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Welcome to the course website for Computer Systems and Programming Tools in Spring 2024 with Professor Brown.

This class meets TuTh 12:30-1:45 in Ranger 302 and lab on Monday 3-4:45 in Ranger 202.

This website will contain the syllabus, class notes, and other reference material for the class.

Navigating the Sections

The Syllabus section has logistical operations for the course broken down into sections. You can also read straight through by starting in the first one and navigating to the next section using the arrow navigation at the end of the page.

This site is a resource for the course. We do not follow a text book for this course, but all notes from class are posted in the notes section, accessible on the left hand side menu, visible on large screens and in the menu on mobile.

The resources section has links and short posts that provide more context and explanation. Content in this section is for the most part not strictly the material that you'll be graded on, but it is often material that will help you understand and grow as a programmer and data scientist.

Reading each page

Some pages of the syllabus and resources are also notebooks, if you want to see behind the curtain of how I manage the course information.

```
# this is a comment in a clode block
command argument --option -a
```

```
command output
important line, emphasized
```

Try it Yourself

Notes will have exercises marked like this

Question from Class

Questions that are asked in class, but unanswered at that time will be answered in the notes and marked with a box like this. Long answers will be in the main notes

Further reading

Notes that are mostly links to background and context will be highlighted like this. These are optional, but will mostly help you understand code excerpts they relate to.

Hint

Both notes and assignment pages will have hints from time to time. Pay attention to these on the notes, they'll typically relate to things that will appear in the assignment.

Click here!

Special tips will be formatted like this

Check your Comprehension

Questions to use to check your comprehension will looklike this

Contribute

Chances to earn community badges will sometimes be marked like this

Computer Systems and Programming Tools

About this course

In this course we will study the tools that we use as programmers and use them as a lens to study the computer system itself. We will begin with two fundamental tools: version control and the shell. We will focus on git and bash as popular examples of each. Sometimes understanding the tools requires understanding an aspect of the system, for example git uses cryptographic hashing which requires understanding number systems. Other times the tools helps us see how parts work: the shell is our interface to the operating system.

About this syllabus

This syllabus is a *living* document. You can get notification of changes from GitHub by “watching” the repository You can view the date of changes and exactly what changes were made on the Github repositorypage.

Creating an issue is also a good way to ask questions about anything in the course it will prompt additions and expand the FAQ section.

> **Should you download the syllabus and rely on your offline copy?**
>
> No, because the syllabus changes

About your instructor

Name: Dr. Sarah M Brown Office hours: listed on communication page

Dr. Sarah M Brown is a third year Assistant Professor of Computer Science, who does research on how social context changes machine learning. Dr. Brown earned a PhD in Electrical Engineering from Northeastern University, completed a postdoctoral fellowship at University of California Berkeley, and worked as a postdoctoral research associate at Brown University before joining URI. At Brown University, Dr. Brown taught the Data and Society course for the Master’s in Data Science Program. You can learn more about me at my website or my research on my lab site.

You can call me Professor Brown or Dr. Brown, I use she/her pronouns.

The best way to contact me is e-mail or an issue on an assignment repo. For more details, see the Communication Section

Land Acknowledgement

> **Important**
>
> The University of Rhode Island land acknowledgment is a statement written by members of the University community in close partnership with members of the Narragansett Tribe. For more information see the university land acknowledgement page

The University of Rhode Island occupies the traditional stomping ground of the Narragansett Nation and the Niantic People. We honor and respect the enduring and continuing relationship between the Indigenous people and this land by teaching and learning more about their history and present-day communities, and by becoming stewards of the land we, too, inhabit.

Tools and Resources

We will use a variety of tools to conduct class and to facilitate your programming. You will need a computer with Linux, MacOS, or Windows. It is unlikely that a tablet will be able to do all of the things required in this course. A Chromebook may work, especially with developer tools turned on. Ask Dr. Brown if you need help getting access to an adequate computer.

All of the tools and resources below are either:

- paid for by URI **OR**
- freely available online.

BrightSpace

On BrightSpace, you will find links to other resource, this site and others. Any links that are for private discussion among those enrolled in the course will be available only from Brightspace.

Prismia chat

Our class link for Prismia chat is available on Brightspace. Once you've joined once, you can use the link above or type the url: prismia.chat. We will use this for chatting and in-class understanding checks.

On Prismia, all students see the instructor's messages, but only the Instructor and TA see student responses.

> **Important**
>
> Prismia is **only** for use during class, we do not read messages there outside of class time

You can get a transcript from class from Prismia.chat using the menu in the top right.

Course Website

The course website will have content including the class policies, scheduling, class notes, assignment information, and additional resources.

Links to the course reference text and code documentation will also be included here in the assignments and class notes.

GitHub

You will need a GitHub Account. If you do not already have one, please create one by the first day of class. If you have one, but have not used it recently, you may need to update your password and login credentials as the Authentication rules changed in Summer 2021.

You will also need the gh CLI. It will help with authentication and allow you to work with other parts of GitHub besides the core git operations.

> **Important**
>
> You need to install this on Mac

Programming Environment

In this course, we will use several programming environments. In order to participate in class and complete assignments you need the items listed in the requirements list. The easiest way to meet these requirements is to follow the recommendations below. I will provide instruction assuming that you have followed the recommendations. We will add tools throughout the semester, but the following will be enough to get started.

> **Warning**
>
> This is not technically a *programming* class, so you will not need to know how to write code from scratch in specific languages, but we will rely on programming environments to apply concepts.

Requirements:

- Python with scientific computing packages (numpy, scipy, jupyter, pandas, seaborn, sklearn)
- a C compiler
- Git
- access to a bash shell
- A high compatibility web browser (Safari will sometimes fail; Google Chrome and Microsoft Edge will; Firefox probably will)
- nano text editor (comes with GitBash and default on MacOS)
- one IDE with git support (default or via extension)
- the GitHub CLI on all OSs

Recommendation

Windows- option A | **Windows - option B** | **MacOS** | **Linux** | **Chrome OS**

- If you will not do any side projects, install python via Anaconda video install
- Otherwise, use the base python installer and then install libraries with pip
- Git and Bash with GitBash (video instructions).

Zoom

(backup only & office hours only)

This is where we will meet if for any reason we cannot be in person. You will find the link to class zoom sessions on Brightspace.

URI provides all faculty, staff, and students with a paid Zoom account. It *can* run in your browser or on a mobile device, but you will be able to participate in office hours and any online class sessions if needed best if you download the Zoom client on your computer. Please log in and configure your account. Please add a photo (can be yourself or something you like) to your account so that we can still see your likeness in some form when your camera is off. You may also wish to use a virtual background and you are welcome to do so.

For help, you can access the instructions provided by IT.

Grading

This section of the syllabus describes the principles and mechanics of the grading for the course. The course is designed around your learning so the grading is based on you demonstrating how much you have learned.

Additionally, since we will be studying programming tools, we will use them to administer the course. To give you a chance to get used to the tools there will be a grade free zone for the first few weeks.

Each section be viewed at two levels of detail. You can toggle the tabs and then the whole page will be at the level of your choice as you scroll.

TL;DR **Full Detail**

this will be short explanations; key points you should **remember**

Learning Outcomes

TL;DR **Full Detail**

The goal is for you to learn and the grading is designed to as close as possible actually align to how much you have learned.

You should be a more independent and efficient developer and better collaborator on code projects by the end of the semester.

Principles of Grading

TL;DR **Full Detail**

- Learning happens with practice and feedback
- I value **learning** not perfect performance or productivity
- a C means you can follow a conversation about the material, but might need help to apply it
- a B means you can *also* apply it in basic scenarios or if the problem is broken down
- an A means you can *also* apply it in complex scenarios independently

please do not make me give you less than a C, but a D means you showed up basically, but you may or may not have actually retained much

The course is designed to focus on **success** and accumulating knowledge, not taking away points.

If you made an error in an assignment what do you need to do?

Read the suggestions and revise the work until it is correct.

Penalty-free Zone

TL;DR | **Full Detail**

We will use developer tools to do everything in this class; in the long term this will benefit you, but it makes the first few weeks hard, so **mistakes in the first few weeks cannot hurt your grade** as long as you learn eventually.

Deadlines are *extra flexible* for 3 weeks while you figure things out.

What happens if you merged a PR without feedback?

During the Penalty-Free zone, we will help you figure that out and fix it so you get credit for it. After that, you have to fix it on your own (or in office hours) in order to get credit.

Important

If there are terms in the rest of this section that do not make sense while we are in the penalty-free zone, do not panic. This zone exists to help you get familiar with the terms needed.

What happens if you're confused by the grading scheme right now?

Nothing to worry about, we will review it again in week three after you get a chance to build the right habits and learn vocabulary. There will also be a lab activity that helps us to be sure that you understand it at that time.

Learning Badges

TL;DR | **Full Detail**

Different badges are different levels of complexity and map into different grades.

- experience: like attendance
- lab: show up & try
- review: understand what was covered in class
- practice: apply what was covered in class
- explore: get a mid-level understanding of a topic of your choice
- build: get a deep understanding of a topic of your choice

To pass:

- 22 experience badges
- 13 lab check outs

Add 18 review for a C or 18 practice for a B.

For an A you can choose:

- 18 review + 3 build
- 18 pracitce + 6 explore

you can mix & match, but the above plans are the simplest way there

Warning

These counts assume that the semester goes as planned and that there are 26 available badges of each base type (experience, review, practice). If the number of available badges decreases by more than 2 for any reason (eg snowdays, instructor illness, etc) the threshold for experience badges will be decreased.

All of these badges will be tracked through PRs in your kwl repo. Each PR must have a title that includes the badge type and associated date. We will use scripts over these to track your progress.

Important

There will be 20 review and practice badges available after the penalty free zone. This means that missing the review and practice badges in the penalty free zone cannot hurt you. However, it does not mean it is a good idea to not attempt them, not attempting them at all will make future badges harder, because reviewing early ideas are important for later ideas.

You cannot earn both practice and review badges for the same class session, but most practice badge requirements will include the review requirements plus some extra steps.

In the second half of the semester, there will be special *integrative* badge opportunities that have multipliers attached to them. These badges will count for more than one. For example an integrative 2x review badge counts as two review badges. These badges will be more complex than regular badges and therefore count more.

Can you do any combination of badges?

No, you cannot earn practice and review for the same date.

Experience Badges

In class

You earn an experience badge in class by:

- preparing for class
- following along with the activity (creating files, using git, etc)
- responding to 80% of inclass questions (even incorrect, `\idk`, `\dgt`)
- reflecting on what you learned
- asking a question at the end of class

Makeup

You can make up an experience badge by:

- preparing for class
- reading the posted notes
- completing the activity from the notes
- completeing an “experience report”
- attaching evidence as indiated in notes OR attending office hours to show the evidence

> **Tip**
>
> On prismia questions, I will generally give a “Last chance to get an answer in” warning before I resume instruction. If you do not respond at all too many times, we will ask you to follow the makeup procedure instead of the In Class proccedure for your experience badge.
>
> To be sure that your response rate is good, if you are paying attention, but do not have an answer you can use one of the following special commands in prismia:
>
> - `\idk`: “I am paying attention, but do not know how to answer this”
> - `\dgt`: “I am paying attention, not really confused, but ran out of time trying to figure out the answer”
>
> you can send these as plain text by pressing `enter` (not Mac) or `return` (on Mac) to send right away or have them render to emoji by pressing `tab`

An experience report is evidence you have completed the activity and reflection questions. The exact form will vary per class, if you are unsure, reach out ASAP to get instructions. These are evaluated only for completeness/ good faith effort. Revisions will generally not be required, but clarification and additional activity steps may be advised if your evidence suggests you may have missed a step.

