Crash Course in Git

Fundamentals of Git

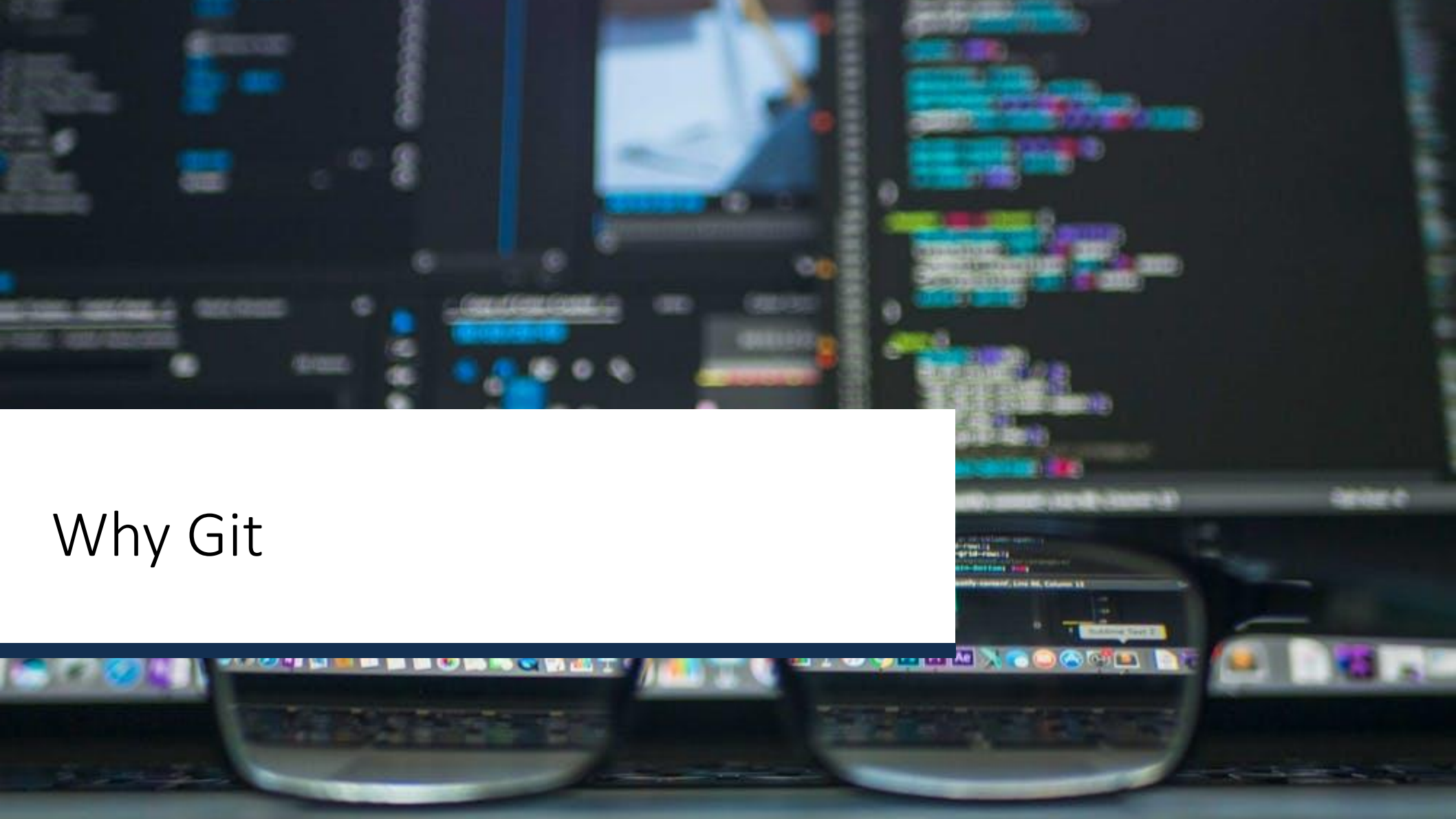
David Gundry

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

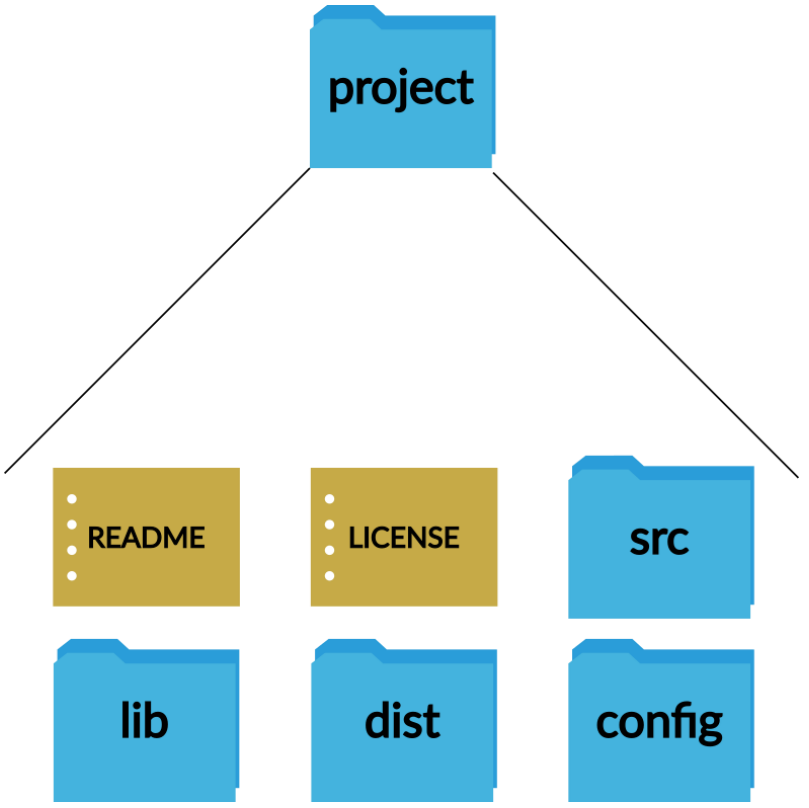
- Overview
  - Why Git
  - Git Concepts
    - Commits and Branches
    - Working with remotes



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



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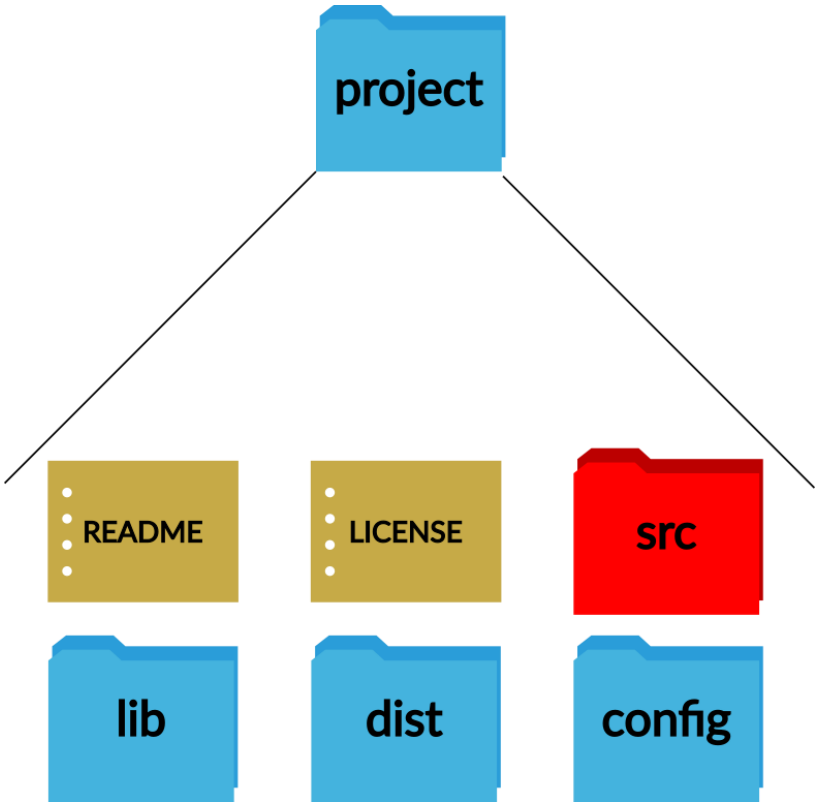

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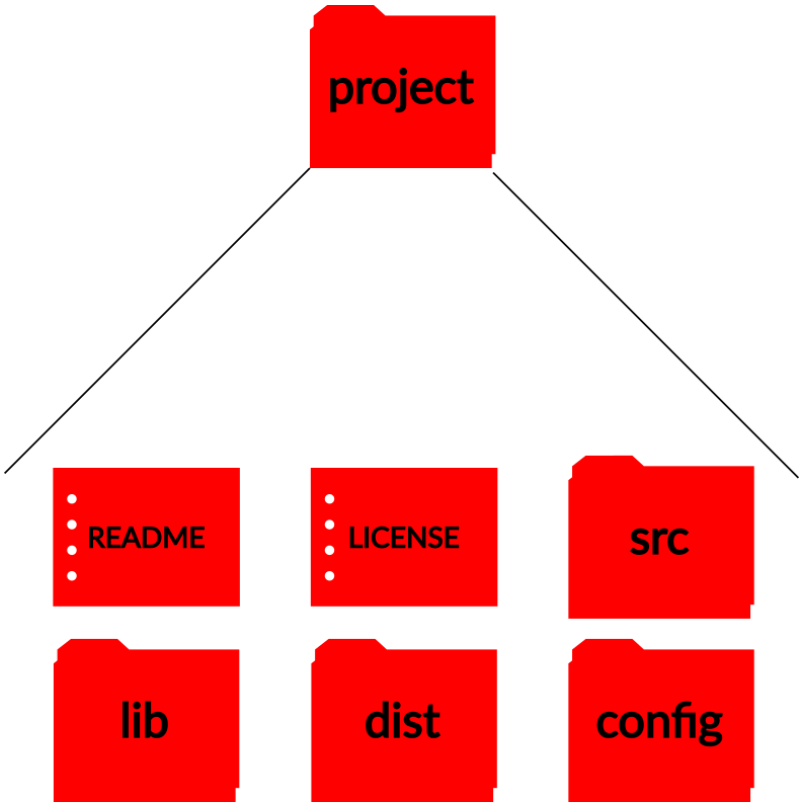

