DevOps

SC-Camp 2021

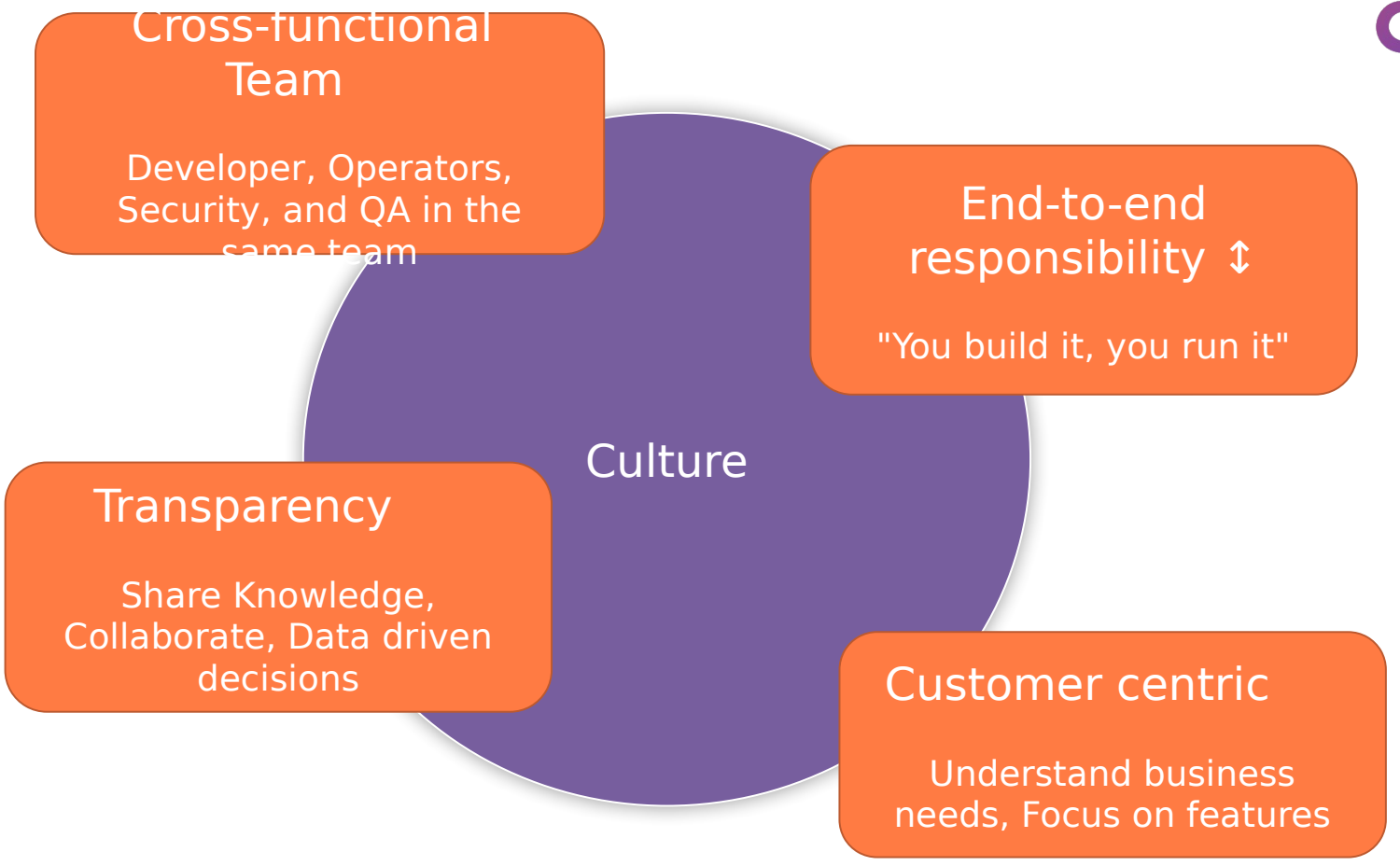
Pedro Velho

PhD - UGA 2004-2010

...

Engineer - Ryax - since 2019

Introduction to DevOps


Cross-functional Team
Developer, Operators, Security, and QA in the same team
End-to-end responsibility ↕
"You build it, you run it"
Culture
Transparency
Share Knowledge, Collaborate, Data driven decisions
Customer centric
Understand business needs, Focus on features

Organization Transfomation

Functional team:

- Focus on technologies
- Long V cycle of release
- Lots of communication friction
- No understanding of user needs
- No knowledge sharing or ownership

Developer Team

Security/QA Team

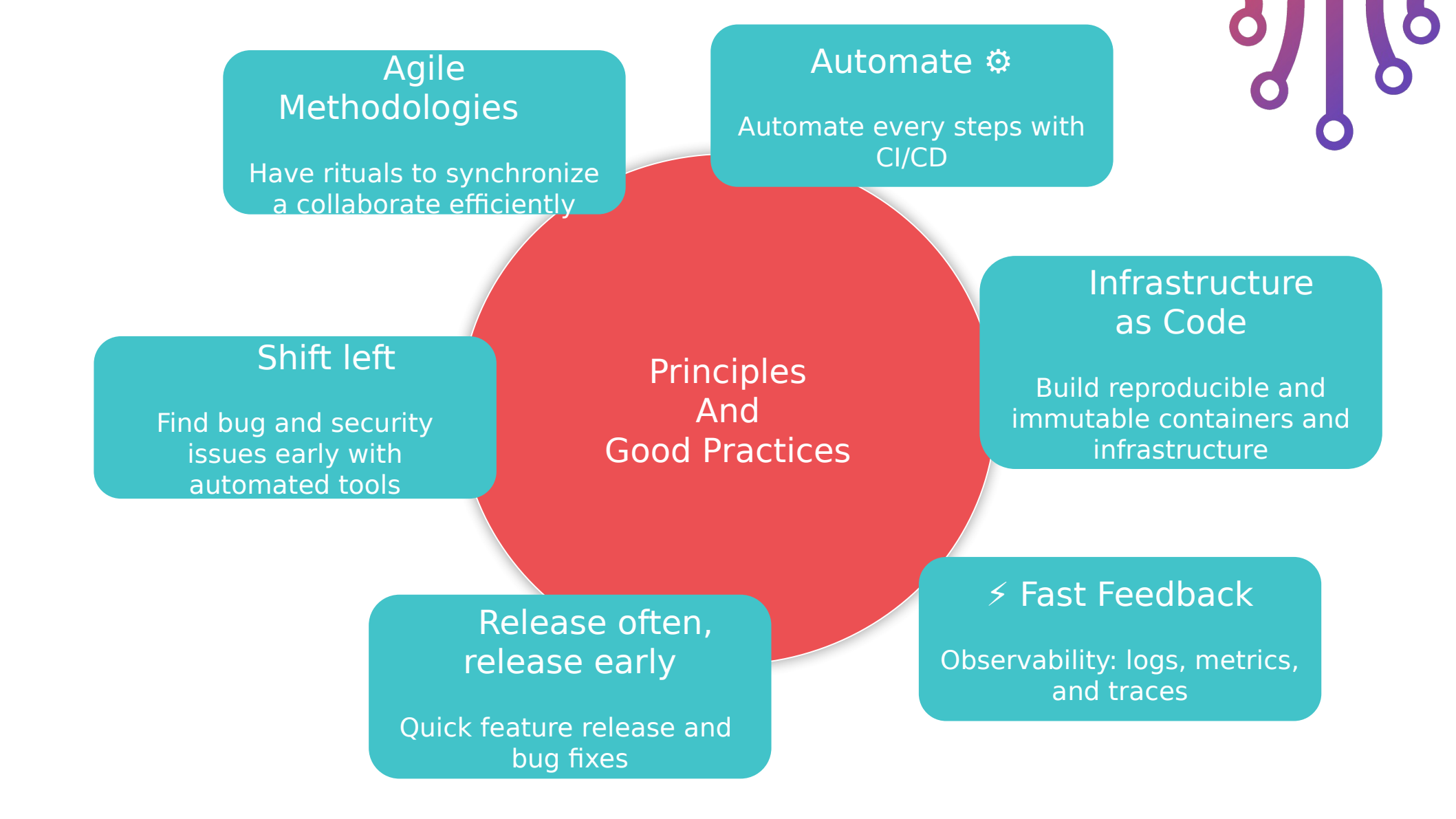
Operation Team

Product Team:

- Focus on product
- Fast Agile cycle of release
- More efficient communication
- Real understanding of user needs
- Share knowledge and ownership

Product A Team

Product B Team


Agile Methodologies
Have rituals to synchronize a collaborate efficiently
Automate ⚙
Automate every steps with CI/CD
Shift left
Find bug and security issues early with automated tools
Principles And Good Practices
Infrastructure as Code
Build reproducible and immutable containers and infrastructure
Release often, release early
Quick feature release and bug fixes
⚡ Fast Feedback
Observability: logs, metrics, and traces

DevOps Best Practices

Agile methodologies

1. Define your rituals (Daily, review, postmortem, retrospective, ...)
2. Randomly choose a Scrum Master
3. Design feature with the whole team, PO brings only business needs
4. Iterate and improve

Shift left

5. Create unit tests and integration
6. Select code quality tools
7. Put tests and quality checks in the CI pipeline
8. Only integrate code if all the quality is good

Automate:

9. Track all manual/implicit processes
10. Choose a documentation tool
11. Document them
12. Automate them if possible

Infrastructure as Code

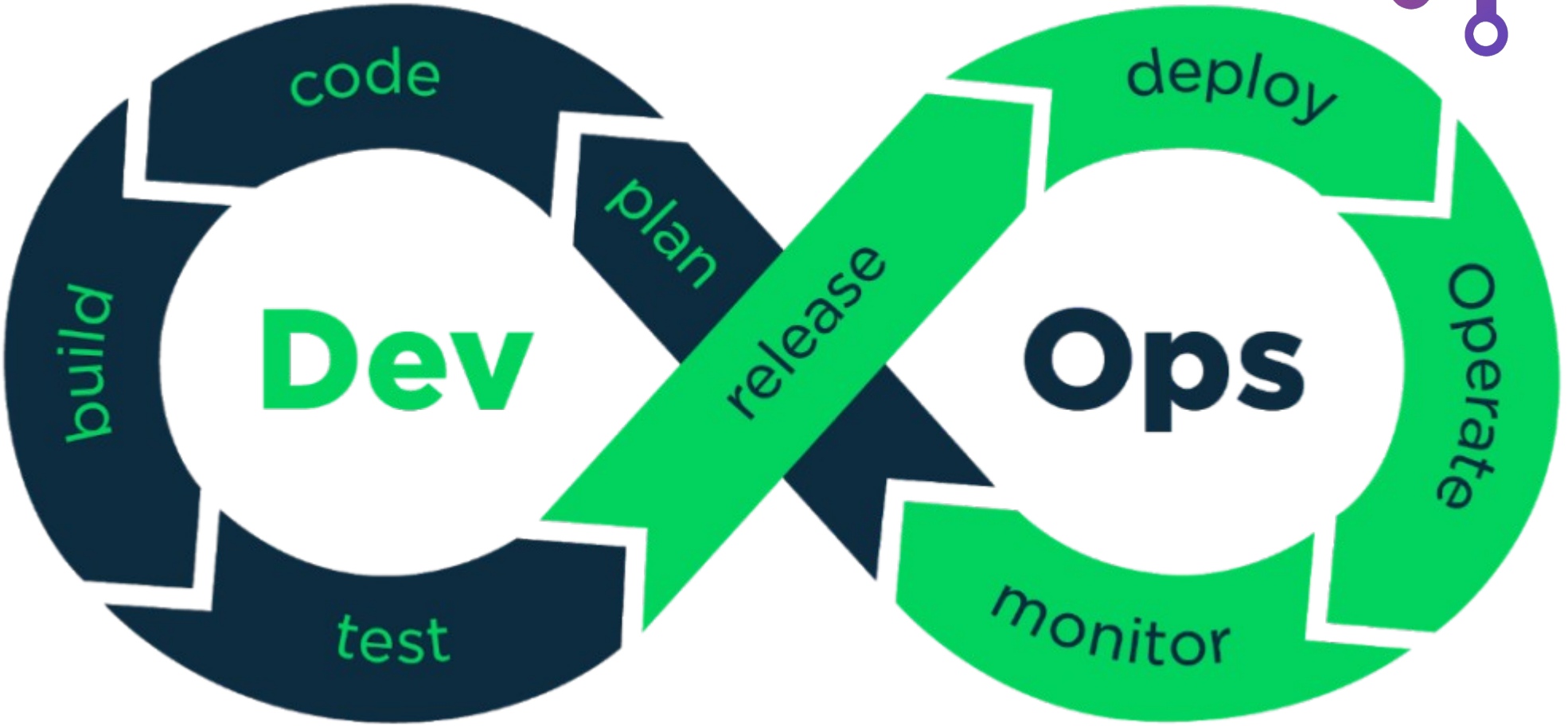
1. Choose appropriate tool
2. Code your infrastructure
3. Deploy it within the CI
4. Forbid any manual changes

Fast Feedback

5. Get metrics, logs and traces from your apps
6. Setup alerting on user focus signals
7. Setup dashboards to observe and explore

Release often, early

8. Implement other practices
9. Automate deployment with CD
10. Monitor and rollback if necessary
11. Track the time-to-deliver and try to improve it!



