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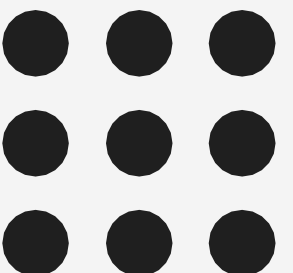**Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai**

Department of Artificial Intelligence and Data Science

23ITT203 Object Oriented Software Engineering

Deployment Pipeline: Overall Architecture Building and Testing-Deployment- Tools

What is a Deployment Pipeline?

A **Deployment Pipeline** is a series of **automated steps** that help to **build, test, and deploy** software safely and quickly.

It makes sure that every change made by developers is automatically:

- **Built (compiled)**

- **Tested**

- **Deployed** to production (live environment)

Overall Architecture of a Deployment Pipeline

Main Stages:

Code Commit

Developer writes code and pushes it to a central place (like GitHub).

Build

Code is compiled or prepared into an executable format.

Automated Testing

The code is tested automatically to check for bugs or errors.

Staging Deployment

The app is deployed to a test environment similar to the real one.

Production Deployment

The app is finally sent live to users.

Developer → Code Commit → Build → Test → Staging → Production

Building and Testing

Build Phase

- The source code is converted into a working application.

- **Example:** Java files are compiled into .class files.

Test Phase

- **Unit Tests**: Check small parts of code

- **Integration Tests**: Check if parts work together

- **UI Tests**: Check if user interface works properly

If tests pass → move to next step

✖ If tests fail → stop the pipeline

Deployment

What is Deployment?

- Deployment means **making the software available** for use, either by:

- Putting it on a website

- Uploading to app stores

- Installing it on servers

Types of Deployment

Type	Explanation
Manual	Developer uploads and configures the app manually
Automated	Tools do it automatically after testing
Continuous Deployment	Every code change is automatically deployed to production
Blue-Green Deployment	Two environments used; switch traffic from old to new after testing
Canary Deployment	New version released to a small group first, then to everyone

Common Tools Used

| Stage	Tool Examples	Use
Code Repository	Git, GitHub, GitLab	Store and manage code
Build	Maven, Gradle, Webpack	Compile or prepare code
Testing	JUnit, Selenium, Jest	Run automated tests
CI/CD	Jenkins, GitHub Actions, GitLab CI, CircleCI	Automate pipeline steps
Deployment	Docker, Kubernetes, AWS, Azure	Deploy apps to servers or cloud

Example of a Pipeline

- You are building a weather app.

- You push code to GitHub.

- Jenkins starts a build.

- JUnit runs tests.

- If tests pass, the app is packed using Docker.

- It is deployed to AWS server.

- You get a message: **"Deployment successful!"**
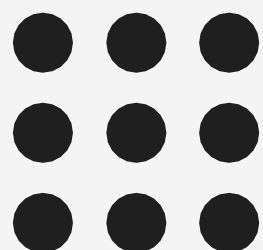
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