

Introduction to Git and GitHub

Nichole Wespe

NCCR Open Research Data Symposium

Basel | 02 June 2023

Agenda

- Slide presentation explaining Git and GitHub (20 min)
- Workshop setup: install Git, configure Git and GitHub access (10 min)
- Break (5 min)
- Workshop activities (30 min)

My goal for this workshop

- Each participant will understand enough about Git to decide if it is a tool that would benefit their work

What is Git?

Git is version control software.

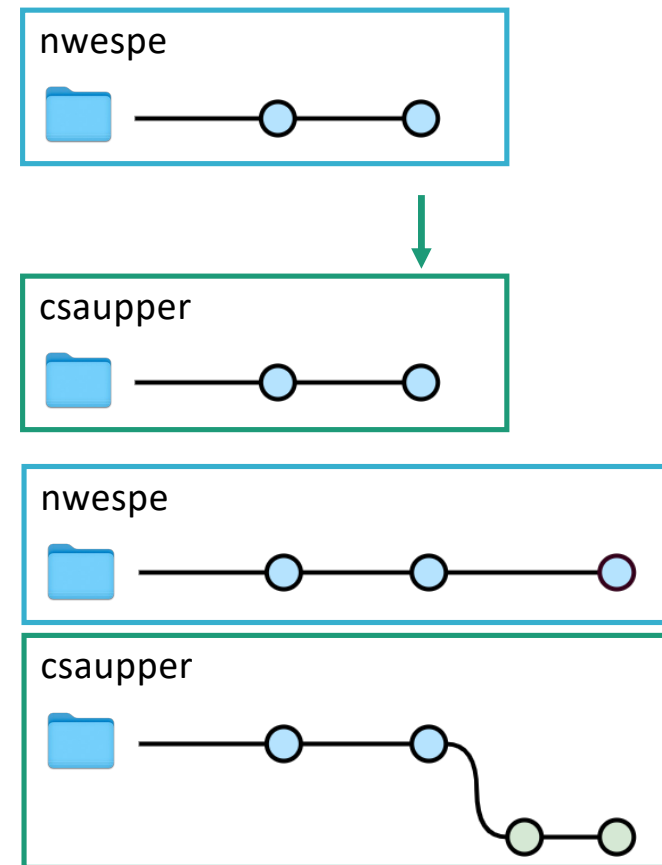
- It records a history of changes to a text document.
- A single tracked Git project is called a *repository* and this is set at the level of a directory, not a file*.
- You use Git to create “snapshots” over time of your repository. Each snapshot is called a *commit*.

It is a *distributed* versioning system.

- The full version history is contained in every copy of the repository across different machines.

It has a concept called *branches*.

- Branches are parallel versions of a repository.



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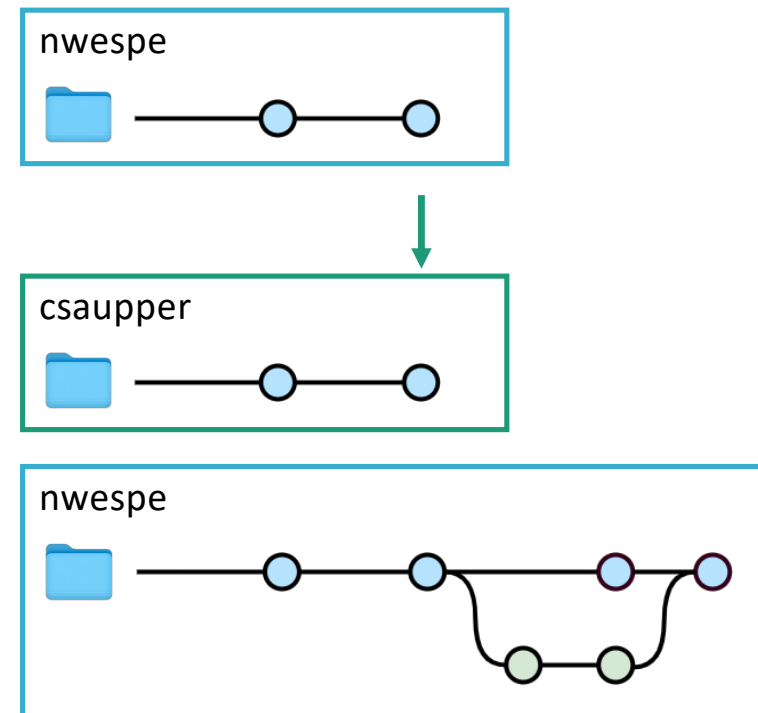
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











It has a concept called *branches*.

