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Getting Started

What & Why?

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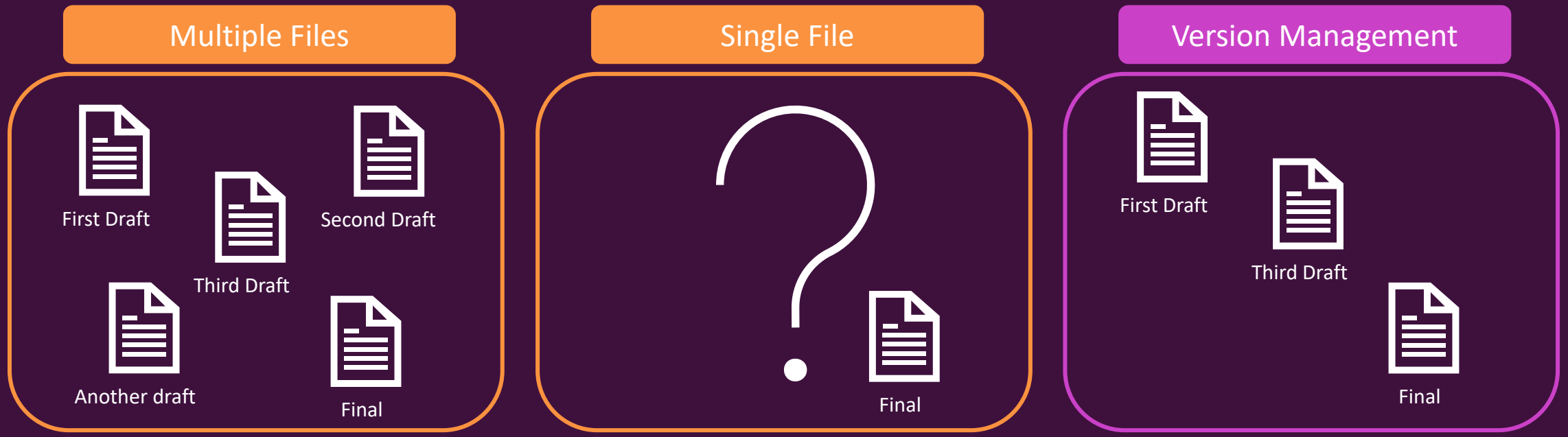
What are Git & GitHub?

What is Version Management/Control?



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Control & tracking of code changes* over time

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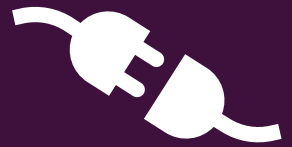
About Git & GitHub

- Version Control System
- Manage Code History
- Track Changes



- Largest Development Platform
- Cloud Hosting & Collaboration Provider
- Git Repository Hosting

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Course Content

Windows Command Prompt	Commits & Branches **The Basics**	Local vs Remote Repositories **The Basics**	
Mac Terminal (Z shell)	Merging, Rebasing & More **Deep Dive**	Pull Requests, Organizations & More **Deep Dive**	
Optional	Git	GitHub	Practice Project

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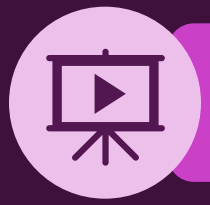
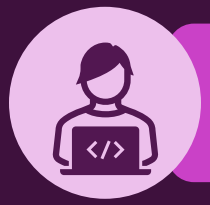
How To Get The Most Out Of The Course



Watch the Videos
(choose your pace)



Code Along & Practice
(also without us telling you)

Debug Errors & Explore Solutions
(also check attachments)

Help Each Other & Learn Together
(Discord, Q&A Board)

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Optional: Command Line Basics

Text Based Computer Interaction

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Module Content

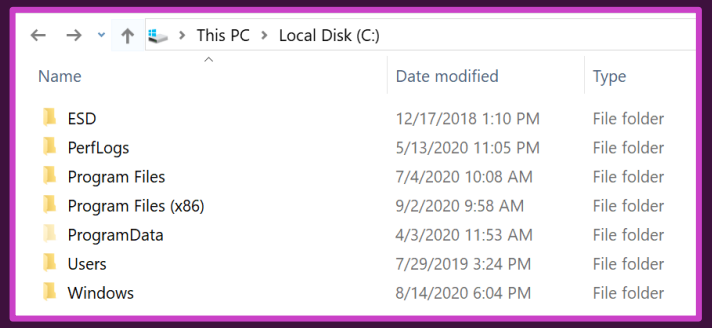
Text Based Computer Interaction – What & Why?

Mac User: Z-Shell Basics

Windows User: Command Prompt Basics

Text Based Computer Interaction – What & Why

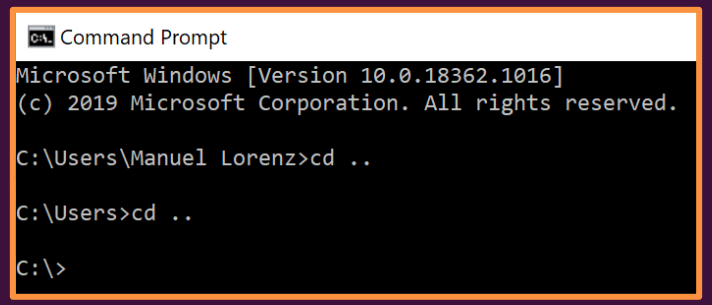
Graphical User Interface (GUI)



User Friendly

Easy to Explore

Command Prompt



Time Saving

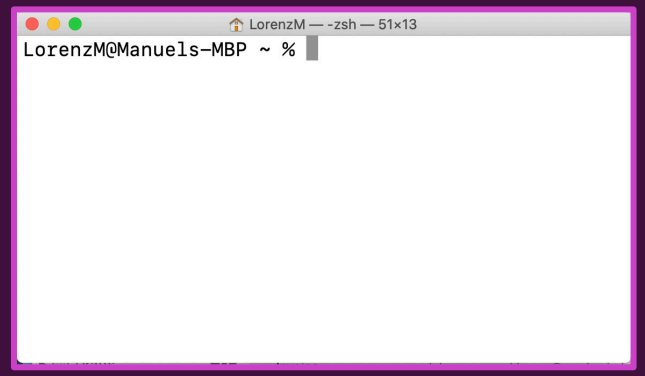
More Possibilities

- Start Servers
- Download + Install Tools
- Run Code
- Execute Files
- Working with Git

Mac Terminology

Terminal

Text Input Environment (“Hardware“)



Shell

Text Input Interface
(“Software“)

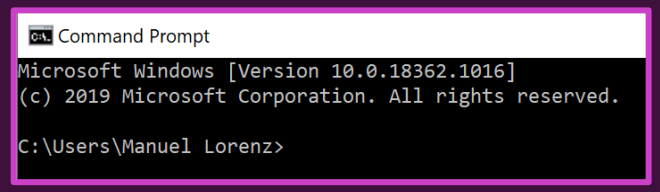
Bash

zsh (Z-Shell)

Windows Terminology

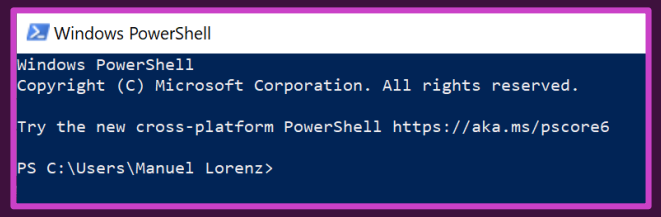
Command Prompt (cmd)

Initial Windows Shell



PowerShell

New Shell (Windows 7 Release)

