

GitHub - Pull Request training

DIME Analytics

October 29, 2020

DIME - The World Bank - <https://www.worldbank.org/en/research/dime>

Who is this training for?

Who is this training for?

Anyone comfortable branching, committing and merging in Git/GitHub who is ready to be introduced to a more advanced workflow using Git/GitHub to ensure high quality code.



THIS TRAINING HAS TWO PARTS

Part 1

Introducing the
branch-PR-merge cycle

A best practice framework for
implementing each task in a PR

Part 2

Introducing the Gitflow
philosophy

A best practice framework for
working with PRs in your project

Part 1:

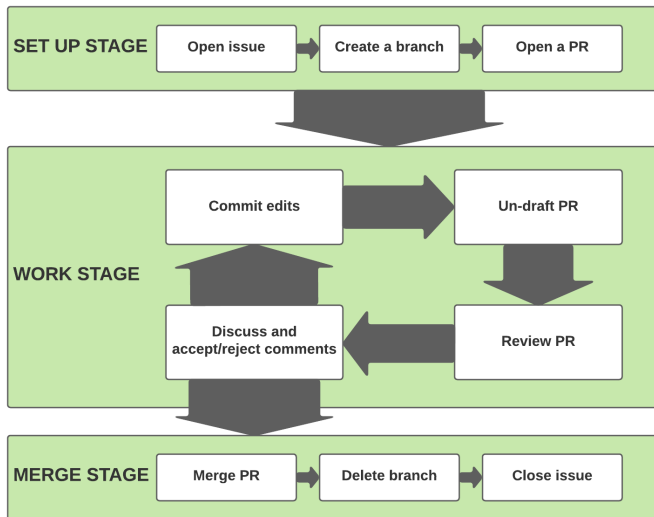
**Best practices for the
branch-PR-merge cycle**

The branch-PR-merge cycle

Three stages with multiple steps in each

Complete a full *branch-PR-merge* cycle for **all tasks**

We will go over all steps but focus today on the **work stage**

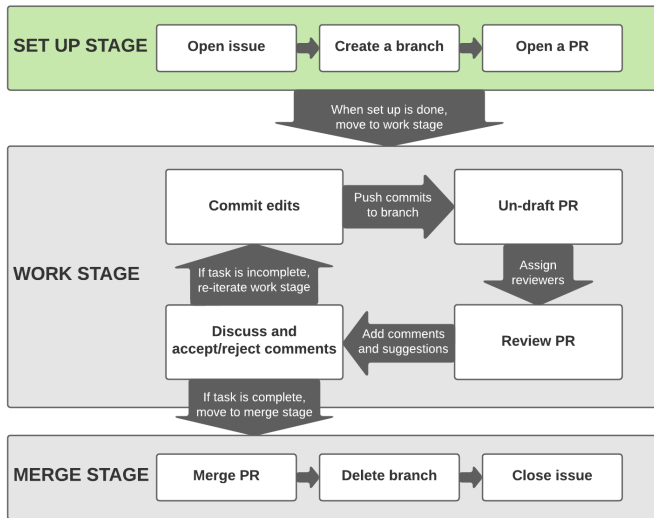


SET UP STAGE

Stage: The set up stage

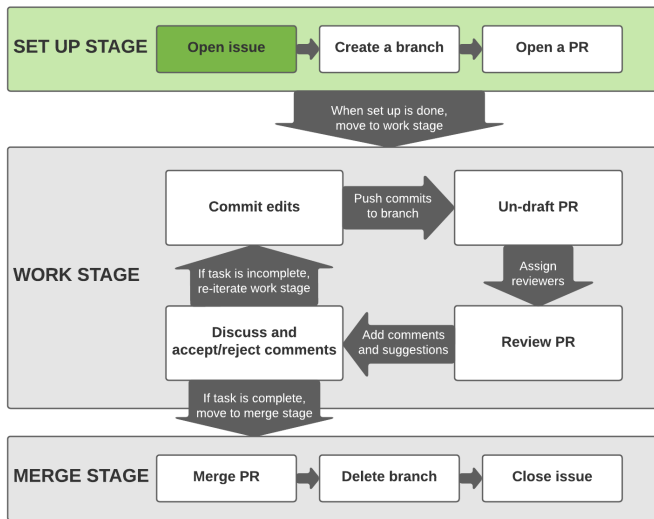
Purpose of the set up stage:

- Document the task you will work on
- Create a space in your repo to work on the task



Step: Create an issue

- Issues is a far superior way to document tasks compared to emails or in-person meetings!
- They allow other team members to provide input on how to solve the task
- Very quick tasks that do not require discussion may not need an issue



Create an issue

<> Code **Issues 3** Pull requests 1 Actions Projects Wiki ...

Create a PR training

Write Preview

H B I

Two parts:

- Best practices for the branch-pr-merge cycle
- How to use the branch-pr-merge cycle in your workflow

Attach files by dragging & dropping, selecting or pasting them.

Styling with Markdown is supported

Submit new issue

Assignees

kbjarkefur

Labels

None yet

Projects

None yet

Milestone

No milestone

Linked pull requests

Successfully merging a pull request may close this issue.

None yet

- Click the issues tab and then New Issue
- Describe the task and assign yourself or someone else to complete the task
- Ask the rest of the team of input if applicable
- Add labels to facilitate future searches

