VERSION CONTROL WITH GIT

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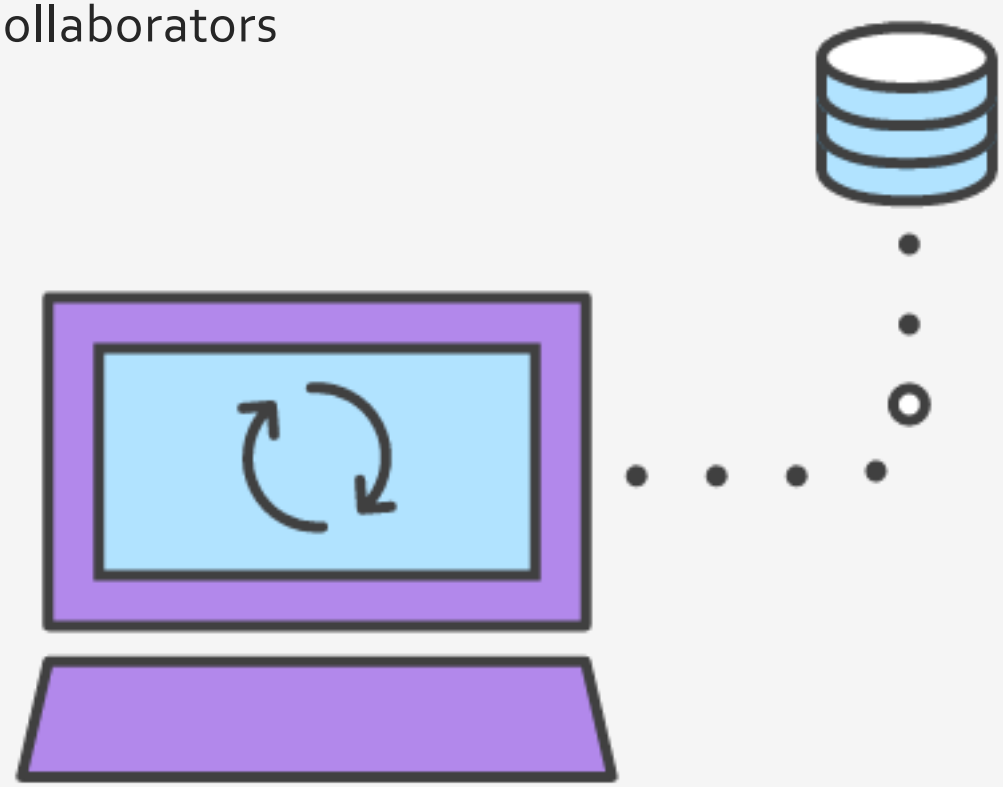
CS50 for MBAs


THIS IS GIT. IT TRACKS COLLABORATIVE WORK ON PROJECTS THROUGH A BEAUTIFUL DISTRIBUTED GRAPH THEORY TREE MODEL.
COOL. HOW DO WE USE IT?
NO IDEA. JUST MEMORIZE THESE SHELL COMMANDS AND TYPE THEM TO SYNC UP. IF YOU GET ERRORS, SAVE YOUR WORK ELSEWHERE, DELETE THE PROJECT, AND DOWNLOAD A FRESH COPY.

Why Git?

- Collaboration
- Distributed version control model
- Local repository
- Remote repository
- Collaborators