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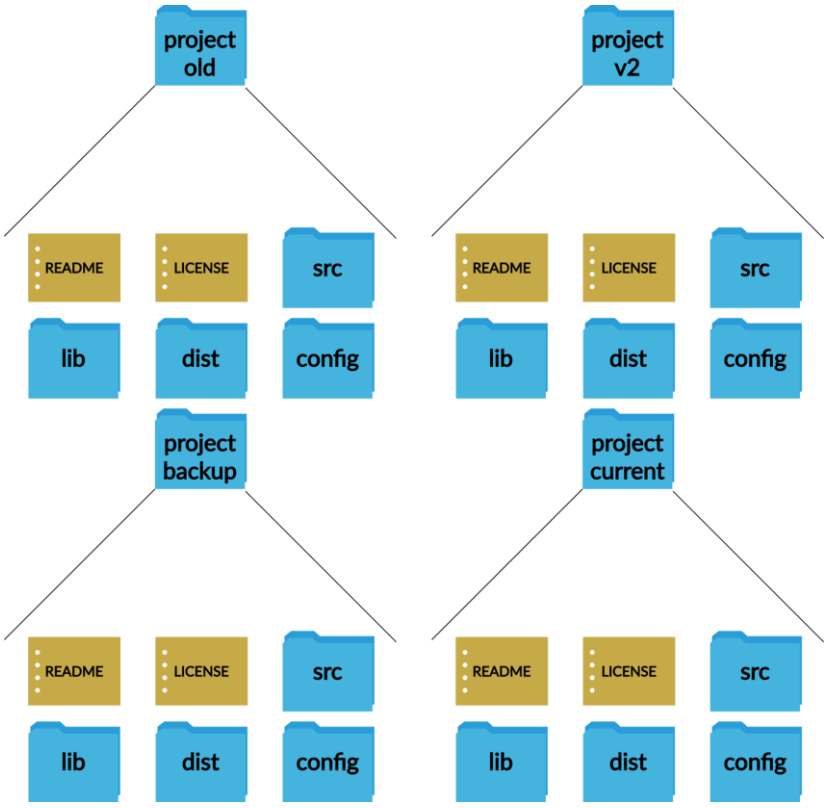

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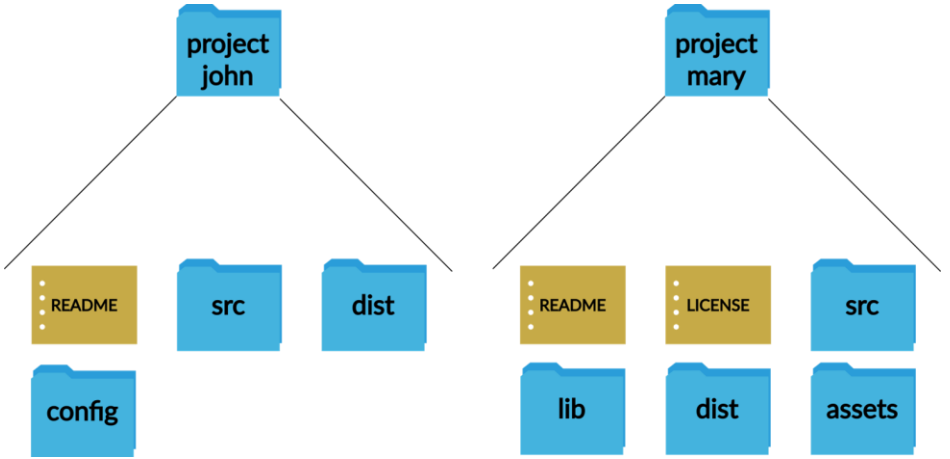

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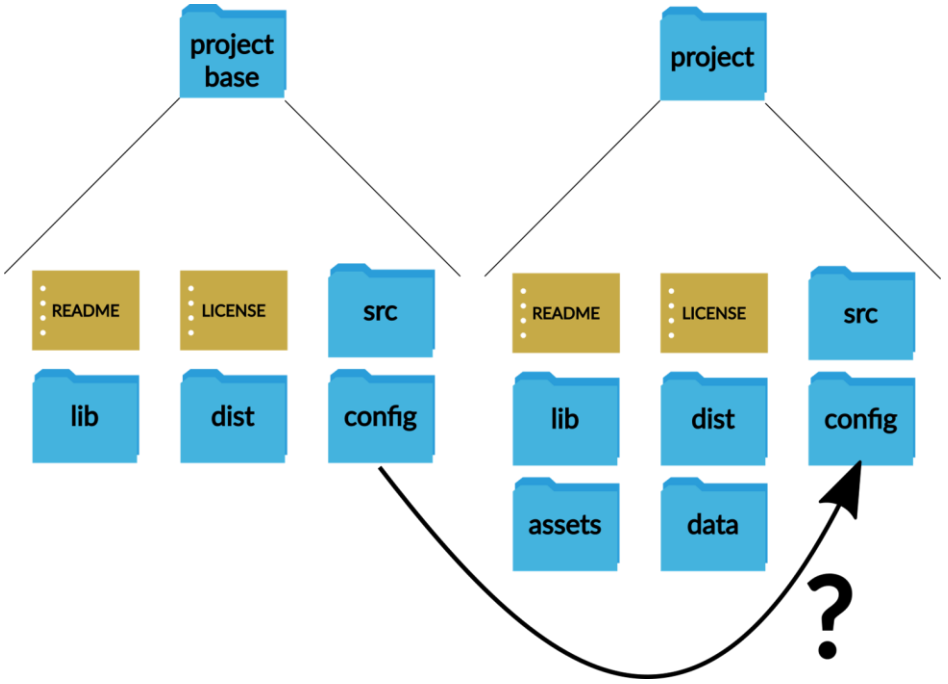
  - You adapt a template project but want to apply updates?



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And do all this with freely available tools and services

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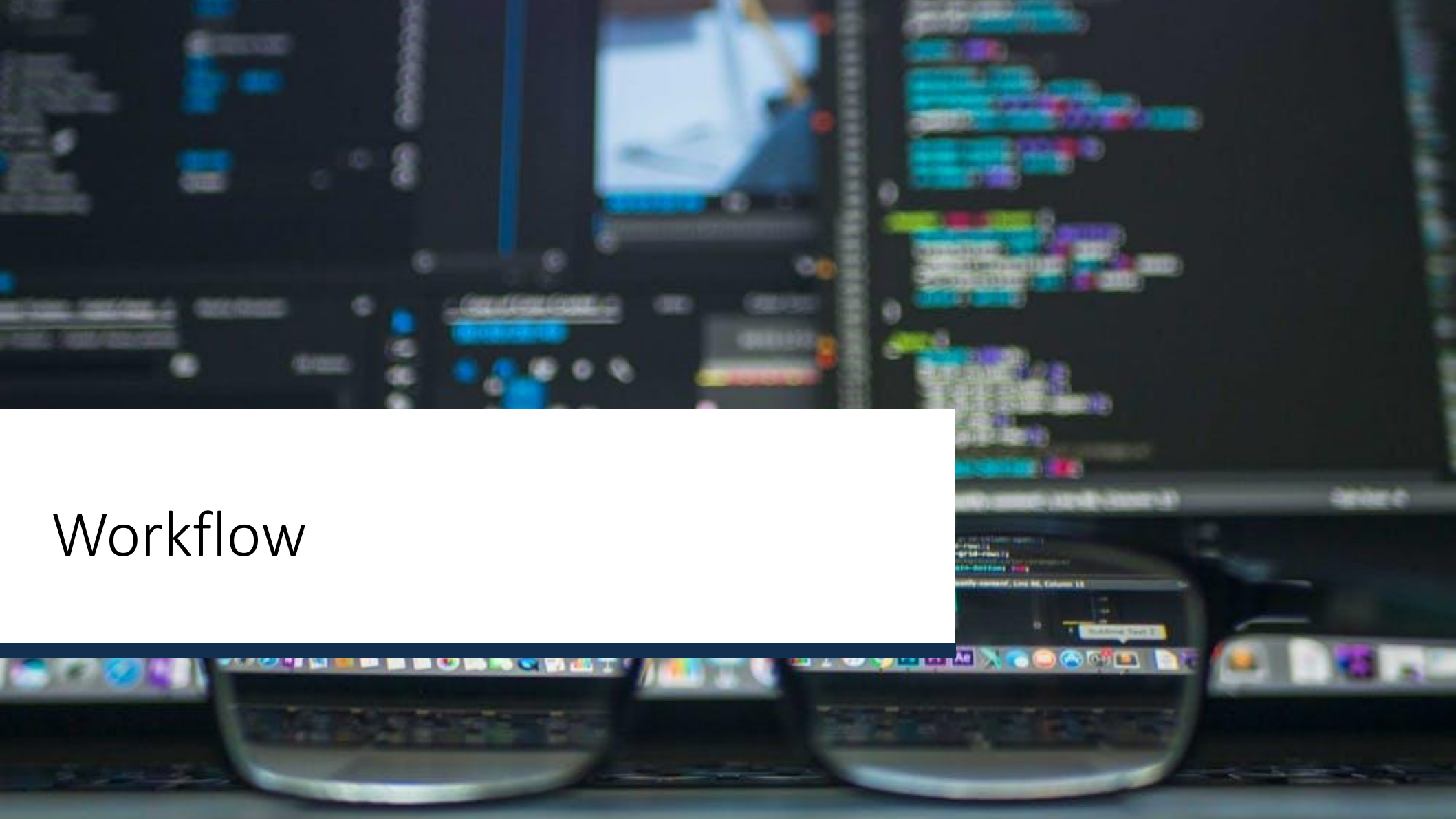
  - That integrate with CI tools and automated publishing workflows

