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Let’s go

The bridge to possible

Get into Git!

The Advanced guide to Git commands

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DVNET - 2123

Agenda

- 2min git refresher
- Merging and Pull Request
- Interactive Rebase
- Recovering Deleted Commits
- Submodules
- Search and Find
- Resources

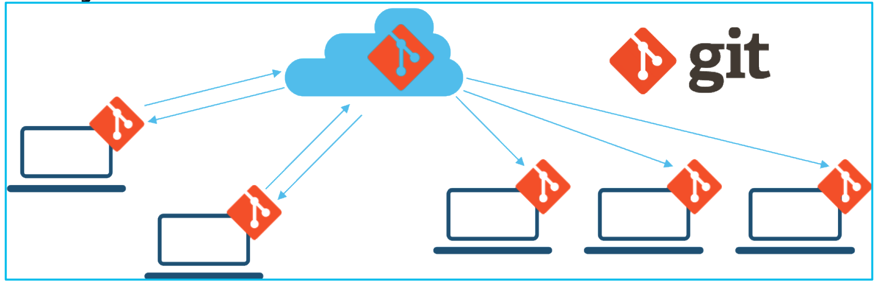
What is Git?

Git

- An open-source distributed version control system
- Designed with performance, security, and flexibility in mind
- Stores snapshots of the full file instead of diffs
- Changes are stored in trees
- Trees contain changed files
- Commits contain trees

Git vs. GitHub

- GitHub is a commercial company, that runs GitHub.com based on Git Version Control System

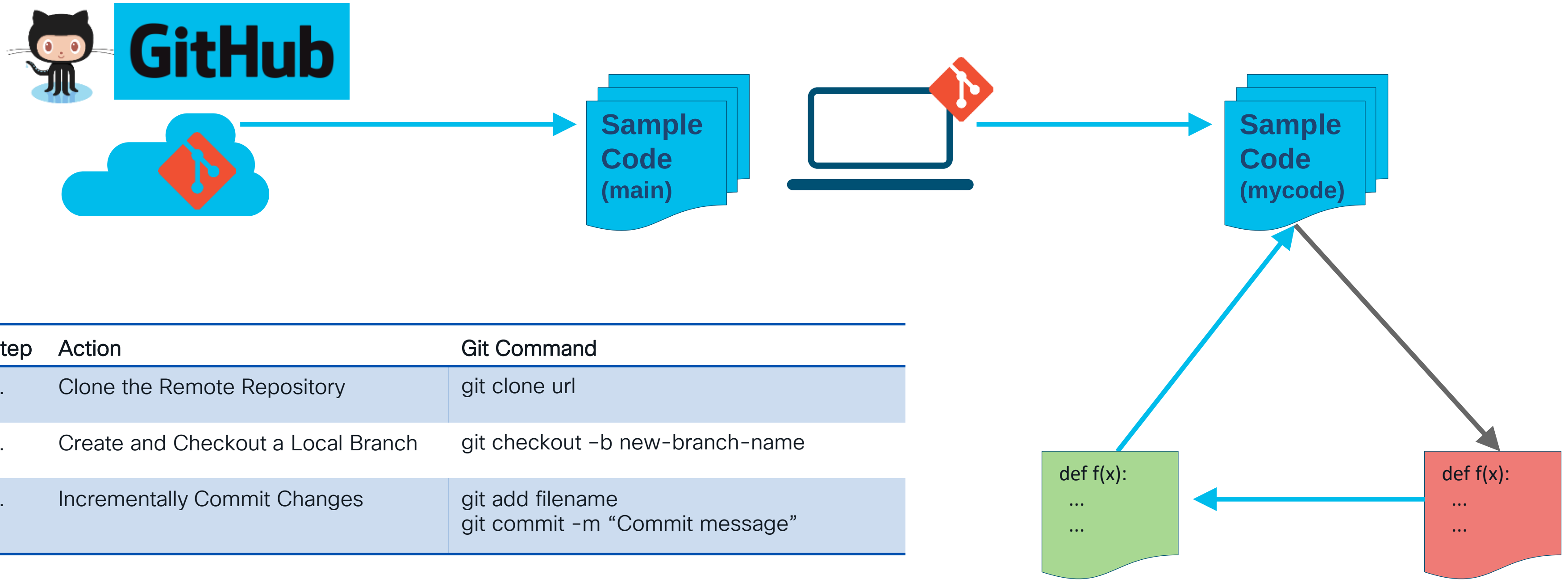


Git: Technical Overview

Useful Git Commands

Action	*What it does*	***Command***
Setup	Tell git who you are *one-time setup*	*> git config --global user.name “your name”* *> git config --global user.email your@email.com*
Clone	Clone (“download”) a git repository	*> git clone <ur>*
Status	Check the Status of your local repository	*> git status*
Checkout A Branch	Create and Checkout a local Branch *Creates a “safe place” for your changes*	*> git checkout –b new-branch-name*
Add	Add a file to your next commit.	*> git add filename*
Commit	Commit your changes.	*> git commit –m “Your commit message.”*
Checkout A File	Check-out a file from the last commit. *Reverts any changes you have made and restores the last committed version of a file.*	*> git checkout filename*

