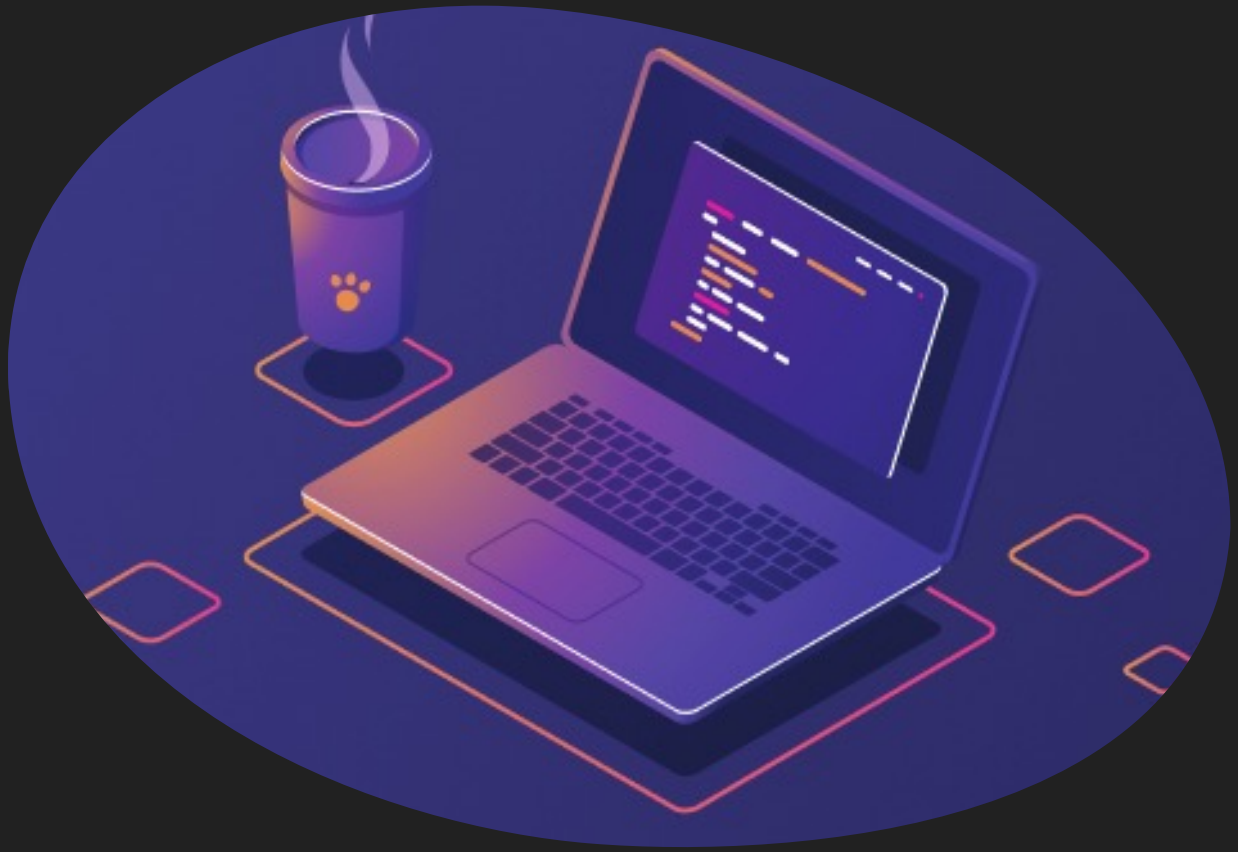


Week 4 : SOFTWARE DEVELOPMENT TOOLS AND ENVIRONMENTS

Week 4
Undoing Changes

Week 4 Undoing Changes

- We’ve explored how to create repositories, how to push and pull code from GitHub, how to use commits with Git, and how to work with branches.
- But what happens when we make a mistake or wish to undo an action?
- Or what if we wish to explore some historical commits?

Week 4 Undoing Changes

- Today we're focused on how to undo actions related to git commands and explore historical commits.
- We'll discuss:
  - **git checkout** and **Detached HEAD**
  - **git restore**
  - **git reset**
  - **git revert**

Week 4 Undoing Changes

- Keep in mind that you don’t use these commands as often as the other commands we’ve learned so far, but they are still important actions to know!

Let’s get started!

Week 4
Git Checkout

Week 4 Undoing Changes

- **git checkout**
  - This is actually a very versatile command, so versatile in fact, that developers complained it was used for too many different actions, thus new git commands were created, such as **git switch**.

Week 4 Undoing Changes

- **git checkout**
  - A "checkout" is the act of switching between different versions of a target entity.
  - The **git checkout** command can operate on three distinct entities: files, commits, and branches.

Week 4 Undoing Changes

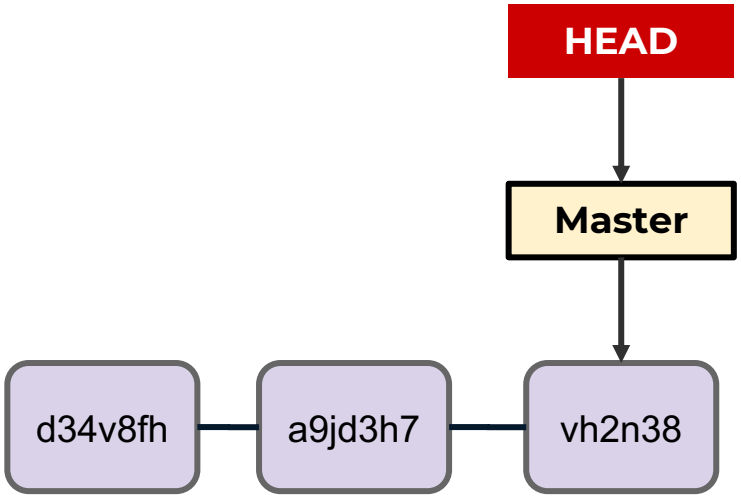
- **git checkout**
  - For example, you could use **git checkout branch_name** instead of **git switch branch_name** to checkout a new branch.
  - Unlike **git switch** however, recall checkout can operate on commits, meaning we can “checkout” historical commits.

Week 4 Undoing Changes

- **git checkout**
  - We can check out a particular commit by specifying its hash, we can get hashes from the **git log** command and we can also see the abbreviated hash using:
    - **git log --oneline**
  - Then we can provide the has as:
    - **git checkout ########**

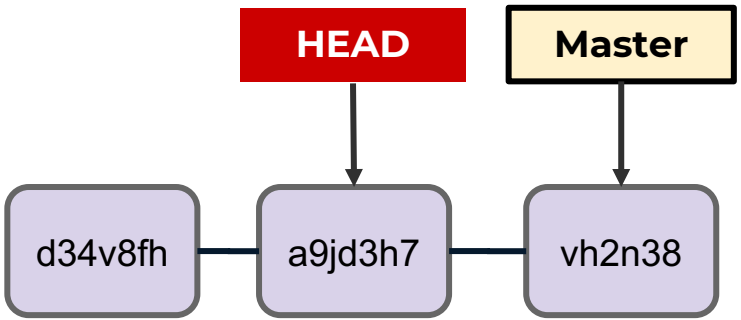
Week 4 Undoing Changes

- Typically our HEAD points to the branch which points to the latest commit.



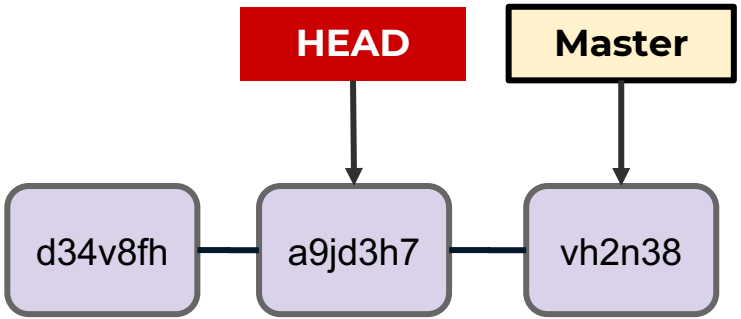
Week 4 Undoing Changes

- Upon calling **git checkout a9jd3h7** we detach the HEAD to a previous commit



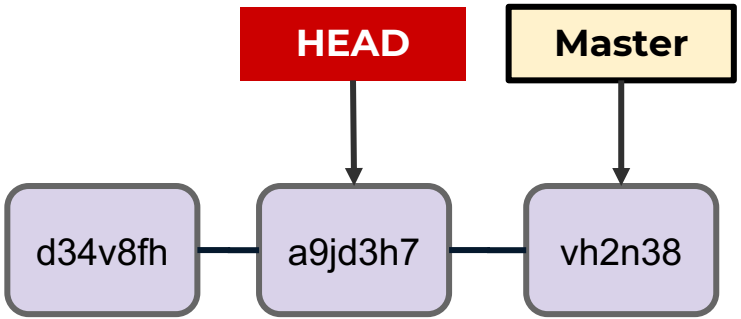
Week 4 Undoing Changes

- You can think of this as traveling back in history to what your code looked like when you ran this commit.



