Team Project Abstract

2024.04.18

SWPP Practice Session

Seunghyeon Nam (with lots of derived works)

Team Project

- Develop compiler optimizations as a team!
- Each team should work on a team repository
  - Each team should create an upstream repository swpp202401-teamN
  - Each member should work on individual fork of the upstream
  - Project skeleton will be distributed as repository template

Collaboration Basics

- Discuss what to implement with teammates
- Implement new feature/bugfix/etc on a new branch
- Send a pull request (PR) to the upstream repository
- Get the PR reviewed by at least 2 reviewers
- Merge the PR into the upstream iff it passes the review

Discussion

- Share your plans before getting into work!
  - Helps teammates understand your work
  - Prevents duplicate works between teammates
- Use GitHub Issue to keep a record of each member's plans
- Presenting short slides can be helpful
  - Especially if you're planning on a very complex algorithm…

Pull Request

- A unit of working feature
- After each PR is merged…
  - The project must compile without any problem
  - All existing tests must pass
- PRs are ‘destined’ to be reviewed
  - Measures should be taken to reduce the burden of reviewing!

Line Diff

- Huge amount of changes are hard to review
- Use line diff to measure the amount of changes in code
- Generally speaking, PRs should not introduce 300+ line diff
  - This does not include comments or tests

Reducing the Diff

- Line diffs should be reduced as much as possible
- One can reduce the line diff by…
    - Splitting a large PR into multiple PRs
    - Writing concise and expressive codes
    - Following the formatting rules

Splitting the Pull Request

- Each PR is responsible for a single subject
- Common mistakes that ‘bloat’ the PRs are…
    - Implement A and format B
    - Fix irrelevant bugs A and B
    - Implement a large feature A and fix B to use A

Splitting the Pull Request

- Sometimes, a single subject may seem to require large diff
- A feature that requires complex algorithm for efficiency
    - Start with simpler implementation, then improve it with another PR
- Fixing tightly related bugs A, A’ and A’’
    - Fix A first, then fix A’ and A’’ based on merged changes

Concise & Expressive Codes

- This topic is somewhat language-specific (C++)
- Use `auto`, `decltype`, or `using statement` to hide complex types
- Look for library functions (`std::do_this()`, `llvm::doThat()`)
- Follow commonly used design patterns (visitor, builder, …)
  - Template-based design patterns may be hard to use
  - But they are very powerful! (CRTP, variadic templates, type traits, …)

Code Formatting

- Properly formatted code is easier to read and understand
- Also, formatting reduces diffs due to minor editing
    - Spaces, newlines, parentheses, etc
- `clang-format` can be used to apply formatting rules file-wide
    - Already installed in LLVM bin directory

Code Review

- Reviewers (teammates) will take time understanding your code
- This may look slower compared to writing the code alone
- But this process makes the code less buggy & simpler
- In the long run, you get a better program in shorter time ☺

Code Review

- Based on their understanding, reviewers may
  - Approve your code to be merged
  - Give feedbacks to suggest changes
  - Ask questions about the implementation

Giving Feedbacks

- Reviewers should look for the following criteria
  - Does this PR correctly address the issue?
  - Does this PR not introduce any UB or unnecessary copy?
  - Does this PR include proper tests to show the correctness?
  - Is there any existing library that does the same job?
  - Is there any better idiom or pattern that has the same meaning?