Do you earn badges for prepare for class?

No, prepare for class tasks are folded into your experience badges.

What do you do when you miss class?

Read the notes, follow along, and produce and experience report or attend office hours.

What if I have no questions?

Learning to ask questions is important. Your questions can be clarifying (eg because you misunderstood something) or show that you understand what we covered well enough to think of hypothetical scenarios or options or what might come next. Basically, focused curiosity.

Lab Checkouts

You earn credit for lab by attending and completing core tasks as defined in a lab issue posted to your repo each week. Work that needs to be correct through revisions will be left to a review or practice badge.

You will have to have a short meeting with a TA or intructor to get credit for each lab. In the lab instructions there will be a checklist that the TA or instructor will use to confirm you are on track. In these conversations, we will make sure that you know how to do key procedural tasks so that you are set up to continue working independently.

To make up a lab, complete the tasks from the lab issue on your own and attend office hours to complete the checkout.

Review and Practice Badges

The tasks for these badges will be defined at the bottom of the notes for each class session *and* aggregated to badge-type specific pages on the left hand side fo the course website.

You can earn review and practice badges by:

- creating an issue for the badge you plan to work on
- completing the tasks
- submitting files to your KWL on a new branch
- creating a PR, linking the issue, and requesting a review
- revising the PR until it is approved
- merging the PR after it is approved

Where do you find assignments?

At the end of notes and on the separate pages in the activities section on the left hand side

You should create one PR per badge

The key difference between review and practice is the depth of the activity. Work submitted for review and practice badges will be assessed for correctness and completeness. Revisions will be common for these activities, because understanding correctly, without misconceptions, is important.

Important

Revisions are to help you improve your work **and** to get used to the process of making revisions. Even excellent work can be improved. The **process** of making revisions and taking good work to excellent or excellent to exceptional is a useful learning outcome. It will help you later to be really good at working through PR revisions; we will use the same process as code reviews in industry, even though most of it will not be code alone.

Explore Badges

Explore badges require you to pose a question of your own that extends the topic. For inspiration, see the practice tasks and the questions after class.

Details and more ideas are on the explore page.

You can earn an explore badge by:

- creating an issue proposing your idea (consider this ~15 min of work or less)
- adjusting your idea until given the proceed label
- completing your exploration
- submitting it as a PR
- making any requested changes
- merging the PR after approval

For these, ideas will almost always be approved, the proposal is to make sure you have the right scope (not too big or too small). Work submitted for explore badges will be assessed for depth beyond practice badges and correctness. Revisions will be more common on the first few as you get used to them, but typically decraese as you learn what to expect.

> **Important**
>
> Revisions are to help you improve your work **and** to get used to the process of making revisions. Even excellent work can be improved. The **process** of making revisions and taking good work to excellent or excellent to exceptional is a useful learning outcome. It will help you later to be really good at working through PR revisions; we will use the same process as code reviews in industry, even though most of it will not be code alone.

You should create one PR per badge

Build Badges

Build badges are for when you have an idea of something you want to do. There are also some ideas on the build page.

You can earn a build badge by:

- creating an issue proposing your idea and iterating until it is given the “proceed” label
- providing updates on your progress
- completing the build
- submitting a summary report as a PR linked to your proposal issue
- making any requested changes
- merging the PR after approval

You should create one PR per badge

For builds, since they’re bigger, you will propose intermediate milestones. Advice for improving your work will be provided at the milestones and revisions of the compelte build are uncommon. If you do not submit work for intermediate review, you may need to revise the complete build. The build proposal will assessed for relevance to the course and depth. The work will be assessed for completeness in comparison to the propsal and correctness. The summary report will be assessed only for completeness, revisions will only be requested for skipped or incomplete sections.

Community Badges

TL;DR | Full Detail

These are like extra credit, they have very limited ability to make up for missed work, but can boost your grade if you are on track for a C or B.

🎁 Free corrections

TL;DR | Full Detail

If you get a 🎁 apply the changes to get credit.

Important

These free corrections are used at the instructional team's discretion and are not guaranteed.

This means that, for example, the first time you make a particular mistake, might get a 🎁, but the second time you will probably get a hint, and a third or fourth time might be a regular revision with a comment like `see #XX and fix accordingly` where XX is a link to a previous badge.

IDEA

If the course response rate on the IDEA survey is about 75%, 🎁 will be applicable to final grading. **this includes the requirement of the student to reply**

Ungrading Option

TL;DR | Full Detail

You should try to follow the grading above; but sometimes weird things happen. I care that you learn.

If you can show you learned in some other way besides earning the badges above you may be able to get a higher grade than your badges otherwise indicate.

What do you think?

share your thoughts on this option in the discussions for the class and then log it for a community badge!

Badge Deadlines and Procedures

This page includes more visual versions of the information on the grading page. You should read both, but this one is often more helpful, because some of the processes take a lot of words to explain and make more sense with a diagram for a lot of people.

▶ Show code cell source

```
/tmp/ipykernel_2114/3787553076.py:90: FutureWarning: ChainedAssignmentError: behaviour will change in par
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['experience'][badge_target_df['date'] <= today] = 'eligible'
/tmp/ipykernel_2114/3787553076.py:92: FutureWarning: ChainedAssignmentError: behaviour will change in par
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

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See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['review_target'][badge_target_df['date'] <= today] = 'active'
/tmp/ipykernel_2114/3787553076.py:93: FutureWarning: ChainedAssignmentError: behaviour will change in par
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

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See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice_target'][badge_target_df['date'] <= today] = 'active'
/tmp/ipykernel_2114/3787553076.py:94: FutureWarning: ChainedAssignmentError: behaviour will change in par
You are setting values through chained assignment. Currently this works in certain cases, but when using
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  badge_target_df['review_target'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:96: FutureWarning: ChainedAssignmentError: behaviour will change in par
You are setting values through chained assignment. Currently this works in certain cases, but when using
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df["col"][row_indexer] = value

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See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice_target'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:98: FutureWarning: ChainedAssignmentError: behaviour will change in par
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['review_target'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:100: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:
```

```
df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice_target'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:103: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['review'][badge_target_df['date'] <= today] = 'active'
/tmp/ipykernel_2114/3787553076.py:104: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice'][badge_target_df['date'] <= today] = 'active'
/tmp/ipykernel_2114/3787553076.py:105: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['review'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:107: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
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df["col"][row_indexer] = value

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See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:109: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
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See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['review'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:111: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
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```

```
See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:113: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

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Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['review'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:115: FutureWarning: ChainedAssignmentError: behaviour will change in pa
You are setting values through chained assignment. Currently this works in certain cases, but when using
A typical example is when you are setting values in a column of a DataFrame, like:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a single step and ensure

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.ht

  badge_target_df['practice'][badge_target_df['date']
/tmp/ipykernel_2114/3787553076.py:120: FutureWarning: Downcasting behavior in `replace` is deprecated and
  badge_target_df_hm = badge_target_df.replace(status_numbers_hm).set_index('date')
```
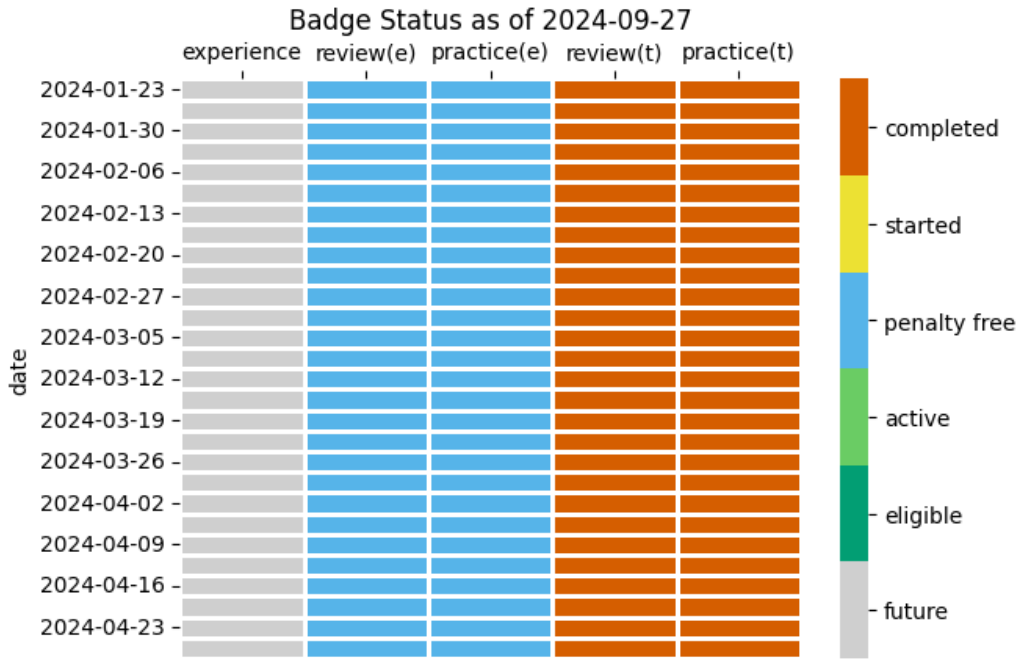

