Gerrit

What is Gerrit and why do people like it?

Gerrit is a code review system from Google in a similar style to Google's internal Critique tool, but based on Git, and publicly available as open source. It hosts a Git repo with the ability to submit changes for review and offers mirroring to other repos (like https://git.lix.systems/lix-project/lix). It has an entirely different review model to GitHub (and Forgejo, GitLab, etc that copy GitHub's review model), where, instead of pull requests, you have changelists (CLs): reviews on individual commits, with each revision of a commit being a different "patchset", rather than reviewing an entire branch at a time. CLs may be merged one by one or in a batch.

Although this has some learning curve, we expect that you will find it pleasant to work with after figuring it out. It has some rough edges and strong opinions that take some getting used to, but it has served us well and saved us an inordinate amount of time both as reviewers and change authors. The rest of this document gives some pointers on the workflows we use with Gerrit.

People like Gerrit because it makes the following things trivial or easy, all of which are somewhere between annoying and impossible on GitHub modeled systems:

Gerrit produces better code:

- Gerrit enforces good commit messages, since there is no second "pr message" so peoples' commit messages get actually looked at with some care
- Gerrit enforces good commit *hygiene*, since adding another commit is really just splitting a commit with `git revise -c` or other tools; since there are no PR dependencies or branches to worry about, splitting commits is no longer a big ask.
  - Relatedly, this directly makes reviews smaller since the overhead of doing another change is low.

Gerrit makes reviewers' lives easier and reduces review round trips:

- As a reviewer, you can look at what changed since you last reviewed, even in the presence of rebases, by looking at the patchset history of a CL. This avoids pointless rereview; you can actually diff versions of changes properly.
- The *change author* generally merges the change after approval, without them needing commit access. This means that they can do a final once-over of the change and make sure that they are ok with its state before merging it. This reduces miscommunication causing merging of unfinished code.
- As a reviewer, you can edit someone's change and/or commit message to fix a typo (*in the web interface*) and then stamp it, while giving them the final say on merging the edited change.

- You can give feedback like the following: "I would merge this as-is but you can consider this feedback if you would like" and then let the change author decide to merge it.
  - Since the permission-requiring step in Gerrit is *approving* the change, not merging it, every change author can have final say in when the change gets merged.
- Review suggestions get applied as a batch without cluttering commit history in a confusing manner.
- You can download someone's change to look at it locally in one command that you can copy paste from the Gerrit interface.

Gerrit makes your life easier as a contributor:

- Submitting a new change is just a matter of committing it and pushing it. You don't need to think about branches or the web interface or extra commands. Want to do more changes building on it? Just commit them and push them.
- Branches are not required and you can easily build off of other peoples' changes by fetching them and rebasing against them; change dependencies are simply commit parents. They can then be merged in whichever manner they will be merged.
- If you are doing a larger change, it is natural to merge it piece by piece, adding little improvements as you go, and putting the highest risk parts of it at the tip, making the obviously good parts of the change land and keeping your diffs and rebases against `main` smaller.
- Gerrit makes it clear which comments still need action in a clean way, compared to GitHub where resolved comments get regularly broken or disappear altogether.
- Gerrit guesses (with reasonable accuracy) who a change is blocked on and shows it on the dashboard with a little arrow next to their name, allowing you to see at a glance which changes are your responsibility at a given time.
- There is a rebase button that just works. Trivial non-conflicting rebases do not require a rereview.

That being said, there are some downsides:

- Gerrit is very mean to you if you don't have your commit history in a clean presentable state, which takes some getting used to and Git does not make editing history easy, so it does involve a little more fighting of Git. However, this also means that the reviews can be of cleaner and smaller pieces of code with fewer unrelated changes.
  - This makes pushing work in progress code with questionable commit history harder; see below for solutions to this.
- Gerrit requires a little bit of local setup in the form of adding your SSH key or setting up the HTTP password. It also requires a Git commit-msg hook, but `nix develop` automatically does that for you.

