RMG Study Group

Basics of Git

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Key URLs

- http://www.github.com/GreenGroup
  - Git repository of all RMG-Py code
- http://greengroup.github.io/RMG-Py/
  - Online version of the current RMG-Py documentation
- http://rmg.mit.edu
  - Official RMG-Py documentation, thermodynamics and kinetics database browser, and web tools
- http://dev.rmg.mit.edu
  - Developmental version of rmg.mit.edu with latest features and potential bugs
  - To use, add 18.172.0.124 dev.rmg.mit.edu to hosts file in your operating system

Git

- Git is a version control tool
  - Multiple users can edit multiple copies of code
  - Single user can create multiple branches for a single repository
- Online detailed tutorial:
  - http://git-scm.com/book
- Where to find programs to help you use git:
  - http://git-scm.com/downloads

Getting started: create a local repo

Two common scenarios: (only do one of these)

a) To **clone an already existing repo** to your current directory:

```
$ git clone <url> [local dir name]
```

This will create a directory named *local dir name*, containing a working copy of the files from the repo, and a **`.git`** directory (used to hold the staging area and your actual repo)

b) To **create a Git repo** in your current directory:

```
$ git init
```

This will create a **`.git`** directory in your current directory.

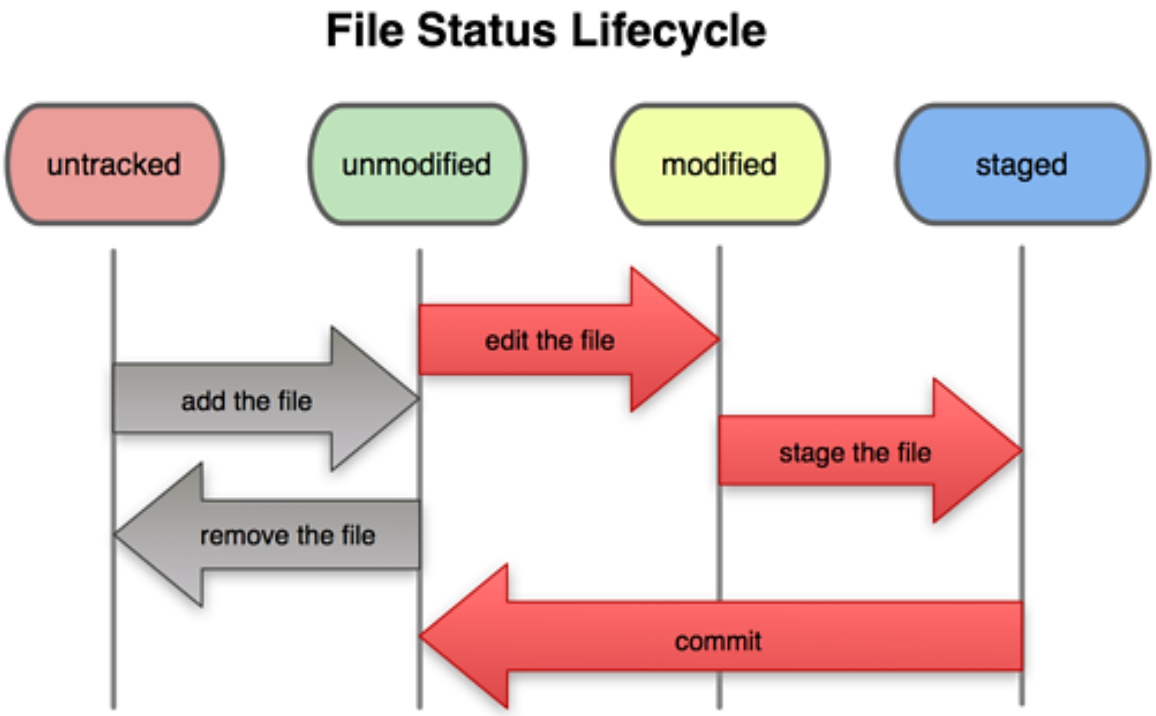
Then you can commit files in that directory into the repo:

```
$ git add file1.java
$ git commit –m “initial project version”
```

Basic Git Workflow

1. **Modify** files in your working directory.
2. **Stage** files, adding snapshots of them to your staging area.
3. Make a **commit**, which takes the files as they are in the staging area and stores that snapshot permanently to your Git directory.

