

AUTOMATED VERSION CONTROL WITH GIT

Chris Fonnesbeck
VUMC Biostatistics

**“WHAT IS VERSION
CONTROL AND WHY
SHOULD I USE IT?”**

OBJECTIVES

1. Understand the benefits of an automated version control system.
2. Understand the basics of how Git works.

Changes are saved sequentially



Different Versions Can be Saved



Multiple Versions Can be Merged



VCS



COMMIT

in case of fire



1. git commit



2. git push



3. leave building

REPOSITORY

```
root@ubuntu:~/gitdemo/.git# tree
.
├── branches
├── config
├── description
├── HEAD
└── hooks
    ├── applypatch-msg.sample
    ├── commit-msg.sample
    ├── post-update.sample
    ├── pre-applypatch.sample
    ├── pre-commit.sample
    ├── prepare-commit-msg.sample
    ├── pre-push.sample
    ├── pre-rebase.sample
    └── update.sample
├── info
│   └── exclude
├── objects
│   └── info
│       └── pack
└── refs
    ├── heads
    └── tags

9 directories, 13 files
```

THE HISTORY OF VERSION CONTROL SYSTEMS

- » RCS
- » CVS
- » Subversion
- » Git
- » Mercurial

EXAMPLE PAPER WRITING

- » Imagine you drafted an excellent paragraph for a paper you are writing, but later ruin it. How would you retrieve the excellent version of your paragraph? Is it even possible?
- » Imagine you have 5 co-authors. How would you manage the changes and comments they make to your paper?

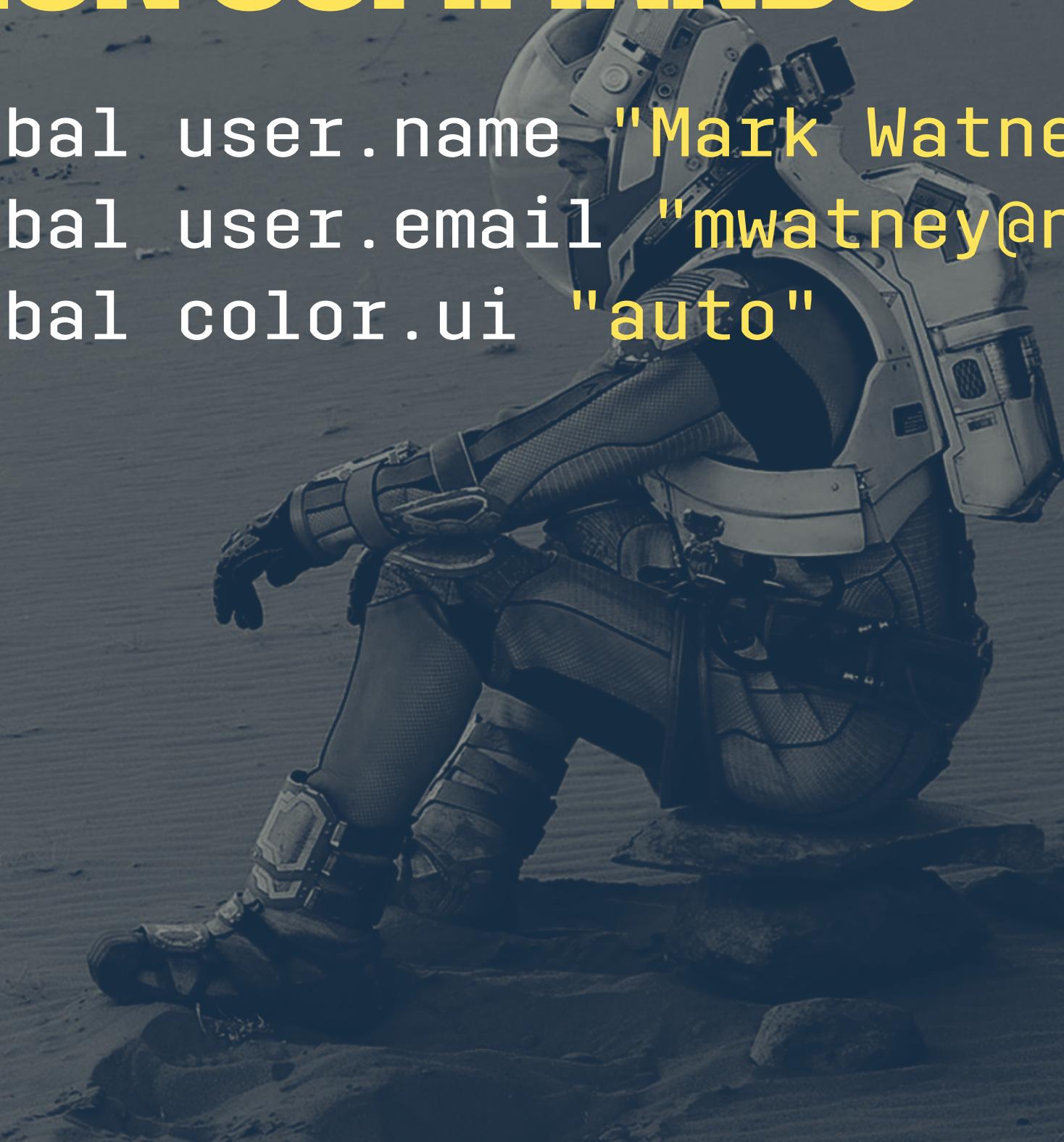
**“HOW DO I GET SET UP
TO USE GIT?”**

When we use Git on a new computer for the first time,
we need to configure a few things.

- » specify our name and email address,
- » colorize our output,
- » identify our preferred text editor,
- » apply settings globally (or not).

CONFIGURATION COMMANDS

```
$ git config --global user.name "Mark Watney"  
$ git config --global user.email "mwatney@nasa.gov"  
$ git config --global color.ui "auto"
```



Text editor configurations

» Atom:

```
$ git config --global core.editor "atom --wait"
```

» VS Code

```
$ git config --global core.editor "code --wait"
```

» Notepad++ (Windows)

```
$ git config --global core.editor "'c:/program  
files/Notepad++/notepad++.exe' -multiInst -  
notabbar -nosession -noPlugin"
```

PROXY

```
$ git config --global http.proxy proxy-url  
$ git config --global https.proxy proxy-url
```

To disable the proxy, use

```
$ git config --global --unset http.proxy  
$ git config --global --unset https.proxy
```

CHECK YOUR SETTINGS

```
$ git config --list
```

```
user.name=Christopher Fonnesbeck
user.email=fonnesbeck@gmail.com
color.ui=auto
core.excludesfile=/Users/fonnescj/.gitignore_global
core.editor=nvim
alias.prune=fetch --prune
alias.co=checkout
alias.hist=log --pretty=format:"%h %ad | %s%d [%an]" --graph --date=short
alias.switch=!legit switch "$@"
alias.branches=!legit branches
alias.sprout=!legit sprout "$@"
alias.unpublish=!legit unpublish "$@"
```

GIT HELP AND MANUAL

```
$ git config -h  
$ git config --help
```

CREATING REPOSITORIES

Create a project directory . . .

```
$ mkdir escape_mars  
$ cd escape_mars
```

Create a project directory . . .

```
$ mkdir escape_mars  
$ cd escape_mars
```

. . . then initialize a repository called escape_mars.

```
$ git init
```

WHAT'S INSIDE?

\$ 1s

WHAT'S INSIDE?

```
$ ls
```

But if we add the -a flag to show everything . . .

```
$ ls -a
```

```
. . . .git
```

PROJECT STATUS

```
$ git status  
  
# On branch master  
#  
# Initial commit  
#  
nothing to commit (create/copy files and use "git add" to track)
```

PLACES TO CREATE GIT REPOSITORIES

Consider the following sequence of commands:

```
cd                      # return to home directory
mkdir escape_mars        # make a new directory escape_mars
cd escape_mars           # go into escape_mars
git init                 # make the escape_mars directory a Git repository
mkdir potatoes            # make a sub-directory escape_mars/potatoes
cd potatoes              # go into escape_mars/potatoes
git init                 # make the potatoes sub-directory a Git repository
```

- » Why is it a bad idea to do this?
- » How can Mark Watney undo his last git init?

TRACKING CHANGES

- » "How do I record changes in Git?"
- » "How do I record notes about what changes I made and why?"

