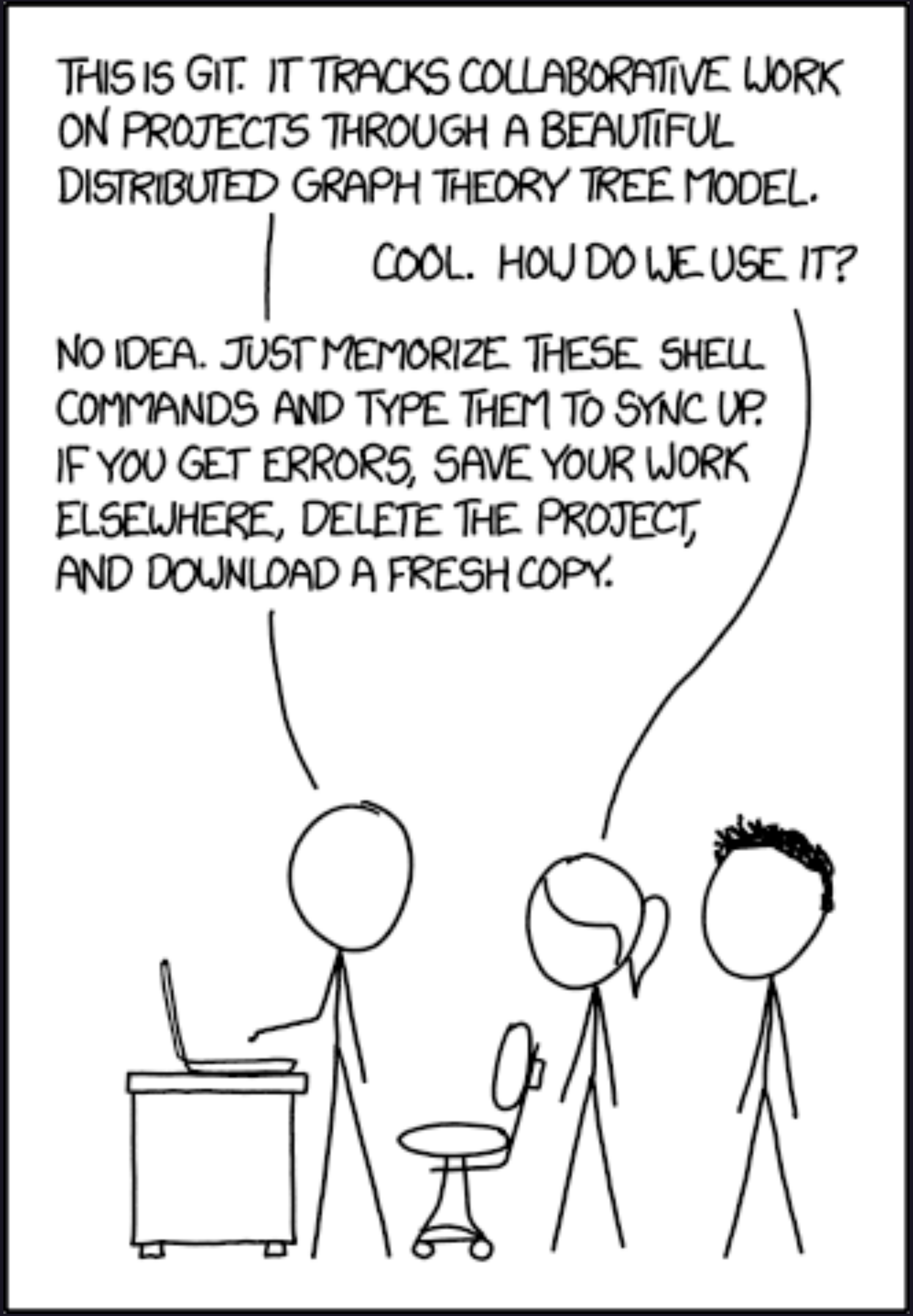
Git & Github

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

https://xkcd.com/1597/

Sven Schippkus – SPIN Friday Seminar – 2022-01-21

The problem git solves


THIS IS GIT. IT TRACKS COLLABORATIVE WORK ON PROJECTS THROUGH A BEAUTIFUL DISTRIBUTED GRAPH THEORY TREE MODEL.
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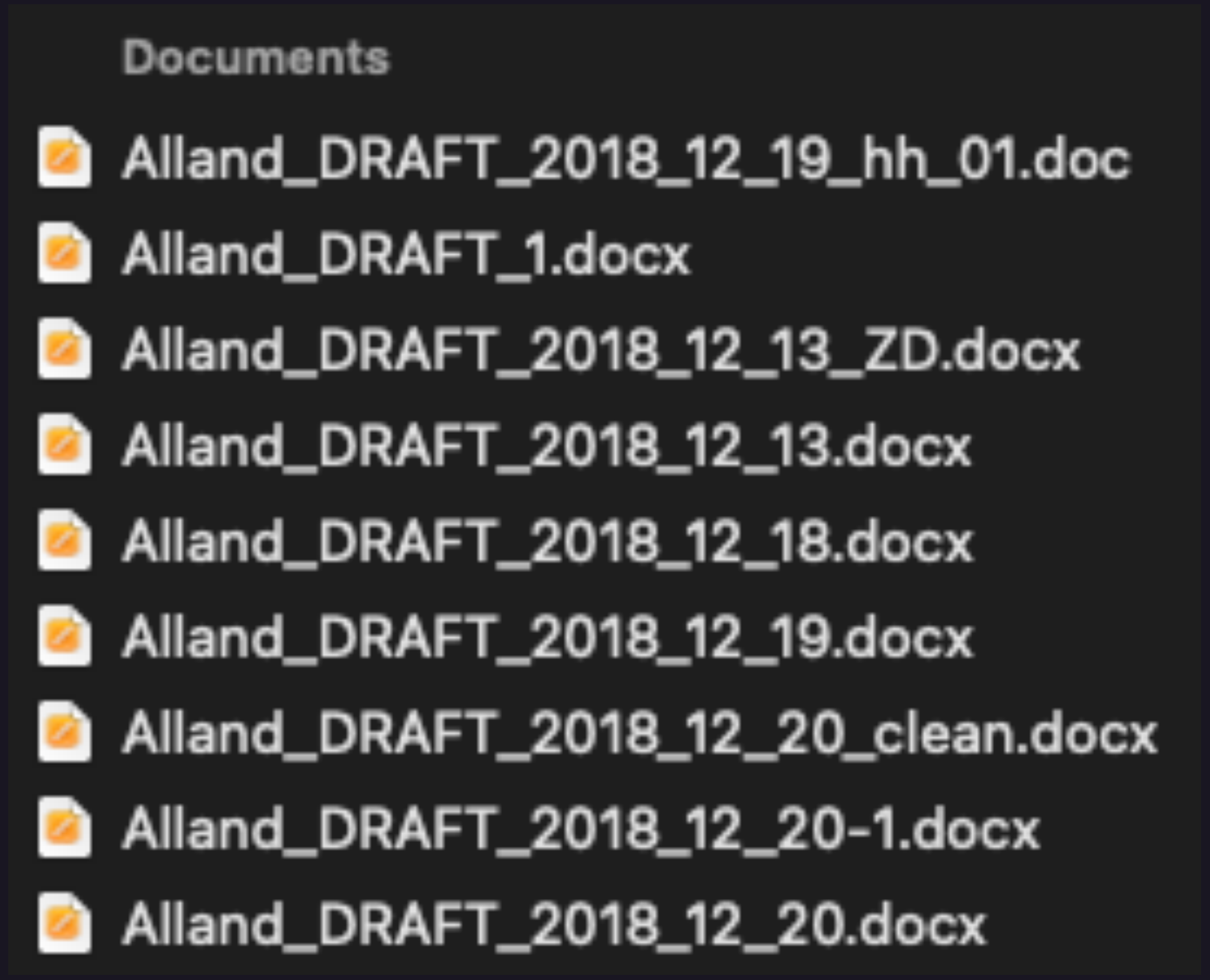
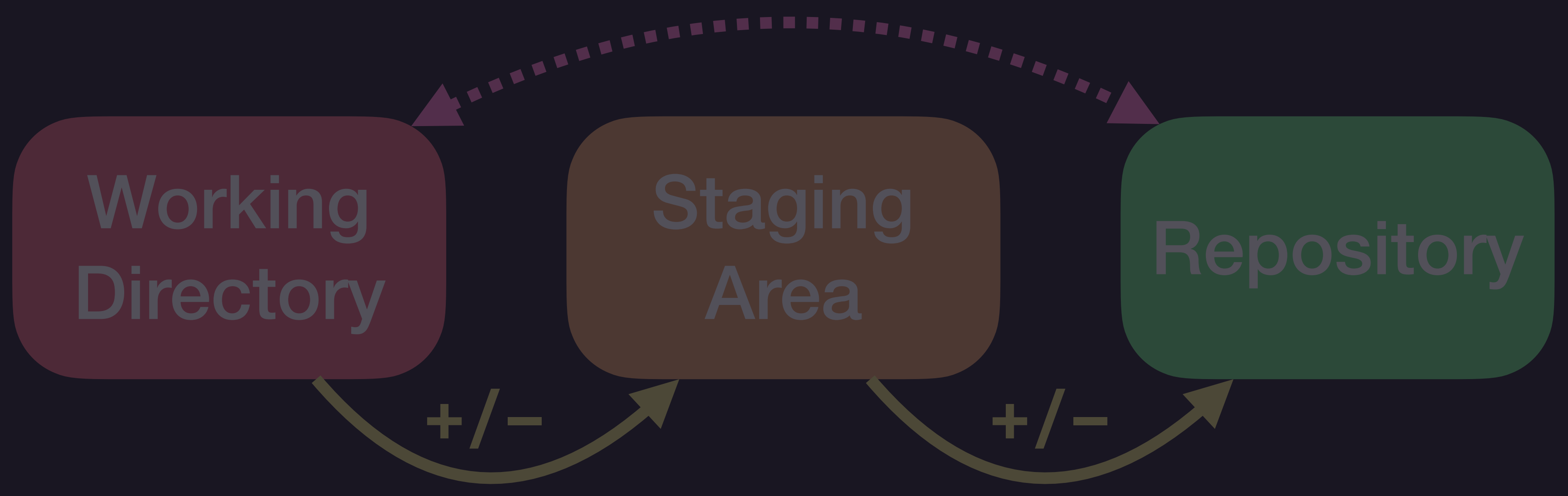

Documents

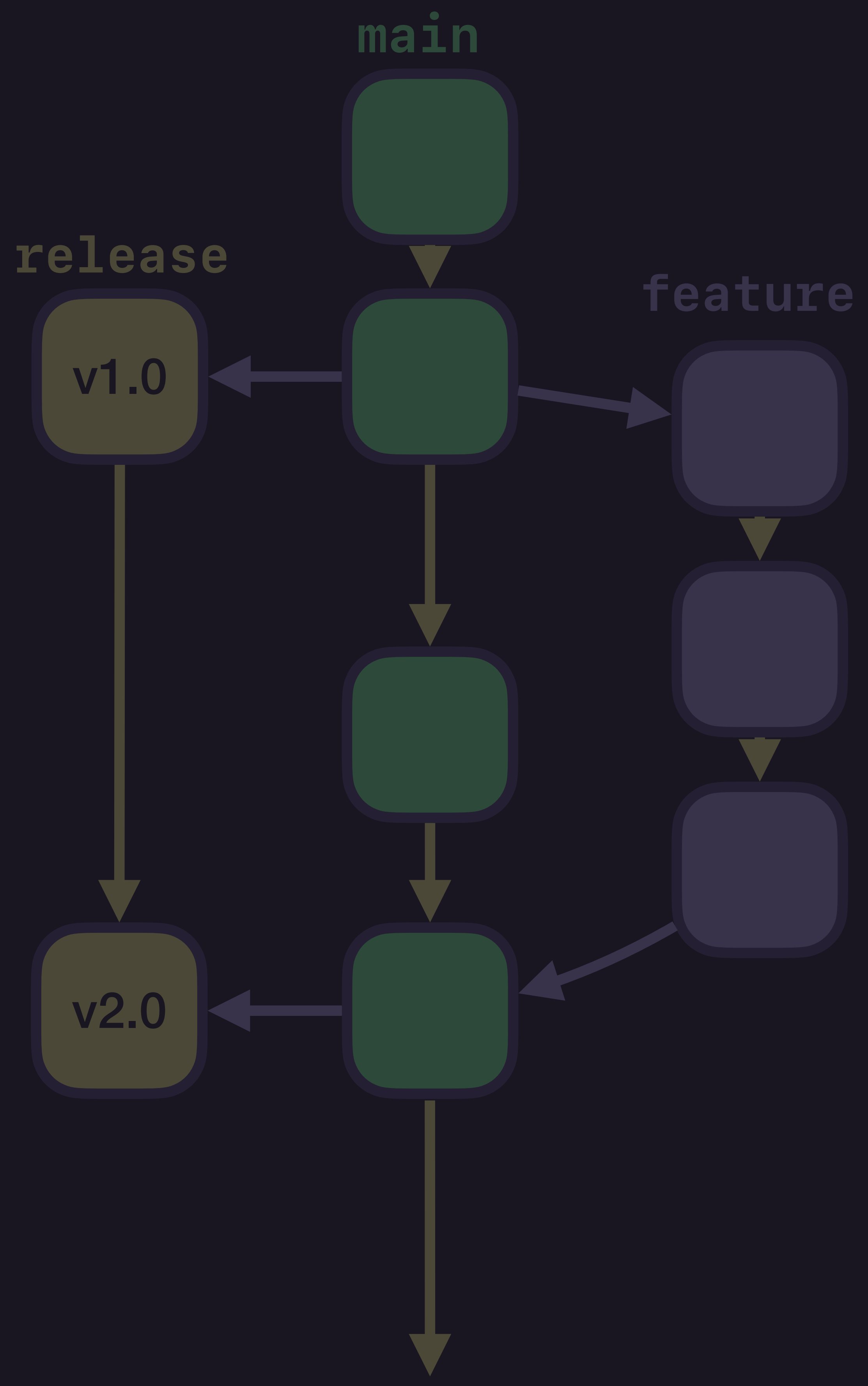
- Alland_DRAFT_2018_12_19_hh_01.doc
- Alland_DRAFT_1.docx
- Alland_DRAFT_2018_12_13_ZD.docx
- Alland_DRAFT_2018_12_13.docx
- Alland_DRAFT_2018_12_18.docx
- Alland_DRAFT_2018_12_19.docx
- Alland_DRAFT_2018_12_20_clean.docx
- Alland_DRAFT_2018_12_20-1.docx
- Alland_DRAFT_2018_12_20.docx

Overview

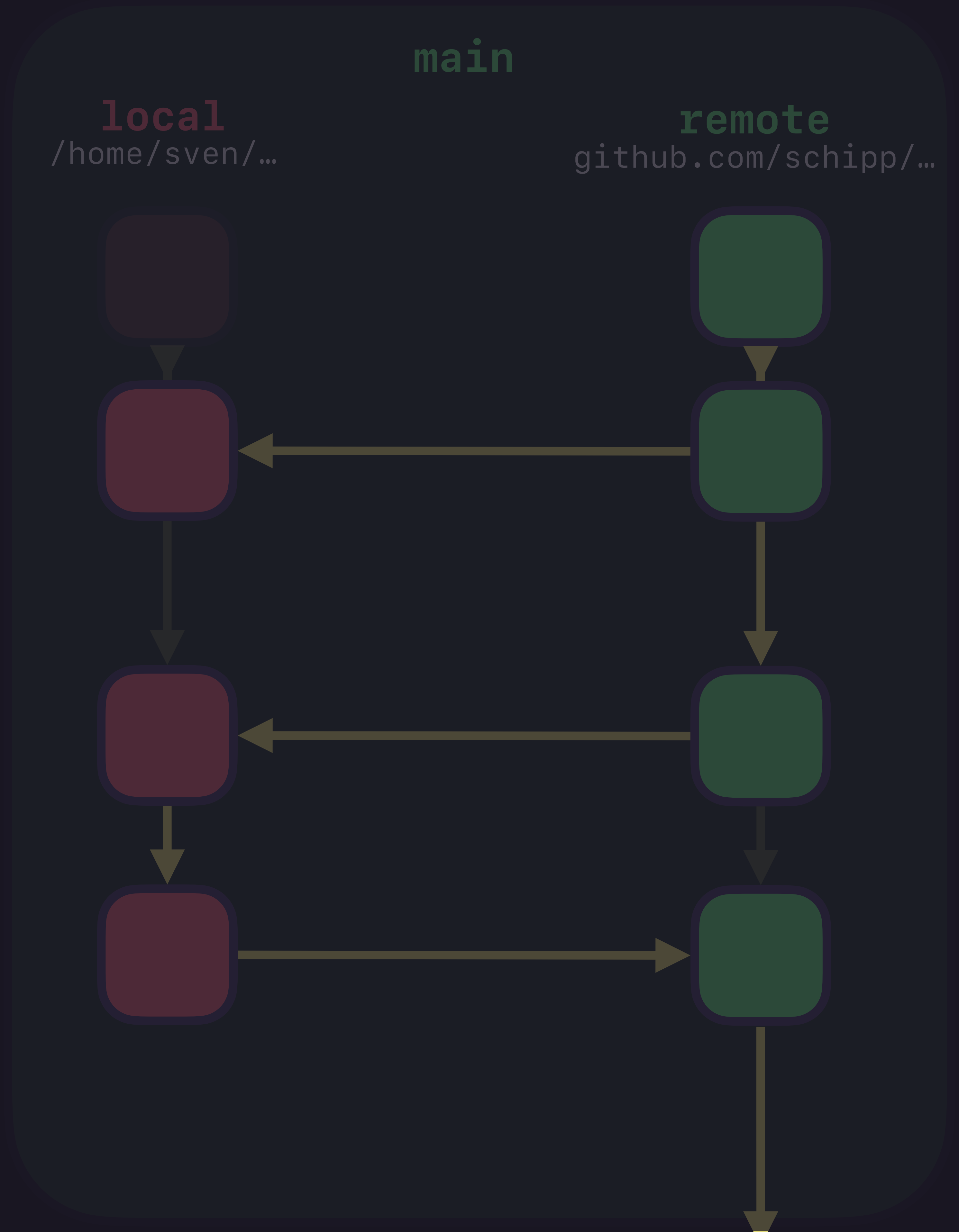
basics



branching

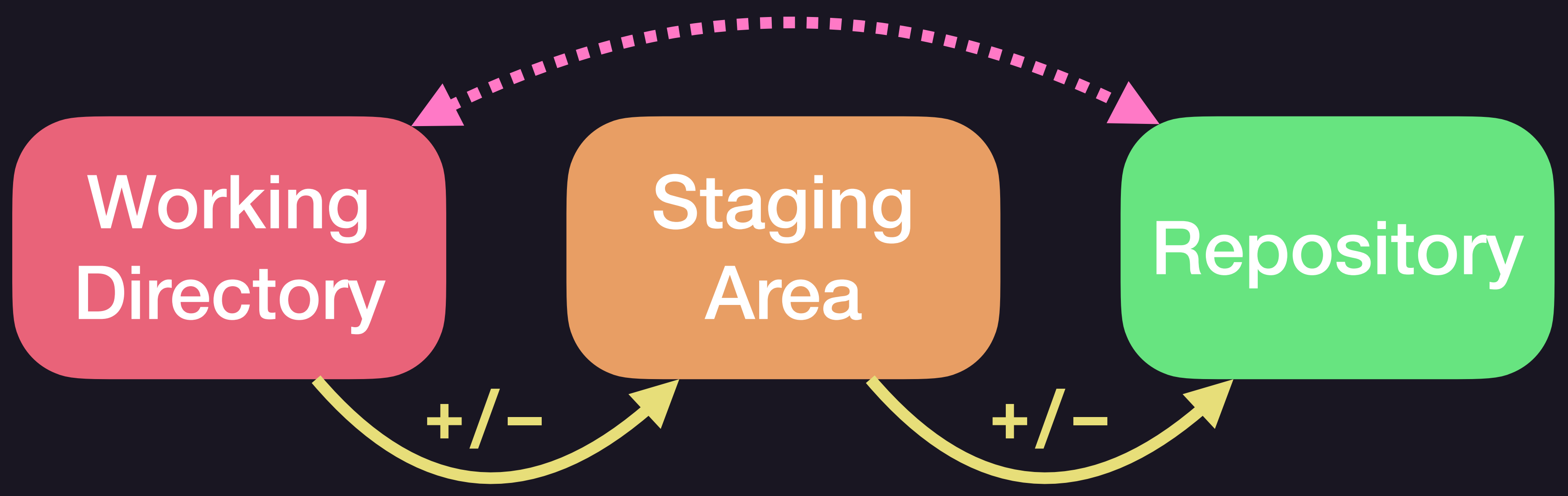


remote

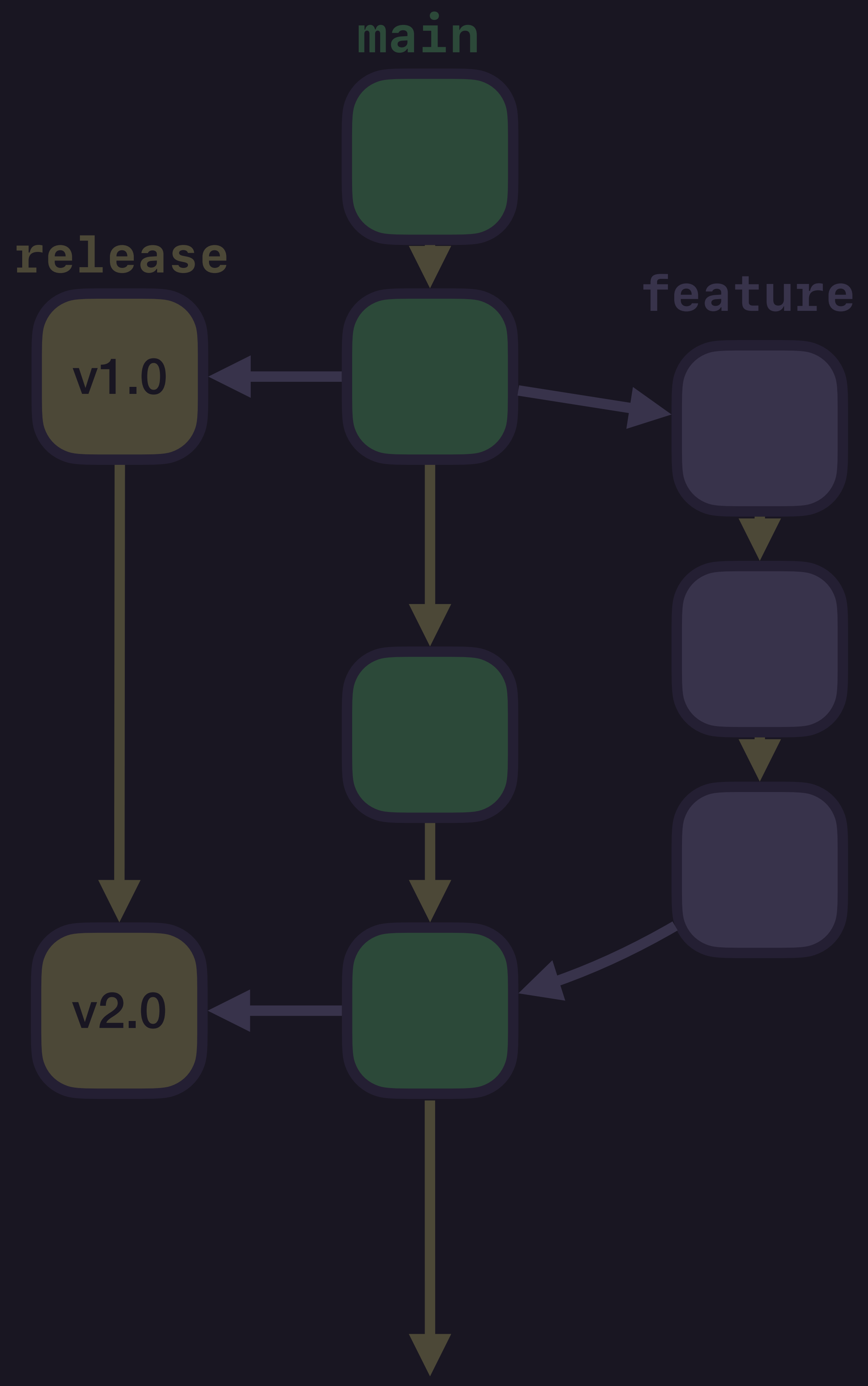


Overview

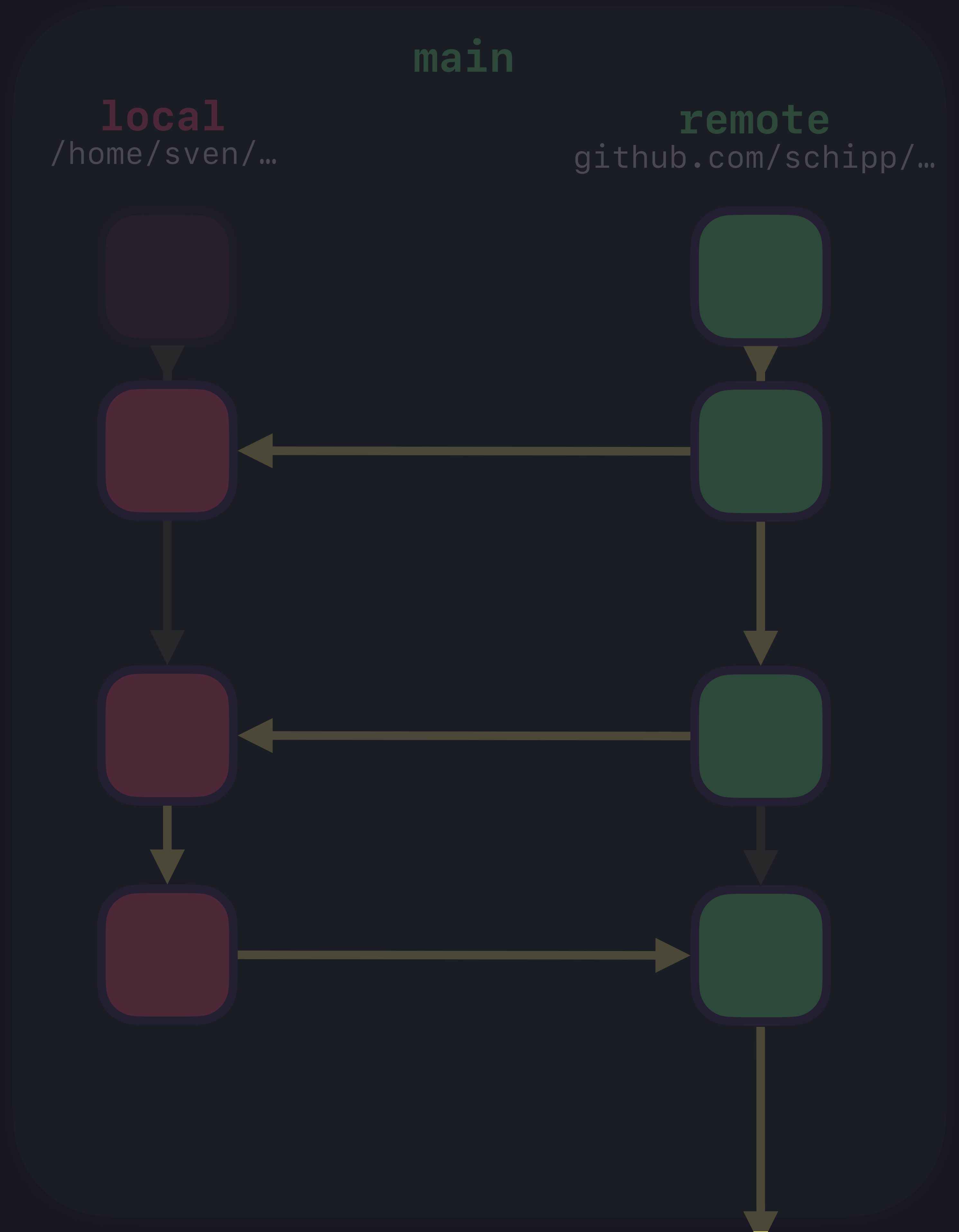
basics



branching



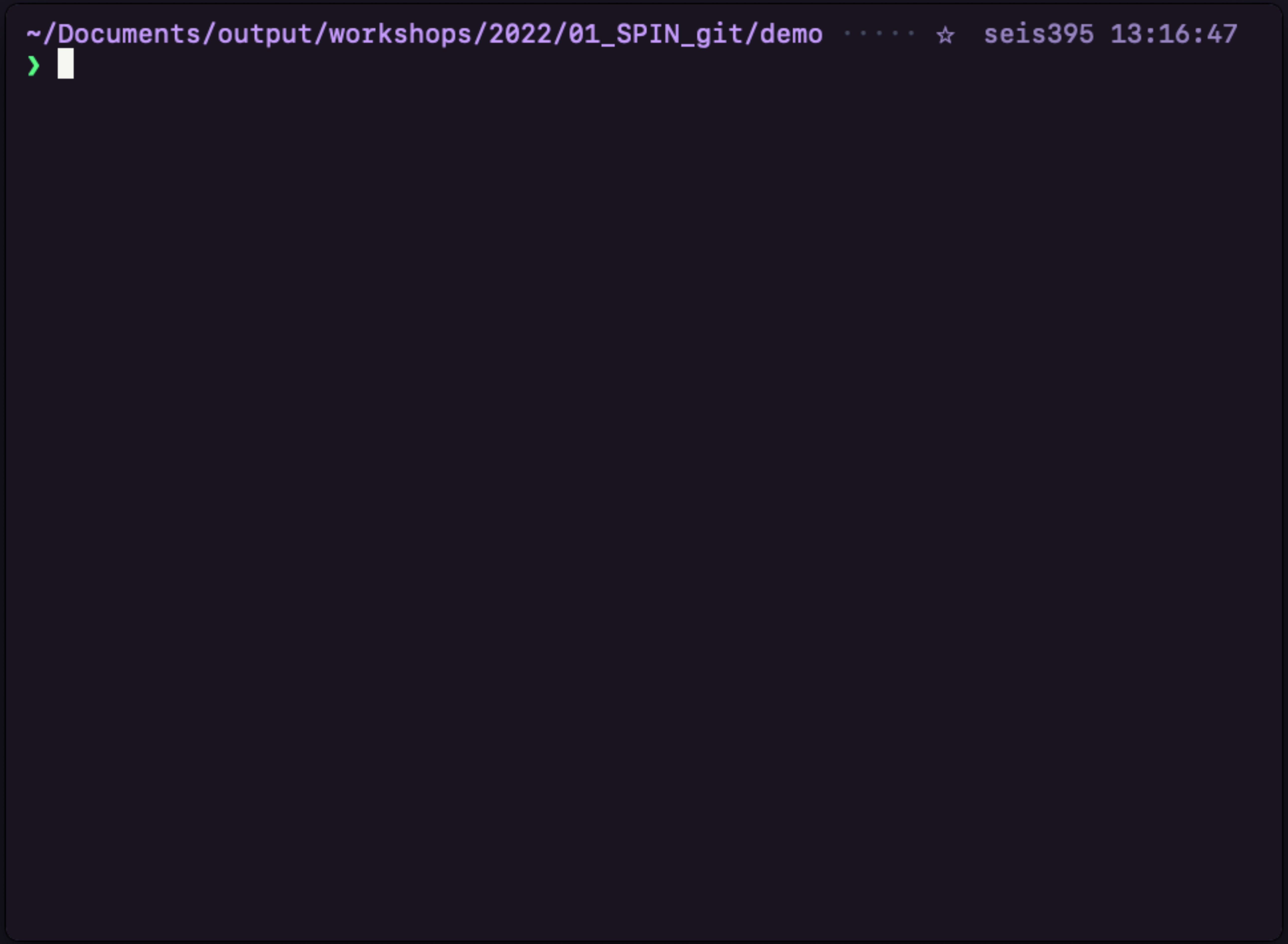
remote



Git

the basics

Working Directory

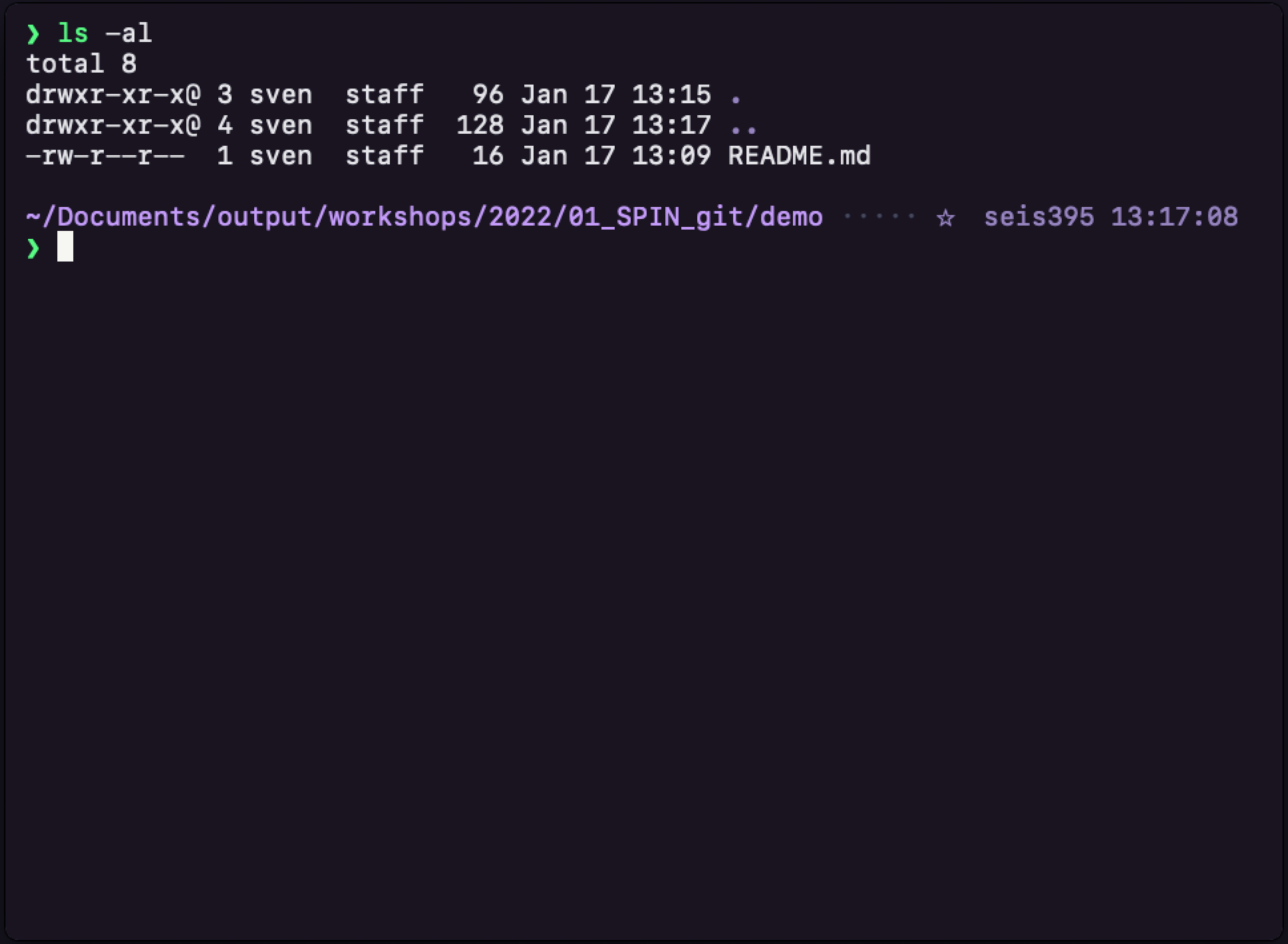


```
~/Documents/output/workshops/2022/01_SPIN_git/demo ····· ☆  seis395 13:16:47
❯ 
```