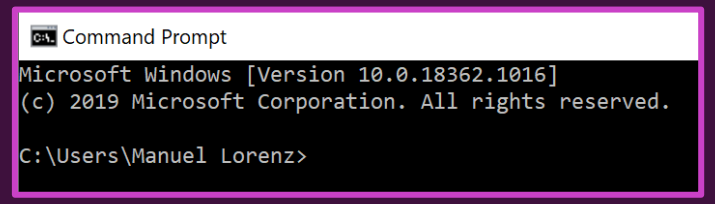


Git Bash

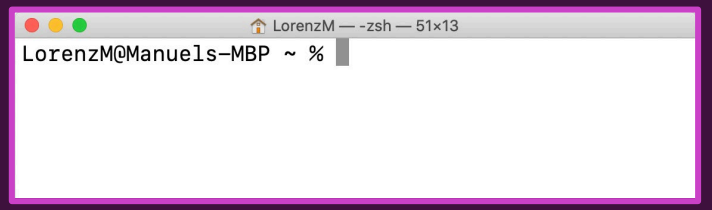
Bash Emulation for Windows

Command Line Tools

Command Prompt
(cmd)



Terminal
(z-Shell)



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Mac: Terminal (z-Shell) – Useful Commands

pwd
(print working directory)

ls
(list items)

cd (..)
(change directory)

cd /
(root directory)

cd /Users
(users directory)

cd or cd ~
(home directory)

touch
(create/ ”touch” file)

mkdir
(create directory)

rm
(delete file)

rmdir
(delete empty folder)

cp
(copy file/folder)

mv
(move file/folder)

Windows: Command Prompt – Useful Commands

cd
(print current path)

dir
(list items)

cls
(clear command prompt)

cd (..)
(change directory)

echo text > name(.type)
(create file)

mkdir foldername
(create directory)

del file
(delete file)

rmdir folder
(delete folder)

copy file
(copy file)

move file folder
(move file or folder)

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Version Management with Git

The Basics

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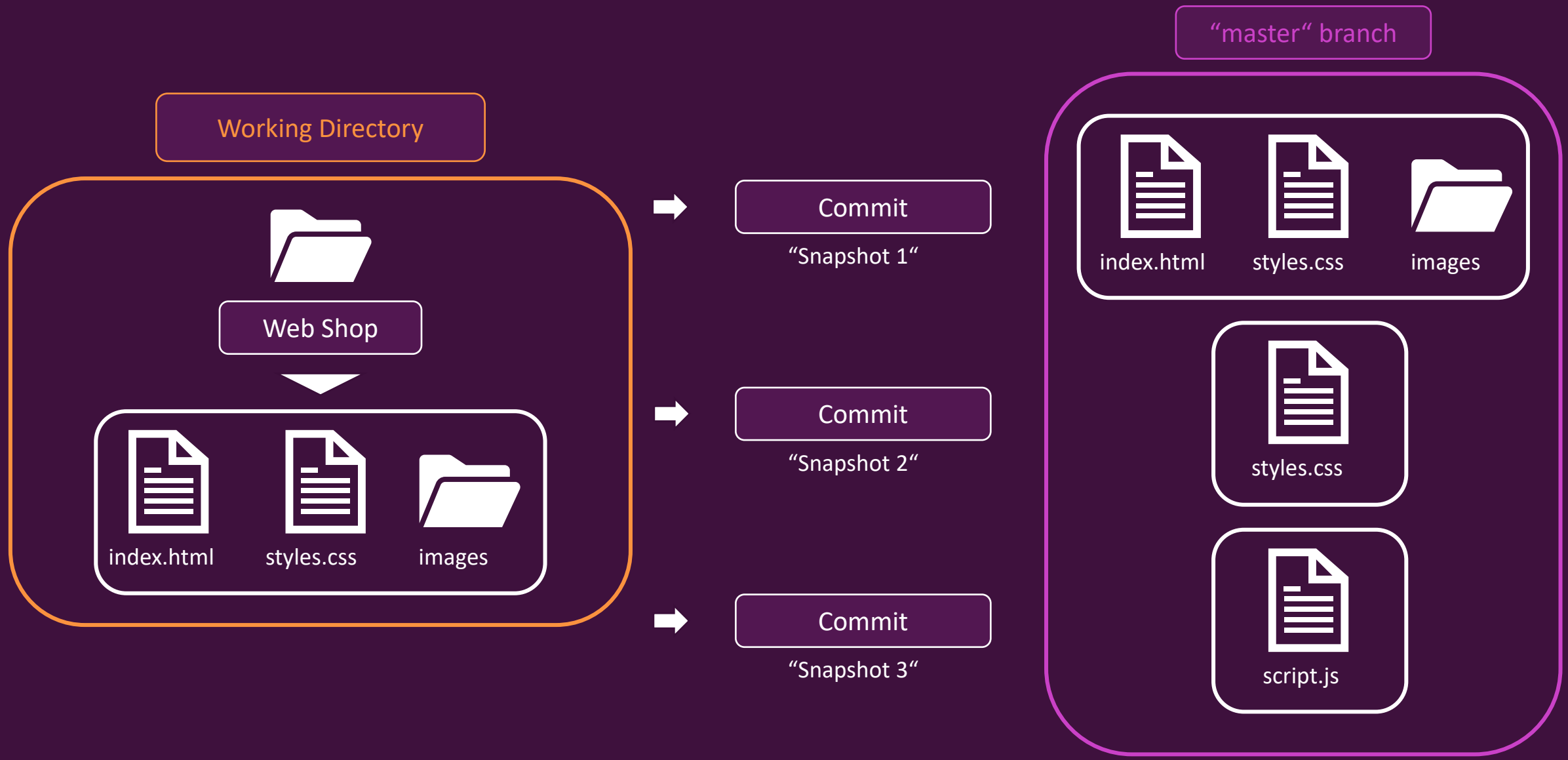
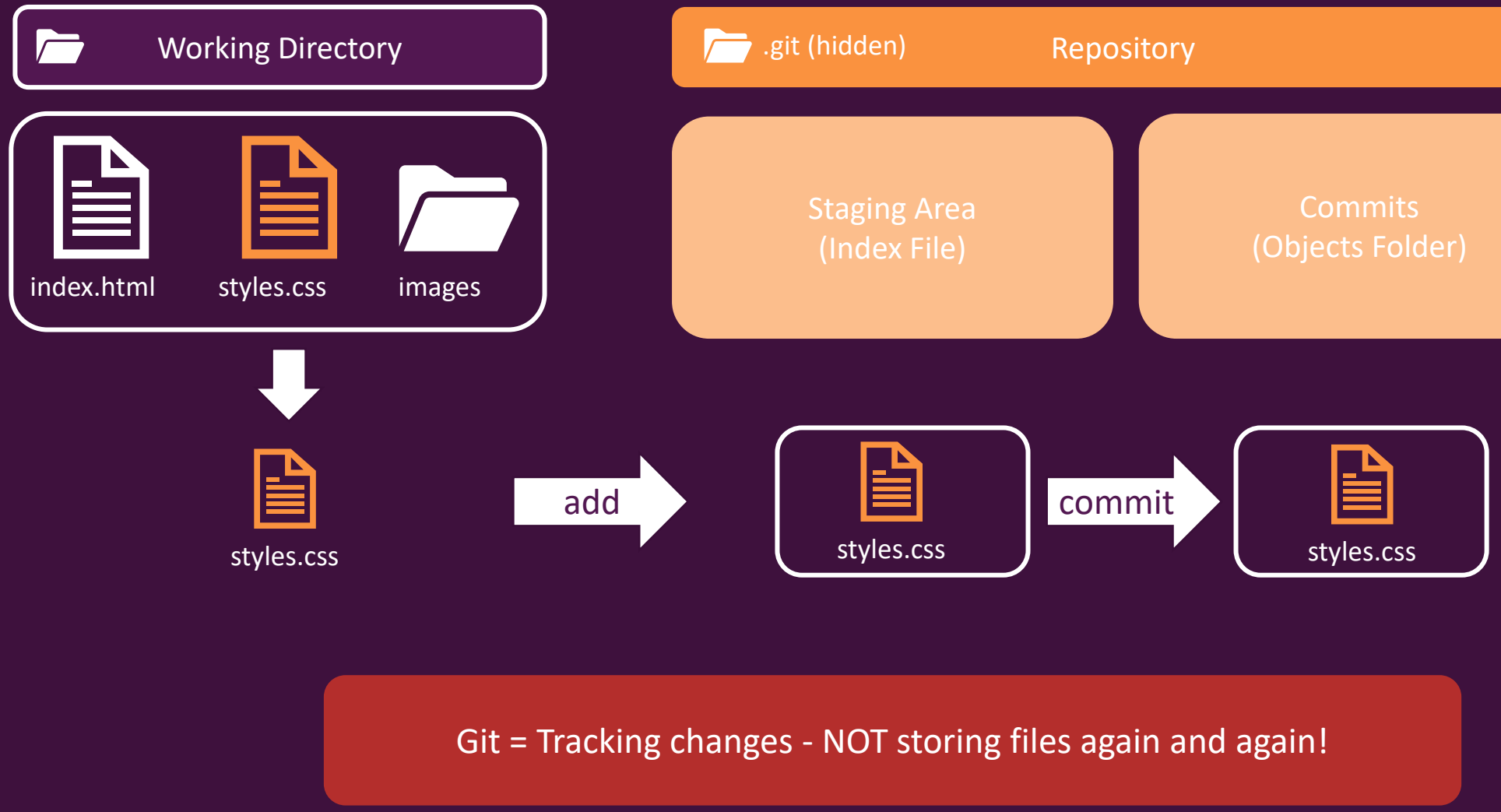
Module Content