Let's create a file called `diary.txt`

```
$ mate diary.txt
```

Then, type some text into the `diary.txt` file...



diary.txt

```
1 I'm pretty much f***ed. That's my
. considered opinion.
```

Line:

1:54

| Plain Text

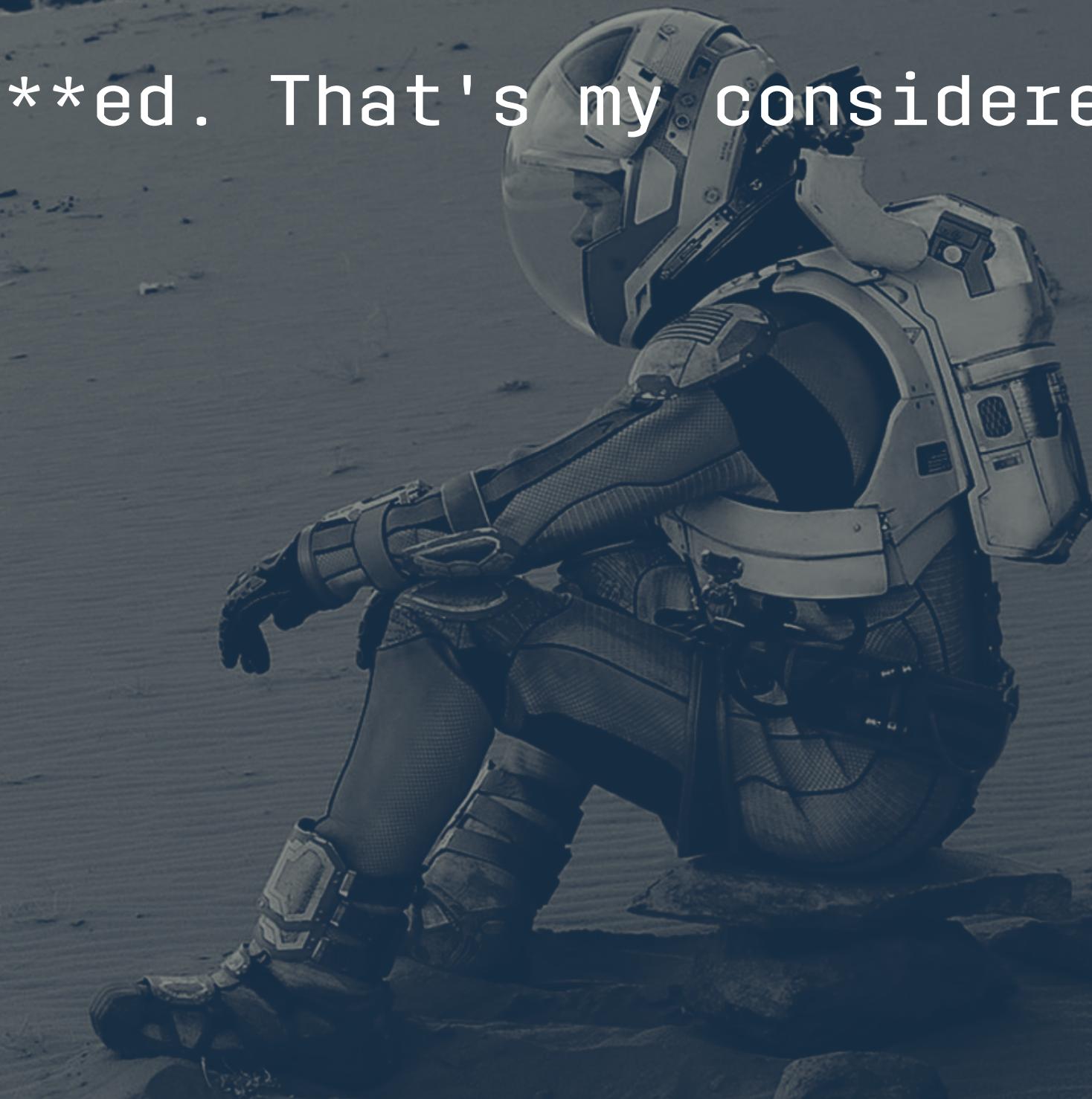


| Soft Tabs: 4



```
$ cat diary.txt
```

I'm pretty much f***ed. That's my considered opinion.



CHECK STATUS

```
$ git status
```

```
# On branch master
#
# Initial commit
#
# Untracked files:
#   (use "git add <file>..." to include in what will be committed)
#
#   diary.txt
nothing added to commit but untracked files present (use "git add" to track)
```

ADDING FILES

```
$ git add diary.txt
```

and then check that the right thing happened . . .

```
$ git status  
  
# On branch master  
#  
# Initial commit  
#  
# Changes to be committed:  
#   (use "git rm --cached <file>..." to unstage)  
#  
#       new file:   diary.txt  
#
```

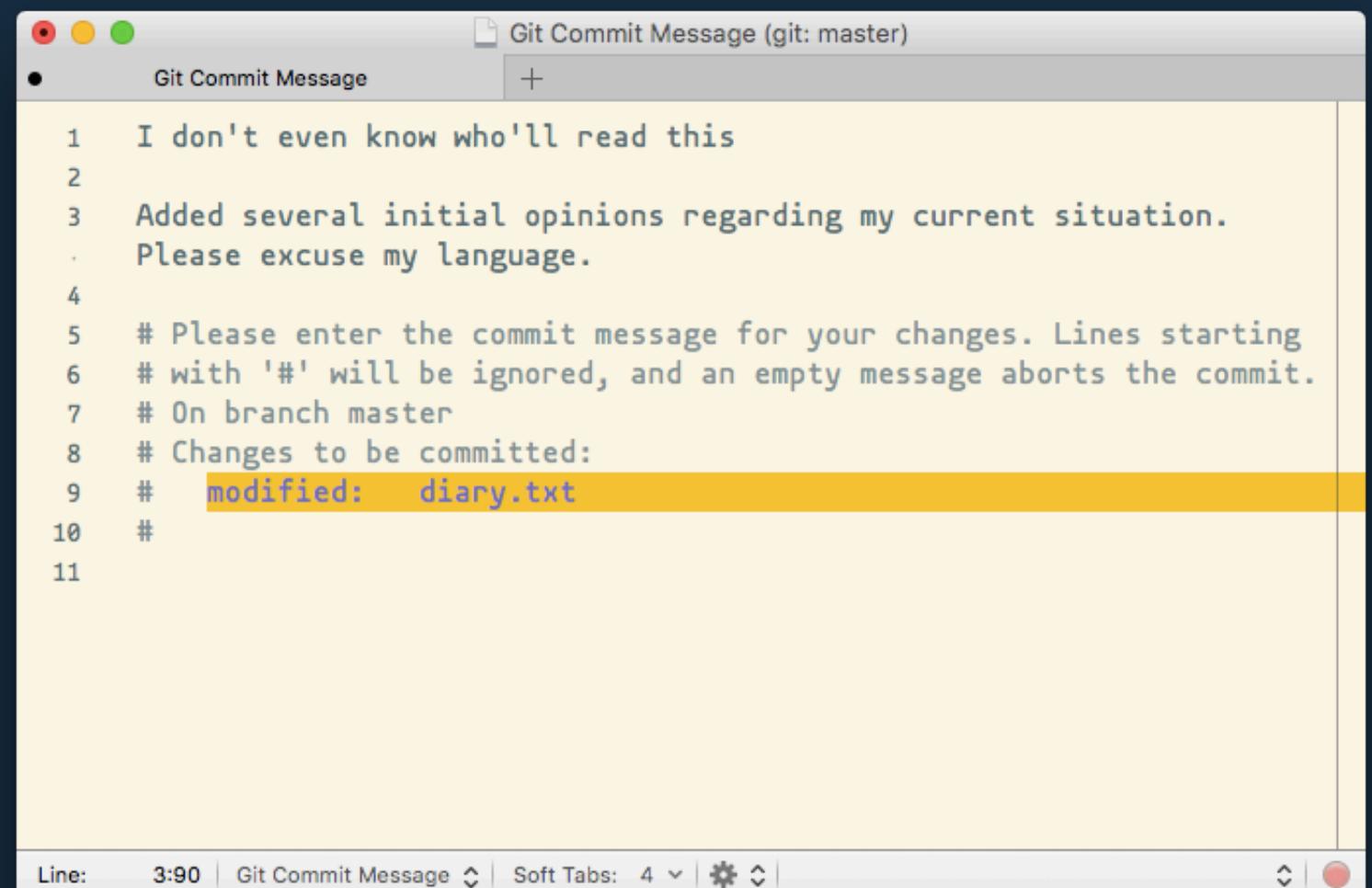
COMMITTING CHANGES

```
$ git commit -m "I don't even know who'll read this"
```

```
[master (root-commit) 643a892] I don't even know who'll read this
 1 file changed, 1 insertion(+)
 create mode 100644 diary.txt
```

