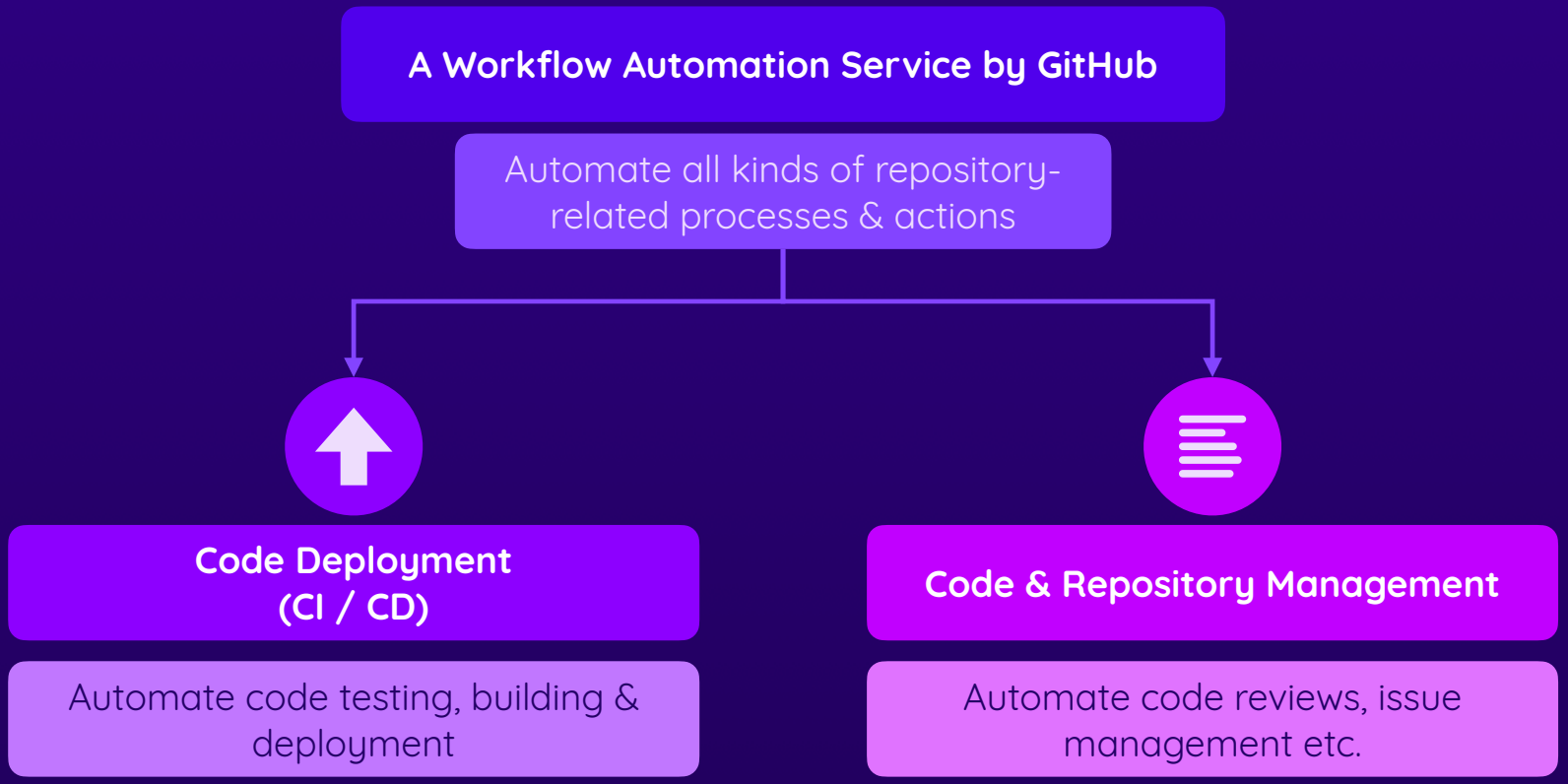
What Is “GitHub Actions”?