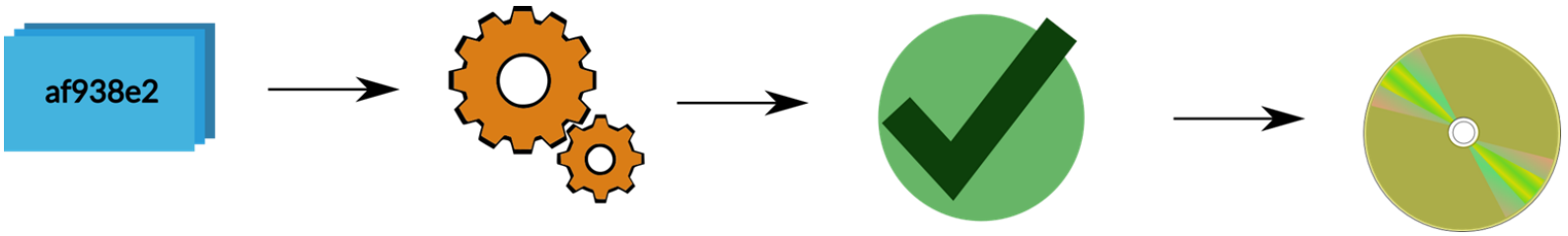


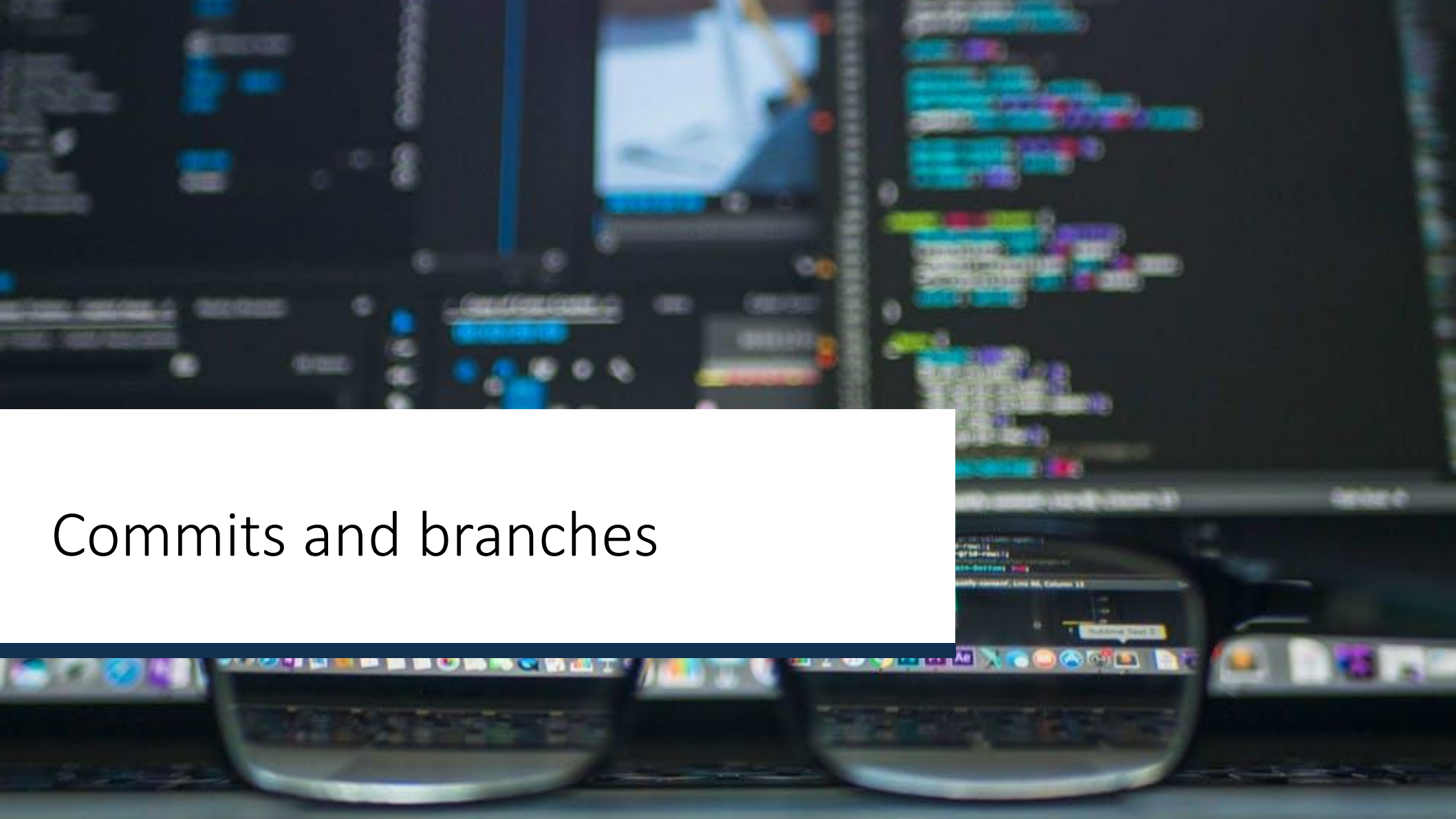
Workflow

Workflow

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

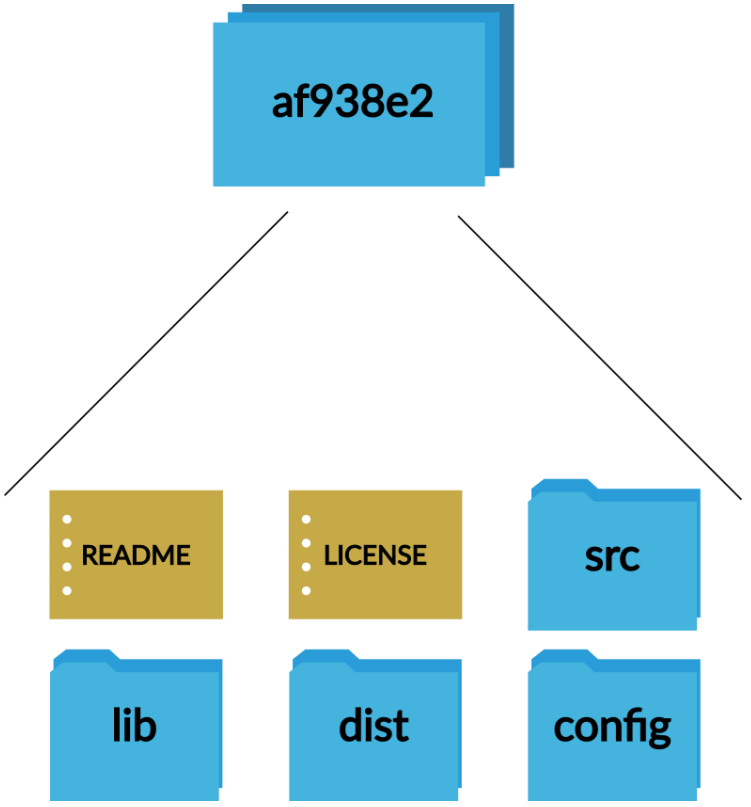
Continuous Delivery



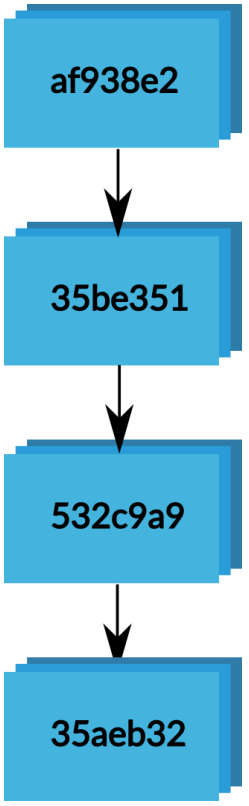


Commits and branches

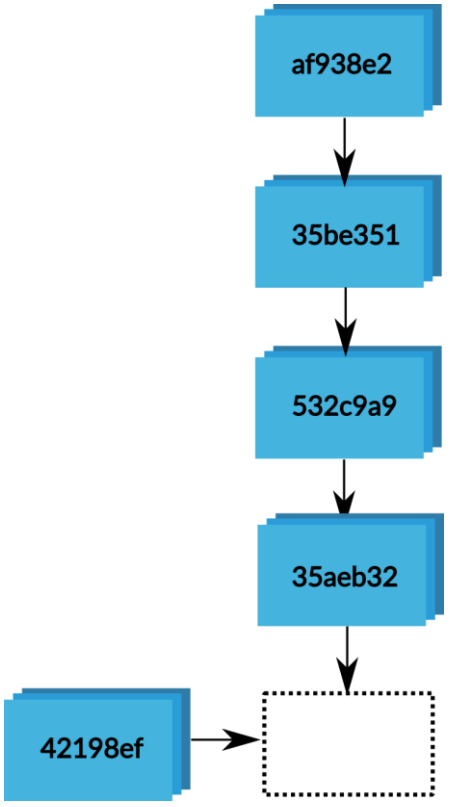
- Commit (noun)
  - A snapshot of your project



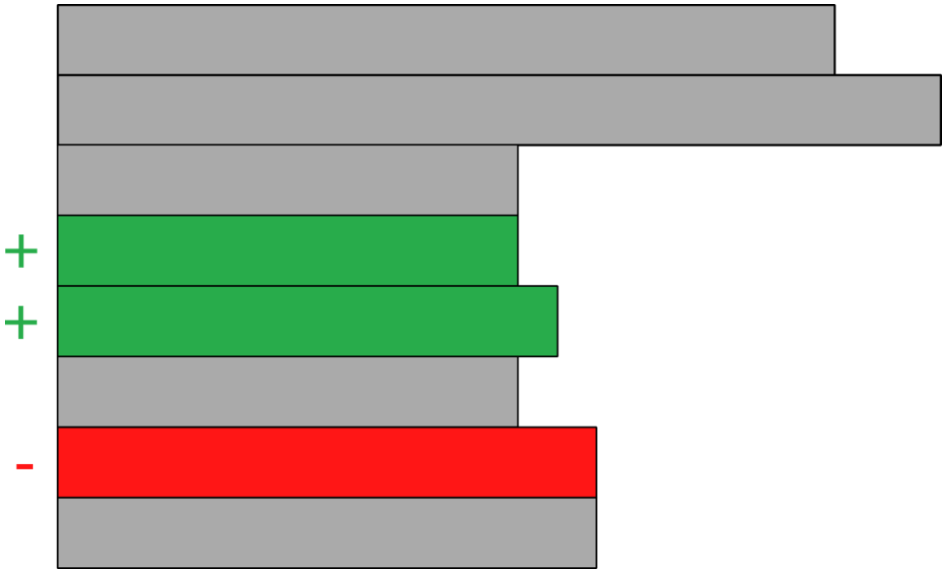
- Branch (noun)
  - A sequence of commits
  - Shows how your project has changed over time