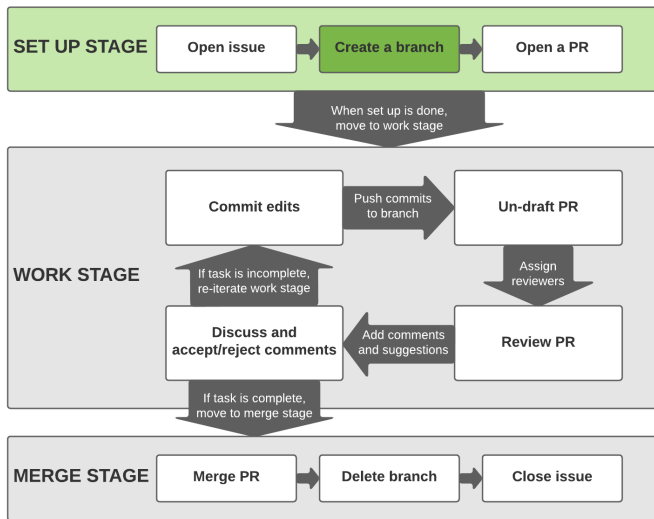
Browse an issue

The screenshot shows a GitHub issue page for 'Create a PR training #11'. At the top, navigation tabs include '<> Code', 'Issues 3' (active), 'Pull requests', 'Actions', 'Projects', and 'Wiki'. The issue title is 'Create a PR training #11', with 'Edit' and 'New issue' buttons. Below the title, a green 'Open' button and text indicate 'kbjarkefur opened this issue now · 0 comments'. A comment by 'kbjarkefur' is shown, stating 'Two parts:' followed by a bulleted list: 'Best practices for the branch-pr-merge cycle' and 'How to use the branch-pr-merge cycle in your workflow'. To the right of the comment, a sidebar lists 'Assignees' (kbjarkefur), 'Labels' (None yet), 'Projects' (None yet), 'Milestone' (No milestone), and 'Linked pull requests' (Successfully merging a pull request may close this issue. None yet). At the bottom, a comment input area with 'Write' and 'Preview' tabs is visible, along with a rich text editor toolbar and a text box labeled 'Leave a comment'.

- Take note of the issue number (also found in end of issue URL) so you can refer to it
- Anyone can provide input using the comment field
- Assignees and labels can be updated as the task evolve
- Future team members can browse closed issues

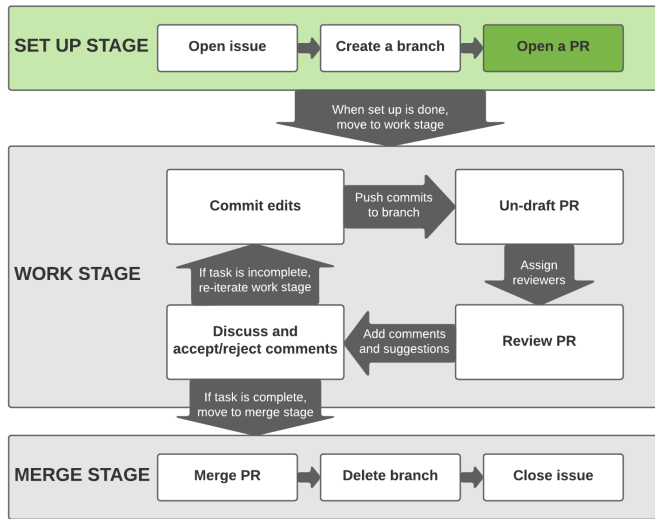
Create a branch

- Create branch on GitHub.com ► Step-by-step
- We create a branch to have a space where work on this task does not interfere with work on other tasks
- Name the branch after the task and add the issue number as suffix - for example:
pr-training-11

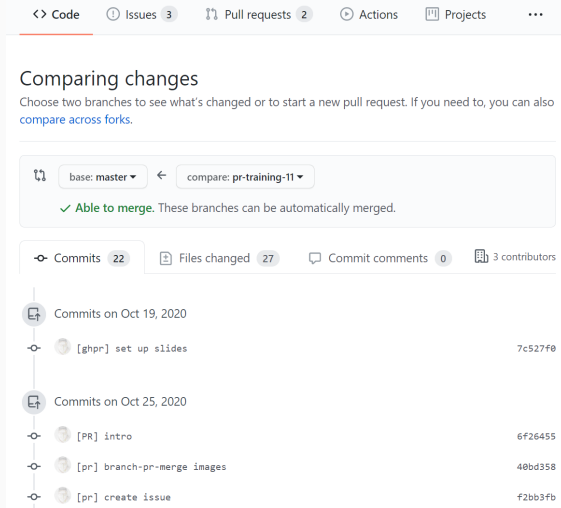


Open the PR

- Create a PR **before** you implement the task - this creates a space on GitHub.com where the progress of this task can be followed
- You can create a “*draft PR*” that cannot be merged while in draft status - signals work in progress



Create a PR



<> Code 1 Issues 3 2 Pull requests 2 3 Actions 4 Projects ...

Comparing changes

Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#).

base: master ← compare: pr-training-11

✓ Able to merge. These branches can be automatically merged.

Commits 22 Files changed 27 Commit comments 0 3 contributors

Commits on Oct 19, 2020

- [ghpr] set up slides 7c527f0

Commits on Oct 25, 2020

- [PR] intro 6f26455
- [pr] branch-pr-merge images 40bd358
- [pr] create issue f2bb3fb

Recap of PR creation best practices:

- Go to the “*Pull request*” tab
- Make sure that you are comparing the correct branches
- Always browse the commits and the files changes before opening the PR
- You need at least one commit - Create/edit a README describing the task

Create a draft PR

Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).

base: master ← compare: pr-training-11

✓ Able to merge. These branches can be automatically merged.

GitHub PR training - Issue #11

Write Preview

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Work on #11

Attach files by dragging & dropping, selecting or pasting them.

Draft pull request

Remember, contributions to the Guidelines.

- Create pull request
Open a pull request that is ready for review
- ✓ Create draft pull request
Cannot be merged until marked ready for review

Reviewers
No reviews

Assignees
No one—assign yourself

Labels
work-in-progress

Projects
None yet

Milestone
No milestone

Linked issues
Use Closing keywords in the description to automatically close issues

Helpful resources

- Give the PR a name associated with the branch name but more descriptive
- Add #11 in the description to create a hyper link to issue - add work-in-progress label
- Click the arrow on the green button and select *Create draft pull request*

Browse draft PR

GitHub PR training - Issue #11 #12 Edit Open with ▾

Draft kbjarkefur wants to merge 6 commits into `master` from `pr-training-11`

Conversation **0** Commits **6** Checks **0** Files changed **17** +282 -0

kbjarkefur commented 22 seconds ago Member

Work on #11

kbjarkefur added 6 commits 6 days ago

- [ghpr] set up slides 7c527f0
- [PR] intro 6f26455 **work-in-progress**
- [pr] branch-pr-merge images 40bd358
- [pr] create issue f2bb3fb
- [pr] spacing e828d8d
- [pr] update to issue - add branch c8cbb86

kbjarkefur added the **work-in-progress** label 22 seconds ago

Reviewers
No reviews

Assignees
No one—assign yourself

Labels
work-in-progress

Projects
None yet

Milestone
No milestone

Linked issues
Successfully merging this pull request may close these issues.