Git

the basics

Working Directory



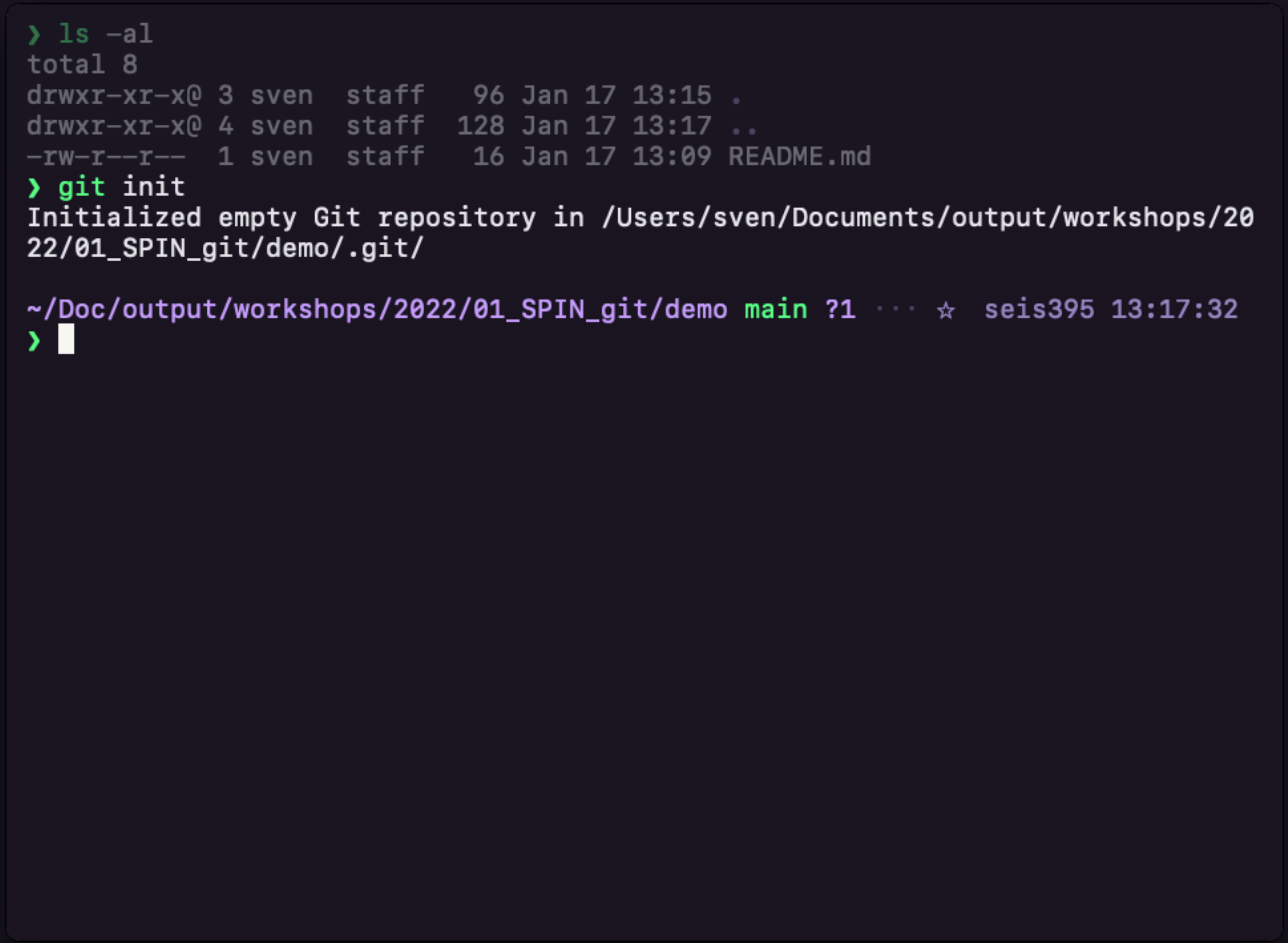
```
❯ ls -al
total 8
drwxr-xr-x@ 3 sven  staff   96 Jan 17 13:15 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 ..
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md

~/Documents/output/workshops/2022/01_SPIN_git/demo ····· ☆  seis395 13:17:08
❯ █
```

Git
the basics

Working Directory

Repository

`git init` - initialise **repository** in **working directory**



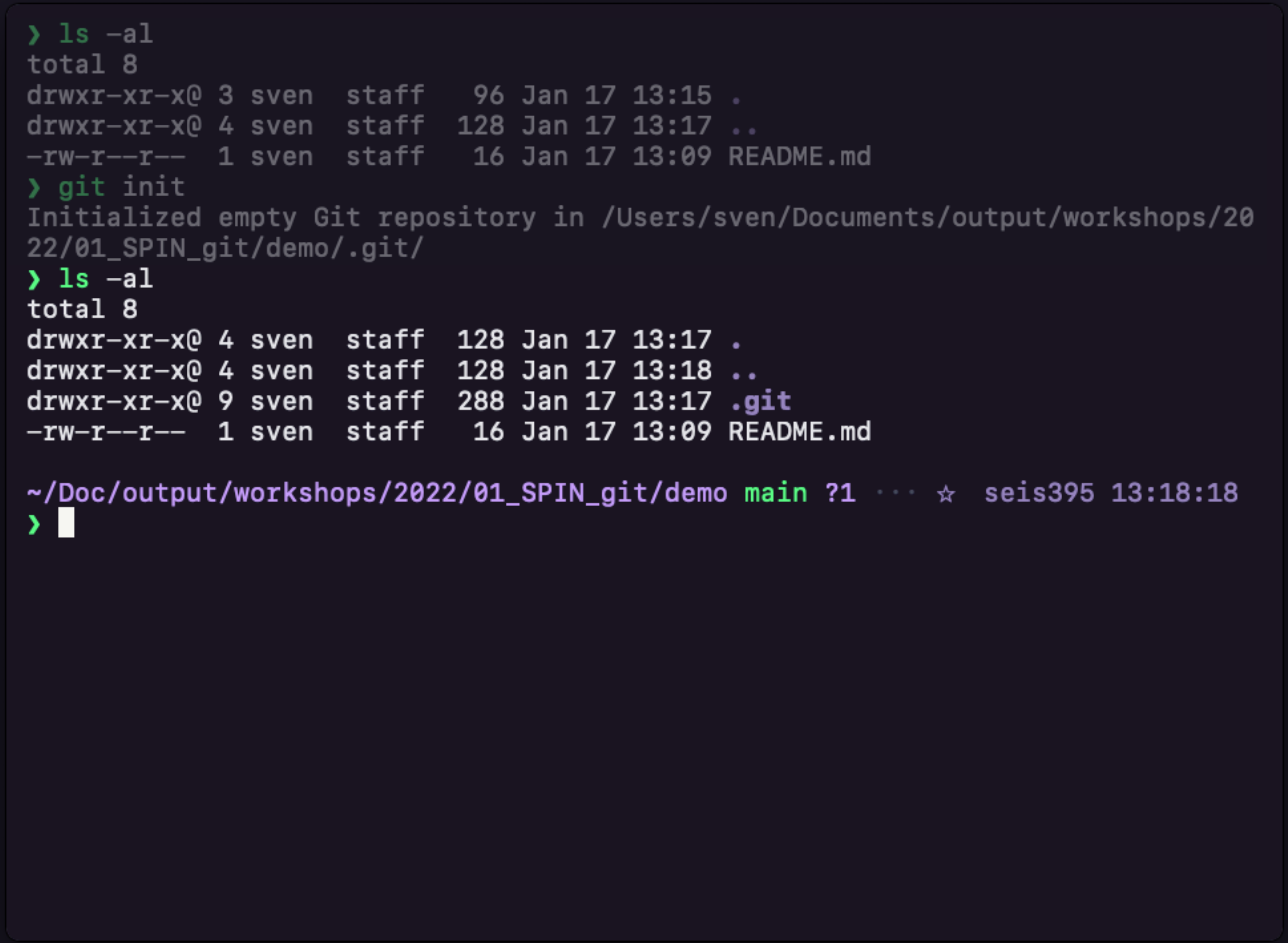
```
❯ ls -al
total 8
drwxr-xr-x@ 3 sven  staff   96 Jan 17 13:15 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 ..
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git init
Initialized empty Git repository in /Users/sven/Documents/output/workshops/20
22/01_SPIN_git/demo/.git/

~/Doc/output/workshops/2022/01_SPIN_git/demo main ?1 ··· ☆  seis395 13:17:32
❯ ▌
```

Git
the basics

Working Directory

Repository

`git init` - initialise **repository** in **working directory**



```
❯ ls -al
total 8
drwxr-xr-x@ 3 sven  staff   96 Jan 17 13:15 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 ..
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git init
Initialized empty Git repository in /Users/sven/Documents/output/workshops/20
22/01_SPIN_git/demo/.git/
❯ ls -al
total 8
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:18 ..
drwxr-xr-x@ 9 sven  staff  288 Jan 17 13:17 .git
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md

~/Doc/output/workshops/2022/01_SPIN_git/demo main ?1 ··· ☆  seis395 13:18:18
❯ 
```

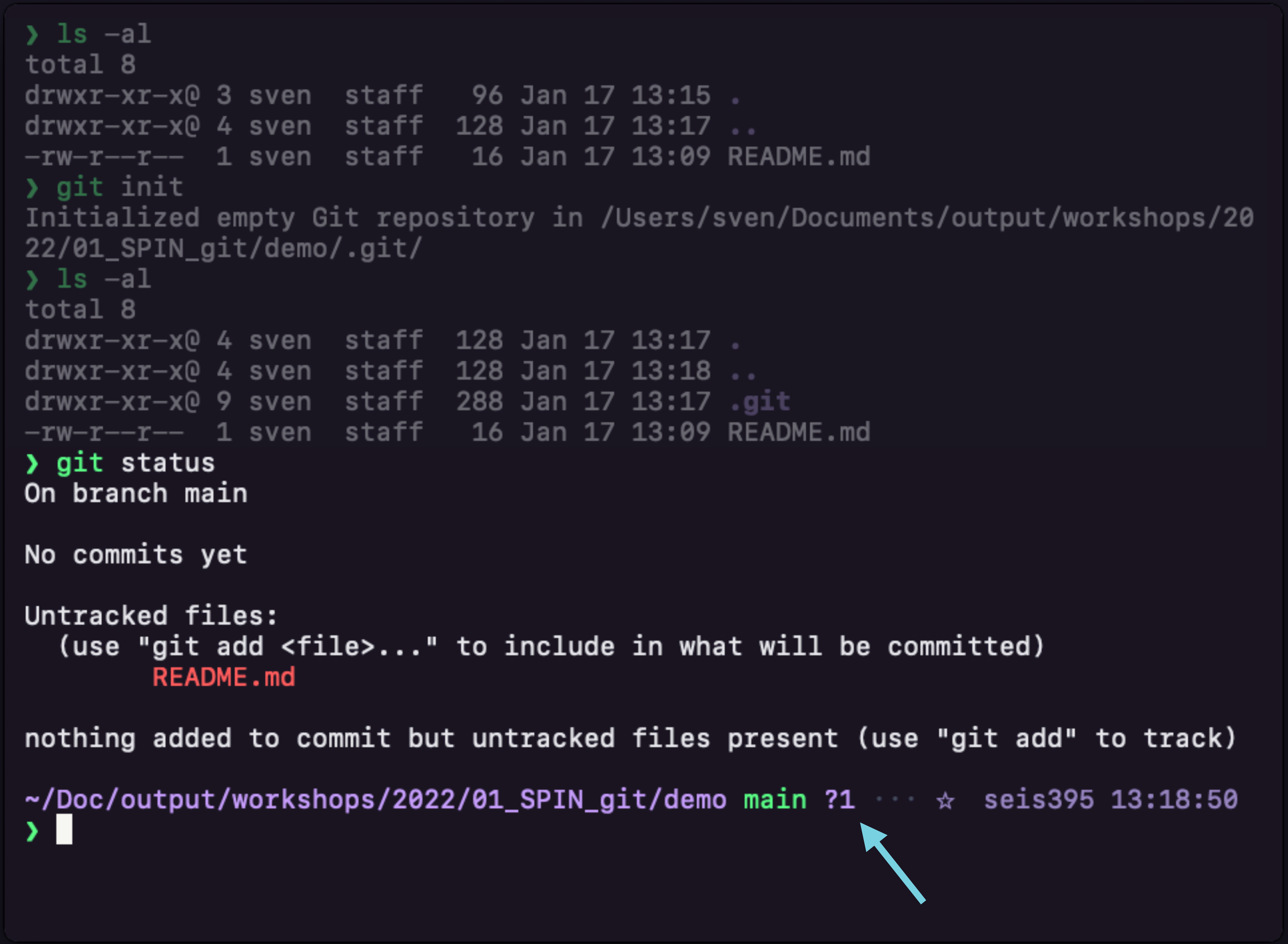
Git
the basics

Working Directory

Repository

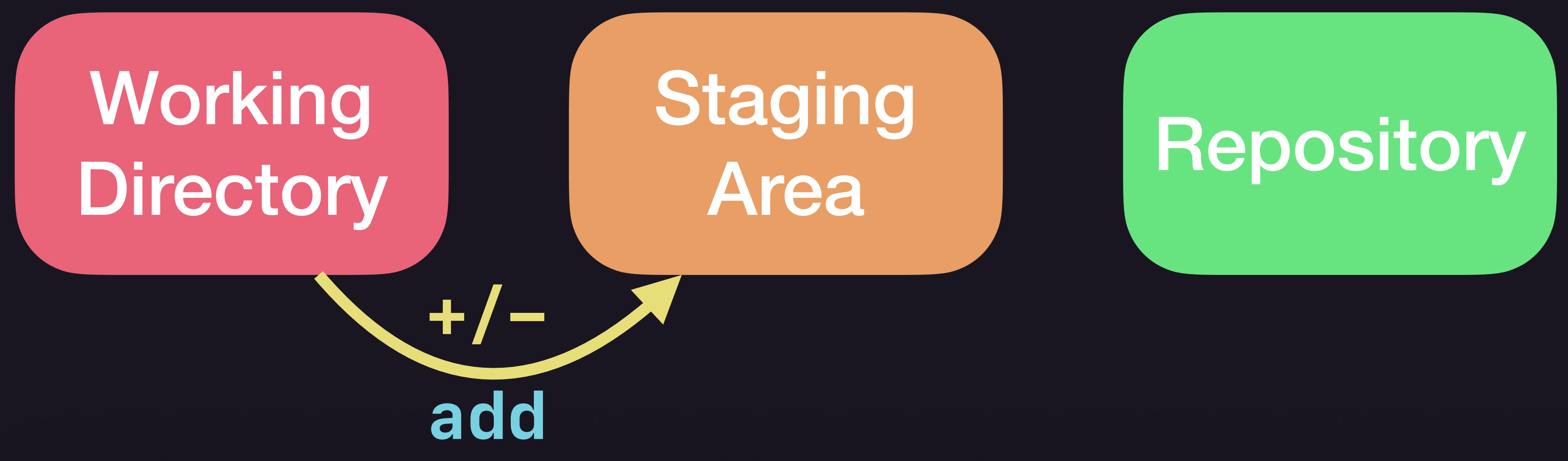
`git init` - initialise **repository** in **working directory**

`git status` - check current status of git



```
❯ ls -al
total 8
drwxr-xr-x@ 3 sven  staff   96 Jan 17 13:15 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 ..
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git init
Initialized empty Git repository in /Users/sven/Documents/output/workshops/20
22/01_SPIN_git/demo/.git/
❯ ls -al
total 8
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:18 ..
drwxr-xr-x@ 9 sven  staff  288 Jan 17 13:17 .git
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git status
On branch main

No commits yet

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

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

~/Doc/output/workshops/2022/01_SPIN_git/demo main ?1 ··· ☆  seis395 13:18:50
❯ █
```

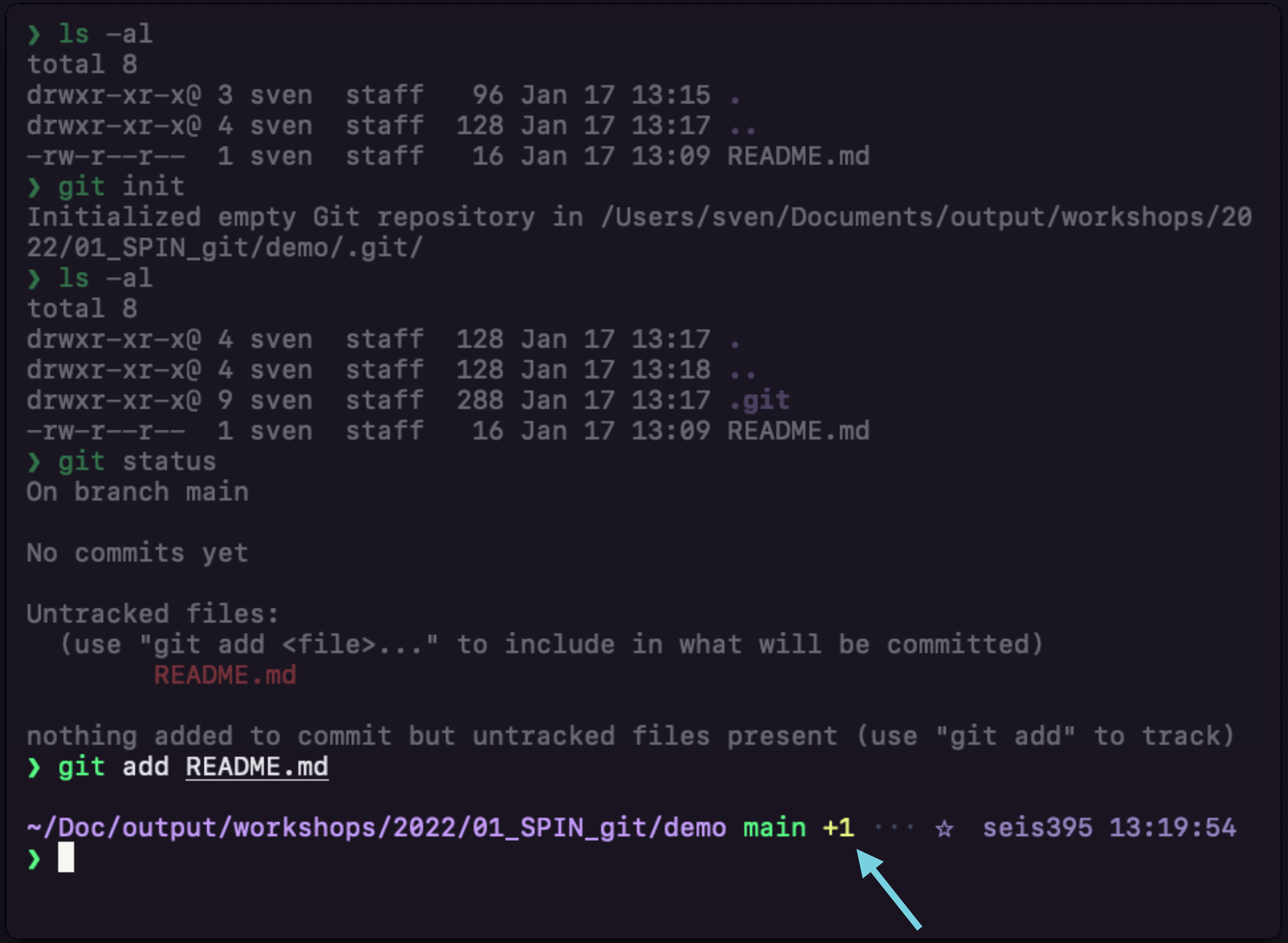
Git
the basics



`git init` - initialise **repository** in **working directory**

`git status` - check current status of git

`git add` - move **changes** to **staging area**



```
❯ ls -al
total 8
drwxr-xr-x@ 3 sven  staff   96 Jan 17 13:15 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 ..
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git init
Initialized empty Git repository in /Users/sven/Documents/output/workshops/20
22/01_SPIN_git/demo/.git/
❯ ls -al
total 8
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:17 .
drwxr-xr-x@ 4 sven  staff  128 Jan 17 13:18 ..
drwxr-xr-x@ 9 sven  staff  288 Jan 17 13:17 .git
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git status
On branch main

No commits yet

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

nothing added to commit but untracked files present (use "git add" to track)
❯ git add README.md

~/Doc/output/workshops/2022/01_SPIN_git/demo main +1 ··· ☆  seis395 13:19:54
❯
```

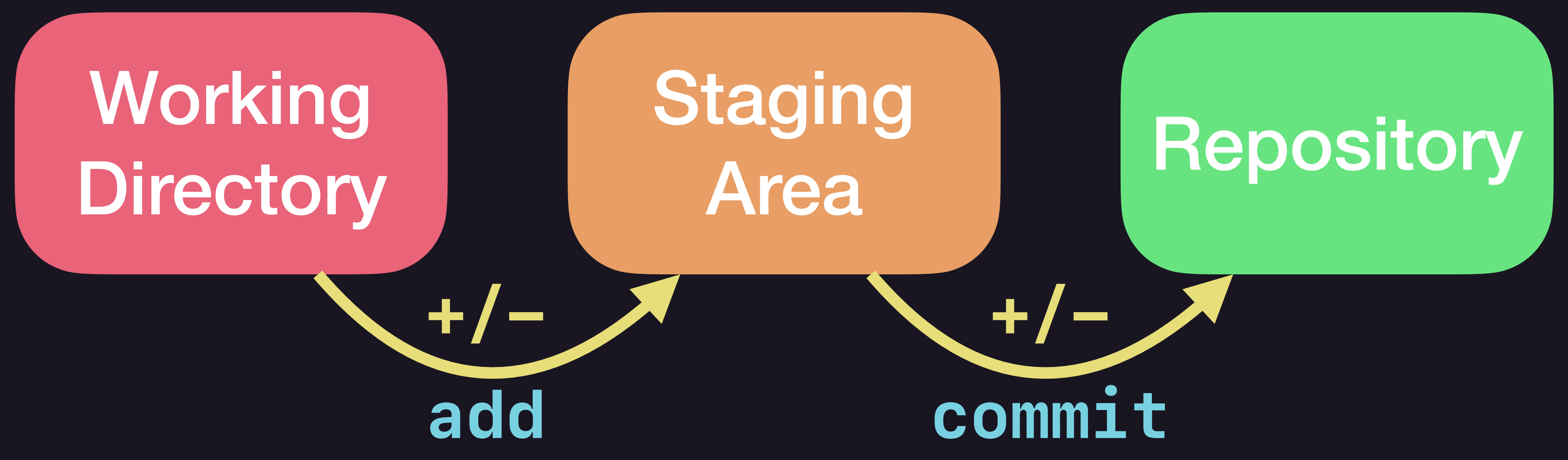
Git
the basics

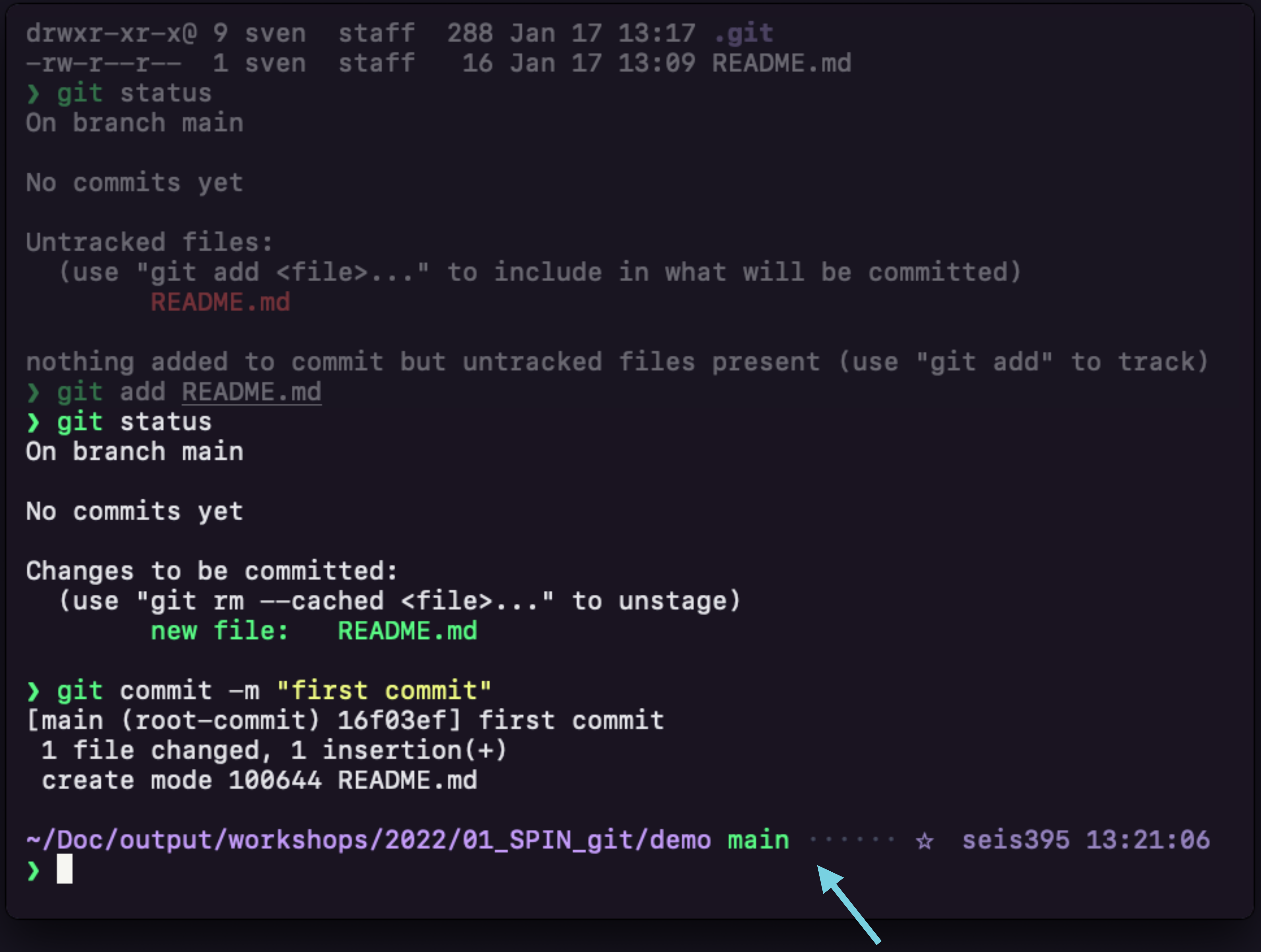
`git init` - initialise repository in working directory

