Git

September 29, 2022

Git

Git is a Version Control System!

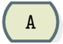
Linus Torvalds invented Git in 2005 for managing the Linux Kernel source code.

Git is a version control system that uses DAG and Merkle trees!

VCS Recap: glossary

- **Working copy**: All project files (on your PC) tracked by the VCS.
- **Commit**: a “snapshot” of the repository at a specific moment in time.
- **Branch**: a line of development. It’s an ordered set of commits.
- **Merge**: the action of *fusing* two or more branches.
- **Tag**: a custom *label* attached to a commit.
- **Repository**: a set of commits, branches, and tags (usually for the same project).
- **Fork**: a new repository that is a copy of an existing one.
- **Pull/Merge request**: a request to merge code from a fork or branch back to the parent repository/branch.

Commit



A snapshot of the project in a given moment. It can include some or all files (it’s up to the user to decide).

Each commit has one or more parents. In rare case, zero!

It **requires** a meaningful message.

Commit

	COMMENT	DATE
○	CREATED MAIN LOOP & TIMING CONTROL	14 HOURS AGO
○	ENABLED CONFIG FILE PARSING	9 HOURS AGO
○	MISC BUGFIXES	5 HOURS AGO
○	CODE ADDITIONS/EDITS	4 HOURS AGO
○	MORE CODE	4 HOURS AGO
○	HERE HAVE CODE	4 HOURS AGO
○	AAAAAAAA	3 HOURS AGO
○	ADKFJSLKDFJSDKLFJ	3 HOURS AGO
○	MY HANDS ARE TYPING WORDS	2 HOURS AGO
○	HAAAAAAAANDS	2 HOURS AGO

AS A PROJECT DRAGS ON, MY GIT COMMIT MESSAGES GET LESS AND LESS INFORMATIVE.

Image credits by XKCD - Randall Munroe

Please, don’t.

Your future self will thank you.

What a git commit contains

- **Commit message**
- **Committer** and commit date
- **Author** and author date
- **Tree** (hash of all files in the commit, sort of)
- **Parent** commits

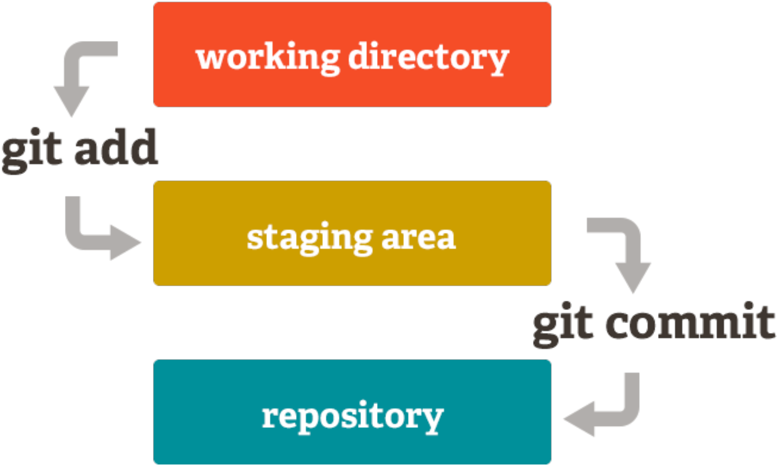
The commit ID is the SHA1 of the content.

“Orphan”

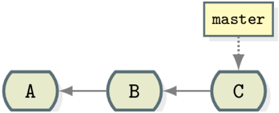
Sometimes commits have no parents. In that case, the commit is called “orphan”.

Example: the first commit in an empty repository.

Git staging area



Branch

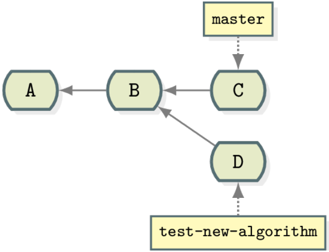


A “branch” is a line of development — an ordered set of commits.

A branch has a name and starts with a commit. Part of the branch history is shared with other branches.

Usually ends up merging again with the main line.

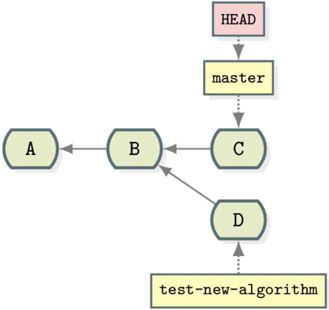
Why branching?



