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# Let's go

The bridge to possible

# Get into Git!

## The Advanced guide to Git commands

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DEVNET-2123

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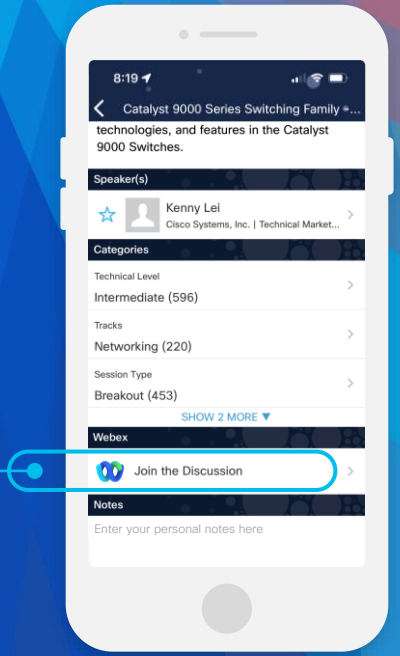


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# Agenda

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

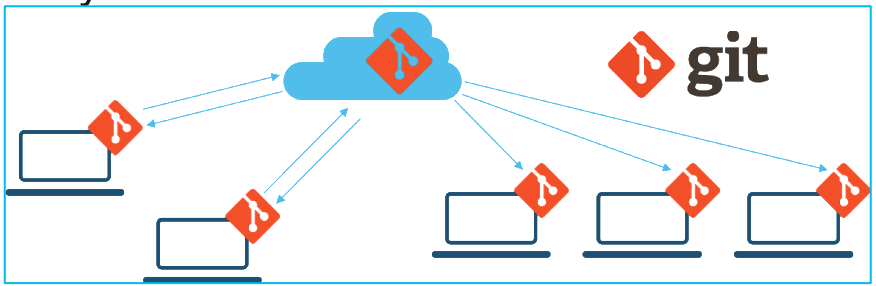
# What is Git?

