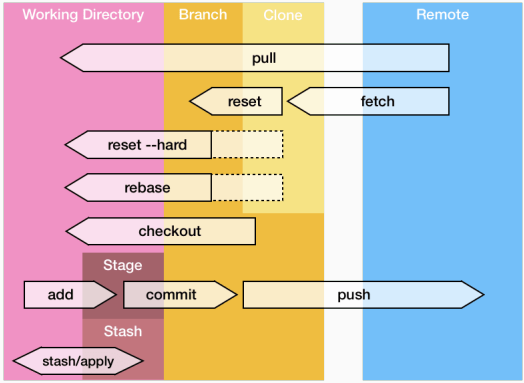
git/GitHub for Leaders

February 28, 2024

Engineers for Exploration, UC San Diego

Introduction

- **Git vs. GitHub:** Distributed VCS vs. collaboration platform.
- **Purpose:** Enhances project management and teamwork.



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Extra Commands

- Interactive Rebase*: Rewrite history, edit commits.
- Stashing: Temporarily shelf changes for tasks.
- Cherry-picking: Apply commit to another branch.
- * Use with caution as this action is DESTRUCTIVE.

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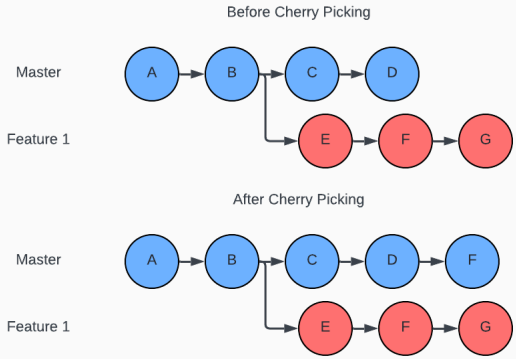
Cherry-picking

- *git cherry-pick commit-hash*



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Git Workflows

- Feature Branch Workflow
- Gitflow Workflow
- Fork Workflow

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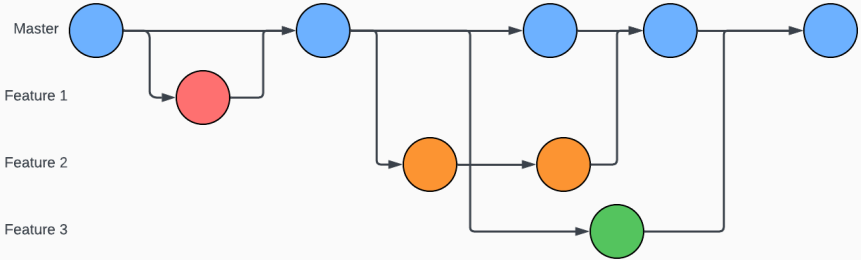
Feature Branch Workflow

- 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.



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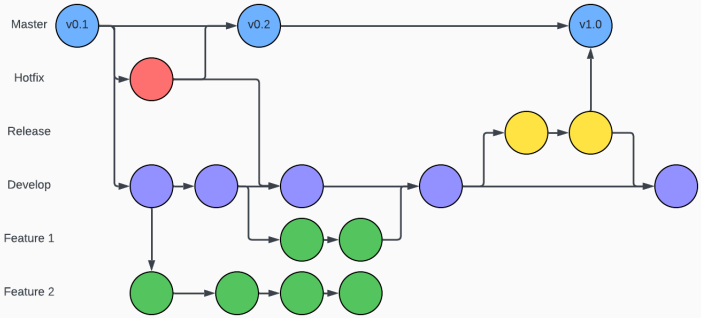
Gitflow Workflow

