



Crash Course in Git

Fundamentals of Git

David Gundry

Learning Outcomes

- Explain the motivation behind using version control
- Describe key terminology and concepts in the use of git
- Perform basic Git tasks on the command line
- Perform basic tasks on GitHub

Overview

- .Overview

- Why Git

- Git Concepts

- .Commits and Branches

- .Working with remotes



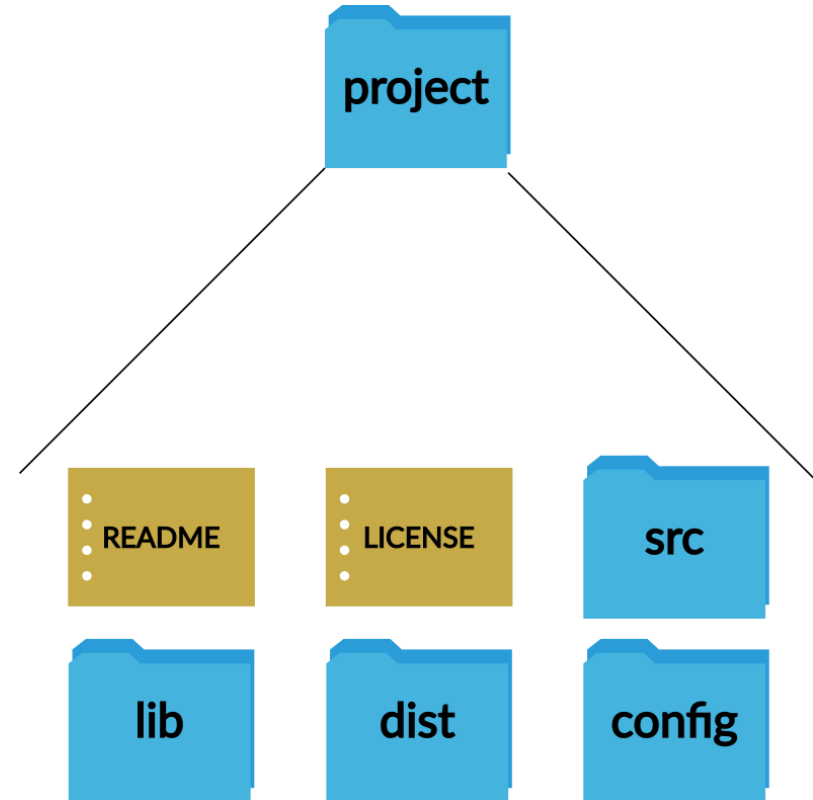
Why Git

.You have a project folder on
your computer

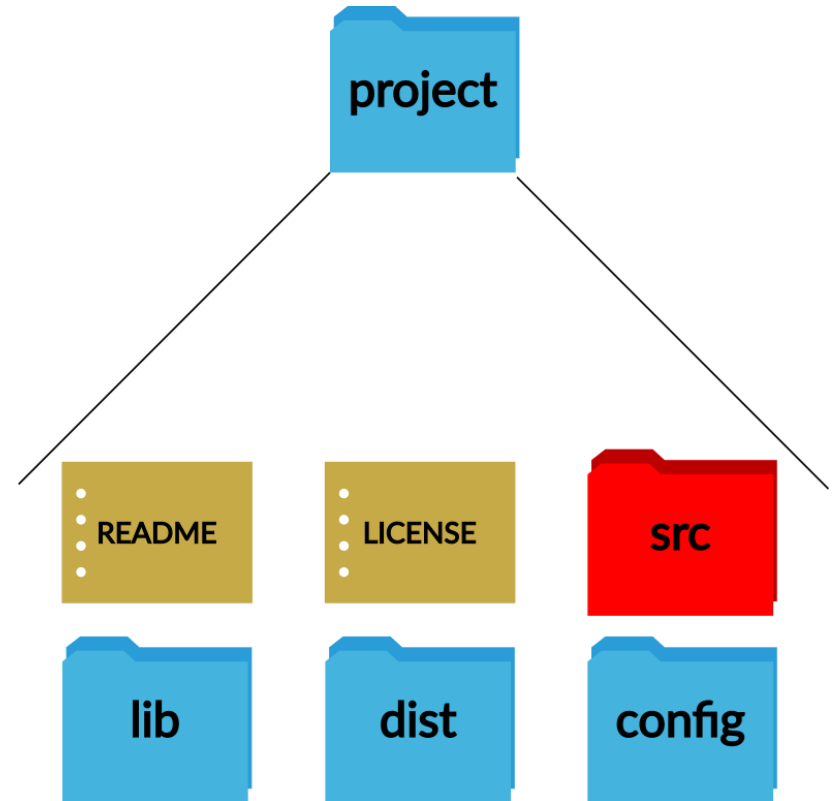


•Inside are the files for your project

- Source code
- Libraries
- Built code
- Configuration files
- Assets

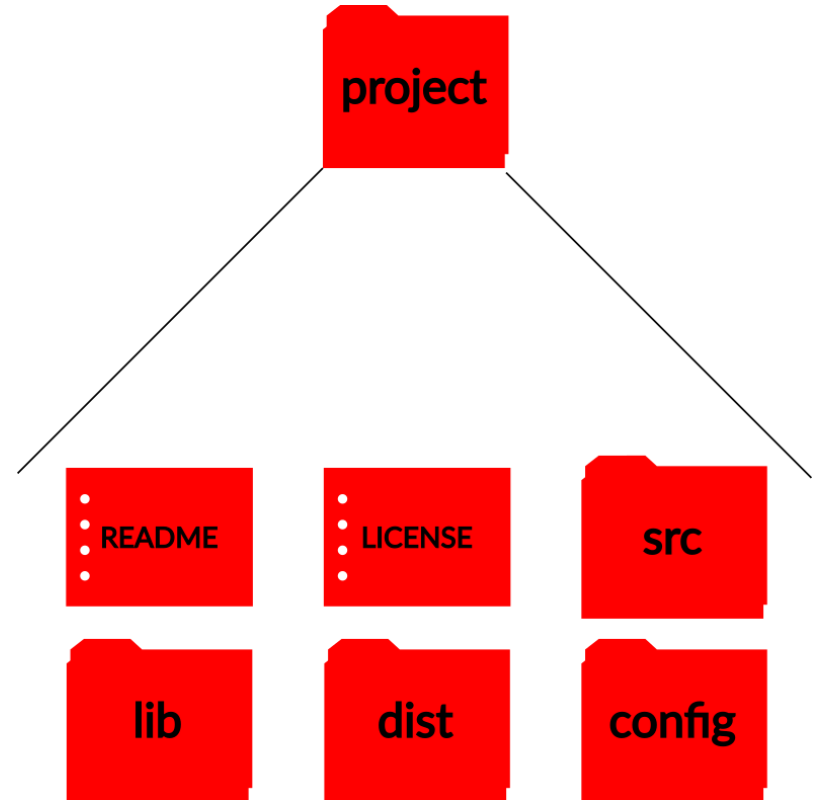


- What happens if
 - You delete a file?



•What happens if

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- You delete the whole folder?