# 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

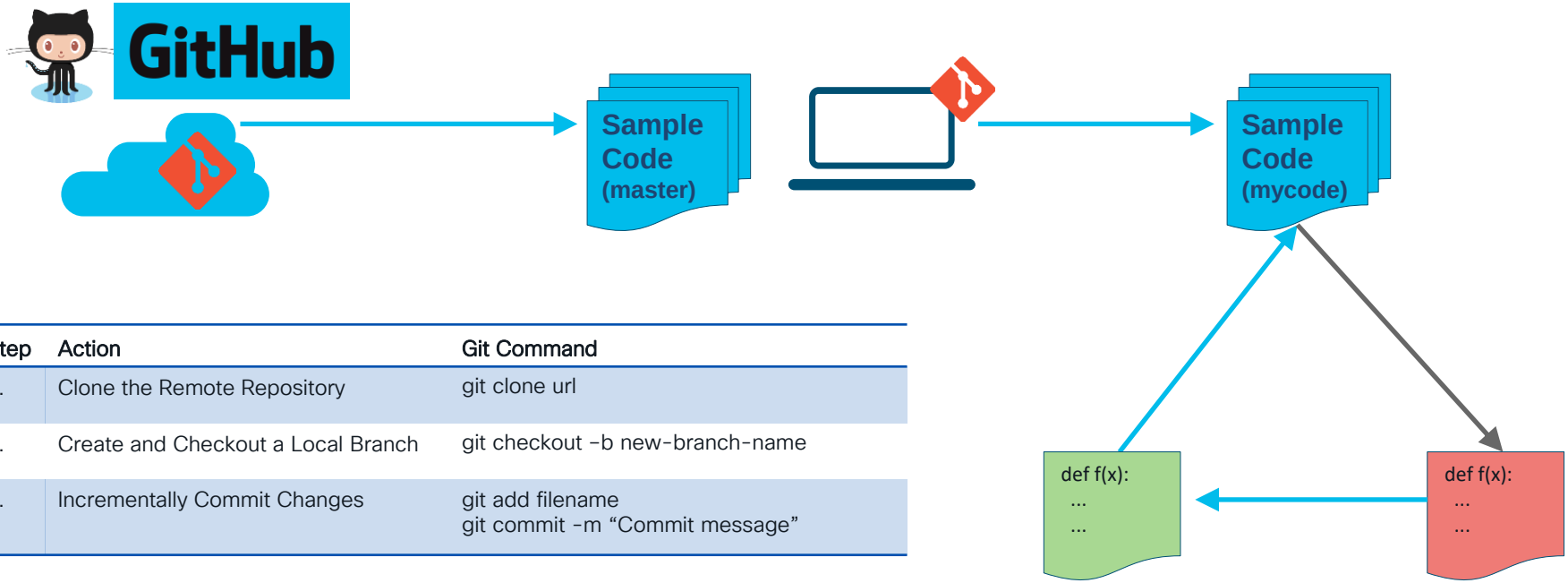



# Git: Technical Overview

# Useful Git Commands

| Action | *What it does* | ***Command*** |
|---|---|---|
| Setup | Tell git who you are<br>*one-time setup* | *> git config --global user.name "your name"*<br>*> 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<br>*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.<br>*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<br>git commit -m “Commit message” |