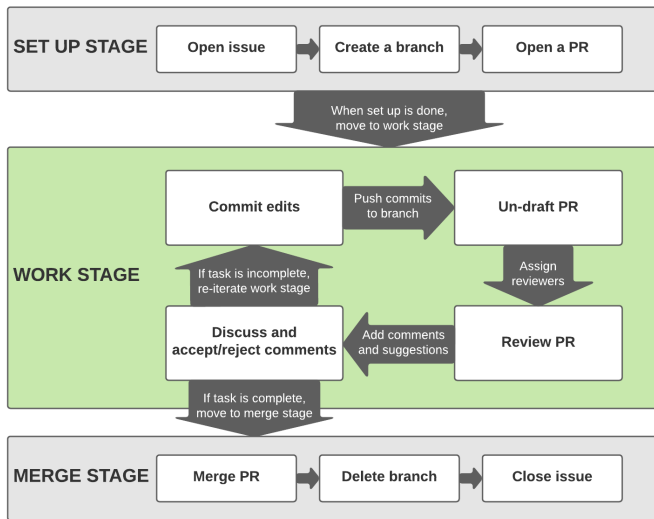
- A draft PR has the color code gray
- You can follow someone's work here - but no one is required to review anything yet
- The author will eventually remove the draft status and ask for reviews

WORK STAGE

Stage: The work stage

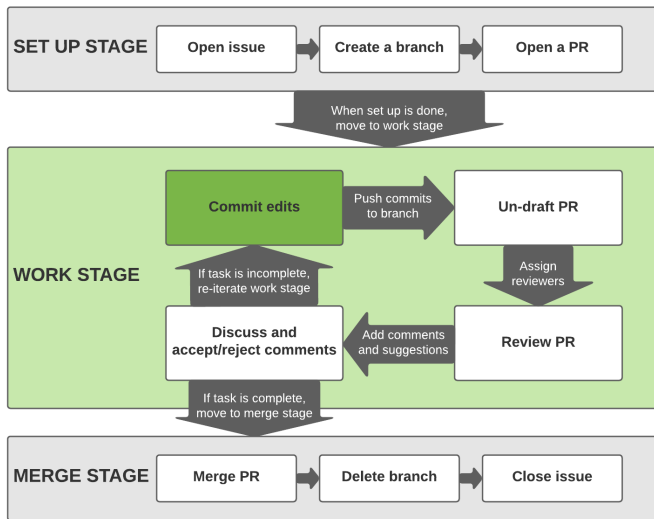
Purpose of the work stage:

- Write the code that implements this task
- Use the review features in a PR to improve code quality
- Iterate this stage until you have high-quality code



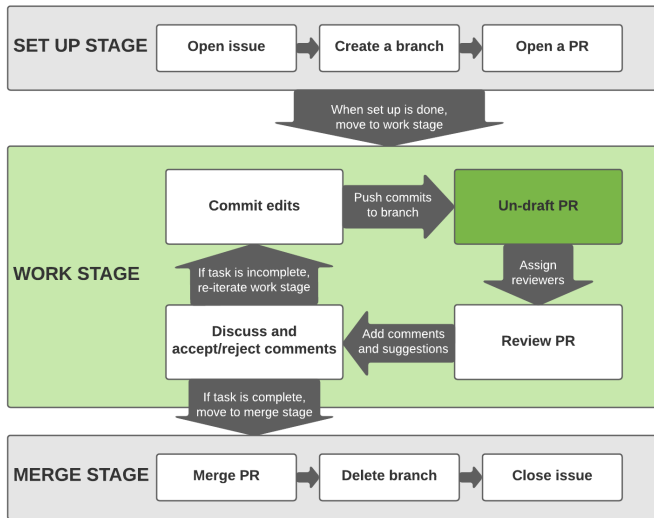
Make commits

- The author commits edits as usual
- The draft PR will be updated as more commits are pushed to the branch
- Keep pushing commits until the first implementation of the task is complete



Un-draft the PR

- Document what has been implemented in the branch
- Un-drafting indicates that a PR is ready to review



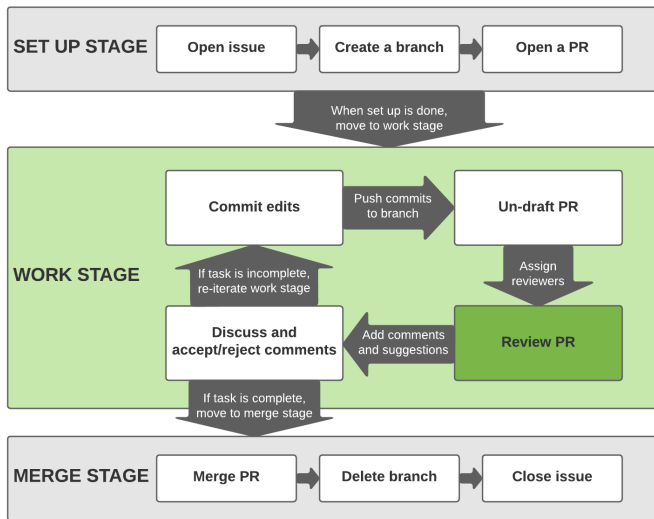
Un-draft the PR

The screenshot shows a GitHub Pull Request (PR) interface. At the top, a commit history shows 'kbjarkefur' adding a 'review-me' label and removing a 'work-in-progress' label 8 minutes ago. Below this, another commit shows 'kbjarkefur' requesting a review from 'bbdaniels' 6 minutes ago. A message states: 'Add more commits by pushing to the `pr-training-11` branch on `worldbank/dime-github-trainings`.' The main section of the PR is titled 'This pull request is still a work in progress' with a warning icon and the text 'Draft pull requests cannot be merged.' To the right of this message is a button labeled 'Ready for review'. Below the message is a 'Merge pull request' button with a dropdown arrow, followed by the text 'You can also [open this in GitHub Desktop](#) or view [command line instructions](#).' At the bottom, there is a comment box with a 'Write' tab selected. The comment text reads: 'In this PR I created a training for how to better work with PR. See slides attached [GitHub-PR-training.pdf](https://github.com/worldbank/dime-github-trainings/files/5449064/GitHub-PR-training.pdf)'. Below the text is a placeholder 'Attach files by dragging & dropping, selecting or pasting them.' and a 'Comment' button. To the left of the 'Comment' button is a 'Close with comment' button with a red 'X' icon.