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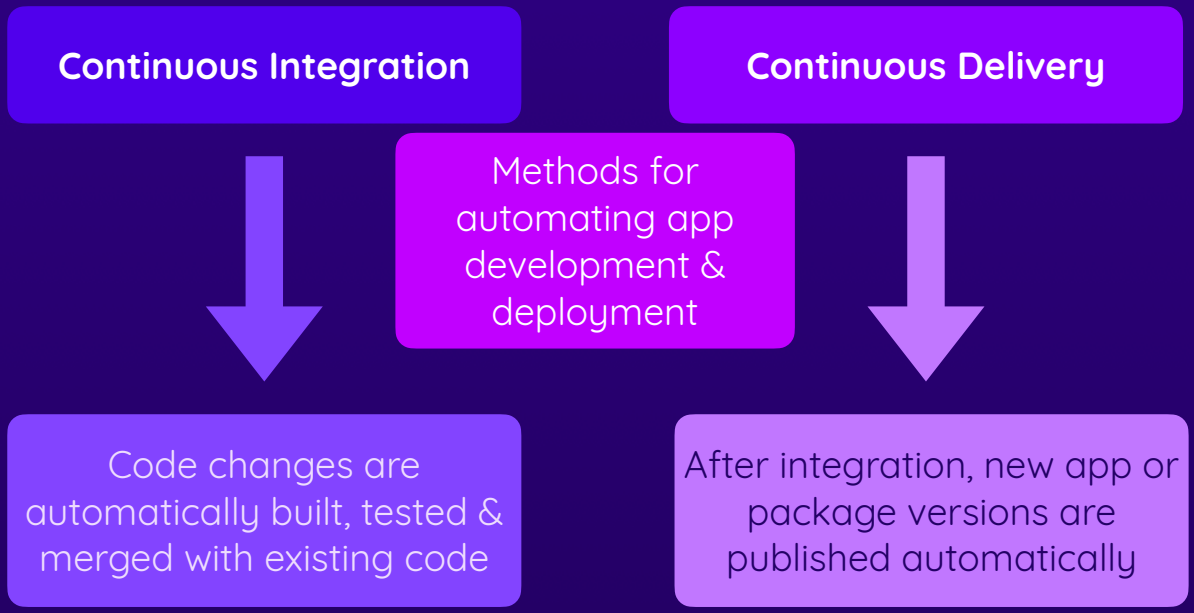
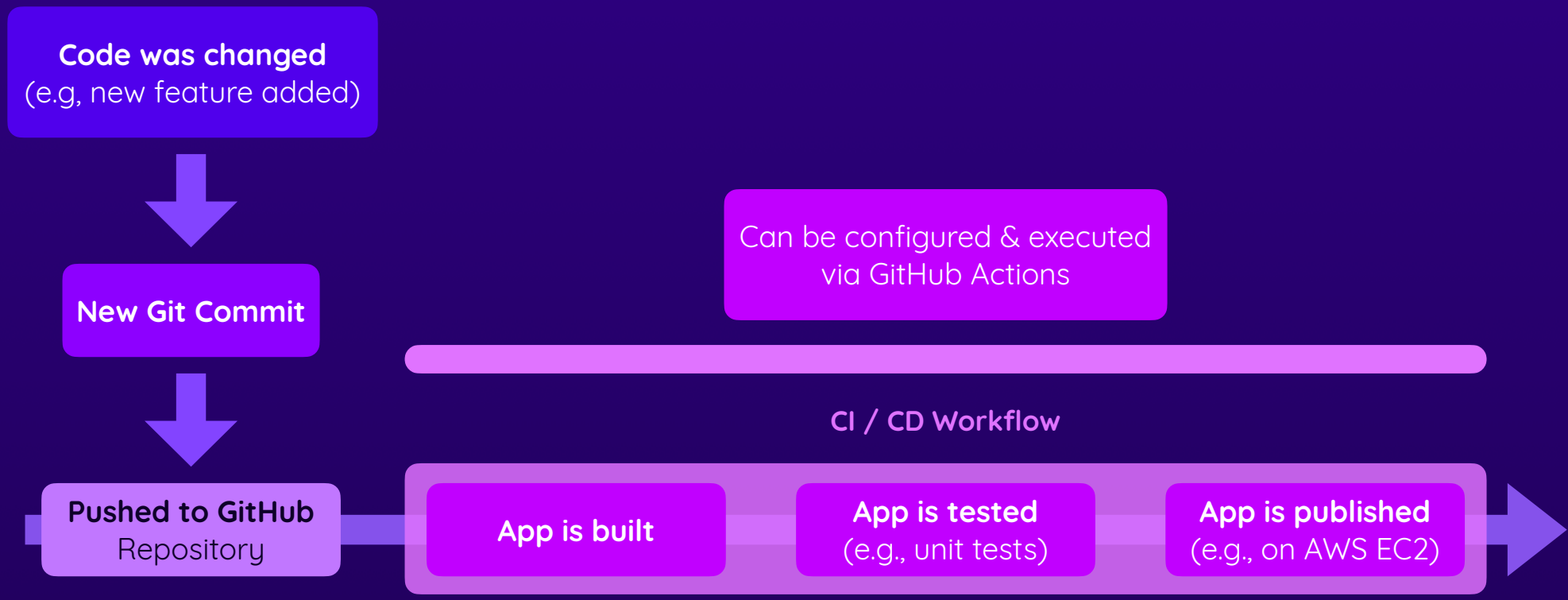
What is GitHub?