```
Text(0.5, 1.0, 'Badge Status as of 2024-09-27')
```



November 5 above will actually be on November 6

Deadlines

We do not have a final exam, but URI assigns an exam time for every class. The date of that assigned exam will be the final due date for all work including all revisions.

Experience badges

Prepare for class tasks must be done before class so that you are prepared. Missing a prepare task could require you to do an experience report to make up what you were not able to do in class.

If you miss class, the experience report should be at least attempted/drafted (though you may not get feedback/confirmation) before the next class that you attend. This is strict, not as punishment, but to ensure that you are able to participate in the next class that you attend. Skipping the experience report for a missed class, may result in needing to do an experience report for the next class you attend to make up what you were not able to complete due to the missing class activities.

If you miss multiple classes, create a catch-up plan to get back on track by contacting Dr. Brown.

Review and Practice Badges

These badges have 5 stages:

- posted: tasks are on the course website
- planned: an issue is created
- started: one task is attempted and a draft PR is open
- completed: all tasks are attempted PR is ready for review, and a review is requested
- earned: PR is approved (by instructor or a TA) and work is merged

> **Tip**
>
> these badges *should* be started before the next class. This will set you up to make the most out of each class session. However, only prepare for class tasks have to be done immediately.

These badges badges must be *started* within one week of when the are posted (2pm) and *completed* within two weeks. A task is attempted when you have answered the questions or submitted evidence of doing an activity or asked a sincere clarifying question.

If a badge is planned, but not started within one week it will become expired and ineligble to be earned. You may request extensions to complete a badge by updating the PR message, these will typically be granted. Extensions for starting badges will only be granted in exceptional circumstances.

Expired badges will receive a comment and be closed

Once you have a good-faith attempt at a complete badge, you have until the end of the semester to finish the revisions in order to *earn* the badge.

> **Tip**
>
> Try to complete revisions quickly, it will be easier for you

Explore Badges

Explore badges have 5 stages:

- proposed: issue created
- in progress: issue is labeled “proceed” by the instructor
- complete: work is complete, PR created, review requested
- revision: “request changes” review was given
- earned: PR approved

Explore badges are feedback-limited. You will not get feedback on subsequent explore badge proposals until you earn the first one. Once you have one earned, then you can have up to two in progress and two in revision at any given time. At most, you will receive feedback for one explore badge per week, so in order to earn six, your first one must be complete by March 18.

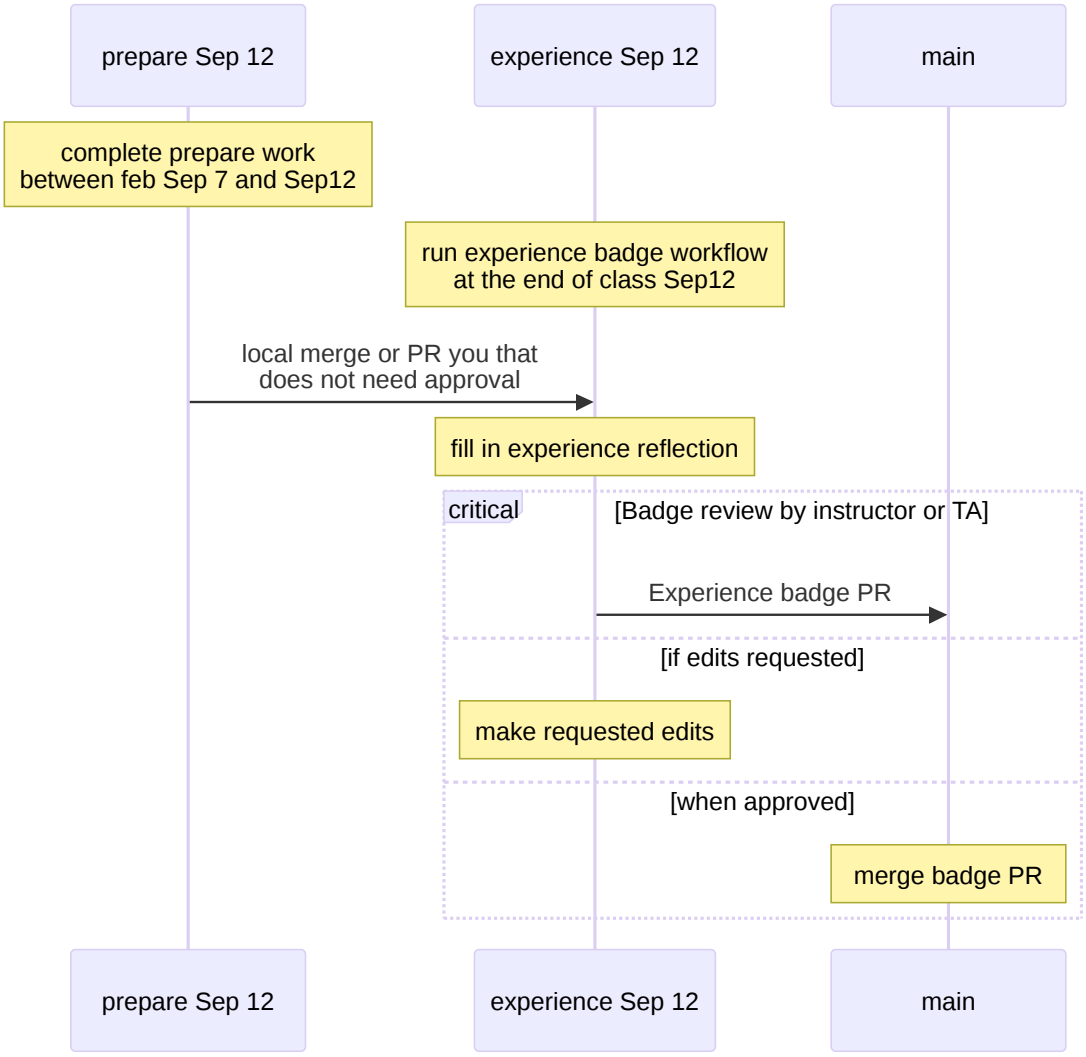
Build Badges

At most one build badge will be evaluated every 4 weeks. This means that if you want to earn 3 build badges, the first one must be in 8 weeks before the end of the semester, March 4. The second would be due April 1st, and the third submitted by the end of classes, April 29th.

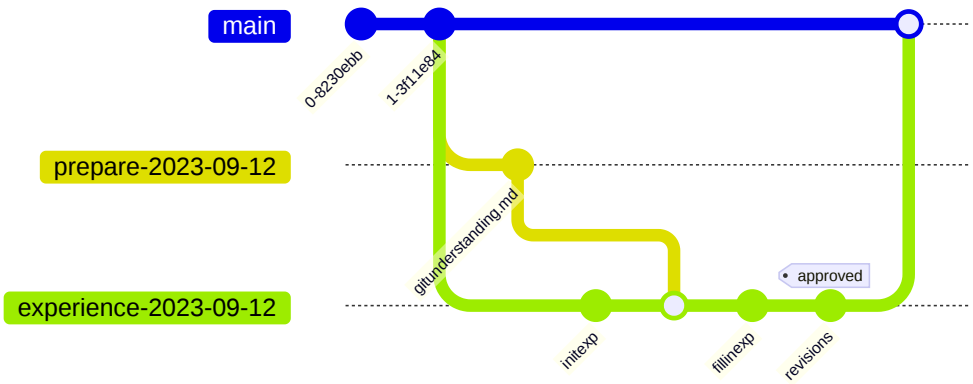
Prepare work and Experience Badges Process

This is for a single example with specific dates, but it is similar for all future dates

The columns (and purple boxes) correspond to branches in your KWL repo and the yellow boxes are the things that you have to do. The “critical” box is what you have to wait for us on. The arrows represent PRs (or a local merge for the first one)



In the end the commit sequence for this will look like the following:

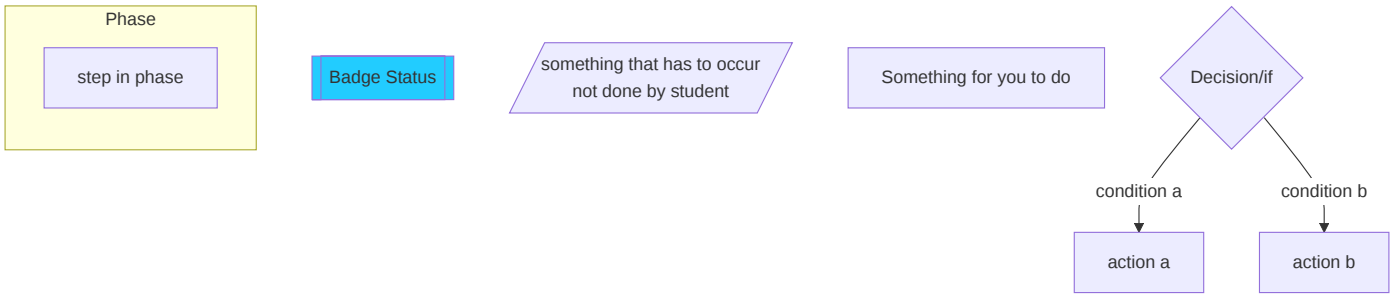


You can merge the prepare into the experience with a PR or on the command line, your choice.

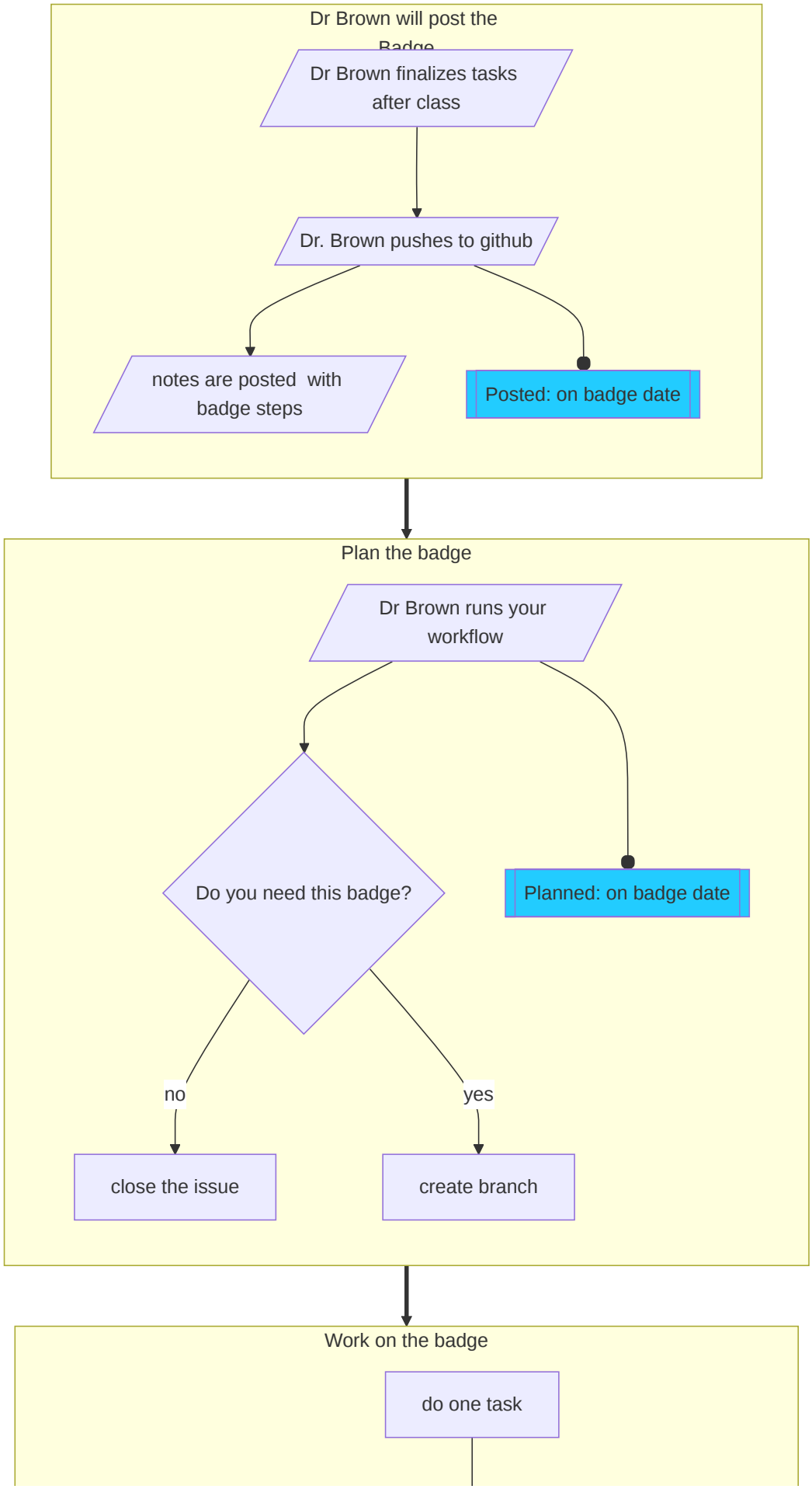
Where the “approved” tag represents and approving reivew on the PR.