`git status` - check current status of git

`git add` - move changes to staging area

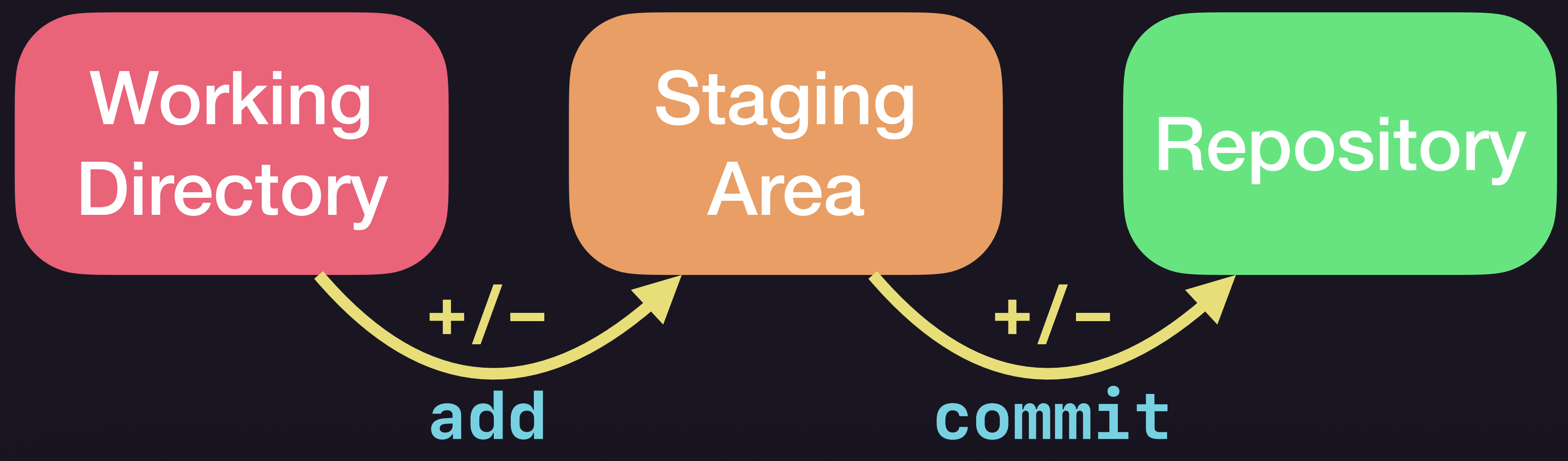
`git commit` - move changes to repository





```
drwxr-xr-x@ 9 sven  staff  288 Jan 17 13:17 .git
-rw-r--r--  1 sven  staff   16 Jan 17 13:09 README.md
❯ git status
On branch main

No commits yet

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

nothing added to commit but untracked files present (use "git add" to track)
❯ git add README.md
❯ git status
On branch main

No commits yet

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

❯ git commit -m "first commit"
[main (root-commit) 16f03ef] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md

~/Doc/output/workshops/2022/01_SPIN_git/demo main ······ ☆  seis395 13:21:06
❯
```

Git
the basics

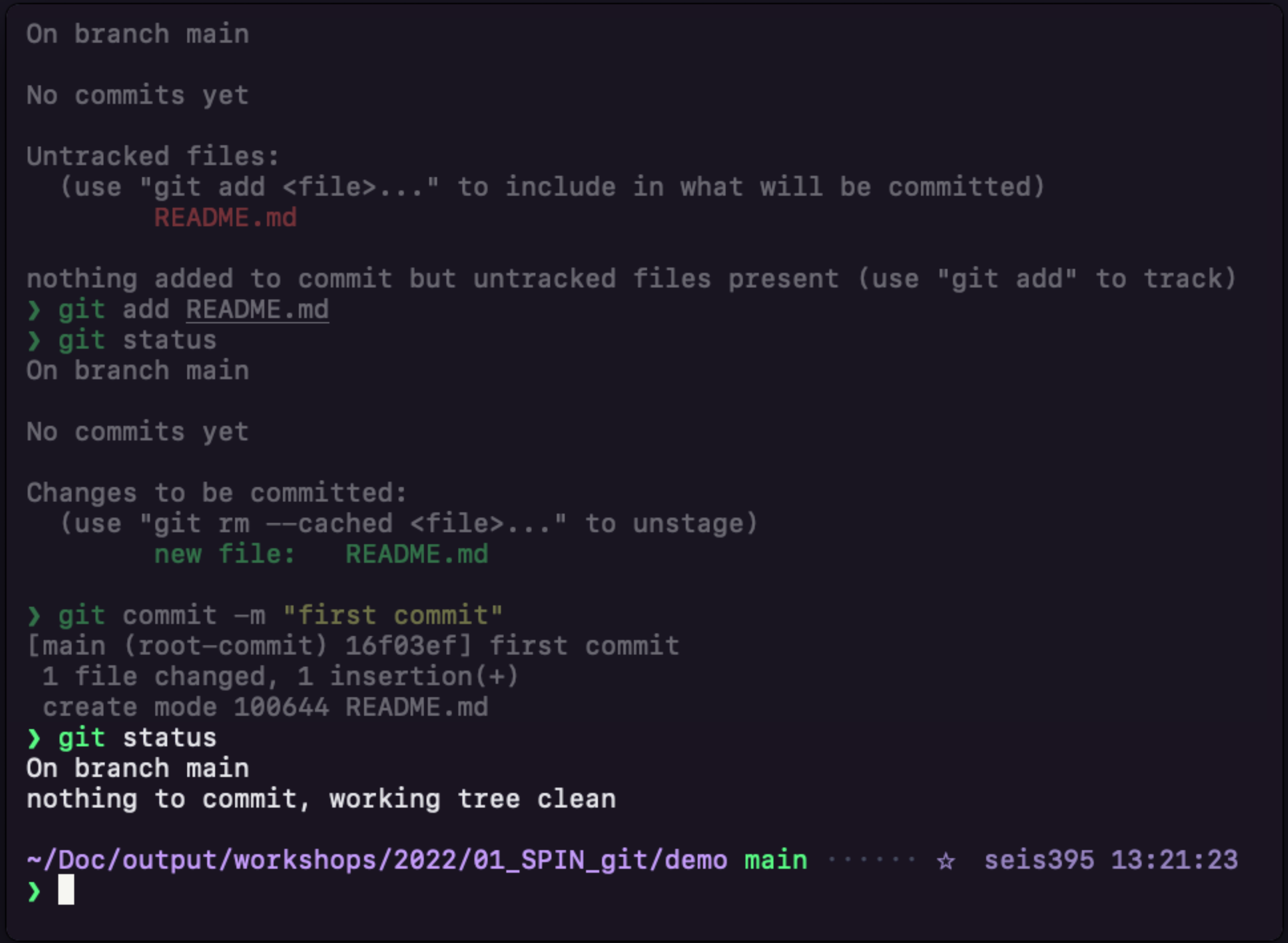


`git init` - initialise **repository** in **working directory**

`git status` - check current status of git

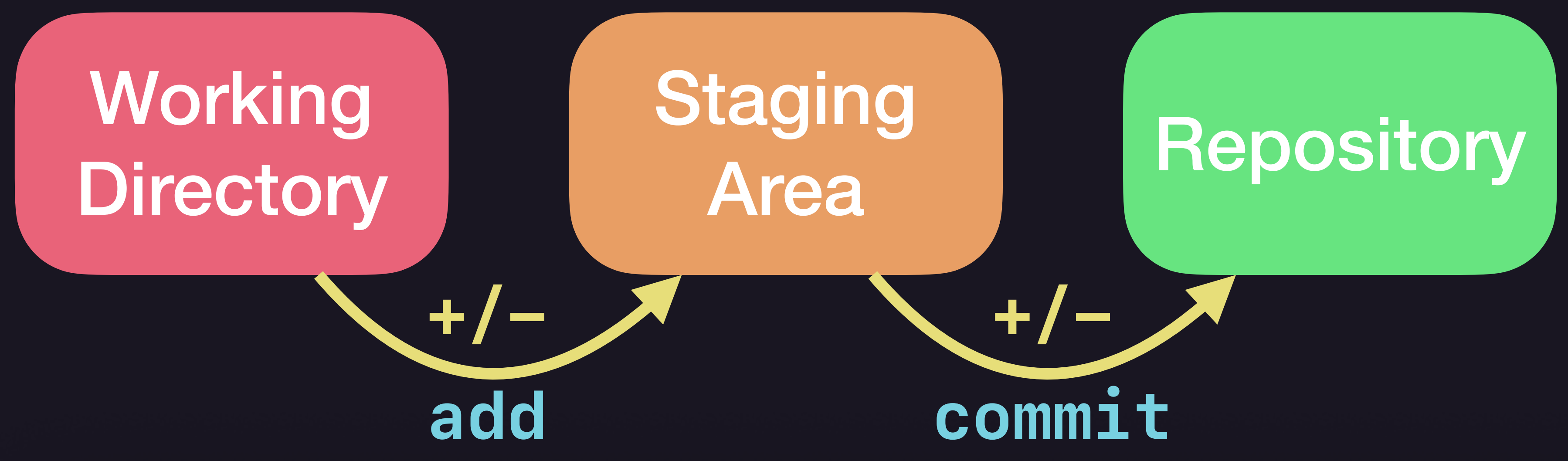
`git add` - move **changes** to **staging area**

`git commit` - move **changes** to **repository**



```
On branch main

No commits yet

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

nothing added to commit but untracked files present (use "git add" to track)
❯ git add README.md
❯ git status
On branch main

No commits yet

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

❯ git commit -m "first commit"
[main (root-commit) 16f03ef] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
❯ git status
On branch main
nothing to commit, working tree clean

~/Doc/output/workshops/2022/01_SPIN_git/demo main ······ ☆  seis395 13:21:23
❯
```

Git
the basics

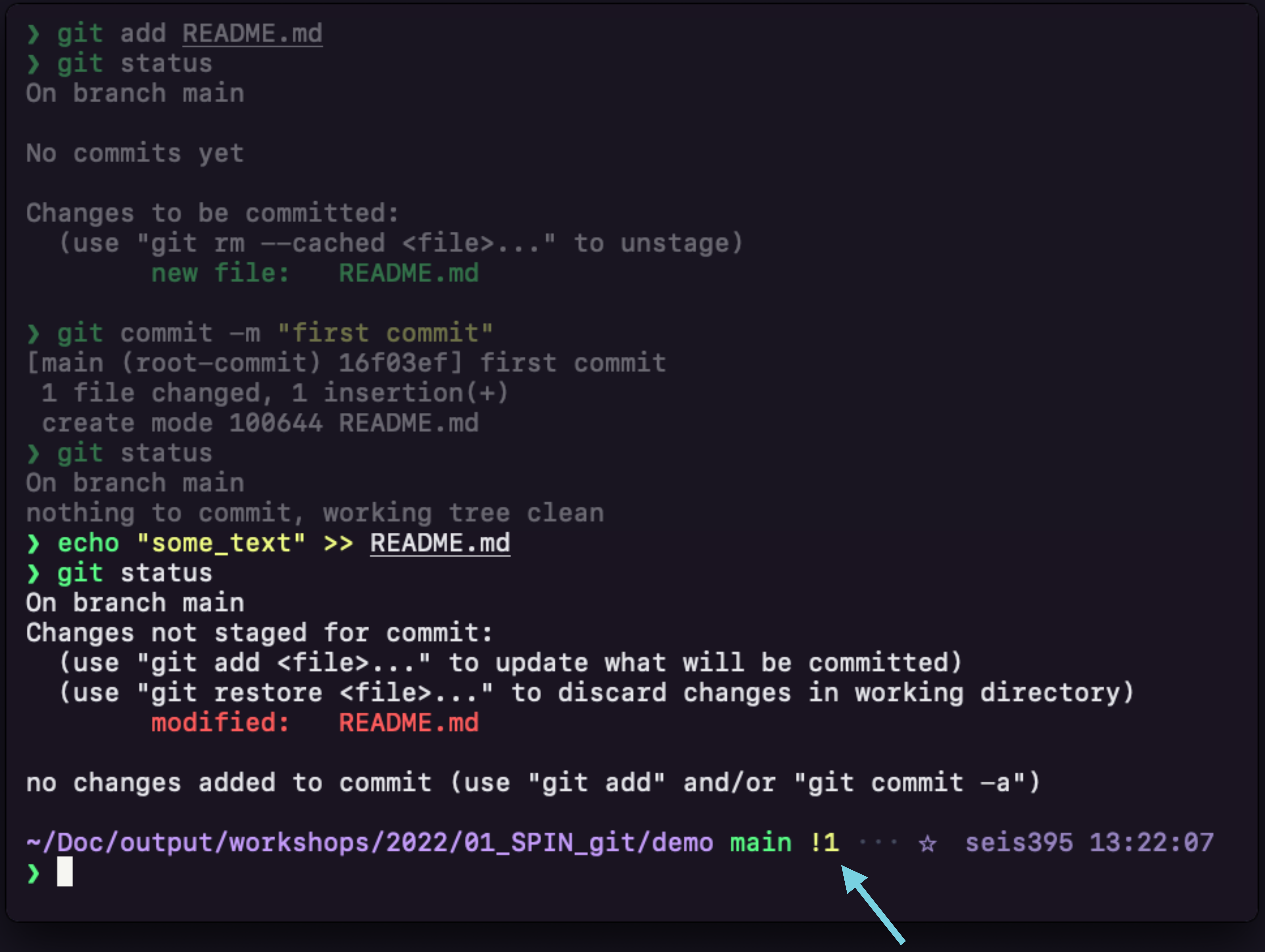


`git init` - initialise **repository** in **working directory**

`git status` - check current status of git

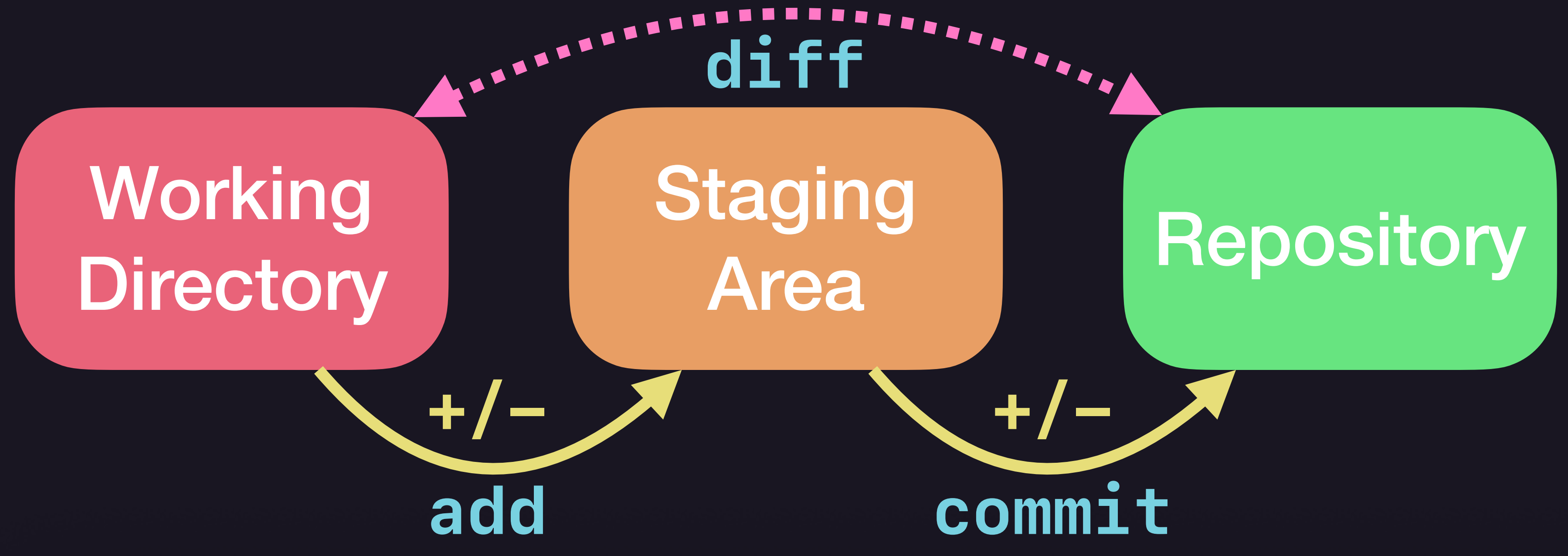
`git add` - move **changes** to **staging area**

`git commit` - move **changes** to **repository**



```
❯ git add README.md
❯ git status
On branch main

No commits yet

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

❯ git commit -m "first commit"
[main (root-commit) 16f03ef] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
❯ git status
On branch main
nothing to commit, working tree clean
❯ echo "some_text" >> README.md
❯ git status
On branch main
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   README.md

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

~/Doc/output/workshops/2022/01_SPIN_git/demo main !1 ··· ☆  seis395 13:22:07
❯
```

Git
the basics



diff

Working Directory

Staging Area

Repository

+/-

add

+/-

commit

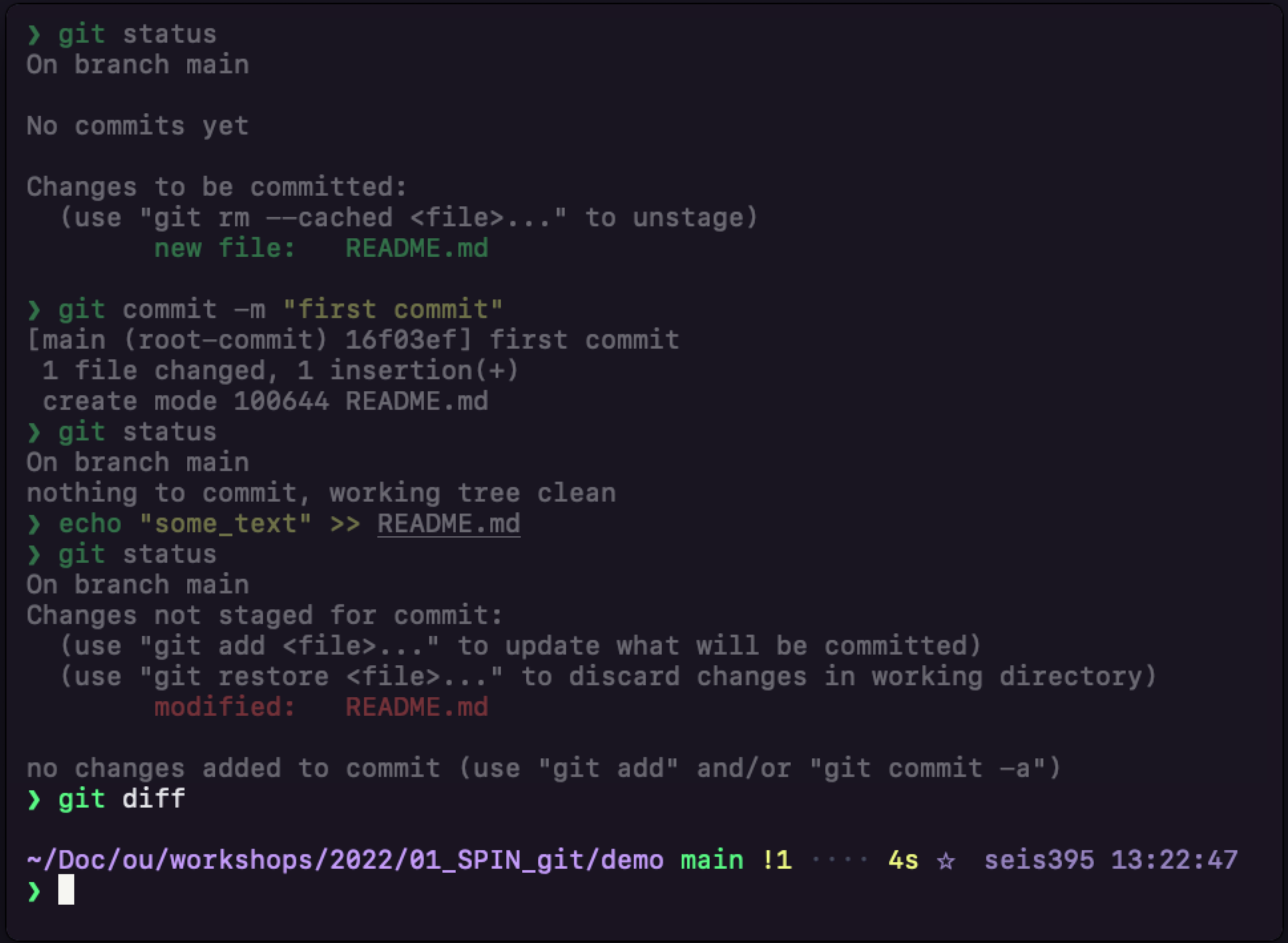
`git init` - initialise **repository** in **working directory**

`git status` - check current status of git

`git add` - move **changes** to **staging area**

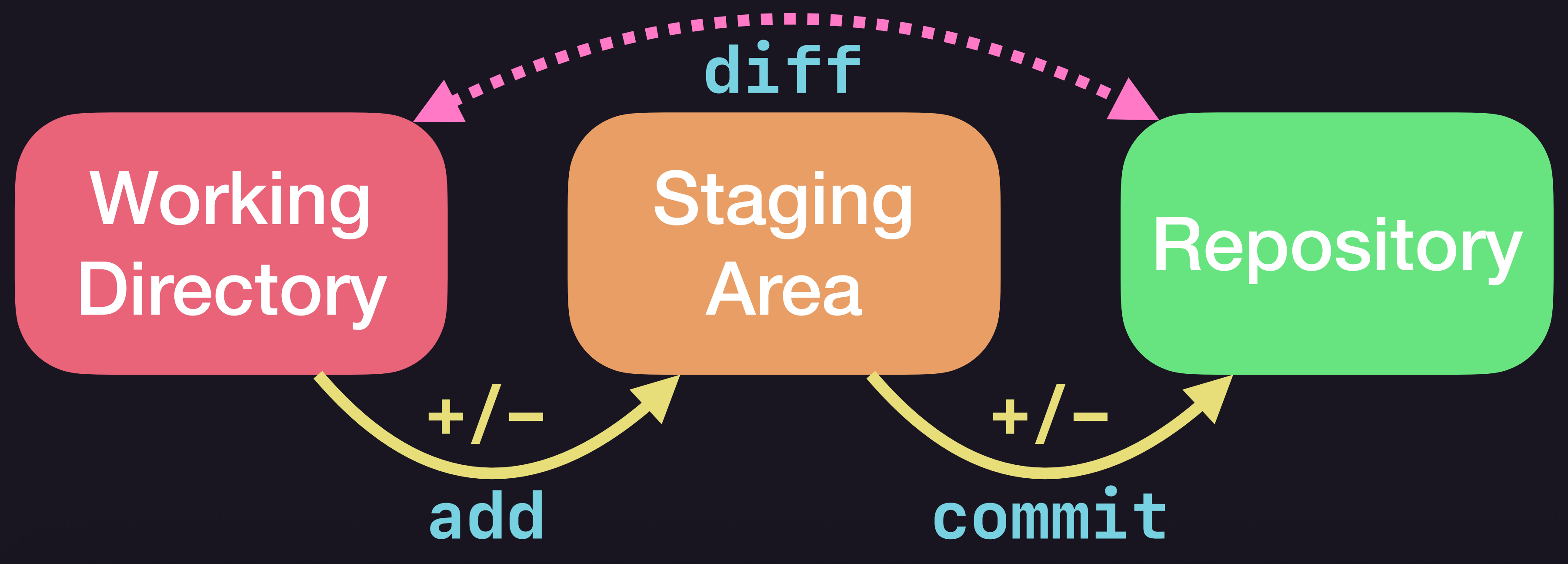
`git commit` - move **changes** to **repository**

`git diff` - compare differences between **working directory** and **repository**



```
❯ git status
On branch main

No commits yet

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

❯ git commit -m "first commit"
[main (root-commit) 16f03ef] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
❯ git status
On branch main
nothing to commit, working tree clean
❯ echo "some_text" >> README.md
❯ git status
On branch main
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   README.md

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

~/Doc/ou/workshops/2022/01_SPIN_git/demo main !1 ···· 4s ☆  seis395 13:22:47
❯ █
```

Git
the basics



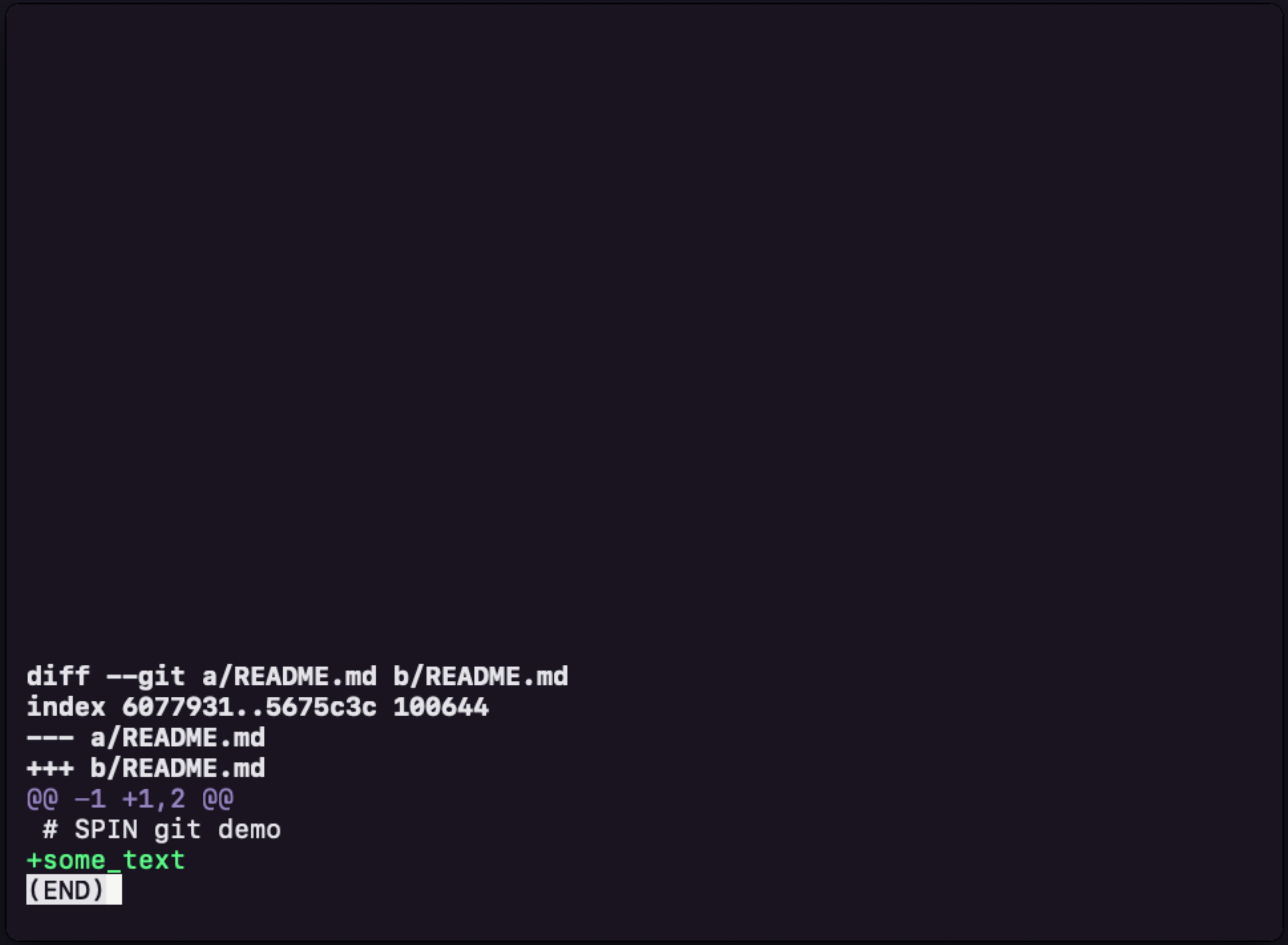
`git init` - initialise **repository** in **working directory**

`git status` - check current status of git

`git add` - move **changes** to **staging area**

`git commit` - move **changes** to **repository**

`git diff` - compare differences between **working directory** and **repository**



```
diff --git a/README.md b/README.md
index 6077931..5675c3c 100644
--- a/README.md
+++ b/README.md
@@ -1 +1,2 @@
 # SPIN git demo
+some_text
(END)
```

Git
the basics

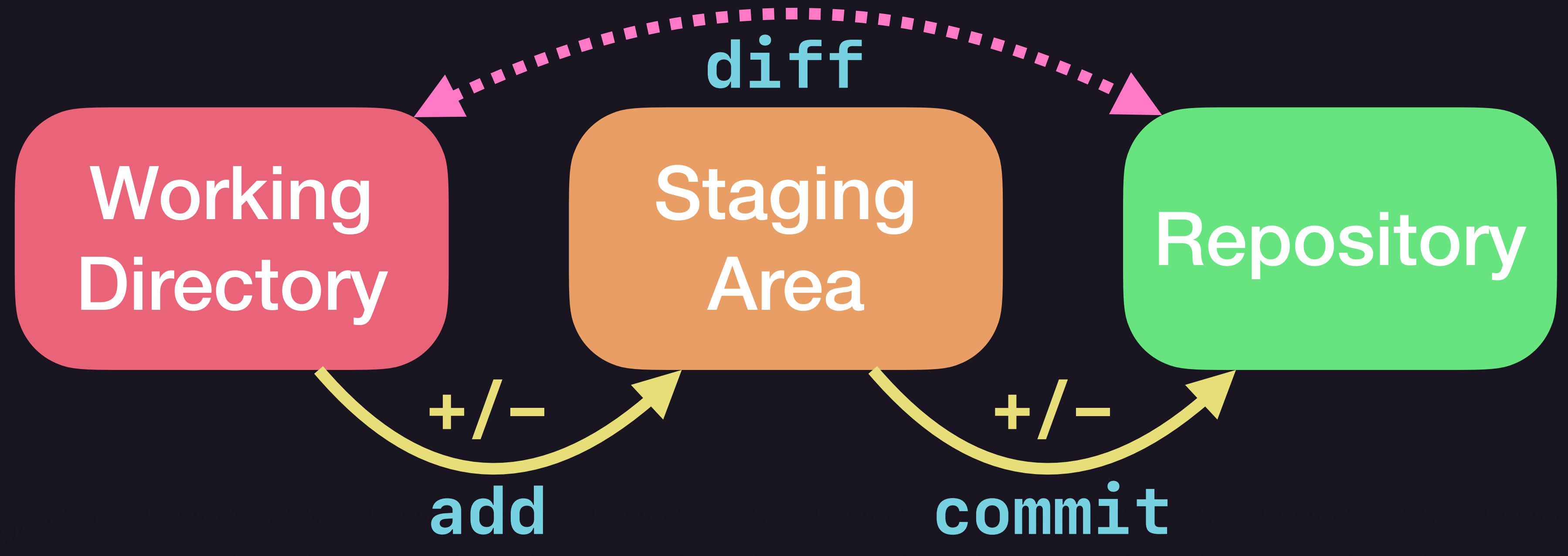
`git init` - initialise repository in working directory