- Theory – How Git Works
- Installation & Development Environment
- Repositories, Branches & Commits

How Does Git Work – Simplified!

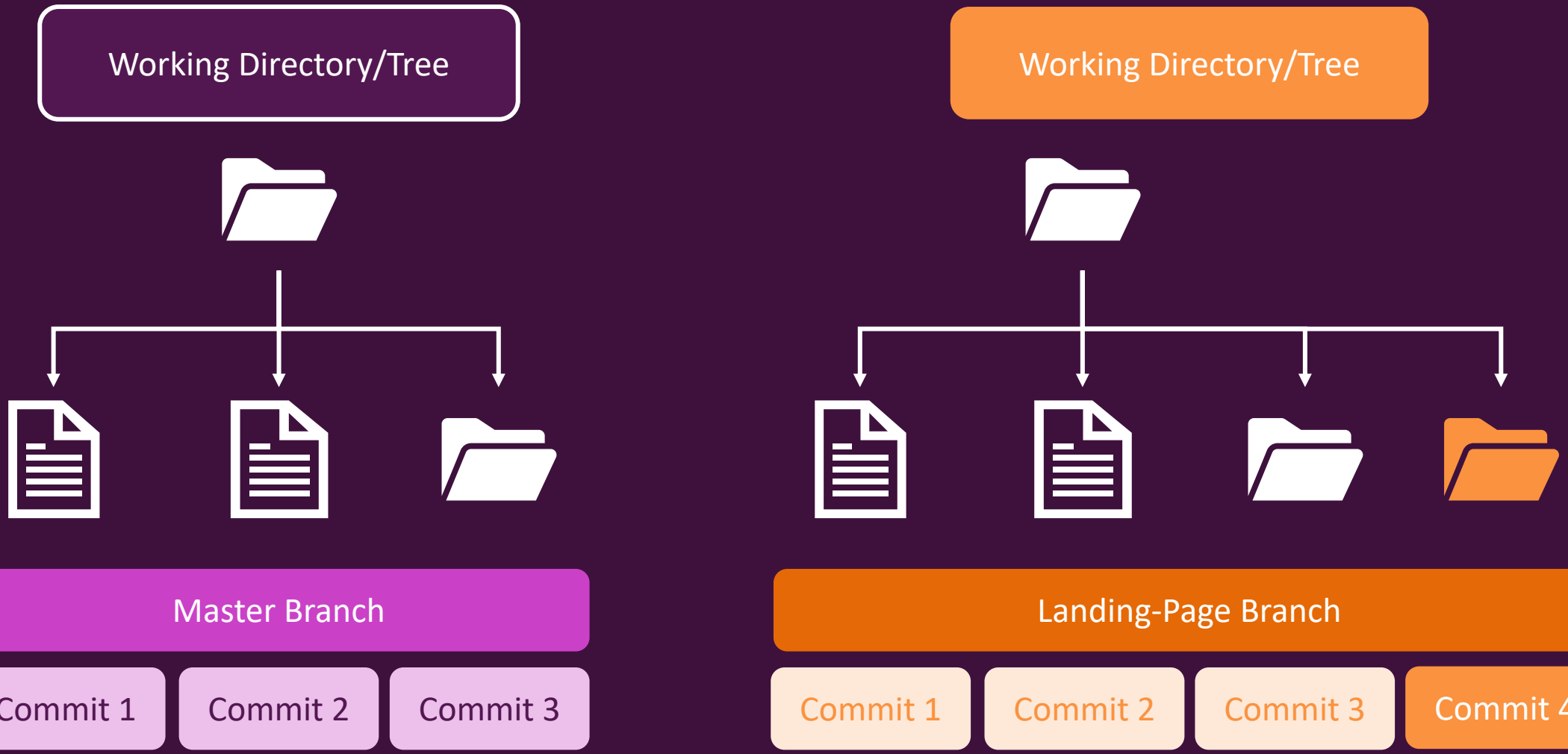


Git under the Hood

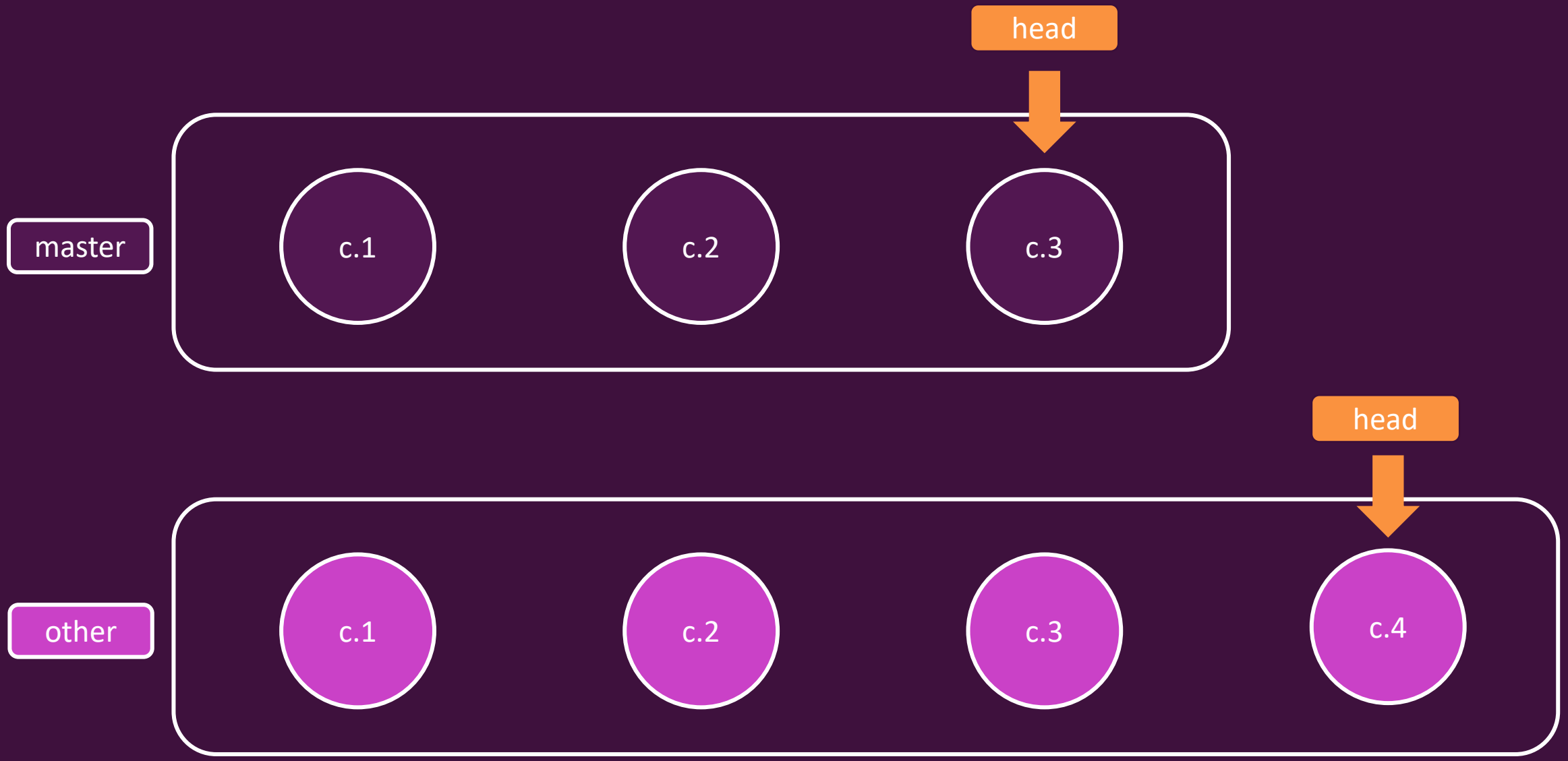


Git = Tracking changes - NOT storing files again and again!