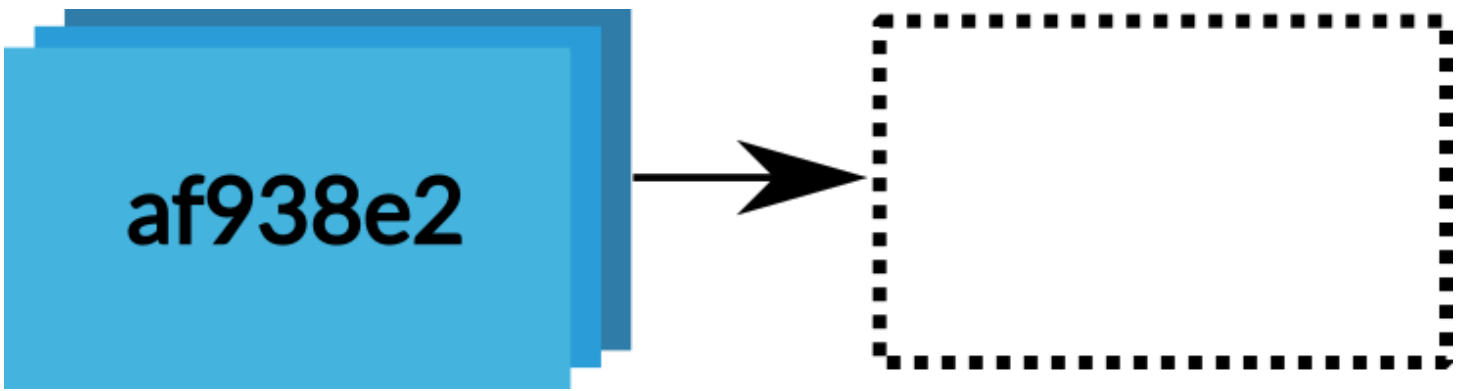
- Commit (verb)
  - Take a snapshot of your project and add it onto the end of the current branch



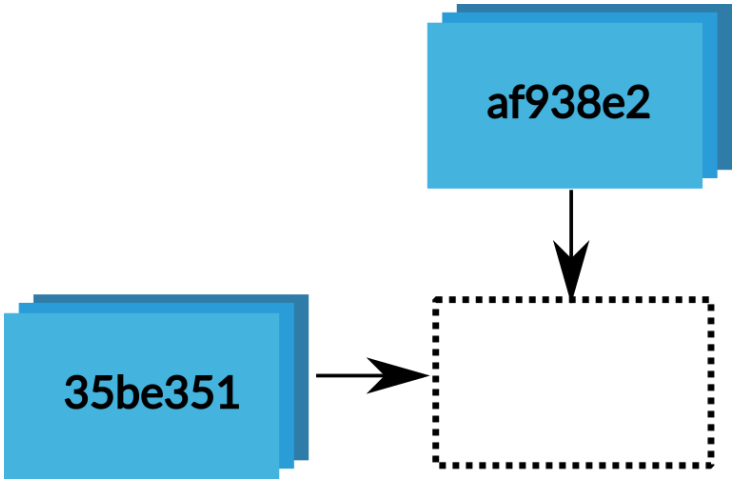
- Commits
  - Commits are calculated line-by-line
  - A commit stores just the changes that have been made since the last commit



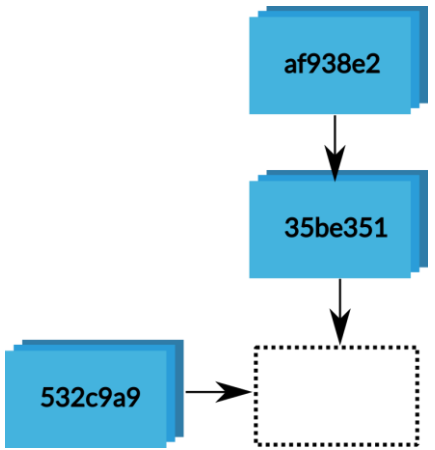
- Simple workflow example
  - Create a new repository and make an initial commit



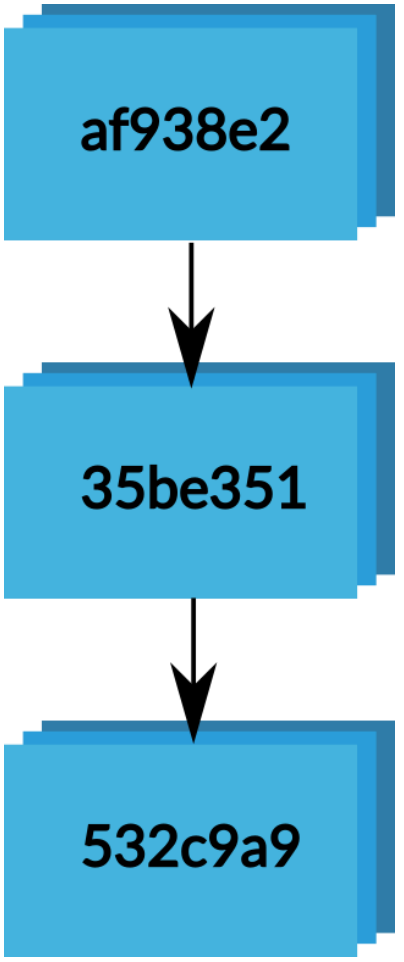
- Simple workflow example
  - Create a new repository and make an initial commit
  - Do some work, then commit it



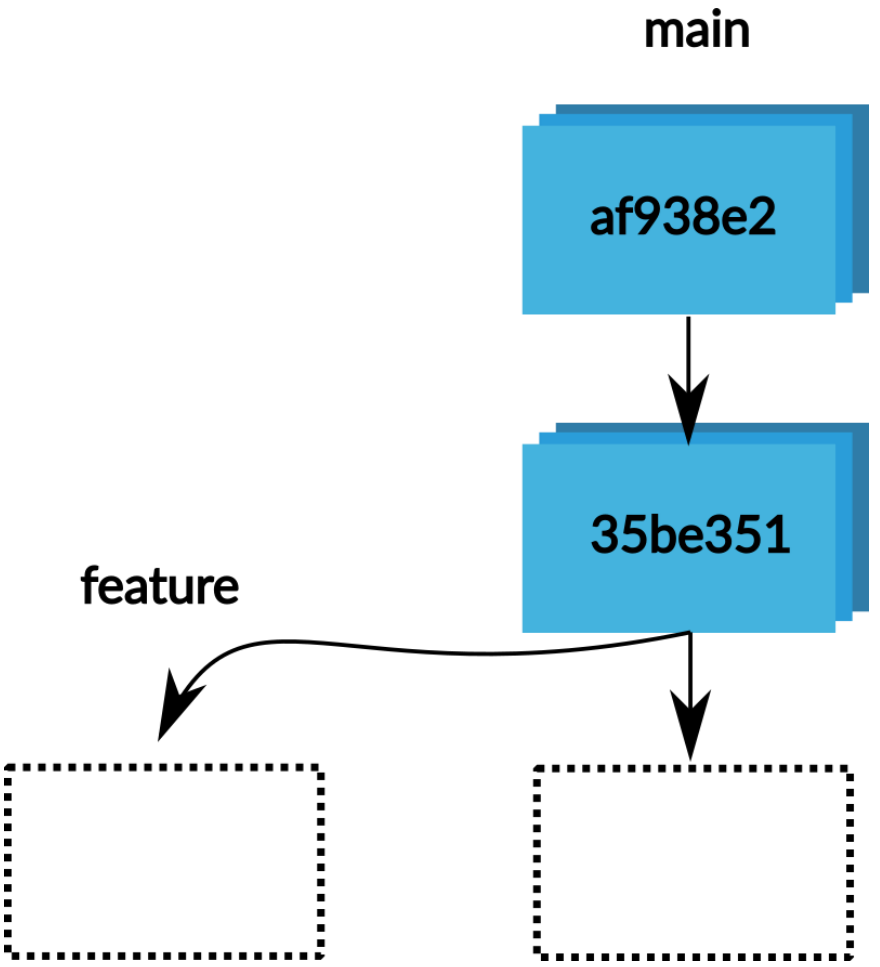
- Simple workflow example
  - Create a new repository and make an initial commit
  - Do some work, then commit it
  - Do some more work, then commit it



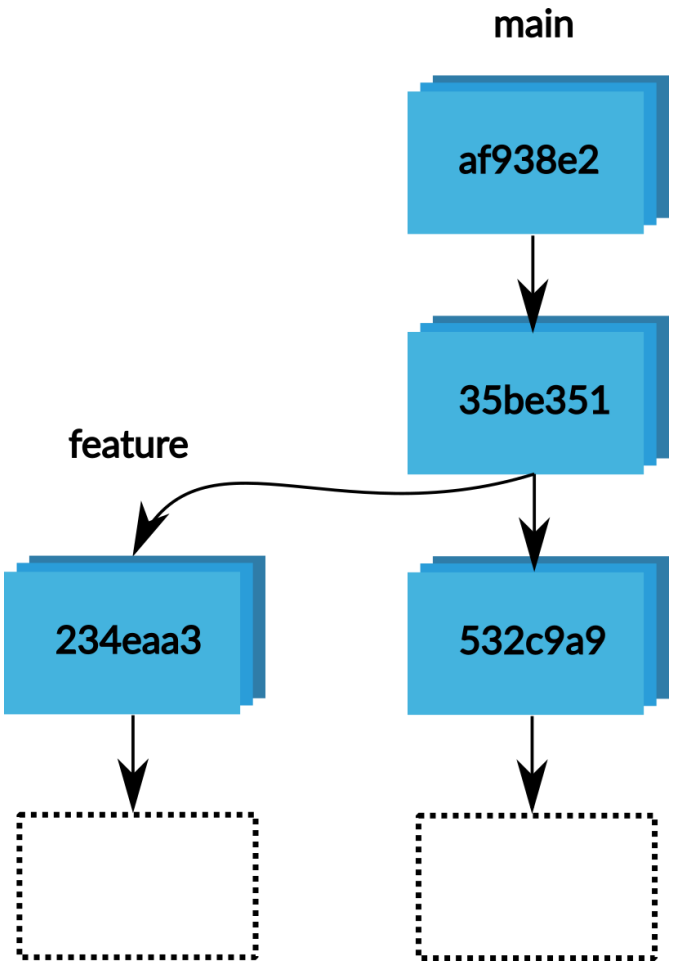
- Simple workflow example
  - Now you've got a branch with
    - The current state of your project
    - All changes made to your project



