CI/CD

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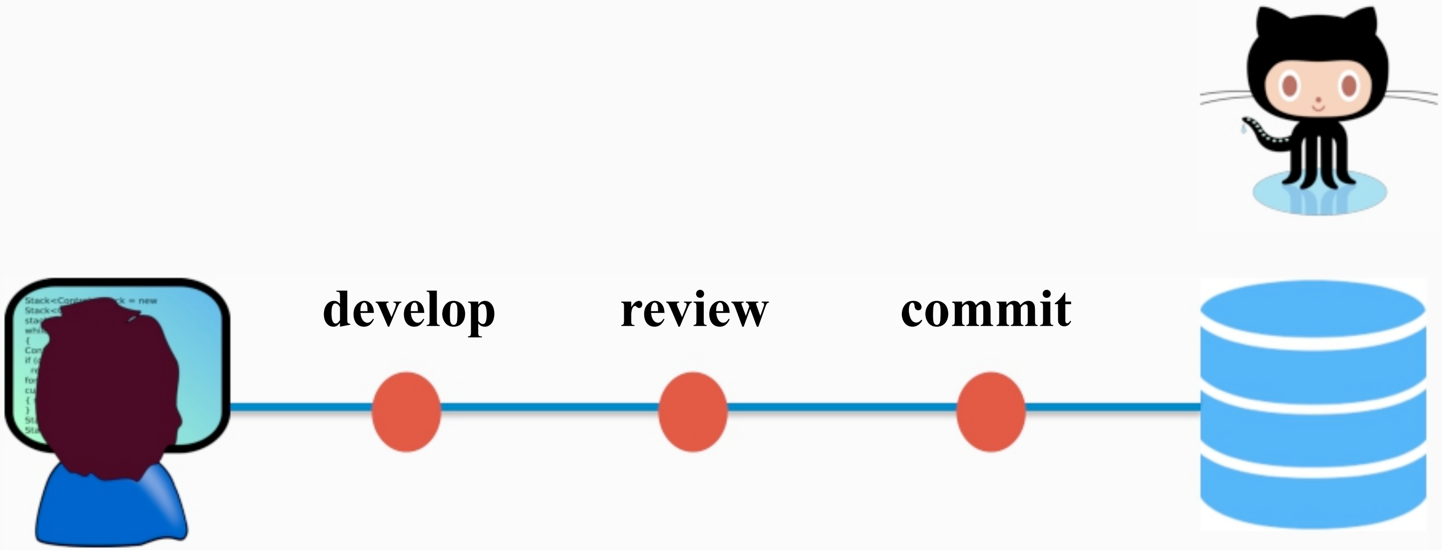


develop

review

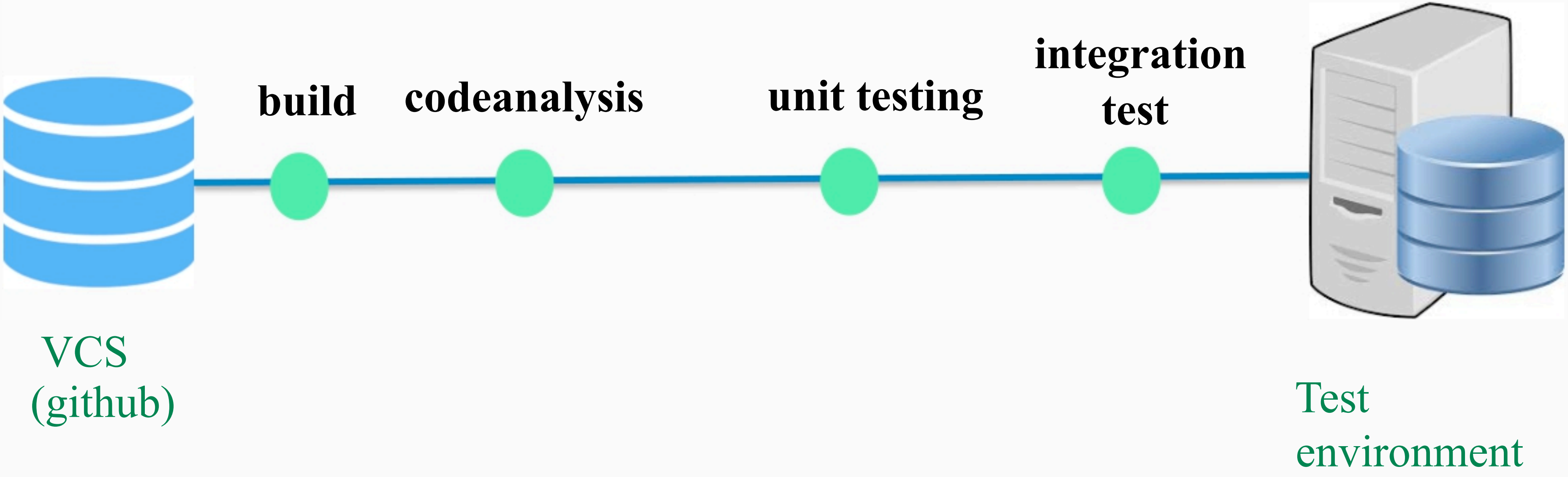
commit

Developers

Version control

sonarqube

JUnit



VCS
(github)

