DevOps

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Post Graduate Program in DevOps

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DevOps

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CI/CD Pipeline with Jenkins

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Jenkins Freestyle Job

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Learning Objectives

By the end of this lesson, you will be able to:

- Configure a Jenkins Freestyle job
- Describe the basic structure of Jenkins job
- Create, rename, and delete a Jenkins Freestyle job
- Outline the various Freestyle job sections in the Jenkins dashboard

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Jenkins Freestyle

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Jenkins Build Job

Jenkins Build job lies at the core of Jenkins Build process. Developers use Jenkins Build job to automate Build and test case execution.

Build Job Functions

- Checkout source code
- Compile source code
- Execute unit test cases
- Perform static code scan
- Measure code quality and code coverage metrics

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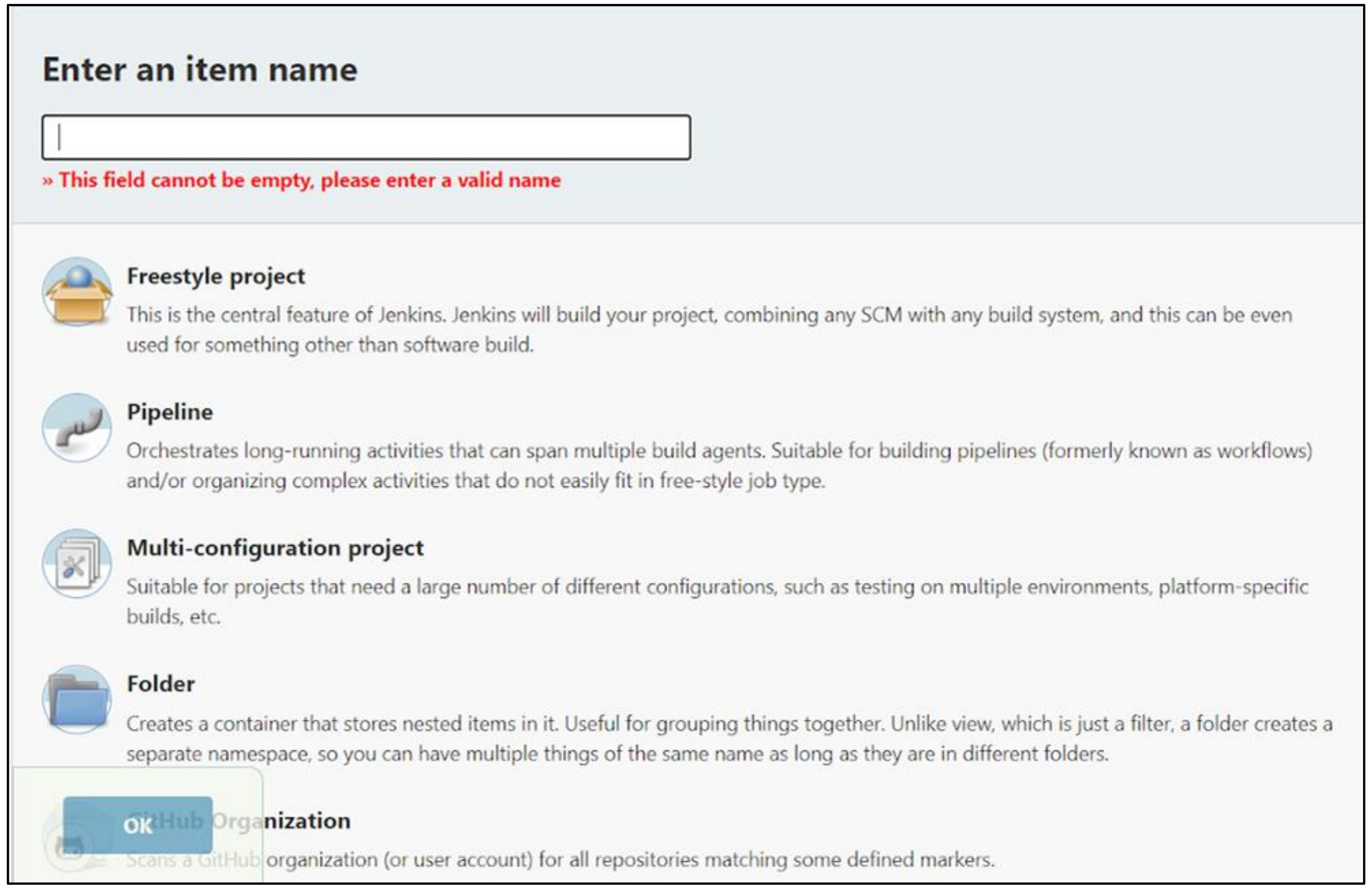
Jenkins Build Job

Build jobs can be configured to perform deployment or other automation with Jenkins. Shown below is the Jenkins Build Job screen:



Enter an item name

» This field cannot be empty, please enter a valid name

Freestyle project
This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.

Pipeline
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.

Multi-configuration project
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.

Folder
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.

GitHub Organization
Scans a GitHub organization (or user account) for all repositories matching some defined markers.

Note

Developers create multiple Build jobs as a part of CI/CD automation.

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Jenkins Freestyle Job

Jenkins Freestyle job is a highly flexible and configurable Build job which can be used to automate any project, irrespective of the underlying programming language.

- It is a repeatable Build job that contains post-Build actions.
- It can span multiple operations.
- It supports multiple plugins that help configure various integrations within Jenkins.
- It can be used to configure multiple Build tools including Gradle, Ant, Maven, Ruby, and MS Build.

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Jenkins Freestyle Job Use Cases

Jenkins Freestyle job is suitable for use in the following scenarios:

- Automation of Builds
- Automation of deployments
- Execution of unit test cases
- Execution on remote servers
- Execution of shell or python scripts

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Jenkins Freestyle Job

To create a basic Jenkins Freestyle job, follow the steps given below:

Step 1

- Login to Jenkins
- Click on New Item

Step 2

- Enter the Job name

Step 3

- Select the Freestyle Job Type
- Click OK

After creating a new Jenkins Freestyle job, it must be configured.

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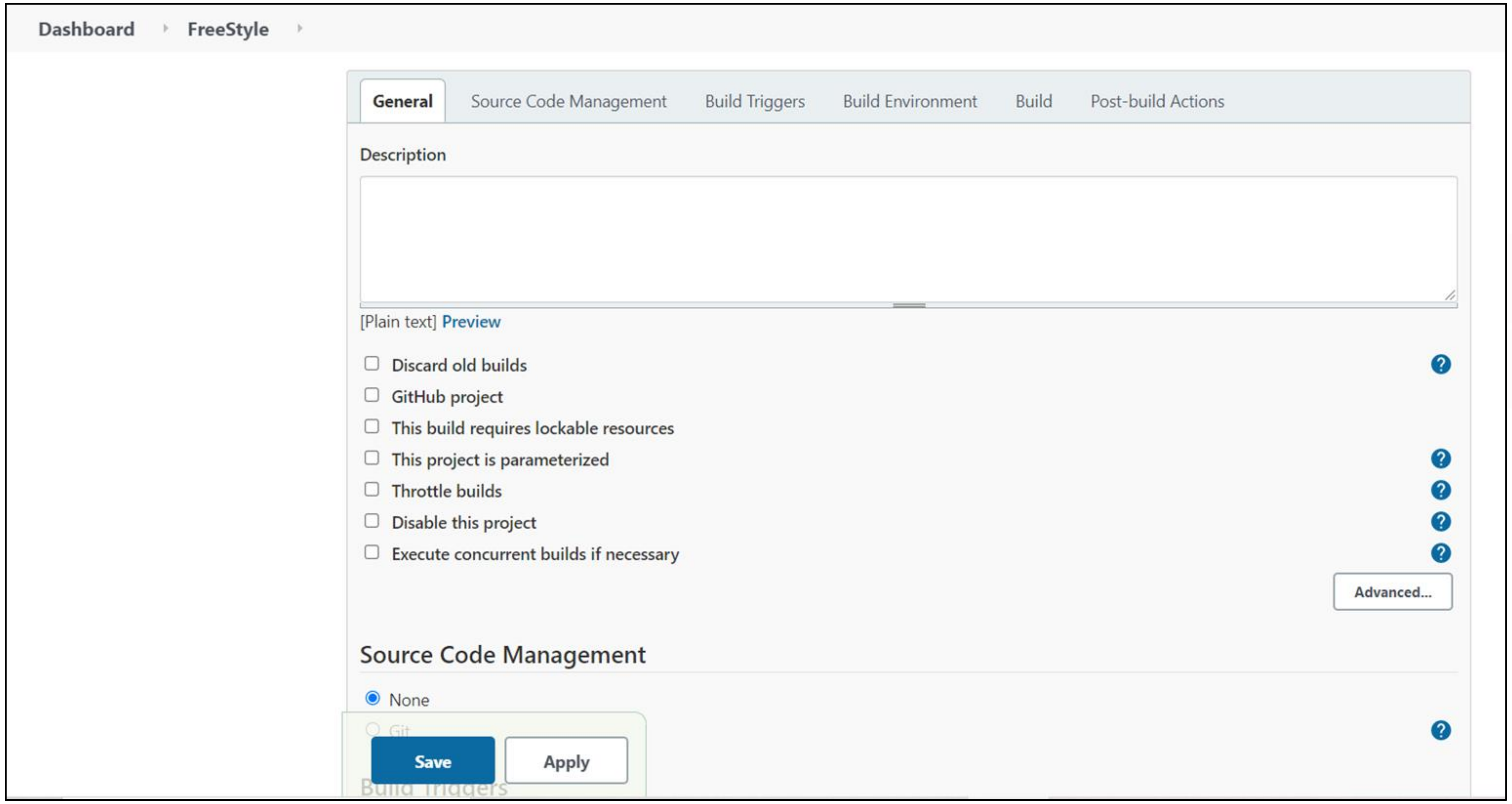
Jenkins Freestyle Job

This is a screenshot of the General section of the Jenkins Freestyle job dashboard:


Dashboard › FreeStyle ›

General | Source Code Management | Build Triggers | Build Environment | Build | Post-build Actions

Description

[Plain text] Preview

- ☐ Discard old builds
- ☐ GitHub project
- ☐ This build requires lockable resources
- ☐ This project is parameterized
- ☐ Throttle builds
- ☐ Disable this project
- ☐ Execute concurrent builds if necessary

Advanced...