Learning materials

- https://gerrit-review.googlesource.com/Documentation/intro-user.html

- https://docs.google.com/presentation/d/1C73UgQdzZDw0gzpaEqIC6SPujZJhqamyqO1XOHjH-uk/view

Our installation

Gerrit is at https://gerrit.lix.systems

The Gerrit SSH server is running on port 2022. The repo URLs are:

- `ssh://{username}@gerrit.lix.systems:2022/lix`
- `https://gerrit.lix.systems/lix` if using HTTP auth; see Gerrit settings for setting an HTTP password if desired

Hit the <kbd>d</kbd> key on any change to download it, which will give you the right URLs.

SSH config

You might like to add the following configuration to your `~/.ssh/config`:

```
Host gerrit.lix.systems
  User YOUR_GERRIT_USERNAME
  Port 2022
  # Keep sessions open for a bit in the background to make connections faster:
  ControlMaster auto
  ControlPath /tmp/ssh-%r@%h:%p
  ControlPersist 120
```

Basic workflow for a change

The unit of code review is a "change", which yields a single commit when "submitted" (merged). The commit message is taken from the change description in Gerrit; in our experience this tends to lead to more comprehensive commit messages.

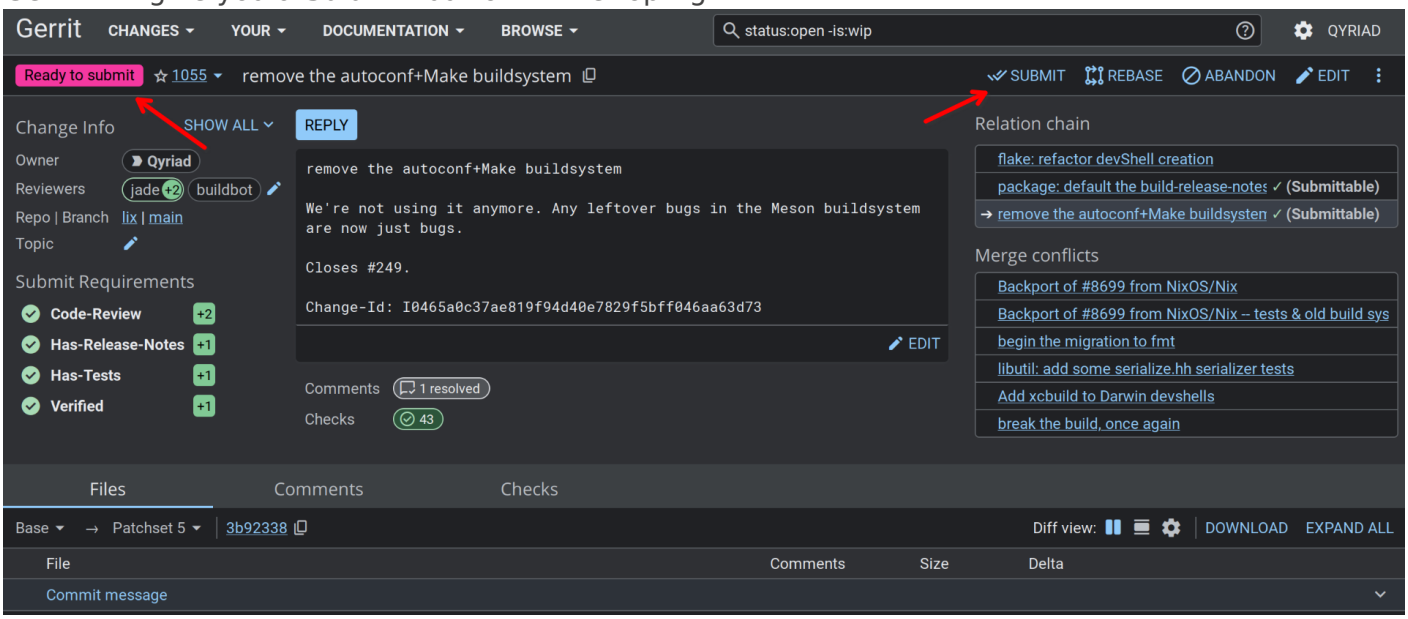
For a change to be merged, it must have the following four "votes", in Gerrit's terminology:

- Set by reviewers:
  - +2 Code-Review: the committer that reviewed this thinks it can be submitted as-is (all users can vote +1/-1, expressing a weaker view on code acceptability)
  - +1 Has-Release-Notes: means the reviewer thinks your commit added relevant release notes for that commit, or that it does not need any. This serves primarily as a reminder.
  - +1 Has-Tests: means the reviewer thinks your commit added all the tests that commit needs, or that it does not need additional tests. Like Has-Release-Notes, this

serves primarily as a reminder.
- Set automatically by CI:
  - +1 Verified: means CI successfully built for all our platforms and passed all tests

If you're newly part of the core team you will need to add yourself to the Gerrit `lix` group, otherwise you can't set the `Has-Release-Notes` or `Has-Tests` labels. If you're not, this doesn't affect you.

When all of those labels are set, a change becomes **Ready to submit**, in Gerrit's termology, and Gerrit will give you a **Submit** button in the top right:



By convention, ***the change author*** *has the final say on clicking the Submit button* (note: this is the opposite of the Github convention), and there is no special permission to merge a change once it has been fully reviewed (the permissions are in the reviewer +2'ing it). This gives you a last chance to have a look at your change before merging it.

Workflow tips

Local branches and commits

Gerrit is very mean to you if you don't have your local commit history in a linear presentable state, which takes getting used to but it is very low overhead once you get used to it. In short, amended commits become "patchsets", new commits become changes, and multiple commits help link your changes together as a "relation chain".

Note: if you're coming from Chromium, this is different to how they use Gerrit, where multiple commits become patchsets, and only the first commit on a local branch creates a new change.

Gerrit's commit-msg hook generates a new Change-Id for each commit you make, which in turn creates a new change that gets reviewed separately. To update an existing change after review feedback, amend or squash your changes into your old commit, keeping its Change-Id unchanged,

then push.

Consider not pushing for review before it is clean, or split commits up with `git-revise` (good) or `jj` (better) after the fact, amending as you work. If you want a backup of your changes, you can fork it on Forgejo and push to that fork.

Basic Pushing

If you cloned the repo from Forgejo, be sure to change your remote URL to point to Gerrit before continuing. Assuming your remote is called `origin` (which is the default):

`git remote set-url origin ssh://{username}@gerrit.lix.systems:2022/lix`

Then you can push to Gerrit with:

`git push origin HEAD:refs/for/main`

If you get tired of doing this every time, you can automate it by setting the `.git/config` as follows:

`git config remote.origin.push HEAD:refs/for/main`

You will have to do that in each fresh check-out. Once it's done, `git push` will work without additional options.

If you get a “remote unpack failed” error while pushing, run `git fetch` then try again.

If you wish to push a change and immediately mark it as WIP, you can push with `-o wip`, or make that the default behavior by checking `Set new changes to "work in progress" by default` in Gerrit's user settings, under "Preferences".

Topics & Push Arguments

A Gerrit topic may be set on push with:

```
git push origin HEAD:refs/for/main%topic=foo
```

Which will create all pushed changes with the topic "foo". Topics are helpful for grouping long series of related changes.