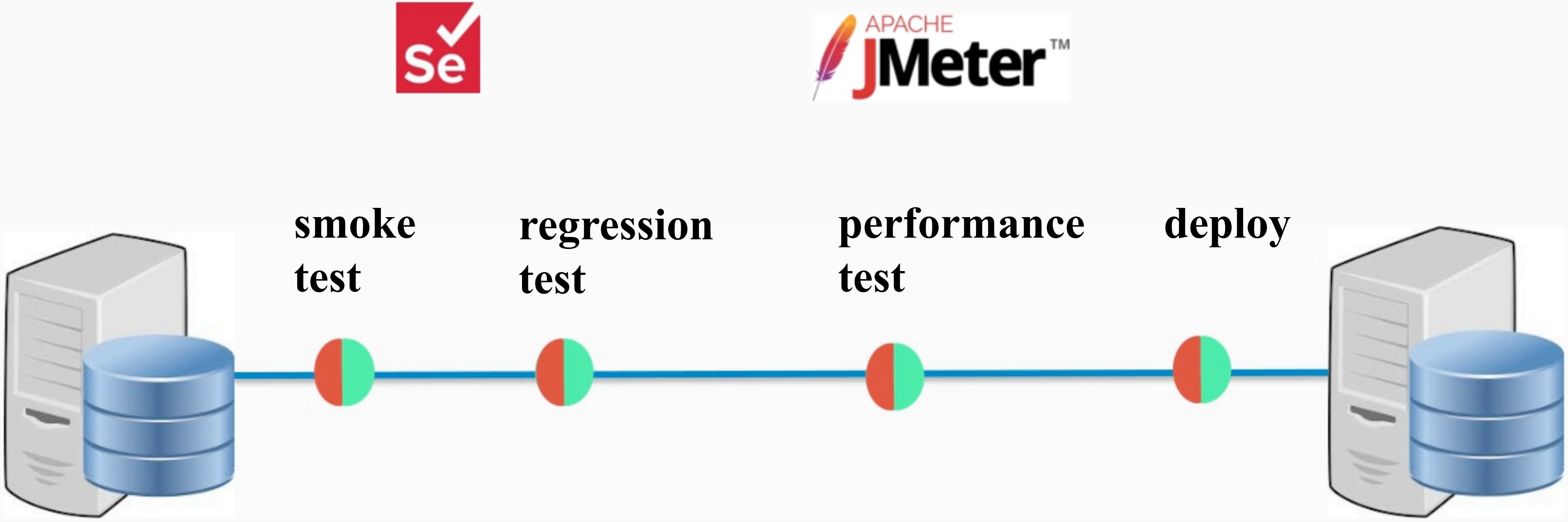
build

codeanalysis

unit testing

integration
test

Test
environment



smoke test

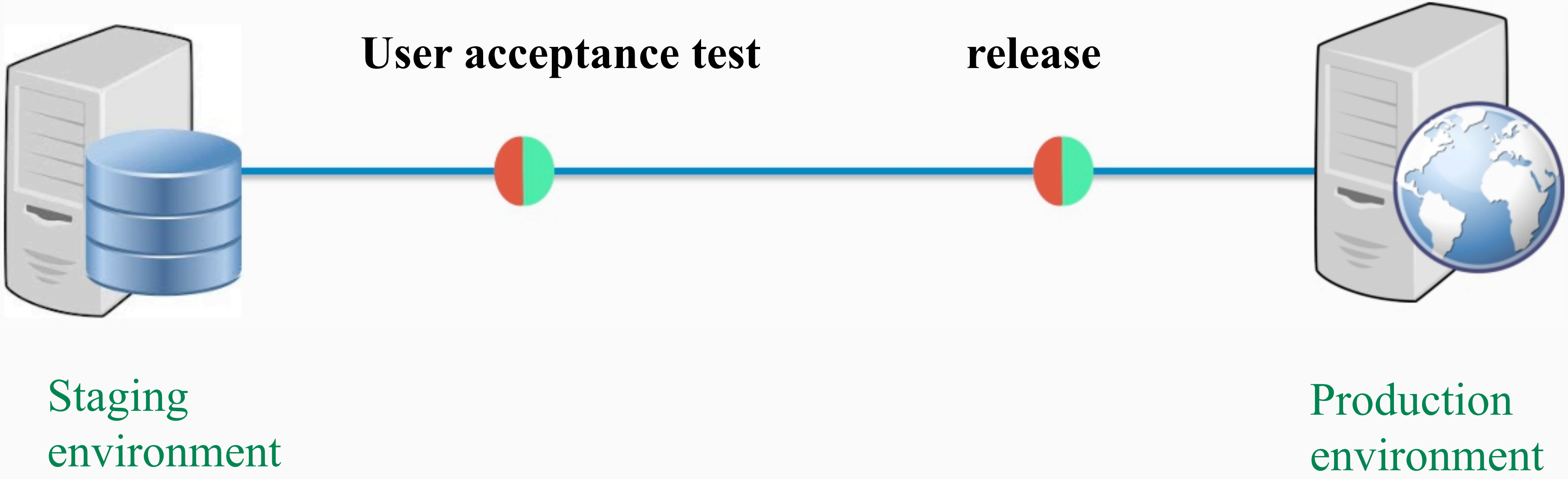
regression test

performance test

deploy

Test environment

Staging environment

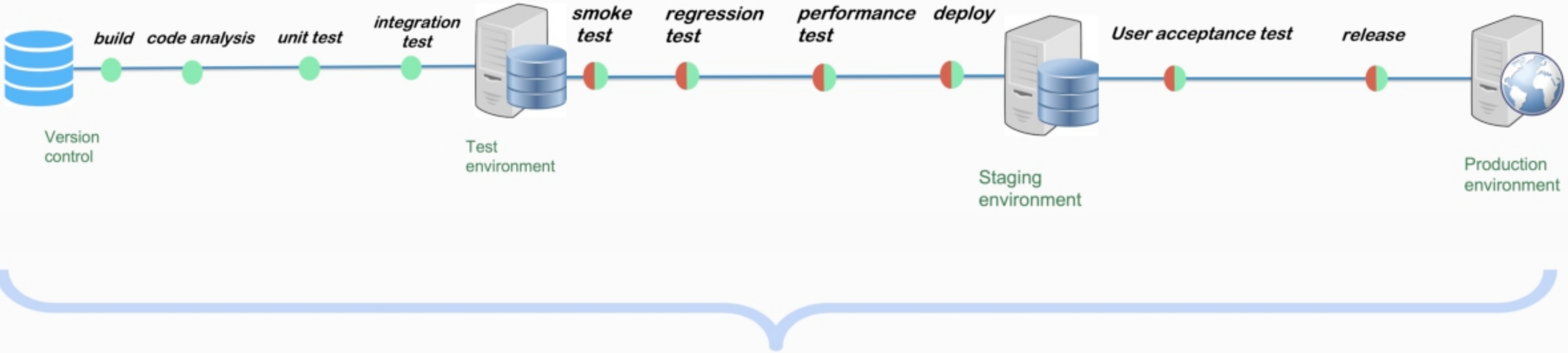


User acceptance test

release

Staging environment

Production environment

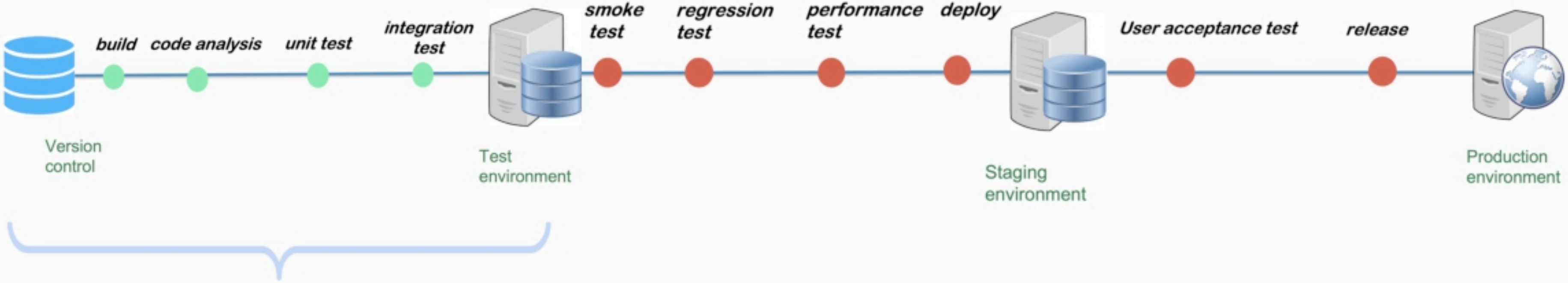


Production Pipeline

Pipeline

Pipeline is a set of processes that take the code from version control and compile, build, test and deploy to production in automated fashion.

The pipeline breaks down the software delivery process into stages. Each stage is made of different tasks which can be carried out in parallel. When all tasks in a stage passes, next stage is triggered.



Continuous Integration

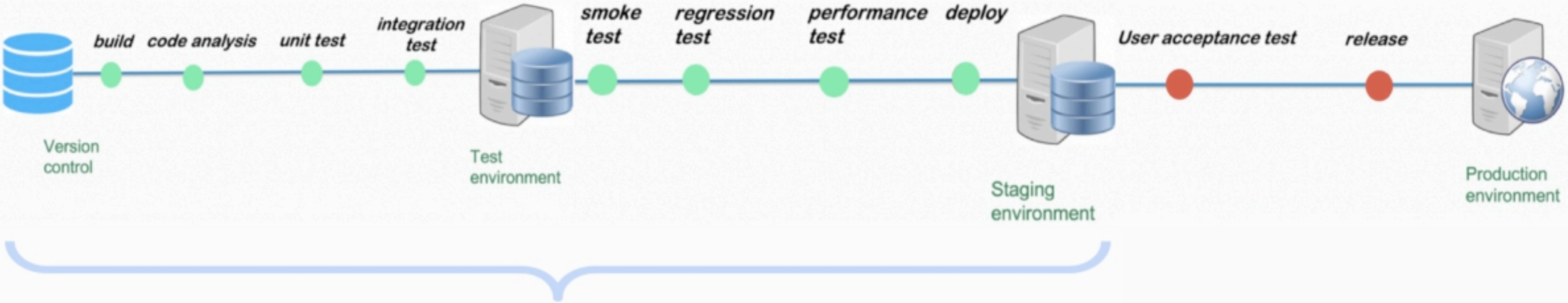
Continuous Integration

Continuous Integration is a process of automated build, unit testing, integration testing and code analysis.

The Continuous Integration process is comprised of automatic tools that assert the new code's correctness before integration. It reduces integration problems allowing to deliver software more rapidly by providing quick feedback every time new code is added to the source control. Usually Continuous Integration does not involve testing the functionality of the application.

Continuous Integration

In a simple words: the practice of merging all developers' working copies to a shared mainline several times a day.



Continuous Delivery

Continuous Delivery

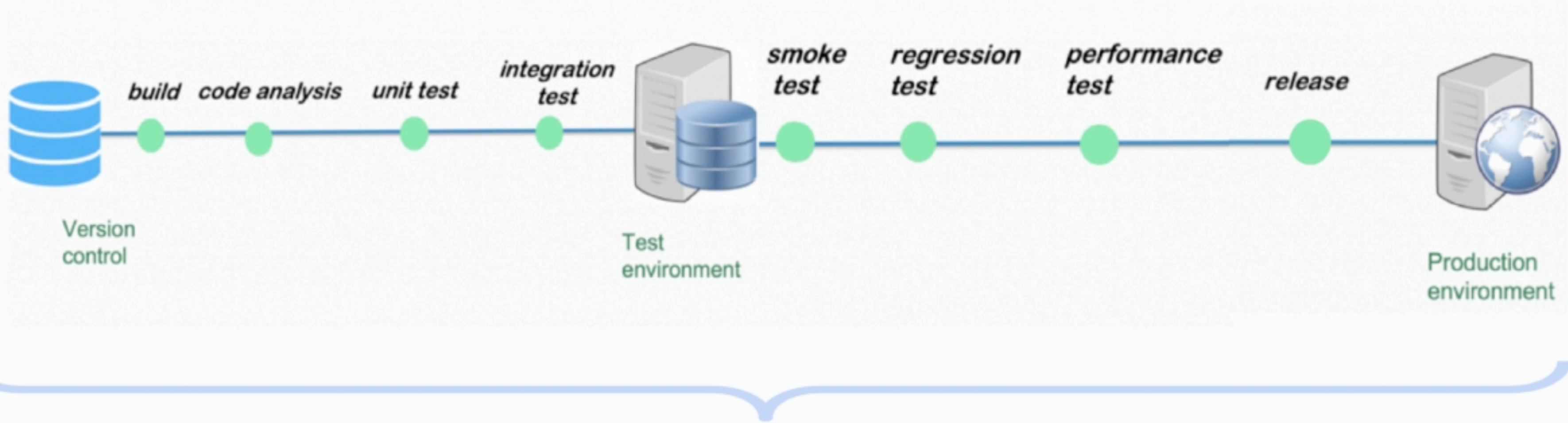
Continuous Delivery is an automated build and execution of at unit and integration tests, execution of code analysis, functional tests and also deploying to any supported platform any time. Each time a build or a set of code passes the tests, it's automatically deployed out to a staging environment.

In Continuous Delivery releasing to end users is a manual process. Continuous delivery involves human decision- making when it comes to deciding when to release the software to the customers.

Continuous Delivery

In a simple words: the practice in which teams produce and release value in short cycles.
8 Principles of Continuous Delivery:

1. Repeatable Reliable Process
2. Automate Everything
3. Version Control Everything
4. Bring the Pain Forward
5. Build-in Quality
6. "Done" Means Released
7. Everyone is Responsible
8. Continuous Improvement



Continuous Deployment

Continuous Deployment

Continuous Deployment

Continuous deployment means that every change that you make, goes through the pipeline, and if it passes all the tests, it automatically gets deployed into production.