DevNet Sample-Code Workflow



Step	Action	Git Command
1.	Clone the Remote Repository	git clone url
2.	Create and Checkout a Local Branch	git checkout -b new-branch-name
3.	Incrementally Commit Changes	git add filename git commit -m “Commit message”

Merge & PR

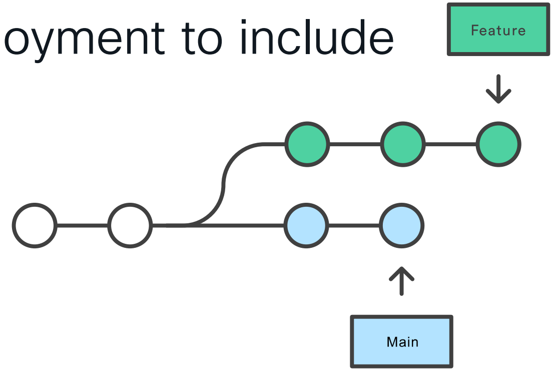
Merging

- Merging is designed to integrate changes from one branch into another branch

Use Case

- Multi-site Python deployment automation in the main branch
- The Main branch also contains a newly added Meraki deployment script
- The Feature branch needs to expand on Meraki deployment to include camera option for the new site

A forked commit history



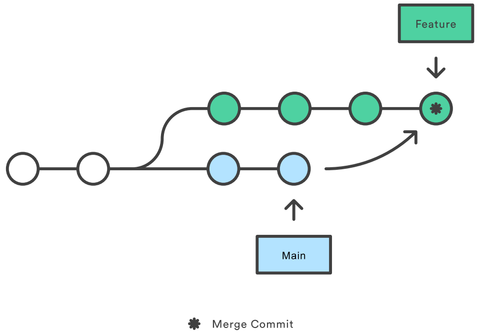
Merge - Steps

```
git checkout feature
git merge main
```

OR

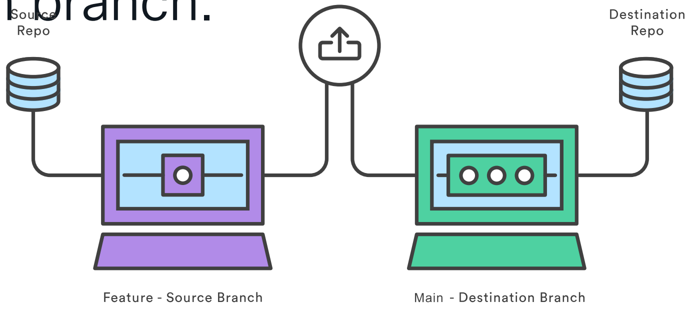
```
git merge feature main
```

- Merging is a non-destructive operation
- Existing branches are not changed in any way
- **Feature** branch will have irrelevant commits
- Can be difficult for developers to understand features added to branch



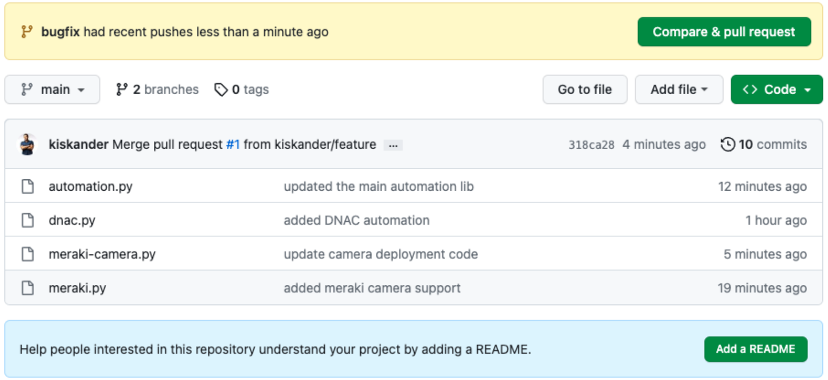
Pull Request

- Pull requests are a mechanism for a developer to notify team members that they have completed a feature.
- Once their feature branch is ready, the developer files a pull request via their GitHub account
- This lets everybody involved know that they need to review the code and merge it into the main branch.



Pull Request - Steps

```
git push origin feature
```


bugfix had recent pushes less than a minute ago

kiskander Merge pull request #1 from kiskander/feature ... 318ca28 4 minutes ago 10 commits

automation.py	updated the main automation lib	12 minutes ago
dnac.py	added DNAC automation	1 hour ago
meraki-camera.py	update camera deployment code	5 minutes ago
meraki.py	added meraki camera support	19 minutes ago

Help people interested in this repository understand your project by adding a README.