GOOD COMMIT MESSAGES

- » start with a brief (<50 characters) summary of changes made in the commit.
- » additional notes may follow a blank line after the summary



```
Git Commit Message (git: master)
• Git Commit Message +
```

```
1 I don't even know who'll read this
2
3 Added several initial opinions regarding my current situation.
. Please excuse my language.
4
5 # Please enter the commit message for your changes. Lines starting
6 # with '#' will be ignored, and an empty message aborts the commit.
7 # On branch master
8 # Changes to be committed:
9 #   modified:   diary.txt
10 #
11
```

Line: 3:90 | Git Commit Message | Soft Tabs: 4 | ⚙️ |

If we run git status now:

```
$ git status
```

```
# On branch master
nothing to commit, working directory clean
```

PROJECT HISTORY

```
$ git log
```

```
commit 643a89258344ec9a02ab8e85e1493945a9b71079
```

```
Author: Mark Watney <mwatney@nasa.gov>
```

```
Date: Sun Aug 14 14:53:07 2016 -0700
```

I don't even know who'll read this

WHERE ARE MY CHANGES?

Have a look at the contents of your project directory now:

```
$ ls
```

WHERE ARE MY CHANGES?

Have a look at the contents of your project directory now:

```
$ ls
```

```
diary.txt
```

```
$ ls .git
```

COMMIT_EDITMSG	config	hooks	info	objects
HEAD	description	index	logs	refs

Git saves information about files' history in the special `.git` directory mentioned earlier so that our filesystem doesn't become cluttered.

Suppose Mark Watney adds more information to the file:

```
$ mate diary.txt
```

I'm pretty much f***ed. That's my considered opinion.

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

When we run git status now...

```
$ git status
```

When we run git status now...

```
$ git status
```

...it tells us that a file it already knows about has been modified:

On branch master

Changes not staged for commit:

(use "git add <file>..." to update what will be committed)

(use "git checkout -- <file>..." to discard changes in working directory)

modified: diary.txt

no changes added to commit (use "git add" and/or "git commit -a")

REVIEWING CHANGES

```
$ git diff
```

```
diff --git a/diary.txt b/diary.txt
index 218b2e6..1004f7e 100644
```

```
--- a/diary.txt
+++ b/diary.txt
@@ -1 +1,4 @@
```

I'm pretty much f***ed. That's my considered opinion.

+

+Okay, I've had a good night's sleep, and things don't seem as hopeless
+as they did yesterday.

```
diff --git a/diary.txt b/diary.txt
index 218b2e6..1004f7e 100644
--- a/diary.txt
+++ b/diary.txt
@@ -1 +1,4 @@
    I'm pretty much f***ed. That's my considered opinion.
+
+Okay, I've had a good night's sleep, and things don't seem as hopeless
+as they did yesterday.
```

The first line tells us that Git is producing output similar to the Unix diff command, comparing the old and new versions of the file.

```
diff --git a/diary.txt b/diary.txt
index 218b2e6..1004f7e 100644
--- a/diary.txt
+++ b/diary.txt
@@ -1 +1,4 @@
    I'm pretty much f***ed. That's my considered opinion.
+
+Okay, I've had a good night's sleep, and things don't seem as hopeless
+as they did yesterday.
```

The second line tells exactly which versions of the file Git is comparing.

218b2e6 and 1004f7e are unique labels for those versions.

```
diff --git a/diary.txt b/diary.txt
index 218b2e6..1004f7e 100644
--- a/diary.txt
+++ b/diary.txt
@@ -1 +1,4 @@
    I'm pretty much f***ed. That's my considered opinion.
+
+Okay, I've had a good night's sleep, and things don't seem as hopeless
+as they did yesterday.
```

The third and fourth lines are a legend for symbols used to indicate each file.

```
diff --git a/diary.txt b/diary.txt
index 218b2e6..1004f7e 100644
--- a/diary.txt
+++ b/diary.txt
@@ -1 +1,4 @@

```

I'm pretty much f***ed. That's my considered opinion.

+

+Okay, I've had a good night's sleep, and things don't seem as hopeless
+as they did yesterday.

The remaining lines show us the actual differences
and the lines on which they occur.

COMMITTING CHANGES

```
$ git commit -m 'Added commentary of second day on Mars'
```

COMMITTING CHANGES

```
$ git commit -m 'Added commentary of second day on Mars'
```

```
On branch master
```

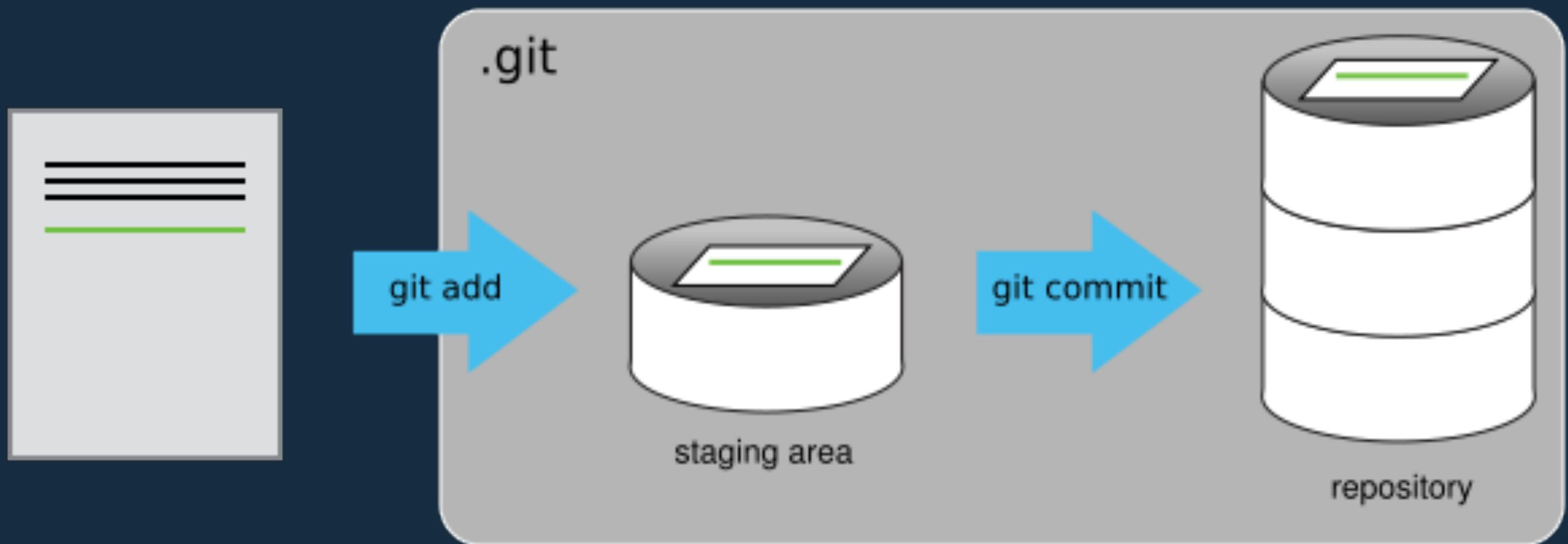
```
Changes not staged for commit:
```

```
modified: diary.txt
```

```
no changes added to commit
```

```
$ git add diary.txt
$ git commit -m 'Added commentary of second day on Mars'
[master c816814] Added commentary of second day on Mars
 1 file changed, 3 insertions(+)
```

STAGING AREA



ADDING AND COMMITTING

All in one step:

```
$ git commit -a
```

ADD ANOTHER LINE

\$ mate diary.txt

I'm pretty much f***ed. That's my considered opinion.