Git file lifecycle



Notes:

If a particular version of a file is in the **git directory**, it's considered **committed**.
If it's modified but has been added to the **staging area**, it is **staged**.
If it was **changed** since it was checked out but has not been staged, it is **modified**.

Local Commits

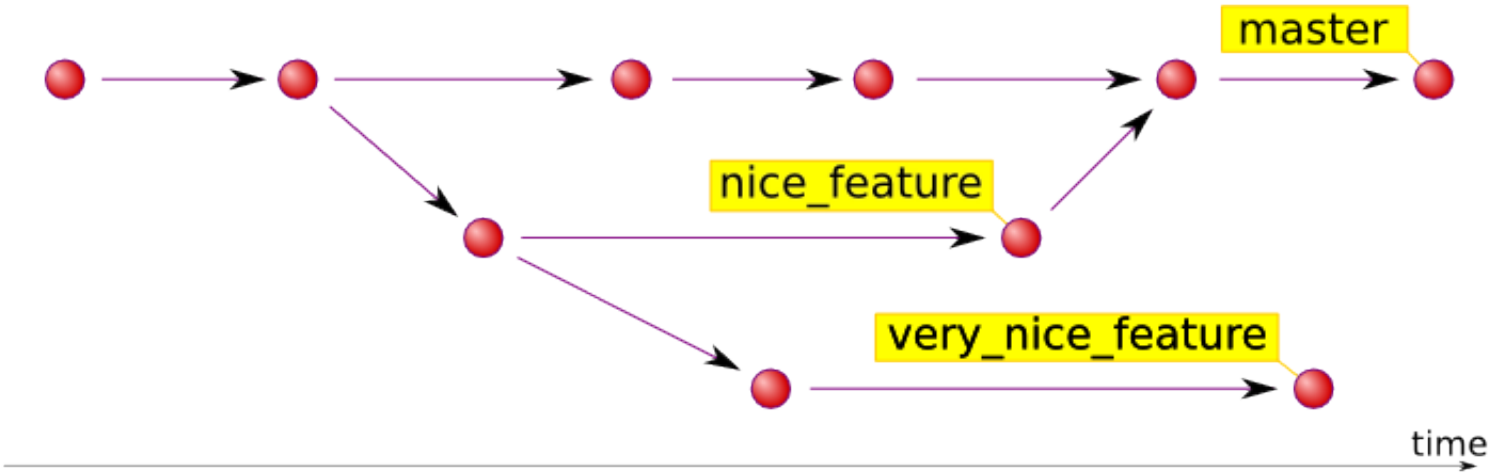
1. ‘git status’ to check which files are modified
   - ’git diff <filename>’ shows line-by-line changes
2. ‘git add <filename>’ stages all desired files
3. ‘git commit’ creates new snapshot of staged files and adds to the history
4. ‘git log’ pulls up history of branch; should see your latest commit

Writing Commit Messages

- **First line** is <80 character **summary**
- Followed by **detailed description**
  - List of all additions/changes
  - Motivation
  - Implementation details
- Examples of bad git messages:
  - “Typo”
  - “Add database entries”
- After saving message a unique commit string is created for each entry