A change may also be marked as "work in progress" on push:

```
git push origin HEAD:refs/for/main%wip
```

Gerrit has documentation on other push arguments you can use here, but it also takes a `help` argument whose output is more canonical and might be easier to understand, which you can view with:

```
git push origin HEAD:refs/for/main%help
```

At the time of this writing (2024/06/26), that output looks like this:

```
$ git push origin @:refs/for/main%help
Total 0 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Processing changes: refs: 1, done
remote:
remote: Help for refs/for/branch:
remote:
remote:  --base BASE                      : merge base of changes
remote:  --cc CC                          : add CC to changes
remote:  --create-cod-token                 : create a token for consistency-on-dema
remote:                                   nd (default: false)
remote:  --deadline NAME                    : deadline after which the push should
remote:                                   be aborted
remote:  --edit (-e)                       : upload as change edit (default: false)
remote:  --hashtag (-t) HASHTAG               : add hashtag to changes
remote:  --help (-h)                       : display this help text (default: true)
remote:  --ignore-automatic-attention-set-rules : do not change the attention set on
remote:  (-ias, -ignore-attention-set)          this push (default: false)
remote:  --label (-l) LABEL+VALUE             : label(s) to assign (defaults to +1 if
remote:                                   no value provided)
remote:  --merged                          : create single change for a merged
remote:                                   commit (default: false)
remote:  --message (-m) MESSAGE               : Comment message to apply to the review
remote:  --no-publish-comments (--np)         : do not publish draft comments
remote:                                   (default: false)
remote:  --notify [NONE | OWNER |             : Notify handling that defines to whom
remote:  OWNER_REVIEWERS | ALL]                 email notifications should be sent.
remote:                                   Allowed values are NONE, OWNER,
remote:                                   OWNER_REVIEWERS, ALL. If not set, the
remote:                                   default is ALL.
remote:  --notify-bcc USER                  : user that should be BCC'd one time by
remote:                                   email
remote:  --notify-cc USER                   : user that should be CC'd one time by
remote:                                   email
remote:  --notify-to USER                   : user that should be notified one time
remote:                                   by email
remote:  --private                         : mark new/updated change as private
```

```
remote:                                 (default: false)
remote:  --publish-comments                     : publish all draft comments on updated
remote:                                 changes (default: false)
remote:  --ready                          : mark change as ready (default: false)
remote:  --remove-private                       : remove privacy flag from updated
remote:                                 change (default: false)
remote:  --reviewer (-r) REVIEWER               : add reviewer to changes
remote:  --skip-validation                    : skips commit validation (default:
remote:                                 false)
remote:  --submit                         : immediately submit the change
remote:                                 (default: false)
remote:  --topic NAME                         : attach topic to changes
remote:  --trace NAME                         : enable tracing
remote:  --wip (-work-in-progress)              : mark change as work in progress
remote:                                 (default: false)
remote:
To ssh://gerrit.lix.systems:2022/lix
 ! [remote rejected]     HEAD -> refs/for/main%help (see help)
error: failed to push some refs to 'ssh://gerrit.lix.systems:2022/lix'
```

Pulling

Pulling from Gerrit will work normally. It's worth keeping in mind that sometimes a CL you're working on has been edited in the web UI or by another contributor, so the commit in your repo isn't the latest. Rebasing will usually make the duplicate go away; this is part of the normal rebase semantics, not Gerrit magic. You might consider making rebase-on-pull your default.

Sandbox branches

> This feature has some notable ways to shoot yourself in the foot. We still support it, since it allows for running CI builds on things before they become proper CLs. If you don't need that and don't want to worry about the footguns, consider using a branch on a Forgejo fork for sharing WIP code.
>
> In particular, if a commit is in *any* branch already including a `sb/` branch, it will be rejected with the error "no new changes" if it is later pushed to `refs/for/main`. This can be worked around by amending all the commits so they are distinct, or by `git push origin HEAD:refs/for/main%base=$(git rev-parse origin/main)`, which forces the merge-base

Use `refs/heads/sb/USERNAME/*`.

CI rerun

Push the CL again with a no-changes commit amendment if you want to force CI to rerun.

Finding CLs to review

Consider bookmarking: https://gerrit.lix.systems/q/status:open+-is:wip+-author:me+label:Code-Review%3C2

Revision #14
Created 25 March 2024 04:26:40 by jade
Updated 7 September 2024 21:39:34 by wiggles dog