Version Control Workshop: Git and GitHub (Day 1)

Cyrus Vandrevala [1]
Nicolás Guarín-Zapata[2]
[1] Physics Department
[2] Civil Engineering Department

October 30-31, 2014

2014-10-30

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GitHub

PURDUE
UNIVERSITY

Overview

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We Encourage Participation!

- Post Questions That You Might Have in the Repo
- Recommend Other Sources That You Found Useful
- Remember, We Do Not Know Everything!

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- One of the first major version control systems was the Revision Control System (RCS). It was released by Walter F. Tichy while he was at Purdue University (RCS: A System for Version Control).

Why is Version Control Important?

1. Keep Track of Code History
2. Concurrent Teamwork
3. Coordinate Coding Environments
4. Due Diligence Checks
5. Share Code

Everybody Should Use Version Control!

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Introduction to Version Control

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What Options Are Available?

Option #1: Client-Server Version Control Systems

Advantages

1. A Single Admin Keeps Track of the Project
2. There is a Single Master Version of the Code
3. It is Relatively Easy to Learn

Disadvantages

1. There Is Only One Admin/Server
2. You Need a Network Connection to Work
3. Operations Can Be Slow

Examples include Concurrent Versions System (CVS) and Subversion (SVN).

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Option #2: Distributed Version Control Systems

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Examples include Git, Mercurial, and Bazaar.

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Version Control in Academia

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2. It Helps Train New Group Members
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Reproducible Research

Purdue is already taking action in this subject:

- Purdue University Research Repository (PURR): `https://purr.purdue.edu/`

We can create a DOI for a GitHub repository using `zenodo.org`:

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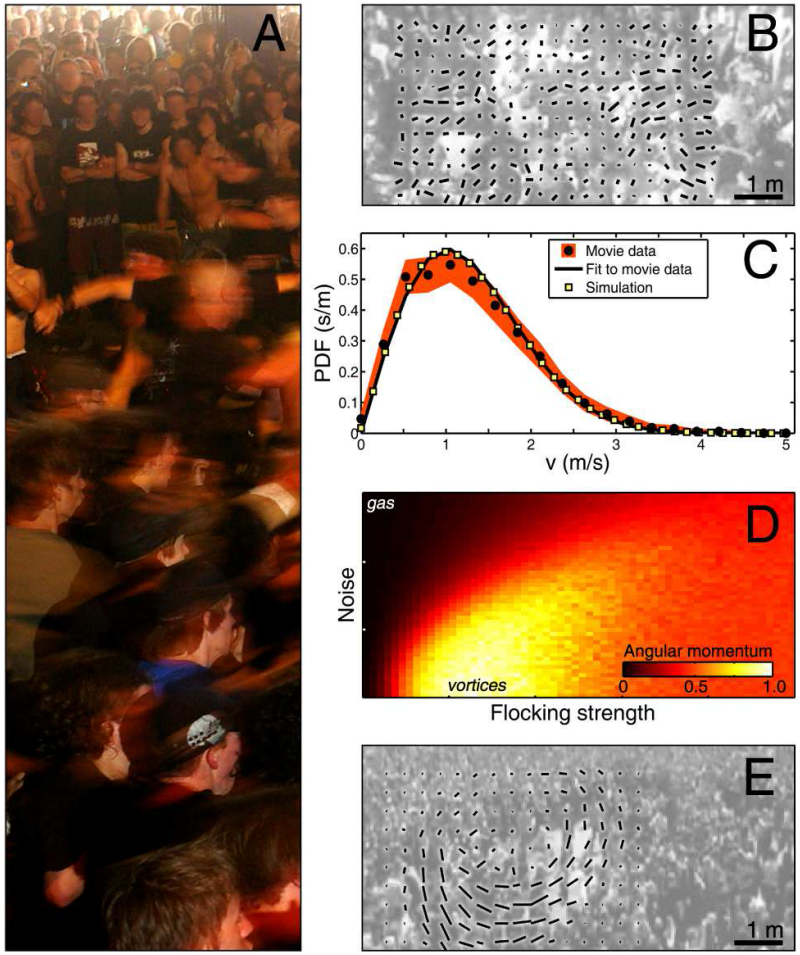

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Work Flow in Computational Science

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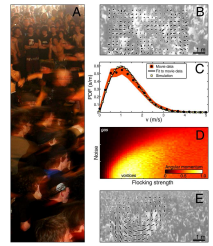

Some Useful Skills

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There are three main ways to install Git:

1. Install the Xcode Command Line Tools and Type "git" Into the Terminal
2. Binary Installer: http://git-scm.com/download/mac
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Setting Up Git - Installing From Source

You can also install GitHub from source. See the Git website for full instructions on how to do that.

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Setting Up Git - Config File

Git stores user information in */etc/gitconfig*, */.gitconfig*, and */your-project/.git/config*. To set up your information:

- *git config --global user.name "Cyrus Vandrevala"*
- *git config --global user.email cyrus.vandrevala@gmail.com*
- *git config --global core.editor vim*

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Setting Up Git On Your Machine

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Setting Up a New Git Repo

1. Create a New Directory (mkdir my-awesome-directory)
2. Navigate Into the Directory (cd my-awesome-directory)
3. Initialize the Directory (git init)

The git init command creates a hidden directory called .git that contains all of the metadata for the project. *You should never change anything in .git directly!*

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Retrieving an Existing Git Repo

1. Navigate to the Directory Where You Want to Store the Project
2. Run *git clone https://mydirectory.com/*

- Git supports many transfer protocols (including SSH)
- Remember, you are creating a standalone copy of the entire project.