Git Branches

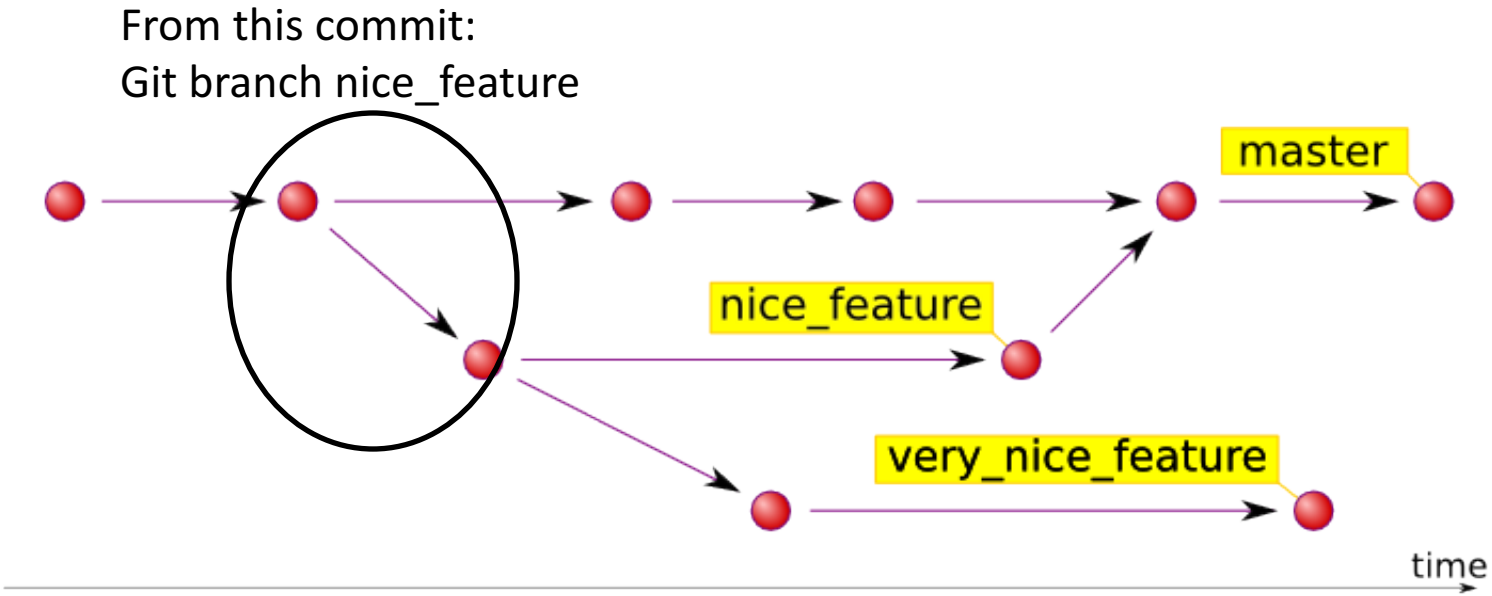
- Branches start a new history to make experimental features



- Allows experimentation without fear of “messing up the code”

