



# Understanding GT

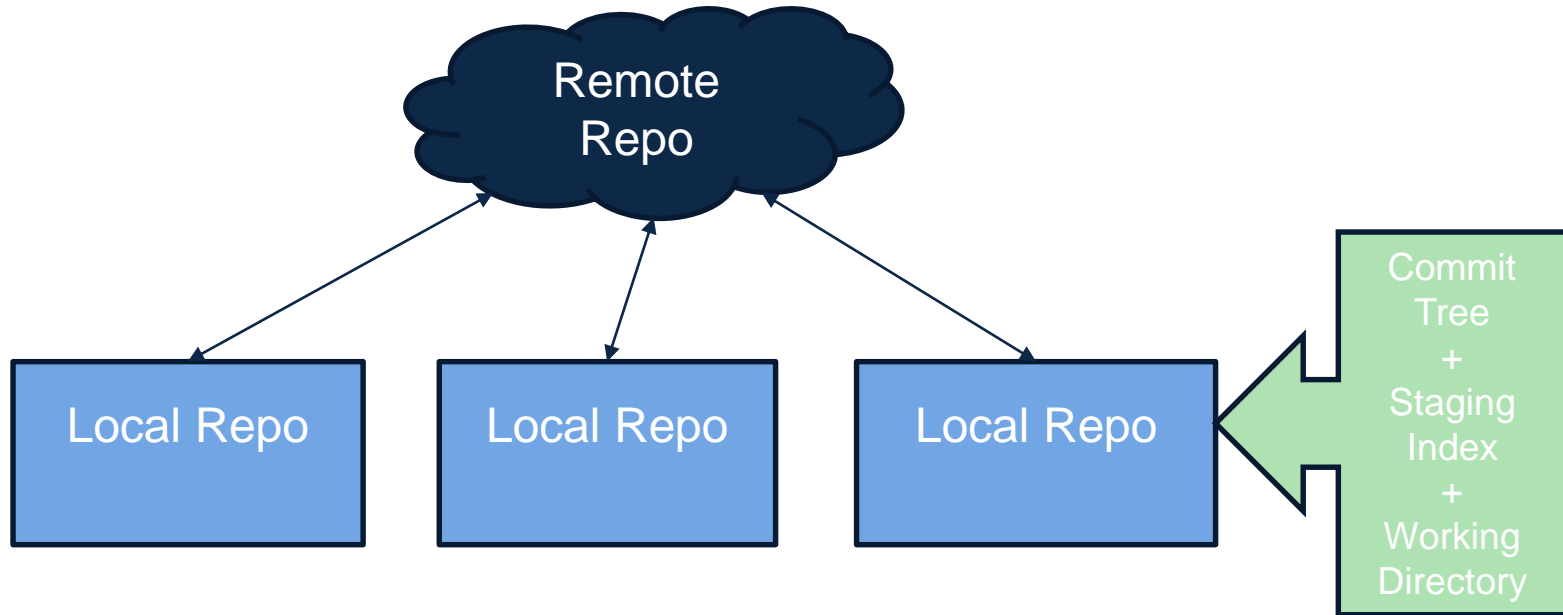
Rachel Singh

*Senior Software Development Engineer*

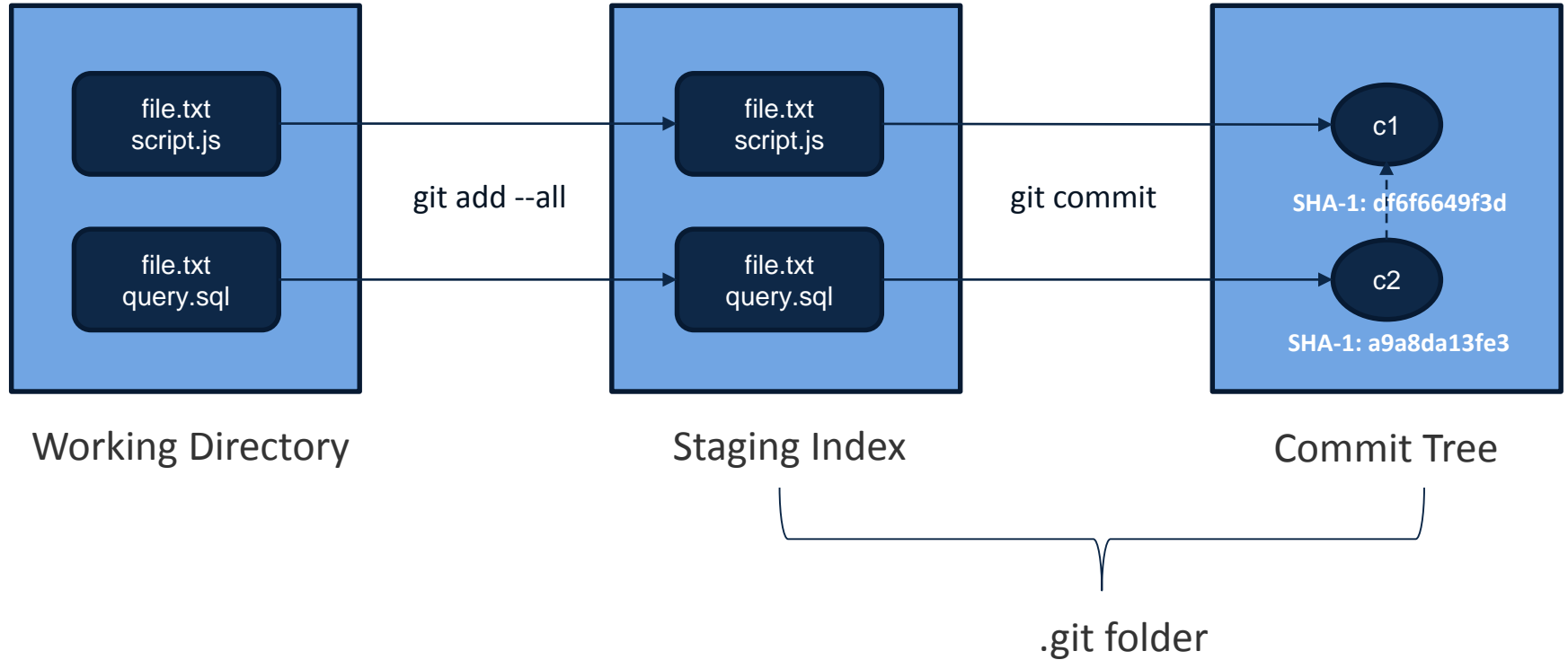
*September 15th, 2018*

# What is GIT?

- Distributed Source Control – Linus Trovaldis in 2005 for Linux Kernel Development