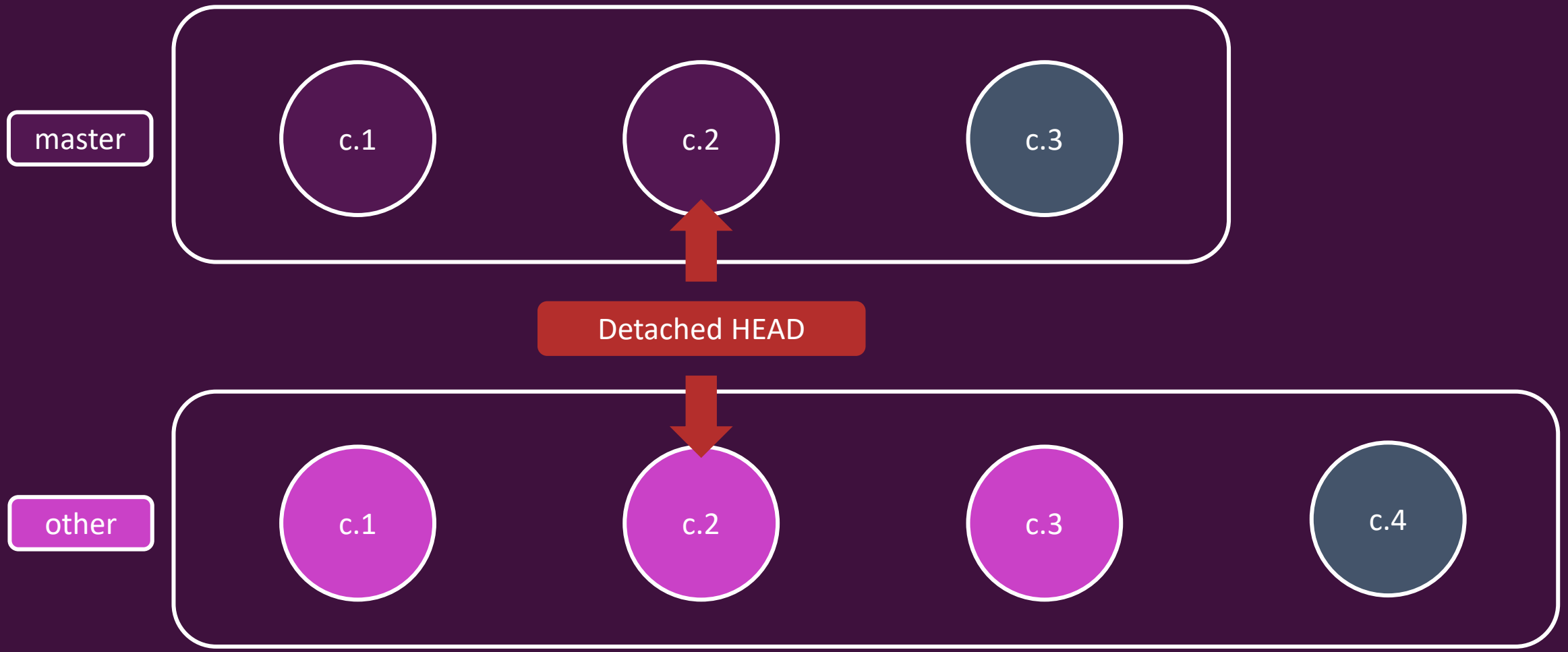
Branches & Commits



What is the “HEAD“?



The “detached HEAD“



“HEAD“ vs “detached HEAD“

HEAD	**Indirectly** points to commit
	`git checkout branchname`
	Points to branch which points to commit
Detached HEAD	**Directly** points to commit
	`git checkout commitid`
	Points to commit with specified ID
	Commit is **not related** to specific branch

Deleting Data

Working Directory Files
(already part of previous commit)

Unstaged Changes

Staged Changes

Latest Commit(s)

Branches

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Basic Commands Summary: General

`git --version`	Check installed Git version
`git init`	Create empty Git repository
`git status`	Check working directory & staging area status
`git log`	Display all commits of current branch
`git ls-files`	List tracked files

Basic Commands Summary: Commit Creation & Access

`git add filename` `git add .`	Add single file or all WD files to staging area
`git commit -m "message"`	Create new commit
`git checkout commitid`	Checkout commit (detached head!)

Basic Commands Summary: Branch Creation & Access

	Git 2.23+	
`git branch branchname`	`git switch branchname`	Create new branch
`git checkout branchname`		Go to branch
`git checkout -b branchname`	`git switch -c branchname`	Create and access new branch
`git merge otherbranch`		Bring other branch‘s changes to current branch

Basic Commands Summary: Deleting Data

Delete/Undo

WD File*	`git rm filename` `git add filename`	Run command after file was deleted from working directory
Unstaged Changes	`git checkout (--) .` 2.23 `git restore filename or .`	Revert changes in tracked files
	`git clean -df`	Delete untracked files

Staged Changes	`git reset filename &`
	`git checkout -- filename`
	2.23 `it restore --staged filename or .`
		Remove file(s) from staging area

Latest Commit(s)	`git reset HEAD~1`
	`git reset --soft HEAD~1`
	`git reset --hard HEAD~1`
		Undo latest (~1) commit

Branches	`git branch -D branchname`	Delete branch

* Already part of previous commit

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Diving Deeper Into Git

Beyond The Basics

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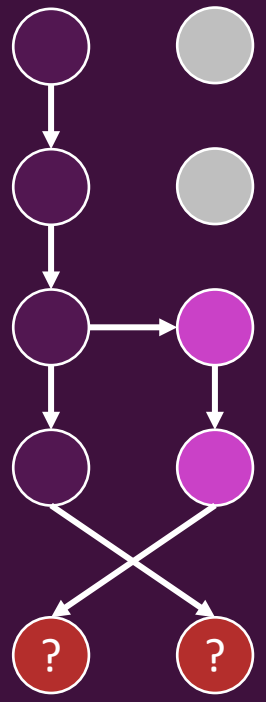
Module Content

- Diving Deeper into Commits
- Managing & Combining Different Branches
- Resolving Conflicts

