CE103 Algorithms and Programming I

Week-3

Fall Semester, 2021-2022

Download DOC, SLIDE, PPTX

Introduction to Source Code Management Systems

Git, Github, Gitlab, Bitbucket, Maven, SVN, TFS

Source code management (SCM) is used to track modifications to a source code repository. SCM tracks a running history of changes to a code base and helps resolve conflicts when merging updates from multiple contributors. SCM is also synonymous with Version control.

As software projects grow in lines of code and contributor head count, the costs of communication overhead and management complexity also grow. SCM is a critical tool to alleviate the organizational strain of growing development costs.

Features of Source Code Management Systems

- Authenticated access for commits
- Revision history on files
- Atomic commits of multiple files
- Versioning/Tagging

Why Do We Need Source Code Management Systems? (1)

We can save the file with a different name if it’s our school project or one-time papers but for a well-equipped software development? Not a chance.

Why Do We Need Source Code Management Systems? (2)

Big projects need a version control system to track the changes and avoid misunderstanding. A good SCM does the following:

- Backup and Restore
- Synchronization
- Short-Term Undo
- Long-Term Undo
- Track Changes
- Ownership
- Branching and Merging

Why Do We Need Source Code Management Systems? (3)

Backup and Restore – Files can be saved at any moment and can be restored from the last saved.

Why Do We Need Source Code Management Systems? (4)

Synchronization – Programmers can get the latest code and fetch the up-to-date codes from the repository.

Why Do We Need Source Code Management Systems? (5)

Short-Term Undo – Working with a file and messed it up. We can do a short-term undo to the last known version.

Why Do We Need Source Code Management Systems? (6)

Long-Term Undo – It helps when we have to make a release version rollback. Something like going to the last version which was created a year

Why Do We Need Source Code Management Systems? (7)

Track Changes– We can track the changes as when anyone is making any change, he can leave a commit message as for why the change was done.

Why Do We Need Source Code Management Systems? (8)

Ownership– With every commit made to the master branch, it will ask the owner permission to merge it.

Why Do We Need Source Code Management Systems? (9)

Branching and Merging – You can create a branch of your source code and create the changes. Once the changes are approved, you can merge it with the master branch.

Why Do We Need Source Code Management Systems? (10)

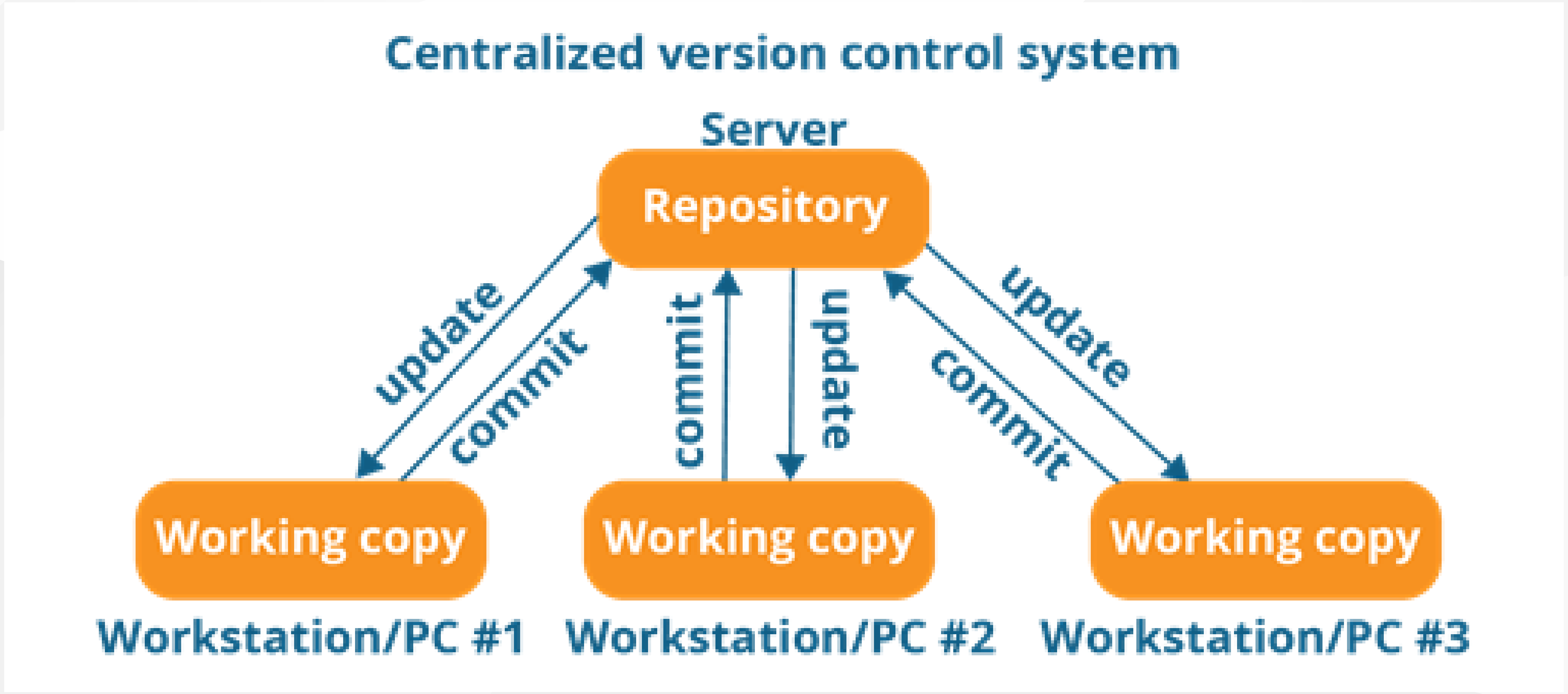
Types of Version Control Systems

- Centralized Version Control (TFS, Subversion)
- Distributed Version Control (Git and Mercurial)

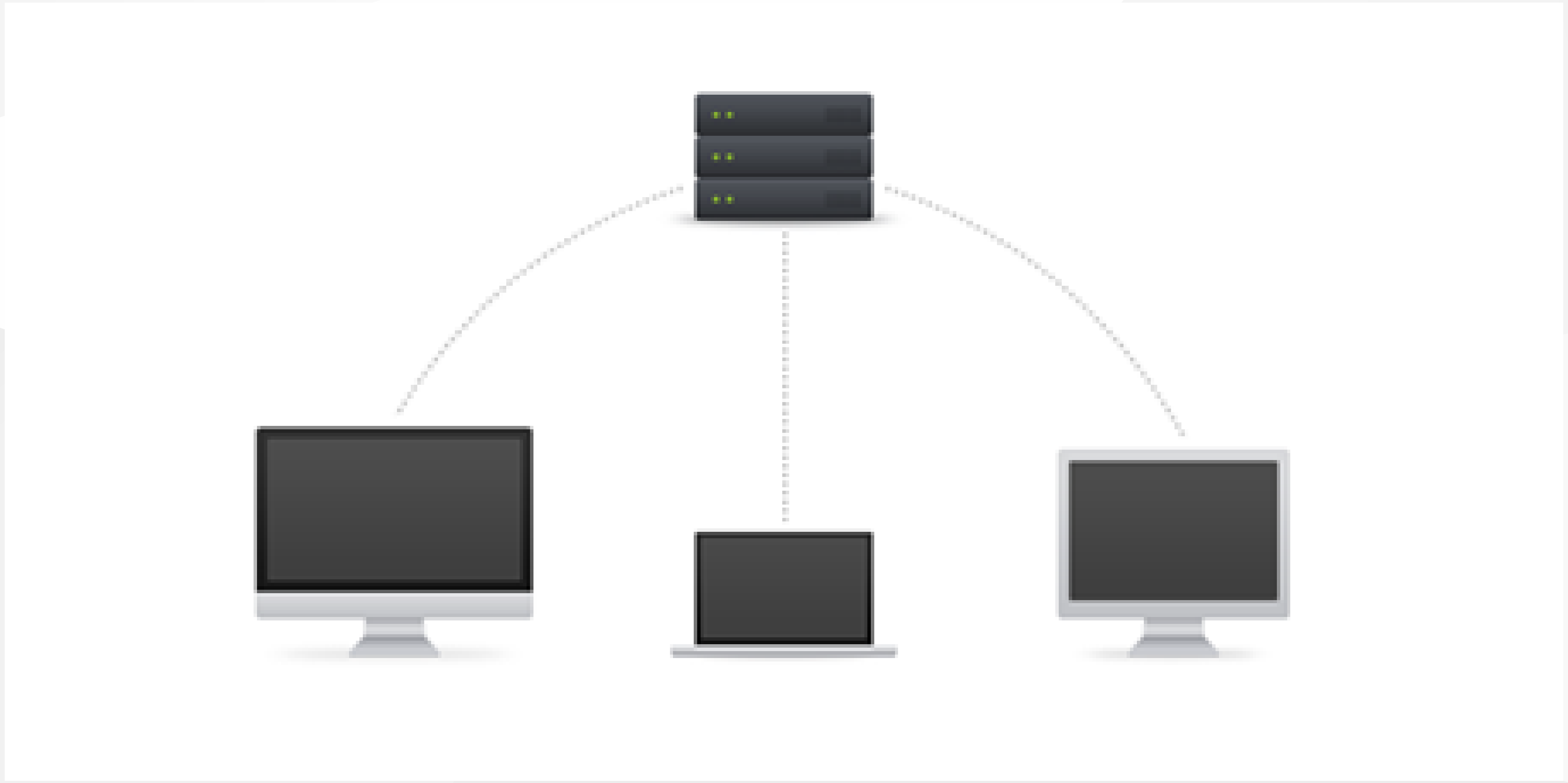
Centralized Version Control (TFS, Subversion) (1)

The main concept of Centralized Version Control is that it works in a client and server relationship. The repository is located in one place and allows access to multiple clients.

Centralized Version Control (TFS, Subversion) (2)



Centralized Version Control (TFS, Subversion) (3)



Centralized Version Control (TFS, Subversion) (4)

It’s very similar to FTP where you have FTP clients which connect to FTP server. Here all the user changes and commits have to pass through the central server. For Ex: Subversion.

Centralized Version Control (TFS, Subversion) (5)

The benefits of centralized version control are:

- It’s easy to understand.
- There are more GUI and IDE clients.
- You have more control over the users and access.

Centralized Version Control (TFS, Subversion) (6)

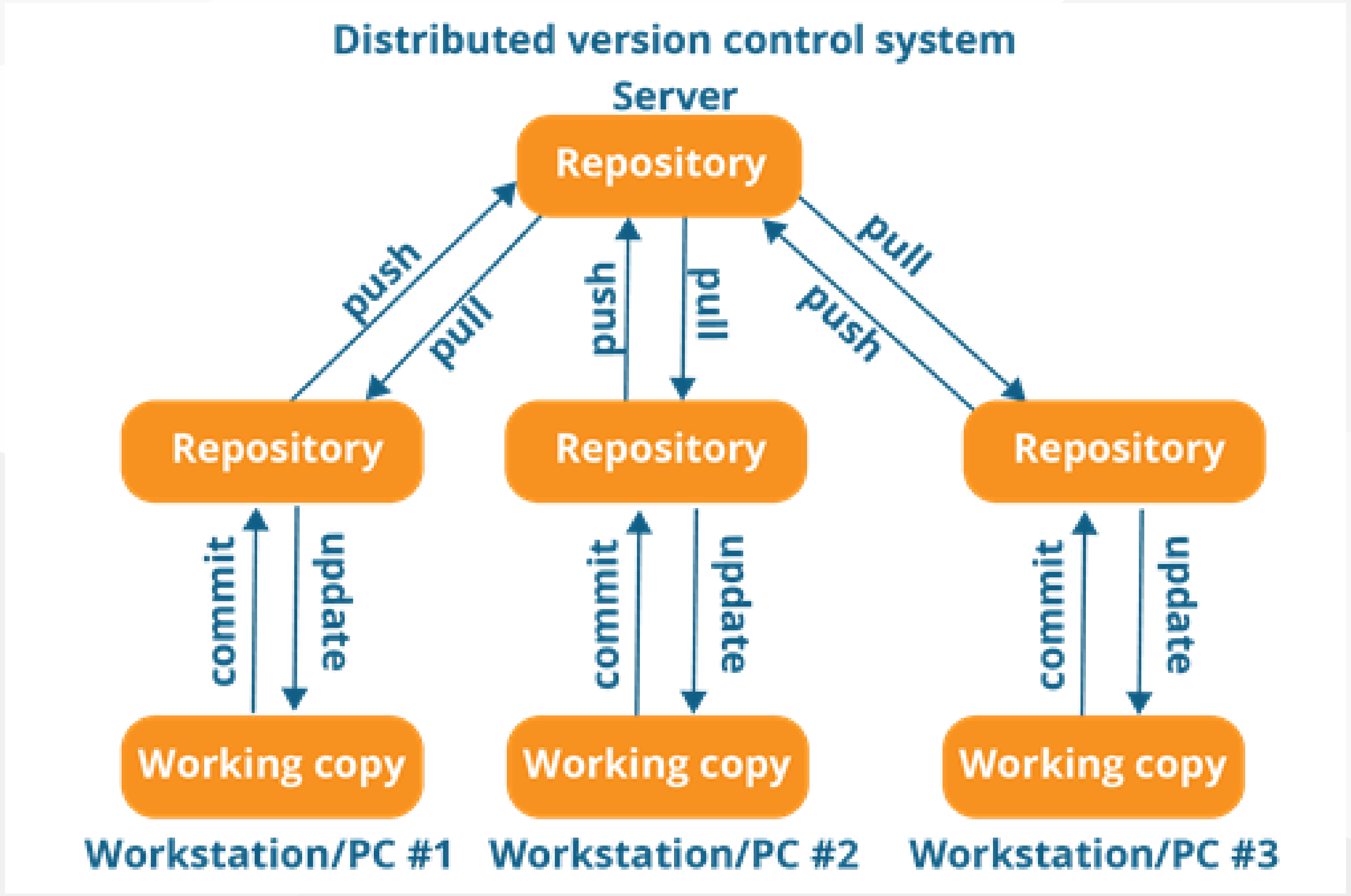
We do have drawbacks also:

- It is dependent on the access to the server.
- It can be slower because every command from the client has to pass the server.
- Branching and merging strategies are difficult to use.

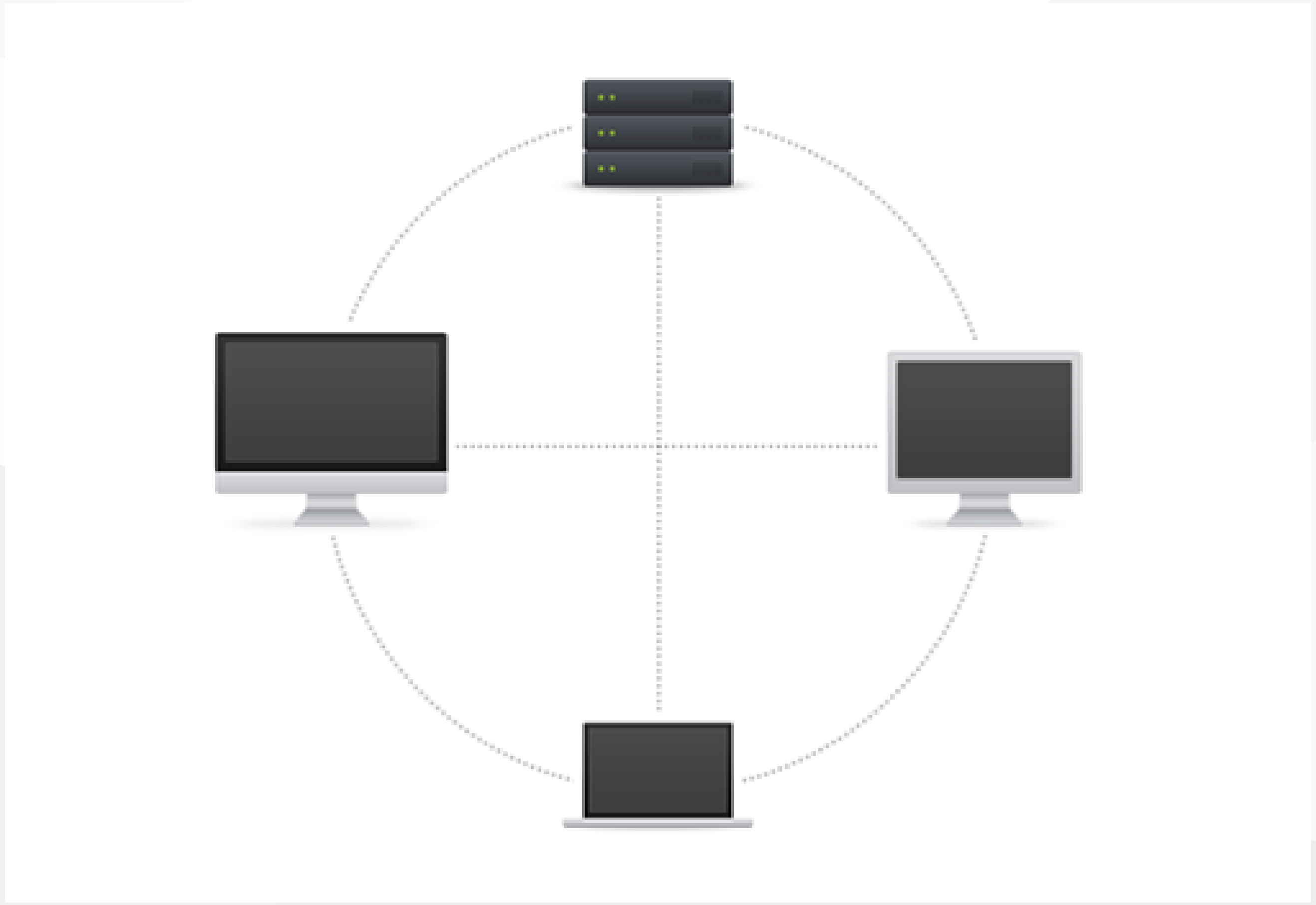
Distributed Version Control (Git and Mercurial) (1)

These systems are newer to use. In Distributed Version Control, each user has their own copy of the entire repository as well as the files and history. For Ex: Git and Mercurial

Distributed Version Control (Git and Mercurial) (2)



Distributed Version Control (Git and Mercurial) (3)



Distributed Version Control (Git and Mercurial) (4)

The benefits of distributed version control are:

- More powerful and easy change tracking.
- No need of a centralized server. Most of the functionalities work in offline mode also apart from sharing the repositories.
- Branching and Merging strategies are more easy and reliable.
- It’s faster than the other one.

List of Source Code Version Management Tools (1)

GitHub	GitLab	BitBucket	SourceForge
Beanstalk	Apache Allura	AWS CodeCommit	Launchpad
	Phabricator	GitBucket	

List of Source Code Version Management Tools (2)

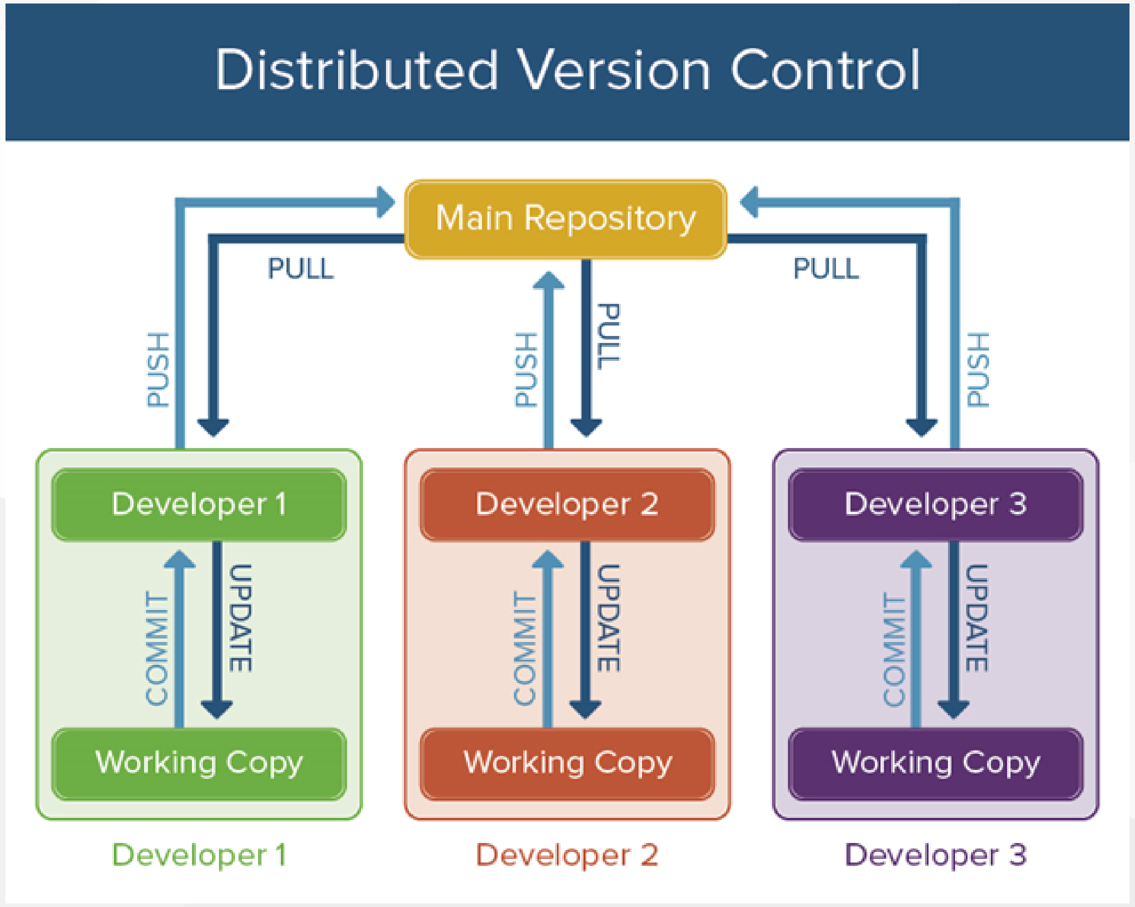
- Github
- GitLab
- BitBucket
- SourceForge
- Beanstalk

List of Source Code Version Management Tools (3)

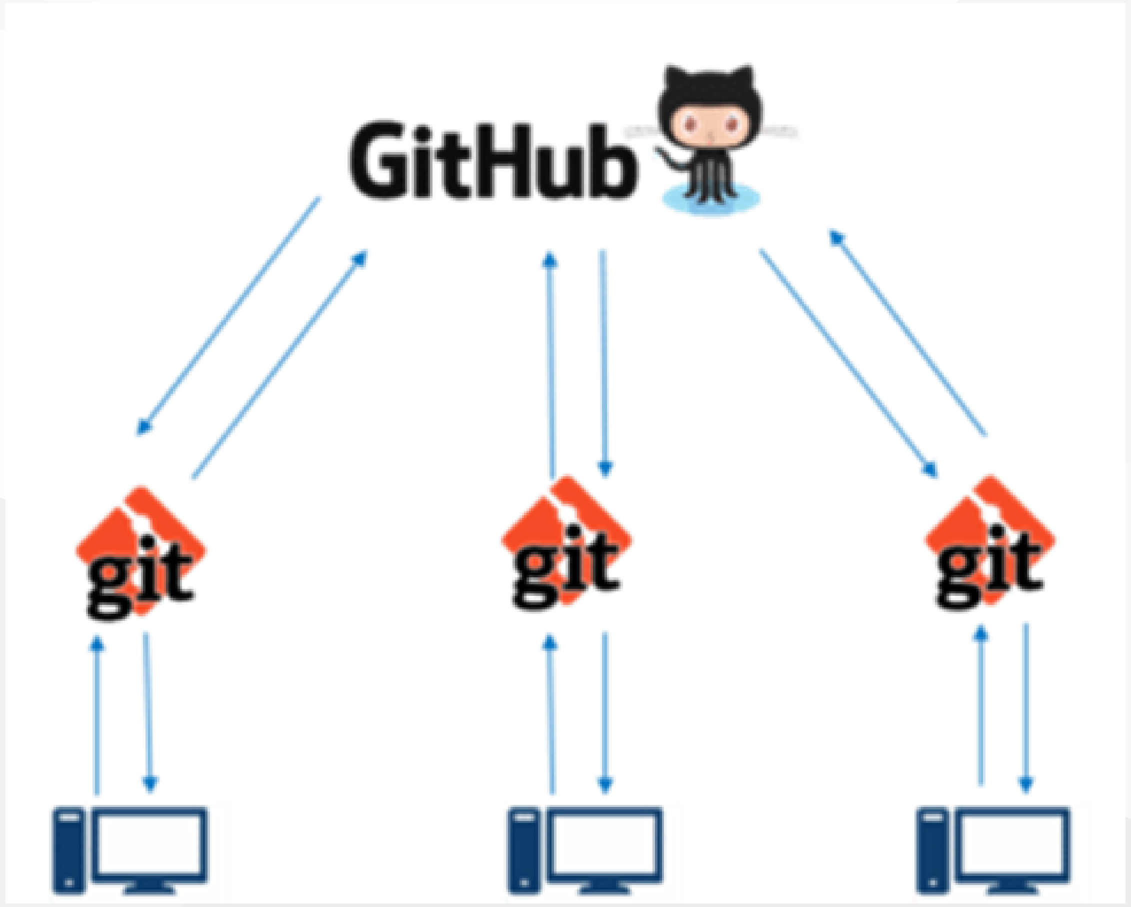
- Apache Allura
- AWS CodeCommit
- Launchpad
- Phabricator
- GitBucket

GIT (Distributed Source Code Management) (1)

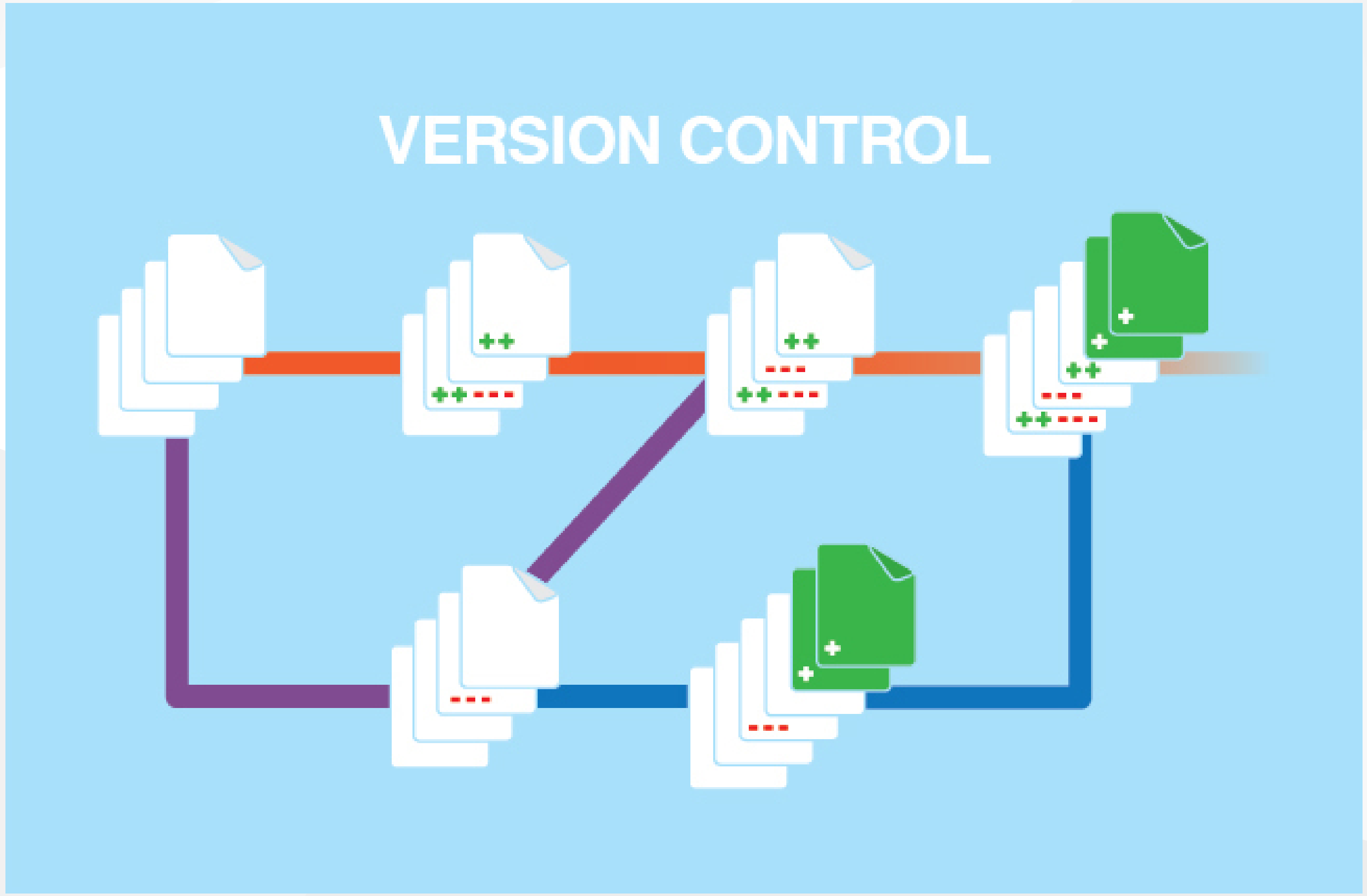
GIT (Distributed Source Code Management) (2)



GIT (Distributed Source Code Management) (3)



GIT (Distributed Source Code Management) (4)



GIT (Distributed Source Code Management) (5)

A Basic Overview of How Git Works (1)

- Create a “repository” (project) with a git hosting tool (like Bitbucket)
- Copy (or clone) the repository to your local machine
- Add a file to your local repo and “commit” (save) the changes
- “Push” your changes to your master branch

GIT (Distributed Source Code Management) (6)

A Basic Overview of How Git Works (2)

- Make a change to your file with a git hosting tool and commit
- “Pull” the changes to your local machine
- Create a “branch” (version), make a change, commit the change
- Open a “pull request”.
- “Merge” your branch to the master branch

GIT (Distributed Source Code Management) (7)

Some of The Basic Operations in GIT are

- Initialize
- Add
- Commit
- Pull
- Push

GIT (Distributed Source Code Management) (8)

Some of The Basic Operations in GIT are

- Initialize
- Add
- Commit
- Pull
- Push

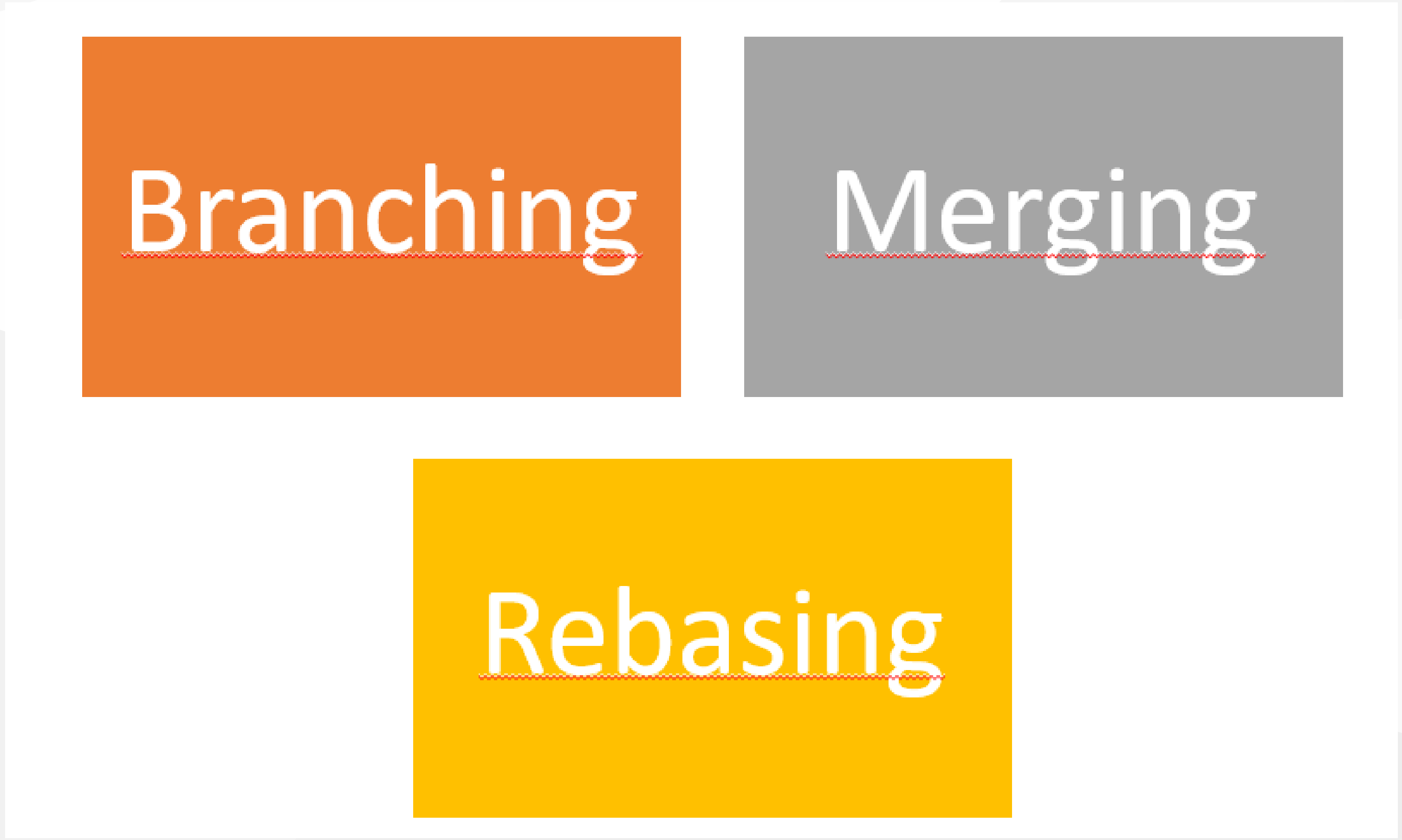
GIT (Distributed Source Code Management) (9)

Some of The Basic Operations in GIT are

- Branching
- Merging
- Rebasing

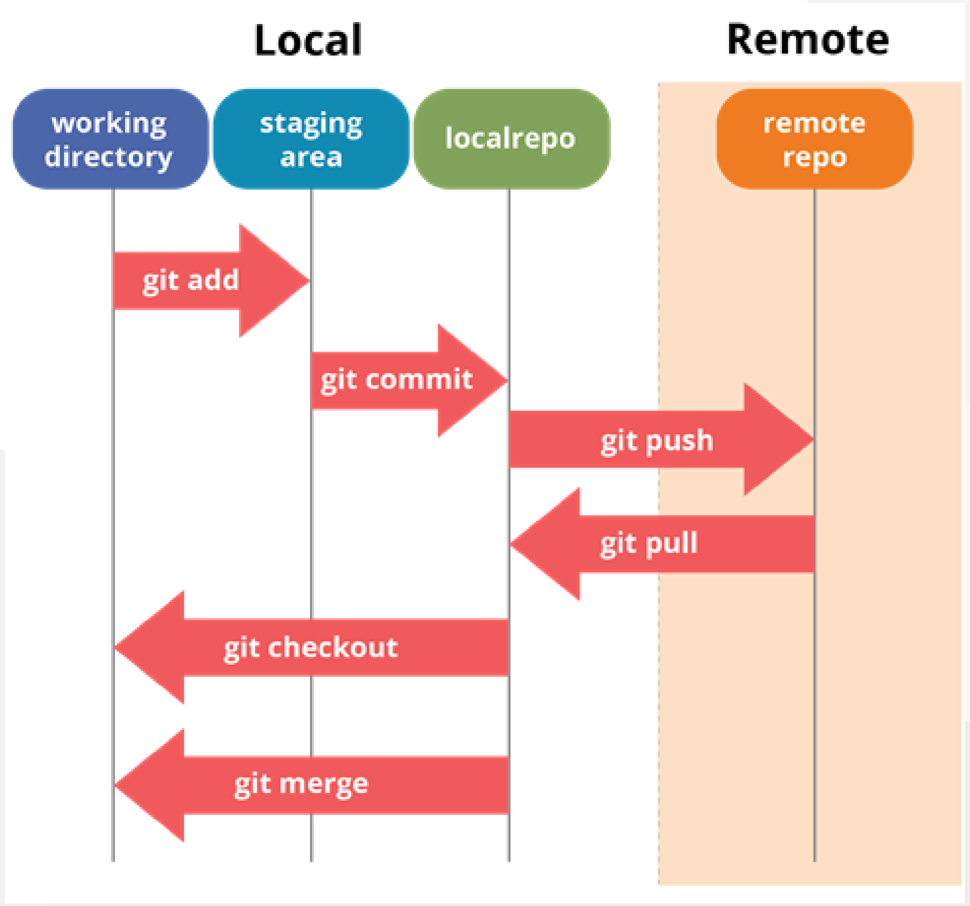
GIT (Distributed Source Code Management) (10)