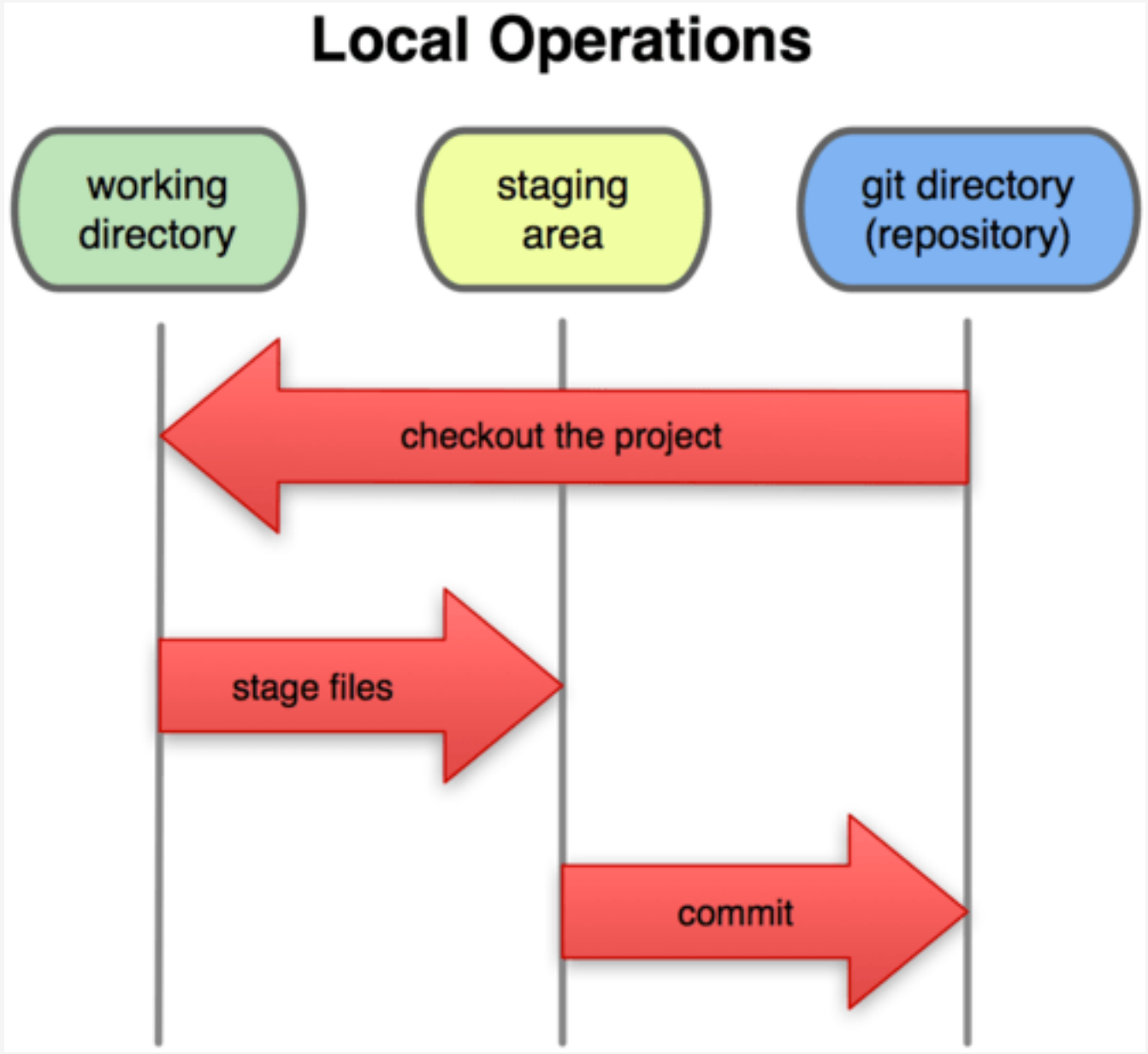


Most common use cases

- adding/modifying a new file
- creating and merging a branch with and without merge conflicts
- Viewing the history/changelog
- Performing a rollback to a certain commit
- Sharing/synching your code to a remote/central repository

Terminology

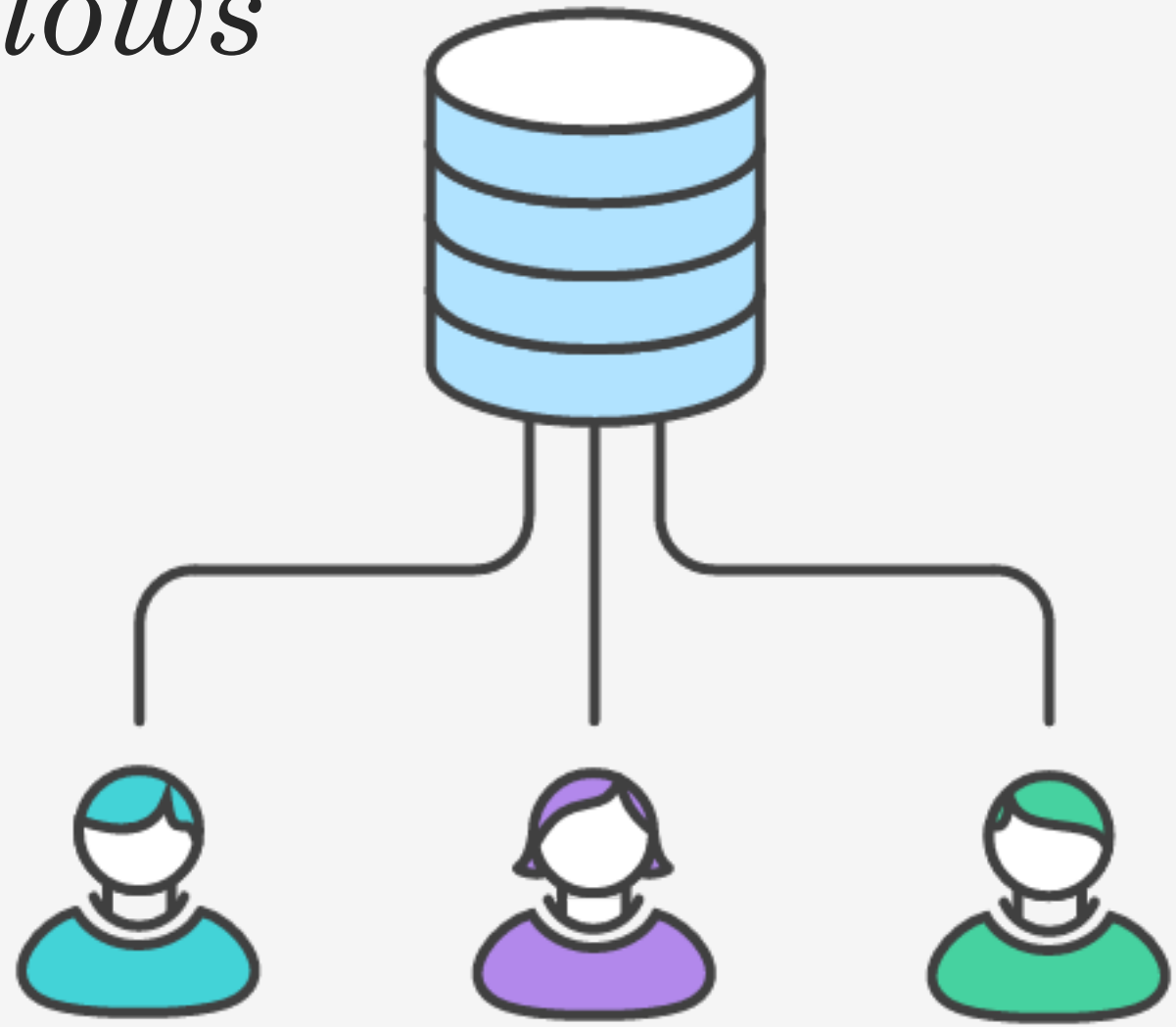
- **repository**, or "**repo**" for short, a digital directory or storage space where you can access your project, its files, and all the versions of its files that Git saves.
- **master -** the repository's main branch. Depending on the work flow it is the one people work on or the one where the integration happens
- **remote -** these are "remote" locations of your repository, normally on some central server.
- **clone -** copies an existing git repository, normally from some remote location to your local environment.
- **commit -** submitting modified files to the repository (the local one)
- **fetch or pull -** like updating or getting latest version. The difference between fetch and pull is that pull combines both, fetching the latest code from a remote repo as well as performs the merging.
- **push -** is used to submit the code to a remote repository
- **head -** is a reference to the node to which our working space of the repository currently points.
- **branch -** a particular label on a given node, a snapshot/copy in time of a particular repository, further modified with its own changes
- **SHA -** every commit or node in the Git tree is identified by a unique SHA key. You can use them in various commands in order to manipulate a specific node.