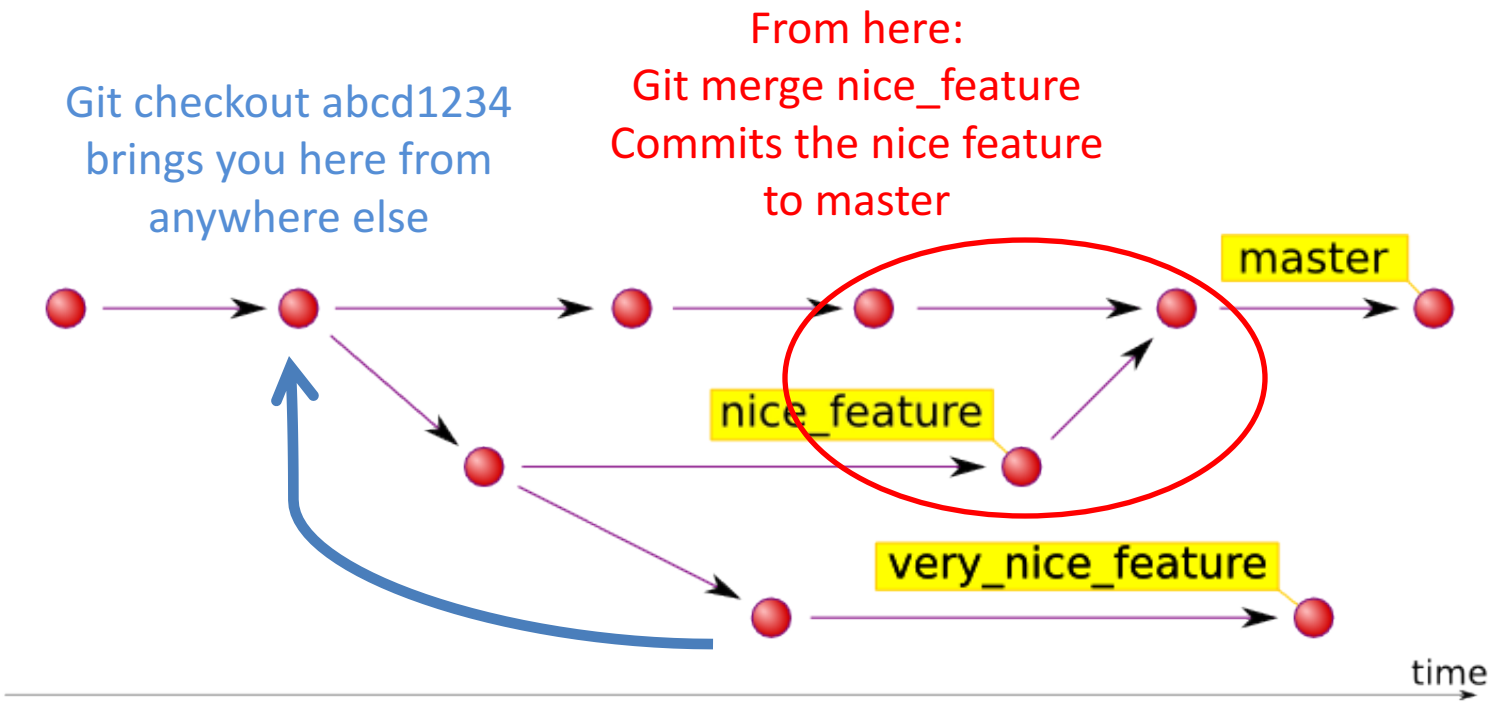
Commands used with Branches

- Git branch: pulls up a list of all the branches
- Git branch <new branch>: forks a new from the current head



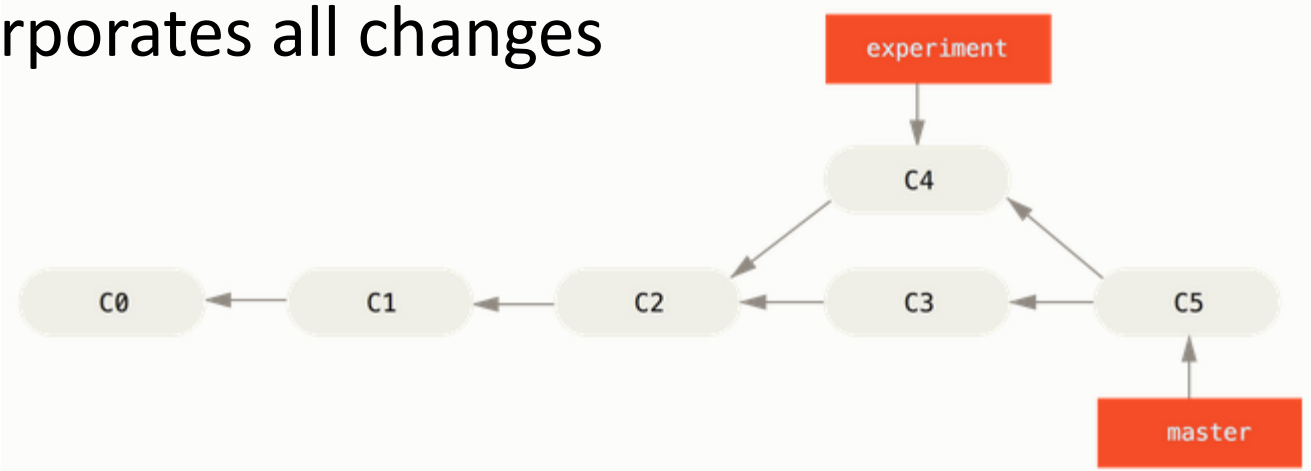
Commands used with Branches

- Git checkout <location>: moves the head to location (can be a commit string or branch name)
- Git merge <branch>: merges all commits from branch