Some of The Basic Operations in GIT are



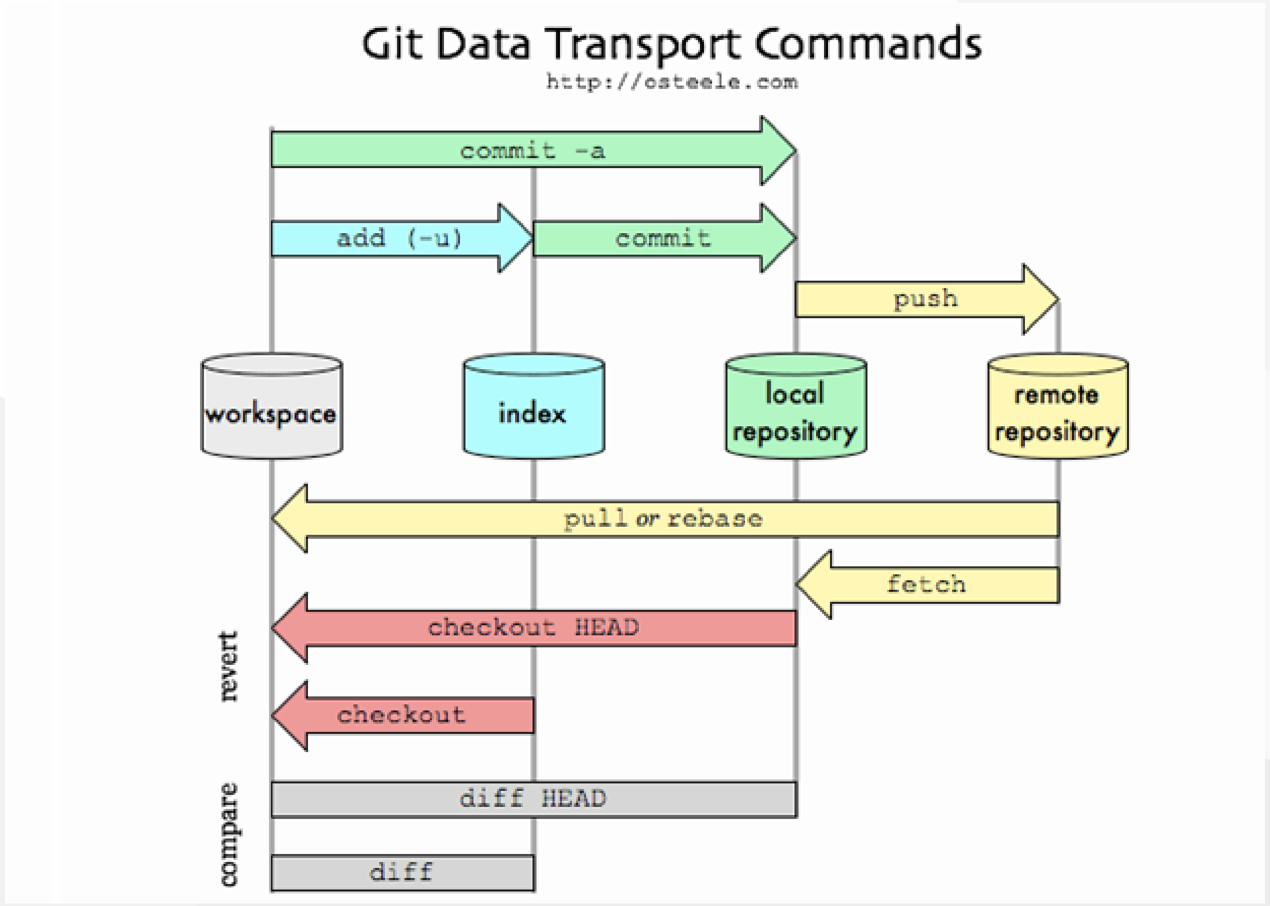
GIT (Distributed Source Code Management) (8)

A brief idea about how these operations work with the Git repositories (1)



GIT (Distributed Source Code Management) (9)

A brief idea about how these operations work with the Git repositories (2)

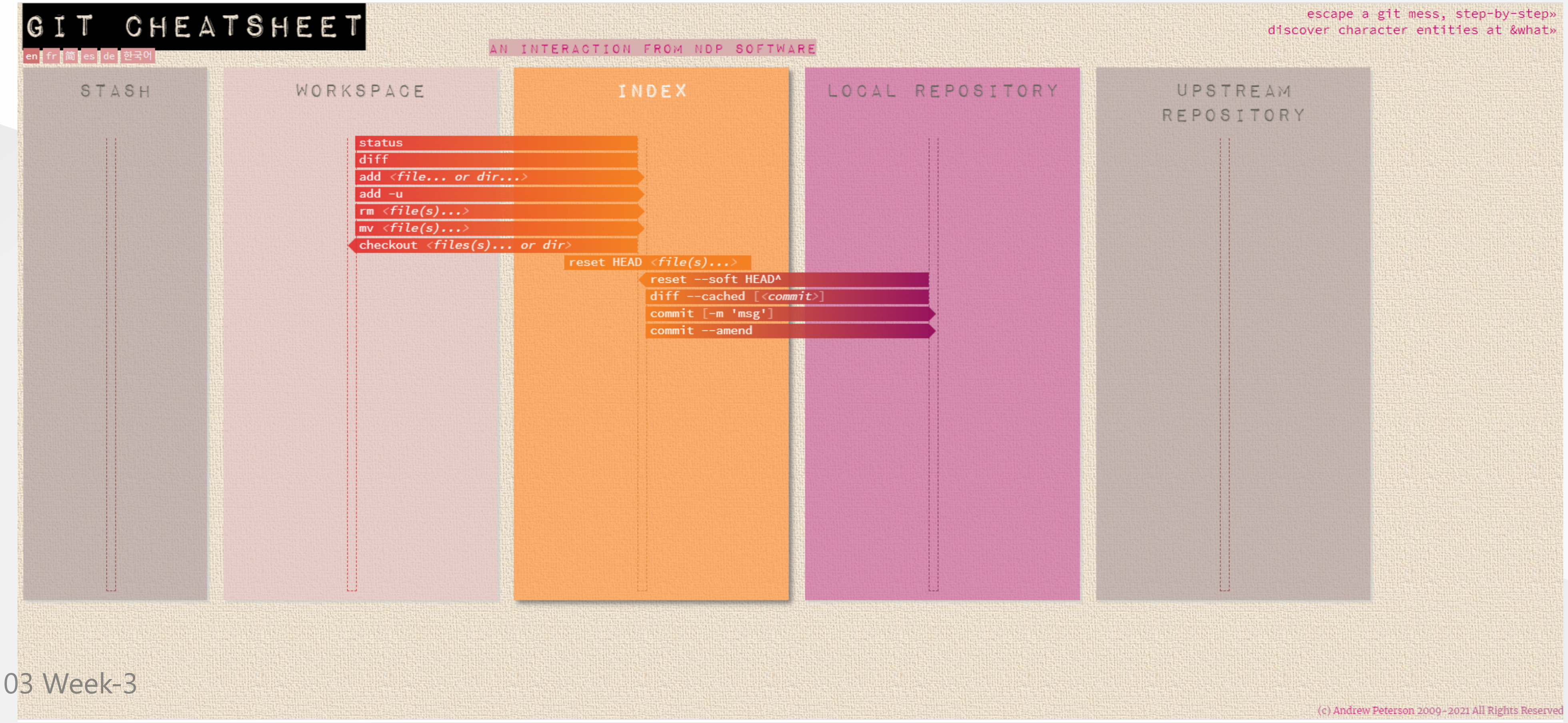


GIT (Distributed Source Code Management) (10)

A brief idea about how these operations work with the Git repositories (3)

For more detailed cheetsheat please check the following interactive map

NDP Software :: Git Cheatsheet


GIT CHEATSHEET

en fr 简 es de 한국어

AN INTERACTION FROM NDP SOFTWARE

escape a git mess, step-by-step»
discover character entities at &what»

STASH | WORKSPACE | INDEX | LOCAL REPOSITORY | UPSTREAM REPOSITORY

```
status
diff
add <file... or dir...>
add -u
rm <file(s)...>
mv <file(s)...>
checkout <files(s)... or dir>
reset HEAD <file(s)...>
reset --soft HEAD^
diff --cached [<commit>]
commit [-m 'msg']
commit --amend
```

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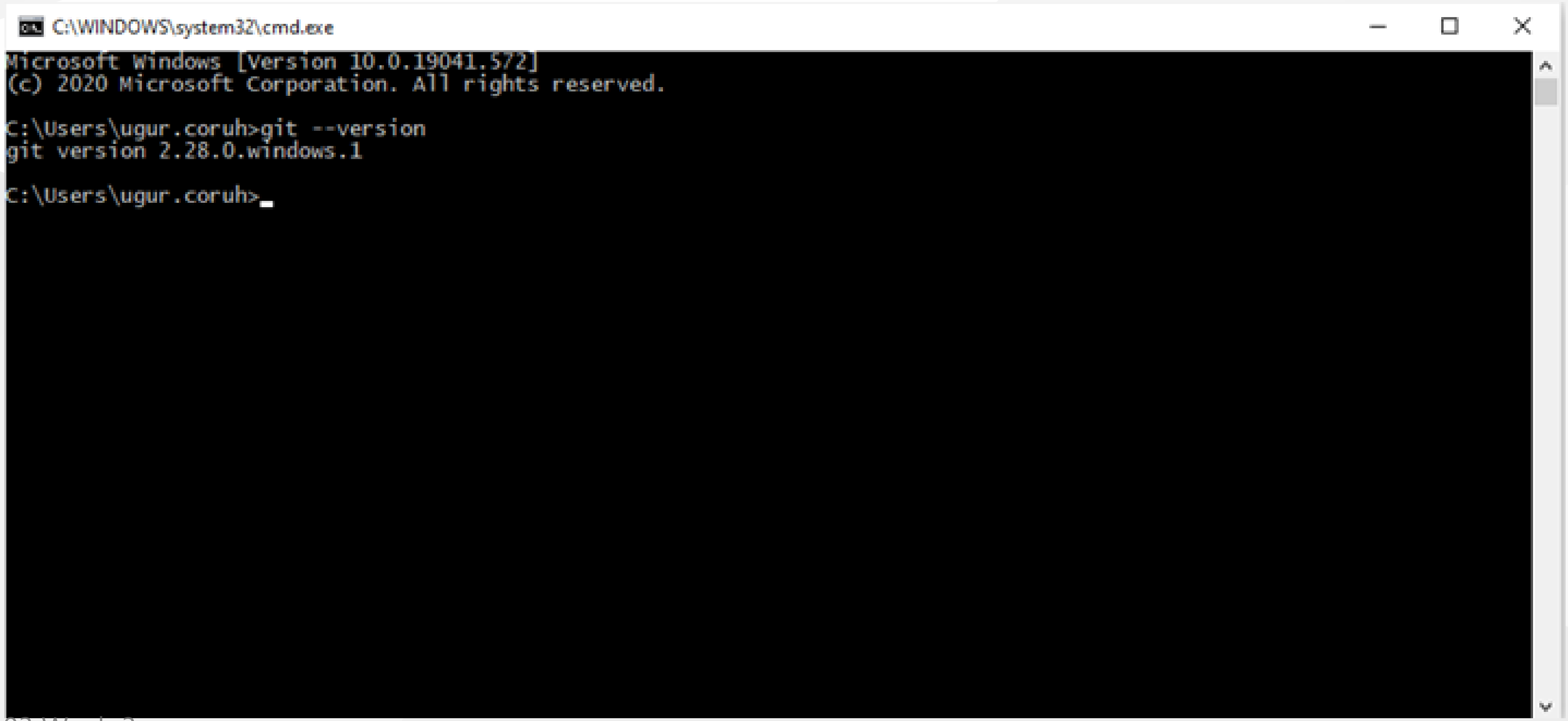
Installation of GIT (1)

Check Installation Already Completed

```
git --version
```



```
Microsoft Windows [Version 10.0.19041.572]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\ugur.coruh>git --version
git version 2.28.0.windows.1

C:\Users\ugur.coruh>
```

Installation of GIT (2)

If your console gives error about git command follow the steps in the link

Install Git | Atlassian Git Tutorial

In this link you will should download following setup according to your operating system

Installation of GIT (3)

GIT Setup Files

- Download git for OSX
- Download git for Windows
- Download git for Linux

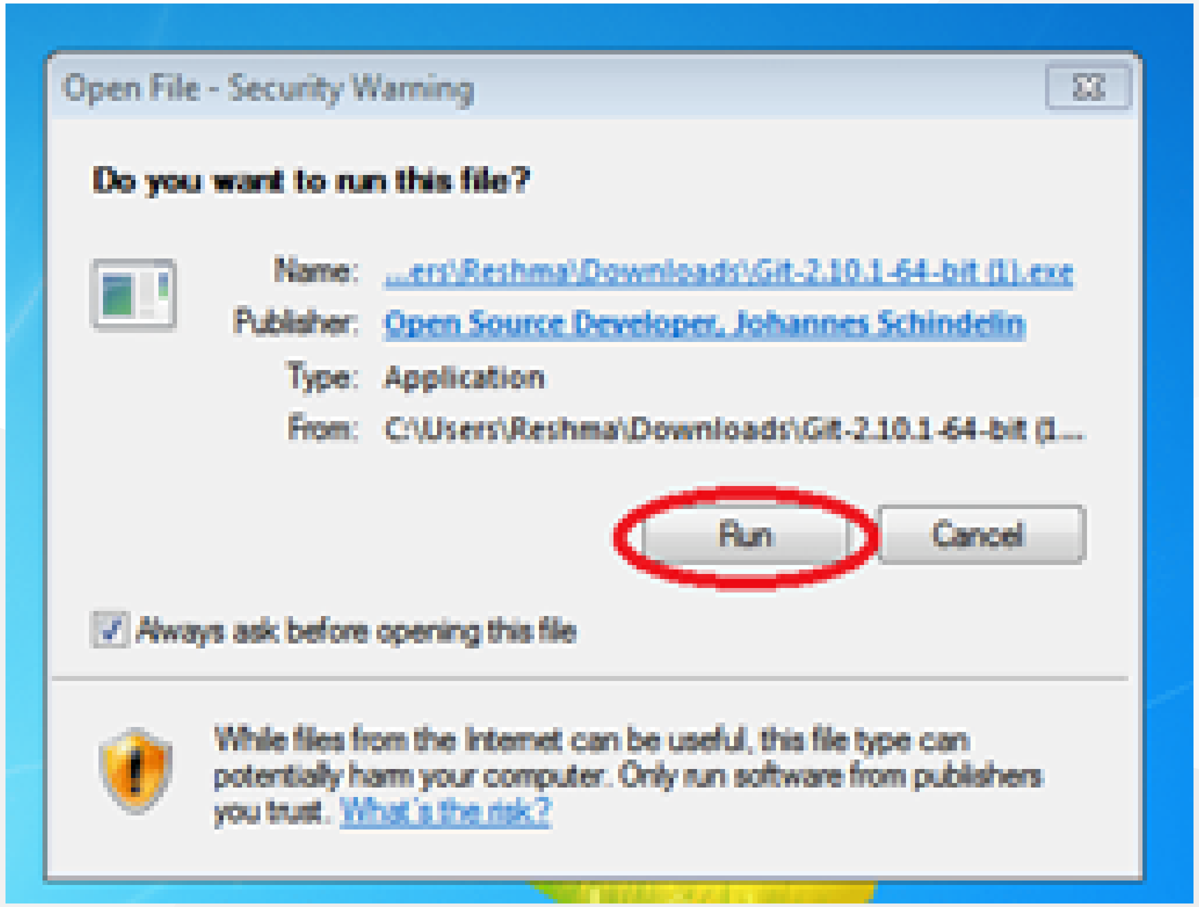
Installation of GIT (4)

Download and install GIT from the following links (both have same github release path)

Git - Downloads

Installation of GIT (5)

After running setup follow the steps below



Open File - Security Warning

Do you want to run this file?

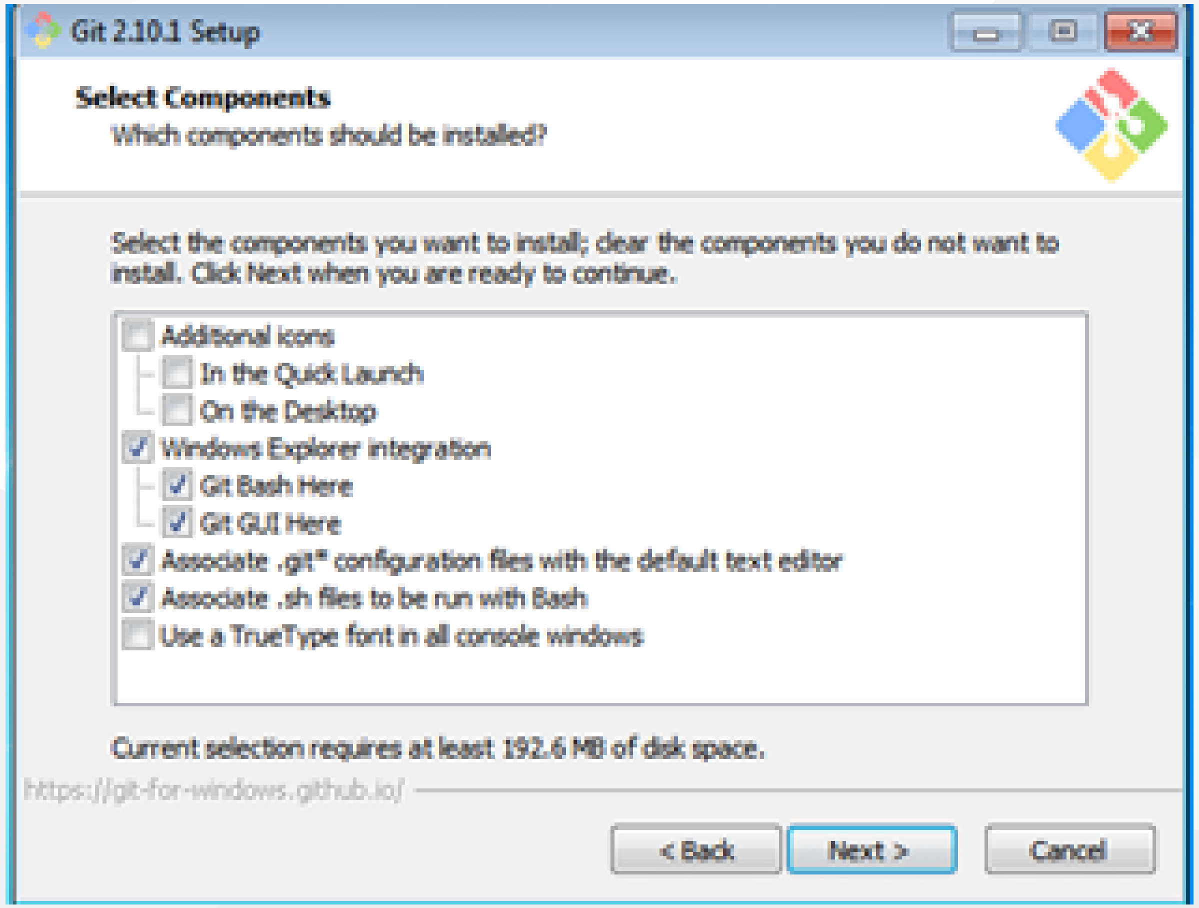
Name: ...ers\Reshma\Downloads\Git-2.10.1-64-bit (1).exe
Publisher: Open Source Developer, Johannes Schindelin
Type: Application
From: C:\Users\Reshma\Downloads\Git-2.10.1-64-bit (1...

Run | Cancel

☑ Always ask before opening this file

While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?

Installation of GIT (6)



Git 2.10.1 Setup

Select Components

Which components should be installed?

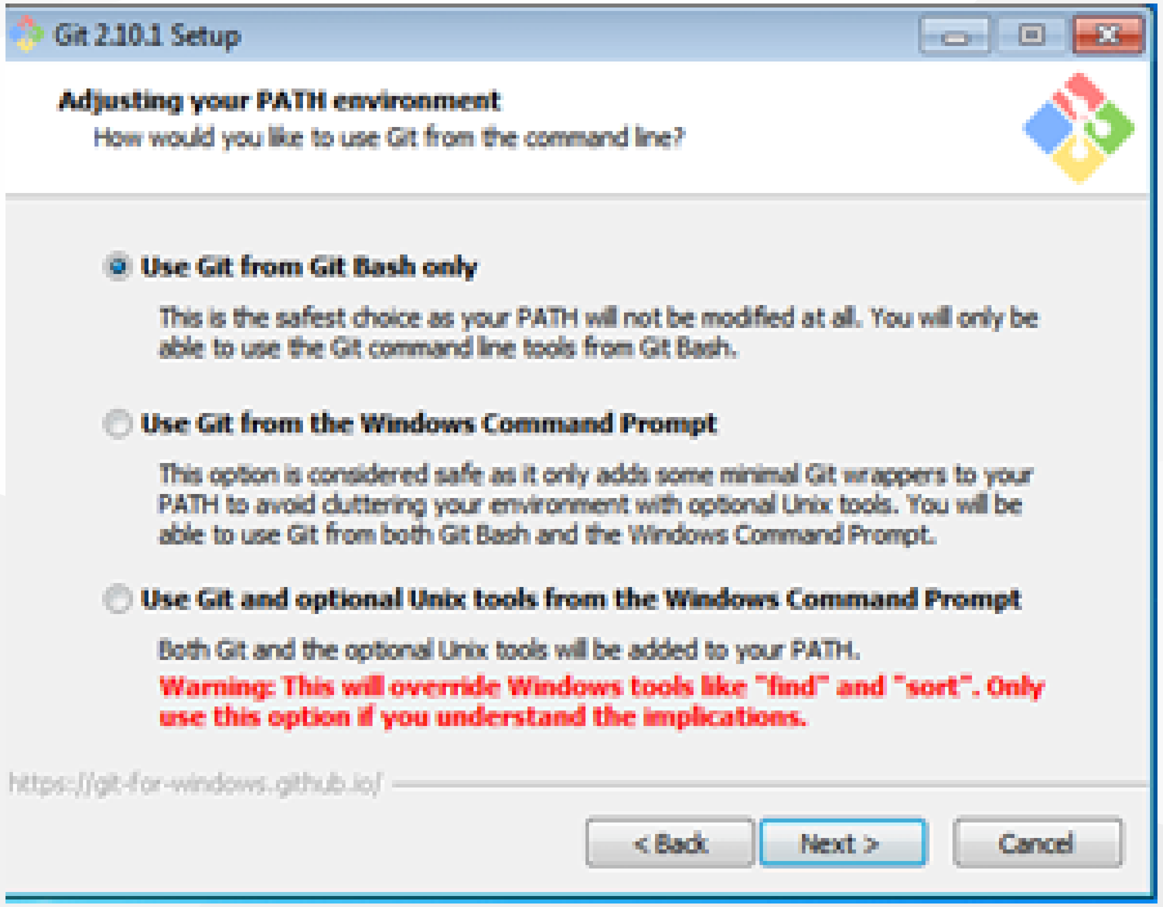
Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue.

- [ ] Additional icons
  - [ ] In the Quick Launch
  - [ ] On the Desktop
- [✓] Windows Explorer integration
  - [✓] Git Bash Here
  - [✓] Git GUI Here
- [✓] Associate .git* configuration files with the default text editor
- [✓] Associate .sh files to be run with Bash
- [ ] Use a TrueType font in all console windows

Current selection requires at least 192.6 MB of disk space.

https://git-for-windows.github.io/

Installation of GIT (7)



Git 2.10.1 Setup

Adjusting your PATH environment

How would you like to use Git from the command line?

[✓ **Use Git from Git Bash only**]

This is the safest choice as your PATH will not be modified at all. You will only be able to use the Git command line tools from Git Bash.

Use Git from the Windows Command Prompt

This option is considered safe as it only adds some minimal Git wrappers to your PATH to avoid cluttering your environment with optional Unix tools. You will be able to use Git from both Git Bash and the Windows Command Prompt.

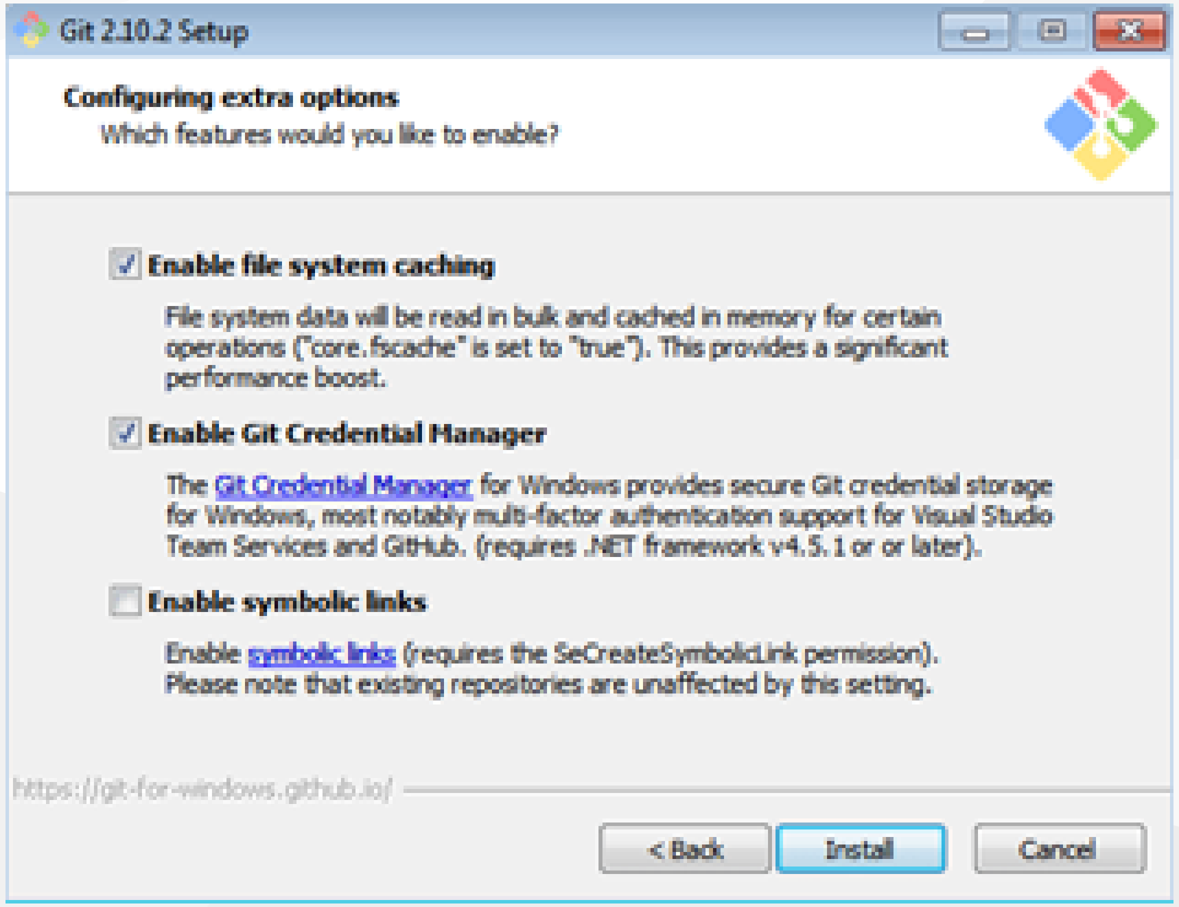
Use Git and optional Unix tools from the Windows Command Prompt

Both Git and the optional Unix tools will be added to your PATH.

Warning: This will override Windows tools like "find" and "sort". Only use this option if you understand the implications.

https://git-for-windows.github.io/

Installation of GIT (8)



Git 2.10.2 Setup

Configuring extra options

Which features would you like to enable?

[✓] **Enable file system caching**

File system data will be read in bulk and cached in memory for certain operations ("core.fscache" is set to "true"). This provides a significant performance boost.

[✓] **Enable Git Credential Manager**

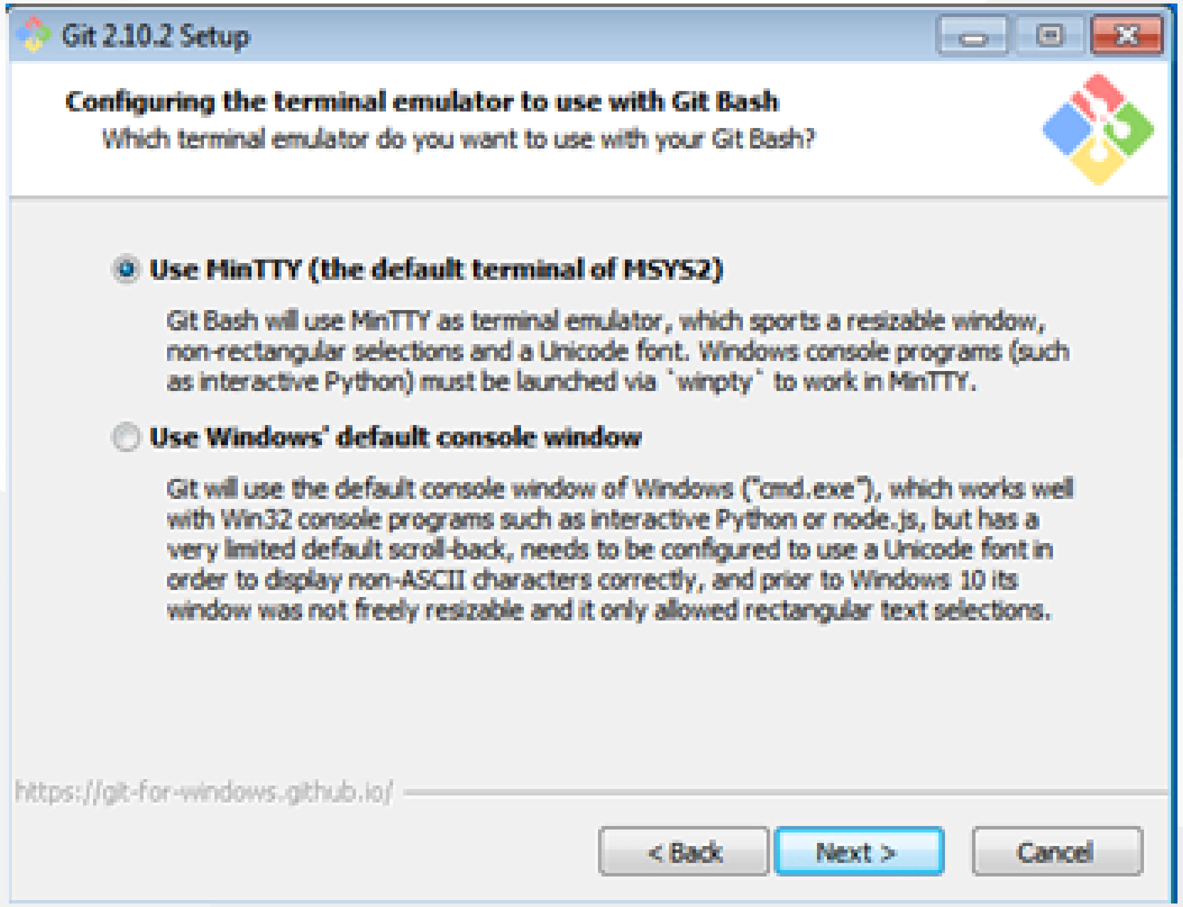
The Git Credential Manager for Windows provides secure Git credential storage for Windows, most notably multi-factor authentication support for Visual Studio Team Services and GitHub. (requires .NET framework v4.5.1 or or later).

[ ] **Enable symbolic links**

Enable symbolic links (requires the SeCreateSymbolicLink permission). Please note that existing repositories are unaffected by this setting.

https://git-for-windows.github.io/

Installation of GIT (9)



Configuring the terminal emulator to use with Git Bash

Which terminal emulator do you want to use with your Git Bash?

[✓ Use MinTTY (the default terminal of MSYS2)]

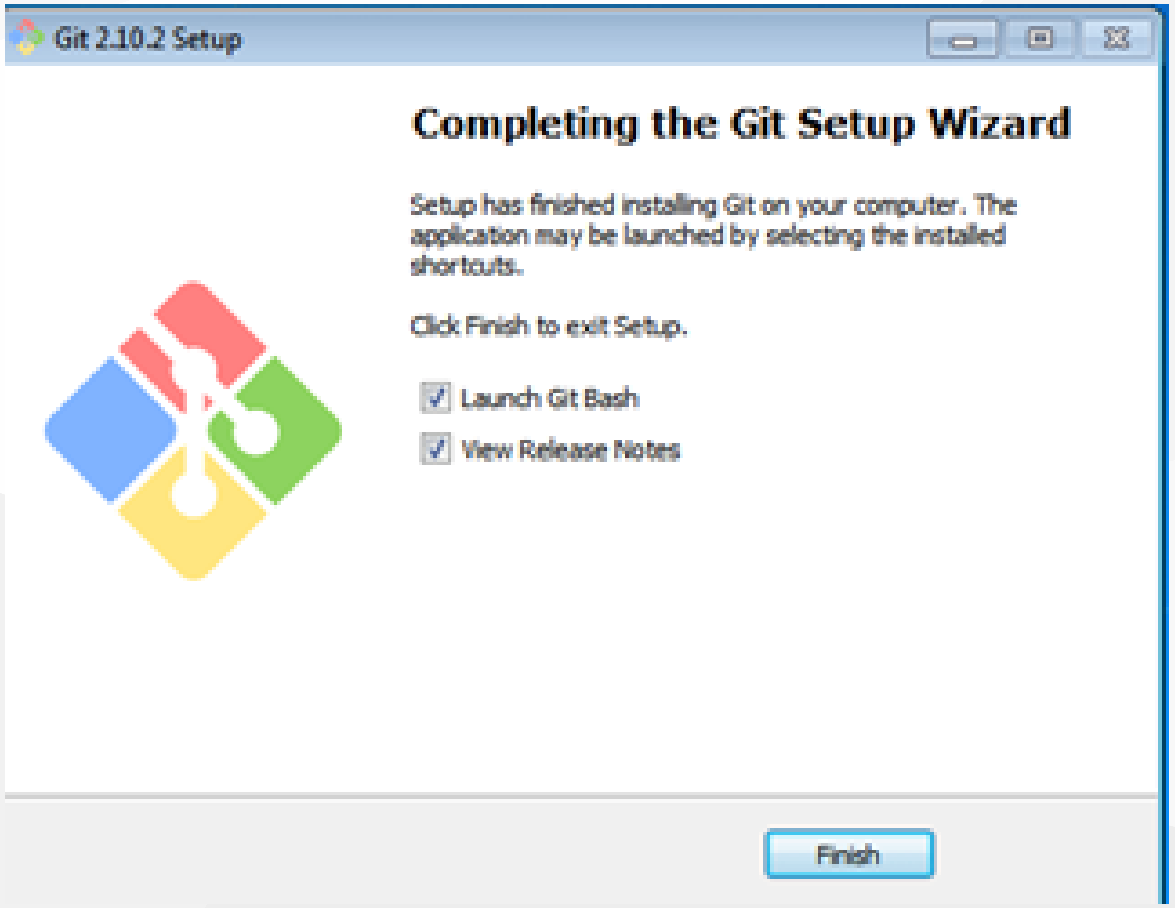
Git Bash will use MinTTY as terminal emulator, which sports a resizable window, non-rectangular selections and a Unicode font. Windows console programs (such as interactive Python) must be launched via `winpty` to work in MinTTY.

Use Windows' default console window

Git will use the default console window of Windows ("cmd.exe"), which works well with Win32 console programs such as interactive Python or node.js, but has a very limited default scroll-back, needs to be configured to use a Unicode font in order to display non-ASCII characters correctly, and prior to Windows 10 its window was not freely resizable and it only allowed rectangular text selections.

https://git-for-windows.github.io/

Installation of GIT (10)



Git 2.10.2 Setup

Completing the Git Setup Wizard

Setup has finished installing Git on your computer. The application may be launched by selecting the installed shortcuts.

Click Finish to exit Setup.

- [✓] Launch Git Bash
- [✓] View Release Notes

Installation of GIT Extension (Windows) (1)

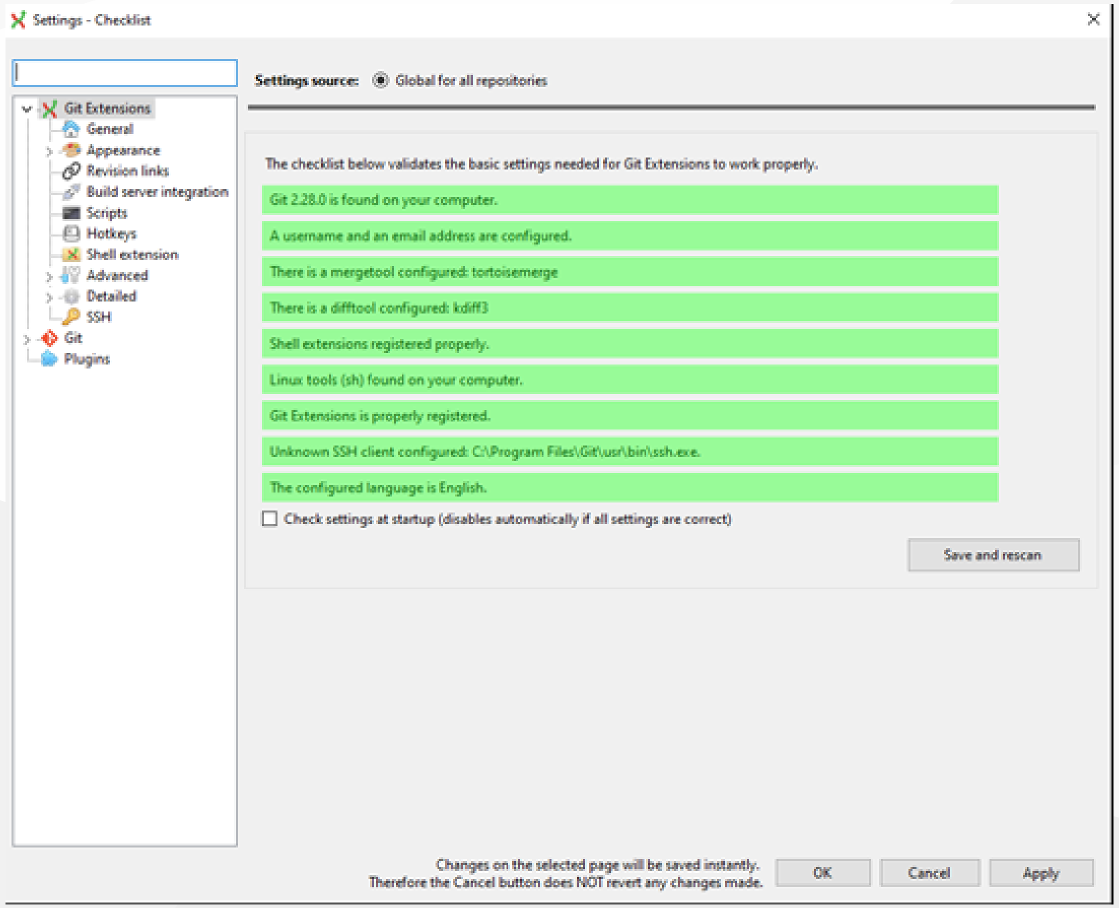
You can install Git GUI from https://git-scm.com/downloads/guis

I prefer to use git extension https://gitextensions.github.io/ and https://tortoisegit.org/

Also Download KDiff3 KDiff3 - Browse Files at SourceForge.net

These extensions provide GUI for git operations to make process easier.

Configuration of GIT Extension (Windows) (1)



Settings source: (●) Global for all repositories

The checklist below validates the basic settings needed for Git Extensions to work properly.

Git 2.28.0 is found on your computer.

A username and an email address are configured.

There is a mergetool configured: tortoisemerge

There is a difftool configured: kdiff3

Shell extensions registered properly.

Linux tools (sh) found on your computer.

Git Extensions is properly registered.

Unknown SSH client configured: C:\Program Files\Git\usr\bin\ssh.exe.

The configured language is English.

☐ Check settings at startup (disables automatically if all settings are correct)

Changes on the selected page will be saved instantly.
Therefore the Cancel button does NOT revert any changes made.