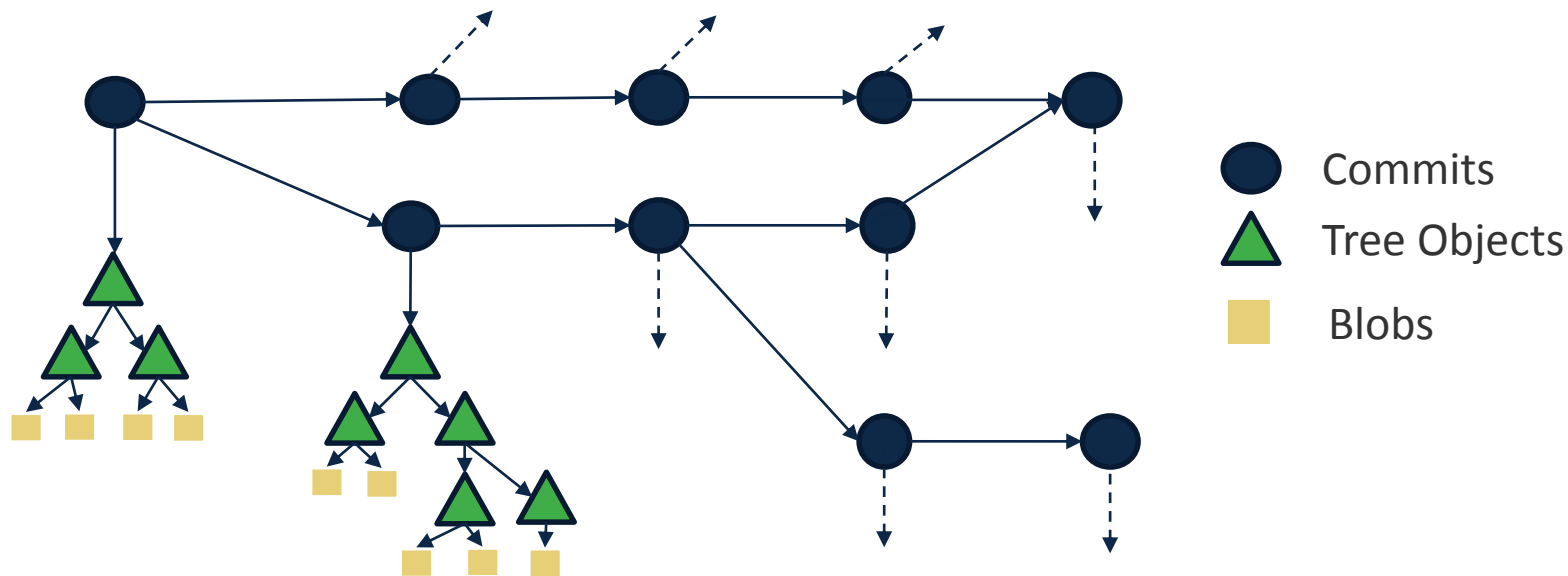


# Stage and Commit

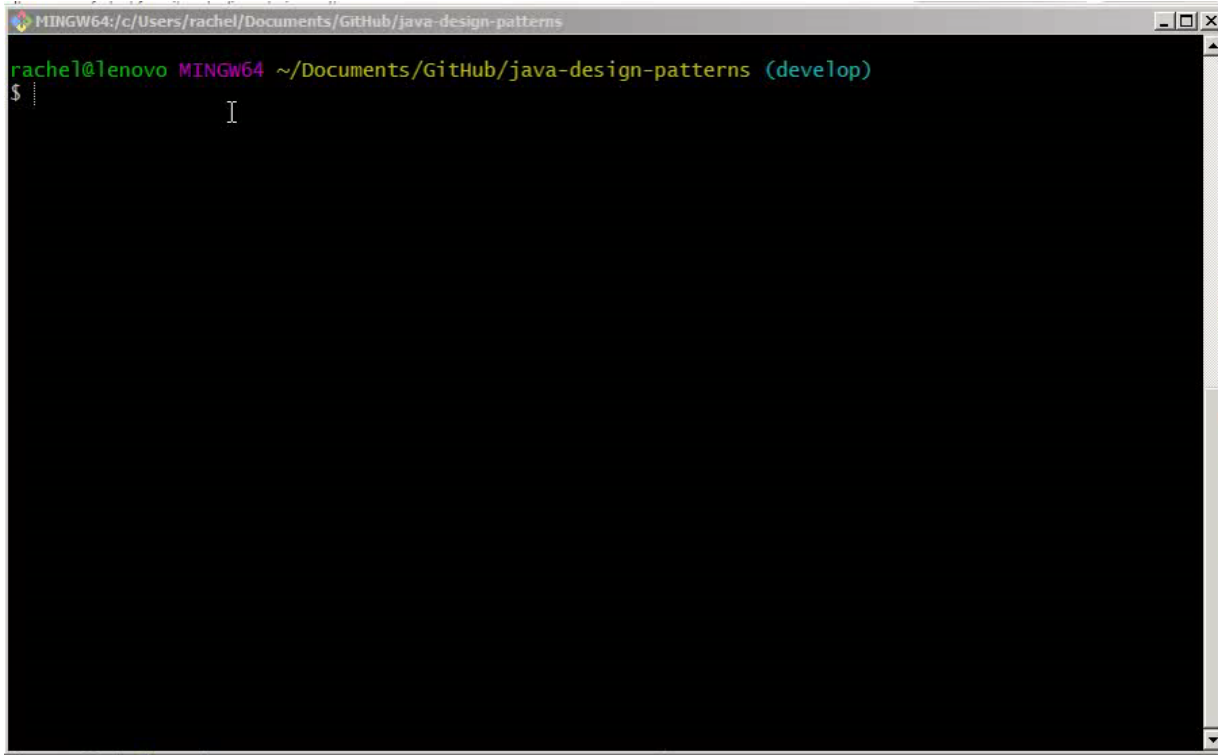


# How does it work?

- Essentially an Acyclic Graph of commits
- Each commit holds a tree of changes with file blobs



# .git DIR



A terminal window titled "MINGW64: c:/Users/rachel/Documents/GitHub/java-design-patterns" is shown. The prompt is "rachel@lenovo MINGW64 ~/Documents/GitHub/java-design-patterns (develop)". The user has entered a command to list the contents of the .git directory, and the output shows a list of files and directories including "branches", "hooks", "logs", "objects", "refs", and "shallow".

```
MINGW64: c:/Users/rachel/Documents/GitHub/java-design-patterns
rachel@lenovo MINGW64 ~/Documents/GitHub/java-design-patterns (develop)
$ ls -la .git
total 104
drwxr-xr-x 10 rachel rachel 4096 Nov 14 14:24 .
drwxr-xr-x  3 rachel rachel 4096 Nov 14 14:24 ..
-rw-r--r--  1 rachel rachel  175 Nov 14 14:24 COMMIT_EDITMSG
-rw-r--r--  1 rachel rachel  205 Nov 14 14:24 CONFIG
-rw-r--r--  1 rachel rachel   70 Nov 14 14:24 CREDENTIALES
-rw-r--r--  1 rachel rachel  190 Nov 14 14:24 HEAD
-rw-r--r--  1 rachel rachel   93 Nov 14 14:24 ORIG_HEAD
-rw-r--r--  1 rachel rachel  139 Nov 14 14:24 TODO
drwxr-xr-x  2 rachel rachel 4096 Nov 14 14:24 branches
-rw-r--r--  1 rachel rachel  111 Nov 14 14:24 config
-rw-r--r--  1 rachel rachel  111 Nov 14 14:24 description
drwxr-xr-x  2 rachel rachel 4096 Nov 14 14:24 hooks
drwxr-xr-x  2 rachel rachel 4096 Nov 14 14:24 logs
drwxr-xr-x  2 rachel rachel 4096 Nov 14 14:24 objects
drwxr-xr-x  2 rachel rachel 4096 Nov 14 14:24 refs
drwxr-xr-x  2 rachel rachel 4096 Nov 14 14:24 shallow
```

# Commit Tree



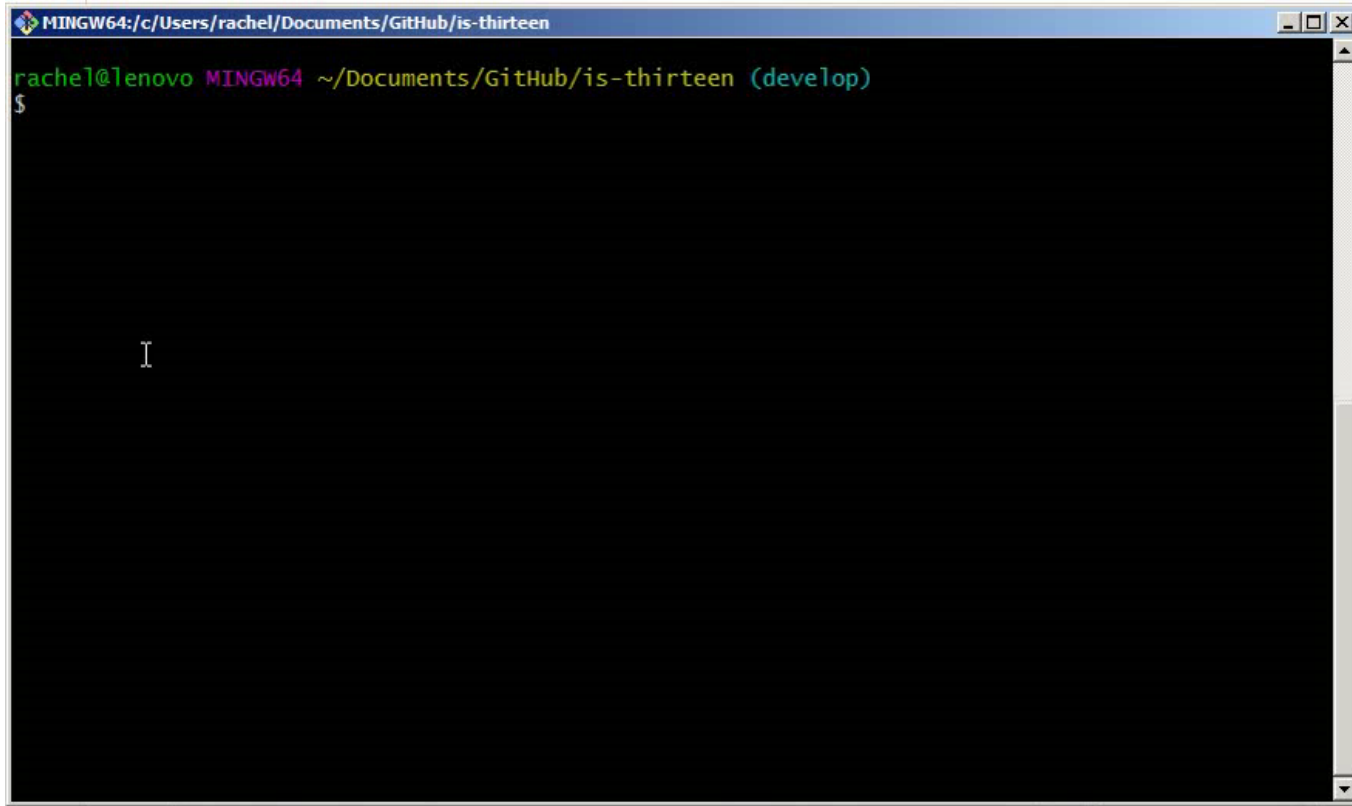
```
MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$ git hist -10
* 27ad8c0 [7 weeks ago] | Update tap [Jezzen Thomas] (HEAD -> develop, origin/master, origin/HEAD, master)
* e2ef93e [4 months ago] | Merge pull request #470 from DAcodedBEAT/patch-1 [Gytis Daujotas]
| \
| * 3dbfc81 [6 months ago] | added emoji to thirteenStrings [Arun Philip]
| * c837866 [5 months ago] | Merge pull request #486 from Aiybe/master [Gytis Daujotas]
| \
| * | ae38246 [6 months ago] | Added Arabic feminine form [Abe Jellinek]
| \
| * | 03f7739 [5 months ago] | Merge pull request #566 from meain/patch-1 [Gytis Daujotas]
| \
| * | fad9a79 [5 months ago] | Fix a type in a language name [Abin Simon]
| * | 26fbd80 [5 months ago] | Merge pull request #559 from nsmgr8/master [Gytis Daujotas]
| \
| * | 10dfffb0 [6 months ago] | Add Bangla variants [M. Nasimul Haque]
| \
| * | f41f667 [5 months ago] | Merge pull request #571 from wphestiraid/master [Gytis Daujotas]
| \
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$
```