- Replace the *work-in-progress* label with *review-me*
- Assign one or several people to review your PR
- Notify the reviewer(s) using email or slack as GitHub notifications may be muted
- Click “*Ready for review*” to remove draft status

Review the PR

- PR reviews are incredibly important for high-quality code
- Use the PR to review code edits in the *file changes* tab
- The reviewer adds code suggestions and comments



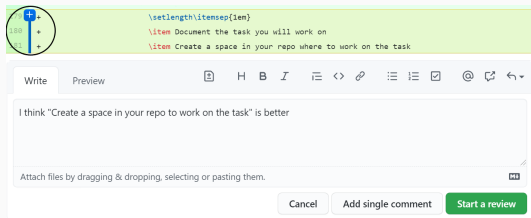
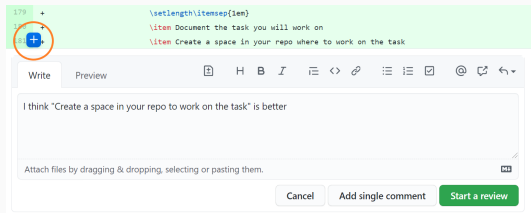
Review the PR

The screenshot shows a GitHub Pull Request (PR) for the file `GitHub-PR-training.tex` in the repository `GitHub-trainings/github-pr-training/latex-slides`. The PR has 19 files changed, with a net change of +584 lines and -0 deletions. The interface includes tabs for Conversation (21), Commits (14), Checks (0), and Files changed (19). A 'Review changes' button is visible. The file viewer shows a diff of the LaTeX file, with line 1 highlighted. The diff shows the following changes:

```
1 + % ----- Preamble
  starts here -----
2 +
3 + \documentclass[aspectratio=169]{beamer}
  %Remove [aspectratio=169] to get non-wide 4:3
  slide aspect ratio
4 +
5 + %-----
  ---
6 + % --- Set beamer theme
7 + \usetheme{Metropolis}
8 + \setbeamertemplate{footline}{}
  % Remove automatic footer
9 + \setbeamertemplate{navigationsymbols}{}
  % Comment this line to display navigation
  symbols
```

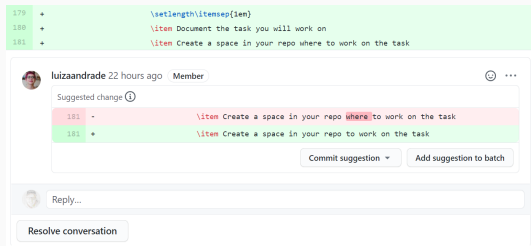
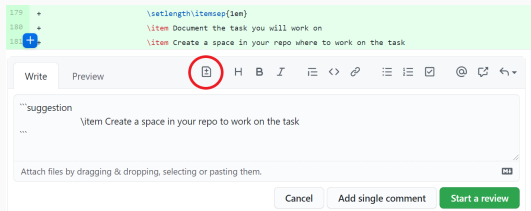
- Start your review by reading what the author or anyone else have already said in the *“Conversation”* tab
- Then go to the *“Files changed”* tab - this is where you will review the new content of the files

Line comments



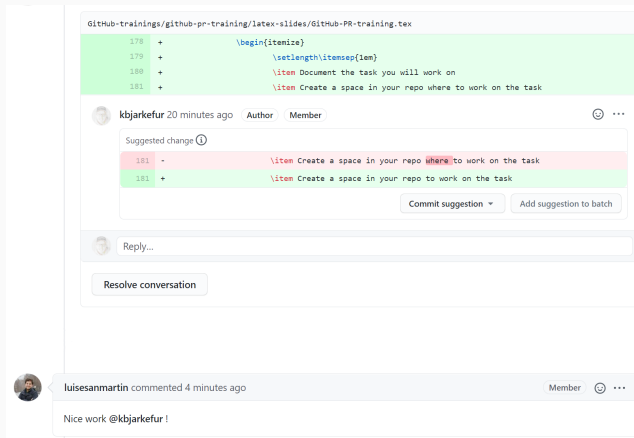
- Make comments on specific lines of as much as possible - line comments are much easier to keep track of
- Hover with the mouse over the line number for a line you want to comment on and click the plus sign (blue circle) to open comment field
- Hold shift when click and drag mouse to comment multiple lines (black circle)

Line suggestions



- You can also suggest an edit directly to the code if the edit is not too big
- Click the suggestion button (red circle) and edit the line of code in the comment field
- The author will then see the exact difference in your suggestion
- Suggestions can be done to multi-line comments too and can be combined with regular comments

Overall comments

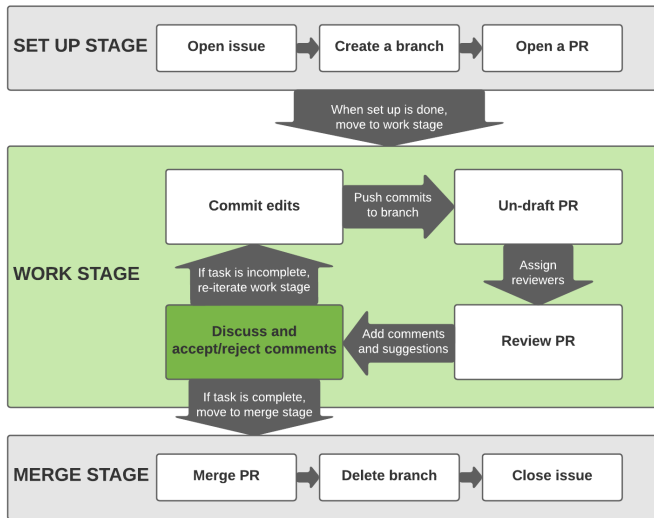


The screenshot shows a GitHub pull request interface. At the top, the file path is `GitHub-trainings/github-pr-training/latex-slides/GitHub-PR-training.tex`. The code diff shows four lines: line 178 with `\begin{itemize}`, line 179 with `\setlength\itemsep{1em}`, line 180 with `\item Document the task you will work on`, and line 181 with `\item Create a space in your repo where to work on the task`. Below the code, a user `kbjarkefur` (Member) has posted a comment 20 minutes ago. The comment shows a 'Suggested change' with two lines: line 181 with `\item Create a space in your repo where to work on the task` (highlighted in red) and line 181 with `\item Create a space in your repo to work on the task` (highlighted in green). Below the suggested change are buttons for 'Commit suggestion' and 'Add suggestion to batch'. At the bottom, a user `luisanmartin` (Member) has commented 4 minutes ago with the text 'Nice work @kbjarkefur !'.