Source Code Management

- ● None
- ○ Git

Save | Apply

Build Triggers

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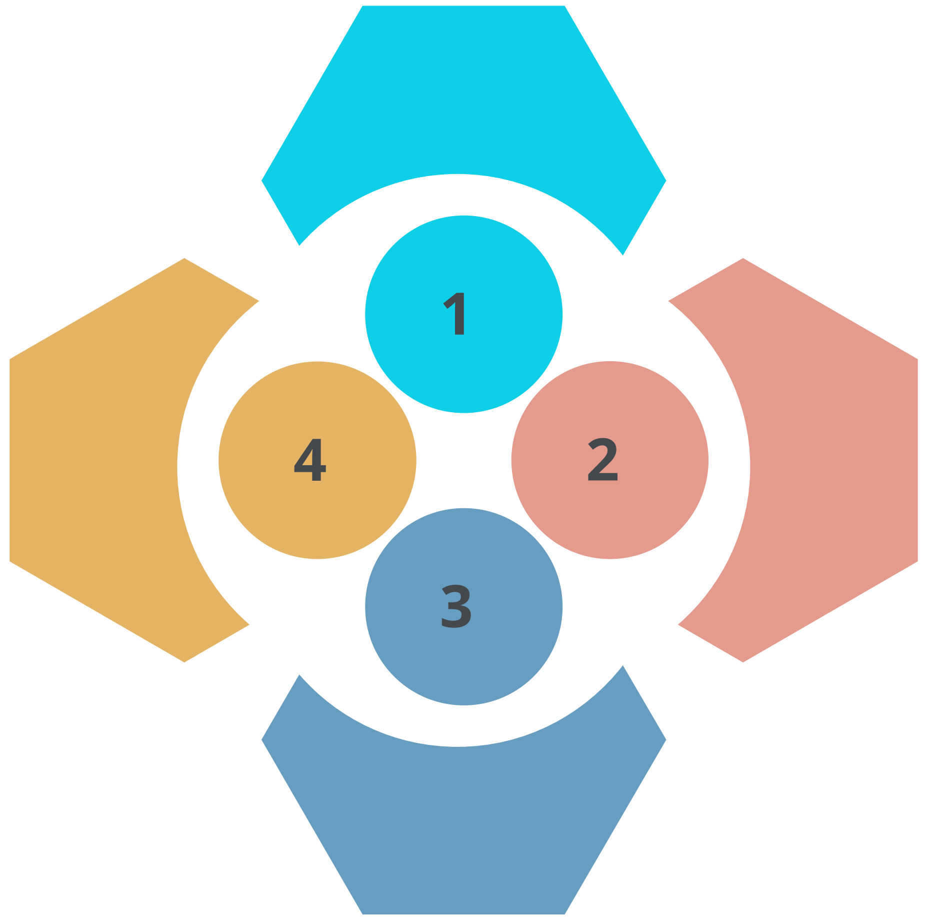
Create Jenkins Freestyle Job Using Existing Job

A Jenkins Freestyle job can be created using an existing job. Follow the steps shown below to create a new Jenkins Freestyle Job from an existing job:

Login to Jenkins and click on New Item.



Configure Jenkins parameters.

Enter the name of the new job

Enter the name of the existing job and click OK.

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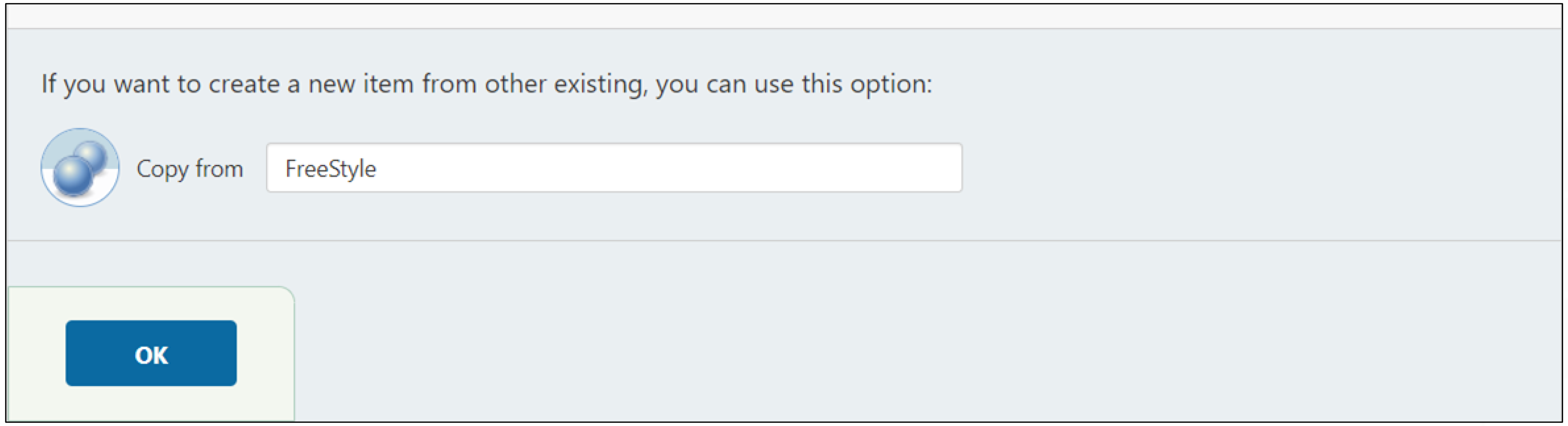
Create Jenkins Freestyle Job Using Existing Job

This is a screenshot showing how to create a new Freestyle job using an existing job:



If you want to create a new item from other existing, you can use this option:

Copy from FreeStyle

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Jenkins Freestyle Job: Renaming

To rename a Jenkins Freestyle job, follow the steps shown below:

1. Login to Jenkins and click on the job to be renamed.
2. Click on Rename.
3. Provide the new Jenkins job name and click Rename.

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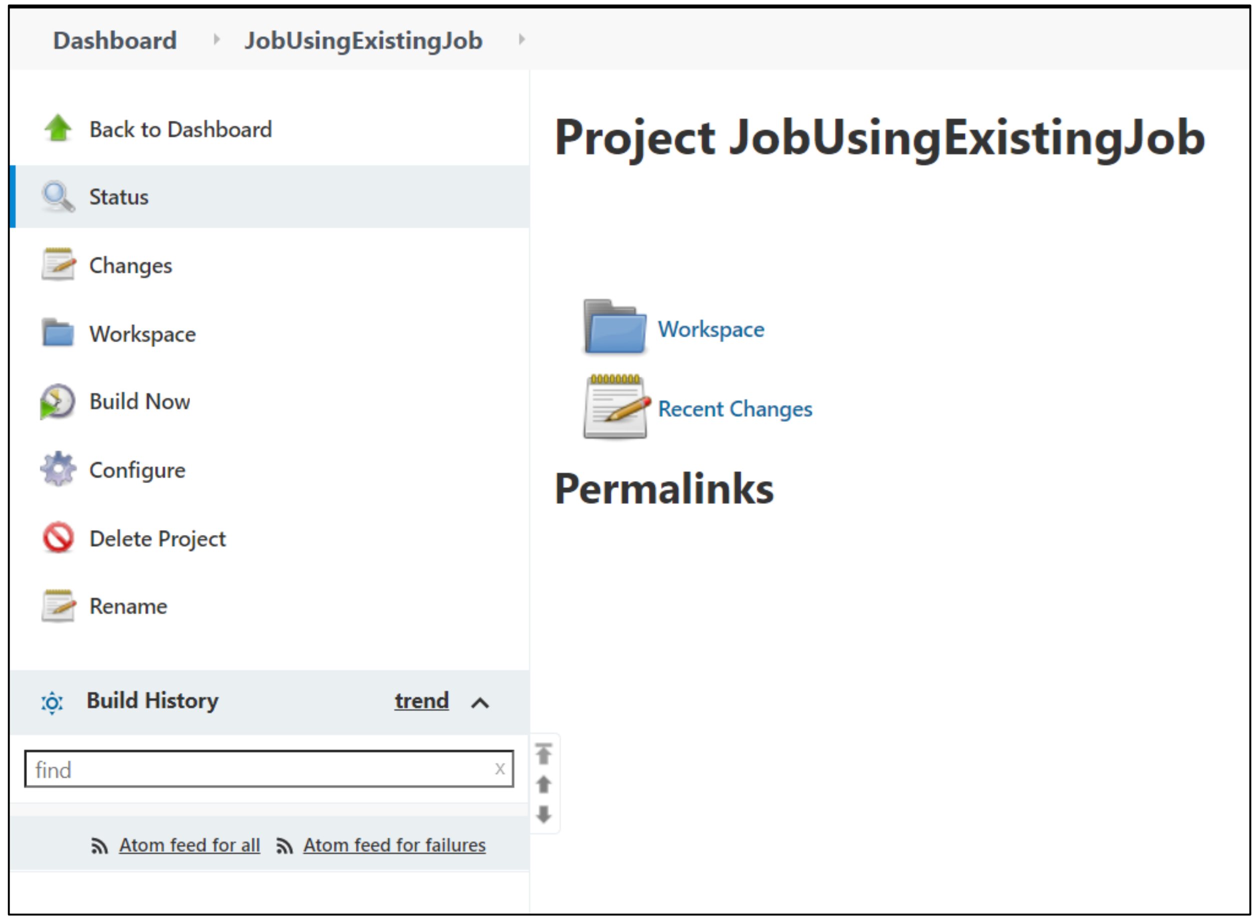
Jenkins Freestyle Job: Renaming