# Reference Logs – git relog

```
MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$ git relog
da7733a (HEAD -> develop) HEAD@{0}: reset: moving to HEAD
da7733a (HEAD -> develop) HEAD@{1}: checkout: moving from newbranch to develop
dd77612 (newbranch, branch) HEAD@{2}: reset: moving to HEAD
dd77612 (newbranch, branch) HEAD@{3}: reset: moving to HEAD
dd77612 (newbranch, branch) HEAD@{4}: checkout: moving from dd7761256cedfd0741b6f124de2cf763673
bd709 to newbranch
dd77612 (newbranch, branch) HEAD@{5}: checkout: moving from develop to dd77612
da7733a (HEAD -> develop) HEAD@{6}: checkout: moving from branch to develop
dd77612 (newbranch, branch) HEAD@{7}: checkout: moving from dd7761256cedfd0741b6f124de2cf763673
bd709 to branch
dd77612 (newbranch, branch) HEAD@{8}: checkout: moving from develop to dd77612
da7733a (HEAD -> develop) HEAD@{9}: commit (amend): new amend change
c5966d7 HEAD@{10}: commit: new change
dd77612 (newbranch, branch) HEAD@{11}: commit (amend): my contribution
6fac3b4 HEAD@{12}: commit (amend): my contribution
e688015 HEAD@{13}: commit (amend): my contribution
ac7b526 HEAD@{14}: commit (amend): my contribution
3164999 HEAD@{15}: commit: my contribution
27ad8c0 (origin/master, origin/HEAD, master) HEAD@{16}: checkout: moving from master to develop
27ad8c0 (origin/master, origin/HEAD, master) HEAD@{17}: clone: from https://github.com/rachel-s
ingh/is-thirteen.git

rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$
```

# Amend Commit??

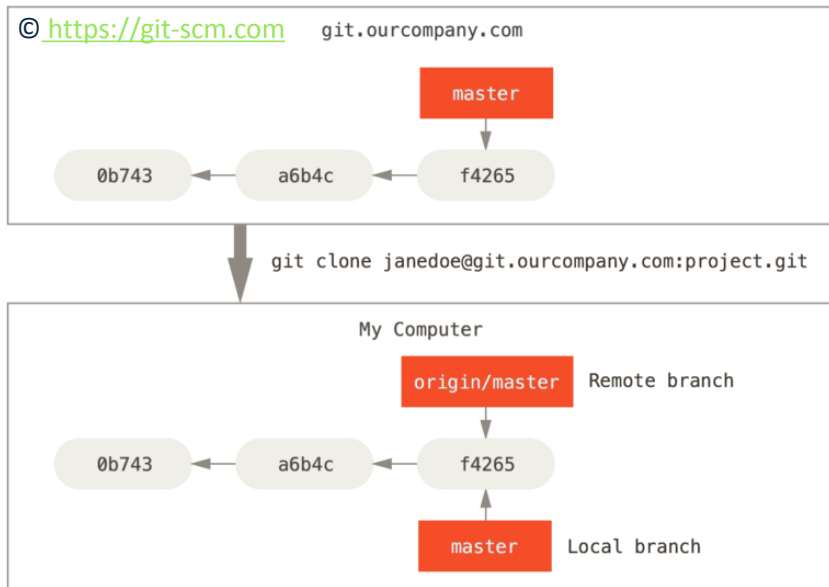


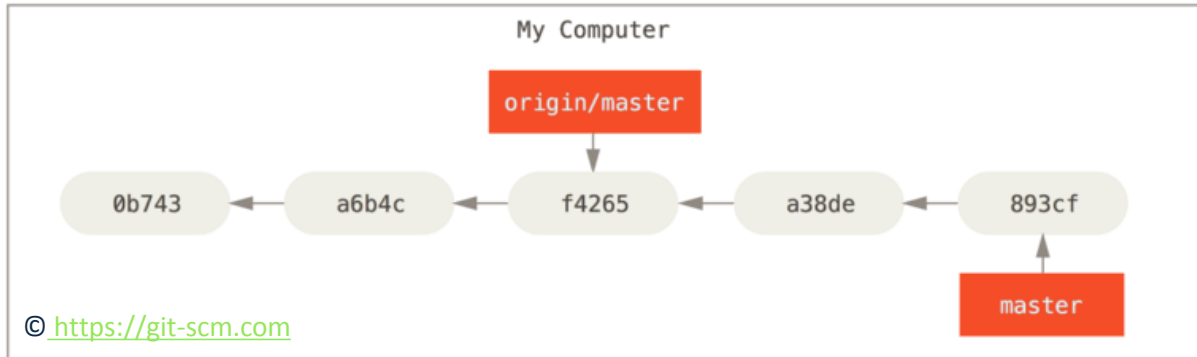
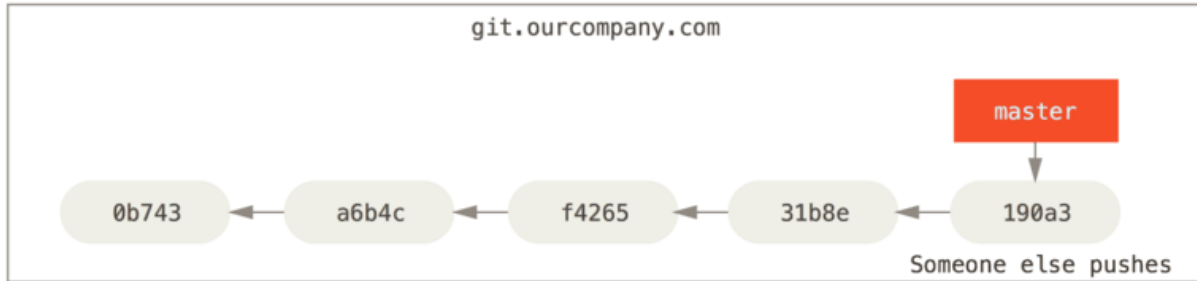
```
MINGW64: c:/Users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$
I
```

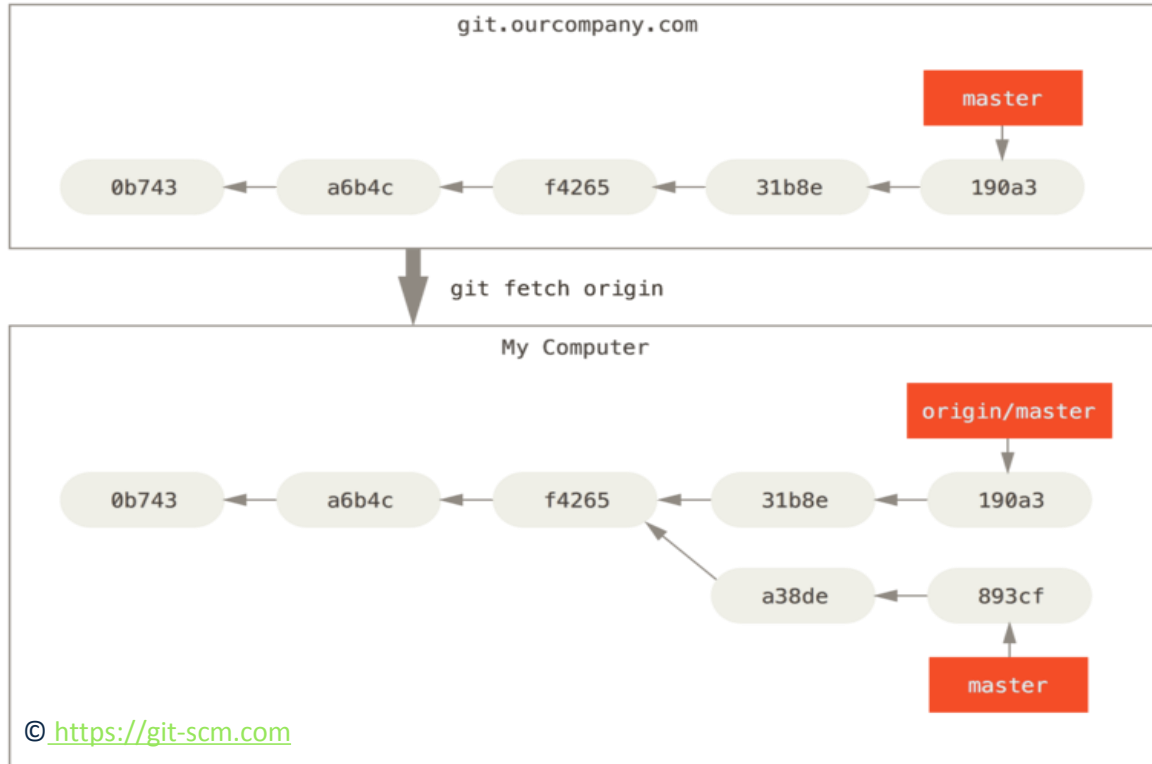


# Branches

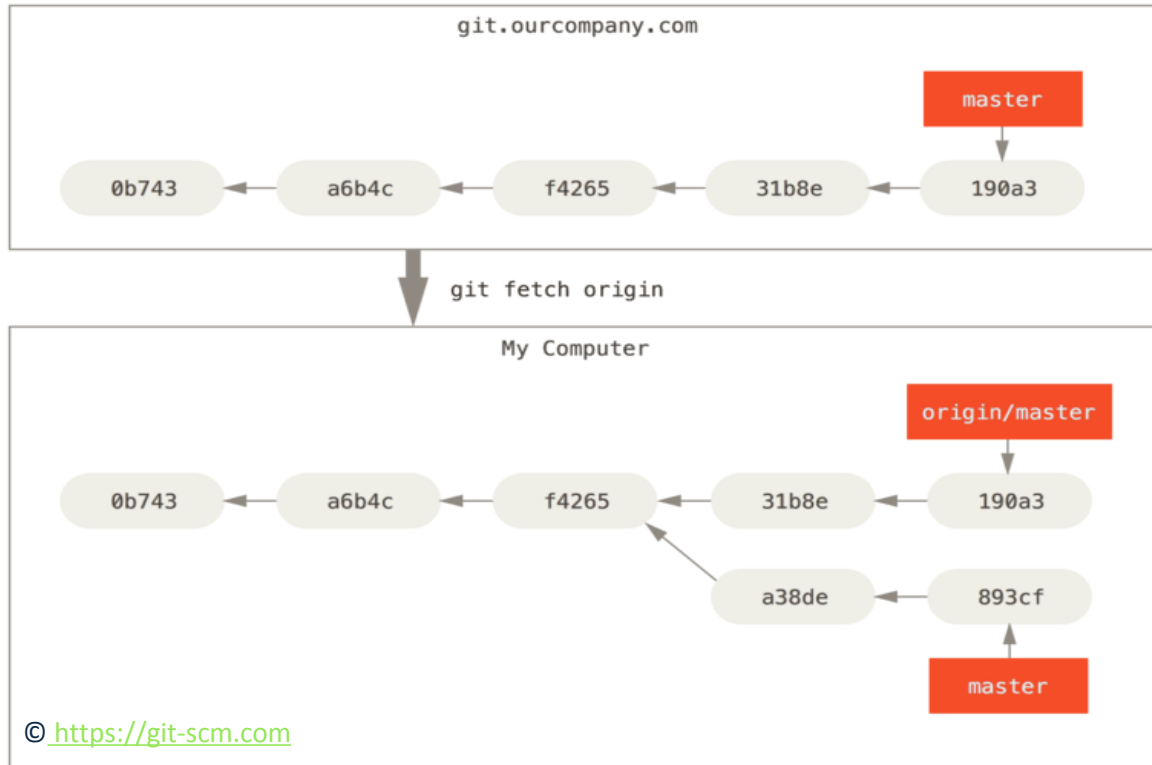
- It is all about the commit tree
- All branches are the same, we just assign meaning to them
- origin – the repository you cloned your repository from (git remote -v, git remote rename)