When a developer checks in code, the automated processes take the code and move it through the entire lifecycle and if it passes each gate, it gets deployed directly to production. The delivery speeds are notably faster due to elimination of manual steps.

Continuous Deployment

In a simple words: the practice in which the value is delivered frequently through automated deployments.

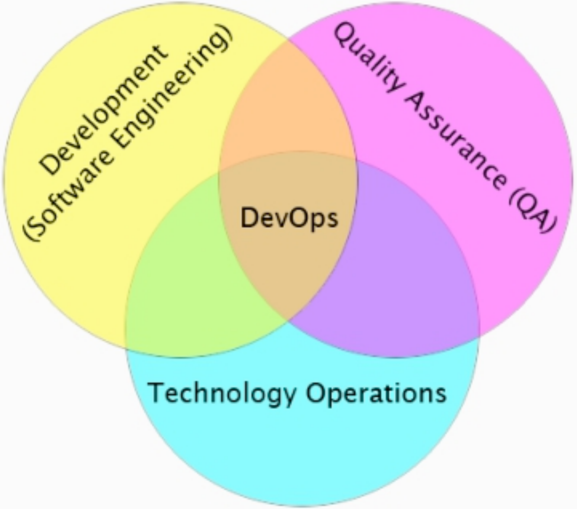
DevOps

Methodology (like agile, waterfall)

DevOps merges developer, tester and operations roles together. whoever writes the software is also responsible and deploying and maintaining it.

DevOps organizations break down the barriers between Operations and Engineering by cross - training each team in the other’s skills.

DevOps focuses on culture highlighting roles that emphasize responsiveness and breaking down barriers between developers and operations teams.

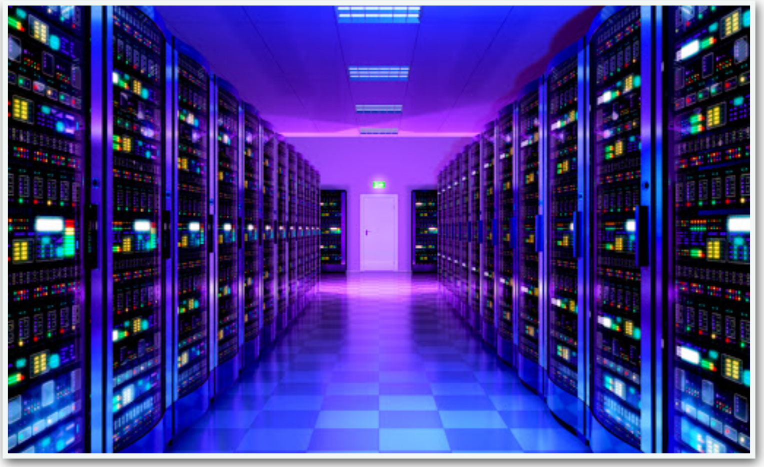


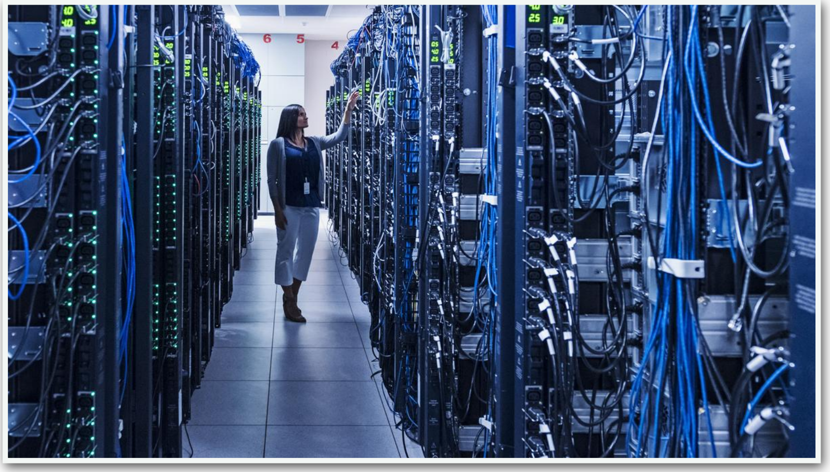
What is a server?

A server is a computer program or device that provides a service to another computer program and its user, also known as the client. In a data center, the physical computer that a server program runs on is also frequently referred to as a server. That machine might be a dedicated server or it might be used for other purposes.

In the client/server programming model, a server program awaits and fulfills requests from client programs, which might be running in the same or other computers. A given application in a computer might function as a client with requests for services from other programs and as a server of requests from other programs.

What is a server?





Physical and virtual servers

1. A physical server is simply a computer that is used to run server software.

2. A virtual server is a virtual representation of a physical server. Like a physical server, a virtual server includes its own operating system and applications. These are kept separate from any other virtual servers that might be running on the physical server.

The process of creating virtual machines involves installing a lightweight software component called a hypervisor onto a physical server. The hypervisor's job is to enable the physical server to function as a virtualization host. The virtualization host makes the physical server's hardware resources - such as CPU time, memory, storage and network bandwidth - available to one or more virtual machines.

Servers In The Cloud

Servers in the cloud have revolutionized the IT industry.

- Scale capacity up and down based on demands.
- Storage, more memory, and computing power can be added as needed.
- Obtain servers in minutes.
- No need for onsite hardware or capital expenses.

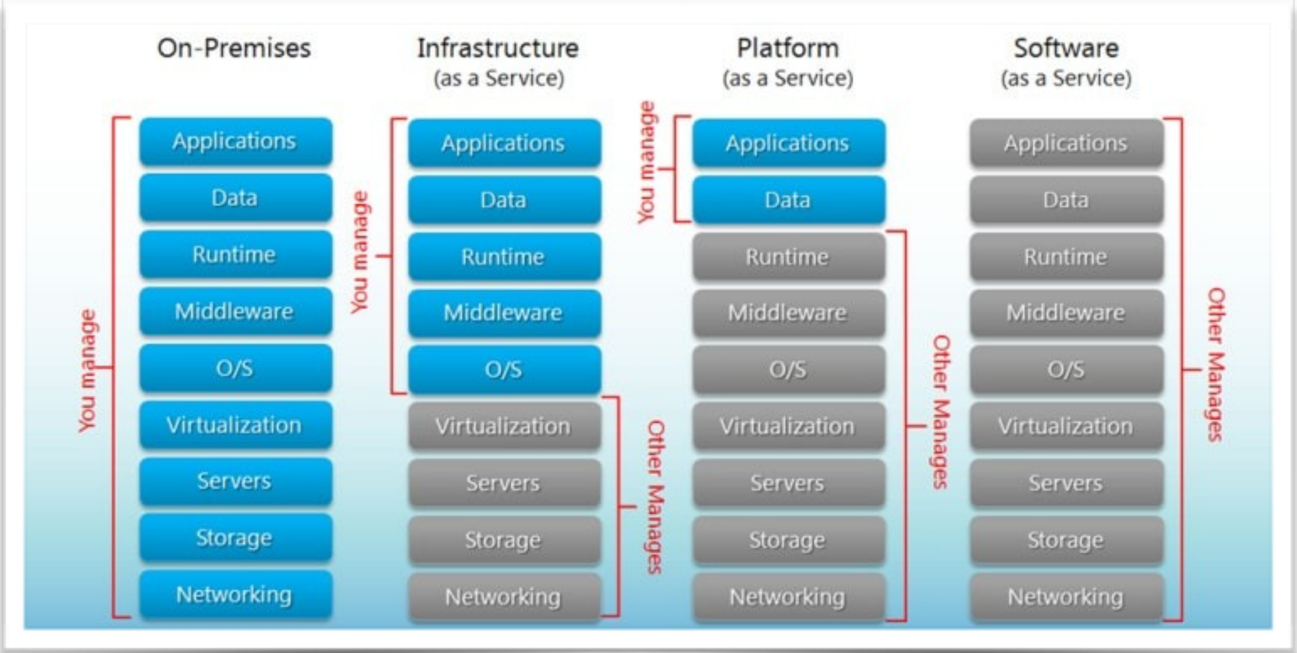
3 main types of cloud computing

SaaS, PaaS, and IaaS are simply three ways to describe how you can use the cloud.

- IaaS: cloud-based services, pay-as-you-go for services such as storage, networking, and virtualization.
- PaaS: hardware and software tools available over the internet.
- SaaS: software that's available via a third-party over the internet.
- On-premise: software that's installed in the same building as your business.