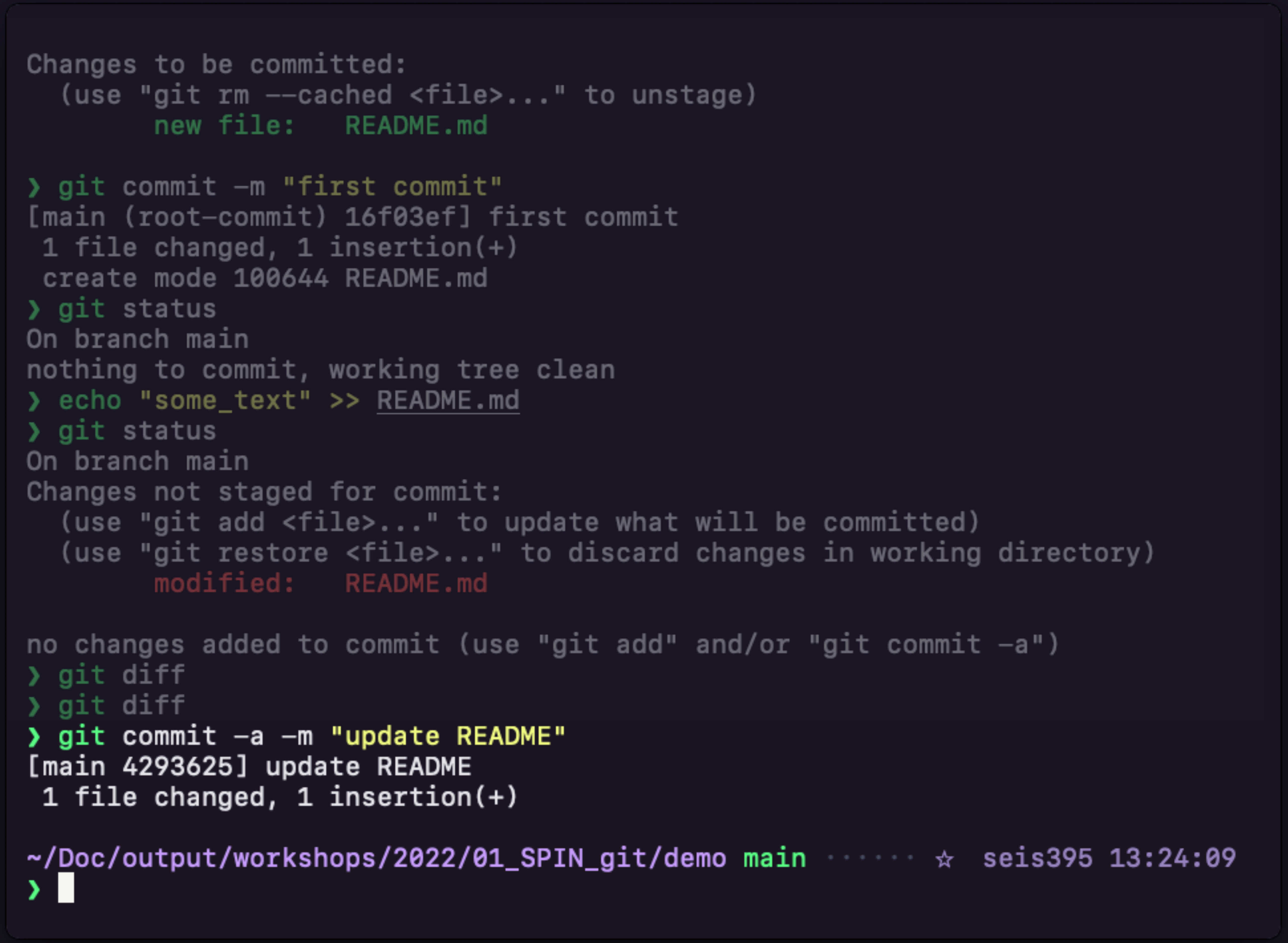
`git status` - check current status of git

`git add` - move changes to staging area

`git commit` - move changes to repository

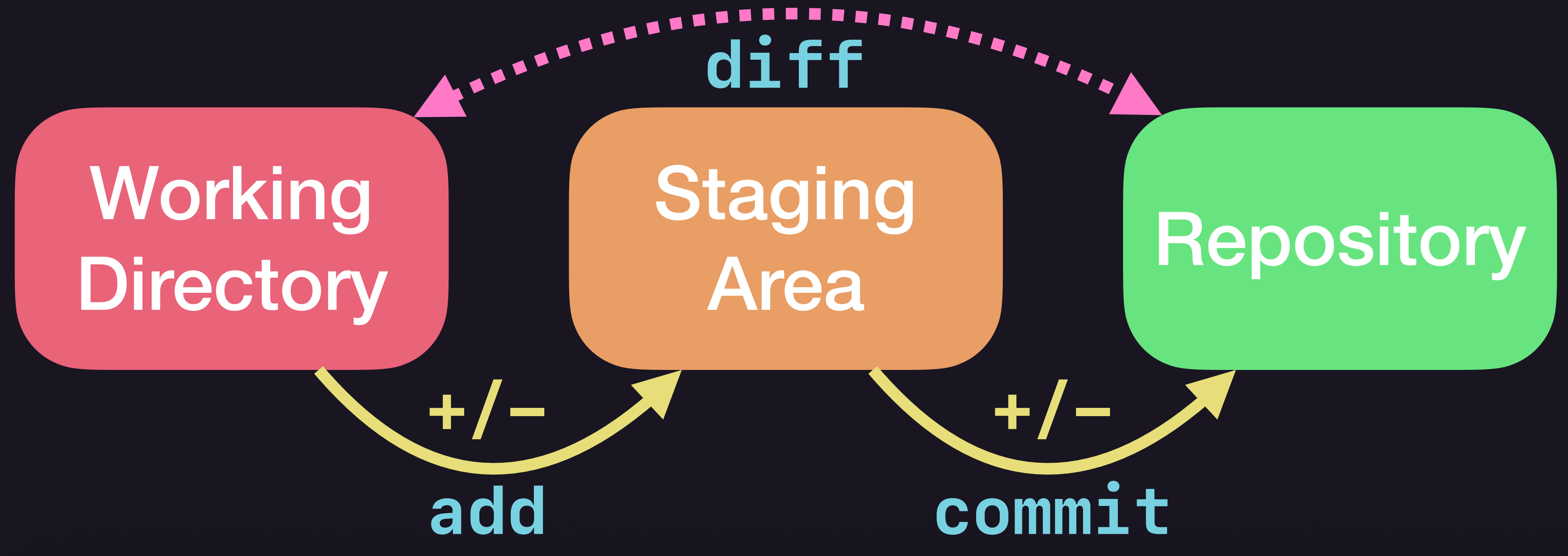
`git diff` - compare differences between working directory and repository





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

❯ git commit -m "first commit"
[main (root-commit) 16f03ef] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
❯ git status
On branch main
nothing to commit, working tree clean
❯ echo "some_text" >> README.md
❯ git status
On branch main
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   README.md

no changes added to commit (use "git add" and/or "git commit -a")
❯ git diff
❯ git diff
❯ git commit -a -m "update README"
[main 4293625] update README
 1 file changed, 1 insertion(+)

~/Doc/output/workshops/2022/01_SPIN_git/demo main ······ ☆  seis395 13:24:09
❯ █
```

Git
the basics



`git init` - initialise **repository** in **working directory**

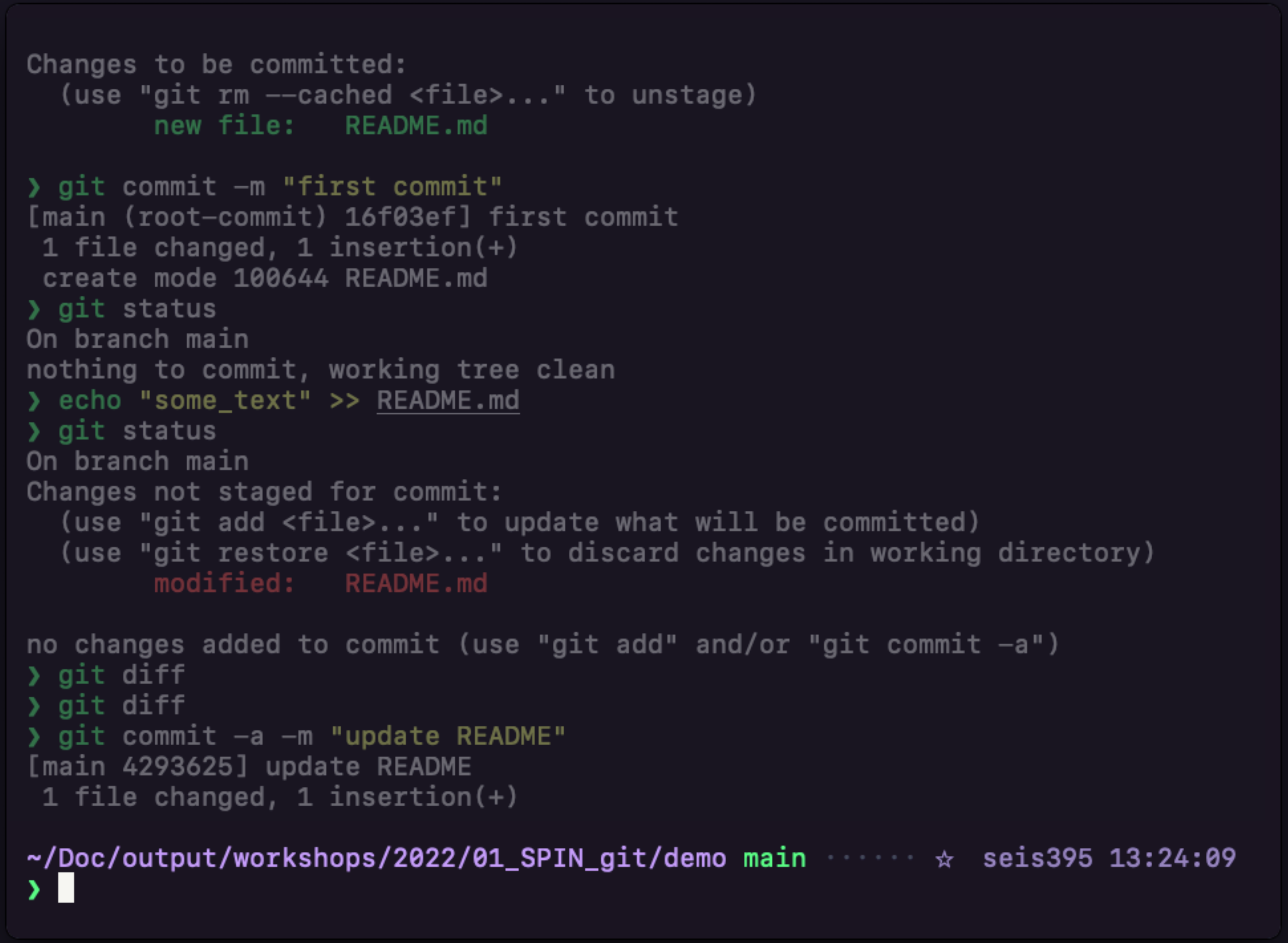
`git status` - check current status of git

`git add` - move **changes** to **staging area**

`git commit` - move **changes** to **repository**

`git diff` - compare differences between **working directory** and **repository**

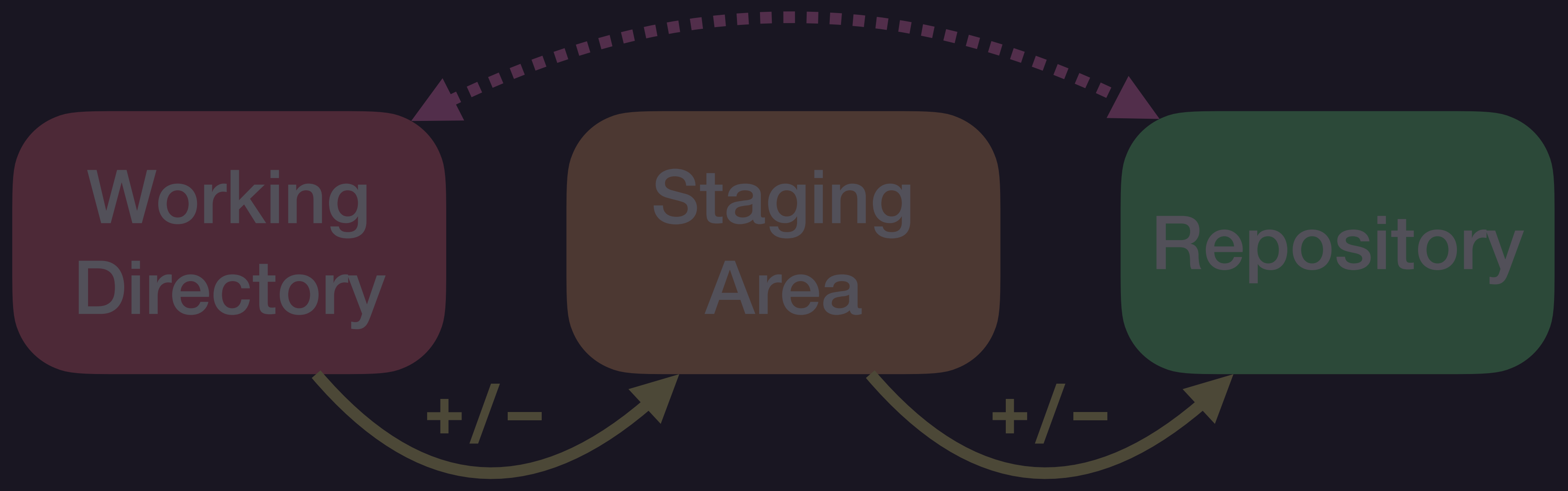
The **staging area** exists to allow commit of changes on a granular level



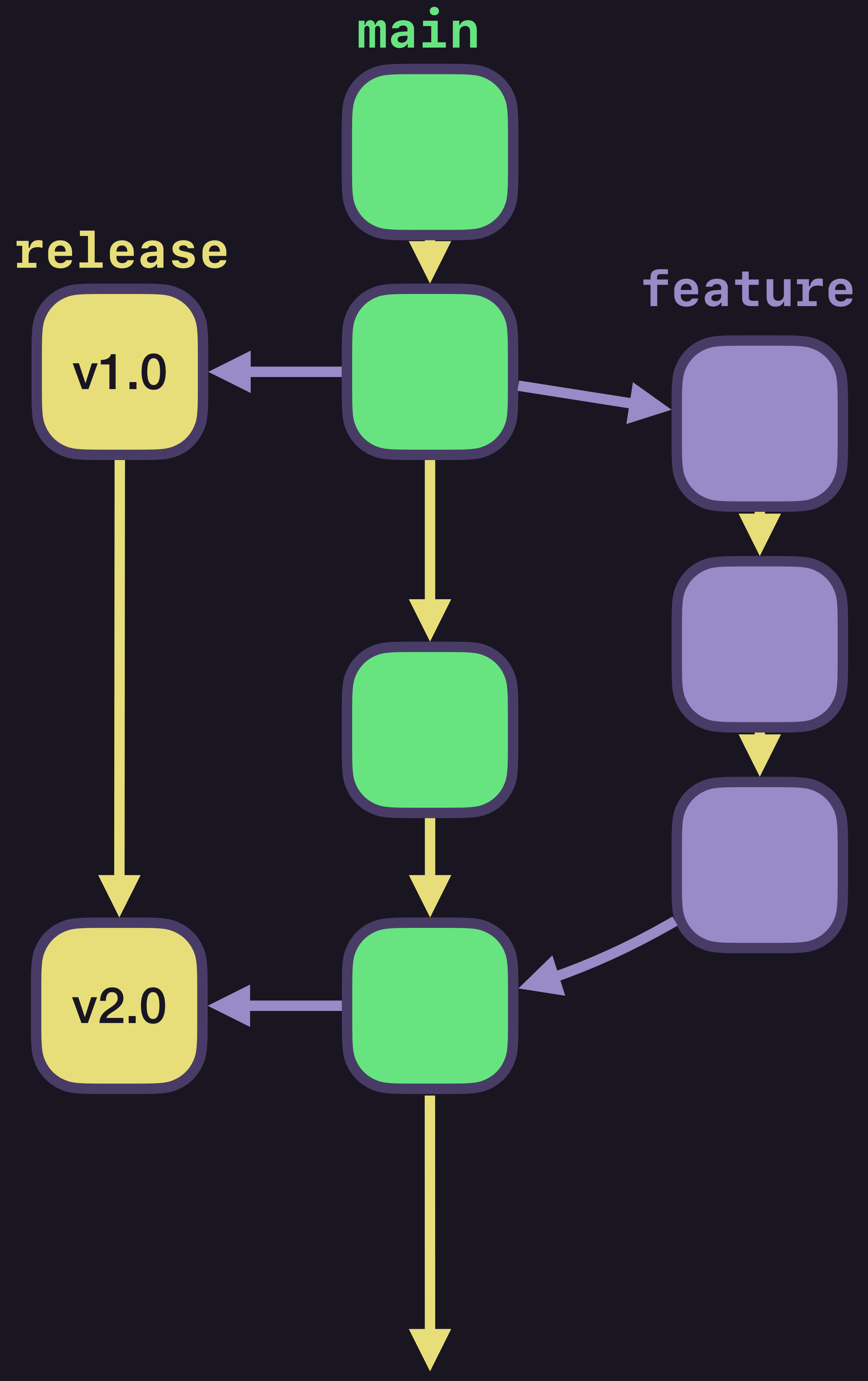
```
Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   README.md

❯ git commit -m "first commit"
[main (root-commit) 16f03ef] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
❯ git status
On branch main
nothing to commit, working tree clean
❯ echo "some_text" >> README.md
❯ git status
On branch main
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   README.md

no changes added to commit (use "git add" and/or "git commit -a")
❯ git diff
❯ git diff
❯ git commit -a -m "update README"
[main 4293625] update README
 1 file changed, 1 insertion(+)

~/Doc/output/workshops/2022/01_SPIN_git/demo main ······ ☆  seis395 13:24:09
❯ 
```

Overview

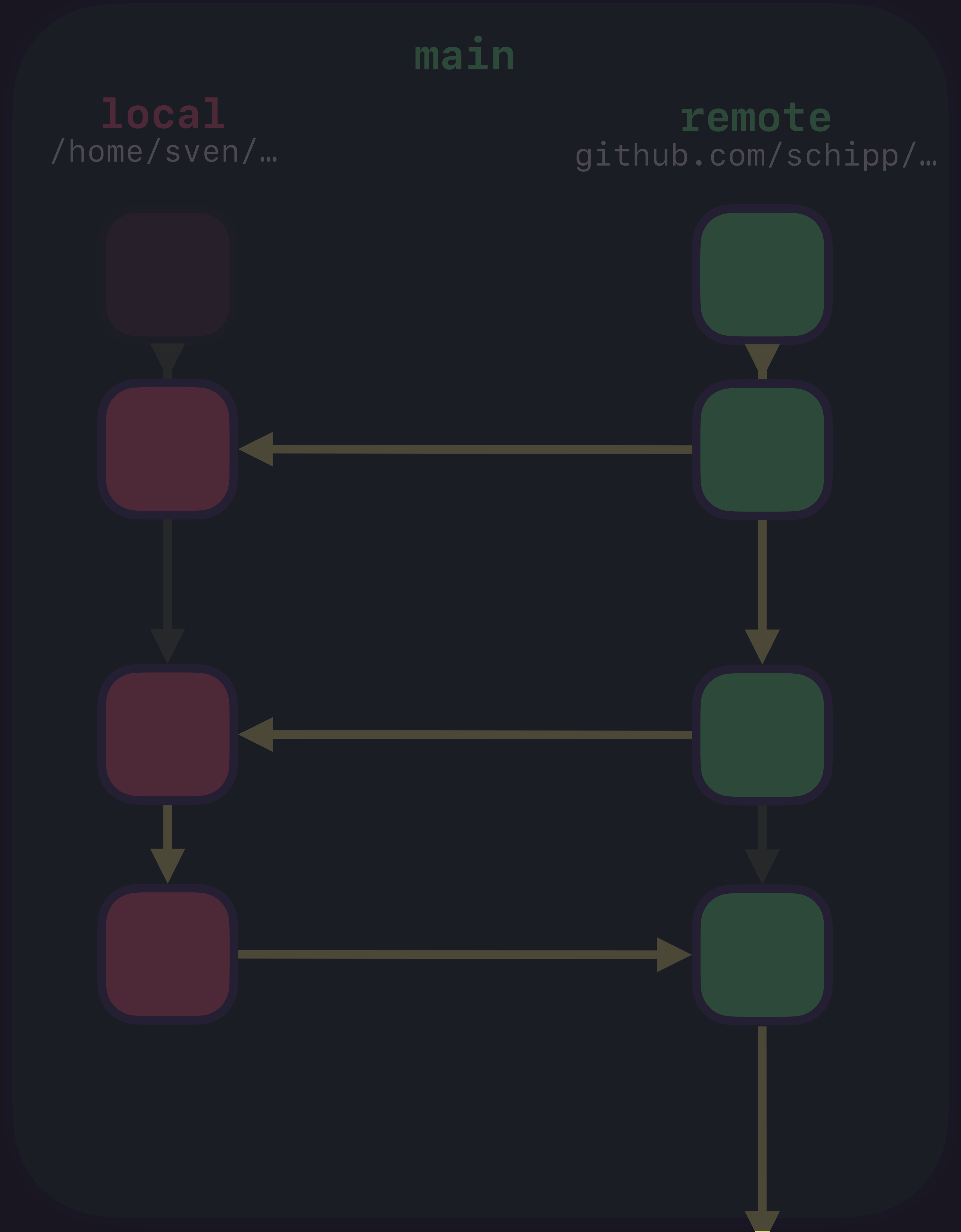
basics



branching

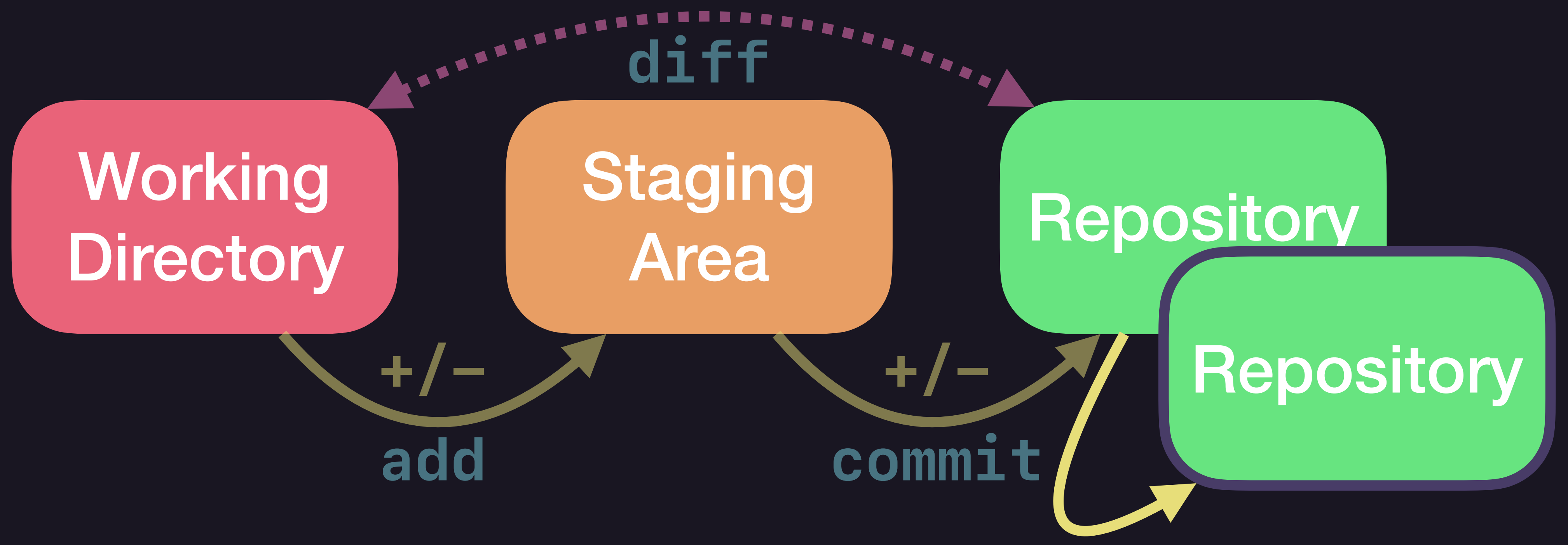


remote



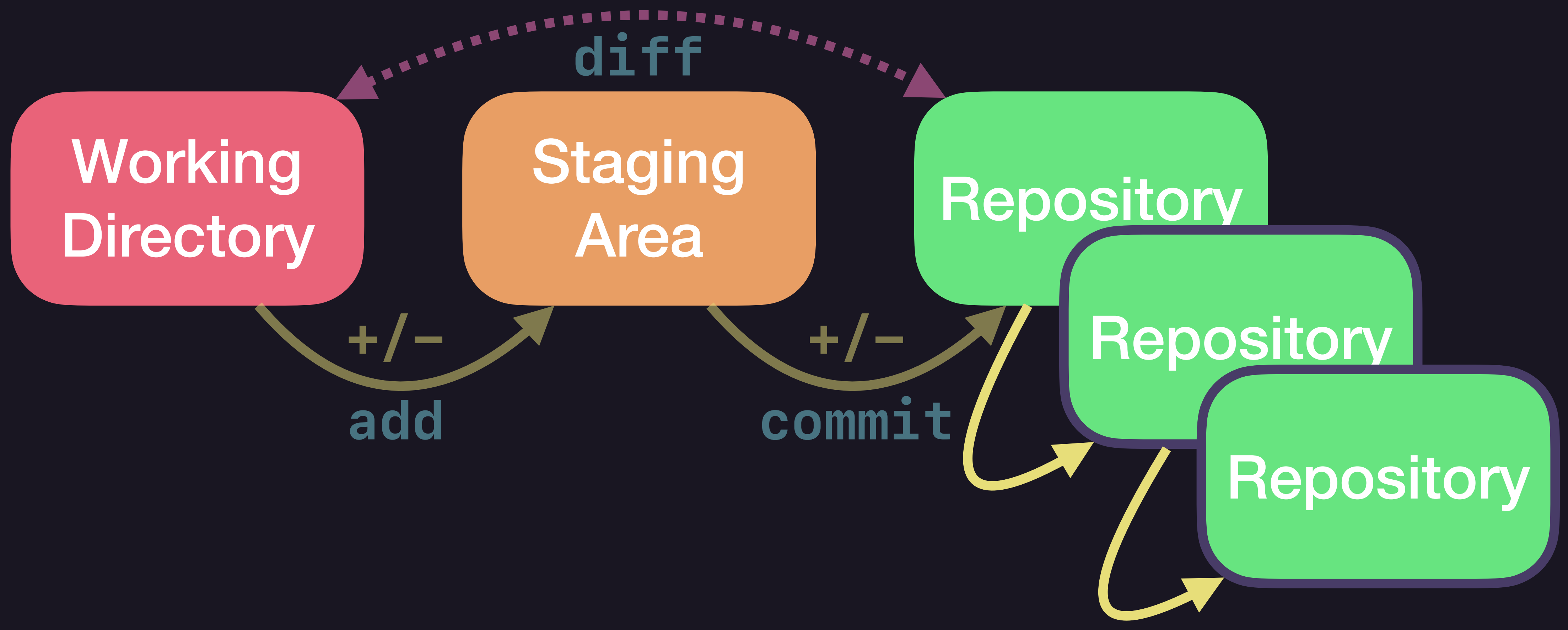
Git

branches



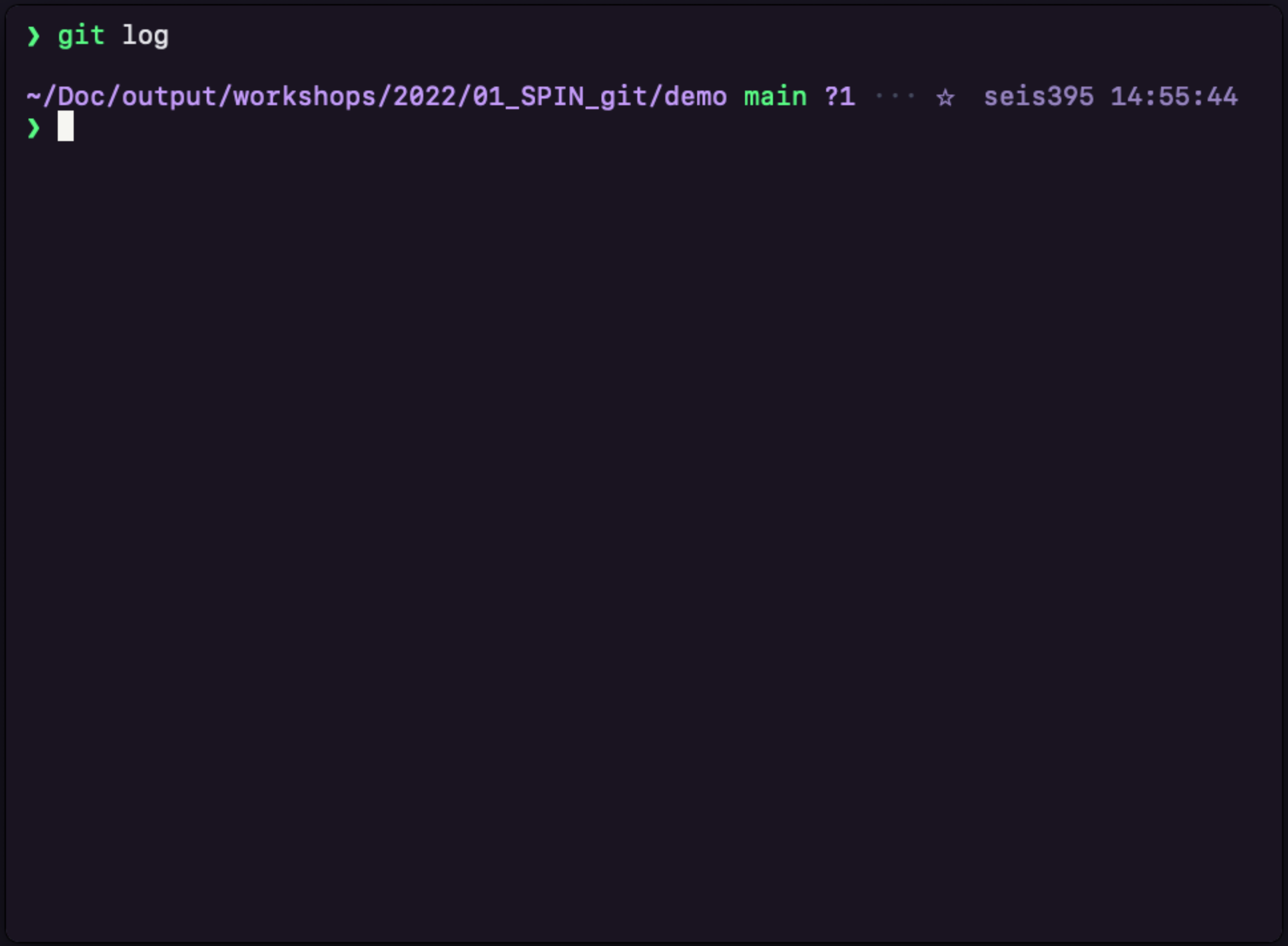
Git

branches

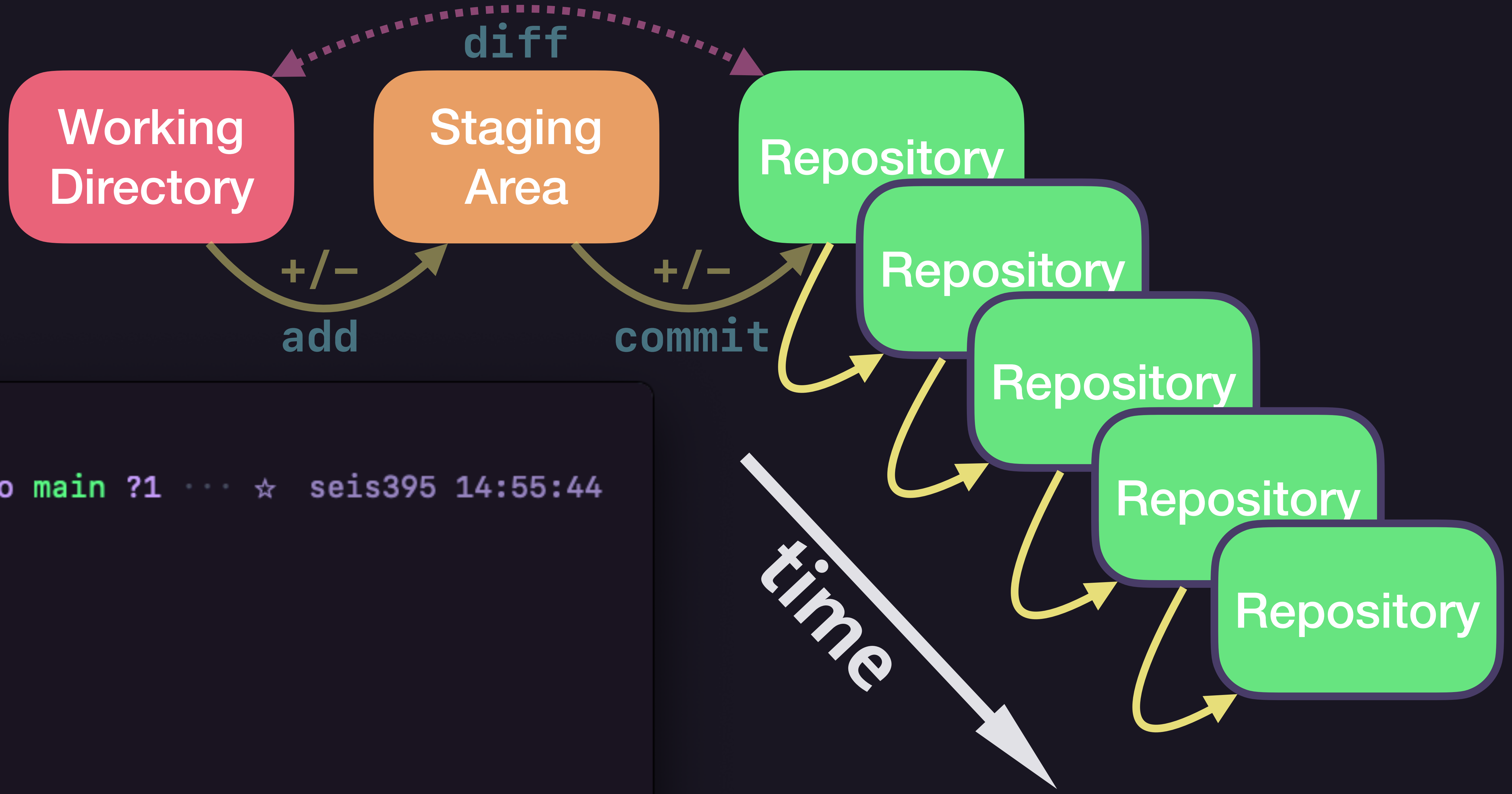


Git

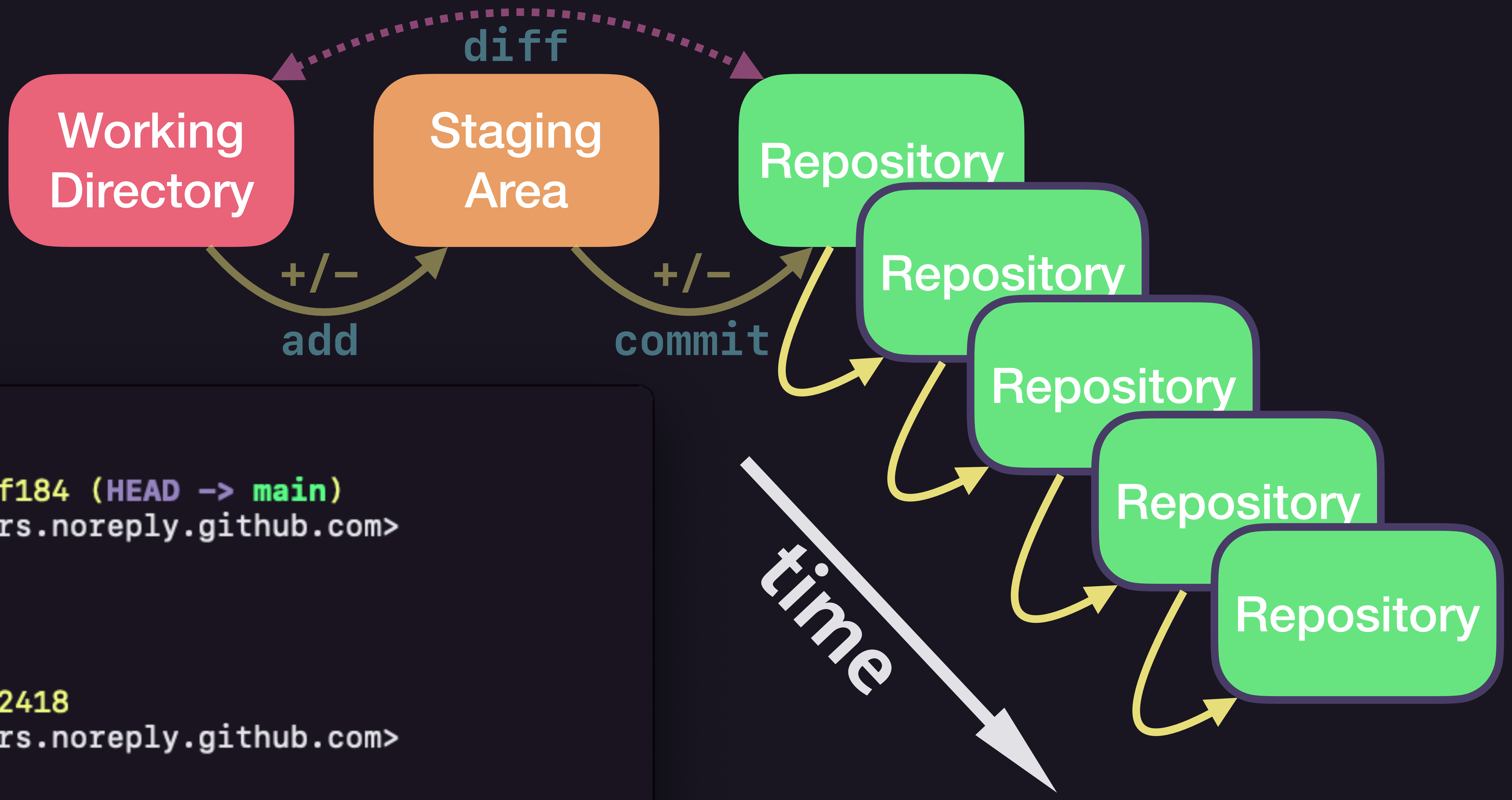
branches

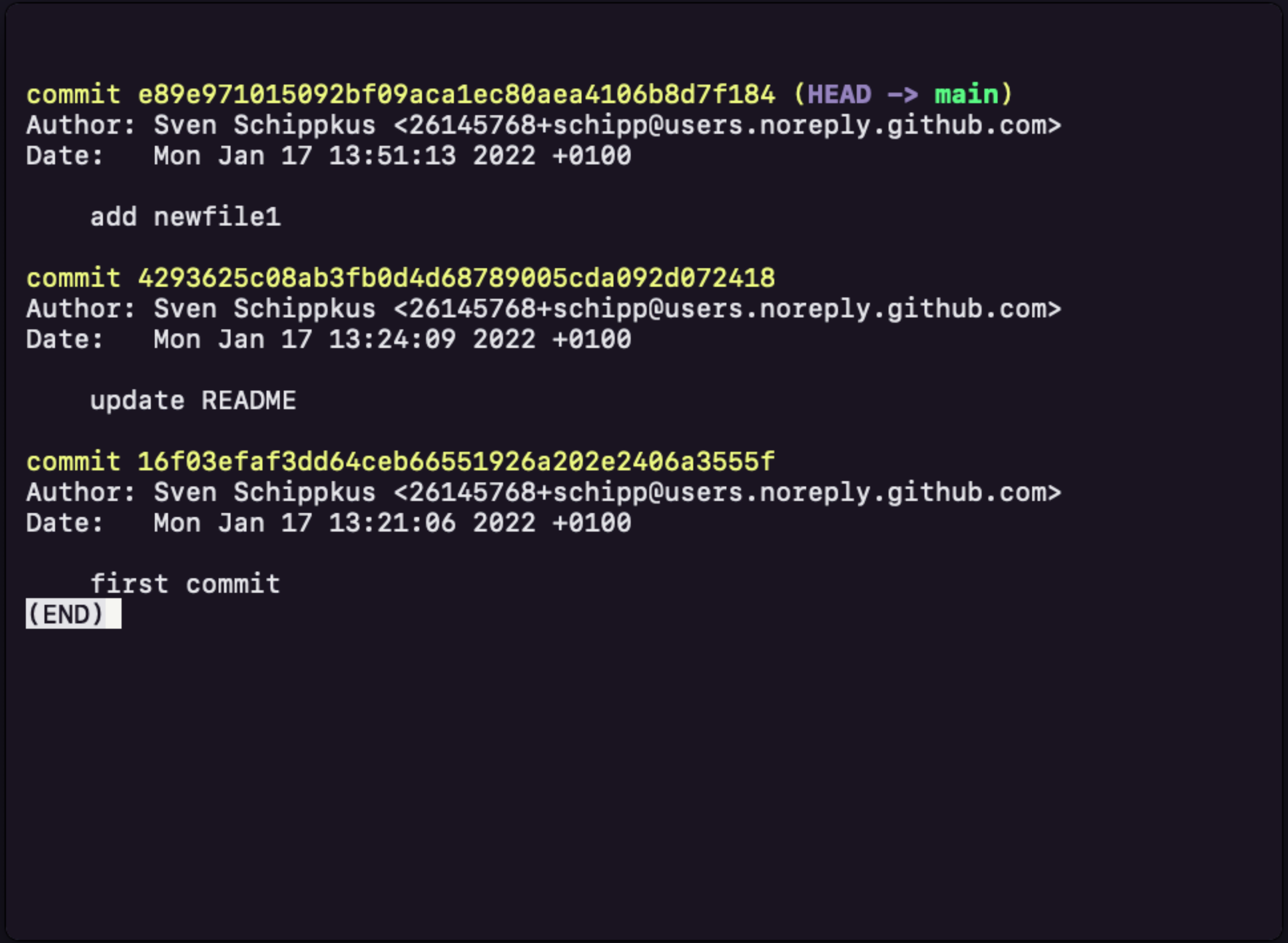