To develop a new feature or do experiments without interfering with others.

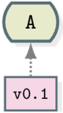
Note: the main line of development is a branch itself - nothing special!

The HEAD



- The *HEAD* is a pointer to the “current” commit/branch/tag.
- In other words: files in the working copy are from the commit/branch/tag pointed by *HEAD*.
- Special case: “*`detached HEAD`*” is when *HEAD* is not a branch: we can’t commit.

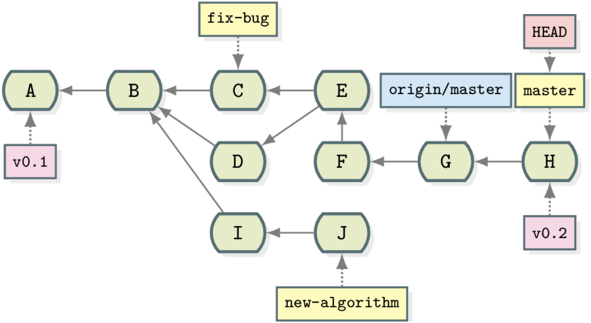
Tags



Commits can be tagged. It makes it easier to look at the repo history.

You can remove a tag, although you shouldn't.

Commit history and branches



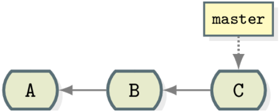
Merge

When a branch is completed and should be added to the main line: merge!

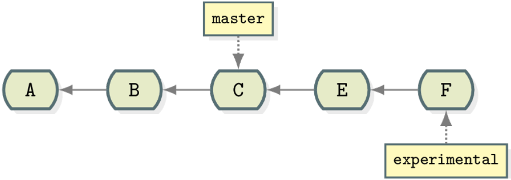
There are different ways of merging branches ("strategies"):

- Fast-forward
- Non-fast-forward
- Rebase

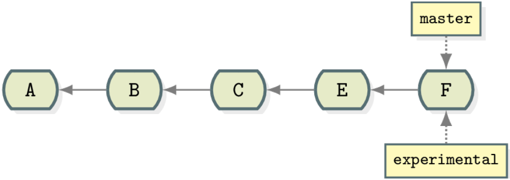
Merge - fast-forward - before



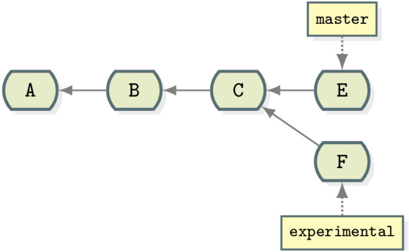
Merge - fast-forward



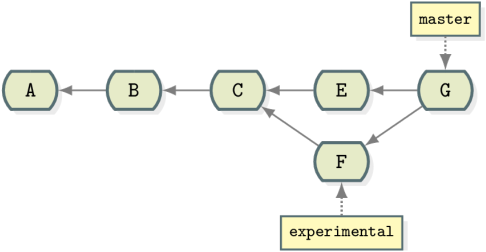
Merge - fast-forward - after



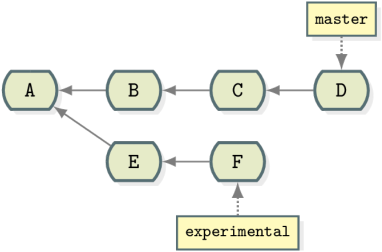
Merge - non-fast-forward



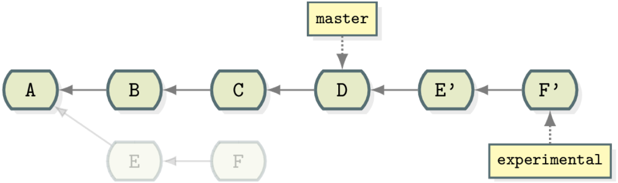
Merge - non-fast-forward - after



Rebase



Rebase - after



Merge conflicts

Merge conflicts

A “merge conflict” may happen when we merge branches using non-fast-forward or rebase strategies.

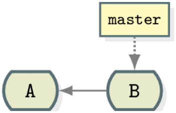
(or in some advanced functions)

example.go

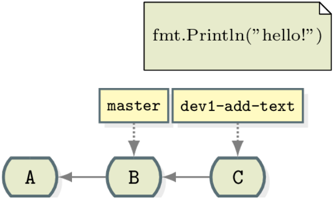
```go
package main

import "fmt"

func main() {
  fmt.Println("")
}
```

Suppose that two developers change the message in parallel to two different texts.