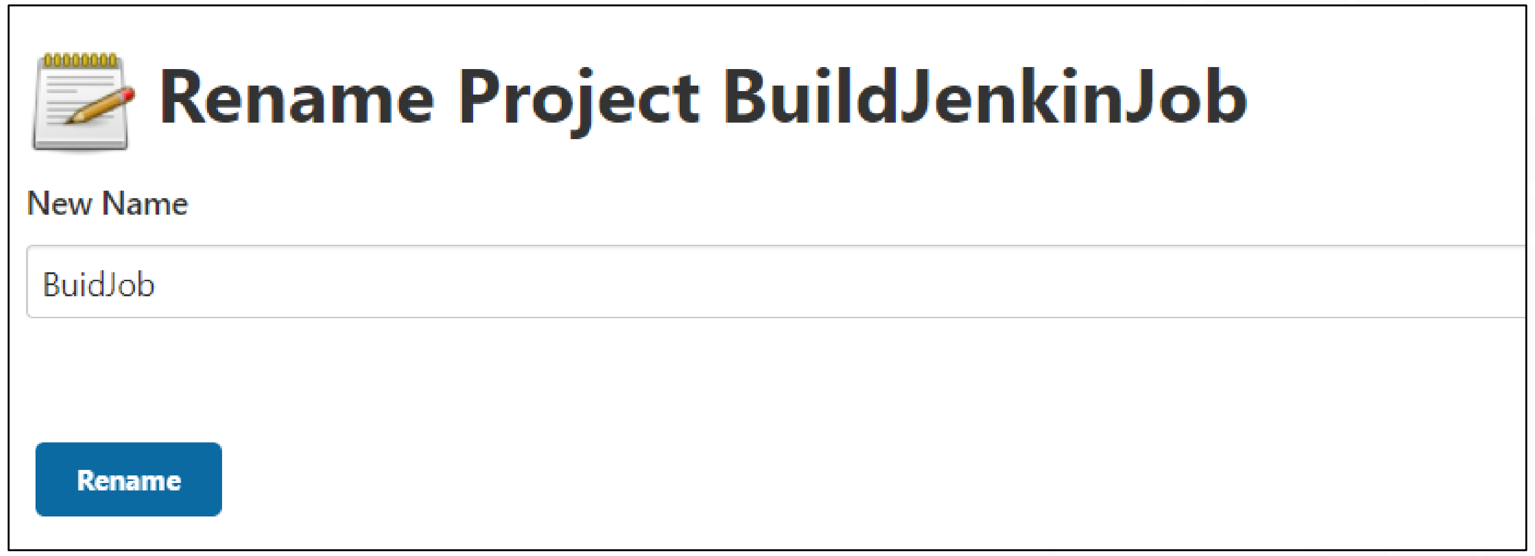
A Jenkins Freestyle job can be renamed. To do so, click on Rename and enter the new name in the following screen.



Dashboard › JobUsingExistingJob ›

Project JobUsingExistingJob

Permalinks



Rename Project BuildJenkinJob

New Name

BuidJob

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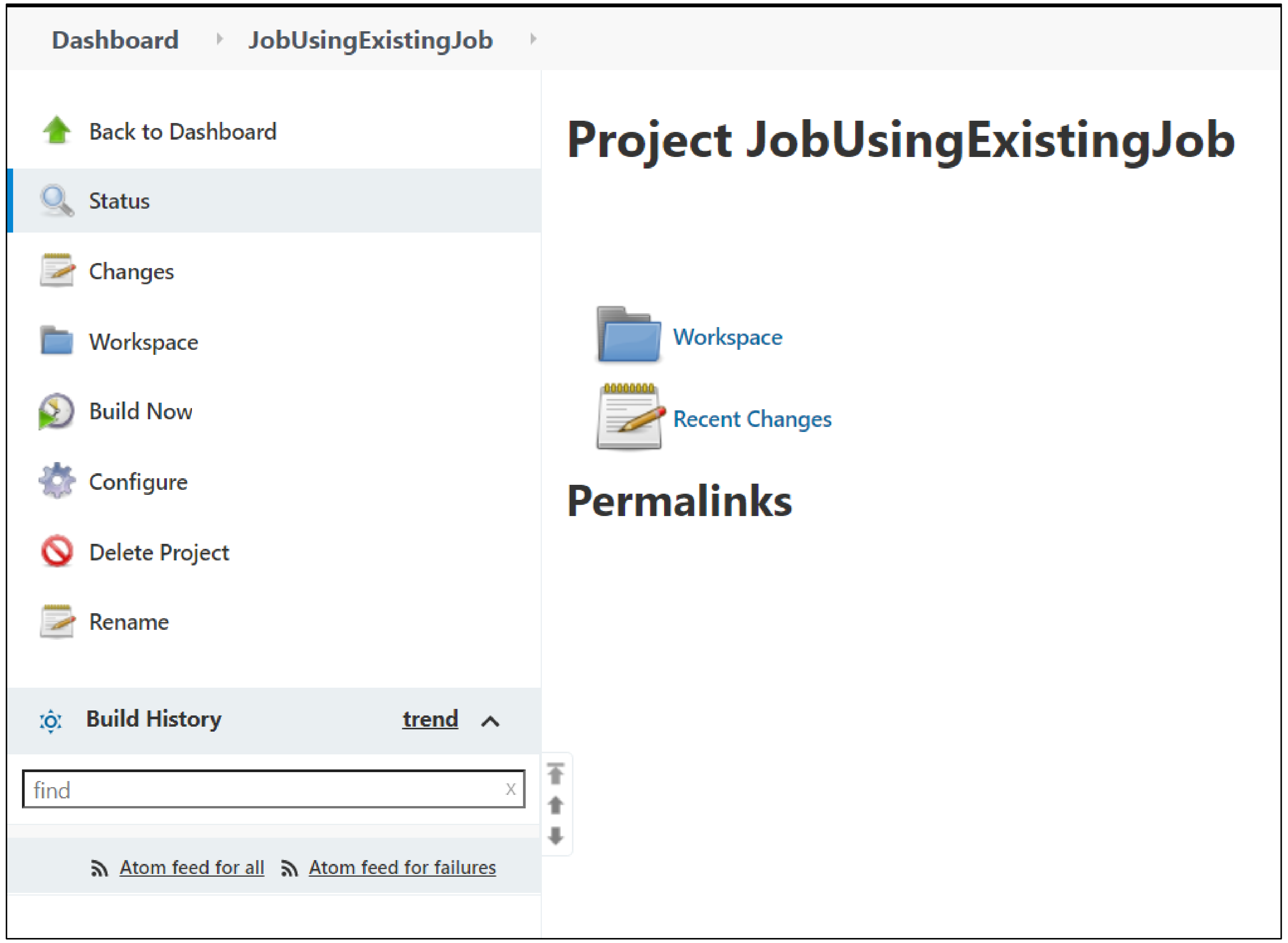
Jenkins Freestyle Job: Deleting

To delete an existing Jenkins Freestyle job, on the dashboard, click on the job to be deleted. Then, in the following screen, click on Delete Project.



Dashboard › JobUsingExistingJob ›

- Back to Dashboard
- Status
- Changes
- Workspace
- Build Now
- Configure
- Delete Project
- Rename

Build History trend

find

Atom feed for all Atom feed for failures

Project JobUsingExistingJob

Workspace

Recent Changes

Permalinks

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Freestyle Job Sections

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General Section

The General section of the freestyle project is used to configure basic configurations such as:

- Discard old builds
- Parameterize the project
- Throttle builds
- Disable the project
- Execute concurrent builds

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Source Code Management Section

The Jenkins Freestyle project can be integrated with source code management. This can be done by configuring the Git repository in Jenkins configuration.

When the build is triggered,

the source code gets downloaded from the repository.

This is an important stage of build process as the compilation process is completely dependent on checking the source code.

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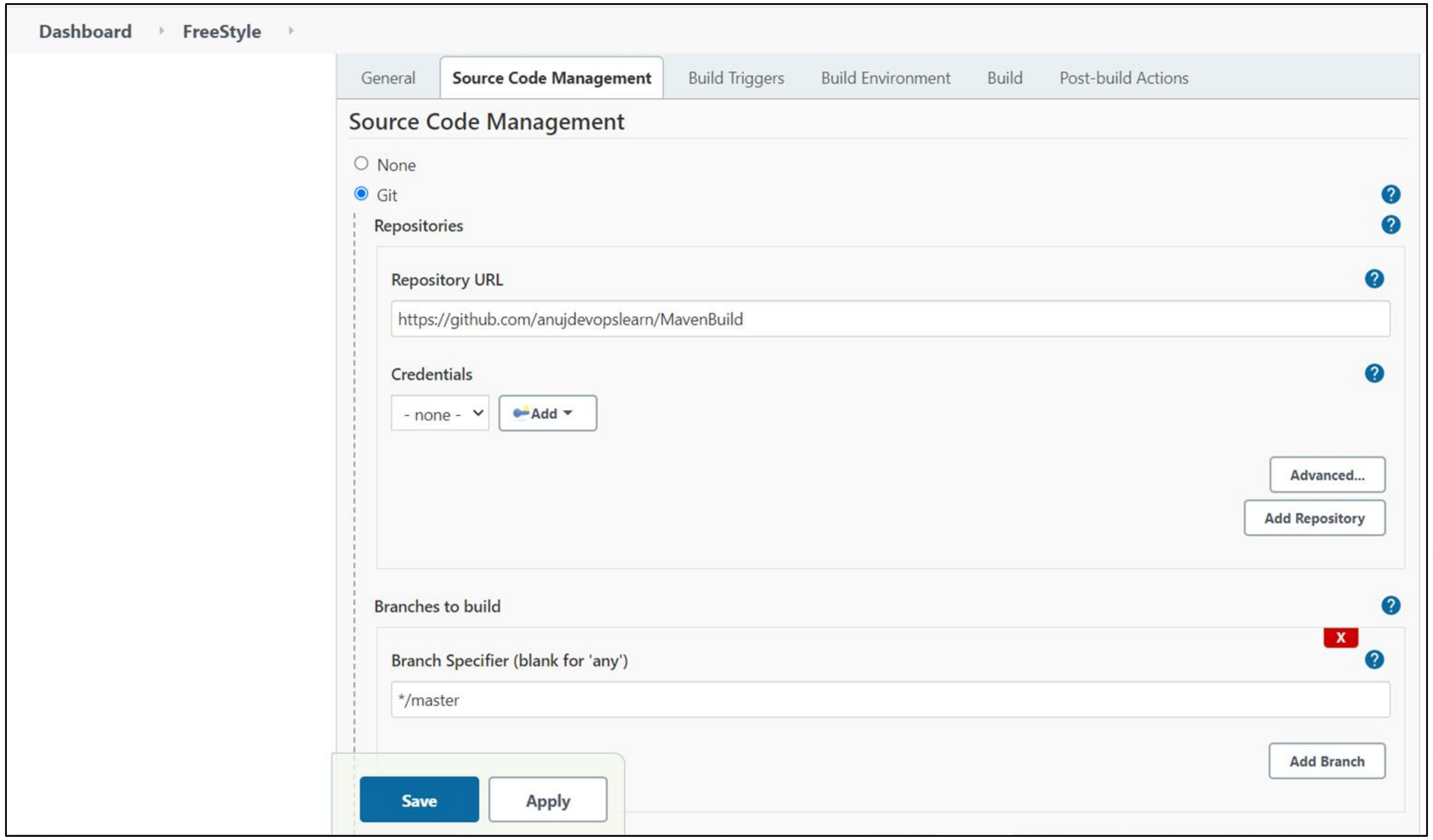
Source Code Management Section

Shown below is the screenshot of Source Code Management section in Jenkins Freestyle Project.