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The Basic Git Work Flow

1. Synchronize Your Repo (git pull)
2. Make Changes to Your Code
3. Stage Changes for Commit (git add)
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- Modified files have been changed on your computer, but they are not in the database yet.
- Staged files means that you have tagged a modified file to be included in the next commit.
- Committed files are safely stored in your local database.

The Basic Git Work Flow

In order to determine which files are in which state, you can use (most to least detail):

1. *git diff* (unstaged changes only)
2. *git status*
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What is Branching?

- Pretty much every version control system has some form of branching. This means that you diverge from the main line of development and continue to do work without changing the main line.
- Usually this is an expensive process because you have to copy all of the source code in the directory into a new branch.
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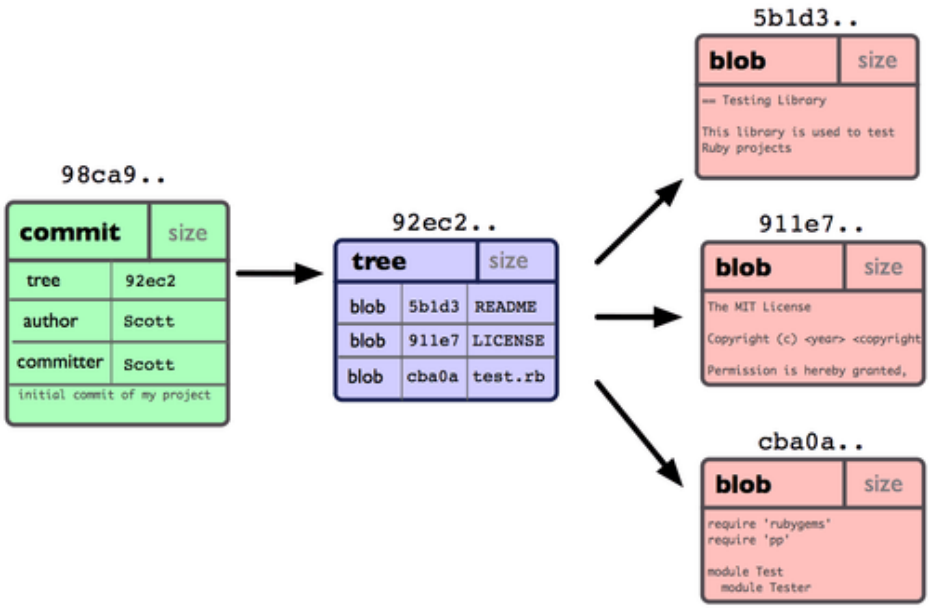

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Git Branches

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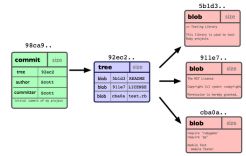

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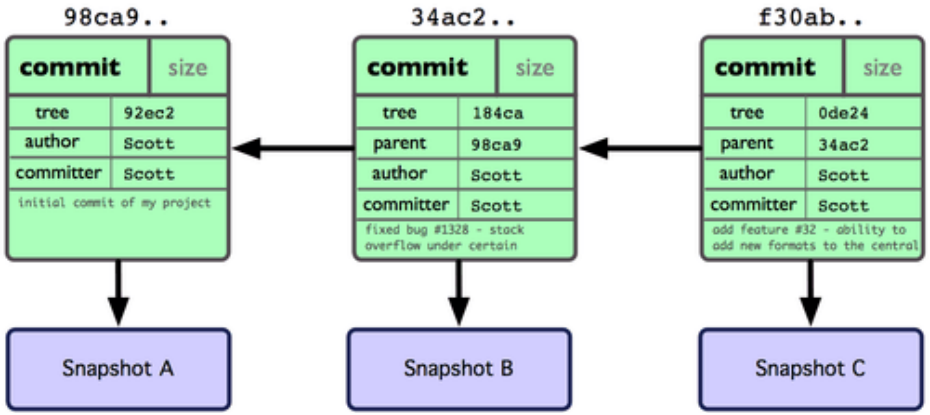


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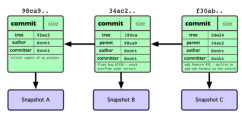


