Advanced git topics

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General

- git helps you ~~develop~~ grow software collaboratively
  - talking face to face is also very effective!
- When contributing to existing projects: stick to their coding style!
  - Reformatting just clutters the history
- Use a graphical user interface
  - git is complex …
- Commit messages: first line < 60 characters, then empty line, then details (line breaks at ~ 72 characters)
- Don’t commit broken code: commit-hooks

Pre-commit hooks

- Fork (or clone) https://github.com/plijnzaad/advanced-git
- Inside the working copy, copy (or symlink) file git-pre-commit-hook.sh to ./.git/hooks/pre-commit
  - make sure it is executable: chmod a+x *thatfile*
- Add a script with an error, or introduce a deliberate error in the R script, and try to commit it

Pull Requests

- Very useful for collaborations with remote projects
  - Within one room: commit to the same repo
- A Pull Requeset (’PR’) is essentially asking for peer review
- Your code, and your commit history should be **clean**
  - if not, it will reduce the chances of your improvements being accepted
- How to achieve that clean history?
  - by modifying it before pushing
- Cheating? No: let’s you get rid of all useless commits
  - ‘typo’, ‘oops’, ‘off-by-one’, ‘missing semi’

Getting clean commits to start with

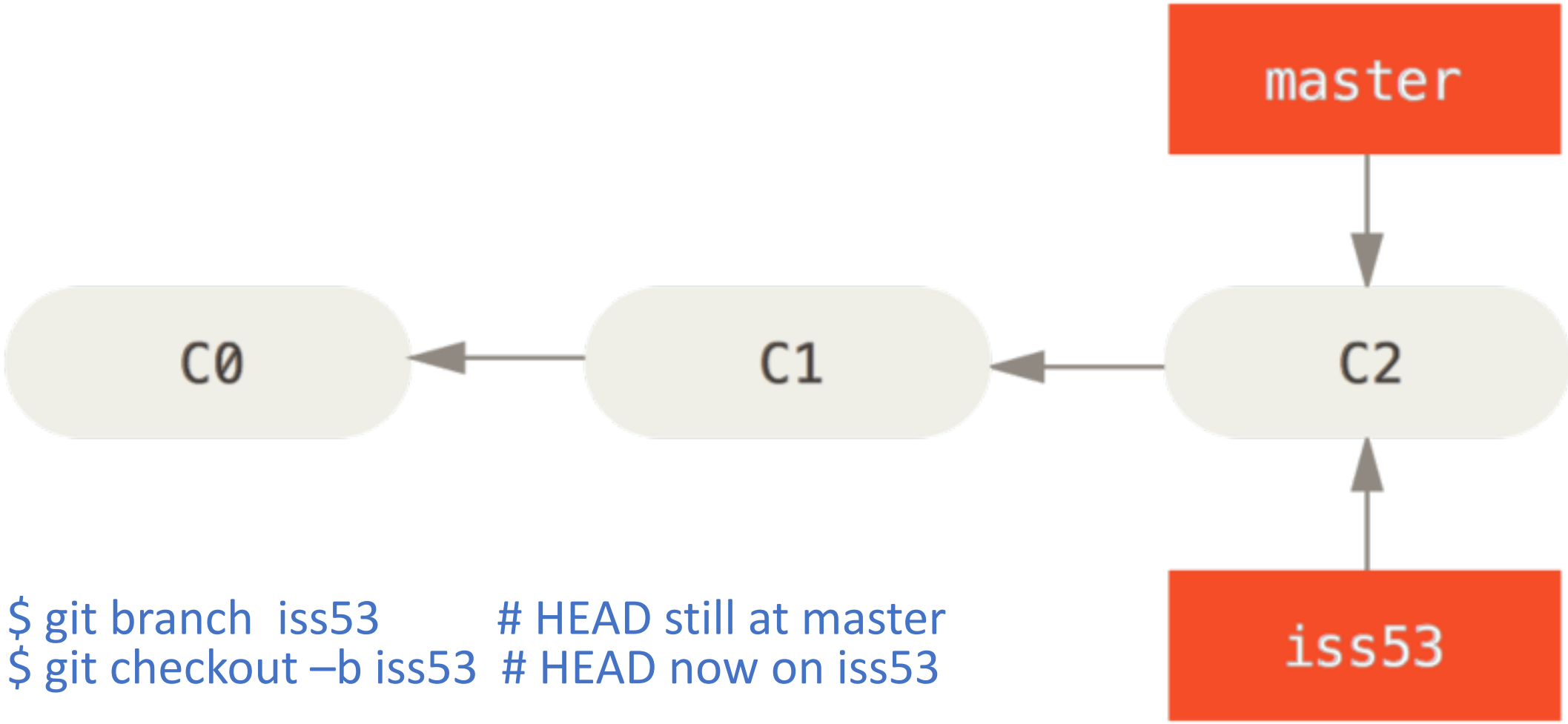
- Do your edits until you're happy
- Next: don't commit *everything*, but pick out the changes that 'belong together', by interactively staging them:
  - git add –p
- Commit only staged changes
  - git commit # without any filename!
- After this, continue with git add –p
  - or the equivalent in your graphical client

- Don't yet push anything!

