GitHub Actions: Overview and Best Practices

# What is GitHub Actions?

* GitHub Actions is a CI/CD platform built into GitHub that enables you to automate workflows such as building, testing, and deploying code directly from your repository.

# Why is GitHub Actions Needed?

* - Automate repetitive tasks (e.g., tests, builds, deployments).
* - Integrate CI/CD directly with your codebase.
* - Enable faster, safer software delivery.
* - Trigger workflows on git events (push, pull\_request, etc.).

# Core Concepts

* - Workflow: Automation pipeline defined in .github/workflows/\*.yml.
* - Event: Trigger for a workflow (e.g., push, pull\_request, schedule).
* - Job: Group of steps that run in the same runner environment.
* - Step: A single task like a shell command or action.
* - Action: A reusable package of code that can be used in workflows.
* - Runner: Server/environment where jobs run (GitHub-hosted or self-hosted).

# Runner Types

* - GitHub-Hosted: Default environments like ubuntu-latest, windows-latest.
* - Self-Hosted: Your own machine or cloud VM acting as a runner.

# Sample Workflow

* name: Deploy to AWS  
    
  on:  
   push:  
   branches: [ main ]  
    
  jobs:  
   deploy:  
   runs-on: ubuntu-latest  
   steps:  
  - name: Checkout Code  
   uses: actions/checkout@v3  
  - name: Set up Node  
   uses: actions/setup-node@v4  
   with:  
   node-version: '20'  
  - name: Install Dependencies  
   run: npm install  
  - name: Run Tests  
   run: npm test  
  - name: Deploy to S3  
   run: aws s3 sync ./dist s3://my-bucket

# Typical Stages in a CI/CD Workflow

* - Checkout: Clone the code using actions/checkout@v3.
* - Build/Test: Compile, test, lint, scan your code.
* - Artifact: Save build output if necessary.
* - Deploy: Deploy to staging/production.
* - Notify: Send messages to Slack, Teams, or email.

# Use Cases

* - Deploy Docker containers to cloud providers.
* - Automate Terraform workflows.
* - Run security scans (e.g., Snyk, Checkov).
* - Schedule tasks using cron expressions.
* - Auto-manage GitHub issues and pull requests.