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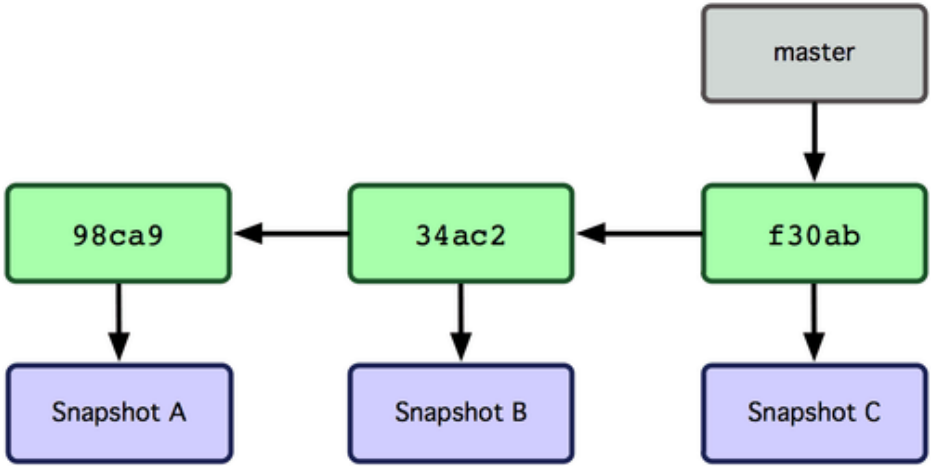

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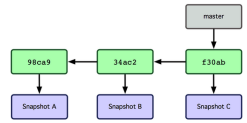

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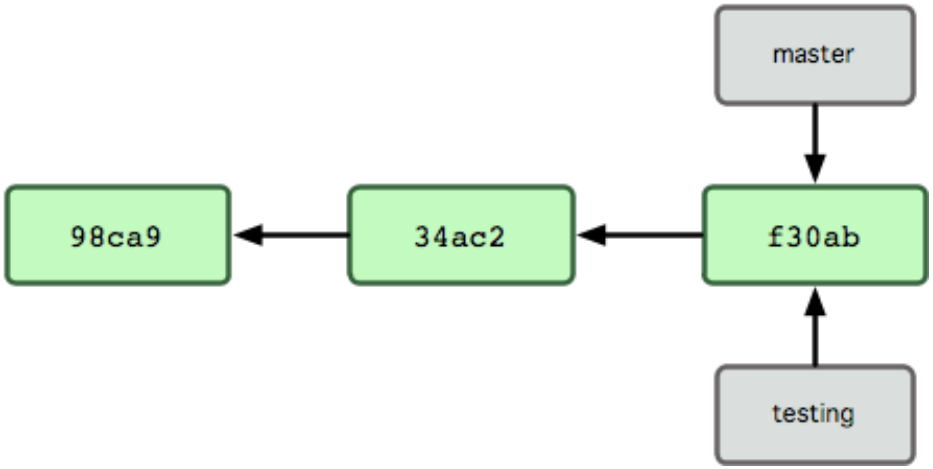

git branch testing

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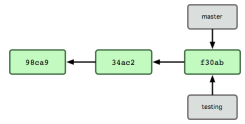

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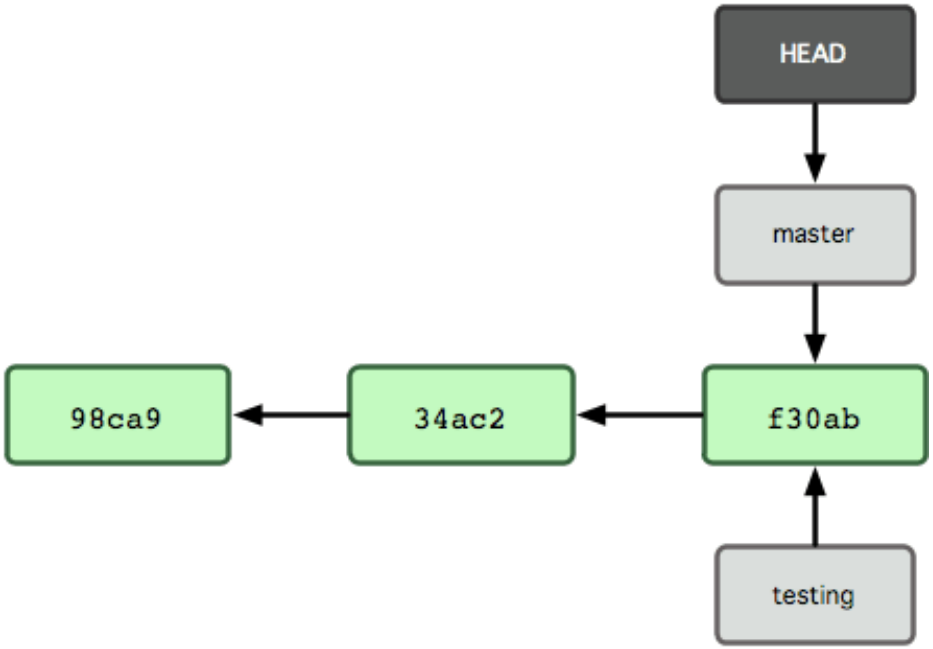

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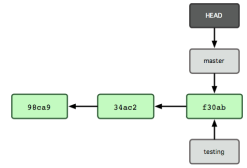