Use Case

- Let's take our Meraki cameras **Feature** branch
- I've made changes, commits and I'd like to notify **Main** branch owners
- **Feature** branch is to become the base code in **Main**

Interactive Rebase

Interactive Rebase

A Tool for Optimizing & Cleaning up Commit History

- Change a commit's message
- Delete a commit
- Reorder commits
- Combine multiple commits into one
- Edit/Split an existing commit into multiple new ones

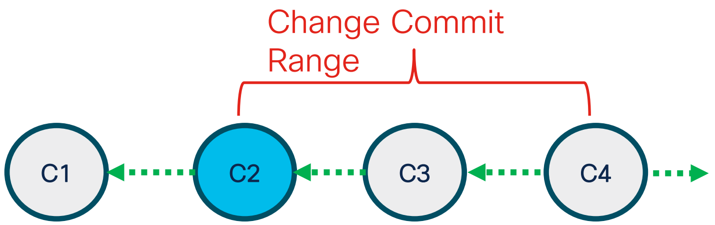
⚠ DO NOT use Interactive Rebase on commits that you've already pushed/shared on remote repo!

Interactive Rebase

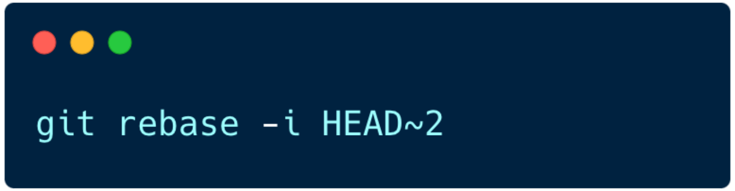
Use Case

- You are working on the **Feature** branch to expand Meraki automation
- You have been making commits ever function you write
- You are ready to merge into **Main** branch
- You have realized:
  1. "Over Commit-ted" - get it?
  2. Commit messages aren't cutting it

Interactive Rebase - Steps



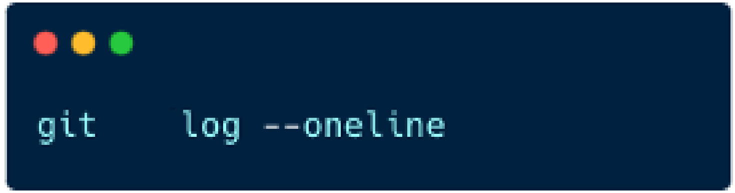
1. How far back do you want to go?