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

Of course, I don't have any plan for surviving four years on one year of food.

```
$ git diff
```

```
diff --git a/diary.txt b/diary.txt
index 1004f7e..b79ef50 100644
--- a/diary.txt
+++ b/diary.txt
@@ -2,3 +2,6 @@ I'm pretty much f***ed. That's my considered opinion.
```

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

+

+Of course, I don't have any plan for surviving four years on one
+year of food.

```
$ git add diary.txt
```

```
$ git add diary.txt
```

```
$ git diff
```

DIFFING WITH STAGED CHANGES

```
$ git diff --staged
```

```
index 1004f7e..b79ef50 100644
--- a/diary.txt
+++ b/diary.txt
@@ -2,3 +2,5 @@ I'm pretty much f***ed. That's my considered opinion.
```

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

+

+Of course, I don't have any plan for surviving four years on one year of food.

```
$ git commit -m "Added evaluation of provisions"  
[master 4db2cce] Added evaluation of provisions  
1 file changed, 2 insertions(+)
```

```
$ git commit -m "Added evaluation of provisions"  
[master 4db2cce] Added evaluation of provisions  
 1 file changed, 2 insertions(+)  
  
check our status ...
```

```
$ git status  
# On branch master  
nothing to commit, working directory clean
```

CHECK THE LOG

```
$ git log
```

```
commit 4db2cce13e52ee653cdabcc7a52c5a6b3b7cb2b3  
Author: Mark Watney <mwatney@nasa.gov>  
Date: Sun Aug 14 15:00:30 2016 -0700
```

Added evaluation of provisions

```
commit c81681408c0b6b4b69ecf5e3ca4413863c8bbb73  
Author: Mark Watney <mwatney@nasa.gov>  
Date: Sun Aug 14 14:57:45 2016 -0700
```

Added commentary of second day on Mars

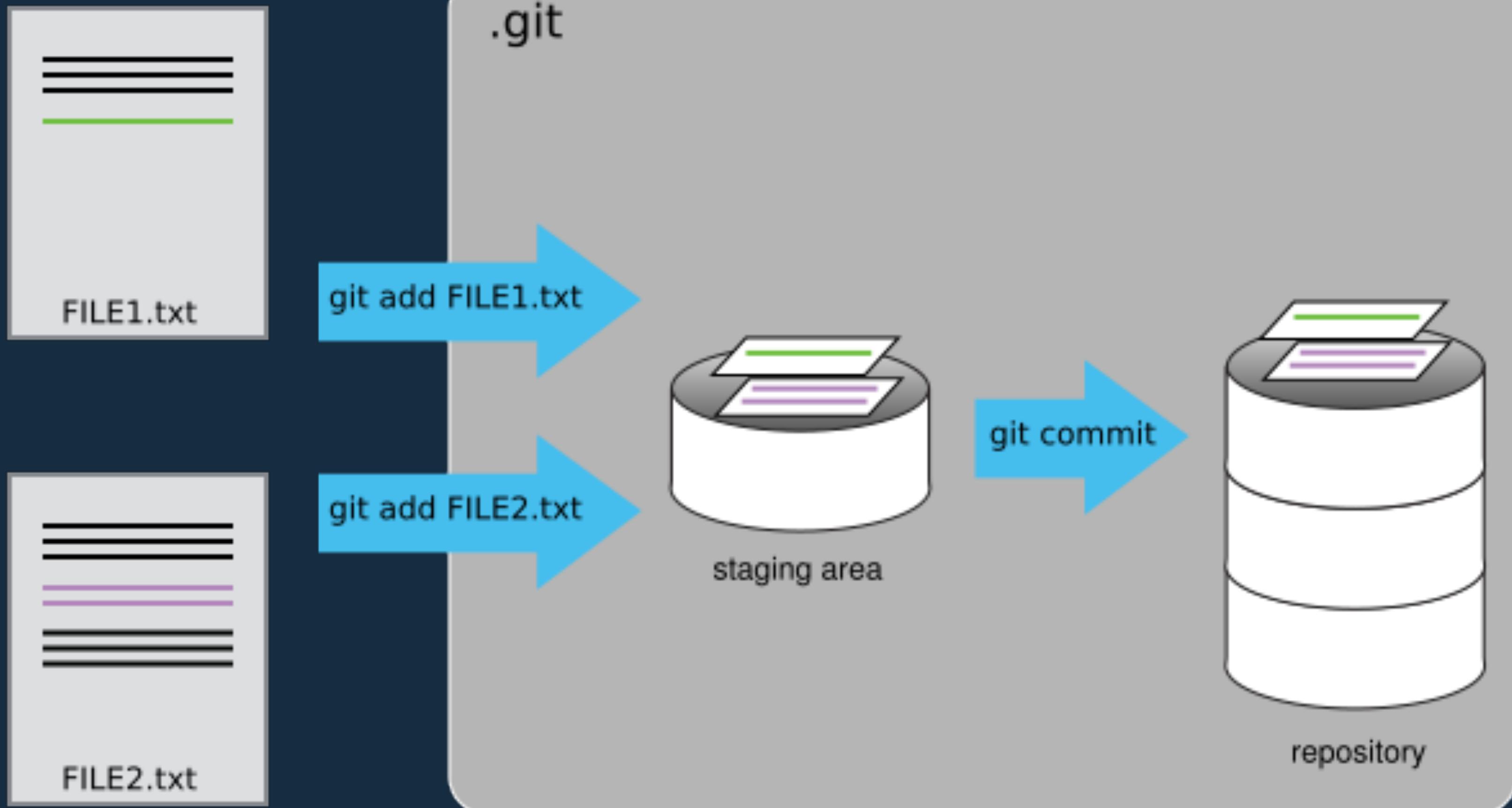
```
commit 643a89258344ec9a02ab8e85e1493945a9b71079  
Author: Mark Watney <mwatney@nasa.gov>  
Date: Sun Aug 14 14:53:07 2016 -0700
```

I don't even know who'll read this

PAGING THE LOG

When the output of git log is too long to fit in your screen, git uses a pager to split it into pages of the size of your screen.

- » To get out of the pager, press q.
- » To move to the next page, press the space bar.
- » To search for some_word in all pages, type /some_word and navigate through matches pressing n.



CHOOSING A COMMIT MESSAGE

Which of the following commit messages would be most appropriate for the last commit made to `diary.txt`?

1. "Changes"
2. "Added line 'Of course, I don't have any plan for surviving four years on one year of food.' to `diary.txt`"
3. "Added evaluation of provisions"

COMMITTING CHANGES TO GIT

Which command(s) below would save the changes of myfile.txt to my local Git repository?

1. \$ git commit -m "my recent changes"
2. \$ git init myfile.txt
\$ git commit -m "my recent changes"
3. \$ git add myfile.txt
\$ git commit -m "my recent changes"
4. \$ git commit -m myfile.txt "my recent changes"

COMMITTING MULTIPLE FILES

The staging area can hold changes from any number of files that you want to commit as a single snapshot.

1. Add some text to diary.txt noting your decision to reconfigure the mars rover
2. Create a new file rover.txt with your initial thoughts on reconfiguring the rover
3. Add changes from both files to the staging area, and commit those changes.

EXPLORING HISTORY

HEAD

You can refer to the most recent commit of the working directory by using the identifier HEAD.

\$ mate diary.txt

I'm pretty much f***ed. That's my considered opinion.

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

Of course, I don't have any plan for surviving four years on one year of food.

For now, I'm well fed and have a purpose: Fix the damn radio.

DIFFING WITH HEAD

```
$ git diff HEAD diary.txt
```

```
diff --git a/diary.txt b/diary.txt
index b79ef50..e2287f6 100644
--- a/diary.txt
+++ b/diary.txt
@@ -4,3 +4,5 @@ Okay, I've had a good night's sleep, and things don't seem as hopeless
 as they did yesterday.
```

Of course, I don't have any plan for surviving four years on one year of food.

+

+For now, I'm well fed and have a purpose: Fix the damn radio.

DIFFING WITH HEAD

```
$ git diff HEAD~1 diary.txt
```

```
diff --git a/diary.txt b/diary.txt
index 1004f7e..e2287f6 100644
--- a/diary.txt
+++ b/diary.txt
@@ -2,3 +2,7 @@ I'm pretty much f***ed. That's my considered opinion.
```

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

+

+Of course, I don't have any plan for surviving four years on one year of food.

+

+For now, I'm well fed and have a purpose: Fix the damn radio.

COMPARING WITH PREVIOUS COMMITS

```
$ git diff HEAD~2 diary.txt
```

```
diff --git a/diary.txt b/diary.txt
```

```
index 218b2e6..e2287f6 100644
```

```
--- a/diary.txt
```

```
+++ b/diary.txt
```

```
@@ -1 +1,8 @@
```

I'm pretty much f***ed. That's my considered opinion.

