol (SNMP), collectd, and log forwarding on the appliance as well. For details, see the [GitHub Enterprise documentation](#).

- **Auditing and compliance**: Over time, your organization might have developed crucial policies around permissions and security auditing. You can use the Commit
Status API in GitHub Enterprise to specify the unique merge conditions necessary for your organization’s compliance requirements. GitHub Enterprise also provides in-depth monitoring and auditing for administrators. For details, see the GitHub Enterprise documentation.

- **Smarter version control**: GitHub Enterprise is built on Git, which is a distributed version control system that supports non-linear workflows on projects of all sizes.

This Quick Start is for system administrators and IT professionals who want to deploy GitHub Enterprise on a virtual machine hosted in the AWS Cloud. Deploying GitHub Enterprise on AWS provides a configurable infrastructure for your coding and deployment tasks. Additional details about GitHub Enterprise are available at https://github.com/business.

**Costs and Licenses**
You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using the Quick Start.

The AWS CloudFormation templates for this Quick Start include configuration parameters that you can customize. Some of these settings, such as instance type and storage, will affect the cost of deployment. For cost estimates, see the pricing pages for each AWS service you will be using. Prices are subject to change.

This Quick Start requires a trial version of GitHub Enterprise, which is available for free from GitHub.

**Architecture**
Deploying this Quick Start for a new virtual private cloud (VPC) with default parameters builds the following GitHub Enterprise environment in the AWS Cloud.
The Quick Start sets up the following:

- A virtual private cloud (VPC) with a single Availability Zone and one public subnet.*
- An Internet gateway to allow access to the Internet.*
- In the public subnet, a GitHub Enterprise EC2 instance with an attached, customizable EBS volume.
- An Amazon CloudWatch monitoring resource that will automatically restore the GitHub Enterprise EC2 instance if it becomes unresponsive.
- An IAM role with the necessary permissions to manage access to resources.
- A security group to enable communication within the VPC and to interact with the GitHub Enterprise EC2 instance.
- A sample Github organization and repository you can use to test the deployment.

* You can choose to launch the Quick Start for a new VPC or use your existing VPC. The template that deploys the Quick Start into an existing VPC skips the creation of components marked by asterisks and prompts you for your existing configuration.
Prerequisites

Specialized Knowledge

Before you deploy this Quick Start, we recommend that you become familiar with the following AWS services. (If you are new to AWS, see Getting Started with AWS.)

- Amazon VPC
- Amazon EC2
- Amazon EBS
- Amazon CloudWatch

Technical Requirements

This Quick Start requires a license to use GitHub Enterprise. You can fill out the form at https://enterprise.github.com/sn-trial to sign up for a free, 45-day trial license for GitHub Enterprise.

The Quick Start also requires Git, which is the open source version control system underlying GitHub Enterprise. Please install Git from https://git-scm.com/ before you deploy the Quick Start.

Deployment Options

This Quick Start provides two deployment options:

- **Deployment of GitHub Enterprise into a new VPC** (end-to-end deployment) builds a new AWS environment consisting of the VPC, subnets, and other infrastructure components, and then deploys GitHub Enterprise into this new VPC.

- **Deployment of GitHub Enterprise into an existing VPC** provisions GitHub Enterprise in your existing AWS infrastructure.

The Quick Start provides separate templates for these options. You can also configure CIDR blocks, instance types, and GitHub Enterprise settings, as discussed in the next section.

Deployment Steps

**Step 1. Prepare Your AWS Account**

1. If you don’t already have an AWS account, create one at https://aws.amazon.com by following the on-screen instructions.

2. Use the region selector in the navigation bar to choose the AWS Region where you want to deploy GitHub Enterprise on AWS.
3. Create a key pair in your preferred region.

4. If necessary, request a service limit increase for the Amazon EC2 m3.xlarge instance type. You might need to do this if you already have an existing deployment that uses this instance type, and you think you might exceed the default limit with this reference deployment.