Source: https://www.hiclipart.com/free-transparent-background-png-clipart-pytym

DevOps Life Cycle Tools

Plan

- Use knowledge sharing tools

  Example: wiki, issue tracker, whiteboard and post-it

Code

- Use an IDE with integrated quality check tools

  Example: VSCode, PyCharm

- Enforce code integration process with code review

  Example: Gitlab, Github

Build

- Enforce reproducible build

  Example: Poetry (Python), Yarn (NodeJs)

- Package in a container

  Example: Docker, Kaniko, Nix, Buildah

Test

- Create a pyramid of test with coverage

  Example: Pytest (Python)

Release

- Push build artifact to a registry with a unique version tag

  Example: Skopeo, DockerHub, Harbor

Deploy

- Deploy your container(s) on a cluster

  Example: Kubernetes, Nomad

Operate

- Manage infrastructure updates

  Example: Helm, Kubeadm

Monitor

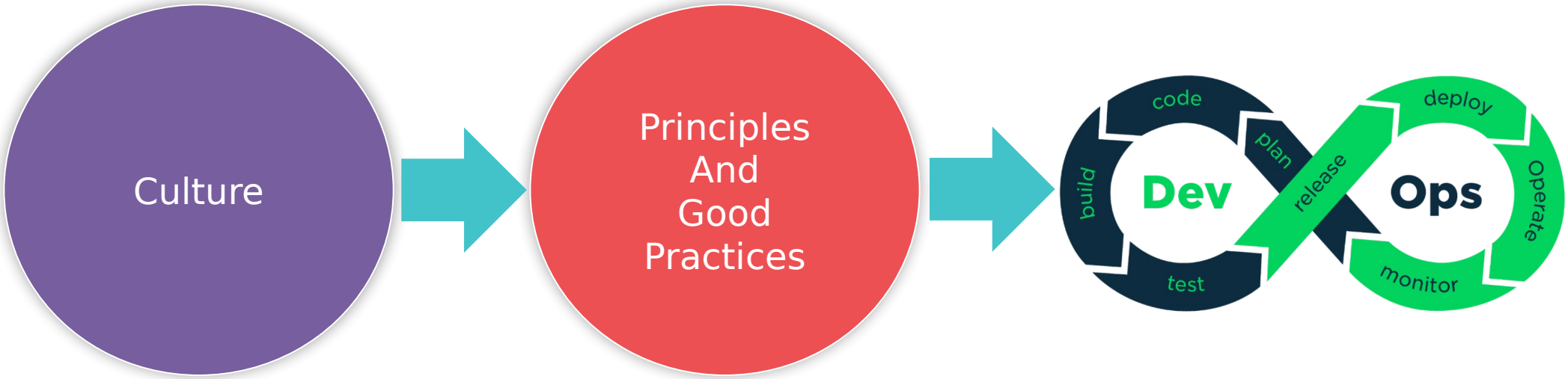
- Monitor important user-facing signals (latency, traffic, errors, saturation)

  Example: Prometheus, Grafana

- Setup an alerting system

  Example: Prometheus, Slack

DevOps: Culture, Practices, Tooling



Versioning

- Introduction to versioning with git
- commit
- pull/push
- merge
- why not use rebase?

Versioning

- Code Versioning Systems propose:

  Keep track of changes, who did what and when?

- Examples:

  Fast rewind to find code before a change/feature

  Fast forward to a new experimental feature

  Find first change that introduced a bug

  Who introduced the bug and when? Blame!

Jhon Romeros talk : Doom's a year of madness : "How did you handle version control back then? There was none,... We just watched not to touch other presons' files", see full talk here https://www.youtube.com/watch?v=eBU34NZhW7I

Versioning

- Git, a bit of history
  - Other CVS exist: cvs, mercury, svn
  - Not adapt well to the linux kernel development culture
    - Mainly remote devs and volunters geographically spread
  - Git was one of the first to introduce CVS in a distributed manner
    - Heavily influenced by the non-free solution bitkeeper
  - Git book is free to read online https://git-scm.com/book/en/v2

Versioning

- Introduction to git

  Every code change is explicit commit by the dev

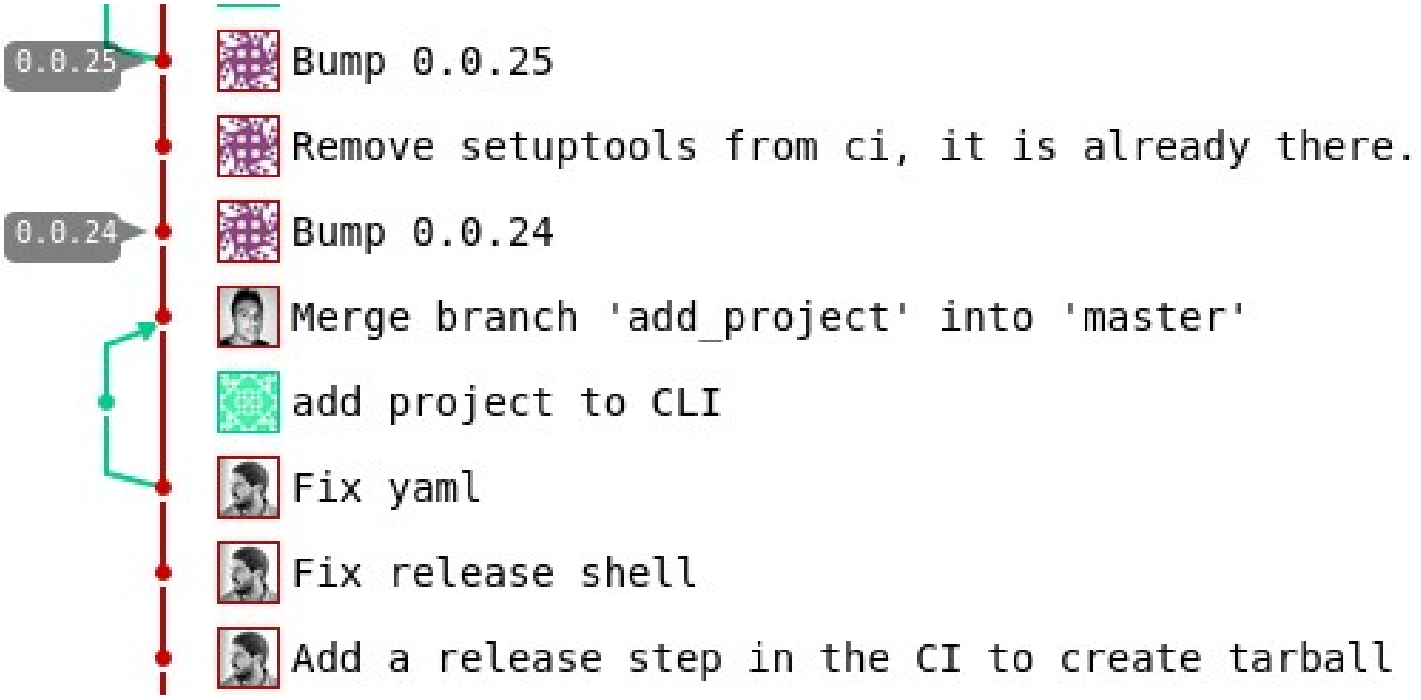
  The commits make a history tree (formaly a graph)

  Every node on the tree is a commit (code change)

  Parallel changes are allowed (branch)

  Parallel changes can be merged

Versioning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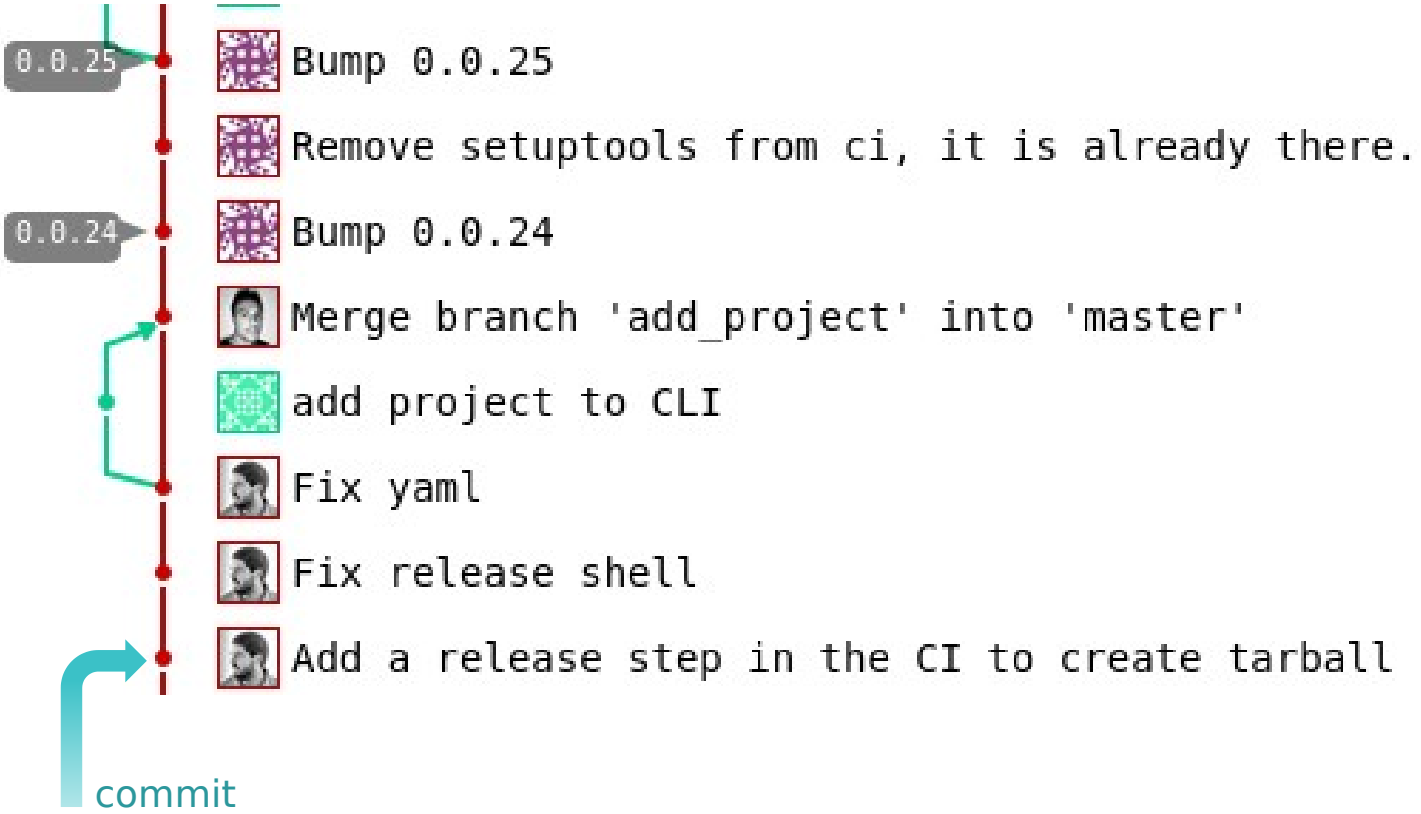
add project to CLI
Fix yaml
Fix release shell
Add a release step in the CI to create tarball

