Introduction to Git and GitHub

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Welcome!

- This presentation starts with some background and then uses a simple interactive example.
- It emphasizes core git operations. As a new user to git, you do not need to focus on everything that is possible with git.
- We will instead highlight library-specific examples of projects and advice not easily discoverable in other tutorials. (But we will still provide many resources at the end!)

What is version control?

- Any system that manages changes to files over time.
- Benefits of a version control system include:
  - Collaboration
  - Versioning

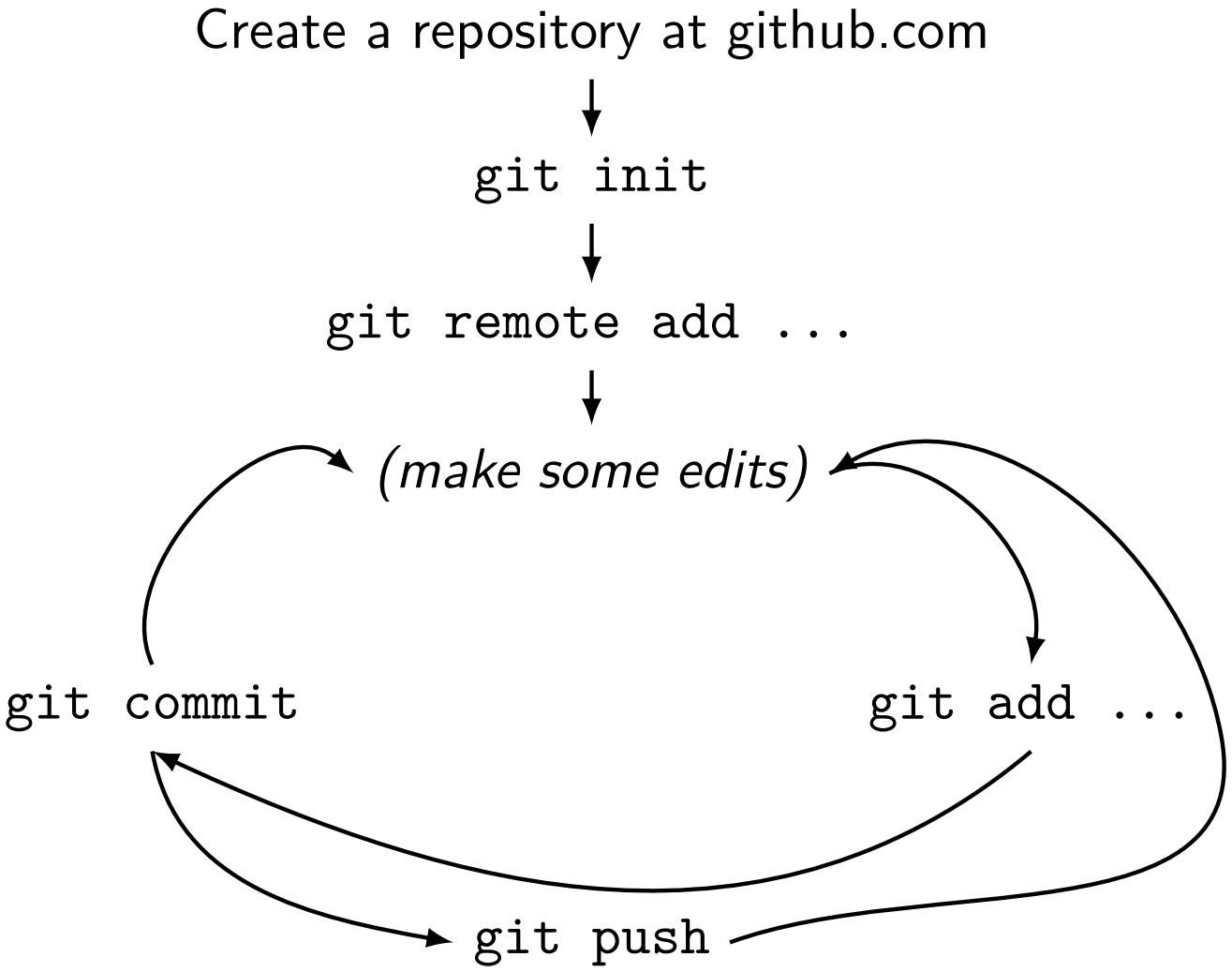
A short history of version control

- SCCS (Source Code Control System) (1972)
- RCS (Revision Control System) (1982)
- CVS (Concurrent Versions System) (1990)
- Subversion (2000)
- Git, Mercurial, Bazaar (2005)

What do librarians use git for?