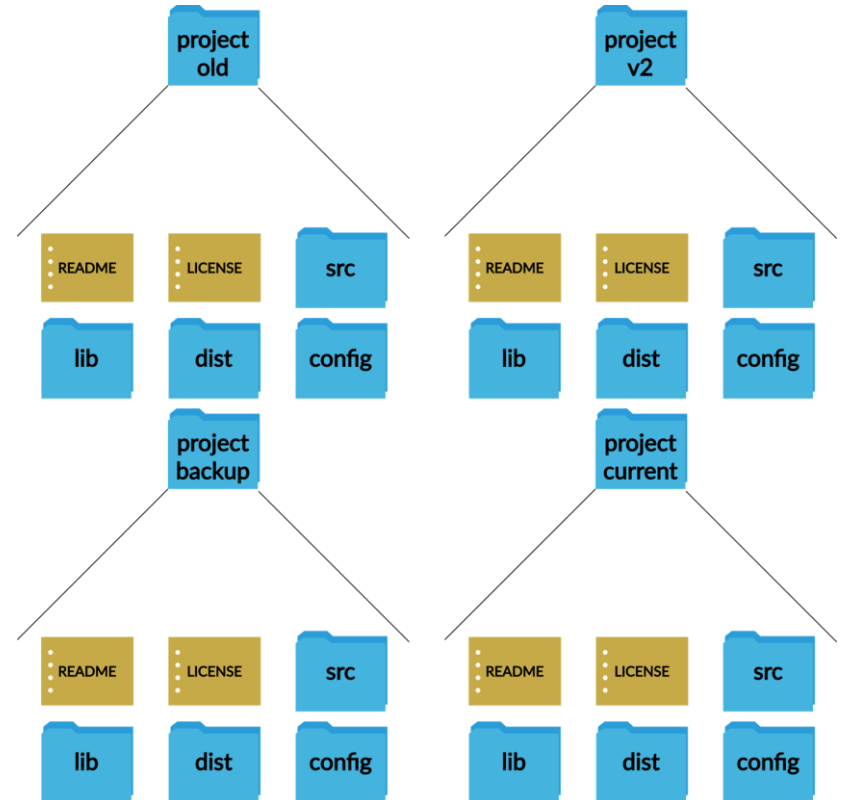


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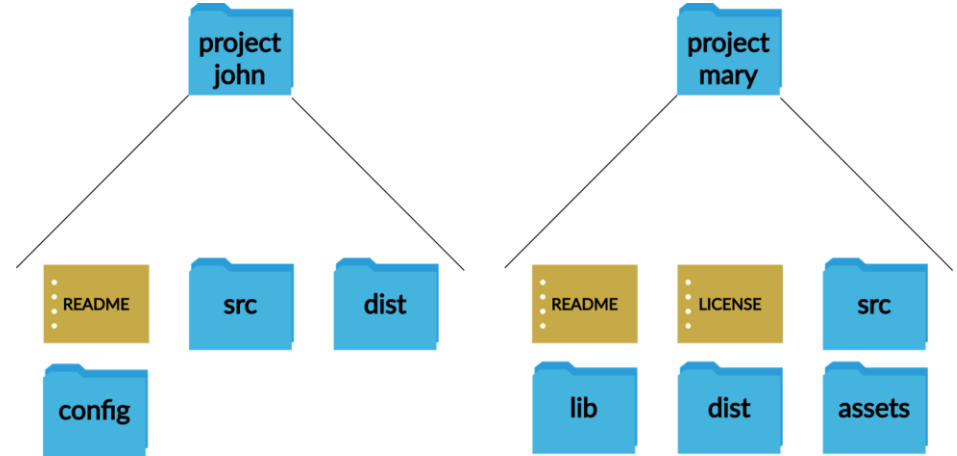
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–You backup the folder?



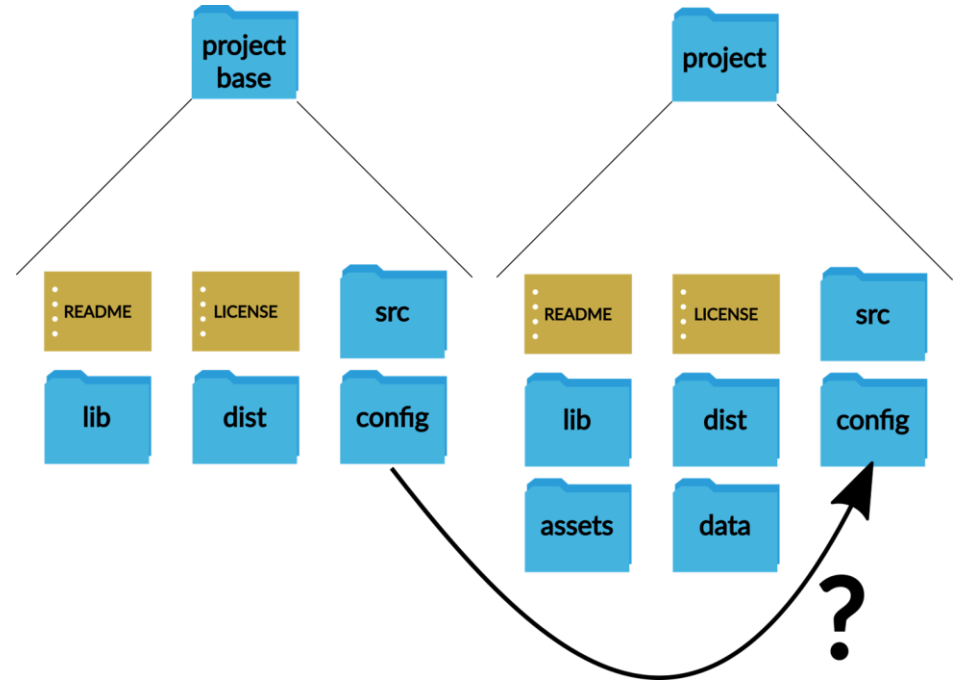
.What happens if

- You delete a file?
- You delete the whole folder?
- You backup the folder?
- A team works on the same project?



•What happens if

- You delete a file?
- You delete the whole folder?
- You backup the folder?
- A team works on the same project?
- You adapt a template project but want to apply updates?



.What happens if

–You want to backup a team project that adapts an existing project, and then incorporate updates to the base project while simultaneously developing new features



.What happens if

- You want to backup a team project that adapts an existing project, and then incorporate updates to the base project while simultaneously developing new features

- AND** have a central server that regularly runs tests on everyone's contributions



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- You want to backup a team project that adapts an existing project, and then incorporate updates to the base project while simultaneously developing new features
- AND** have a central server that regularly runs tests on everyone's contributions
- AND** automatically build and deploy a new version of your product every time the main version is updated



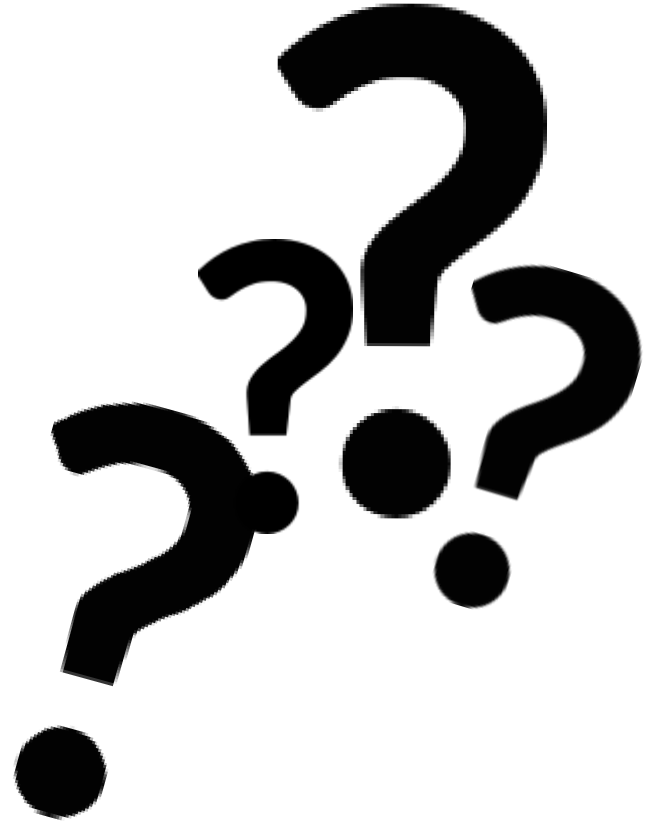
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- AND** then split your project into multiple libraries that can be reused across multiple projects while keeping them updated and automatically running tests and automatically publishing them



.What happens if

-You want to backup a team project that adapts an existing project, and then incorporate updates to the base project while simultaneously developing new features

-**AND** have a central server that regularly runs tests on everyone's contributions

And do all this with freely available tools and services

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- You turn your libraries into submodules
- That integrate with CI tools and automated publishing workflows



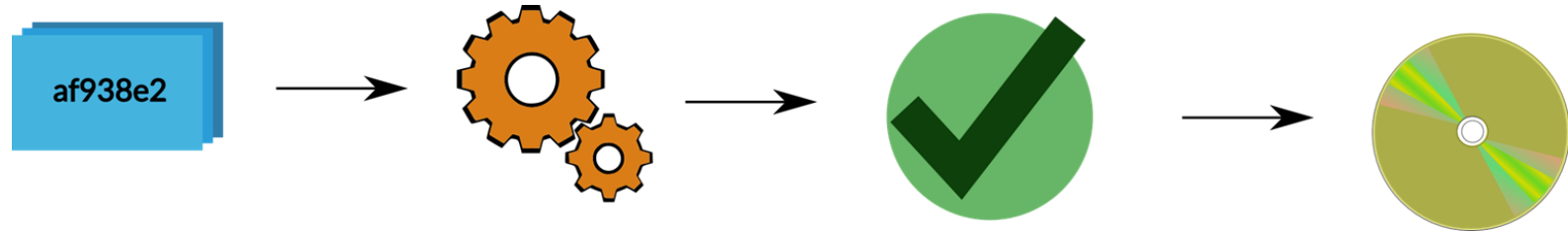
Workflow

Workflow

- Good workflows make development easier
- Bad workflow leads to bad projects
 - Poor code quality
 - Cutting corners
 - Slow updates
 - Integration hell