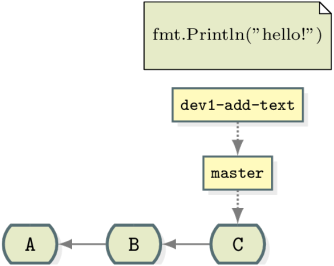
The calm before the storm



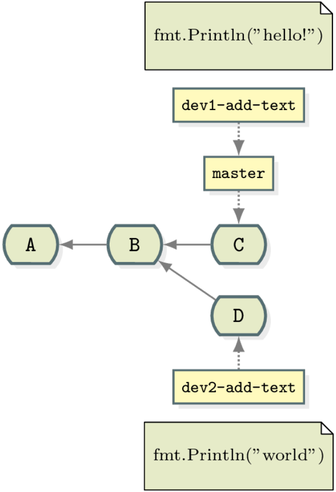
The 1st developer commits



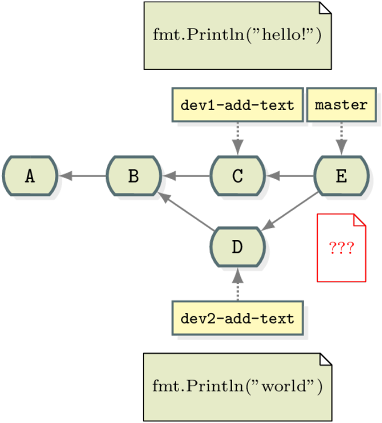
Fast-forward merge is ok...



...however 2nd dev committed in the meantime



Oops!


fmt.Println(”hello!”)
dev1-add-text
master
A
B
C
E
D
???
dev2-add-text
fmt.Println(”world”)

example.go during conflict

```
package main

import "fmt"

func main() {
<<<<<< HEAD
  fmt.Println("hello!")
======
  fmt.Println("world")
>>>>>> dev2-add-text
}
```

How to resolve conflicts?

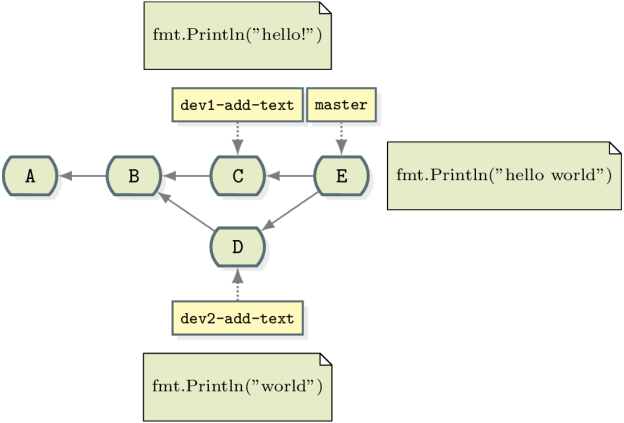
Three ways to resolve:

- Edit the file manually
- Keep the already-merged **file** from dev1 (“ours”)
- Use the new **file** from dev2 (“theirs”)

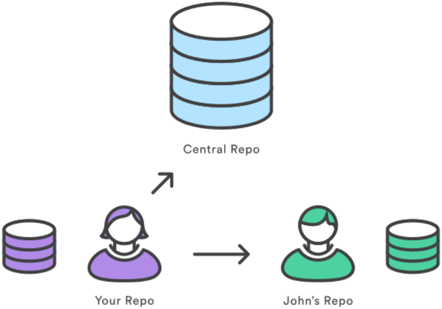
Let’s fix example.go manually

```go
package main

import "fmt"

func main() {
  fmt.Println("hello world!")
}
```

We edit the file and commit



Remote git repositories



Git can retrieve and send commits, tags, and branches to remote hosts (named *remotes*).

The default remote is named ***`origin`***.

Clone

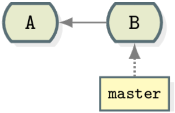
“Clone” creates a local copy of the repository, starting from a URL.

Git will download all commits, branches, and tags.

The provided URL will be the *`origin`* remote.