Combining Master & Feature Branches

Master = Main project branch



Feature = Separate branch “based“ on master branch

Goal:
Combining master & feature branch

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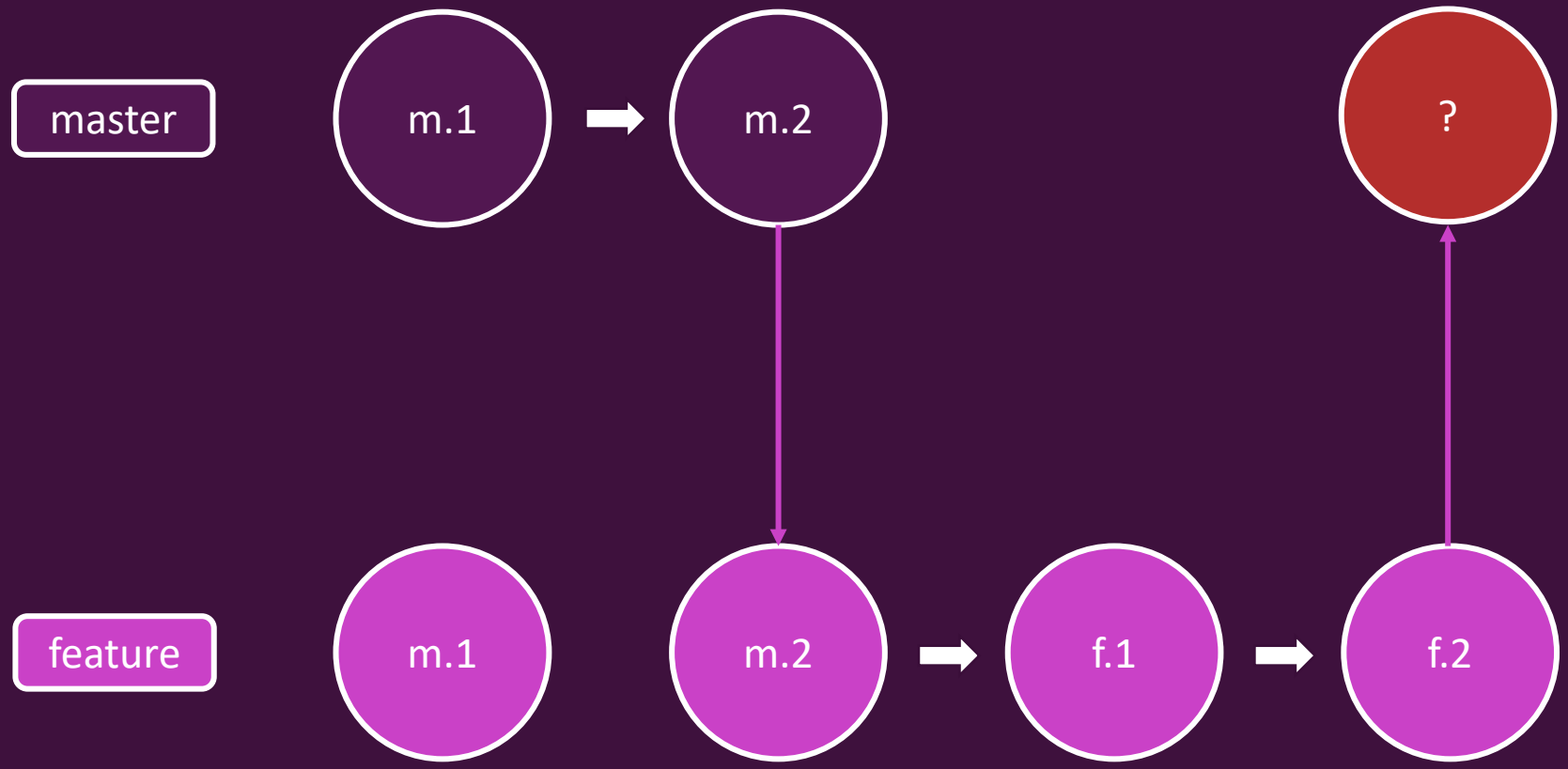
Merge Types

- Fast-Forward
- Non Fast-Forward
  - Recursive
  - Octopus
  - Ours
  - Subtree

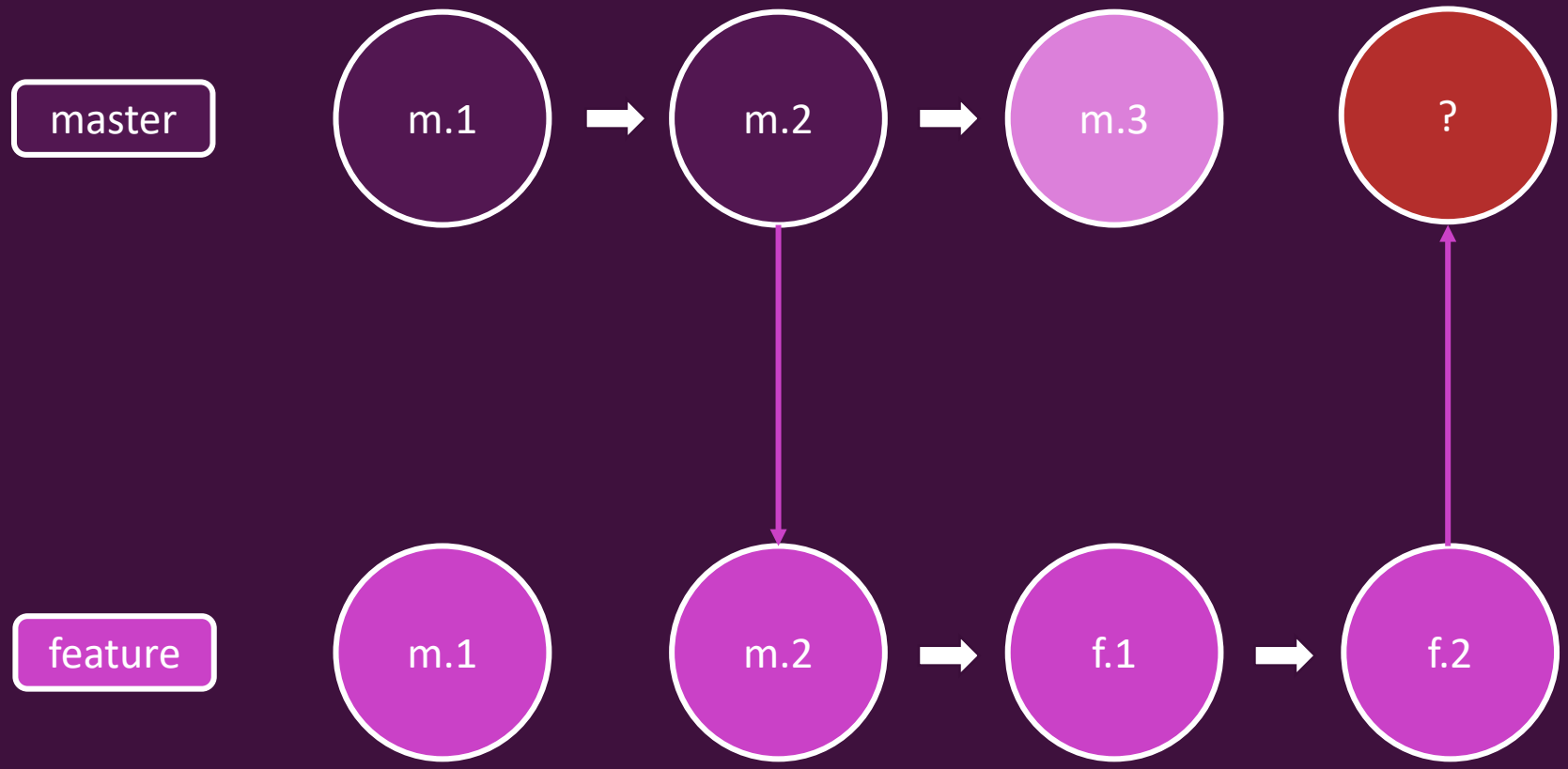
Master & Feature – Merge (“fast-forward“)



No additional commit in master
(after feature branch was created)

Merge moves HEAD forward but does not create new commit!