+

+Okay, I've had a good night's sleep, and things don't seem as hopeless
+as they did yesterday.

+

+Of course, I don't have any plan for surviving four years on one year of food.

+

+For now, I'm well fed and have a purpose: Fix the damn radio.

DIFFING BY HASH

```
$ git diff c81681408c0b6b4b69ecf5e3ca4413863c8bbb73 diary.txt
```

```
diff --git a/diary.txt b/diary.txt
index 1004f7e..e2287f6 100644
--- a/diary.txt
+++ b/diary.txt
@@ -2,3 +2,7 @@ I'm pretty much f***ed. That's my considered opinion.
```

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

```
+  
+Of course, I don't have any plan for surviving four years on one year of food.  
+  
+For now, I'm well fed and have a purpose: Fix the damn radio.
```

```
$ git diff c816 diary.txt
```

```
diff --git a/diary.txt b/diary.txt
index 1004f7e..e2287f6 100644
--- a/diary.txt
+++ b/diary.txt
@@ -2,3 +2,7 @@ I'm pretty much f***ed. That's my considered opinion.
```

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

```
+
+Of course, I don't have any plan for surviving four years on one year of food.
+
+For now, I'm well fed and have a purpose: Fix the damn radio.
```

BAD THINGS HAPPEN

Let's suppose we accidentally overwrite our file:

```
$ mate diary.txt
```

So I ran into a bunch of problems with my water plan.

git status now tells us that the file has been changed . . .

```
$ git status
```

```
# On branch master
# Changes not staged for commit:
#   (use "git add <file>..." to update what will be committed)
#   (use "git checkout -- <file>..." to discard changes in working directory)
#
#       modified:   diary.txt
#
no changes added to commit (use "git add" and/or "git commit -a")
```

. . . but those changes haven't been staged

REVERTING TO HEAD

```
$ git checkout HEAD diary.txt  
$ cat diary.txt
```

I'm pretty much f***ed. That's my considered opinion.

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

Of course, I don't have any plan for surviving four years on one year of food.

If we want to go back even further,
we can use a commit identifier instead:

```
$ git checkout c816814 diary.txt
```

DON'T LOSE YOUR HEAD

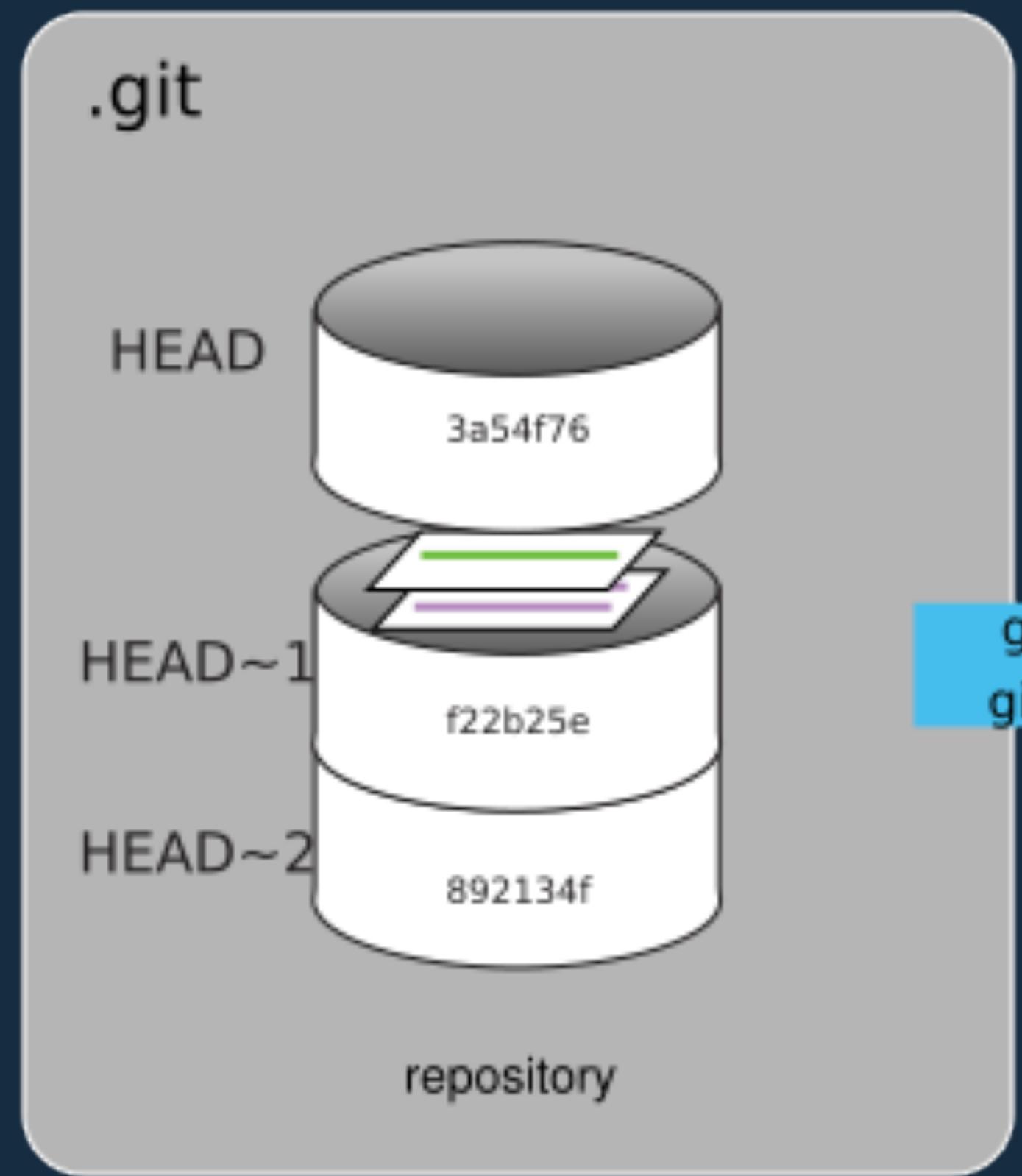
Notice we used

```
$ git checkout c816814 diary.txt
```

to revert diary.txt to its state after the commit
c816814.

If you forget diary.txt in that command, git will
tell you that

“You are in ‘detached HEAD’ state.”



git checkout HEAD~1
or
git checkout f22b25e

FILE1.txt

FILE2.txt

SIMPLIFYING THE COMMON CASE

If you read the output of `git status` carefully, you'll see that it includes this hint:

(use "`git checkout -- <file>...`" to discard changes `in` working directory)

The double dash `--` is needed to separate the names of the files being recovered from the command itself.

RECOVERING OLDER VERSIONS OF A FILE

Jennifer has made changes to the Python script that she has been working on for weeks, and the modifications she made this morning "broke" the script and it no longer runs.

Luckily, she has been keeping track of her project's versions using Git! Which commands below will let her recover the last committed version of her Python script called data_cruncher.py?

1. \$ git checkout HEAD
2. \$ git checkout HEAD data_cruncher.py
3. \$ git checkout HEAD~1 data_cruncher.py
4. \$ git checkout <unique ID of last commit> data_cruncher.py

EXPLORE AND SUMMARIZE HISTORIES

After several months, the escape_mars project has more than 50 files.

You would like to find a commit with specific text in diary.txt is modified.

When you type git log, a very long list appeared,

How can you narrow down the search?

EXPLORE AND SUMMARIZE HISTORIES

```
$ git log diary.txt
```

Perhaps some of these commit messages are very ambiguous (e.g. "update files").

How can you search through these files?

EXPLORE AND SUMMARIZE HISTORIES

Both git diff and git log are very useful and they summarize different part of the history for you.