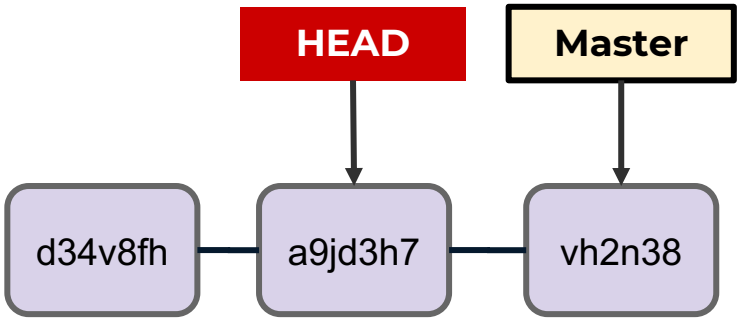
Week 4 Undoing Changes

- This command does **not** undo previous work, you are simply exploring the historical commit.



Week 4 Undoing Changes

- If you started making changes here, they won't be preserved since HEAD is not pointing at a branch reference.



Week 4 Undoing Changes

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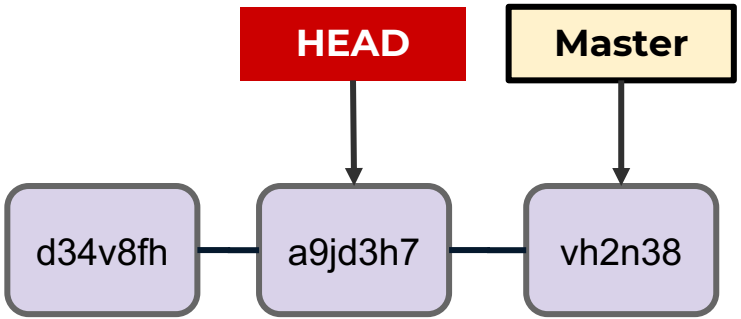

Week 4 Undoing Changes

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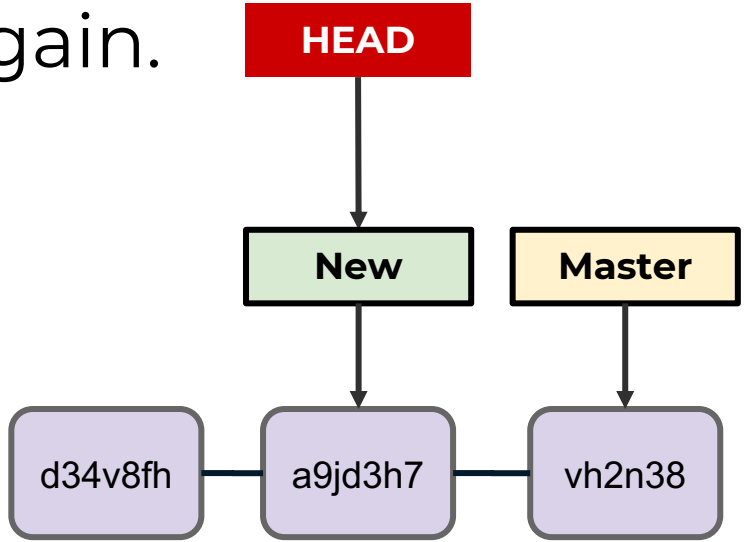

Week 4 Undoing Changes

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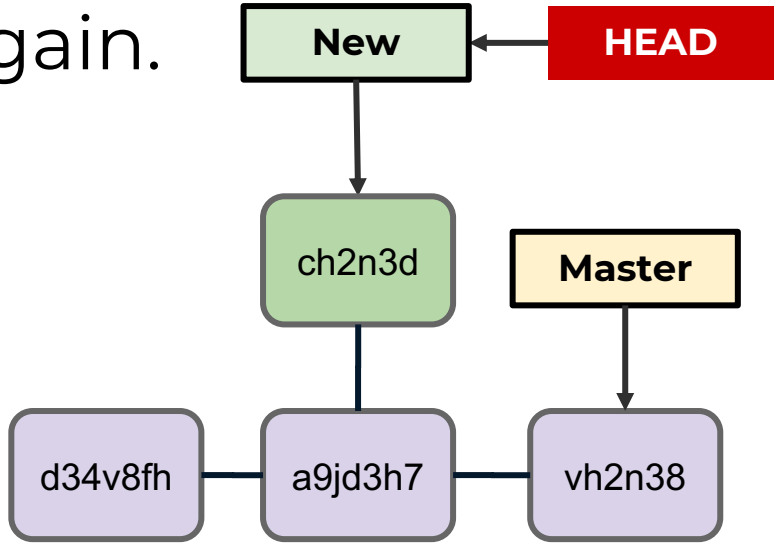

Week 4 Undoing Changes

- Let’s explore these commands in practice!

Week 4
Git Restore

Week 4 Undoing Changes

- Imagine you've been working on a file that is already part of a commit.
- You know the code was working at the point of the last commit, however now the code is totally broken, and you just can't seem to fix it.
- You've written too much code to just run Ctrl+Z! How to fix this?

Week 4 Undoing Changes

- **Git restore**
  - We can restore a file to its state at the previous most recent commit using the **git restore command:**
    - **git restore file_name**

Week 4 Undoing Changes

- **Git restore**
  - We can restore a file to its state at the previous most recent commit using the **git restore command:**
    - **git restore file_name**
  - ***Warning:***
    - You can not undo a git restore command, since your changes were not committed!

Week 4 Undoing Changes

- **Git restore**
  - We can restore a file to its state at the previous most recent commit using the **git restore command:**
    - **git restore file_name**
  - ***Warning:***
    - Think of this command as an ultimate “Ctrl+Z” restoring files to their previous commit.

Week 4 Undoing Changes

- **Git restore**
  - Technically speaking **git restore** will restore the file back to the HEAD, which typically we have pointing to the most recent commit in the branch.

Week 4 Undoing Changes

- **Git restore**
  - This actually gives us even more flexibility in our restore procedure, we can restore a file to any commit in the log.
  - We state the number of commits from the HEAD to go back to:
    - **git restore --source HEAD~N file.txt**

Week 4 Undoing Changes

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  - We state the number of commits prior from the HEAD to go back to:
    - **git restore --source HEAD~N file.txt**

Week 4 Undoing Changes

- **Git restore**
  - Finally, git restore also allows us to unstage files that we had already added to the staging area using **git add**.
  - We can do this with:
    - **git restore --staged filename**

Week 4 Undoing Changes

- Let’s explore this command in practice:
  - **git restore filename**
  - **git restore --source HEAD~N filename**
  - **git restore --staged filename**

Week 4
Git Reset

Week 4 Undoing Changes

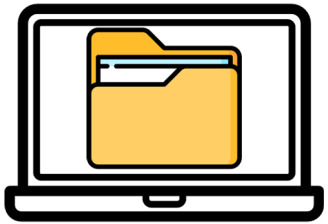
- Git reset allows us to remove commits and “reset” the branch.
- There are two main types of **git reset** calls:
  - **git reset ########**
    - Removes commits in front of the specific hash called, files unchanged.
  - **git reset ######## --hard**
    - Removes commits *and* the changes in the files.

Week 4 Undoing Changes

- To fully understand this, let’s recall our discussions about working directory, staging area, and repository.