Versioning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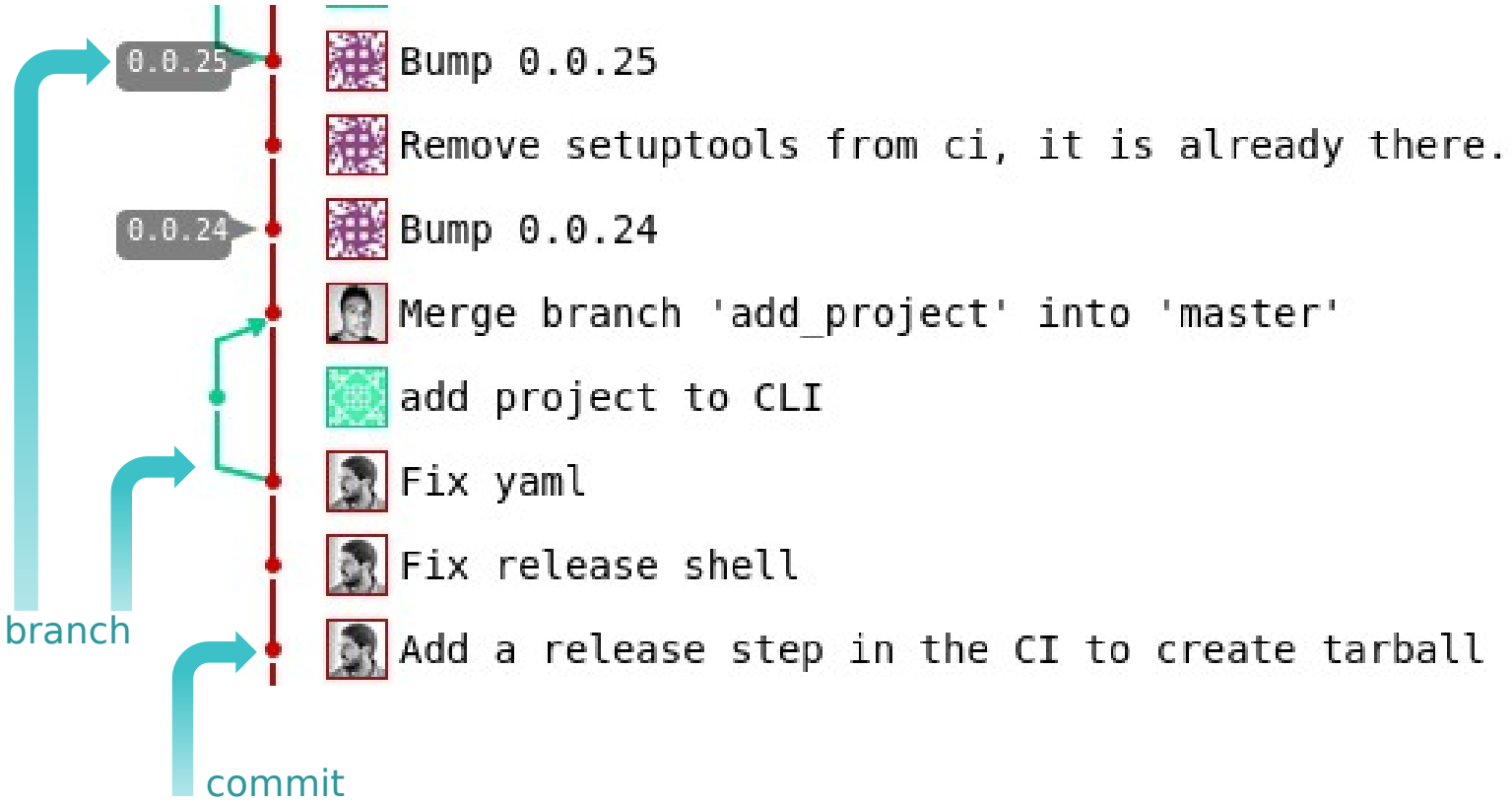
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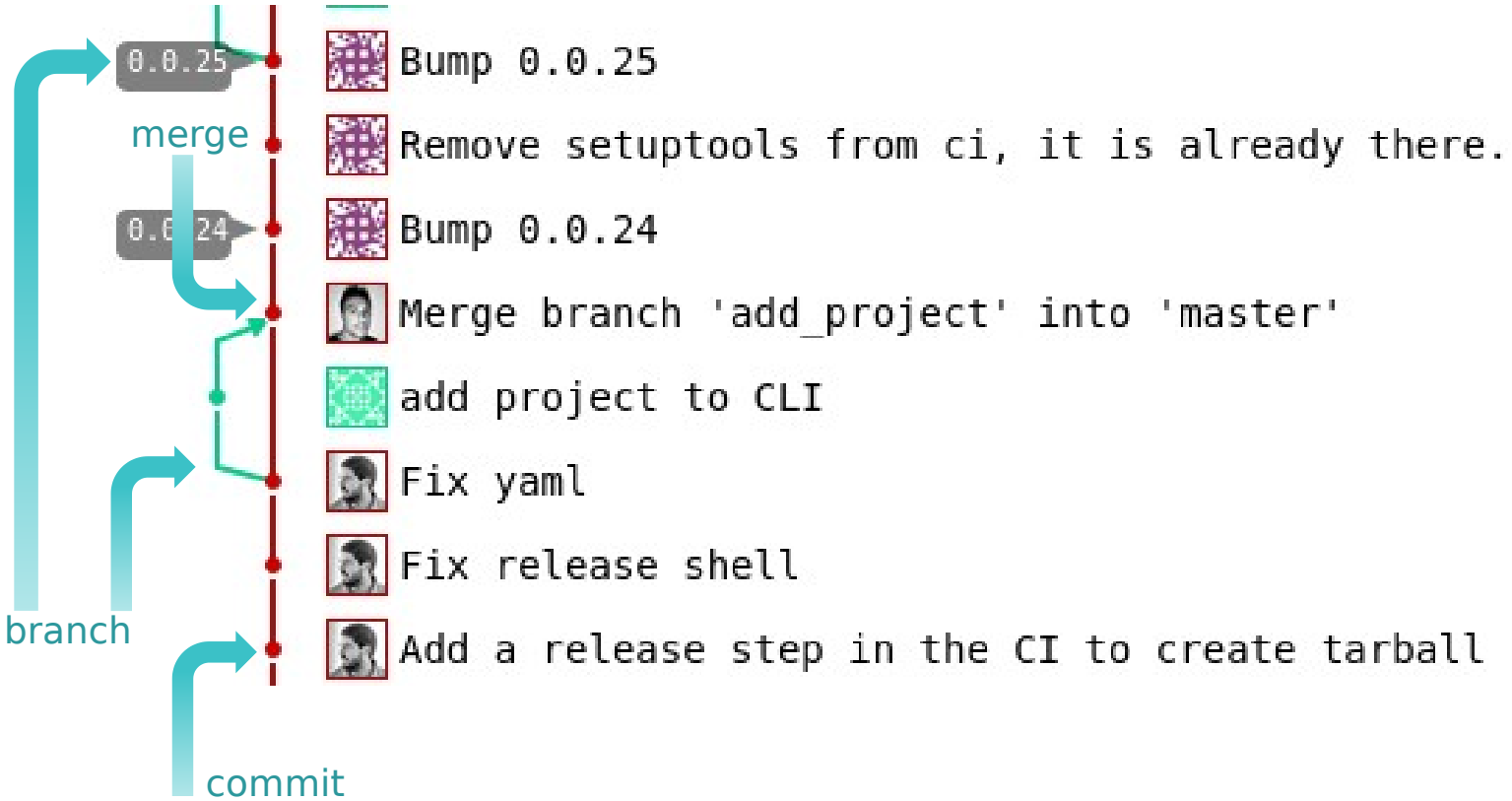
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Versioning

- The remote history (commit tree) is shared amongs devs
- Every dev copy the full history to start working
- Devs then make changes on the local history

  Branch

  Commit

  Merge
- Once changes are ready devs can **push** changes to the remote
- Devs can **pull** remote changes as well
- Beware of conflicts

Versioning

- Working example 1 dev (Bob)

  Clone from inital commit

  git clone

  Add a README.md file

  git add README.md

  git commit -m "Add README.md FILE"

  Update README.md file

  git add README.md

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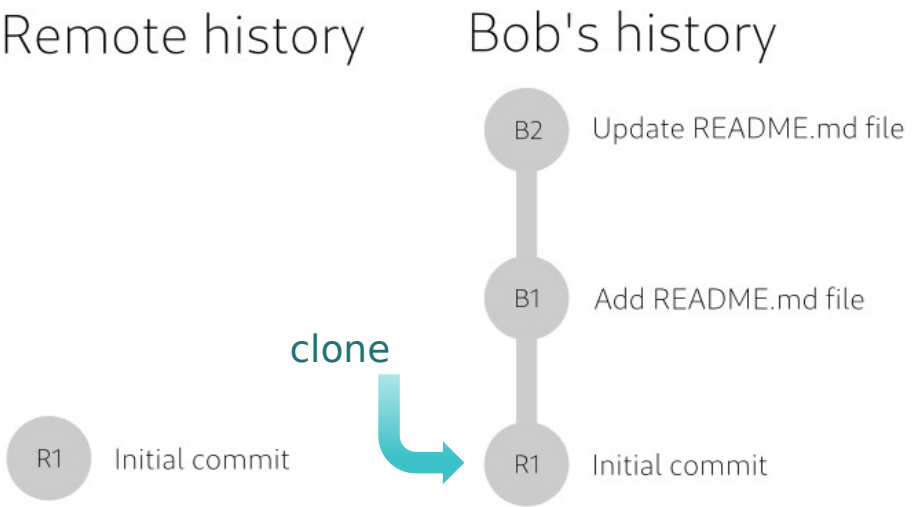

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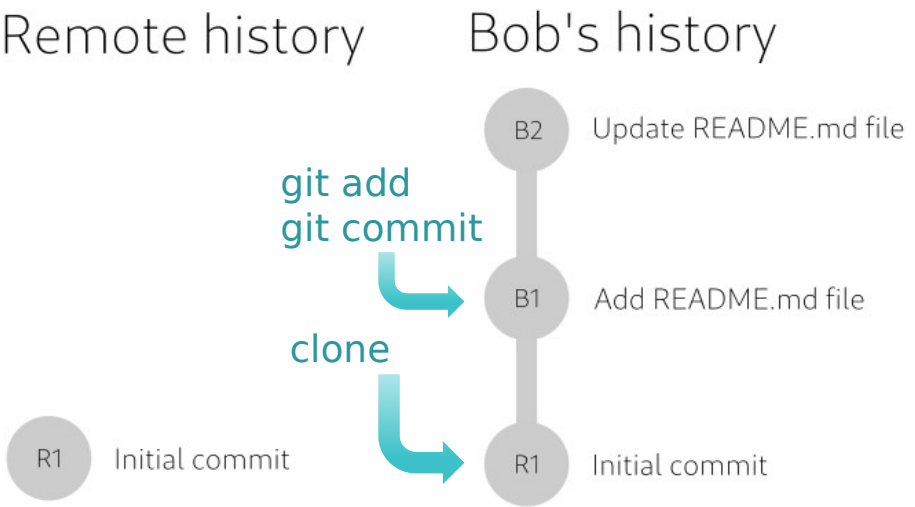