2.


```
git rebase -i HEAD~2
```

3. Determine action to apply to your commits

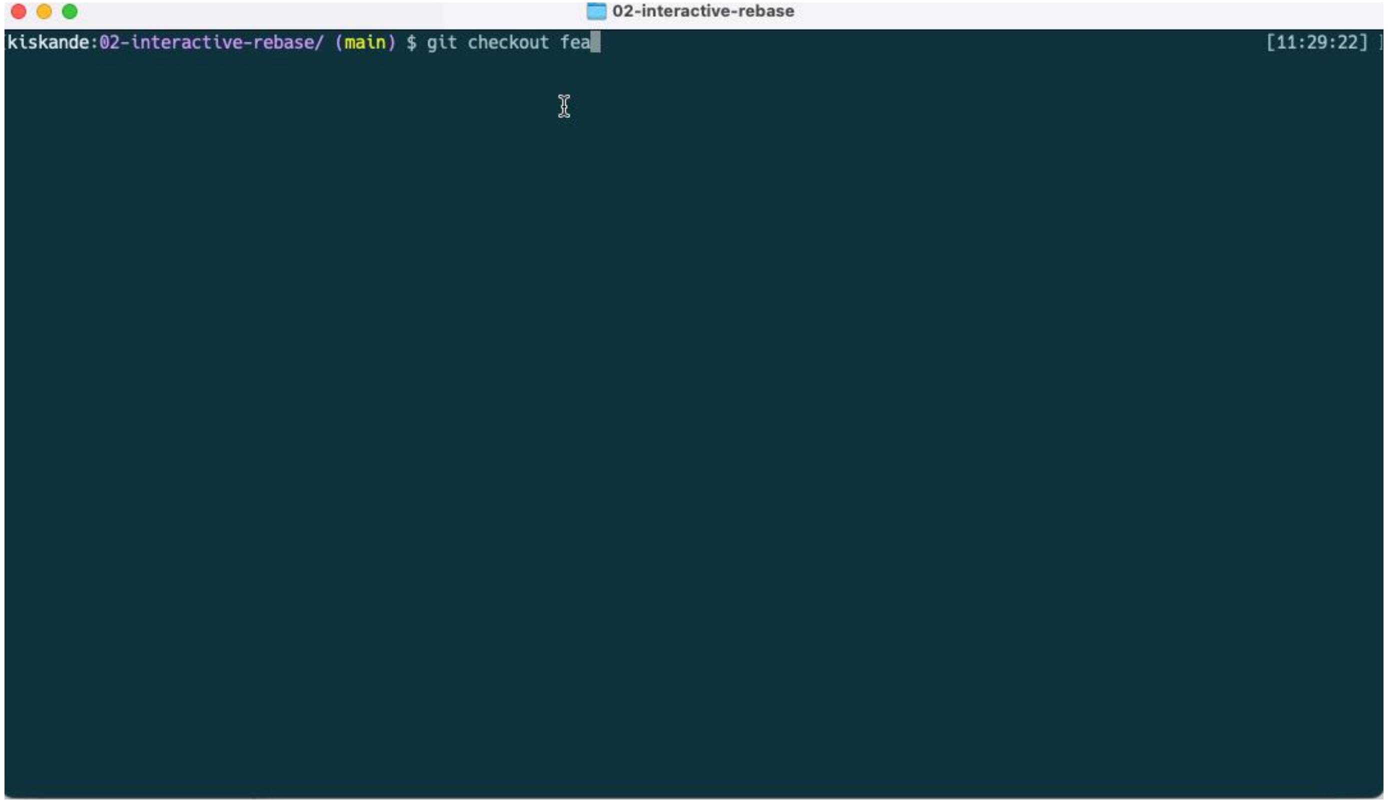
4. Make changes & save

5.


```
git    log --oneline
```

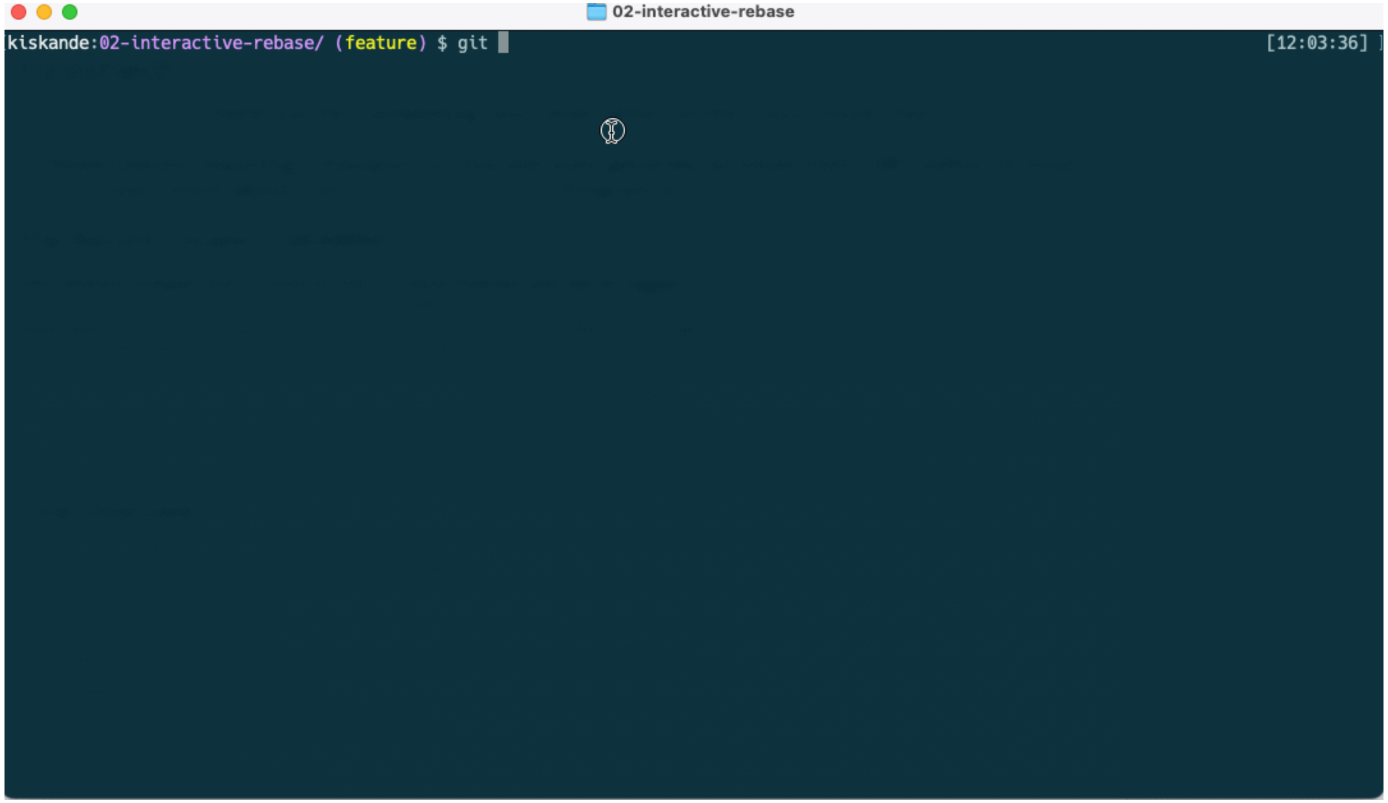
Let’s try it!