Branching

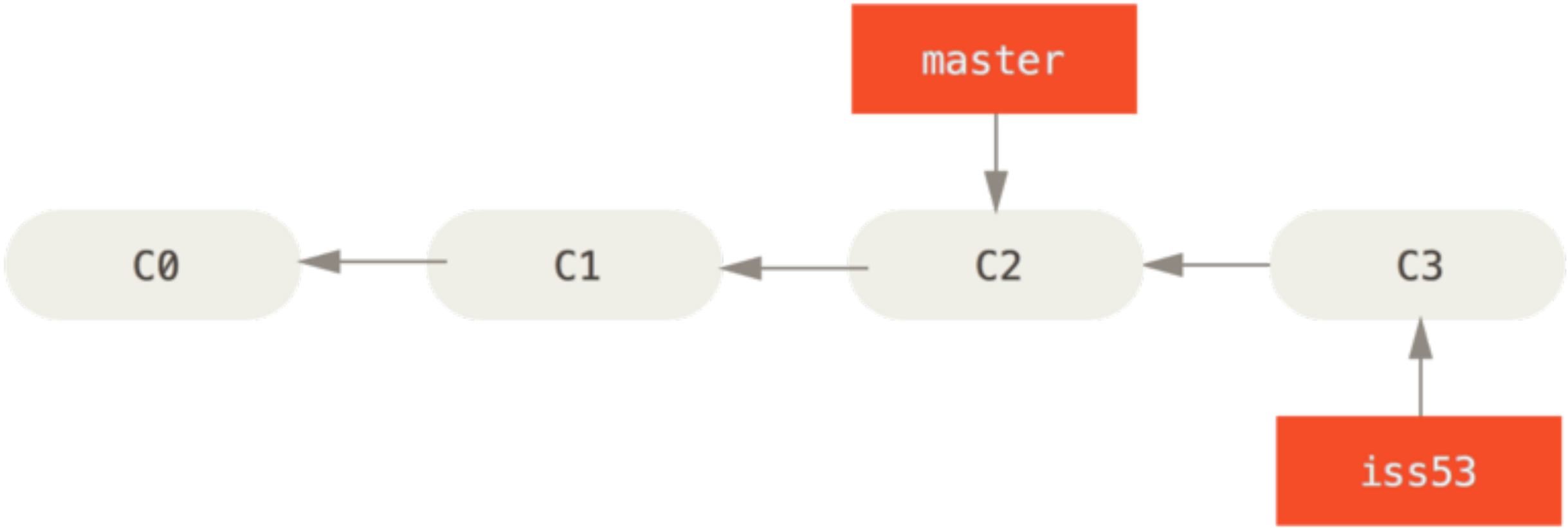
- A branch is just a pointer to a commit
  - it moves automatically to the new commit
- Branches are cheap!
- They help organize the flow of development
- Use topic branches to implement ‘new stuff’
  - aka ’feature branches’
- Use the master branch for integrating …
  - don’t commit to master
- … and for releasing
  - e.g. $ git branch ‘release2.1’

Create a branch:

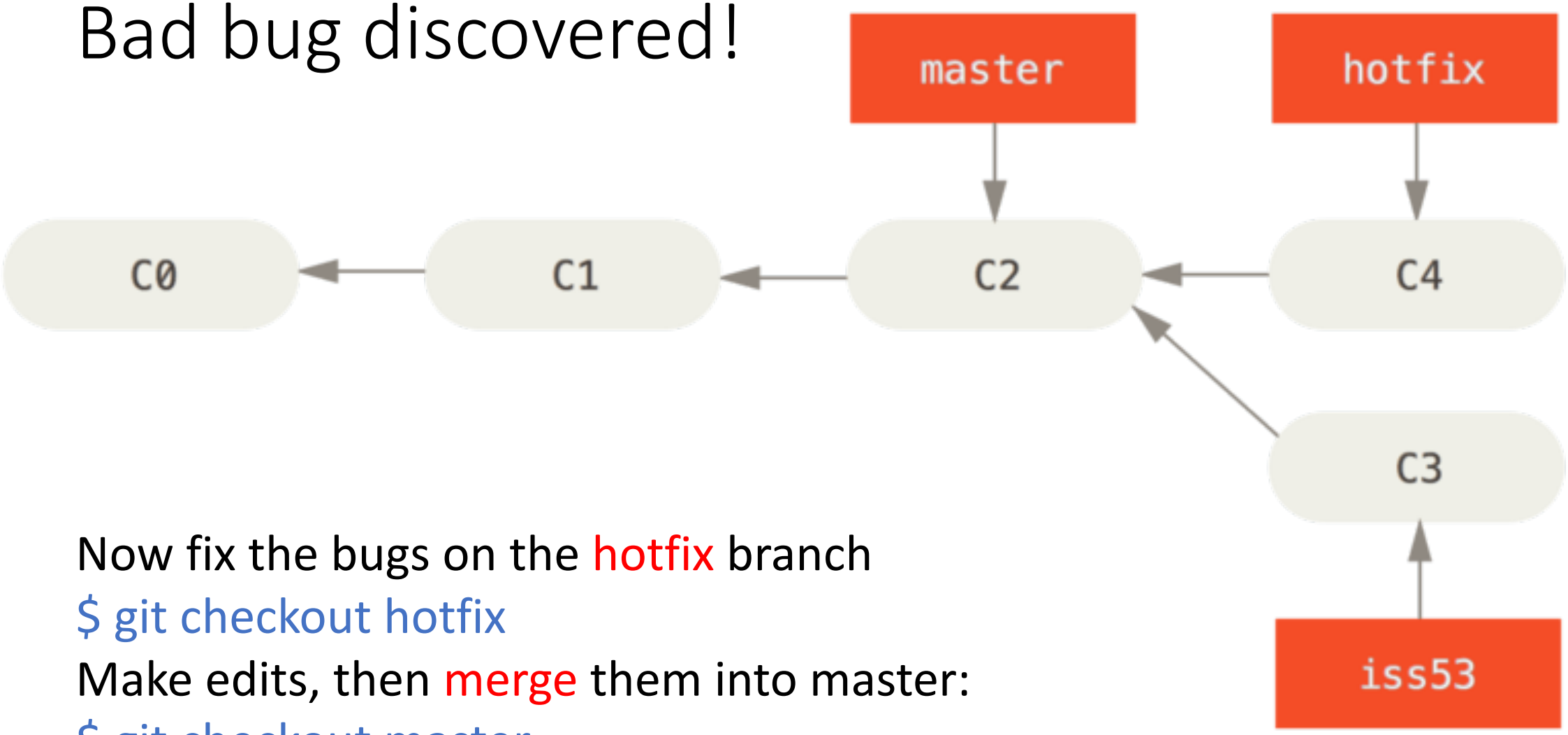



```
$ git branch  iss53          # HEAD still at master
$ git checkout –b iss53  # HEAD now on iss53
```

After commit:



Bad bug discovered!