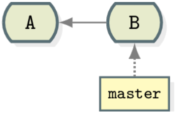
Clone

Remote



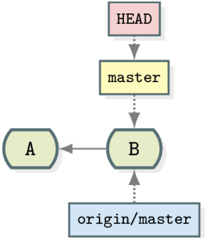
Clone

Remote



↓ Git clone ↓

Local



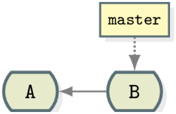
Send commits/branches/tags

You can send any commit, branch, or tag to any remote.

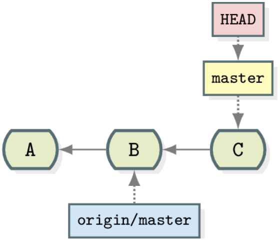
The action is named **push**.

Send commits/branches/tags

Remote

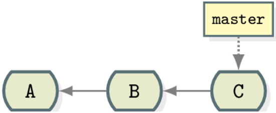


Local



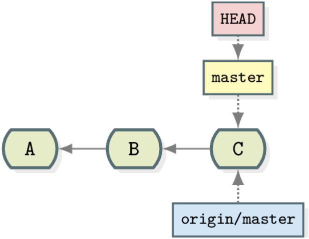
Send commits/branches/tags

Remote



↑ Git push ↑

Local



Retrieve commits/branches/tags

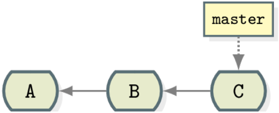
You can retrieve any commit, branch, or tag from any remote.

There are two main actions: **fetch** and **pull**.

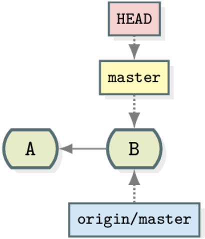
- *Fetch* retrieves remote commits, branches, and tags
- *Pull* is *fetch* plus a merge!

Retrieve commits/branches/tags: fetch

Remote

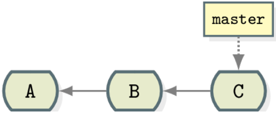


Local



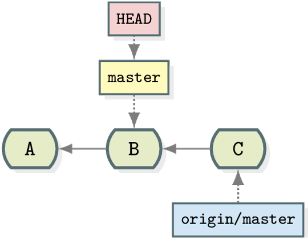
Retrieve commits/branches/tags: fetch

Remote



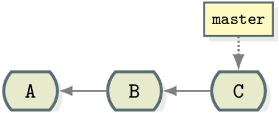
↓ Git fetch ↓

Local



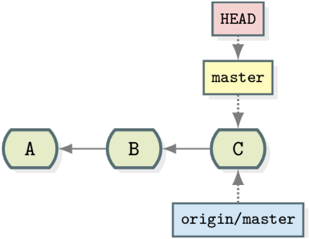
Retrieve commits/branches/tags: fetch

Remote



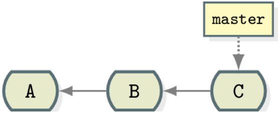
→ Git merge fast-forward →

Local

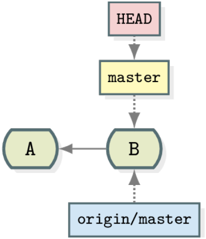


Retrieve commits/branches/tags: pull

Remote

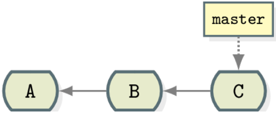


Local



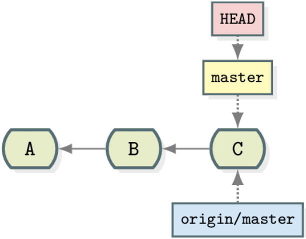
Retrieve commits/branches/tags: pull

Remote



↓ Git pull ↓

Local



Forges

“forges”?