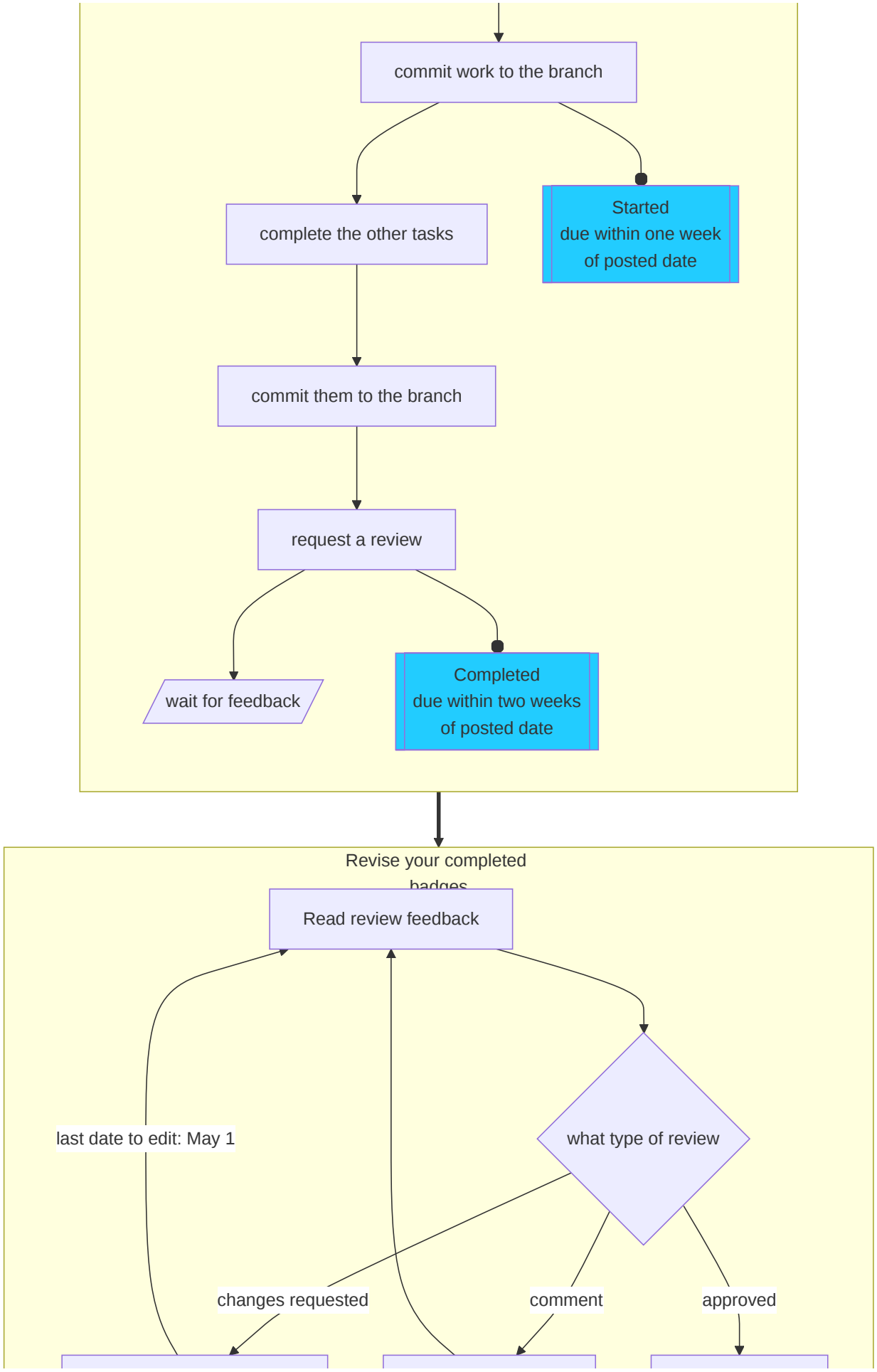
Review and Practice Badge

Legend:



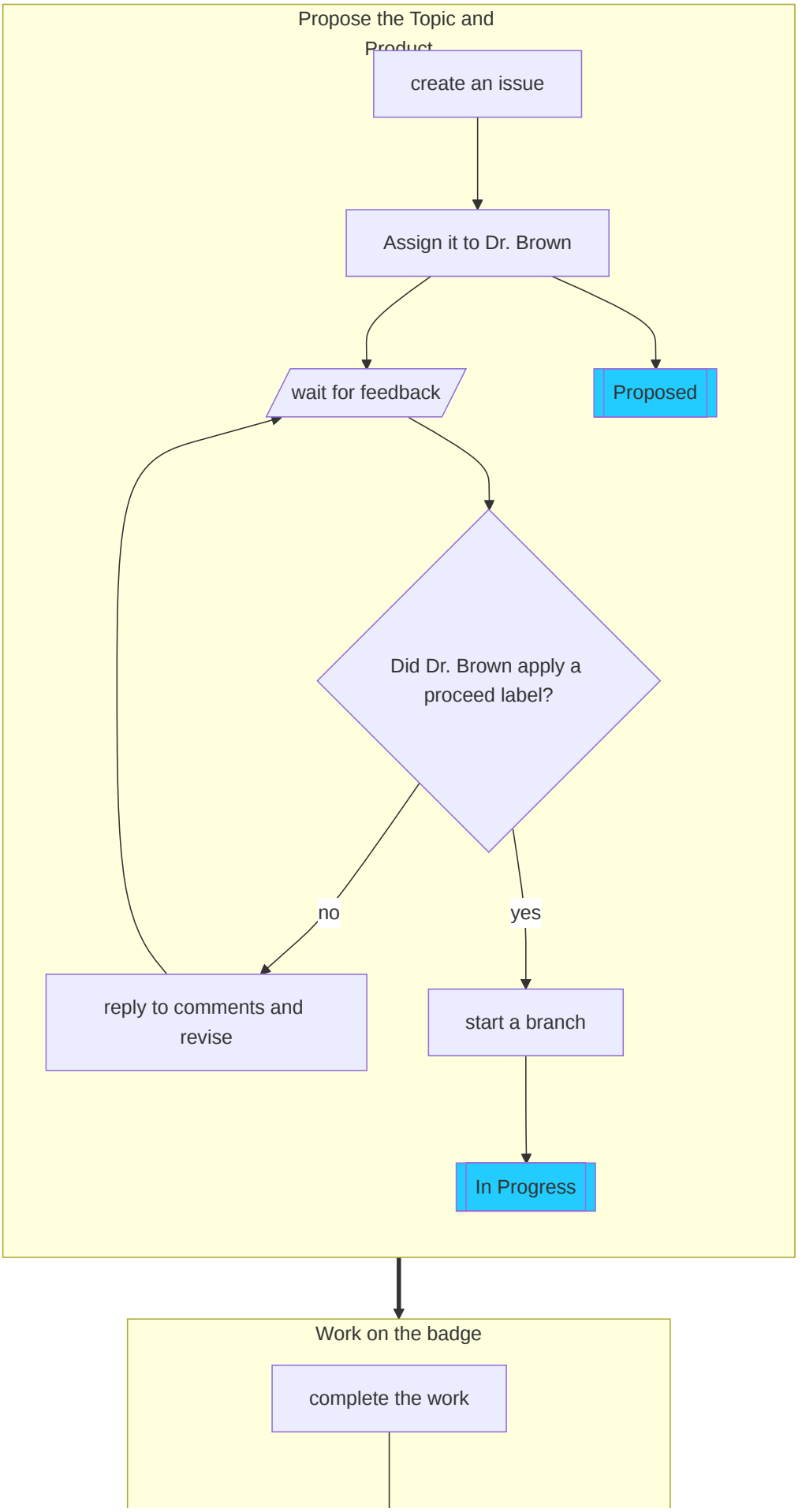
This is the general process for review and practice badges

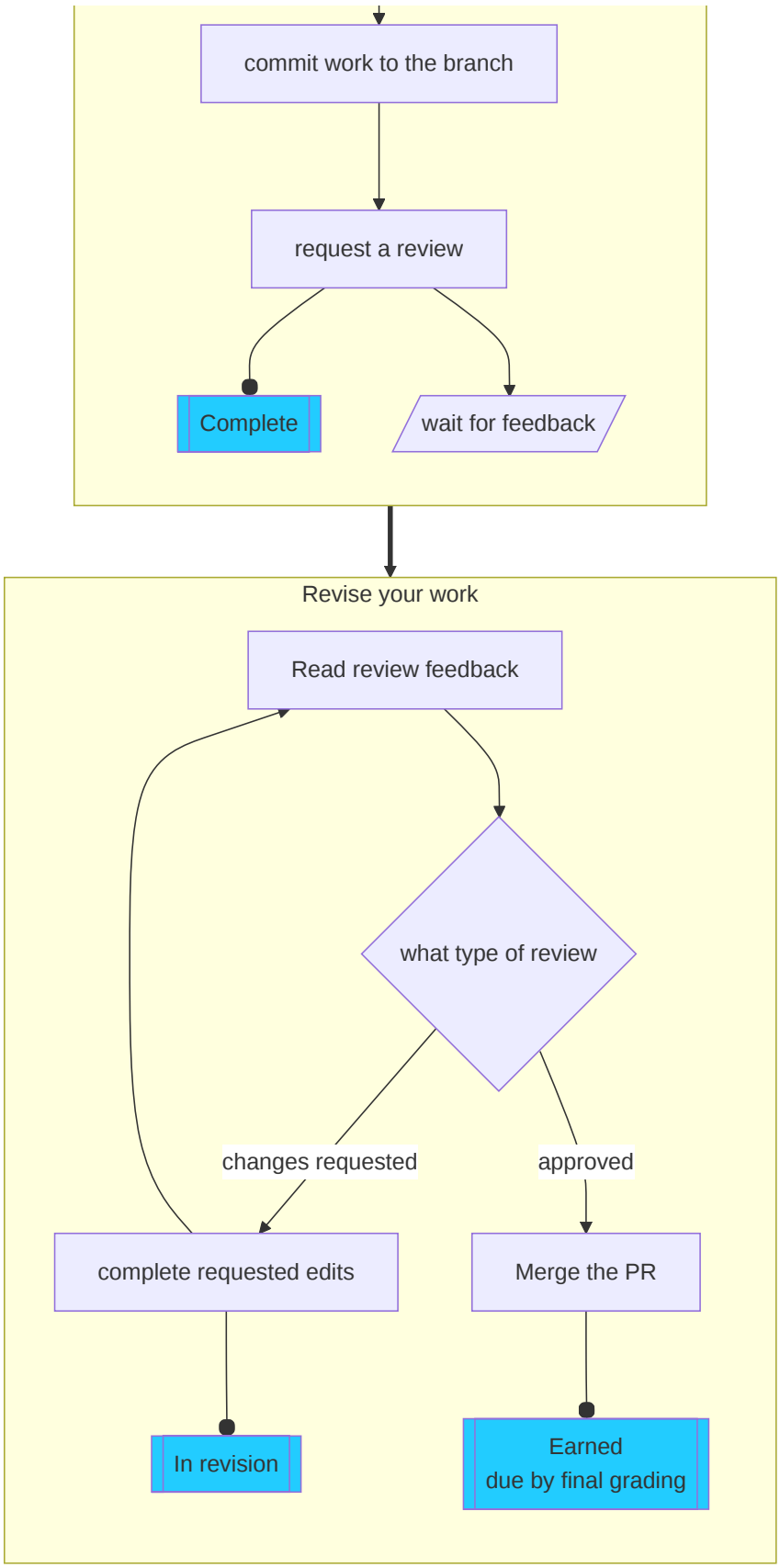

Dr Brown will post the
Dr Brown finalizes tasks after class
Dr. Brown pushes to github
notes are posted with badge steps
Posted: on badge date
Plan the badge
Dr Brown runs your workflow
Do you need this badge?
Planned: on badge date
no
yes
close the issue
create branch
Work on the badge
do one task


commit work to the branch
complete the other tasks
Started
due within one week
of posted date
commit them to the branch
request a review
wait for feedback
Completed
due within two weeks
of posted date
Revise your completed
badges
Read review feedback
last date to edit: May 1
what type of review
changes requested
comment
approved

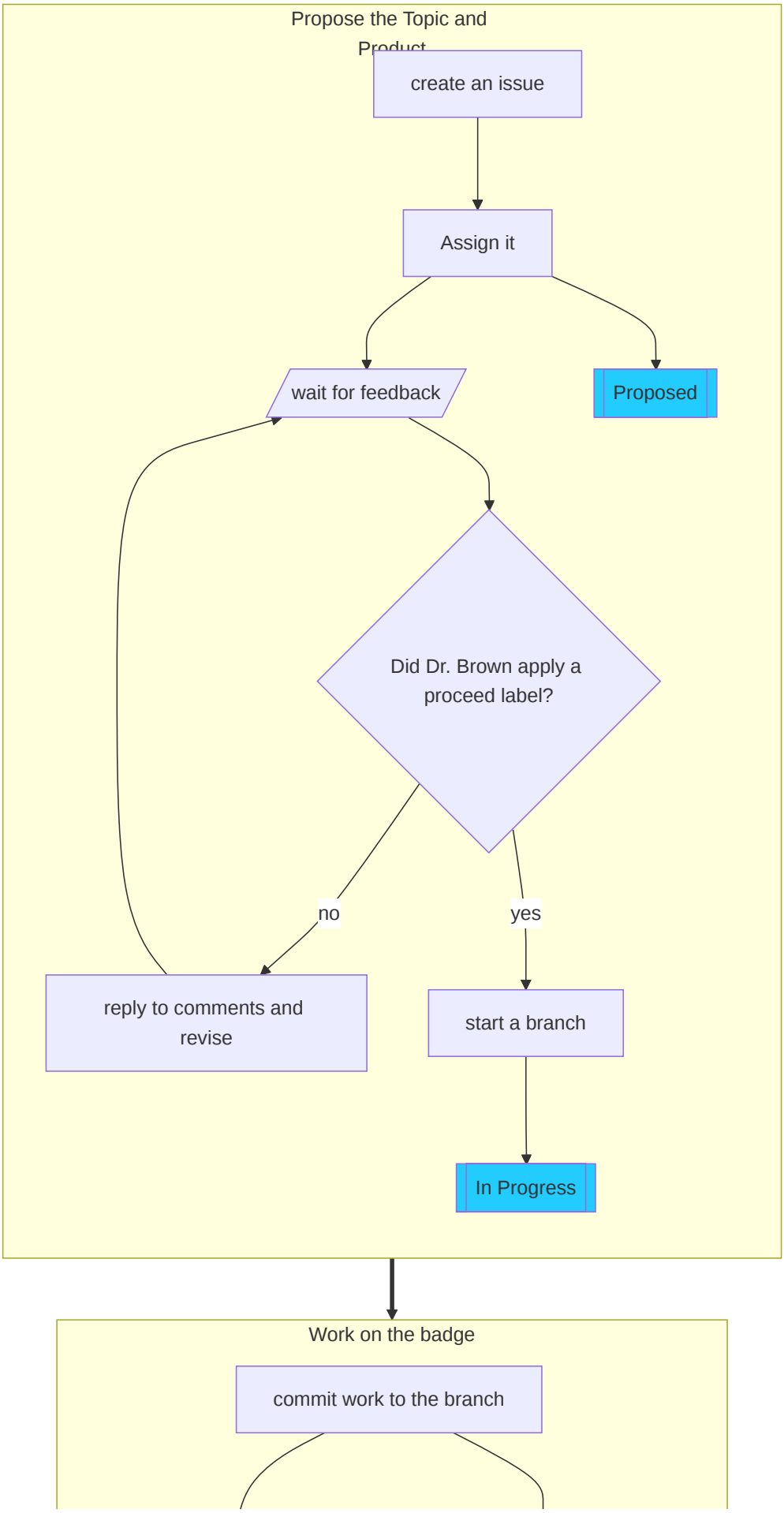

complete requested edits
reply to comments
Merge the PR
Earned
due by final grading

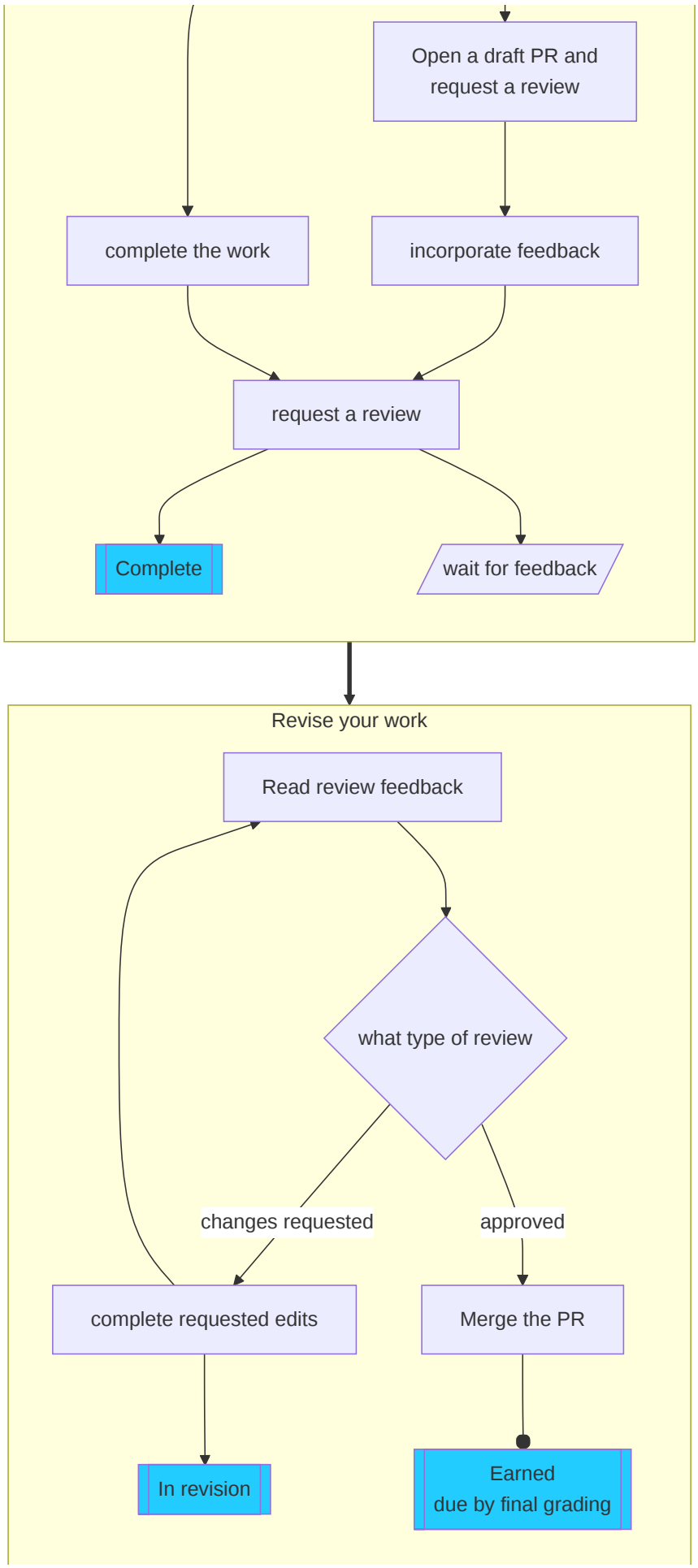
Explore Badges


Propose the Topic and Product
create an issue
Assign it to Dr. Brown
wait for feedback
Proposed
Did Dr. Brown apply a proceed label?
no
yes
reply to comments and revise
start a branch
In Progress
Work on the badge
complete the work


commit work to the branch
request a review
Complete
wait for feedback
Revise your work
Read review feedback
what type of review
changes requested
approved
complete requested edits
Merge the PR
In revision
Earned
due by final grading

Build Badges


Propose the Topic and Product
create an issue
Assign it
wait for feedback
Proposed
Did Dr. Brown apply a proceed label?
no
yes
reply to comments and revise
start a branch
In Progress
Work on the badge
commit work to the branch


Open a draft PR and request a review
complete the work
incorporate feedback
request a review
Complete
wait for feedback
Revise your work
Read review feedback
what type of review
changes requested
approved
complete requested edits
Merge the PR
In revision
Earned due by final grading

Community Badges

You can log them either manualy via files or with help of an action that a past student contributed!

Logger Action

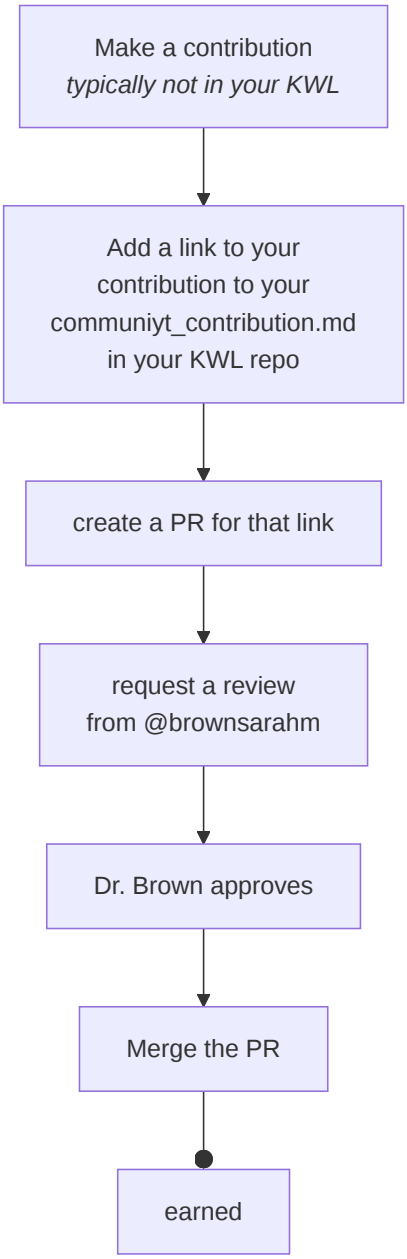
Your KWL repo has an action called “Community & Explore Badge Logger” that will help you

Manual logging

These are the instructions from your `community_contributions.md` file in your KWL repo: For each one:

- In the `community_contributions.md`` file on your kwl repo, add an item in a bulleted list (start the line with -)
- Include a link to your contribution like `[text to display](url/of/contribution)`
- create an individual pull request titled “Community-shortname” where `shortname` is a short name for what you did. approval on this PR by Dr. Brown will constitute credit for your grade
- request a review on that PR from @brownsarahm

> **Important**
>
> You want one contribution per PR` for tracking



Detailed Grade Calculations

Important

This page is generated with code and calculations, you can view them for more precise implementations of what the english sentences mean.

Warning

These calculations may change a litle bit and this page will be updated.

What is on the Grading page will hold true, but the detailed calculation here will update a little bit in ways that provide some more flexibility.

▶ Show code cell source

Grade cutoffs for total influence are:

▶ Show code cell source

letter	threshold
F	0
D	106
D+	124
C-	142
C	192
C+	210
B-	228
B	246
B+	264
A-	282
A	300

The total influence of each badge is as follows:

▶ Show code cell source

	badge	complexity	badge_type
0	experience	2	learning
1	lab	2	learning
2	review	3	learning
3	practice	6	learning
4	explore	9	learning
5	build	36	learning

Bonuses

In addition to the weights for each badge, there also bonuses that will automatically applied to your grade at the end of the semester. These are for longer term patterns, not specific assignments. You earn these while workng on other assignments, not separately.

Important

the grade plans on the grading page and the thresholds above assume you earn the Participation and Lab bonuses for all grades a D or above and the Breadth bonus for all grades above a C.