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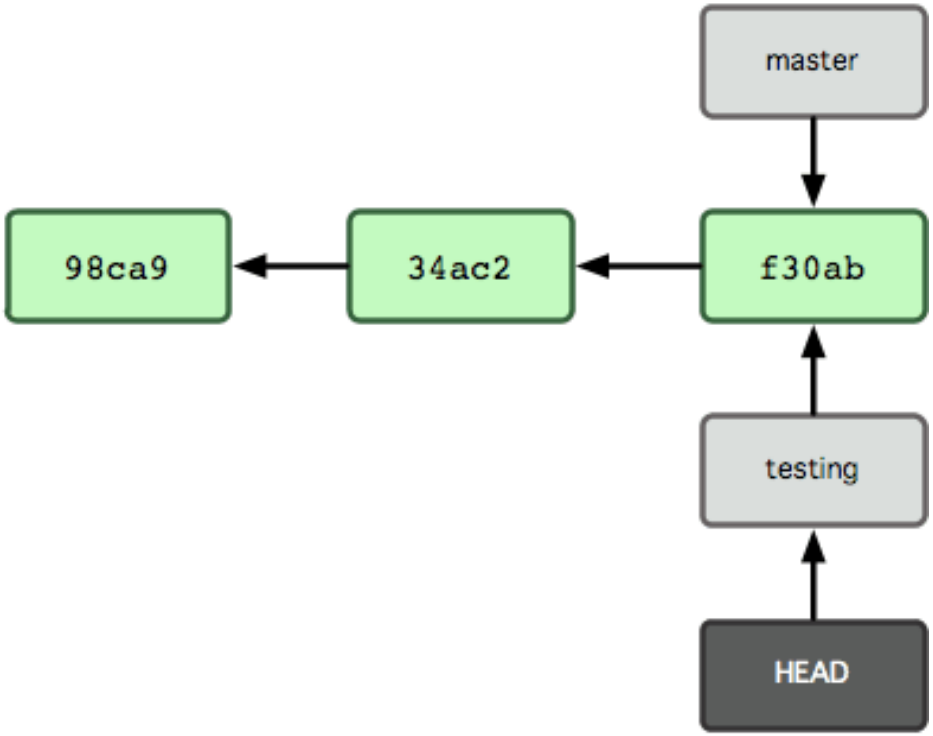

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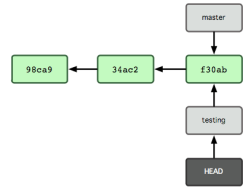

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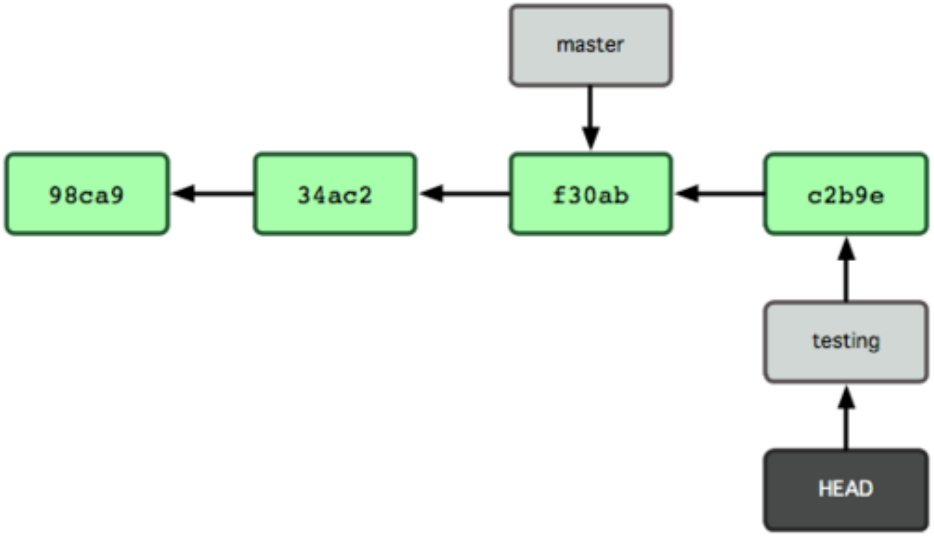


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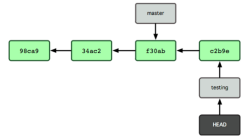


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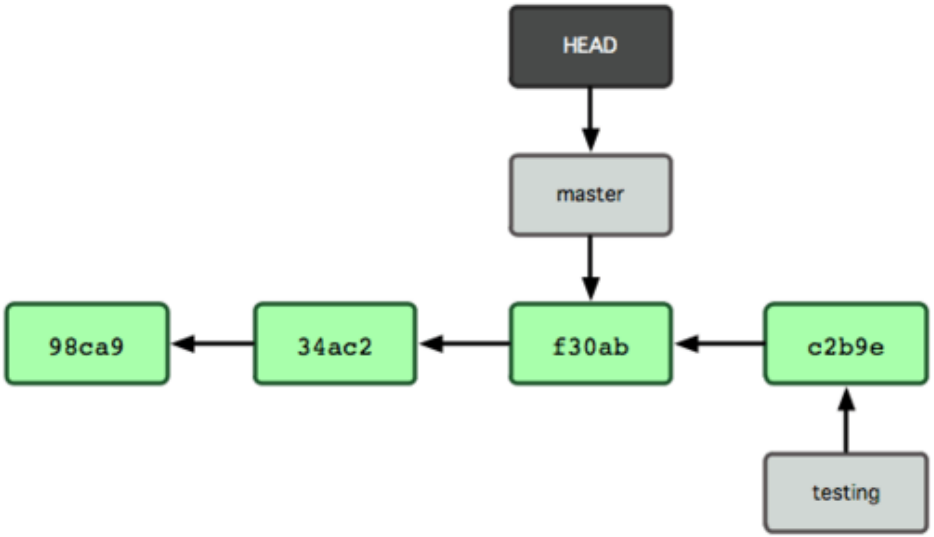