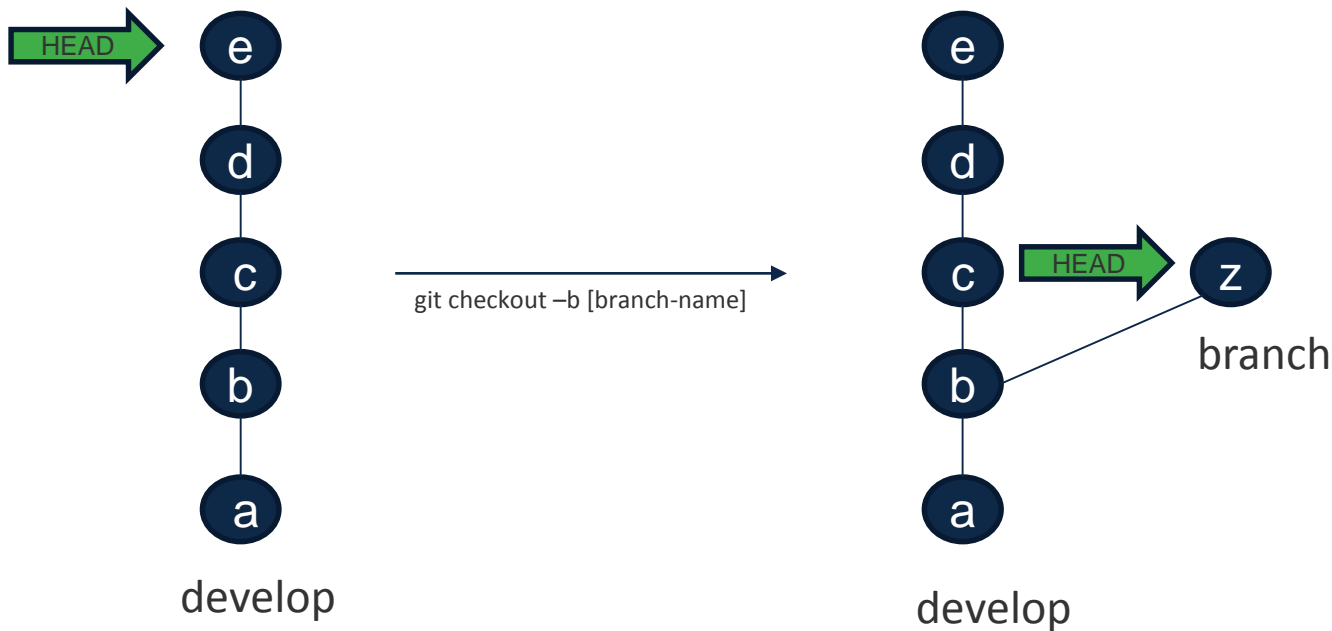
`git pull`  $\approx$  `git fetch` + `git merge`

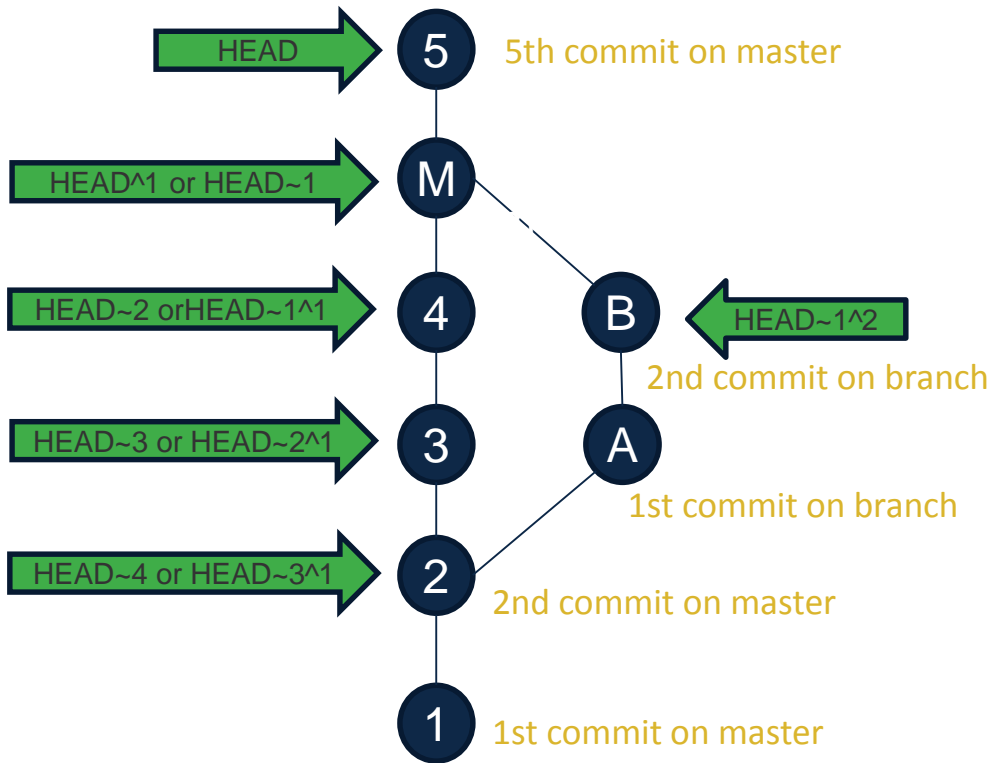


git pull ≈ git fetch + git merge

# HEAD

- Symbolic pointer to the checked out commit.





### TLDR vs CARET

- ~1 commit's first parent
- ~2 commit's first parent of first parent
- ^1 commit's first parent
- ^2 commit's second parent

HEAD<sup>^^^</sup> is the same as HEAD~3 but not the same as HEAD^3

~ ancestor

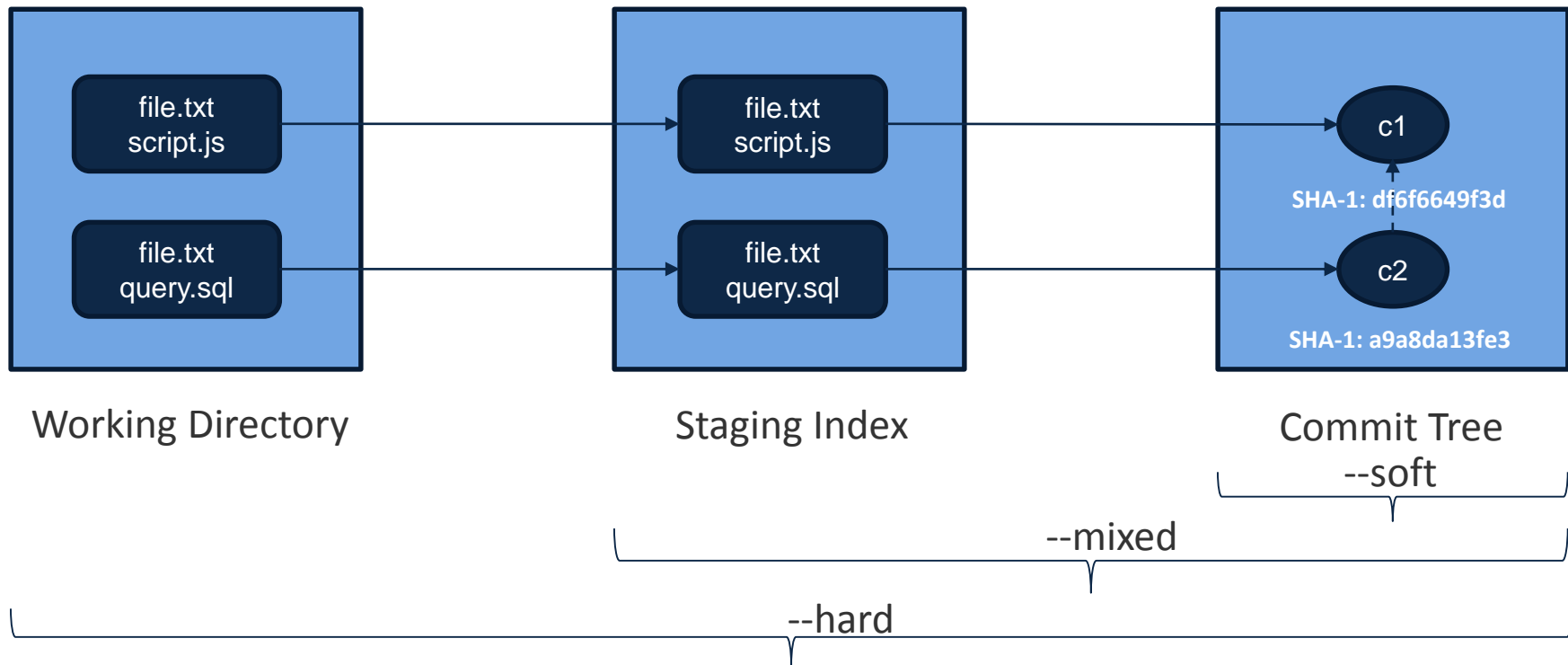
^ parent

# Undo Local Changes

- Reset
- Checkout
- Revert
- Stash

Command	Scope	Common use cases
git reset [commit]	Commit-level	Discard commits in a private local branch or throw away uncommitted changes
git reset [filename]	File-level	Unstage a file
git checkout [commit or branch]	Commit-level	Switch between branches or inspect old snapshots
git checkout [filename]	File-level	Discard changes in the working directory
git revert [commit]	Commit-level	Undo commits in a public branch
git revert	File-level	(N/A)