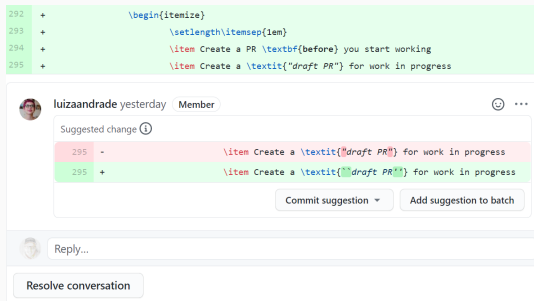
- Make overall comments and comments that cannot be done to a specific section of the code in thread in the “*Conversation*” tab
- Tag the author so they get a notification that someone have reviewed the PR
- Suggestions are also listed in this tab

Discuss and accept/reject

- The author discusses, accepts or rejects suggestions and replies to comments
- The author, the reviewer(s) and/or anyone else in the project team then decide if the work stage needs to be repeated



Review suggestions



The screenshot displays a code review interface. At the top, a code diff is shown with line numbers 292 to 295. Line 292 has a '+' sign and contains the LaTeX command `\begin{itemize}`. Line 293 has a '+' sign and contains `\setlength\itemsep{1em}`. Line 294 has a '+' sign and contains `\item Create a PR \textbf{before} you start working`. Line 295 has a '+' sign and contains `\item Create a \textit{"draft PR"} for work in progress`. Below the code diff, a user profile for 'luizaandrade' (Member) is shown. A 'Suggested change' section highlights a change on line 295, showing the removal of `\textit{"draft PR"}` and the addition of `\textit{"draft PR"}`. Below this, there are buttons for 'Commit suggestion' and 'Add suggestion to batch'. A 'Reply...' input field and a 'Resolve conversation' button are also visible.

- Respond to code suggestions before comments as suggestions tend to be quicker to address
- Suggestions and line comments are listed chronologically in the “*Conversation*” tab and by line number in the “*File changes*” tab
- Accept the suggestion with *Commit Suggestion*, ignore/delete it with *Resolve conversation* or comment to ask for more information



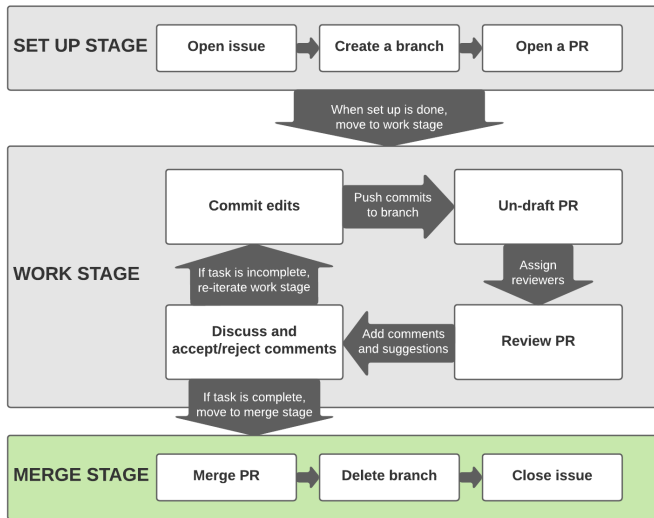
- When all suggestions and comments have been responded to, the team should discuss if a task is done or need more work
- If major work is still required, revert the PR to draft status, add back the *work-in-progress* label and iterate the work stage again
- Move on to the merge stage only when the task is complete and the team agrees the code is high-quality

MERGE STAGE

Stage: The merge stage

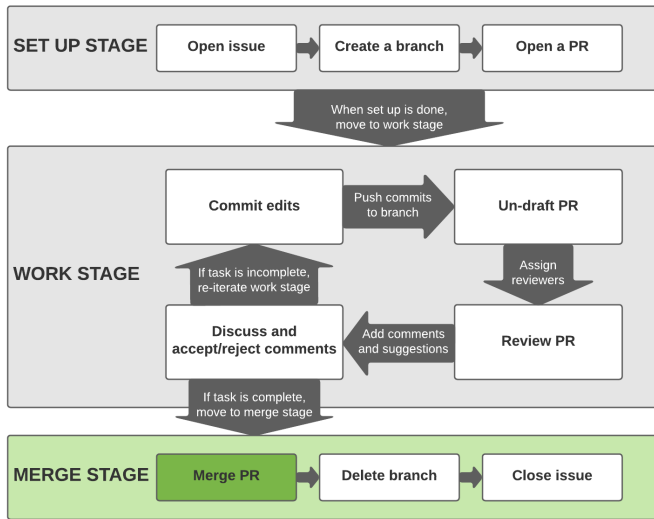
Purpose of the merge stage:

- Merge the quality controlled PR
- Make sure the task is properly documented and clean up the repo



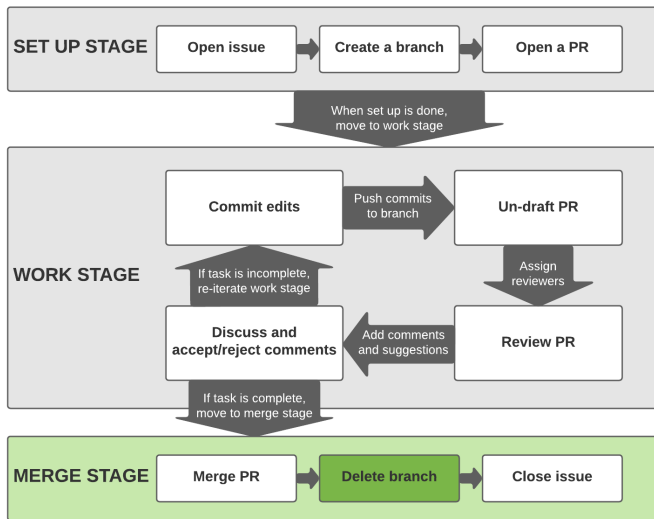
Merge the PR

- Make sure that the PR is well documented - this is where future team members will read how something was done and why
- Then you can merge your well-reviewed and well-documented code
- **Test run your code after merging it!**