- GitHub Pages – a free web server for simple static websites
  - Professional/portfolio websites
  - Miscellaneous websites for libraries (e.g., conferences, projects)
  - Prototypes/mockups
- Sharing documents or other assets (e.g., fonts, images)
- Sharing code
  - Python, R, etc. scripts
  - Drupal modules
  - Many other examples...

A very basic workflow



Some terminology

A **repository (repo)** refers to the set of files that make up your project.

- Local vs. remote

A **commit** is best thought of as a snapshot of your project at a point in time. As you work on your project, you will "snap" more commits. The ordered sequence of all these commits is called a **branch**. (A repository can have more than one branch, but today we will only be dealing with one branch, conventionally called *main*.)

Some terminology

In many ways, Git is like the version history of a Microsoft Word file or Google Doc. But what makes it a little more complicated is that projects typically consist of multiple files, and not all files need to be put together in the same commits. It is *your* job to tell Git which files are changing and when.

Working tree: What you are editing; the files you see in front of you.
Staging area: The files you mark as needing to be updated in the next commit. Files not on the stage are "carried over" from the previous commit.

A graphical representation

WORKING TREE

STAGE

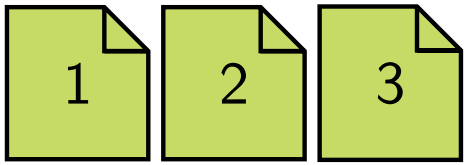
REPOSITORY

TERMINAL

STATUS

A graphical representation

WORKING TREE | STAGE | REPOSITORY



TERMINAL | STATUS

3 untracked files

A graphical representation

WORKING TREE | STAGE | REPOSITORY

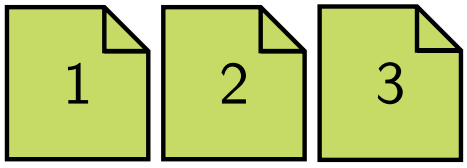
TERMINAL | STATUS

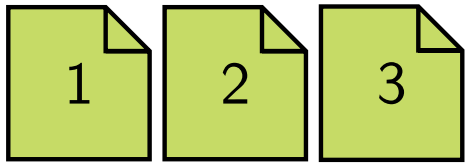
```
git add 1 2 3
```

3 untracked files

A graphical representation

WORKING TREE | STAGE | REPOSITORY



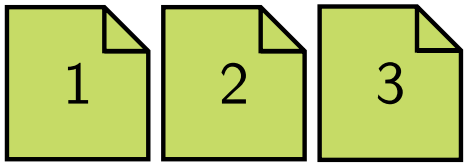


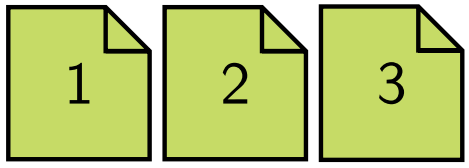
TERMINAL | STATUS

`git add 1 2 3` 3 untracked files; 3 staged files

A graphical representation

WORKING TREE | STAGE | REPOSITORY





TERMINAL | STATUS

`git commit` | 3 untracked files; 3 staged files

A graphical representation

WORKING TREE

STAGE

REPOSITORY

TERMINAL

STATUS

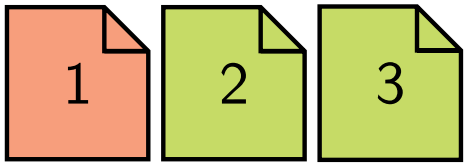
```
git commit
```

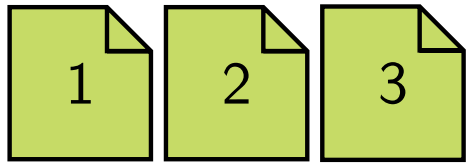
A graphical representation

WORKING TREE

STAGE

REPOSITORY





TERMINAL

STATUS

1 modified file

A graphical representation

WORKING TREE

STAGE

REPOSITORY

TERMINAL

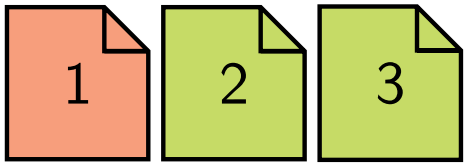
```
git add 1
```

STATUS

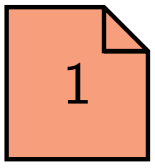
1 modified file

A graphical representation

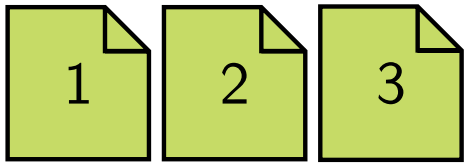
WORKING TREE



STAGE



REPOSITORY



TERMINAL

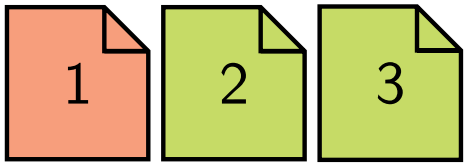
```
git add 1
```

STATUS

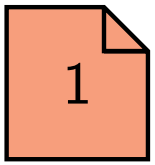
1 modified file; 1 staged file

A graphical representation

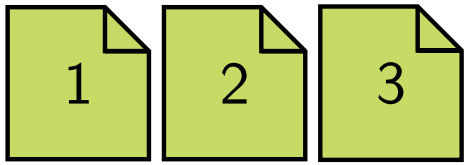
WORKING TREE



STAGE



REPOSITORY



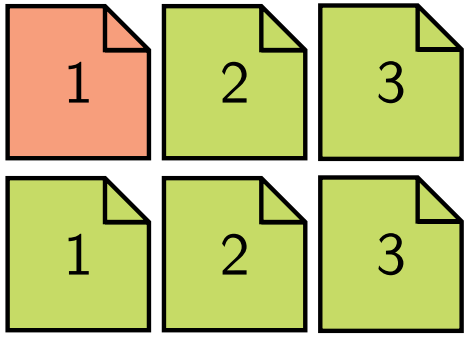
TERMINAL	STATUS
`git commit`	1 modified file; 1 staged file