- Branches are parallel versions of a repository.
- Git enables you to combine changes made on different branches and to reconcile any conflicts.



What does Git version control look like?

git blame

Older  Newer		 Contributors 2	
last month	 add first recipe	1	# Classic Toll House recipe for chocolate chip cookies
		2	# Adapted from https://www.nestle.com/stories/timeless-discovery-toll-house-chocolate-chip-cookie-recipe
15 hours ago	 comments in cc recipe 	3	# Converted most volume measurements to weight in grams, converted bakingg temperature to Celsius
last month	 add first recipe	4	# author: Nichole Wespe
		5	Ingredients
		6	
2 weeks ago	 convert cookie recipe to metri... 	7	270 g white flour
last month	 add first recipe	8	1 teaspoon baking soda
		9	1 teaspoon salt
2 weeks ago	 convert cookie recipe to metri... 	10	215 g butter, softened
		11	150 g granulated sugar
		12	165 g brown sugar (I recommend Alnatura Vollrohrzucker)
last month	 add first recipe	13	1 teaspoon vanilla extract
		14	2 large eggs
2 weeks ago	 convert cookie recipe to metri... 	15	200-350 g semi-sweet chocolate chips or chopped chocolate pieces
last month	 add first recipe	16	Method
		17	
2 weeks ago	 convert cookie recipe to metri... 	18	1. Preheat oven to 180°C.
		19	2. Combine flour, baking soda and salt in small bowl.
		20	3. Beat butter, granulated sugar, brown sugar and vanilla extract in large mixer bowl until creamy.
		21	4. Add eggs, one at a time, beating well after each addition.
		22	5. Gradually beat in flour mixture until fully incorporated.
		23	6. Stir in chocolate chips.
		24	7. Drop by rounded tablespoon onto ungreased baking sheets.
		25	8. Bake for 9 to 11 minutes or until golden brown.
		26	9. Cool on baking sheets for 2 minutes; remove to wire racks to cool completely.

What does Git version control look like?