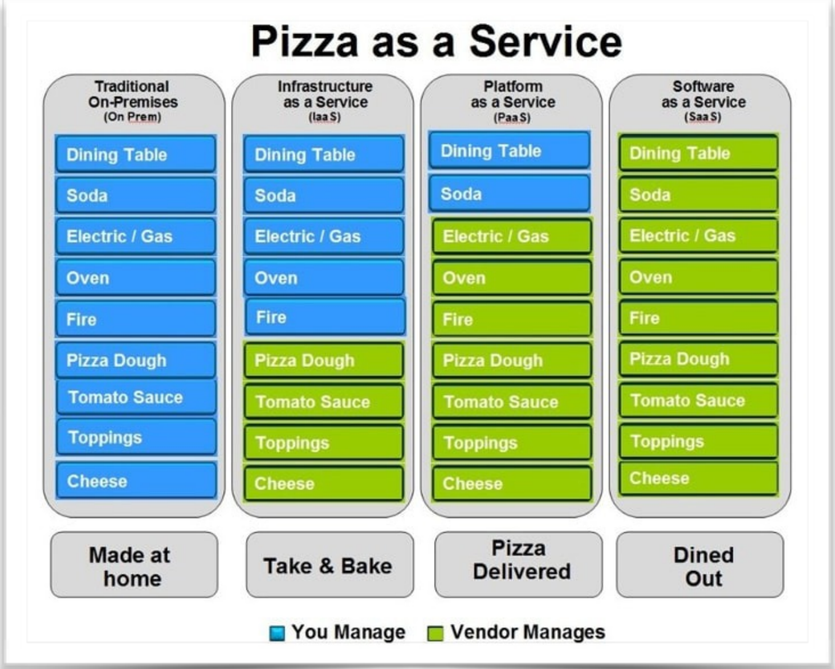
*IaaS - Infrastructure As A Service
*PaaS - Platform As A Service
*SaaS - Software As A Service

3 main types of cloud computing



On-Premises	Infrastructure (as a Service)	Platform (as a Service)	Software (as a Service)
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

3 main types of cloud computing



Pizza as a Service

Traditional On-Premises (On Prem)	Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
🟦 Dining Table	🟦 Dining Table	🟦 Dining Table	🟩 Dining Table
🟦 Soda	🟦 Soda	🟦 Soda	🟩 Soda
🟦 Electric / Gas	🟦 Electric / Gas	🟩 Electric / Gas	🟩 Electric / Gas
🟦 Oven	🟦 Oven	🟩 Oven	🟩 Oven
🟦 Fire	🟦 Fire	🟩 Fire	🟩 Fire
🟦 Pizza Dough	🟩 Pizza Dough	🟩 Pizza Dough	🟩 Pizza Dough
🟦 Tomato Sauce	🟩 Tomato Sauce	🟩 Tomato Sauce	🟩 Tomato Sauce
🟦 Toppings	🟩 Toppings	🟩 Toppings	🟩 Toppings
🟦 Cheese	🟩 Cheese	🟩 Cheese	🟩 Cheese
Made at home	Take & Bake	Pizza Delivered	Dined Out

🟦 You Manage 🟩 Vendor Manages

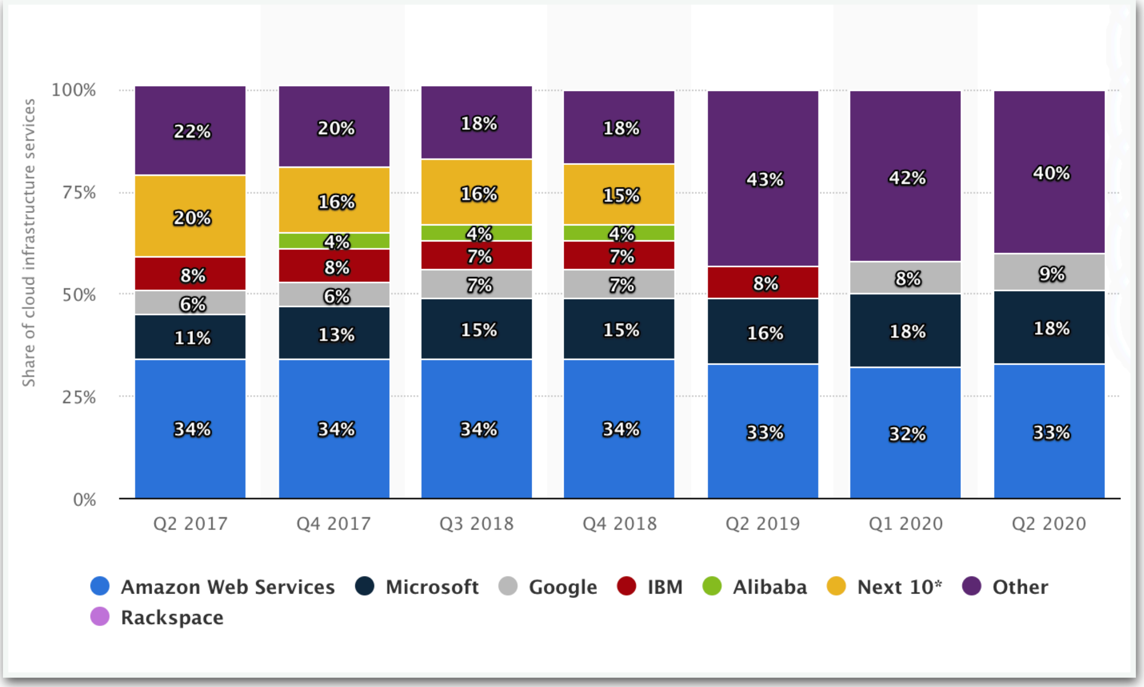
Examples of SaaS, PaaS, and IaaS

SaaS: BigCommerce, Google Apps, Salesforce, Dropbox, MailChimp, ZenDesk, DocuSign, Slack, Hubspot.

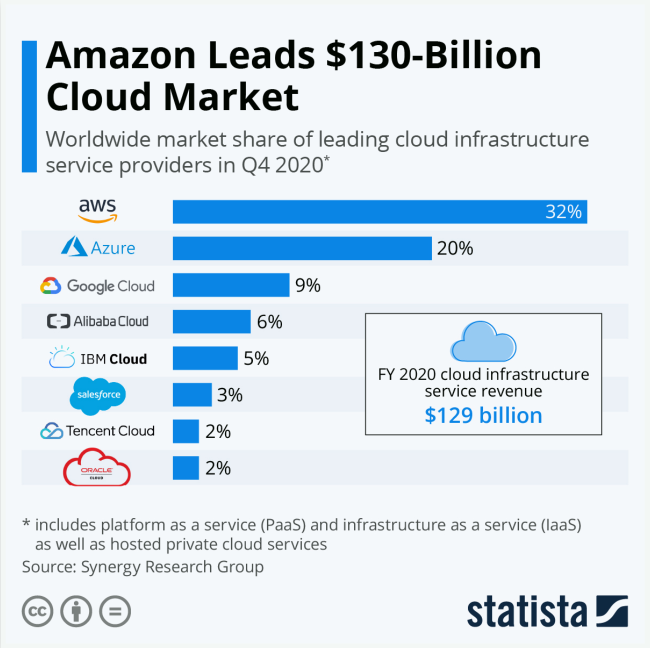
PaaS: AWS Elastic Beanstalk, Heroku, Windows Azure (mostly used as PaaS), Force.com, OpenShift, Apache Stratos, Magento Commerce Cloud.

IaaS examples: AWS EC2, Rackspace, Google Compute Engine (GCE), Digital Ocean, Magento 1 Enterprise Edition*.

Cloud Computing Market



Cloud Computing Market



Amazon Leads $130-Billion Cloud Market

Worldwide market share of leading cloud infrastructure service providers in Q4 2020*

FY 2020 cloud infrastructure service revenue
$129 billion

* includes platform as a service (PaaS) and infrastructure as a service (IaaS) as well as hosted private cloud services

Source: Synergy Research Group

statista

Cloud computing with AWS

Amazon Web Services (AWS) is the world’s most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centers globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

AWS is made up of so many different cloud computing products and services. The highly profitable Amazon division provides servers, storage, networking, remote computing, email, mobile development, and security. AWS can be broken into three main products: EC2, Amazon’s virtual machine service, Glacier, a low-cost cloud storage service, and S3, Amazon’s storage system. AWS is so large and present in the computing world that it's far outpaced its competitors.

Cloud computing with AWS

AWS has 77 availability zones in which its servers are located. These serviced regions are divided in order to allow users to set geographical limits on their services (if they so choose), but also to provide security by diversifying the physical locations in which data is held. Overall, AWS spans 245 countries and territories.

AWS EC2

Elastic Cloud Compute or EC2 is a foundational piece of AWS' cloud computing platform and is a service that provides servers for rent in the cloud.

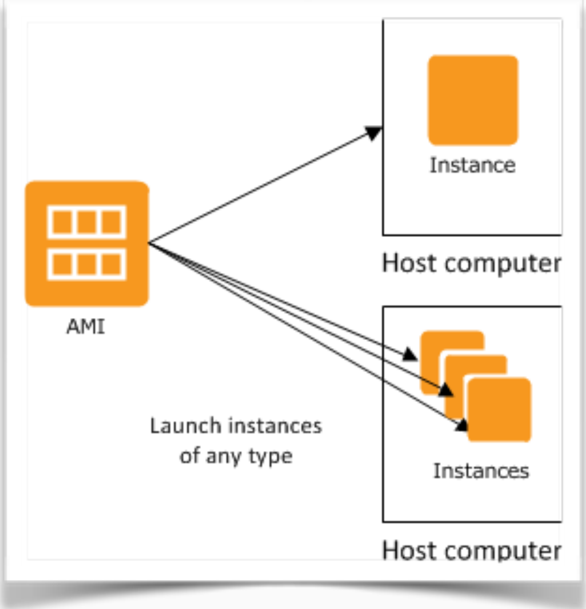
Pricing Options
There are several pricing options for EC2.

- On Demand - Pay as you go, no contract.
- Dedicated Hosts - You have your own dedicated hardware and don't share it with others.
- Spot - You place a bid on an instance price. If there is extra capacity that falls below your bid, an EC2 instance is provisioned. If the price goes above your bid while the instance is running, the instance is terminated.
- Reserved Instances - You earn huge discounts if you pay up front and sign a 1-year or 3-year contract.

AMI

An *Amazon Machine Image (AMI)* is a template that contains a software configuration (for example, an operating system, an application server, and applications).

From an AMI, you launch an *instance*, which is a copy of the AMI running as a virtual server in the cloud. You can launch multiple instances of an AMI, as shown in the following figure.