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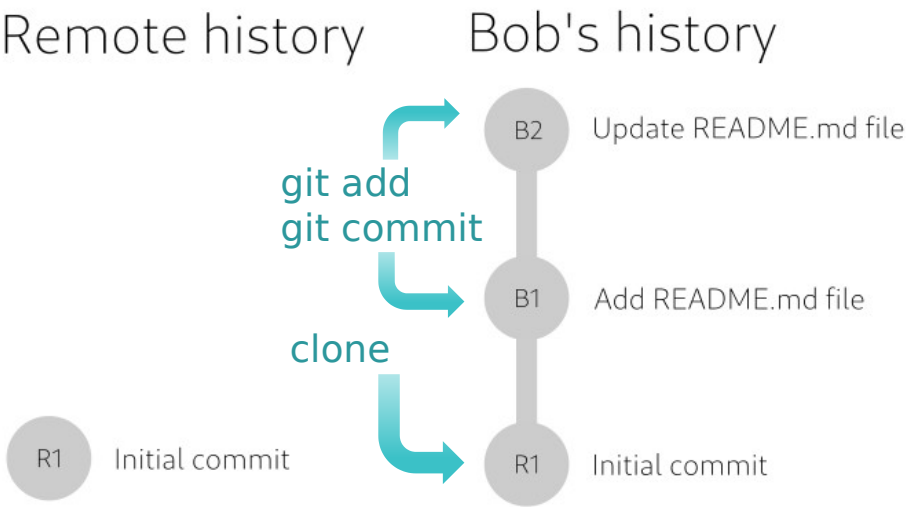
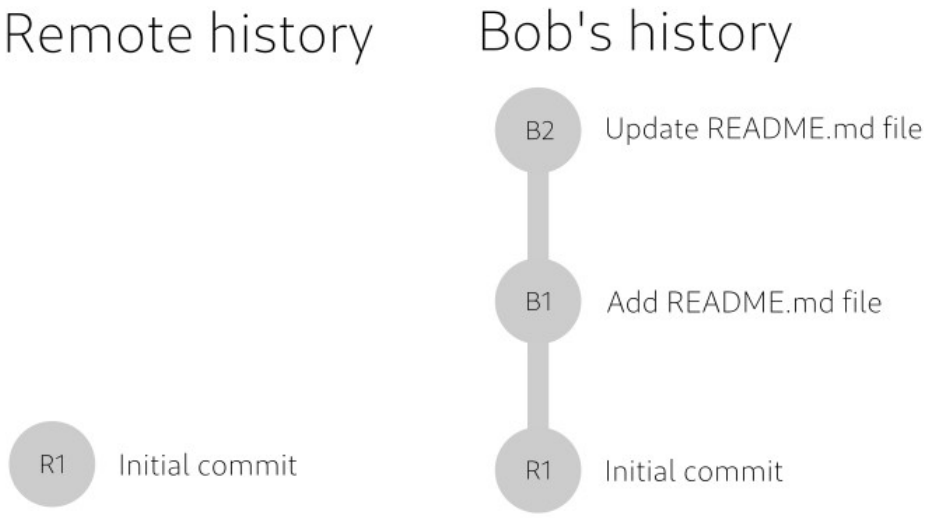


Versioning

- Working example 1 dev

  Remote history only add B1 and B2 after bob calls

  git push



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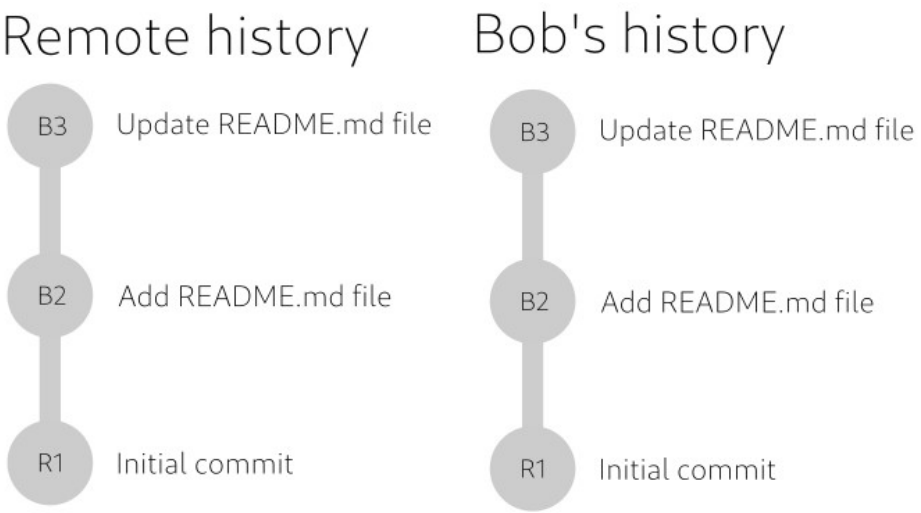


Versioning

- Working example 2 devs (ana & bob)

  Ana start fresh clone from R1

  Bob start fresh clone from R1

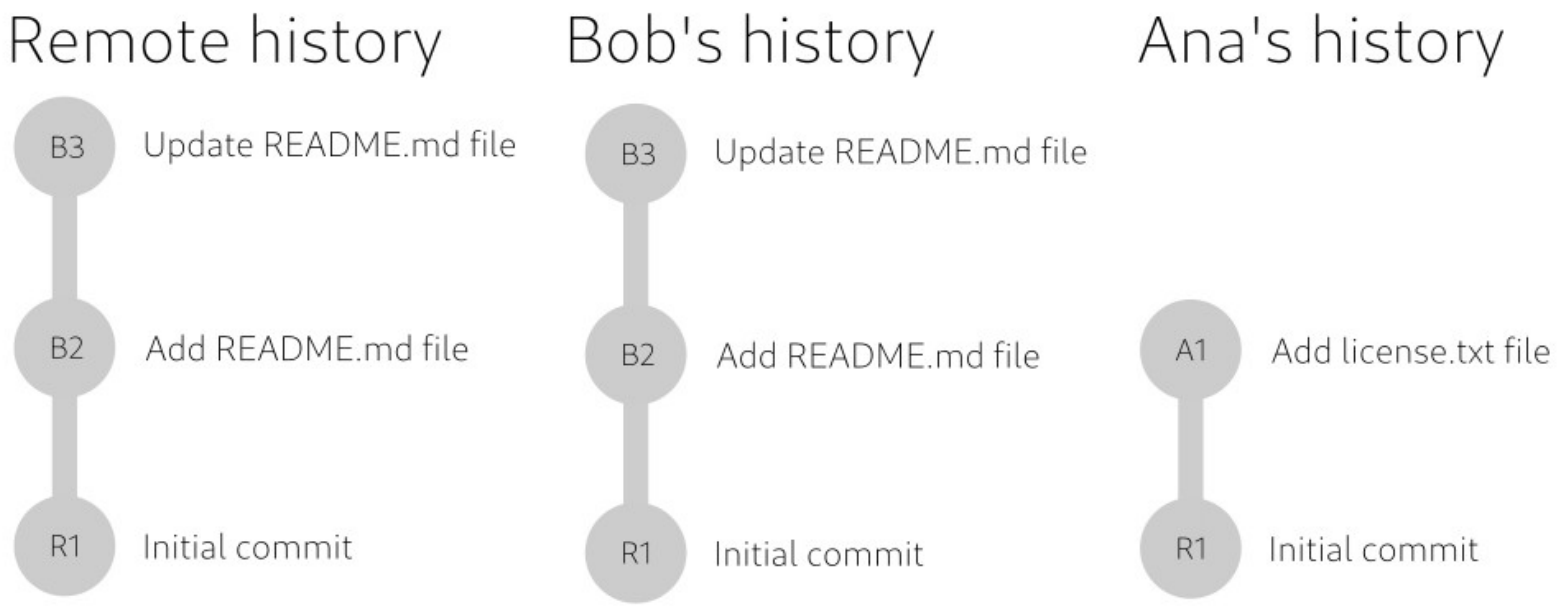
  Bob finishes and push his work to remote upstream

  Ana finishes and push her work to the upstream

    What happens?

Versioning

- Working example 2 devs (ana & bob)



Versioning

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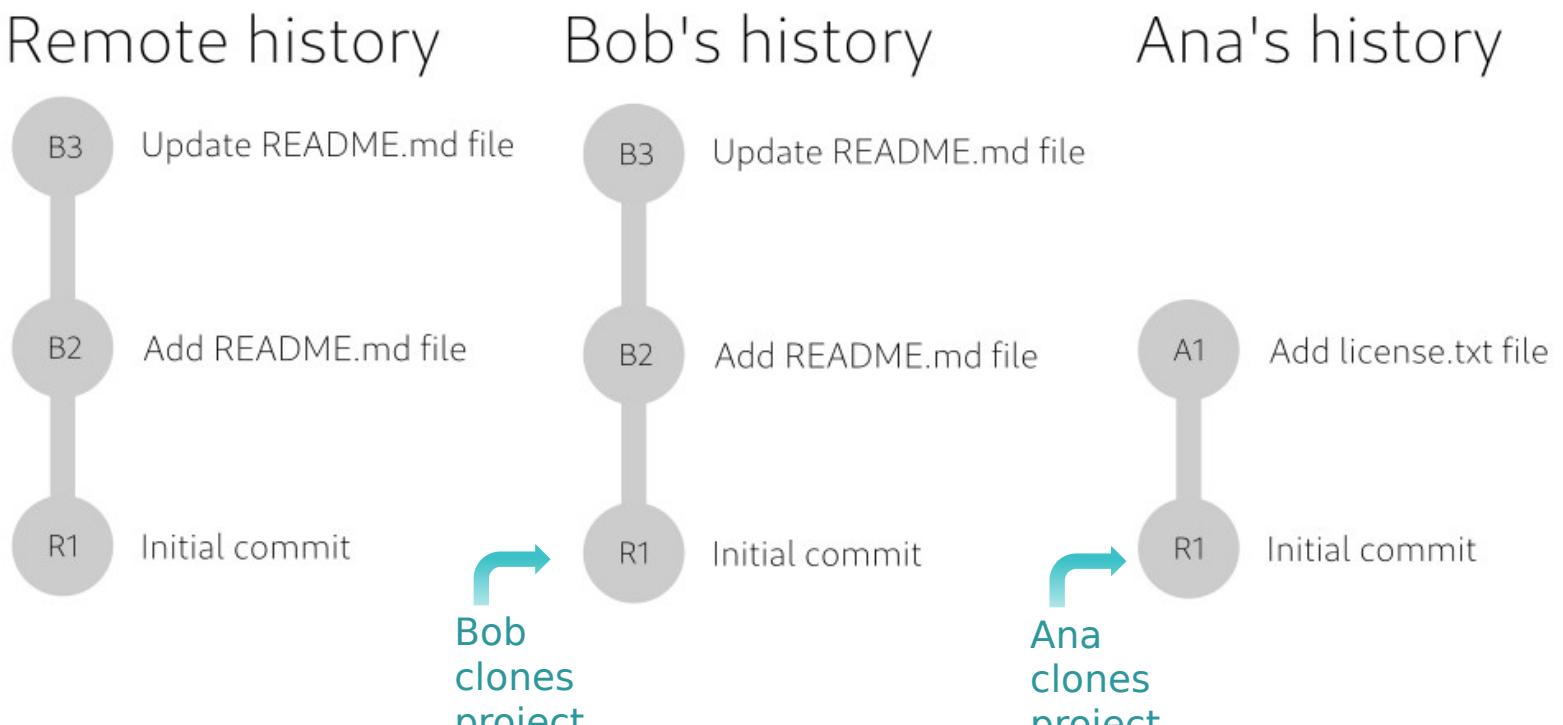

