

git/GitHub For Developers

June 26, 2024

Engineers for Exploration, UC San Diego

Introduction: Why do we care



Resume Dec 2023 - Sean Perry



Resume Dec 2022 - Sean Perry



Resume June 2022 - Sean Perry

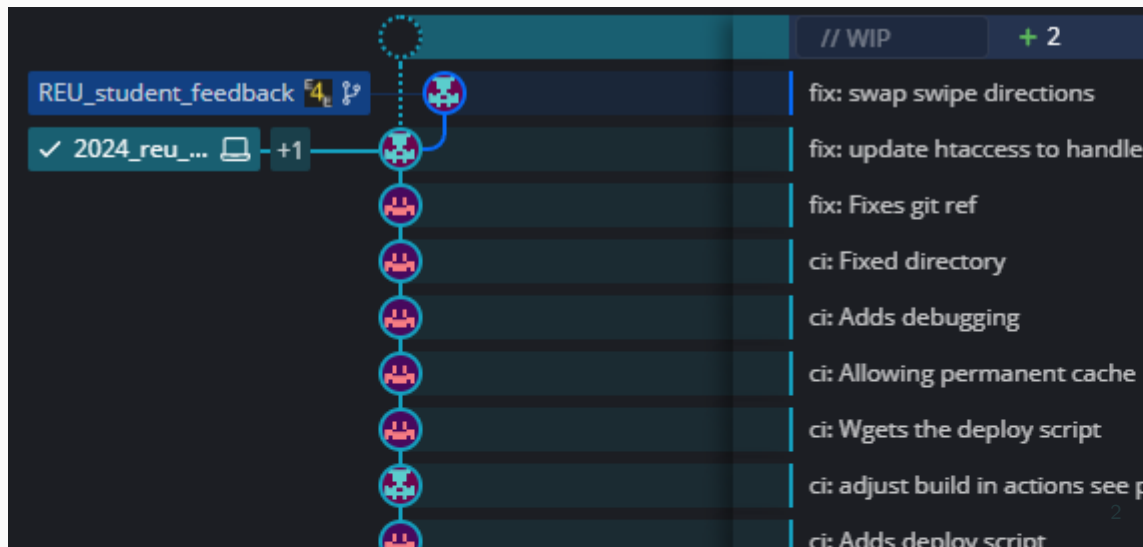


Resume APRIL 2020- Sean Perry



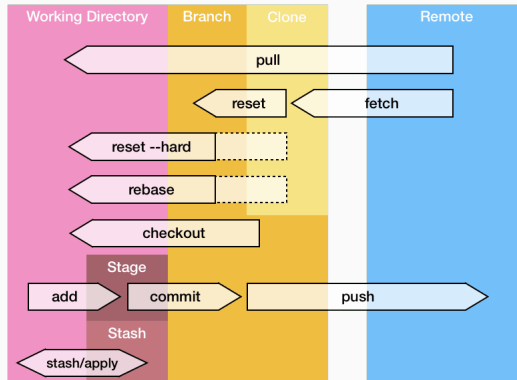
Resume OCTOBER 2021 - Sean Perry

Introduction: Track Changes, Not Files



Introduction: Git GitHub

- **Git vs. GitHub:** Distributed VCS vs. collaboration platform.
- **Purpose:** Enhances project management and teamwork.
- **Git Helps By:** tracking and saving version changes over time

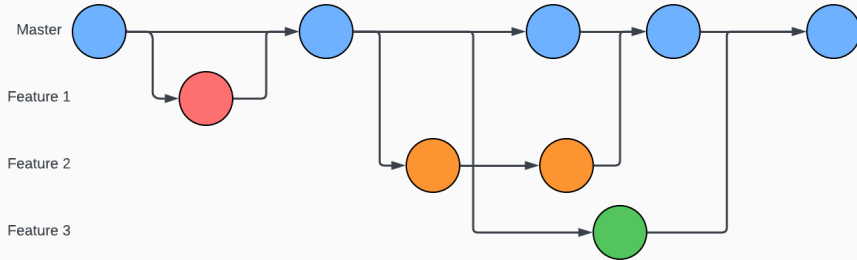


- Marks significant project milestones.
- Useful for release points, use semantic versioning.
- Lightweight tags: `git tag tagname`.
- Annotated tags: `git tag -a tagname "message"`.
- List/delete tags: `git tag`, `git tag -d tagname`.