Is that possible to combine both? Let's try the following:

```
$ git log --patch diary.txt
```

```
commit 4db2cce13e52ee653cdabcc7a52c5a6b3b7cb2b3
Author: Chris Fonnesbeck <chris.fonnesbeck@vanderbilt.edu>
Date: Sun Aug 14 15:00:30 2016 -0700
```

Added evaluation of provisions

```
diff --git a/diary.txt b/diary.txt
index 1004f7e..b79ef50 100644
--- a/diary.txt
+++ b/diary.txt
@@ -2,3 +2,5 @@ I'm pretty much f***ed. That's my considered opinion.
```

Okay, I've had a good night's sleep, and things don't seem
as hopeless as they did yesterday.

+

```
+Of course, I don't have any plan for surviving four years on
+one year of food.
```

commit c81681408c0b6b4b69ecf5e3ca4413863c8bbb73

Author: Chris Fonnesbeck <chris.fonnesbeck@vanderbilt.edu>

Date: Sun Aug 14 14:57:45 2016 -0700

Added commentary of second day on Mars

diff --git a/diary.txt b/diary.txt

index 218b2e6..1004f7e 100644

--- a/diary.txt

+++ b/diary.txt

@@ -1 +1,4 @@

I'm pretty much f***ed. That's my considered opinion.

+

+Okay, I've had a good night's sleep, and things don't seem
+as hopeless as they did yesterday.

IGNORING THINGS

INTERMEDIATE OUTPUT FILES

```
$ mkdir potato_results  
$ touch a.dat b.dat c.dat potato_results/a.out  
potato_results/b.out  
$ git status
```

INTERMEDIATE OUTPUT FILES

```
$ mkdir potato_results  
$ touch a.dat b.dat c.dat potato_results/a.out  
potato_results/b.out  
$ git status
```

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

```
a.dat  
b.dat  
c.dat  
potato_results/
```

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

.GITIGNORE

```
$ mate .gitignore
```

```
*.dat  
potato_results/
```

```
$ git status  
  
# On branch master  
# Untracked files:  
#   (use "git add <file>..." to include in what will be committed)  
#  
#       .gitignore  
nothing added to commit but untracked files present (use "git add" to track)
```

Let's add and commit .gitignore:

```
$ git add .gitignore
$ git commit -m "Add the ignore file"
$ git status
# On branch master
nothing to commit, working directory clean
```

Using `.gitignore` helps us avoid accidentally adding to the repository files that we don't want to track:

```
$ git add a.dat
```

The following paths are ignored by one of your `.gitignore` files:
a.dat

Use `-f` if you really want to add them.

```
fatal: no files added
```

```
$ git status --ignored
```

```
# On branch master
# Ignored files:
#   (use "git add -f <file>..." to include in what will be committed)
#
#       a.dat
#       b.dat
#       c.dat
#       results/
```

```
nothing to commit, working directory clean
```

IGNORING NESTED FILES

Given a directory structure that looks like:

results/data

results/plots

How would you ignore only results/plots and not results/data?

INCLUDING SPECIFIC FILES

How would you ignore all files with a .data extension
in your root directory except for
final.data?

INCLUDING SPECIFIC FILES

How would you ignore all files with a .data extension in your root directory except for final.data?

You would add the following two lines to your .gitignore:

```
*.data          # ignore all data files  
!final.data     # except final.data
```

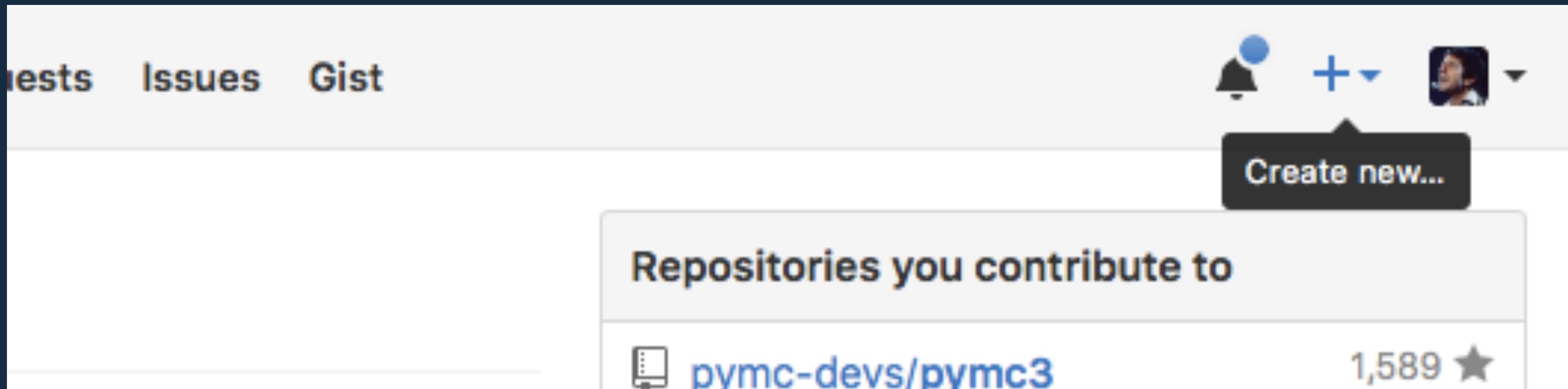
REMOTES IN GITHUB

GIT HOSTING SERVICES

Popular commercial services for hosting Git for collaboration include:

- » GitHub
- » BitBucket
- » GitLab

CREATING A REPOSITORY ON GITHUB (STEP 1)



CREATING A REPOSITORY ON GITHUB (STEP 2)

Create a new repository

A repository contains all the files for your project, including the revision history.

Owner Repository name

 **fonnesbeck** / mars 

Great repository names are short and memorable. Need inspiration? How about [fuzzy-tribble](#).

Description (optional)

Glad GitHub has servers on Mars!

 **Public**
Anyone can see this repository. You choose who can commit.

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

CREATING A REPOSITORY ON GITHUB (STEP 3)

Quick setup — if you've done this kind of thing before

 Set up in Desktop or [HTTPS](https://github.com/fonnesbeck/mars.git) [SSH](ssh://git@github.com:fondesbeck/mars.git) git@github.com:fondesbeck/mars.git

We recommend every repository include a [README](#), [LICENSE](#), and [.gitignore](#).

...or create a new repository on the command line

```
echo "# mars" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:fondesbeck/mars.git
git push -u origin master
```

...or push an existing repository from the command line

```
git remote add origin git@github.com:fondesbeck/mars.git
git push -u origin master
```

up — if you've done this kind of thing before

Desktop or **HTTPS** **SSH** <git@github.com:fonnesbeck/mars.git>

and every repository include a [README](#), [LICENSE](#), and [.gitignore](#)

Create a new repository on the command line

```
rs" >> README.md
```

ADME.md

```
-m "first commit"  
add origin git@github.com:fonnesbeck/mars.git  
u origin master
```

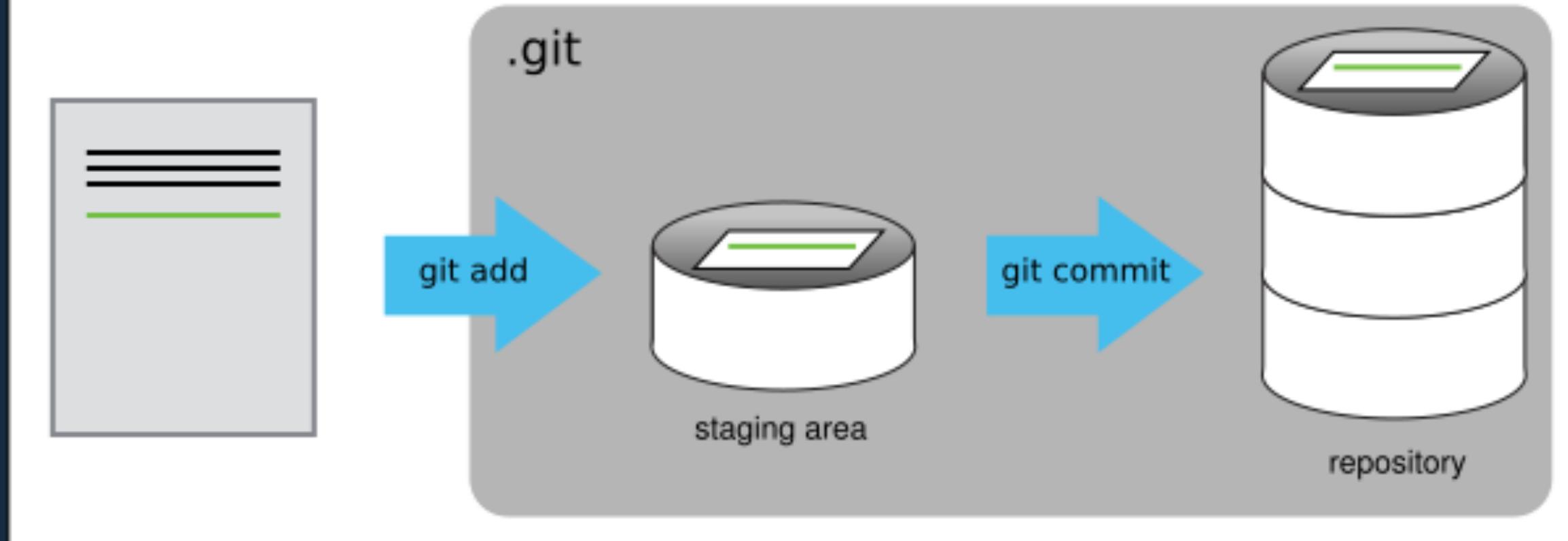
Create an existing repository from the command line

```
add origin git@github.com:fonnesbeck/mars.git  
u origin master
```