And what are “repositories”?

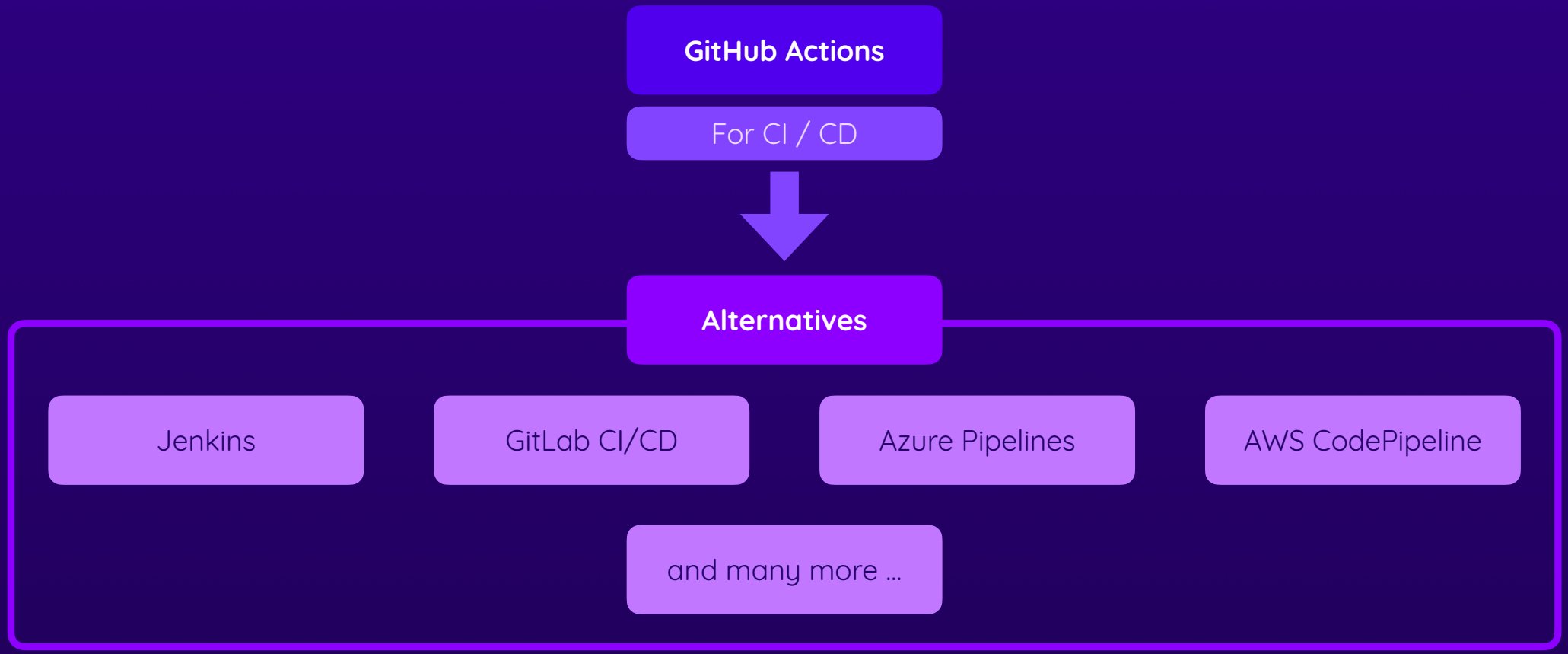
What's CI / CD?


Continuous Integration
Continuous Delivery
Methods for automating app development & deployment
Code changes are automatically built, tested & merged with existing code
After integration, new app or package versions are published automatically

A Typical CI / CD Workflow



GitHub Actions Alternatives



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What is Git?

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What Is GitHub?

A cloud Git repository & services provider

Store & manage Git repositories

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What Is Git?

A (free) version control system

A tool for managing source code changes

Save code snapshots **(“commits”)**

Work with alternative code versions **(“branches”)**

Move between branches & commits

With Git, you can easily roll back to older code snapshots or develop new features without breaking production code.