Dashboard › FreeStyle ›

General | Source Code Management | Build Triggers | Build Environment | Build | Post-build Actions

Source Code Management

○ None
● Git

Repositories

Repository URL
https://github.com/anujdevopslearn/MavenBuild

Credentials
- none -

Branches to build

Branch Specifier (blank for 'any')
*/master

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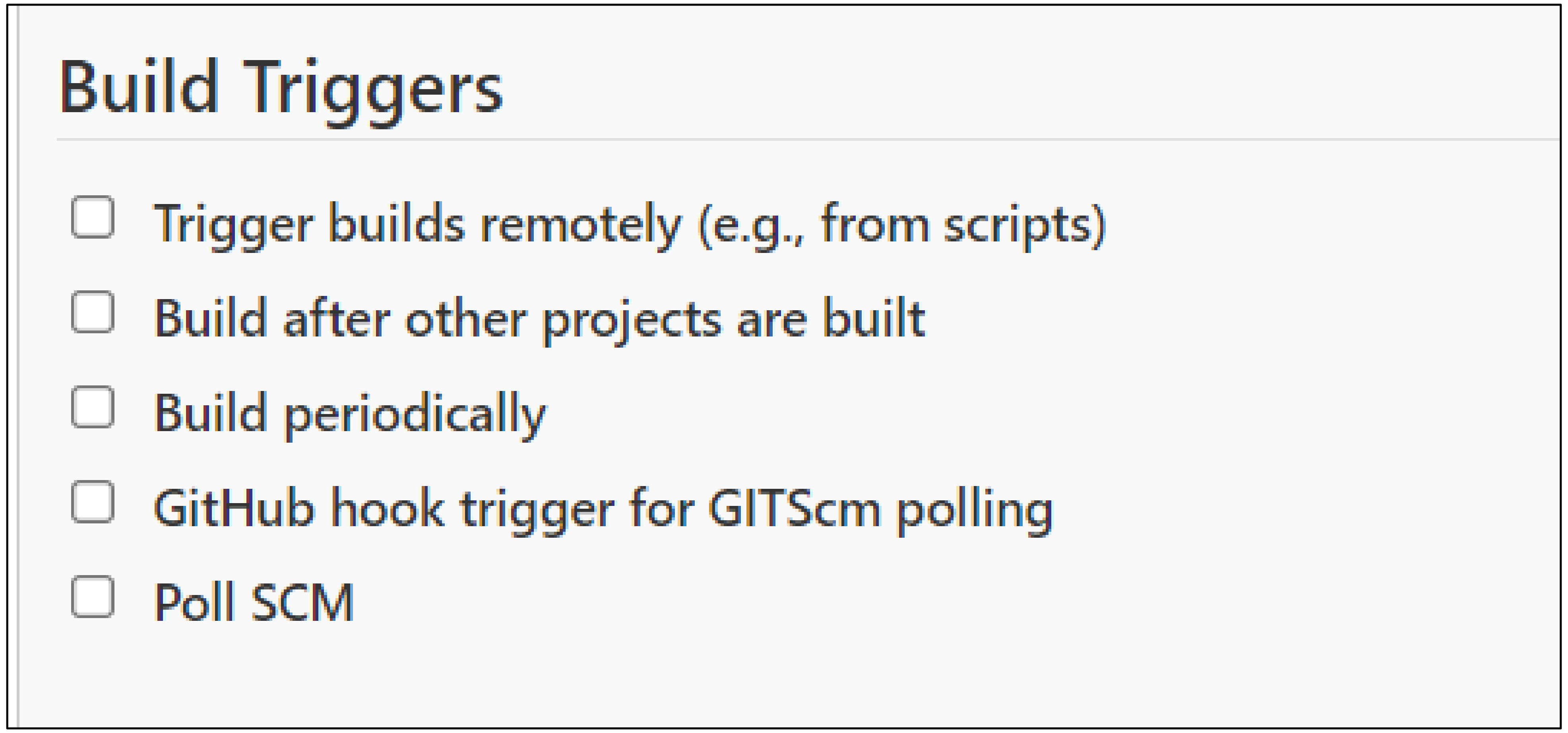
Build Triggers

A build trigger can serve various purposes depending on the project context.



Build Triggers

- ☐ Trigger builds remotely (e.g., from scripts)
- ☐ Build after other projects are built
- ☐ Build periodically
- ☐ GitHub hook trigger for GITScm polling
- ☐ Poll SCM

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Build Triggers

Jenkins builds can be triggered automatically without clicking the build now option.

Trigger builds remotely

This option allows to execute builds remotely from anywhere. An authentication token is required.

Build after other projects are built

This option can be used when the project is dependent on another project build.

Build periodically

This option schedules the project build periodically by using cron pattern.

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Build Triggers

GitHub Webhook trigger for GITScm polling

This option uses a webhook trigger which gets executed when some push activity is done to the repository.

Poll SCM

This trigger continuously polls SCM for new commits and triggers the build when new commits are done.

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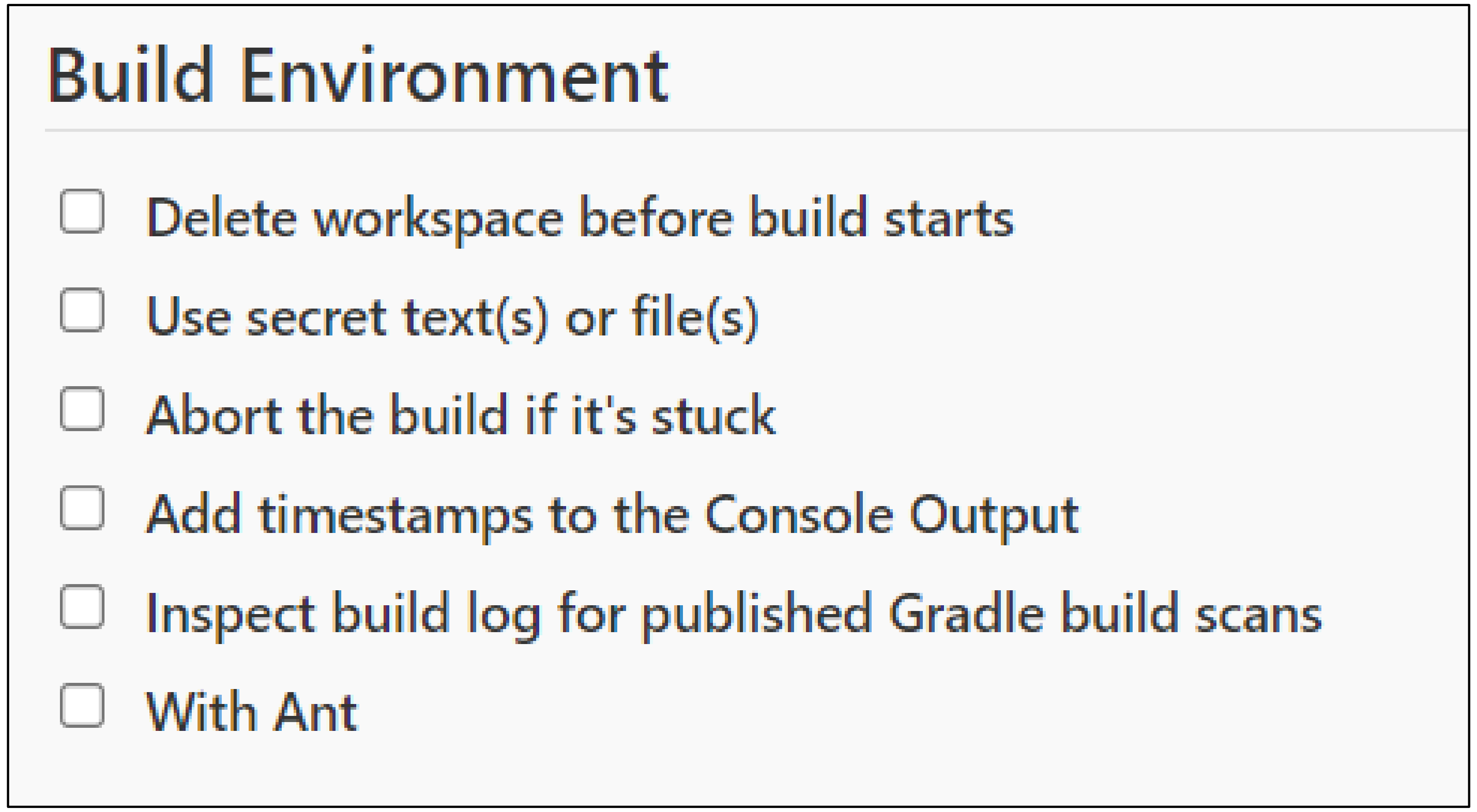
Build Environment

The Jenkins build environment offers essential tools and data for building projects.