Step 2. Request a GitHub Enterprise Trial License

1. Fill out the form at https://enterprise.github.com/sn-trial to sign up for a free, 45-day trial license for GitHub Enterprise.

2. Upload the trial license to Amazon S3 and note its URL. You’ll need to supply the location and file name of the license file when you launch the AWS CloudFormation template in the next step.

Step 3. Launch the Quick Start

**Note** You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using this Quick Start. For full details, see the pricing pages for each AWS service you will be using in this Quick Start. Prices are subject to change.

1. Choose one of the following options to launch the AWS CloudFormation template into your AWS account. For more information, see deployment options earlier in this guide.

   - **Option 1** Deploy GitHub Enterprise into a new VPC on AWS
     - Launch
   - **Option 2** Deploy GitHub Enterprise into an existing VPC on AWS
     - Launch

   Each deployment takes about 15 minutes to complete.

   **Important** If you’re deploying GitHub Enterprise into an existing VPC, you’ll be prompted for your VPC settings when you launch the Quick Start.

2. Check the region that’s displayed in the upper-right corner of the navigation bar, and change it if necessary. This is where the network infrastructure for GitHub Enterprise will be built. The template is launched in the US West (Oregon) Region by default.
3. On the **Select Template** page, keep the default setting for the template URL, and then choose **Next**.

4. On the **Specify Details** page, change the stack name if needed. Review the parameters for the template. Provide values for the parameters that require input. For all other parameters, review the default settings and customize them as necessary. When you finish reviewing and customizing the parameters, choose **Next**.

In the following tables, parameters are listed by category and described separately for the two deployment options:

- Parameters for deploying GitHub Enterprise into a new VPC
- Parameters for deploying GitHub Enterprise into an existing VPC

**Option 1: Parameters for deploying GitHub Enterprise into a new VPC**

**View template**

**VPC Network Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC CIDR (VPCCIDR)</td>
<td>10.0.0.0/16</td>
<td>CIDR block for the VPC to create.</td>
</tr>
<tr>
<td>Permitted IP range (AccessCIDR)</td>
<td><em>Requires input</em></td>
<td>The CIDR IP range that is permitted to access GitHub Enterprise. We recommend that you set this value to a trusted IP range. For example, you might want to grant only your corporate network access to the software.</td>
</tr>
</tbody>
</table>

**GitHub Enterprise License:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GitHub License Location (LicenseLocation)</td>
<td><em>Requires input</em></td>
<td>The name of the S3 bucket that contains the GitHub Enterprise license, from step 2.</td>
</tr>
<tr>
<td>GitHub License Filename (GHELicense)</td>
<td><em>Requires input</em></td>
<td>The file name of your GitHub Enterprise license file, from step 2.</td>
</tr>
</tbody>
</table>
**GitHub Enterprise Organization and Repository:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Organization</strong></td>
<td>initial-organization</td>
<td>The sample organization to hold the GitHub Enterprise repository. You'll use this organization and repository in <strong>step 4</strong>, to test the deployment.</td>
</tr>
<tr>
<td><strong>Initial Repository</strong></td>
<td>initial-repository</td>
<td>The sample repository to create. You'll use this organization and repository in <strong>step 4</strong>, to test the deployment.</td>
</tr>
</tbody>
</table>