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Backup, work across machines & work in teams

Public & private, team management & more

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Via "Issues", "Projects", "Pull Requests" & more

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Via **GitHub Actions**, GitHub Apps & more

About This Course

Learn GitHub Actions From The Ground Up

Video-based Explanations

- Watch the videos—at your pace
- Recommendation: Watch all videos in the provided order
- Repeat videos as needed

Practice & Experiment

- Pause videos and practice on your own
- Build up on course examples & feel free to experiment
- Build your own demo projects & workflow examples

Learn & Grow Together

- Help each other in the course Q&A section
- Dive into our (free!) community

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Git & GitHub Crash Course

The Very Basics

- Working with Git: Setup & Key Commands
- Working with GitHub: Creating & Using Repositories
- Using Git with GitHub

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What Is Git?

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Git Repositories

Git features can be used in projects with Git repositories

A repository is a folder used by Git to track all changes of a given project → Git commands require a repository in a project

Create Git repositories via `git init` → Only required once per folder / project

Some projects initialize Git for you → e.g., React projects

Working with Commits (Code Snapshots)

Create Commits

`git add <file(s)>`

Stage changes for next commit

+

`git commit`

Create a commit that includes all staged changes

Move between Commits

`git checkout <id>`

Temporarily move to another commit

Working with Commits (Code Snapshots)

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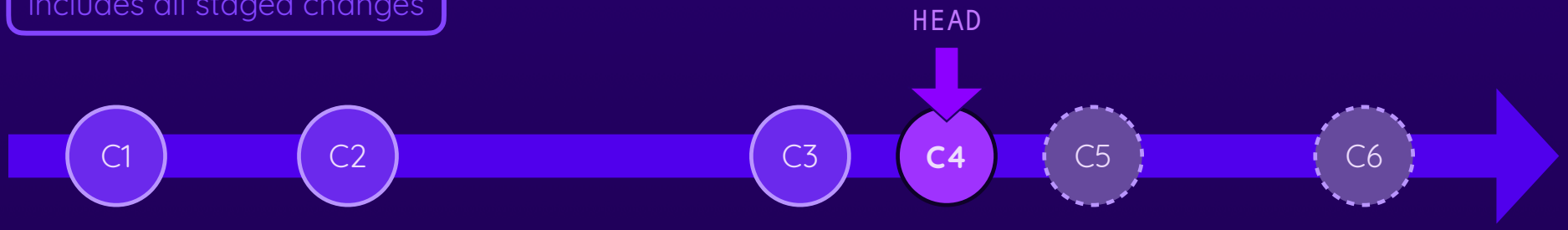
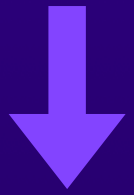


Understanding Staging

Staging controls which changes are part of a commit



With staging, you can make sure that not all code changes made are added to a snapshot

If all changes should be included, you can use `git add .` to include all files in a Git repository

Working with Commits (Code Snapshots)

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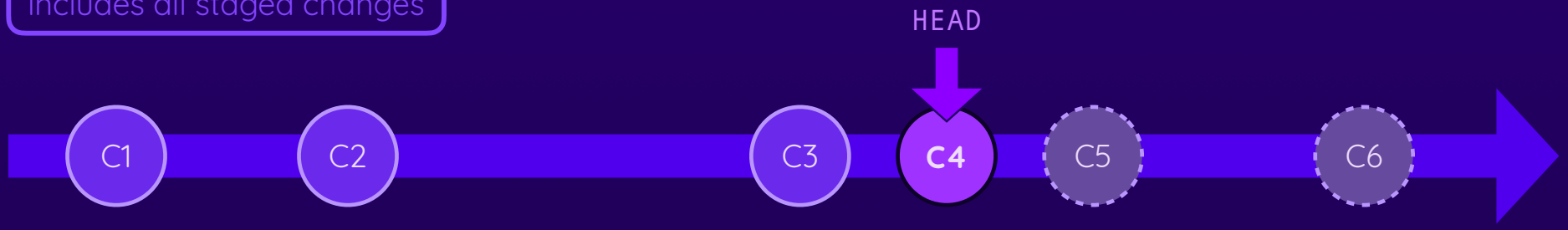

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Undo Commits

`git revert <id>`

Revert changes of commit by creating a new commit

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`git reset --hard <id>`

Undo changes by deleting all commits since <id>

Working with Commits (Code Snapshots)