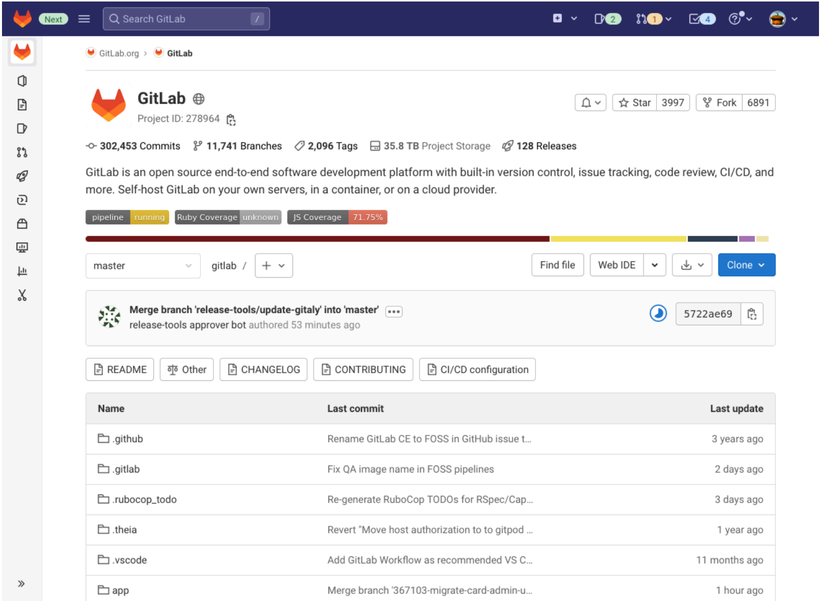
A Git remote can be a server running *sshd*. Or even a USB key that you share with your colleagues.

However, specific platforms ease collaboration - they’re named “git forges”.

Git forges: hosting services

- Always online git remote
- Bug tracking
- Documentation wikis
- Manage forks and pull/merge requests
- Collaborate with others
- Advanced: CI/CD, integrated IDEs, etc

Project management



GitLab

Project ID: 278964

Star 3997 Fork 6891

302,453 Commits 11,741 Branches 2,096 Tags 35.8 TB Project Storage 128 Releases

GitLab is an open source end-to-end software development platform with built-in version control, issue tracking, code review, CI/CD, and more. Self-host GitLab on your own servers, in a container, or on a cloud provider.

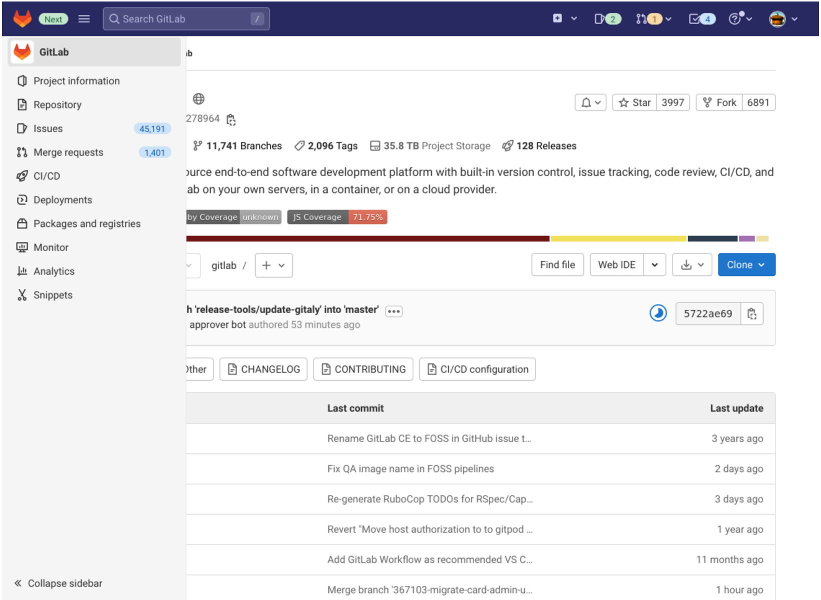
pipeline running · Ruby Coverage unknown · JS Coverage 71.75%

Merge branch 'release-tools/update-gitaly' into 'master'
release-tools approver bot authored 53 minutes ago

5722ae69

Name	Last commit	Last update
.github	Rename GitLab CE to FOSS in GitHub issue t...	3 years ago
.gitlab	Fix QA image name in FOSS pipelines	2 days ago
.rubocop_todo	Re-generate RuboCop TODOs for RSpec/Cap...	3 days ago
.theia	Revert "Move host authorization to to gitpod ...	1 year ago
.vscode	Add GitLab Workflow as recommended VS C...	11 months ago
app	Merge branch '367103-migrate-card-admin-u...	1 hour ago

Project management



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278964

Star 3997 Fork 6891

11,741 Branches 2,096 Tags 35.8 TB Project Storage 128 Releases

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by Coverage unknown JS Coverage 71.75%