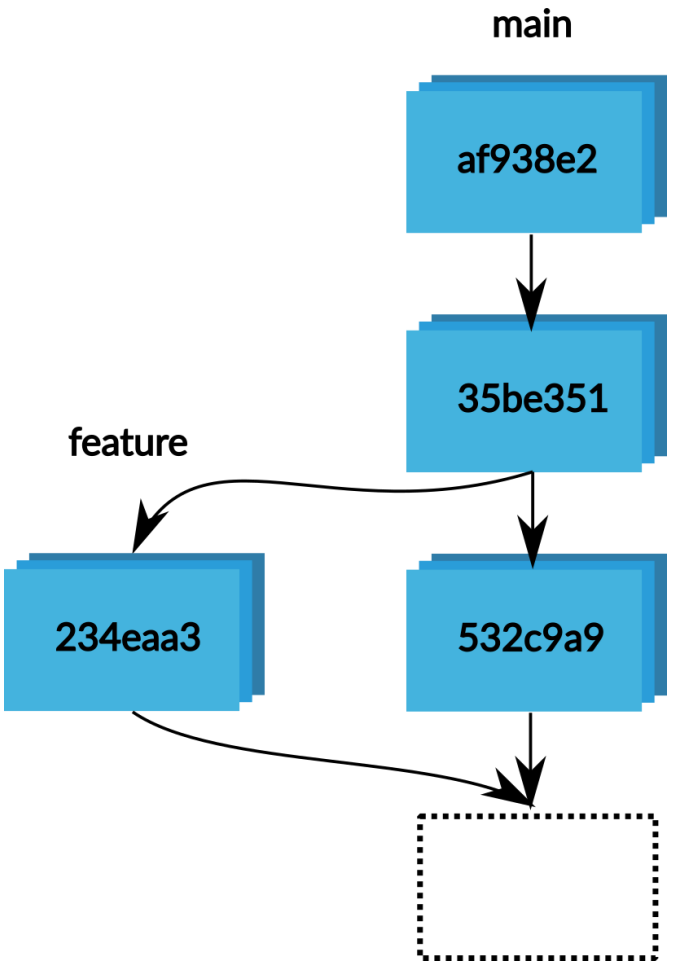
- Branch (verb)
  - Take a branch and split a new one off it
  - Now you've got two branches



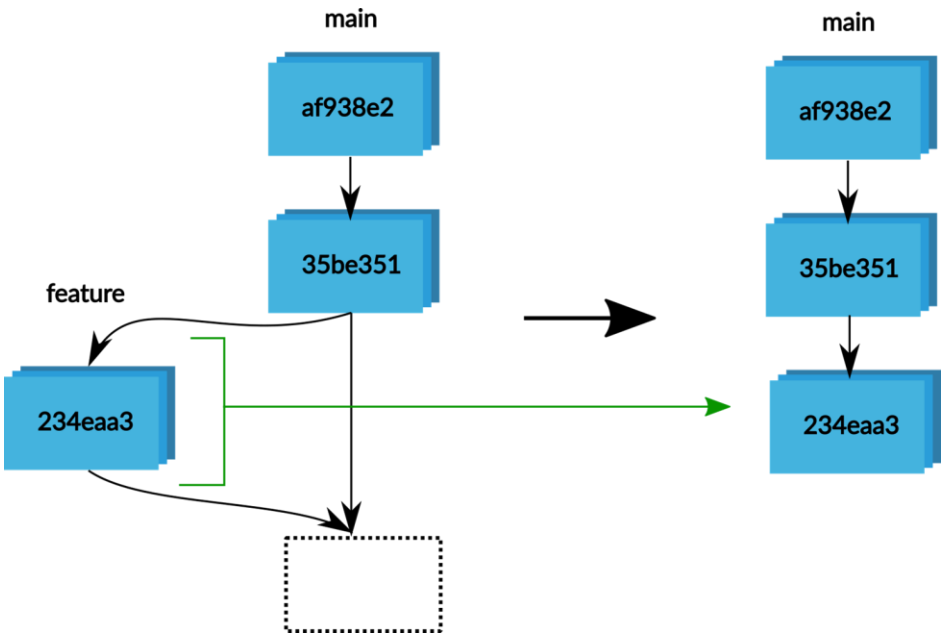
- Multiple branches
  - You can add commits to each branch
  - This gives you two different versions of your project



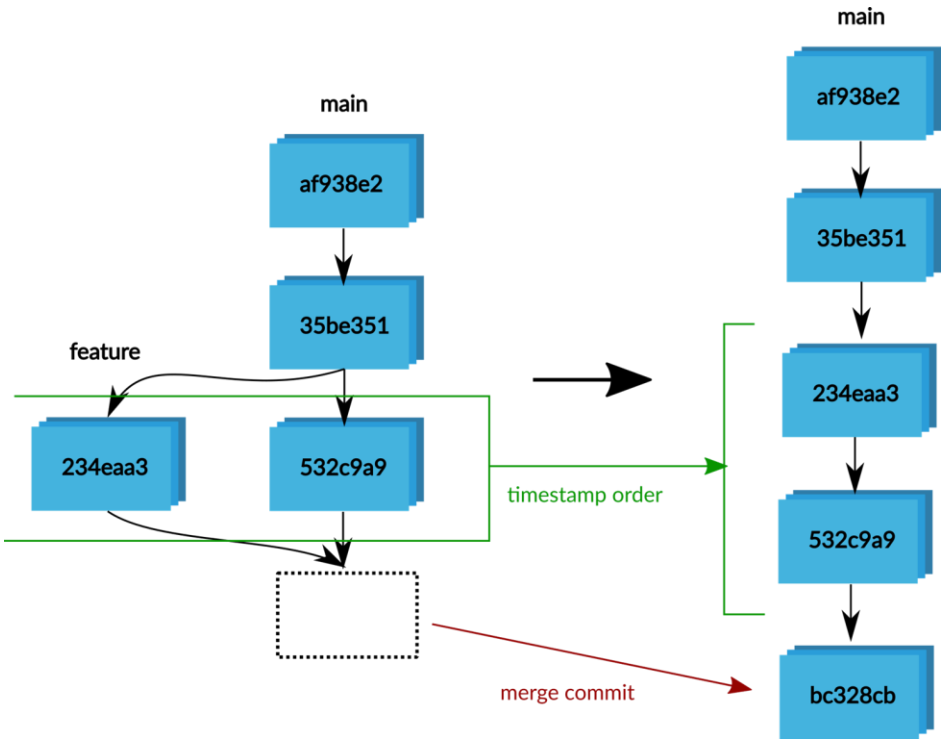
- Merge
  - Combine the changes made in two branches



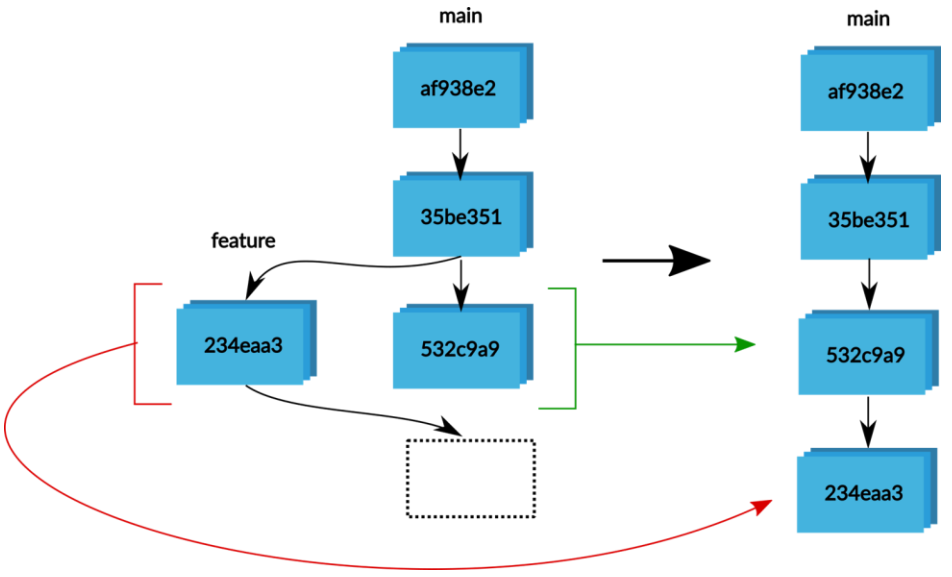
- Merge (Fast Forward)
  - There are only commits on the branch to merge in
  - These commits can be added on to the end of the main branch



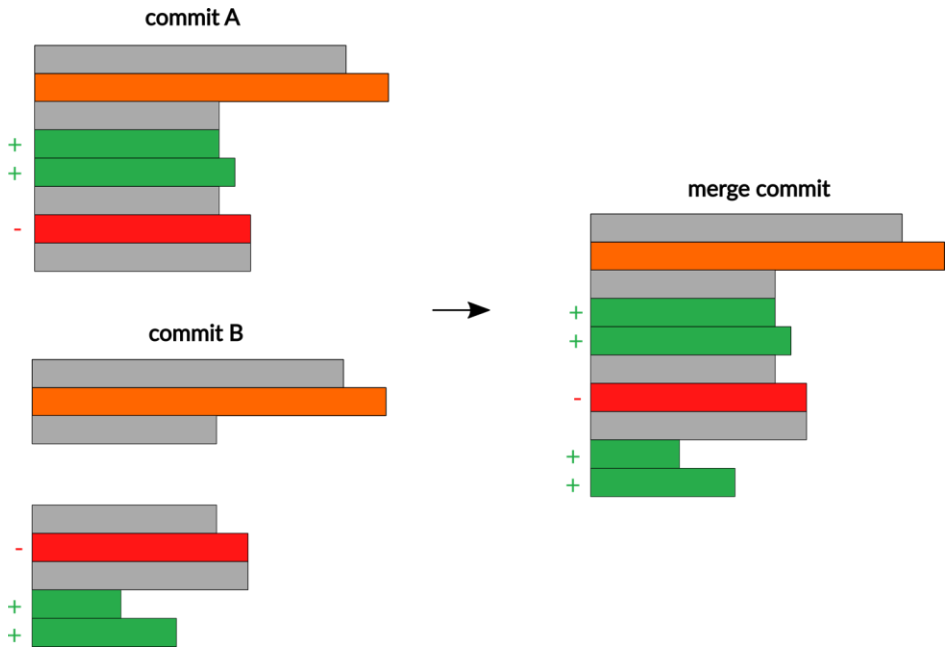
- Merge (Standard Merge)
  - Adds commits in timestamp order
  - Create a new commit for the merge