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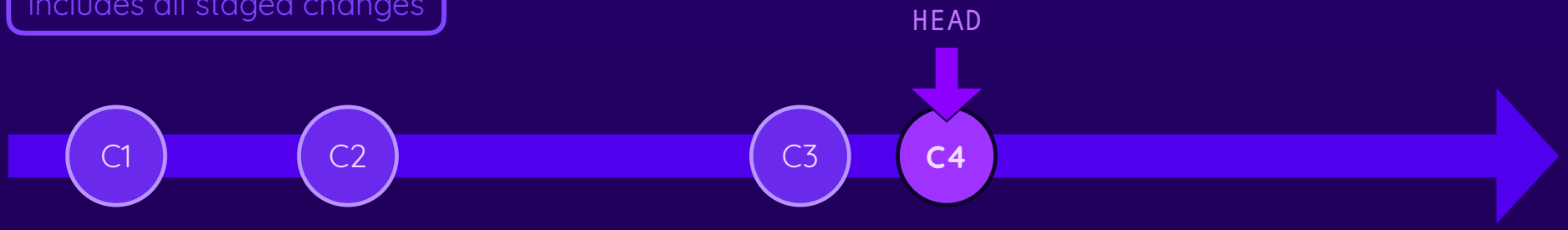

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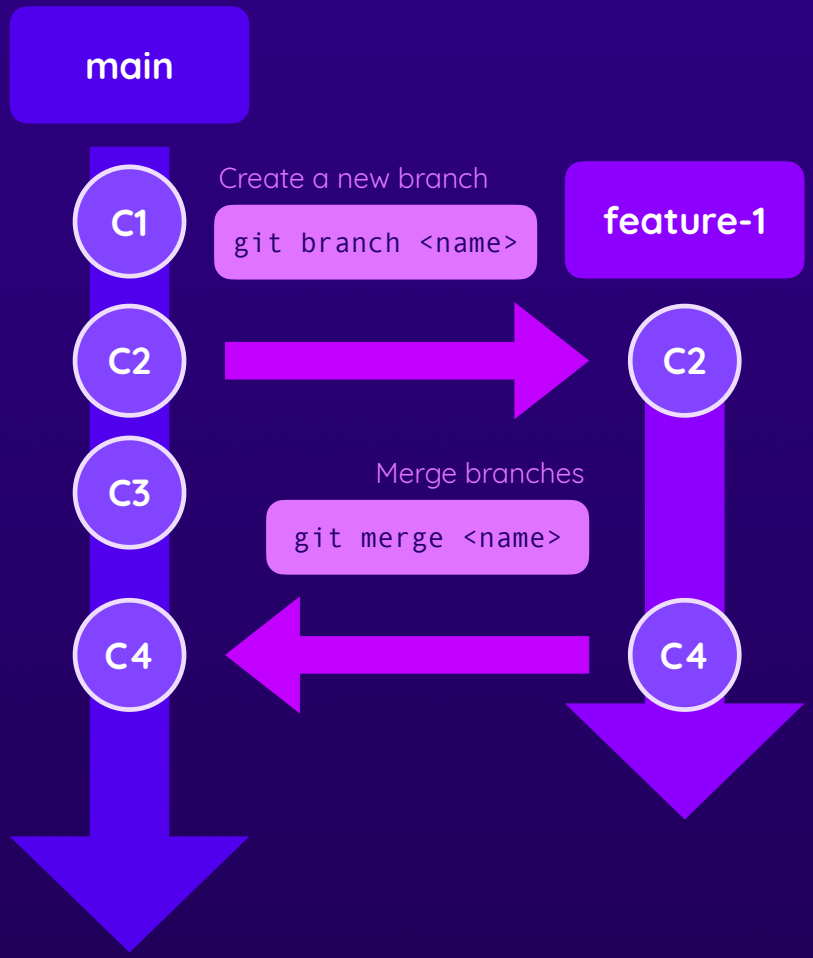
Key Commands

`git init`	**Initialize a Git repository** (only required once per project)
`git add <file(s)>`	**Stage code changes** (for the next commit)
`git commit -m "..."`	**Create a commit for the staged changes** (with a message)
`git status`	**Get the current repository status** (e.g., which changes are staged)
`git log`	**Output a chronologically ordered list of commits**
`git checkout <id>`	**Temporarily move back to commit <id>**
`git revert <id>`	**Revert the changes of commit <id> (**by creating a new commit)
`git reset <id>`	**Undo commit(s) up to commit <id> by deleting commits**