```
❯ git log

~/Doc/output/workshops/2022/01_SPIN_git/demo main ?1 ··· ☆  seis395 14:55:44
❯ 
```



Git branches



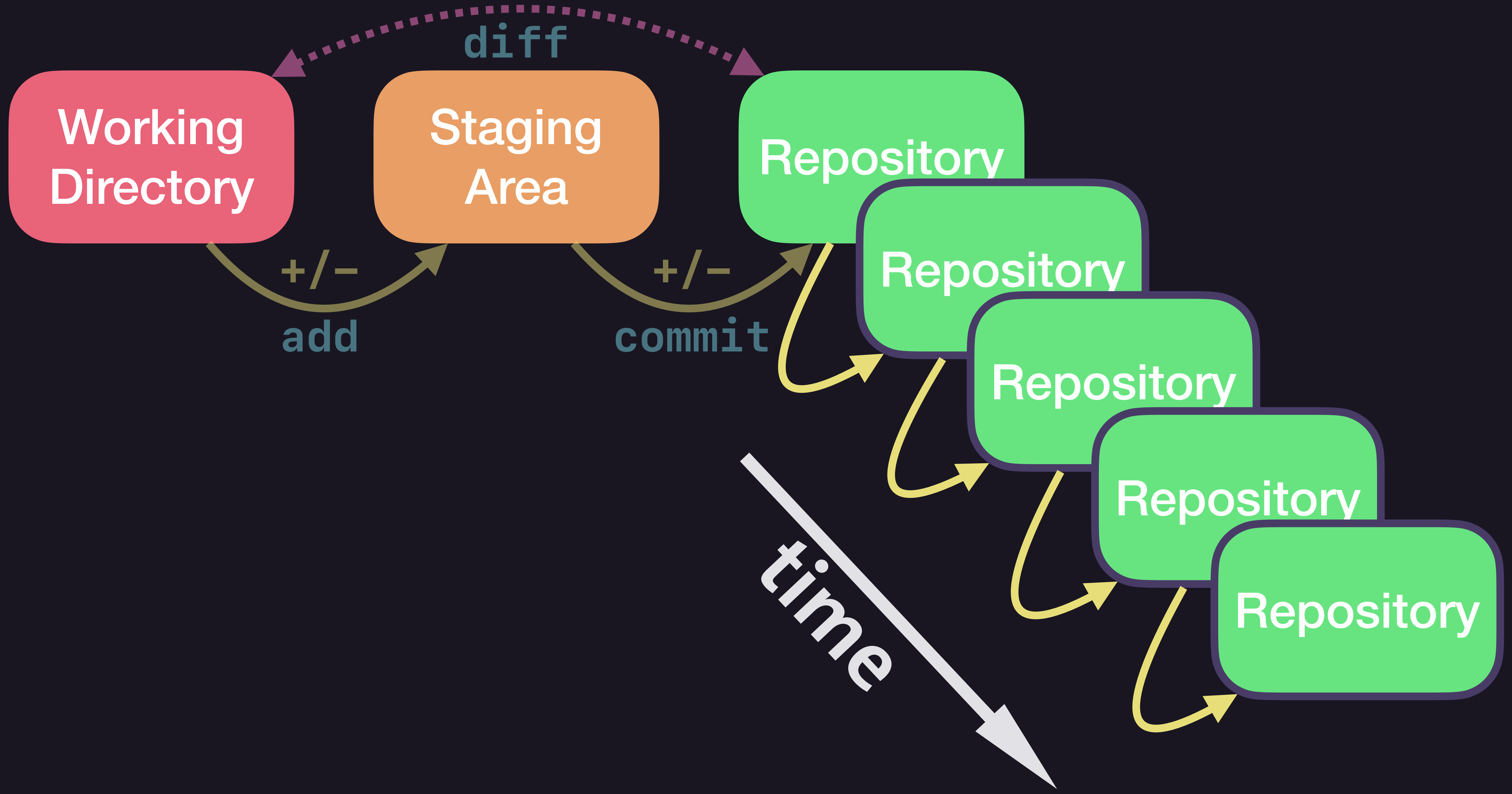


```
commit e89e971015092bf09aca1ec80aea4106b8d7f184 (HEAD -> main)
Author: Sven Schippkus <26145768+schipp@users.noreply.github.com>
Date:   Mon Jan 17 13:51:13 2022 +0100

    add newfile1

commit 4293625c08ab3fb0d4d68789005cda092d072418
Author: Sven Schippkus <26145768+schipp@users.noreply.github.com>
Date:   Mon Jan 17 13:24:09 2022 +0100

    update README

commit 16f03efaf3dd64ceb66551926a202e2406a3555f
Author: Sven Schippkus <26145768+schipp@users.noreply.github.com>
Date:   Mon Jan 17 13:21:06 2022 +0100

