

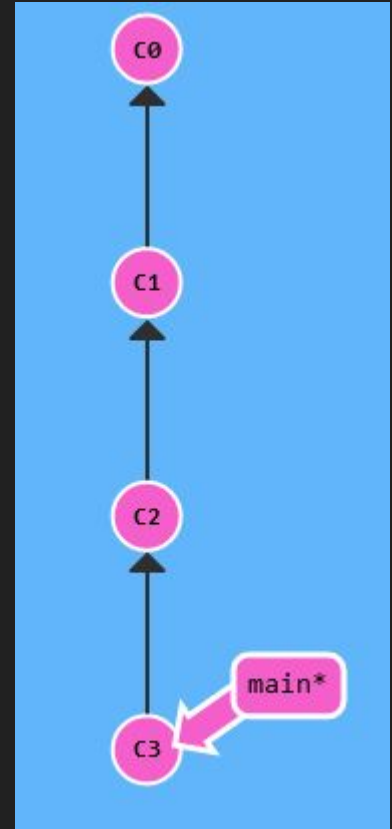
# Version Control

CMSE 890-402

What is a *version*?

# Git definition of a version

- **A commit** referenced by a SHA-1 string (“hash”)
  - Contains all commit information
  - Refers to a *previous commit* hash (“parent commit”)
- Thus all *direct* version history can be found by following commits backwards in time



# Tagging versions

- Git allows you to apply tags to commits for easier reference
- This can act as a custom versioning system
- Tags can just point to a commit OR include a message and have their own hash
- Tags are often used for release markers

Tags			
2023.9.0.dev0	...		
🕒 on Aug 17	🔗 b5c8abb	📦 zip	📦 tar.gz
2023.7.0	...		
🕒 on Aug 17	🔗 22e8001	📦 zip	📦 tar.gz
2023.7.0.dev0	...		
🕒 on Jun 1	🔗 582fbf2	📦 zip	📦 tar.gz
2023.5.1	...		
🕒 on May 30	🔗 af777c6	📦 zip	📦 tar.gz
2023.5.0	...		
🕒 on May 23	🔗 5aab659	📦 zip	📦 tar.gz
2023.5.0.dev0	...		
🕒 on Mar 4	🔗 1509bbe	📦 zip	📦 tar.gz

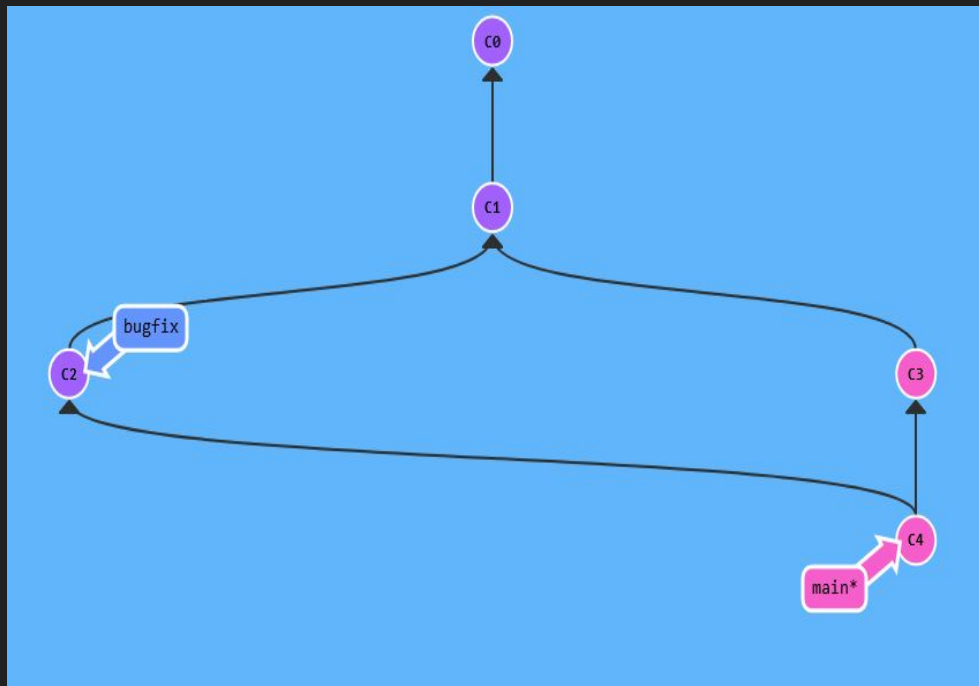
Pre-class questions?

# Branches

- Branches have their *own* commit history that diverges from others at the point of creation
- Can be merged back into the main branch (sometimes called trunk)
  - Merge?
  - Squash?
  - Rebase?