Delete the branch

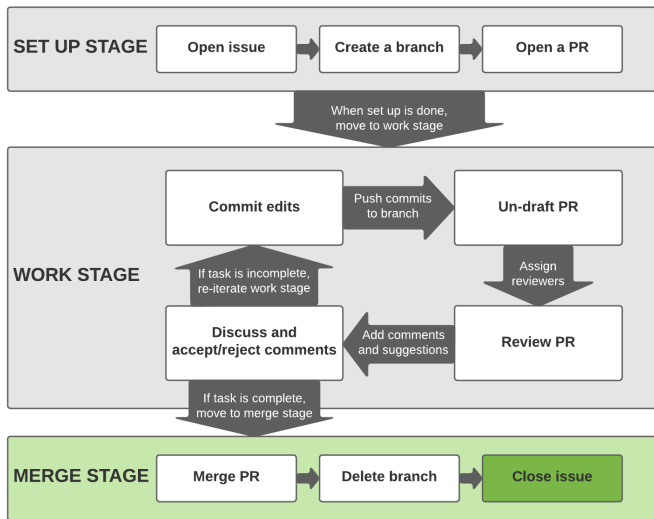
- Always delete branches after they are merged
- If you want to keep working in a branch with the same name, then re-create that branch
- Otherwise you risk working on an outdated version of the repo



Close issue

If you created an issue for this task:

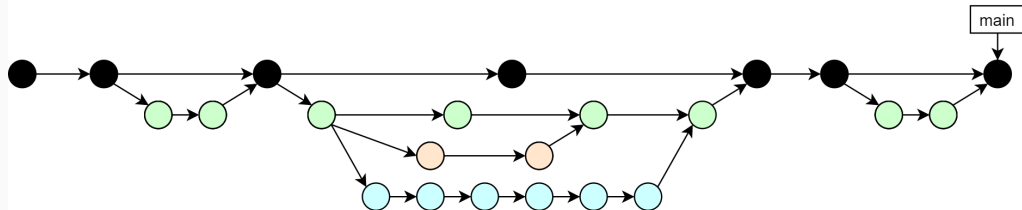
- Make sure that the PR number is referenced in the issue
- For example: *"Issue resolved in PR #12"*
- Then close the issue



Part 2:

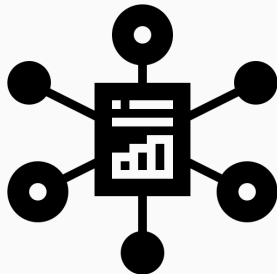
**Gitflow - How to fit the
“branch-PR-merge” cycle into your
workflow**

The network graph



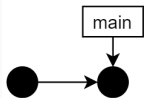
- A typical git network graph - each dot is a commit
- Several branches have been opened and merged, but currently only the *main* branch is open

- **Gitflow** is an idea or a philosophy of how to organize work in git - it is not a software you install
- It is developed by computer scientists and you will find a lot of resources for it online
- We will present a simplified version adapted for research
- Two branch types (later we add a third type):
 - The **main branch** (formerly master branch) - should never be worked in directly
 - **Feature branches** - this is where you do all your work



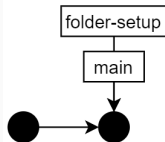
Simple branch-PR-merge cycle

Start a branch-PR-merge cycle



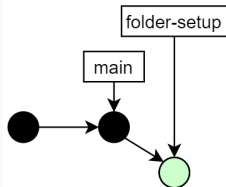
- This can either be the beginning of a repo or at a point where all previous branches were merged to the main branch
- Let's say your next task is to set up folders - apply the *branch-PR-merge* cycle

Set up stage - 1



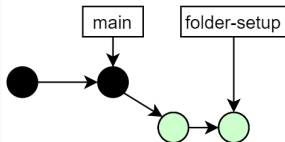
- Create a new *feature* branch at the point where you want the the *branch-PR-merge* cycle to start from
- Two branches pointing to the same commit are identical by definition

Set up stage - 2



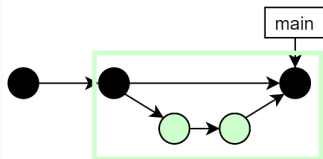
- Create a new short README or quickly edit an existing and commit - (or make a quick commit for the task) - at least one commit is needed to follow this workflow
- Open up a draft PR so there is a good place for your team to follow your work

Work stage



- Complete the task using one or many commits - in this example only one more commit was needed
- Assign someone to review the PR - iterate until you are all satisfied

Merge stage

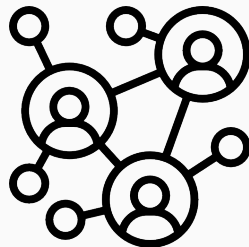


- Merge the PR and delete the *feature* branch
- The green box represents a full *branch-PR-merge* cycle in the network graph

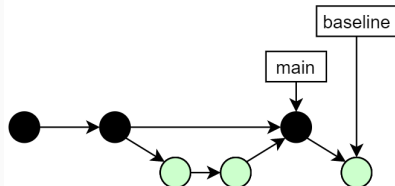
Nested branch-PR-merge cycles

Nested branch-PR-merge cycles

- Many high-level tasks are not simple - multiple team members working over multiple months
- Cleaning the baseline data, for example, is one big task composed of many smaller tasks
- Solve this by using nested *branch-PR-merge* cycles
- Third type of branch: **Develop branch** - a branch that is a high-level task that will have several *feature* branches