Understanding Git Branches



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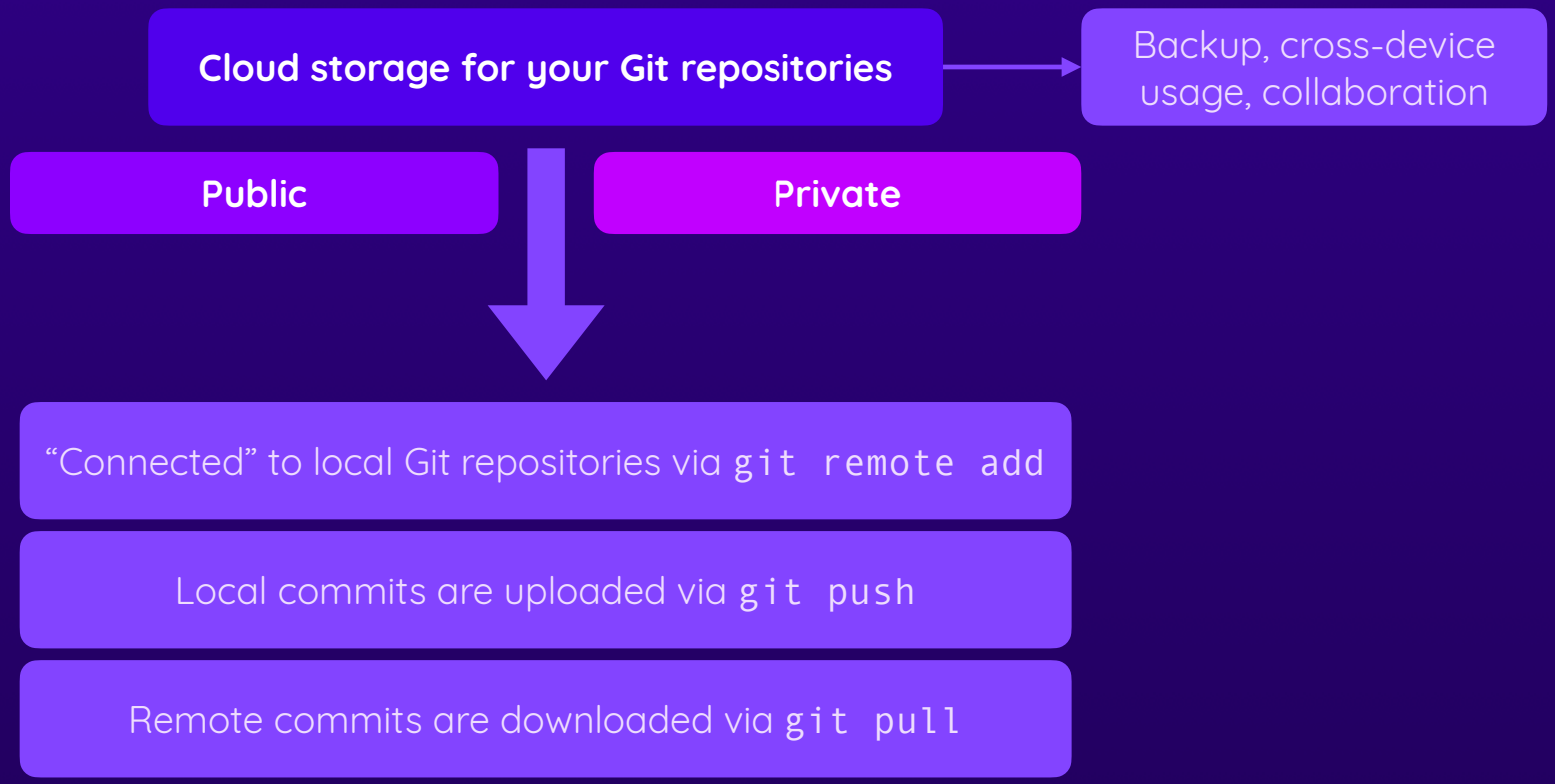

Forking & Pull Requests

Repository Forking

Creates a standalone copy of a repository

Can be used to work on code without affecting the original repository

Pull Requests

Requests merging code changes into a branch

Can be based on a forked repository or another branch from the same repository

Pull requests allow for code reviews before merging changes

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GitHub Actions: Fundamentals

Key Building Blocks & Usage

- Understanding the Key Elements
- Working with Workflows, Jobs & Steps
- Building an Example Workflow

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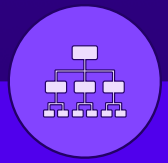
Key Elements



Workflows

- Attached to a GitHub repository
- Contain one or more **Jobs**
- Triggered upon **Events**