A graphical representation

WORKING TREE

STAGE

REPOSITORY



TERMINAL

STATUS

```
git commit
```

A graphical representation

WORKING TREE | STAGE | REPOSITORY

TERMINAL | STATUS

```
git commit
```

A graphical representation

WORKING TREE STAGE REPOSITORY

TERMINAL STATUS

1 modified file

A graphical representation

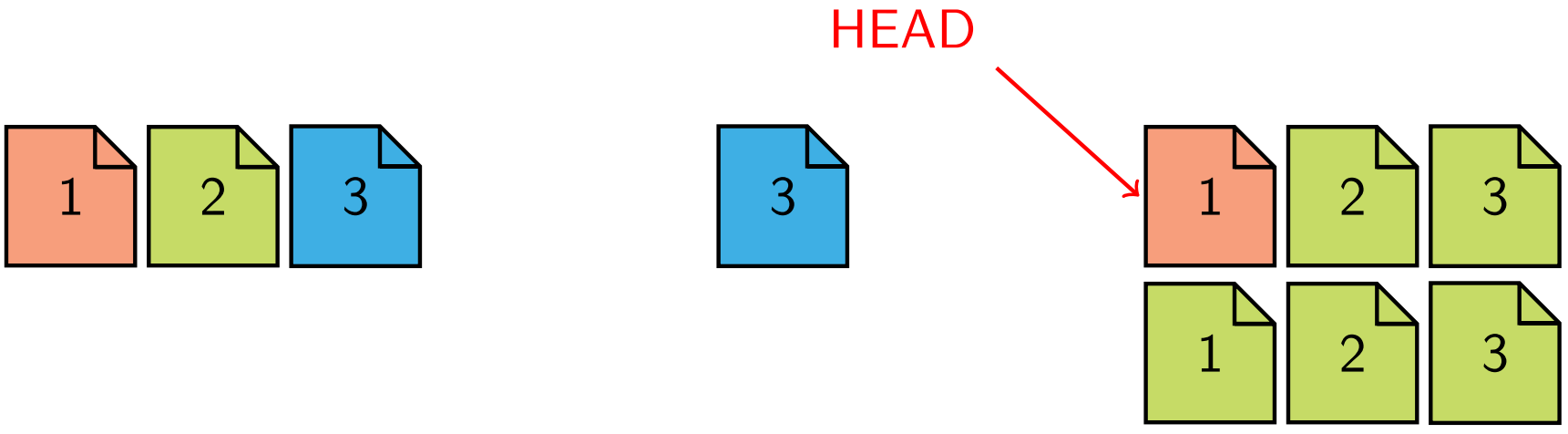
WORKING TREE | STAGE | REPOSITORY

TERMINAL | STATUS

`git add 3` | 1 modified file

A graphical representation

WORKING TREE | STAGE | REPOSITORY

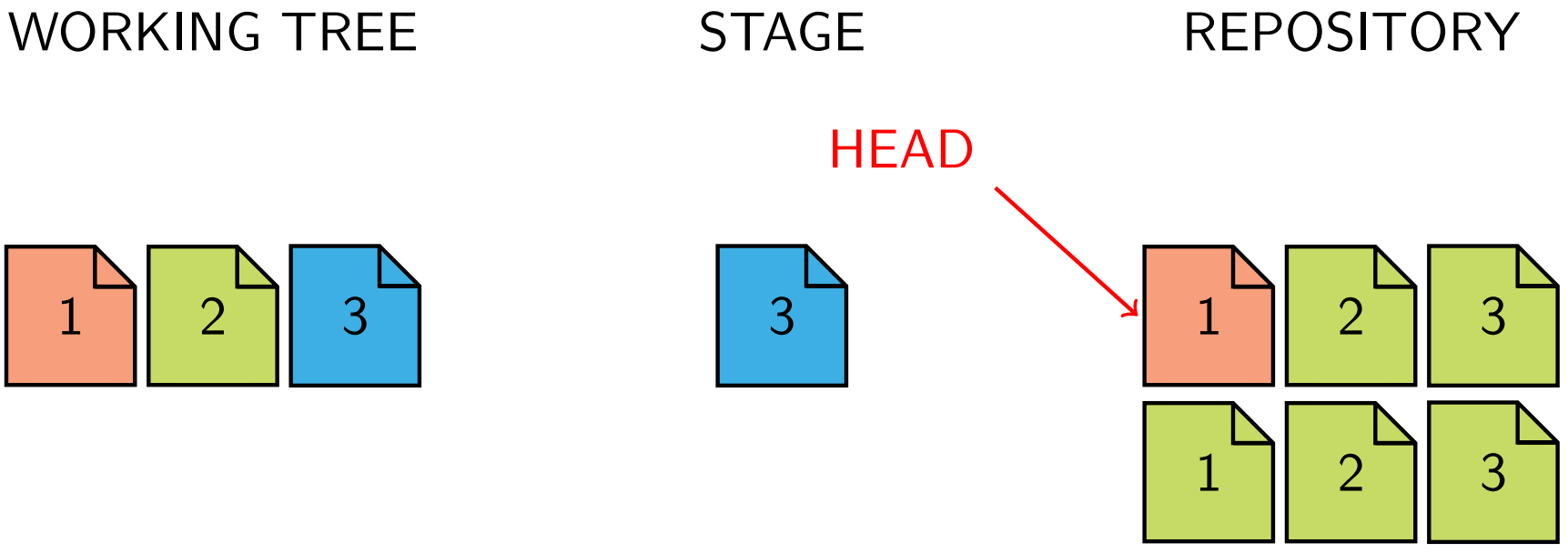


TERMINAL | STATUS

```
git add 3
```

1 modified file; 1 staged file

A graphical representation



TERMINAL	STATUS
`git commit`	1 modified file; 1 staged file

A graphical representation

WORKING TREE

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STATUS

```
git commit
```

Practice

Let's run through the example of a GitHub profile README.

Personal access token

New personal access token

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication.

Note

SG

What's this token for?

Expiration *

Custom... 2022-12-31

Select scopes

Scopes define the access for personal tokens. Read more about OAuth scopes.

repo	Full control of private repositories
repo:status	Access commit status
repo_deployment	Access deployment status
public_repo	Access public repositories
repo:invite	Access repository invitations
security_events	Read and write security events

Tips I learned the hard way

- Don't forget to configure your email address on your local machine to match your github.com email address
- Don't add too much
  - `git add --all --dry-run` is very useful!
  - Consider a .gitignore file
- Don't commit too much
  - Get in the habit of using **atomic commits**
- Frequently use `git status`, read the output and carefully think about it. Does it make sense? Doing this can prevent mistakes that you will later need to reverse.
- It is a good idea to follow best practices for the kind of project you are working on (i.e., follow Python best practices, follow Jekyll best practices, follow Drupal best practices, etc.)

Resources

Library Carpentry: Introduction to Git

git - the simple guide

git/github guide

Oh Shit, Git!?!