Configuration of GIT Extension (Windows) (2)

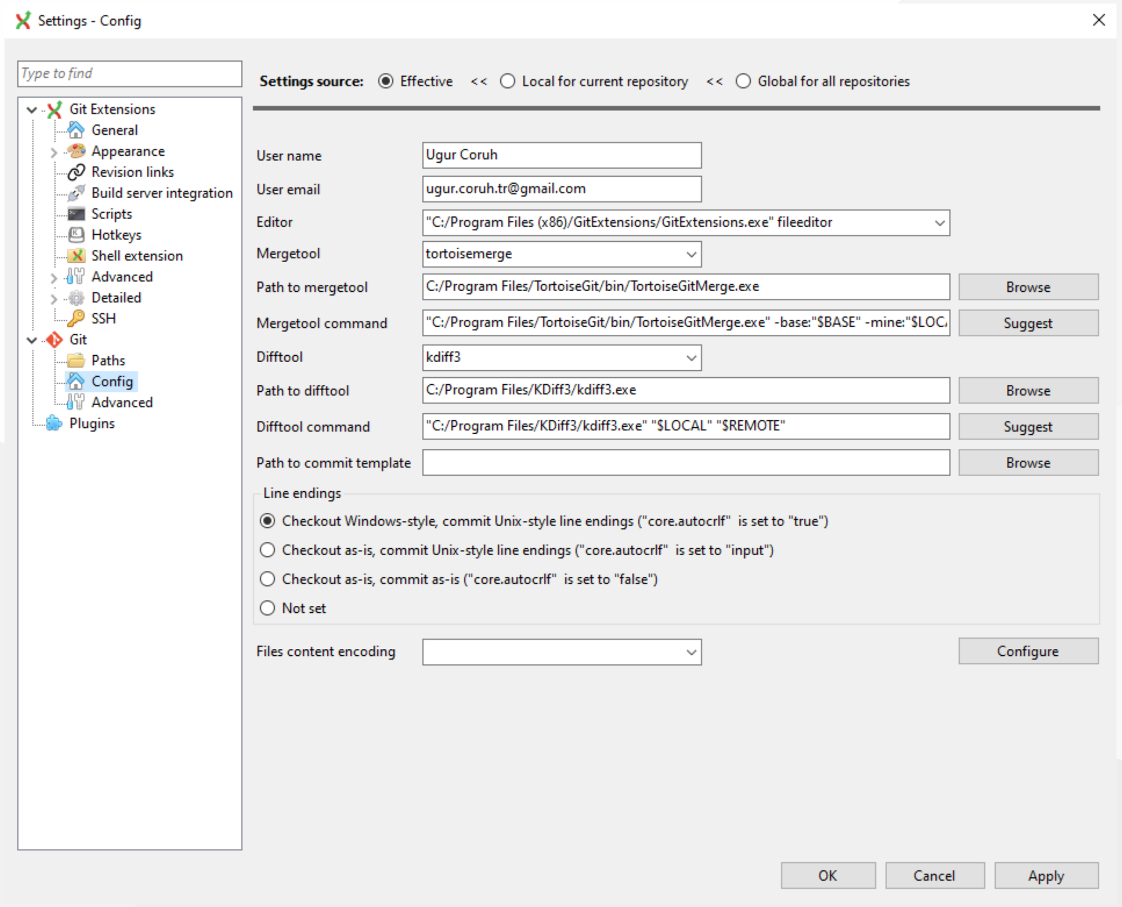
If you install git everything should be green and this configuration is stored on .gitconfig on your home `C:/Windows/Users/<user>/.gitconfig`

Configuration of GIT Extension (Windows) (3)

```
[core]
    editor = \"C:/Program Files (x86)/GitExtensions/GitExtensions.exe\" fileeditor
    autocrlf = true
    quotePath = false
    commitGraph = true
    longpaths = true
[user]
    email = xxxxxxx@gmail.com
    name = xxxx xxxxxx
[filter "lfs"]
    clean = git-lfs clean -- %f
    smudge = git-lfs smudge -- %f
    process = git-lfs filter-process
    required = true
[pull]
    rebase = false
[fetch]
    prune = false
[rebase]
    autoStash = false
[credential]
    helper = manager
[diff]
    guitool = kdiff3
[difftool "kdiff3"]
    path = C:/Program Files/KDiff3/kdiff3.exe
    cmd = \"C:/Program Files/KDiff3/kdiff3.exe\" \"$LOCAL\" \"$REMOTE\"
[merge]
    guitool = tortoisemerge
[mergetool "tortoisemerge"]
    path = C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe
    cmd = \"C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe\" -base:\"$BASE\" -mine:\"$LOCAL\" -theirs:\"$REMOTE\" -merged:\"$MERGED\"
[receive]
    advertisePushOptions = true
[gc]
    writeCommitGraph = true
```

Configuration of GIT Extension (Windows) (4)

Also in extension you can see similar settings



Settings source: [✓ Effective] << Local for current repository << Global for all repositories

User name	Ugur Coruh
User email	ugur.coruh.tr@gmail.com
Editor	"C:/Program Files (x86)/GitExtensions/GitExtensions.exe" fileeditor
Mergetool	tortoisemerge
Path to mergetool	C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe
Mergetool command	"C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe" -base:"$BASE" -mine:"$LOC
Difftool	kdiff3
Path to difftool	C:/Program Files/KDiff3/kdiff3.exe
Difftool command	"C:/Program Files/KDiff3/kdiff3.exe" "$LOCAL" "$REMOTE"
Path to commit template	

Line endings

- [✓ Checkout Windows-style, commit Unix-style line endings ("core.autocrlf" is set to "true")]
- Checkout as-is, commit Unix-style line endings ("core.autocrlf" is set to "input")
- Checkout as-is, commit as-is ("core.autocrlf" is set to "false")
- Not set

Files content encoding

Configuration of GIT Extension (Windows) (5)

Samples

MergeTool

```
tortoisemerge
```

Path to mergetool

```
C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe
```

Mergetool command

```
"C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe" -base:"$BASE" -mine:"$LOCAL" -theirs:"$REMOTE" -merged:"$MERGED"
```

Configuration of GIT Extension (Windows) (6)

Difftool

```
kdiff3
```

Path to difftool

```
C:/Program Files/KDiff3/kdiff3.exe
```

Difftool command

```
"C:/Program Files/KDiff3/kdiff3.exe" "$LOCAL" "$REMOTE"
```

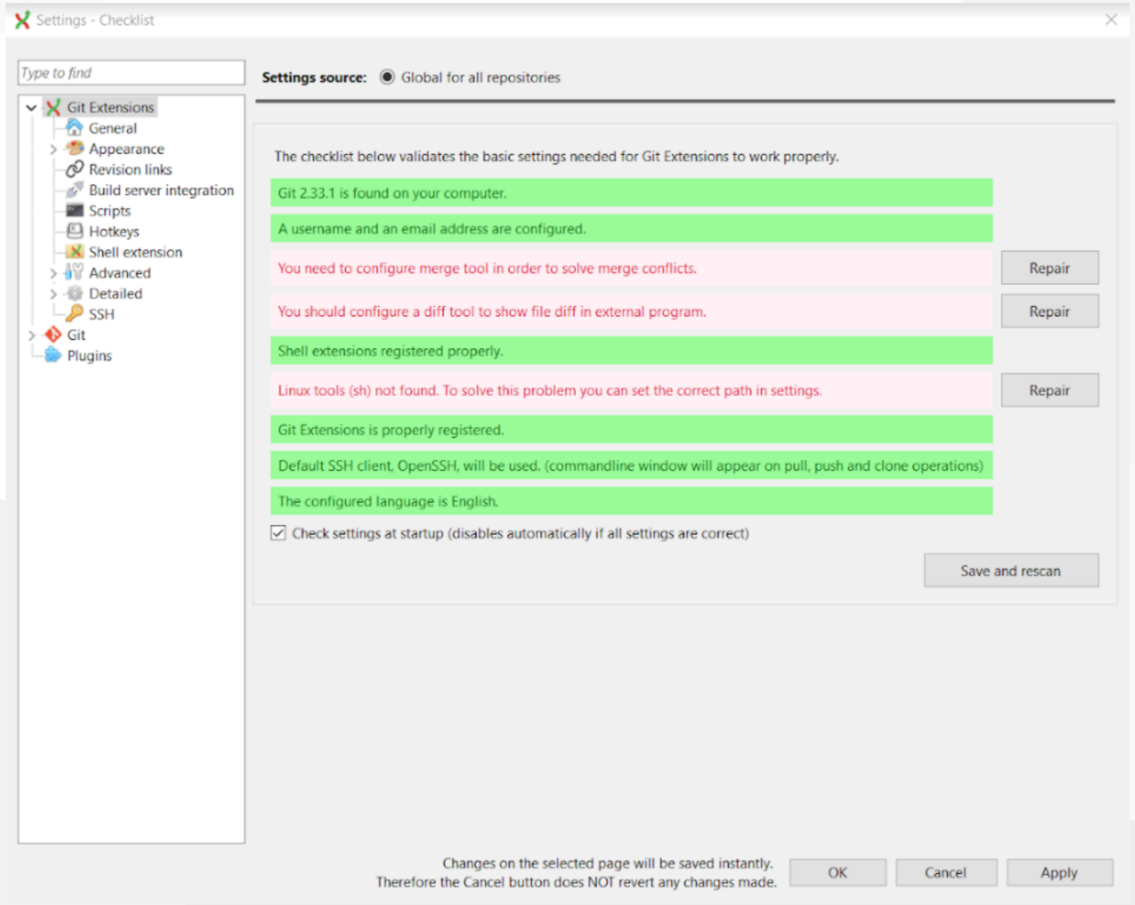
Configuration of GIT Extension (Windows) (7)

If you see something as merge and diff tool is not configured, follow the similar settings above on your computer. If you installed kdiff3, tortoisegit and extension you will have same diff and merge tools

This topic also help you

Git: How can I configure KDiff3 as a merge tool and diff tool? - Stack Overflow

Configuration of GIT Extension (Windows) (8)



Settings source: ● Global for all repositories

The checklist below validates the basic settings needed for Git Extensions to work properly.

🟩 Git 2.33.1 is found on your computer.

🟩 A username and an email address are configured.

🟥 You need to configure merge tool in order to solve merge conflicts.

🟥 You should configure a diff tool to show file diff in external program.

🟩 Shell extensions registered properly.

🟥 Linux tools (sh) not found. To solve this problem you can set the correct path in settings.

🟩 Git Extensions is properly registered.

🟩 Default SSH client, OpenSSH, will be used. (commandline window will appear on pull, push and clone operations)

🟩 The configured language is English.

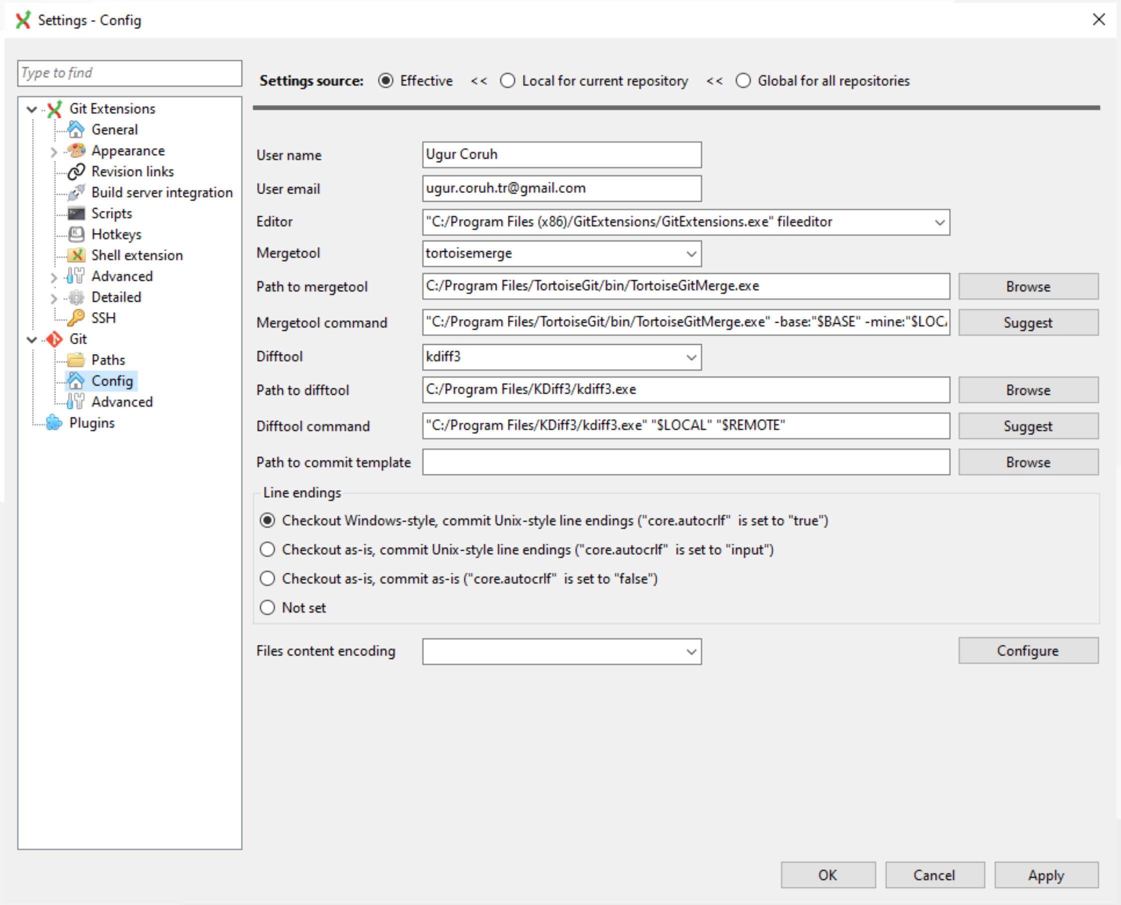
☑ Check settings at startup (disables automatically if all settings are correct)

Changes on the selected page will be saved instantly.
Therefore the Cancel button does NOT revert any changes made.

Configuration of GIT Extension (Windows) (9)

Open Git->Config, in your settings you will see path to mergetool and difftool will be empty fill settings like that below find executables in your computer and copy paths to here.

Configuration of GIT Extension (Windows) (10)



Settings source: [✓ Effective] << Local for current repository << Global for all repositories

User name	Ugur Coruh
User email	ugur.coruh.tr@gmail.com
Editor	"C:/Program Files (x86)/GitExtensions/GitExtensions.exe" fileeditor
Mergetool	tortoisemerge
Path to mergetool	C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe
Mergetool command	"C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe" -base:"$BASE" -mine:"$LOC
Difftool	kdiff3
Path to difftool	C:/Program Files/KDiff3/kdiff3.exe
Difftool command	"C:/Program Files/KDiff3/kdiff3.exe" "$LOCAL" "$REMOTE"
Path to commit template	

Line endings

- [✓ Checkout Windows-style, commit Unix-style line endings ("core.autocrlf" is set to "true")]
- Checkout as-is, commit Unix-style line endings ("core.autocrlf" is set to "input")
- Checkout as-is, commit as-is ("core.autocrlf" is set to "false")
- Not set

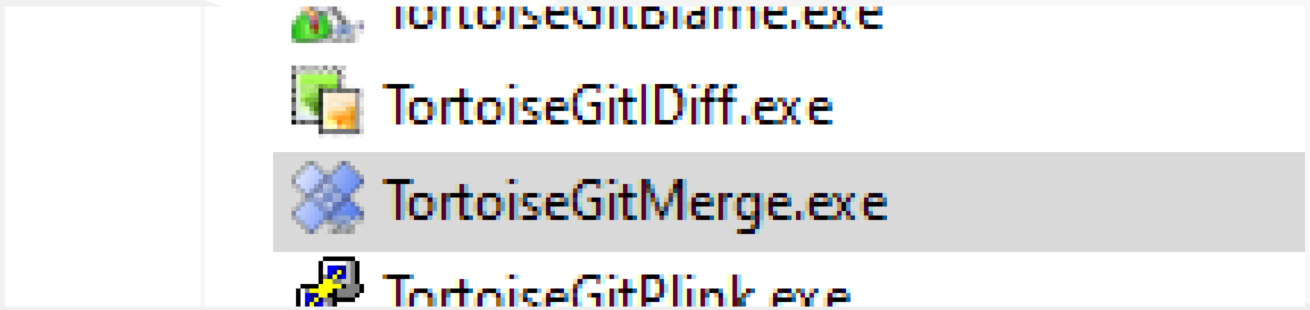
Files content encoding

Configuration of GIT Extension (Windows) (11)

Also if we want to change and use different diff and merge tool then we can do this with gitbash console as below

```
C:\Program Files\TortoiseGit\bin
```

Find TortoiseGitIDiff.exe and TortoiseGitMerge.exe



TortoiseGitIDiff.exe
TortoiseGitMerge.exe

Configuration of GIT Extension (Windows) (12)

Copy path of this applications

```
C:\Program Files\TortoiseGit\bin\TortoiseGitMerge.exe
C:\Program Files\TortoiseGit\bin\TortoiseGitIDiff.exe
```

Configuration of GIT Extension (Windows) (13)

open a gitbash console and run following commands

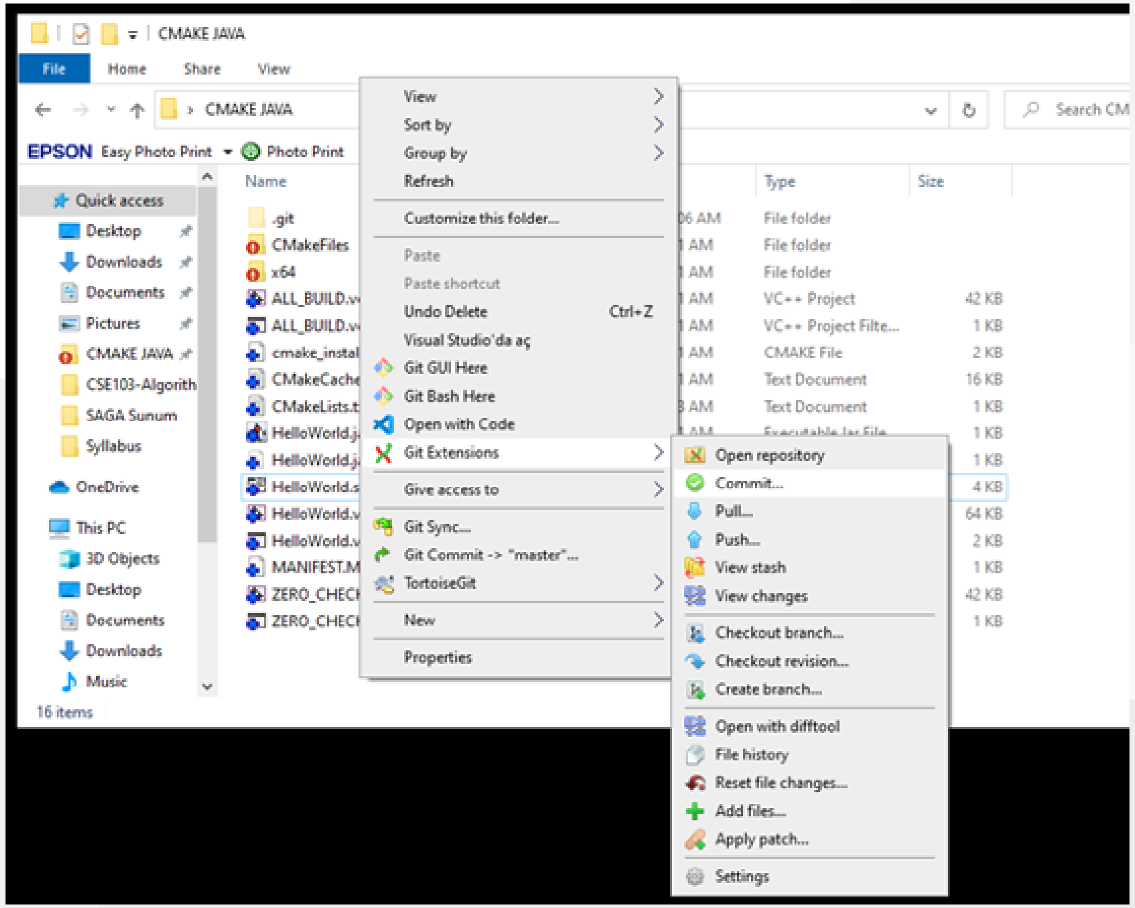
```
git config --global merge.tool TortoiseGitMerge
git config --global mergetool.TortoiseGitMerge.path "C:/Program Files/TortoiseGit/bin/TortoiseGitMerge.exe"
git config --global mergetool.TortoiseGitMerge.trustExitCode false

git config --global diff.guitool TortoiseGitIDiff
git config --global difftool.TortoiseGitIDiff.path "C:/Program Files/TortoiseGit/bin/TortoiseGitIDiff.exe"
git config --global difftool.TortoiseGitIDiff.trustExitCode false
```

This updates will be stored on .gitconfig

Using the GIT Extension (1)

right click in the git folder and use Git Extension menu for operations.

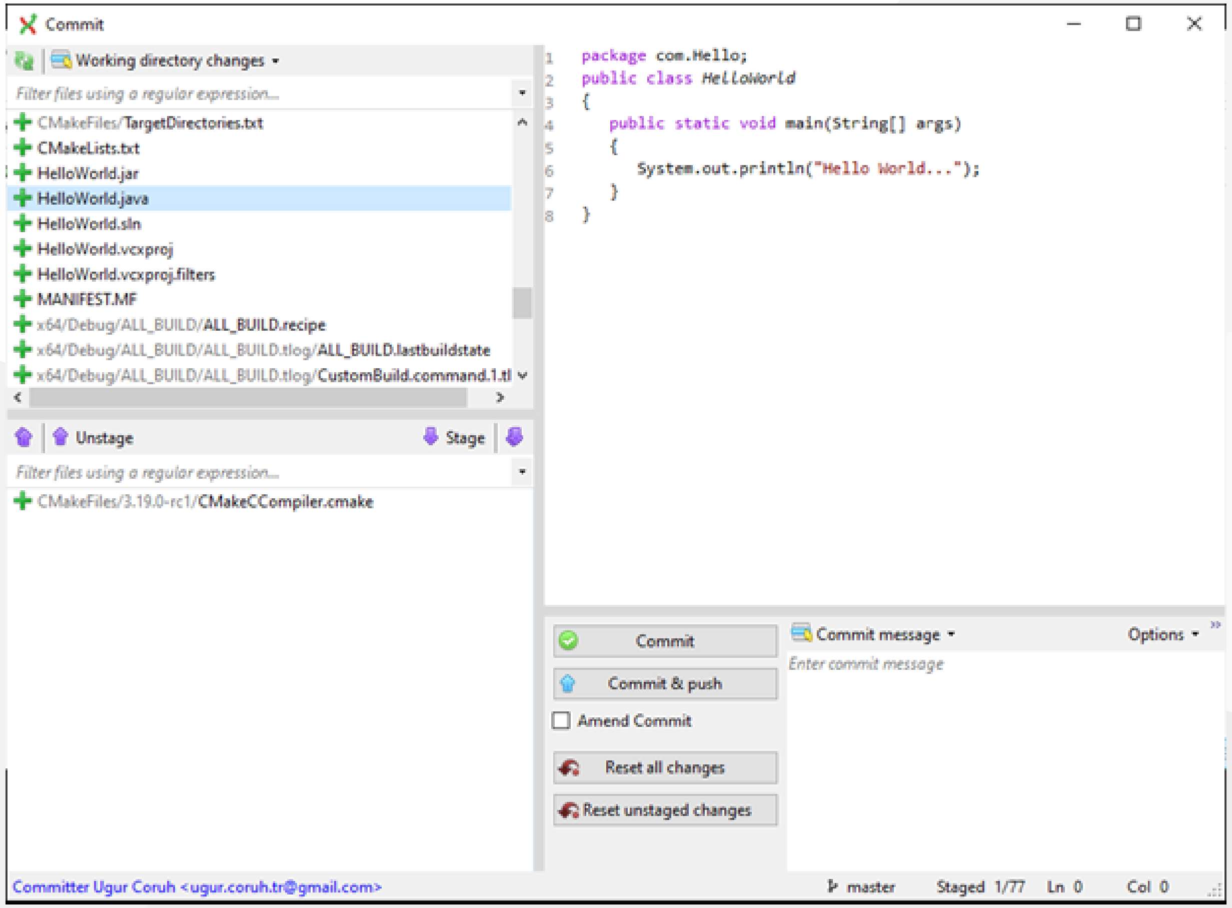
for sample commit click "Commit"



Using the GIT Extension (1)

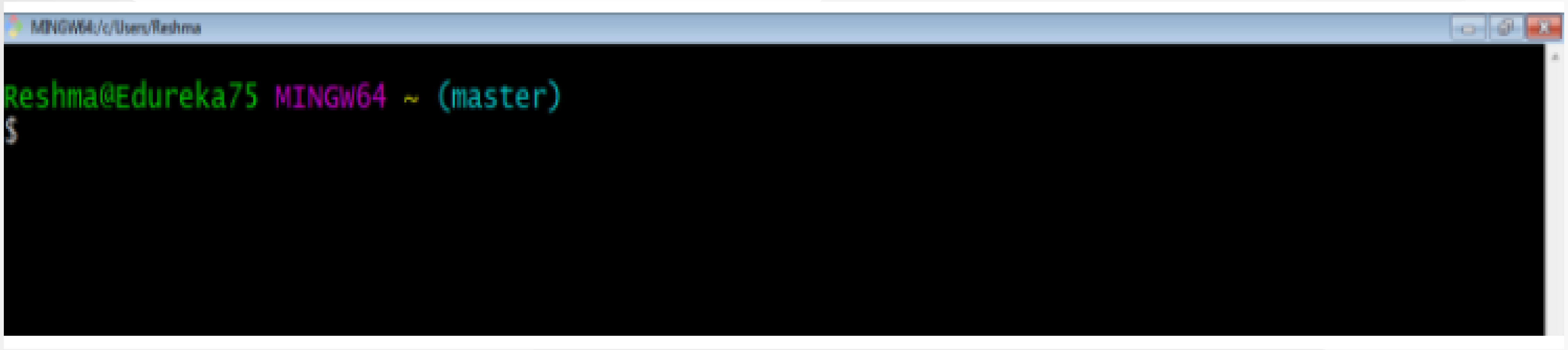
from opening window first stage related files and then write a good commit message

finally click commit to local. You can also commit&push it to remote repository.


Commit
Working directory changes
Filter files using a regular expression...
CMakeFiles/TargetDirectories.txt
CMakeLists.txt
HelloWorld.jar
HelloWorld.java
HelloWorld.sln
HelloWorld.vcxproj
HelloWorld.vcxproj.filters
MANIFEST.MF
x64/Debug/ALL_BUILD/ALL_BUILD.recipe
x64/Debug/ALL_BUILD/ALL_BUILD.tlog/ALL_BUILD.lastbuildstate
x64/Debug/ALL_BUILD/ALL_BUILD.tlog/CustomBuild.command.1.tl
Unstage
Stage
Filter files using a regular expression...
CMakeFiles/3.19.0-rc1/CMakeCCompiler.cmake
Commit
Commit & push
Amend Commit
Reset all changes
Reset unstaged changes
Commit message
Options
Enter commit message
Committer Ugur Coruh <ugur.coruh.tr@gmail.com>
master
Staged 1/77
Ln 0
Col 0

```java
package com.Hello;
public class HelloWorld
{
    public static void main(String[] args)
    {
        System.out.println("Hello World...");
    }
}
```

GIT Installation Completed..



```
Reshma@Edureka75 MINGW64 ~ (master)
$
```

Installation of gig (git ignore creator) (1)

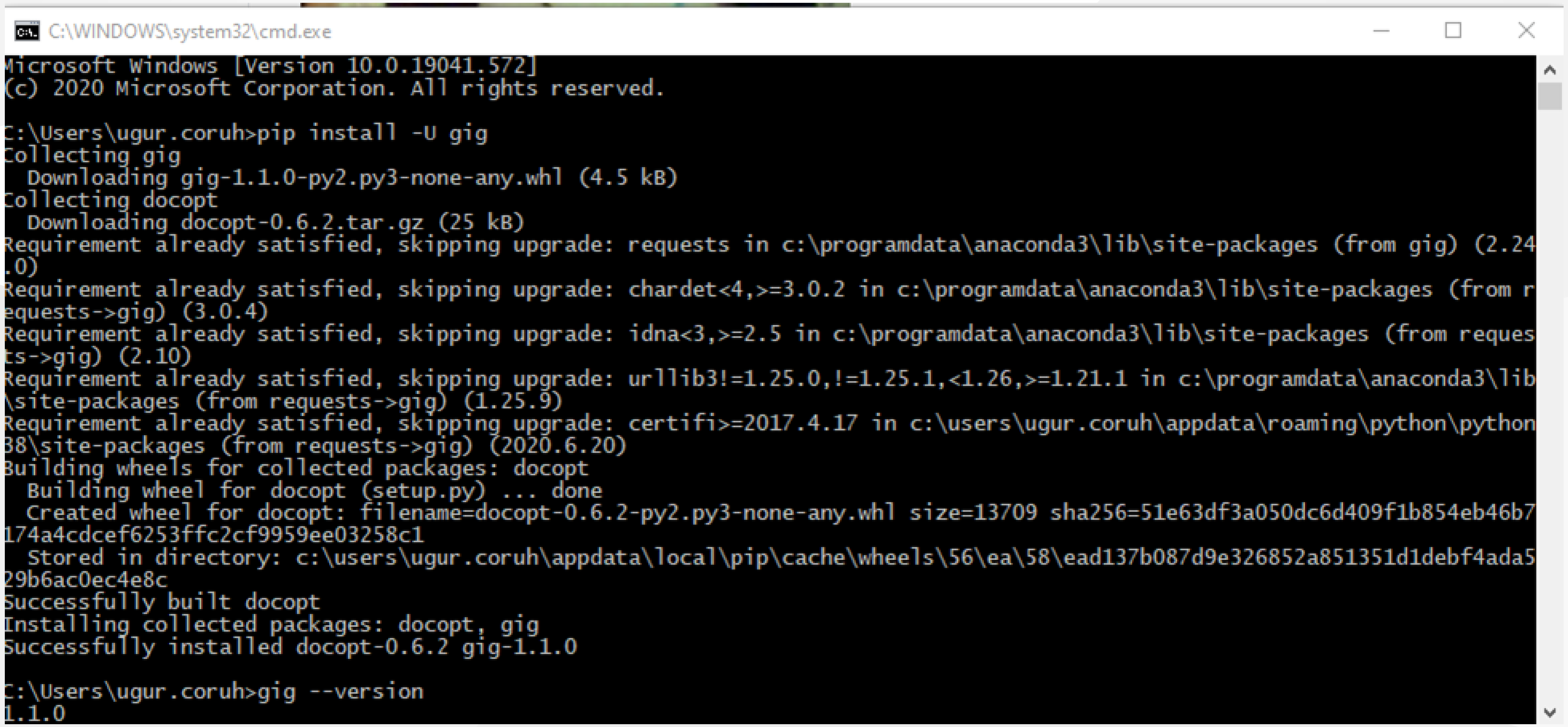
Requirements

- Python >= 3.6
- Internet connection

https://github.com/sloria/gig

```
pip install -U gig
```

Installation of gig (git ignore creator) (2)



C:\WINDOWS\system32\cmd.exe

```
Microsoft Windows [Version 10.0.19041.572]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\ugur.coruh>pip install -U gig
Collecting gig
  Downloading gig-1.1.0-py2.py3-none-any.whl (4.5 kB)
Collecting docopt
  Downloading docopt-0.6.2.tar.gz (25 kB)
Requirement already satisfied, skipping upgrade: requests in c:\programdata\anaconda3\lib\site-packages (from gig) (2.24
.0)
Requirement already satisfied, skipping upgrade: chardet<4,>=3.0.2 in c:\programdata\anaconda3\lib\site-packages (from r
equests->gig) (3.0.4)
Requirement already satisfied, skipping upgrade: idna<3,>=2.5 in c:\programdata\anaconda3\lib\site-packages (from reques
ts->gig) (2.10)
Requirement already satisfied, skipping upgrade: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in c:\programdata\anaconda3\lib
\site-packages (from requests->gig) (1.25.9)
Requirement already satisfied, skipping upgrade: certifi>=2017.4.17 in c:\users\ugur.coruh\appdata\roaming\python\python
38\site-packages (from requests->gig) (2020.6.20)
Building wheels for collected packages: docopt
  Building wheel for docopt (setup.py) ... done
  Created wheel for docopt: filename=docopt-0.6.2-py2.py3-none-any.whl size=13709 sha256=51e63df3a050dc6d409f1b854eb46b7
174a4cdcef6253ffc2cf9959ee03258c1
  Stored in directory: c:\users\ugur.coruh\appdata\local\pip\cache\wheels\56\ea\58\ead137b087d9e326852a851351d1debf4ada5
29b6ac0ec4e8c
Successfully built docopt
Installing collected packages: docopt, gig
Successfully installed docopt-0.6.2 gig-1.1.0

C:\Users\ugur.coruh>gig --version
1.1.0
```

Installation of gig (git ignore creator) (3)

```
gig --version
```

Usage of gig (1)

List all gitignore templates

```
gig list
gig list -global
```

Usage of gig (2)

Sample gitignore for C Java and Visual Studio

```
gig C Java VisualStudio > .gitignore
```

Usage of gig (3)

There is a portal for this also by Toptal

- gitignore.io - Create Useful .gitignore Files For Your Project

Toptal. | gitignore.io
.gitignore.io
Projen için işe yarar .gitignore dosyaları yarat
İşletim Sistemleri, IDE'ler, ya da Programlama Dilleri ara
Yarat
Kaynak Kodu | Komut Satırı Kılavuzu

Usage of gig (4)

for samples you can check the following links.

https://github.com/github/gitignore

https://dev.to/shihanng/gig-a-gitignore-generator-opc

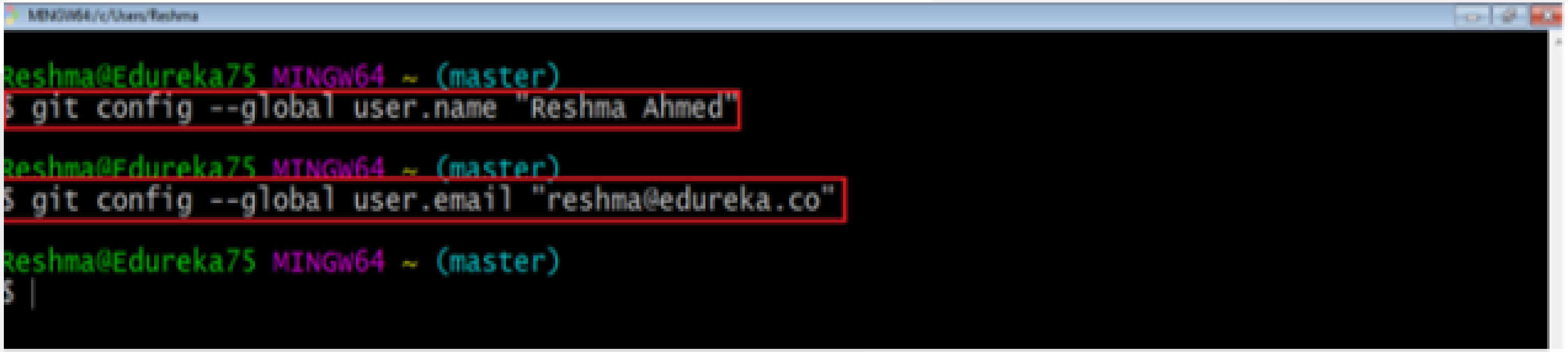
Configuration of GIT (1)

It is important to configure your Git because any commits that you make are associated with your configuration details.

configuring Git with your username and email. In order to do that, type the following commands in your Git Bash:

```
git config - - global user.name "<your name>"

git config - - global user.email "<your email>"
```

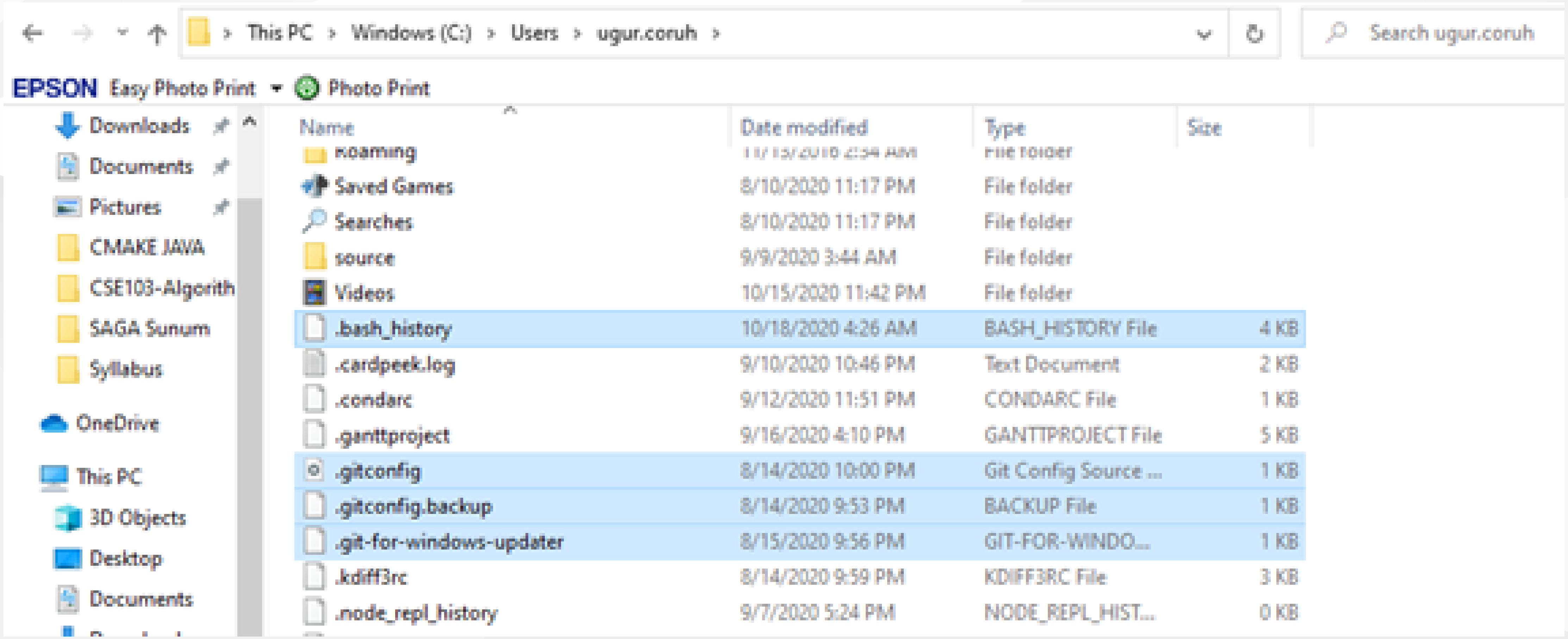
Configuration of GIT (2)



```
Reshma@Edureka75 MINGW64 ~ (master)
$ git config --global user.name "Reshma Ahmed"

Reshma@Edureka75 MINGW64 ~ (master)
$ git config --global user.email "reshma@edureka.co"

Reshma@Edureka75 MINGW64 ~ (master)
$ |
```