Interactive Rebase - Reword


02-interactive-rebase

```
kiskande:02-interactive-rebase/ (main) $ git checkout fea                                                    [11:29:22]
```

Interactive Rebase - Squash



02-interactive-rebase

```
kiskande:02-interactive-rebase/ (feature) $ git                                   [12:03:36]
```

Cherry Picking 🍒

Cherry Picking 🍒

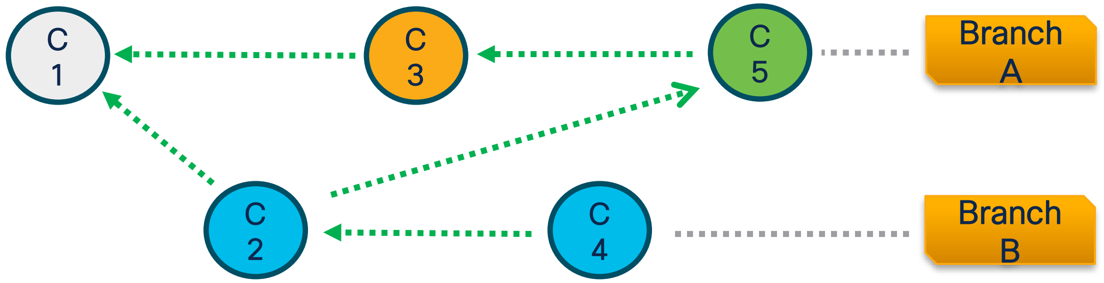
Use Case

- You are working on the **Feature** branch to expand your Meraki site automation
- You have made a commit on the **Feature** Branch
- You noticed you are working in the **Main** Branch
- The commit does not belong in **Main** .. Yet
- What to do??

Cherry Picking

Integrate Single, Specific commit

- Cherry Picking allows you to select individual commits
- Cherry Picking integrate specific commits to Branch
- Only Commit C2 from Branch B to integrate into Branch A



Cherry Picking - Steps

1. While on **Main** Grab the commit hash

```
git    log --oneline
```

2. Checkout the **Feature** branch

```
git checkout Feature
```

3.