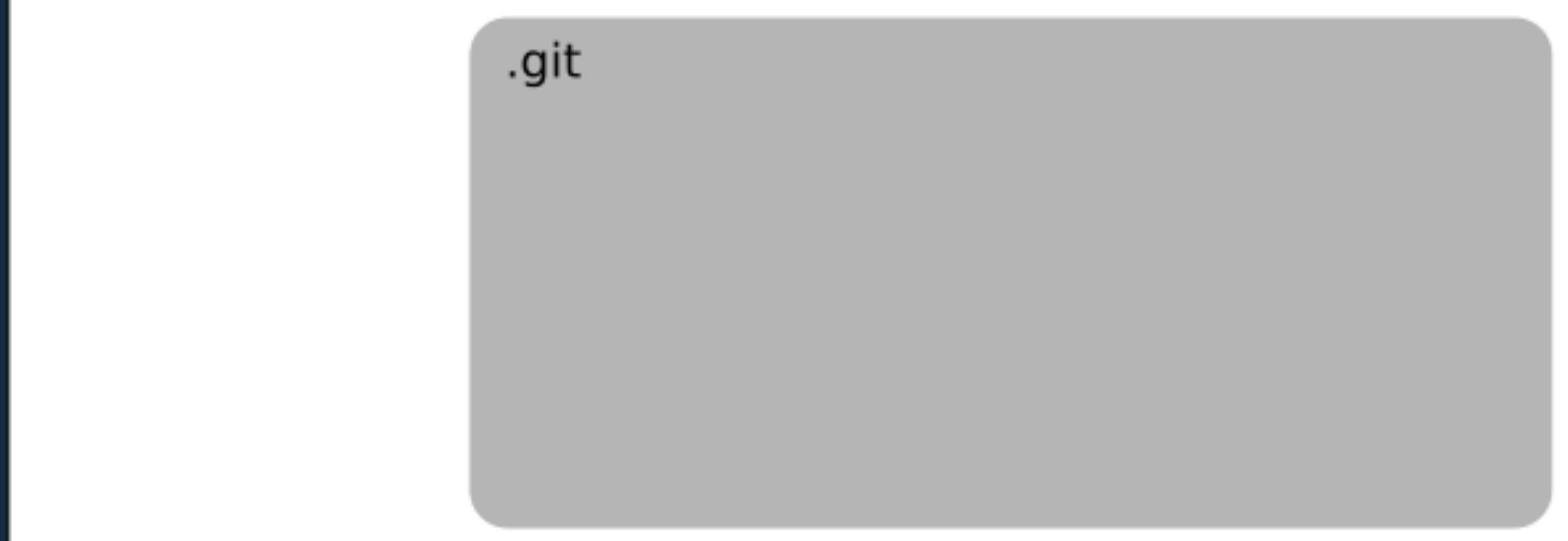
This effectively does the following on GitHub's servers:

```
$ mkdir mars  
$ cd mars  
$ git init
```

~/mwatney/mars.git



<https://github.com/mwatney/mars.git>



The home page of the repository on GitHub includes a copyable URL of the repo...

Quick setup — if you've done this kind of thing before

 Set up in Desktop

or

HTTPS

SSH

git@github.com:fonnesbeck/mars.git

We recommend every repository include a [README](#), [LICENSE](#), and [.gitignore](#).

HTTPS VS. SSH

We use HTTPS here because it does not require additional configuration.

After the workshop you may want to set up SSH access, which is a bit more secure, and does not require repeated entry of passwords.

SPECIFYING A REMOTE REPO

Copy the GitHub repo URL from the browser, and run . . .

```
$ git remote add origin https://github.com/mwatney/mars.git
```

Check that the command has worked . . .

```
$ git remote -v
```

```
origin    https://github.com/mwatney/mars.git (push)
origin    https://github.com/mwatney/mars.git (fetch)
```

PUSHING CHANGES

```
$ git push origin master
```

```
Counting objects: 9, done.
```

```
Delta compression using up to 4 threads.
```

```
Compressing objects: 100% (6/6), done.
```

```
Writing objects: 100% (9/9), 821 bytes, done.
```

```
Total 9 (delta 2), reused 0 (delta 0)
```

```
To https://github.com/mwatney/mars
```

```
* [new branch]      master -> master
```

```
Branch master set up to track remote branch master from origin.
```

PULLING CHANGES

```
$ git pull origin master
```

```
From https://github.com/mwatney/mars
```

```
* branch                  master      -> FETCH_HEAD
```

```
Already up-to-date.
```

EXERCISE

Find a project on GitHub that interests you, and clone it to your local machine.

For example, the Jupyter Notebook repository:

<https://github.com/jupyter/notebook>

The screenshot shows the GitHub repository page for 'jupyter / notebook'. At the top, there's a navigation bar with links for 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. Below the header, the repository name 'jupyter / notebook' is displayed, along with statistics: 10,822 commits, 7 branches, 37 releases, and 323 contributors. A 'Clone or download' button is visible. The main content area shows a list of recent commits, with the most recent one being a merge from 'mpacer/selenium_utils'. The commit list includes entries for updating changelogs, adding git hooks, and creating shortcut editors for the notebook. The commits span from 5 days ago to 3 years ago.

Commit	Message	Date
takluyver Merge pull request #3458 from mpacer/selenium_utils	Merge pull request #3458 from mpacer/selenium_utils	5 days ago
docs-translations/ko-KR	Add translated files	4 months ago
docs	Update changelog for 5.4.1	15 days ago
git-hooks	Update githooks and description	3 years ago
notebook	Merge pull request #3458 from mpacer/selenium_utils	5 days ago
tools	use fit addon	2 months ago
.babelrc	Create shortcut editor for the notebook	2 years ago
.bowerrc	s/jupyter_notebook/notebook	3 years ago
.eslintignore	Create shortcut editor for the notebook	2 years ago
.eslintrc.json	Disable "comma-dangle" eslint rule	2 years ago
.gitignore	Work on loading UI translations (#2969)	5 months ago
.gitmodules	remove submodule	3 years ago

CONFLICTS

```
remote: Counting objects: 5, done.  
remote: Compressing objects: 100% (2/2), done.  
remote: Total 3 (delta 1), reused 3 (delta 1)  
Unpacking objects: 100% (3/3), done.  
From https://github.com/mwatney/mars  
 * branch                  master       -> FETCH_HEAD  
Auto-merging diary.txt  
CONFLICT (content): Merge conflict in diary.txt  
Automatic merge failed; fix conflicts and then commit the result.
```

COLLABORATION

A black and white photograph showing a group of astronauts inside a space station module. In the foreground, a man in a dark t-shirt with a NASA logo stands looking towards the camera. Behind him, a woman in a similar t-shirt looks off to the side. To their right, another man in a t-shirt and a woman in a flight suit with a helmet on her head are also looking towards the camera. The background shows the interior of the station with various equipment, cables, and a hatch.

4db2cce 2 days ago

Edit this file

Raw

Blame

History



as hopeless

on one year of food.

mars / diary.txt

or cancel

<> Edit file

Preview changes

```
1 I'm pretty much f***ed. That's my considered opinion.  
2  
3 Okay, I've had a good night's sleep, and things don't seem as hopeless  
4 as they did yesterday.  
5  
6 Of course, I don't have any plan for surviving four years on one year of food.  
7  
8 Mark, we are coming to get you!
```

Commit changes

Added message to stranded astronaut|

Add an optional extended description...