Configuration of GIT (3)

git configuration files are located on the user folder

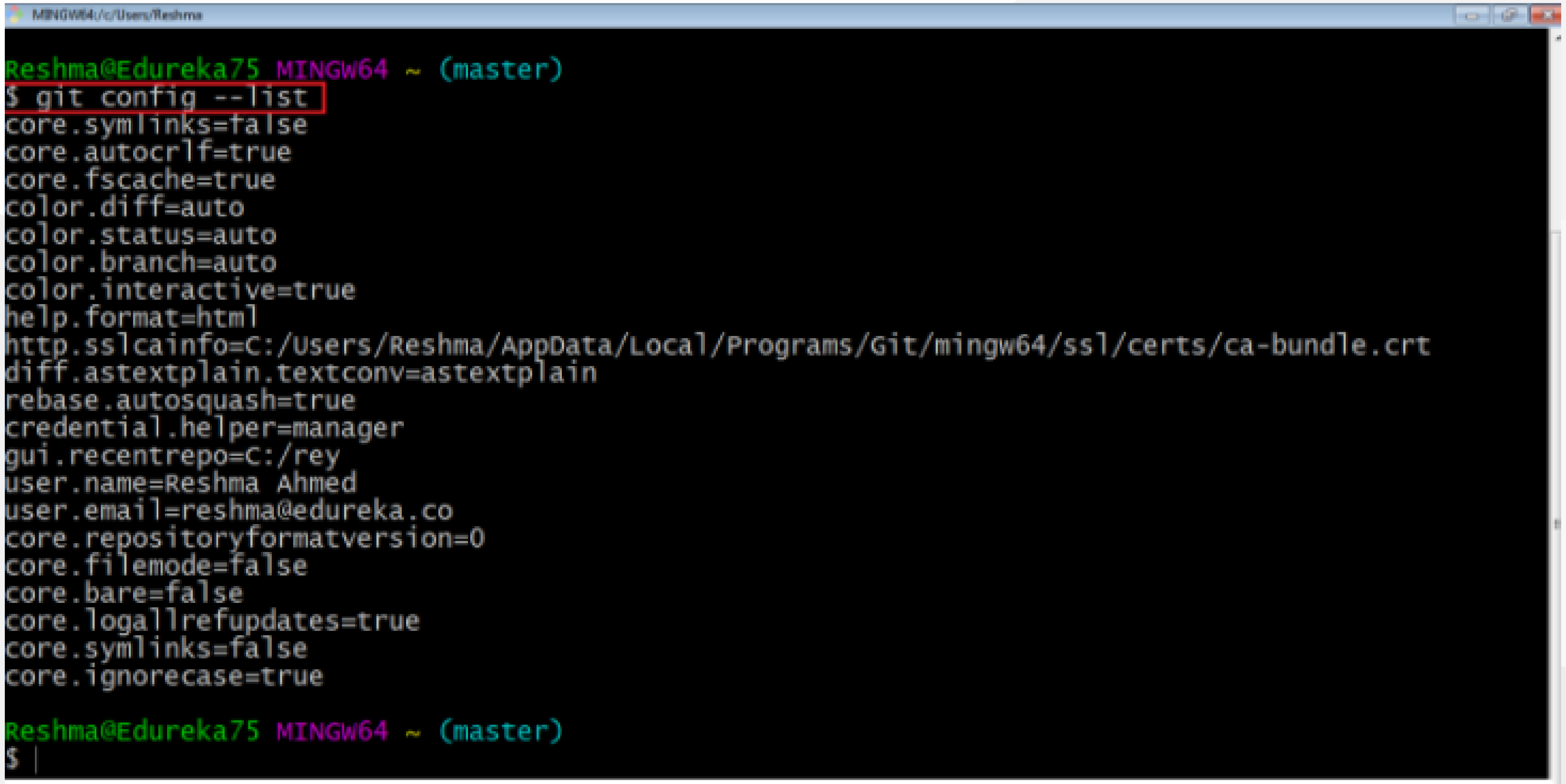


Name	Date modified	Type	Size
Roaming	11/15/2018 2:54 AM	File folder	
Saved Games	8/10/2020 11:17 PM	File folder	
Searches	8/10/2020 11:17 PM	File folder	
source	9/9/2020 3:44 AM	File folder	
Videos	10/15/2020 11:42 PM	File folder	
.bash_history	10/18/2020 4:26 AM	BASH_HISTORY File	4 KB
.cardpeek.log	9/10/2020 10:46 PM	Text Document	2 KB
.condarc	9/12/2020 11:51 PM	CONDARC File	1 KB
.ganttproject	9/16/2020 4:10 PM	GANTTPROJECT File	5 KB
.gitconfig	8/14/2020 10:00 PM	Git Config Source ...	1 KB
.gitconfig.backup	8/14/2020 9:53 PM	BACKUP File	1 KB
.git-for-windows-updater	8/15/2020 9:56 PM	GIT-FOR-WINDO...	1 KB
.kdiff3rc	8/14/2020 9:59 PM	KDIFF3RC File	3 KB
.node_repl_history	9/7/2020 5:24 PM	NODE_REPL_HIST...	0 KB

Configuration of GIT (4)

If you want to view all your configuration details, use the command below

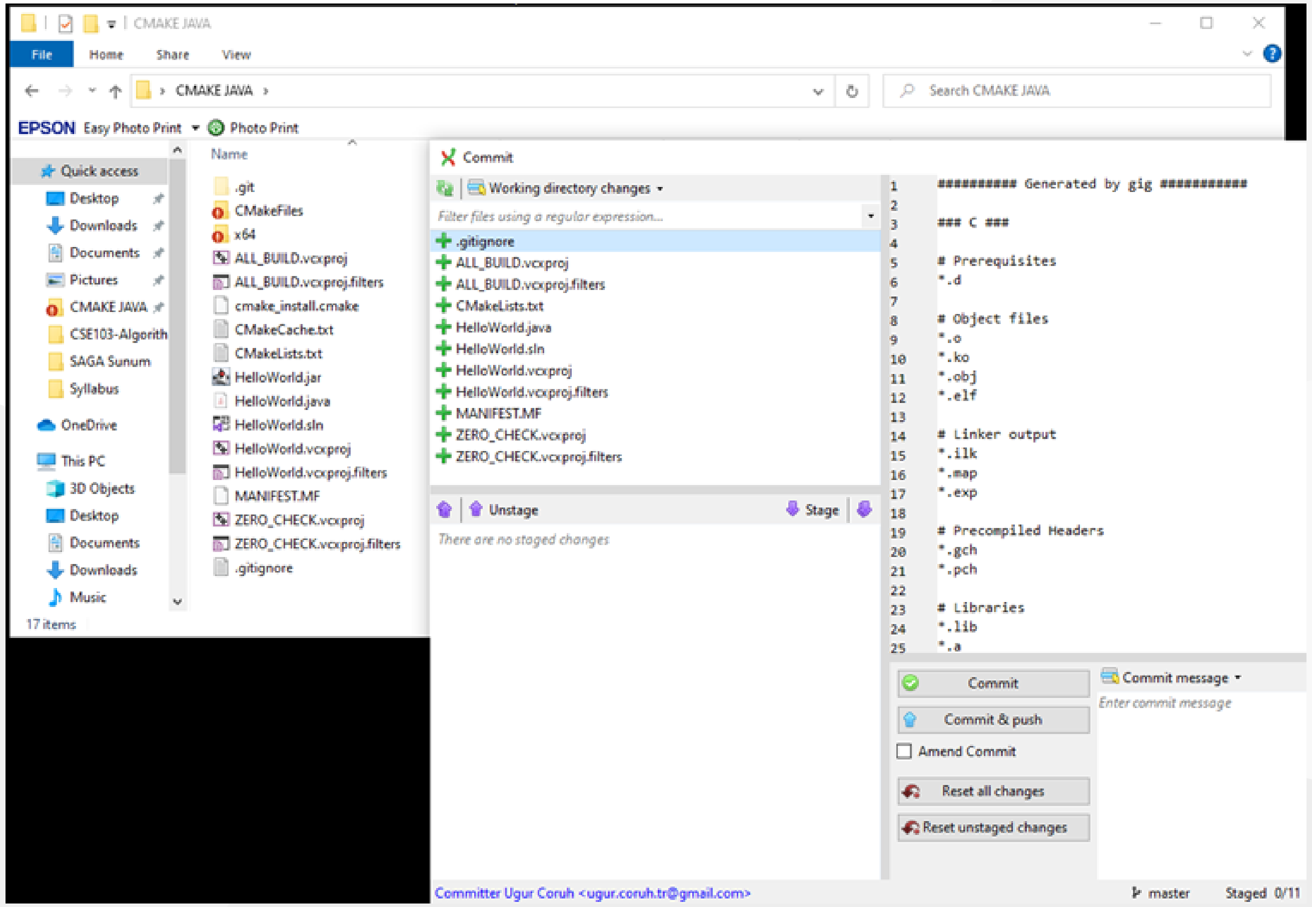
```
git config --list
```



```
MINGW64:/c/Users/Reshma

Reshma@Edureka75 MINGW64 ~ (master)
$ git config --list
core.symlinks=false
core.autocrlf=true
core.fscache=true
color.diff=auto
color.status=auto
color.branch=auto
color.interactive=true
help.format=html
http.sslcainfo=C:/Users/Reshma/AppData/Local/Programs/Git/mingw64/ssl/certs/ca-bundle.crt
diff.astextplain.textconv=astextplain
rebase.autosquash=true
credential.helper=manager
gui.recentrepo=C:/rey
user.name=Reshma Ahmed
user.email=reshma@edureka.co
core.repositoryformatversion=0
core.filemode=false
core.bare=false
core.logallrefupdates=true
core.symlinks=false
core.ignorecase=true

Reshma@Edureka75 MINGW64 ~ (master)
$ |
```

Using .gitignore files with git-extension (1)

with gitignore file



.git
CMakeFiles
x64
ALL_BUILD.vcxproj
ALL_BUILD.vcxproj.filters
cmake_install.cmake
CMakeCache.txt
CMakeLists.txt
HelloWorld.jar
HelloWorld.java
HelloWorld.sln
HelloWorld.vcxproj
HelloWorld.vcxproj.filters
MANIFEST.MF
ZERO_CHECK.vcxproj
ZERO_CHECK.vcxproj.filters
.gitignore

Working directory changes:

.gitignore
ALL_BUILD.vcxproj
ALL_BUILD.vcxproj.filters
CMakeLists.txt
HelloWorld.java
HelloWorld.sln
HelloWorld.vcxproj
HelloWorld.vcxproj.filters
MANIFEST.MF
ZERO_CHECK.vcxproj
ZERO_CHECK.vcxproj.filters

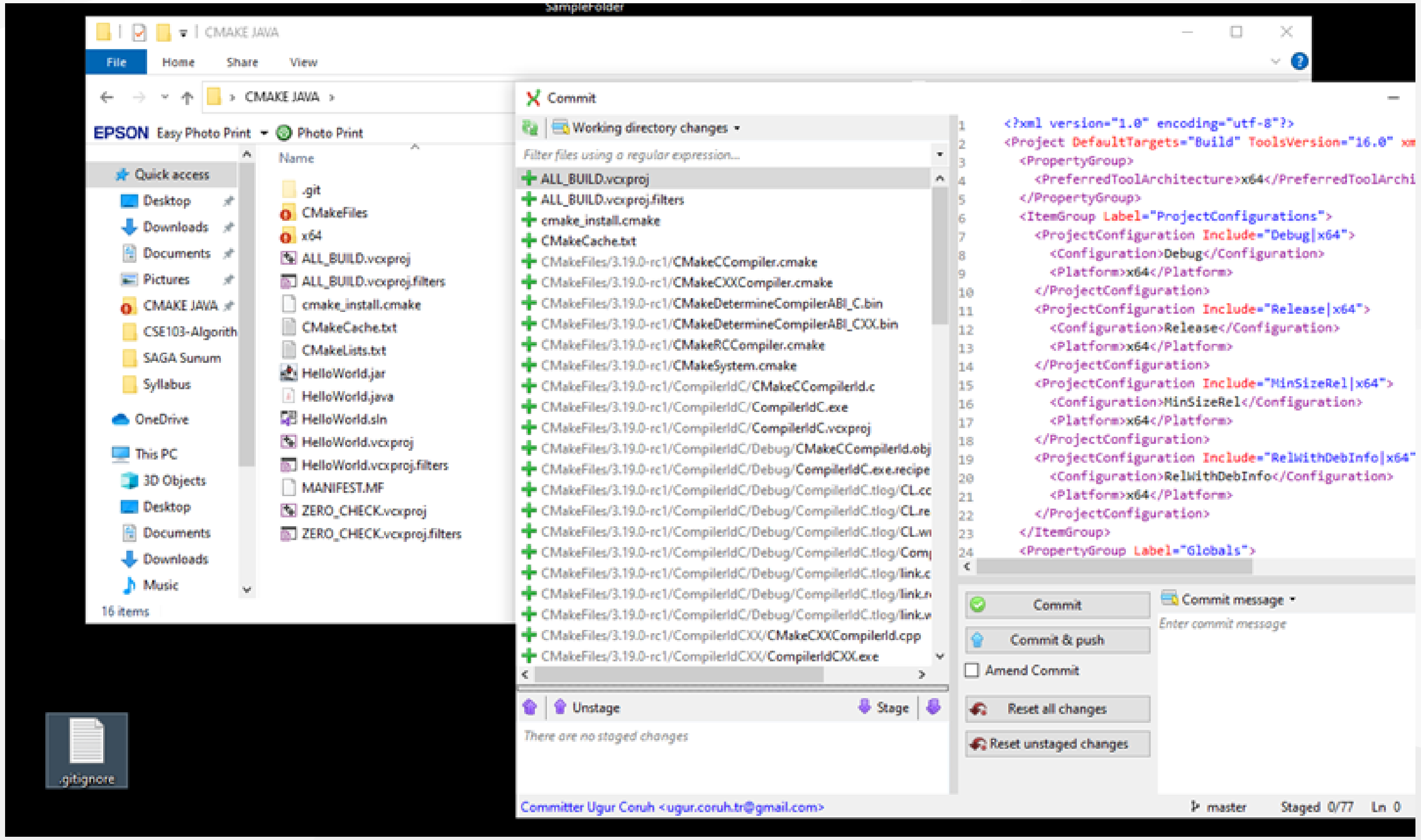
There are no staged changes

```
########## Generated by gig ###########

### C ###

# Prerequisites
*.d

# Object files
*.o
*.ko
*.obj
*.elf

# Linker output
*.ilk
*.map
*.exp

# Precompiled Headers
*.gch
*.pch

# Libraries
*.lib
*.a
```

Committer Ugur Coruh <ugur.coruh.tr@gmail.com>

Using .gitignore files with git-extension (2)

without gitignore file (just move to another location)



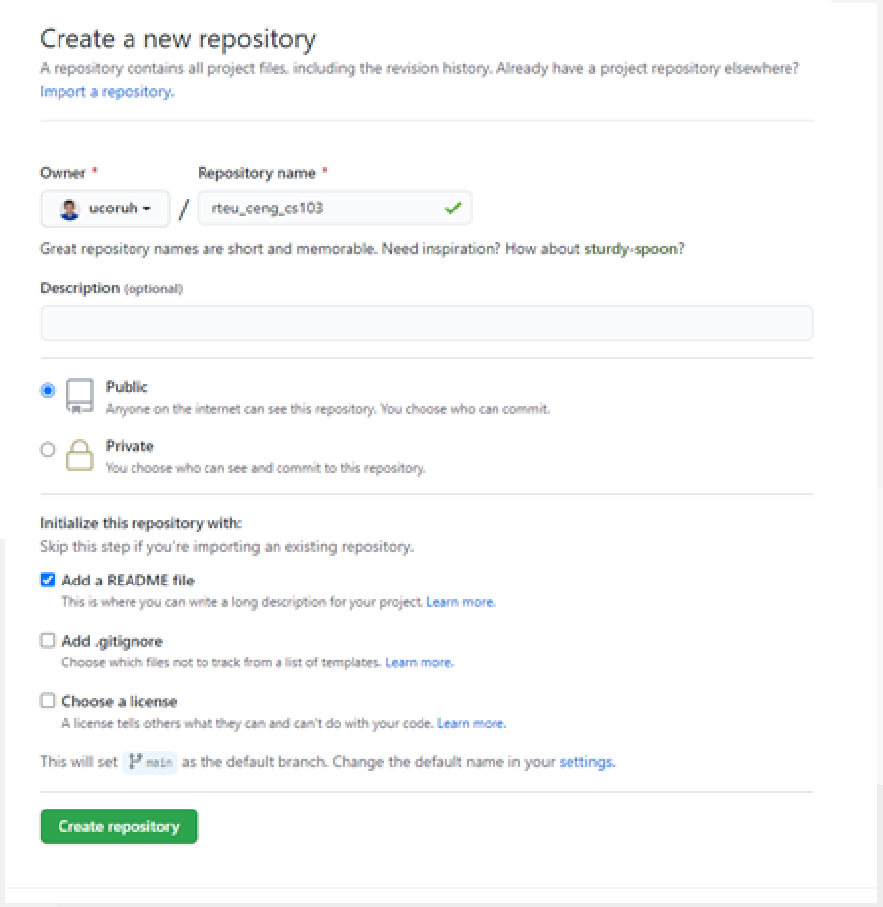
```
.git
CMakeFiles
x64
ALL_BUILD.vcxproj
ALL_BUILD.vcxproj.filters
cmake_install.cmake
CMakeCache.txt
CMakeLists.txt
HelloWorld.jar
HelloWorld.java
HelloWorld.sln
HelloWorld.vcxproj
HelloWorld.vcxproj.filters
MANIFEST.MF
ZERO_CHECK.vcxproj
ZERO_CHECK.vcxproj.filters
```

```
ALL_BUILD.vcxproj
ALL_BUILD.vcxproj.filters
cmake_install.cmake
CMakeCache.txt
CMakeFiles/3.19.0-rc1/CMakeCCompiler.cmake
CMakeFiles/3.19.0-rc1/CMakeCXXCompiler.cmake
CMakeFiles/3.19.0-rc1/CMakeDetermineCompilerABI_C.bin
CMakeFiles/3.19.0-rc1/CMakeDetermineCompilerABI_CXX.bin
CMakeFiles/3.19.0-rc1/CMakeRCCompiler.cmake
CMakeFiles/3.19.0-rc1/CMakeSystem.cmake
CMakeFiles/3.19.0-rc1/CompilerIdC/CMakeCCompilerId.c
CMakeFiles/3.19.0-rc1/CompilerIdC/CompilerIdC.exe
CMakeFiles/3.19.0-rc1/CompilerIdC/CompilerIdC.vcxproj
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CMakeCCompilerId.obj
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.exe.recipe
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/CL.cc
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/CL.re
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/CL.wi
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/Com
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/link.c
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/link.r
CMakeFiles/3.19.0-rc1/CompilerIdC/Debug/CompilerIdC.tlog/link.v
CMakeFiles/3.19.0-rc1/CompilerIdCXX/CMakeCXXCompilerId.cpp
CMakeFiles/3.19.0-rc1/CompilerIdCXX/CompilerIdCXX.exe
```

```xml
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="16.0" xm
  <PropertyGroup>
    <PreferredToolArchitecture>x64</PreferredToolArchi
  </PropertyGroup>
  <ItemGroup Label="ProjectConfigurations">
    <ProjectConfiguration Include="Debug|x64">
      <Configuration>Debug</Configuration>
      <Platform>x64</Platform>
    </ProjectConfiguration>
    <ProjectConfiguration Include="Release|x64">
      <Configuration>Release</Configuration>
      <Platform>x64</Platform>
    </ProjectConfiguration>
    <ProjectConfiguration Include="MinSizeRel|x64">
      <Configuration>MinSizeRel</Configuration>
      <Platform>x64</Platform>
    </ProjectConfiguration>
    <ProjectConfiguration Include="RelWithDebInfo|x64"
      <Configuration>RelWithDebInfo</Configuration>
      <Platform>x64</Platform>
    </ProjectConfiguration>
  </ItemGroup>
  <PropertyGroup Label="Globals">
```

Committer Ugur Coruh <ugur.coruh.tr@gmail.com>

Github Create Repo


Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? Import a repository.

Owner * ucoruh / Repository name * rteu_ceng_cs103

Great repository names are short and memorable. Need inspiration? How about sturdy-spoon?

Description (optional)

[✓ Public] Anyone on the internet can see this repository. You choose who can commit.

Private You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

[✓ Add a README file] This is where you can write a long description for your project. Learn more.

Add .gitignore Choose which files not to track from a list of templates. Learn more.

Choose a license A license tells others what they can and can't do with your code. Learn more.

This will set main as the default branch. Change the default name in your settings.

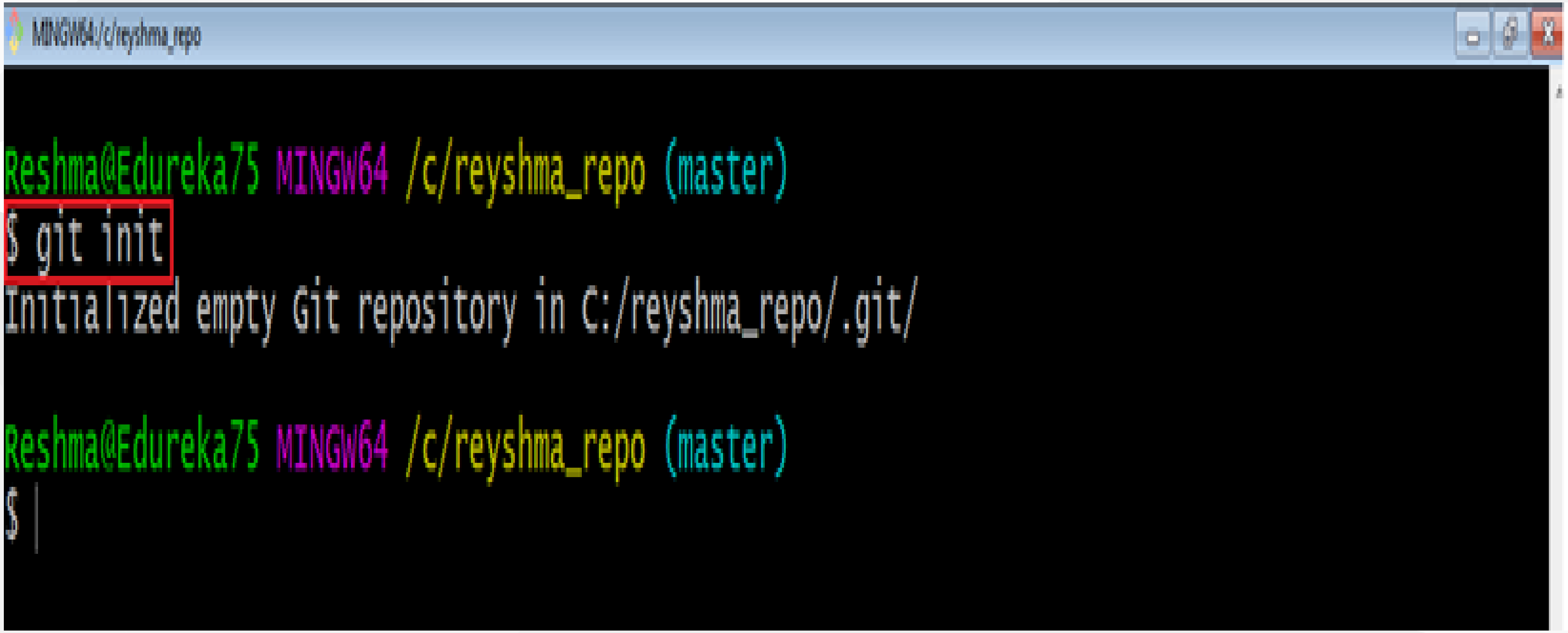
Initilization of Repo (not existing in github)

git init

- In order to do that, we use the command **git init**.
- **git init** creates an empty Git repository or re-initializes an existing one. It basically creates a **.git** directory with sub directories and template files. Running a **git init** in an existing repository will not overwrite things that are already there. It rather picks up the newly added templates.

```
git init
```

git init


MINGW64:/c/reyshma_repo

```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git init
Initialized empty Git repository in C:/reyshma_repo/.git/

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ |
```

Adding Initiated Repo Remote Upstream Repo (Link with Github Repo) (1)

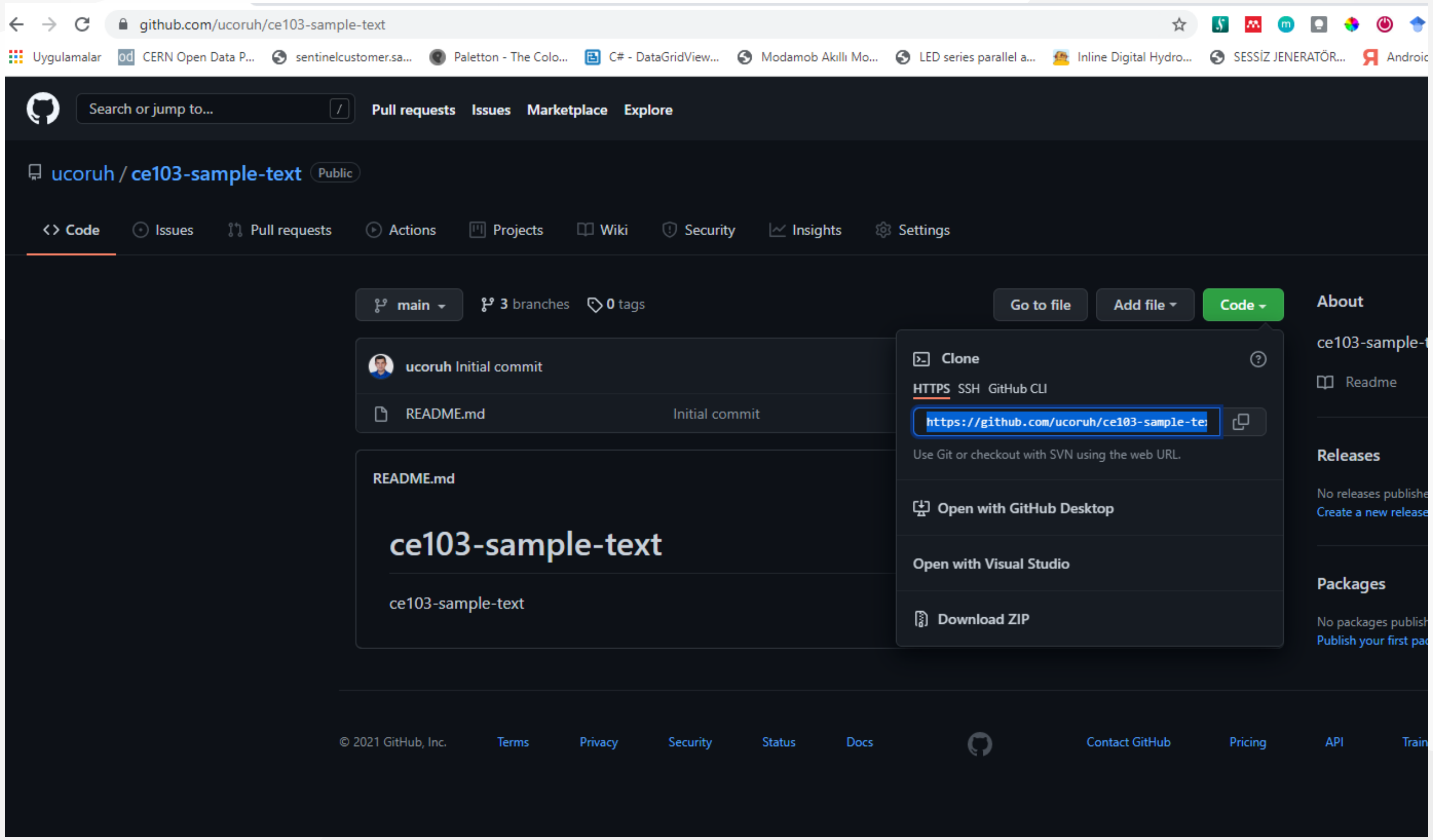
If you enter following command in the git folder you will see nothing

```
git remote -v
```

That mean this repository do not have a remote upstream repository such as a github or bitbucket repo.

Adding Initiated Repo Remote Upstream Repo (Link with Github Repo) (2)

Open the github and bitbucket repository and copy project path from



Adding Initiated Repo Remote Upstream Repo (Link with Github Repo) (3)

you will see the following sample from github code button

```
https://github.com/ucoruh/ce103-sample-text.git
```

Adding Initiated Repo Remote Upstream Repo (Link with Github Repo) (4)

copy link and use with following command

```
git remote add origin https://github.com/ucoruh/ce103-sample-text.git
```

Adding Initiated Repo Remote Upstream Repo (Link with Github Repo) (5)

then you can check your remote setting with

```
$ git remote -v
origin  https://github.com/ucoruh/ce103-sample-text.git (fetch)
origin  https://github.com/ucoruh/ce103-sample-text.git (push)
```

Adding Initiated Repo Remote Upstream Repo (Link with Github Repo) (6)

you can check the following sample

How to Add a New Remote to your Git Repo | Assembla Help Center

Now you can push your local changes to remote repository

If you see a repository on Github then you can download with following operation

Checkout a Repository (1)

create a working copy of a local repository by running the command

```
git clone /path/to/repository
```

Checkout a Repository (2)

Sample clone command

```
git clone https://github.com/ucoruh/ce103-sample-text.git
```

Checkout a Repository (3)

when using a remote server, your command will be

```
git clone username@host:/path/to/repository
```

Checking Repository Status (1)

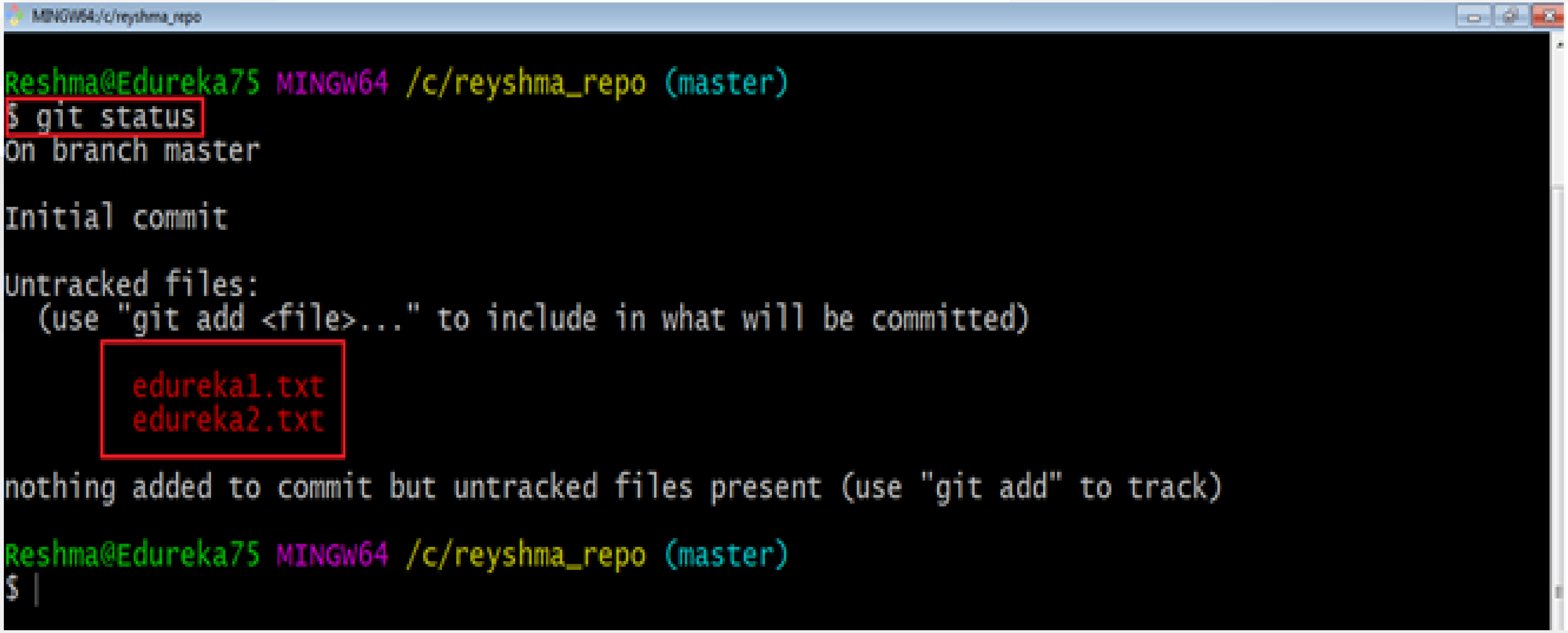
git status

The git status command lists all the modified files which are ready to be added to the local repository.

```
git status
```

Checking Repository Status (2)

git status



MINGW64:/c/reyshma_repo

```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git status
On branch master

Initial commit

Untracked files:
  (use "git add <file>..." to include in what will be committed)

        edureka1.txt
        edureka2.txt

nothing added to commit but untracked files present (use "git add" to track)

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ |
```

Adding Files to Index (1)

git add

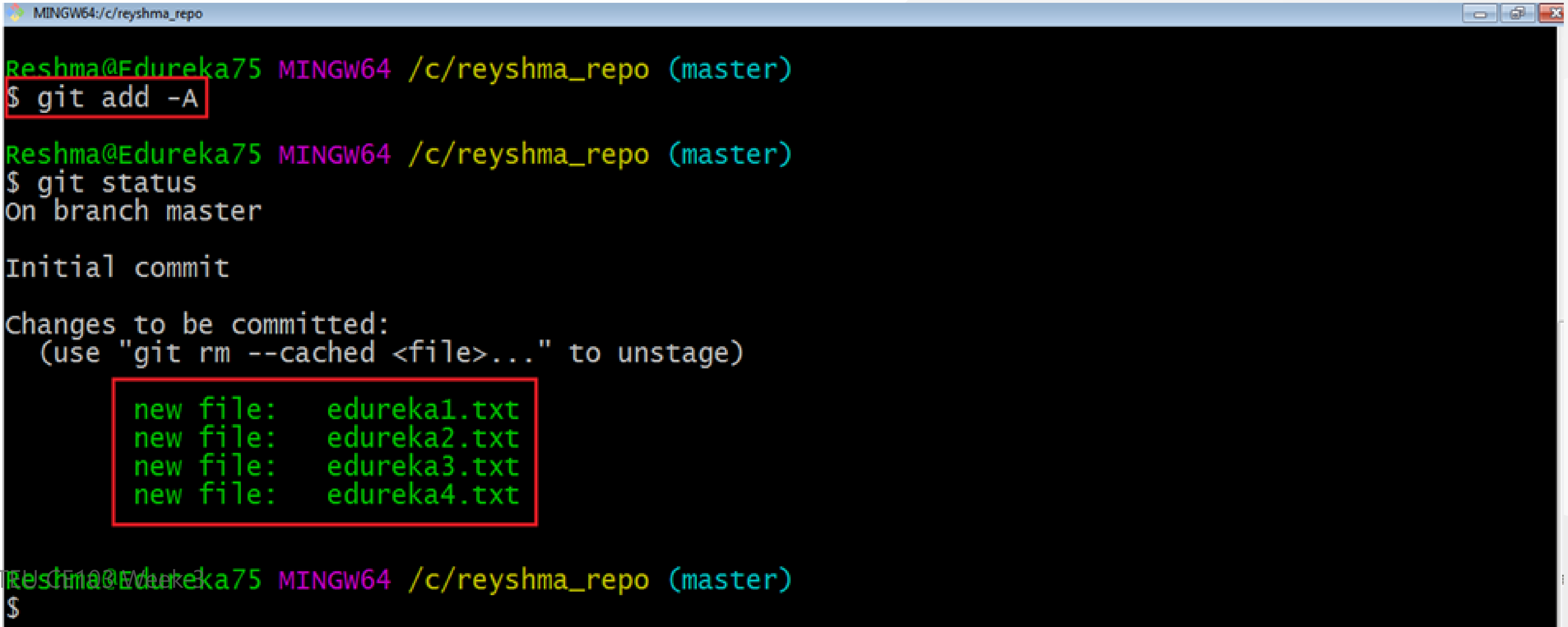
This command updates the index using the current content found in the working tree and then prepares the content in the staging area for the next commit.

```
git add <directory>
git add <file>
git add *
```

Adding Files to Index (1)

git add

Created two more files edureka3.txt and edureka4.txt. Let us add the files using the command git add -A. This command will add all the files to the index which are in the directory but not updated in the index yet.



MINGW64:/c/reyshma_repo

```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git add -A

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git status
On branch master

Initial commit

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

        new file:   edureka1.txt
        new file:   edureka2.txt
        new file:   edureka3.txt
        new file:   edureka4.txt


Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$
```

Commit Changes (1)

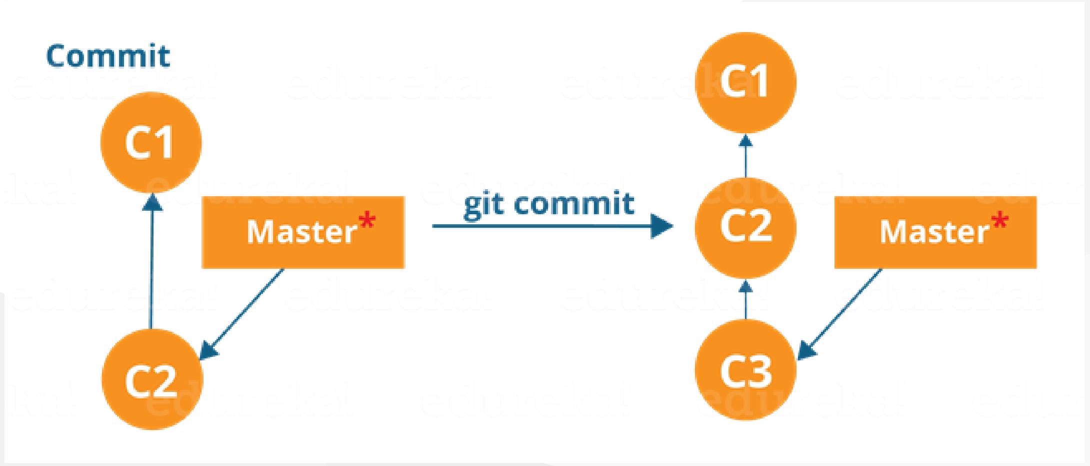
git commit

•It refers to recording snapshots of the repository at a given time. Committed snapshots will never change unless done explicitly.