- Feature Branch Workflow
- Gitflow Workflow
- Fork Workflow

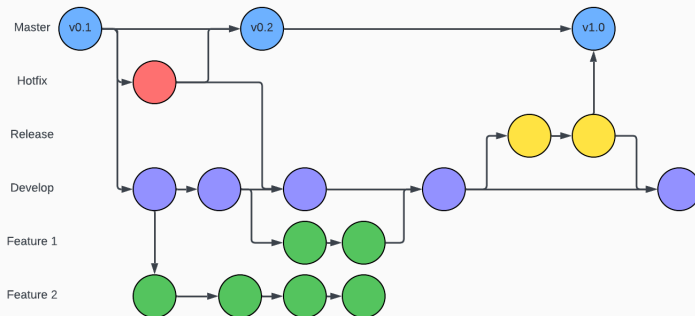
Feature Branch Workflow

- Develop each feature in its own branch.
- Merges via pull requests for code review.
- Keeps main branch stable, encourages collaboration.
- Ideal for projects with simultaneous feature development.



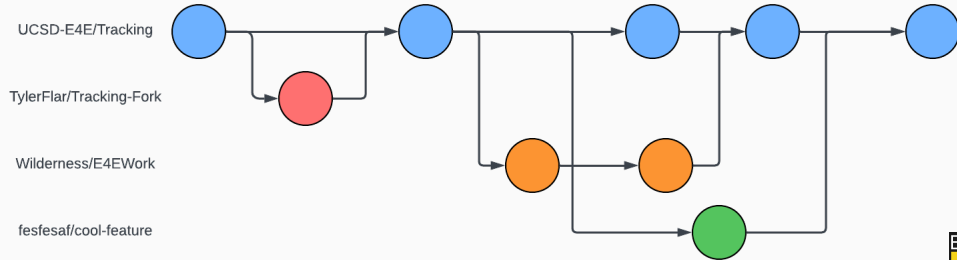
Gitflow Workflow

- Structured model: development, features, releases, hotfixes.
- Systematic release management, clear branch roles.
- Tracks progress efficiently, supports parallel releases.
- Suited for scheduled release cycles.



Fork Workflow

- Developers work on personal repository copies.
- Changes proposed via pull requests.
- Encourages external contributions, safe experimentation.
- Ideal for open-source and large collaborations.



.gitignore

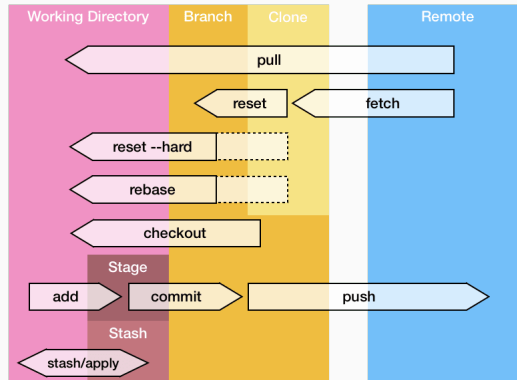
```
◆ .gitignore
1  # Created by https://www.toptal.com/developers/gitignore/api/latex,
2  # Edit at https://www.toptal.com/developers/gitignore?templates=lat
3
4  ### LaTeX ###
5  ## Core latex/pdflatex auxiliary files:
6  *.aux
7  *.lof
8  *.log
9  *.lot
10 *.fls
11 *.out
12 *.toc
13 *.fmt
14 *.fot
15 *.cb
16 *.cb2
17 *.lb
18
19 ## Intermediate documents:
20 *.dvi
21 *.xdv
22 *-converted-to.*
23 # these rules might exclude image files for figures etc.
24 # *.ps
25 # *.eps
26 # *.pdf
27
```

UI or CLI?