Week 4 Undoing Changes

Working Directory



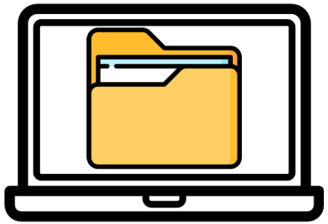
`program.py`

Staging Area

Repository

Week 4 Undoing Changes

Working Directory



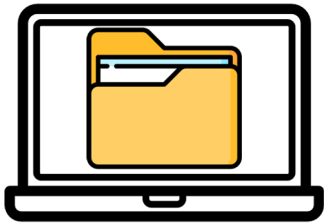
Staging Area

`program.py`

Repository

Week 4 Undoing Changes

Working Directory



Staging Area

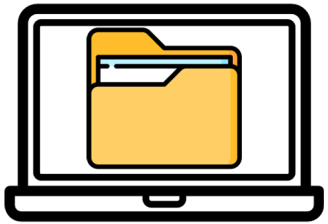
Repository

`program.py`

`“python code”`
`f3h4782`

Week 4 Undoing Changes

Working Directory



index.html

style.css

Staging Area

Repository

program.py

“python code”
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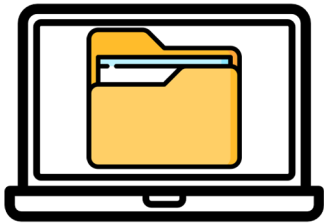
Week 4 Undoing Changes

Working Directory



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Week 4 Undoing Changes

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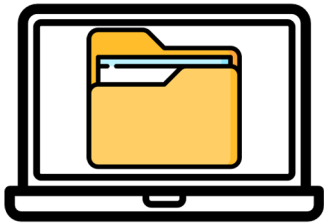

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g82j37l

Week 4 Undoing Changes

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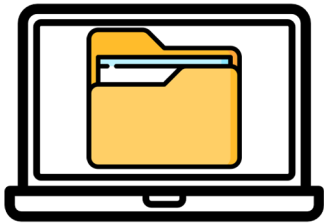

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“python code”
f3h4782

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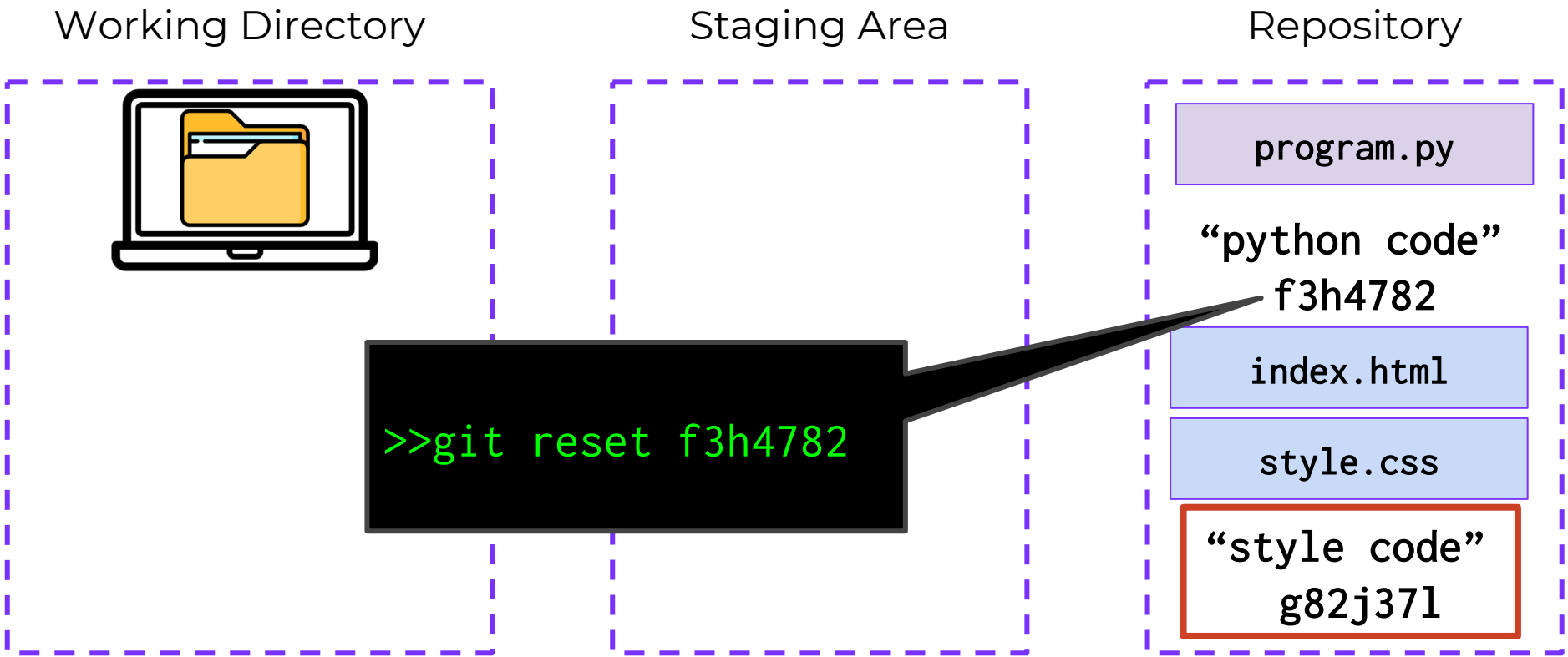
g82j371

Week 4 Undoing Changes



Week 4 Undoing Changes

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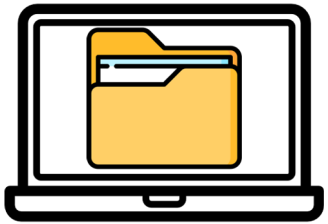

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Week 4 Undoing Changes

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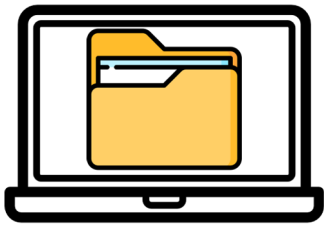


Files are unchanged!
You just reset the commits only.

program.py

“python code”
f3h4782

index.html

style.css

Week 4 Undoing Changes

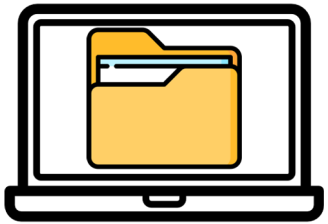
- This means when you do **git reset** you won’t notice a change in the files themselves, you just reset the commits.
- This is useful if you accidentally committed to the wrong branch (for example, maybe you forgot to run **git switch** right after creating a new branch, accidentally committing to the original branch).

Week 4 Undoing Changes

- What if you do want the files to change?
- In the case where you just want to undo everything, including changes and have the branch files look like they did at a previous commit, you add the flag **--hard**.
- For example:
  - **git reset f3h4782 --hard**

Week 4 Undoing Changes

Working Directory



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Week 4 Undoing Changes

Working Directory

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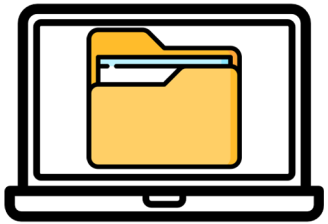

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>>git reset f3h4782 --hard
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Week 4 Undoing Changes