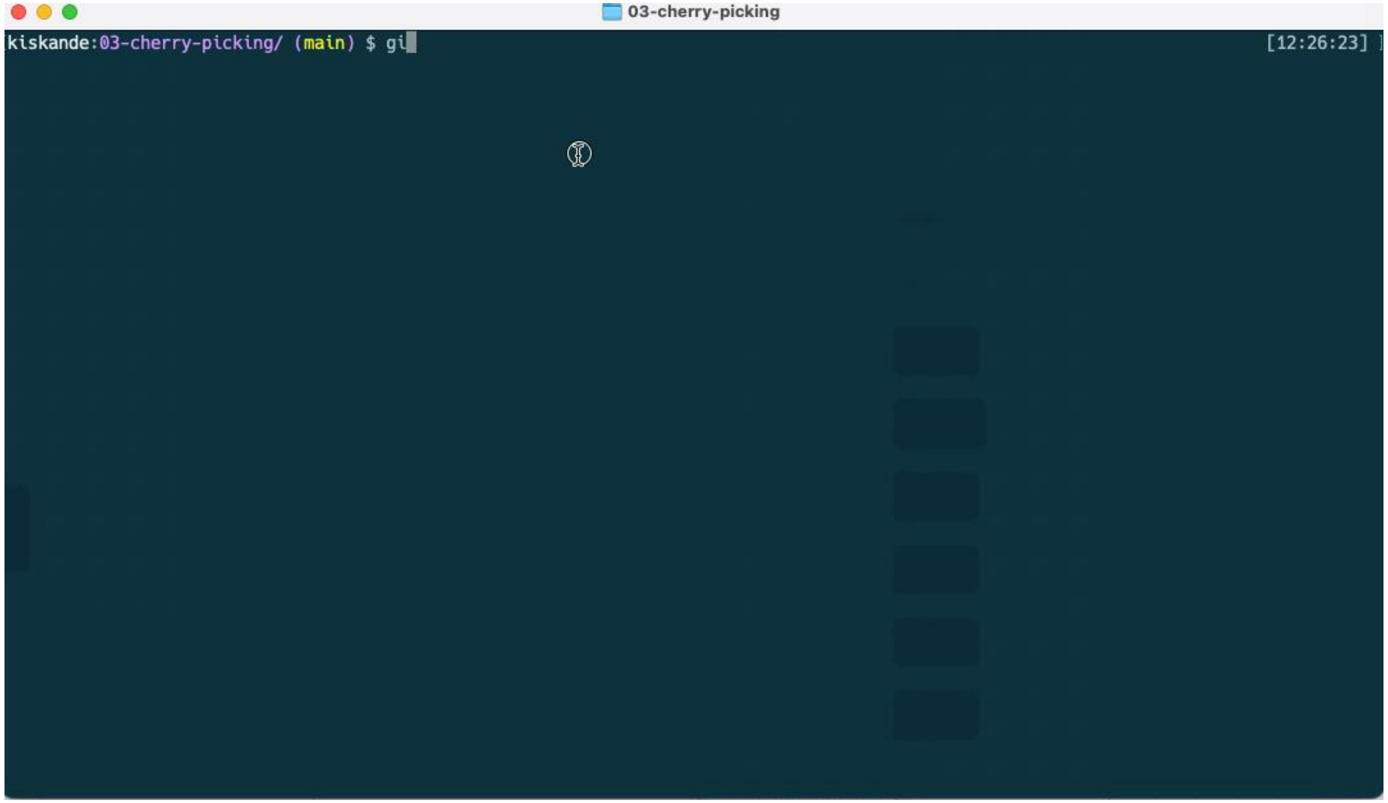
```
git cherry-pick a827df1
```

4. Clean up **Main**

```
git checkout main
git reset --hard HEAD~1
```

Let’s try it!

Interactive Rebase - Squash

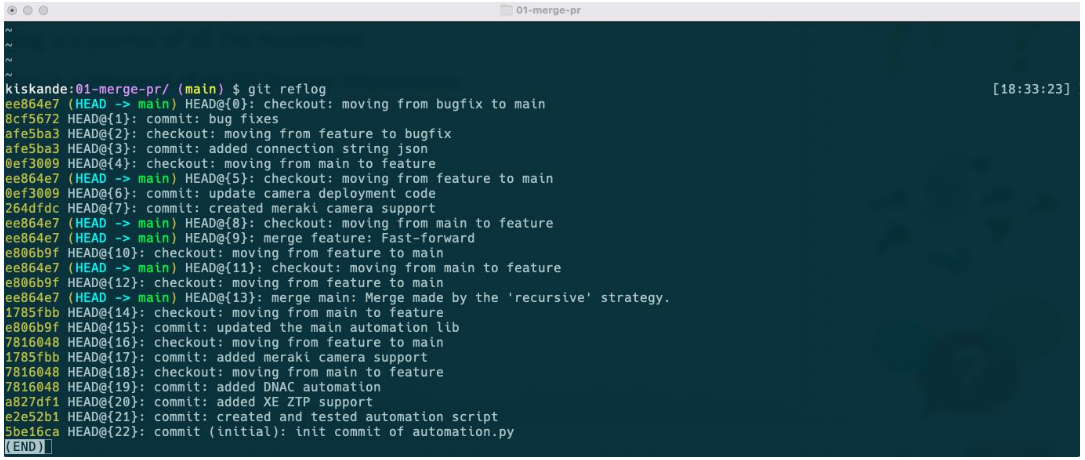


```
kiskande:03-cherry-picking/ (main) $ gi                                    [12:26:23]
```

Reference logs

Reflog

- Reflog is a journal of all the movement
- Reflog is a Protocol of HEAD Pointer Movements
- Merge, Rebase, Cherry Pick, Reset .. All of the movements

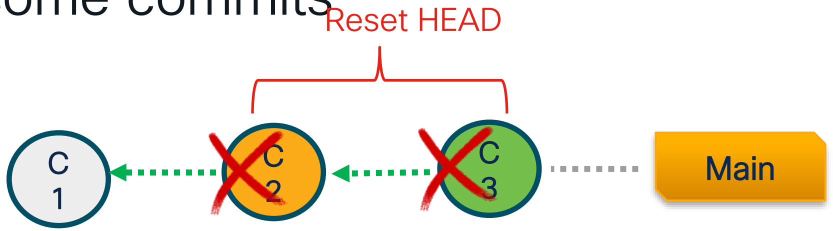


```
~
~
~
~
kiskande:01-merge-pr/ (main) $ git reflog                                                          [18:33:23]
ee864e7 (HEAD -> main) HEAD@{0}: checkout: moving from bugfix to main
8cf5672 HEAD@{1}: commit: bug fixes
afe5ba3 HEAD@{2}: checkout: moving from feature to bugfix
afe5ba3 HEAD@{3}: commit: added connection string json
0ef3009 HEAD@{4}: checkout: moving from main to feature
ee864e7 (HEAD -> main) HEAD@{5}: checkout: moving from feature to main
0ef3009 HEAD@{6}: commit: update camera deployment code
264dfdc HEAD@{7}: commit: created meraki camera support
ee864e7 (HEAD -> main) HEAD@{8}: checkout: moving from main to feature
ee864e7 (HEAD -> main) HEAD@{9}: merge feature: Fast-forward
e806b9f HEAD@{10}: checkout: moving from feature to main
ee864e7 (HEAD -> main) HEAD@{11}: checkout: moving from main to feature
e806b9f HEAD@{12}: checkout: moving from feature to main
ee864e7 (HEAD -> main) HEAD@{13}: merge main: Merge made by the 'recursive' strategy.
1785fbb HEAD@{14}: checkout: moving from main to feature
e806b9f HEAD@{15}: commit: updated the main automation lib
7816048 HEAD@{16}: checkout: moving from feature to main
1785fbb HEAD@{17}: commit: added meraki camera support
7816048 HEAD@{18}: checkout: moving from main to feature
7816048 HEAD@{19}: commit: added DNAC automation
a827df1 HEAD@{20}: commit: added XE ZTP support
e2e52b1 HEAD@{21}: commit: created and tested automation script
5be16ca HEAD@{22}: commit (initial): init commit of automation.py
(END)
```