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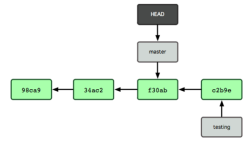

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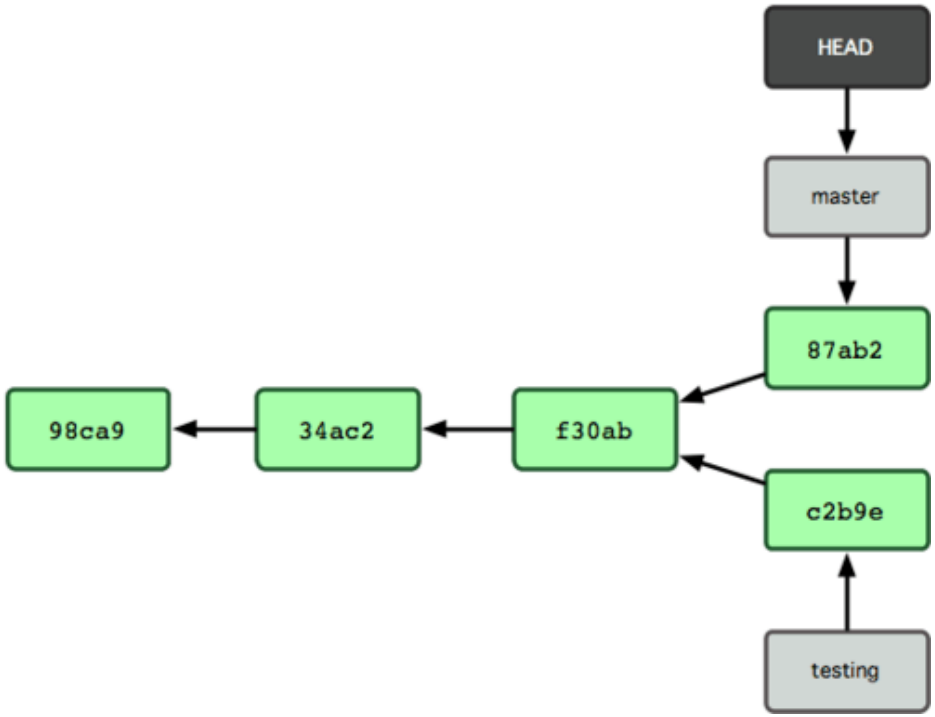

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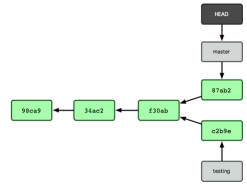

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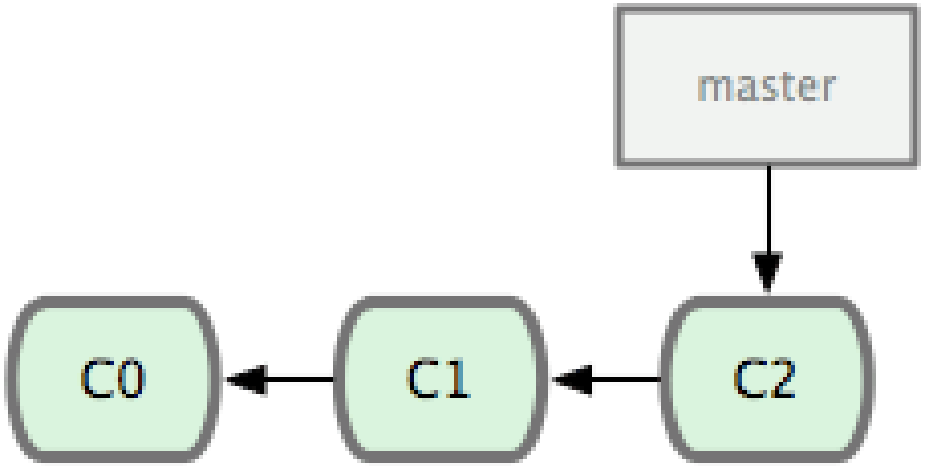

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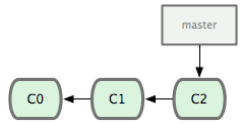