Local Operations
working directory
staging area
git directory (repository)
checkout the project
stage files
commit

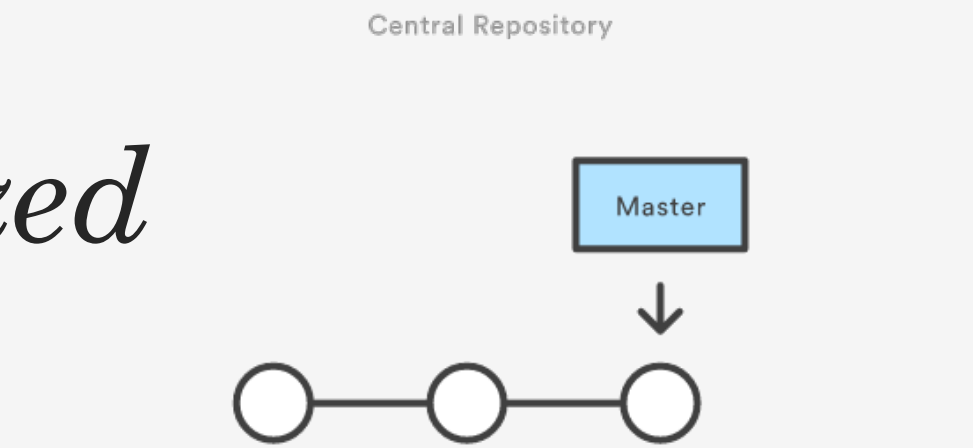
Basic Git Workflow

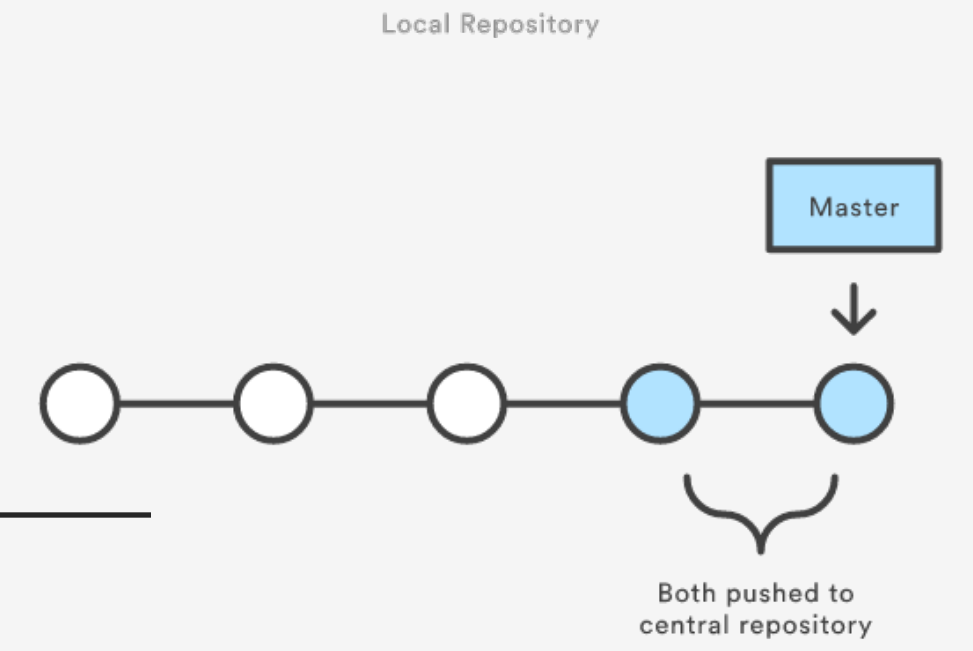
- You modify files in your working directory.
- You stage the files, adding snapshots of them to your staging area.
- You do a commit, which takes the files as they are in the staging area and stores that snapshot permanently to your Git directory.

