git/GitHub for Developers

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Engineers for Exploration, UC San Diego

Introduction

- **Git vs. GitHub:** Distributed VCS vs. collaboration platform.
- **Purpose:** Enhances project management and teamwork.
- **Basic Commands Overview:**
    - *git init/clone*: Start or copy repositories.
    - *git add/commit*: Stage and save changes.
    - *git push/pull*: Update remote and local repos.
    - *git branch/checkout*: Manage and switch branches.
    - *git merge*: Combine branch changes.

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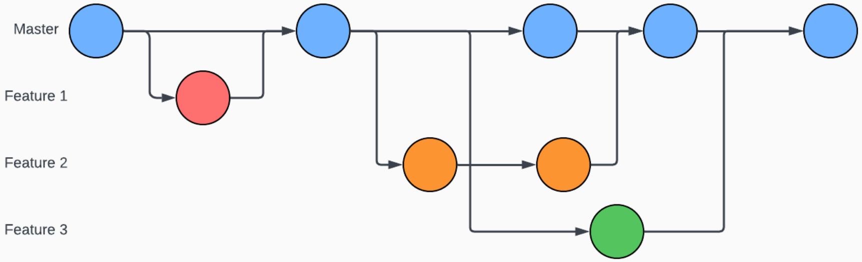
Git Workflows

- Feature Branch Workflow
- Gitflow Workflow
- Fork Workflow

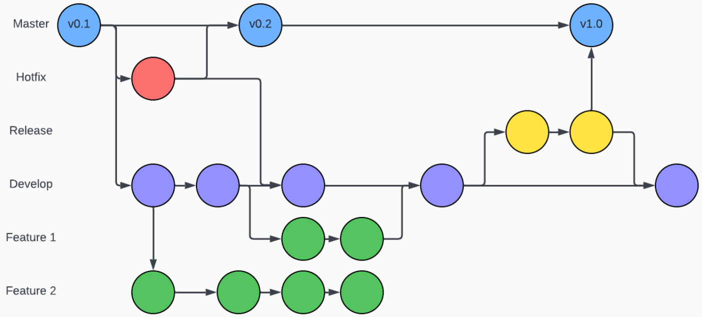
Feature Branch Workflow

- 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.



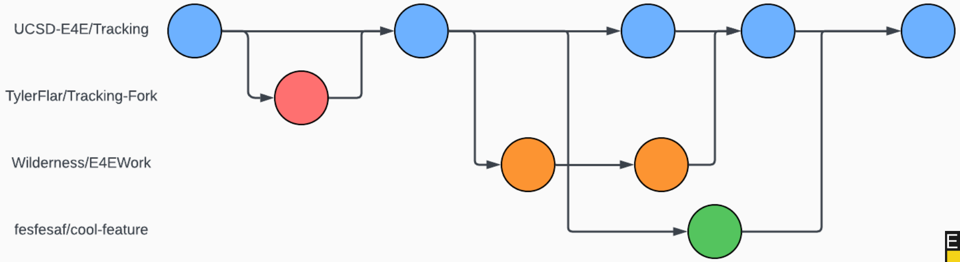
Gitflow Workflow

- 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.



Tags

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

Pull Requests (PR) Management

- Keep PRs small for easy review.
- Use checklists for consistent reviews.
- Automate tests and checks via GitHub Actions.

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

GitHub Actions for Automation

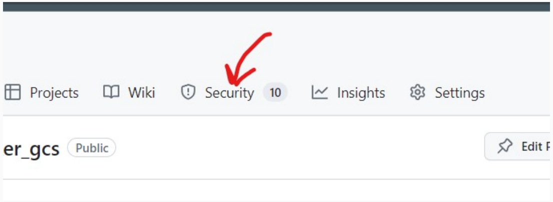
- Triggered by GitHub events (push, PRs).
- Workflows combine actions in YAML files.
- Runs on GitHub-hosted or self-hosted runners.
- Automates tests and deployment on PR merge.
- Auto-assigns issues, auto-labels PRs by path.

Putting it Together

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

Securing Your Project

- Set branch protection rules for safety.
- Dependabot scans and fixes vulnerabilities.
- Secret scanning detects exposed credentials.
- Code scanning for vulnerabilities on push.



Extras

- Interactive Rebase: Rewrite history, edit commits.
- Use Case: Clean feature branch before merging.
- Cherry-picking: Apply commit to another branch.
- Use Case: Apply bug fixes across branches.
- Stashing: Temporarily shelf changes for tasks.