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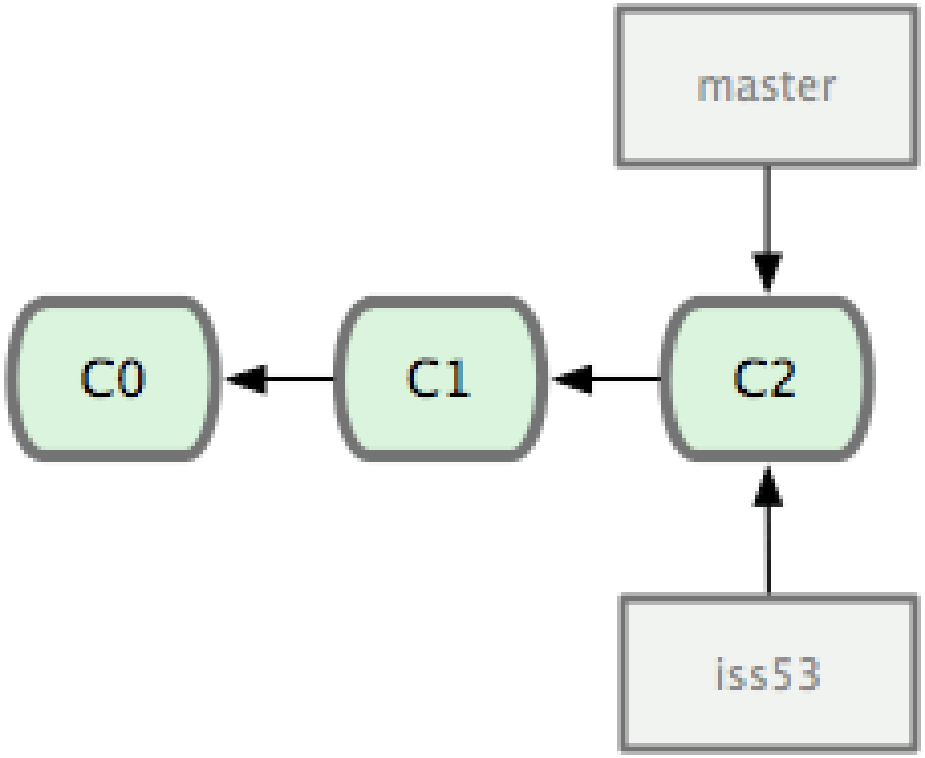

git checkout -b iss53
(git branch iss53; git checkout iss53)

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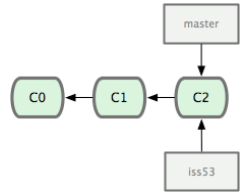