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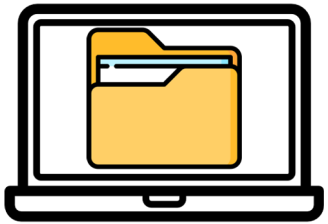

program.py

“python code”

f3h4782

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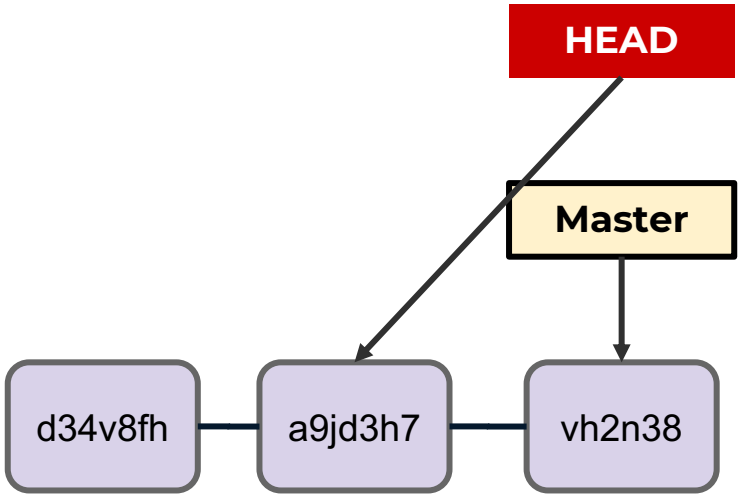
>>git reset f3h4782 --hard
```

Week 4 Undoing Changes

- We can visualize a **git reset** moving back to a previous commit, but not undoing file changes (unless it is --hard)



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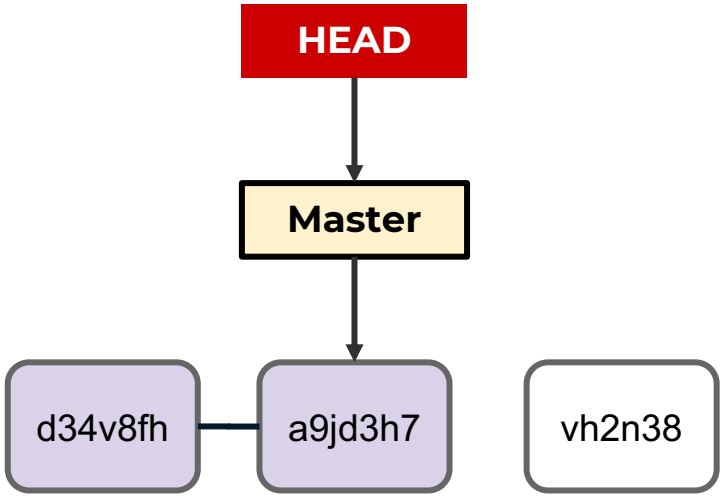

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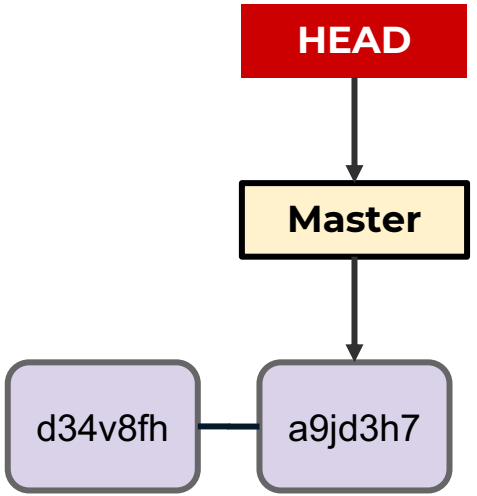


Week 4 Undoing Changes

- *Can you undo a git reset --hard?*
  - Technically you can try to recover a commit before Git does its garbage collection, however you should operate under the assumption that a --hard reset is not recoverable.

Week 4 Undoing Changes

- Let’s explore examples of **git reset**!

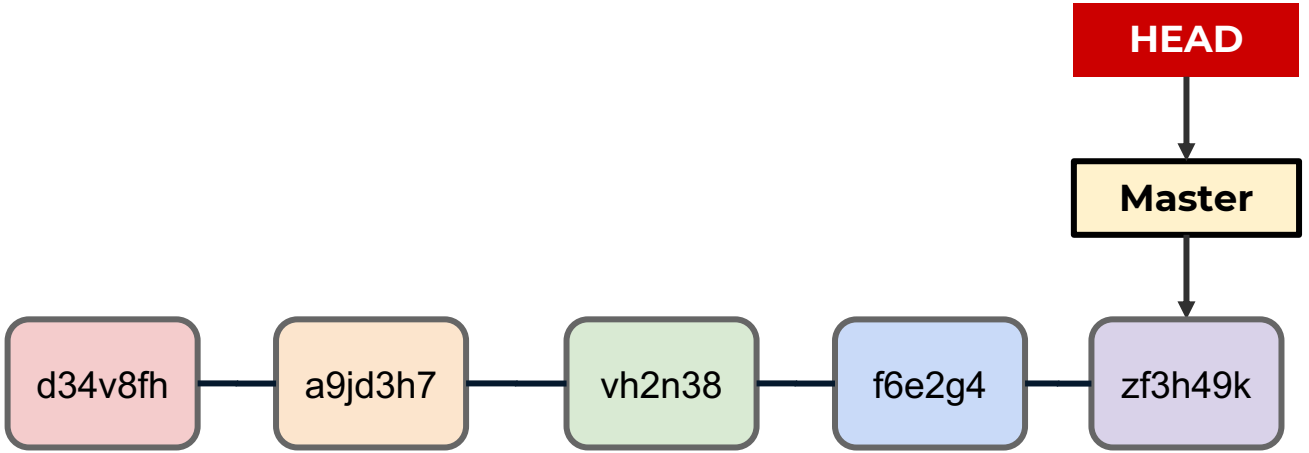
Week 4
Git Revert

Week 4 Undoing Changes

- Let’s explore the last command for undoing changes, **git revert**.
- The **git revert** command will create a new commit that undoes work from previous commits, but keeps those commits in the branch.