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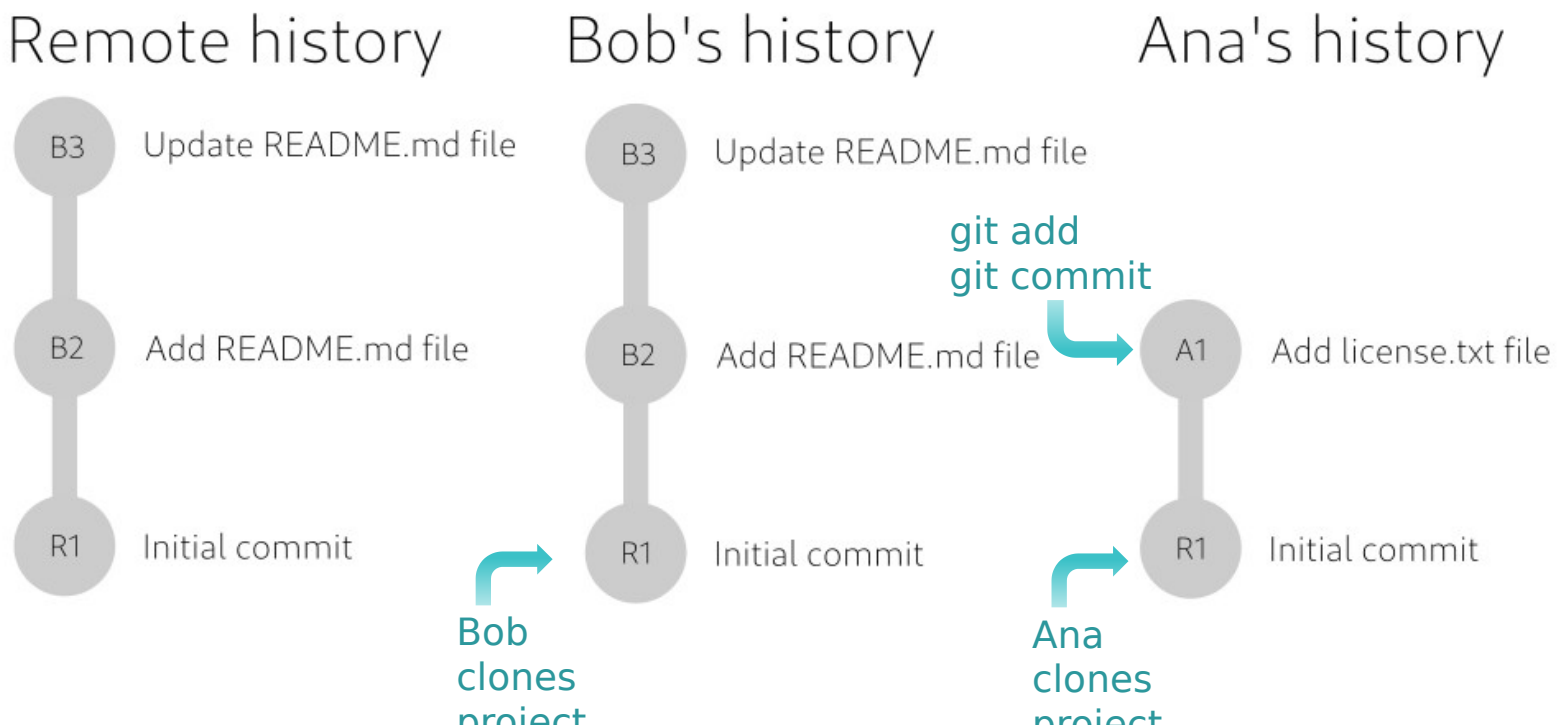

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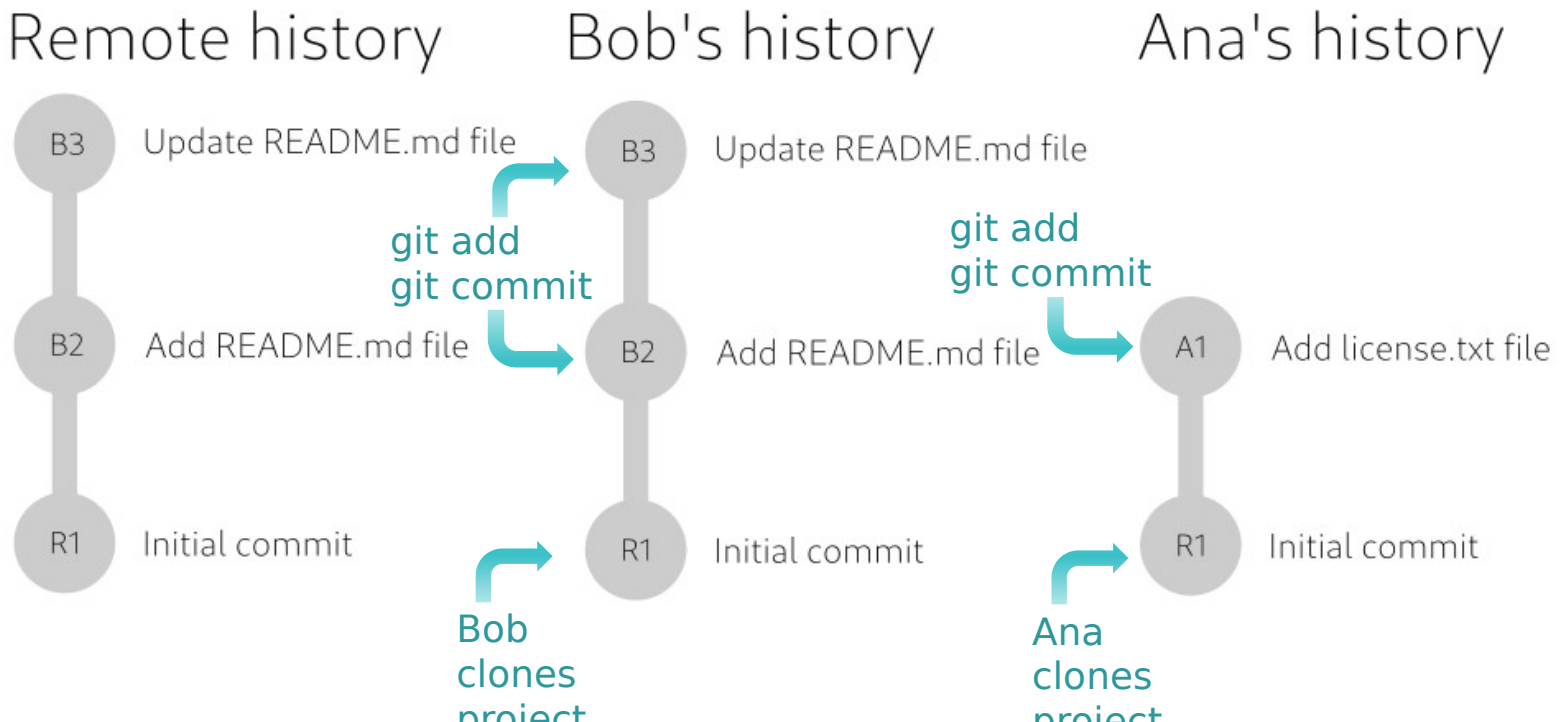

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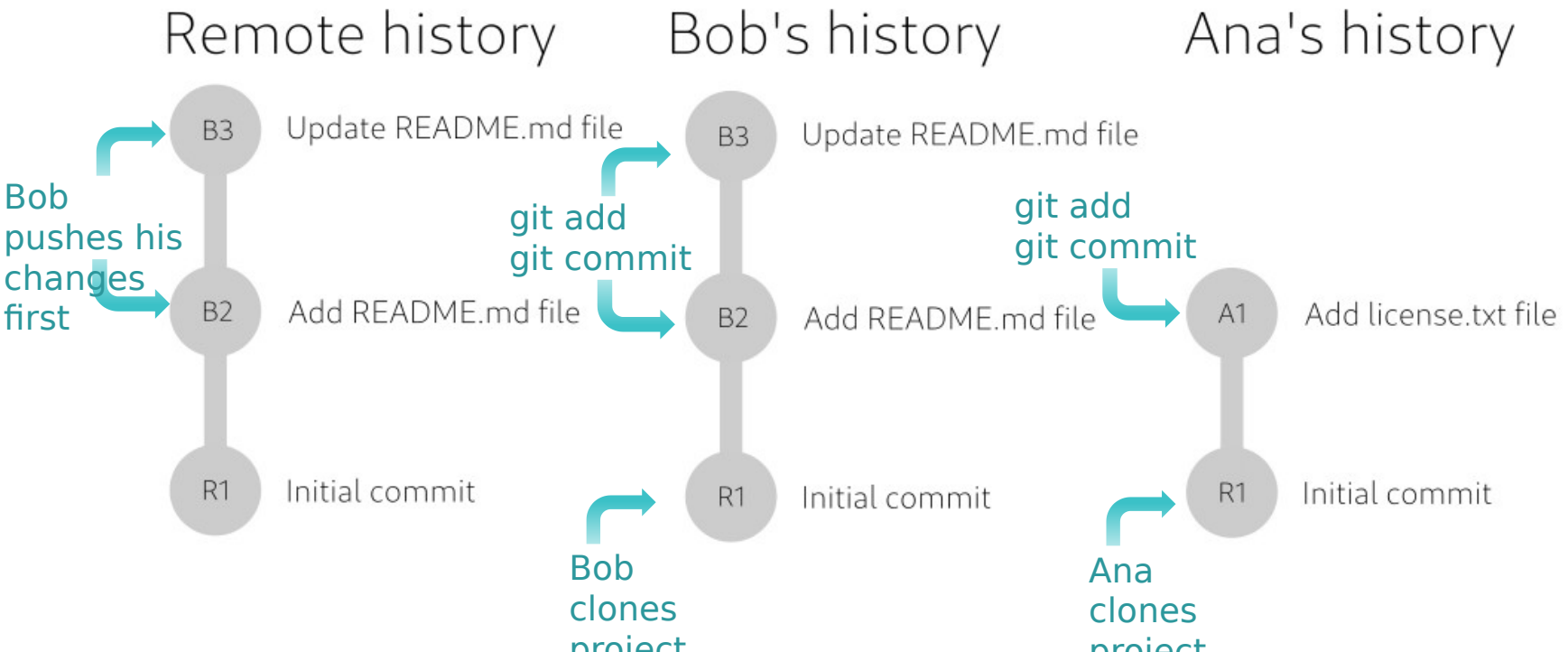

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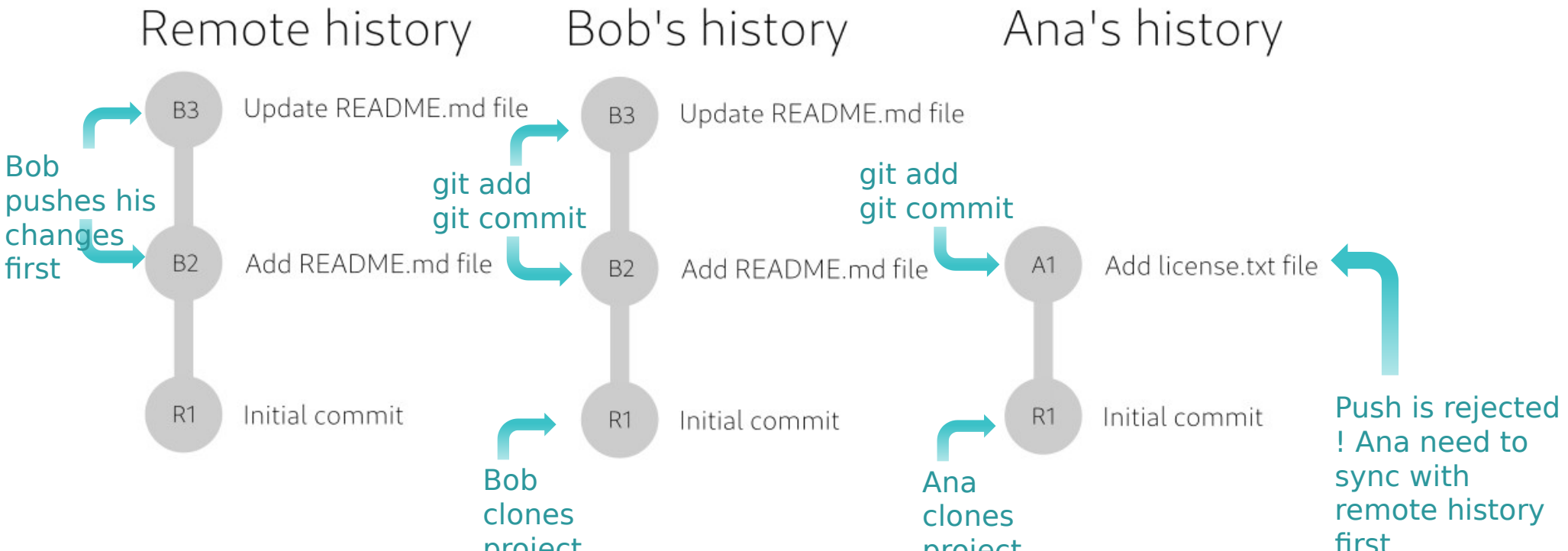