Workflows

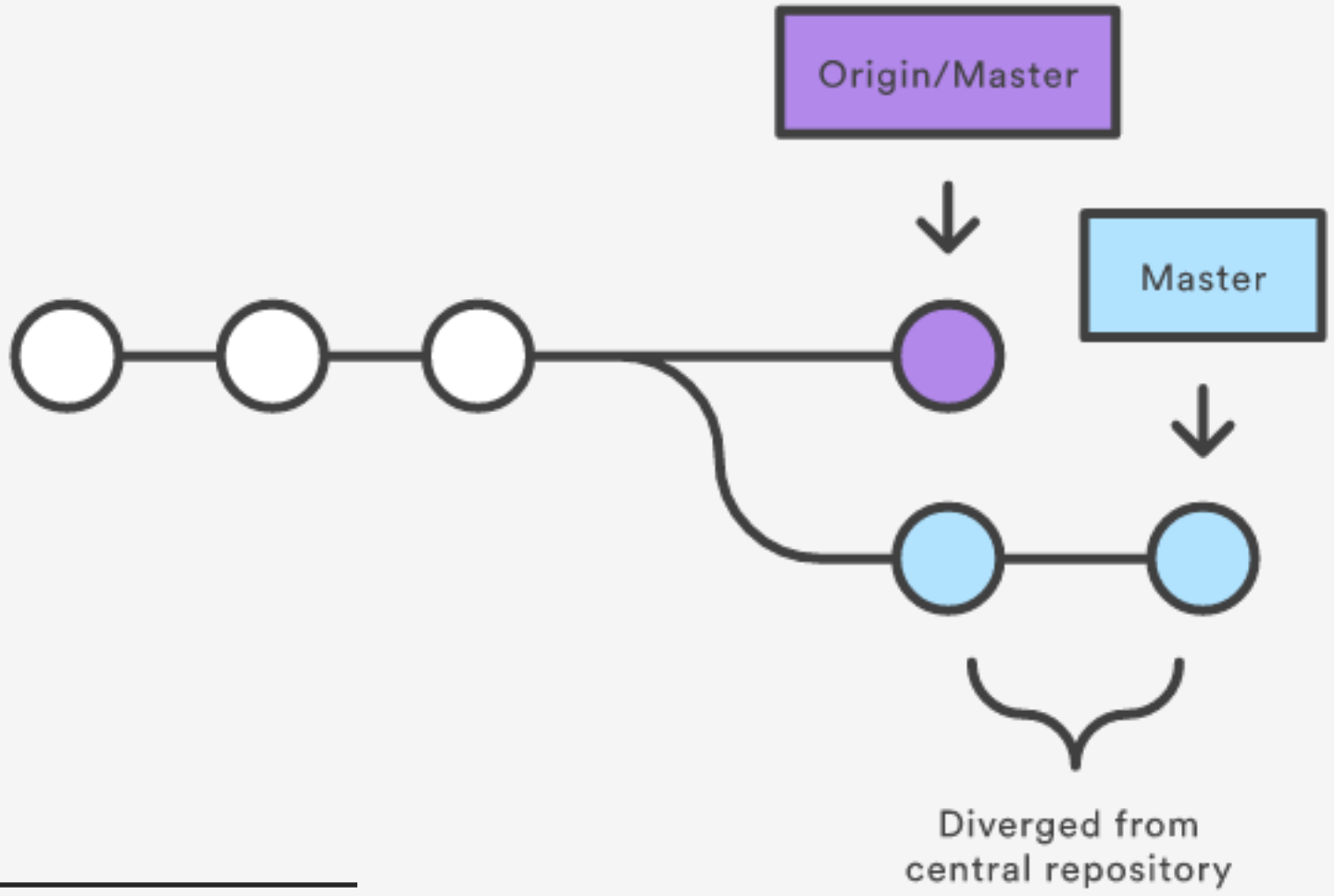


Centralized





Centralized



Example

git config --global user.name ”Maria Zlatkova"

git config --global user.email ”zlatkova@college.harvard.edu"

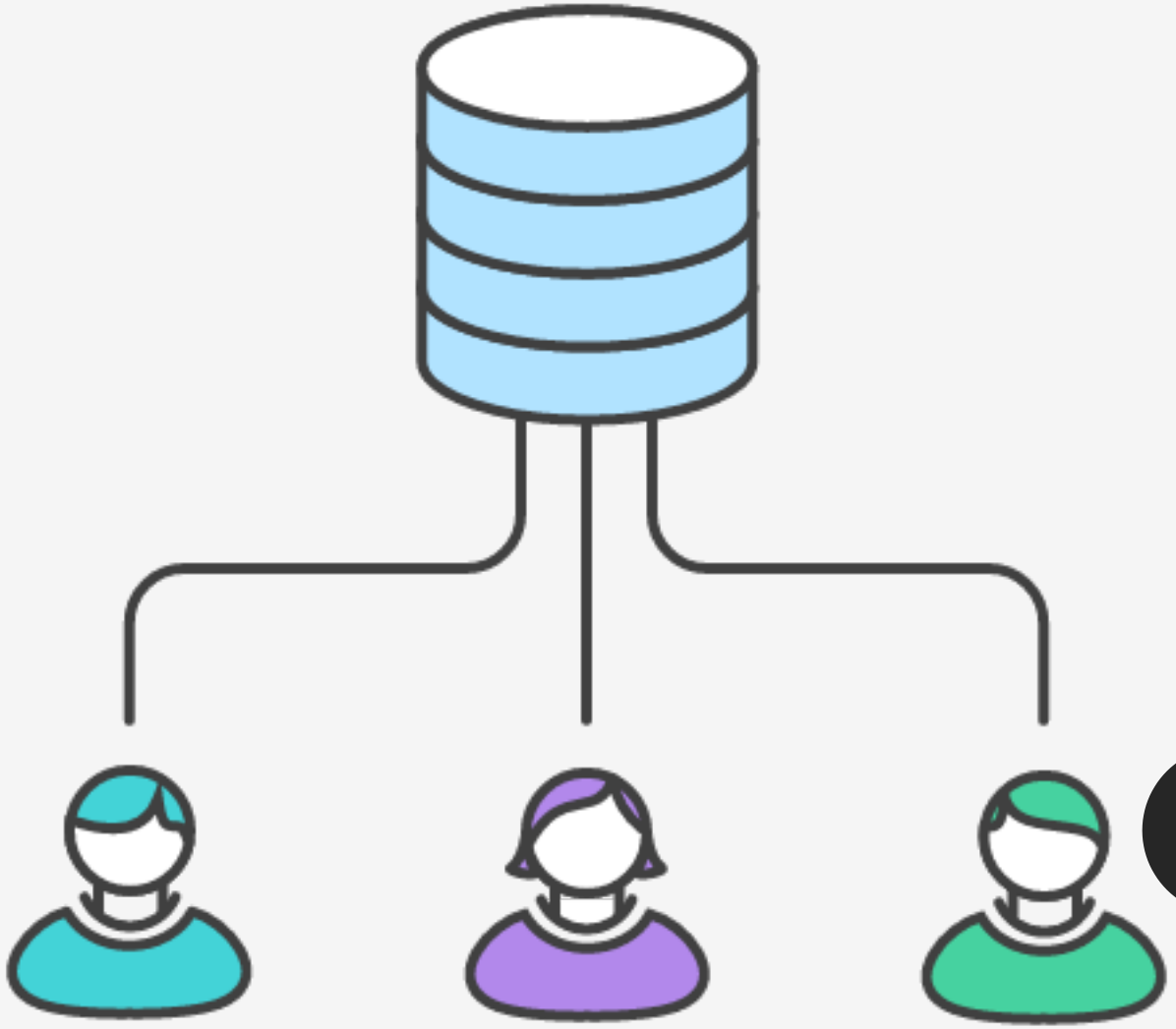
Example

- Maria and David work on a project together
- One of them initializes the central repository

