



JOHNS HOPKINS
UNIVERSITY

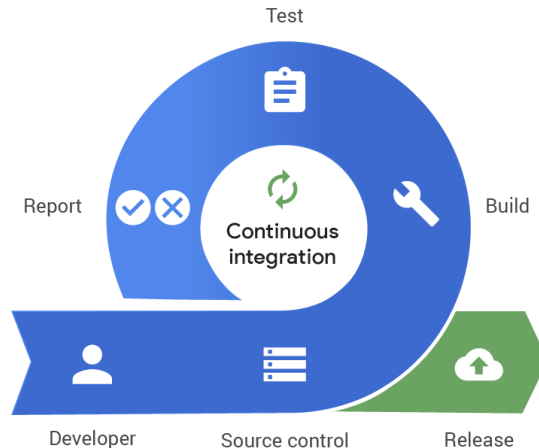
EN.601.422 / EN.601.622

Software Testing & Debugging

The material in this video is subject to the copyright of the owners of the material and is being provided for educational purposes under rules of fair use for registered students in this course only. No additional copies of the copyrighted work may be made or distributed.

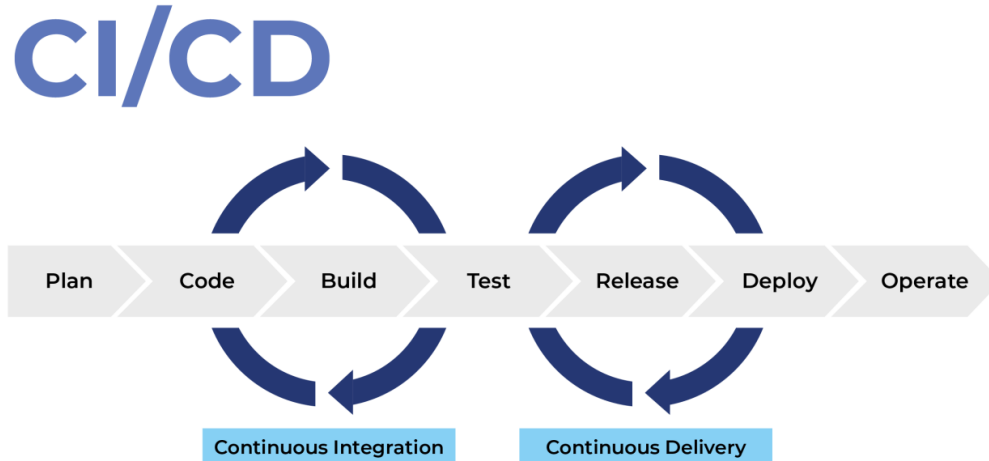
Continuous Integration (CI)

- ▶ Continuous integration (CI): a software development strategy to increase the speed of development
 - ❖ developers continually commit changes in small increments
 - ❖ each change is automatically built and tested before it is merged into the codebase.



Continuous Delivery (CD)

- ▶ Continuous Delivery: a software development strategy where code changes are automatically built, tested **and released** to production
 - ❖ CI focuses on preparing code for release (build/test), whereas CD involves the actual release of code (release/deploy).



Benefits of CI/CD

- **Improved quality of software:** Identifying and fixing problems early on.
- **Reduced risk of broken builds:** Automating your build process with CI to better avoid broken builds by resolving issues earlier in the process.
- **Increased confidence in releases:** CI/CD can help to ensure that each release is stable and ready for production. By running automated tests, CI can identify potential problems
- **Improved communication and collaboration:** Providing a central place for developers to share code and test results
- **Increased productivity:** Increasing developer productivity by automating tasks that would otherwise be time-consuming and error-prone

CI/CD Steps & Best Practices

- ▶ Maintain a code repository
- ▶ Automate the build: every commit (to baseline) should be built
- ▶ Make the build self-testing
- ▶ Everyone can see the results of the latest build
- ▶ CD step: Automate deployment

CI/CD Pipeline

- ▶ A CI/CD pipeline is the most fundamental component of automated software integration/delivery.
- ▶ A CI/CD pipeline is the full set of processes and steps to make CI/CD happen

CI/CD PIPELINE



CI/CD Pipeline

- ▶ A pipeline encompasses **workflows**, which coordinate **jobs**
 - ❖ A workflow is a set of jobs
 - ❖ A job is a set of runnable steps
- ▶ A **configuration (file)** is how we set up a workflow

CI/CD Tools & Platforms

- ▶ Jenkins
- ▶ Travis CI
- ▶ CircleCI
- ▶ GitLab
- ▶ Github Actions
- ▶ Etc.