Build Environment

- ☐ Delete workspace before build starts
- ☐ Use secret text(s) or file(s)
- ☐ Abort the build if it's stuck
- ☐ Add timestamps to the Console Output
- ☐ Inspect build log for published Gradle build scans
- ☐ With Ant

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Build Environment

Delete workspace before build starts

Cleans up the workspace folder before running builds to prevent interference from compiled files of the previous build

Use secret texts or files

Configures the credentials for shell and other build steps by binding them with an environment variable

Abort the build when stuck

In case of builds getting stuck, this option can be configured to abort the build

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Build Environment

Add timestamps to the console output

Adds up the timestamp to the console output while running Jenkins builds in build logs

Inspect build log for published Gradle build scans

Detect build scans from build logs and publishes them on Jenkins

Run builds with the Ant build tool

Configures the Ant build tool to run builds in Jenkins

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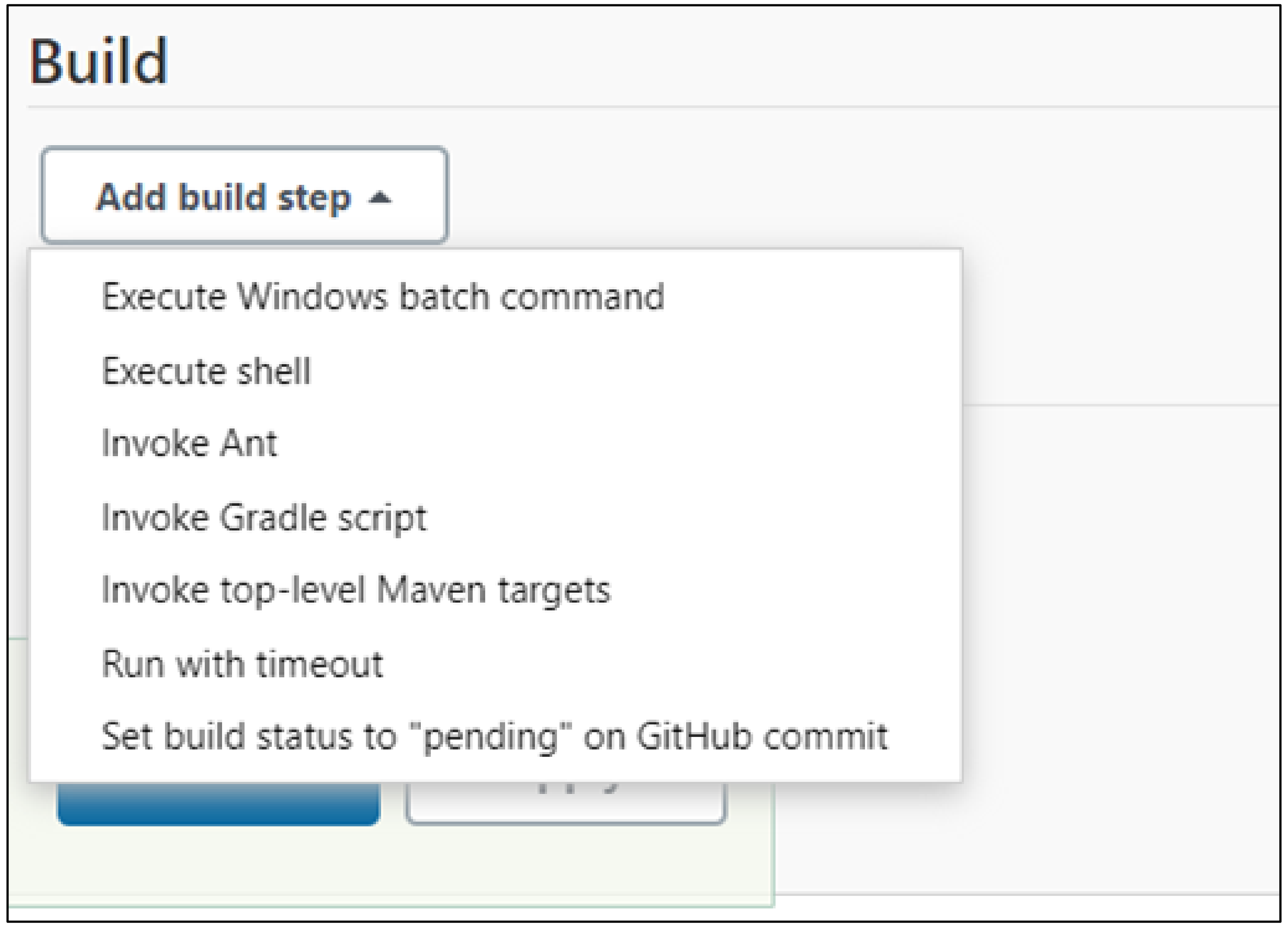
Build Step Section

The chief task of Jenkins is to automate the build process using Maven, Ant, Gradle and other build tools.


Build
Add build step
Execute Windows batch command
Execute shell
Invoke Ant
Invoke Gradle script
Invoke top-level Maven targets
Run with timeout
Set build status to "pending" on GitHub commit

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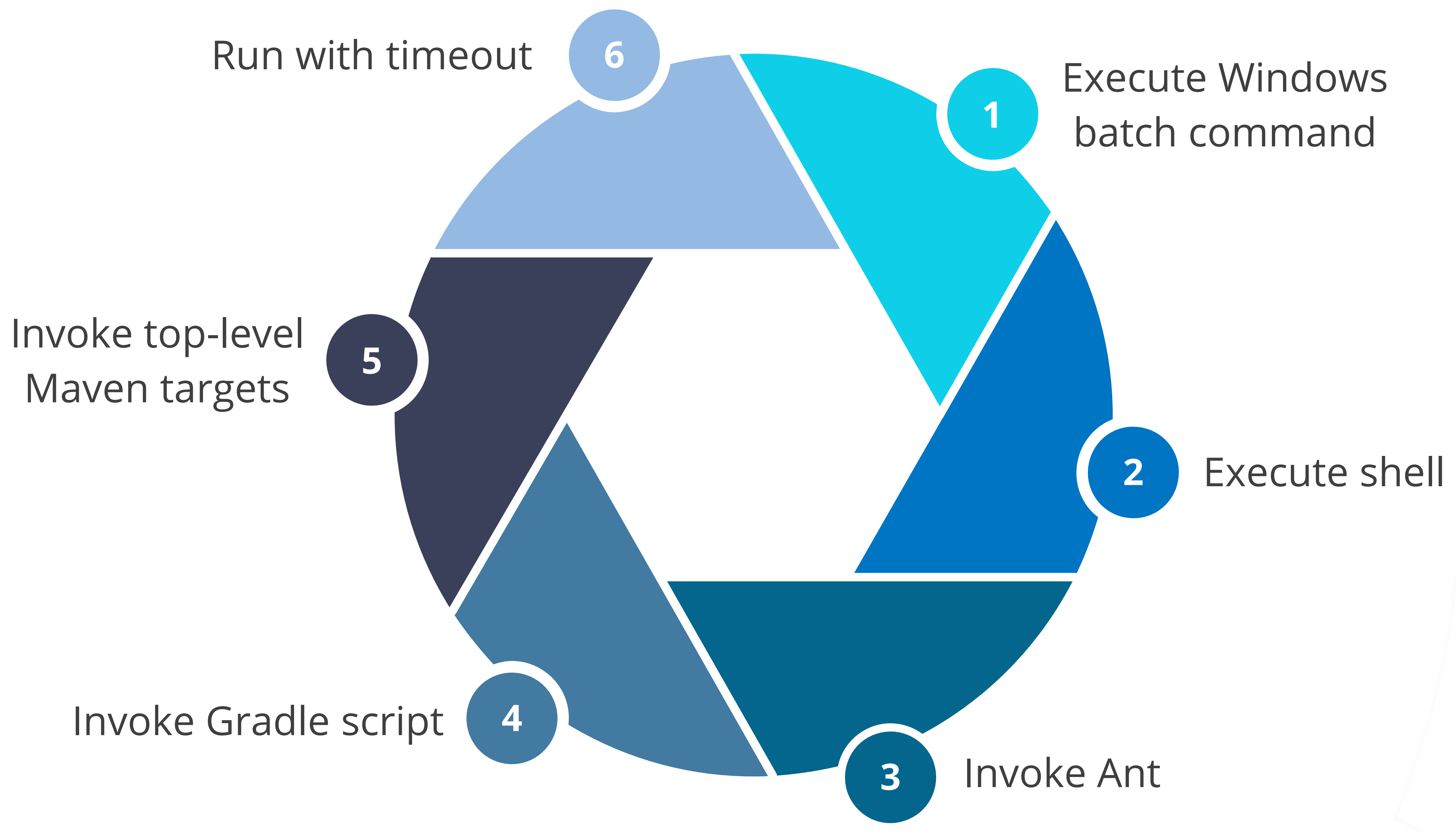
Functions of Build Step Section



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Post-Build Section

The popular post-build actions in Jenkins build job are:

- **Archive the artifacts** - used to keep the artifacts secure so that they can be downloaded later
- **Build other projects** - used to trigger another build project once a build is successful
- **Publish JUnit test result report** – used to publish XML test reports generated by Junit and TestNG test executions

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Post-Build Section

The popular post-build actions in Jenkins build job are:

- **Record fingerprints of files to track usage -** stores the MD5 checksum for each file instead of saving them
- **Git publisher** - performs push for merges, tag/branch creation or even commits during the build process
- **Editable email notification** – allows to customize email notifications for the build process
- **Delete workspace when build is done** – ensures that the next build starts from scratch

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Assisted Practice

Creating A Freestyle Job

Duration: 15 min

Problem Statement:

Create a new Jenkins job to checkout source code from the Git repository.

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Assisted Practice: Guidelines

Steps to create a new Jenkins job for source code checkout:

1. Login to Jenkins CI tool with admin user and click on New Item to create a new Jenkins's job.
2. Select Freestyle project while creating the Jenkins's job and provide a custom job name.
3. Click on the Ok button to save the Jenkins's job and a new configuration screen would be opened.
4. In the configure screen, access the Source Code Management tab and provide the Git repository configurations.
5. Save the configurations in Jenkins.
6. Click on the Build Now option to trigger the new build. Build logs will show the code check out process during the build process.

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Notification

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Jenkins Notifications

Jenkins supports sending build status notifications.

Several built-in and third-party tools are available for sending notifications.

Notifications can also be used to send alerts upon the completion of application deployments.

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Jenkins Notifications

Jenkins supports email notifications by default. Users can also install various plugins to support different notification channels.