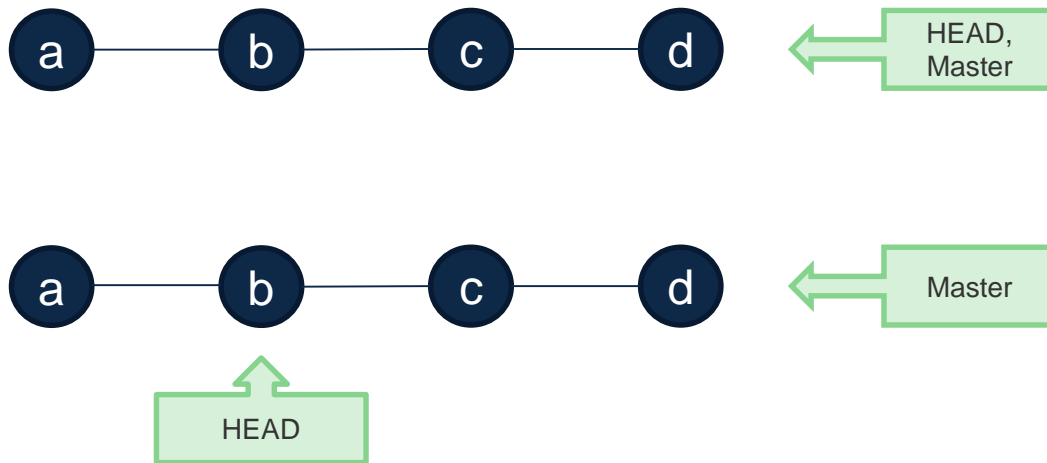
# Reset Options





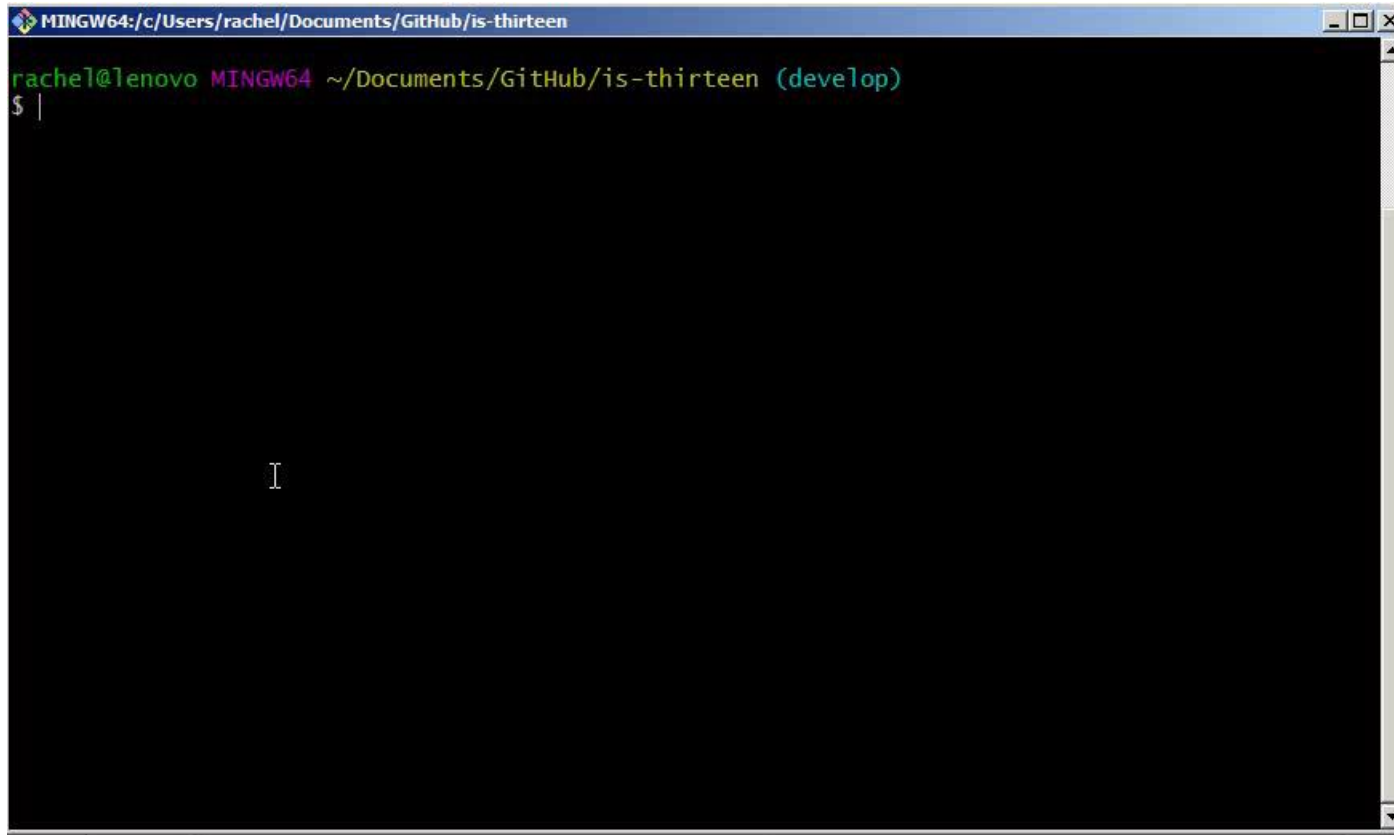
# Checkout

- Moves HEAD to a specified commit



- Detached HEAD – Checkout a specific commit instead of a branch.
  - `git checkout -b [branchname] [commit]`

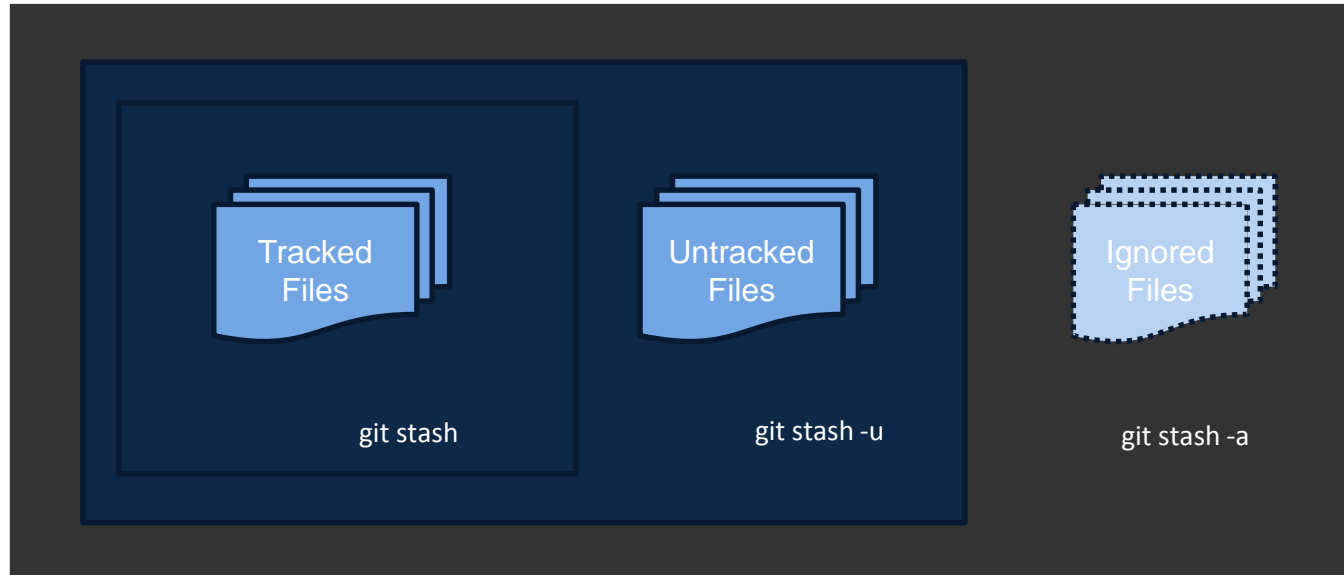
# Detached HEAD



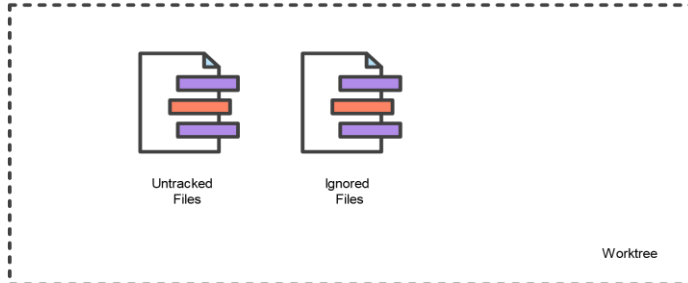
A terminal window titled "MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen" showing a Git checkout of the 'develop' branch. The prompt is "rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)". The user has entered a dollar sign "\$" followed by a vertical bar "|", indicating a detached HEAD state. A cursor is visible on the line below the prompt.

```
MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$ |
```