Name	Definition	Influence	type
Participation	22 experience badges	18	auto
Lab	13 lab badges	18	auto
Breadth	If review + practice badges >=18:	32	auto
Git-ing unstuck	fix large mistakes your repo using advanced git operations and submit a short reflection (allowable twice; Dr. Brown must approve)	9	event
Early bird	(review + practice) submitted by 9/26 >=5	9	event
Descriptive commits	all commits in KWL repo and build repos after penalty free zone have descriptive commit messages (not GitHub default or nonsense)	9	event
Curiosity	at least 15 experience reports have questions on time (before notes posted in evenings; Dr. Brown will log & award)	9	event
Community Star	10 community badges	18	auto
Hack the course - Contributor - Build	1 build that contributes to the course infrastructure/website +1 community or review	18	event
Hack the course - Contributor - Explore	1 explore that contributes to the course infrastructure/website + 2 community, with at least 1 review	18	event
Hack the course - Critic	5 total community badge, at least 2 reviews of other course contributions	9	event

Auto bonuses will be calculated from your other list of badges. Event bonuses will be logged in your KWL repo, where you get instructions when you meet the criteria.

Note

These bonuses are not pro-rated, you must fulfill the whole requirement to get the bonus. Except where noted, each bonus may only be earned once

Note

You cannot guarantee you will earn the Git-ing unstuck bonus, if you want to intentionally explore advanced operations, you can propose an explore badge, which is also worth 9.

Bonus Implications

Attendance and participation is *very* important:

- 14 experience, 6 labs, and 9 practice is an F
- 22 experience, 13 labs, and 9 practice is a C-
- 14 experience, 6 labs, 9 practice and one build is a C-
- 22 experience, 13 labs, 9 practice and one build is a C+

Missing one thing can have a nonlinear effect on your grade. Example 1:

- 22 experience, 13 labs, and 18 review is a C
- 21 experience, 13 labs, and 18 review is a C-
- 21 experience, 13 labs, and 17 review is a D+
- 21 experience, 12 labs, and 17 review is a D

Example 2:

- 22 experience, 13 labs, and 17 practice is a C
- 22 experience, 13 labs, 17 practice, and 1 review is a B-
- 22 experience, 13 labs, and 18 practice is a B

The Early Bird and Descriptive Commits bonuses are straight forward and set you up for success. Combined, they are also the same amount as the participation and lab bonuses, so getting a strong start and being detail oriented all semester can give you flexibility on attendance or labs.

Early Bird, Descriptive commits, Community Star, and Git-ing Unstuck are all equal to the half differnce between steps at a C or above. So earning any two can add a + to a C or a B for example:

- 22 experience, 13 labs, 18 practice, Descriptive Commits, and Early Bird is a B+
- 22 experience, 13 labs, 18 review, Descriptive Commits, and Early Bird is a C+

in these two examples, doing the work at the start of the semester on time and being attentive throughout increases the grade without any extra work!

If you are missing learning badges required to get to a bonus, community badges will fill in for those first. If you earn the Participation, Lab, and Breadth bonuses, then remaining community badges will count toward the community bonus.

For example, at the end of the semester, you might be able to skip some the low complexity learning badges (experience, review, practice) and focus on your high complexity ones to ensure you get an A.

The order of application for community badges:

- to make up missing experience badges
- to make up for missing review or practice badges to earn the breadth bonus
- to upgrade review to practice to meet a threshold
- toward the community badge bonus

To calculate your final grade at the end of the semester, a script will count your badges and logged event bonuses. The script can output as a yaml file, which is like a dictionary, for an example here we will use a dictionary.

see cspt docs for CLI version