Continuous Delivery

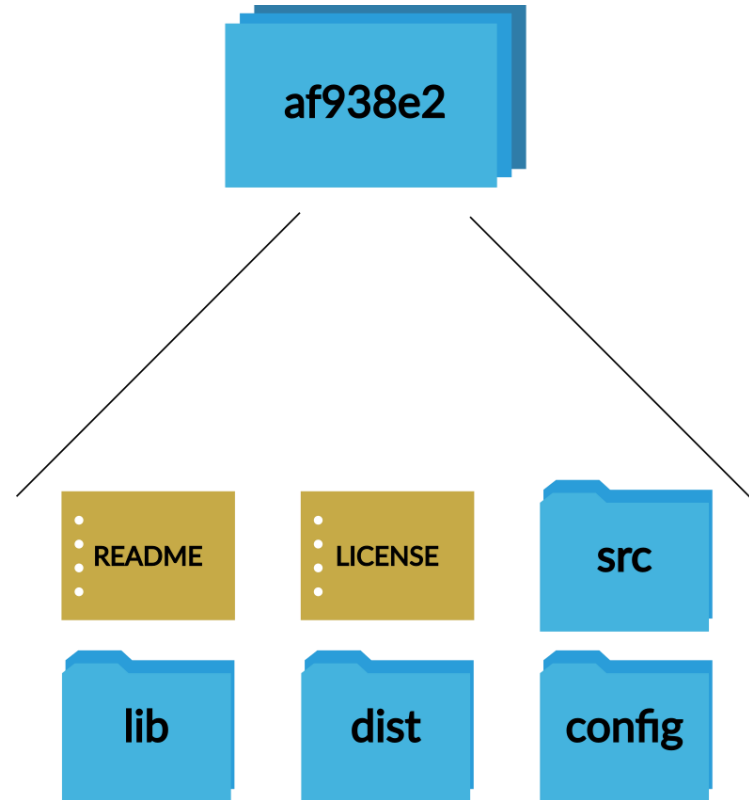




Commits and branches

.Commit (noun)

-A snapshot of your project



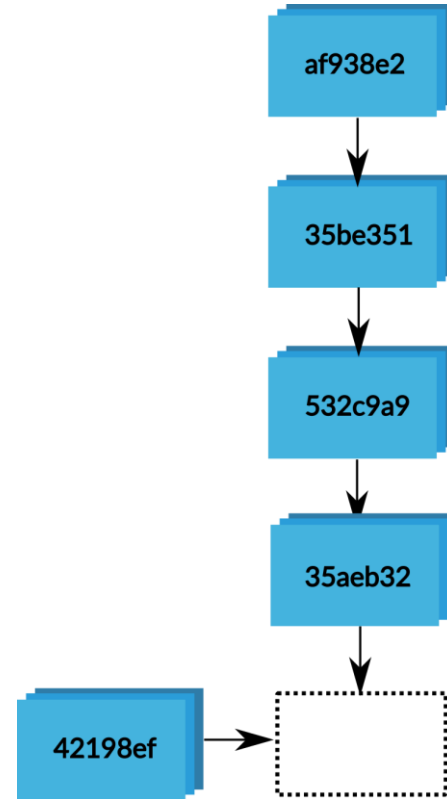
•Branch (noun)

- A sequence of commits
- Shows how your project has changed over time



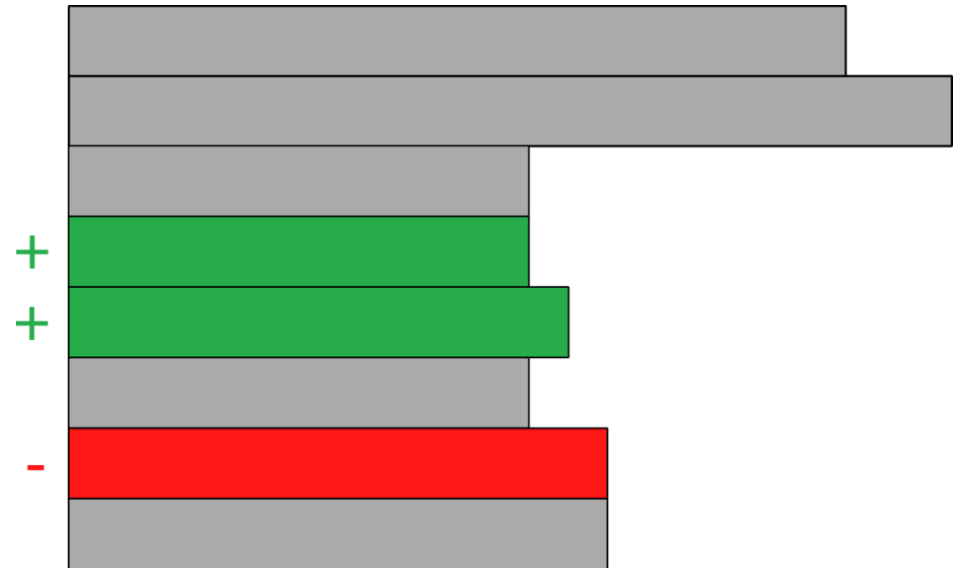
.Commit (verb)

-Take a snapshot of your project and add it onto the end of the current branch



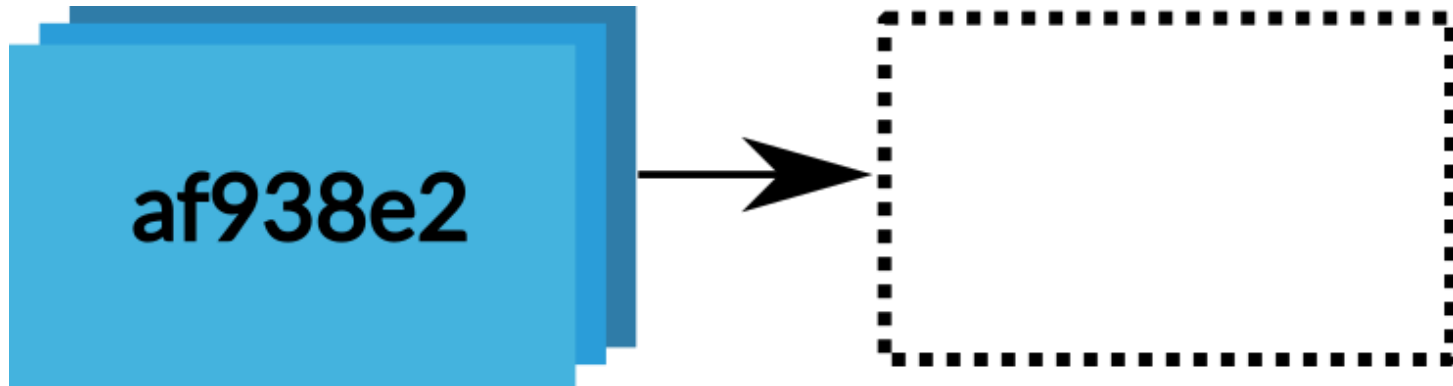
.Commits

- Commits are calculated line-by-line
- A commit stores just the changes that have been made since the last commit