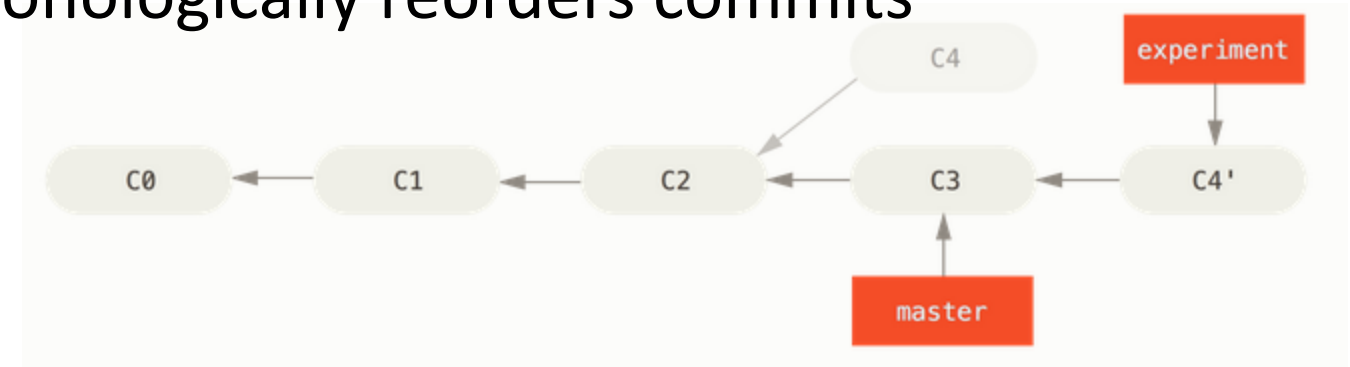


Advanced History Control: Rebase

- Normally when merging: make a new commit that incorporates all changes



- From experiment: Git rebase master merges and chronologically reorders commits



Full Control: Git rebase interactive

- Git rebase –i <commit string>: opens interactive GUI that allows full rewriting of history
  - Delete or reorder commits
  - Squash commits together
  - Make changes to a commit
  - Rewrite commit messages
- **WARNING**: do not use this to rewrite history you have pushed to official

Green Group Repos

Official Green Group Repo

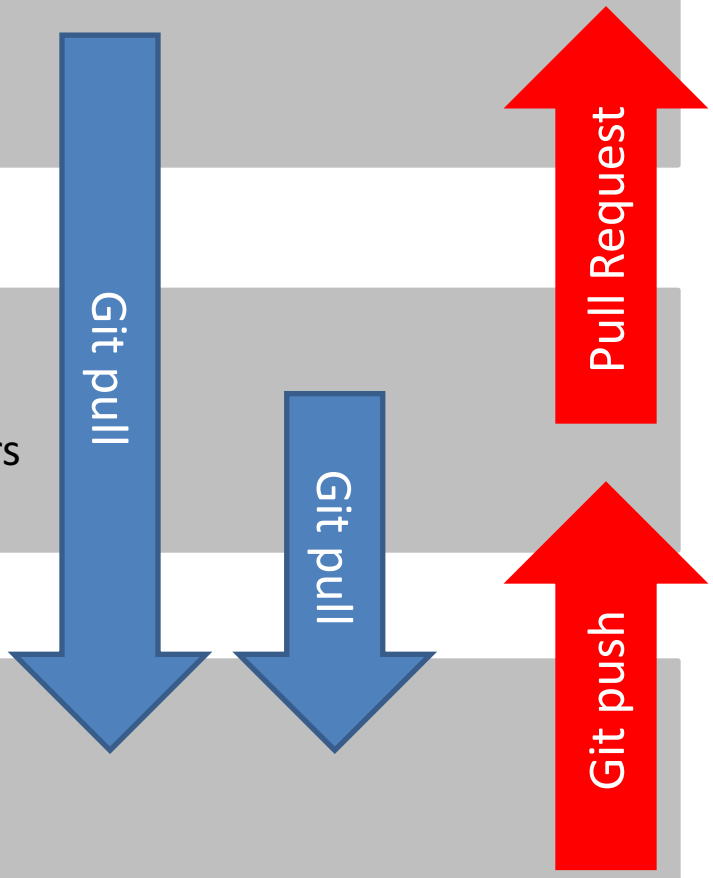
- https://github.com/GreenGroup/
- For official distribution