ssh user@host **git init** --bare /path/to/repo.git

Everybody clones the central repository

git clone ssh://user@host/path/to/repo.git



David works on his feature

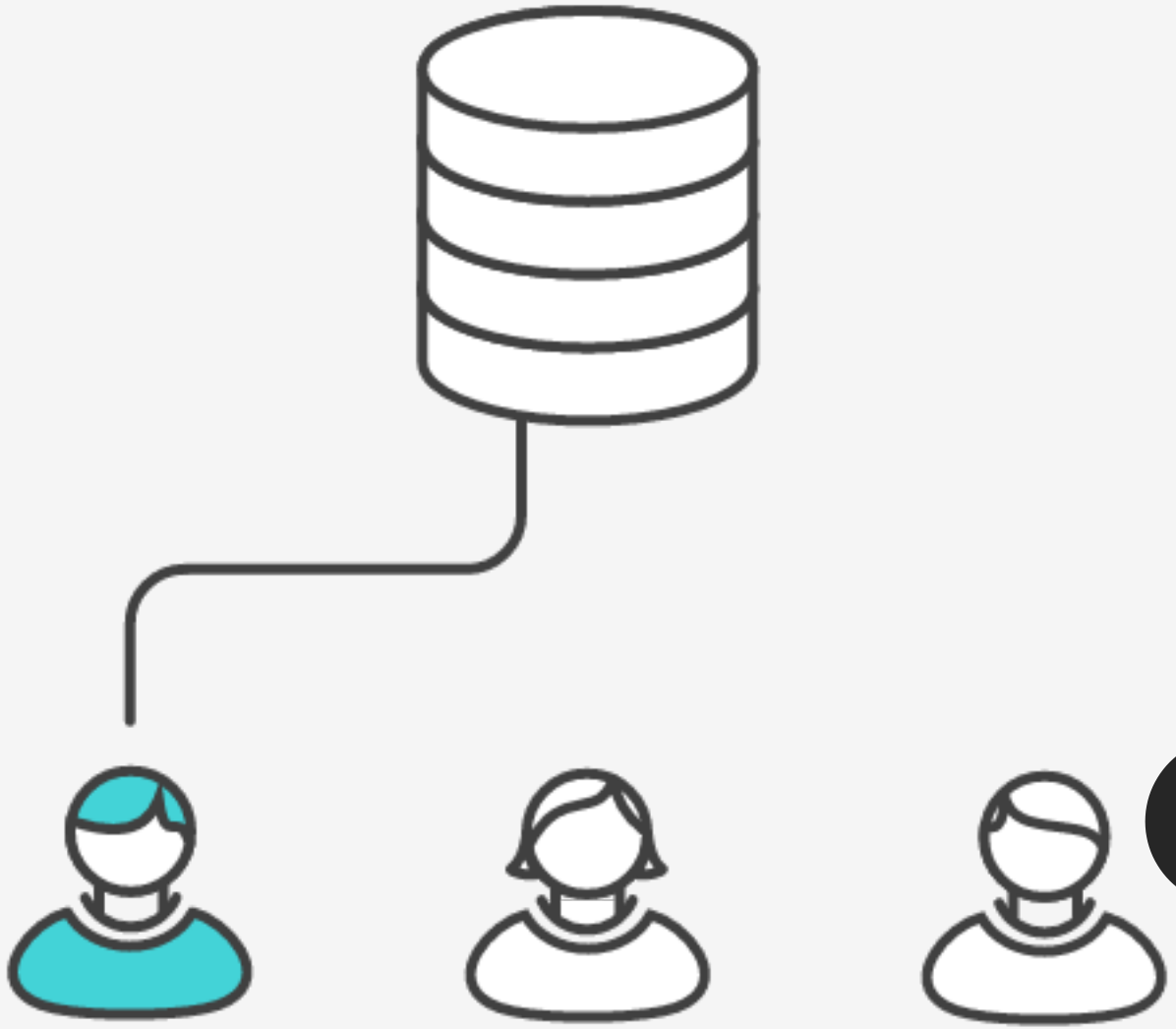
```
git status # View the state of the repo
git add <some-file> # Stage a file
git commit # Commit a file</some-file>
```

Maria works on her own feature

```
git status # View the state of the repo
git add <some-file> # Stage a file
git commit # Commit a file</some-file>
```

David publishes his feature

git push origin master



Maria tries to publish her feature

git push origin master

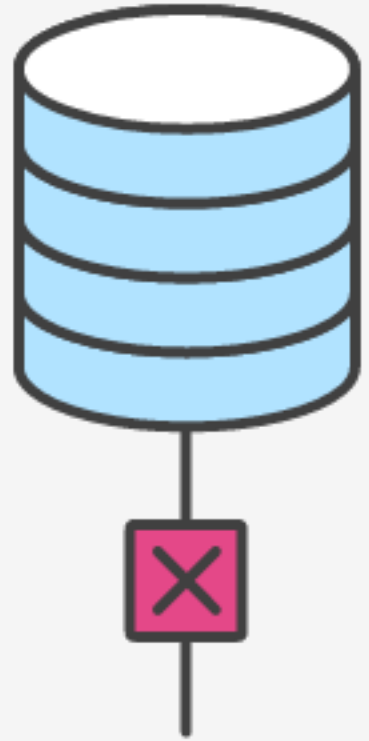
error: failed to push some refs to '/path/to/repo.git'

hint: Updates were rejected because the tip of your current branch is behind

hint: its remote counterpart. Merge the remote changes (e.g. 'git pull')