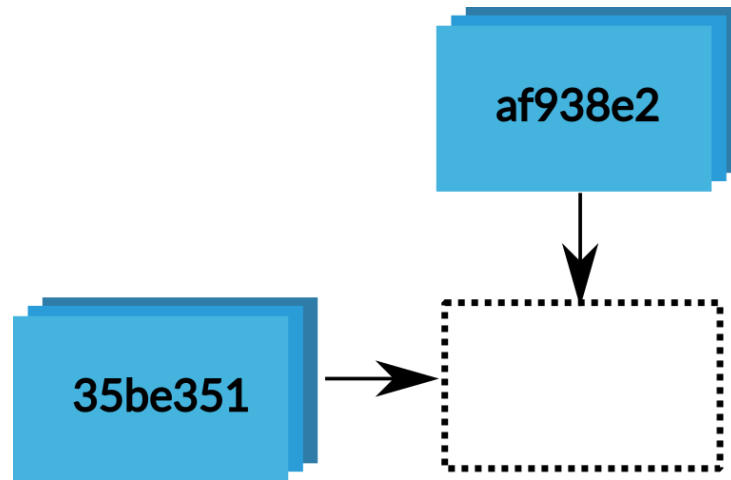
.Simple workflow example

- Create a new repository and make an initial commit



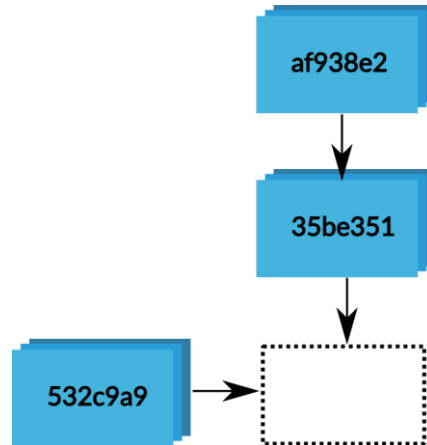
•Simple workflow example

- Create a new repository and make an initial commit
- Do some work, then commit it



.Simple workflow example

- Create a new repository and make an initial commit
- Do some work, then commit it
- Do some more work, then commit it

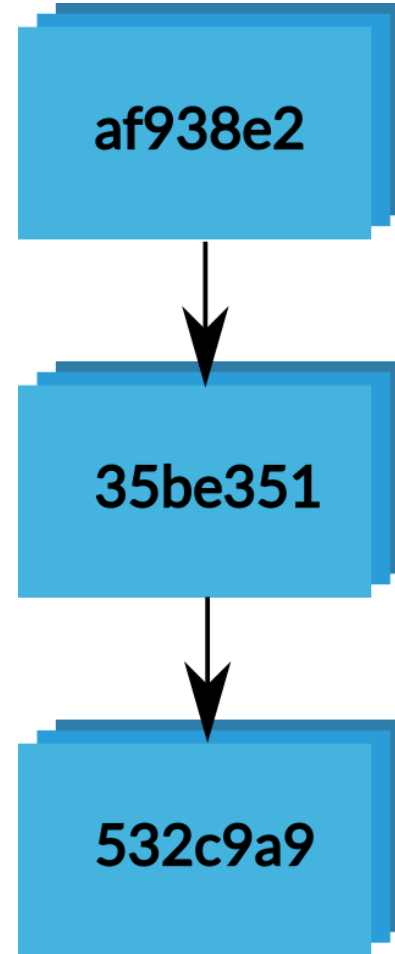


.Simple workflow example

-Now you've got a branch with

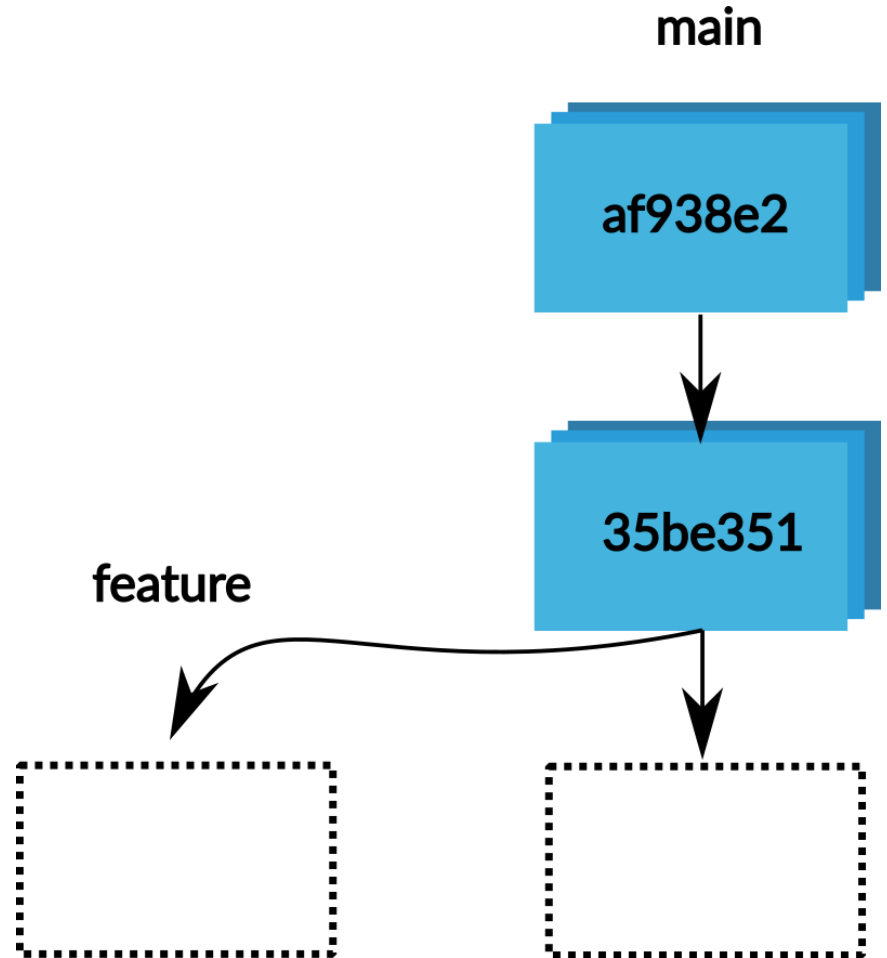
.The current state of your project

.All changes made to your project



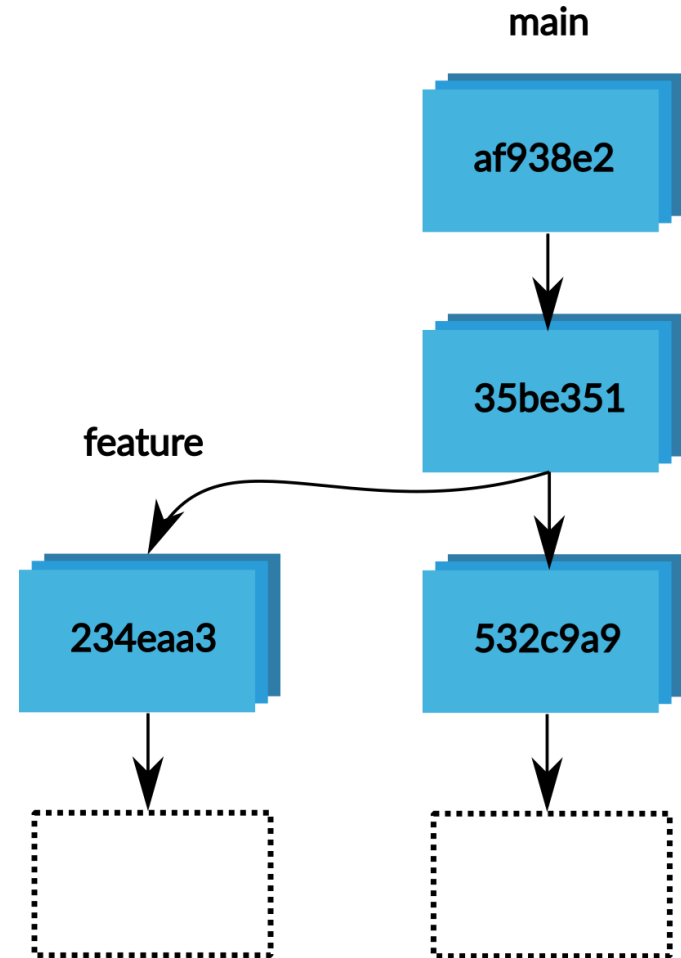
•Branch (verb)