Personal Github Repo

-Sharing developments with other users
-Back up of in-progress code

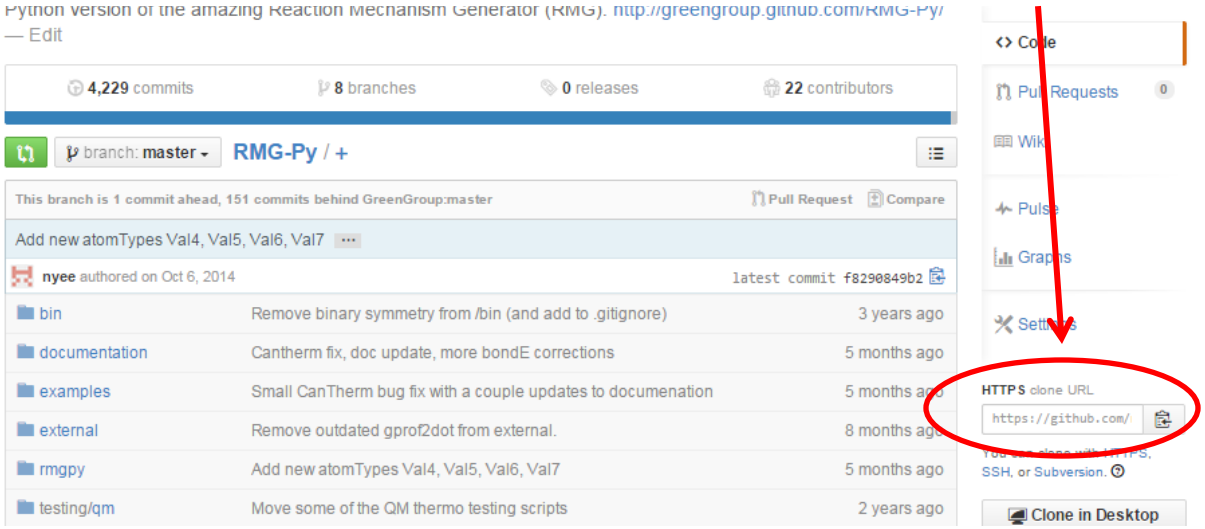
Local Repositories

-Running jobs
-Code development and debugging



Setting up Remote Repos

- Git remote add <remote name> <url>



- If you originally forked from GreenGroup official:
  - **Git remote rename origin official**
  - Create your own fork on Github and name origin

Pulling/Pushing Commits

- Each repo has its own branches
- Commands for pulling and pushing call branches
  - **Most common call**: git pull official master
  - For pushing: git push origin new_feature
- Good idea to try to keep branch names consistent