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



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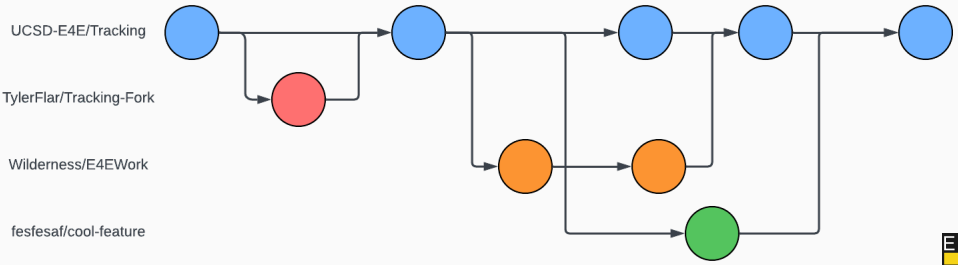
Fork Workflow

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



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Tags

- 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*.

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Issue Management

- Templates for each type of issue.
  - Describes issue type, steps to reproduce, etc.
  - Type of issue (bug, feature, etc.).
  - Assignees, labels.
  - Reproducibility, severity, and priority.

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Pull Requests (PR) Management

- Keep PRs small for easy review.
- Use checklists for consistent reviews.
- Automate tests and checks via GitHub Actions.
- Example: https://github.com/stevemao/github-issue-templates/blob/master/checklist2/PULL_REQUEST_TEMPLATE.md

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Releases

- 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

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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.

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Putting it Together

- Combine Tags, Releases, and GitHub Actions.
- Interact with source code.
- Example: https://github.com/TylerFlar/MinecraftDiscord-CrossChat

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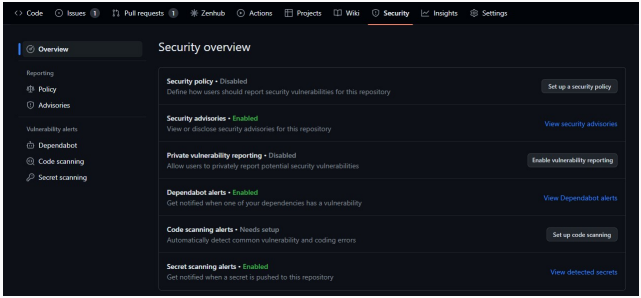
Code Security

Protection against:

- Vulnerable dependencies
- Some code vulnerabilities
- Some committed secrets



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Branch Protection

Why do we need branch protections?

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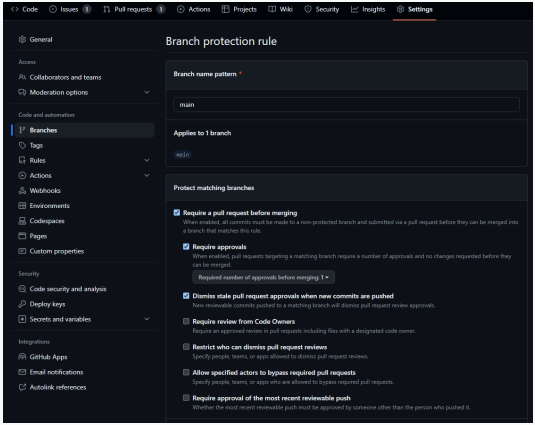
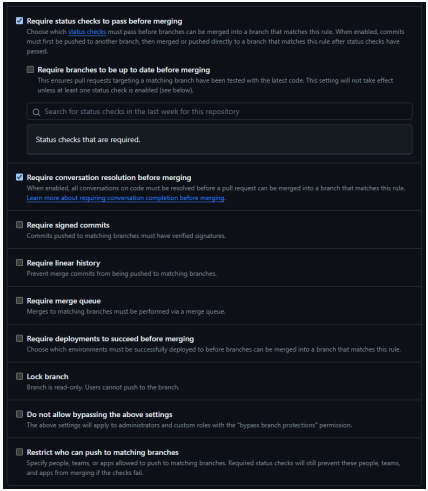
Configuring Branch Protection





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Branch Protection Example

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

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More Useful GitHub Features

- Projects/Project Templates
- Wikis

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