Commit Changes (2)

git commit

Let me explain how commit works with the diagram below



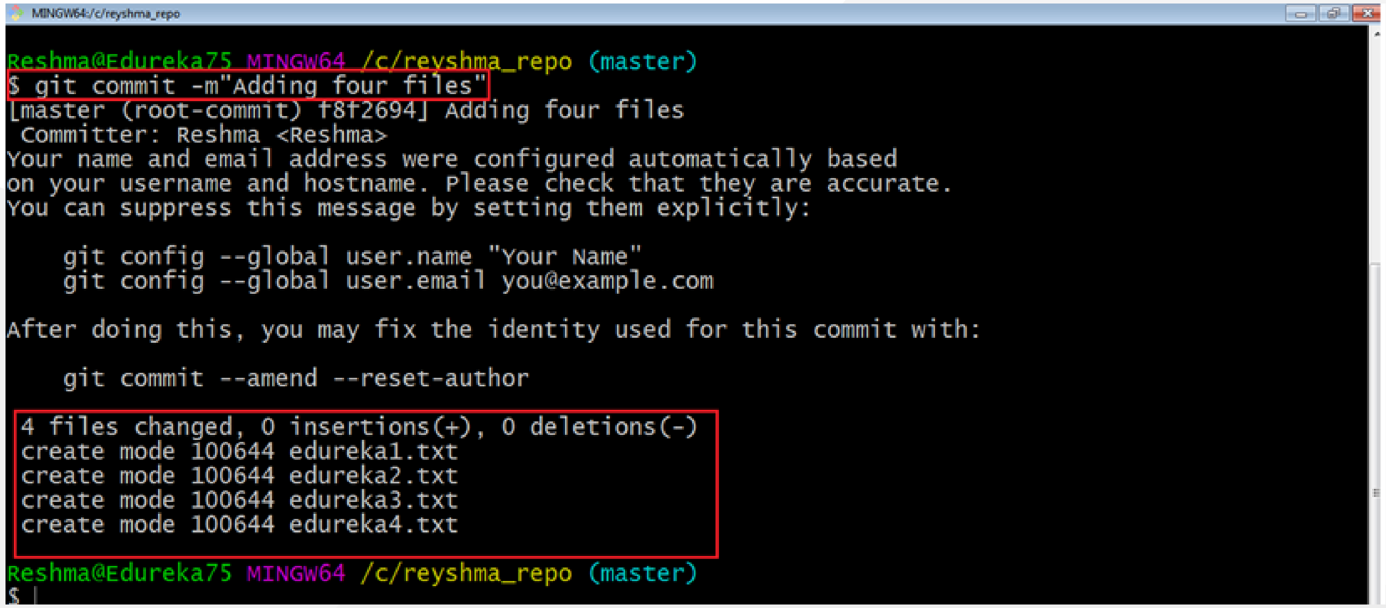
Here, C1 is the initial commit, i.e. the snapshot of the first change from which another snapshot is created with changes named C2. Note that the master points to the latest commit. Now, when I commit again, another snapshot C3 is created and now the master points to C3 instead of C2.

Commit Changes (3)

git commit

Commands:

```
git commit -m "<message>"
```



```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git commit -m"Adding four files"
[master (root-commit) f8f2694] Adding four files
 Committer: Reshma <Reshma>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly:

    git config --global user.name "Your Name"
    git config --global user.email you@example.com

After doing this, you may fix the identity used for this commit with:

    git commit --amend --reset-author

 4 files changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 edureka1.txt
 create mode 100644 edureka2.txt
 create mode 100644 edureka3.txt
 create mode 100644 edureka4.txt

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ 
```

Now, if you want to commit a snapshot of all the changes in the working directory at once, you can use the command below

Commit Changes (4)

git commit

Please check writing good commit messages article below

How to write a good commit message - DEV Community

Writing Good Commit Messages (1)

```
type: subject

body (optional)

footer (optional)
```

Writing Good Commit Messages (2)

1. Type

- **feat** - a new feature
- **fix** - a bug fix
- **docs** - changes in documentation
- **style** - everything related to styling
- **refactor** - code changes that neither fixes a bug or adds a feature
- **test** - everything related to testing
- **chore** - updating build tasks, package manager configs, etc

Writing Good Commit Messages (3)

2. Subject

This contains a short description of the changes made. It shouldn't be greater than 50 characters, should begin with a capital letter and written in the imperative eg. Add instead of Added or Adds.

Writing Good Commit Messages (4)

3. Body

The body is used to explain what changes you made and why you made them. Not all commits are complex enough that they need a body, especially if you are working on a personal project alone, and as such writing a body is optional.

A blank line between the body and the subject is required and each line should have no more than 72 characters.

Writing Good Commit Messages (5)

4.Footer

The footer is also optional and mainly used when you are using an issue tracker to reference the issue ID.

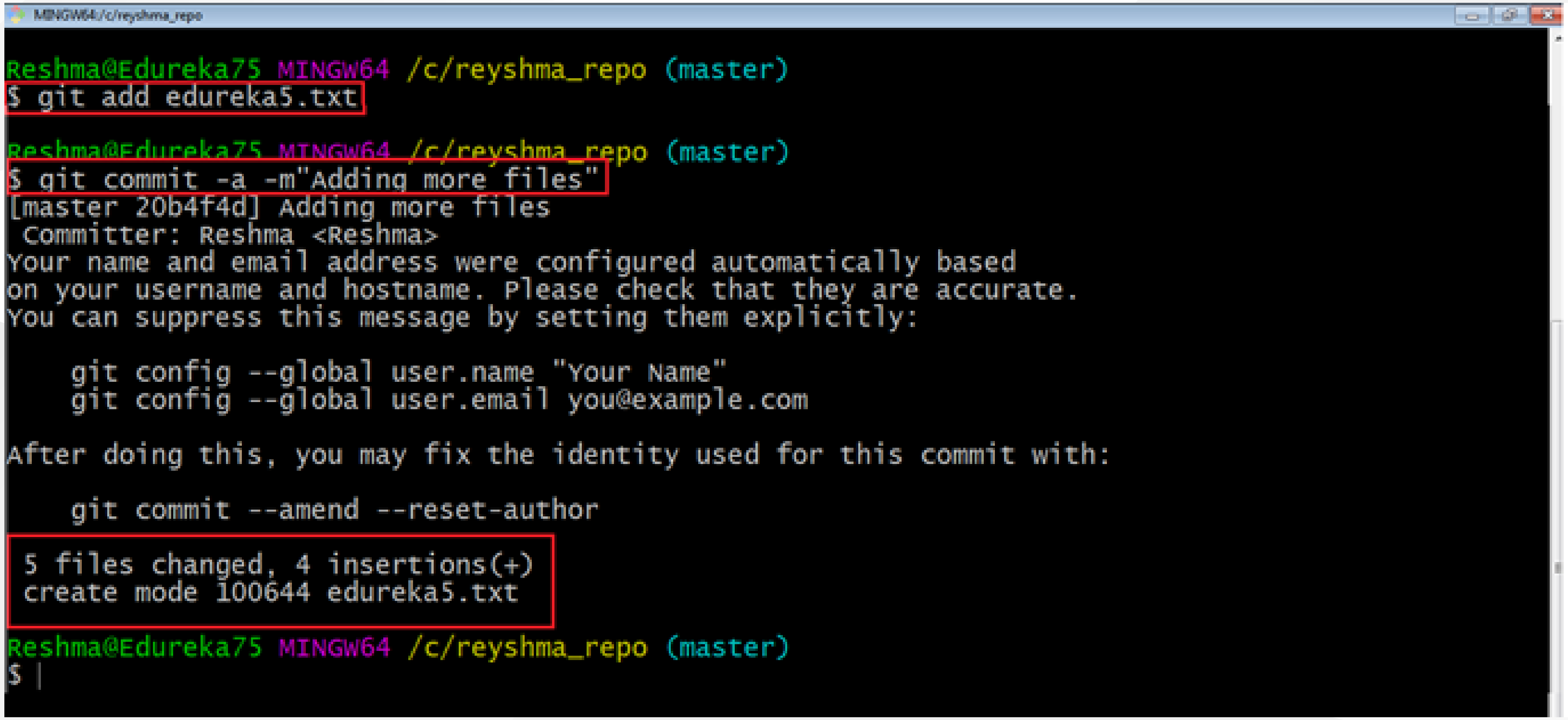
Writing Good Commit Messages (6)

Example Commit Message

```
feat: Summarize changes in around 50 characters or less

More detailed explanatory text, if necessary. Wrap it to about 72
characters or so. In some contexts, the first line is treated as the
subject of the commit and the rest of the text as the body. The
blank line separating the summary from the body is critical (unless
you omit the body entirely); various tools like `log`, `shortlog`
and `rebase` can get confused if you run the two together.

Explain the problem that this commit is solving. Focus on why you
are making this change as opposed to how (the code explains that).
Are there side effects or other unintuitive consequences of this
change? Here's the place to explain them.

Further paragraphs come after blank lines.

 - Bullet points are okay, too

 - Typically a hyphen or asterisk is used for the bullet, preceded
   by a single space, with blank lines in between, but conventions
   vary here

If you use an issue tracker, put references to them at the bottom,
like this:

Resolves: #123
See also: #456, #789
```

Writing Good Commit Messages (7)

```
git commit -a
```



```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git add edureka5.txt

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git commit -a -m"Adding more files"
[master 20b4f4d] Adding more files
 Committer: Reshma <Reshma>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly:

    git config --global user.name "Your Name"
    git config --global user.email you@example.com

After doing this, you may fix the identity used for this commit with:

    git commit --amend --reset-author

 5 files changed, 4 insertions(+)
 create mode 100644 edureka5.txt

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ |
```

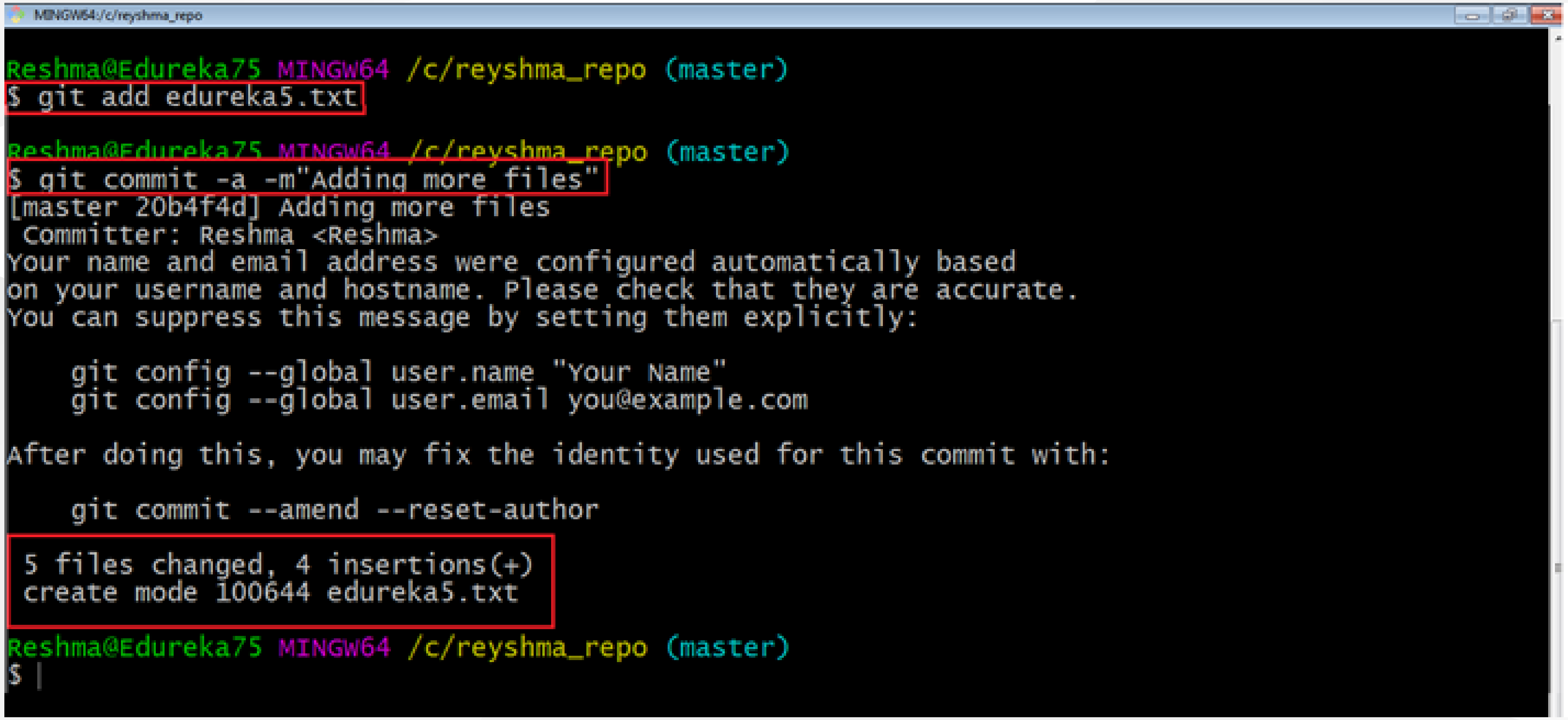
Add Files to Index (1)

I have created two more text files in my working directory viz. edureka5.txt and edureka6.txt but they are not added to the index yet.

I am adding edureka5.txt using the command

```
git add edureka5.txt
```

Add Files to Index (2)


MINGW64:/c/reyshma_repo

```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git add edureka5.txt

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git commit -a -m"Adding more files"
[master 20b4f4d] Adding more files
 Committer: Reshma <Reshma>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly:

    git config --global user.name "Your Name"
    git config --global user.email you@example.com

After doing this, you may fix the identity used for this commit with:

    git commit --amend --reset-author

 5 files changed, 4 insertions(+)
 create mode 100644 edureka5.txt

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ |
```

Add Files to Index (3)

I have added edureka5.txt to the index explicitly but not edureka6.txt and made changes in the previous files. I want to commit all changes in the directory at once.

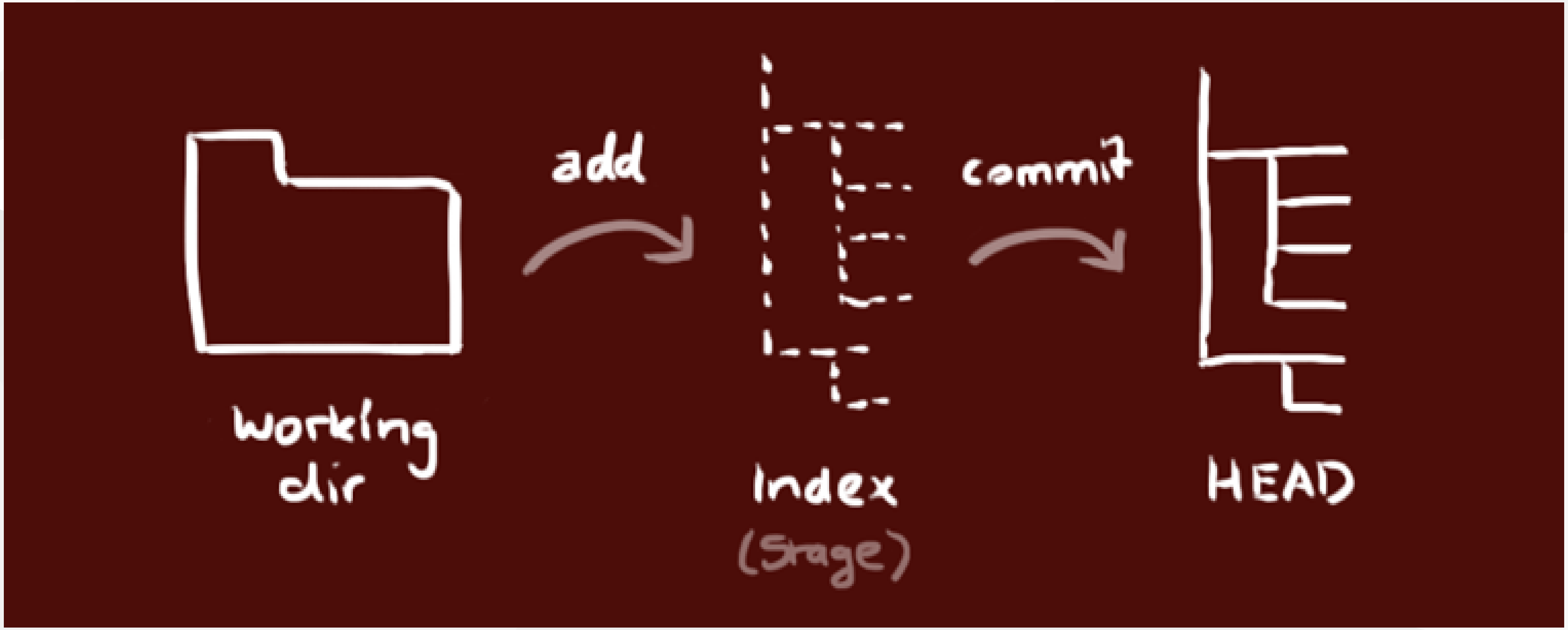
Add Files to Index (4)

> This command will commit a snapshot of all changes in the working directory but only includes modifications to tracked files i.e. the files that have been added with git add at some point in their history. Hence, edureka6.txt was not committed because it was not added to the index yet. But changes in all previous files present in the repository were committed, i.e. edureka1.txt, edureka2.txt, edureka3.txt, edureka4.txt and edureka5.txt. Now I have made my desired commits in my local repository

Add Files to Index (5)

your local repository consists of three "trees" maintained by git. the first one is your Working Directory which holds the actual files. the second one is the Index which acts as a staging area and finally the HEAD which points to the last commit you've made

Add Files to Index (6)



Update local repo before sending (1)

Fetching

If we have a remote Git branch, for example a branch on Github, it can happen that the remote branch has commits that the current branch doesn't have! Maybe another branch got merged, your colleague pushed a quick fix, and so on.

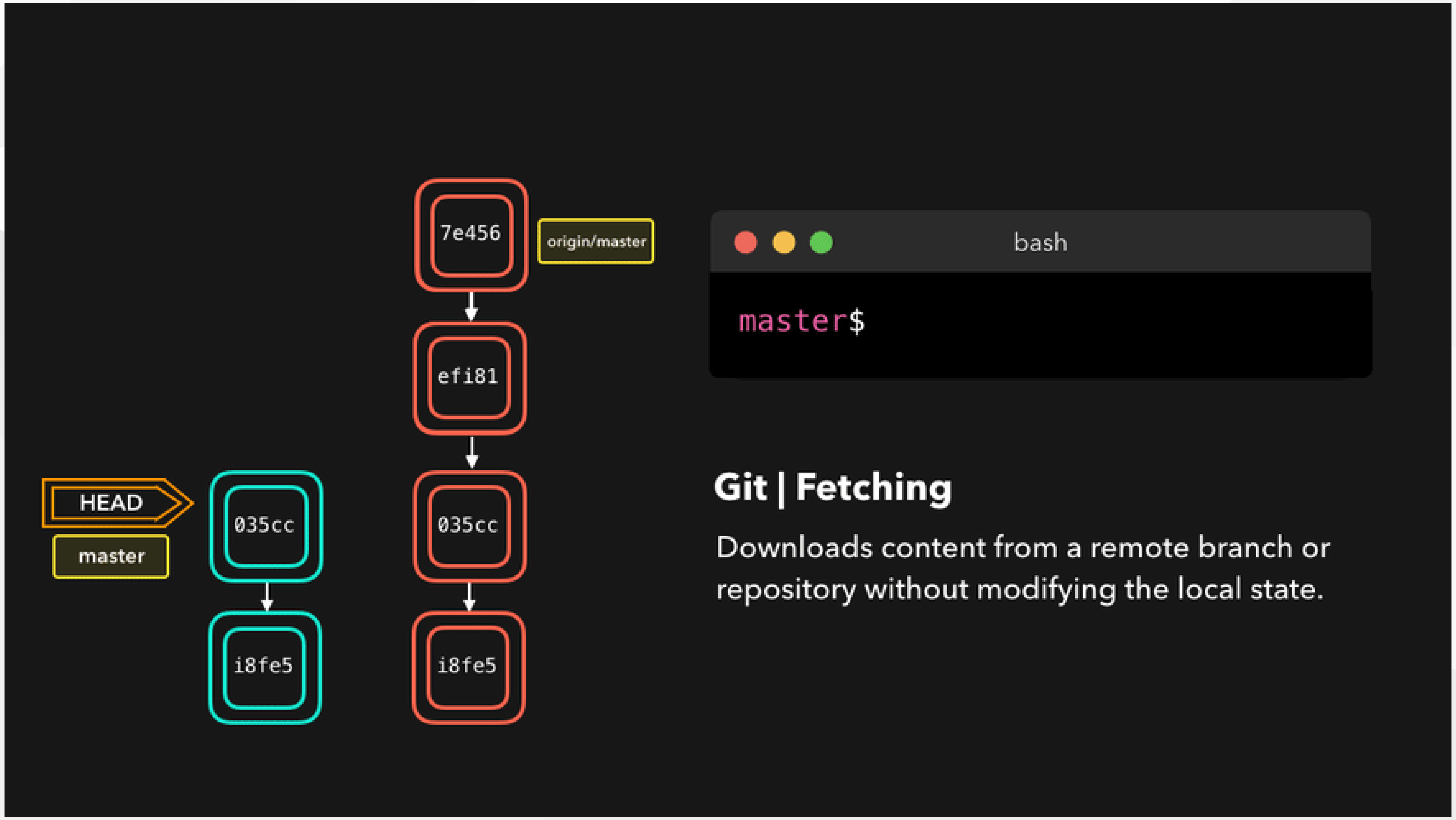
Update local repo before sending (2)

Fetching

We can get these changes locally, by performing a `git fetch` on the remote branch! It doesn't affect your local branch in any way: a `fetch` simply downloads new data.

Update local repo before sending (3)

Fetching



```
master$
```

Git | Fetching

Downloads content from a remote branch or repository without modifying the local state.

Update local repo before sending (4)

Fetching

We can now see all the changes that have been made since we last pushed! We can decide what we want to do with the new data now that we have it locally.

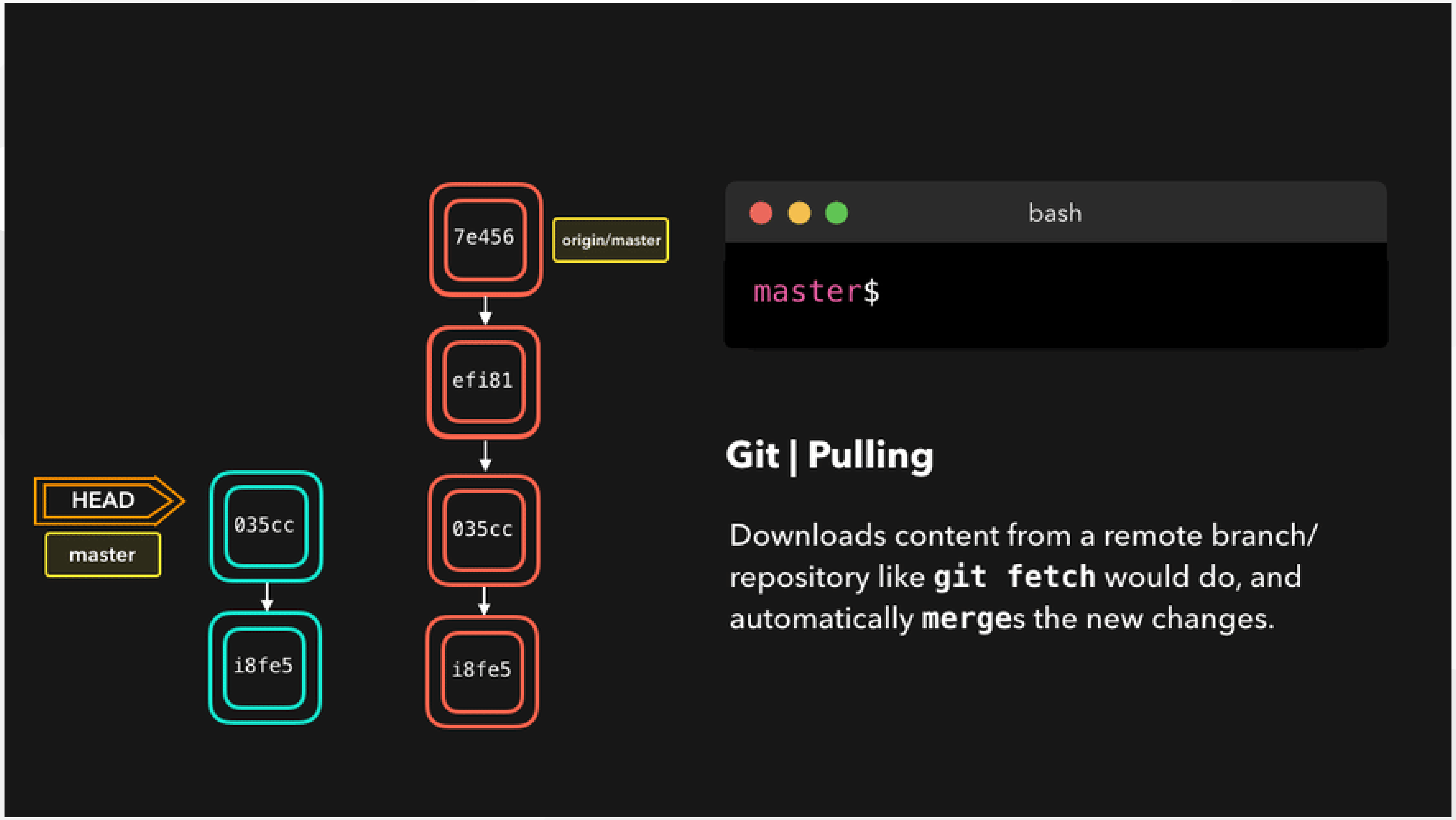
Update local repo before sending (5)

Pulling

Although a `git fetch` is very useful in order to get the remote information of a branch, we can also perform a `git pull`. A `git pull` is actually two commands in one: a `git fetch`, and a `git merge`. When we're pulling changes from the origin, we're first fetching all the data like we did with a `git fetch`, after which the latest changes are automatically merged into the local branch

Update local repo before sending (6)

Pulling



```
master$
```

Git | Pulling

Downloads content from a remote branch/ repository like **`git fetch`** would do, and automatically **`merge`**s the new changes.

Update local repo before sending (7)

Pulling

Awesome, we're now perfectly in sync with the remote branch and have all the latest changes!

Update local repo before sending (8)

Pulling

git pull

Note that before you affect changes to the central repository you should always pull changes from the central repository to your local repository to get updated with the work of all the collaborators that have been contributing in the central repository. For that we will use the pull command.

Update local repo before sending (9)

Pulling

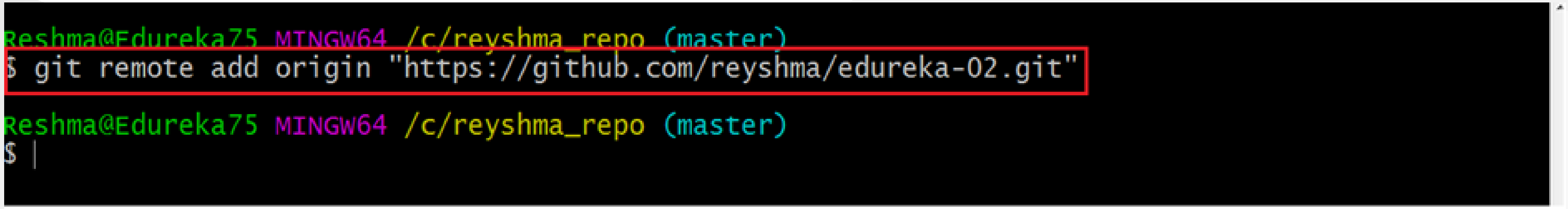
git pull

But first, you need to set your central repository as origin using the command

```
git remote add origin <link of your central repository>
```

Update local repo before sending (10)

Pulling / `git pull`



```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git remote add origin "https://github.com/reyshma/edureka-02.git"

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ |
```

> Now that my origin is set

Update local repo before sending (11)

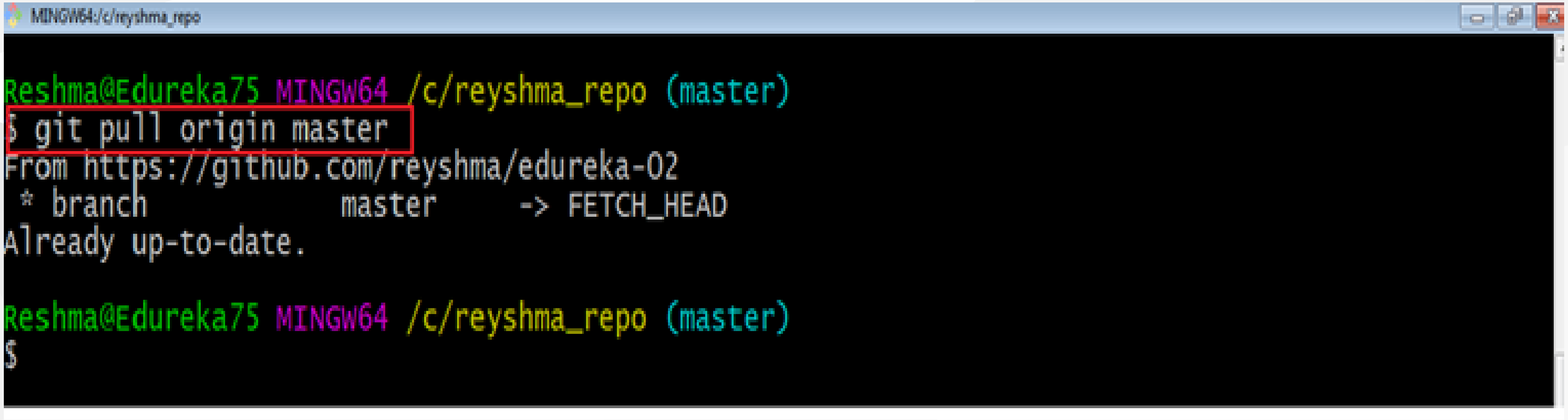
Pulling / `git pull`

let us extract files from the origin using pull. For that use the command

```
git pull origin master
```

Update local repo before sending (12)

Pulling / `git pull`



```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git pull origin master
From https://github.com/reyshma/edureka-02
 * branch            master     -> FETCH_HEAD
Already up-to-date.

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$
```

This command will copy all the files from the master branch of remote repository to your local repository.

Update local repo before sending (13)

Pulling / `git pull`

> Since my local repository was already updated with files from master branch, hence the message is Already up-to-date. Refer to the screen shot above

Update local repo before sending (14)

Pulling / `git pull`

One can also try pulling files from a different branch using the following command:

```
git pull origin <branch-name>
```

Update local repo before sending (15)

Pulling / `git pull`

> Your local Git repository is now updated with all the recent changes. It is time you make changes in the central repository by using the push command.

Send Changes to Remote Repo (1)

git push

- This command transfers commits from your local repository to your remote repository. It is the opposite of pull operation.

Send Changes to Remote Repo (2)

git push

- Pulling imports commits to local repositories whereas pushing exports commits to the remote repositories

Send Changes to Remote Repo (3)

git push

- The use of git push is to publish your local changes to a central repository. After you’ve accumulated several local commits and are ready to share them with the rest of the team,

Send Changes to Remote Repo (4)

git push

you can then push them to the central repository by using the following command

```
git push <remote>
```

Send Changes to Remote Repo (5)

git push

> This remote refers to the remote repository which had been set before using the pull command.

Send Changes to Remote Repo (6)

git push

- This pushes the changes from the local repository to the remote repository along with all the necessary commits and internal objects. This creates a local branch in the destination repository

Send Changes to Remote Repo (7)

git push

The below files are the files which we have already committed previously in the commit section and they are all “push-ready“.

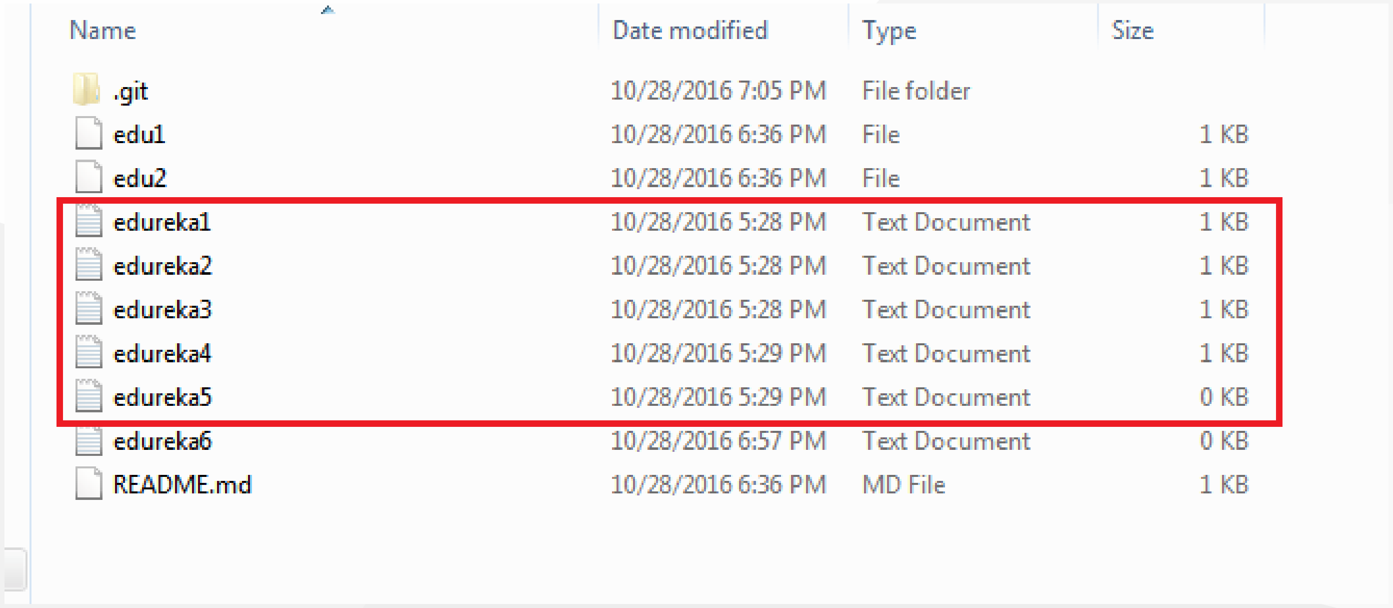
Send Changes to Remote Repo (8)

git push

I will use the command `git push origin master` to reflect these files in the master branch of my central repository.

