Lab 3: Version control and collaboration

Comp Sci 1585 Data Structures Lab: Tools for Computer Scientists





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- Keeps track of changes to your code.
- You don't have to worry about accidentally losing or deleting code.
- You can experiment and reset to a known good state.
- Makes collaborating with others easier.

What is Git?

- Git is software it is not GitHub, which is a website
- Distributed everything is kept on your local machine.
- 'Repository' a collection of code and history.
- 'Commit' a chunk of saved changes.



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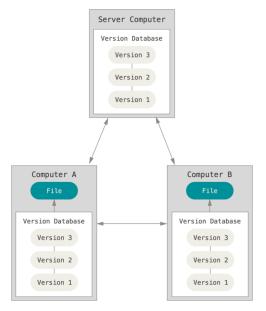
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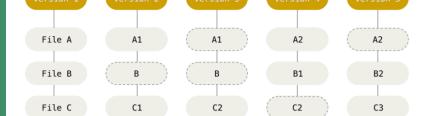
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Snapshots (commits) include all files

Snapshots



Checkins Over Time



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Three places where edits exist

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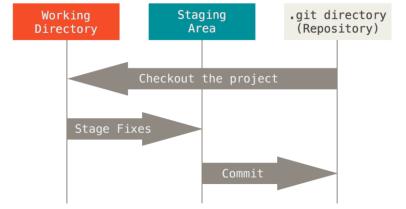
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Gitting started...

- \$ git init Makes a new empty git repository.
- \$ git add <FILENAME> Adds changes in FILENAME to the next commit.
- \$ git status Shows the status of the repository.
- \$ git config --global user.name "<YOUR FULL NAME>"
- \$ git config --global user.email <EMAIL>
- \$ git config --global core.editor vim



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\$ git commit -m ''a''

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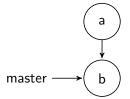
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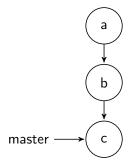
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\$ git commit -m ''b''



commit

\$ git commit -m ''c''



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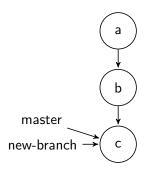
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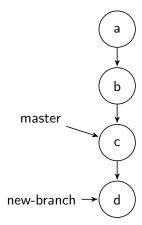
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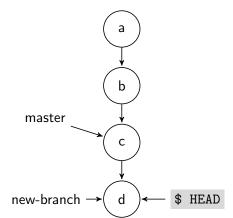
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\$ git checkout -b new-branch



\$ git commit -m ''d''





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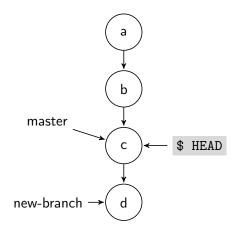
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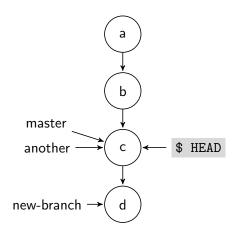
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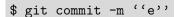
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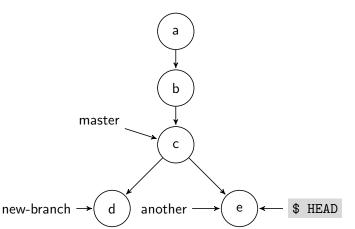
\$ git checkout master



\$ git checkout -b another







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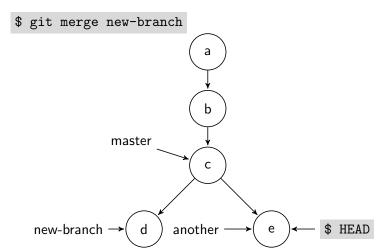
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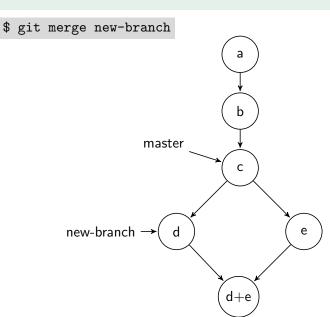
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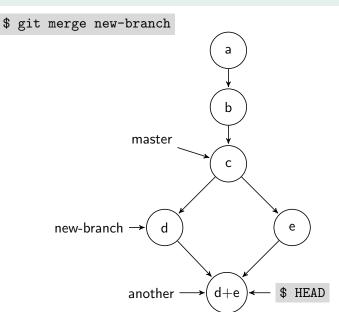
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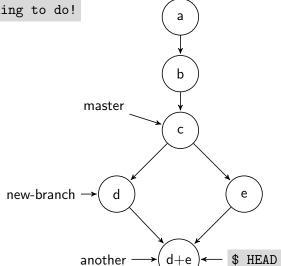




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\$ git merge master

\$ Nothing to do!



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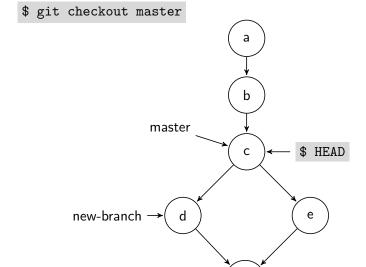
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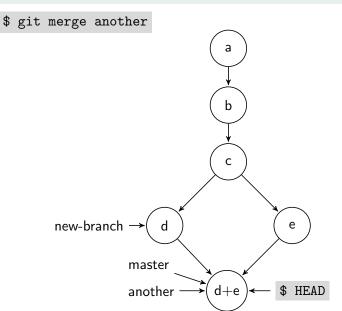
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Automatic merge failed; fix conflicts and then commit the result.

In the-file.txt:

<<<<< HEAD

The current branch's contents

======

Stuff from the branch you're merging >>>>> new-branch

\$ git add the-file.txt and \$ git commit

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- \$ git log Show a log of commits
 - --graph Neat ASCII graph
 - -p Show what changed in each commit
- \$ git diff Show uncommitted changes
- \$ gitk Graphical log
 - --all Show all branches
- \$ git gui Graphical tool for committing



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Remote repositories

Working with remotes

- \$ git clone <REPO_URL> makes a copy of a repository.
- \$ git push Pushes changes from your current branch to the remote branch it tracks.

(You may need to run

```
$ git config --global push.default simple.)
```

- \$ git pull Pulls changes from the remote branch and merges them into your current branch.
- \$ git remote add <REMOTE_NAME> <REPO_URL> a remote to an existing repository.



Industrial workflow

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Industrial workflow

- You and your co-workers are working on a project simultaneously
- You clone the company's repository:\$ git clone https://git.company.com/project.git
- \$ git checkout -b doug to create your own development branch
- Modify files, \$ git add <FILENAME> to stage them,
 \$ git commit when they are in a working state.
- Ready to merge with mainline?\$ git checkout master and \$ git merge doug.
- Your work is now merged with your *local* master branch (but not on the company's repo).
- Question: which branch is HEAD now pointing to?

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- Meanwhile, your co-workers might have made changes!
- First, \$ git pull to fetch and merge their changes
- Rectify merge conflicts, test the code, then
 \$ git add <FILENAME> to stage, and then
 \$ git commit when in a working state
- Only after pulling and merging the most recent changes should you \$ git push
- Your work is merged with that of your co-workers, and now resides on the company repo
- Take a coffee break.

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- Make your commit messages descriptive!
- Only \$ git commit when the code works!
- Don't add generated files (like a.out) to your repo.
- You can ignore certain files by putting their names in a .gitignore file in your repo.
- When collaborating, work on separate branches and merge as you go along.
- \$ git help COMMAND will show you documentation.