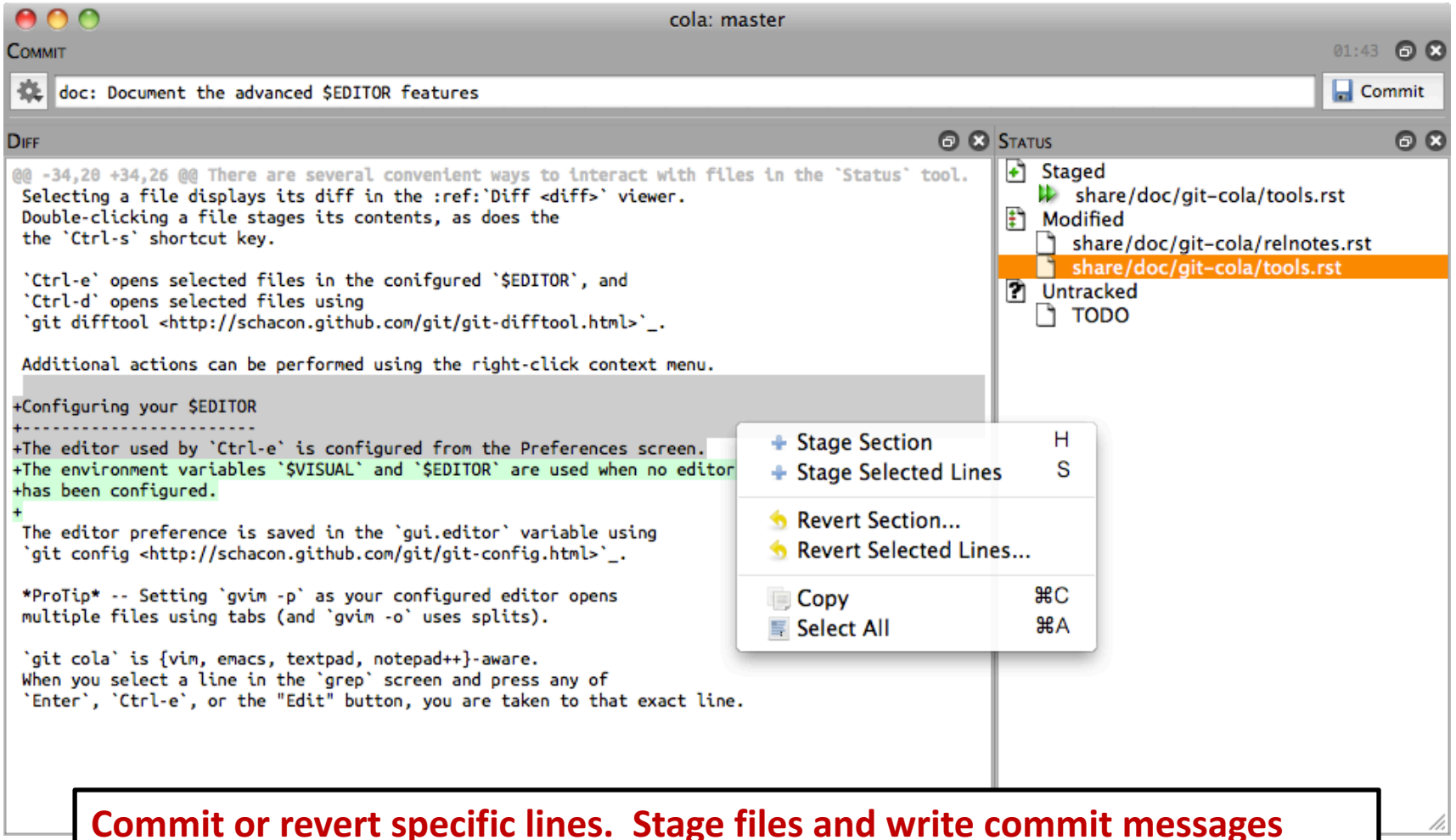
Keeping Official Repo Clean

- To push a commit to official:
  1. Clean up your commit history with **Git rebase –i <first new commit>**
  2. Check that your current commit is updated up to the official **Git pull –rebase official master**
  3. Push to your personal GitHub repo: **Git push origin new_feature**
  4. Make formal **pull request** from your GitHub Repo