Send Changes to Remote Repo (9)

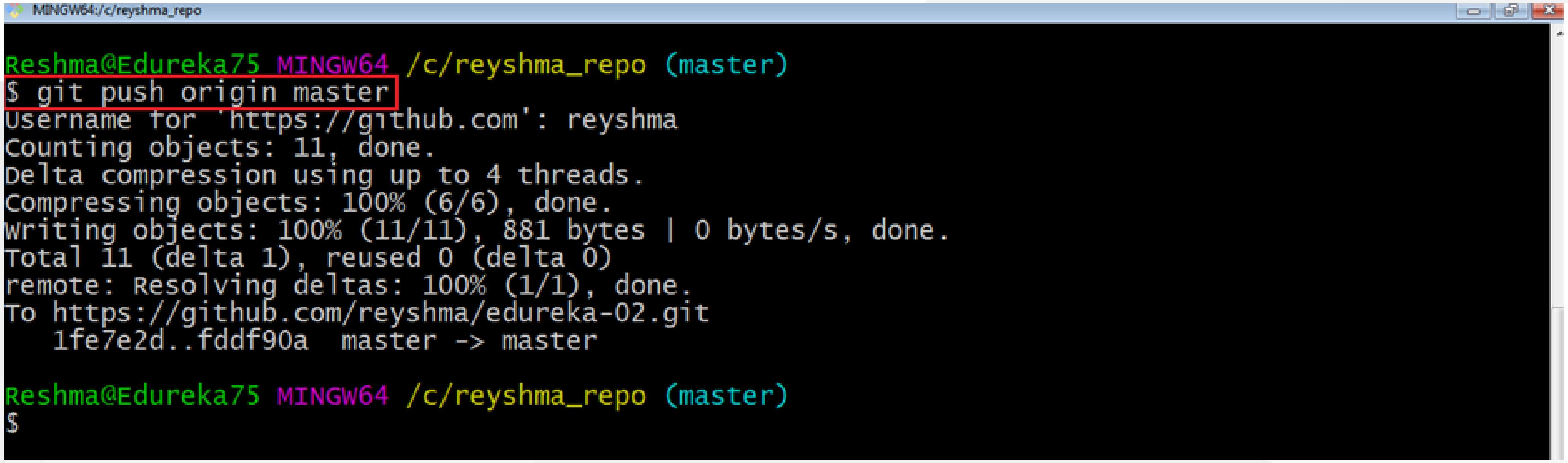
git push



Name	Date modified	Type	Size
.git	10/28/2016 7:05 PM	File folder	
edu1	10/28/2016 6:36 PM	File	1 KB
edu2	10/28/2016 6:36 PM	File	1 KB
edureka1	10/28/2016 5:28 PM	Text Document	1 KB
edureka2	10/28/2016 5:28 PM	Text Document	1 KB
edureka3	10/28/2016 5:28 PM	Text Document	1 KB
edureka4	10/28/2016 5:29 PM	Text Document	1 KB
edureka5	10/28/2016 5:29 PM	Text Document	0 KB
edureka6	10/28/2016 6:57 PM	Text Document	0 KB
README.md	10/28/2016 6:36 PM	MD File	1 KB

Send Changes to Remote Repo (10)

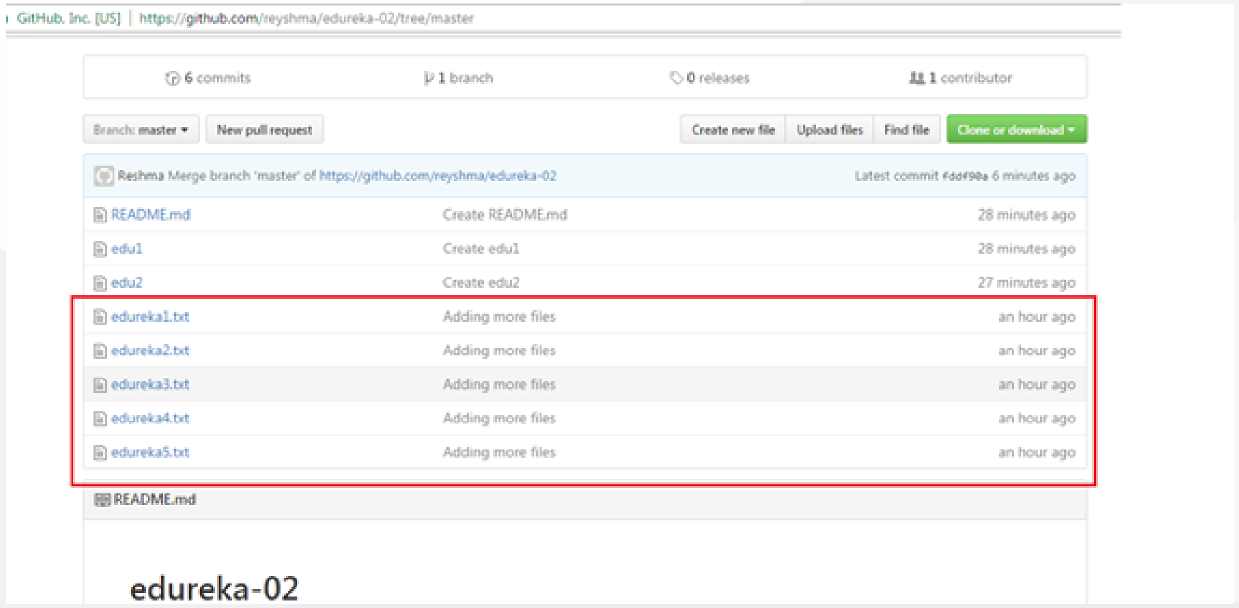
git push



```
Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$ git push origin master
Username for 'https://github.com': reyshma
Counting objects: 11, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (11/11), 881 bytes | 0 bytes/s, done.
Total 11 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), done.
To https://github.com/reyshma/edureka-02.git
   1fe7e2d..fddf90a  master -> master

Reshma@Edureka75 MINGW64 /c/reyshma_repo (master)
$
```

Send Changes to Remote Repo (11)

git push



GitHub, Inc. [US] | https://github.com/reyshma/edureka-02/tree/master

6 commits | 1 branch | 0 releases | 1 contributor

Reshma Merge branch 'master' of https://github.com/reyshma/edureka-02 Latest commit fddf90a 6 minutes ago

README.md	Create README.md	28 minutes ago
edu1	Create edu1	28 minutes ago
edu2	Create edu2	27 minutes ago
edureka1.txt	Adding more files	an hour ago
edureka2.txt	Adding more files	an hour ago
edureka3.txt	Adding more files	an hour ago
edureka4.txt	Adding more files	an hour ago
edureka5.txt	Adding more files	an hour ago

README.md

edureka-02

Send Changes to Remote Repo (12)

git push

> To prevent overwriting, Git does not allow push when it results in a non-fast forward merge in the
> destination repository.

Send Changes to Remote Repo (13)

git push

> A non-fast forward merge means an upstream merge i.e. merging with ancestor or parent branches from a child branch
> To enable such merge, use the command below
>
> ```
> git push <remote> -force
> ```

The above command forces the push operation even if it results in a non-fast forward merge

Branching (1)

git branch

Branches in Git are nothing but pointers to a specific commit. Git generally prefers to keep its branches as lightweight as possible.

Branching (2)

git branch

There are basically two types of branches viz.

- local branches
- remote tracking branches.

Branching (3)

git branch

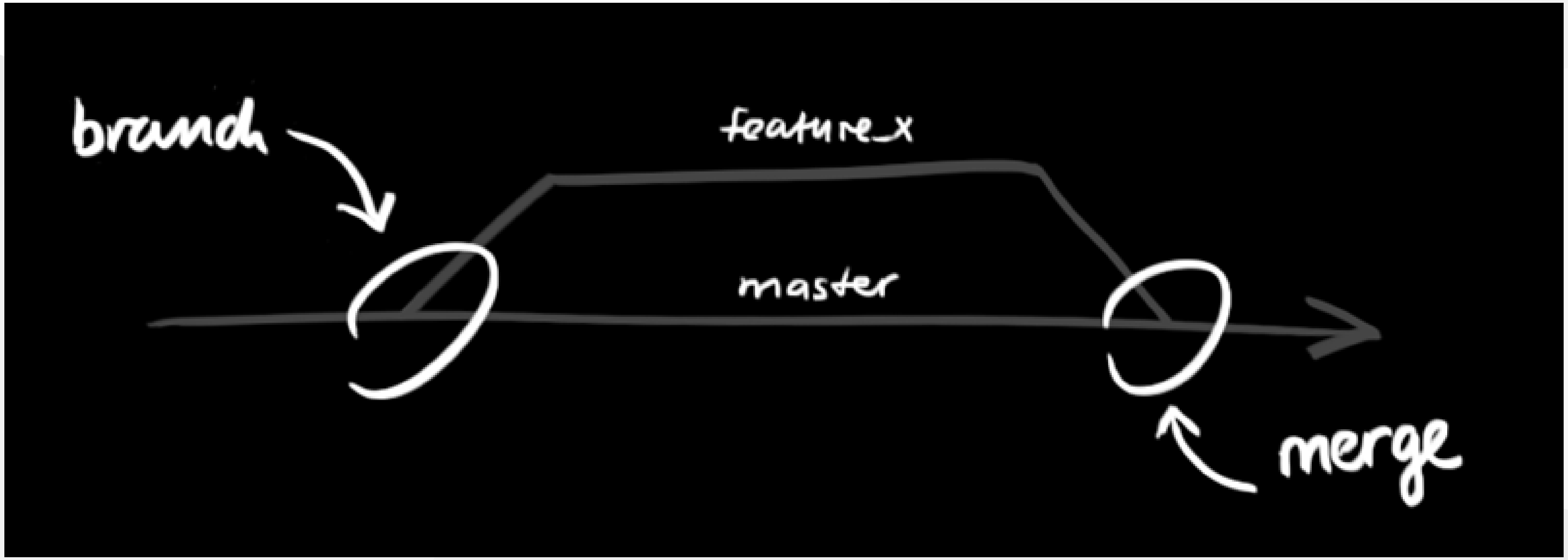
A local branch is just another path of your working tree. On the other hand, remote tracking branches have special purposes. Some of them are:

They link your work from the local repository to the work on central repository.

Branching (4)

git branch

They automatically detect which remote branches to get changes from, when you use git pull.



Branching (5)

Learn current branch

You can check what your current branch is by using the command

```
git branch
```

The one mantra that you should always be chanting while branching is “branch early, and branch often”

Branching (6)

List Local Branches

```
git branch -l
```

Branching (7)

List Remote Branches

```
git branch -r
```

Branching (8)

List All Local and Remote Branches

```
git branch -a
```

Branching (9)

Removing merged git branches

(after pull-request action in github)

If you merged your branch to base branch in github and delete it on github your local branch list will not be updated by it self. You have to use the following command to update local and remote branch lists. Use the following command to syncronize your repository with remote upstream repo.

```
git remote update --prune
```

Branching (10)

Create Branch

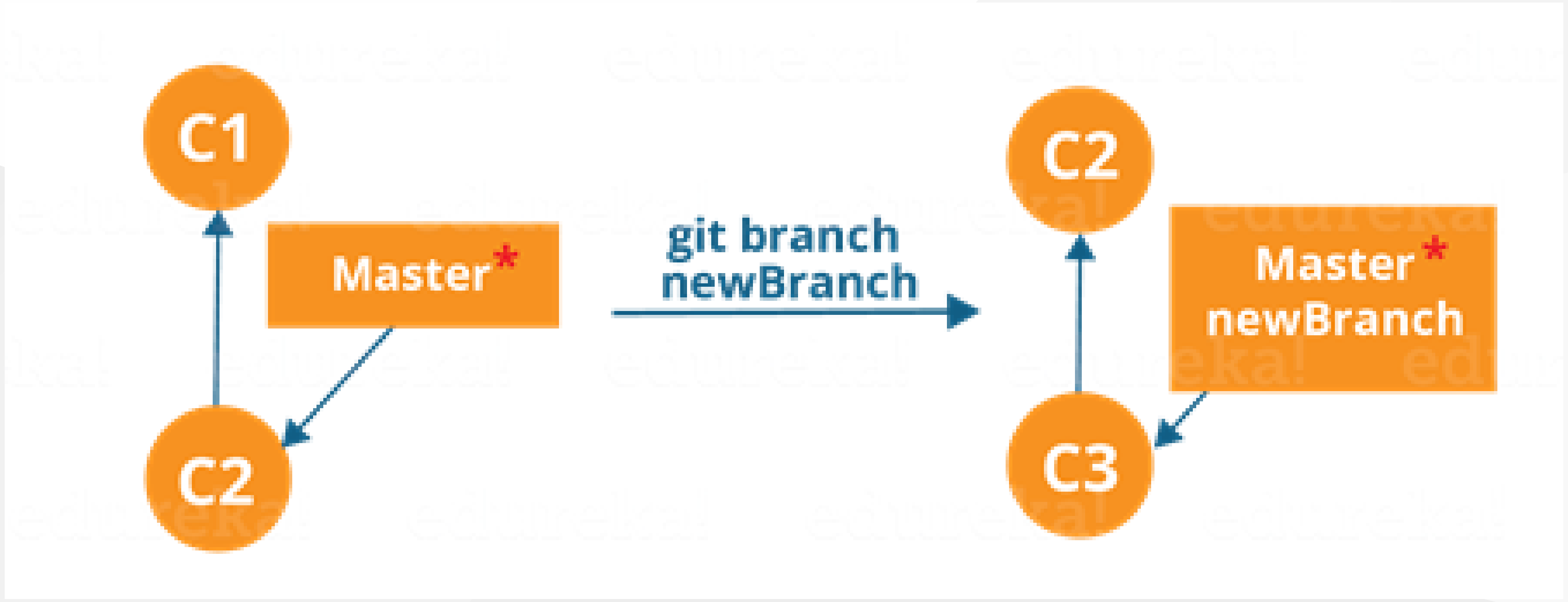
To create a new branch we use the following command

```
git branch <branch-name>
```

The diagram below shows the workflow when a new branch is created. When we create a new branch it originates from the master branch itself.

Branching (11)

Create Branch



Branching (12)

Create Branch

Since there is no storage/memory overhead with making many branches, it is easier to logically divide up your work rather than have big chunky branches

You can create and change branch with following command, create a new branch named "feature_x" and switch to it using

```
git checkout -b feature_x
```

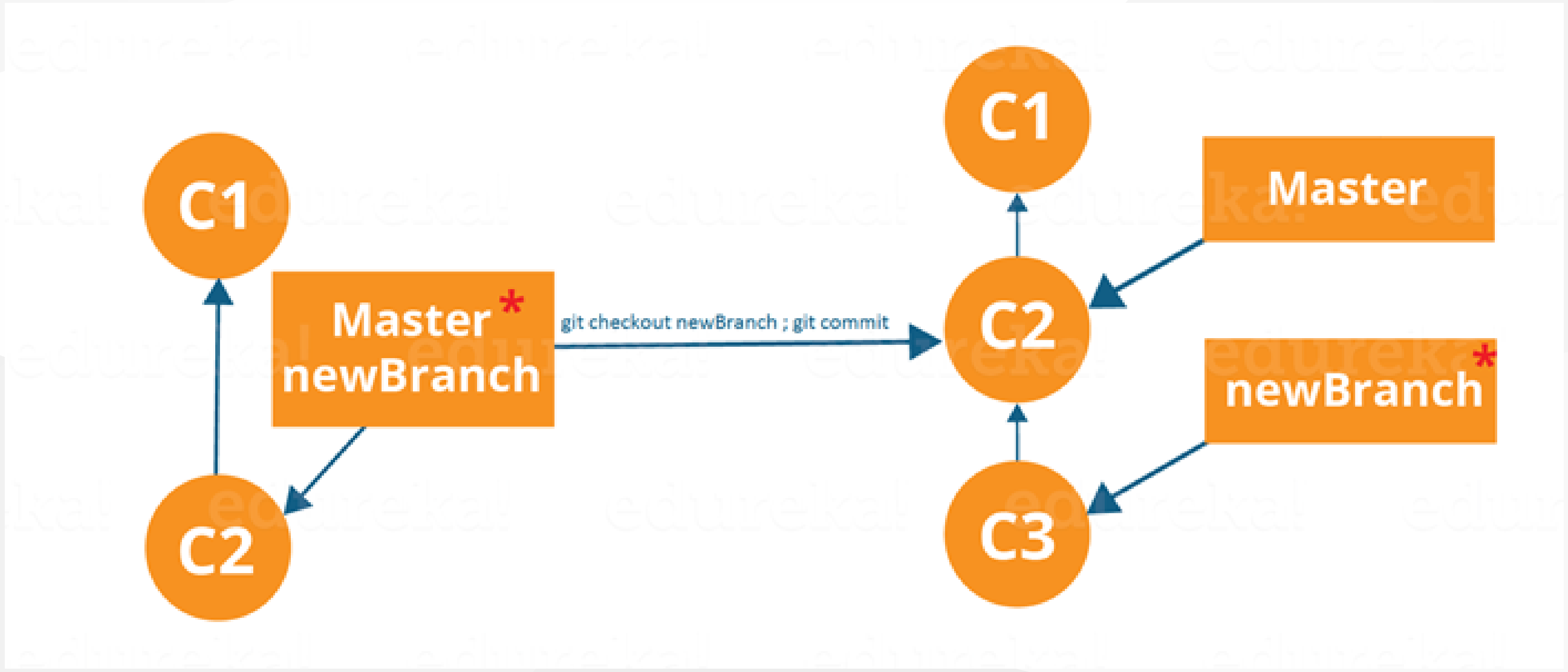
Branching (13)

Change Branch

```
git checkout <branch-name>

git checkout master
```

Branching (14)

Change Branch



> Branching includes the work of a particular commit along with all parent commits. As you can see in the diagram above, the newBranch has detached itself from the master and hence will create a different path

Branching (15)

Delete Local Branch

and delete the branch again, before doing this switch to main or master branches.

```
git branch -d feature_x
```

Branching (16)

Delete Remote Branch

and delete the branch again, before doing this switch to main or master branches.

```
git push origin --delete feature_x
```

How to delete remote branches in Git

Branching (17)

Push Specific Branch to Remote

A branch is not available to others unless you push the branch to your remote repository

```
git push origin <branch>
```

Branching (18)

Update & Merge (Conflicts)

to update your local repository to the newest commit, execute

```
git pull
```

in your working directory to fetch and merge remote changes.

to merge another branch into your active branch (e.g. master), use

```
git merge <branch>
```

Branching (19)

Update & Merge (Conflicts)

in both cases git tries to auto-merge changes. Unfortunately, this is not always possible and results in conflicts. You are responsible to merge those conflicts manually by editing the files shown by git. After changing, you need to mark them as merged with

```
git add <filename>
```

before merging changes, you can also preview them by using

```
git diff <source_branch> <target_branch>
```

Git merge conflicts | Atlassian Git Tutorial

Branching (20)

Update & Merge (Conflicts)

There are two types of merges Git can perform: a **fast-forward**, or a **no-fast-forward**

Branching (21)

Update & Merge (Conflicts)

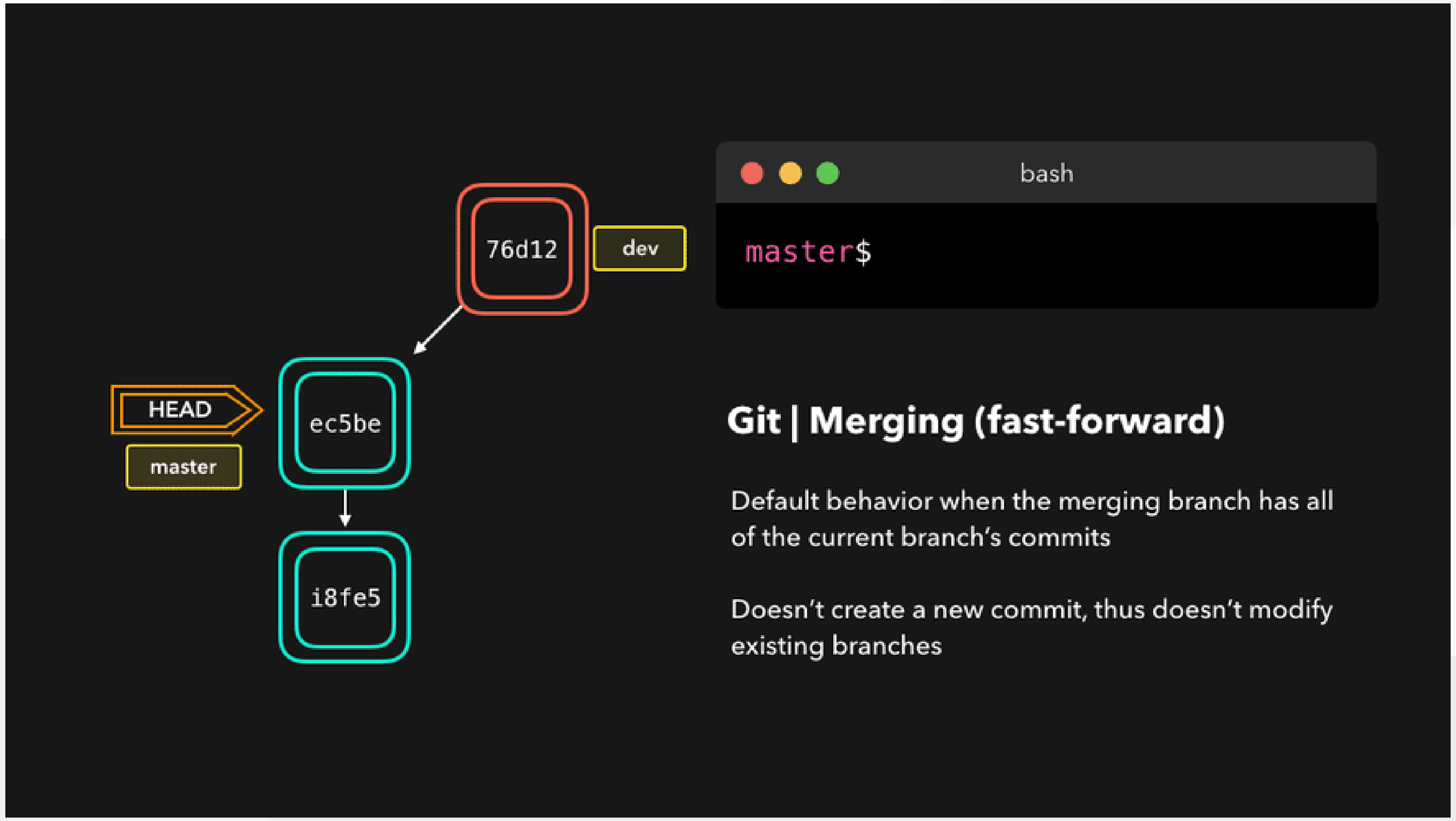
Fast-forward (`--ff`)

A **fast-forward merge** can happen when the current branch has no extra commits compared to the branch we're merging. Git is... *lazy* and will first try to perform the easiest option: the fast-forward! This type of merge doesn't create a new commit, but rather merges the commit(s) on the branch we're merging right in the current branch

Branching (22)

Update & Merge (Conflicts)

Fast-forward (`--ff`)



```
master$
```

Git | Merging (fast-forward)

Default behavior when the merging branch has all of the current branch's commits

Doesn't create a new commit, thus doesn't modify existing branches

Branching (23)

Update & Merge (Conflicts)

Perfect! We now have all the changes that were made on the `dev` branch available on the `master` branch. So, what's the **no-fast-forward** all about?

Branching (24)

Update & Merge (Conflicts)

No-fast-foward (`--no-ff`)

It's great if your current branch doesn't have any extra commits compared to the branch that you want to merge, but unfortunately that's rarely the case! If we committed changes on the current branch that the branch we want to merge doesn't have, git will perform a *no-fast-forward* merge.

Branching (25)

Update & Merge (Conflicts)

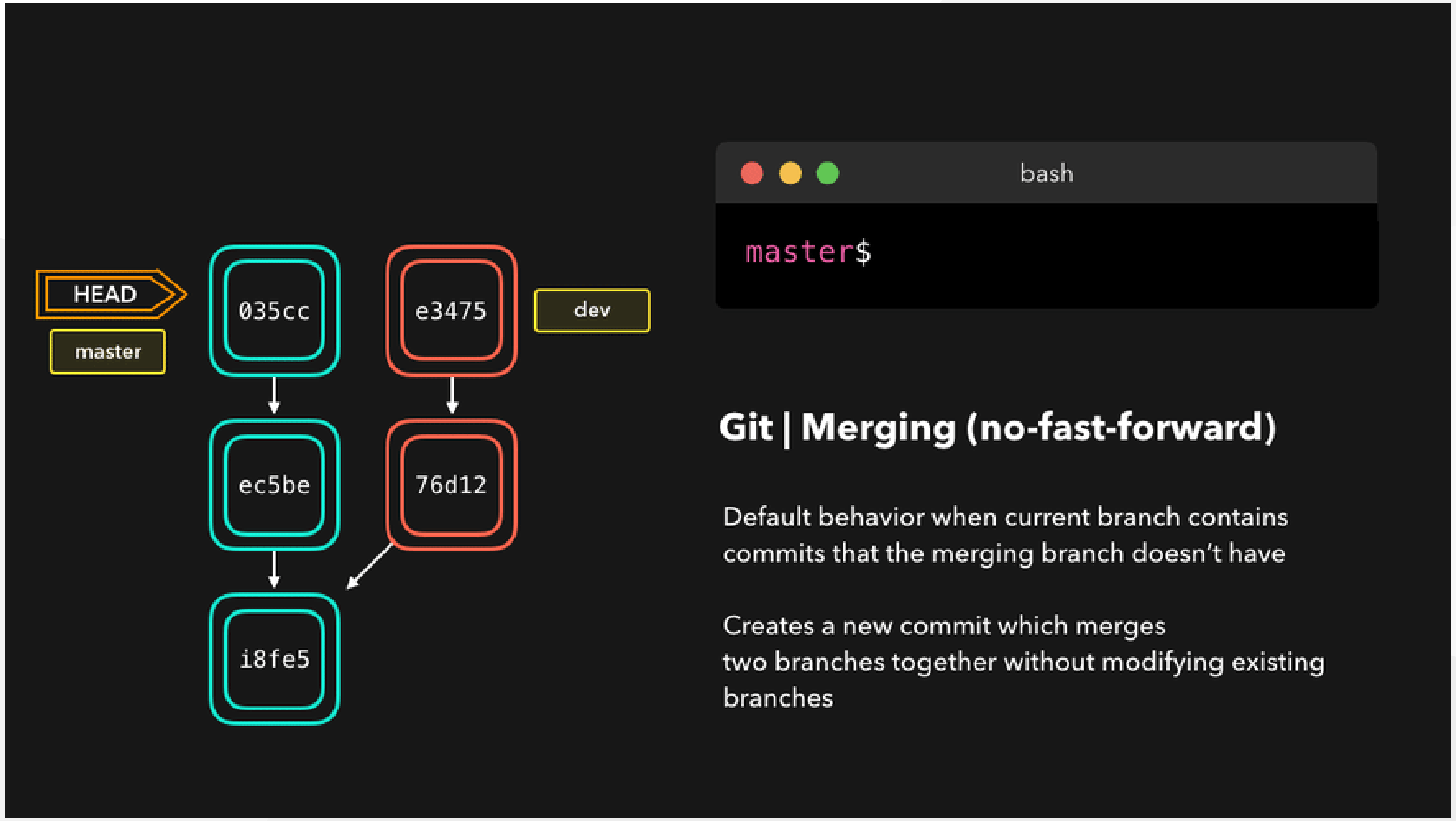
No-fast-foward (`--no-ff`)

With a no-fast-forward merge, Git creates a new *merging commit* on the active branch. The commit's parent commits point to both the active branch and the branch that we want to merge!

Branching (26)

Update & Merge (Conflicts)

No-fast-foward (`--no-ff`)



```
master$
```

Git | Merging (no-fast-forward)

Default behavior when current branch contains commits that the merging branch doesn't have

Creates a new commit which merges two branches together without modifying existing branches

Branching (27)

Update & Merge (Conflicts)

No-fast-foward (`--no-ff`)

No big deal, a perfect merge! The `master` branch now contains all the changes that we've made on the `dev` branch.

Branching (28)

Merge Conflicts

Although Git is good at deciding how to merge branches and add changes to files, it cannot always make this decision all by itself This can happen when the two branches we're trying to merge have changes on the same line in the same file, or if one branch deleted a file that another branch modified, and so on.

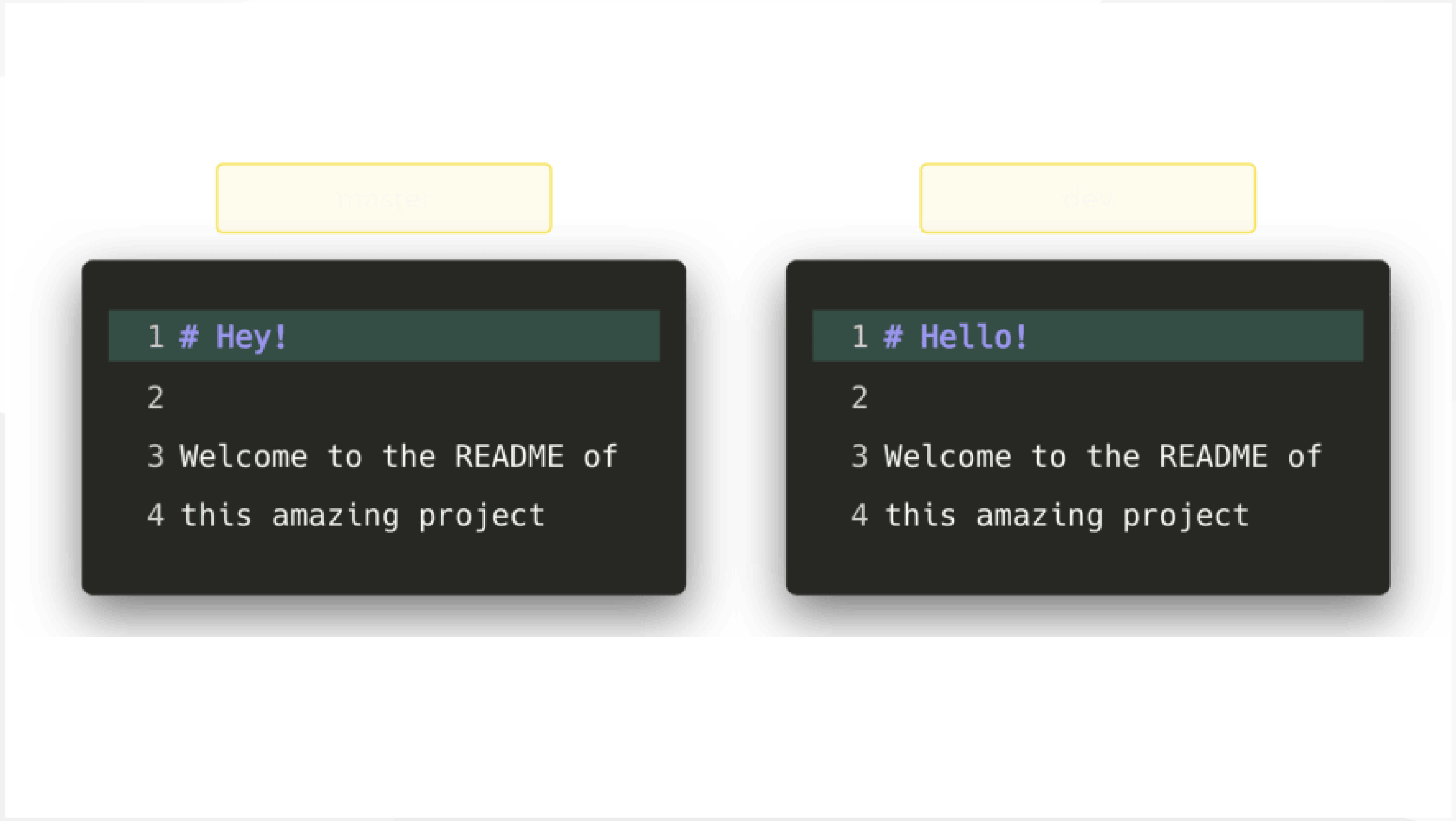
Branching (29)

Merge Conflicts

In that case, Git will ask you to help decide which of the two options we want to keep! Let's say that on both branches, we edited the first line in the `README.md`.

Branching (30)

Merge Conflicts



```
# Hey!

Welcome to the README of
this amazing project
```

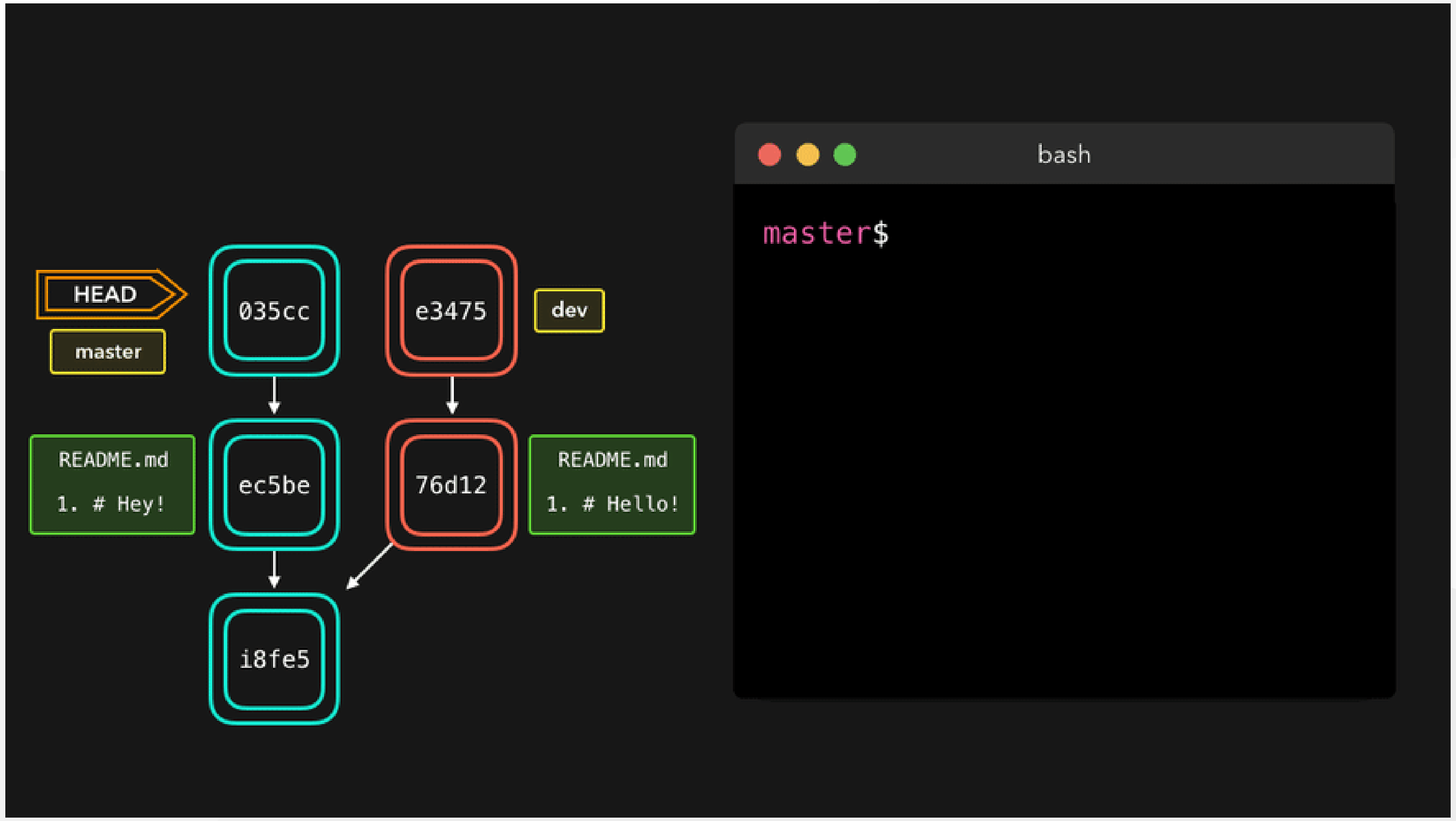
```
# Hello!

Welcome to the README of
this amazing project
```

If we want to merge `dev` into `master`, this will end up in a merge conflict: would you like the title to be `Hello!` or `Hey!`?

Branching (31)

Merge Conflicts

When trying to merge the branches, Git will show you where the conflict happens. We can manually remove the changes we don't want to keep, save the changes, add the changed file again, and commit the changes



```
master$
```

Branching (32)

Merge Conflicts

Although merge conflicts are often quite annoying, it makes total sense: Git shouldn't just *assume* which change we want to keep

Branching (33)

Sample Conflict -1

participants.txt

(I added a hyphen before each name)

```
Finance team
 Charles
 Lisa
 John
 Stacy
 Alexander
```

```
git init
git add .
git commit -m 'Initial list for finance team'
```

Branching (34)

Sample Conflict -1

Create a new branch called marketing using the following syntax

```
git checkout -b marketing
```

Branching (35)

Sample Conflict -1

Now open the `participants.txt` file and start entering the names for the marketing department below the finance team list, as follows: (**I added a hyphen before each name**)

```
Marketing team
 Collins
 Linda
 Patricia
 Morgan
```

```
git add .
git commit -m 'Unfinished list of marketing team'
git checkout master
```

Branching (36)

Sample Conflict -1

Open the file and delete the names **Alexander** and **Stacy**, save, close, add the changes, and commit with the commit message Final list from Finance team

```
git add .
git commit -m "Final list from Finance team"
git checkout marketing
```

Branching (37)

Sample Conflict -1

Open the file and add the fifth name, **Amanda**, for the marketing team, save, add, and commit

```
git add .
git commit -m "Initial list of marketing team"
```

names entered for marketing have been confirmed; now we need to merge these two lists, which can be done by the following command

```
git merge master
```

Branching (38)

Sample Conflict -1

```
Auto-merging participants.txt
CONFLICT (content): Merge conflict in participants.txt
Automatic merge failed; fix conflicts and then commit the result.
```

Branching (39)

Sample Conflict -1

```
Finance team
-Charles
-Lisa
-John
<<<<<<< HEAD
-Stacy
-Alexander

Marketing team
- Collins
- Linda
- Patricia
- Morgan
- Amanda
=======
>>>>>>> master
```

Branching (40)

Sample Conflict -1

```
<<<<<<<
Changes made on the branch that is being merged into. In most cases,
this is the branch that I have currently checked out (i.e. HEAD).
|||||||
The common ancestor version.
=======
Changes made on the branch that is being merged in. This is often a
feature/topic branch.
>>>>>>>
```

Branching (41)

Sample Conflict -1

- remove them
- keep the lines you want to see in the final version of the file
- add and commit

Branching (42)

Sample Conflict -1

If we want to save all to our version

```
git checkout --ours .  # checkout our local version of all files
git add -u             # mark all conflicted files as merged
git commit             # commit the merge
```

Branching (43)

Sample Conflict -1

If we want to discard all our revision

```
git checkout --theirs .  # checkout remote version of all files
git add -u              # mark all conflicted files as merged
git commit              # commit the merge
```

Branching (44)

Sample Conflict -2

You're going to pull some changes, but oops, you're not up to date:

```
git fetch origin
git pull origin master

From ssh://gitosis@example.com:22/projectname
 * branch            master     -> FETCH_HEAD
Updating a030c3a..ee25213
error: Entry 'filename.c' not uptodate. Cannot merge.
```

Branching (45)

Sample Conflict -2

So you get up-to-date and try again, but have a conflict:

```
git add filename.c
git commit -m "made some wild and crazy changes"
git pull origin master

From ssh://gitosis@example.com:22/projectname
 * branch            master     -> FETCH_HEAD
Auto-merging filename.c
CONFLICT (content): Merge conflict in filename.c
Automatic merge failed; fix conflicts and then commit the result.
```

Branching (46)

Sample Conflict -2

So you decide to take a look at the changes:

```
git mergetool
```

Oh my, oh my, upstream changed some things, but just to use my changes...no...their changes...

```
git checkout --ours filename.c
git checkout --theirs filename.c
git add filename.c
git commit -m "using theirs"
```

Branching (47)

Sample Conflict -2

And then we try a final time

```
git pull origin master

From ssh://gitosis@example.com:22/projectname
 * branch            master     -> FETCH_HEAD
Already up-to-date.
```

Tagging

it's recommended to create tags for software releases. this is a known concept, which also exists in SVN. You can create a new tag named 1.0.0 by executing

```
git tag 1.0.0 1b2e1d63ff
```

the 1b2e1d63ff stands for the first 10 characters of the commit id you want to reference with your tag. You can get the commit id by looking at the...

Log (1)

in its simplest form, you can study repository history using.. git log

You can add a lot of parameters to make the log look like what you want. To see only the commits of a certain author:

```
git log --author=bob
```

Log (2)

To see a very compressed log where each commit is one line:

```
git log --pretty=oneline
```

Log (3)

Or maybe you want to see an ASCII art tree of all the branches, decorated with the names of tags and branches:

```
git log --graph --oneline --decorate --all
```

Log (4)

See only which files have changed:

```
git log --name-status
```

Log (5)

These are just a few of the possible parameters you can use. For more, see

```
git log --help
```

Replace Local Changes (1)

In case you did something wrong, which for sure never happens ;), you can replace local changes using the command

```
git checkout -- <filename>
```

this replaces the changes in your working tree with the last content in HEAD. Changes already added to the index, as well as new files, will be kept.