- UI's exist to wrap around git
- CLI → Helps better understand whats happening
- CLI → May only have access to CLI
- UI → Useful for manging many repos
- UI → Visualization is nice

Whatabout GitHub?

- **Git vs. GitHub:** Distributed VCS vs. collaboration platform.
- **Purpose:** Enhances project management and teamwork.
- **GitHub helps by:** Being a collaborator platform built upon being a remote repo



Whatabout GitHub?

- <https://github.com/UCSD-E4E/website2.0>

The screenshot shows the GitHub interface for the repository UCSD-E4E / website2.0. The 'Pull requests' tab is selected, showing 3 open pull requests. The interface includes a search bar, navigation links (Code, Issues, Pull requests, Discussions, Actions, Projects, Wiki, Security, Insights, Settings), and a list of pull requests with details like title, status, and author.

UCSD-E4E / website2.0

Search: Type to search

Navigation: <> Code Issues 7 Pull requests 3 Discussions Actions Projects Wiki Security Insights Settings

Filters: is:pr is:open

Labels: 12 Milestones: 0 New pull request

Author	Label	Projects	Milestones	Reviews	Assignee	Sort
3 Open 89 Closed						
fix: implement feedback from reu ✓ #141 opened 2 days ago by Sean1572 • Review required						
Collapse abstracts ✓ #88 opened on May 17 by Sean1572 • Draft						
feat: Adds analytics ✓ #58 opened on May 8 by ntlhui • Draft						

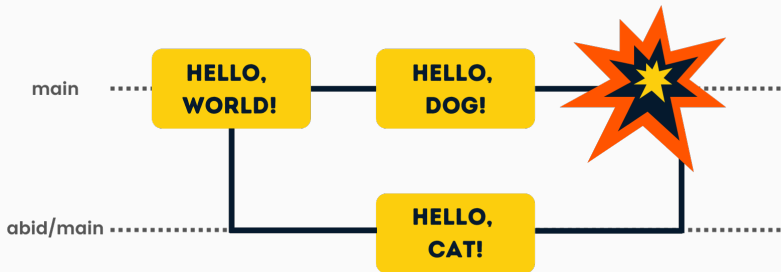
- Tracks Bugs, Features Ideas, Discussions
- Assign people and PRs to address
- <https://github.com/UCSD-E4E/website2.0/issues/142>

Pull Requests (PR) Management

- Handles merging branches from collaborators together
- Keep PRs small for easy review.
- Automate tests and checks via GitHub Actions.
- <https://github.com/UCSD-E4E/website2.0/pull/135>
- Most of the time merges work... but sometimes

Merging a Merge Conflict: Do's and Don'ts

- Conflicts occur when a branch does not have some newer changes
- **don't try fixing a merge conflict without talking to your lead**
- anytime you are about to change git history, talk to a lead
- Here is how to fix: merge conflict example



Putting it Together!

- Lets start by adding to the blogpost!
- Have blog post showing you were in the program!
- Send me on slack your github username
- Clone <https://github.com/UCSD-E4E/website2.0>
- Checkout "2024_reu_students" branch
- make a new branch for your changes
- Go to _posts/
- Add a photo + small blog, you can change it later
- photo can be dumped into "assets/people" change to notation: s.perry.jpg
- Commit and push those changes to github
- Make a PR for your changes

Extras: GitHub Actions for Automation

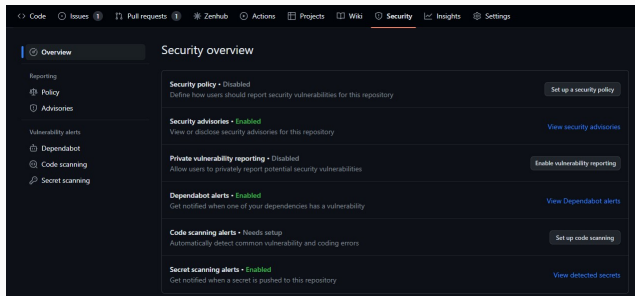
- Triggered by GitHub events (push, PRs).
- Workflows combine actions in YAML files.
- Runs on GitHub-hosted or self-hosted runners.
- Automates tests and deployment on PR merge.
- Auto-assigns issues, auto-labels PRs by path.