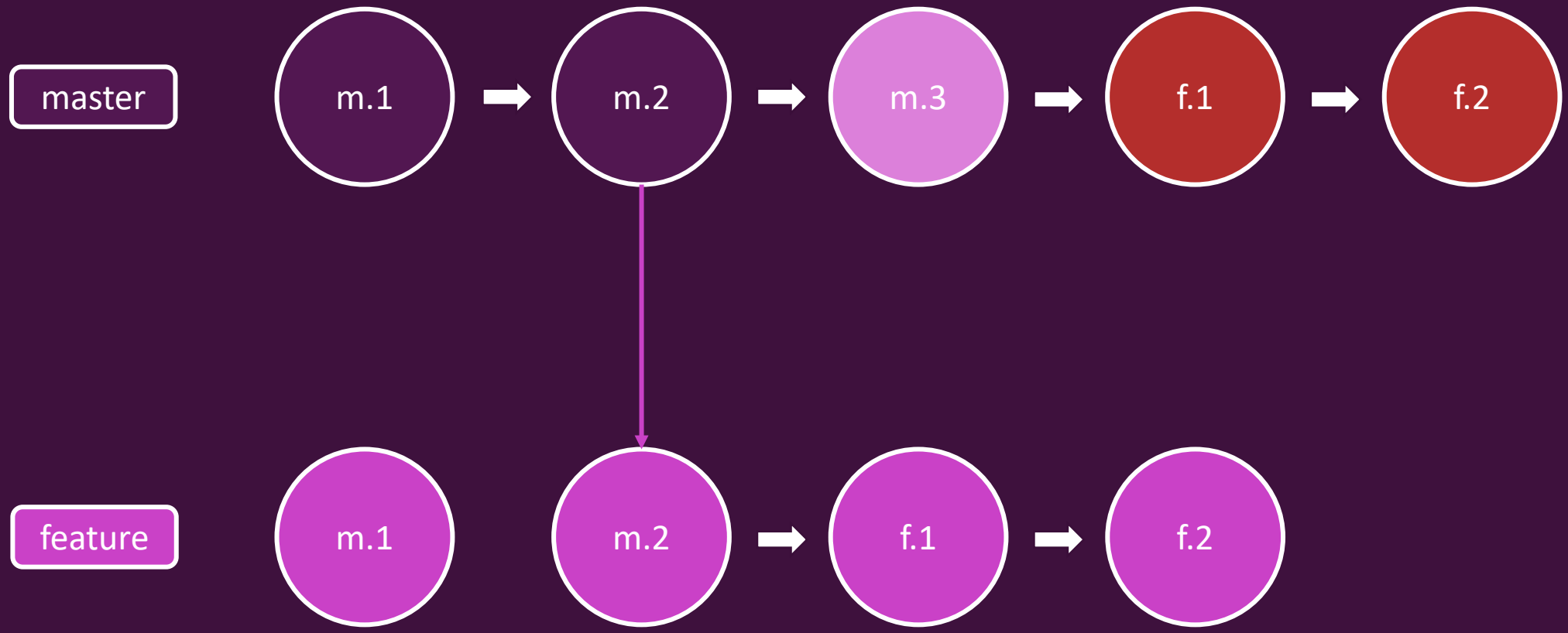
Master & Feature – Merge (“recursive“)



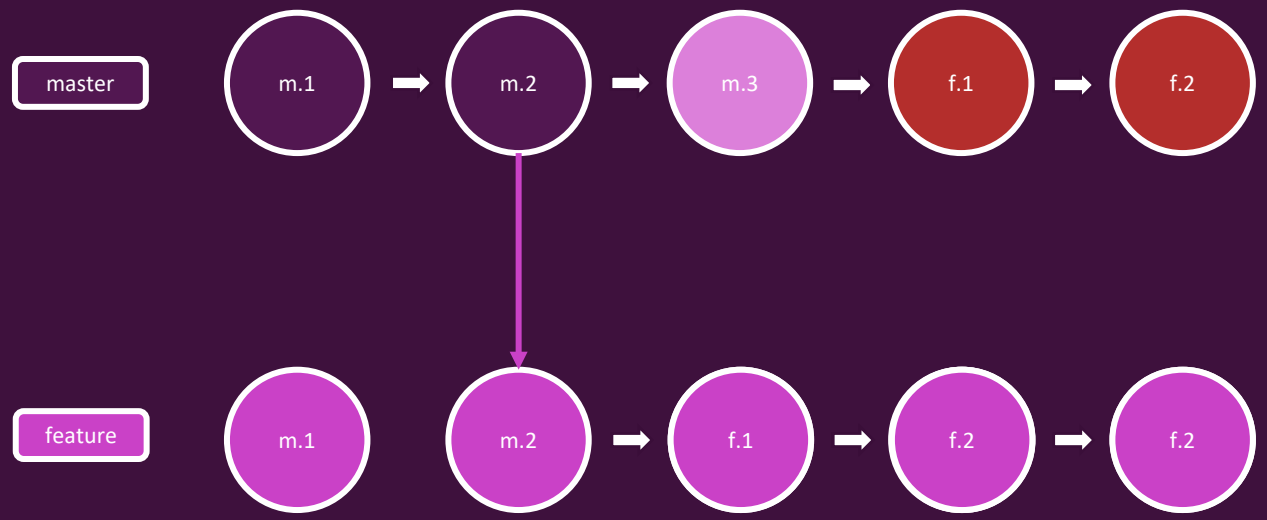
Additional commits in both master & feature branch after feature branch was created

Additional (merge) commit is created in master branch

Master & Feature – Rebase



Rebase – What happened?



"m.3" becomes new base commit for commits created in feature branch

rebase master to feature branch

merge rebased feature into master

"rebase"does **not move** commits, it **creates new commits**

Never rebase commits outside your repository!

Rebase – When to Apply?

New commits in master branch while working in feature branch

Feature relies on additional commits in master branch

Feature is finished – Implementation into master **without merge commit**

Rebase master into feature branch

Rebase master into feature + (fast-forward) merge feature into master

!

Remember: Rebasing re-writes code history!

Merge vs Rebase vs Cherry-Pick

Merge (non fast-forward)	Rebase	Cherry-Pick
Create merge commit	Change single commit‘s parent	Add specific commit to branch (HEAD)
New commit	New commit ID(s)	Copies commit with new ID

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Deep Dive Summary

git stash	Temporary storage for unstaged and uncommitted changes
git reflog	A log of all project changes made including deleted commits
git merge	Combining commits from different branches by creating a new merge commit (recursive) or by moving the HEAD (fast-forward)
git rebase	Change the base (i.e. the parent commit) of commits in another branch
git cherry-pick	Copy commit including the changes made only in this commit as HEAD to other branch

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Understanding GitHub

Leaving the Local Repository

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Module Content

What is GitHub &

How Git & GitHub are Connected

Remote Branches, Remote Tracking Branches & Local Tracking Branches

Understanding Upstreams & Git Clone

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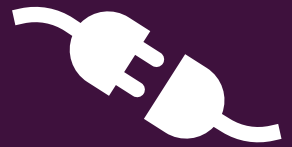
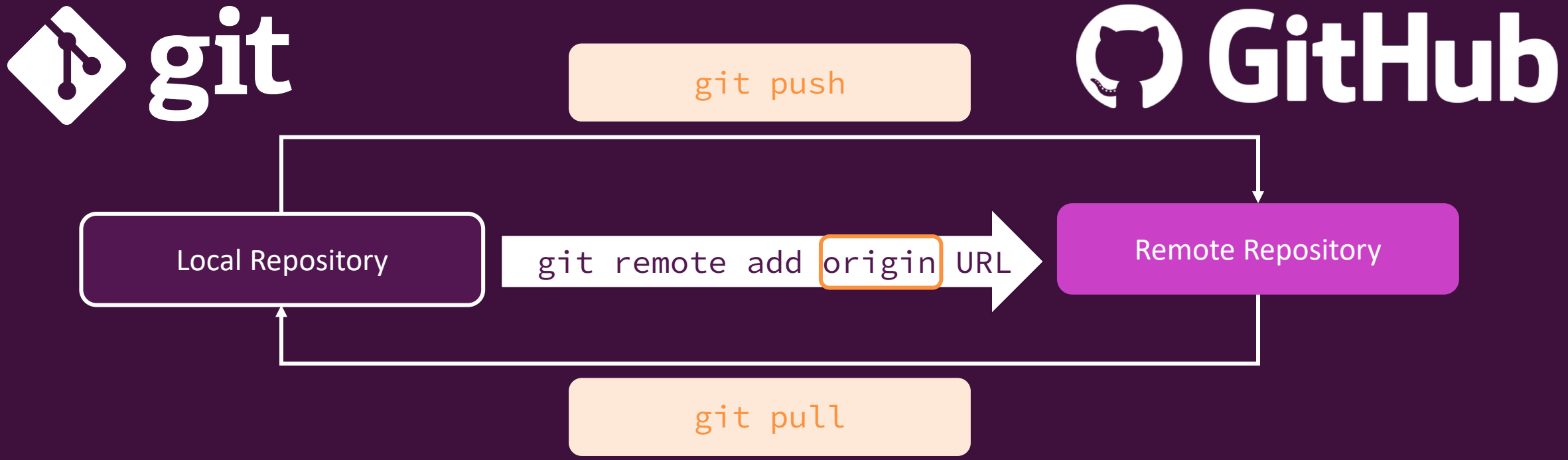
About Git & GitHub

- Version Control System
- Manage Code History
- Track Changes



- Largest Development Platform
- Cloud Hosting & Collaboration Provider
- Git Repository Hosting

Connecting Git & Github – Local to Empty Remote Repo



"Name of the remote machine" or
alias/shorthand of the URL of the remote repository

More Branches?