Replace Local Changes (2)

if you use dot (.) then all local changes will be rollbacked.

```
git checkout -- .
```

Replace Local Changes (3)

If you instead want to drop all your local changes and commits, fetch the latest history from the server and point your local master branch at it like this

```
git fetch origin

git reset --hard origin/master
```

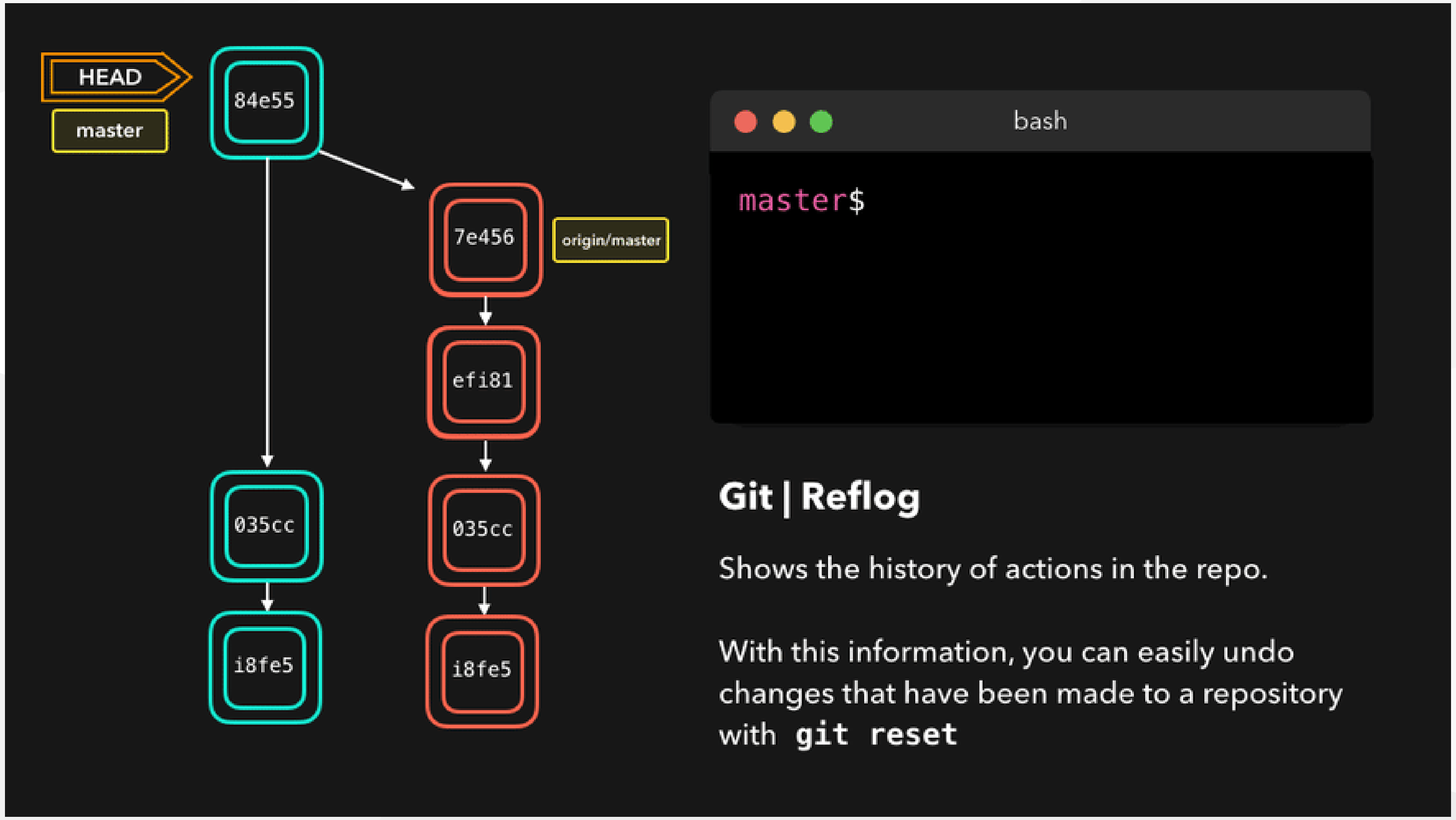
Reflog (1)

Everyone makes mistakes, and that's totally okay! Sometimes it may feel like you've corrupt your git repo so badly that you just want to delete it entirely.

Reflog (2)

`git reflog` is a very useful command in order to show a log of all the actions that have been taken! This includes merges, resets, reverts: basically any alteration to your branch.

Reflog (3)



```
master$
```

Git | Reflog

Shows the history of actions in the repo.

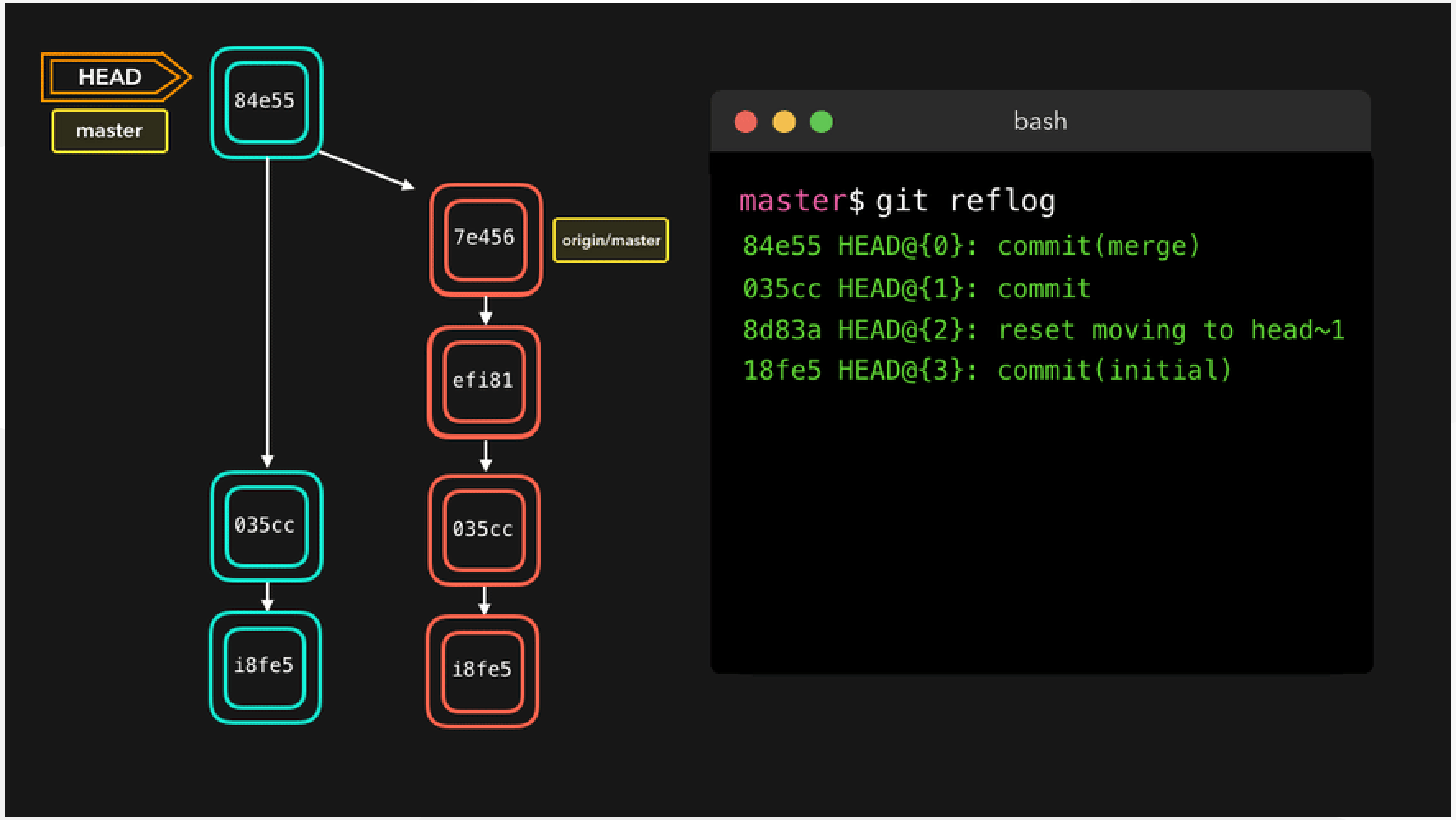
With this information, you can easily undo changes that have been made to a repository with `git reset`

Reflog (4)

If you made a mistake, you can easily redo this by resetting `HEAD` based on the information that `reflog` gives us!

Say that we actually didn't want to merge the origin branch. When we execute the `git reflog` command, we see that the state of the repo before the merge is at `HEAD@{1}`. Let's perform a `git reset` to point HEAD back to where it was on `HEAD@{1}`!

Reflog (5)



```
master$ git reflog
84e55 HEAD@{0}: commit(merge)
035cc HEAD@{1}: commit
8d83a HEAD@{2}: reset moving to head~1
18fe5 HEAD@{3}: commit(initial)
```

We can see that the latest action has been pushed to the `reflog`

Resetting (1)

It can happen that we committed changes that we didn't want later on. Maybe it's a `WIP` commit, or maybe a commit that introduced bugs! In that case, we can perform a `git reset`.

Resetting (2)

A `git reset` gets rid of all the current staged files and gives us control over where `HEAD` should point to.

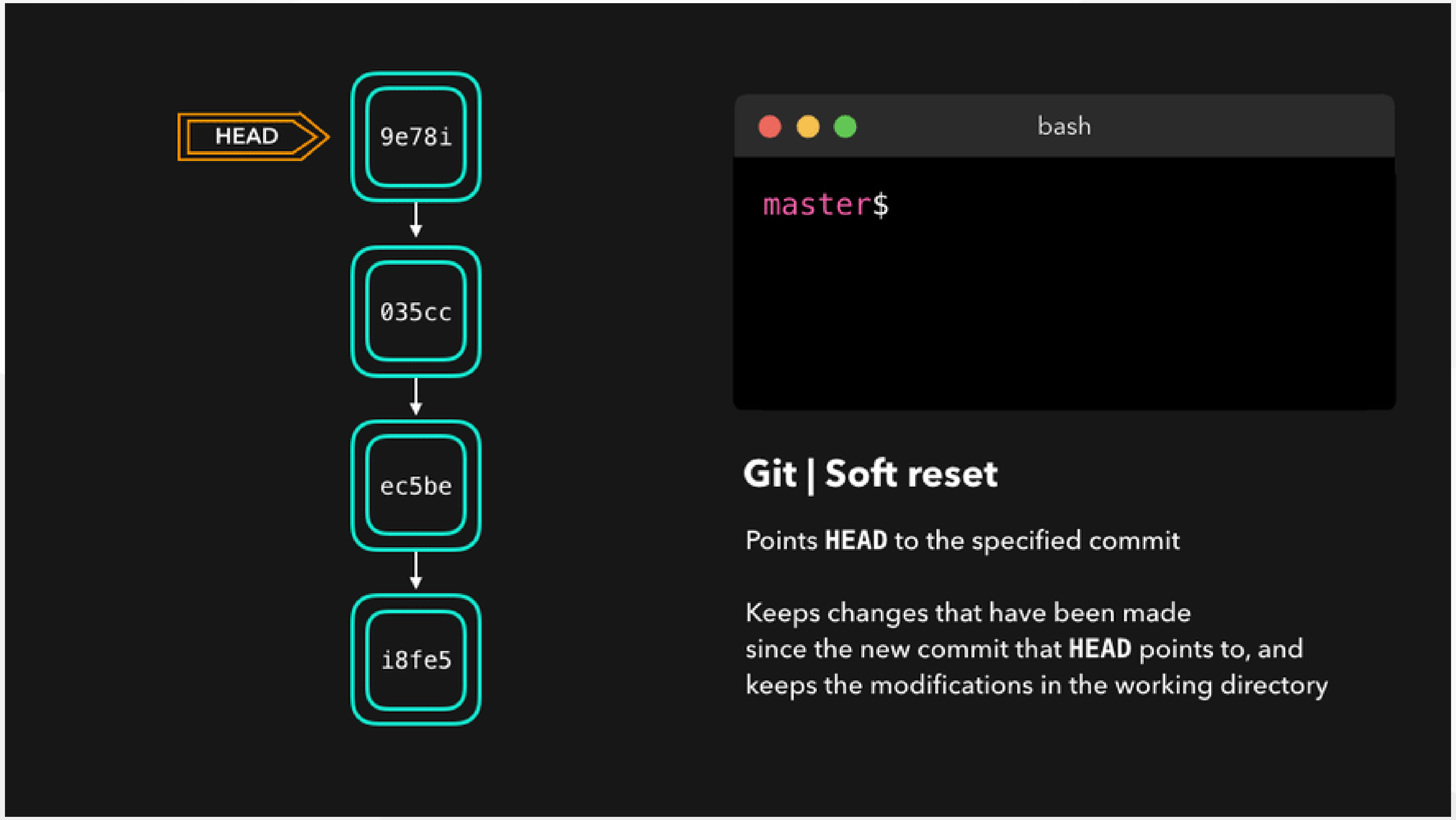
Soft Reset (1)

A *soft reset* moves `HEAD` to the specified commit (or the index of the commit compared to `HEAD`), without getting rid of the changes that were introduced on the commits afterward!

Soft Reset (2)

Let's say that we don't want to keep the commit `9e78i` which added a `style.css` file, and we also don't want to keep the commit `035cc` which added an `index.js` file. However, we do want to keep the newly added `style.css` and `index.js` file! A perfect use case for a soft reset.

Soft Reset (3)



```
master$
```

Git | Soft reset

Points **HEAD** to the specified commit

Keeps changes that have been made since the new commit that **HEAD** points to, and keeps the modifications in the working directory

Soft Reset (2)

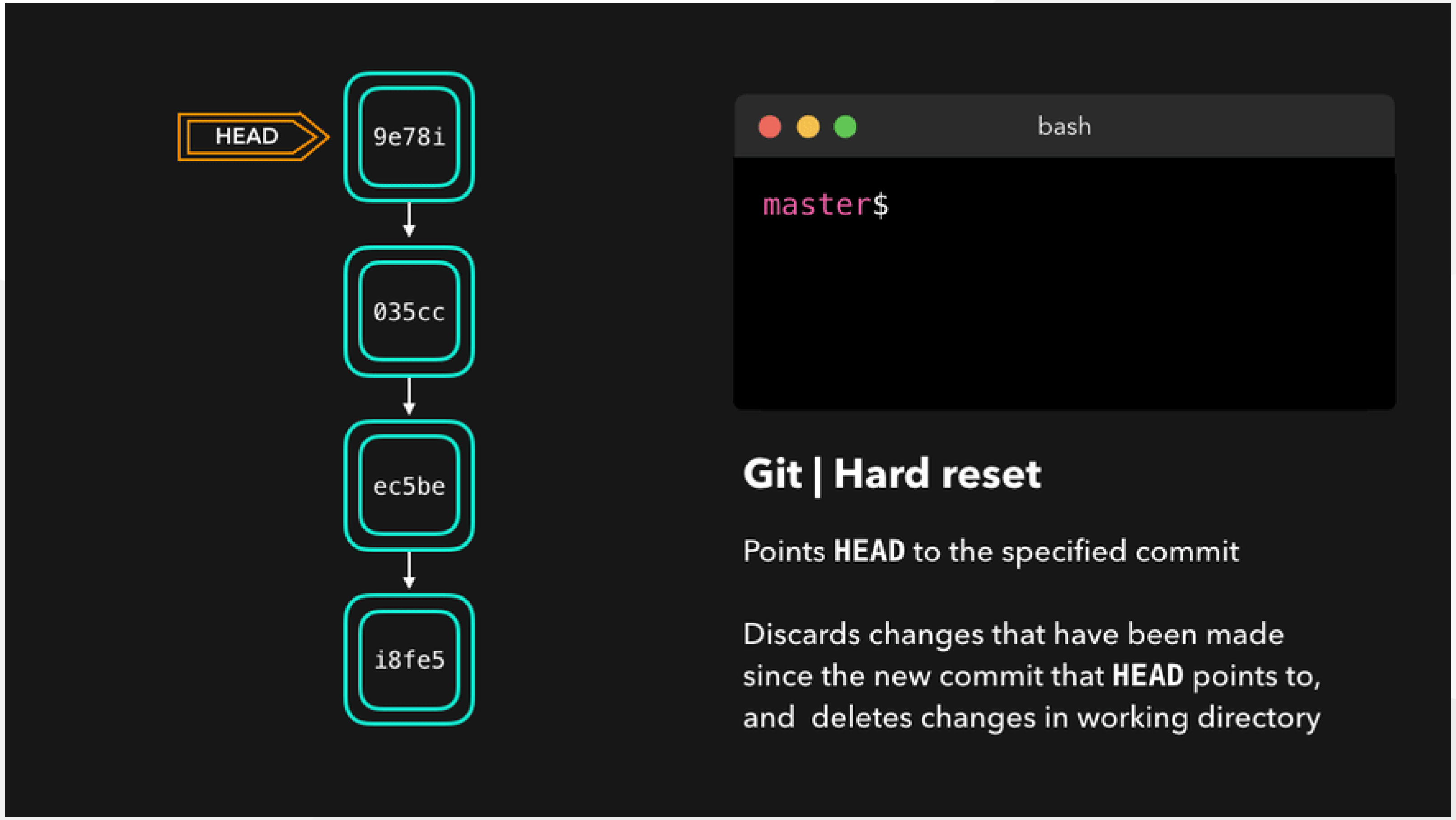
When typing `git status`, you'll see that we still have access to all the changes that were made on the previous commits. This is great, as this means that we can fix the contents of these files and commit them again later on!

Hard reset (1)

Sometimes, we don't want to keep the changes that were introduced by certain commits. Unlike a soft reset, we shouldn't need to have access to them any more. Git should simply reset its state back to where it was on the specified commit: this even includes the changes in your working directory and staged files!

Hard reset (2)

Git has discarded the changes that were introduced on `9e78i` and `035cc`, and reset its state to where it was on commit `ec5be`.



```
master$
```

Git | Hard reset

Points **HEAD** to the specified commit

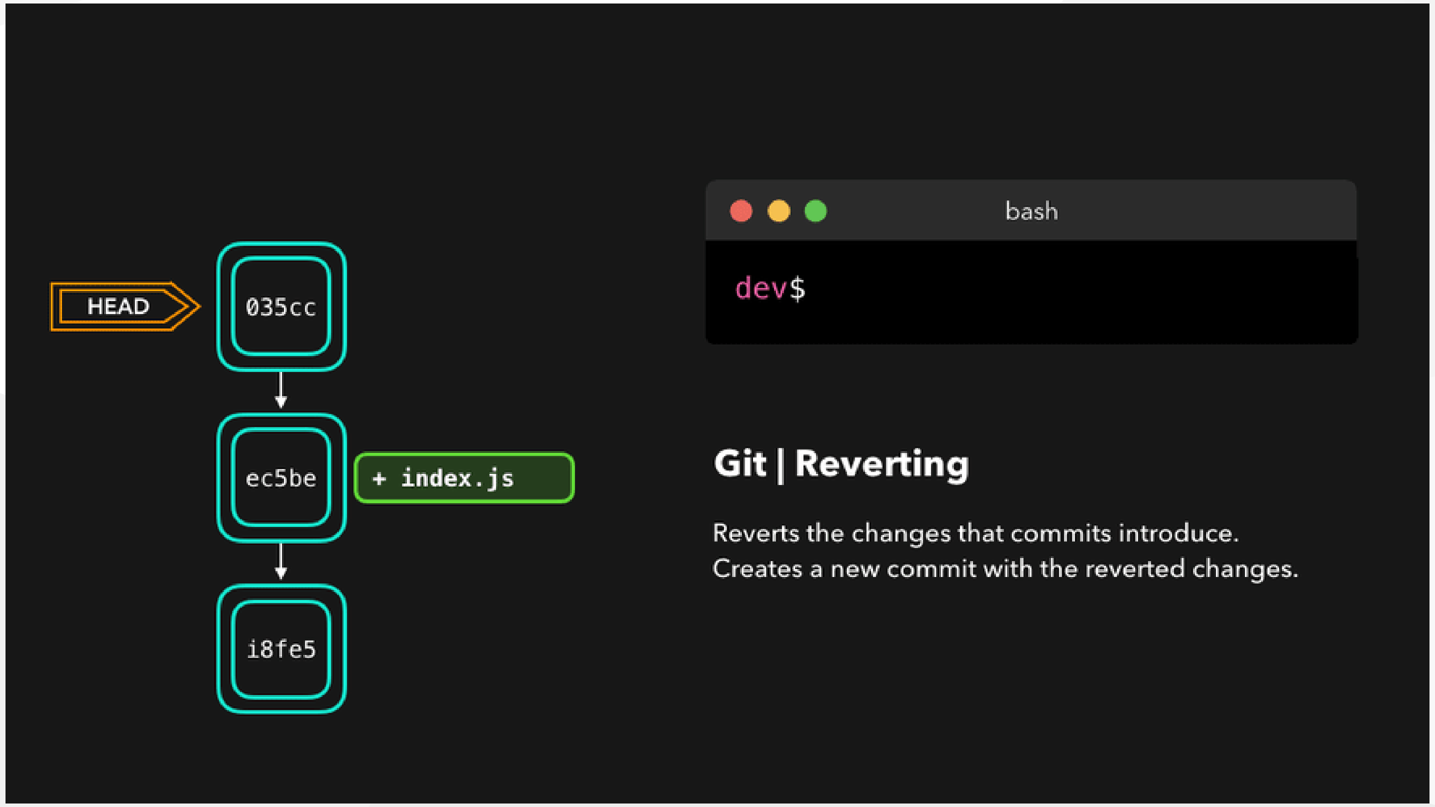
Discards changes that have been made since the new commit that **HEAD** points to, and deletes changes in working directory

Reverting (1)

Another way of undoing changes is by performing a `git revert`. By reverting a certain commit, we create a *new commit* that contains the reverted changes!

Reverting (2)

Let's say that `ec5be` added an `index.js` file. Later on, we actually realize we didn't want this change introduced by this commit anymore! Let's revert the `ec5be` commit.



```
dev$
```

Git | Reverting

Reverts the changes that commits introduce.
Creates a new commit with the reverted changes.

Perfect! Commit `9e78i` reverted the changes that were introduced by the `ec5be` commit.

Reverting (3)

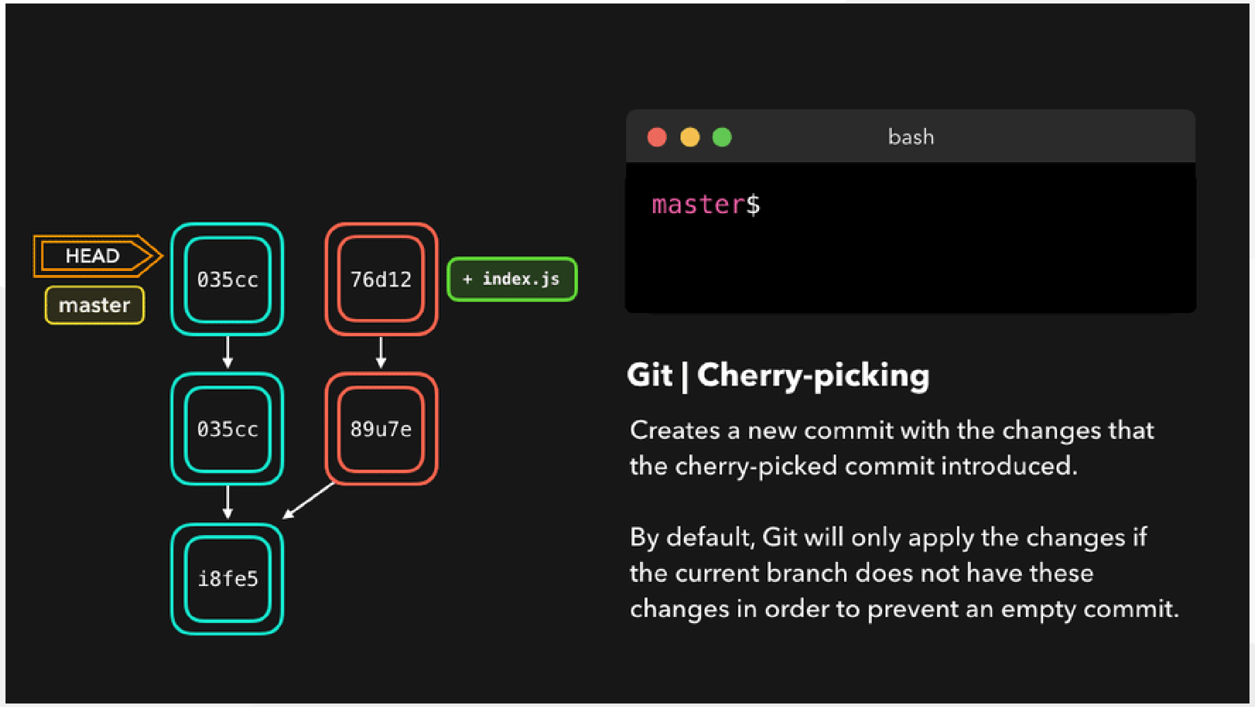
Performing a `git revert` is very useful in order to undo a certain commit, without modifying the history of the branch.

Cherry-picking (1)

When a certain branch contains a commit that introduced changes we need on our active branch, we can `cherry-pick` that command! By `cherry-pick`ing a commit, we create a new commit on our active branch that contains the changes that were introduced by the `cherry-pick`ed commit.

Cherry-picking (1)

Say that commit `76d12` on the `dev` branch added a change to the `index.js` file that we want in our `master` branch. We don't want the *entire* we just care about this one single commit!



```
master$
```

Git | Cherry-picking

Creates a new commit with the changes that the cherry-picked commit introduced.

By default, Git will only apply the changes if the current branch does not have these changes in order to prevent an empty commit.

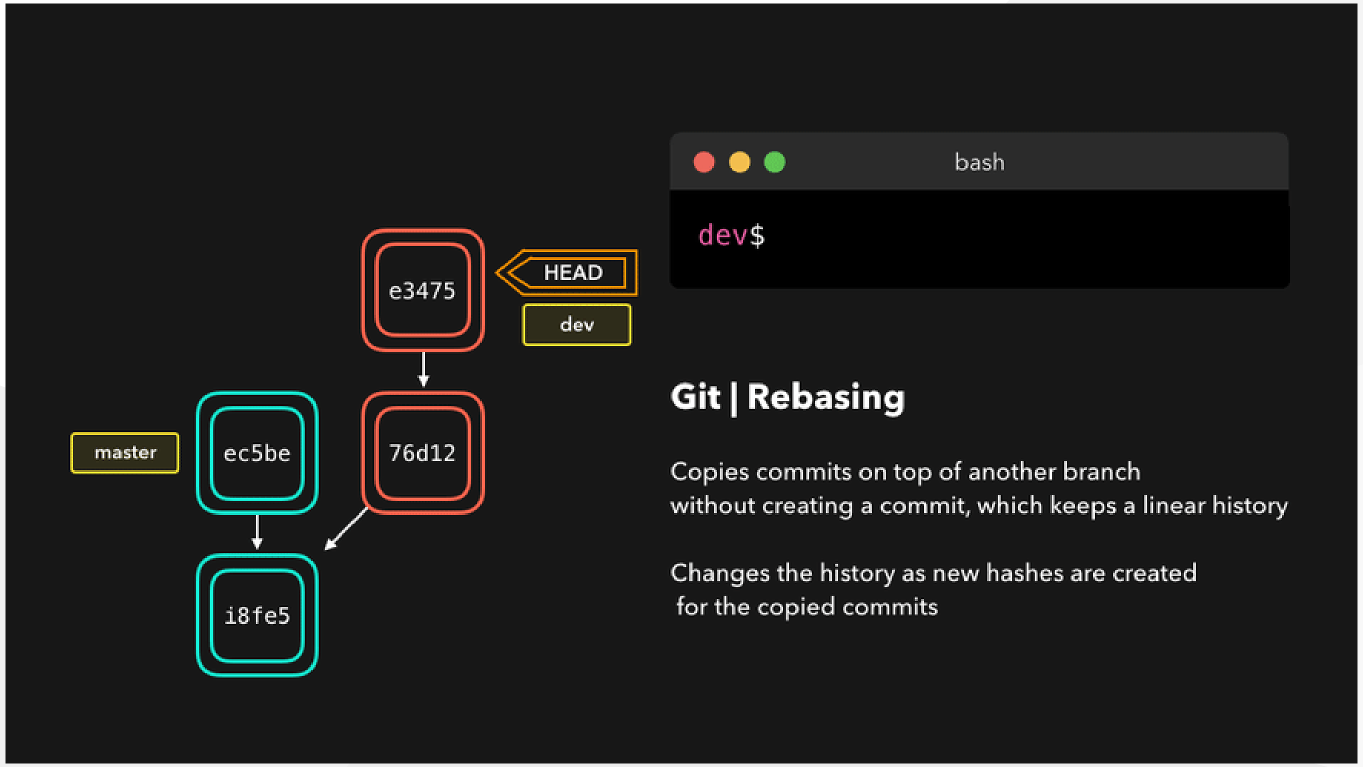
Cool, the master branch now contains the changes that `76d12` introduced

Rebasing (1)

We just saw how we could apply changes from one branch to another by performing a `git merge`. Another way of adding changes from one branch to another is by performing a `git rebase`.

Rebasing (2)

A `git rebase` *copies* the commits from the current branch, and puts these copied commits on top of the specified branch.



```
dev$
```

Git | Rebasing

Copies commits on top of another branch without creating a commit, which keeps a linear history

Changes the history as new hashes are created for the copied commits

Perfect, we now have all the changes that were made on the `master` branch available on the `dev` branch!

Rebasing (3)

A big difference compared to merging, is that Git won't try to find out which files to keep and not keep. The branch that we're rebasing always has the latest changes that we want to keep! You won't run into any merging conflicts this way, and keeps a nice linear Git history.

Rebasing (4)

This example shows rebasing on the `master` branch. In bigger projects, however, you usually don't want to do that. A `git rebase` **changes the history of the project** as new hashes are created for the copied commits!

Rebasing (5)

Rebasing is great whenever you're working on a feature branch, and the master branch has been updated. You can get all the updates on your branch, which would prevent future merging conflicts!

Interactive Rebase (1)

Before rebasing the commits, we can modify them! We can do so with an *interactive rebase*. An interactive rebase can also be useful on the branch you're currently working on, and want to modify some commits.

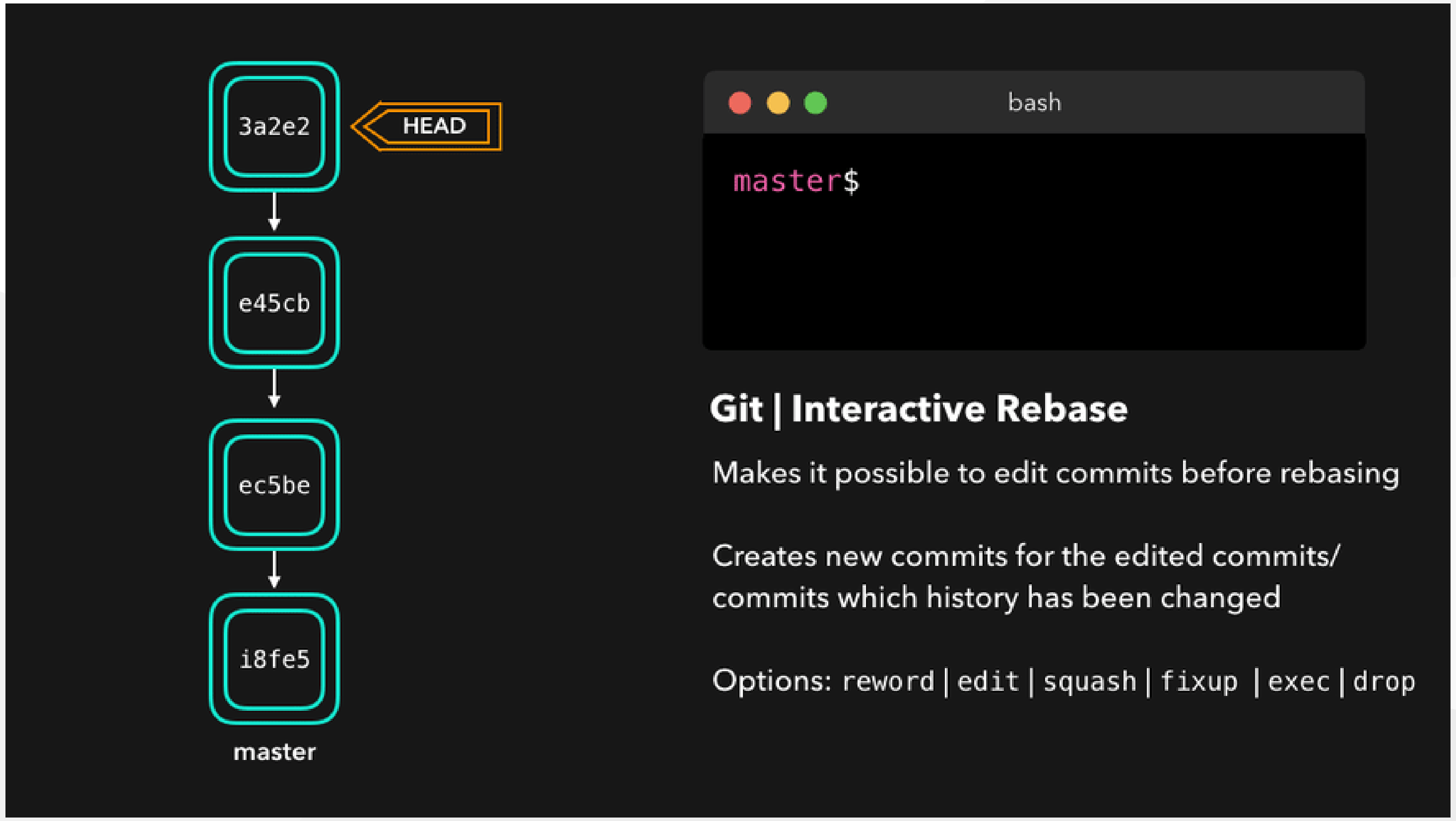
Interactive Rebase (2)

There are 6 actions we can perform on the commits we're rebasing:

- `reword` : Change the commit message
- `edit` : Amend this commit
- `squash` : Meld commit into the previous commit
- `fixup` : Meld commit into the previous commit, without keeping the commit's log message
- `exec` : Run a command on each commit we want to rebase
- `drop` : Remove the commit

Interactive Rebase (3)

Awesome! This way, we can have full control over our commits. If we want to remove a commit, we can just `drop` it.



```
master$
```

Git | Interactive Rebase

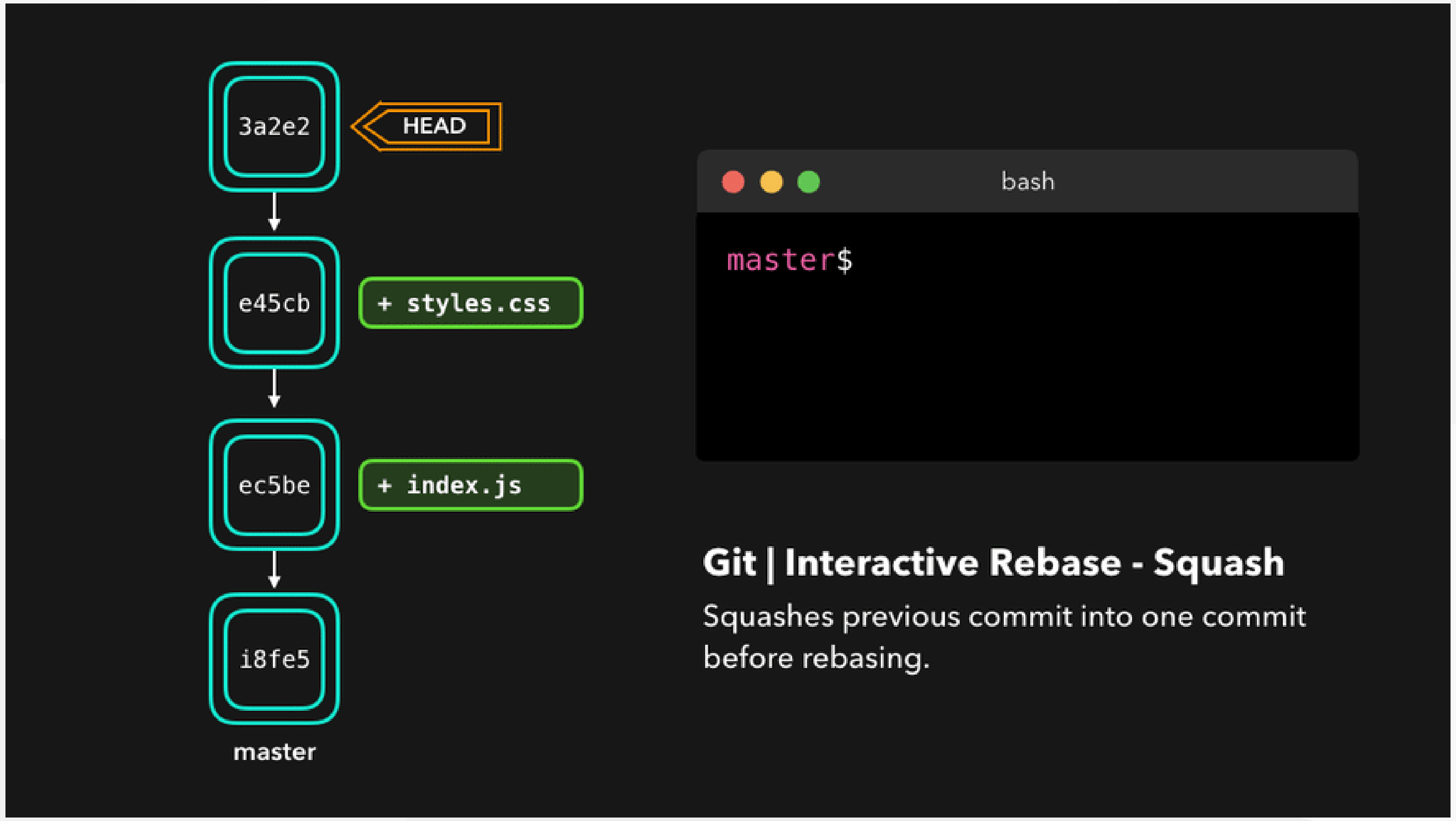
Makes it possible to edit commits before rebasing

Creates new commits for the edited commits/ commits which history has been changed

Options: `reword` | `edit` | `squash` | `fixup` | `exec` | `drop`

Interactive Rebase (4)

Or if we want to squash multiple commits together to get a cleaner history, no problem!