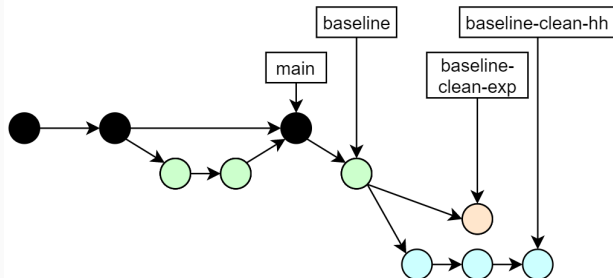


Create a develop branch



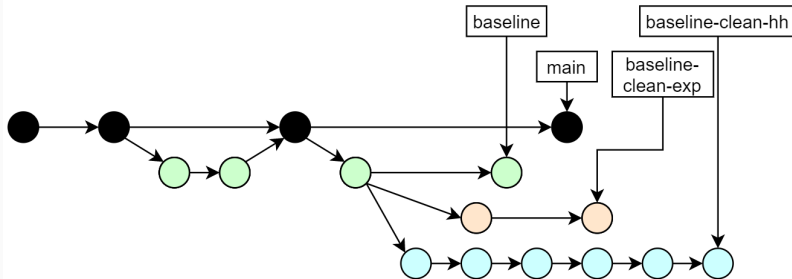
- Create a *develop* branch - name it after the high-level task - complete set up stage
- *Develop* branches often do not have a Github issue - but the *feature* branches off of it often have corresponding GitHub issues
- Include *develop* branch name as prefix to all *feature* branches off it

Create feature branches of the develop branch



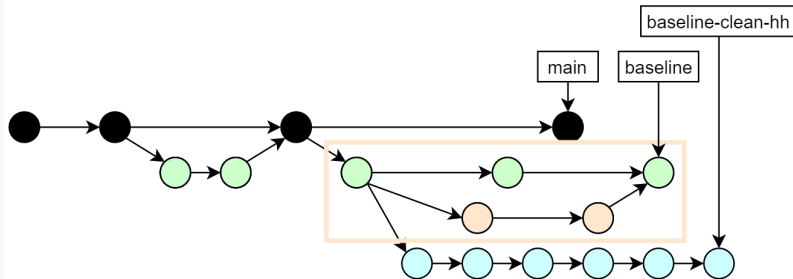
- Create as many *feature* branches off the *develop* branch as you need
- Split up the high-level task in as many smaller tasks as needed - try to split up tasks until each is small enough for one person to complete in max a week or two
- Create new *feature* branches off the *develop* branch even after it progresses

Work in the branches



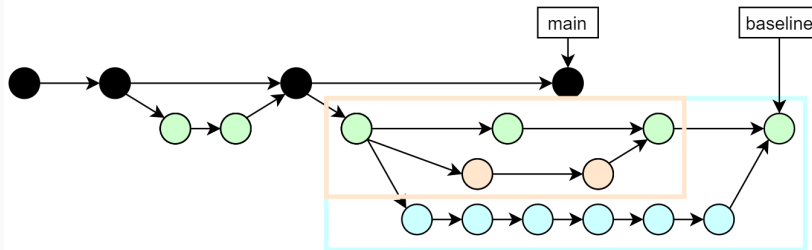
- Keep working on the *feature* branches until they are done
- When a task is complete: assign a reviewer - make comments/suggestions - accept/reject/discuss

Merge a feature branch



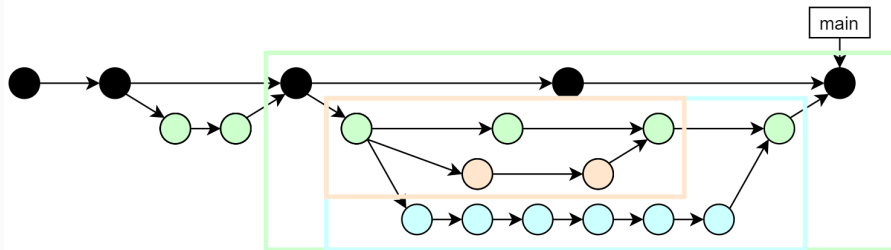
- The branch `baseline-clean-exp` was approved in the last step in the work stage and was merged and deleted in the merge stage
- The orange box is one *branch-PR-merge* cycle

Merge a feature branch



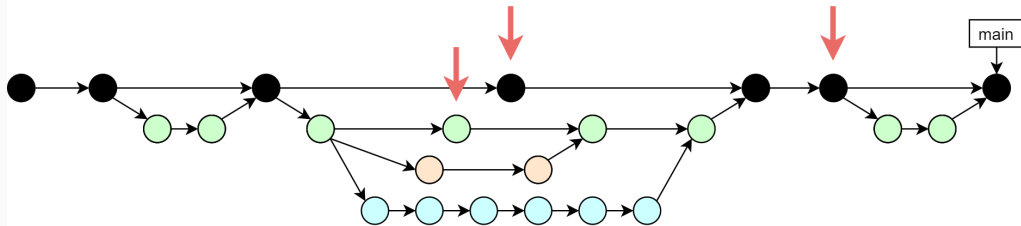
- The branch `baseline-clean-hh` was then also approved in the last step in the work stage and was merged and deleted in the merge stage
- The blue box is also a *branch-PR-merge* cycle

Merge a develop branch



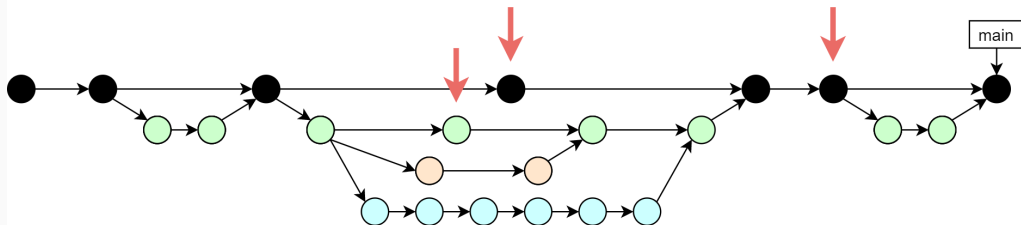
- Then the branch baseline is ready for a review - assign a reviewer - comment/suggest - accept/reject/discuss
- The green box is also a *branch-PR-merge* cycle
- This network graph shows a nested *branch-PR-merge* cycle

Work directly in main/develop



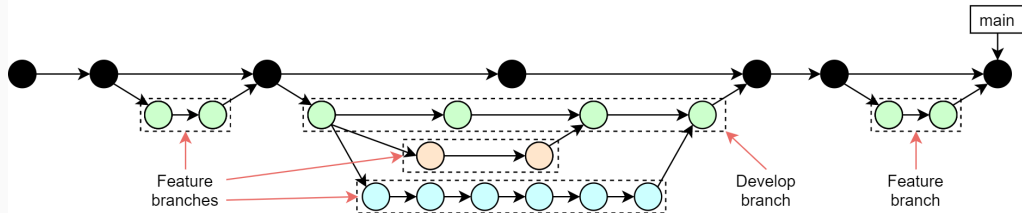
- When could it be ok to work directly on a *main/develop* branch? - see red arrows