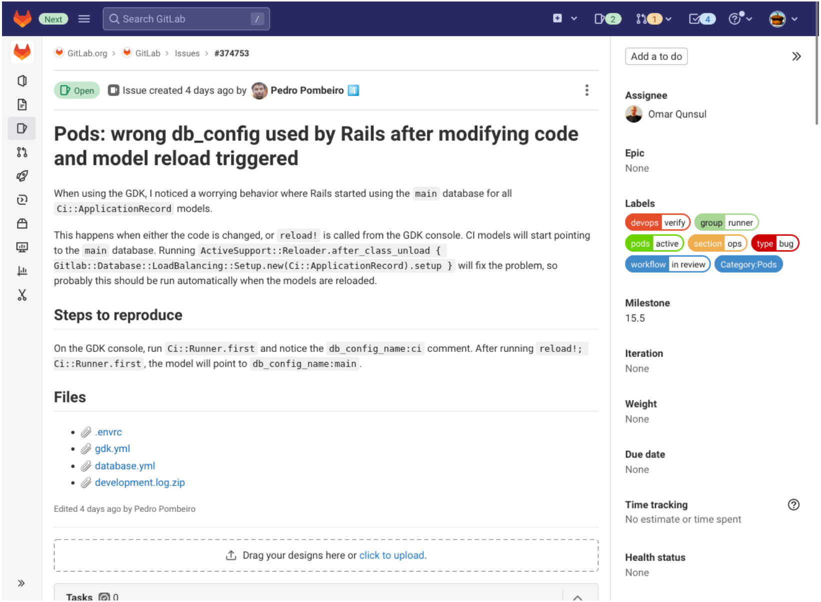
gitlab / Find file Web IDE Clone

h 'release-tools/update-gitaly' into 'master'
approver bot authored 53 minutes ago 5722ae69

Other CHANGELOG CONTRIBUTING CI/CD configuration

Last commit	Last update
Rename GitLab CE to FOSS in GitHub issue t...	3 years ago
Fix QA image name in FOSS pipelines	2 days ago
Re-generate RuboCop TODOs for RSpec/Cap...	3 days ago
Revert "Move host authorization to to gitpod ...	1 year ago
Add GitLab Workflow as recommended VS C...	11 months ago
Merge branch '367103-migrate-card-admin-u...	1 hour ago

Project management: Issues



GitLab.org › GitLab › Issues › #374753

Open Issue created 4 days ago by **Pedro Pombeiro**

Pods: wrong db_config used by Rails after modifying code and model reload triggered

When using the GDK, I noticed a worrying behavior where Rails started using the `main` database for all `Ci::ApplicationRecord` models.

This happens when either the code is changed, or `reload!` is called from the GDK console. CI models will start pointing to the `main` database. Running `ActiveSupport::Reloader.after_class_unload { Gitlab::Database::LoadBalancing::Setup.new(Ci::ApplicationRecord).setup }` will fix the problem, so probably this should be run automatically when the models are reloaded.

Steps to reproduce

On the GDK console, run `Ci::Runner.first` and notice the `db_config_name:ci` comment. After running `reload!; Ci::Runner.first`, the model will point to `db_config_name:main`.

Files

- .envrc
- gdk.yml
- database.yml
- development.log.zip

Edited 4 days ago by Pedro Pombeiro

Drag your designs here or click to upload.

Tasks 0

Add a to do

Assignee
Omar Qunsul

Epic
None

Labels
devops verify · group runner · pods active · section ops · type bug · workflow in review · Category:Pods