- Take a branch and split a new one off it
- Now you've got two branches



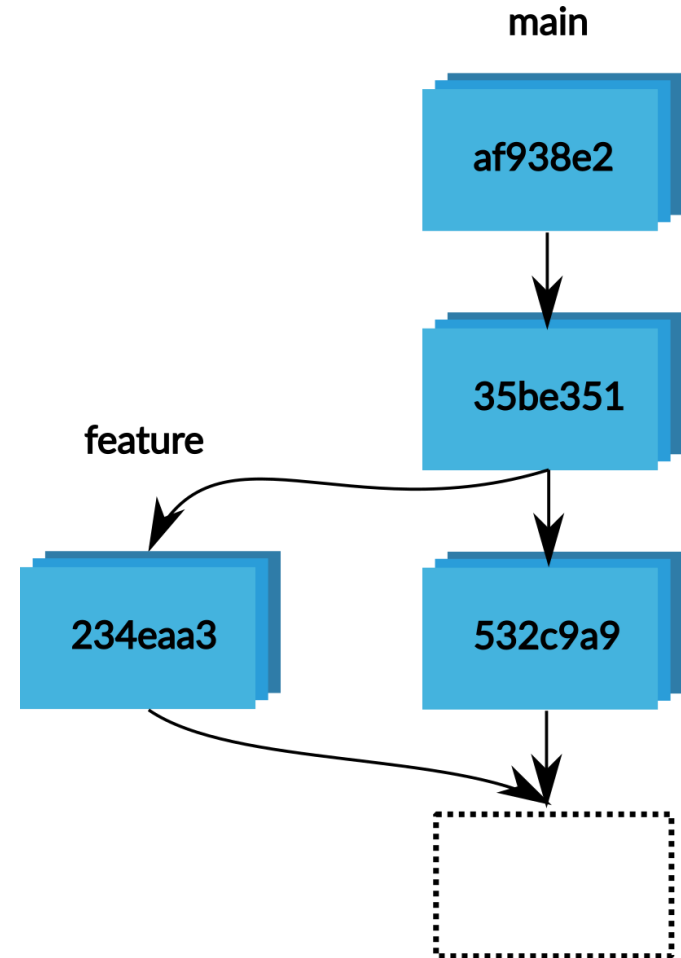
•Multiple branches

- You can add commits to each branch
- This gives you two different versions of your project



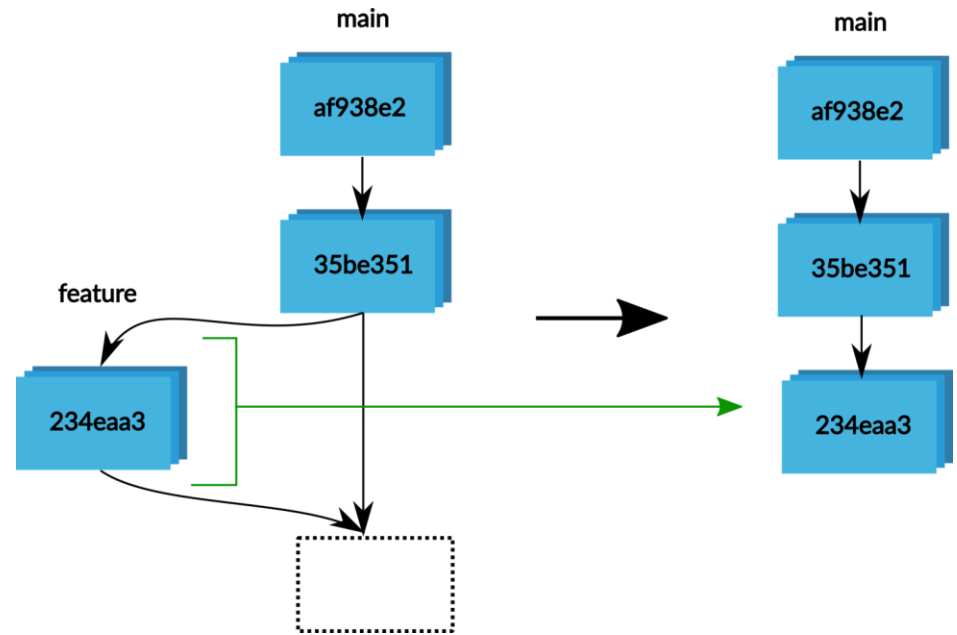
.Merge

-Combine the changes made
in two branches



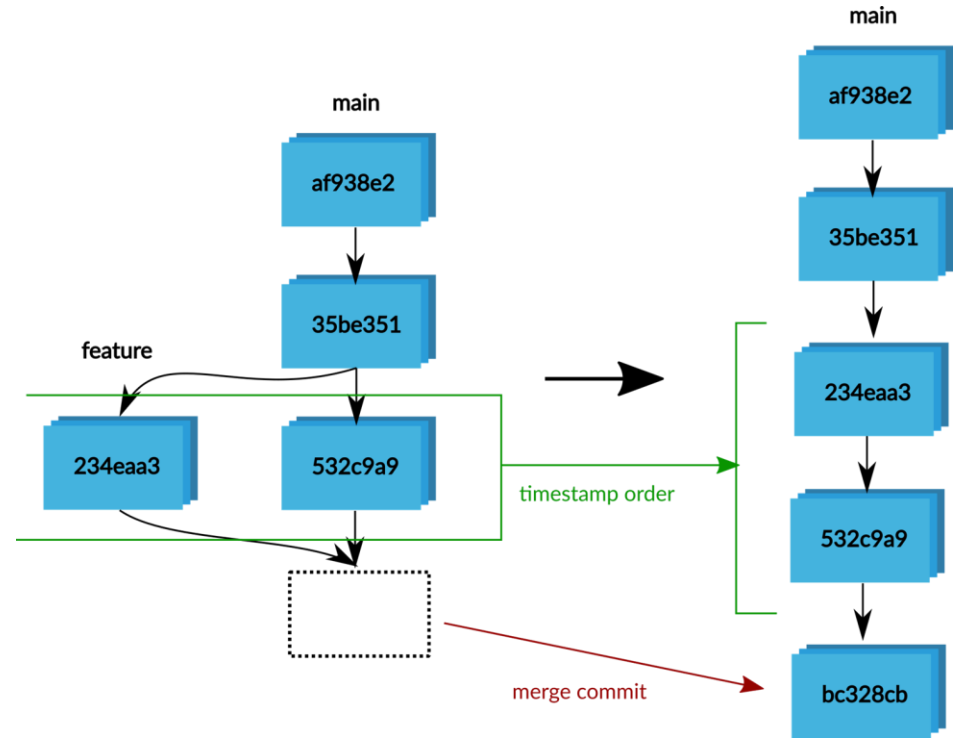
•Merge (Fast Forward)

- There are only commits on the branch to merge in
- These commits can be added on to the end of the main branch



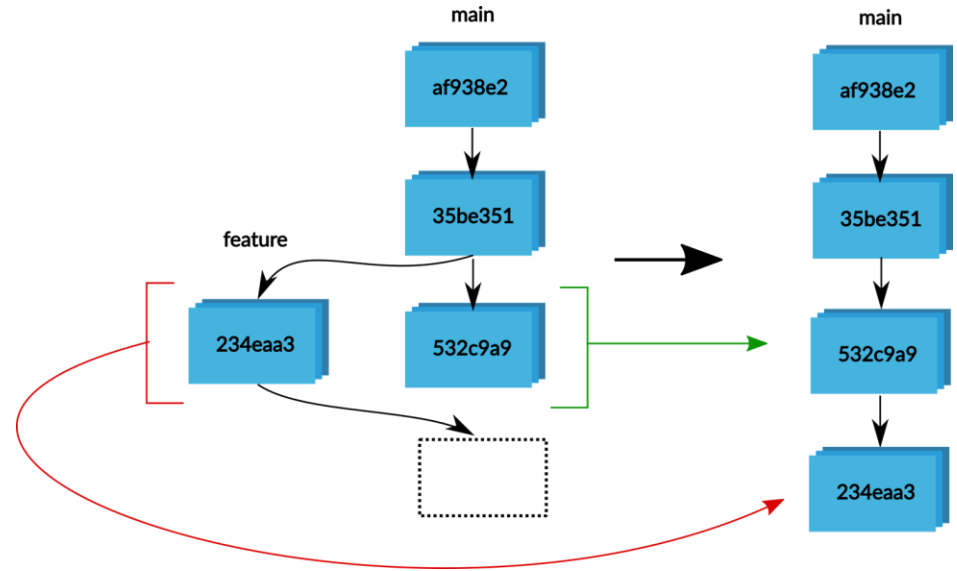
•Merge (Standard Merge)