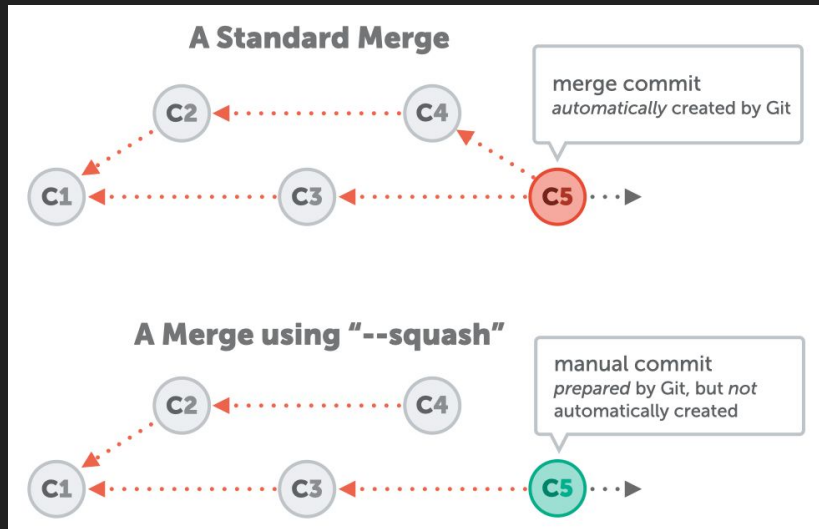
# Merge

- Takes commits from one branch and creates a merge commit pointing at those changes
  - and including the diff between the branches
- The new commit has *two* parents
- The branch commits become part of the main history
- If C3 was not made, C4 is not needed



# Squash

- Technically a kind of rebase
- Can be handled by GitHub on a merge
- Instead of a merge commit pointing at two parents the commits are *squashed* into one
- Branch history is *lost*
- Main history is simpler





# Rebase

- Reorganizes commits
- ***Rewrites history***
- Can be used to:
  - Reorder commits
  - Bring commits in from another branch
  - Remove commits
  - Squash commits together
- Can be horrible if there are conflicting changes between branches- these have to be handled per-commit

# Merge vs Squash vs Rebase

- Merge if the branch history is simple
- Squash if you want to keep main simple
- Rebase if branches have diverged significantly
  - OR if you want to clean up a branch history

# Forks

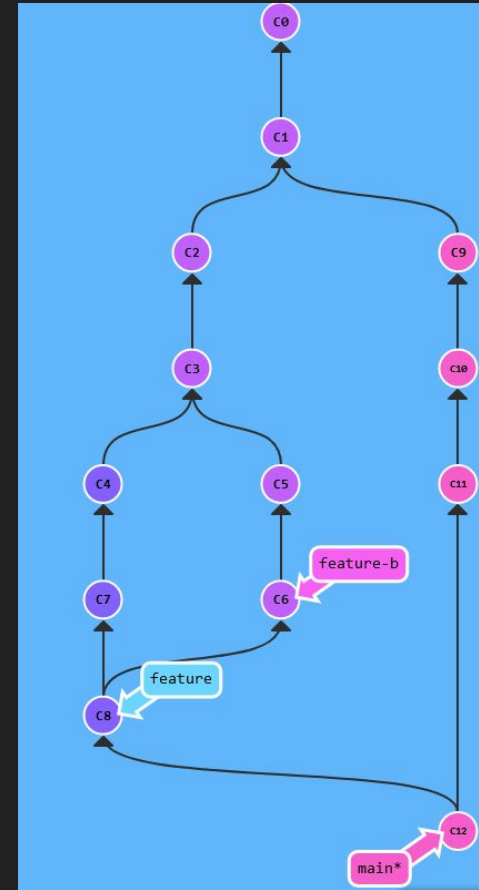
- Copies of a repository that can diverge
- Can be updated from the “original” repository or other forks
- Origin: your fork of a project
- Upstream: the original repository
  - Caution, upstream in git also refers to any remote repository
- Be careful of the license!

# Fork and branch workflow

1. Fork the repository
  2. Create a new branch in your fork
  3. Work in the branch
  4. Create a pull request in the original repository
- Avoids permissions issues in the original repository
  - Extra branches have no effect on the original repository
  - Common in open source for external contributors

# Branch from a branch

- You can make as many branches as you want
- Branches do *not* have to be created from main
- Useful for working together on new features
- Can reduce merge conflicts into main
  - But may create conflicts on the branch itself



## Group Activity

- Open “advanced\_git\_in-class.pdf” from the main classroom repository
- Follow the instructions
- Add me as a contributor to your repository

# Pre-class for next week

Read

<https://docs.github.com/en/actions/learn-github-actions/understanding-github-actions>.

Then, create and run the starter action in the classroom repository:

<https://classroom.github.com/a/chB0NDGr>