Jenkins

1. CI/CD tool
2. Travis, TeamCity, Bamboo
3. Open source
4. Automates building, testing, packaging, staging, deploying the application

Integrates with different tools using plugins

Jenkins job

In Jenkins everything is done by creating a job

1. a task that Jenkins performs based its schedule

2. be made of several steps

3. can have a schedule or a trigger which determines when it runs

4. reports the results of the run automatically

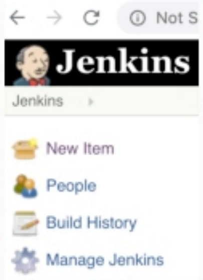
Create new job on jenkins

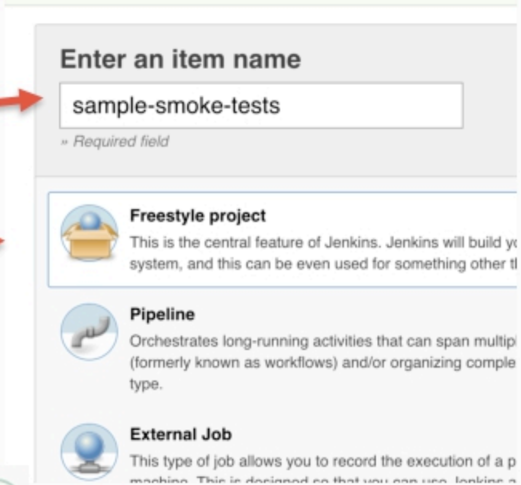
1. Click on New Item on Jenkins home page

2. Enter name

3. Select freestyle project

4. Click OK





Enter an item name

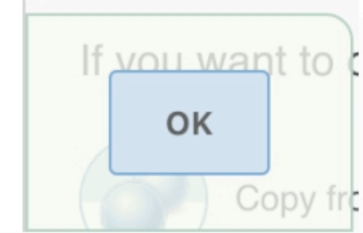
sample-smoke-tests

» Required field

Freestyle project
This is the central feature of Jenkins. Jenkins will build y
system, and this can be even used for something other t

Pipeline
Orchestrates long-running activities that can span multip
(formerly known as workflows) and/or organizing comple
type.

External Job
This type of job allows you to record the execution of a p
machine. This is designed so that you can use Jenkins a



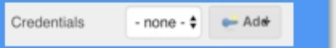
If you want to c

Copy fr

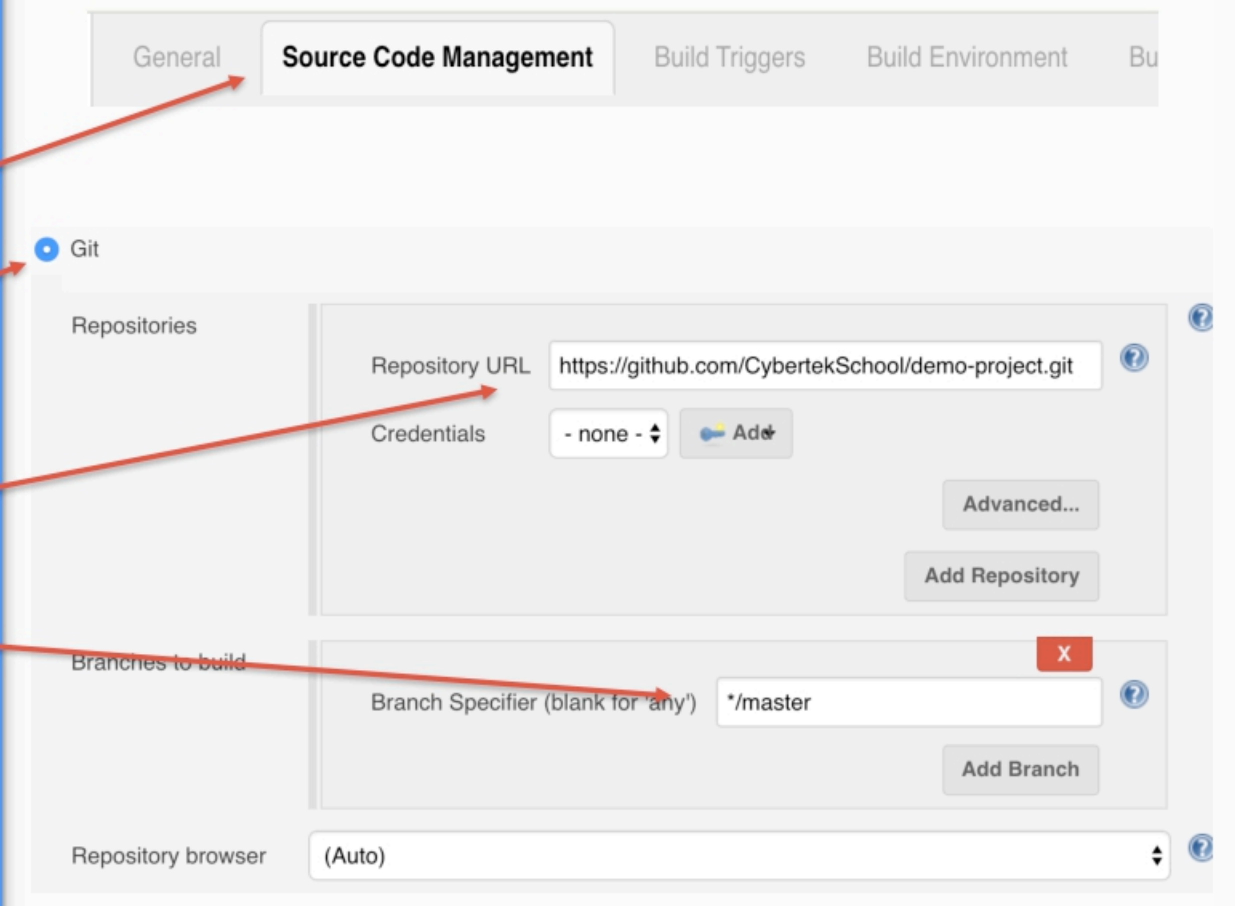
Enter source code information

1. Click on Source Code Management. You also scroll down on the page
2. Select Git
3. Enter your git repository url information
4. Select the branch to build

NOTE: For private repositories you will have to Credentials



Credentials - none - Add



● Git

Repositories

Repository URL: https://github.com/CybertekSchool/demo-project.git

Credentials: - none - Add

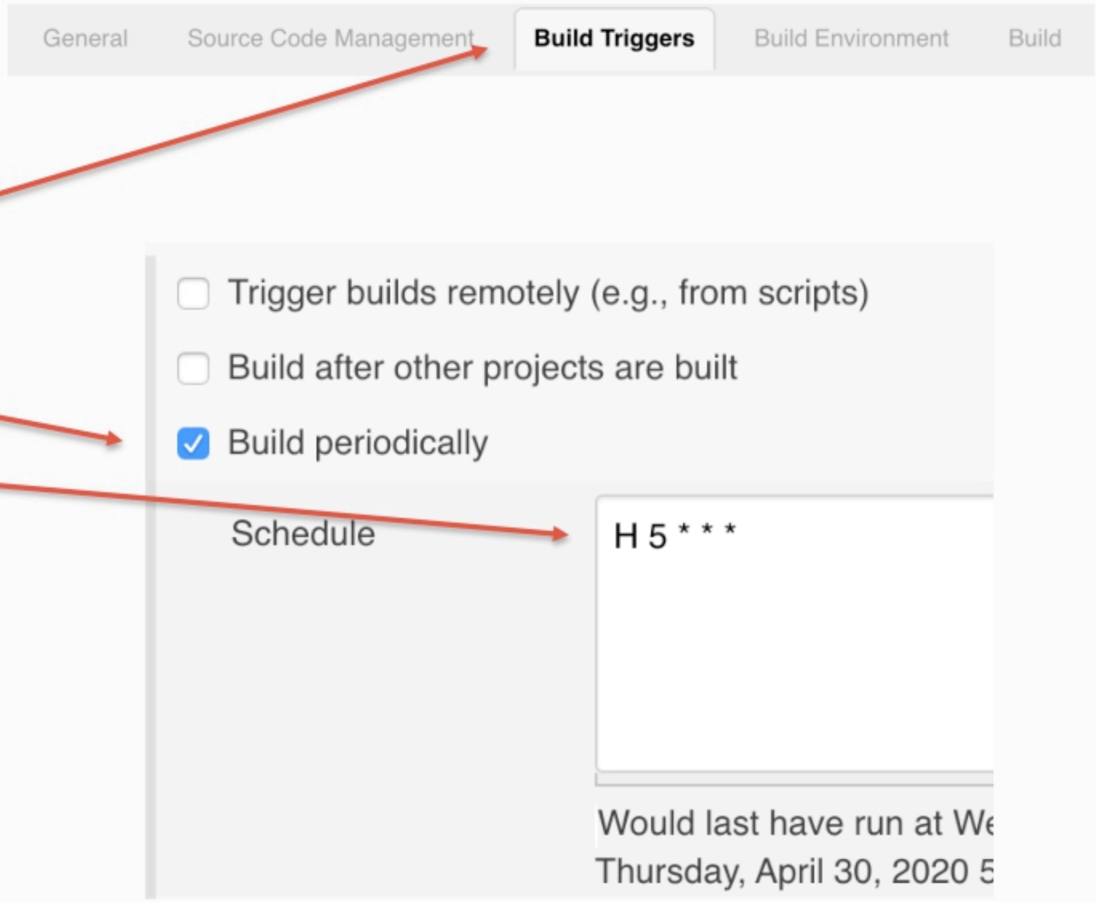
Branches to build

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

Repository browser: (Auto)

Build triggers

1. Click on Build triggers. You also scroll down on the page
2. Select Build periodically
3. Enter job schedule



General | Source Code Management | **Build Triggers** | Build Environment | Build