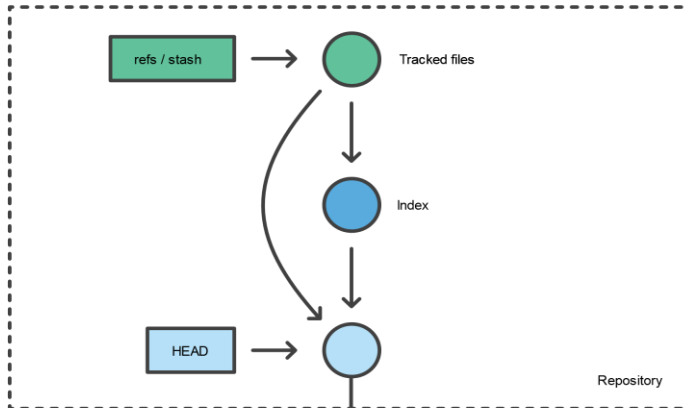
# Stash



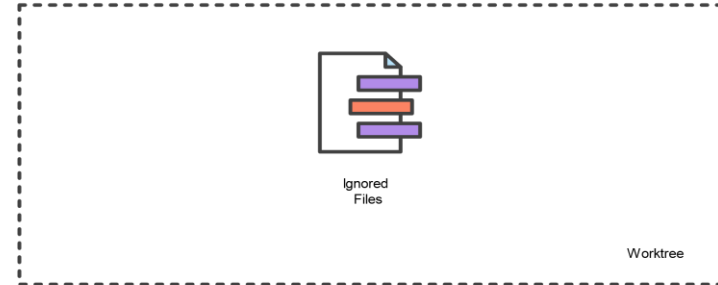
git stash



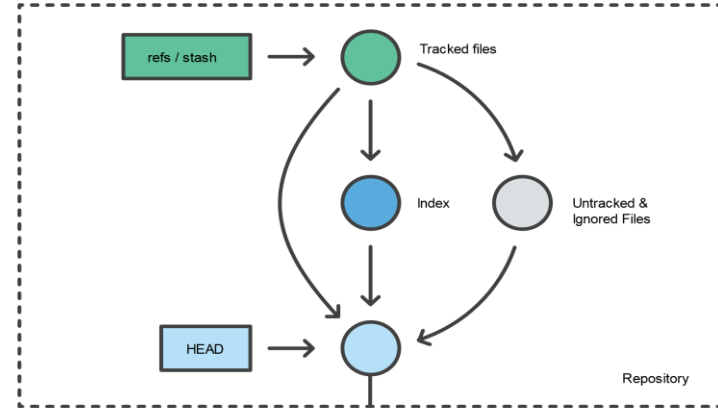
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stash --include-untracked



© <https://www.atlassian.com/git/tutorials>



git stash --all

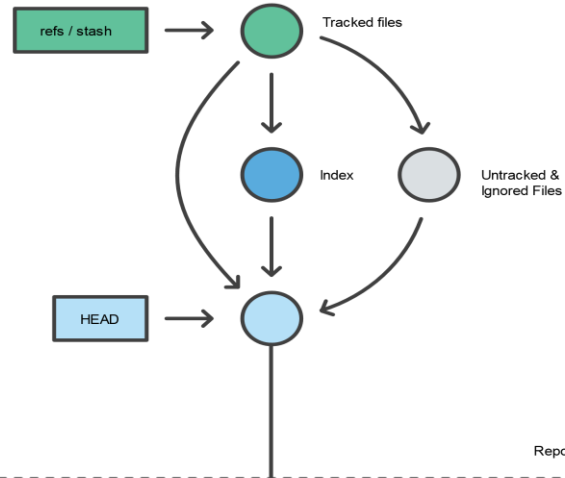
Clean

Worktree

© <https://www.atlassian.com/git/tutorials>

Empty

Index



# Stash



```
MINGW64:~/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$ git stash list
stash@{0}: On develop: Changes to new file
stash@{1}: WIP on newbranch: dd77612 my contribution
stash@{2}: On newbranch: the stuff I was working on but do not need

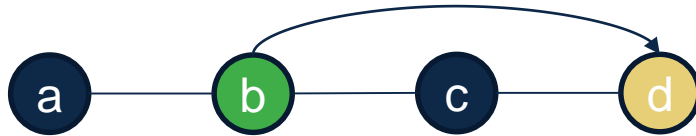
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$ |
```

git stash apply

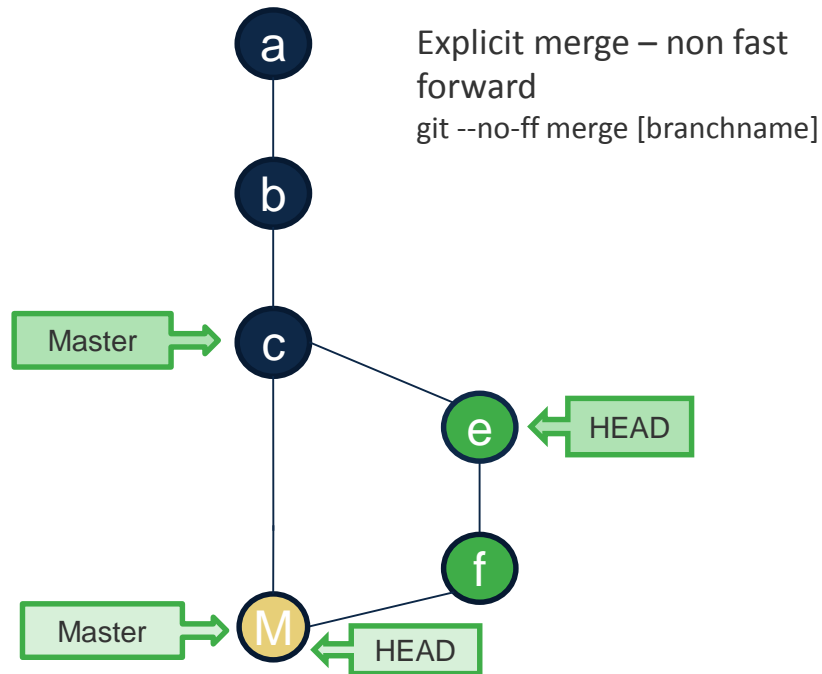
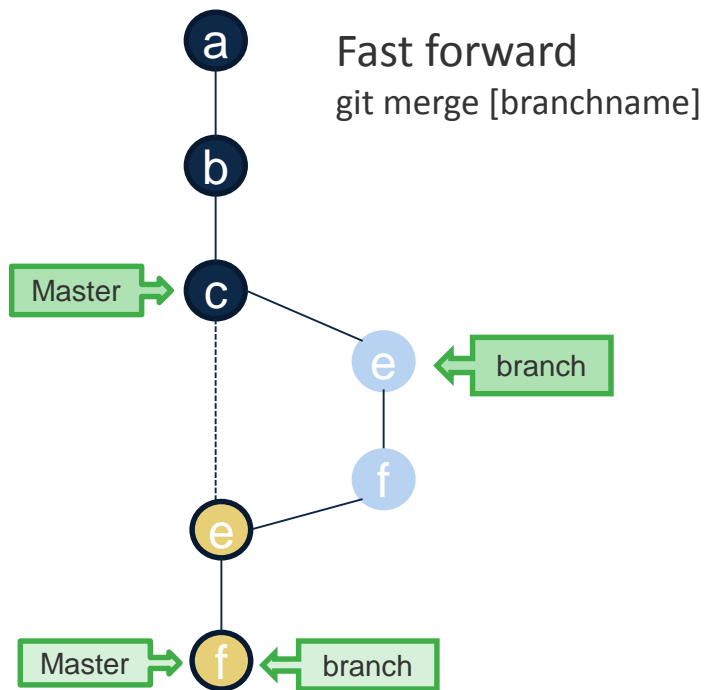
git stash apply stash@{2}