3a2e2
HEAD
e45cb
+ styles.css
ec5be
+ index.js
i8fe5
master
bash
Git | Interactive Rebase - Squash
Squashes previous commit into one commit before rebasing.

```
master$
```

Interactive rebasing gives you a lot of control over the commits you're trying to rebase, even on the current active branch

Useful Hints (1)

built-in git GUI

```
gitk
```

Useful Hints (2)

use colorful git output

```
git config color.ui true
```

Useful Hints (3)

show log on just one line per commit

```
git config format.pretty oneline
```

Useful Hints (4)

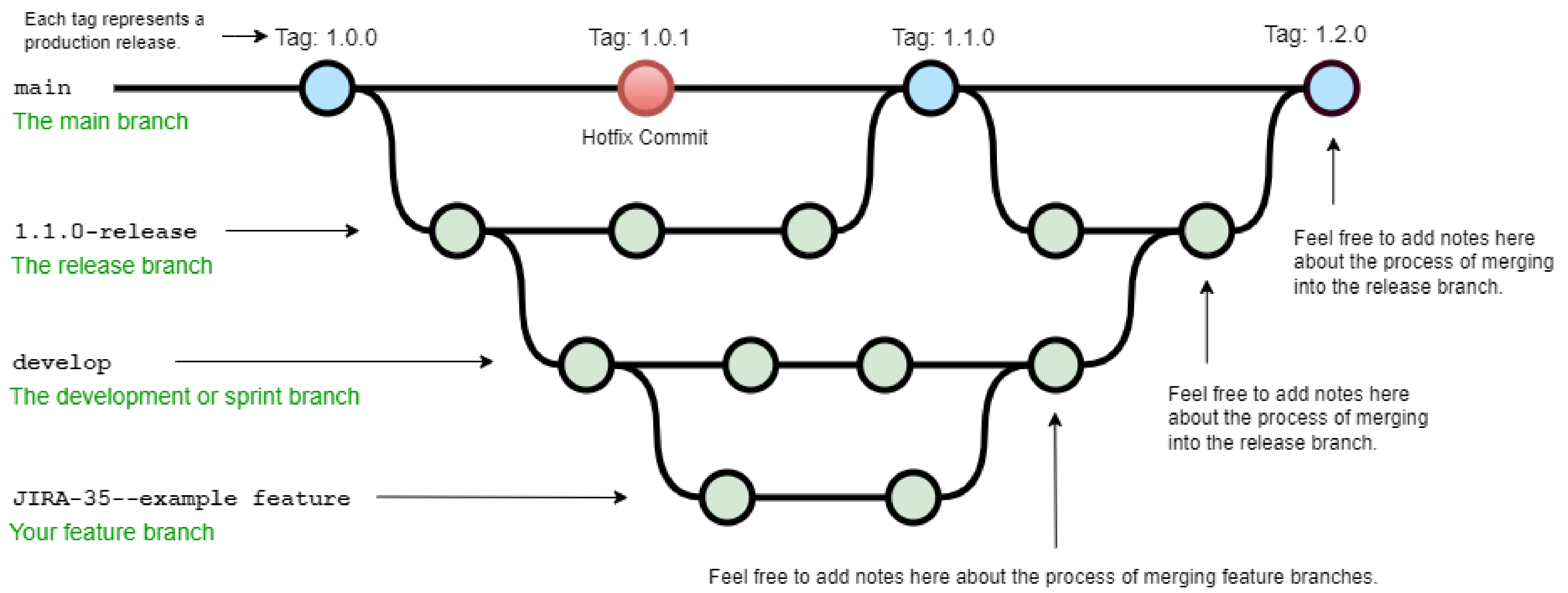
use interactive adding

```
git add -i
```

```
HEAD~2           // previous two commits fro head
HEAD~~          // previous two commits from head
HEAD@{2}     // reflog order
18fe5               // previous commit hash
```

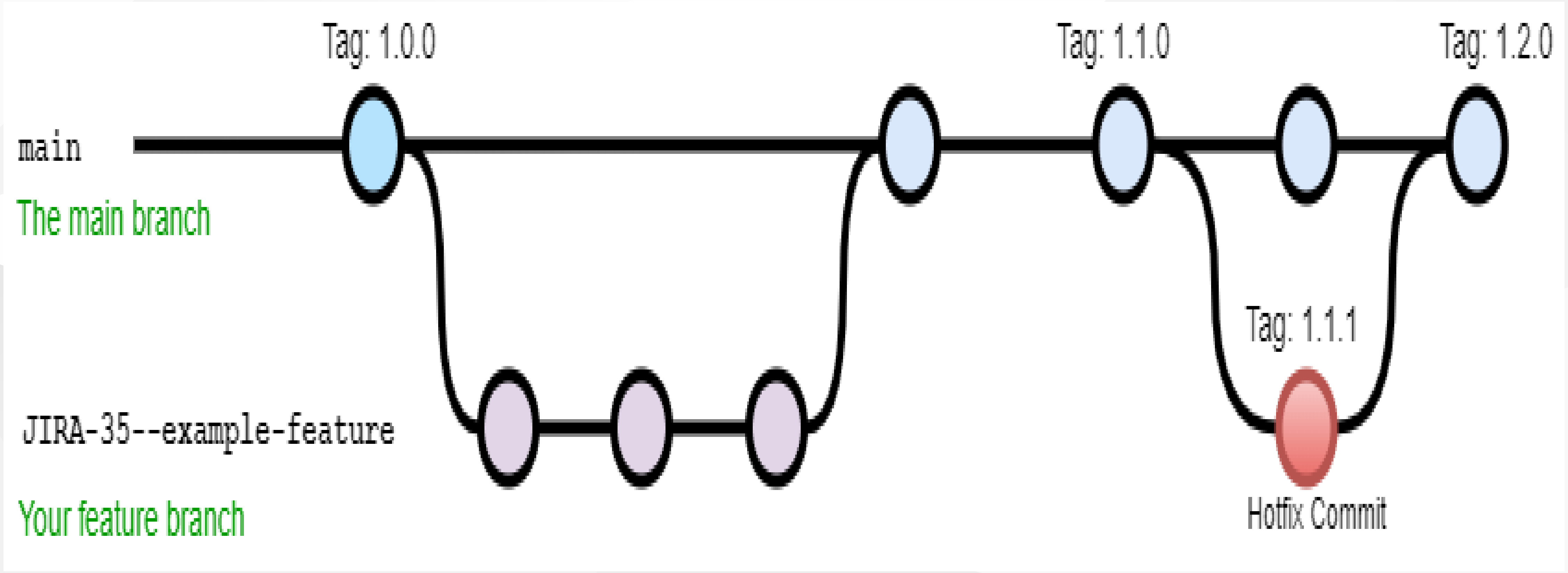
GIT Flow

Example diagram for a workflow similar to "Git-flow" :


Each tag represents a production release.
Tag: 1.0.0
Tag: 1.0.1
Tag: 1.1.0
Tag: 1.2.0
main
The main branch
Hotfix Commit
1.1.0-release
The release branch
develop
The development or sprint branch
JIRA-35--example feature
Your feature branch
Feel free to add notes here about the process of merging into the release branch.
Feel free to add notes here about the process of merging into the release branch.
Feel free to add notes here about the process of merging feature branches.

A successful Git branching model » nvie.com

Hotfix

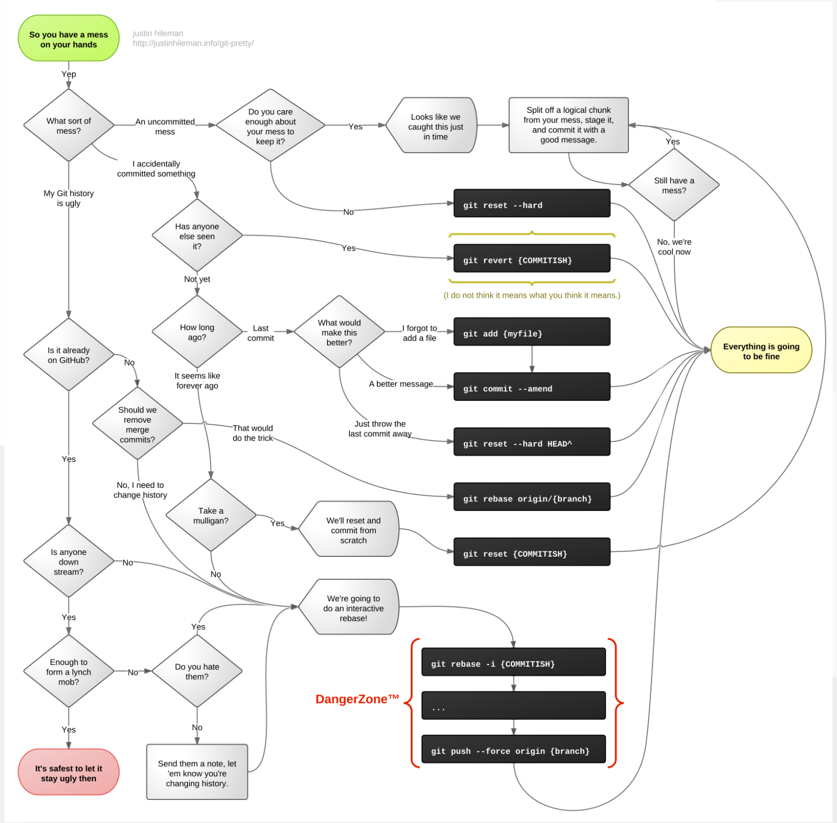


OneFlow – a Git branching model and workflow | End of Line Blog

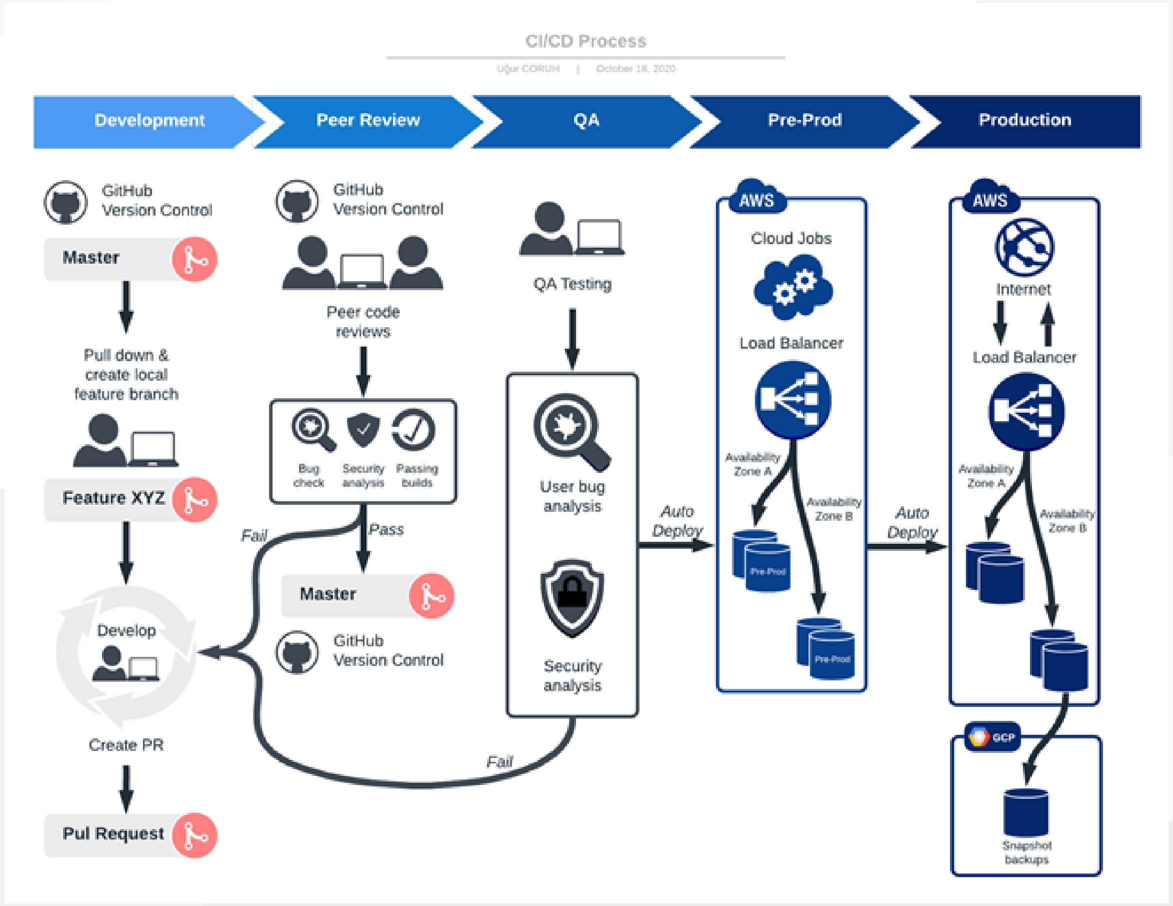
a simple git branching model · GitHub

GIT Decision Tree

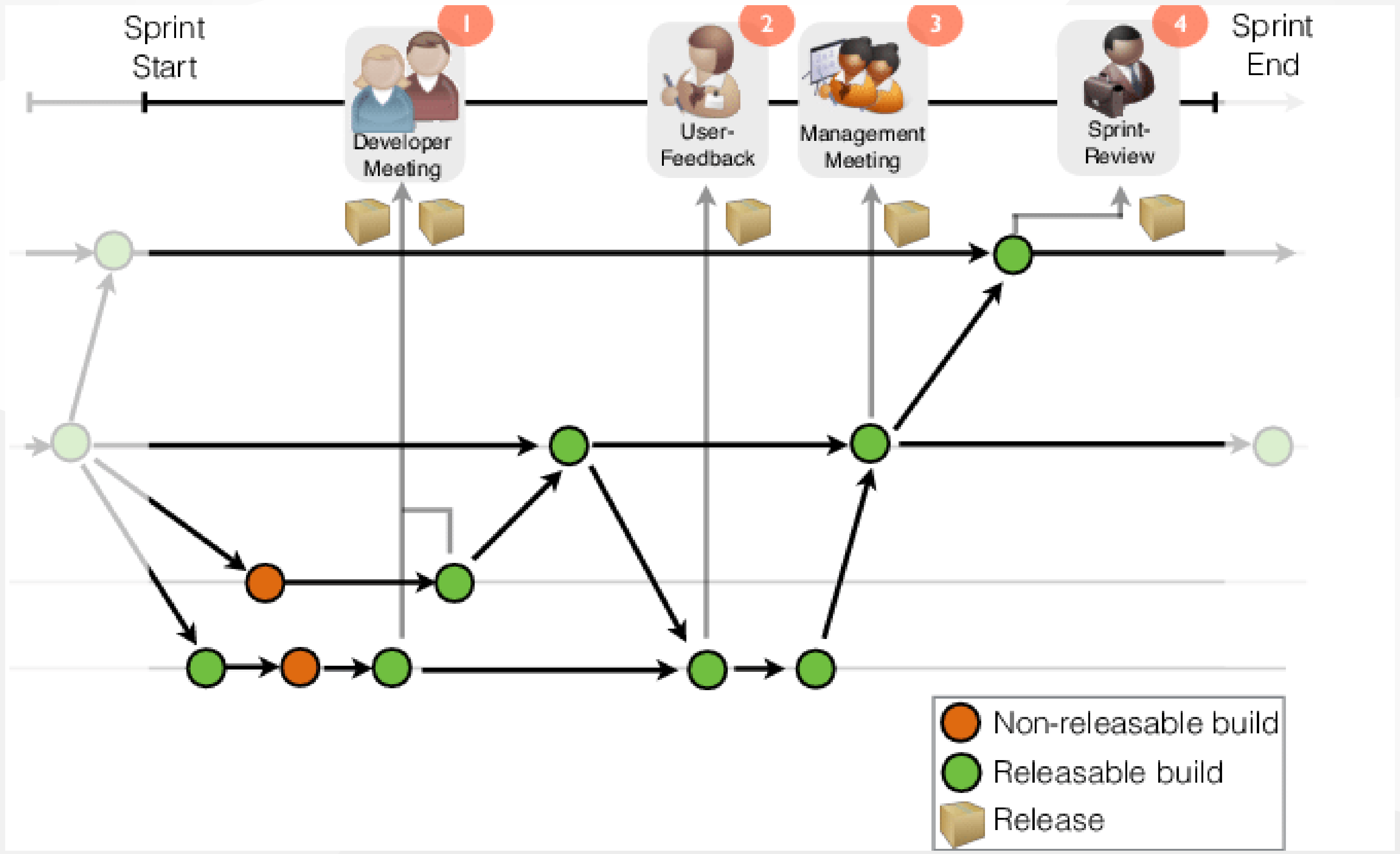
http://justinhileman.info/article/git-pretty/git-pretty.png


So you have a mess on your hands
justin hileman
http://justinhileman.info/git-pretty/
Yep
What sort of mess?
An uncommitted mess
Do you care enough about your mess to keep it?
Yes
Looks like we caught this just in time
Split off a logical chunk from your mess, stage it, and commit it with a good message.
Yes
Still have a mess?
No, we're cool now
No
git reset --hard
I accidentally committed something
Has anyone else seen it?
Yes
git revert {COMMITISH}
(I do not think it means what you think it means.)
Not yet
How long ago?
Last commit
What would make this better?
I forgot to add a file
git add {myfile}
A better message
git commit --amend
Just throw the last commit away
git reset --hard HEAD^
Everything is going to be fine
It seems like forever ago
My Git history is ugly
Is it already on GitHub?
No
Should we remove merge commits?
That would do the trick
git rebase origin/{branch}
No, I need to change history
Take a mulligan?
Yes
We'll reset and commit from scratch
git reset {COMMITISH}
No
Yes
Is anyone down stream?
No
We're going to do an interactive rebase!
Yes
Enough to form a lynch mob?
No
Do you hate them?
Yes
No
Send them a note, let 'em know you're changing history.
Yes
It's safest to let it stay ugly then
DangerZone™
git rebase -i {COMMITISH}
...
git push --force origin {branch}

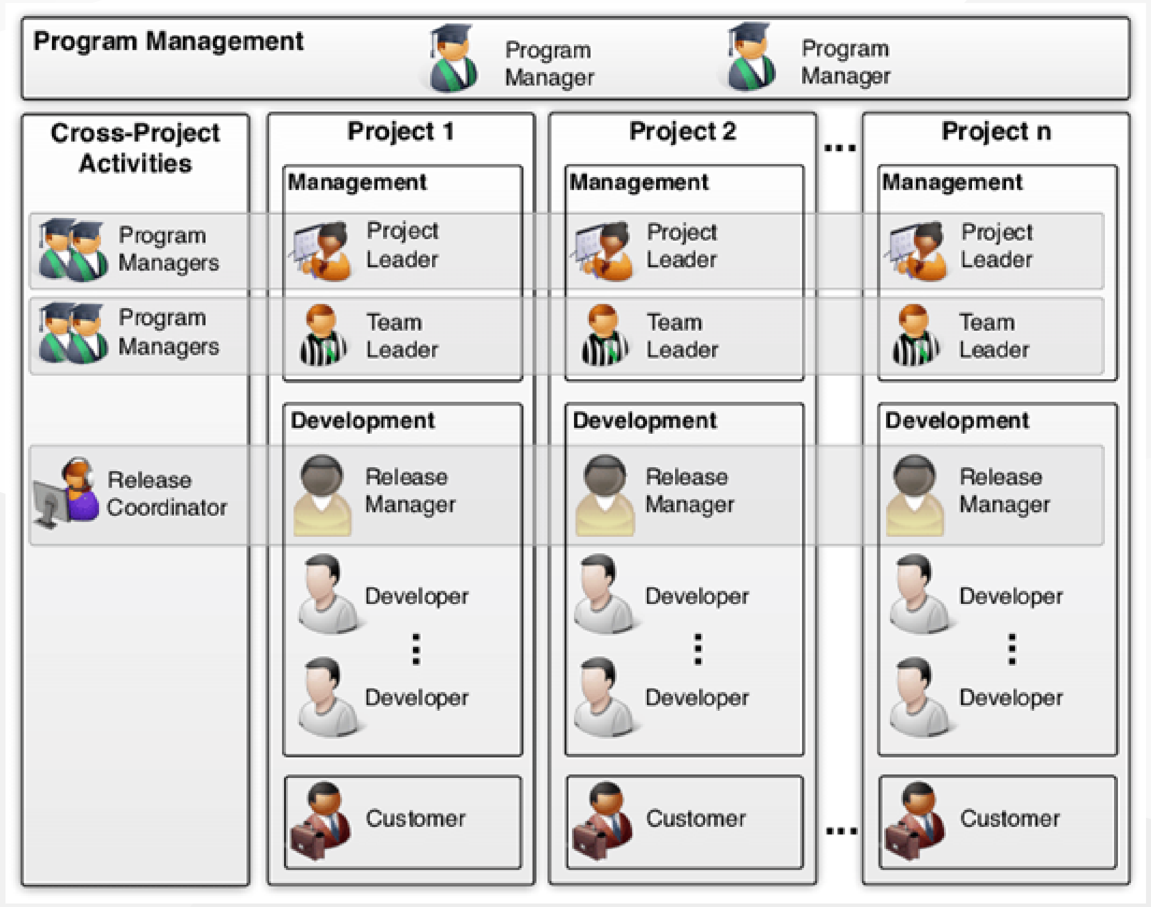
GIT in action (1)



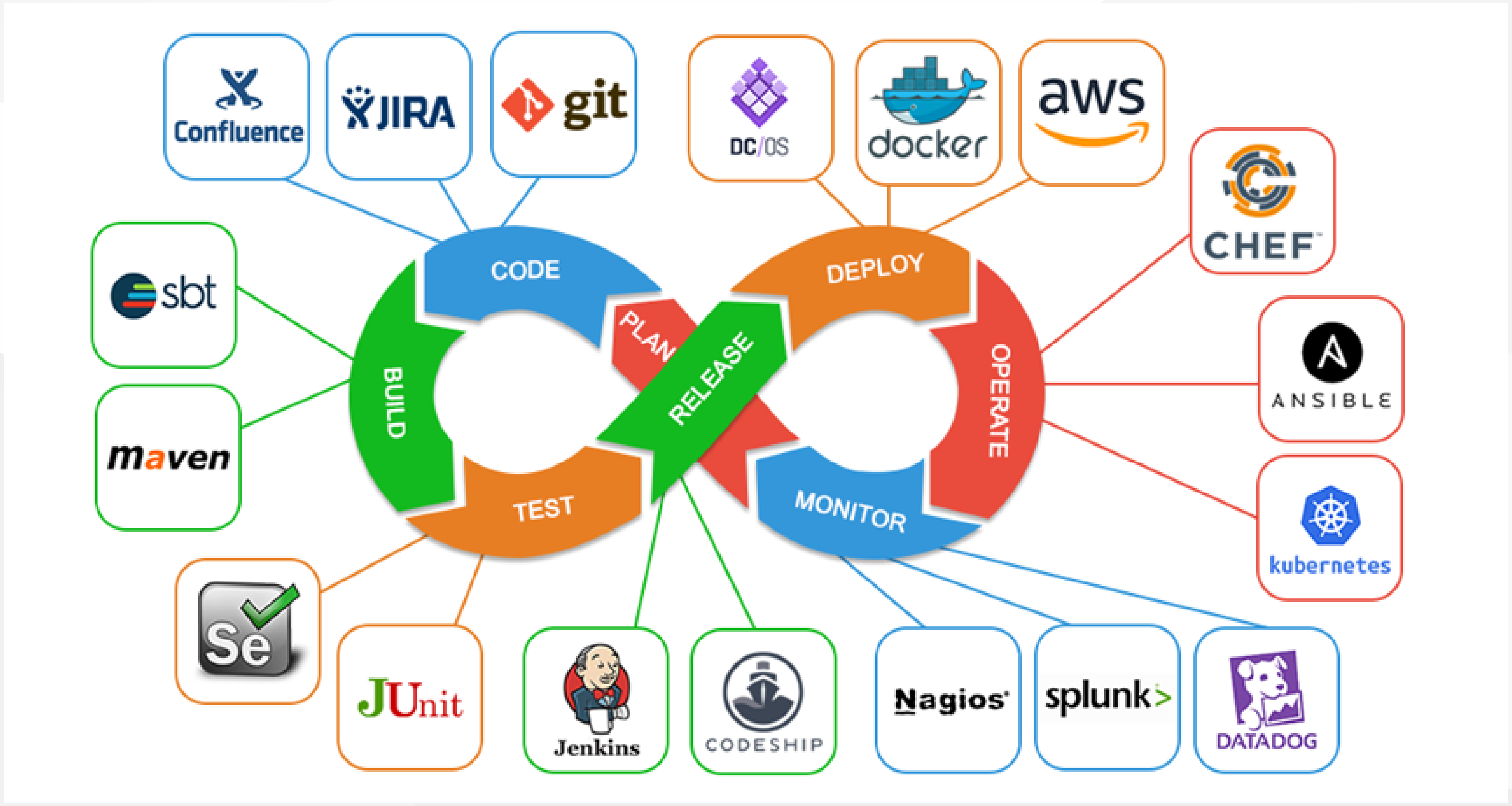
GIT in action (2)



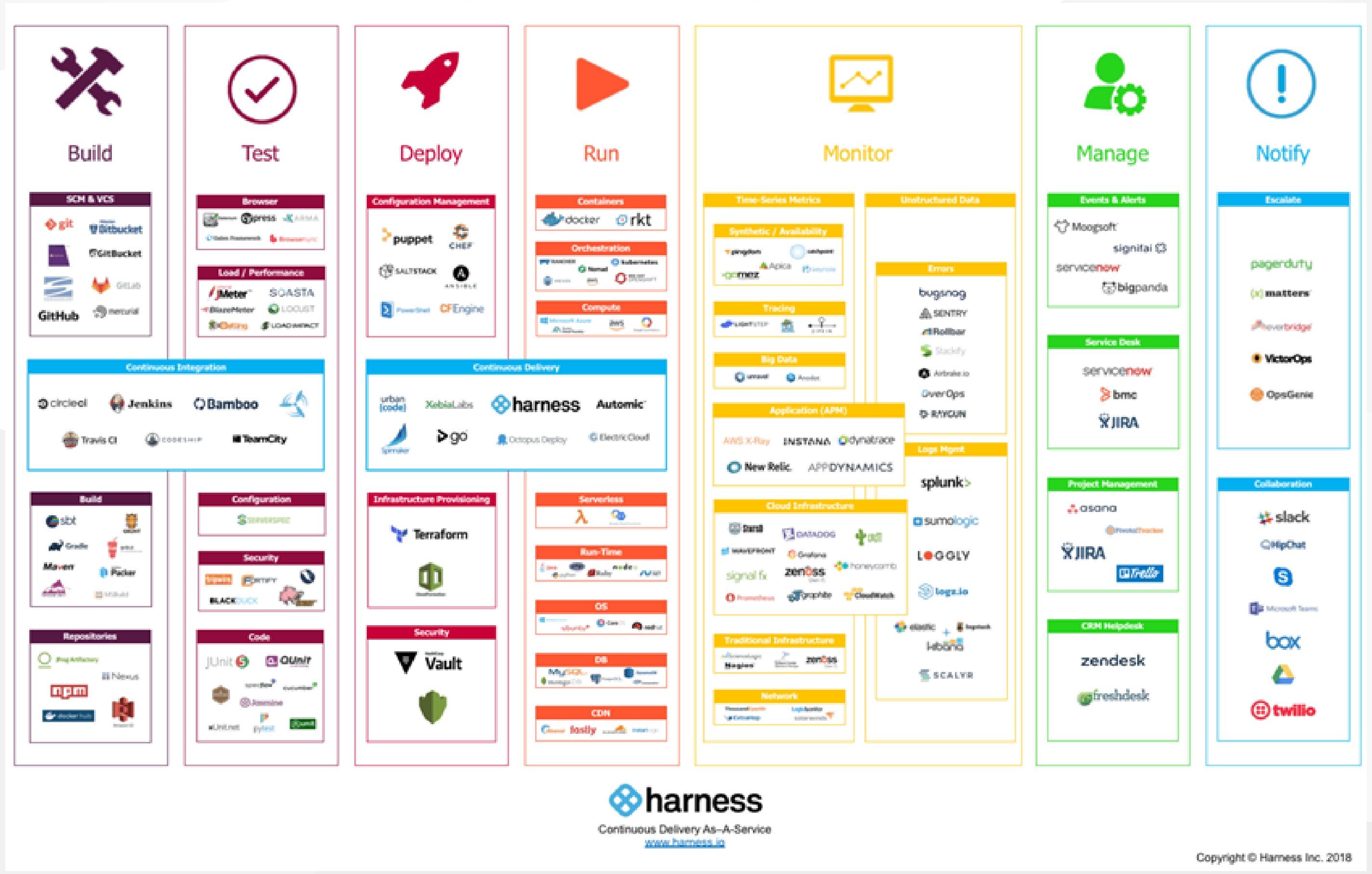
GIT in action (3)



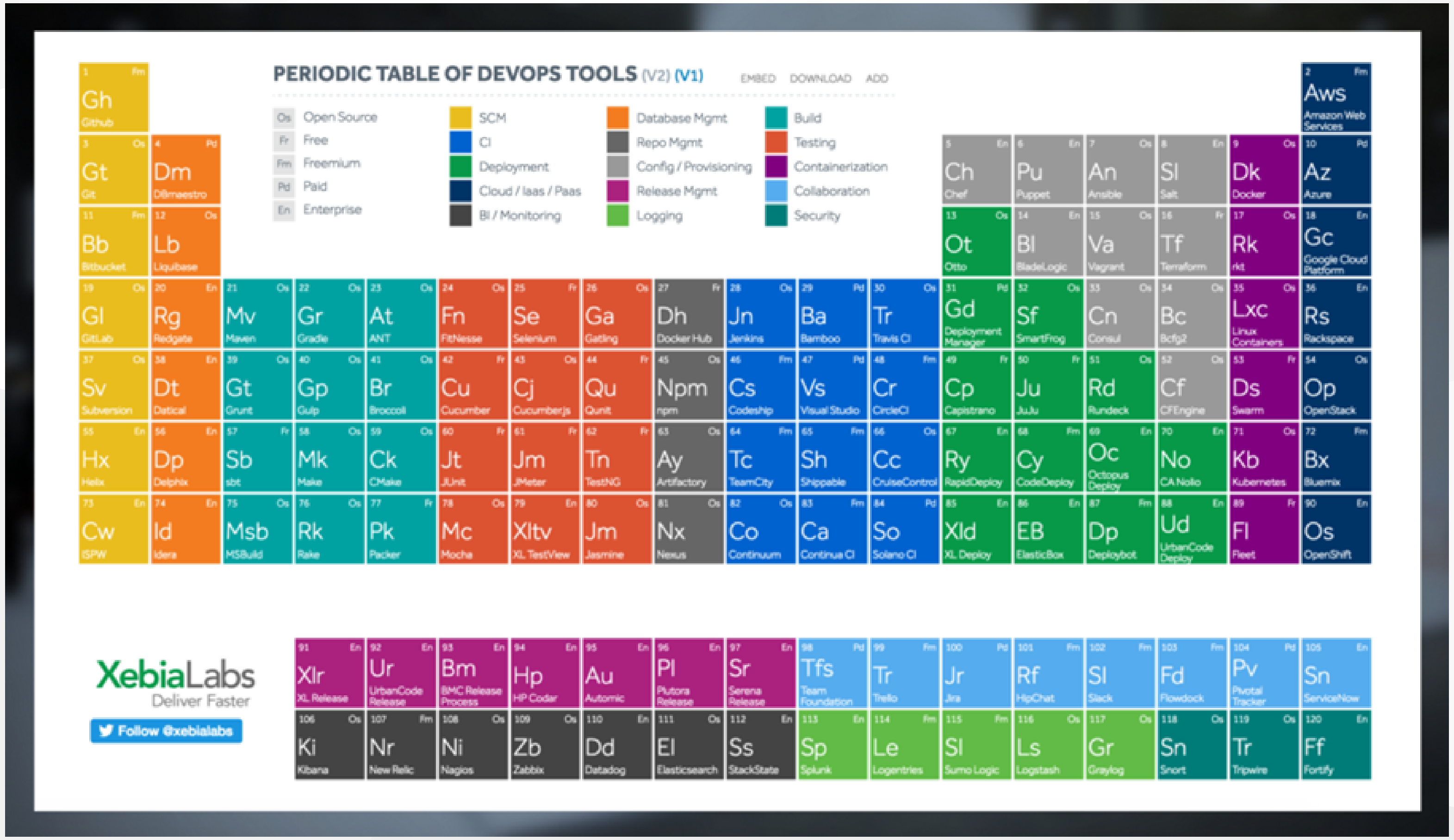
GIT in action (4)



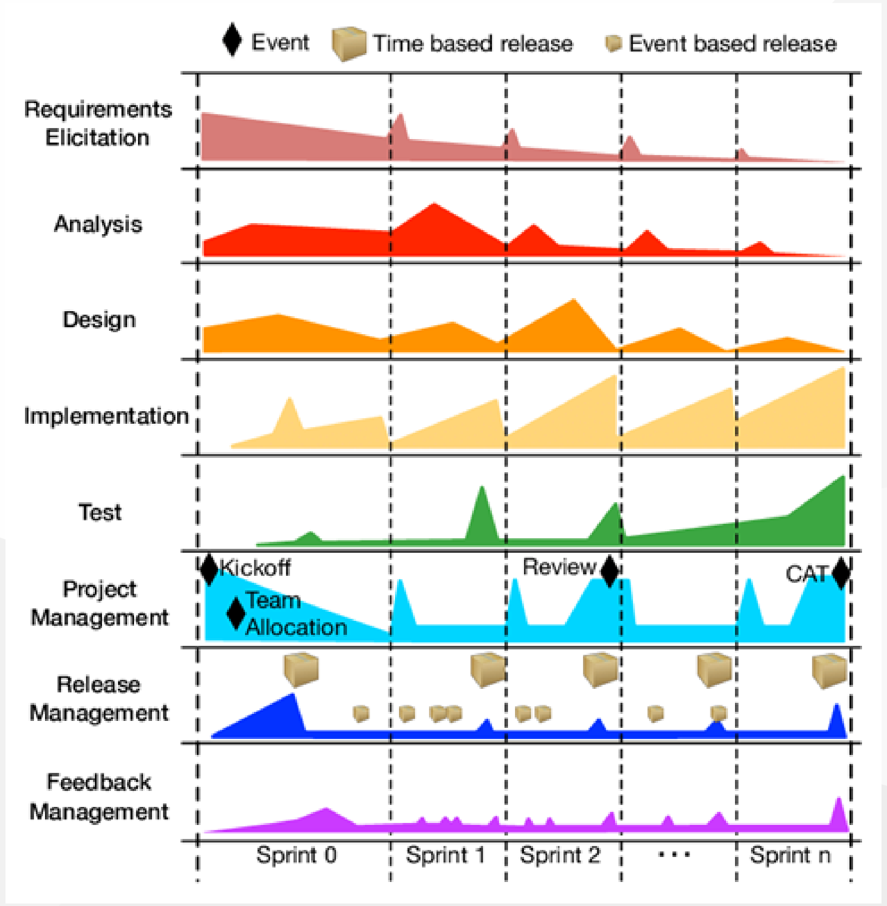
GIT in action (5)



GIT in action (6)

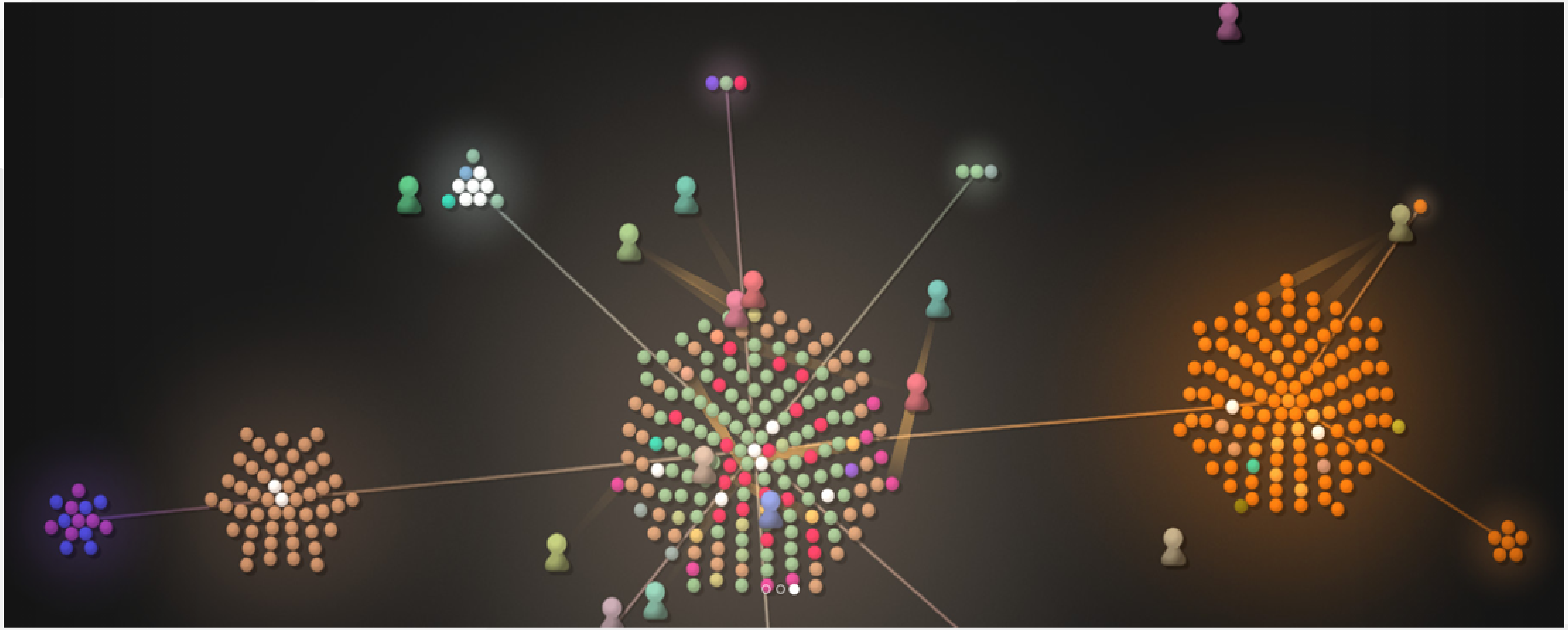


GIT in action (7)



Gource

https://gource.io/



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References (3)

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References (4)

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Git Tutorial | Commands And Operations In Git | Edureka

How to write a good commit message - DEV Community

An Introduction to Git and GitHub by Brian Yu - YouTube

References (5)

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NDP Software :: Git Cheatsheet;

Learn Git Branching

https://guides.github.com/introduction/git-handbook/