```
example_student = {'experience' :22, 'lab': 13, 'review': 0,'practice': 18,
                    'explore': 3,
                    'build' :0,
                   'community': 0,
                   'hack':0,
                   'unstuck': 0,
                   'descriptive': 1,
                   'early': 1,
                    'question':10 }
```

```
badges_comm_applied = grade_calculation.community_apply(example_student)
badges_comm_applied
```

```
{'experience': 22,
 'lab': 13,
 'review': 0,
 'practice': 18,
 'explore': 3,
 'build': 0,
 'community': 0,
 'hack': 0,
 'unstuck': 0,
 'descriptive': 1,
 'early': 1,
 'question': 10}
```

```
grade_calculation.calculate_grade(badges_comm_applied)
```

```
'A-'
```

```
grade_calculation.calculate_grade(badges_comm_applied,True)
```

```
291
```

Schedule

Overview

The following is a tentative outline of topics in an order, these things will be filled into the concrete schedule above as we go. These are, in most cases bigger questions than we can tackle in one class, but will give the general idea of how the class will go.

How does this class work?

~ one week

We will start by introducing some basics of GitHub and setting expectations for how the course will work. This will include how you are expected to learn in this class which requires a bit about how knowledge production in computer science works and getting started with the programming tools.

What tools do Computer Scientists use?

Next we'll focus in on tools we use as computer scientists to do our work. We will use this as a way to motivate how different aspects of a computer work in greater detail. While studying the tools and how they work, we will get to see how some common abstractions are re-used throughout the fields and it gives a window and good motivation to begin considering how the computer actually works.

Topics:

- bash
- linux
- git
- i/o
- ssh and ssh keys
- number systems
- file systems

What Happens When I run code?

Finally, we'll go in really deep on the compilation and running of code. In this part, we will work from the compilation through to assembly down to hardware and then into machine representation of data.

Topics:

- software system and Abstraction
- programming languages
- cache and memory
- compiliation
- linking
- basic hardware components

Recommended workload distribution

> **Note**
>
> General badge deadlines are on the detailed badge procedures page.

To plan your time, I recommend expecting the following:

- 30 minutes, twice per week for prepare work (typically not this much).
- 1.5(review)-3(practice) hours, twice per week for the dated badges (including revisions).

For each explore :

- 30 min for proposal
- 7 hours for the project

For each build:

- 1.5 hour for the proposal (including revisions)
- 22 hours for the project
- 30 min for the final reflection

This is a four credit course, meaning we have approximately 4 hours of class + lab time per week($75 \times 2 + 105 = 255$ minutes or 4.25 hours). By the accredidation standards, students should spend a minimum of 2 hours per credit of work outside of class over 14 weeks. For a 4 credit class, then, the expected minimum number of hours of work outside of class you should be spending is 112 hours(2 * 4 * 14). With these calculations, given that there are 26 class sessions and only 18 review or practice are required, it is possible to earn an A with approximately 112 hours of work outside of class and lab time.

Tentative Timeline

> **Warning**
>
> This section is not yet updated for fall 2024.
>
> This is a rough example.

This is the planned schedule, but is subject to change in order to adapt to how things go in class or additional questions that come up.

```
import pandas as pd
pd.read_csv('schedule.csv',index_col='date').sort_index()
```

date	question	keyword	conceptual	practical	social	activity
2023-09-07	Welcome, Introduction, and Setup	intro	what is a system, why study tools	GitHub basics	class intros	create kwl repo in github, navigate github.com...
2023-09-12	Course Logistics and Learning	logistics	github flow with issues	syllabus	working together and building common vocab	set up to work offline together, create a folder
2023-09-14	Bash intro & git offline	terminal start	git structure, paths and file system	bash path navigation, git terminal authentication	why developers work differently than casual users	navigate files and clone a repo locally
2023-09-19	How can I work with branches offline?	gitoffline	git branches	github flow offline, resolving merge conflicts	commuication is important, git can help fix mi...	clone a repo and make a branch locally
2023-09-21	When do I get an advantage from git and bash?	why terminal	computing mental model, paths and file structure	bash navigation, tab completion	collaboration requires shared language, shared...	work with bash and recover from a mistake with...
2023-09-26	What *is* a commit?	merge conflicts	versions, git vlaues	merge conflicts in github, merge conflicts wit...	human and machine readable, commit messages ar...	examine commit objects, introduce plumbing com...
2023-09-28	How do programmers communicate about code?	documentation	build, automation, modularity, pattern matching,	generate documentation with jupyterbook, gitig...	main vs master, documentation community	make a jupyterbook
2023-10-03	What *is* git?	git structure	what is a file system, how does git keep track...	find in bash, seeing git config, plumbing/porc...	git workflows are conventions, git can be used...	examine git from multiple definitions and insp...
2023-10-05	Why are these tools like this?	unix philosophy	unix philosophy, debugging strategies	decision making for branches	social advantages of shared mental model, diff...	discussion with minor code examples
2023-10-12	How does git make a commit?	git internals	pointers, design and abstraction, intermediate...	inspecting git objects, when hashes are unique...	conventions vs requirements	create a commit using plumbing commands
2023-10-17	What is a commit number?	numbers	hashes, number systems	git commit numbers, manual hashing with git	number systems are derived in culture	discussion and use hashing algorithm
2023-10-19	How can can I release and share my code?	git references	pointers, git branches and tags	git branches, advanced fixing, semver and conv...	advantages of data that is both human and mach...	make a tag and release
2023-10-24	How can I automate things with bash?	bash scripting	bash is a programming language, official docs,...	script files, man pages, bash variables, bash ...	using automation to make collaboration easier	build a bash script that calculates a grade

date	question	keyword	conceptual	practical	social	activity
2023-10-26	How can I work on a remote server?	server	server, hpc, large files	ssh, large files, bash head, grep, etc	hidden impacts of remote computation	log into a remote server and work with large f...
2023-10-31	What is an IDE?	IDE	IDE parts	compare and contrast IDEs	collaboraiton features, developer communities	discussions and sharing IDE tips
2023-11-02	How do I choose a Programming Language for a p...	programming languages	types of PLs, what is PL studying	choosing a language for a project	usability depends on prior experience	discussion or independent research
2023-11-07	How can I authenitcate more securely from a te...	server use	ssh keys, hpc system strucutre	ssh keys, interactive, slurm	social aspects of passwords and security	configure and use ssh keys on a hpc
2023-11-09	What Happens when we build code?	building	building C code	ssh keys, gcc compiler	file extensions are for people, when vocabular...	build code in C and examine intermediate outputs
2023-11-14	What happens when we run code?	hardwar	von neuman architecture	reading a basic assembly language	historical context of computer architecures	use a hardware simulator to see step by step o...
2023-11-16	How does a computer represent non integer quan...	floats	float representation	floats do not equal themselves	social processes around standard developents, ...	work with float representation through fractio...
2023-11-21	How can we use logical operations?	bitwise operation	what is a bit, what is a register, how to brea...	how an ALU works	tech interviews look for obscure details somet...	derive addition from basic logic operations
2023-11-28	What *is* a computer?	architecture	physical gates, history	interpretting specs	social context influences technology	discussion
2023-11-30	How does timing work in a computer?	timing	timing, control unit, threading	threaded program with a race condition	different times matter in different cases	write a threaded program and fix a race condition
2023-12-05	How do different types of storage work together?	memory	different type of memory, different abstractions	working with large data	privacy/respect for data	large data that has to be read in batches
2023-12-07	How does this all work together	review	all	end of semester logistics	group work final	review quiz, integration/reflection questions
2023-12-12	How did this semester go?	feedback	all	grading	how to learn better together	discussion

Tentative Lab schedule