How to configure an SMTP server

Go to Manage Jenkins -> Configure System
Update with SMTP details for sending email alerts

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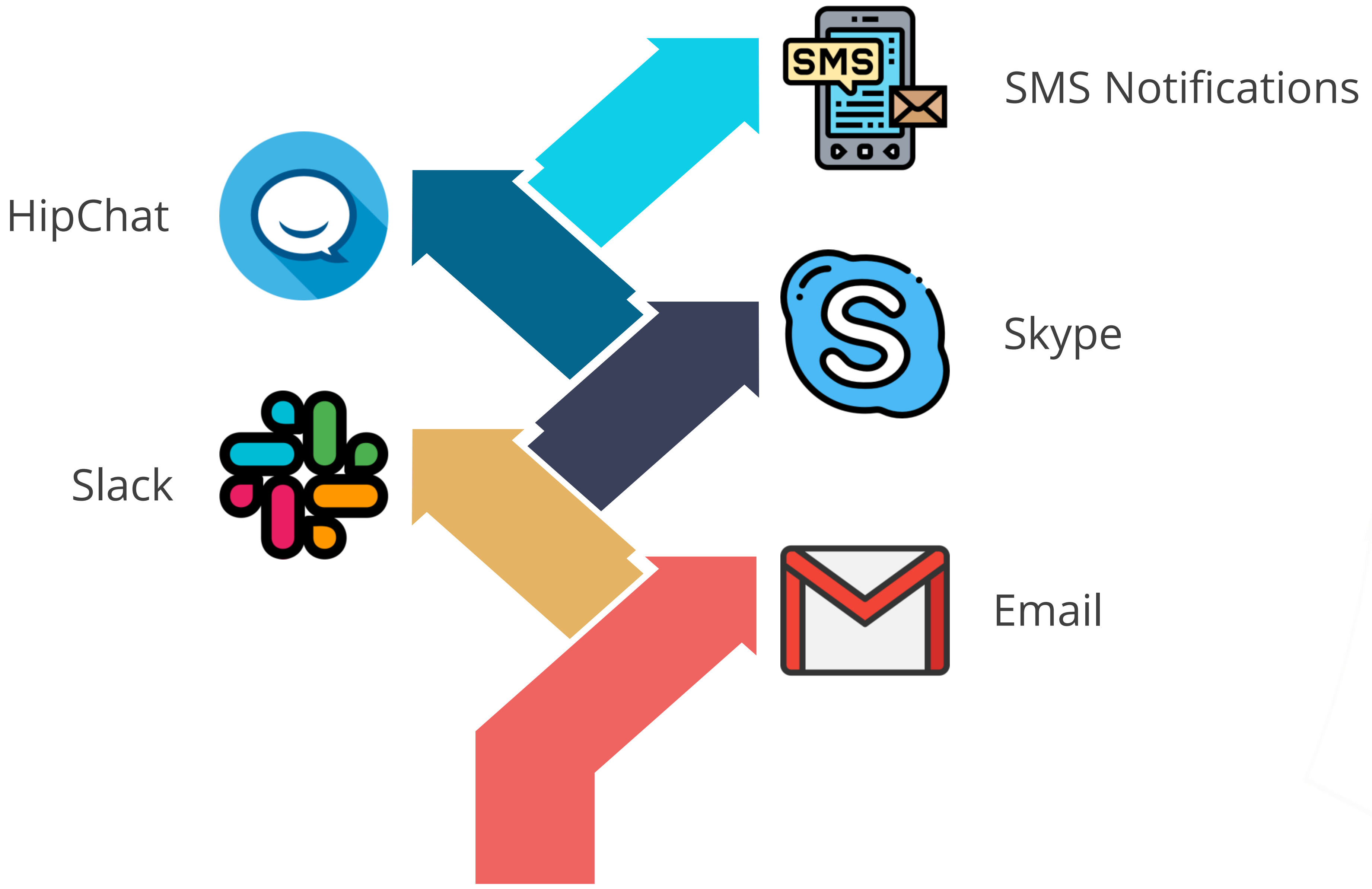
Jenkins Notifications

Popular tools that can be integrated with Jenkins for sending notifications:



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Jenkins Email Plugin

Jenkins email or mailer plugin works by configuring the email notification in the post-build section of the job.

This plugin sends email notifications only in case of:

- Failure
- Success build post failure
- Unstable builds

How to configure the Jenkins email plugin:

Access configuration in Manage Jenkins page -> Configure System -> Email Notification section

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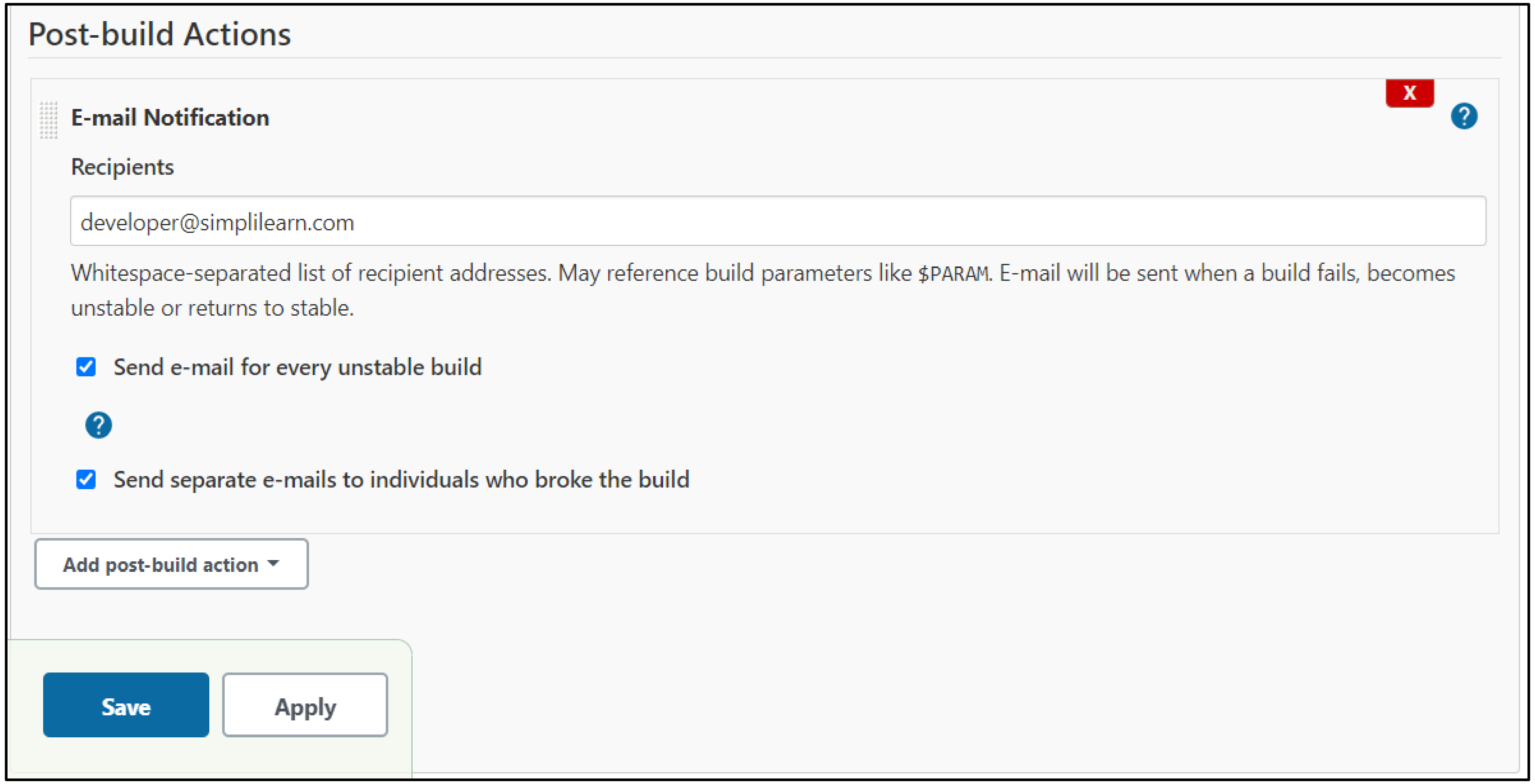
Jenkins Email Plugin

Jenkins Email plugin is used to send email notifications. The screenshot below shows how the email can be configured.



Post-build Actions

E-mail Notification

Recipients

developer@simplilearn.com

Whitespace-separated list of recipient addresses. May reference build parameters like $PARAM. E-mail will be sent when a build fails, becomes unstable or returns to stable.

- [✓] Send e-mail for every unstable build
- [✓] Send separate e-mails to individuals who broke the build

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Jenkins Extended Email Plugin

Jenkins extended email plugin provides more control to the end user for configuring email notifications.

- The email trigger can be configured for every event and is not limited to only unstable builds.
- It provides flexibility to override the default subject, body and attachments.

How to configure the Jenkins extended email plugin:

Access configuration in Manage Jenkins page -> Configure System -> Extended Email Notification section