Milestone
15.5

Iteration
None

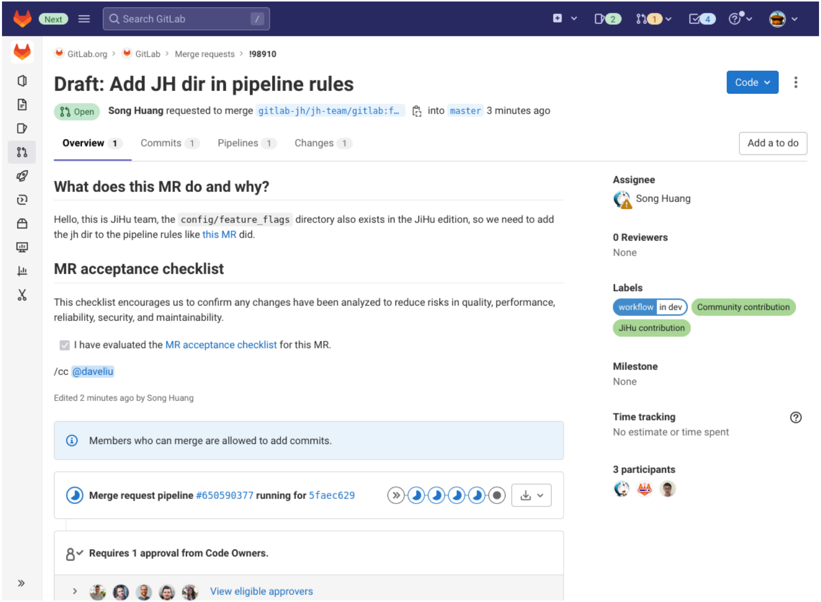
Weight
None

Due date
None

Time tracking
No estimate or time spent

Health status
None

Project management: Pull/Merge request



Draft: Add JH dir in pipeline rules

Song Huang requested to merge `gitlab-jh/jh-team/gitlab:f…` into `master` 3 minutes ago

What does this MR do and why?

Hello, this is JiHu team, the `config/feature_flags` directory also exists in the JiHu edition, so we need to add the jh dir to the pipeline rules like this MR did.

MR acceptance checklist

This checklist encourages us to confirm any changes have been analyzed to reduce risks in quality, performance, reliability, security, and maintainability.

☑ I have evaluated the MR acceptance checklist for this MR.

/cc @daveliu

Edited 2 minutes ago by Song Huang

Members who can merge are allowed to add commits.

Merge request pipeline #650590377 running for 5faec629

Requires 1 approval from Code Owners.

View eligible approvers

Assignee
Song Huang

0 Reviewers
None

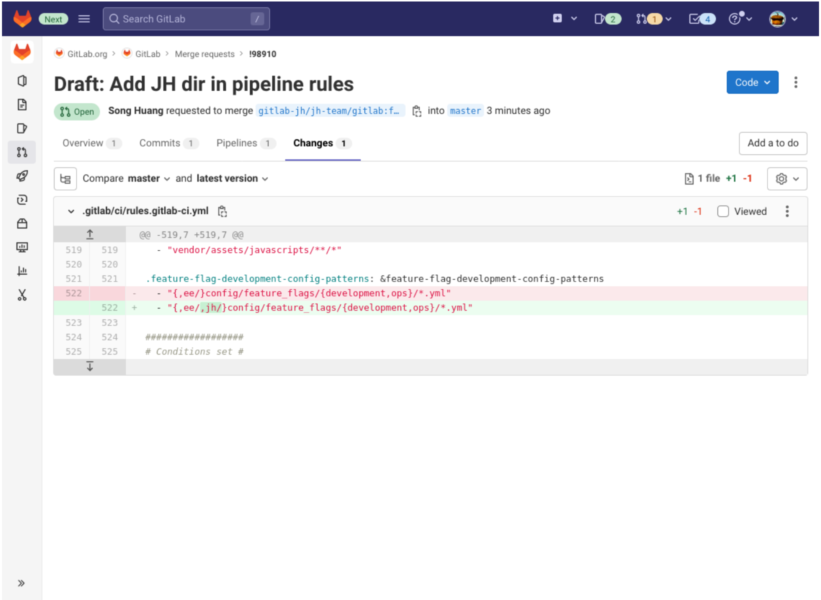
Labels
workflow in dev
Community contribution
JiHu contribution

Milestone
None

Time tracking
No estimate or time spent

3 participants

Project management: Pull/Merge request



GitLab.org › GitLab › Merge requests › !98910

Draft: Add JH dir in pipeline rules

Open **Song Huang** requested to merge `gitlab-jh/jh-team/gitlab:f…` into `master` 3 minutes ago

Compare **master** and **latest version**

1 file +1 -1

.gitlab/ci/rules.gitlab-ci.yml +1 -1 □ Viewed

```
@@ -519,7 +519,7 @@
    - "vendor/assets/javascripts/**/*"

  .feature-flag-development-config-patterns: &feature-flag-development-config-patterns
-   - "{,ee/}config/feature_flags/{development,ops}/*.yml"
+   - "{,ee/,jh/}config/feature_flags/{development,ops}/*.yml"

  ##################
  # Conditions set #
```

Resources

Links

- https://git-scm.com/book
- https://www.atlassian.com/git/tutorials
- https://threesaplings.co/articles/explaining-basic-concepts-git-and-github/
- https://github.com/RomuloOliveira/commit-messages-guide
- https://nitaym.github.io/ourstheirs/