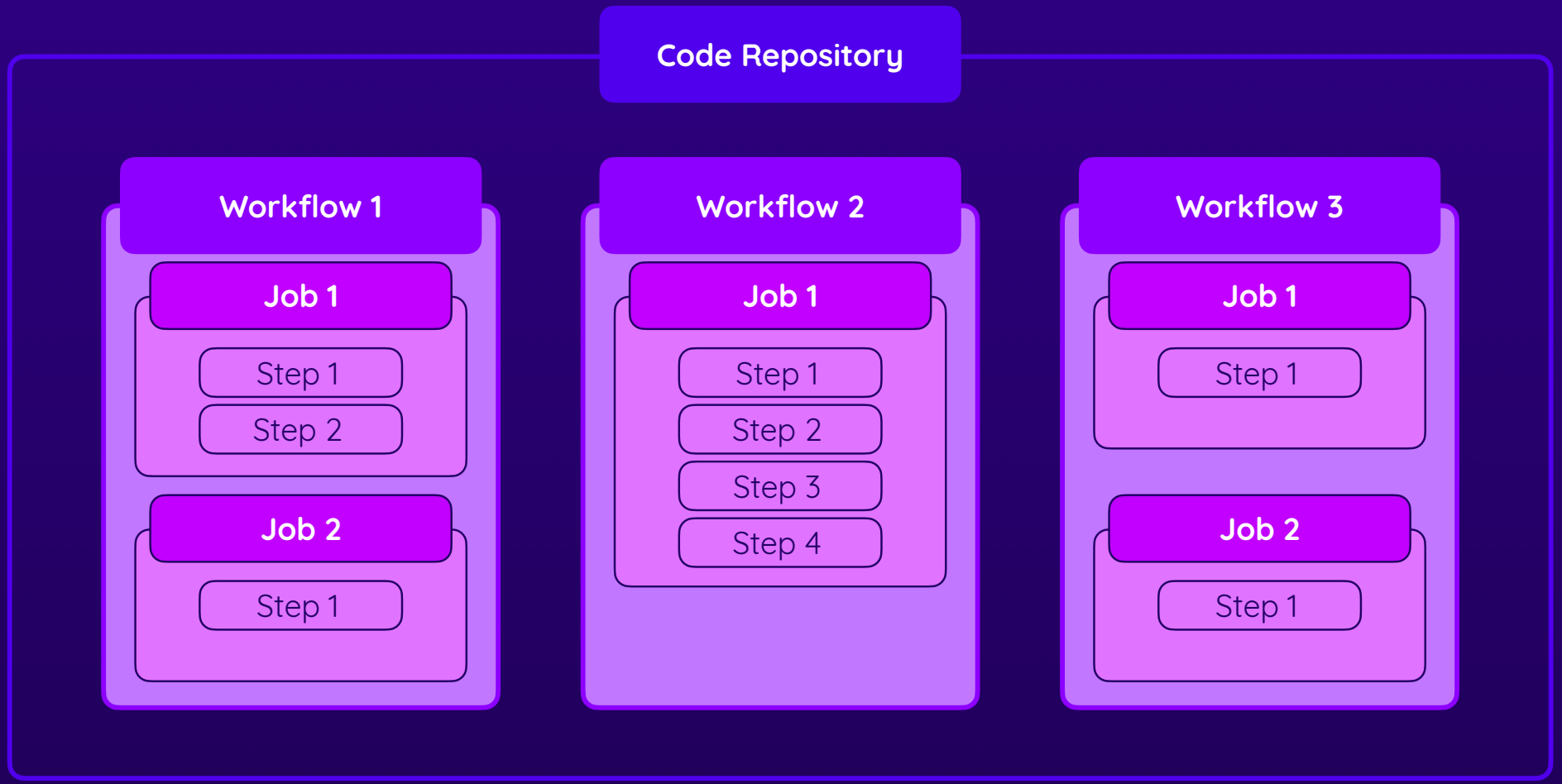
Jobs

- Define a **Runner** (execution environment)
- Contain one or more **Steps**
- Run in parallel (default) or sequential
- Can be conditional

Steps

- Execute a **shell script** or an **Action**
- Can use custom or third-party actions
- Steps are executed in order
- Can be conditional

Workflows, Jobs & Steps



Events (Workflow Triggers)

Repository-related

push
Pushing a commit

pull_request
Pull request action (opened, closed, ...)

create
A branch or tag was created

fork
Repository was forked

issues
An issue was opened, deleted, ...

issue_comment
Issue or pull request comment action

watch
Repository was starred

discussion
Discussion action (created, deleted, ...)

Many More!

Other

workflow_dispatch
Manually trigger workflow

repository_dispatch
REST API request triggers workflow

schedule
Workflow is scheduled

workflow_call
Can be called by other workflows

What Are Actions?