Versioning

- Working example 2 devs (ana & bob)

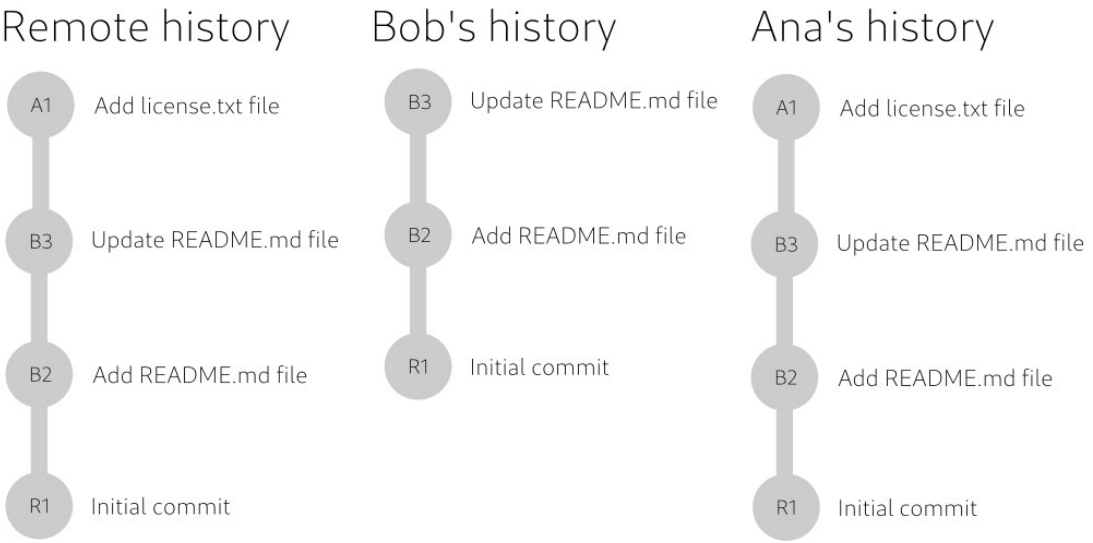
  Ana execute command to pull remote changes

  git pull

  When pulling the differer

  git push

  Ana's commit goes after



Versioning

- Conflicts can happen and will happen
- Always branch before start working

  git checkout -b "my-branch-name"
- 2 devs work on the same file and same branch

  Last dev to push, is the one that must solve the conflict
- Avoid commands that rewrite the history

  Never use -> git rebase
- Avoid commiting on the master branch

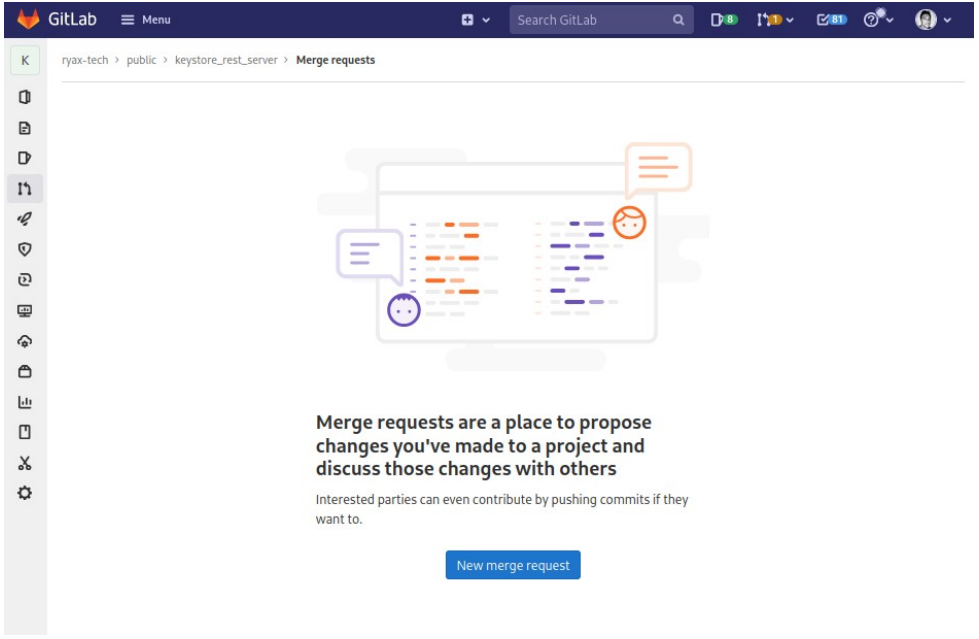
  Create a new branch for each dev

Versioning

- Gitlab merge-request
- Every change on the main branch affect all users and the new release
- In gitlab a merge-request allows to keep track of changes on the main branch (simplification)
- Advantages on the CI process:
  - Keep a clear track of what changes are upcomming
  - Show the code changes for a specific request
  - Allows a review process to take place
    - Ideally not the same dev will look at the code and validate
    - Ideally not the same dev will merge the changes

Versioning

- Gitlab merge-request



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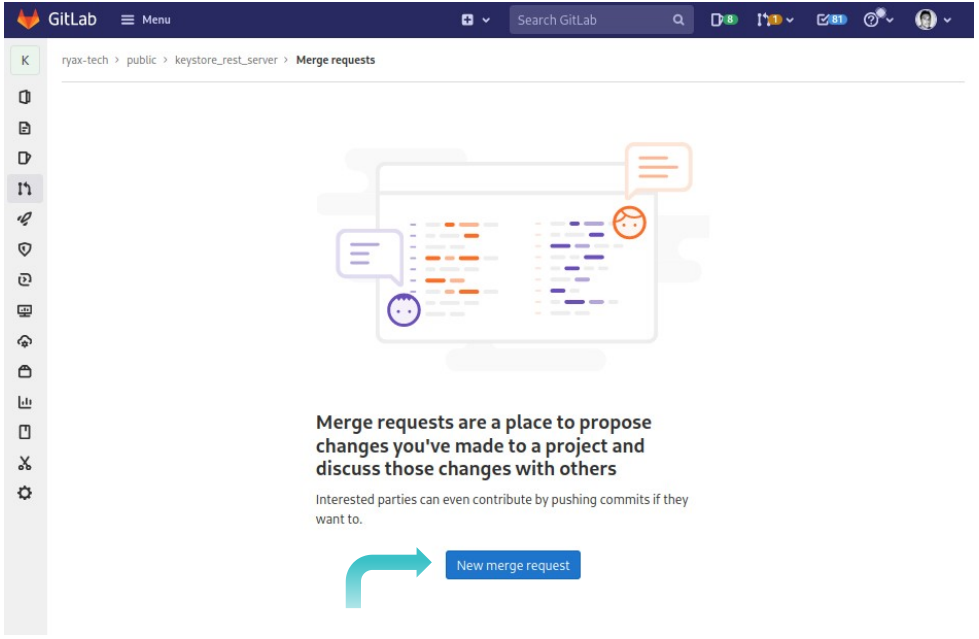

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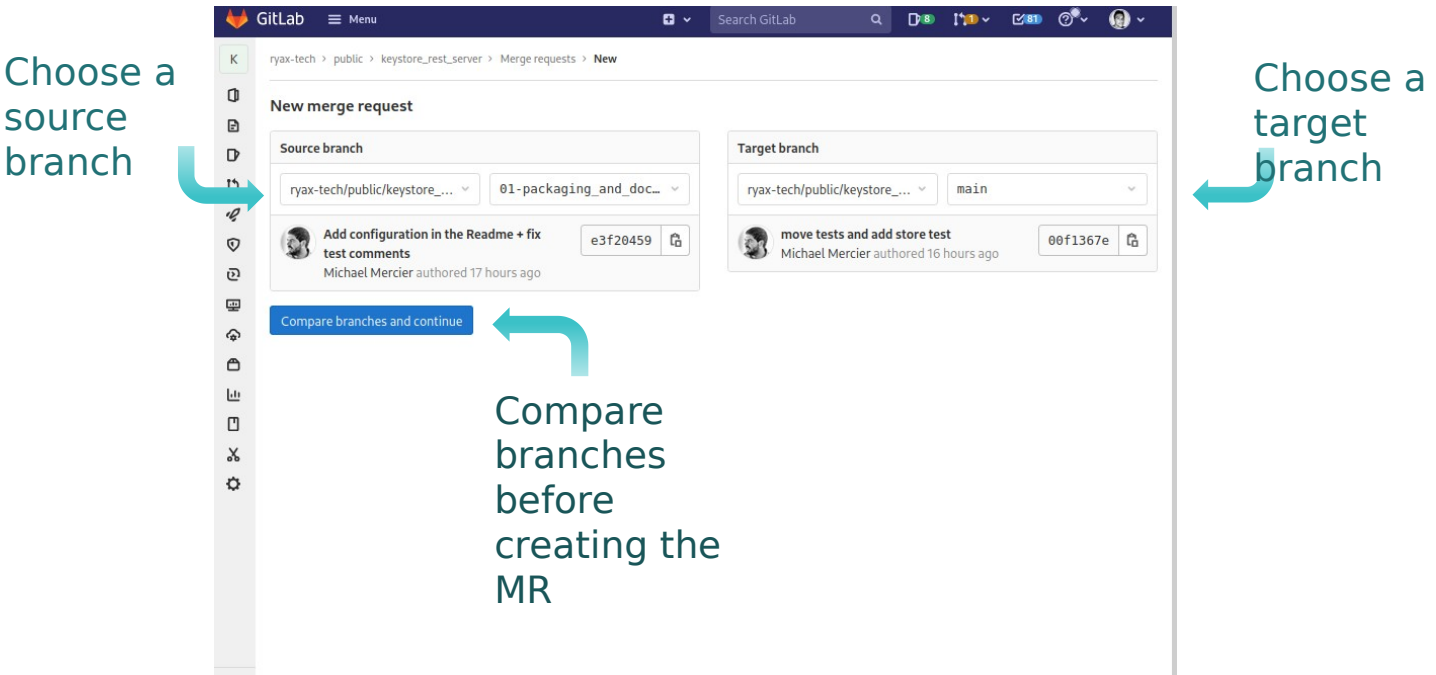