# Revert

- Undoes a single commit
- Does not change history

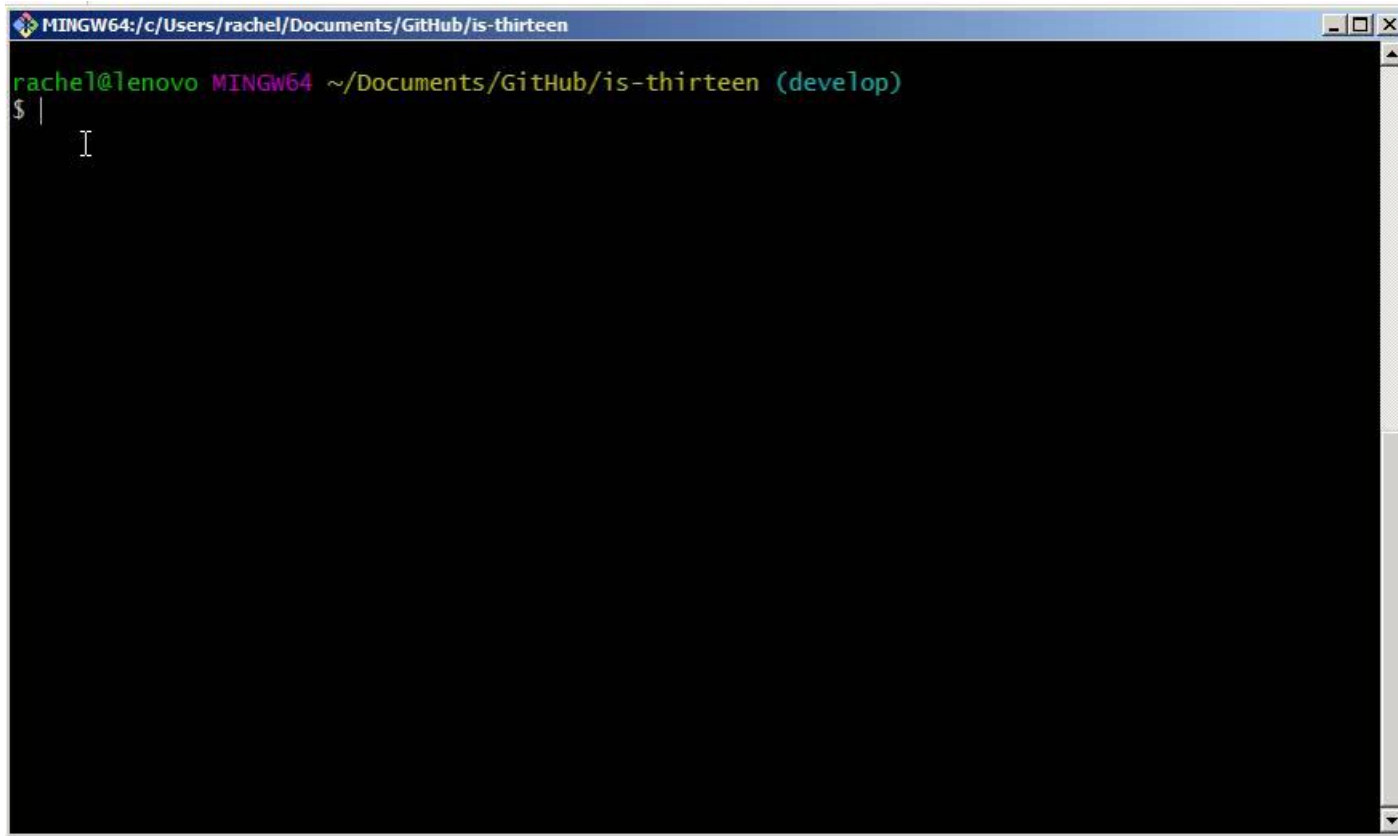


# Merge





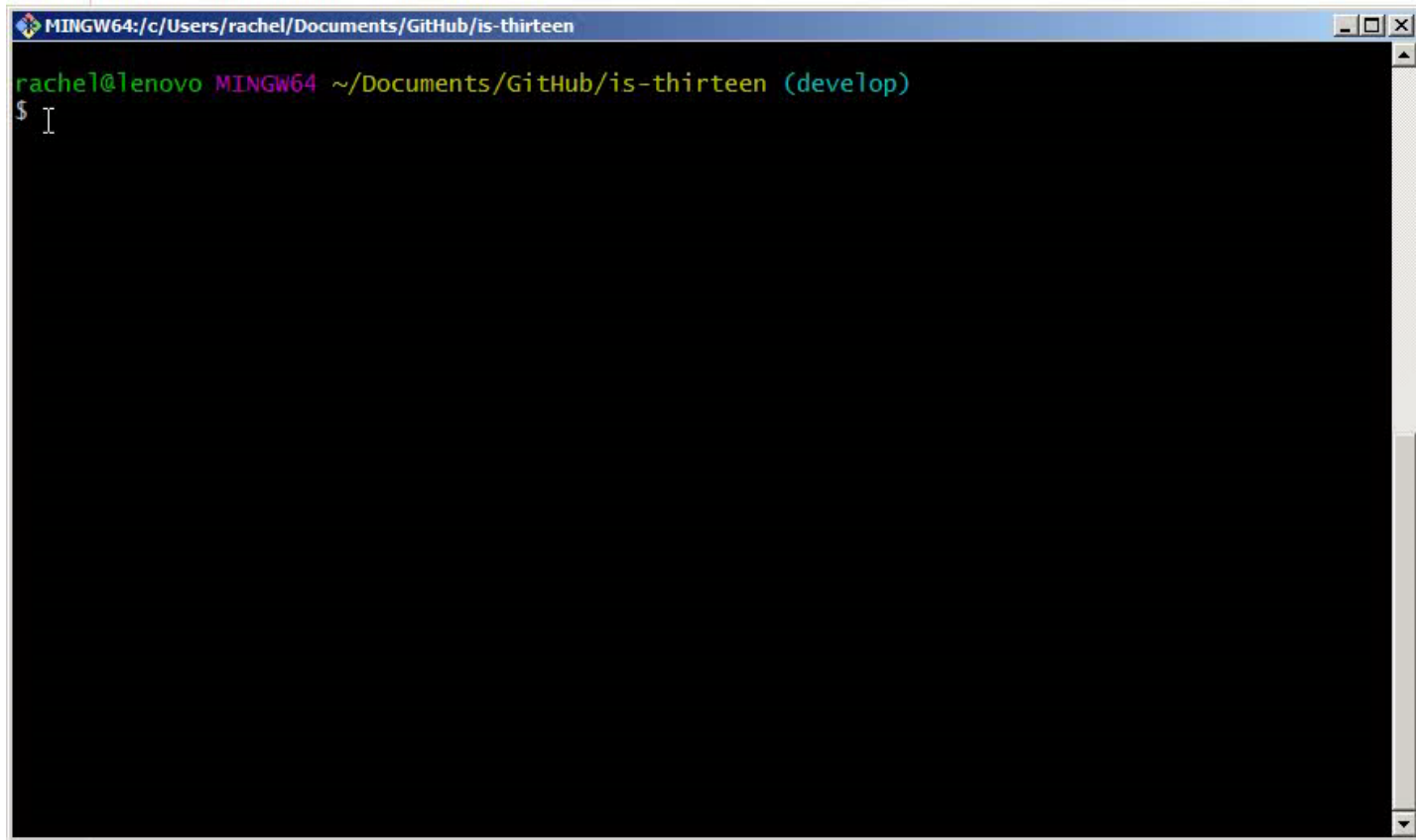
# Fast forward merge



A terminal window titled "MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen" with standard window controls. The prompt is "rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)". The command "\$" has been entered, and a cursor is visible on the next line.

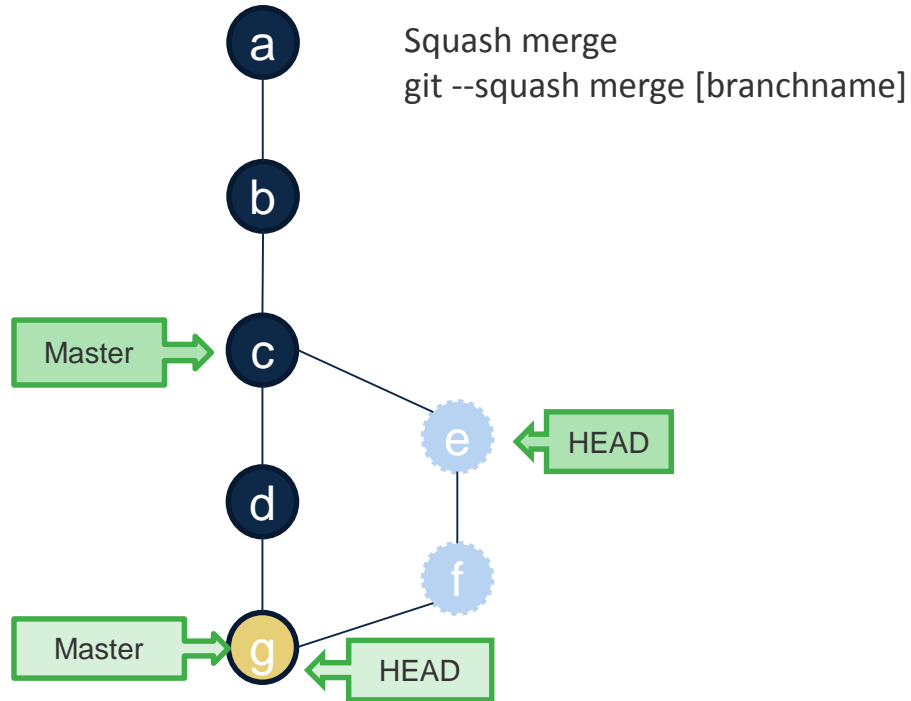
```
MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$
I
```

# Non fast forward merge

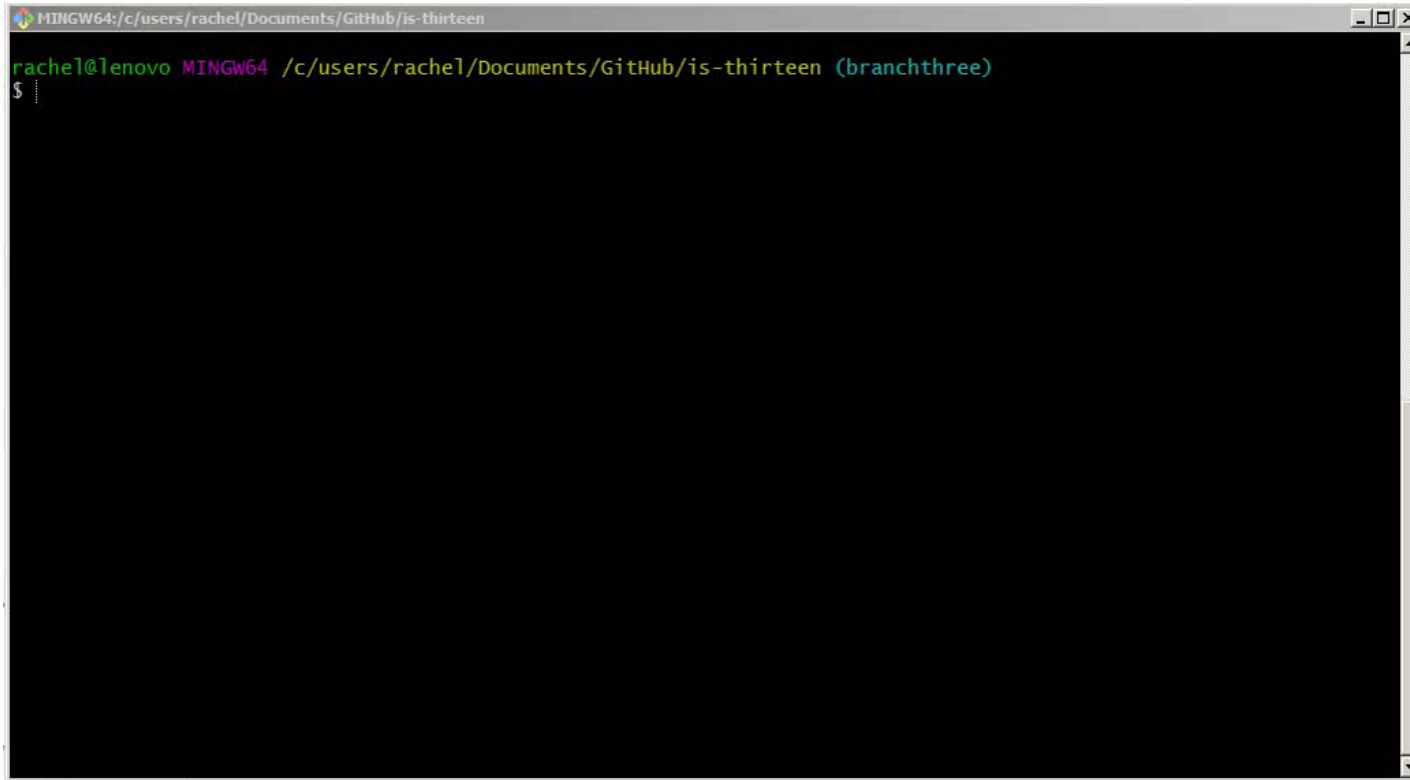


```
MINGW64:/c/Users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 ~/Documents/GitHub/is-thirteen (develop)
$
```