- Draft new release, choose git tag.
- Add release notes describing changes.
- Bundles code, executables, and assets.
- Detailed notes inform users of updates.
- Example: <https://github.com/HumanSignal/label-studio/releases>

Extras: Code Security

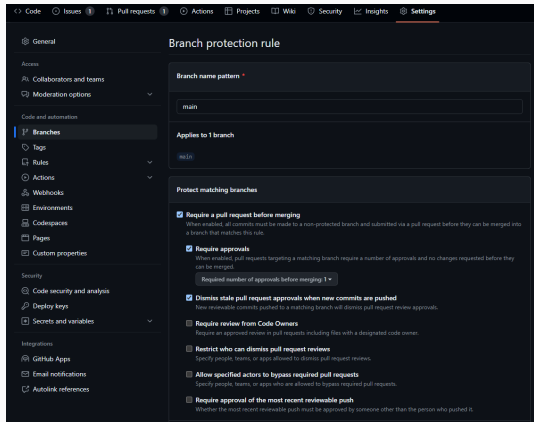
Protection against:

- Vulnerable dependencies
- Some code vulnerabilities
- Some committed secrets



Why do we need branch protections?

Configuring Branch Protection



The screenshot shows the GitHub 'Branch protection rule' configuration page. The left sidebar contains navigation links for General, Access, Moderation options, Code and automation, Branches (selected), Tags, Rules, Actions, Webhooks, Environments, Codepages, Pages, Custom properties, Security, Code security and analysis, Deploy keys, and Secrets and variables. The main content area is titled 'Branch protection rule' and includes sections for 'Branch name pattern' (set to 'main'), 'Applies to 1 branch' (set to 'main'), and 'Protect matching branches'. Under 'Protect matching branches', several checkboxes are enabled: 'Require a pull request before merging', 'Require approvals' (with a dropdown set to 'Required number of approvals before merging 1'), 'Dismiss stale pull request approvals when new commits are pushed', 'Require review from Code Owners', 'Restrict who can dismiss pull request reviews', 'Allow specified actors to bypass required pull requests', and 'Require approval of the most recent reviewable push'.

☒ **Require status checks to pass before merging**
Choose which [status checks](#) must pass before branches can be merged into a branch that matches this rule. When enabled, commits must first be pushed to another branch, then merged or pushed directly to a branch that matches this rule after status checks have passed.

☐ **Require branches to be up to date before merging**

This ensures pull requests targeting a matching branch have been tested with the latest code. This setting will not take effect unless at least one status check is enabled (see below).

Search for status checks in the last week for this repository

Status checks that are required.

☒ **Require conversation resolution before merging**

When enabled, all conversations on code must be resolved before a pull request can be merged into a branch that matches this rule. [Learn more about requiring conversation completion before merging.](#)

☐ **Require signed commits**

Commits pushed to matching branches must have verified signatures.

☐ **Require linear history**

Prevent merge commits from being pushed to matching branches.

☐ **Require merge queue**

Merges to matching branches must be performed via a merge queue.

☐ **Require deployments to succeed before merging**

Choose which environments must be successfully deployed to before branches can be merged into a branch that matches this rule.

☐ **Lock branch**

Branch is read-only. Users cannot push to the branch.

☐ **Do not allow bypassing the above settings**

The above settings will apply to administrators and custom roles with the "bypass branch protections" permission.

☐ **Restrict who can push to matching branches**

Specify people, teams, or apps allowed to push to matching branches. Required status checks will still prevent these people, teams, and apps from merging if the checks fail.

Branch Protection Example

`https://github.com/UCSD-E4E/branch_protections_demo`