- Commit directly to the `master` branch.
- Create a new branch for this commit and start a pull request. Learn more about this

[Commit changes](#)

[Cancel](#)

LOCAL CHANGE

```
$ echo "Im still cowering in the rover, but I've had time to  
think." >> diary.txt
```

```
$ git add diary.txt
```

```
$ git commit -m "Progress report on rover reconfiguration"
```

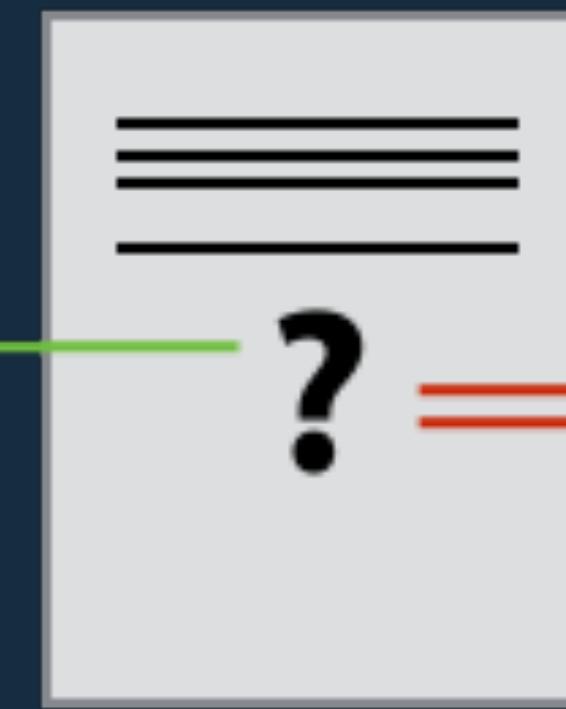
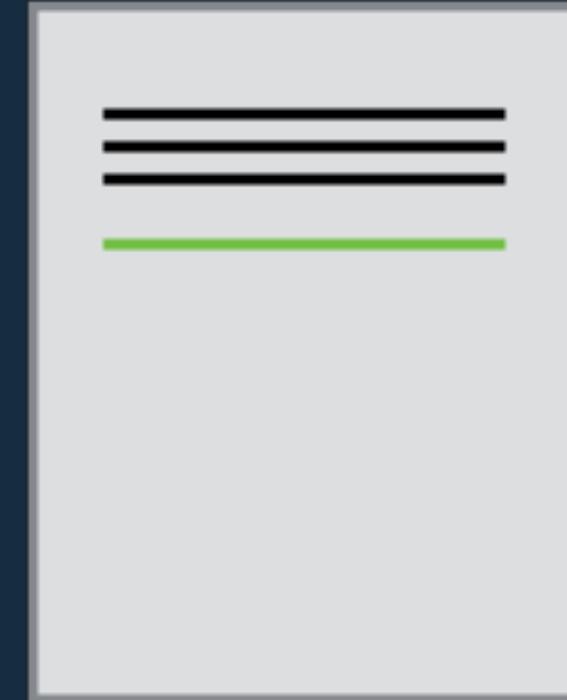
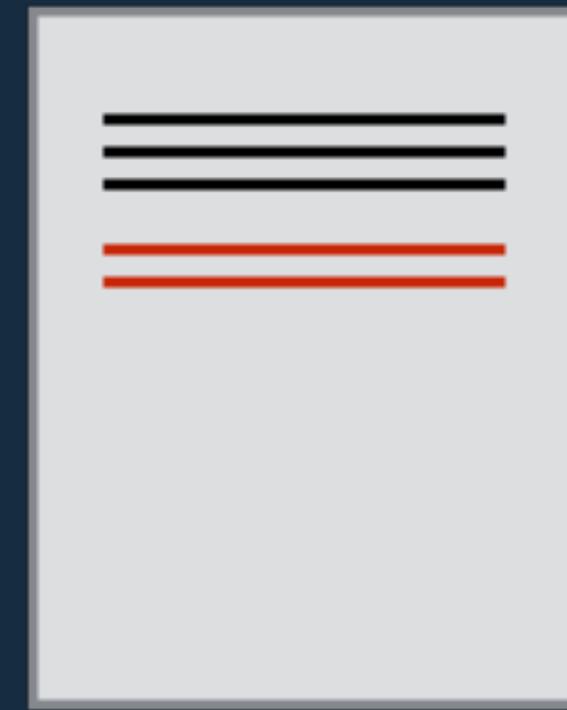
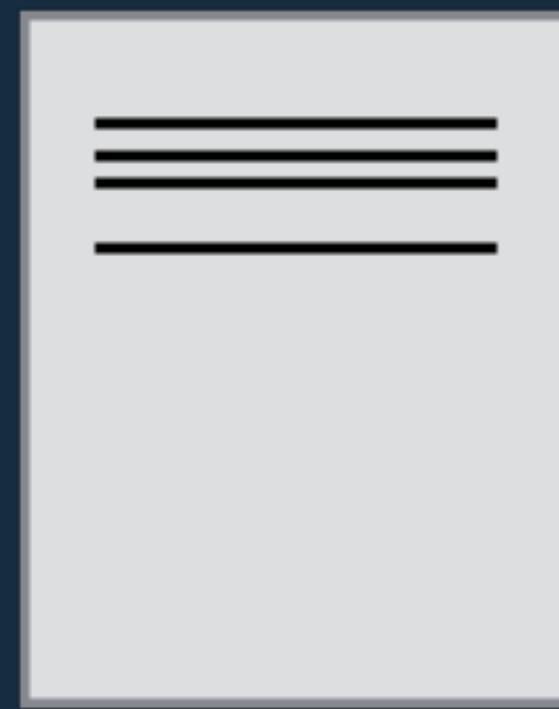
```
[master 2104602] Progress report on rover reconfiguration  
1 file changed, 1 insertion(+)
```

PUSH LOCAL CHANGES

```
$ git push
```

```
To git@github.com:mwatney/mars.git
```

```
! [rejected]          master -> master (fetch first)
error: failed to push some refs to 'git@github.com:mwatney/mars.git'
hint: Updates were rejected because the remote contains work that you do
hint: not have locally. This is usually caused by another repository pushing
hint: to the same ref. You may want to first integrate the remote changes
hint: (e.g., 'git pull ...') before pushing again.
hint: See the 'Note about fast-forwards' in 'git push --help' for details.
```



RESOLVING THE CONFLICT

Let's start by pulling:

```
$ git pull  
  
remote: Counting objects: 3, done.  
remote: Compressing objects: 100% (3/3), done.  
remote: Total 3 (delta 1), reused 0 (delta 0), pack-reused 0  
Unpacking objects: 100% (3/3), done.  
From github.com:mwatney/mars  
  6326f7d..9fca57b  master      -> origin/master  
Auto-merging diary.txt  
CONFLICT (content): Merge conflict in diary.txt  
Automatic merge failed; fix conflicts and then commit the result.
```

RESOLVING THE CONFLICT

```
$ cat diary.txt
```

I'm pretty much f***ed. That's my considered opinion.

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

Of course, I don't have any plan for surviving four years on one year of food.

<<<<< HEAD

I'm still cowering in the rover, but I've had time to think.

=====

Mark, we are coming to get you!

>>>>> 9fca57bfa92c4e4aa23566695f5bd21535addb87

MERGING CHANGES

\$ mate diary.txt

I'm pretty much f***ed. That's my considered opinion.

Okay, I've had a good night's sleep, and things don't seem as hopeless as they did yesterday.

Of course, I don't have any plan for surviving four years on one year of food.

Now that NASA can talk to me, they won't shut the hell up.

COMPLETE MERGE

```
$ git add diary.txt  
$ git status
```

On branch master

Your branch and 'origin/master' have diverged,
and have 1 and 1 different commit each, respectively.

(use "git pull" to merge the remote branch into yours)

All conflicts fixed but you are still merging.

(use "git commit" to conclude merge)

Changes to be committed:

modified: diary.txt

COMPLETE MERGE

```
$ git commit -m "Merging changes from GitHub"
```

```
[master e536f96] Merging changes from GitHub
```

PUSH MERGED BRANCH

```
$ git push
```

```
Counting objects: 6, done.  
Delta compression using up to 4 threads.  
Compressing objects: 100% (6/6), done.  
Writing objects: 100% (6/6), 776 bytes | 0 bytes/s, done.  
Total 6 (delta 2), reused 0 (delta 0)  
remote: Resolving deltas: 100% (2/2), completed with 1 local objects.  
To git@github.com:mwatney/mars.git  
 9fca57b..e536f96  master -> master
```



rbads.dev