git checkout -b iss53
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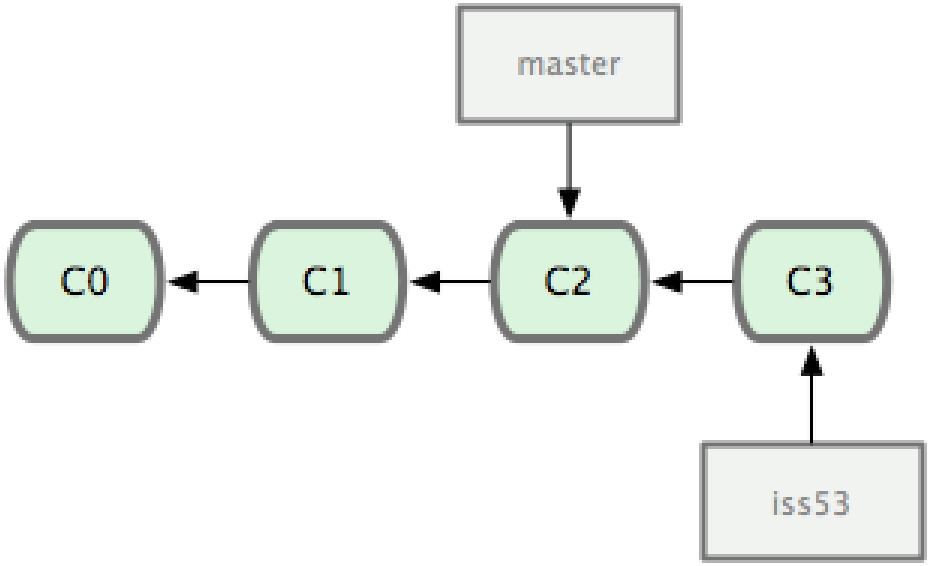


```
# Add code to iss53
git -a commit
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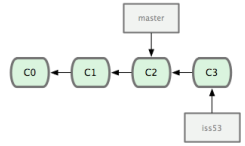


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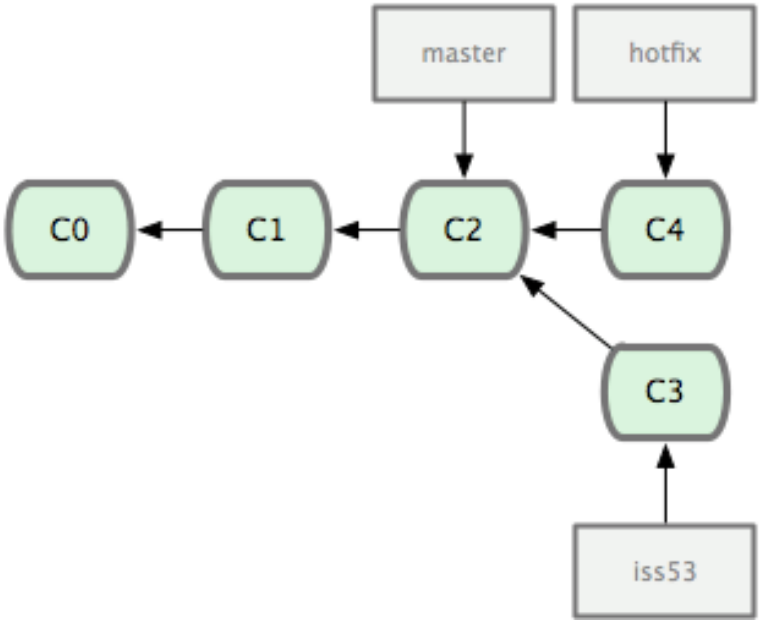

git checkout master
git checkout -b hotfix
Add code to hotfix
git -a commit

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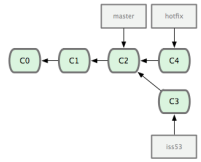

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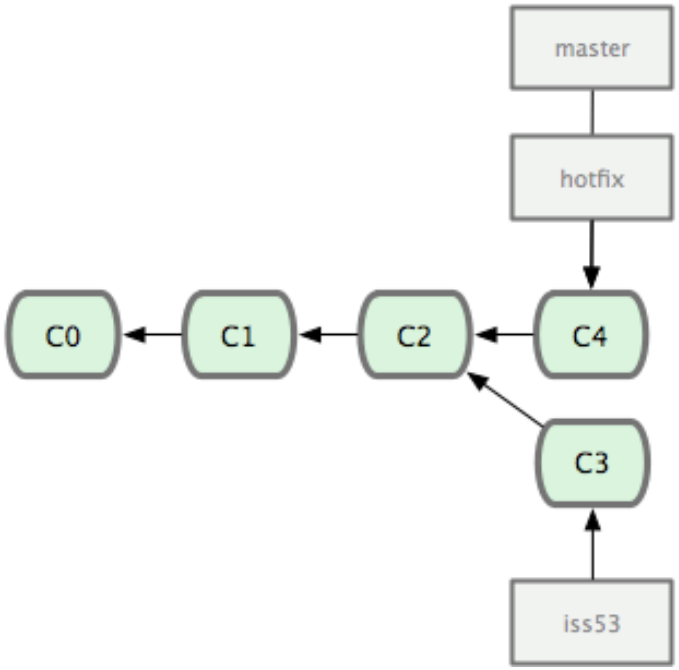

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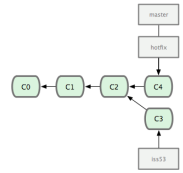

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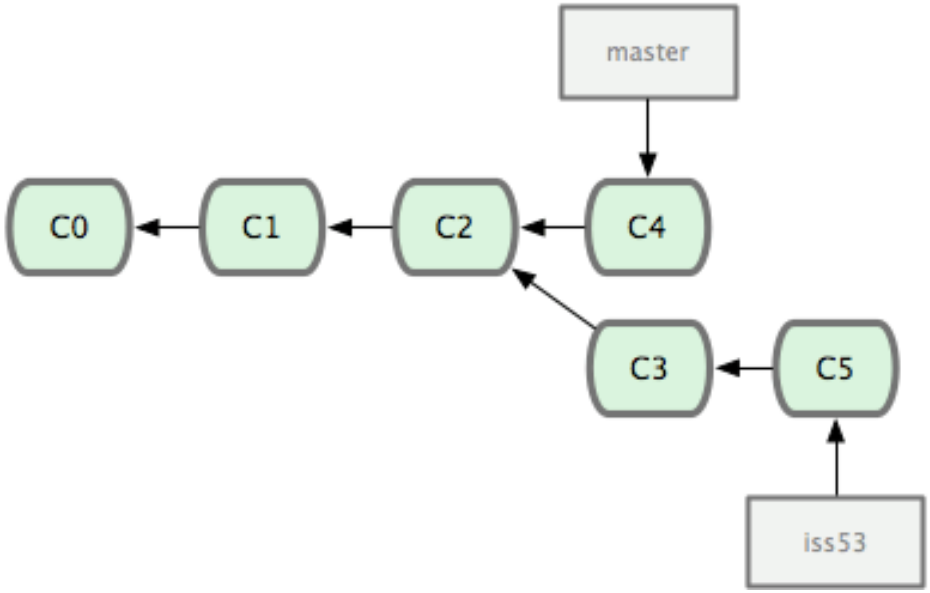


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git branch -d hotfix
git checkout iss53
# Add code to iss53 branch
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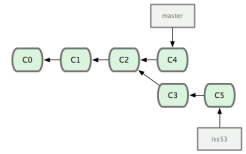


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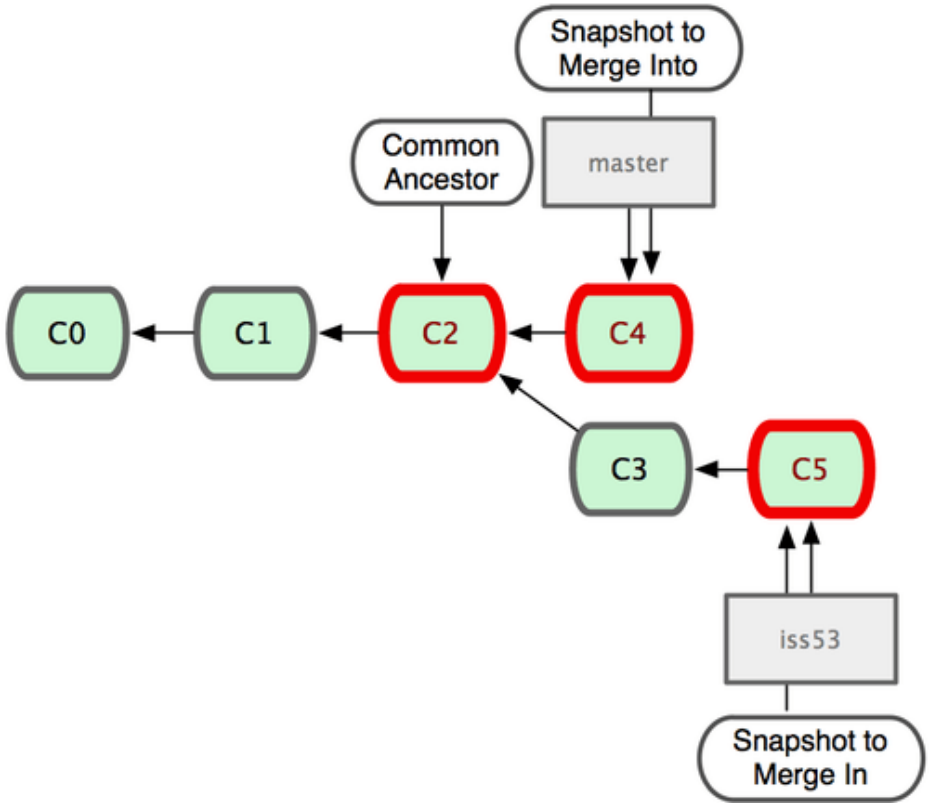
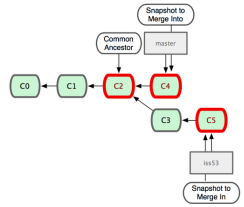


We want to merge iss53 to master

Version Control Workshop: Git and GitHub (Day 1)

Git Branches

How Does Merging Work?



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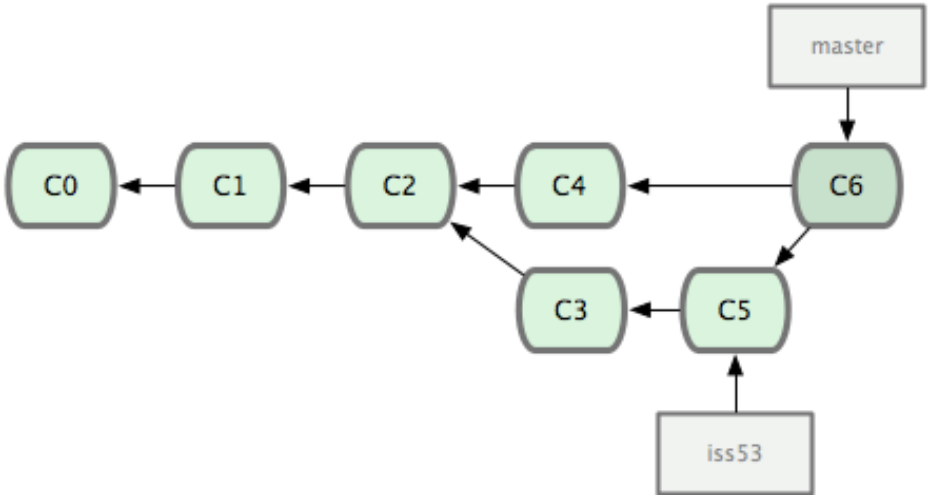

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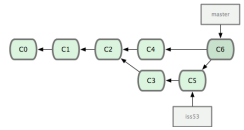

git checkout master
git merge iss53

Merge Conflicts

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Auto-merging index.html
CONFLICT (content): Merge
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- *git status* is useful in these cases

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Merge Conflicts

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<<<<<<< HEAD:index.html