Github Actions

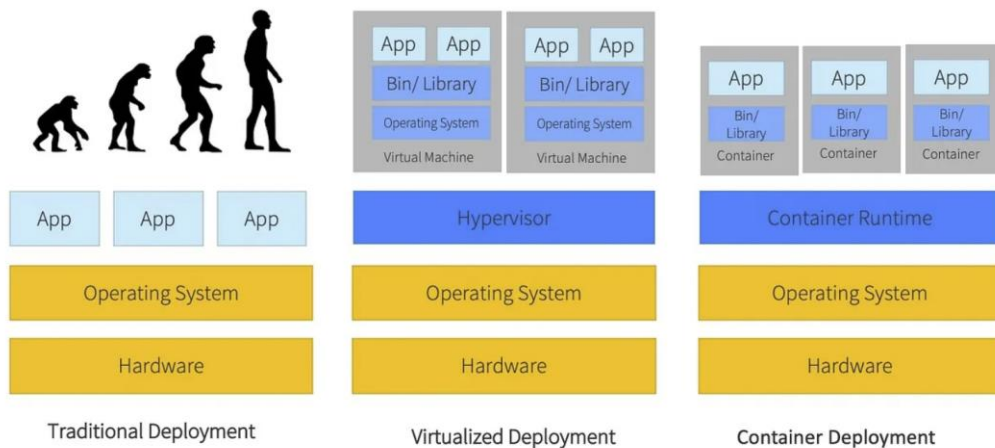
- ▶ GitHub Actions is a CI/CD platform, provided by Github, that allows you to **automate your build, test, and deployment pipeline**:
 - ❖ You can create **workflows** that build and test every push/pull requests to (specific branches) of the repository or deploy merged push/pull requests to production (CD).



GitHub Actions

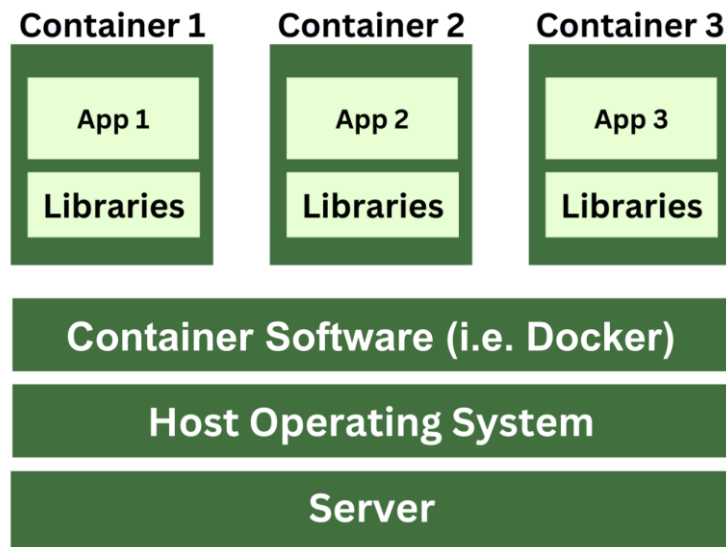
Containers

- ▶ Containers are packages of software that contain all of the necessary elements to run in any environment.
- ❖ makes it easy to move the contained application between environments while retaining full functionality