# Merge & PR

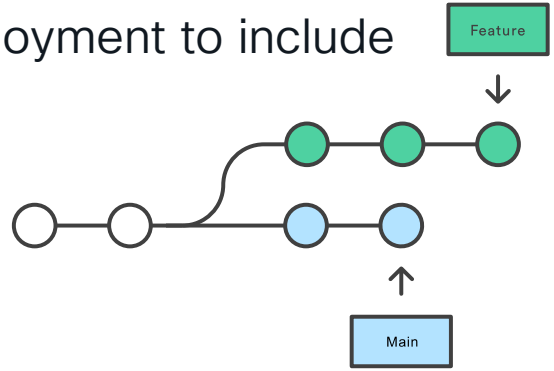
# Merging

- 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

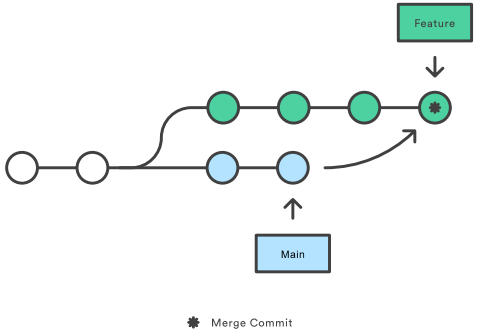


# Merge - Steps

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

OR

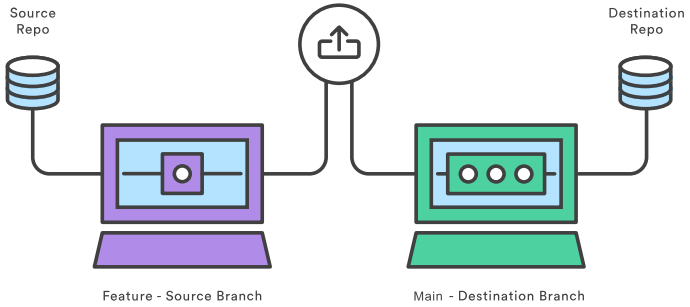
```
git merge feature main
```




- 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

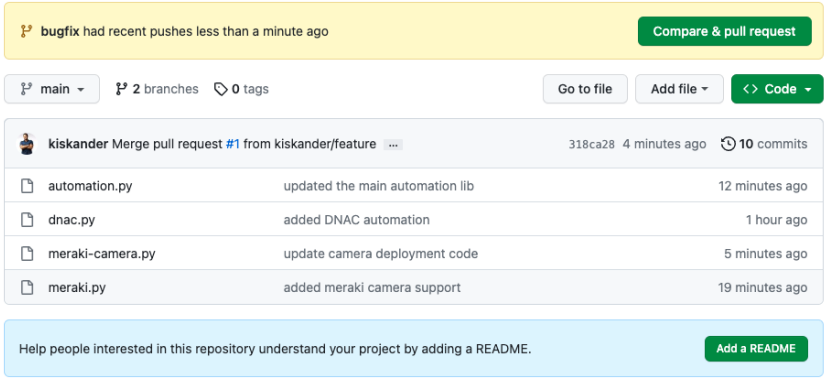
# Pull Request

- 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
```




## 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**

# Let’s try it!

# Interactive Rebase

# Interactive Rebase

## A Tool for Optimizing & Cleaning up Commit Histo

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

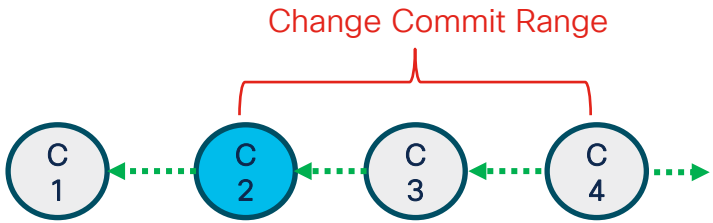
⚠ DO NOT use Interactive Rebase on commits that you've already pushed/shared on remote repo!

# 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 <u>action</u> to apply to your commits

4. Make changes & save

5.
```
git log oneline
```

# Let’s try it!

# Cherry Picking

# Cherry Picking

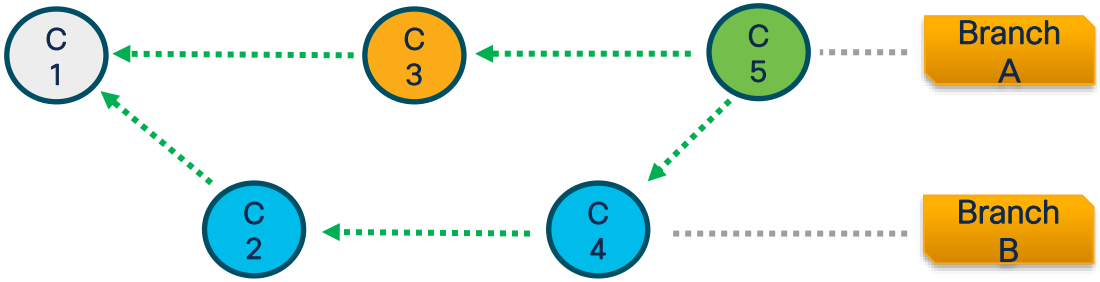
## Use Case

- 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

## Merging Branches

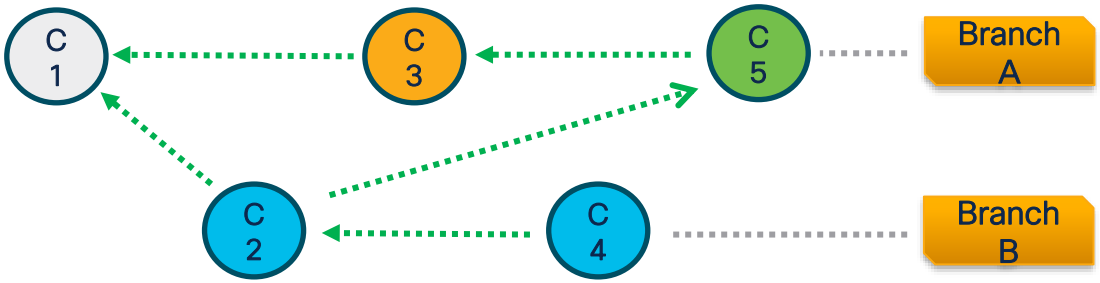
- Merging is designed to integrate changes from one branch into another branch (as we've seen)
- New Commits from **Branch B** is copied over to the HEAD of the **Branch A**



# 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

```
git log oneline
```

2. ranch

```
git checkout Feature
```

3.