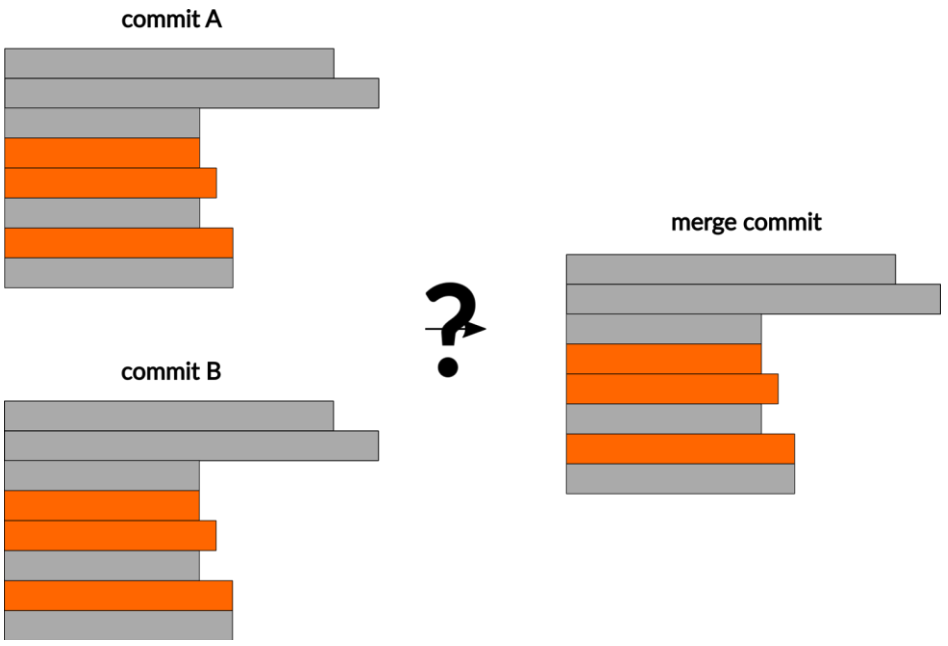
- Merge (Rebase)
  - Replay the feature branch on top of the new commits on the main branch



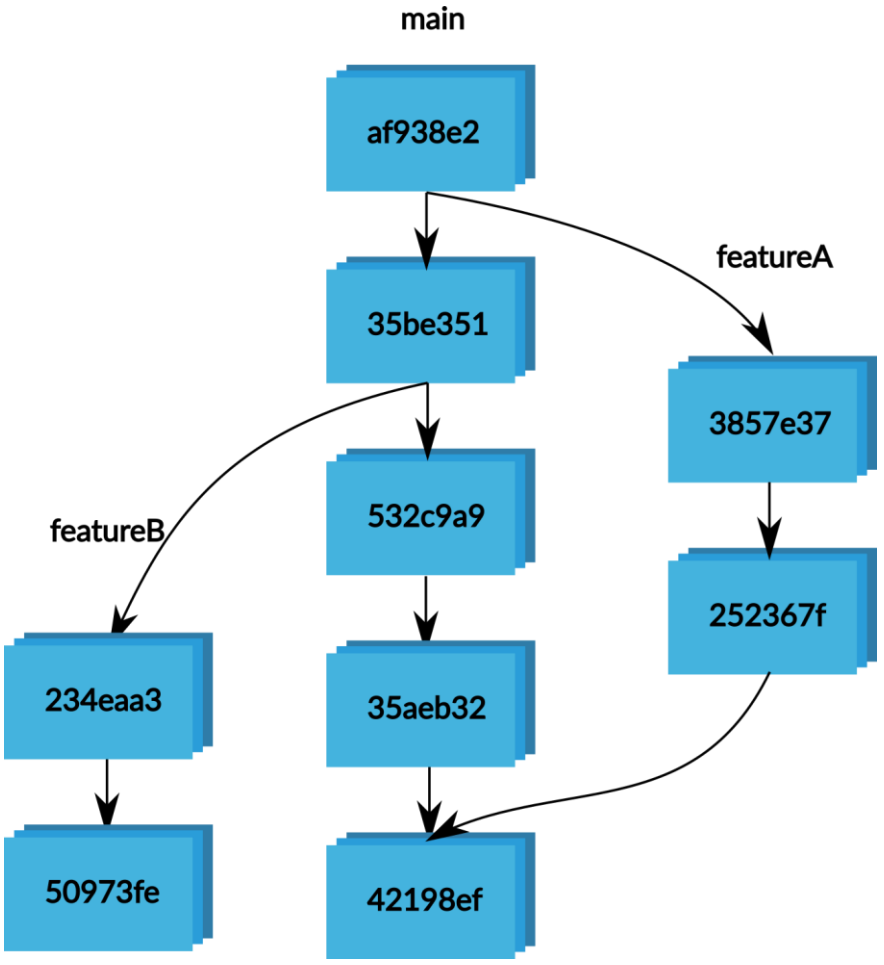
- Resolving a merge
  - Git merges line-by-line
  - If the branches change different lines everything resolves automatically



- 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

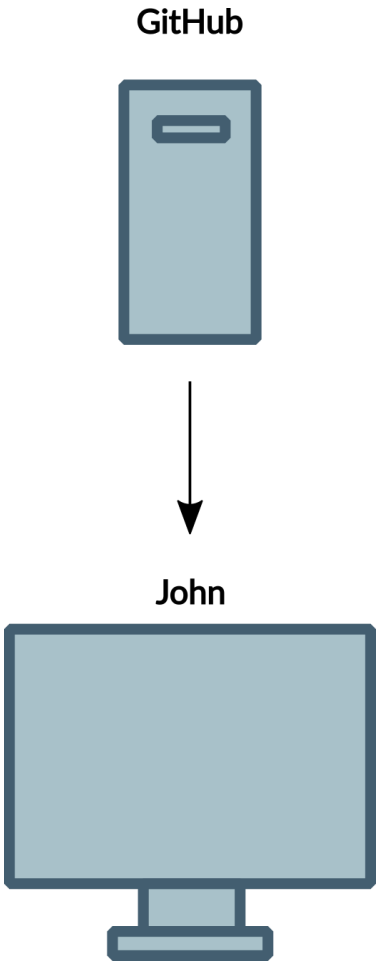


- Repository (noun)
  - Everything git keeps track of for your project
  - A collection of branches

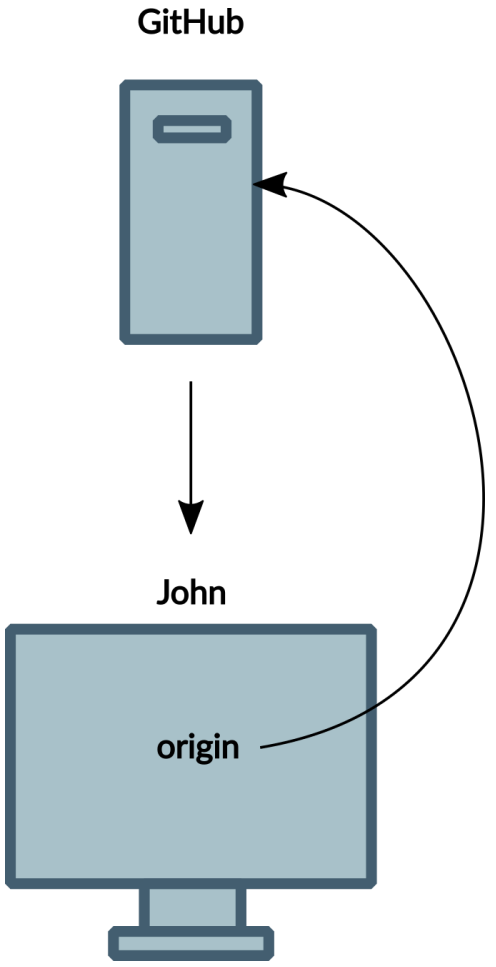


Working with Remotes

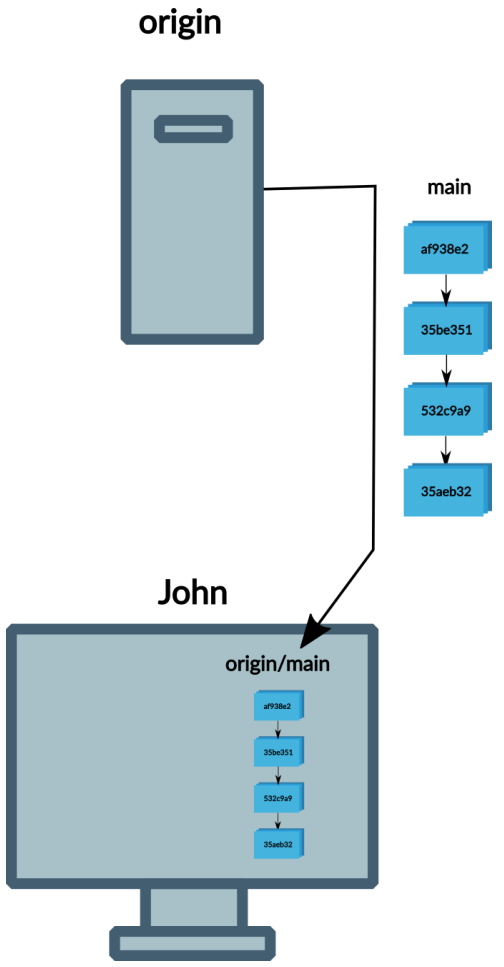
- Clone (verb)
  - Make a copy of a repository held on a git server