Week 4 Undoing Changes

- Let's review a **git reset** first.
- A **git reset** goes back and removes the commits (and changes if its **--hard**)



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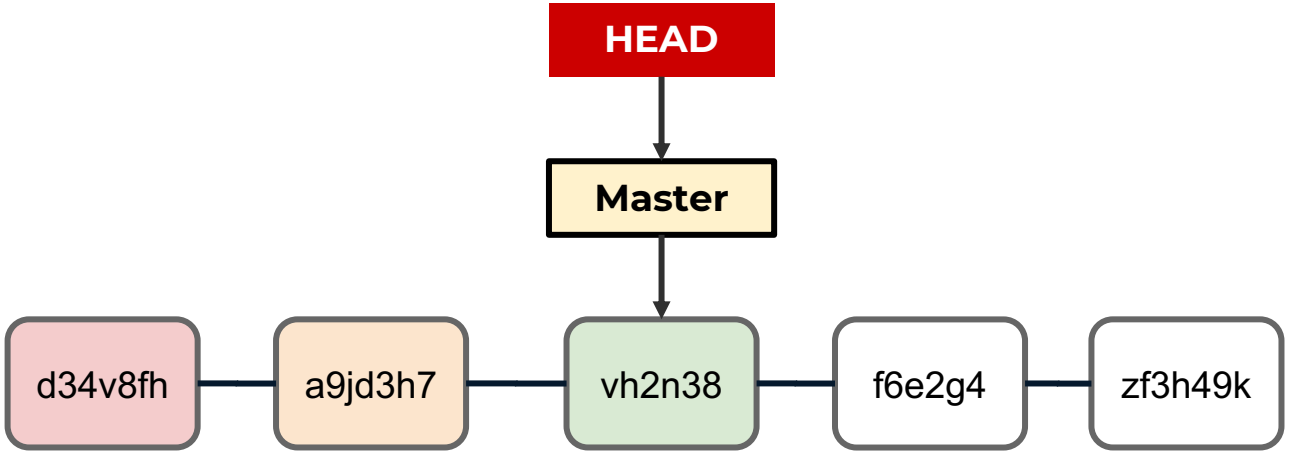

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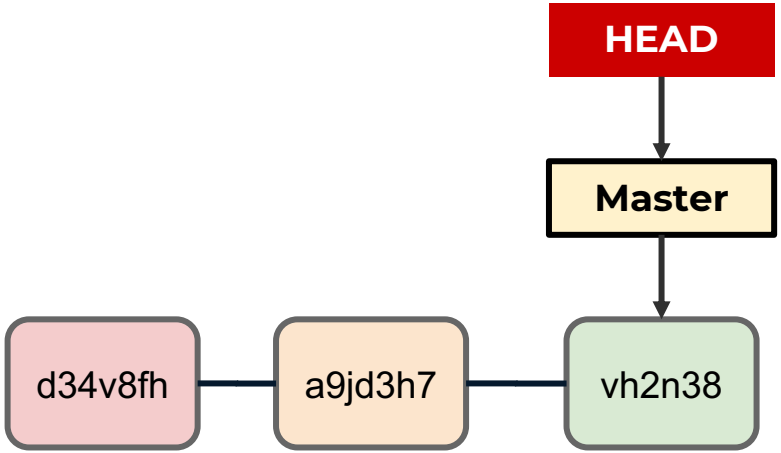
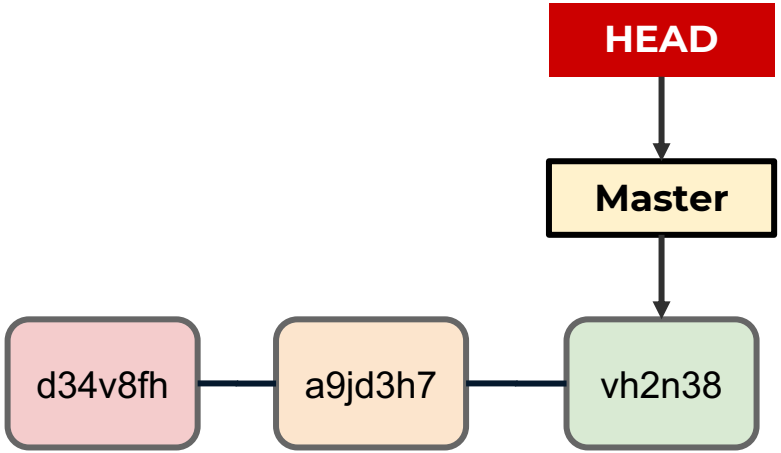


Week 4 Undoing Changes

- Why could this be an issue?
- You can lose **shared history**!



Week 4 Undoing Changes

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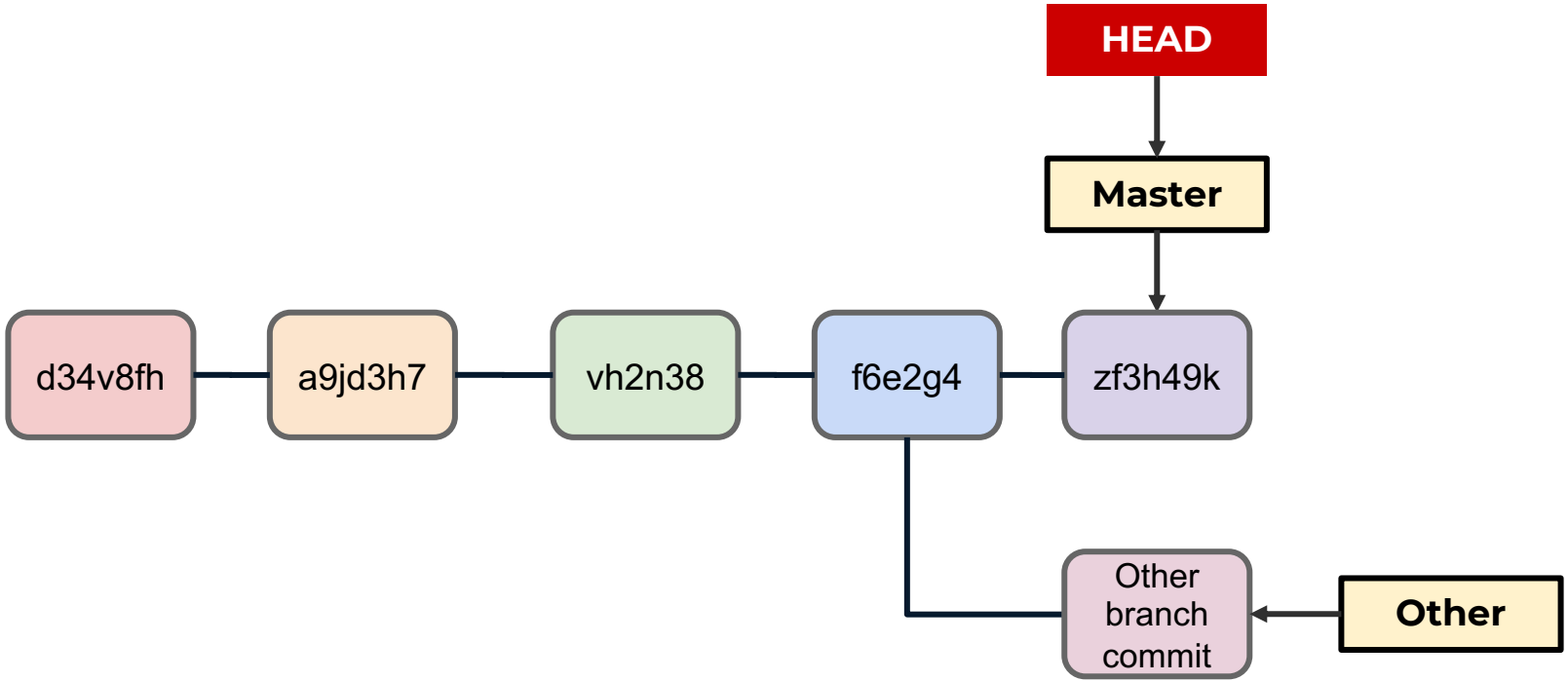

Week 4 Undoing Changes

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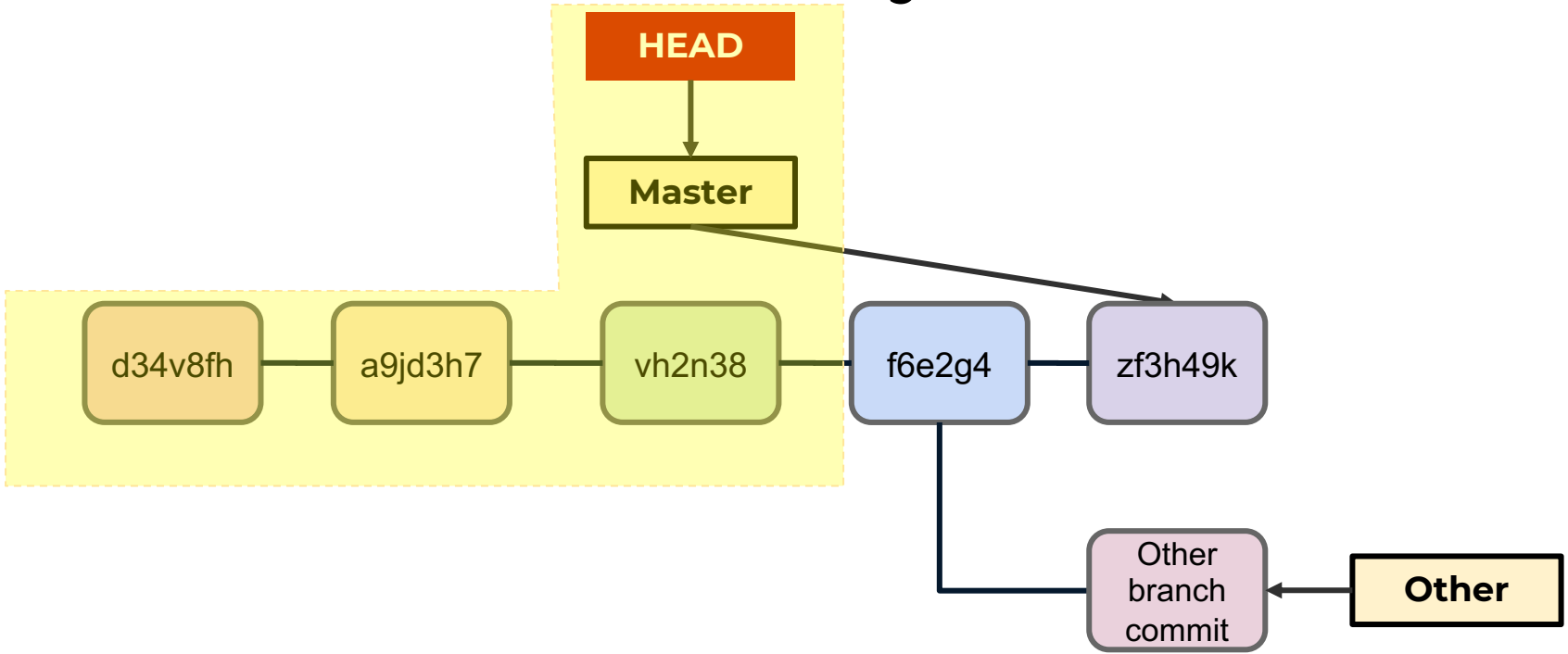

Week 4 Undoing Changes

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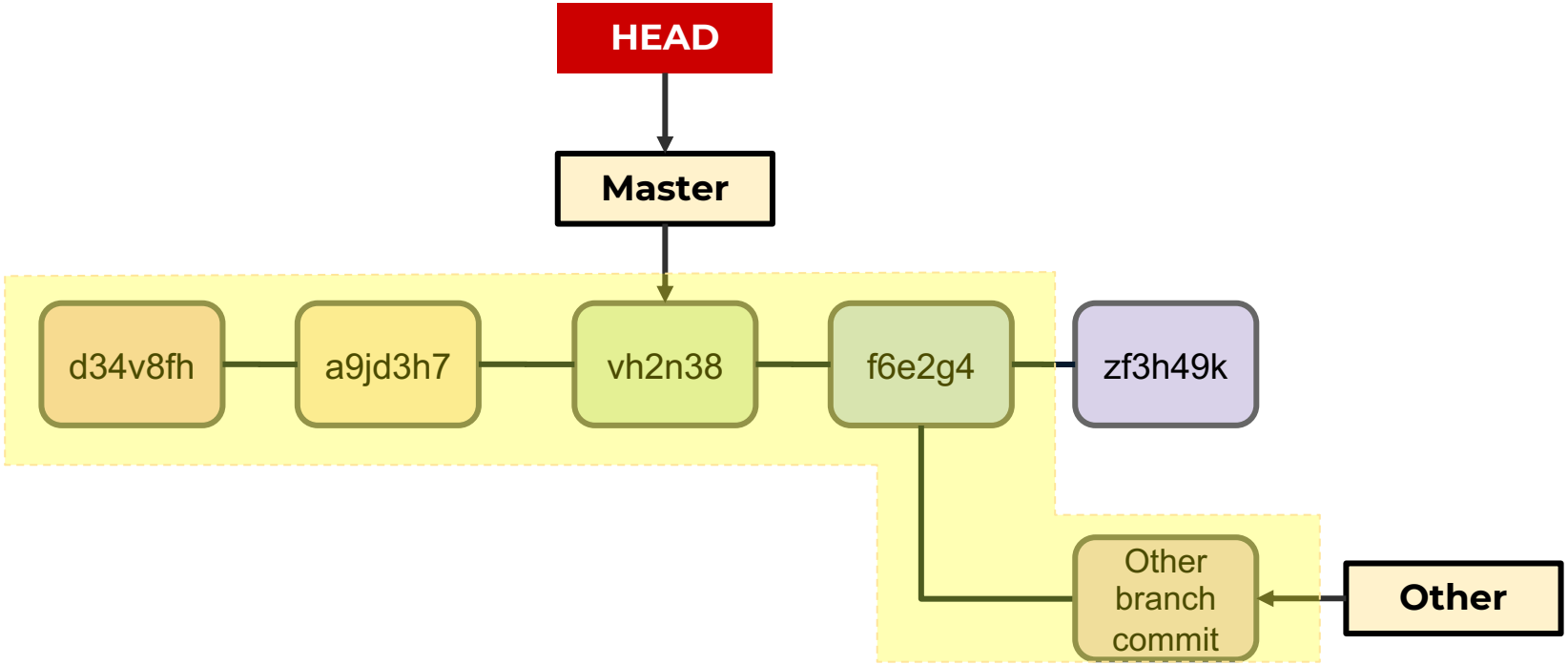
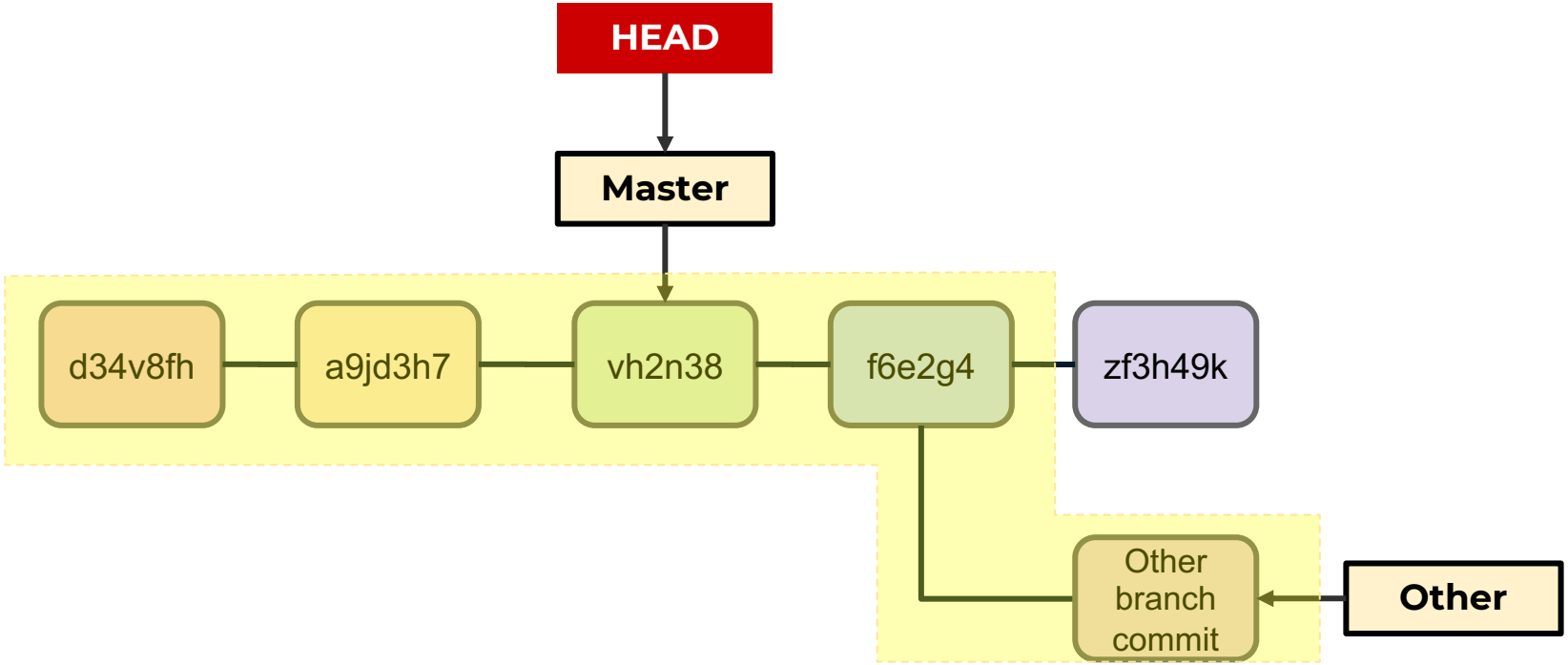


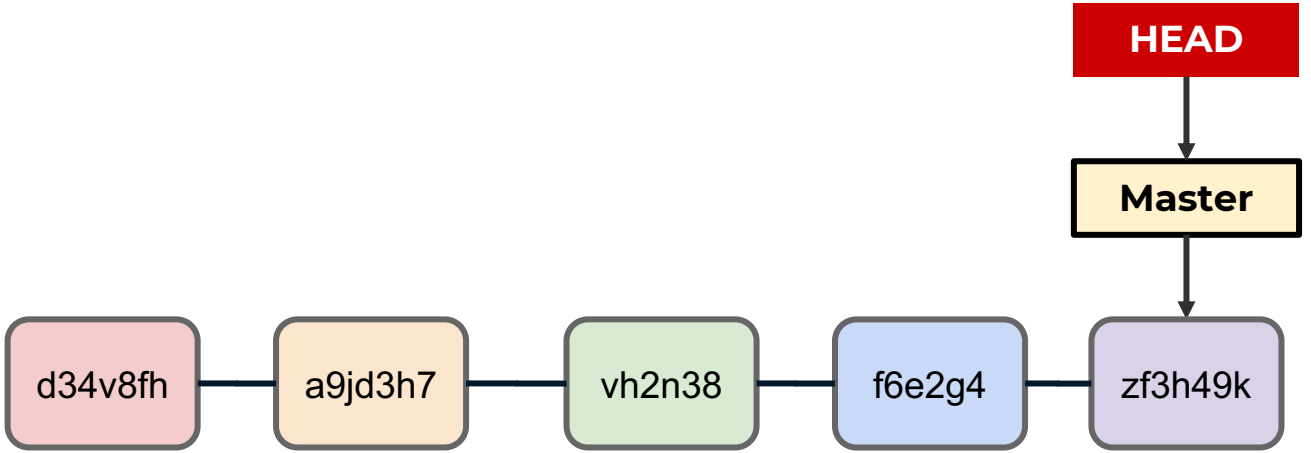
Week 4 Undoing Changes

- This makes a merge of the branches harder!



Week 4 Undoing Changes

- A **git revert** creates a new commit that matches the historical state of a previous commit.



Week 4 Undoing Changes