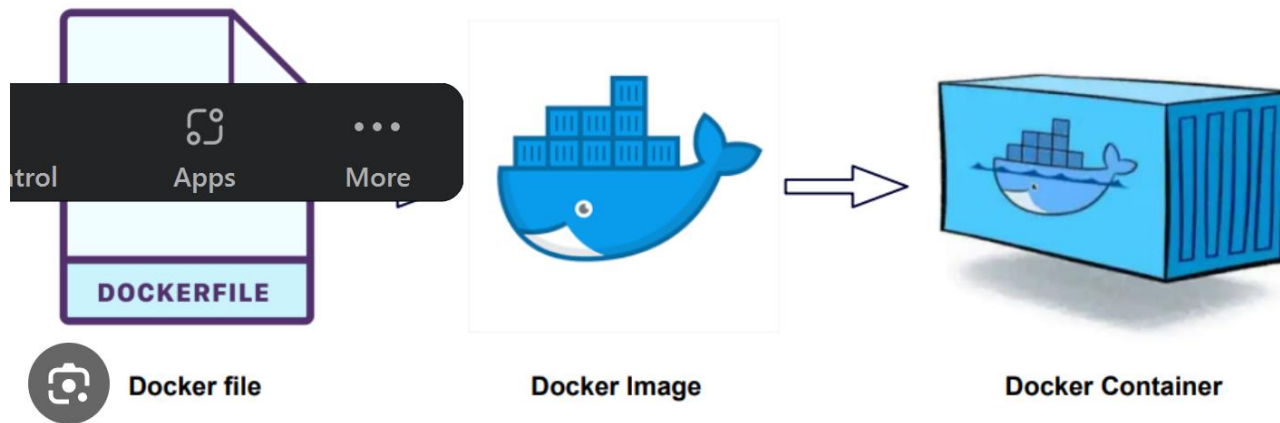
Containers

- ▶ Containers are packages of software that contain all of the necessary elements to run in any environment.
 - ❖ makes it easy to move the contained application between environments while retaining full functionality



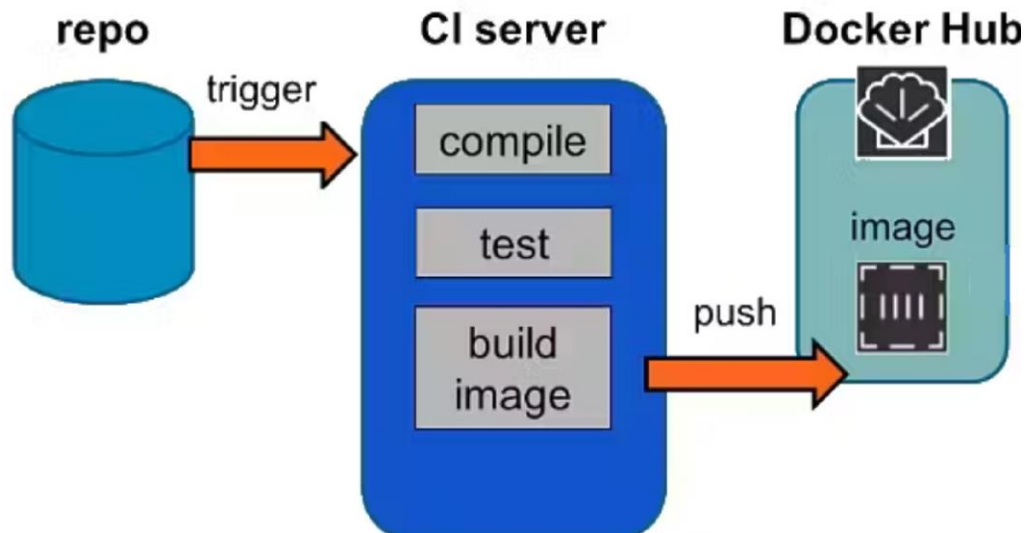
Docker Container

- ▶ A Docker **container image** is a lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings.



Docker Container

- ▶ A Docker **container image** is a lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings.



CI Helloworld demo

- ▶ Available at: <https://github.com/jhu-st/ci-helloworld>
- ▶ Pipeline defined in: ``.github/workflows/gradle.yml``
 - ❖ Job1: `build_and_test`
 - ❖ Job2: `build_and_publish_docker_image`
- ▶ How to setup Github secrets to store docker user/pass:
<https://docs.docker.com/build/ci/github-actions/secrets/>