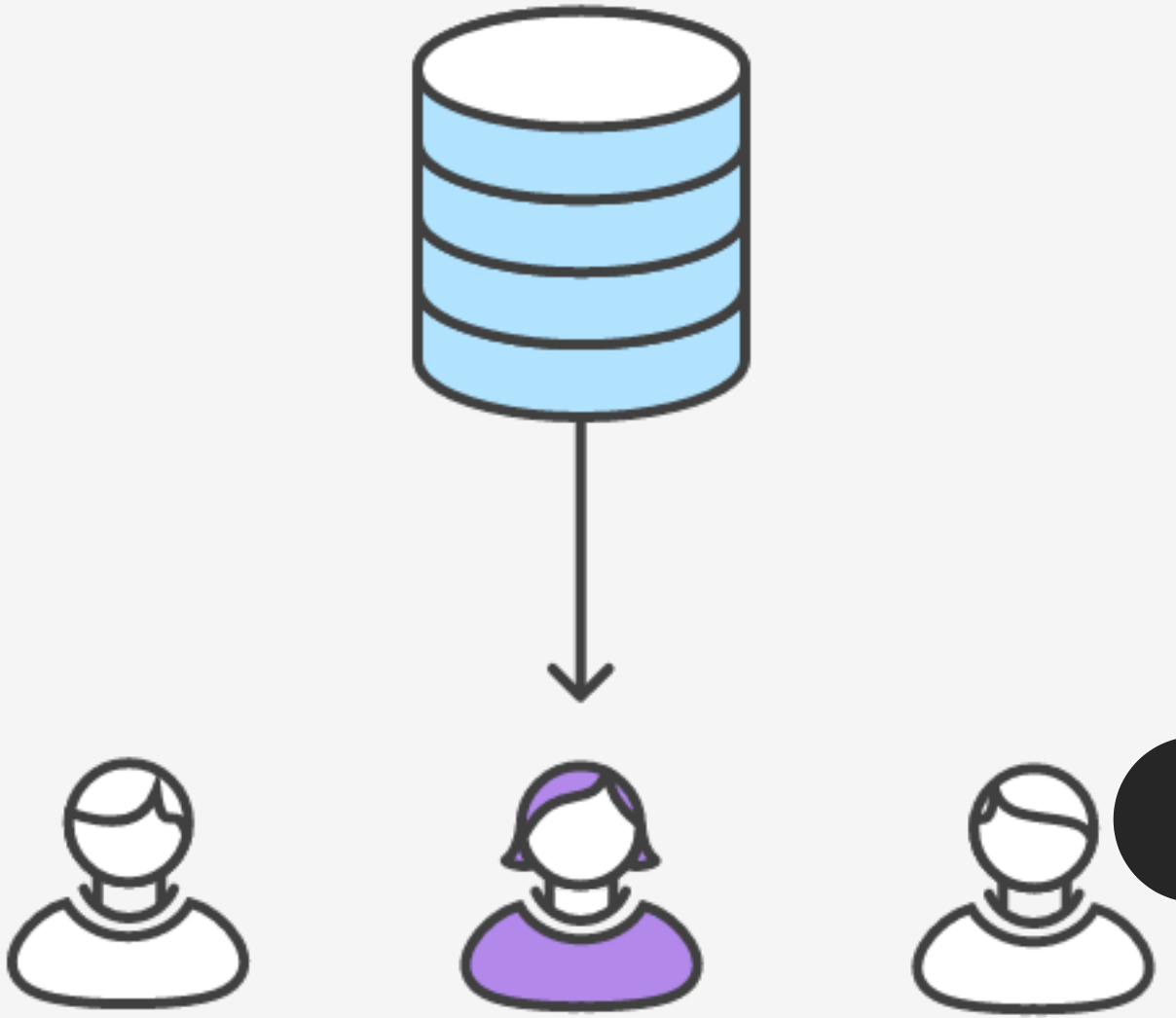
hint: before pushing again.

hint: See the 'Note about fast-forwards' in 'git push --help' for details.