    first commit
(END)
```

Git

branches

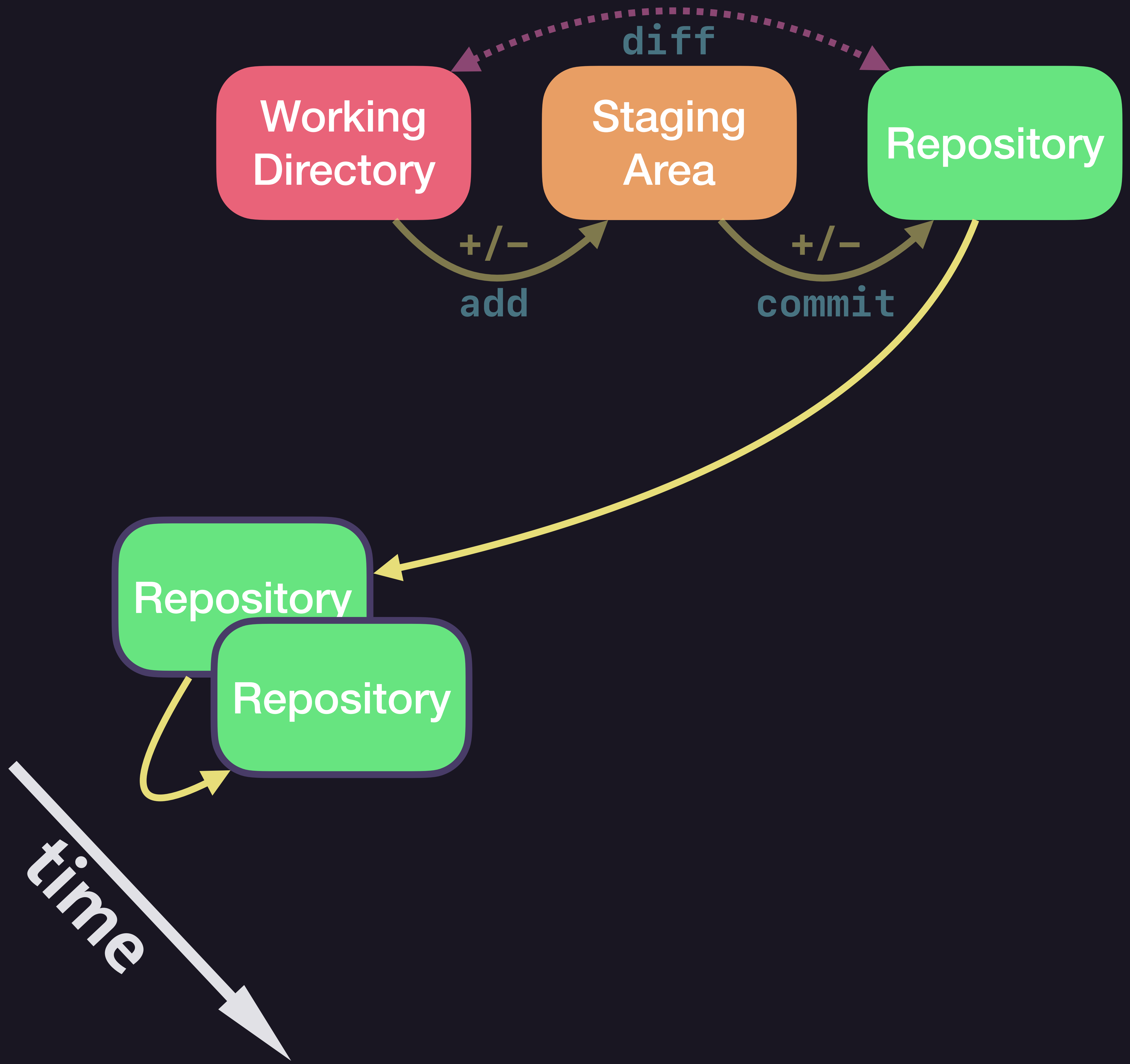
`git log` - view history of **commits**



Git

branches

`git log` - view history of **commits**



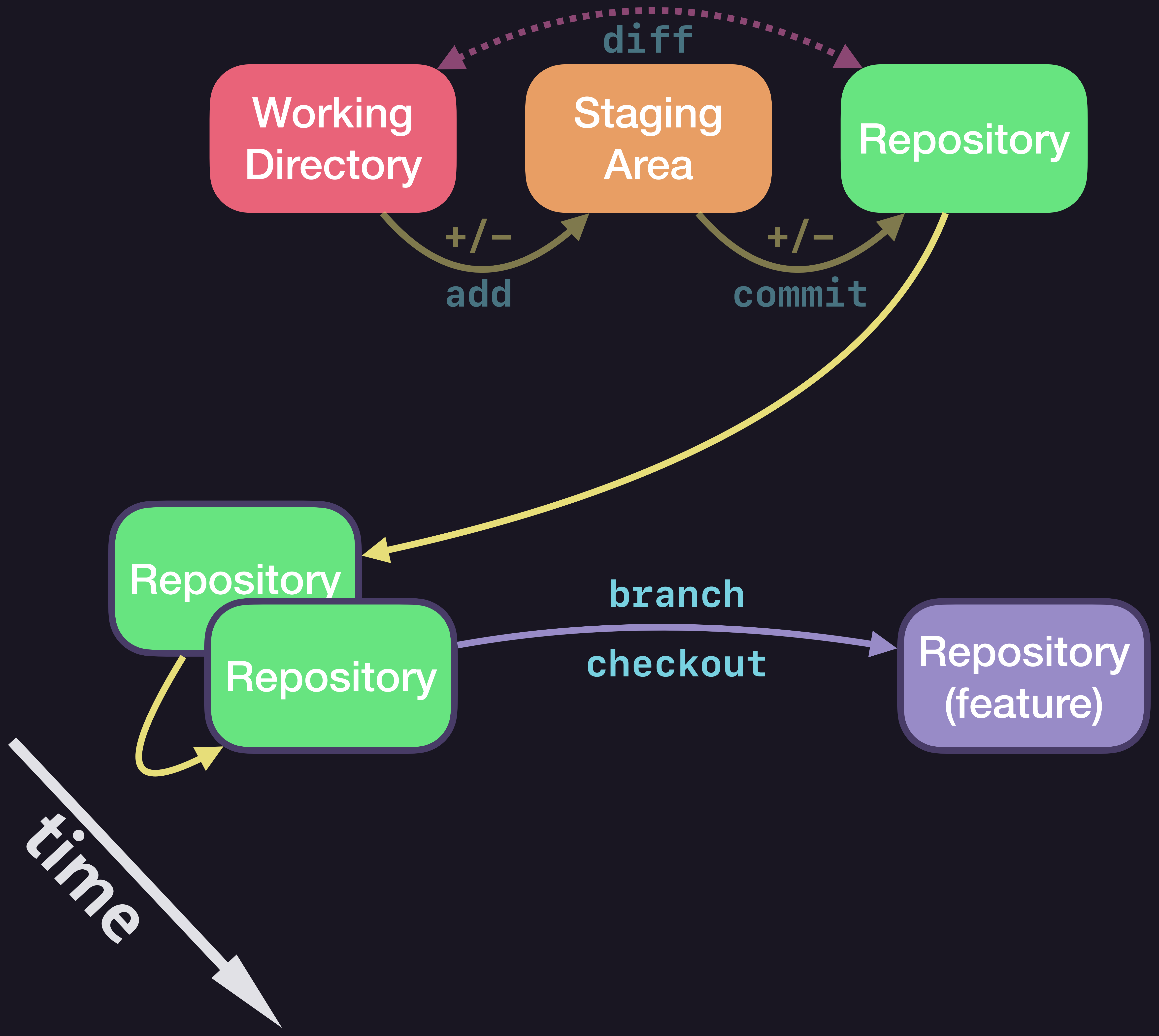
Git

branches

`git log` - view history of **commits**

`git branch` - manage **branches**

`git checkout` - switch **branches**



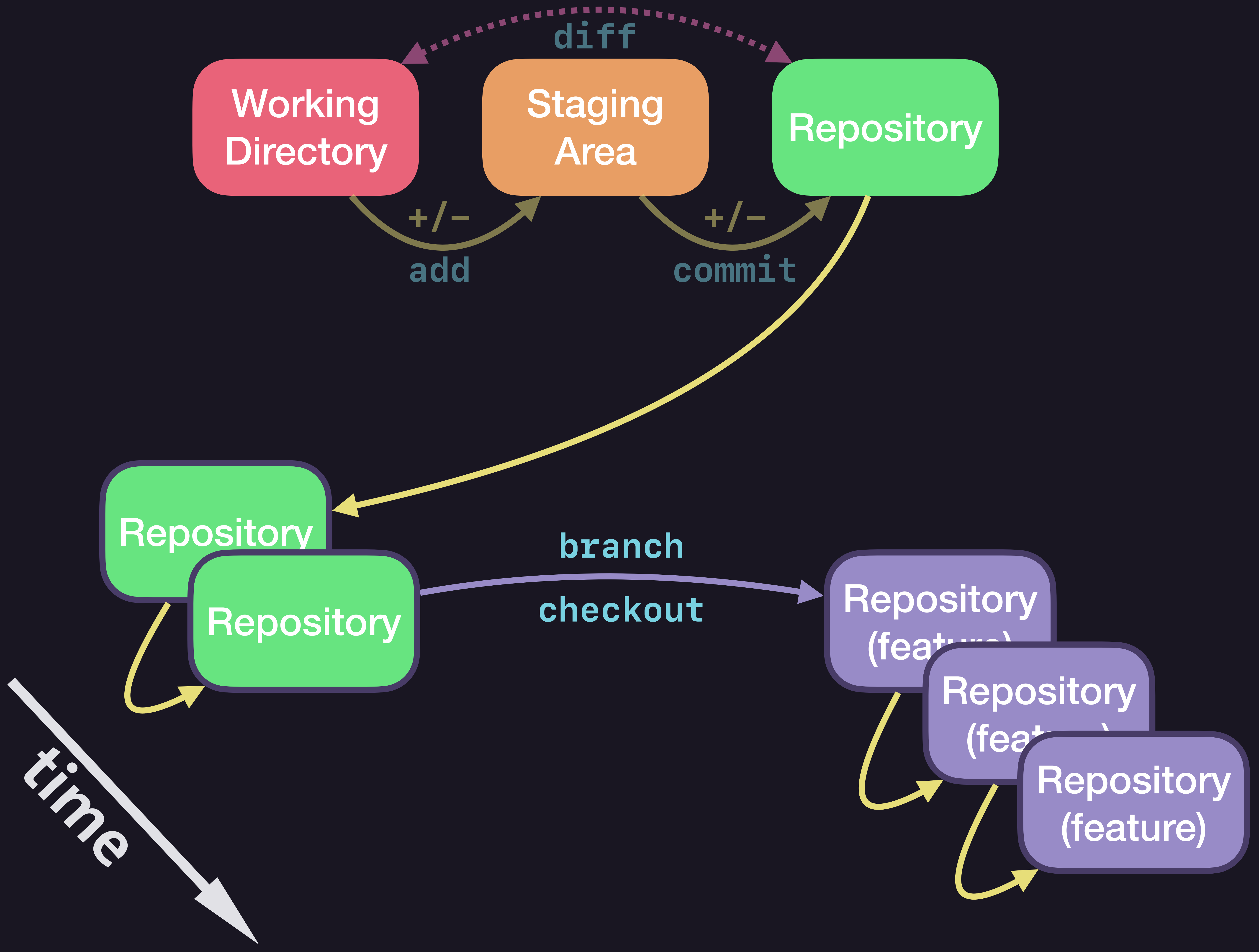
Git

branches

`git log` - view history of **commits**

`git branch` - manage **branches**

`git checkout` - switch **branches**



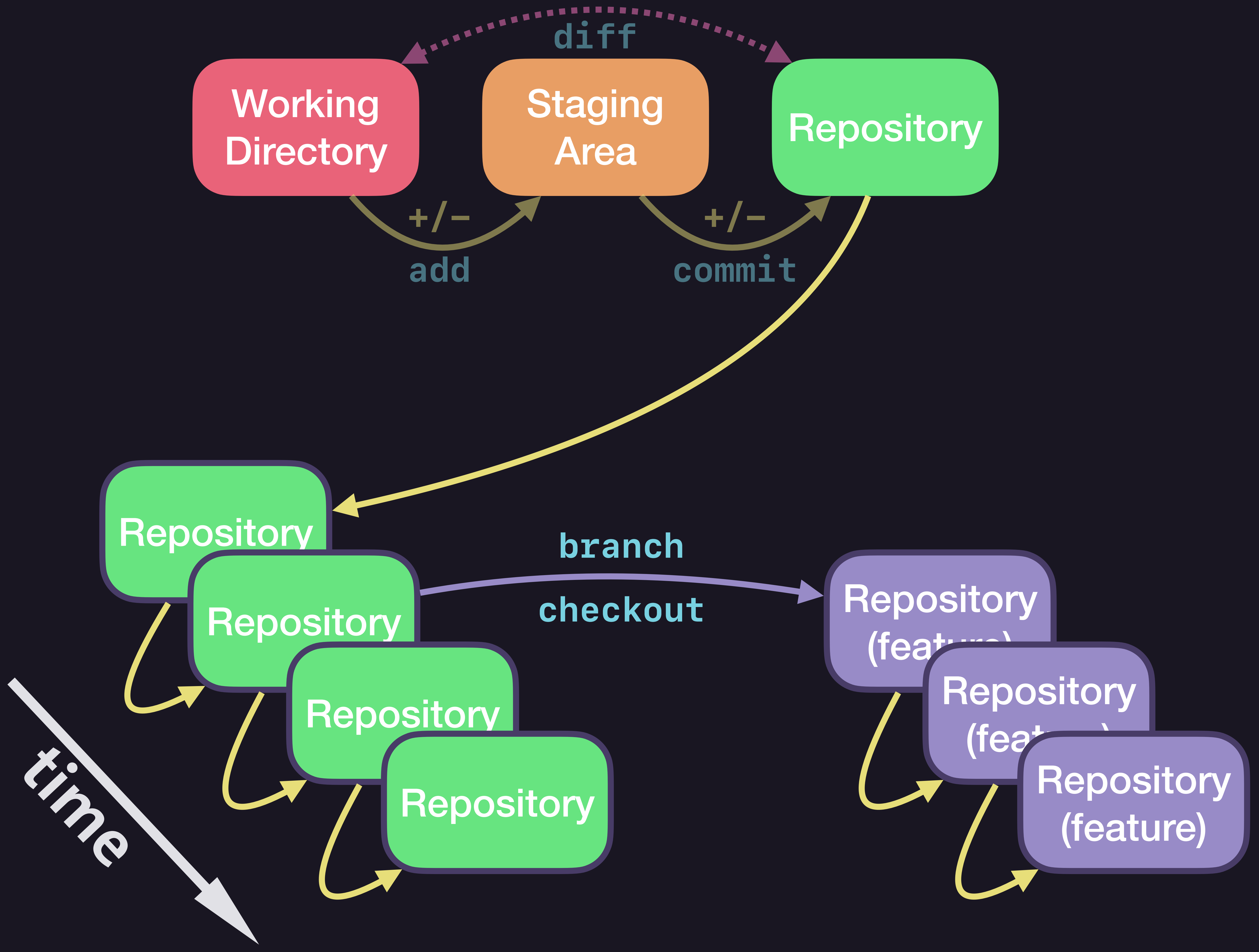
Git

branches

`git log` - view history of **commits**

`git branch` - manage **branches**

`git checkout` - switch **branches**



Git

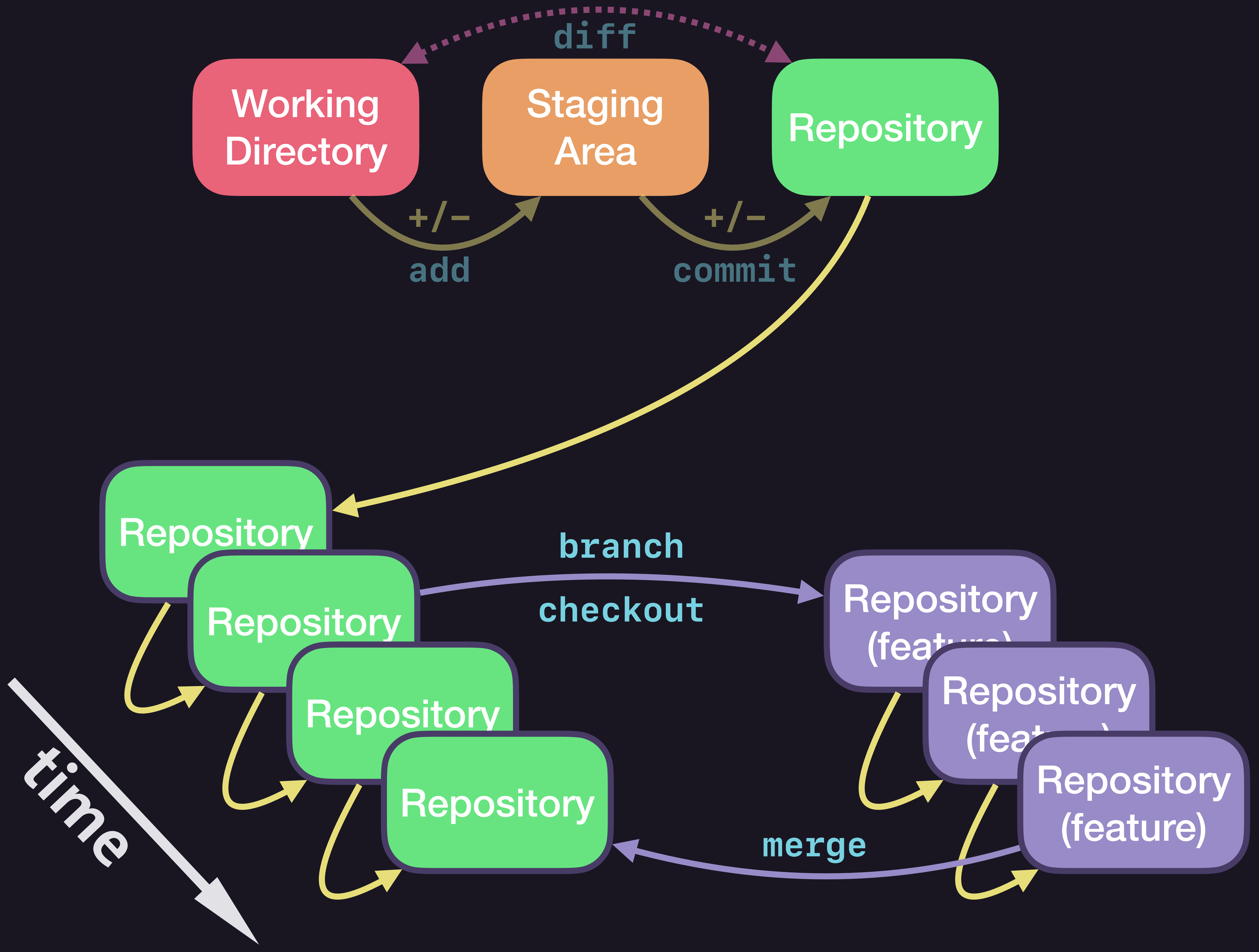
branches

`git log` - view history of **commits**

`git branch` - manage **branches**

`git checkout` - switch **branches**

`git merge` - merge changes from one **branch** to another **branch**



Git

branches

`git log` - view history of **commits**

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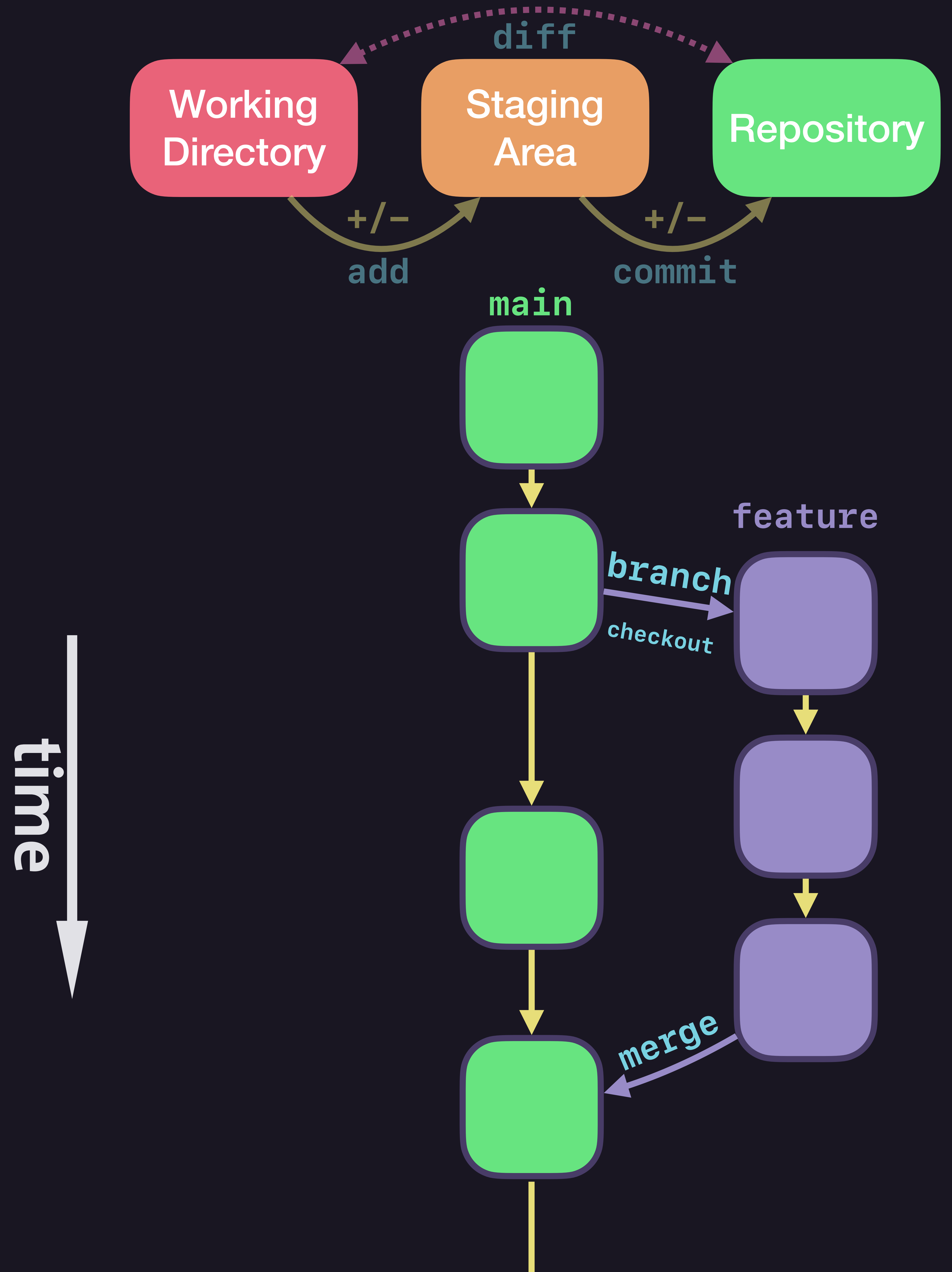

Git
branches

`git log` - view history of **commits**

`git branch` - manage **branches**

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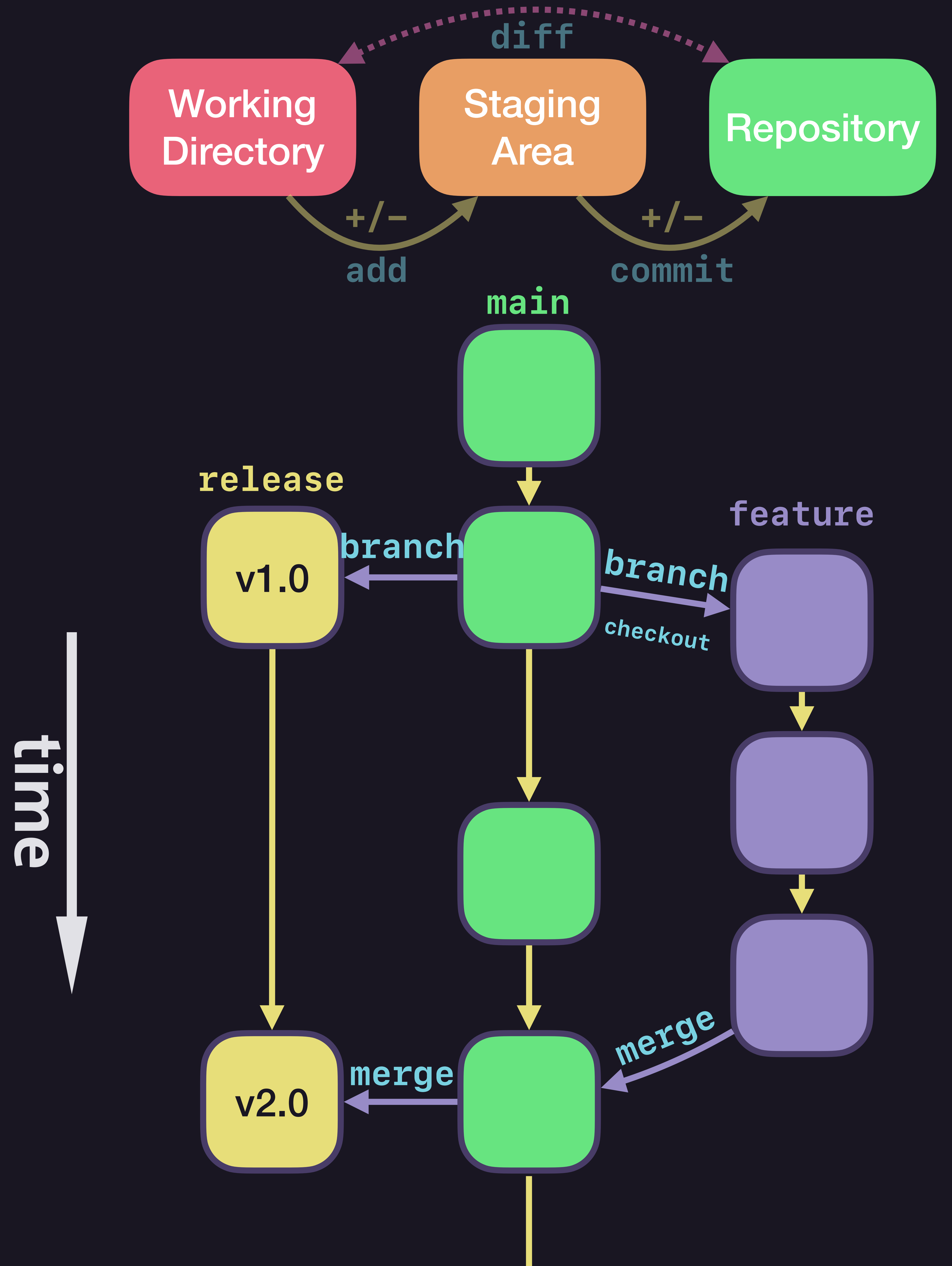
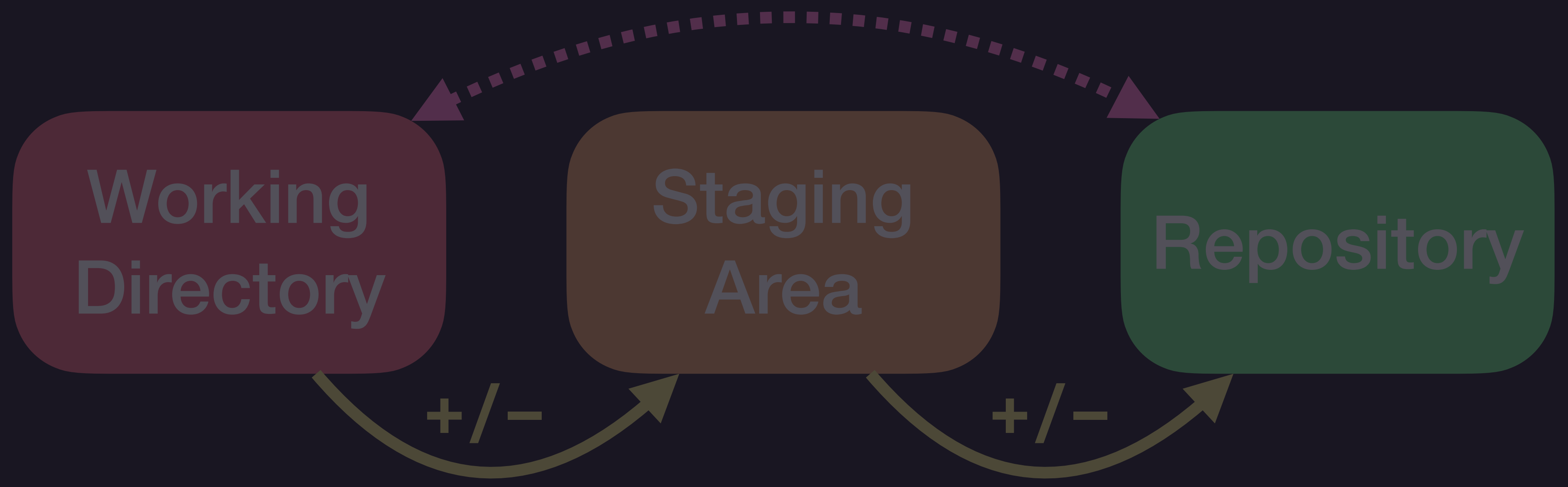
`git merge` - merge changes from one **branch** to another **branch**

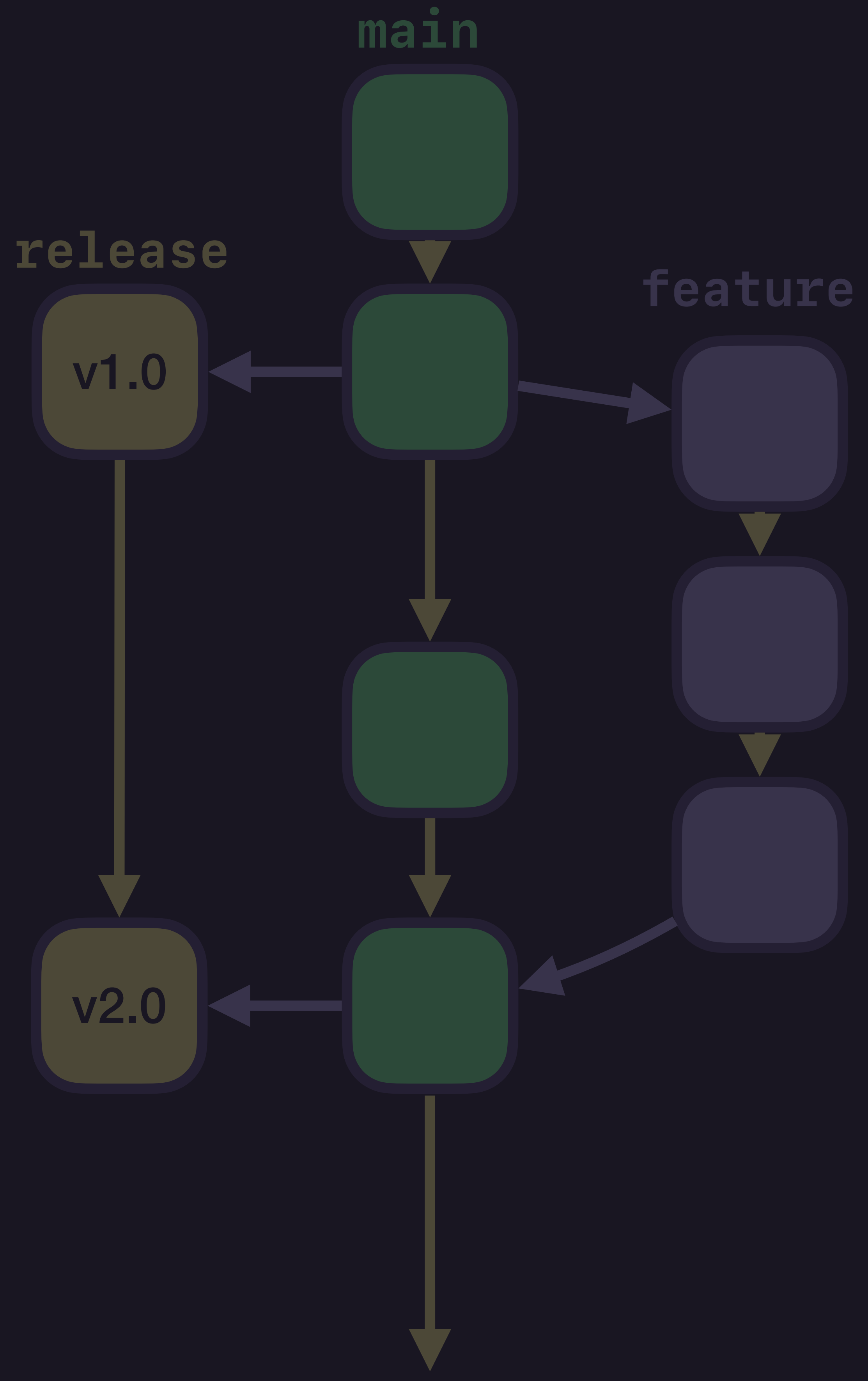


Overview

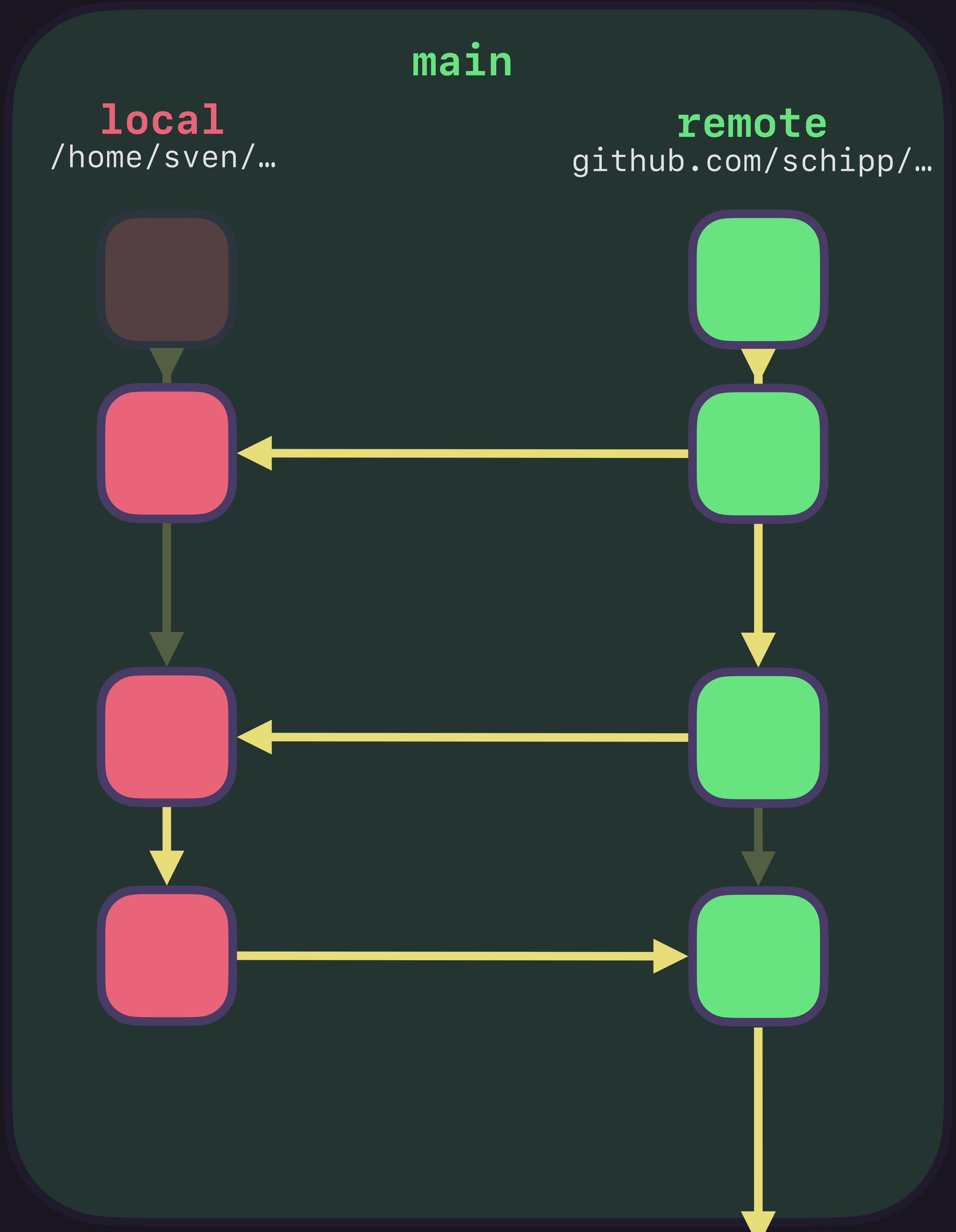
basics



branching

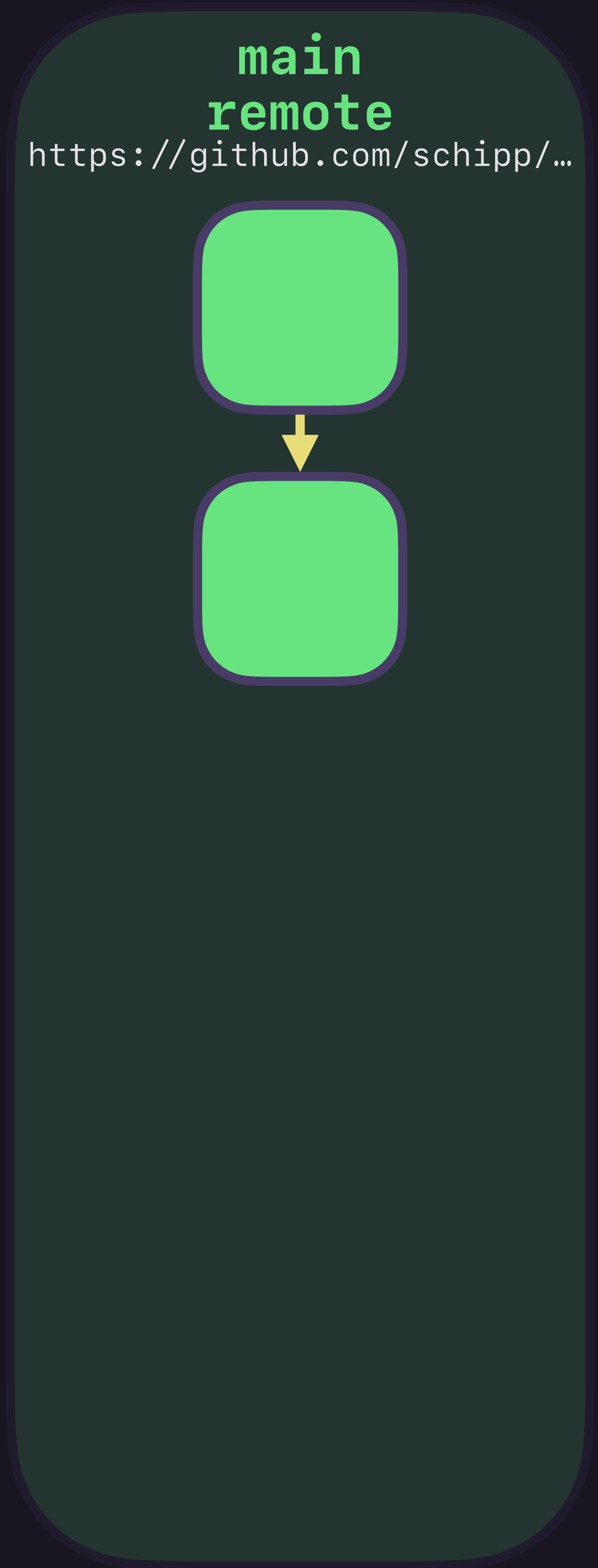


remote



Git

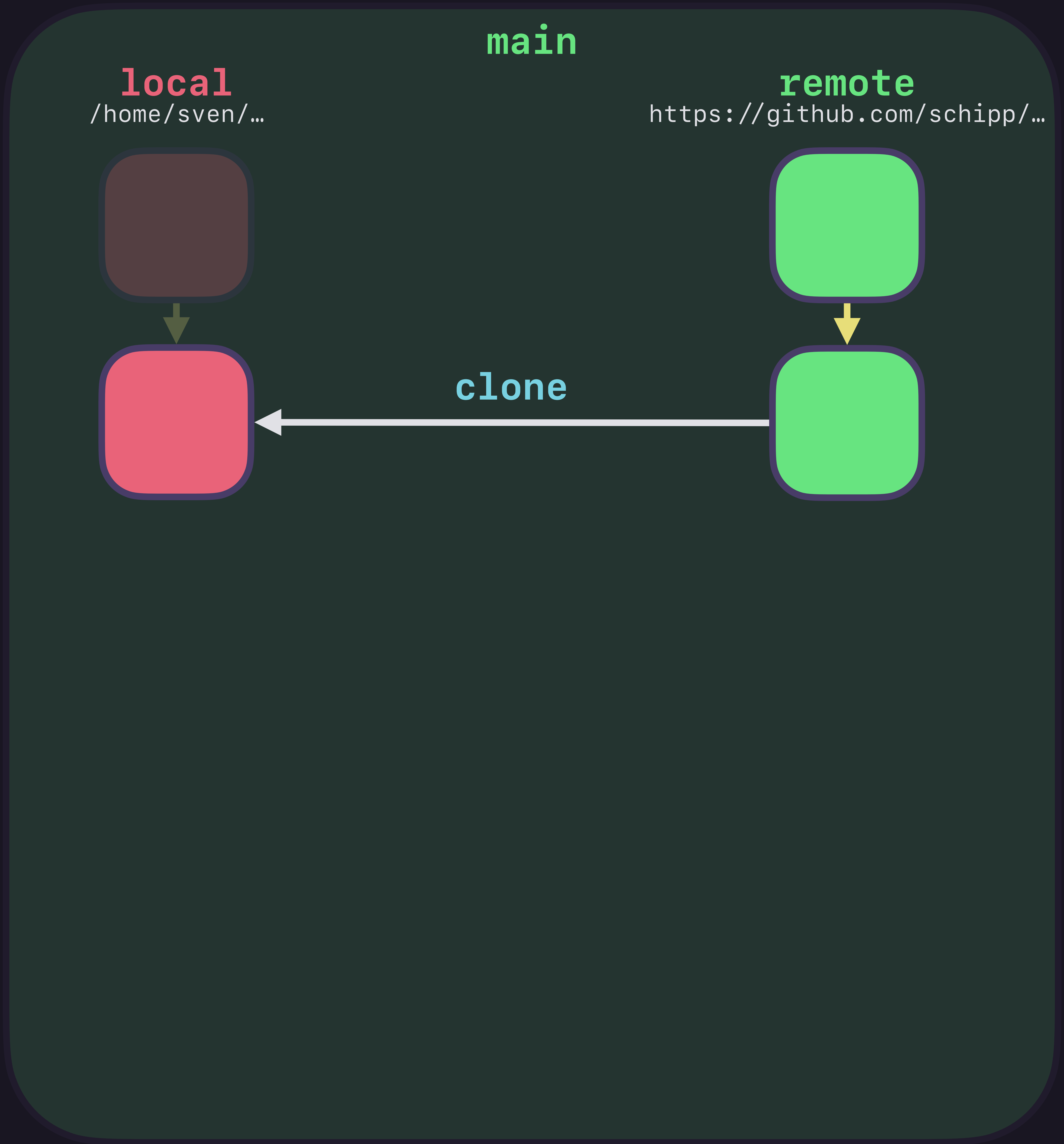
remote repositories



Git

remote repositories

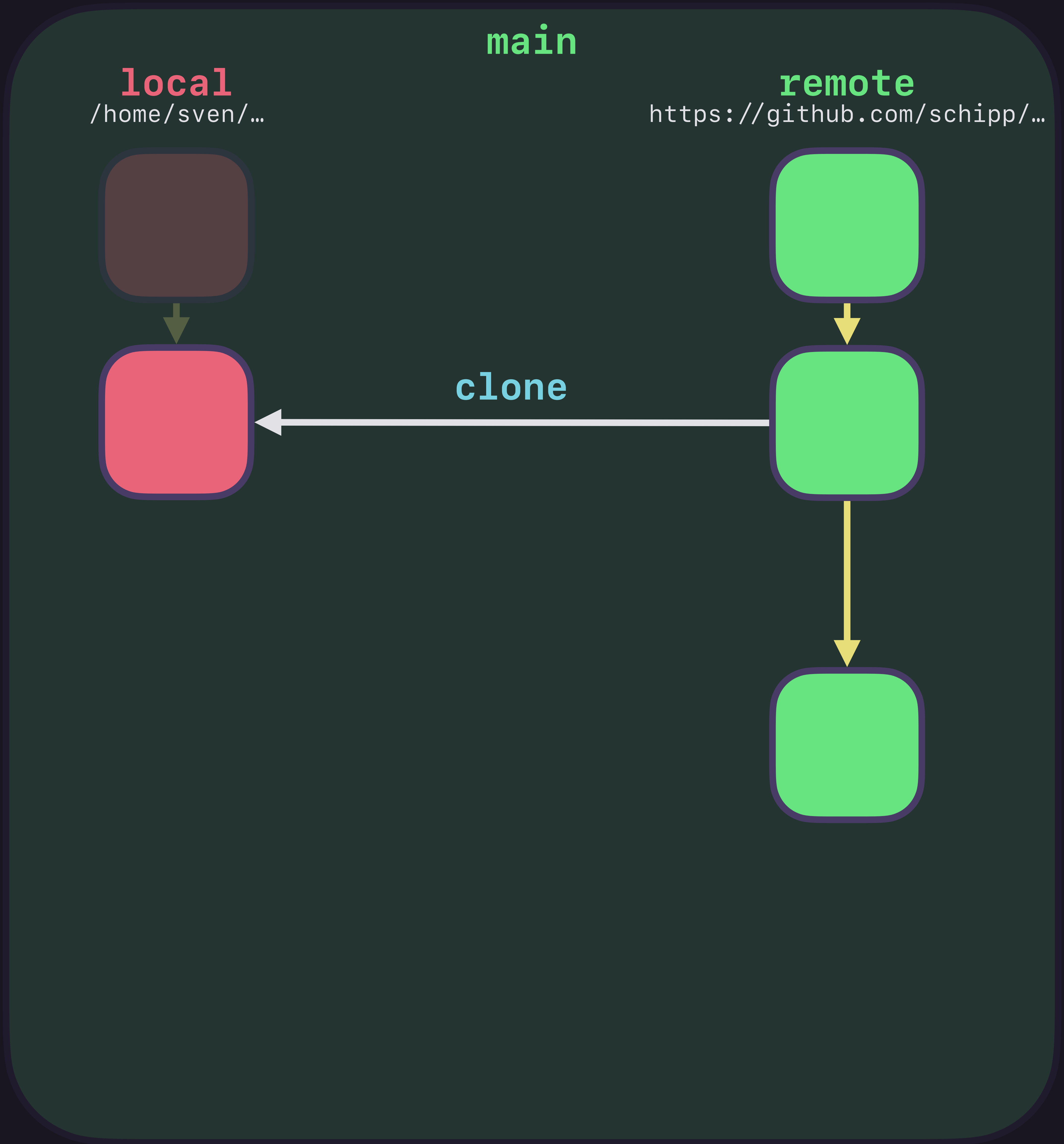
`git clone` - local copy of remote repository



Git

remote repositories

`git clone` - local copy of remote repository

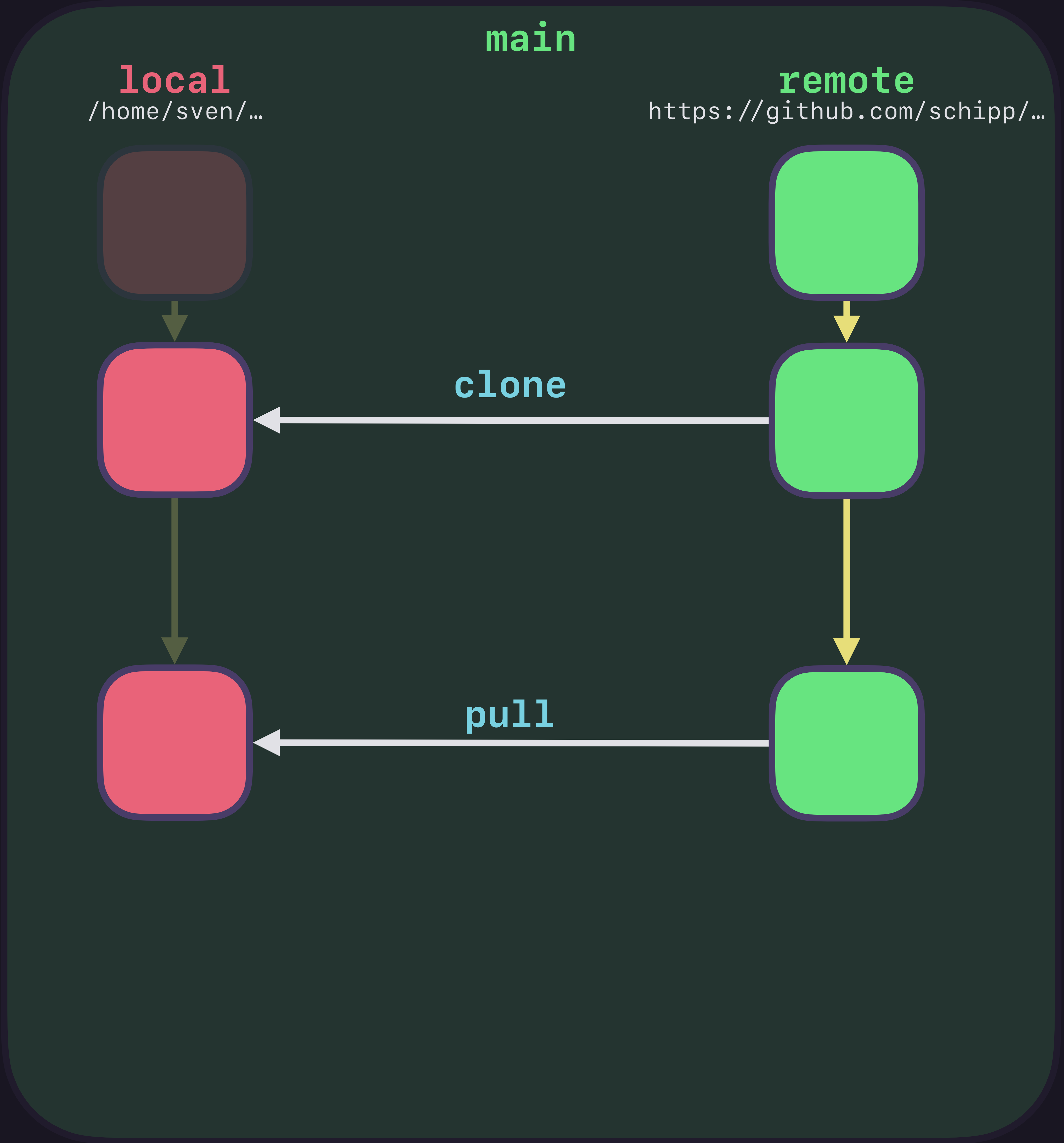


Git

remote repositories

`git clone` - local copy of remote repository

`git pull` - fetch & integrate **changes** from remote



Git

remote repositories

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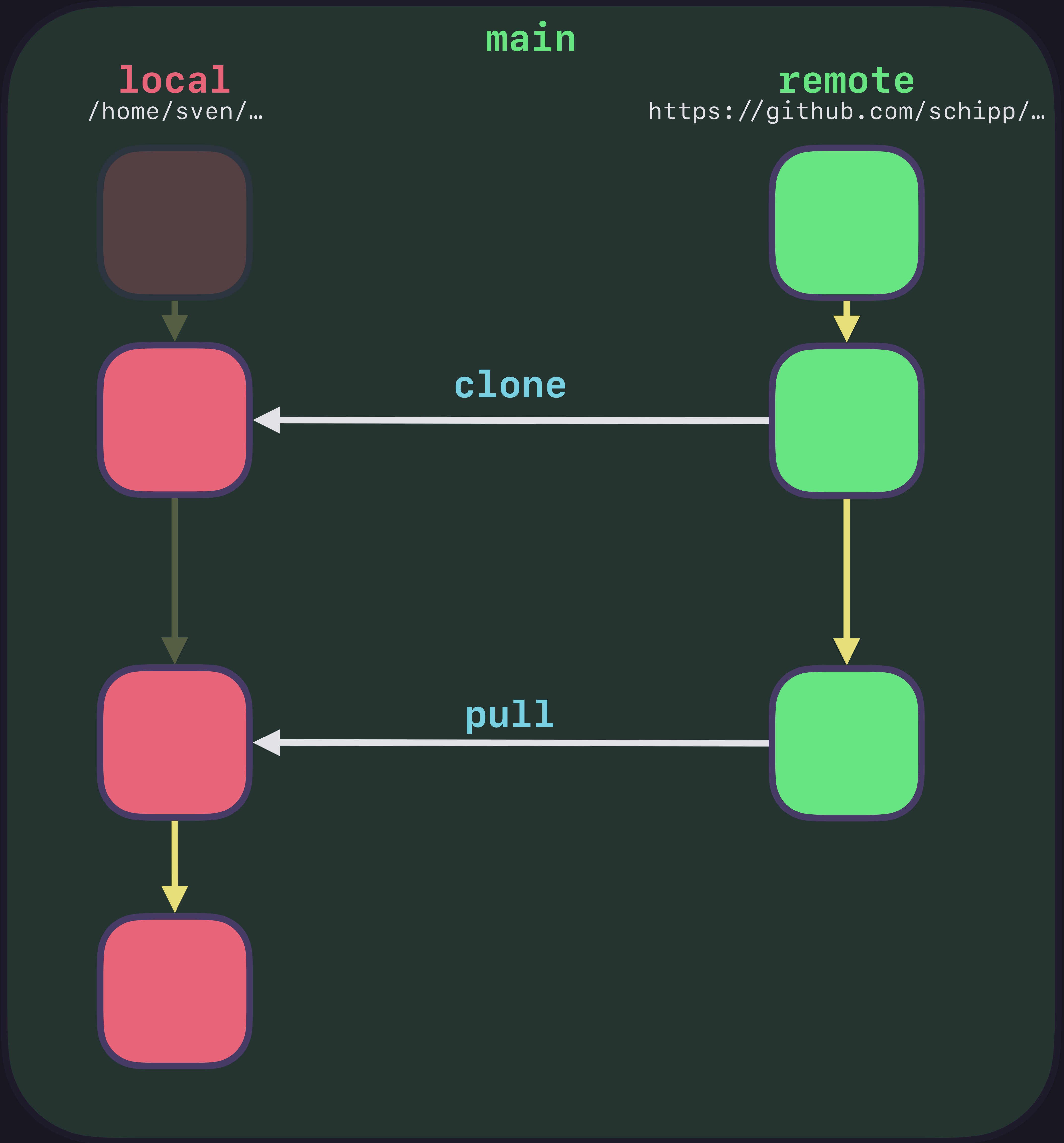