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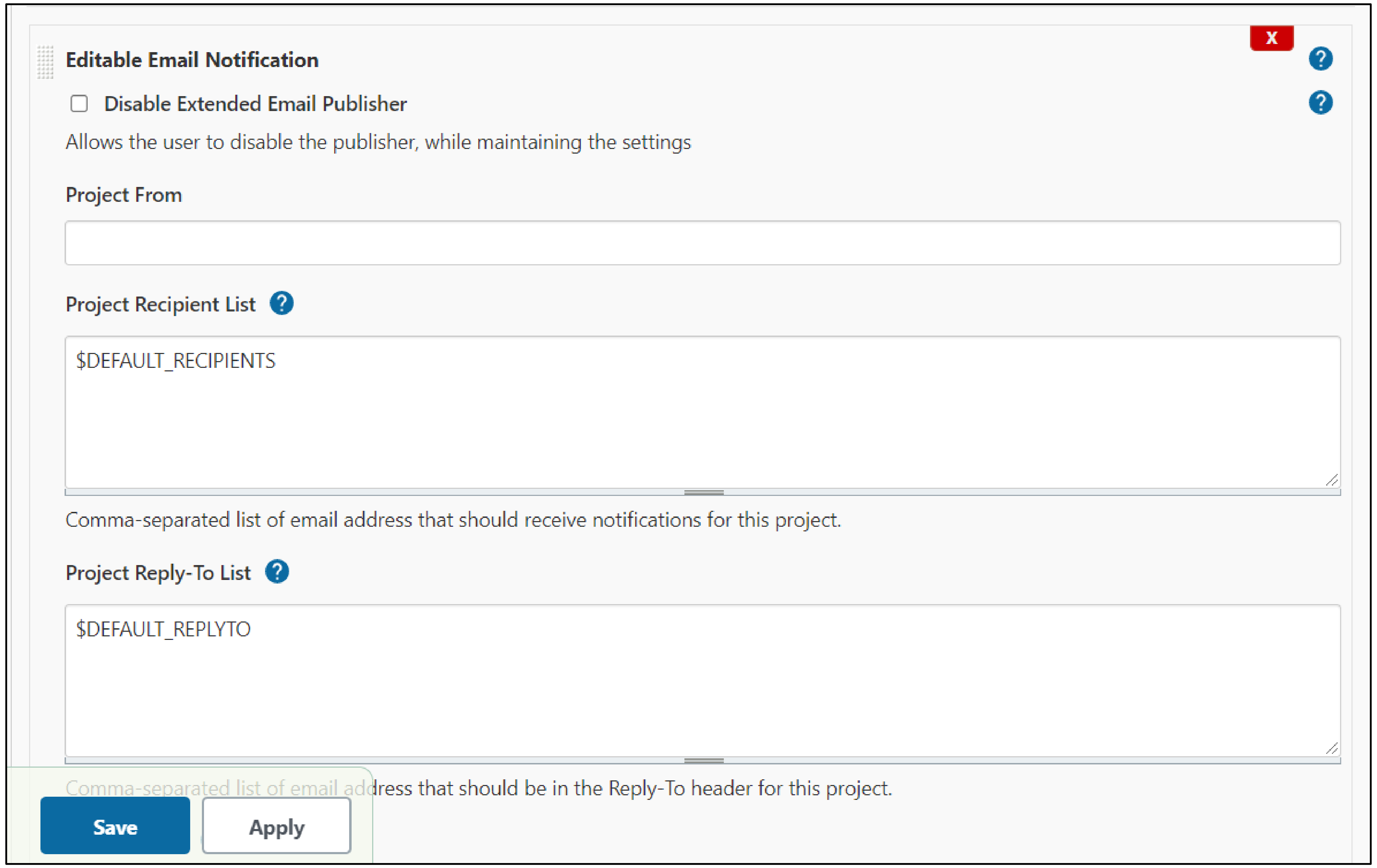
Jenkins Extended Email Plugin

Jenkins extended email plugin is an extension of the mailer plugin.



Editable Email Notification

☐ Disable Extended Email Publisher

Allows the user to disable the publisher, while maintaining the settings

Project From

Project Recipient List

$DEFAULT_RECIPIENTS

Comma-separated list of email address that should receive notifications for this project.

Project Reply-To List

$DEFAULT_REPLYTO

Comma-separated list of email address that should be in the Reply-To header for this project.

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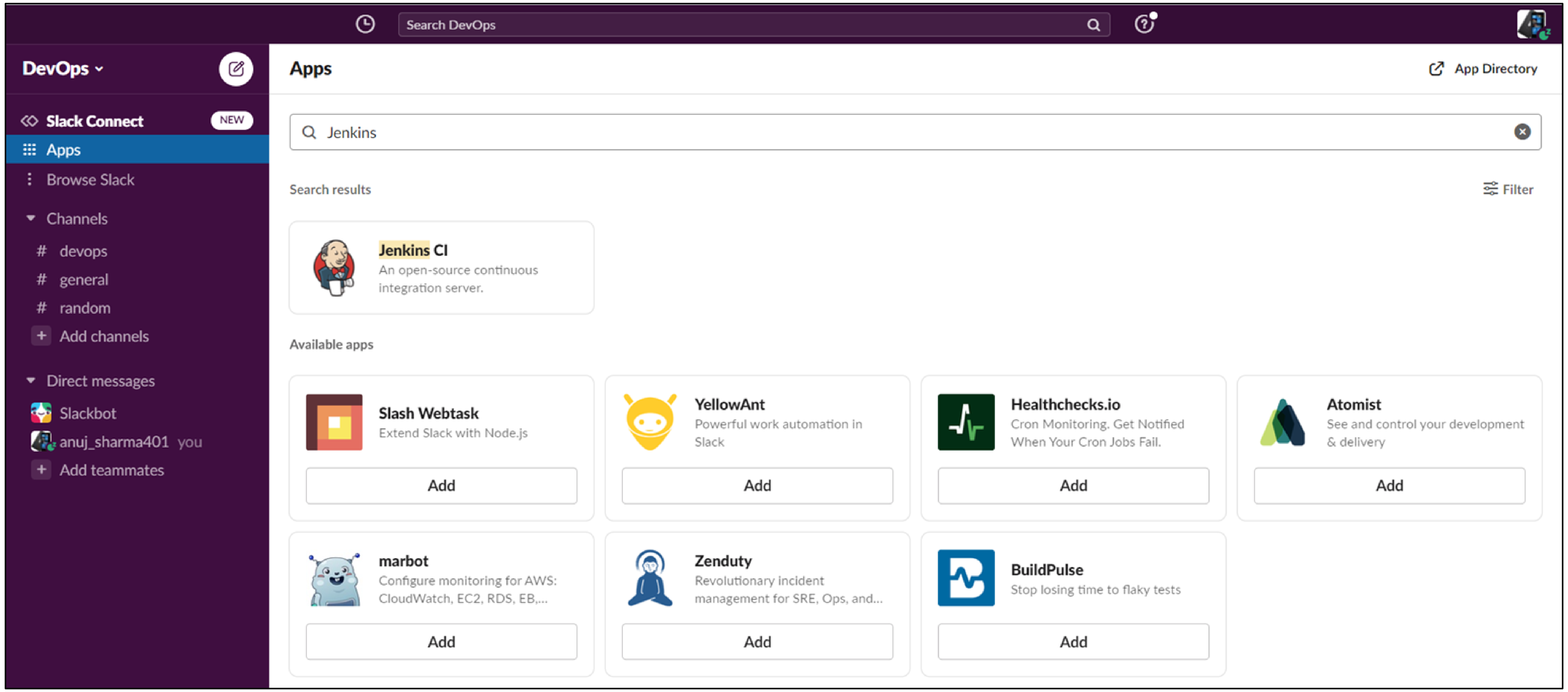
Jenkins Slack Integration Configuration

To establish a connection between Slack and Jenkins, the Jenkins CI app needs to be configured with Jenkins.



Search DevOps

DevOps

Slack Connect NEW

Apps

Browse Slack

Channels

devops

general

random

Add channels

Direct messages

Slackbot

anuj_sharma401 you

Add teammates

Apps

App Directory

Jenkins

Search results

Filter

Jenkins CI
An open-source continuous integration server.

Available apps

Slash Webtask
Extend Slack with Node.js
Add

YellowAnt
Powerful work automation in Slack
Add

Healthchecks.io
Cron Monitoring. Get Notified When Your Cron Jobs Fail.
Add

Atomist
See and control your development & delivery
Add

marbot
Configure monitoring for AWS: CloudWatch, EC2, RDS, EB,...
Add

Zenduty
Revolutionary incident management for SRE, Ops, and...
Add

BuildPulse
Stop losing time to flaky tests
Add

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Jenkins Slack Integration Configuration

Some of the important configurations that need to be specified are:

- Post to channel details
- Customized name
- Customize icon

After configuring all the details, save the settings to further proceed with configuring slack in Jenkins CI server.

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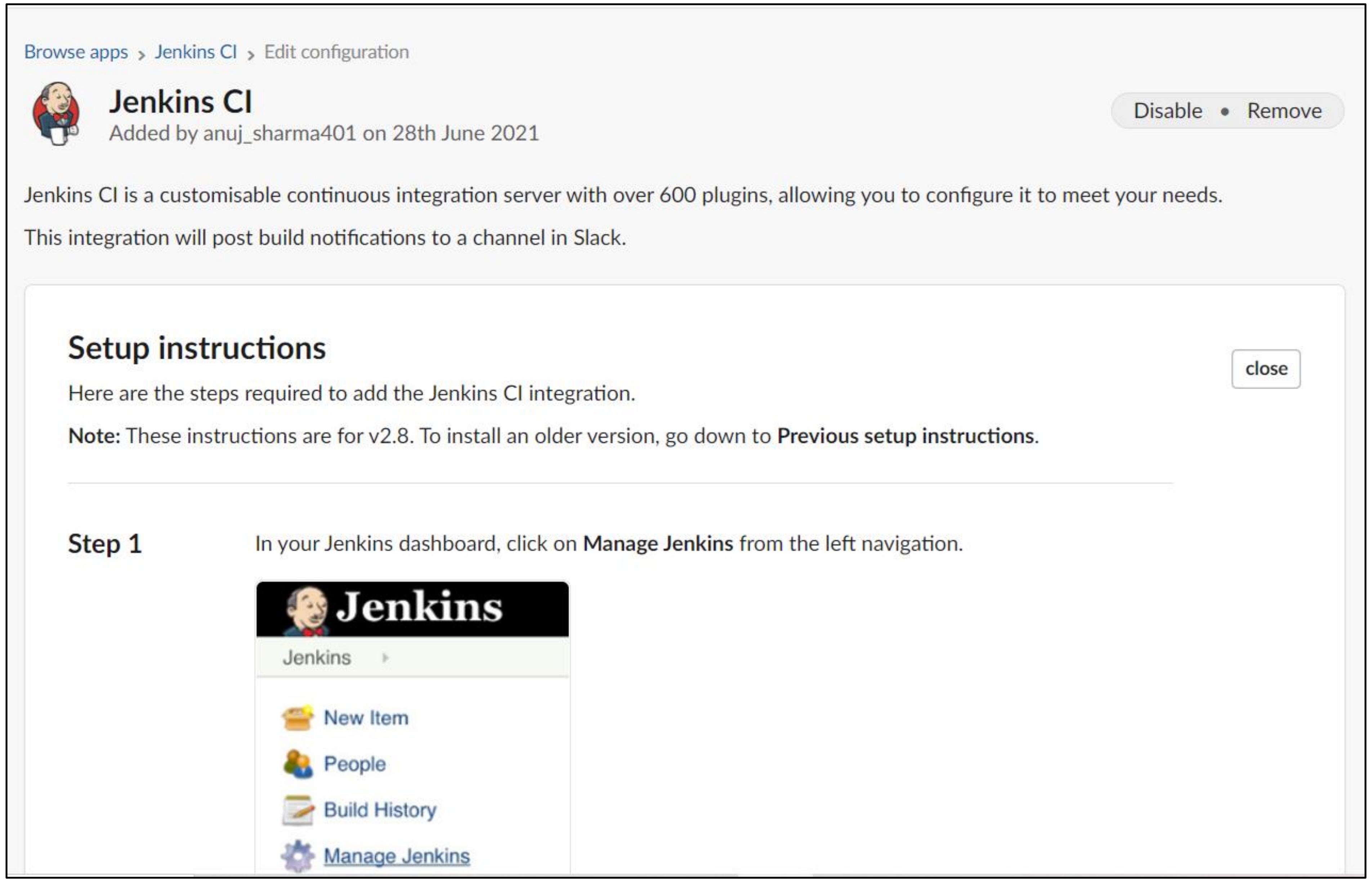
Jenkins Slack Integration Configuration



Browse apps > Jenkins CI > Edit configuration

Jenkins CI

Added by anuj_sharma401 on 28th June 2021

Disable • Remove

Jenkins CI is a customisable continuous integration server with over 600 plugins, allowing you to configure it to meet your needs.