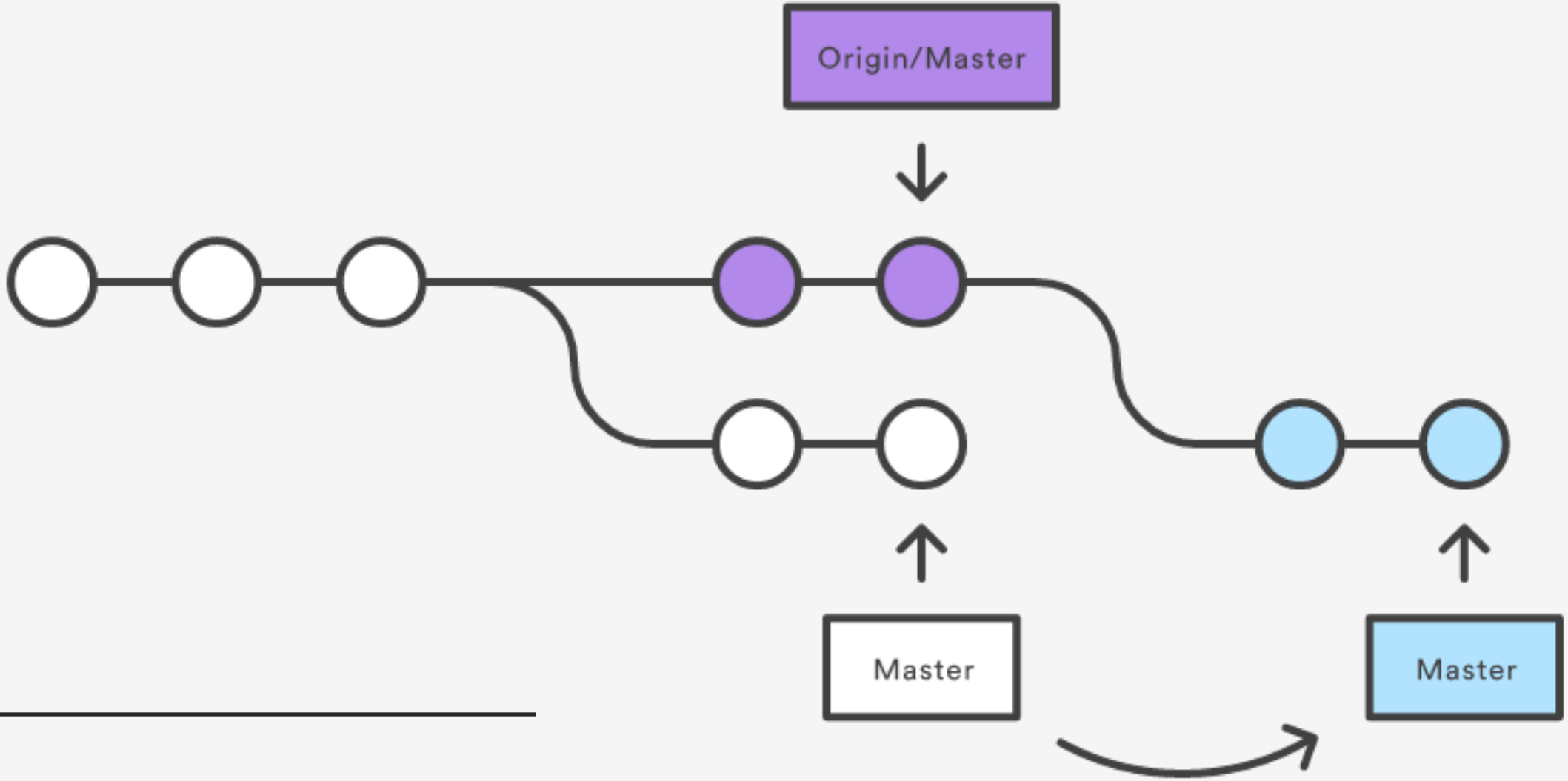


Maria rebases on top of David's commits

git pull --rebase origin master



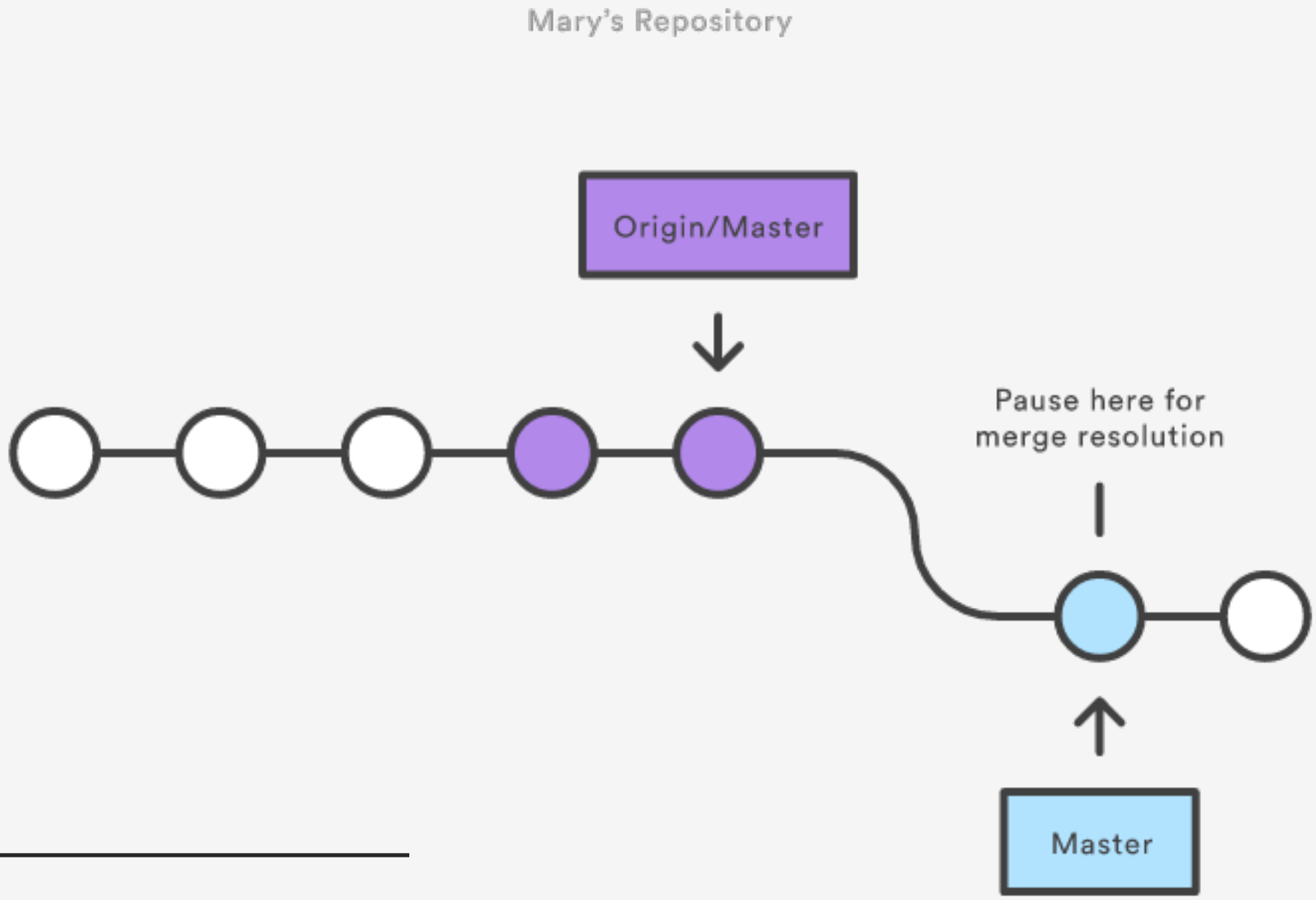
Mary's Repository



Maria resolves a merge conflict

CONFLICT (content): Merge conflict in <some-file>

CONFLICT (content): Merge conflict in <some-file>

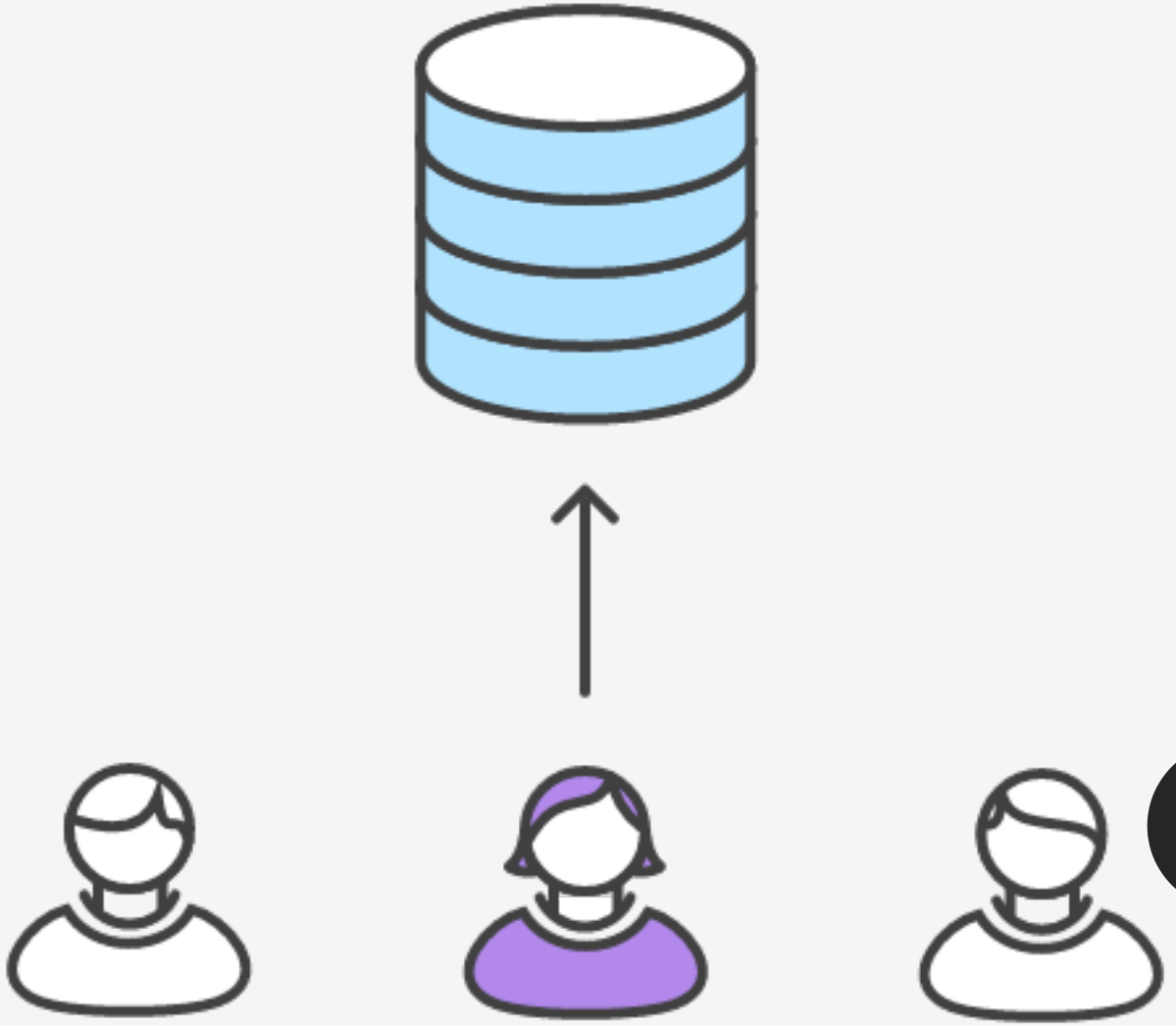


```
# Unmerged paths:
# (use "git reset HEAD <some-file>..." to unstage)
# (use "git add/rm <some-file>..." as appropriate to mark resolution)
#
# both modified: <some-file>

git add <some-file>
git rebase --continue
```