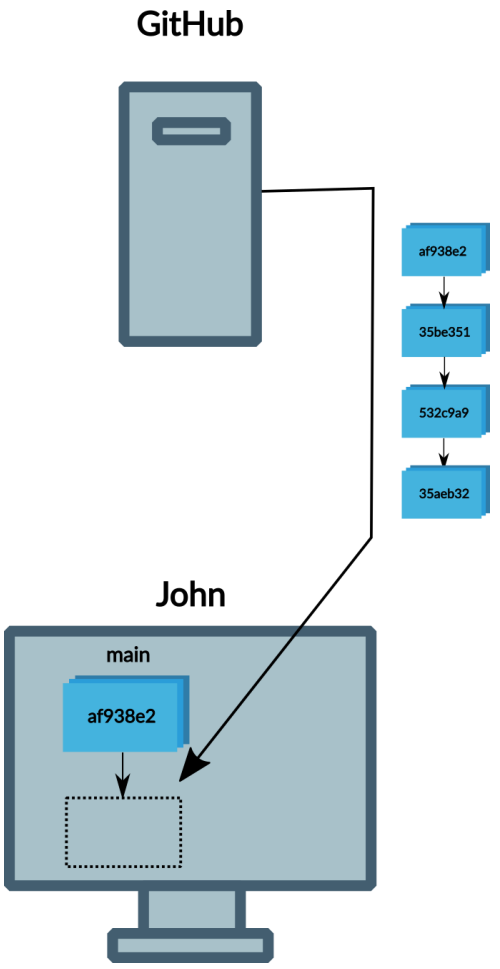
- Remote (noun)
  - A reference in your git repo to a repository elsewhere
  - When you clone a repo, it creates a remote called origin



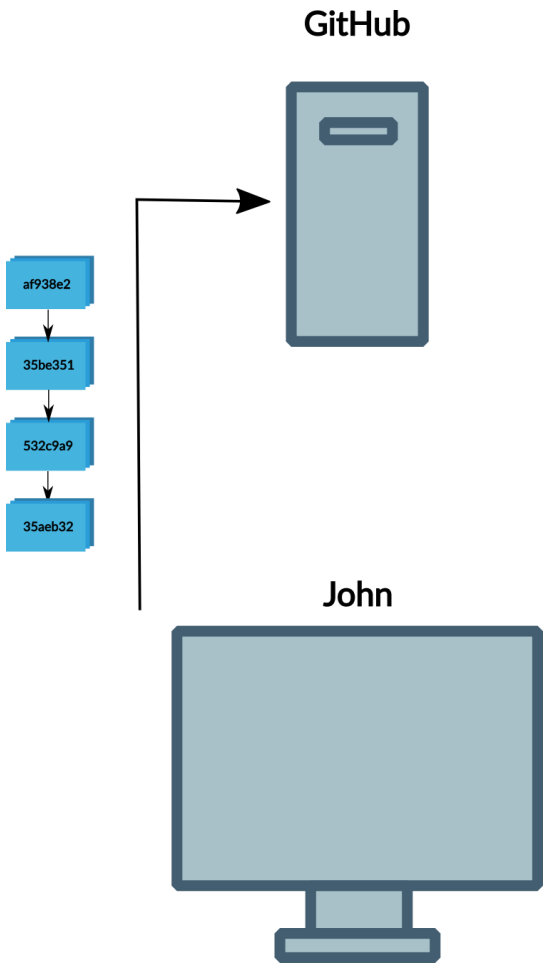
- Fetch (verb)
  - Download commits made on a remote branch
  - Fetching branch main from origin would put result in branch origin/main



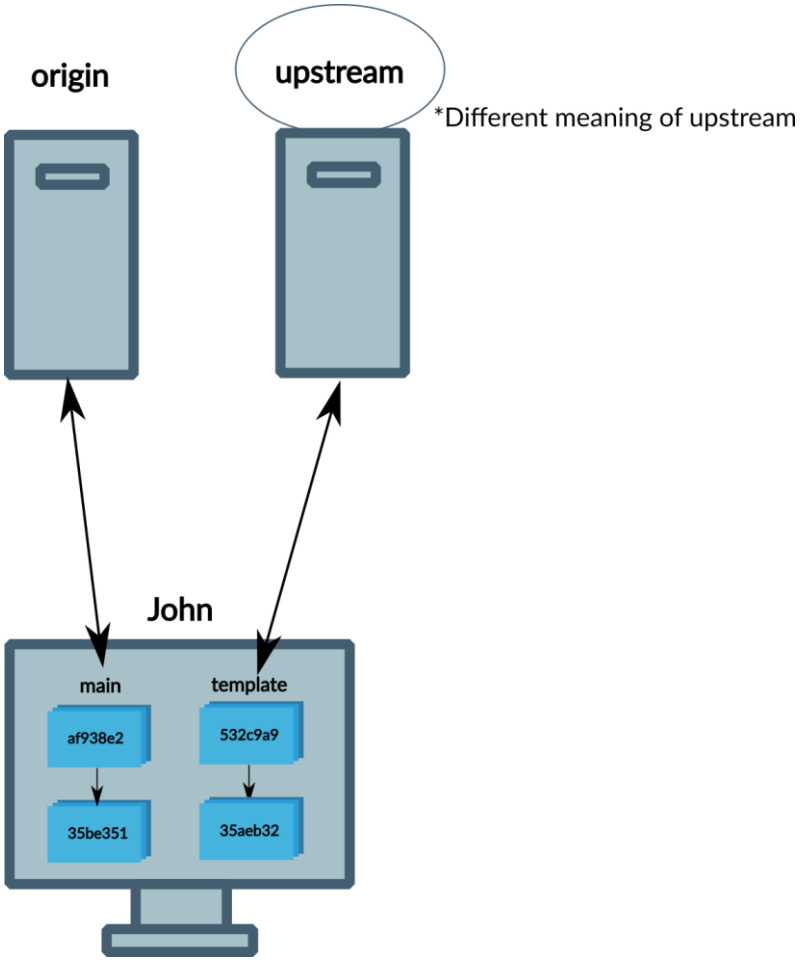
- Pull (verb)
  - Fetch **and merge** commits made on a remote branch



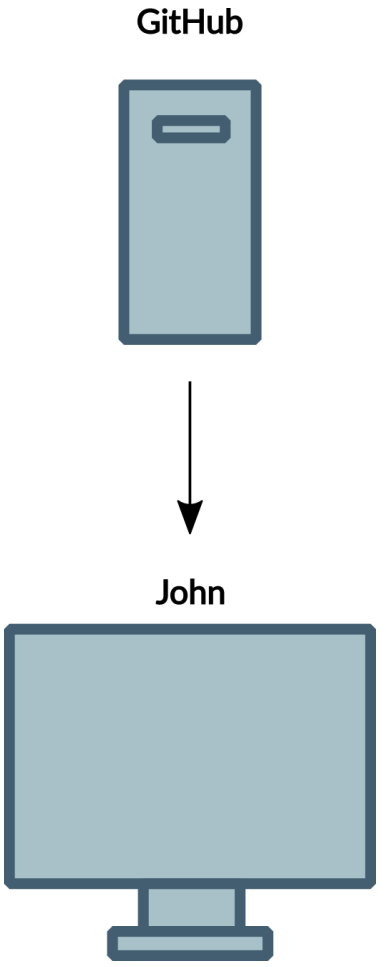
- Push (verb)
  - Upload new commits in the local repository to a remote branch



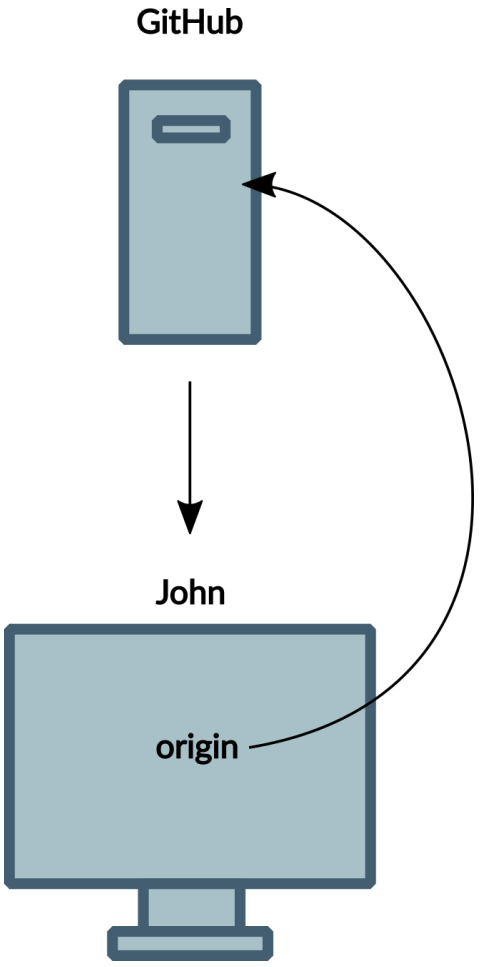
- Upstream (noun)
  - Which remote branch our branch should fetch/pull from and push to
  - Different branches may have upstreams on different remotes



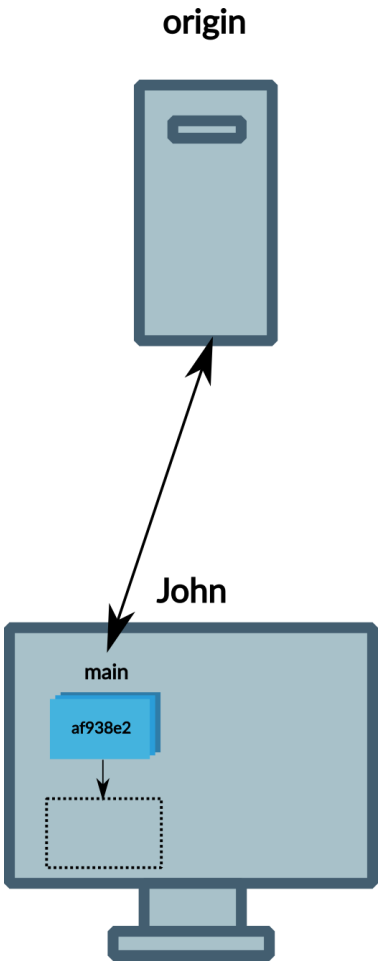
- Example workflow
  - Clone a repository



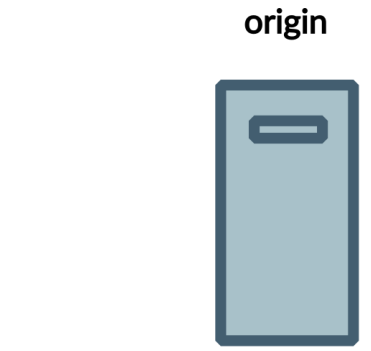
- Example workflow
  - Clone a repository
    - Remote **origin** is set automatically