Local Branch

`git push origin master`

master

`git pull origin master`

master

Remote Tracking Branch

remotes/origin/master

remotes/origin/master

`git merge`

Remote Branch
(“origin“ repository)

master

master

`git fetch`

Remote repository‘s name (“origin“) and branch name must always be added

Branch Types - Overview

Local Branch

Branch on your machine only (as seen in the course)

Remote Branch

Branch in remote location (e.g. in GitHub)

Tracking Branch

Remote Tracking Branch

Local copy of remote branch (not to be edited)

`git fetch`

Local Tracking Branch

Local reference to remote tracking branch (to be edited)

`git push`

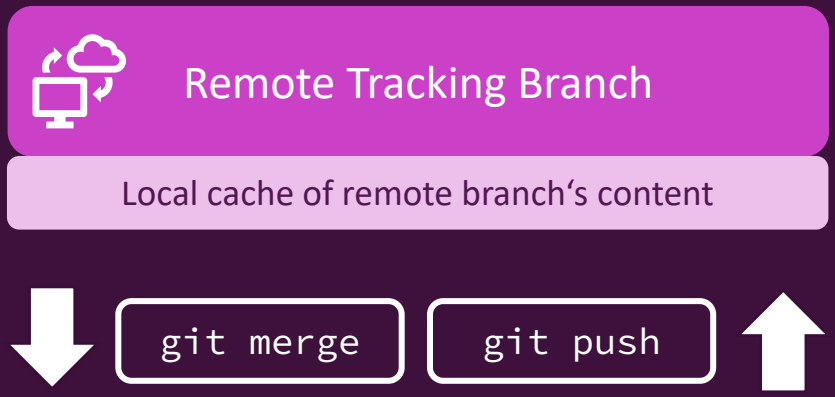
`git pull`

Local & Remote Tracking Branches

Remote Branch

`git remote` — Show remote servers

`git fetch`



Remote Tracking Branch

Local cache of remote branch‘s content

`git branch -a` — List all branches

`git branch -r` — Show remote tracking branches

`git remote show origin` — Show detailed configuration

`git merge` `git push`

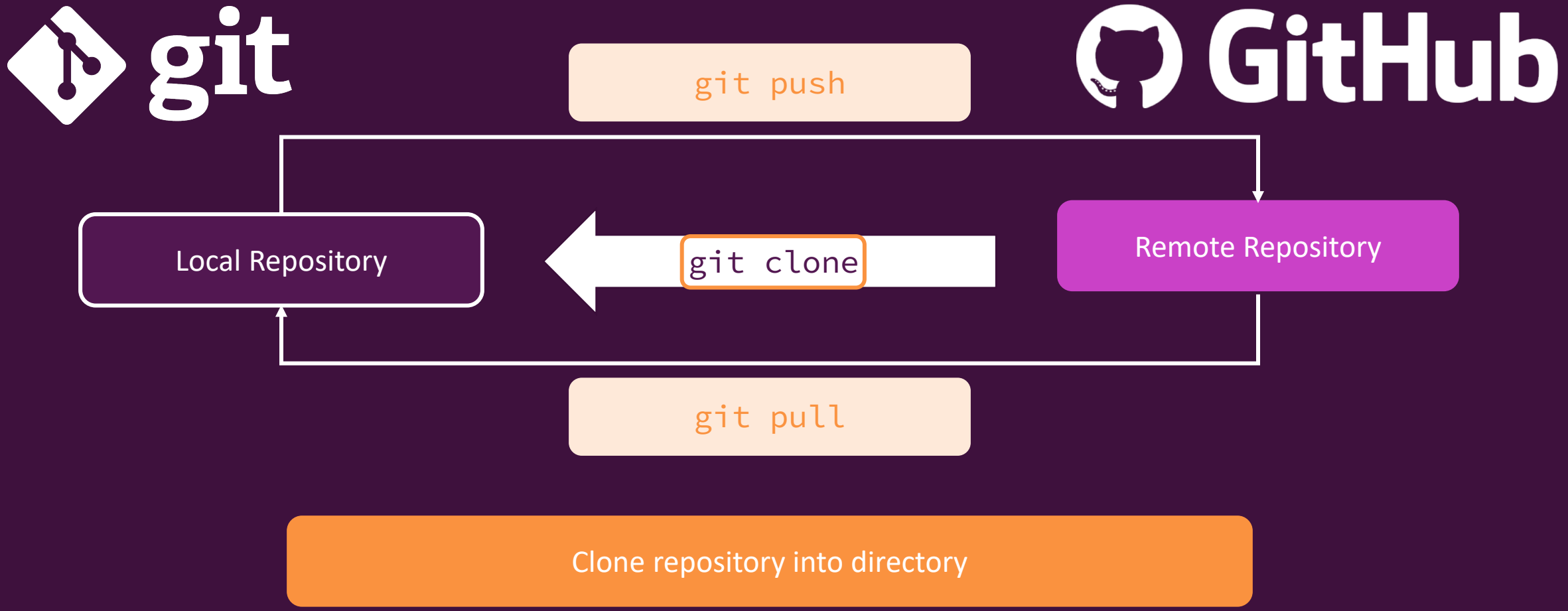
Local Tracking Branch

Remote repository‘s name (“origin“) and branch name can be omitted

`git branch -vv` — List local tracking branches and their remotes

`git branch --track branchname origin/branchname` — Create local tracking branch

Connecting Git & Github – Remote to Empty Local Repo



GitHub – Summary

	git	GitHub	
Repository	Local	Remote	`git remote add origin URL`
Branches	Local-Tracking	Remote	`git branch --track branchname origin/branchname`
	Remote-Tracking		`git pull/push origin branch`

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GitHub – Deep Dive

Collaboration & Contribution

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Module Content

Understanding GitHub Accounts
& Repository Types

Collaborating in GitHub
& Contributing to Open Source Projects

Creating your GitHub Portfolio Page
& More Features to Explore

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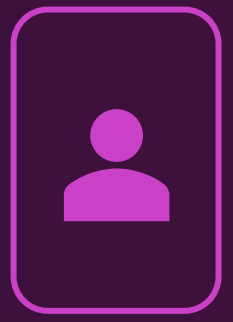
Why We Use GitHub



Cloud Storage ☑

Portfolio Page

Collaboration ☑

Contribution

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Understanding Account Types

Personal User Account	Organizational Account	Enterprise Account
Every GitHub user‘s user account	Shared account for groups of people to collaborate	Central management of multiple GitHub accounts
Unlimited public & private repositories	Base features as for personal account	GitHub Enterprise Cloud & GitHub Enterprise Server
Unlimited collaborators	Advanced features with GitHub Team/Enterprise	Enterprise level only
Base features included in “Free“ pricing plan		“Enterprise“ pricing only