This integration will post build notifications to a channel in Slack.

Setup instructions

close

Here are the steps required to add the Jenkins CI integration.

Note: These instructions are for v2.8. To install an older version, go down to **Previous setup instructions**.

Step 1 In your Jenkins dashboard, click on **Manage Jenkins** from the left navigation.

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Jenkins Slack Plugin

Jenkins Slack plugin helps to integrate Slack with Jenkins. This can be used to send build notifications on Slack.

Slack is a chat software. It contains hooks that provide communication between the tools being used and the team members.

Slack Jenkins hook is available as an app in Slack. It can be easily accessed on the workspace page.

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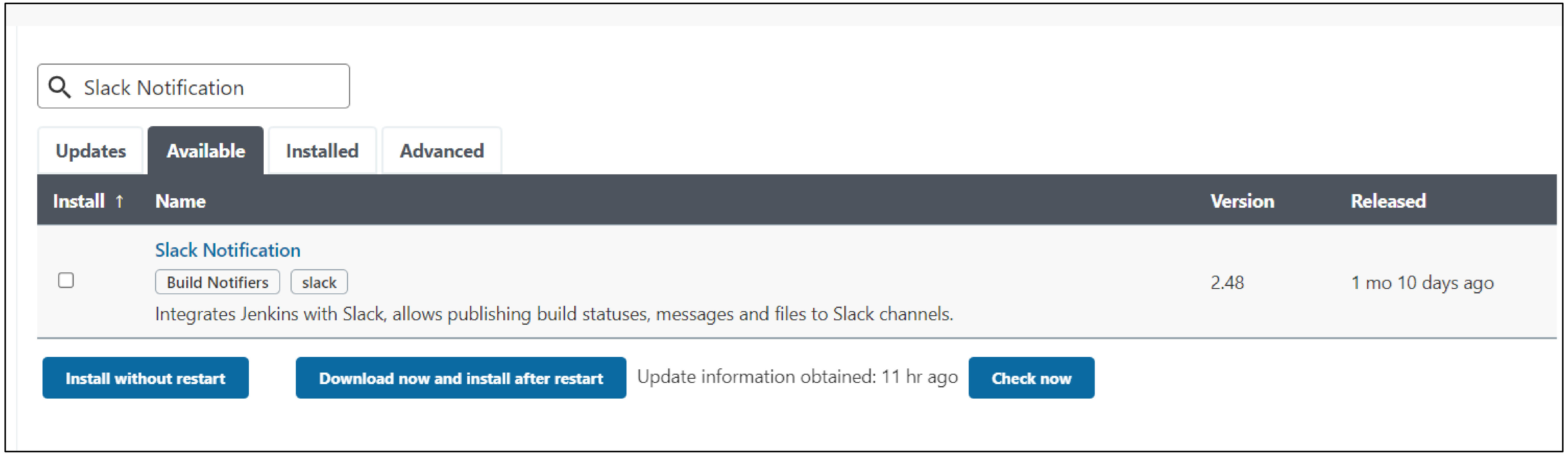
Jenkins Slack Plugin

Slack Jenkins hook is available as an app in Slack. It can be easily accessed on the workspace page.



Slack Notification

Install ↑	Name	Version	Released
☐	Slack Notification Build Notifiers · slack Integrates Jenkins with Slack, allows publishing build statuses, messages and files to Slack channels.	2.48	1 mo 10 days ago

Update information obtained: 11 hr ago

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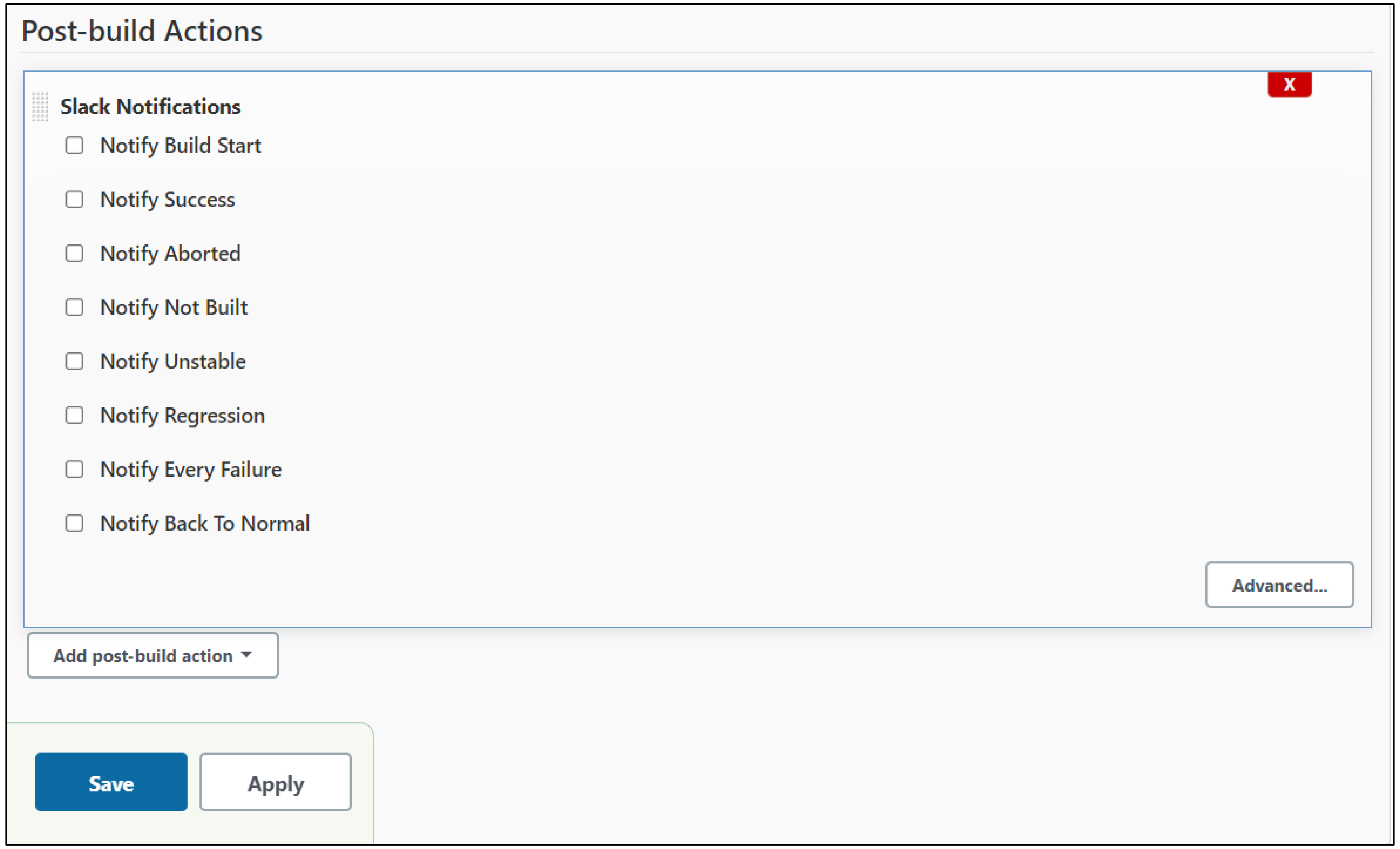
Jenkins Slack Plugin

This plugin is used for executing a shell/batch task according to the build log output.



Post-build Actions

Slack Notifications

- [ ] Notify Build Start
- [ ] Notify Success
- [ ] Notify Aborted
- [ ] Notify Not Built
- [ ] Notify Unstable
- [ ] Notify Regression
- [ ] Notify Every Failure
- [ ] Notify Back To Normal

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Assisted Practice

Email Notification

Duration: 25 min

Problem Statement:

Set up a custom SMTP to send an email notification.

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Assisted Practice: Guidelines

Steps to set up a custom SMTP for sending an email notification:

1. Login to Jenkins CI tool as admin.
2. Navigate to Manage Jenkins to access Email configuration section.
3. Click on Configure System and navigate to the bottom of page to Extended E-mail Notification section.
4. Provide the following SMTP details to configure email alerts configuration: Gmail SMTP server name: smtp.gmail.com, Gmail SMTP username: your Gmail address, Gmail SMTP password: your password, and Gmail SMTP port: 465.

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Assisted Practice

Slack Notification

Duration: 25 min

Problem Statement:

Set up Slack notifications from Jenkins.

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Assisted Practice: Guidelines

Steps to set up Slack notifications from Jenkins:

1. Login or create an account on slack to configure channel for alerts.
2. Log in to Jenkins CI tool and configure Slack notification plugin.
3. Configure Jenkins job for setting up Slack notifications.

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Key Takeaways

- Jenkins Build job is used to automate Build and test case execution.
- Build jobs can be configured to perform deployment or other automation with Jenkins.
- Jenkins Freestyle job is a highly flexible and configurable Build job which can be used to automate any project.
- Jenkins Freestyle job can be created using an existing job; it can also be renamed, and deleted.
- The various sections in Jenkins Freestyle Job dashboard are: General, Source Code Management, Build Triggers, Build Environment, Build, and Post-Build Actions.

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Lesson-End Project

Creating a Freestyle Job

Problem Statement:

Perform the following:

- Create a Freestyle Job to send an email upon a successful Build.

Access: Click on the **Labs** tab on the left side panel of the LMS. Copy or note the username and password that is generated. Click on the **Launch Lab** button. On the page that appears, enter the username and password in the respective fields, and click **Login**.

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Thank You

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