Reflog

Use Case

- You are working on the **Feature** to expand your Meraki site automation
- You have gone “commit-crazy”
- You think you want to get rid of some commits
- You use “git reset”
- You delete an important commit
- Panic Mode 😱



Reflog - Steps

1. Reflog are in chronological order

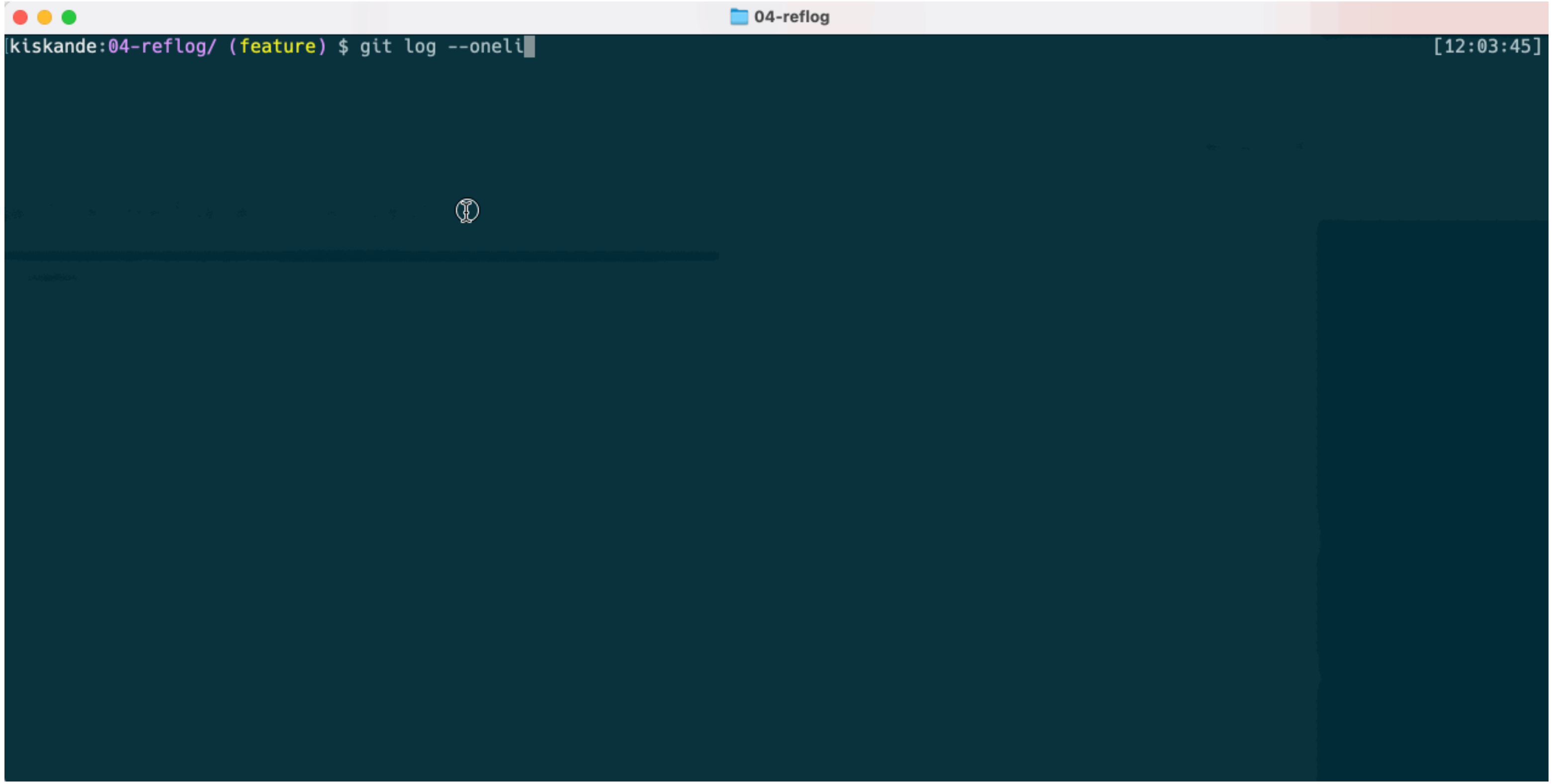
```
git reflog --oneline
```

2. Find the catastrophic reset and copy the state before into new Branch

```
git branch recovery 8cf5672
```

Let’s try it!