- **Git revert** doesn’t change the project history, which makes it a “safe” operation for commits that have already been published to a shared repository.

Week 4 Undoing Changes

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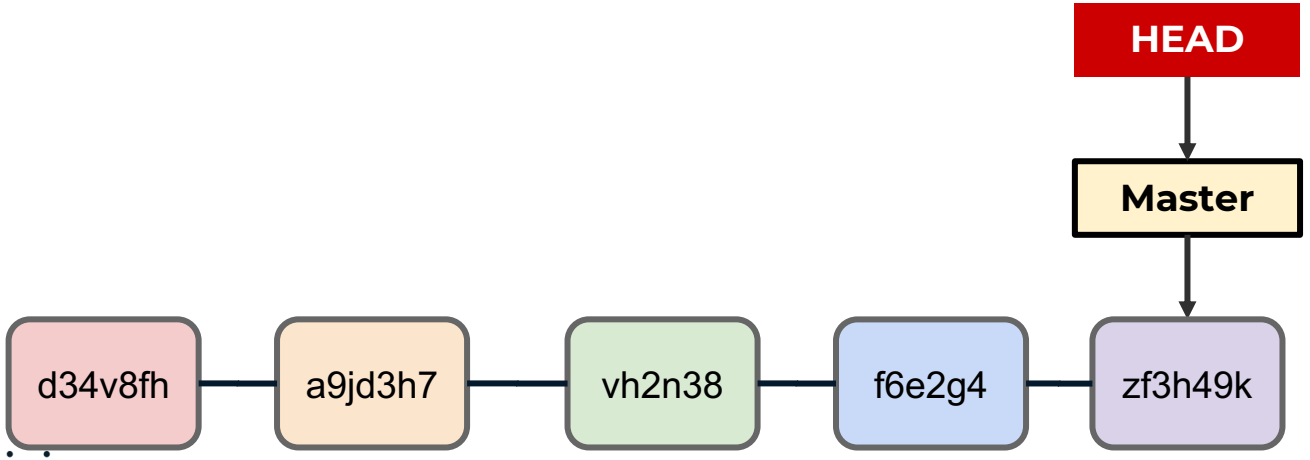

Week 4 Undoing Changes

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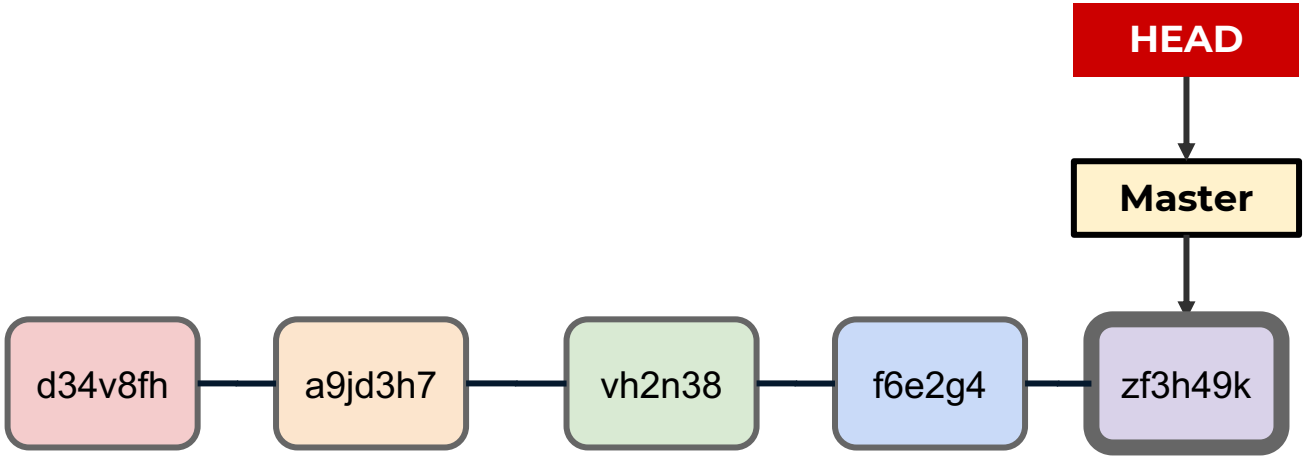

Week 4 Undoing Changes

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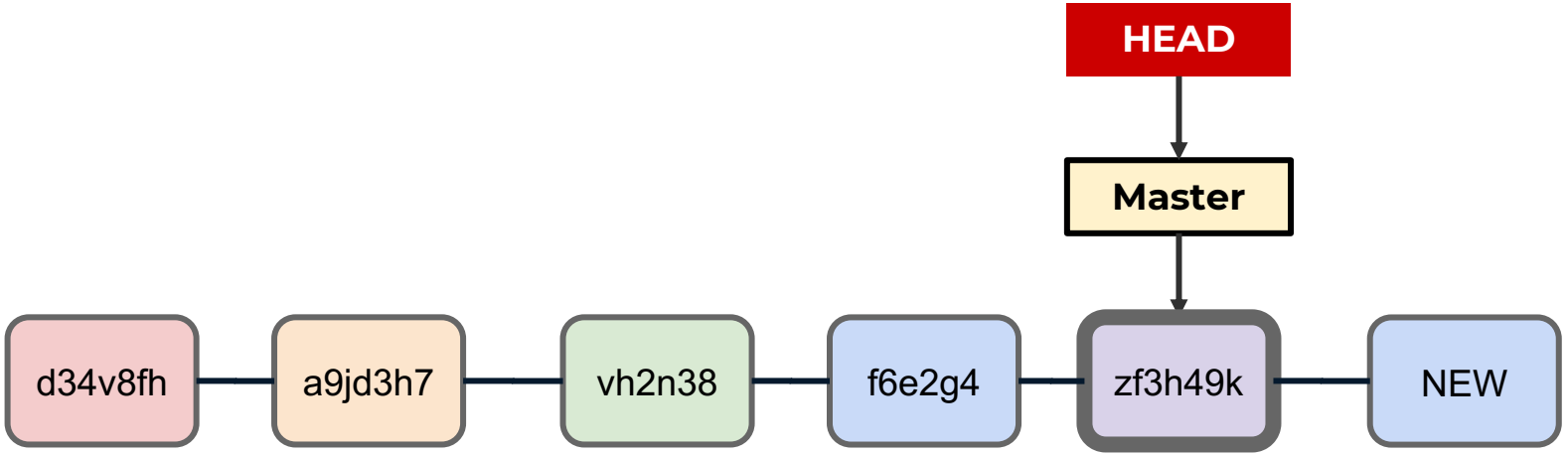

Week 4 Undoing Changes

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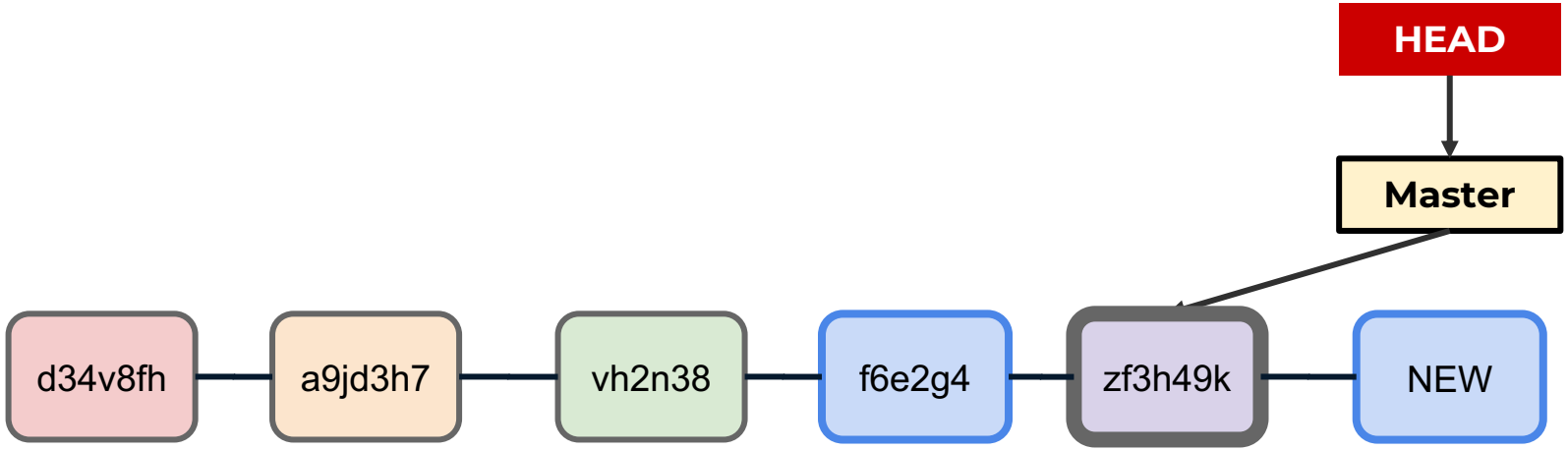
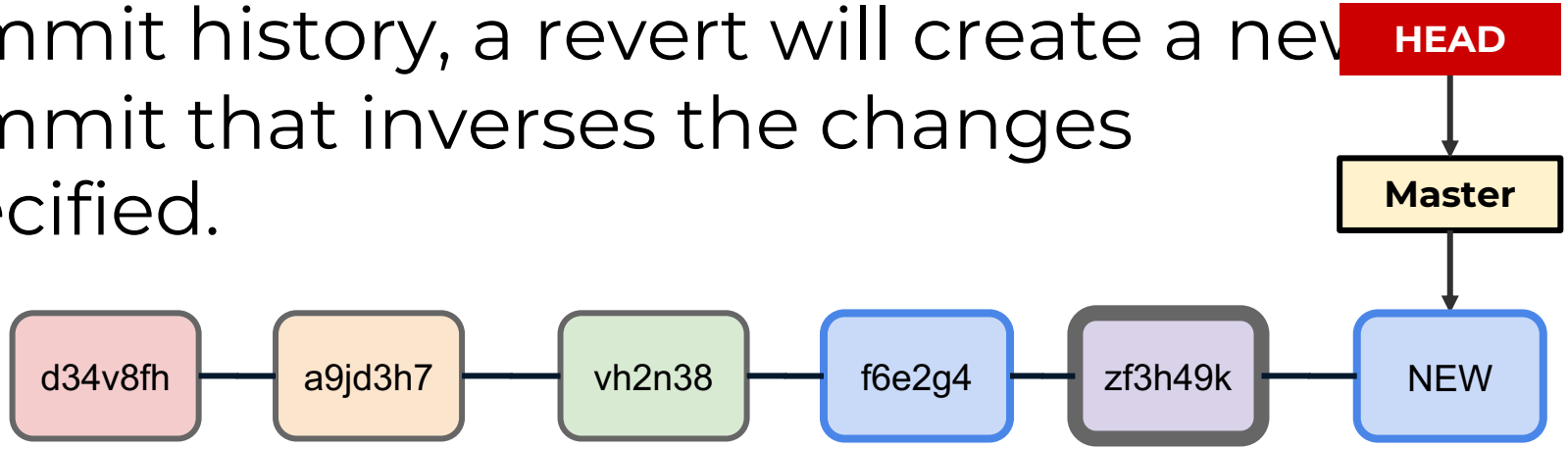


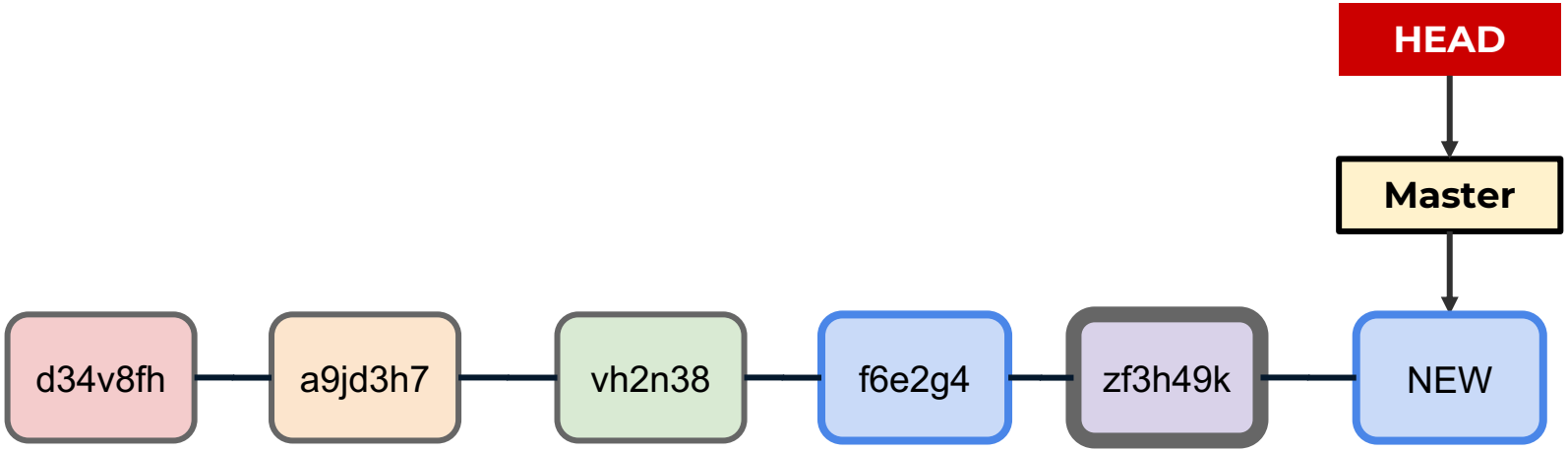
Week 4 Undoing Changes

- The **git revert** command is a forward-moving undo operation that offers a safe method of undoing changes. Instead of deleting or orphaning commits in the commit history, a revert will create a new commit that inverses the changes specified.



Week 4 Undoing Changes

- **Git revert** is a safer alternative to git reset in regards to losing work.



Week 4 Undoing Changes

- Let’s explore an example of **git revert**!

Week 4
Exercises and Solution