- Adds commits in timestamp order
- Create a new commit for the merge



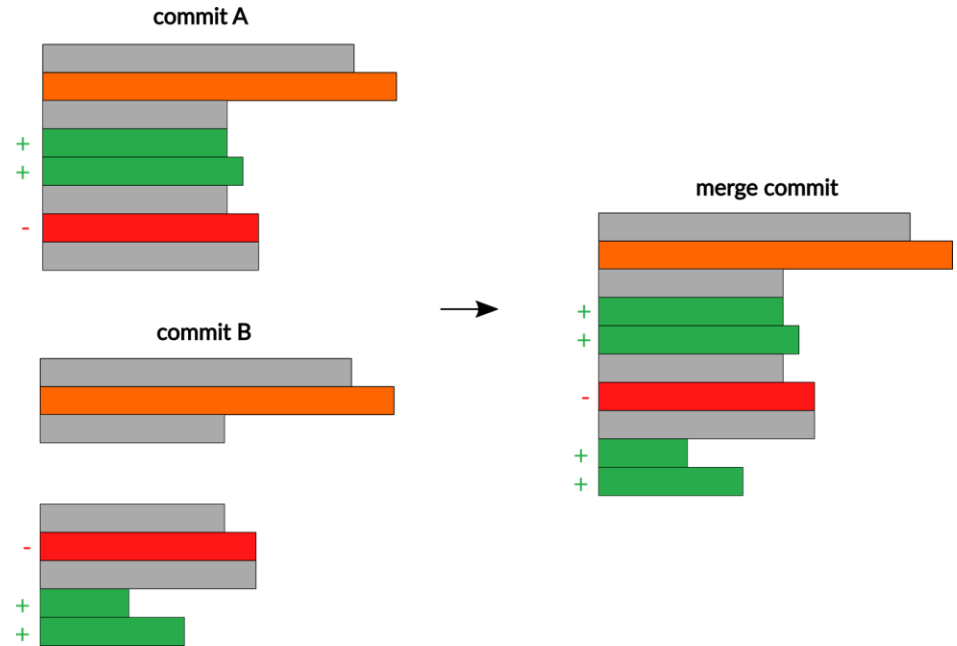
•Merge (Rebase)

-Replay the feature branch
on top of the new commits
on the main branch



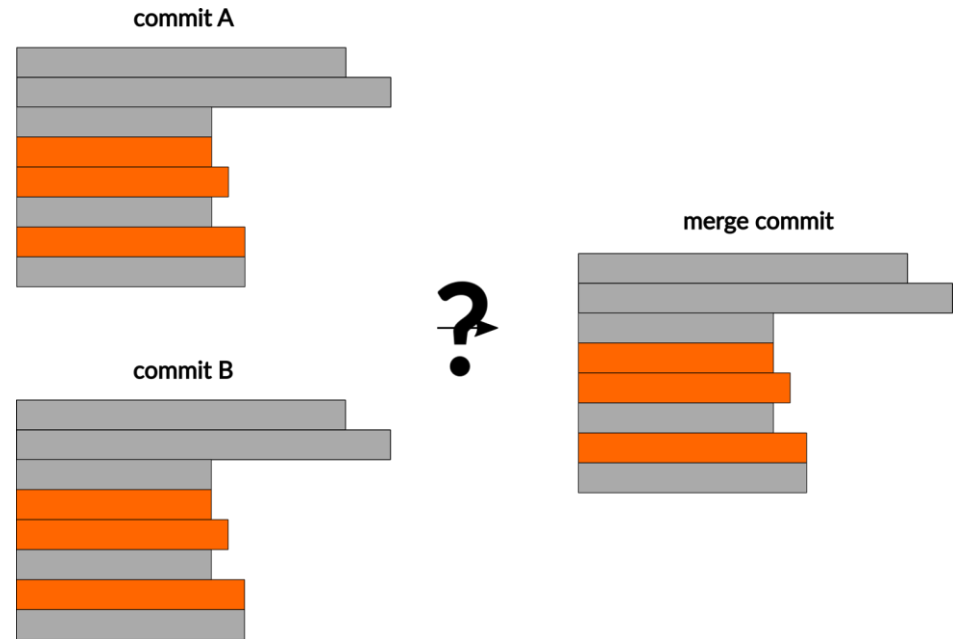
•Resolving a merge

- Git merges line-by-line
- If the branches change different lines everything resolves automatically



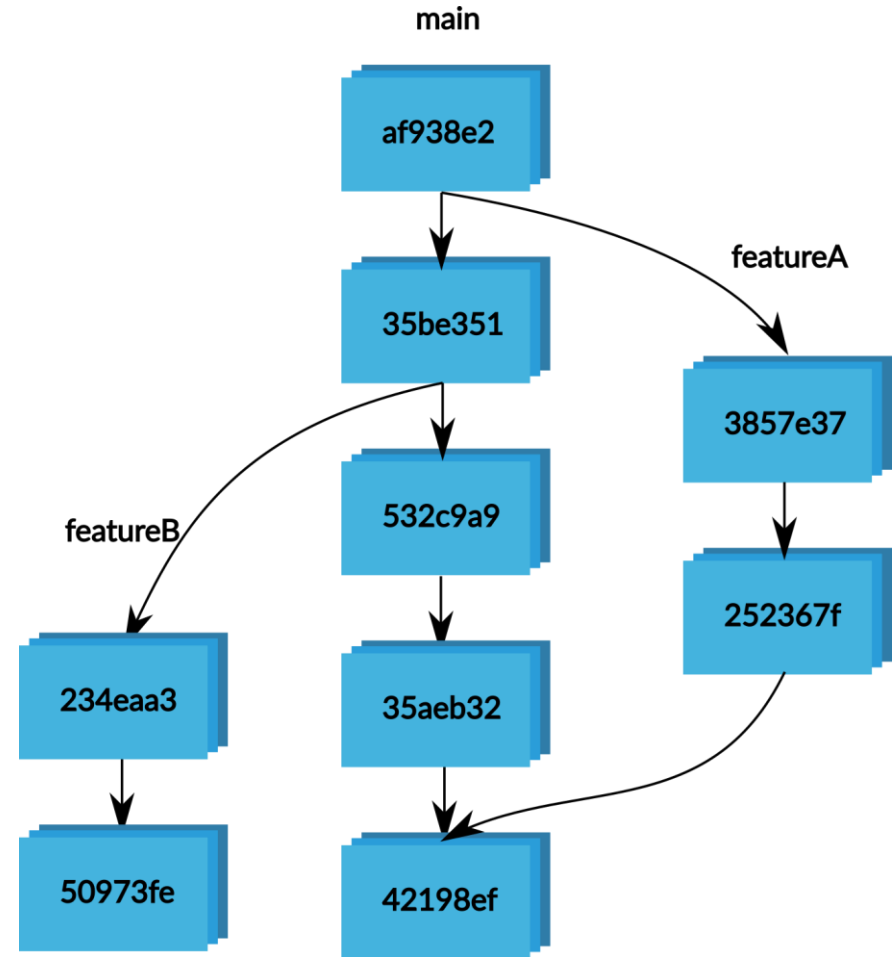
•Resolving a merge

- If both branches change the same line, you need to resolve the merge manually
- Git will edit the files with the options. You delete the appropriate section and commit the merge



•Repository (noun)

- Everything git keeps track of for your project
- A collection of branches



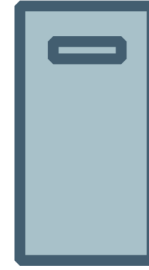


Working with Remotes

.Clone (verb)