`git pull` - fetch & integrate **changes** from remote



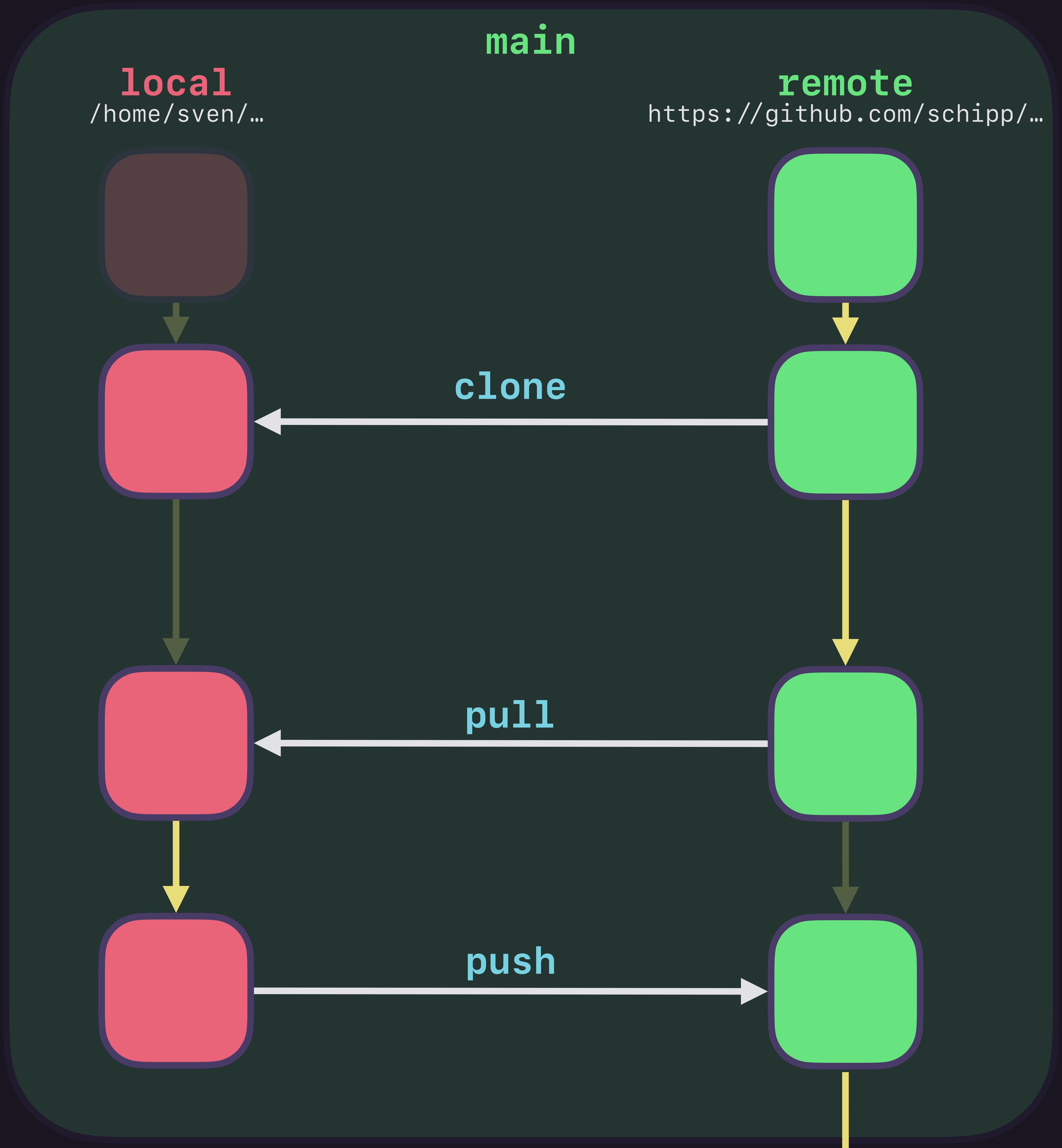
Git

remote repositories

`git clone` - local copy of remote repository

`git pull` - fetch & integrate changes from remote

`git push` - integrate changes from local at remote



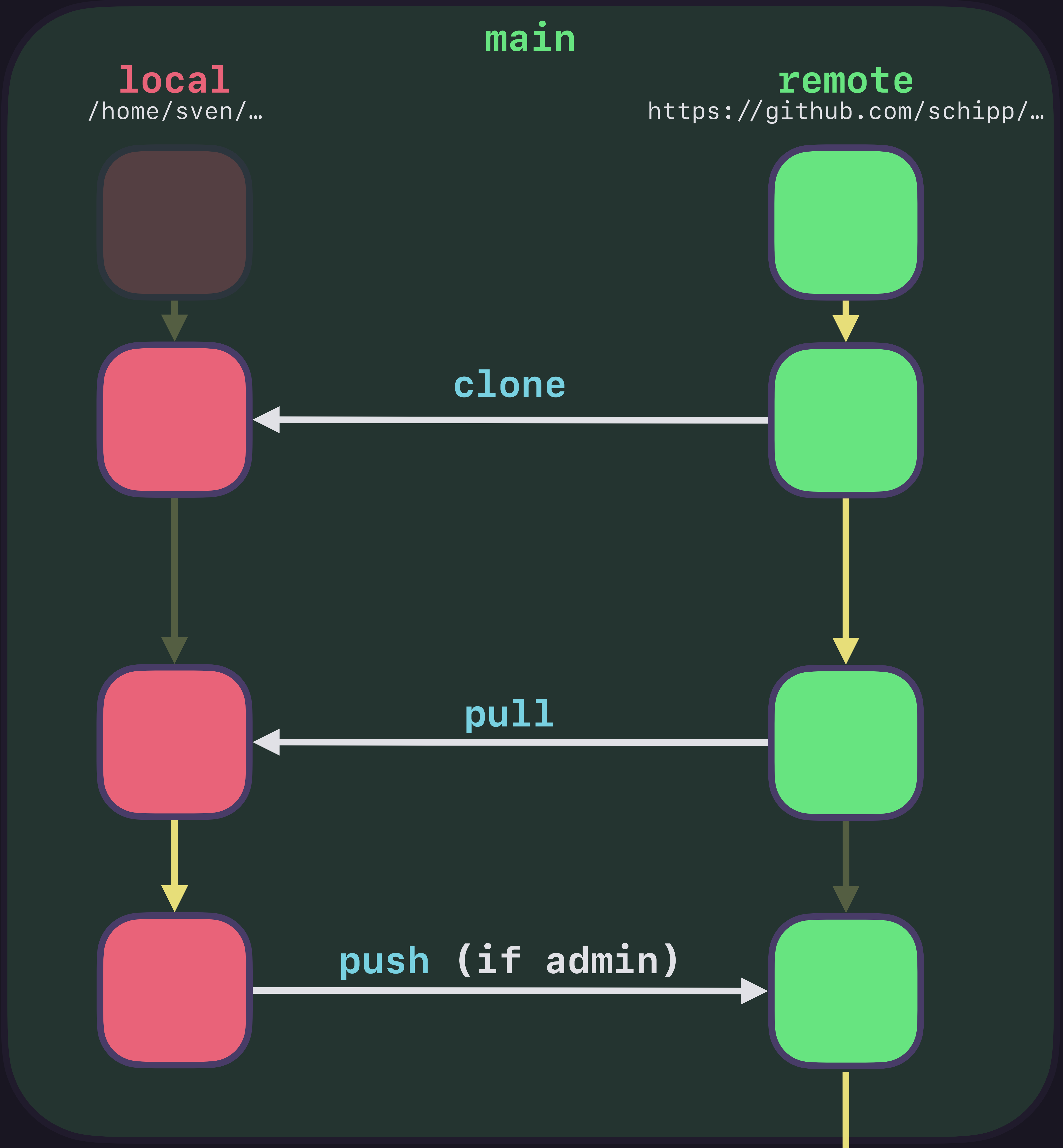
Git

remote repositories

`git clone` - local copy of remote repository

`git pull` - fetch & integrate changes from remote

`git push` - integrate changes from local at remote



Git

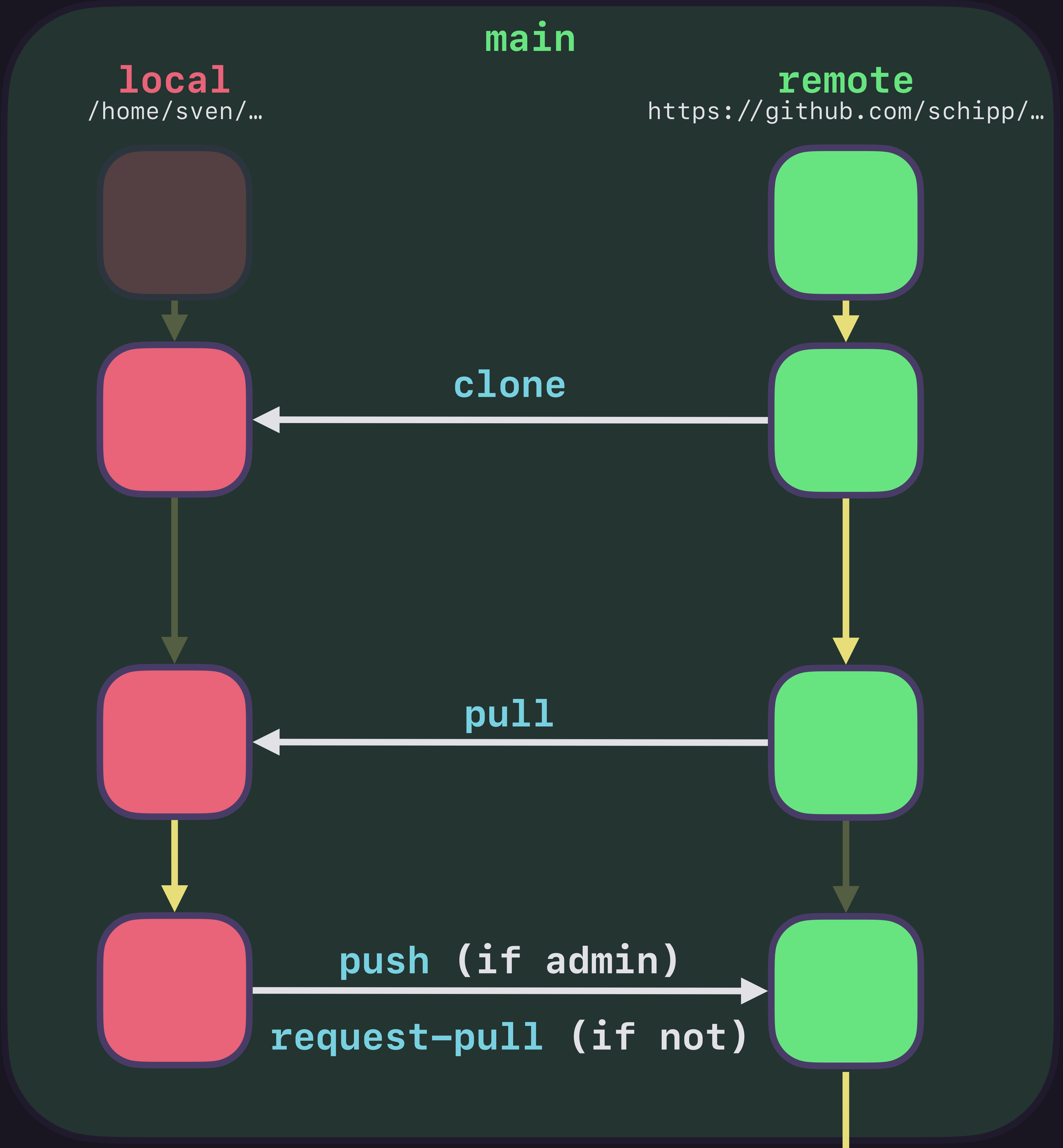
remote repositories

`git clone` - local copy of remote repository

`git pull` - fetch & integrate changes from remote

`git push` - integrate changes from local at remote

`git request-pull` - ask remote repository to pull changes from local



Git

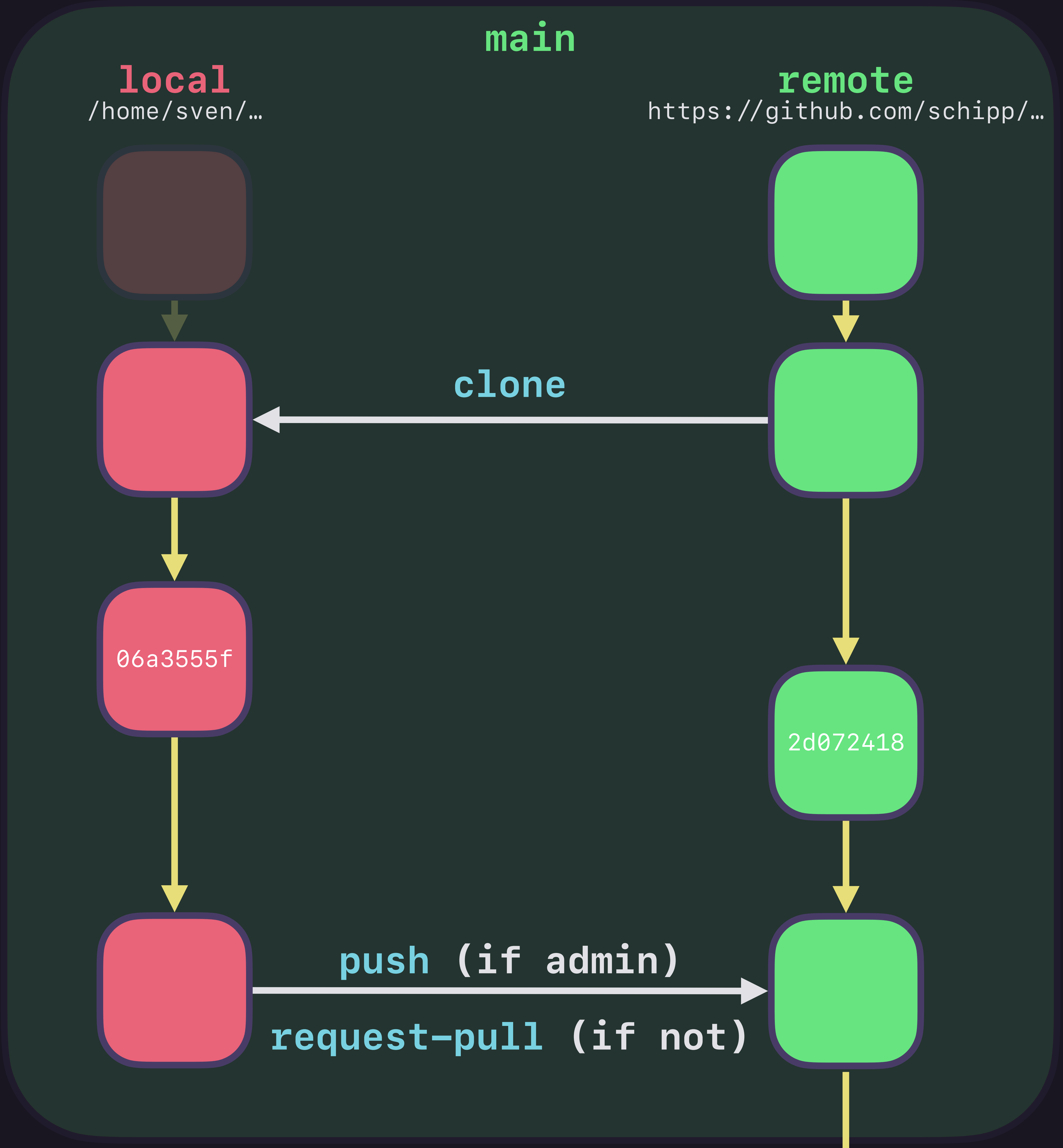
remote repositories

`git clone` - local copy of remote repository

`git pull` - fetch & integrate changes from remote

`git push` - integrate changes from local at remote

`git request-pull` - ask remote repository to pull changes from local



Git

remote repositories

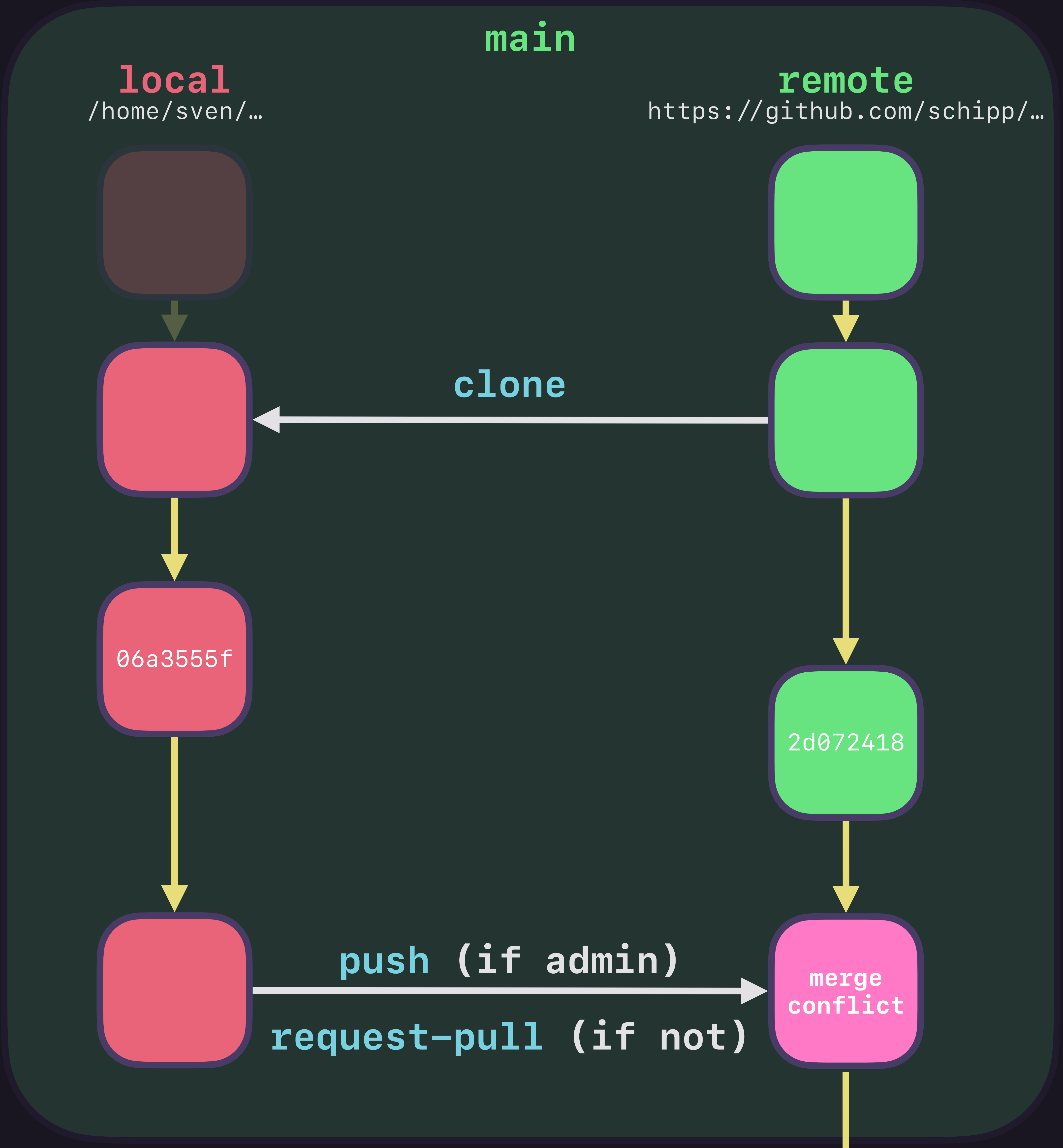
`git clone` - local copy of remote repository

`git pull` - fetch & integrate changes from remote

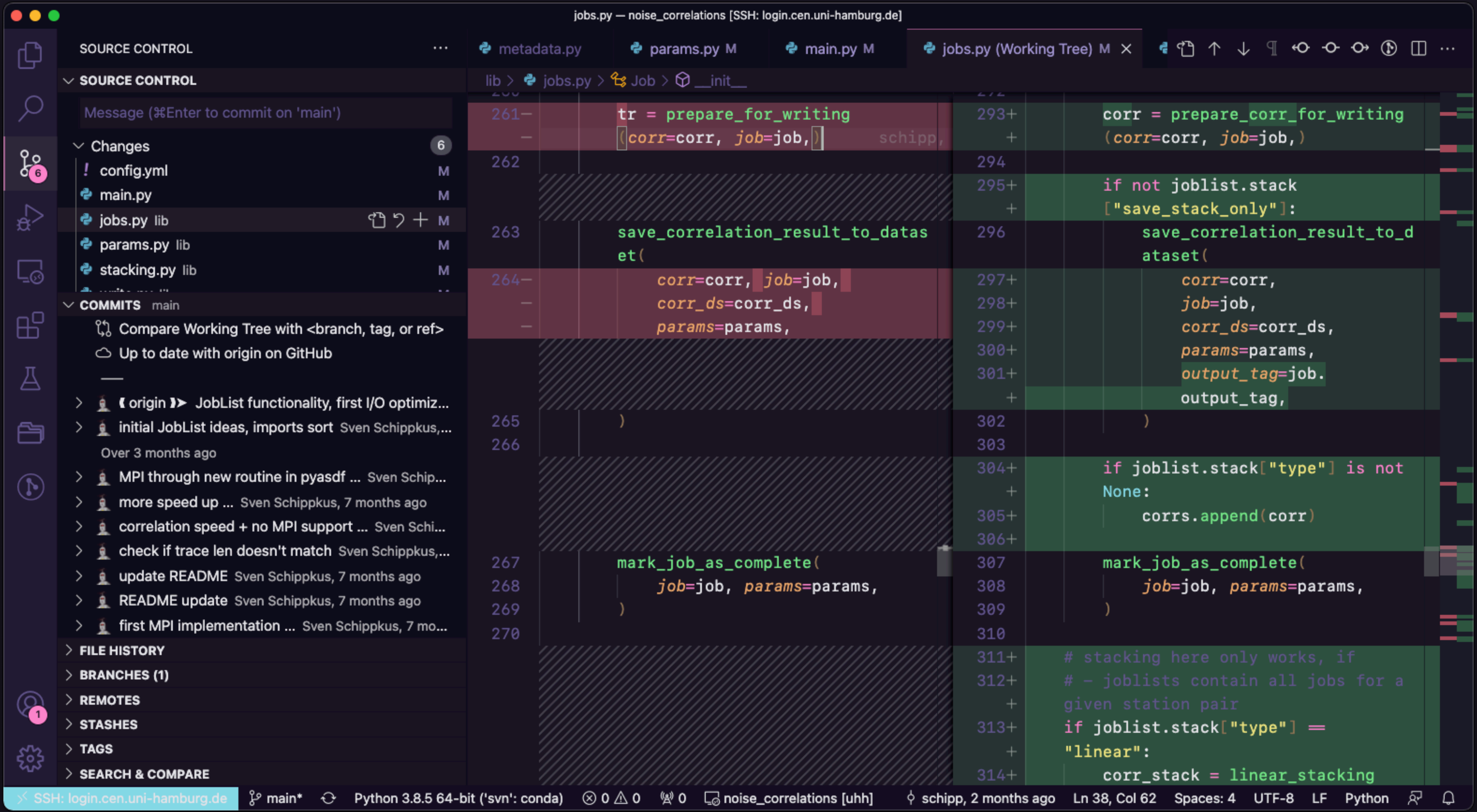
`git push` - integrate changes from local at remote

`git request-pull` - ask remote repository to pull changes from local

A `merge conflict` can occur when changes have been made to the same file in different branches or repository locations (local, remote).



Git in practise (example vscode)

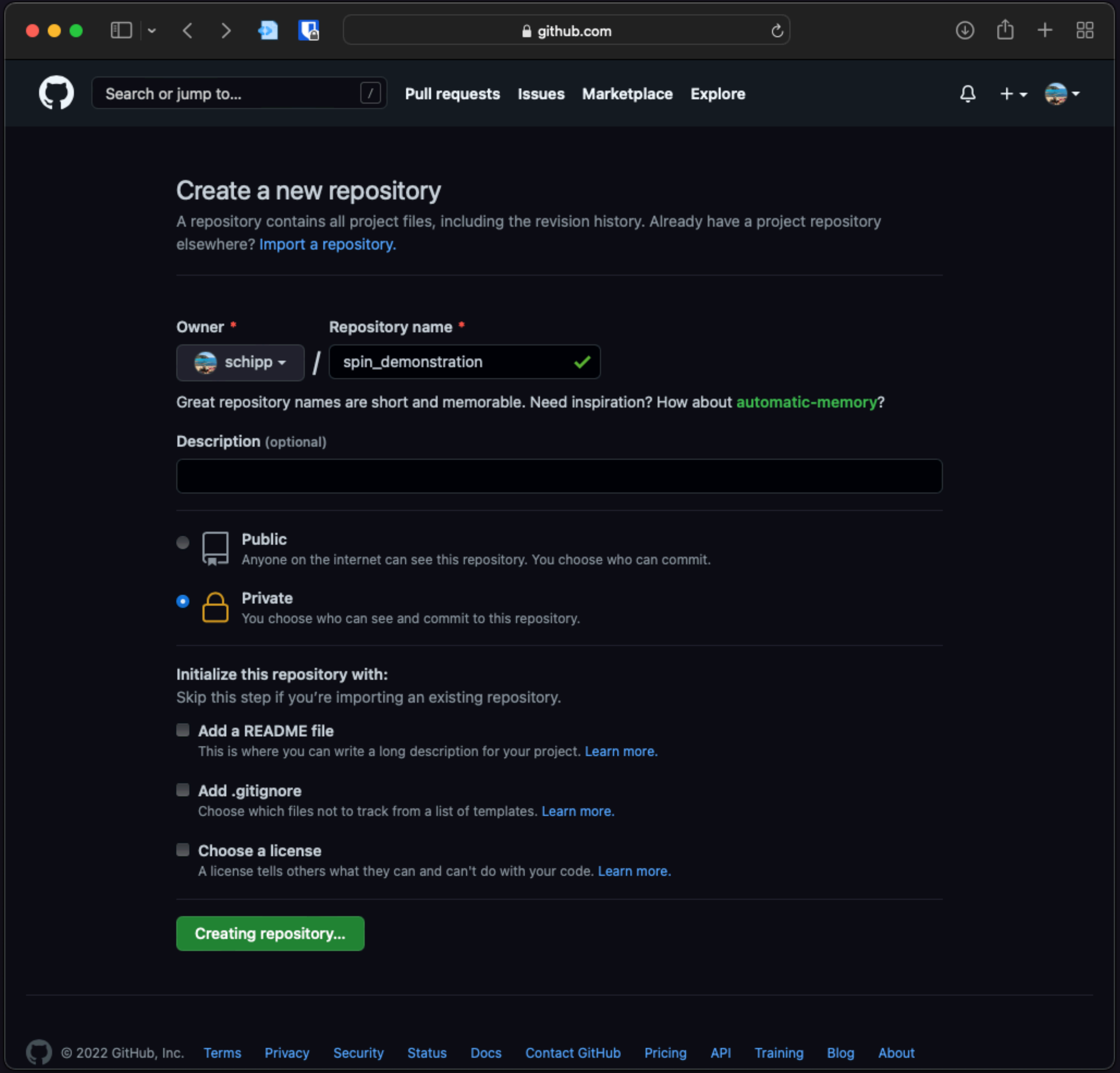


- origin JobList functionality, first I/O optimiz...
- initial JobList ideas, imports sort Sven Schippkus,...
  Over 3 months ago
- MPI through new routine in pyasdf ... Sven Schip...
- more speed up ... Sven Schippkus, 7 months ago
- correlation speed + no MPI support ... Sven Schi...
- check if trace len doesn't match Sven Schippkus,...
- update README Sven Schippkus, 7 months ago
- README update Sven Schippkus, 7 months ago
- first MPI implementation ... Sven Schippkus, 7 mo...