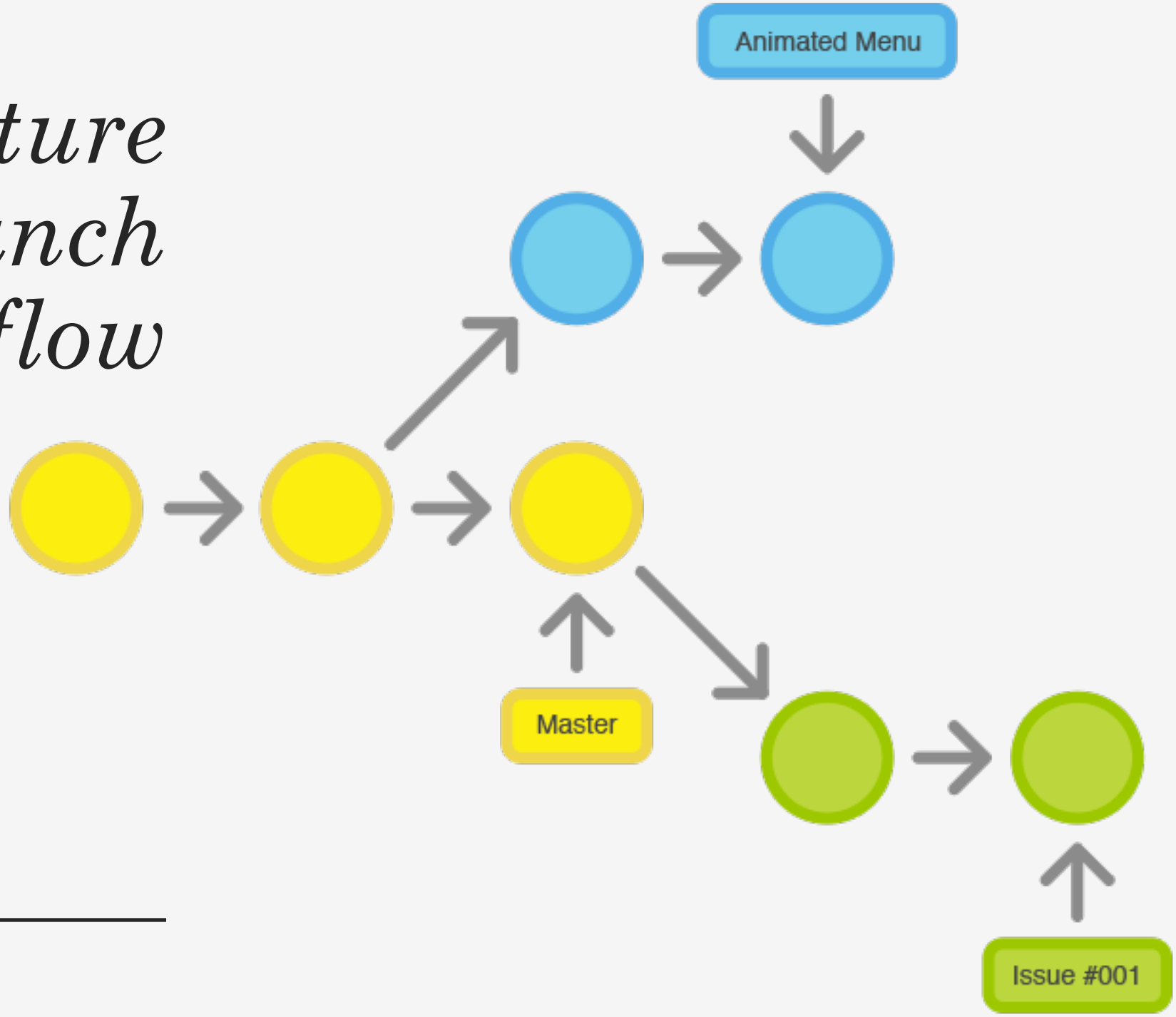
Maria successfully publishes her feature

git push origin master




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
HAAAAAAAAANDS
2 HOURS AGO
AS A PROJECT DRAGS ON, MY GIT COMMIT MESSAGES GET LESS AND LESS INFORMATIVE.

Feature Branch Workflow



Questions?

- Let's try it out!
- For more information, visit https://www.atlassian.com/git/tutorials/what-is-version-control