–Make a copy of a repository
held on a git server

GitHub

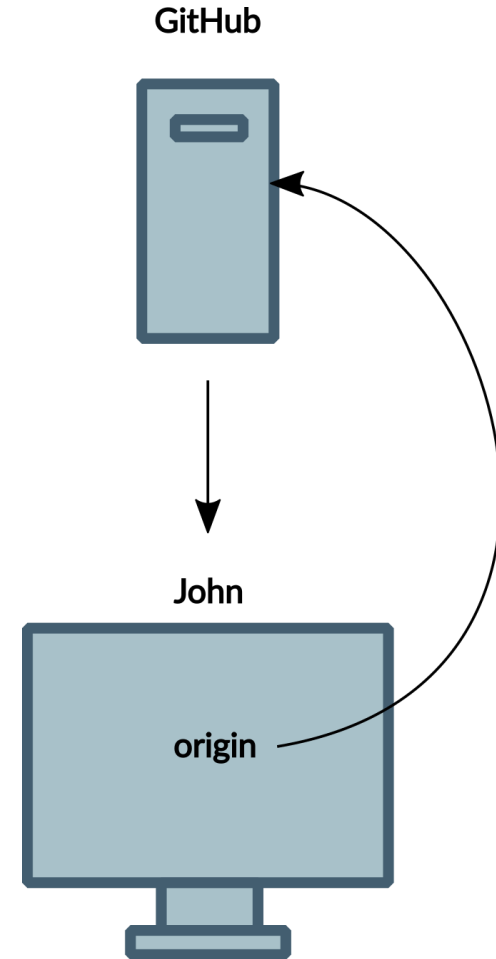


John



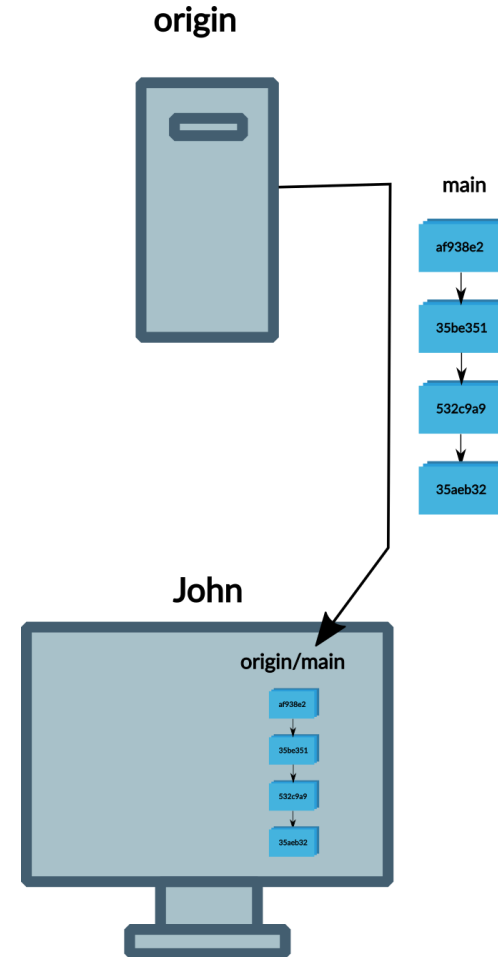
•Remote (noun)

- A reference in your git repo to a repository elsewhere
- When you clone a repo, it creates a remote called origin



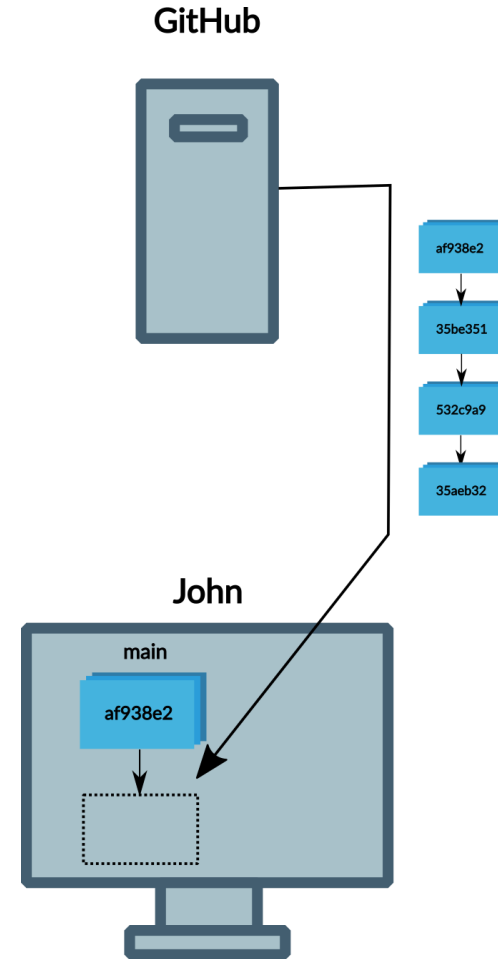
•Fetch (verb)

- Download commits made on a remote branch
- Fetching branch main from origin would put result in branch origin/main



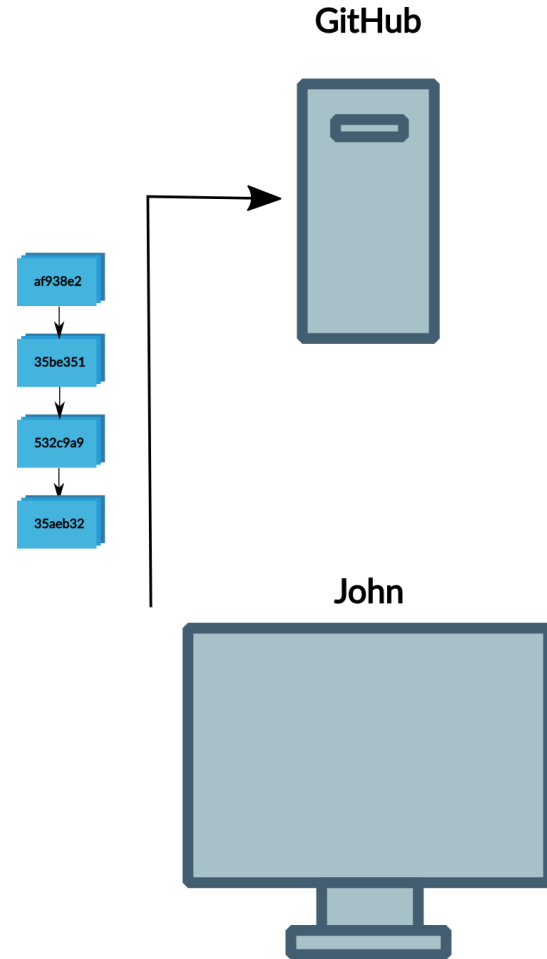
.Pull (verb)

-Fetch **and merge** commits made on a remote branch



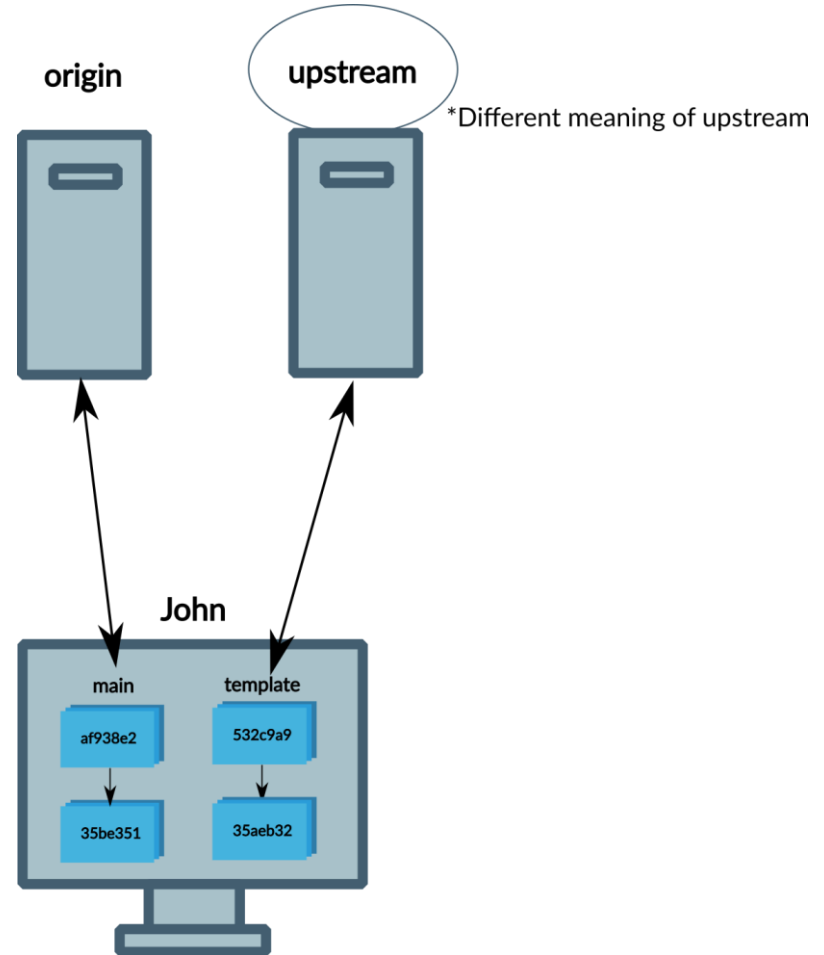
•Push (verb)