git diff

```
23 chocolate_chip_cookies.txt
@@ -3,18 +3,23 @@
3  # author: Nichole Wespe
4
5  Ingredients
6 - 2 1/4 cups all-purpose flour
7  1 teaspoon baking soda
8  1 teaspoon salt
9 - 1 cup (2 sticks) butter, softened
10 - 3/4 cup granulated sugar
11 - 3/4 cup packed brown sugar
12  1 teaspoon vanilla extract
13  2 large eggs
14 - 2 cups (12-oz. pkg.) Nestlé Toll House Semi-Sweet Chocolate Morsels
15 - 1 cup chopped nuts (optional)
16
17  Method
18 - 1. Preheat oven to 375°F.
19 - 2. Combine flour, baking soda and salt in small bowl. Beat butter,
    granulated sugar, brown sugar and vanilla extract in large mixer bowl
    until creamy. Add eggs, one at a time, beating well after each addition.
    Gradually beat in flour mixture. Stir in morsels and nuts. Drop by rounded
    tablespoon onto ungreased baking sheets.
20 - 3. Bake for 9 to 11 minutes or until golden brown. Cool on baking sheets
    for 2 minutes; remove to wire racks to cool completely.
3  # author: Nichole Wespe
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```

What is Git? Real Talk



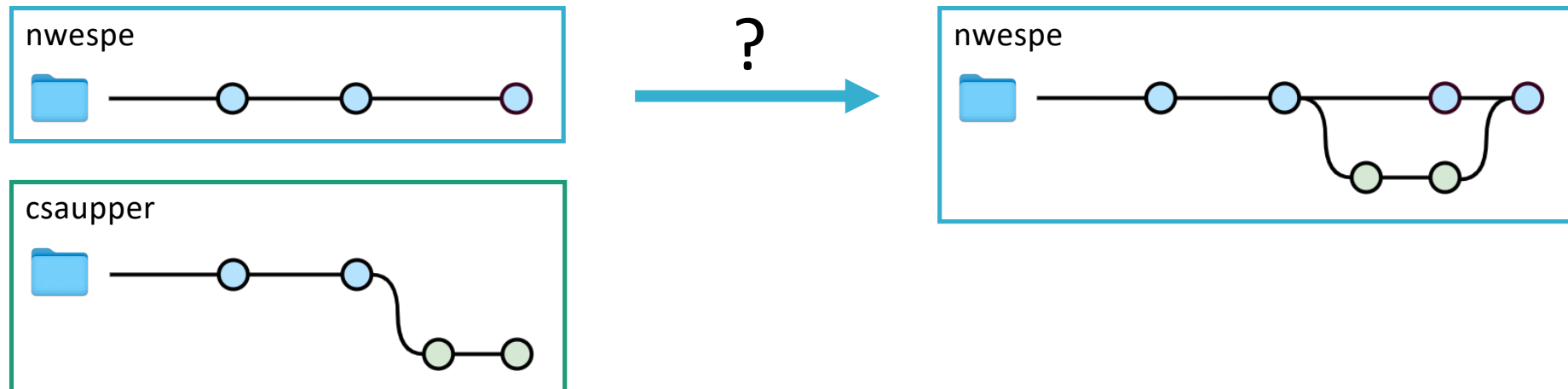
With great power comes a steep learning curve.

Git can be a major pain in the you-know-what.
Here is my advice:

- learn as you go
- focus on the workflows you need
- use online tutorials

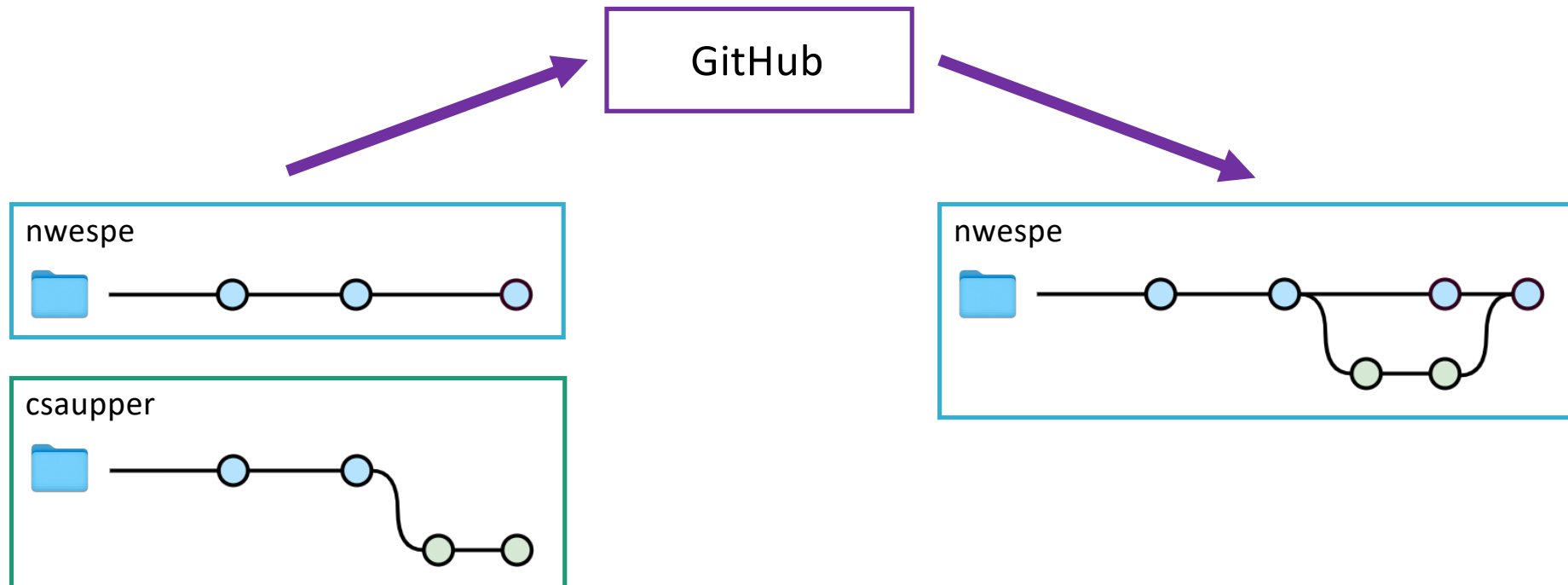
What is GitHub?

GitHub is a website that serves as a collection of Git repositories.



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What can I use Git for?

Text documents that have **multiple contributors** and/or **change over time**

- Code
- Manuscripts in progress (in private repo)
- Lab protocols

Why is it useful?

- Version control!
 - rolling back changes
 - reconciling conflicts
 - tracking provenance
- Protection around editing through managed collaboration
- Persistent documentation for changes

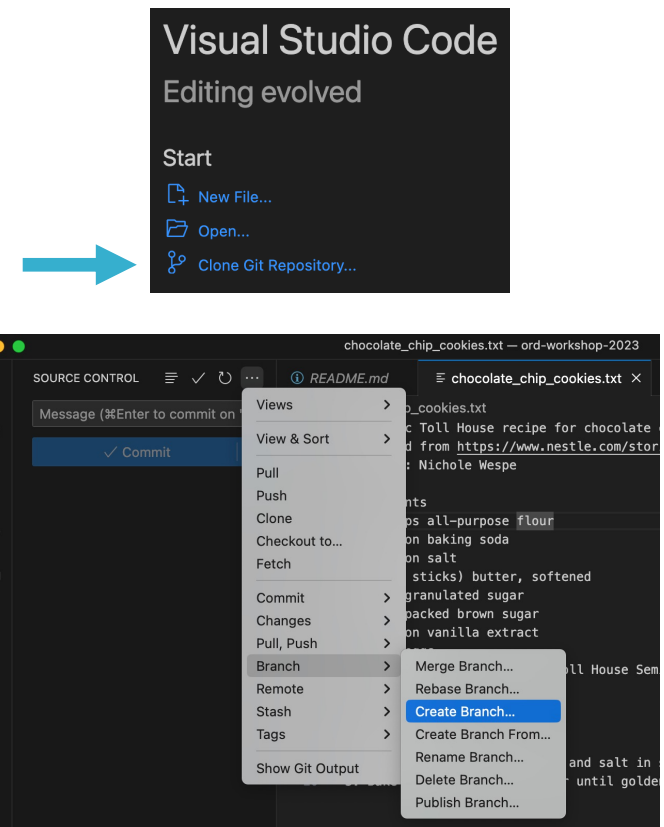
What should I NOT use Git and GitHub for?

- passwords or access codes
- large data files (>100 MB not allowed, warning for files >50 MB)
- not necessary for datasets that don't change over time
- not ideal for jupyter notebooks