□ Trigger builds remotely (e.g., from scripts)

□ Build after other projects are built

☑ Build periodically

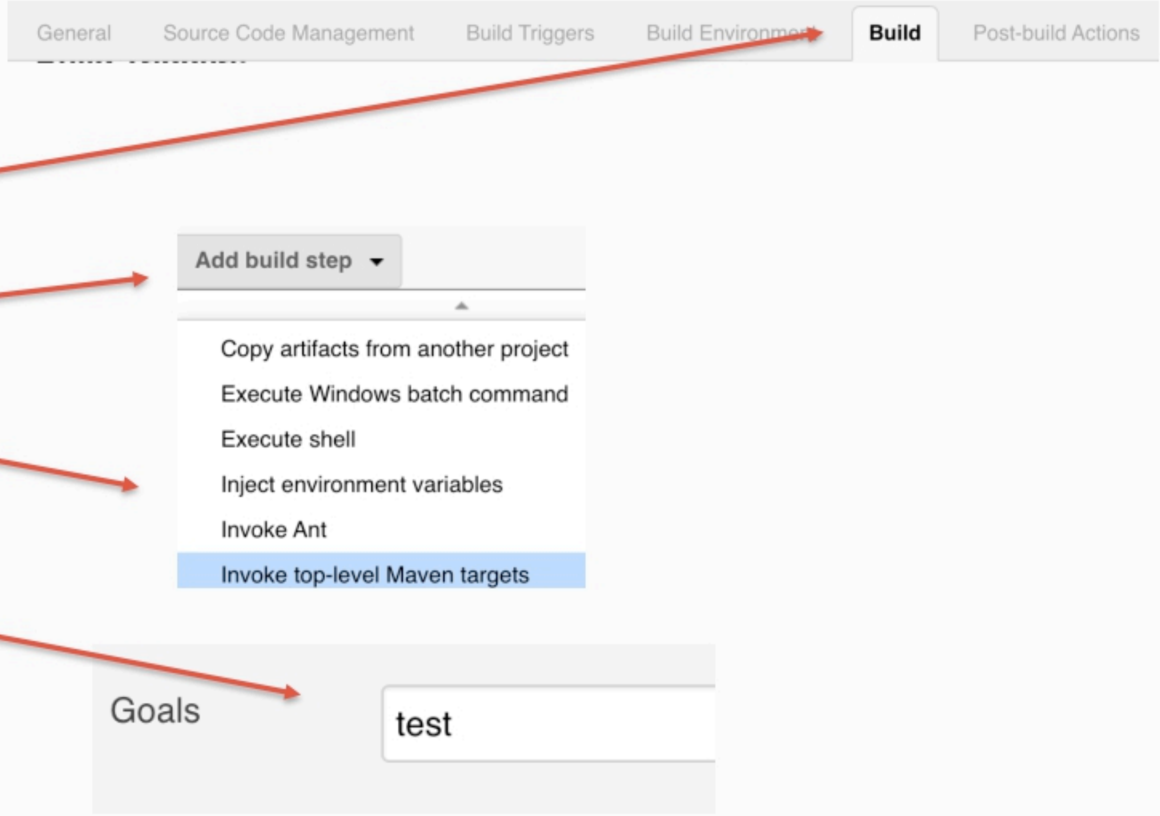
Schedule

```
H 5 * * *
```

Would last have run at We
Thursday, April 30, 2020 5

Build

1. Click on Build. You also scroll down on the page
2. Click on Add build step
3. Select Invoke top-level Maven targets
4. Enter maven goal that executes your test


General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
Add build step
Copy artifacts from another project
Execute Windows batch command
Execute shell
Inject environment variables
Invoke Ant
Invoke top-level Maven targets

Goals: test

Cucumber reports

1. Click on Post-build Actions. You also scroll down on the page

2. Click on Add post-build action

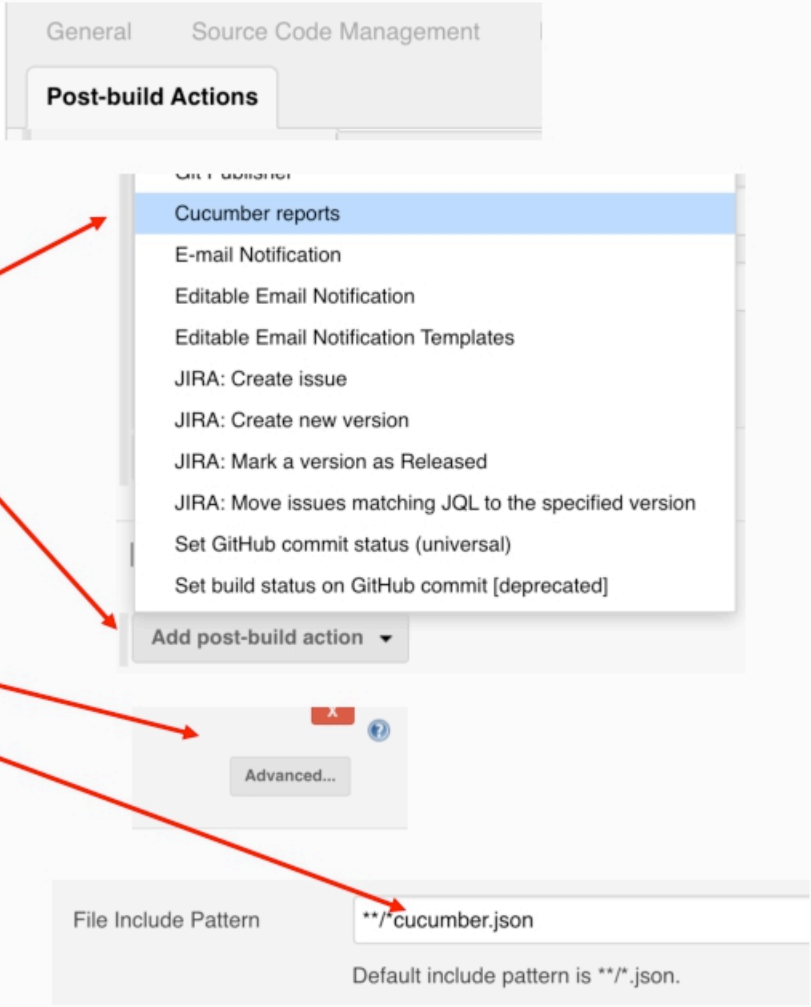
3. Select Cucumber reports.

4. OPTIONAL STEPS. By default customize the path to json reports

   4.1 Click on Advanced

   4.2 Show path to cucumber json file

NOTE: Cucumber reports is a 3rd party plugin. If you do not see this plugin, if mean is not installed. Go to Jenkins plugin management to install

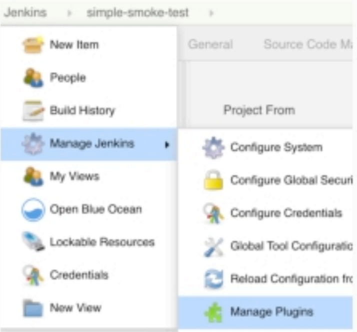

General
Source Code Management
Post-build Actions
Git Publisher
Cucumber reports
E-mail Notification
Editable Email Notification
Editable Email Notification Templates
JIRA: Create issue
JIRA: Create new version
JIRA: Mark a version as Released
JIRA: Move issues matching JQL to the specified version
Set GitHub commit status (universal)
Set build status on GitHub commit [deprecated]
Add post-build action
x
Advanced...

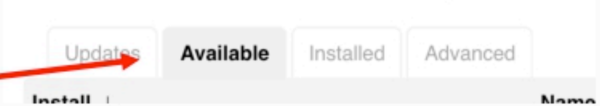
File Include Pattern: **/*cucumber.json

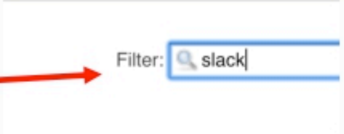
Default include pattern is **/*.json.

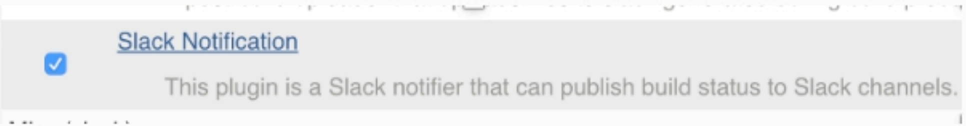
Install slack plugins

1. Go to Jenkins → Manage Jenkins → Manage Plugins
2. Click Available
3. Enter search filter slack
4. Select plugin Slack Notification
5. Click on Download now and install after restart Update
6. Wait until Jenkins restarts

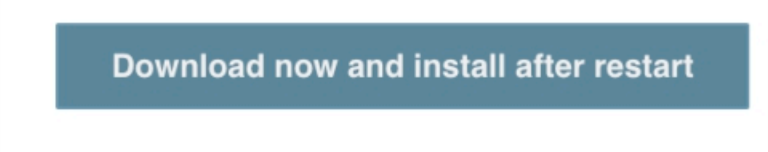





Filter: slack

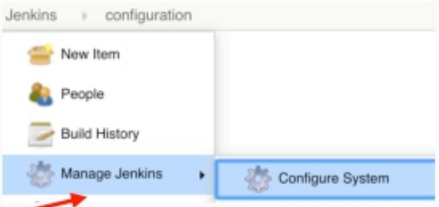

☑ Slack Notification

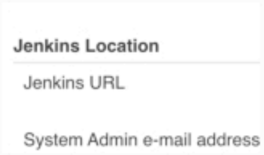
This plugin is a Slack notifier that can publish build status to Slack channels.