# Merge



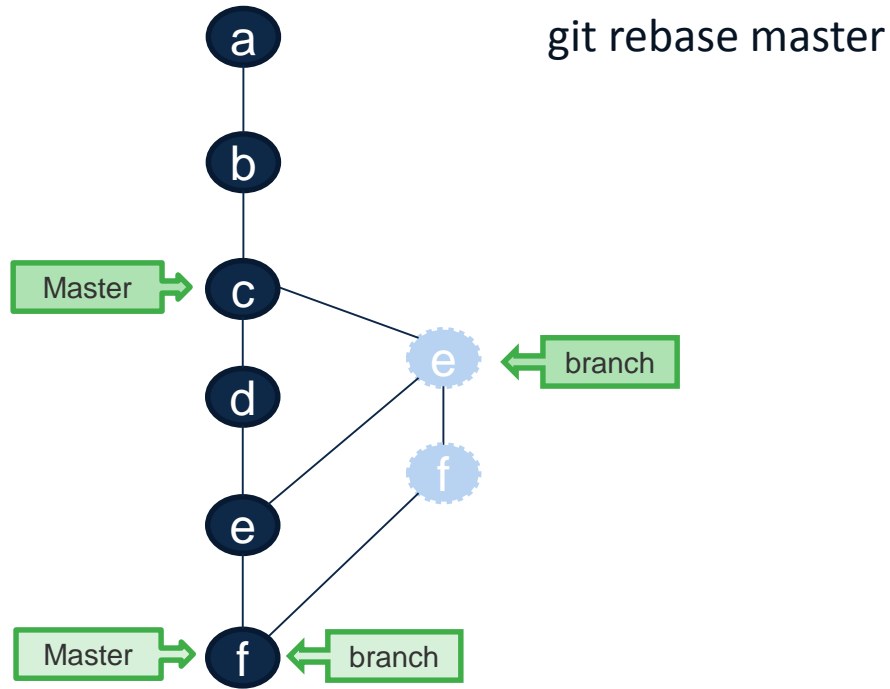
# Squash merge



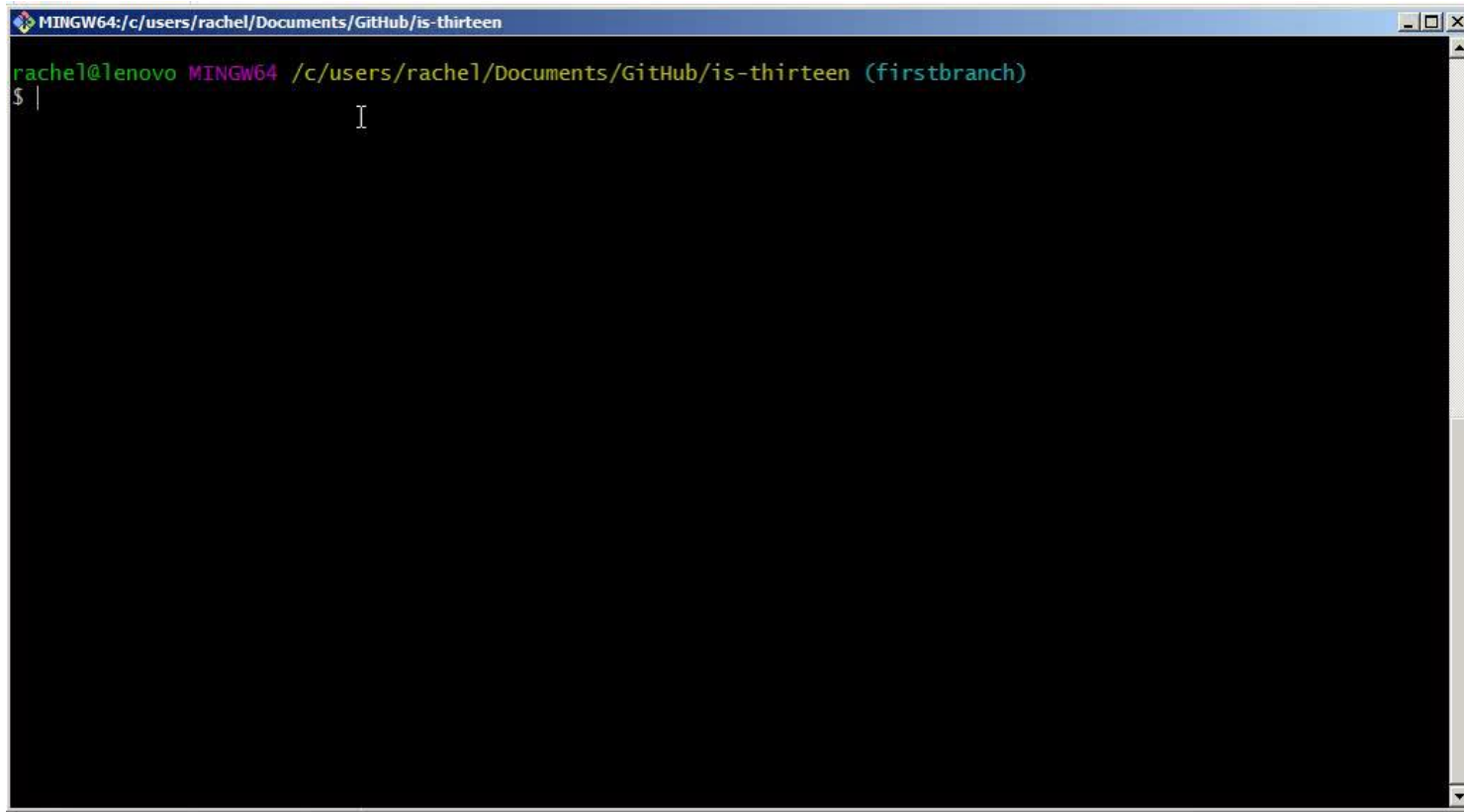
A terminal window titled "MINGW64: /c/users/rachel/Documents/GitHub/is-thirteen" is shown. The prompt is "rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (branchthree)". The user has entered the command "git squash merge" followed by a cursor. The terminal background is black with green and pink text.

```
MINGW64: /c/users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (branchthree)
$ git squash merge
```

# Rebase



# Rebase



A terminal window titled "MINGW64:/c/users/rachel/Documents/GitHub/is-thirteen" is shown. The prompt is "rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (firstbranch)". The user has entered the command "git rebase" and the cursor is at the end of the line.

```
MINGW64:/c/users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (firstbranch)
$ git rebase
```

# Cherry-pick

```
MINGW64:/c/users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (branchthree)
$ git hist -5
* 2e51bfa [21 hours ago] | second change [Rachel Singh] (HEAD -> branchthree)
* 1dd1c51 [21 hours ago] | first change [Rachel Singh]
* 094b580 [21 hours ago] | Merge branch 'secondbranch' into develop [Rachel Singh]
| \
| * b98d87d [21 hours ago] | second branch change [Rachel Singh] (secondbranch)
| /
* 2c7d44c [21 hours ago] | first branch change [Rachel Singh]
rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (branchthree)
$ |
```

# Local Strategies

- Merge vs cherry-pick vs rebase
- Rebase as local clean up



# Interactive Rebase

```
MINGW64:/c/users/rachel/Documents/GitHub/is-thirteen
rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (cleanupbranch)
$ git hist -10
* 4f056c2 [48 minutes ago] | merge from branchthree [Rachel Singh] (HEAD -> cleanupbranch, newbranch, develop)
* 7f30800 [51 minutes ago] | my change [Rachel Singh]
* 094b580 [21 hours ago] | Merge branch 'secondbranch' into develop [Rachel Singh]
| \
| * b98d87d [21 hours ago] | second branch change [Rachel Singh]
| /
* 2c7d44c [21 hours ago] | first branch change [Rachel Singh]
* da7733a [22 hours ago] | new amend change [Rachel Singh]
* dd77612 [22 hours ago] | my contribution [Rachel Singh] (branch)
* 27ad8c0 [7 weeks ago] | Update tap [Jezzen Thomas] (origin/master, origin/HEAD, master)
* e2ef93e [4 months ago] | Merge pull request #470 from DACodedBEAT/patch-1 [Gytis Daujotas]
| \
| * 3dbfc81 [6 months ago] | added emoji to thirteenStrings [Arun Philip]
rachel@lenovo MINGW64 /c/users/rachel/Documents/GitHub/is-thirteen (cleanupbranch)
$ |
```

# References

- <https://git-scm.com/>
- <https://www.atlassian.com/git/tutorials>
- Git from the bottom up – John Wiegley