-Upload new commits in the local repository to a remote branch

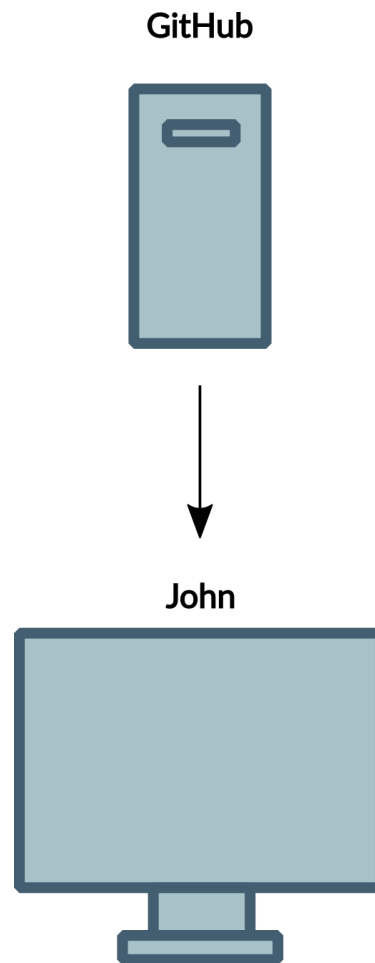


•Upstream (noun)

- Which remote branch our branch should fetch/pull from and push to
- Different branches may have upstreams on different remotes



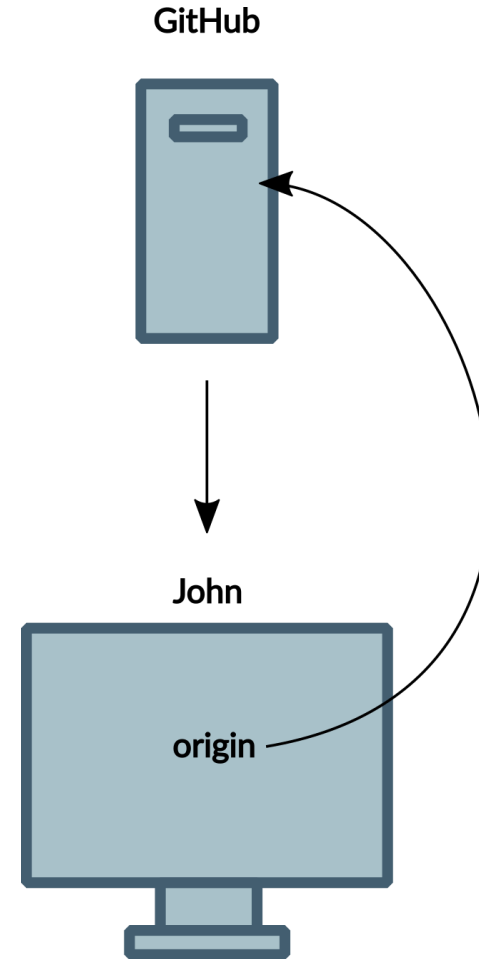
- Example workflow
 - Clone a repository



- Example workflow

- Clone a repository

- Remote **origin** is set automatically

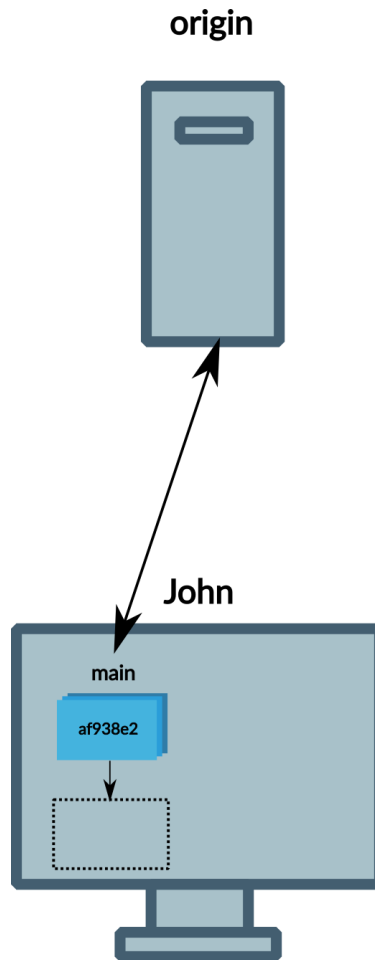


•Example workflow

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 - Remote **origin** is set automatically

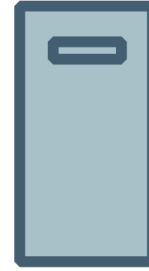
- Set upstream for branch **main**



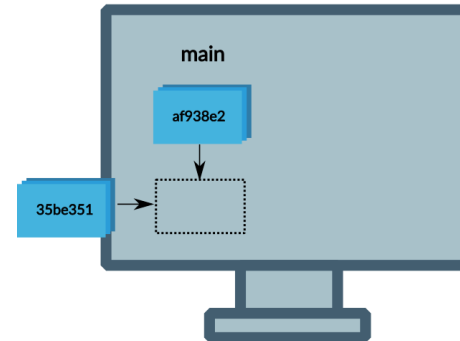
•Example workflow

- Clone a repository
 - Remote **origin** is set automatically
- Set upstream for branch **main**
- Commit changes on branch **main**

origin

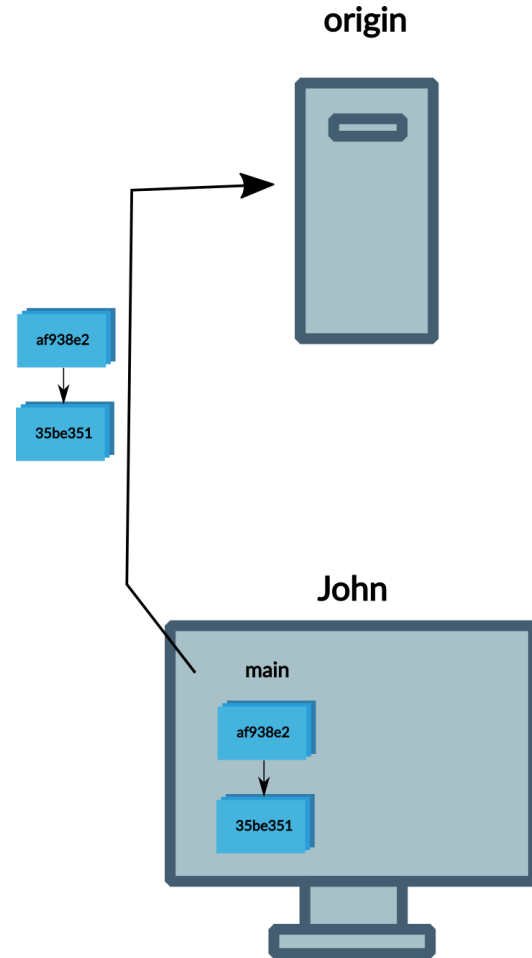


John



•Example workflow

- Clone a repository
 - Remote **origin** is set automatically
- Set upstream for branch **main**
- Commit changes on branch **main**
- Push commits to remote branch





Questions

.Question: What would be the steps involved in the following:

1. Create a repository locally
2. Add content to it
3. Create an empty repository on GitHub
4. Push your content to the empty repository

.Answer: What would be the steps involved in the following:

- Create a repository locally

 - .git init

- Add content to it

 - .git commit

- Create an empty repository on GitHub

 - .git remote add

 - .git push --set-upstream

- Push your content to the empty repository

 - .git push

.Question: What would be the steps involved in the following:

1. Copy an existing repo (upstream)
2. Make a new GitHub repo for it
3. Work on a new feature
4. Update with changes to upstream
5. Incorporate new feature into main branch
6. Push to GitHub repo

.Answer: What would be the steps involved in the following:

- Copy an existing repo (upstream)

 - `.git clone`

- Make a new GitHub repo for it

 - `.git remote add`

- Work on a new feature

 - `.git branch`

 - `.git commit`

- Update with changes to upstream

 - `.git pull`

- Incorporate new feature into main branch

 - `.git merge`

- Push to GitHub repo

 - `.git push --set-upstream`



Summary

Summary

.Git Concepts

- Repository
- Commit
- Branch
- Merge

.Git Commands

- git init
- git commit
- git pull
- git push
- git remote