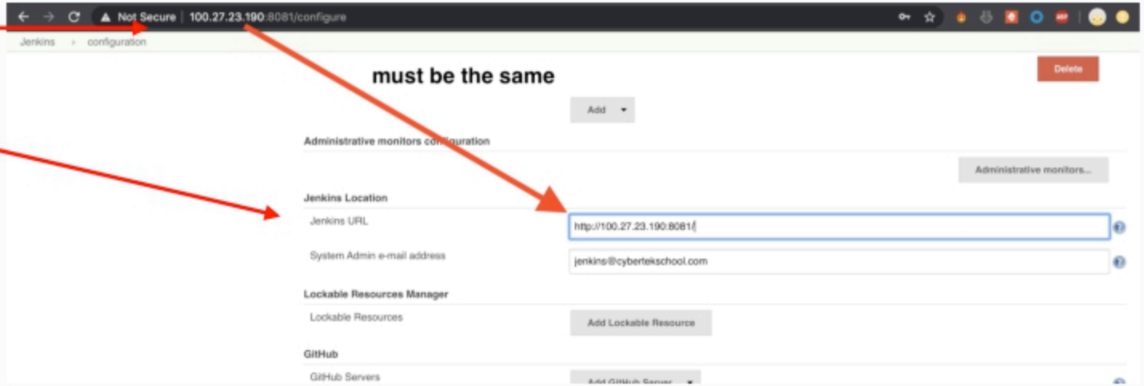


Jenkins link fix

1. Go to Jenkins → Manage Jenkins → Configure System
2. Scroll down to Jenkins Location
3. Copy the IP address and port number of your EC2 instance
4. Paste the value to the Jenkins URL field






Not Secure
100.27.23.190:8081/configure
Jenkins
configuration
Delete
Add
Administrative monitors configuration
Administrative monitors...
Jenkins Location
Lockable Resources Manager
Add Lockable Resource
GitHub
Add GitHub Server

must be the same

Jenkins URL: http://100.27.23.190:8081/

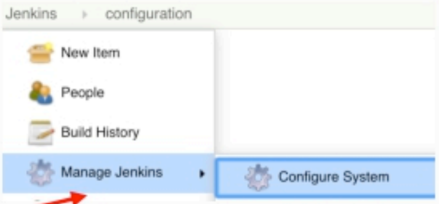
System Admin e-mail address: jenkins@cybertekschool.com

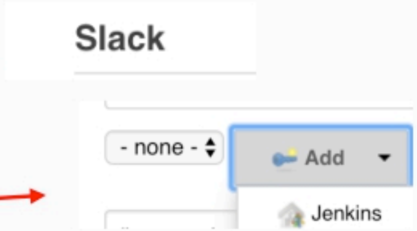
Lockable Resources

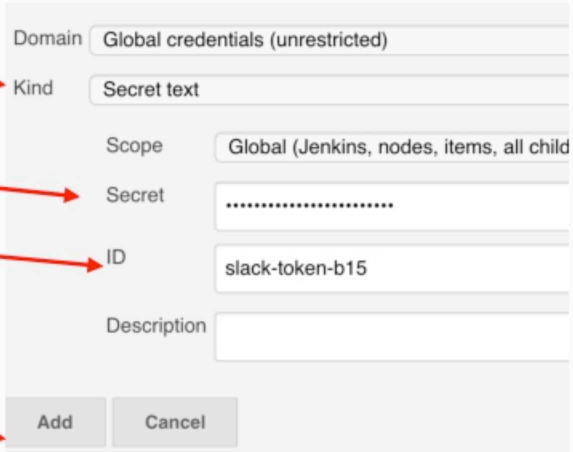
GitHub Servers

Slack configuration 1

1. Go to Jenkins → Manage Jenkins → Configure System
2. Scroll down to Slack
3. Click Add → Jenkins
4. Select Kind → Secret text
5. Enter secret
6. Select ID
7. Click Add







Domain: Global credentials (unrestricted)

Kind: Secret text

Scope: Global (Jenkins, nodes, items, all child

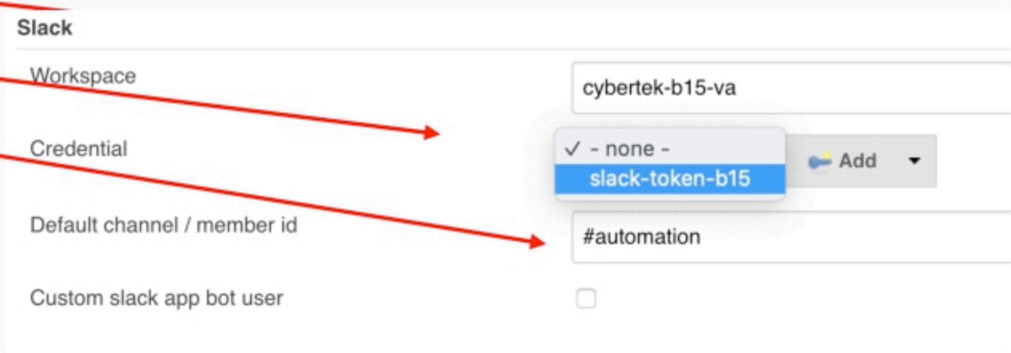
Secret: ••••••••••••••••••••••••••

ID: slack-token-b15

Description:

Slack configuration 2

1. Enter workspace
2. Select none → slack token
3. Select Default channel/member id



Slack

Workspace: cybertek-b15-va

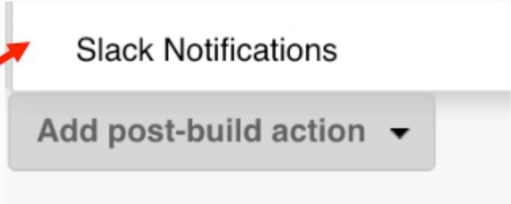
Credential: ✓ - none - / slack-token-b15

Default channel / member id: #automation

Custom slack app bot user □

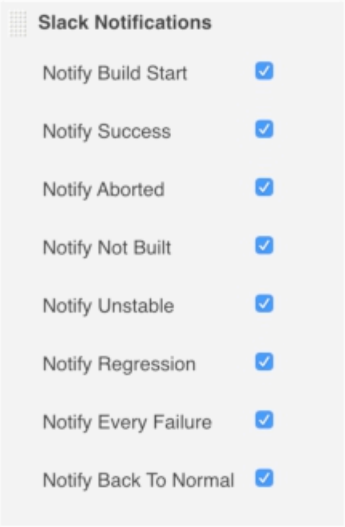
Add Slack notification

1. Click on Add post build action
2. Select Slack Notifications
3. Select All options that apply



Slack Notifications

Add post-build action ▾



Slack Notifications

Notify Build Start ☑

Notify Success ☑

Notify Aborted ☑

Notify Not Built ☑

Notify Unstable ☑

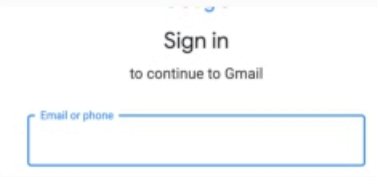
Notify Regression ☑

Notify Every Failure ☑

Notify Back To Normal ☑

Configure security settings on Gmail 1

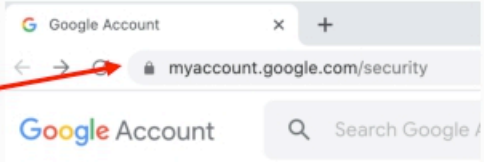
1. Login to your email account
2. Go to link https://myaccount.google.com/security
3. Scroll down to Less secure app access
4. Click on Turn on access
5. Change Allow less secure apps to ON

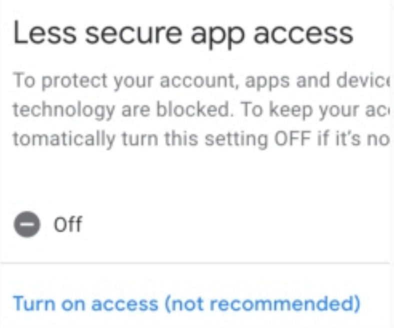


Sign in

to continue to Gmail

Email or phone



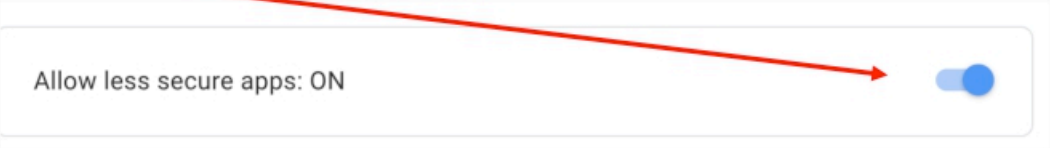


Less secure app access

To protect your account, apps and devic
technology are blocked. To keep your ac
tomatically turn this setting OFF if it's no

Off

Turn on access (not recommended)



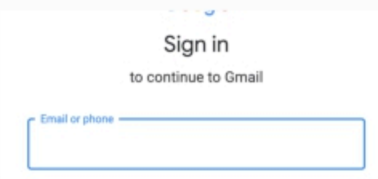
Allow less secure apps: ON

Configure security settings on Gmail 2

1. Login to your email account

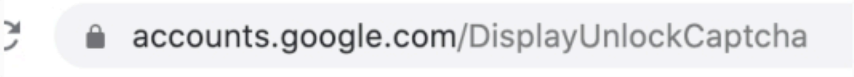
2. Go to link https:// www.google.com/accounts/ DisplayUnlockCaptcha

3. Click Continue

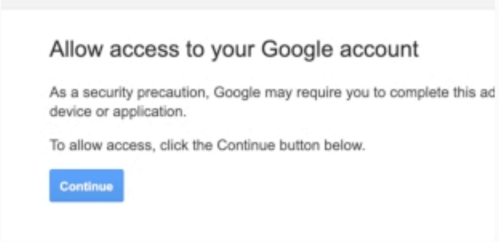


Sign in

to continue to Gmail



accounts.google.com/DisplayUnlockCaptcha



Allow access to your Google account

As a security precaution, Google may require you to complete this ad
device or application.