**Site Admin User Information:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management Password</strong></td>
<td>Requires input</td>
<td>The password for the Github Enterprise Management Console. Passwords must be at least 7 characters long and must include at least one number and one uppercase letter.</td>
</tr>
<tr>
<td><strong>Site Admin Username</strong></td>
<td>Requires input</td>
<td>The user name for the GitHub Enterprise site administrator.</td>
</tr>
<tr>
<td><strong>Site Admin User Email</strong></td>
<td>Requires input</td>
<td>The email address for the GitHub Enterprise site administrator.</td>
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<td><strong>Site Admin User Password</strong></td>
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**Server Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instance Type</strong></td>
<td>m3.xlarge</td>
<td>EC2 instance type for the GitHub Enterprise web server.</td>
</tr>
<tr>
<td><strong>Key Pair Name</strong></td>
<td>Requires input</td>
<td>Public/private key pair, which allows you to connect securely to your instance after it launches. When you created an AWS account, this is the key pair you created in your preferred region.</td>
</tr>
<tr>
<td><strong>Volume Type</strong></td>
<td>gp2</td>
<td>Type of the Amazon EBS (data) volume to be attached to the GitHub Enterprise instance (101 or gp2). We recommend 101 for more than 500 users.</td>
</tr>
<tr>
<td><strong>Provisioned IOPS</strong></td>
<td>Requires input</td>
<td>IOPS of the EBS volume when the 101 volume type is chosen. Otherwise, this setting is ignored. You can enter a value between 100 and 20,000.</td>
</tr>
<tr>
<td><strong>Volume Size</strong></td>
<td>100</td>
<td>Size of the Amazon EBS (data) volume to be attached to the GitHub Enterprise instance, in GiBs.</td>
</tr>
</tbody>
</table>
**AWS Quick Start Configuration:**

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<tr>
<th>Parameter label (name)</th>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Quick Start S3 Bucket Name</td>
<td>aws-quickstart</td>
<td>S3 bucket where the Quick Start templates and scripts are installed. Use this parameter to specify the S3 bucket name you've created for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. The bucket name can include numbers, lowercase letters, uppercase letters, and hyphens, but should not start or end with a hyphen.</td>
</tr>
<tr>
<td>Quick Start S3 Key Prefix</td>
<td>quickstart-github-enterprise/</td>
<td>The S3 key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens, and forward slashes, but should not start with a forward slash (which is automatically added).</td>
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**Option 2: Parameters for deploying GitHub Enterprise into an existing VPC**

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<td>Permitted IP range</td>
<td>Requires input</td>
<td>The CIDR IP range that is permitted to access GitHub Enterprise. We recommend that you set this value to a trusted IP range. For example, you might want to grant only your corporate network access to the software.</td>
</tr>
<tr>
<td>Subnet ID</td>
<td>Requires input</td>
<td>ID of the public subnet in your existing VPC (e.g., subnet-a0246dcd) where you want to launch the GitHub Enterprise server.</td>
</tr>
<tr>
<td>VPC ID</td>
<td>Requires input</td>
<td>ID of your existing VPC where you want to launch the GitHub Enterprise server (e.g., vpc-0343606e).</td>
</tr>
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</tr>
<tr>
<td>Volume Type</td>
<td>gp2</td>
<td>Type of the Amazon EBS (data) volume to be attached to the GitHub Enterprise instance (io1 or gp2). We recommend io1 for more than 500 users.</td>
</tr>
<tr>
<td>Provisioned IOPS</td>
<td>Requires input</td>
<td>IOPS of the EBS volume when the io1 volume type is chosen. Otherwise, this setting is ignored. You can enter a value between 100 and 20,000.</td>
</tr>
<tr>
<td>Volume Size</td>
<td>100</td>
<td>Size of the Amazon EBS (data) volume to be attached to the GitHub Enterprise instance, in GiBs.</td>
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</tr>
<tr>
<td>Quick Start S3 Key Prefix (QSS3KeyPrefix)</td>
<td>quickstart-ubuntu-ec2</td>
<td>The S3 Key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens, and forward slashes, but should not start with a forward slash (which is automatically added).</td>
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On the **Options** page, you can **specify tags** (key-value pairs) for resources in your stack and **set advanced options**. When you’re done, choose **Next**.

5. On the **Review** page, review and confirm the template settings. Under **Capabilities**, select the check box to acknowledge that the template will create IAM resources.

6. Choose **Create** to deploy the stack.

7. Monitor the status of the stack. When the status is **CREATE_COMPLETE**, the GitHub Enterprise deployment is complete.