Common Git commands

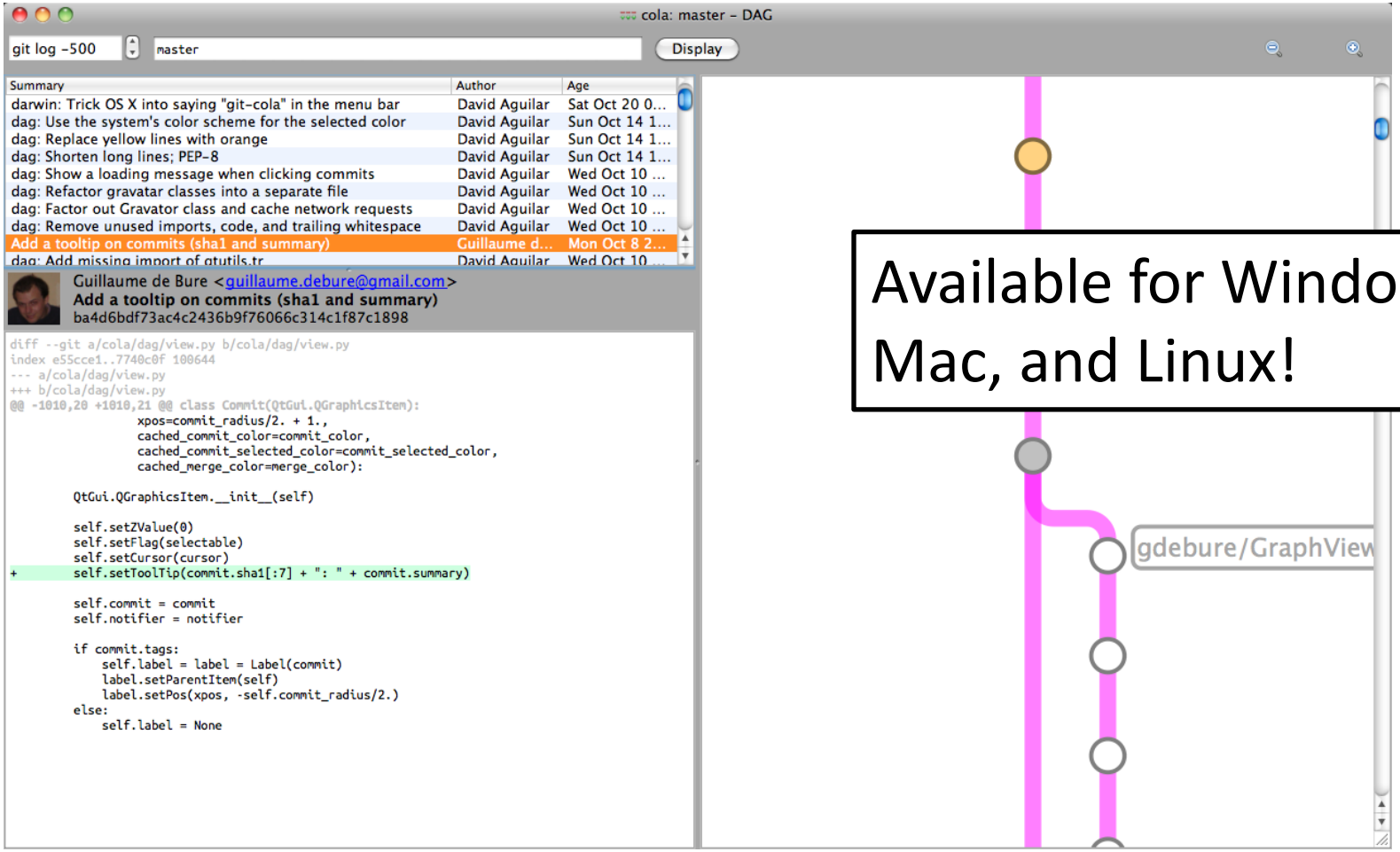
command	description
`git clone` ***`url [dir]`***	copy a git repository so you can add to it
`git add` ***`files`***	adds file contents to the staging area
`git commit`	records a snapshot of the staging area
`git status`	view the status of your files in the working directory and staging area
`git diff`	shows diff of what is staged and what is modified but unstaged
`git help` ***`[command]`***	get help info about a particular command
`git pull`	fetch from a remote repo and try to merge into the current branch
`git push`	push your new branches and data to a remote repository
others: `init, reset, branch, checkout, merge, log, tag`	

You can do all of this using Git-cola: a powerful GUI interface



Commit or revert specific lines. Stage files and write commit messages graphically. Amend commits.

Git-cola: a powerful GUI nterface



Visualize past commit history and repository branches. (Great for tracking specific code changes.)