```
tr = prepare_for_writing
(corr=corr, job=job,)        schipp,

save_correlation_result_to_datas
et(
    corr=corr, job=job,
    corr_ds=corr_ds,
    params=params,
)

mark_job_as_complete(
    job=job, params=params,
)
```

```
corr = prepare_corr_for_writing
(corr=corr, job=job,)

if not joblist.stack
["save_stack_only"]:
    save_correlation_result_to_d
    ataset(
        corr=corr,
        job=job,
        corr_ds=corr_ds,
        params=params,
        output_tag=job.
        output_tag,
    )

if joblist.stack["type"] is not
None:
    corrs.append(corr)

mark_job_as_complete(
    job=job, params=params,
)

# stacking here only works, if
# - joblists contain all jobs for a
given station pair
if joblist.stack["type"] ==
"linear":
    corr_stack = linear_stacking
```

Github



Create a new repository

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

Owner * schipp / Repository name * spin_demonstration ✓

Great repository names are short and memorable. Need inspiration? How about automatic-memory?

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.

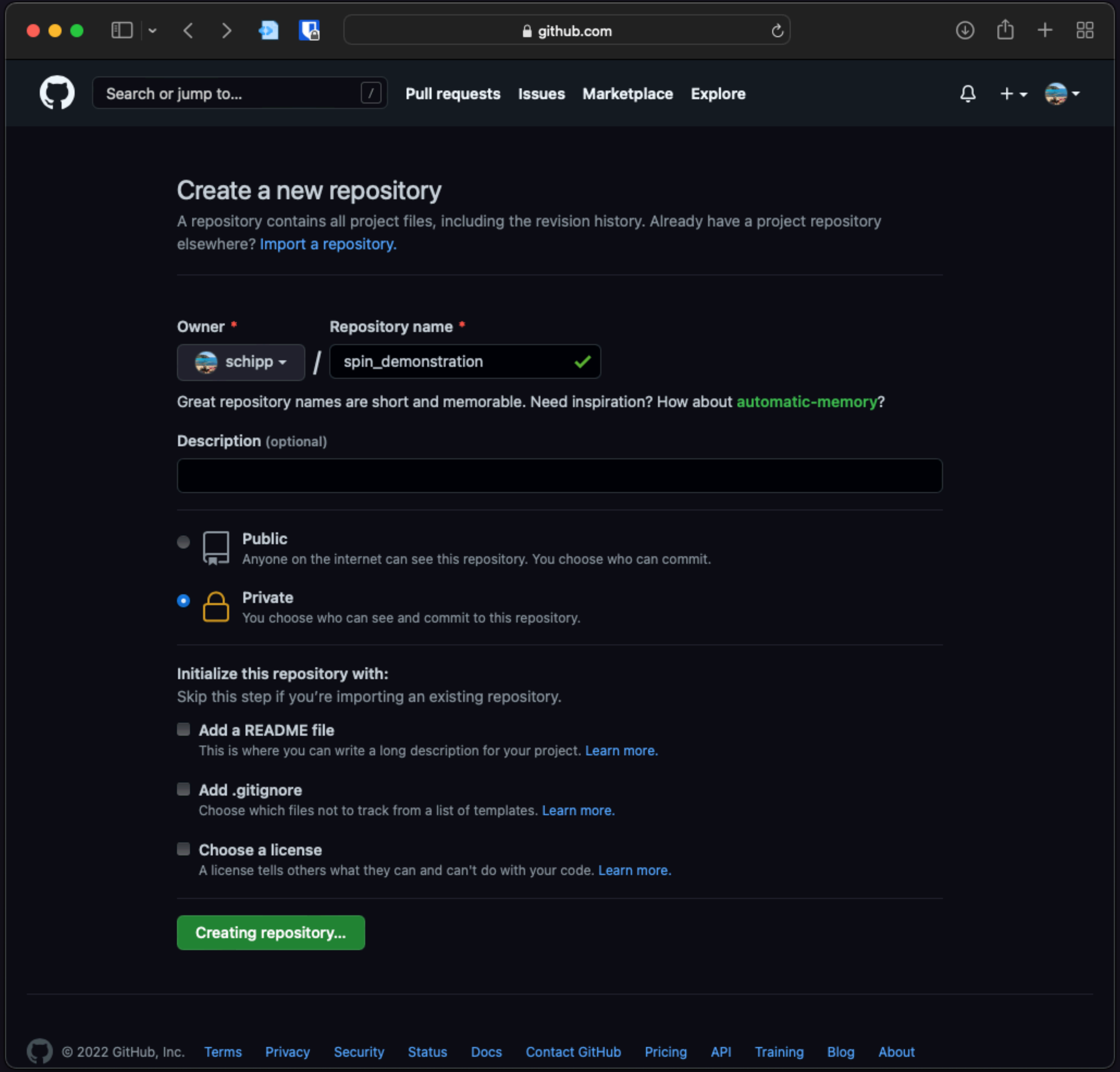
Initialize this repository with:
Skip this step if you're importing an existing repository.

□ 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.

Github



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Creating repository...

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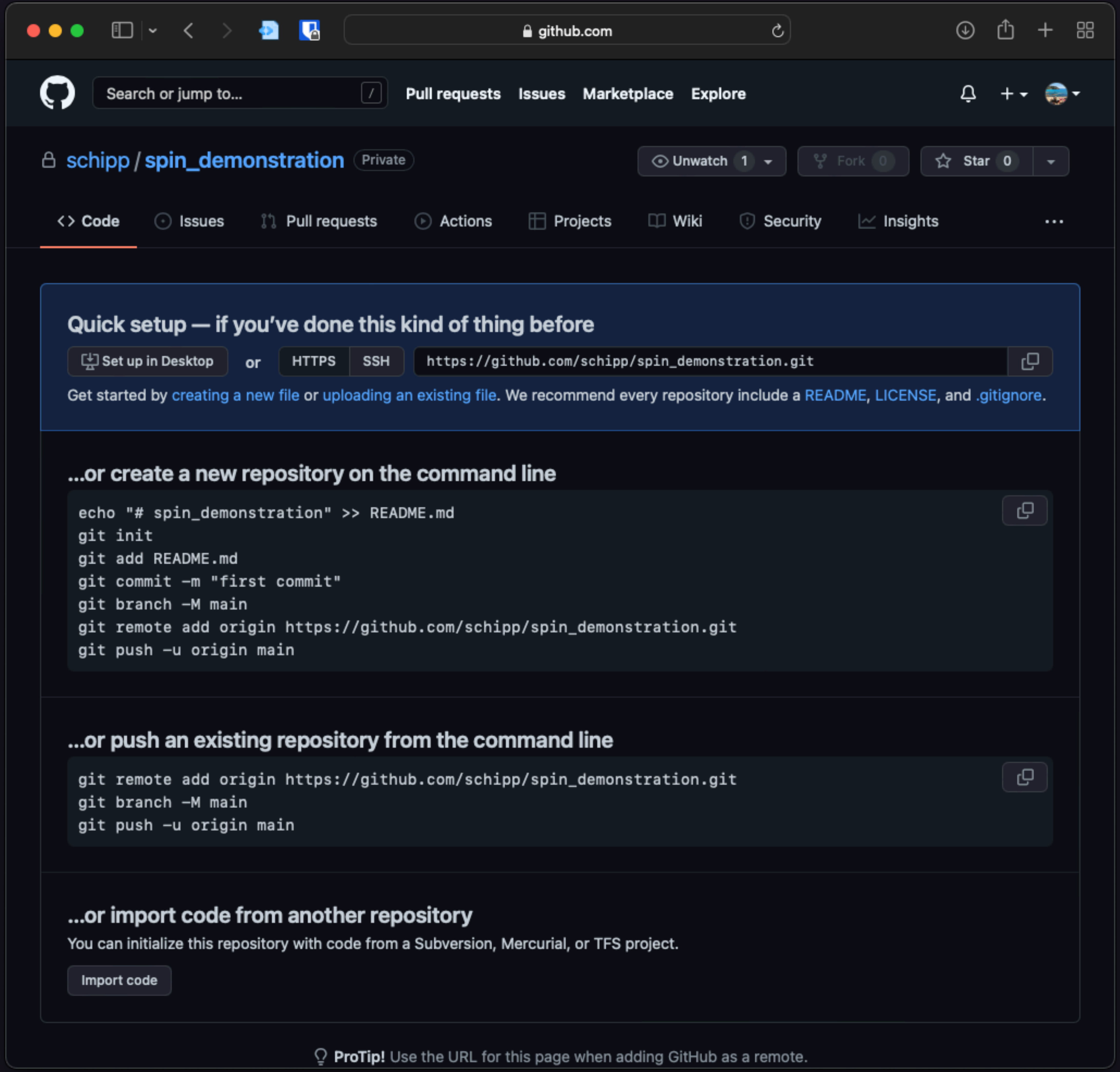


schipp / spin_demonstration Private

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

Set up in Desktop or HTTPS SSH https://github.com/schipp/spin_demonstration.git

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

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

```
echo "# spin_demonstration" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin https://github.com/schipp/spin_demonstration.git
git push -u origin main
```

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

```
git remote add origin https://github.com/schipp/spin_demonstration.git
git branch -M main
git push -u origin main
```

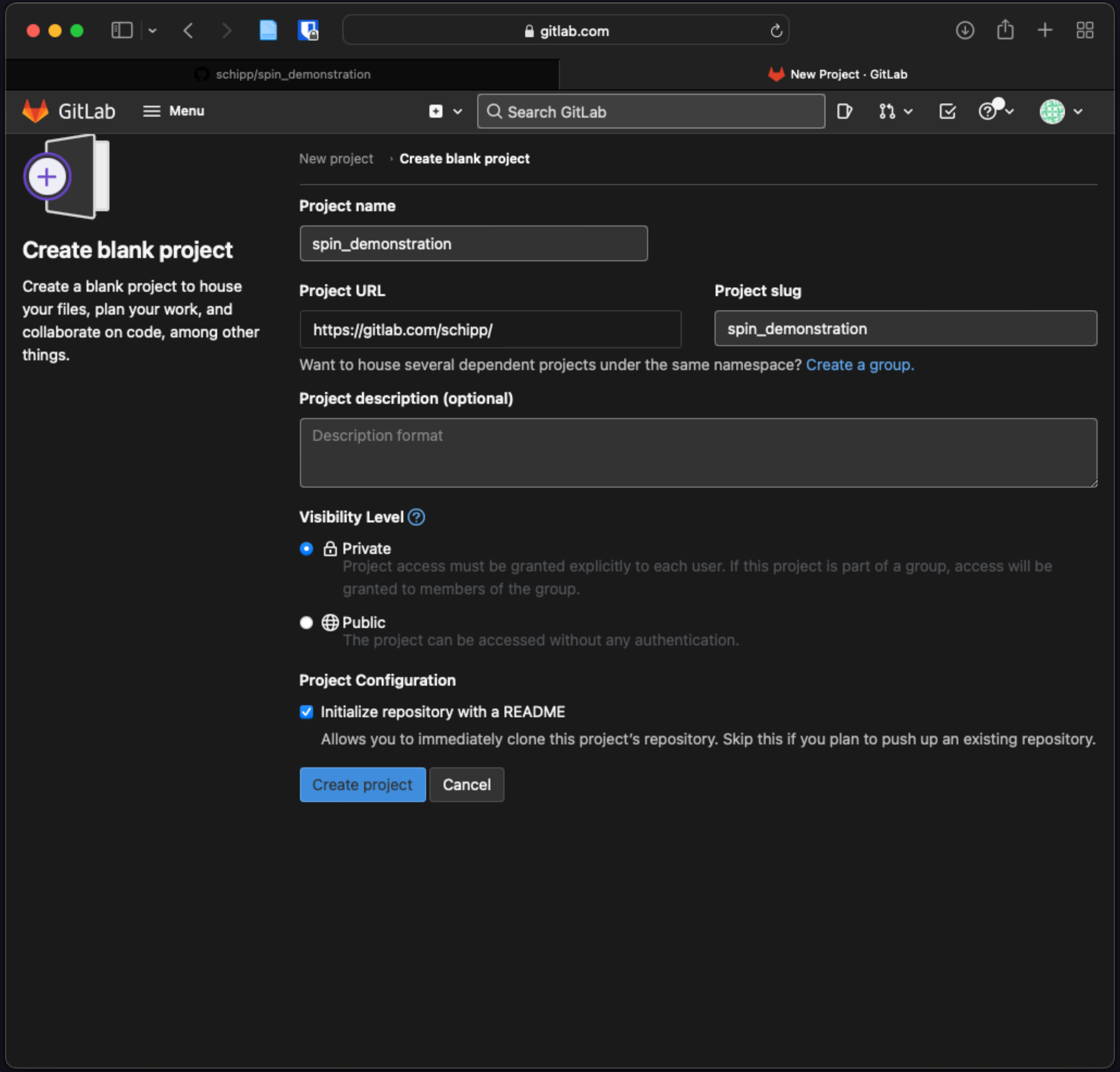
...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

Import code

ProTip! Use the URL for this page when adding GitHub as a remote.

Github, GitLab, ...



New project › Create blank project

Create blank project

Create a blank project to house your files, plan your work, and collaborate on code, among other things.

Project name
spin_demonstration

Project URL
https://gitlab.com/schipp/

Project slug
spin_demonstration

Want to house several dependent projects under the same namespace? Create a group.

Project description (optional)
Description format

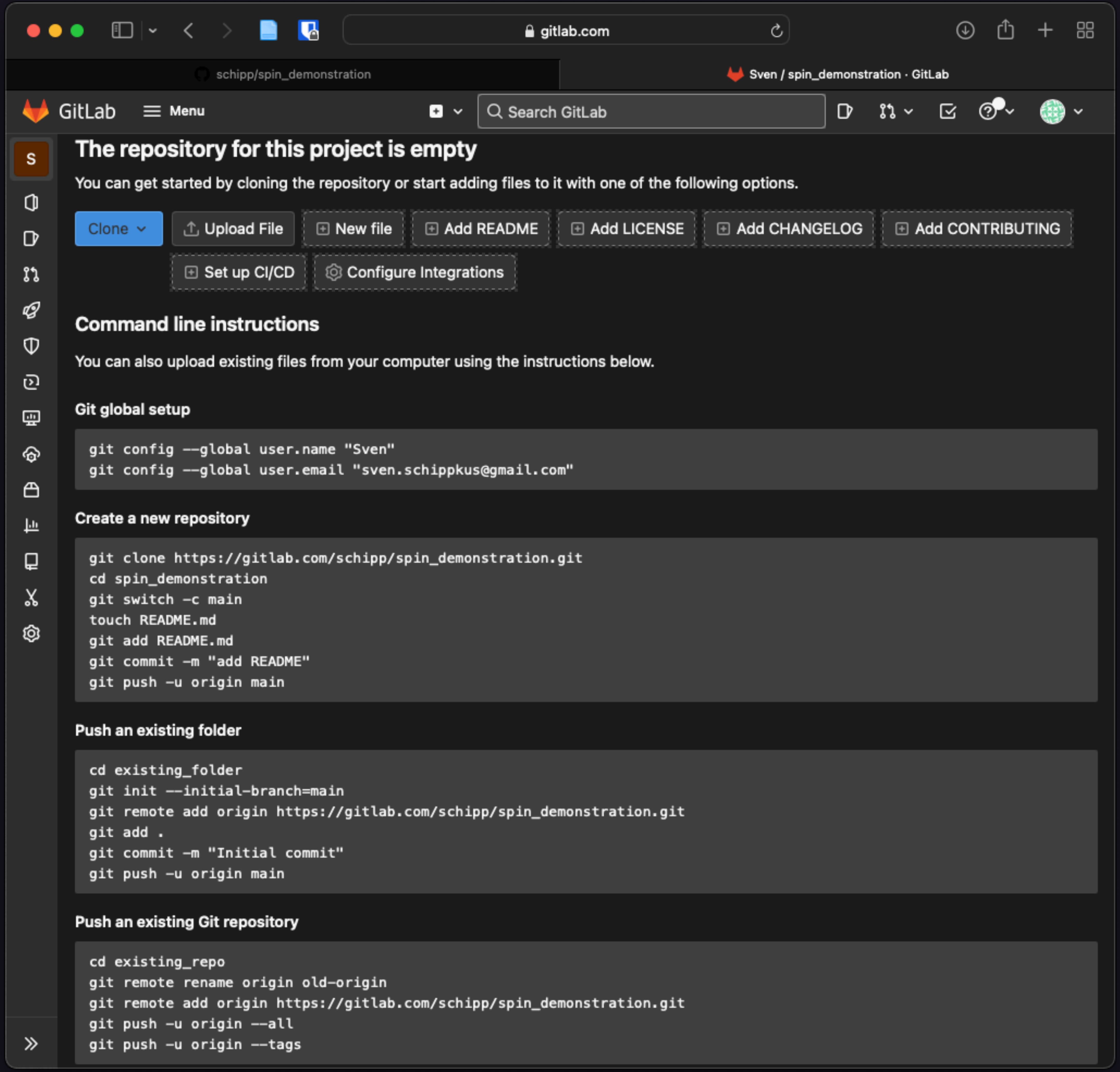
Visibility Level

● Private
Project access must be granted explicitly to each user. If this project is part of a group, access will be granted to members of the group.

○ Public
The project can be accessed without any authentication.

Project Configuration

☑ Initialize repository with a README
Allows you to immediately clone this project's repository. Skip this if you plan to push up an existing repository.



The repository for this project is empty

You can get started by cloning the repository or start adding files to it with one of the following options.

Command line instructions

You can also upload existing files from your computer using the instructions below.

Git global setup

```
git config --global user.name "Sven"
git config --global user.email "sven.schippkus@gmail.com"
```

Create a new repository

```
git clone https://gitlab.com/schipp/spin_demonstration.git
cd spin_demonstration
git switch -c main
touch README.md
git add README.md
git commit -m "add README"
git push -u origin main
```

Push an existing folder

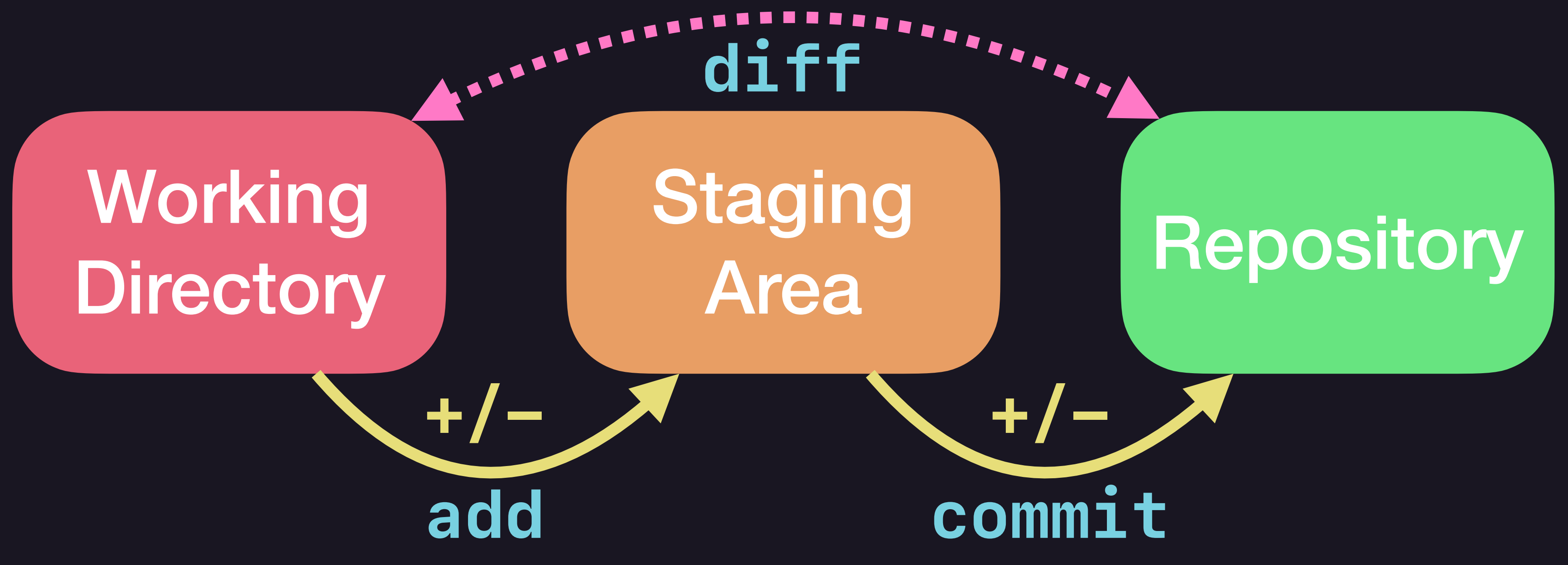
```
cd existing_folder
git init --initial-branch=main
git remote add origin https://gitlab.com/schipp/spin_demonstration.git
git add .
git commit -m "Initial commit"
git push -u origin main
```

Push an existing Git repository

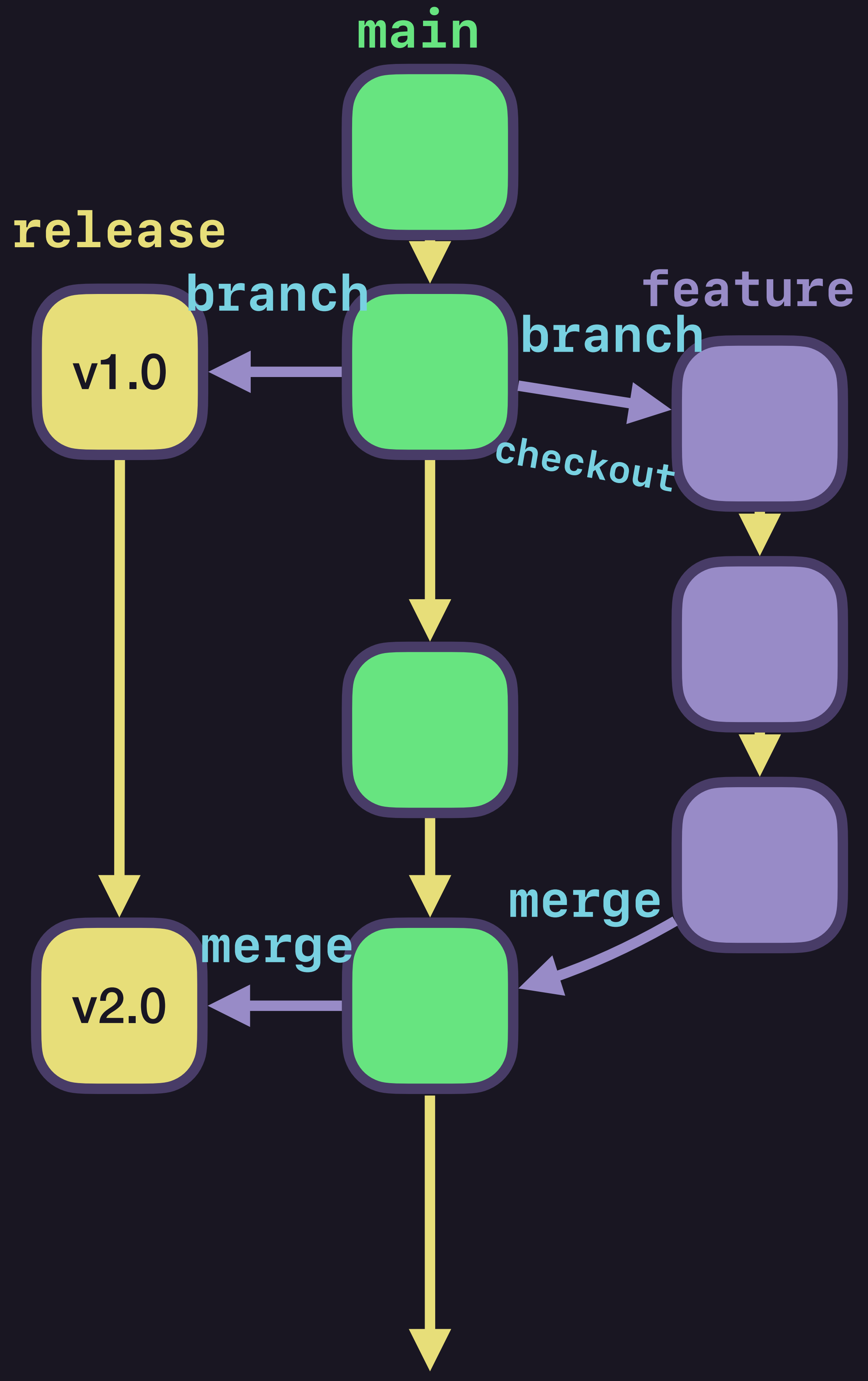
```
cd existing_repo
git remote rename origin old-origin
git remote add origin https://gitlab.com/schipp/spin_demonstration.git
git push -u origin --all
git push -u origin --tags
```

Summary

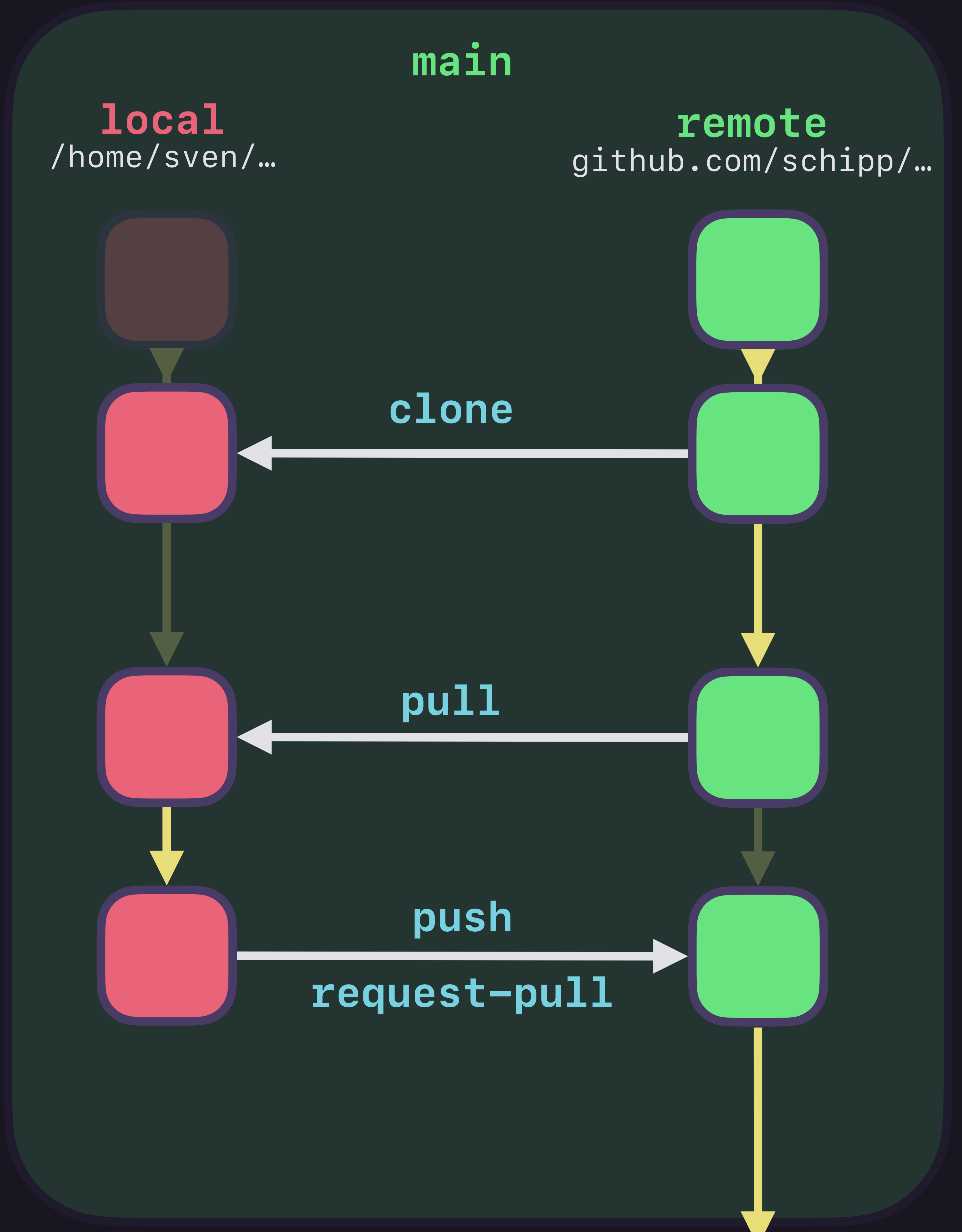
basics



branching



remote


main
local
/home/sven/…
remote
github.com/schipp/…
clone
pull
push
request-pull