- not considered a FAIR repository
 - does not assign “a globally unique and persistent identifier”

How do I use Git?

- Command-line interface (CLI) commands
<https://git-scm.com/docs>
- Many coding IDEs have Git integration
e.g., VSCode and PyCharm
- GitHub Desktop and other GUIs

Workshop materials are provided with step-by-step instructions for both CLI and GitHub Desktop



Common Workflows

Getting a repo to work in:

- clone an existing repo for collaboration or personal use
- create a new repo

Working in a repo:

1. create a new branch
2. make some changes (work work work)
3. stage and commit changes
4. merge changes into main branch
 - Option 1: merge branch into main locally
 - Option 2: push commit to remote repo and create pull request against remote main branch

	COMMENT	DATE
○	CREATED MAIN LOOP & TIMING CONTROL	14 HOURS AGO
○	ENABLED CONFIG FILE PARSING	9 HOURS AGO
○	MISC BUGFIXES	5 HOURS AGO
○	CODE ADDITIONS/EDITS	4 HOURS AGO
○	MORE CODE	4 HOURS AGO
○	HERE HAVE CODE	4 HOURS AGO
○	AAAAAAA	3 HOURS AGO
○	ADKFJSLKDFJSDKLFJ	3 HOURS AGO
○	MY HANDS ARE TYPING WORDS	2 HOURS AGO
○	HAAAAAAAANDS	2 HOURS AGO

AS A PROJECT DRAGS ON, MY GIT COMMIT MESSAGES GET LESS AND LESS INFORMATIVE.

Workshop Setup

1. Install Git
2. Create GitHub account
3. Configure Git

Workshop Activity: Recipes

Collaborate on an existing repo

1. clone the workshop repository: [nwespe/ord-workshop-2023](https://github.com/nwespe/ord-workshop-2023)
2. create a new branch named as your GitHub username
3. make changes: add your recipe file to the folder and add your name to the README.md file
4. stage and commit changes
5. push branch to remote repo (requires being added as a collaborator)
6. create pull request on GitHub
7. merge changes into main branch once PR is approved
8. resolve conflicts (if any)

Workshop Activity: Recipes

Fork an existing repo for personal development

- fork an existing repo (the now-populated recipes repo) to personal account

Workshop Activity: Recipes

Create a new repo

1. create a new git repo locally or through GitHub
2. if local: import to GitHub; if in GitHub: clone locally
3. practice branching, editing, committing and merging