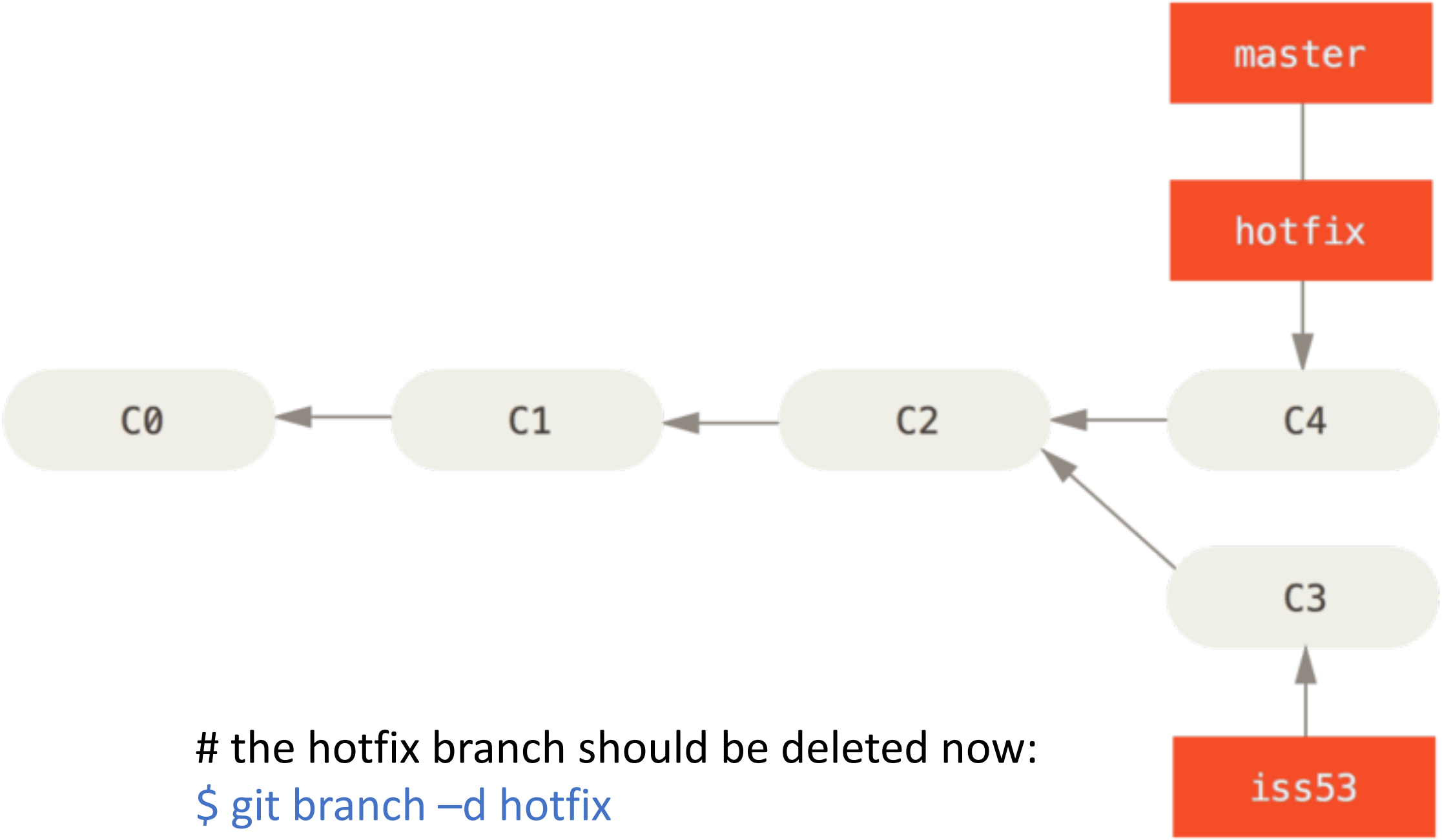
Now fix the bugs on the hotfix branch

$ git checkout hotfix

Make edits, then merge them into master:

$ git checkout master

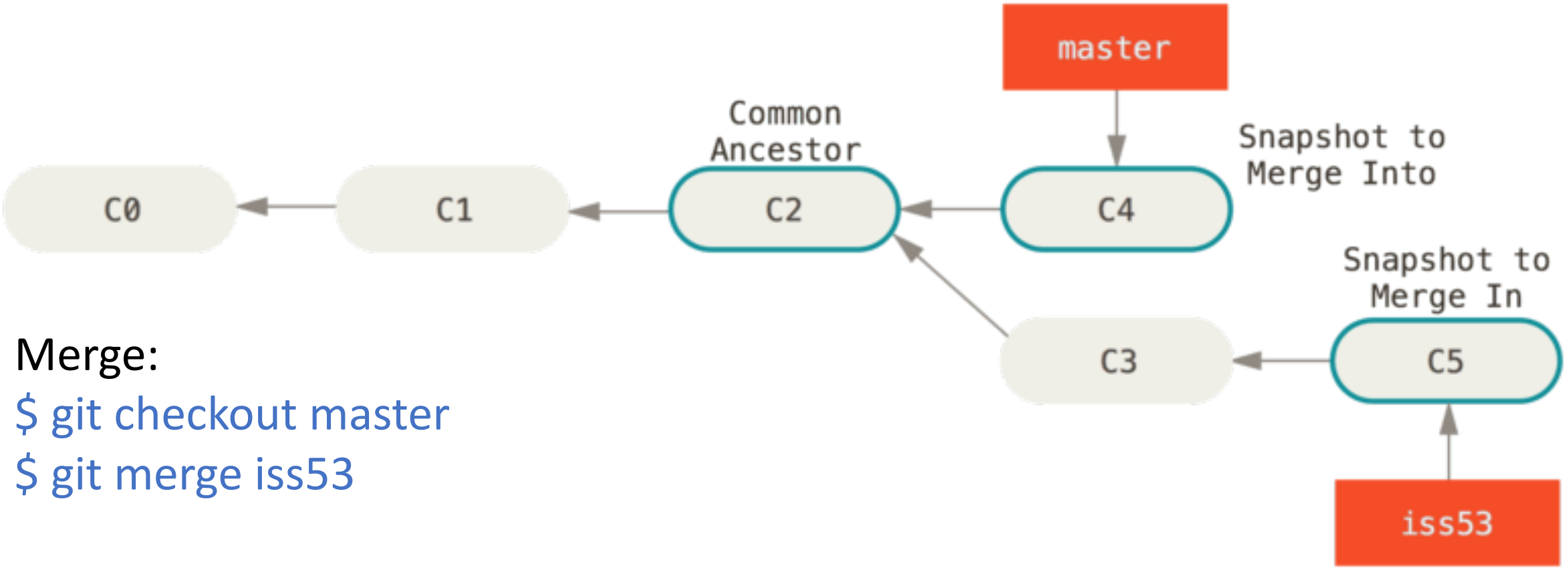
$ git merge hotfix



the hotfix branch should be deleted now:

$ git branch –d hotfix

Meanwhile, work on iss53 has progressed

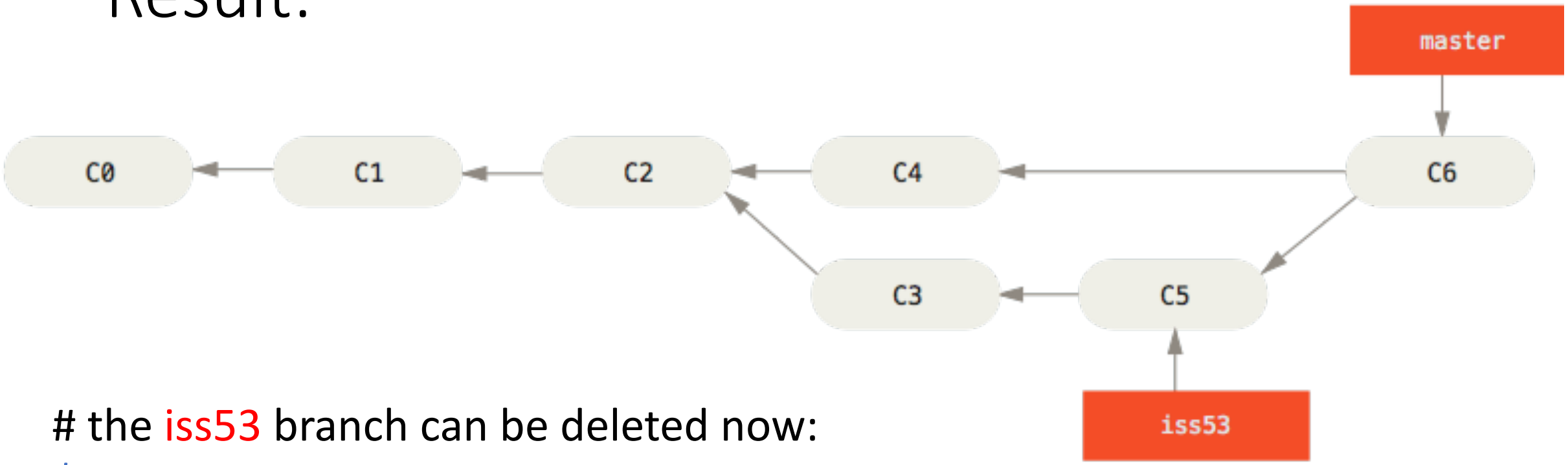


Merge:

$ git checkout master

$ git merge iss53

Result:



the iss53 branch can be deleted now:

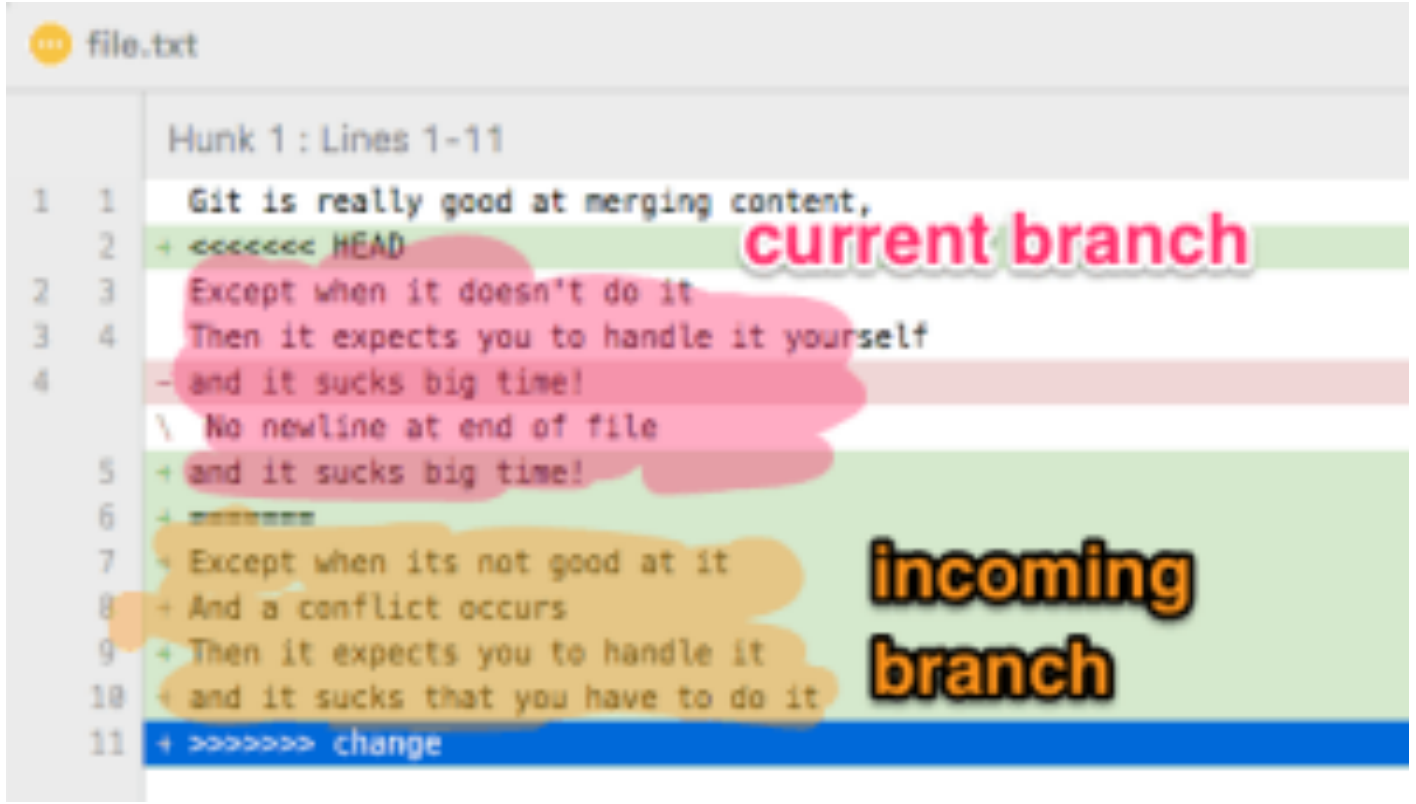
$ git branch –d iss53

seeing all branches:

$ git branch -a -vv

Conflicts

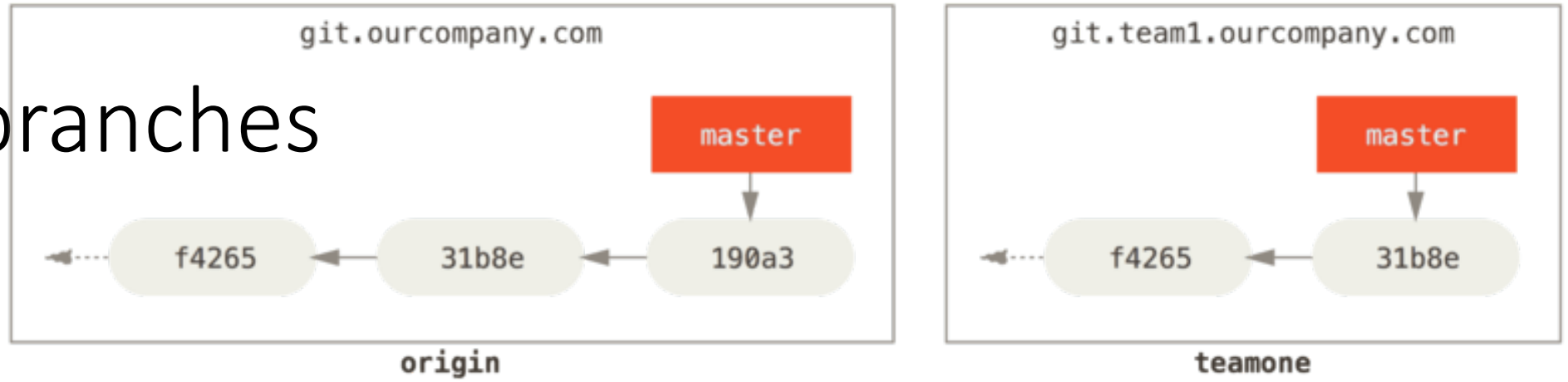
- Can happen occasionally
- git will warn you
- Search for markers <<<<<<<, ======= and/or >>>>>>>



- Select/edit the text you want, and get rid of the markers
- Then git add the changes and commit:

```
$ git add thefile-with-conflicts
$ git commit
```

Remote branches



Collect remote changes:

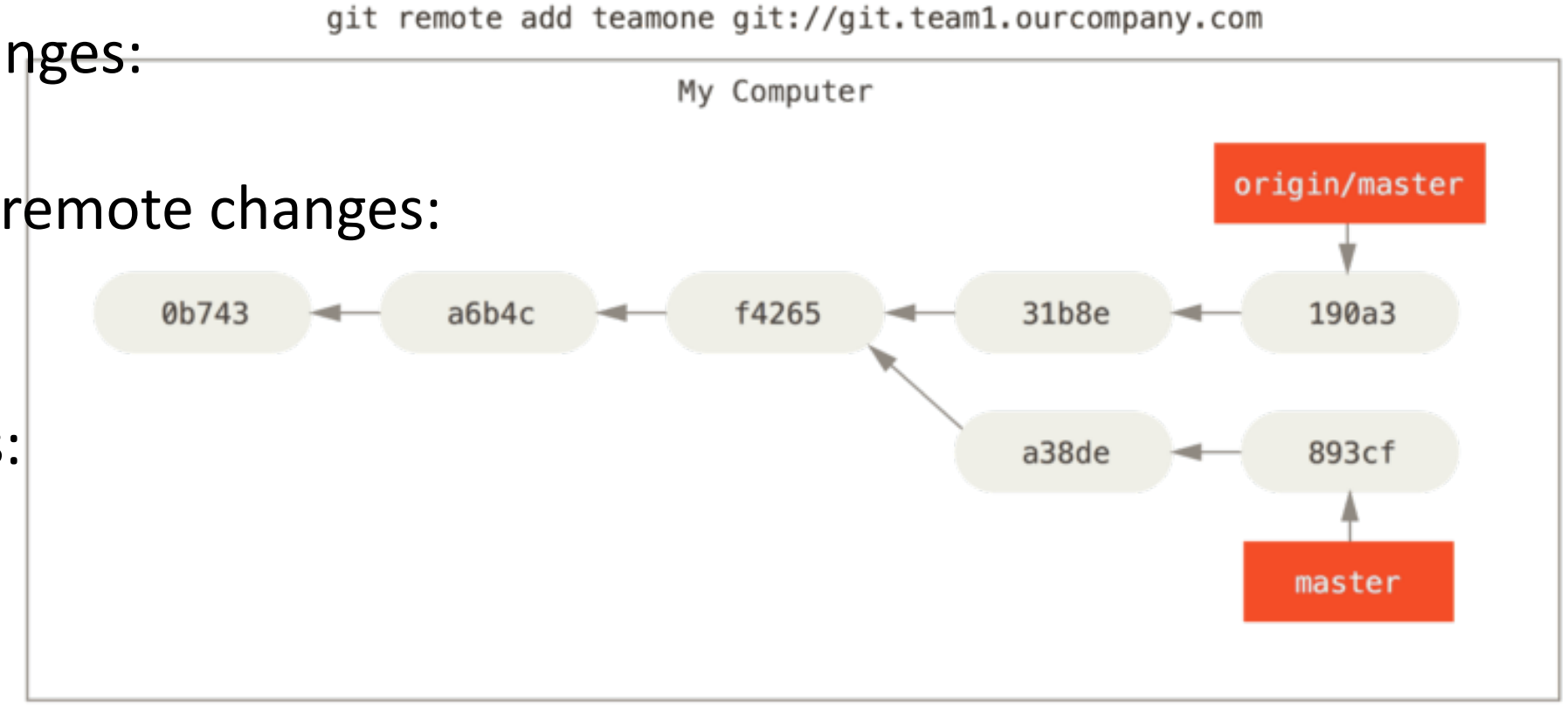
$ git fetch

Collect and merge remote changes:

$ git pull

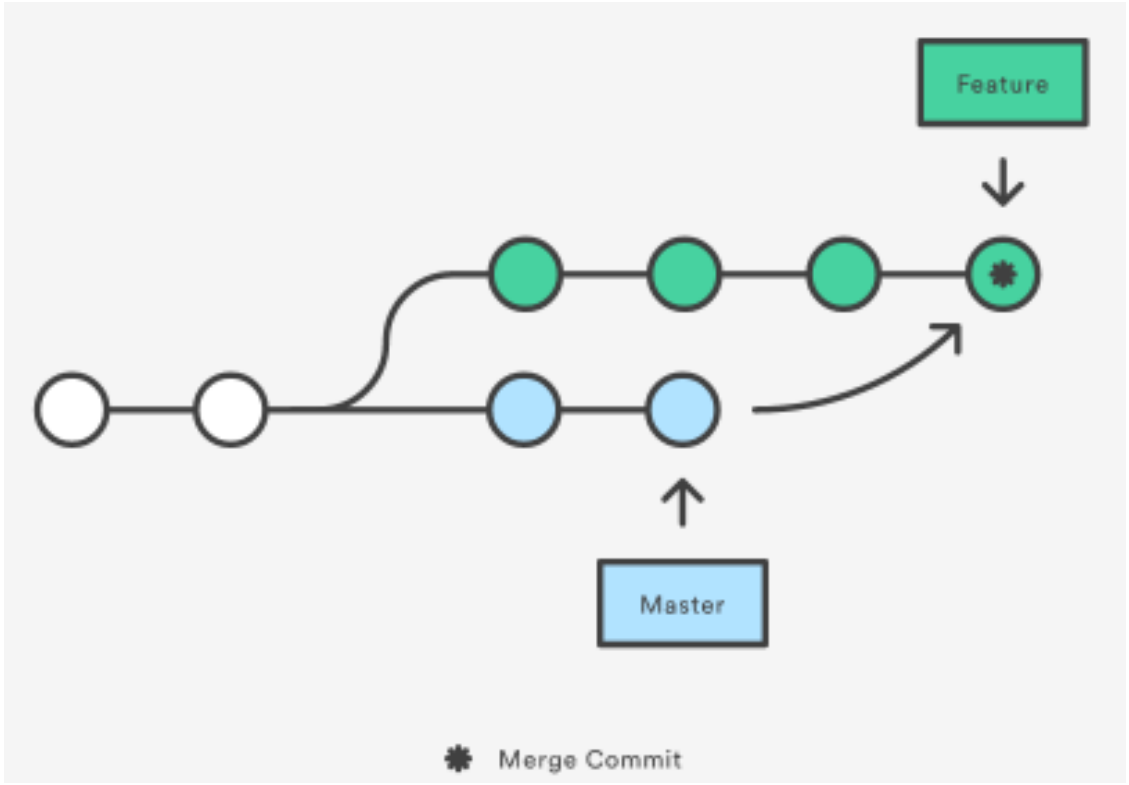
Send local changes:

$ git push

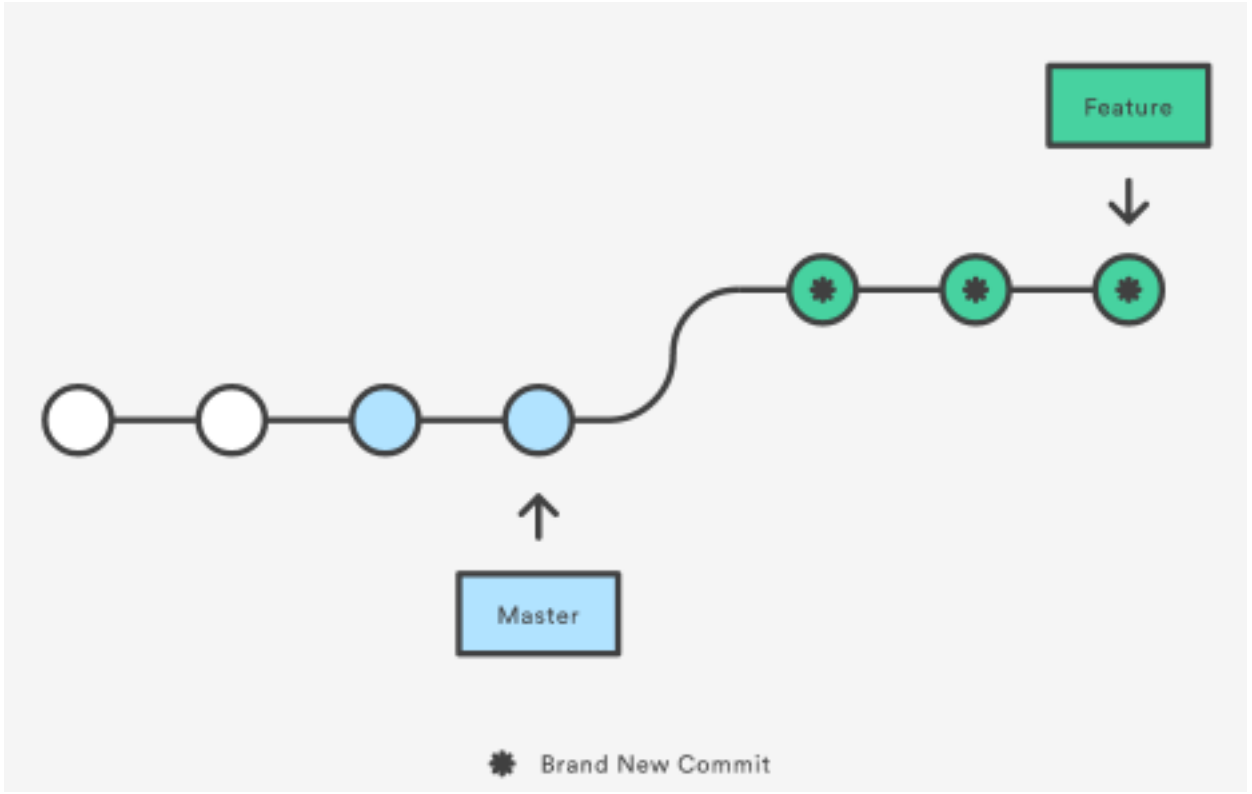


Rebasing: ’transplant’ changes onto the other branch

Merge



Rebase



Why rebase?

- Simplifies history by making it linear
- Rebase rewrites the commits
- NEVER REBASE anything with a public history!
  - i.e.: only rebase local changes
- typical example: getting in the latest upstream changes
  - configure git to use rebase when pulling:
    git config --global pull.rebase true

Advanced cleaning: interactive rebase

- $ git rebase –i
- Reorder, join or split commits
- **Only local commits!**
- Determine from where you want to start changing history, e.g.
  $ git rebase –i HEAD~4
- Next, use your editor to tell git what to do: pick; reword; edit, drop, squash, fixup.
- You can also reorder the lines to change the order (top to bottom)

git rebase –i: splitting commits

- To split a commit that is too big, use edit
  - allows you to change history in more sophisticated manner
- Lands you in the command line, where you first must do
  $ git reset HEAD^1
- After this, reshape existing changes into separate commits, e.g. using a series of
  $ git add –p ; $ git commit # commit without filename
- Once ready, issue
  $ git rebase –continue

Branching models

- Use topic branches to implement ‘new stuff’
  - aka ’feature branches’
- Use the master branch for integrating …
  - Don’t commit to master
- … and for releasing
  - e.g. $ git branch ‘release2.1’
- On local branch, integrate upstream changes using $ git rebase
  - often, but certainly before merging into master
- When merging into master, avoid fast-forwards
  $ git co master
  $ git merge –no-ff *mytopicbranch*
  $ git push
- This keeps clear who did what when: there is always a ‘merge commit’