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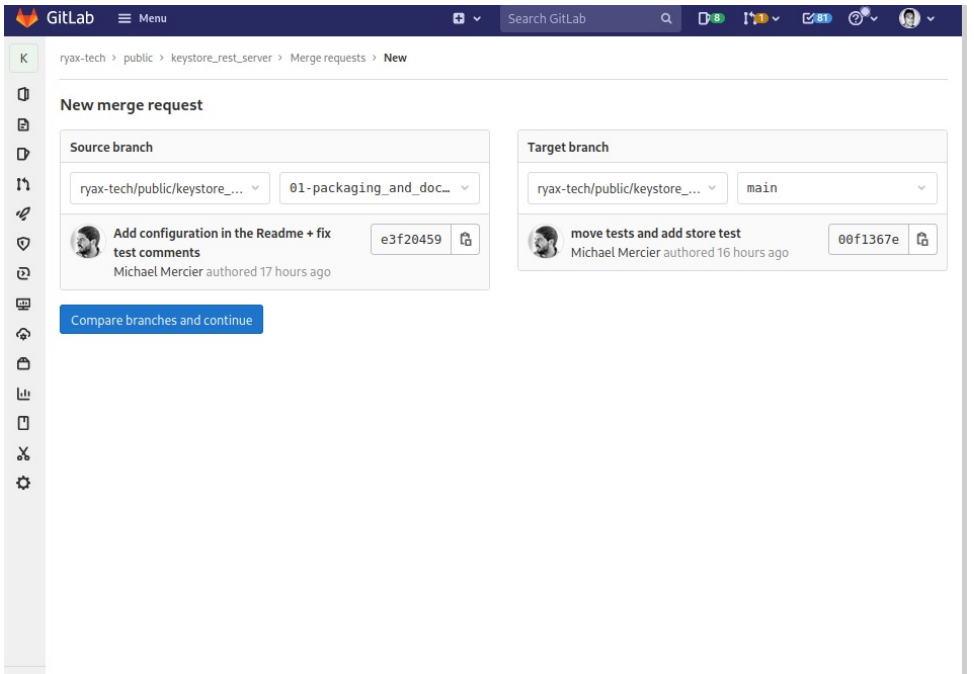
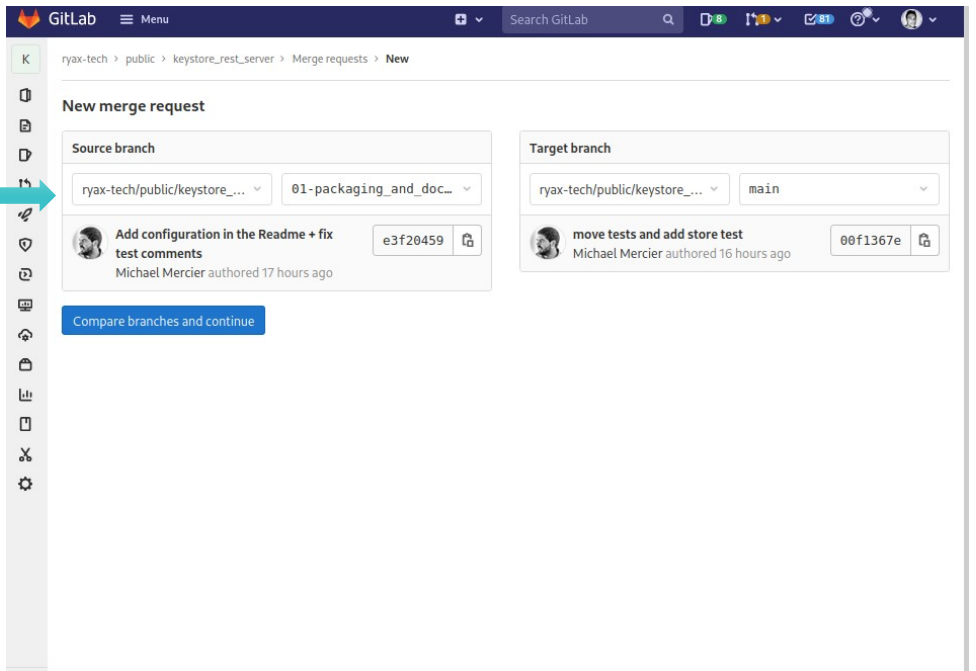


Versioning

- Gitlab merge-request

Choose a source branch



Versioning

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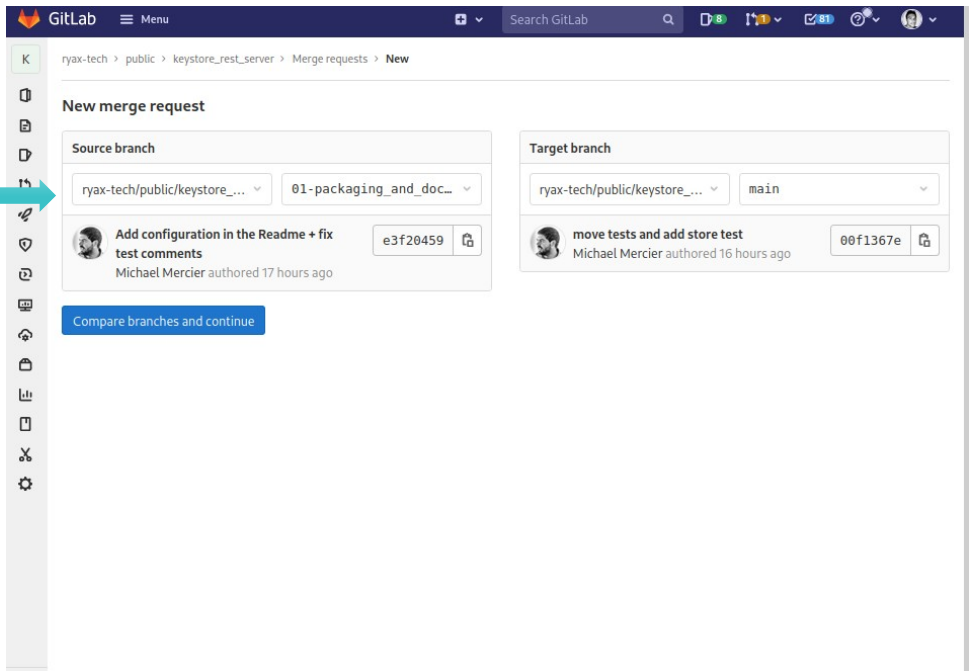
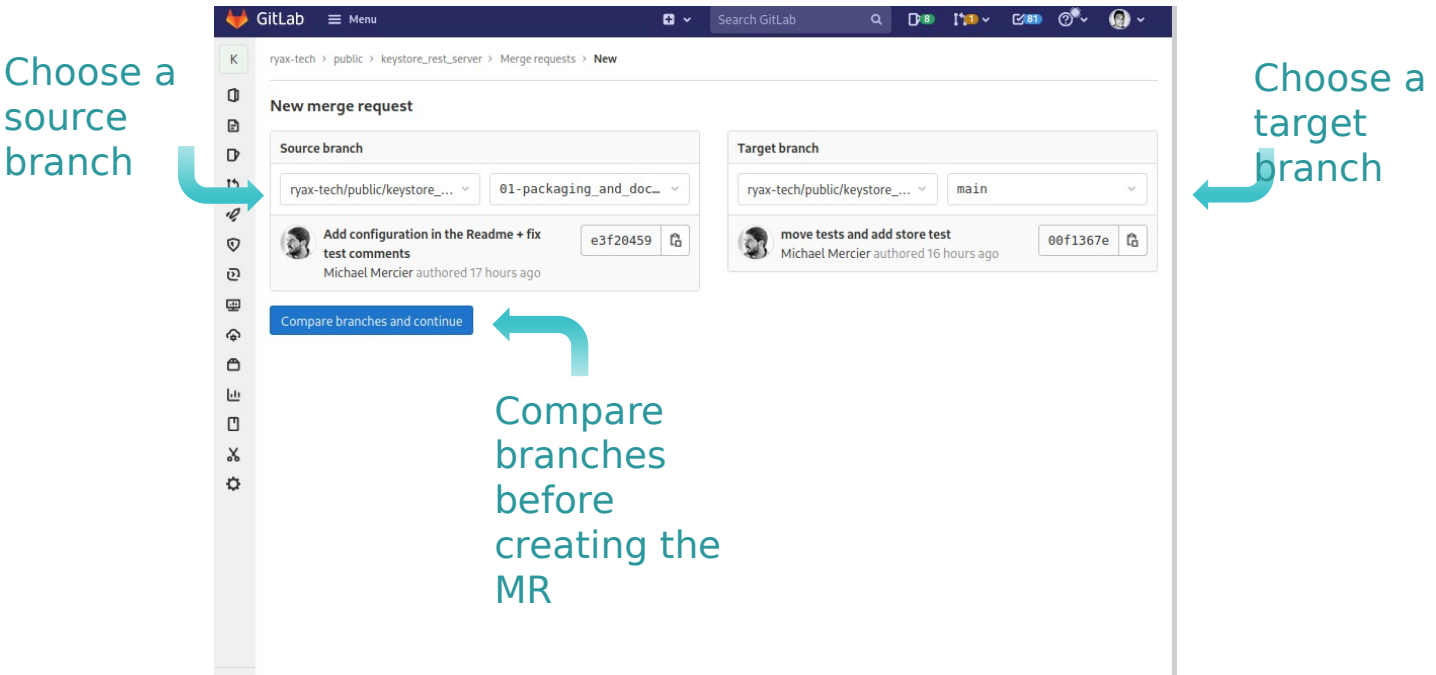


Choose a target branch

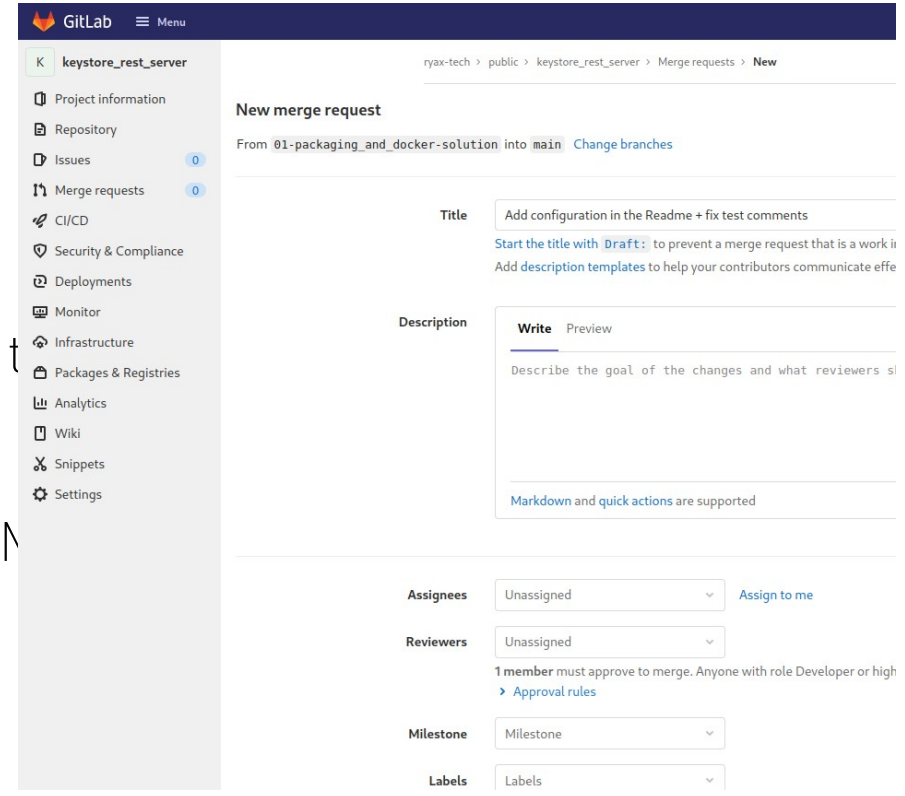
Versioning

- Gitlab merge-request



Versioning

- Gitlab merge-request
  - Set a title and description
  - Assignees
    - Person that repondes to t
  - Reviewers
    - Person to approuve this M