<div id="footer">contact :
email.support@github.com</div>
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<div id="footer">
 please contact us at
support@github.com
</div>
>>>>>>> iss53:index.html
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The "=======" divides the two types of code.

Merge Conflicts


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Deleting a File (rm vs. git rm)

- If you delete a file in your filesystem, you still need to commit your changes with *git add file_removed*.
- Or you can use *git rm file_name*.

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- More discussion at: http://stackoverflow.com/questions/7434449/why-use-git-rm-to-remove-a-file-instead-of-rm

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If you want to delete a file that has been staged, but not committed use:

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Ok, fine...

- *git commit --amend*

But you are missing the point of version control...

Version Control Workshop: Git and GitHub (Day 1)

Git Delete Commands

Amending Commits

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Remote Repositories

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Pull From Remote Repositories

In order to pull data from a remote repository use:

git fetch some_url
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In order to push data to a remote repository use:

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GitHub Demo

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- Aliases
- Advanced Remote Control
- The --hard Option
- Custom Environments
- Scripting and Extending Git
- And Much More!

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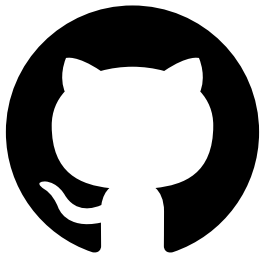

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