```
pd.read_csv('labschedule.csv',index_col='date').sort_index()
```

date	topic	activity
2023-09-08	GitHub Basics	syllabus quiz, setup
2023-09-15	working at the terminal	organization, setup kwl locally, manage issues
2023-09-22	offline branches	plan for success, clean a messy repo
2023-09-29	tool familiarity	work on badges, self progress report
2023-10-06	unix philosophy	design a command line tool that would enable a...
2023-10-13	git plumbing	git plumbing experiment
2023-10-20	git plumbing	grade calculation script, self reflection
2023-10-27	scripting	releases and packaging
2023-11-03	remote, hpc	server work, batch scripts
2023-11-10	Compiling	C compiling experiments
2023-11-17	Machine representation	bits and floats and number libraries
2023-12-01	hardware	self-reflection, work, project consultations
2023-12-08	os	hardware simulation

Support Systems

> **Warning**
>
> these links may be outdated, will update soon

Mental Health and Wellness:

We understand that college comes with challenges and stress associated with your courses, job/family responsibilities and personal life. URI offers students a range of services to support your mental health and wellbeing, including the URI Counseling Center, MySSP (Student Support Program) App, the Wellness Resource Center, and Well-being Coaching.

Academic Enhancement Center

Academic Enhancement Center (for undergraduate courses): Located in Roosevelt Hall, the AEC offers free face-to-face and web-based services to undergraduate students seeking academic support. Peer tutoring is available for STEM-related courses by appointment online and in-person. The Writing Center offers peer tutoring focused on supporting undergraduate writers at

any stage of a writing assignment. The UCS160 course and academic skills consultations offer students strategies and activities aimed at improving their studying and test-taking skills. Complete details about each of these programs, up-to-date schedules, contact information and self-service study resources are all available on the AEC website.

- **STEM Tutoring** helps students navigate 100 and 200 level math, chemistry, physics, biology, and other select STEM courses. The STEM Tutoring program offers free online and limited in-person peer-tutoring this fall. Undergraduates in introductory STEM courses have a variety of small group times to choose from and can select occasional or weekly appointments. Appointments and locations will be visible in the TutorTrac system on September 14th, FIXME. The TutorTrac application is available through URI Microsoft 365 single sign-on and by visiting aec.uri.edu. More detailed information and instructions can be found on the AEC tutoring page.
- **Academic Skills Development** resources helps students plan work, manage time, and study more effectively. In Fall FIXME, all Academic Skills and Strategies programming are offered both online and in-person. UCS160: Success in Higher Education is a one-credit course on developing a more effective approach to studying. Academic Consultations are 30-minute, 1 to 1 appointments that students can schedule on Starfish with Dr. David Hayes to address individual academic issues. Study Your Way to Success is a self-guided web portal connecting students to tips and strategies on studying and time management related topics. For more information on these programs, visit the Academic Skills Page or contact Dr. Hayes directly at davidhayes@uri.edu.
- The **Undergraduate Writing Center** provides free writing support to students in any class, at any stage of the writing process: from understanding an assignment and brainstorming ideas, to developing, organizing, and revising a draft. Fall 2020 services are offered through two online options: 1) real-time synchronous appointments with a peer consultant (25- and 50-minute slots, available Sunday - Friday), and 2) written asynchronous consultations with a 24-hour turn-around response time (available Monday - Friday). Synchronous appointments are video-based, with audio, chat, document-sharing, and live captioning capabilities, to meet a range of accessibility needs. View the synchronous and asynchronous schedules and book online, visit uri.mywconline.com.

General Policies

> **Warning**
>
> links on this page may be outdated, will update soon

Anti-Bias Statement:

We respect the rights and dignity of each individual and group. We reject prejudice and intolerance, and we work to understand differences. We believe that equity and inclusion are critical components for campus community members to thrive. If you are a target or a witness of a bias incident, you are encouraged to submit a report to the URI Bias Response Team at www.uri.edu/brt. There you will also find people and resources to help.

Disability, Access, and Inclusion Services for Students Statement

This course is specifically designed to use universal design principles. Many of the standard accomodations that the DAI office provides will not apply to this course, because of how it is designed: there are no exams for you to get extra time on, and no slides for you to get in advance. However, I am happy to work with you to help you understand how to use the build in support systems for the course.

URI wide:

> Your access in this course is important. Please send me your Disability, Access, and Inclusion (DAI) accommodation letter early in the semester so that we have adequate time to discuss and arrange your approved academic accommodations. If you have not yet established services through DAI, please contact them to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom. DAI can be reached by calling: 401-874-2098, visiting: web.uri.edu/disability, or emailing: dai@etal.uri.edu. We are available to meet with students enrolled in Kingston as well as Providence courses.

Academic Honesty

Students are expected to be honest in all academic work. A student's name or email address associated with a commit on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student's own independent thought and study. Work should be stated in the student's own words, with outside content properly attributed to its source. Students have an obligation to know how to quote, paraphrase, summarize, cite and reference the work of others with integrity. The following are examples of academic dishonesty:

- Using material, directly or paraphrasing, from published sources (print or electronic) without appropriate citation
- Claiming disproportionate credit for work not done independently
- Unauthorized possession or access to exams
- Unauthorized communication during exams
- Unauthorized use of another's work or preparing work for another student
- Taking an exam for another student
- Altering or attempting to alter grades
- Fabricating or falsifying facts, data or references
- Facilitating or aiding another's academic dishonesty
- Submitting the same work for more than one course without prior approval from the instructors

> **Tip**
>
> Most assignments are tested against LLMs and designed so that outsourcing it to an LLM will likely lead to a submission that is below the bar of credit.

AI Use

All of your work must reflect your own thinking and understanding. The written work in English that you submit for review and practice badges must be your own work or content that was provided to you in class, it cannot include text that was generated by an AI or plagiarized in any other way. You may use auto-complete in all tools incuding, IDE-integrated GitHub co-pilot (or similar, IDE embedded tool) for any code that is required for this course because the code is necessary to demonstrate examples, but language syntax is not the core learning outcome.

> **Important**
>
> It is not okay to copy-paste and submit anything from an LLM chatbot interface in this course

If you are found to submit prismia responses that do not reflect your own thinking or that of discussion with peers as directed, the experience badge for that class session will be ineligible.

If work is suspected to be the result of inappropriate collaboration or AI use, you will be allowed to take an oral exam in lab time to contest and prove that your work reflects your own understanding.

The first time you will be allowed to appeal through an oral exam. If your appeal is successful, your counter resets. If you are found to have violated the policy then the badge in question will be ineligible and your maximum number of badges possible to be earned will be limited according to the guidelines below per badge type (you cannot treat the plagiarized badge as skipped). If you are found to have violated the policy a second time, then no further work will be graded for the remainder of the semester.

If you are found to submit work that is not your own for a *review or practice* badge, the review and practice badges for that date will be ineligible and the penalty free zone terms will no longer apply to the first six badges.

If you are found to submit work that is not your own for an *explore or build* badge, that badge will not be awarded and your maximum badges at the level possible will drop by 1/3 of the maximum possible (2 explore or 1 build) for each infraction.

Attendance

“Attendance” is not explicitly checked, but participation in class through prismia is monitored, and lab checkouts and experience badges grade your engagement in the activities of lab and class respectively.

Viral Illness Precautions

The University is committed to delivering its educational mission while protecting the health and safety of our community. Students who are experiencing symptoms of viral illness should NOT go to class/work. Those who test positive for COVID-19 should follow the isolation guidelines from the Rhode Island Department of Health and CDC.

If you miss class once, you **do not need to notify me** in advance. You can follow the makeup procedures on your own.

Excused Absences

Absences due to serious illness or traumatic loss, religious observances, or participation in a university sanctioned event are considered excused absences.

You do not need to notify me in advance.

For *short absences* (1-2 classes), for any reason, you can follow the makeup procedures, no extensions will be provided typically for this; if extenuating circumstances arise, then ask Dr. Brown.

For *extended excused absences*, (3 or more classes) email Dr. Brown when you are ready to get caught up and she will help you make a plan for the best order to complete missed work so that you are able to participate in subsequent activities.

Extensions on badges will be provided if needed for excused absences. In your plan, include what class sessions you missed by date.

For unexcused absences, the makeup procedures apply, but not the planning assistance via email, only regularly scheduled office hours, unless you have class during all of those hours and then you will be allowed to use a special appointment.

Office Hours & Communication

Announcements

Announcements will be made via GitHub Release. You can view them online in the releases page or you can get notifications by watching the repository, choosing “Releases” under custom see GitHub docs for instructions with screenshots. You can choose GitHub only or e-mail notificaiton from the notification settings page

Warning

For the first week announcements will be made by BrightSpace too, but after that, all course activities will be only on GitHub.

Sign up to watch

Watch the repo and then, after the first class, claim a community badge for doing so, using a link to these instructions as the “contribution” like follows.

```
- [watched the repo as per announcements](https://compsys-progtools.github.io/fall2024/syllabus/c
```

put this on a branch called `watch_community_badge` and title your PR “Community-Watch”

Help Hours

Day	Time	Location	Host
Wednesday	10am-6pm (appt)	Zoom	Marcin
Monday	5-7pm	Swan 305	Skye
Friday	4-6pm	Zoom	Dr. Brown

Online office hours locations and appointment links for alternative times are linked on the GitHub Organization Page

Important

You can only see them if you are a “member”. To join, make sure that you have completed Lab 0.

Tips

> **TLDR**
>
> Contribute a TLDR set of tabs or mermaid visual to this section for a community badge.

For assignment help

- use the badge issue for comments and @ mention instructors
- **send in advance, leave time for a response**
- **always** use issues in your repo for content directly related to assignments. If you push your partial work to the repository and then open an issue, we can see your work and your question at the same time and download it to run it if we need to debug something
- use issues or discussions for questions about this syllabus or class notes. At the top right there's a GitHub logo ⓘ that allows you to open a issue (for a question) or suggest an edit (eg if you think there's a tpo or you find an additional helpful resource related to something)

> **Note**
>
> I check e-mail/github a small number of times per day, during work hours, almost exclusively. You might see me post to this site, post to BrightSpace, or comment on your assignments outside of my normal working hours, but I will not reliably see emails that arrive during those hours. This means that it is important to start assignments early.

For E-mail

- use e-mail only for things that **need to be private to Dr. Brown and not seen by TAs**
- other messages may be addressed on your repo or the course website, without a response via email
- Include `[CSC311]` in the subject line of your email along with the topic of your message. This is important, because your messages are important, but I also get a lot of e-mail. Consider these a cheat code to my inbox: I have setup a filter that will flag your e-mail if you include that in subject to ensure that I see it.

> **Should you e-mail your work?**
>
> No, request a pull request review or make an issue if you are stuck

1. Welcome, Introduction, and Setup

Today:

- intros
- what the *learning* goals of the course are

- see how in class time will work
- start learning git/github by doing

Not Today:

- syllabus review (on your own time/lab Monday)
- cours policy discussion (next week)

1.1. Introductions

- Dr. Sarah Brown
- Please address me as Dr. Brown or Professor Brown,
- Ms./Mrs. are not acceptable

You can see more about me in the about section of the syllabus.

1.2. Why think like a computer?

With Large Language Models (LLMs) able to write code from English (or other spoken languages, but LLMs are generally worse at non English)

Let's discuss some examples.

Many things in this course *are* things you will use **everyday** some of it is stuff that will help you in the trickest times.

I was given this excerpt:

```
echo "# fall2024" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin https://github.com/compsys-progtools/fall2024.git
git push -u origin main
```

but since I had content already I needed to skip several of these steps I needed to know what each one did to skip the right ones.

Assume you have dates stored as a date type, is it the same to add 365 days and add 1 year?

In Python, let's see

```
from datetime import date, timedelta
date.today() + timedelta(days=365)
```

What if we do last year?