Command ("run")

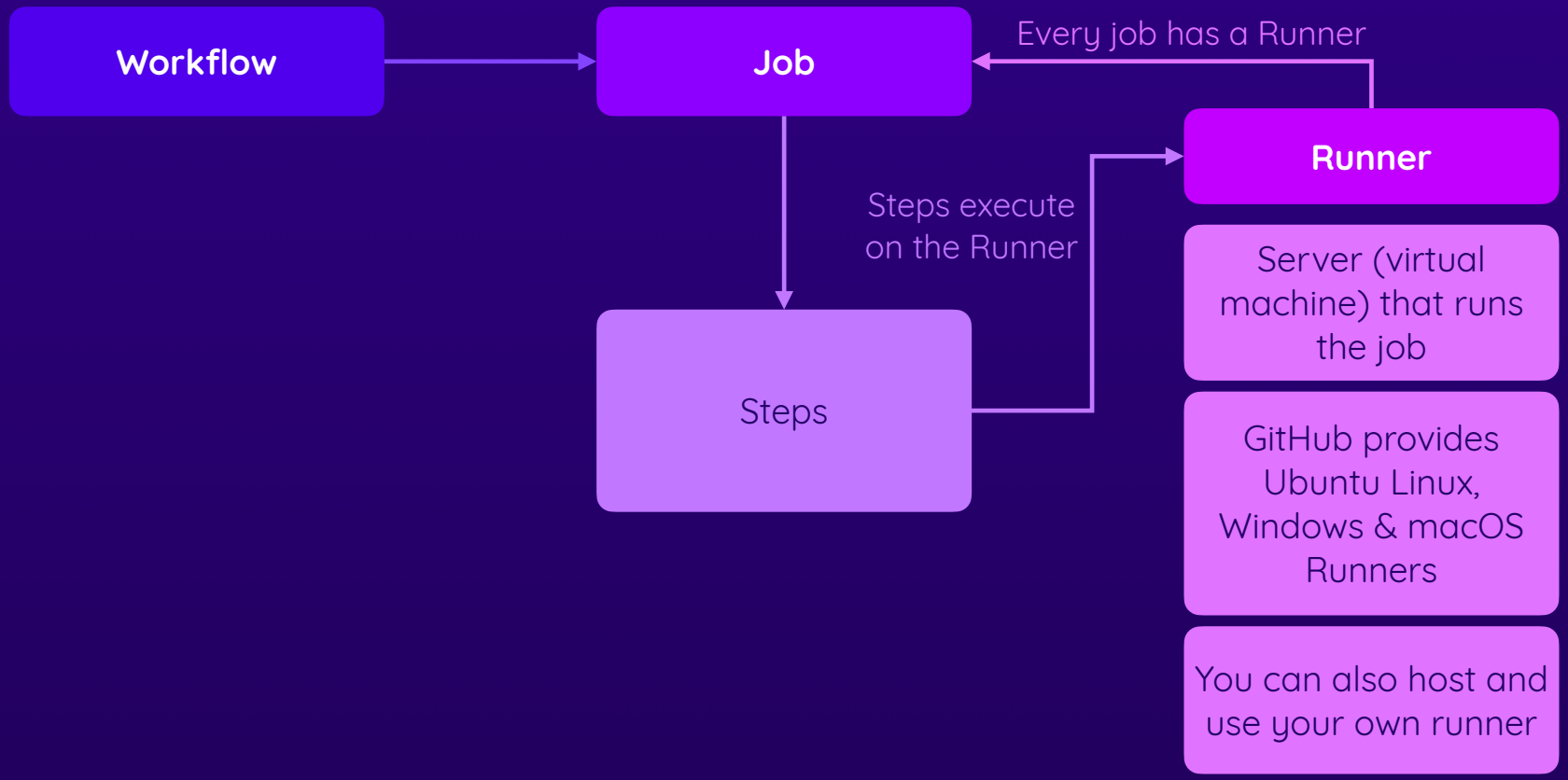
A (typically simple) shell command that's defined by you

Action

A (custom) application that performs a (typically complex) frequently repeated task

You can build your own Actions but you can also use official or community Actions

Job Runners


Workflow
Job
Every job has a Runner
Runner
Steps execute on the Runner
Steps
Server (virtual machine) that runs the job
GitHub provides Ubuntu Linux, Windows & macOS Runners
You can also host and use your own runner

Module Summary

Core Components

- Workflows: Define Events + Jobs
- Jobs: Define Runner + Steps
- Steps: Do the actual work

Defining Workflows

- .github/workflows/<file>.yml (on GitHub or locally)
- GitHub Actions syntax must be followed

Events / Triggers

- Broad variety of events (repository-related & other)
- Workflows have at least one (but possible more) event(s)

Runners

- Servers (machines) that execute the jobs
- Pre-defined Runners (with different OS) exist
- You can also create custom Runners

Workflow Execution

- Workflows are executed when their events are triggered
- GitHub provides detailed insights into job execution (+ logs)

Actions

- You can run shell commands
- But you can also use pre-defined Actions (official, community or custom)

Exercise Time!