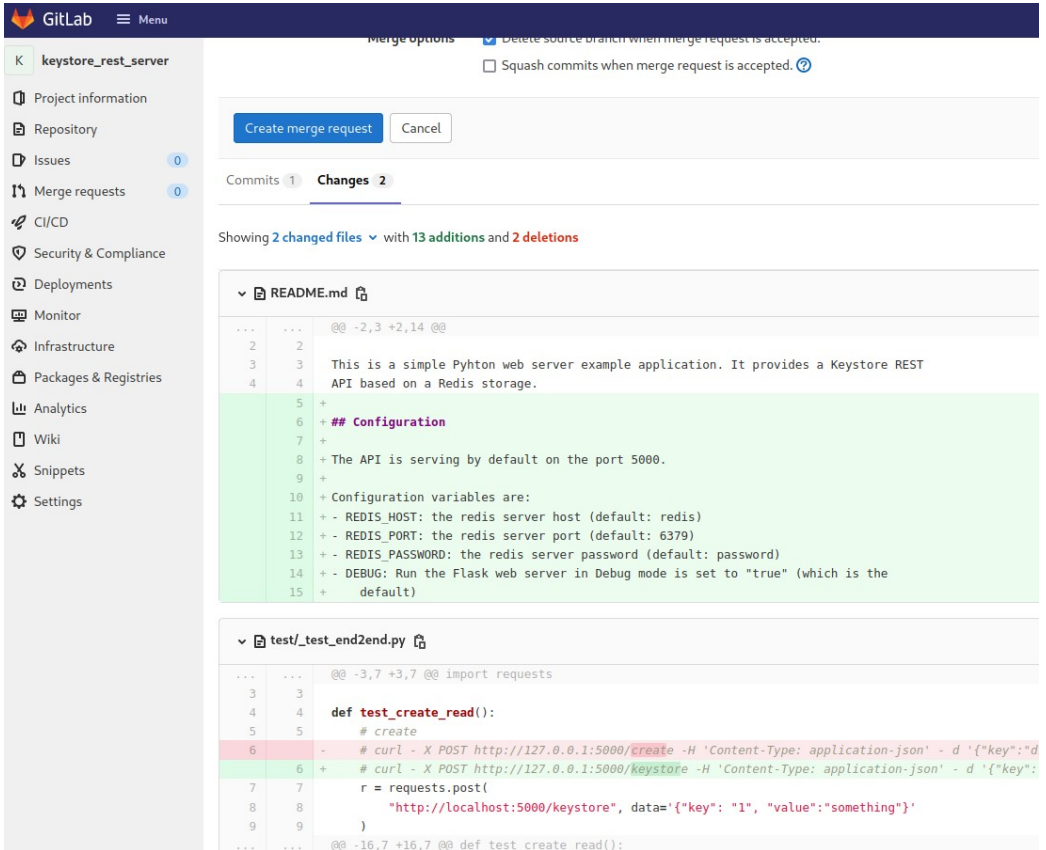
Versioning

- Gitlab merge-request

  Scrolling down we can see

  Changes

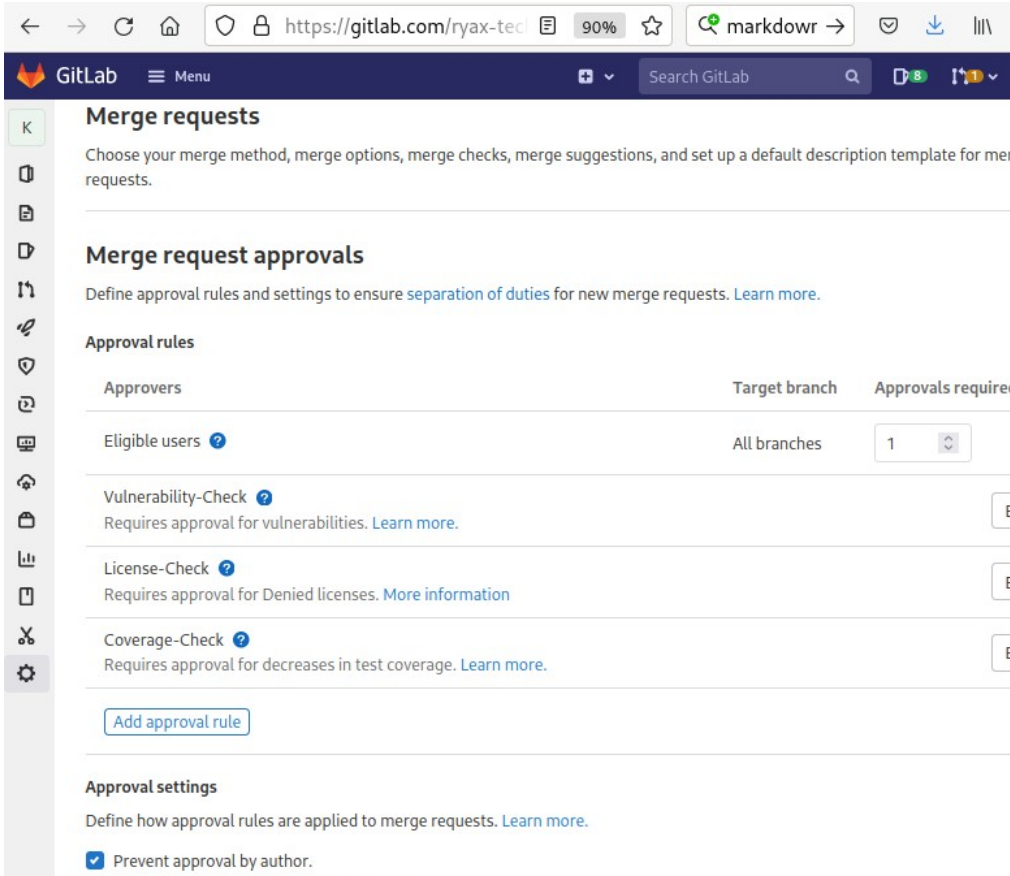
  Commits



Versioning

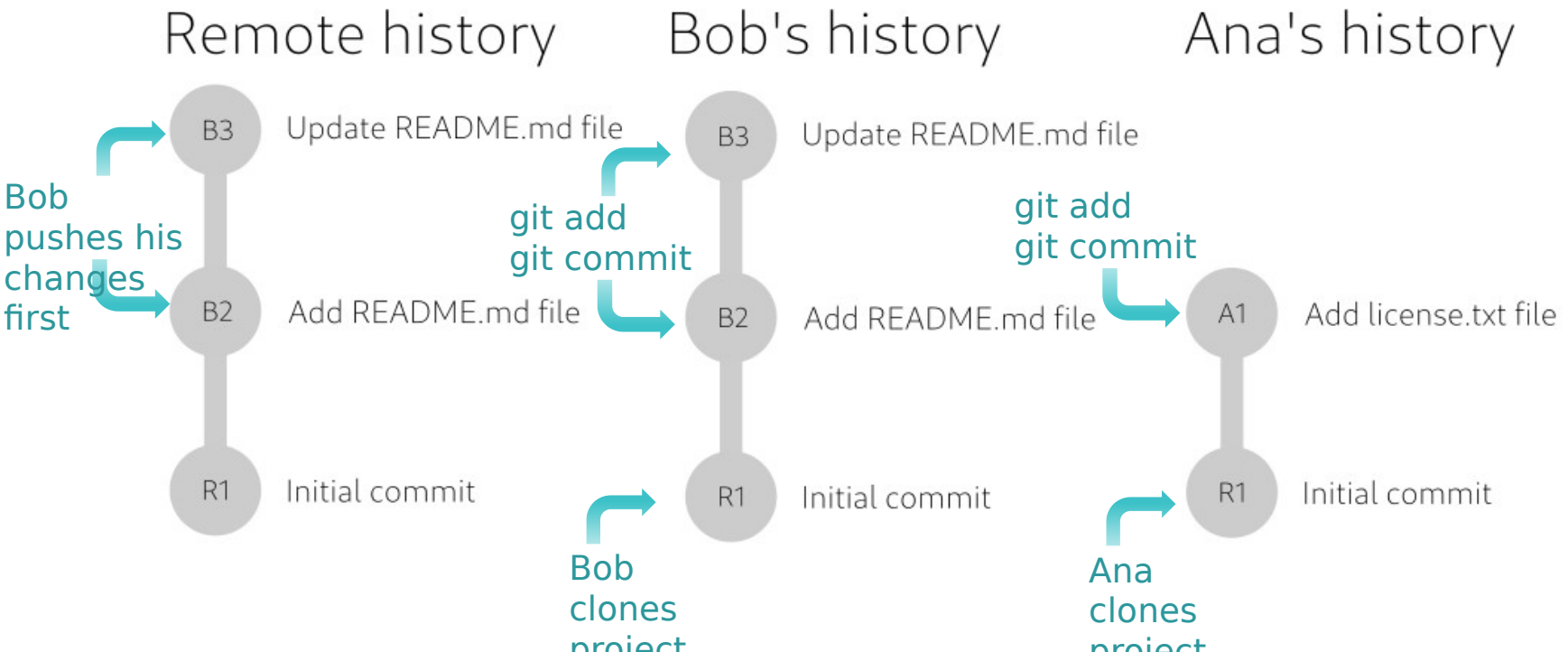
- Settings -> General
- Merge request approvals

  # reviewers that must approve



Versioning

- How this scenario would work with gitlab review?



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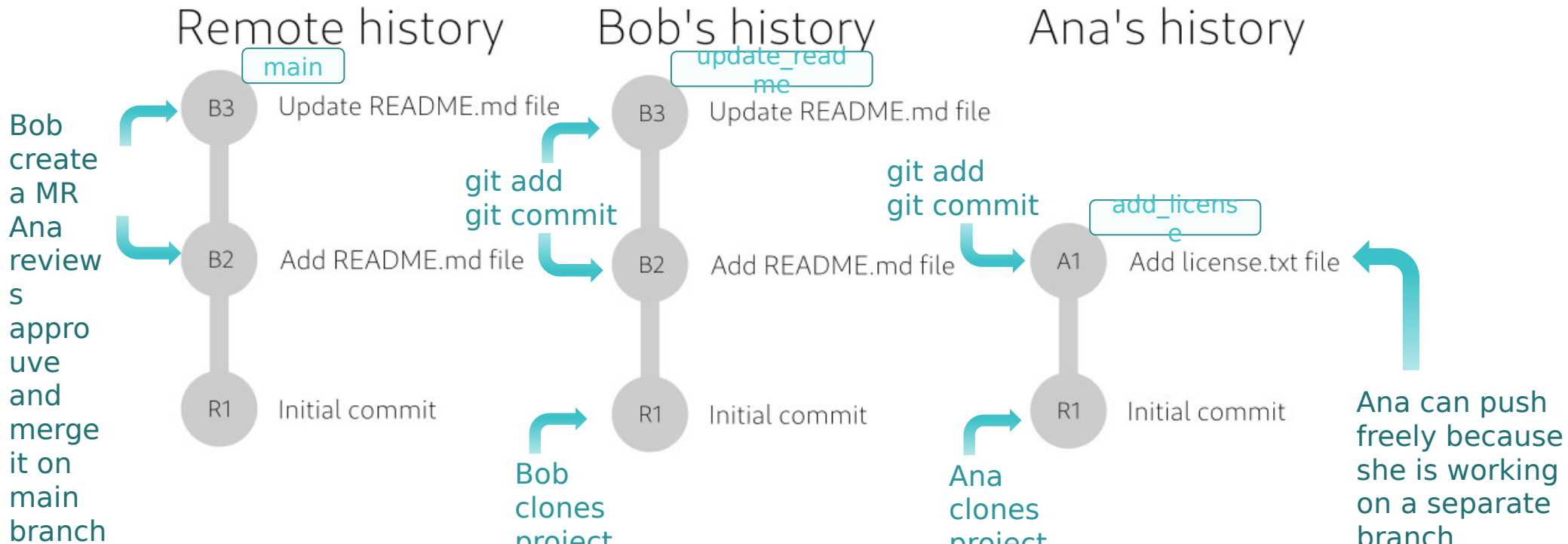

Versioning

- Work on a multi-tenant gitlab project
  - Precommit - add basic coding checks style
  - merge request
  - review process
  - approval system