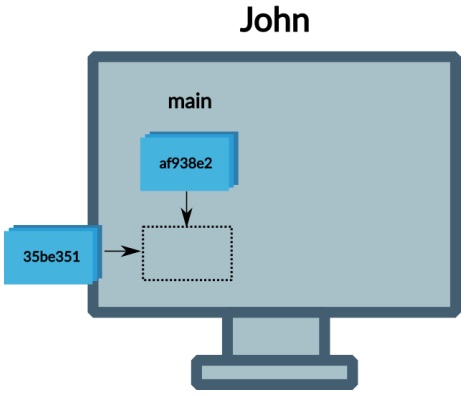


- Example workflow
  - Clone a repository
    - Remote **origin** is set automatically
  - Set upstream for branch **main**

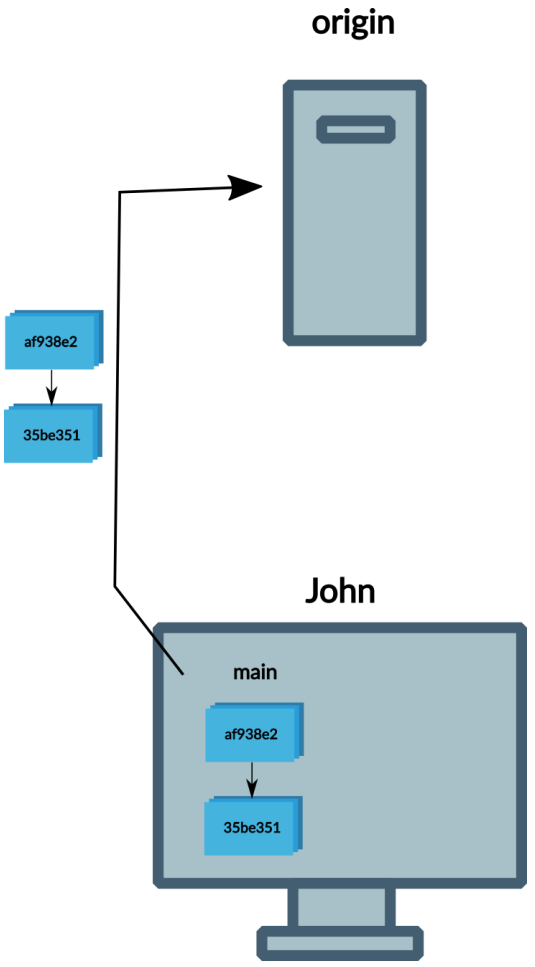


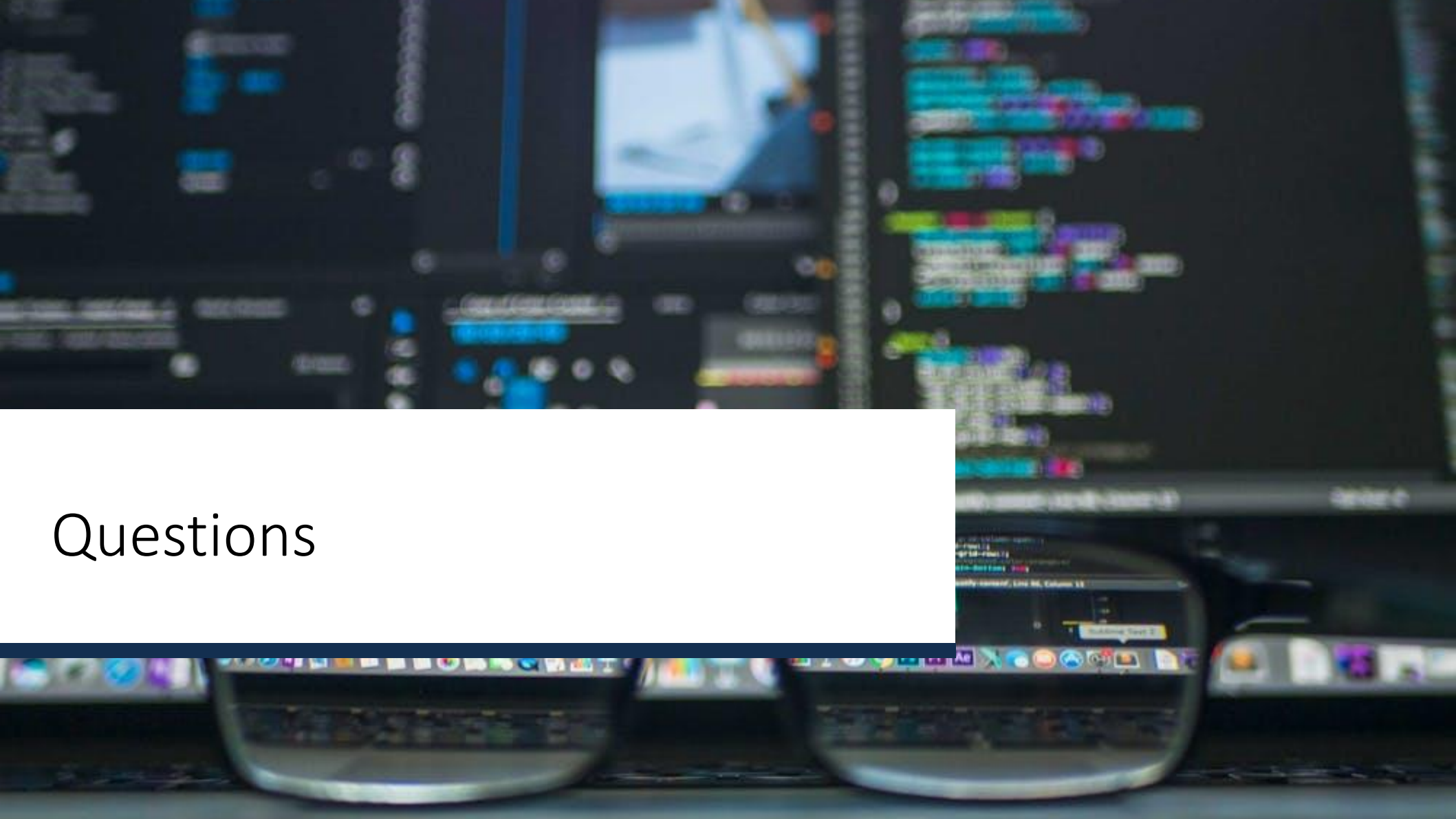
- Example workflow
  - Clone a repository
    - Remote **origin** is set automatically
  - Set upstream for branch **main**
  - Commit changes on branch **main**





- 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





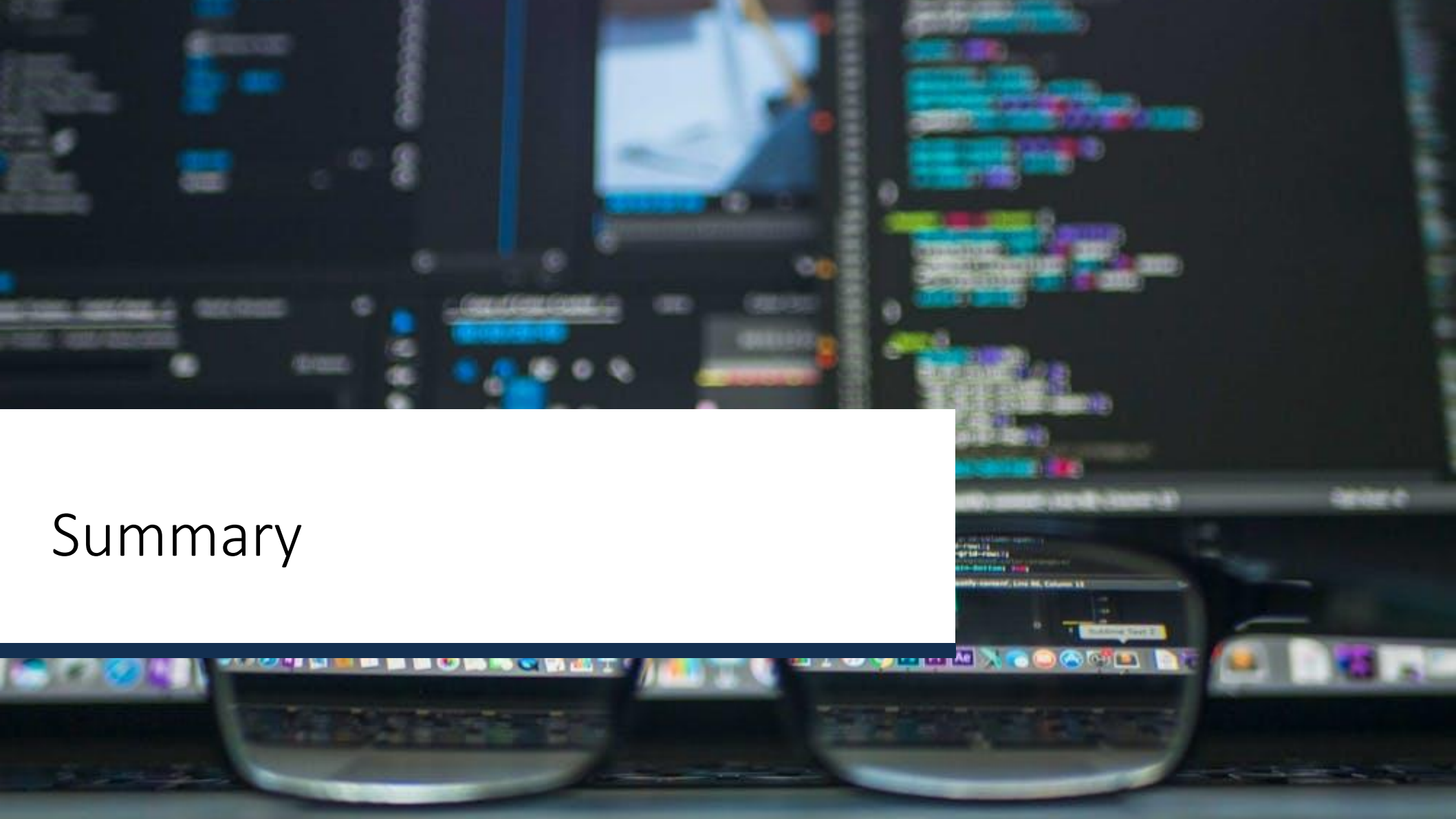
Questions

- **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