To allow access, click the Continue button below.

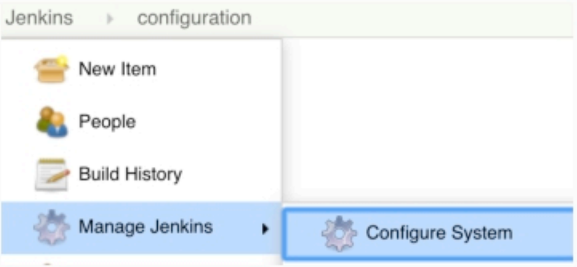
Email settings configuration (gmail specific) 1

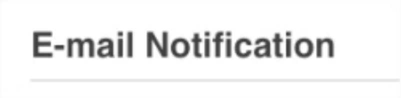
1. Go to Jenkins → Manage Jenkins → Configure System

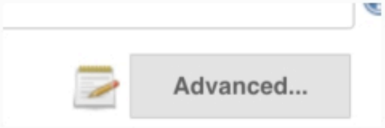
2. Scroll down to Email Notification

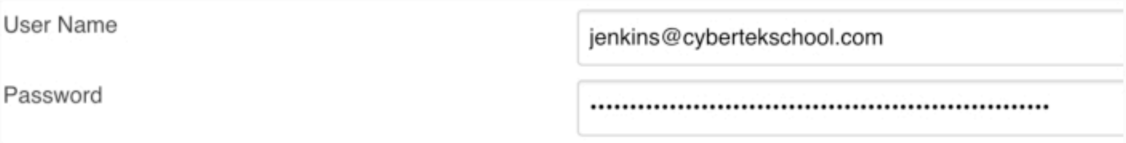
3. Click on Advanced

4. Enter your email username and password







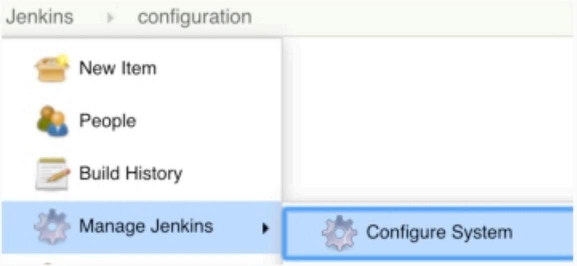


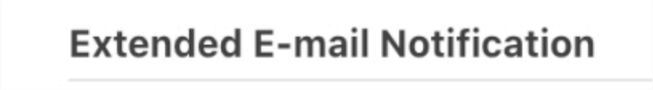
User Name jenkins@cybertekschool.com

Password ••

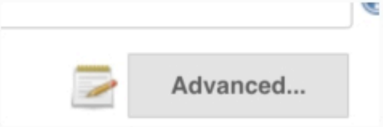
Email settings configuration (gmail specific) 2

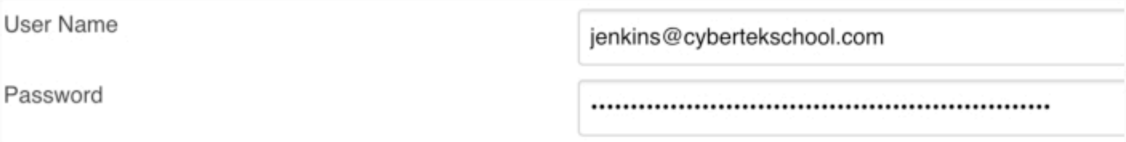
1. Go to Jenkins → Manage Jenkins → Configure System
2. Scroll down to Extended E -mail Notification
3. Click on Advanced
4. Enter your email username and password





Extended E-mail Notification





User Name: jenkins@cybertekschool.com

Password: ••

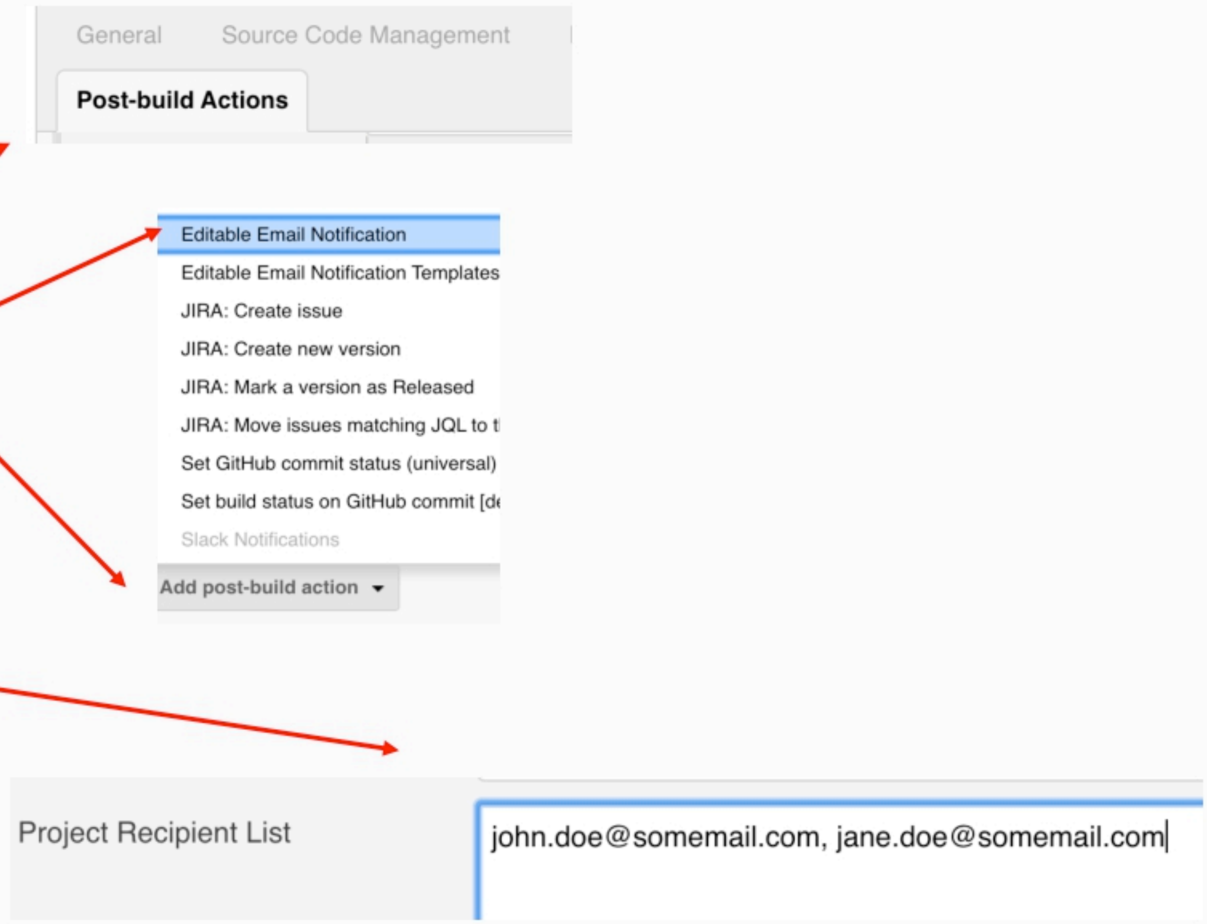
Configure Email notification 3

1. Click on Post-build Actions. You also scroll down on the page

2. Click on Add post-build action

3. Select Editable E-mail notification

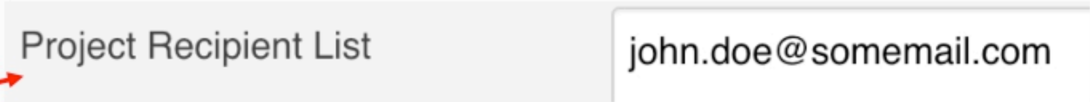
4. Enter receipt email


General
Source Code Management
Post-build Actions
Editable Email Notification
Editable Email Notification Templates
JIRA: Create issue
JIRA: Create new version
JIRA: Mark a version as Released
JIRA: Move issues matching JQL to t
Set GitHub commit status (universal)
Set build status on GitHub commit [de
Slack Notifications
Add post-build action

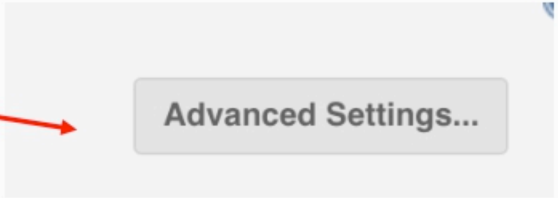
Project Recipient List: john.doe@somemail.com, jane.doe@somemail.com

Configure Email notification 4

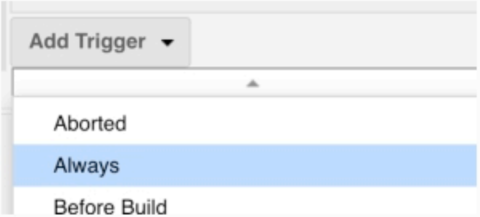
1. Enter receipt email
2. Click on advanced settings
3. Select Add Trigger → Always



Project Recipient List: john.doe@somemail.com



Advanced Settings...



Add Trigger
Aborted
Always
Before Build