GitHub Security & Access

Local Git User

Personal Access Token

GitHub Account

GitHub account access via Git

Personal user account

Part of organization

Owner access

Collaborator access

Member role access

Repository 1

Repository 1

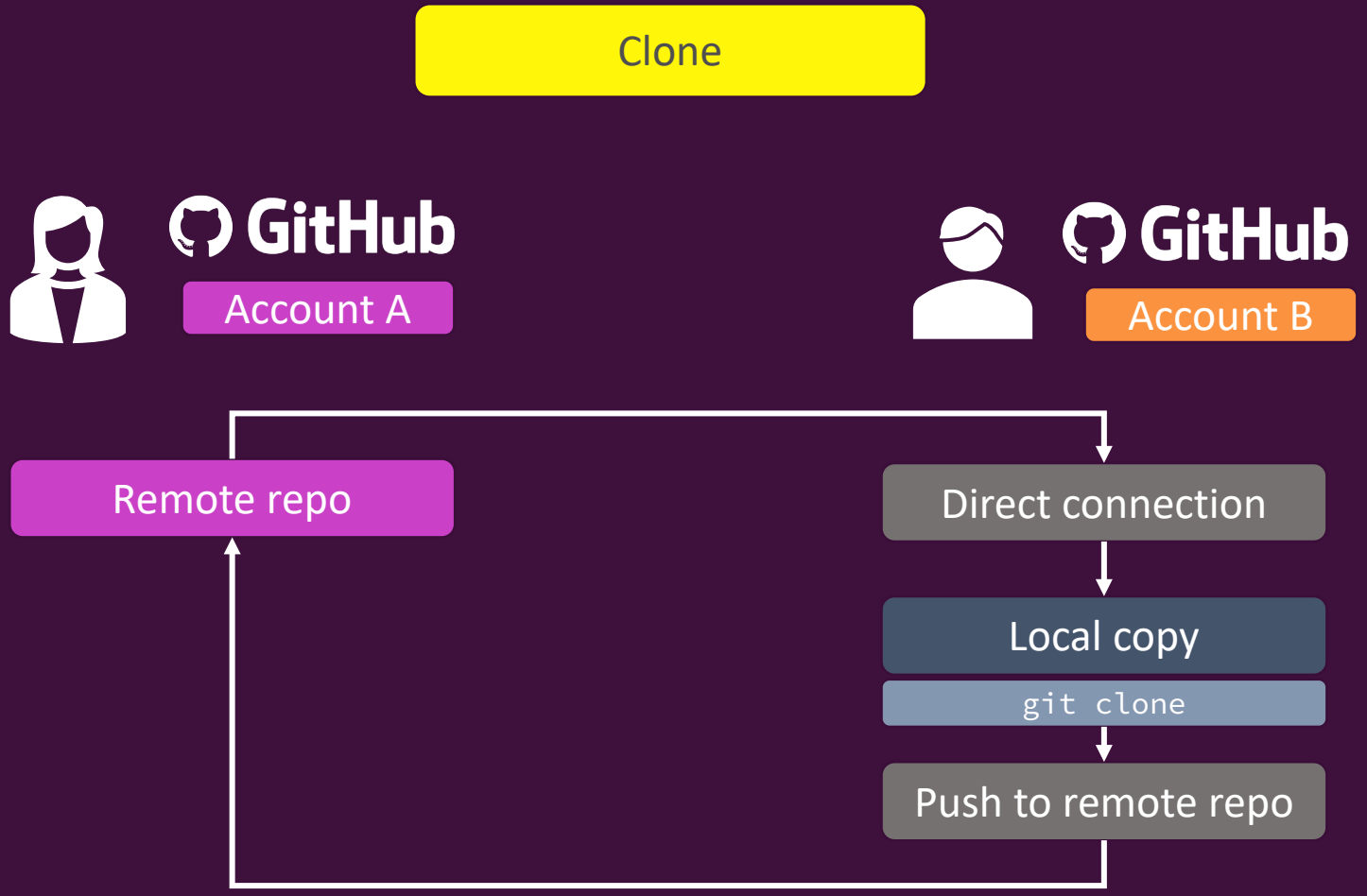
Repository 2

Repository 2

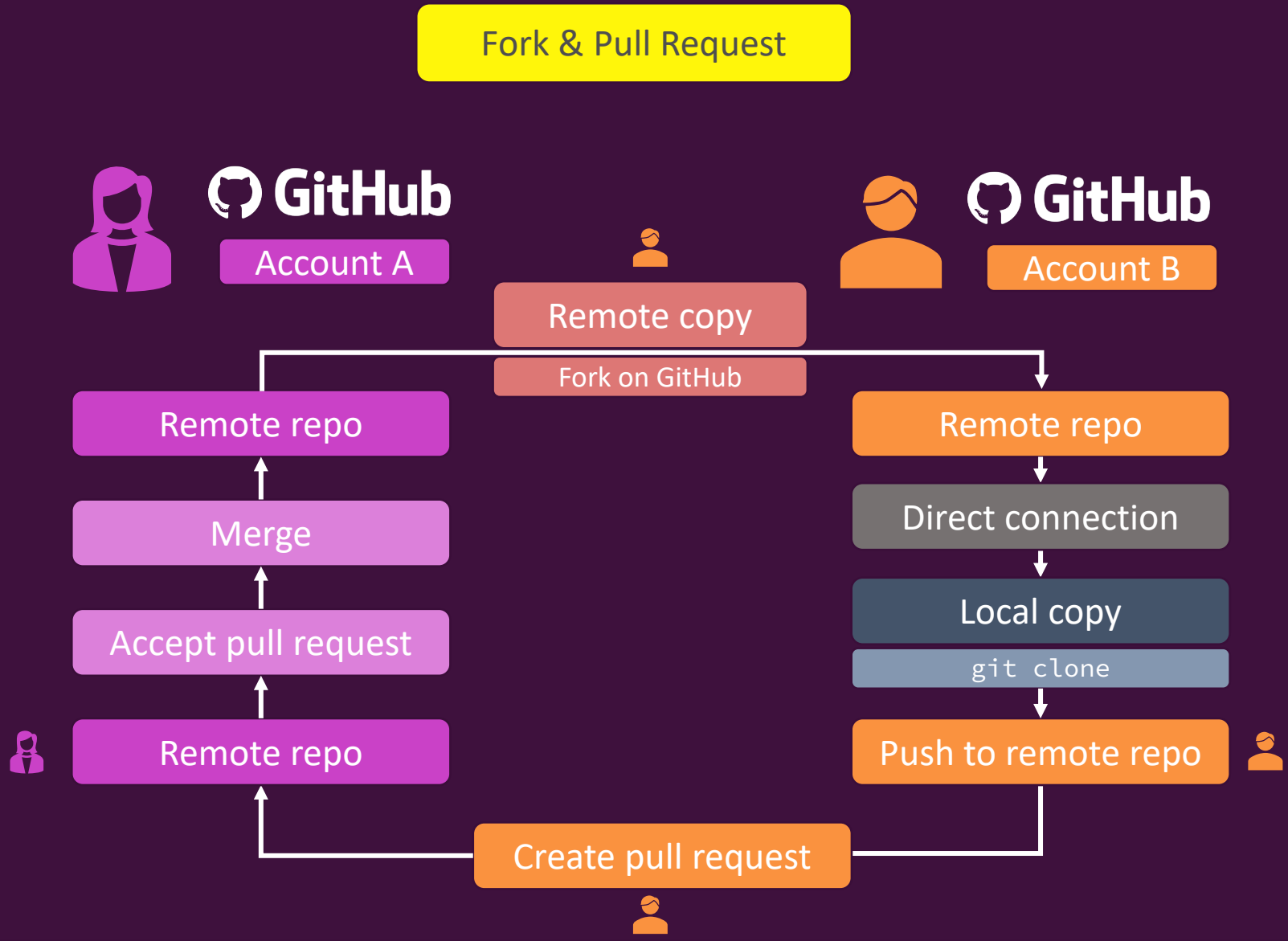
...

...

Comparing Clone...



...with Forks & Pull Requests



Module Summary

GitHub

- Account Types
- Repository Types
- Security

Collaboration

- Collaborators
- Organizations
- Teams

Contribution & Project Management

- Forks & Pull Requests
- Issues
- Projects

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Applying Our Knowledge: Food Order Project

A Real-World Example

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Module Content

- Creating & Using A Local Git Repository
- Managing Code On Github
- Collaboration: Merging & Pull Requests

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Congratulations!

You Finished this Course!

Congratulations!

CONGRATULATIONS!

- Working Directory
- Stash
- Tags
- Staging Area
- Reflog
- Origin & Remote
- Repository
- Merge
- Clone
- Commits & Branches
- Rebase
- Tracking & Upstreams