```
git cherry-pick a827df1
```

4. Clean up **Main**

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

# Let’s try it!

# Reference logs

# Reflog

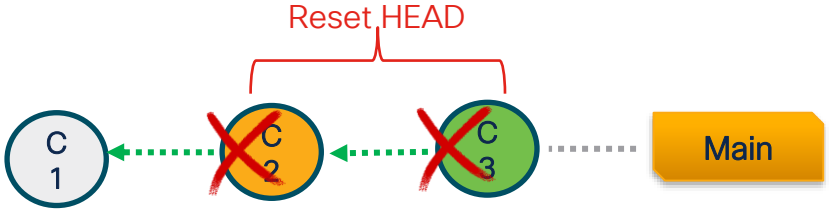
- Reflog is a journal of all the movement
- Reflog is a Protocol of HEAD Pointer Movements
- Merge, Rebase, Cherry Pick, Reset .. All of the movements

```
01-merge-pr
~
~
~
~
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** branch 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
```

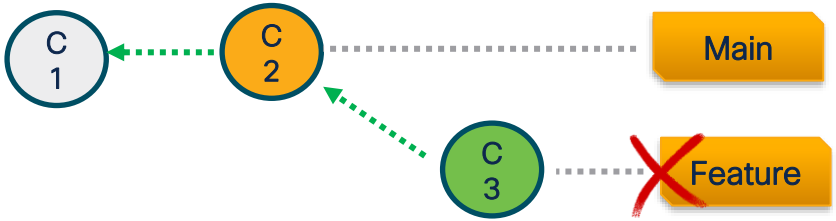
2. Find the catastrophic reset and copy the state before into new Branch

```
git branch recovery 8cf5672
```

# Reflog

## Use Case

- You are working on the **Feature** branch to expand your Meraki site automation
- You think you merged the **Feature** branch, but you didn't
- You delete the branch
- Panic Mode 😱



# Let’s try it!

# 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
```

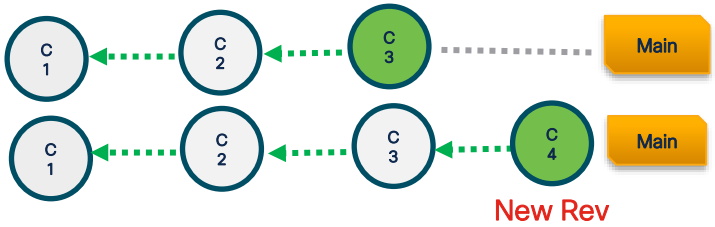
OR

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

# Submodules – Revision

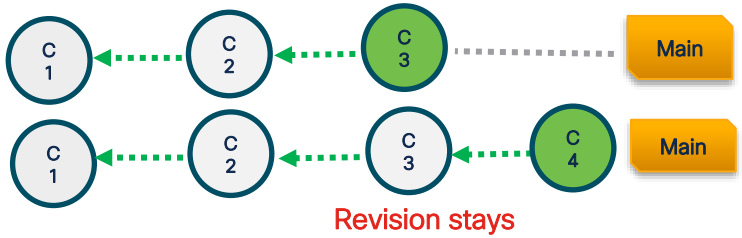
## In a “Standard” Git Repo

- 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



# Let’s try it!

# 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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# Kareem Iskander

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**https://github.com/CiscoLearning**

**https://www.youtube.com/@CiscoUtube**

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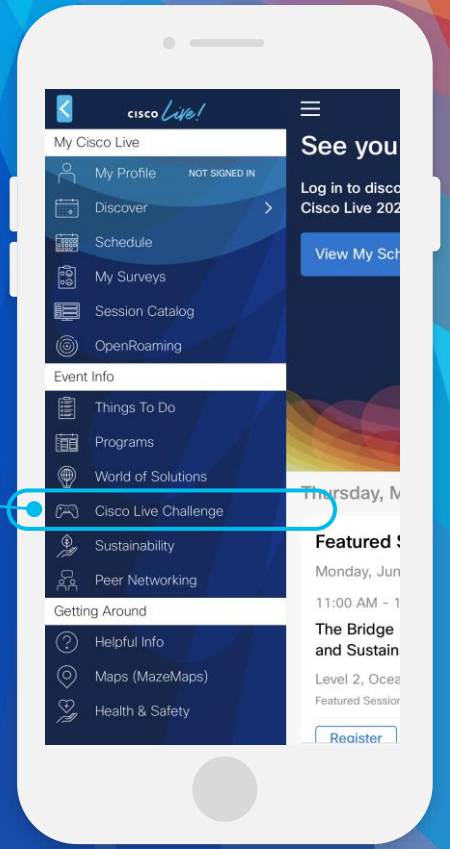

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