Reflog - Recover Commits



```
[kiskande:04-reflog/ (feature) $ git log --oneli                                        [12:03:45]
```

Submodules □

Submodules

- Git Repo inside Git Repo
- Submodule is a standard git repo which means you can add, commit, pull ..
- Difference is that it is nested within a parent repo
- Important to know:
  - Submodule content are not stored in the parent repository
  - Parent repo stores:
    - Submodule remote URL
    - Local path
    - Checked out revision

Submodules

Use Case

- You decided to use Meraki SDK to automate your Meraki Deployment
- SDK needs to be embedded into your **Branch**
- **Option 1 (bad):**
  - Download the SDK , Mix it with your code and treat it as one branch
  - Updating the external code is now a manual process
- **Option 2 (good):**
  - Git Submodules

Submodules - Steps - Local Project

1. Let’s create a subfolder with our library

```
mkdir lib
cd lib
```

2. Grab the library as a Git Submodule

```
git submodule add https://github.com/meraki/dashboard-api-python.git
```

3. View system files

```
cat .gitmodules
cat .git/config
```

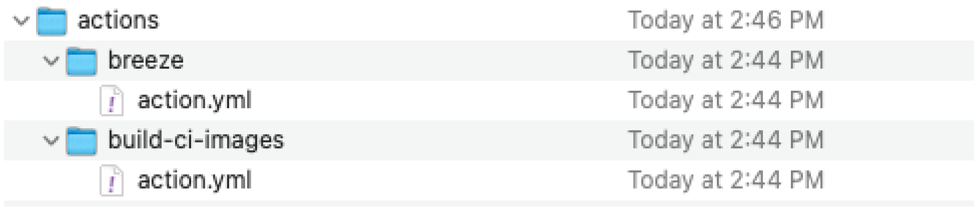
⚠ DO NOT forget to commit the submodule in Parent repo

Submodules - Steps - Cloned Repo

1. Clone Repo with Submodules

```
git clone https://github.com/apache/airflow.git
```

2. Notice the submodules. empty folders



```
actions                    Today at 2:46 PM
  breeze                   Today at 2:44 PM
    action.yml             Today at 2:44 PM
  build-ci-images          Today at 2:44 PM
    action.yml             Today at 2:44 PM
```

3. Populate the submodules

```
git submodule update --init --recursive
```

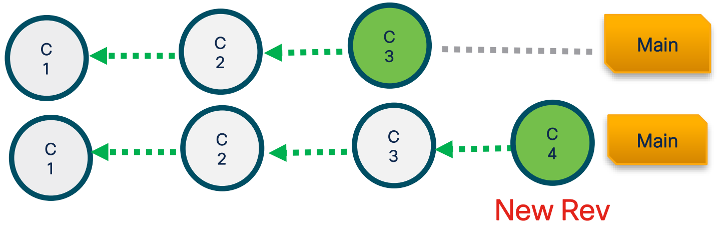
OR

```
git clone --recurse-submodules <url>
```

Submodules - Revision

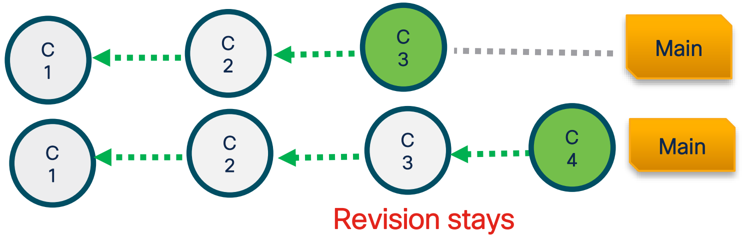
In a “Standard” Git Repo

- You checkout a Branch
- The last commit is your checkout revision
- The new revisions are always the latest commits



In a Submodule Git Repo

- Your last commit is your checkout revision
- You must explicitly update and commit a submodule for the point to move



Search and Find

Search & Find 🔎

Action	*flag*	***Command***
By date	*--before / -- after*	*git log --after="2023-2-1" --before"2023-4-1"*
By message	--grep	*git log --grep="" (Can use Regex)*
By author	--author	*git log --author="Kareem iskander"*
By file	*-- <filename>*	*git log -- README.md*
By branch	<branch-A>	*git log feature..main (in main but not in feature)*

Resources

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