Week 4 Undoing Changes

- Let’s test your skills with the Git’s “undo” set of commands.
- Note:
  - You will definitely want to reference the documentation or our lectures to remember the differences between restore, revert, and reset!

Week 4 Undoing Changes

- **TASKS:**
- Clone the repository at this URL:
- **https://github.com/Pierian-Data/day-four-undo-exercise-file**
- View the historical commits and confirm the name of the branch.

Week 4 Undoing Changes

- **TASKS:**
- Without permanently changing the content of the file at any commit, view what the file looked like after the “first commit”. This should give you a Detached HEAD at the first commit.
- After viewing the file, move the HEAD back to the current main branch (most recent commit).

Week 4 Undoing Changes

- Go back to commit with message “second commit” and create a new branch called **new_branch** starting from that point (do not delete commits that came after this one).
- Stay on the main branch pretend like you “forgot” to switch to your new branch.

Week 4 Undoing Changes

- While on the main branch at the second commit, delete everything in the file using the text editor and your delete key.
- Now using Git commands only (not just Ctrl+Z) restore the file so it matches what it looked like at the second commit (right before you deleted everything).

Week 4 Undoing Changes

- While still on the main branch at the second commit, add a new line that says “new branch text”.
- Add and Commit this change to the file.
- Realize that you meant to actually do this change on your new_branch, figure out how to undo the commit on the main branch *without* losing your work, then switch branches and do the add/commit.

Week 4 Undoing Changes

- Note!
  - This repository was initially created on GitHub, meaning the **master** branch is actually called **main**.
  - Keep this in mind as you switch or checkout branches.
- PAUSE THE VIDEO NOW IF YOU DON'T WANT TO SEE THE SOLUTIONS!

Week 4 Undoing Changes

- Solution:
  - **git log --oneline**
  - **git checkout 5f2f515**
  - **git checkout main** or **git switch main**
  - **git checkout 461e423**
  - **git branch new_branch**
  - **git restore myfile.txt**
  - **git commit -a -m “new branch text”**
  - **git reset 1d9c172**
  - **git switch new_branch**
  - **git commit -a -m “fixed new branch text”**