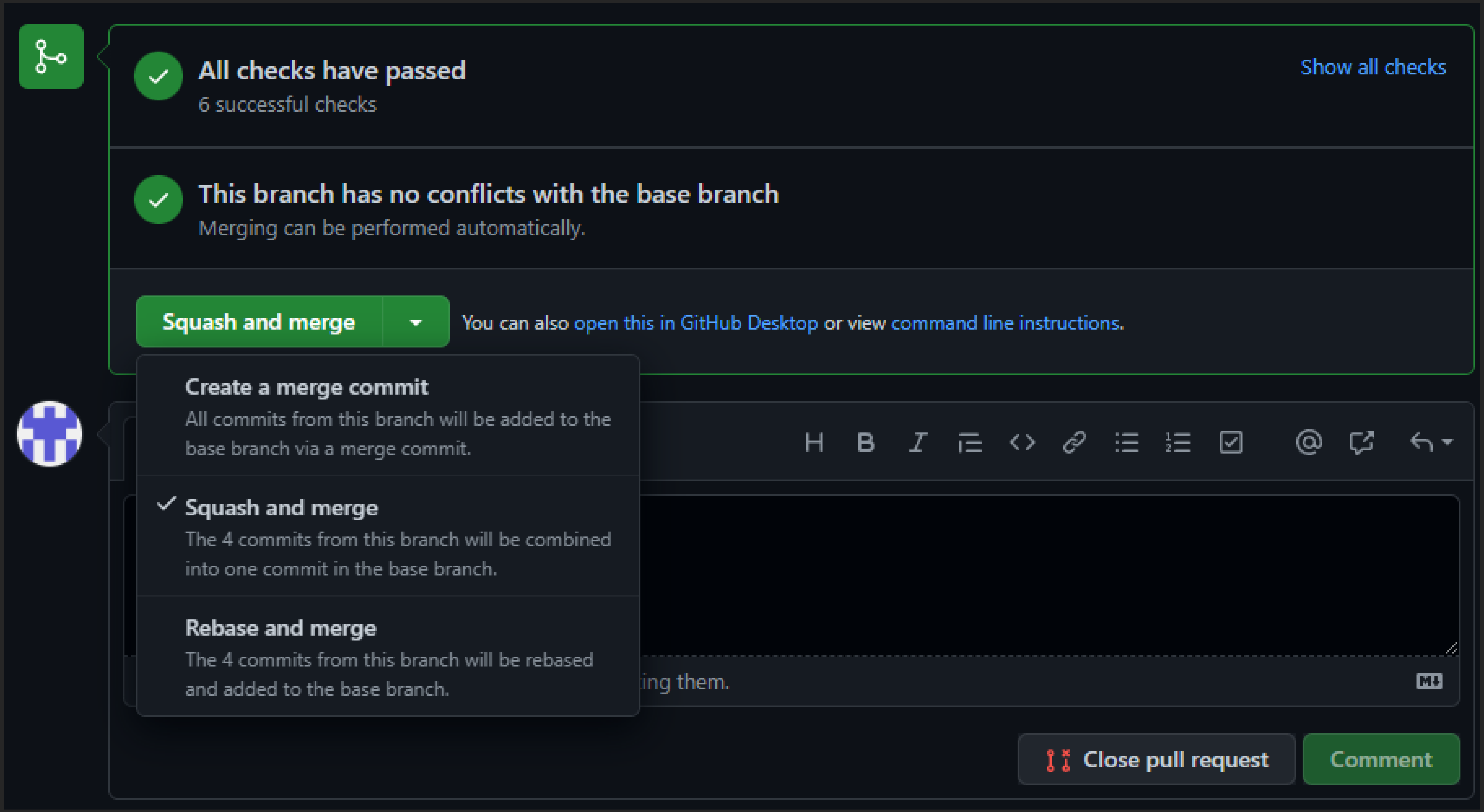
Code Review

- Feedbacks may be heartbreaking ☹
  - Remember that reviewers are not blaming you for bad code
  - Code review is an act of collaboration toward better code
- Answer the questions for you and your teammates
  - Better understanding leads to better feedbacks
  - You may ‘rubber-duck’ unnoticed problems in the process

Merging the Pull Request

- Use squash and merge
  - Makes the commit history concise & linear
  - Keeps the ‘intermediate commits’ from flooding the upstream
  - Helps reduce buggy PR into buggy commit

Merging the Pull Request



All checks have passed
6 successful checks

Show all checks

This branch has no conflicts with the base branch
Merging can be performed automatically.

Squash and merge

You can also open this in GitHub Desktop or view command line instructions.

Create a merge commit
All commits from this branch will be added to the base branch via a merge commit.

✓ Squash and merge
The 4 commits from this branch will be combined into one commit in the base branch.

Rebase and merge
The 4 commits from this branch will be rebased and added to the base branch.

ing them.