Work directly in main/develop



- When could it be ok to work directly on a *main/develop* branch? - see red arrows
- When updating documentation!
 - Documentation about the repo in the *main* branch
 - Documentation about the high-level task in the *develop* branch

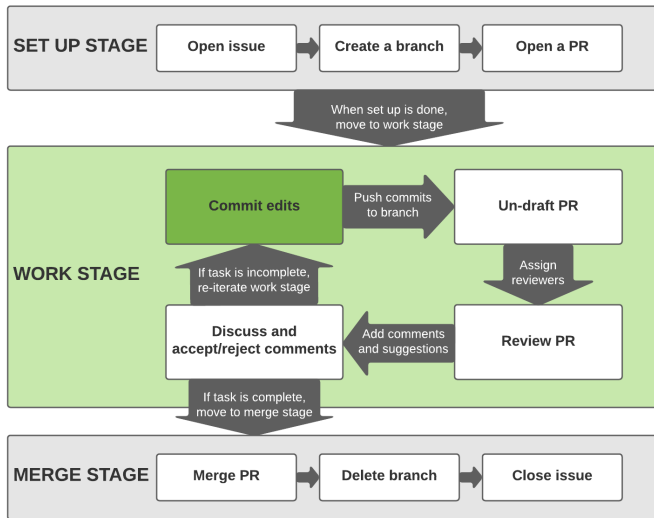
The network graph



- There is no technical git difference between the Gitflow types of branches - the only difference is what workflow that is expected
 - **Main branch:** The branch where all branches originates from
 - **Develop branch:** Non-*main* branch with *feature* branches
 - **Feature branch:** Branches of the *main* branch or *develop* branches with no other branches from it

Nest cycles in the work stage

- *Branch-PR-merge* cycles should be nested in the work stage
- The *develop* branch is kept in the *Commit edits* step while the *branch-PR-merge* cycles are completed for the feature branches
- If needed, convert a *feature* branch to a *develop* branch here



Thank you!

Questions?

Slides can be found here: <https://osf.io/e54gy/>

Useful links

- All DIME Analytics GitHub trainings: <https://osf.io/e54gy/>
- Other DIME Analytics GitHub resources:
<https://github.com/worldbank/dime-github-trainings>. For example:
 - DIME Analytics GitHub Templates (for example .gitignore):
<https://github.com/worldbank/dime-github-trainings/tree/master/GitHub-resources/DIME-GitHub-Templates>
 - DIME Analytics GitHub Roles:
<https://github.com/worldbank/dime-github-trainings/blob/master/GitHub-resources/DIME-GitHub-Roles/DIME-GitHub-roles.md>
- Markdown cheat sheet (how to format text on GitHub.com):
<https://www.markdownguide.org/cheat-sheet/>
- DIME GitHub Account admin info and instructions:
<https://github.com/dime-worldbank/dime-account-admin>

Most recent commit at the point of compiling this \LaTeX Beamer presentation:

<https://github.com/worldbank/dime-github-trainings/commit/40a95f94162e500dc0d10c38ede0ed4cbe43877b>

For instructions on how to include URLs to most recent commit used to generate document in Git, see: <https://gist.github.com/kbjarkefur/88820e5a5365b3f707b6b20aee57cf8a>

Appendix

Create branch on GitHub.com

The screenshot shows the GitHub interface for the repository `worldbank / dime-github-trainings`. At the top, navigation links include Code, Issues (3), Pull requests (1), Actions, Projects, Wiki, Security, and Insights. On the right, there are buttons for Unwatch (11), Star (7), and Fork (11).

The main content area shows the `master` branch selected, with 3 branches and 0 tags. A `Switch branches/tags` dialog is open, allowing the user to create a new branch named `new-branch-name` from the `master` branch. Below the dialog, a list of files is shown, including `README.md` and `fix link`.


The `README.md` file content is displayed below the file list:

DIME GitHub Trainings and Resources

This repo contains GitHub training materials and other GitHub resources. All content in this repository is published under the MIT License so anyone is free to use these resources in way the see fit. See [LICENSE](#) for all details.

On the right side of the repository page, there are sections for **About** (Training materials and other GitHub related information developed by DIME Analytics), **Releases** (No releases published), **Packages** (No packages published), and **Contributors** (4).

Create branch on GitHub.com

 worldbank / dime-github-trainings

Unwatch 11

Star 7

Fork 11

[Code](#) [Issues 3](#) [Pull requests 1](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#)

master 3 branches 0 tags

Go to file

Add file

Code

Switch branches/tags

new-branch-name

Branches Tags

Create branch: new-branch-name from 'master'

View all branches

new-branch-name

c08c37c 9 days ago 96 commits

Add .Rproj to gitignore 3 months ago

link-slide - add osf link 9 days ago

Move GitHub templates to this repo 10 months ago

Create LICENSE 10 months ago

fix link 10 months ago

README.md

fix link

README.md

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Readme

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Releases

No releases published
[Create a new release](#)

Packages

No packages published
[Publish your first package](#)

Contributors 4



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Create branch on GitHub.com

The screenshot shows the GitHub repository page for `worldbank / dime-github-trainings`. The repository has 3 branches and 0 tags. The `master` branch is selected. A dialog box titled "Switch branches/tags" is open, showing a list of branches. The `new-branch-name` branch is highlighted, and the "Create branch: new-branch-name from 'master'" option is selected. The repository's README.md file is visible, titled "DIME GitHub Trainings and Resources". The README text states: "This repo contains GitHub training materials and other GitHub resources. All content in this repository is published under the MIT License so anyone is free to use these resources in way the see fit. See [LICENSE](#) for all details."

worldbank / dime-github-trainings

Unwatch 11 Star 7 Fork 11

Code Issues 3 Pull requests 1 Actions Projects Wiki Security Insights

master 3 branches 0 tags

Go to file Add file Code

Switch branches/tags

new-branch-name

Branches Tags

Create branch: new-branch-name from 'master'

View all branches

README.md

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