**Step 4. Test the Deployment**

The Quick Start sets up a sample organization and repository during the deployment process. You can test the deployment by accessing the GitHub Enterprise EC2 instance, accessing the sample repository, and cloning it.

1. Use the URL of the primary instance displayed in the **Outputs** tab for the stack to view the resources that were created.
2. Log in to GitHub Enterprise. Enter the site administrator user name and password you provided in the Quick Start parameters in step 3.
3. Upload a deploy key. This is an SSH key that gives you access to the sample GitHub repository.
   b. In the sidebar, choose **SSH and GPG keys**.
   c. Choose **New SSH key**.
      • For **Title**, give your key a descriptive name.
      • In the **Key** field, paste your public key. This key is typically found in ~/.ssh/id_rsa.pub.
      • Choose **Add SSH key**.
4. Clone your GitHub repository.

   a. Navigate back to the main page by choosing the GitHub Enterprise logo on the navigation bar.

   b. Switch dashboard context by selecting the organization name. This is the organization you specified in the Quick Start parameters in step 3 (quickstart-created-repo in Figures 4 and 5).
c. Select the repository name. This is the repository you specified in the Quick Start parameters in **step 3** *(repo1 in Figure 6).*

d. Choose **Clone or download**, and then copy the Git URL that’s displayed by choosing the Clipboard icon.
e. Open a terminal shell. (This requires that you install Git on your workstation, as instructed in the Prerequisites section.)

f. Use the Git CLI to clone your repository:

```
git clone git@13.58.62.155:quickstart-created-repo/repo1.git
```

To try out additional GitHub Enterprise features, follow the instructions in the GitHub Enterprise documentation.
Troubleshooting

Q. I encountered a CREATE_FAILED error when I launched the Quick Start. What should I do?

A. If AWS CloudFormation fails to create the stack, we recommend that you relaunch the template with **Rollback on failure** set to **No**. (This setting is under **Advanced** in the AWS CloudFormation console, **Options** page.) With this setting, the stack’s state will be retained and the instance will be left running, so you can troubleshoot the issue. (You’ll want to look at the log files in `%ProgramFiles%\Amazon\EC2ConfigService` and `C:\cfn\log`.)

```
Important When you set **Rollback on failure** to **No**, you’ll continue to incur AWS charges for this stack. Please make sure to delete the stack when you’ve finished troubleshooting.
```

For additional information, see Troubleshooting AWS CloudFormation on the AWS website or contact us on the AWS Quick Start Discussion Forum.

Q. I encountered a size limitation error when I deployed the AWS Cloudformation templates.

A. We recommend that you launch the Quick Start templates from the location we’ve provided or from another S3 bucket. If you deploy the templates from a local copy on your computer or from a non-S3 location, you might encounter template size limitations when you create the stack. For more information about AWS CloudFormation limits, see the AWS documentation.

Additional Resources

**AWS services**

- Amazon EC2  

- AWS CloudFormation  
  [https://aws.amazon.com/documentation/cloudformation/](https://aws.amazon.com/documentation/cloudformation/)

- Amazon VPC  
  [https://aws.amazon.com/documentation/vpc/](https://aws.amazon.com/documentation/vpc/)
GitHub Enterprise

- GitHub Enterprise
  https://github.com/business

- GitHub Enterprise trial
  https://enterprise.github.com/sn-trial

- GitHub Enterprise documentation
  https://help.github.com/enterprise/2.9/

Quick Start reference deployments

- AWS Quick Start home page
  https://aws.amazon.com/quickstart/

Send Us Feedback

You can visit our GitHub repository to download the templates and scripts for this Quick Start, to post your comments, and to share your customizations with others.

Document Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
<th>In sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2017</td>
<td>Added Amazon CloudWatch for monitoring</td>
<td>Architecture</td>
</tr>
<tr>
<td>May 2017</td>
<td>Initial publication</td>
<td>—</td>
</tr>
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</table>
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