```
date(2023,9,3) + timedelta(days=365)
```

I look forward to getting to know you all better.

1.3. Prismia

- instead of slides
- you can message us
- we can see all of your responses
- emoji!

questions can be “graded”

- this is instant feedback
- participation will be checked
- correctness will not impact your final grade (directly)
- this helps both me and you know how you are doing

or open ended

And I can share responses, grouped up

1.4. This course will be different

- no Brightspace
- 300 level = more independence
- I will give advice, but only hold you accountable to a minimal set
- High expectations, with a lot of flexibility

> as an aside another Professor describing what she does not like about learning management systems (LMS). Brightspace is one, she talks about Canvas in the post, but they are similar.

I do not judge your reasons for missing class.

- **No need to tell me in advance**
- For 1 class no need to tell me why at all
- For 1 class, make it up and keep moving
- For longer absences, I will help you plan how to get caught up, and you must meet university criteria for excused absence

If you do email me about missing a single clss, I will likely not reply. Not because I do not care about your long term success; I do! I just get too many emails and cannot do the more important parts of my job if I answser every single email. Skipping these emails gives me more time to help students who actually need my help.

1.4.1. My focus is for you to learn

- that means, practice, feedback, and reflection
- you should know that you have learned
- you should be able to apply this material in other courses

1.4.2. Learning comes in many forms

- different types of material are best remembered in different ways
- some things are hard to explain, but watching it is very concrete

1.5. Learning is the goal

- producing outputs as fast as possible is not learning
- in a job, you may get paid to do things fast
- your work also needs to be correct, without someone telling you it is
- in a job you are trusted to know your work is correct, your boss does not check your work or grade you
- to get a job, you have to interview, which means explaining, in words, to another person how to do something

1.6. How does this work?

1.6.1. In class:

1. Memory/ understanding check
2. Review/ clarification as needed
3. New topic demo with follow along, tiny practice
4. Review, submit questions

1.6.2. Outside of class:

1. Read notes Notes to refresh the material, check your understanding, and find more details
2. Practice material that has been taught
3. Activate your memory of related things to what we will cover
4. Read articles/ watch videos to either fill in gaps or learn more details
5. Bring questions to class

1.7. Getting started

Your KWL chart is where you will start by tracking what you know now/before we start and what you want to learn about each topic. Then you will update it throughout the semester. You will also add material to the repository to produce evidence of your

learning.

see the link on prismia if you missed class

There is a Glossary!!

repository

pro tip: links are often hints or more information

1.8. GitHub Docs are really helpful and have screenshots

- editing a file
- pull request

they pay people to update them so I direct you to theirs mostly instead of recreating them

Today we did the following:

1. Accept the assignment to create your repo
2. Edit the README to add your name by clicking the pencil icon (editing a file step 2)
3. adding a descriptive commit message (editing a file step 5)
4. adding prior knowledge
5. created a new branch (named `day1_kwl`) (editing a file step 7-8)
6. added a message to the Pull Request (pull request step 5)
7. Creating a pull request (pull request step 6)
8. Clicking Merge Pull Request

1.9. Git and GitHub terminology

We also discussed some of the terminology for git. We will also come back to these ideas in greater detail later.

1.9.1. GitHub Actions

GitHub allows us to run scripts within our repos, the feature is called GitHub Actions and the individual items are called workflows.

Action files are stored in the `.github/workflows` folder in yaml files (key value pairs that hold settings and script steps).

Some run automatically, like on any PR or when a commit is to main. The ones in your KWL repo are "manual" so we run them from the Actions tab.

1.9.2. Fix your repo

> **Important**
>
> So, it is apparently a weird bug in GitHub, that the actions were not working, but it is easy (though a little annoying) to fix.
>
> You can do this before or in Lab on Monday.

On each file in the `.github/workflows` folder that ends in `.yml` edit in some small way (eg add an additional blank line in a place where there is a blank line already) and commit directly to main.

1.9.3. Get Credit for class

You can use the same content you sent on prismia at the end of class, but for the script to count it at the end of the semester, it has to be in your repo.

1. Go to the actions tab of your repo
2. Select the action that has the name `Forgotten Badge (Late, but was in class)`
3. In the blue banner that appears click `Run Workflow`
4. leave the branch set to main
5. Enter the date `2024-09-05`
6. Wait a minute or so for it to run, when it has a green checkmark, go to your PR tab
7. select the PR with the title Experience Report 2024-09-05
8. Go to the files tab of that PR and edit it (use the 3 dots menu in the top right of the file box)
9. fill in the information and commit to the same branch (do not open an additional PR)
10. assign @instructors to review your PR.

For screenshots, see the Manually running a workflow, on GitHub

1.10. Prepare for next class

1. (for lab Monday) Read the syllabus section of the course website carefully and explore the whole course website
2. (for lab Monday) Bring questions about the course
3. (for class Tuesday) Think about one thing you've learned really well (computing or not). Be prepared to discuss the following: How do you know that you know it? What was it llike to first learn it? (nothing written to submit, but you can use the issue to take notes if you would like)

1.11. Badges

Review **Practice**

1. accept this assignment and join the existing team to get access to more features in our course organization.
2. Post an introduction to your classmates on our discussion forum (include link to your comment in PR comment, must accept above to see)
3. Read the notes from today's class carefully
4. Fill in the first two columns of your KWL chart (content of the PR; named to match the badge name)

1.12. We havea Glossary!!

For example, the term we used above:

repository

> **Tip**
>
> In class, on prismia, I will sometimes link like above, but you can also keep the page open if that is helpful for you.

In the course site, glossary terms will be linked as in the follwing list.

Key terms for the first class:

- repository
- git
- github
- PR

1.13. Questions after class

1.13.1. How do I actually use Git/Github with one of my coding projects?

We will build that up

1.13.2. What conceptually are we supposed to take from today lesson aside from just how pull requests work?

the key vocabulary.

1.13.3. What kind of projects will we be completing?

Optionally, you may complete projects. You can see examples in the build section.

1.13.4. Will this class go over topics that will help me on CSC 212 content?

the collaboration on github will help

1.13.5. what a day to day looks like in this class

a lot like this class, but the 3rd class will be more typical than the first 2.

1.13.6. will we need to access git without using github

we will use the git program without GitHub yes, locally on your computer

1.13.7. how to create branches and merge branches to the main. Other basic features of github

We will learn over time

1.13.8. I want to learn all of github’s functions.

We will not get to *every* function, but we will cover the main categories

1.13.9. Something that I want to learn more about is using git from the command line

Soon!

1.13.10. Nothing specific, I would just like to learn more about GitHub in general because I know how important of a tool it is

perfect! that is what we will do

1.13.11. just how to utilize github more and all the futures we haven’t covered

we will get there

2. More orientation

Today we will:

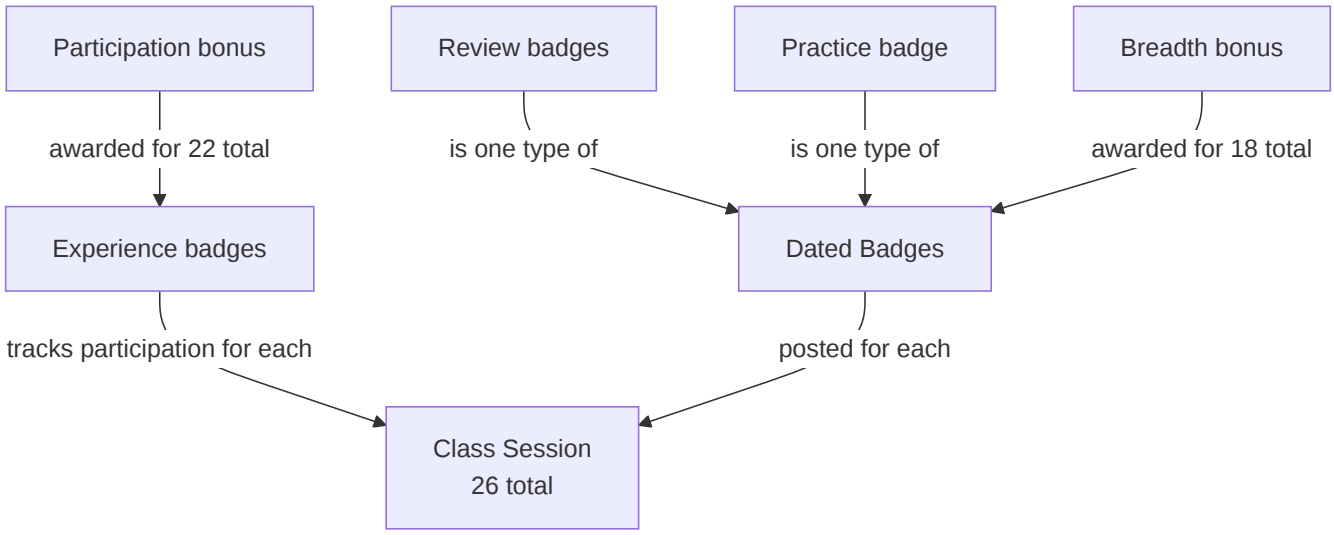
- continue getting familiar with the structure of GitHub
- clarify more how the course will flow

- practice with new vocabulary

Last class was a lot of new information, today we will reinforce that mostly, and add only a little

conceptmap)=

2.1. Reminder about class structure



This is called a concept map, you would read it along the arrows, so this corresponds to the following bullets:

- review badges are one type of dated badge
- practice badges
- dated badges are posted for each class session
- experience badges track participation for each class session

2.2. Warm up

1. Navigate to your KWL repo
2. Find the issues tab
3. Open the prepare-2024-09-10 issue and discuss the questions with your classmates at your table

*hint: my KWL repo URL is: `https://github.com/compsys-progtools/fall24-brownsarahm`

Becoming an expert requires:

- different types of study
- pracitce and feedback to get better

2.3. Making up for action issue last week

To activate the workflows in your repo, edit them, even adding a space or deleting a blank line will make it work.

We fixed the `forgottenexperience.yml` file and then ran it manually.

Then we edited the file it created to add a title on the line with one `#` (should be line 10) uisn ghte 3 dots menue in the top right of the file on the `files changed` tab of the PR.

> **Note**
>
> When you add more commits to a branch that has a PR, it automatically updates the PR.

note, here we are learning *by example* and then *synthesizing* that into more concrete facts.

“just play with it”

- common attitude in CS
- not optimal for learning

my goal is to teach you to get better at learning in that way, bc it is what employers will expect

To do this:

- set up opportunities for you to *do* the things that give you the opportunity
- highlight important facts about what just happened
- ask you questions to examine what just happened

This is why attendance/participation is a big part of your grade.

Experience badges are evidence of having learned.

2.3.1. My focus is for you to learn

- that means, practice, feedback, and reflection
- you should know that you have learned
- you should be able to apply this material in other courses

2.3.2. Learning comes in many forms

- different types of material are best remembered in different ways
- some things are hard to explain, but watching it is very concrete

2.4. Learning is the goal

- producing outputs as fast as possible is not learning
- in a job, you may get paid to do things fast
- your work also needs to be correct, without someone telling you it is
- in a job you are trusted to know your work is correct, your boss does not check your work or grade you
- to get a job, you have to interview, which means explaining, in words, to another person how to do something

2.5. What about AI?

Large Language Models will change what programming looks like, but understanding is always going to be more effective than asking an AI. Large language models actually do not know anything, they just know what languages loook like and generate text.

if you cannot tell it when it's wrong, you do not add value for a company, so why would they pay you?

2.6. This is a college course

- more than getting you one job, a bootcamp gets you one job
- build a long (or maybe short, but fruitful) career
- build critical thinking skill that makes you adaptable
- have options

2.7. How does this work?

2.7.1. In class:

1. Memory/ understanding checks
2. Review/ clarification as needed
3. New topic demo with follow along, tiny practice
4. Review, submit questions

2.7.2. Outside of class:

1. Read notes to refresh the material, check your understanding, and find more details
2. Practice material that has been taught
3. Activate your memory of related things to what we will cover to prepare
4. Read articles/ watch videos to either fill in gaps or learn more details
5. Bring questions to class

I give a time breakdown in the syllabus.

2.8. Prepare for next class

1. Choose where you want to save files for this class locally on your computer and make note of that location. (nothing to submit; but we will be working locally and you need to have a place)
2. Think about how you think about files and folders in a computer. What do you know about how they are organized? how they're implemented? (nothing to submit)

2.9. Badges

Review | **Practice**

the text in `( )` below is why each step is assigned

1. review today's notes after they are posted, both rendered and the raw markdown versions. Include links to both views in your badge PR comment. (to review)
2. "Watch" the course website repo, specifically watch Releases under custom (to get notifications)
3. map out your computing knowledge and add it to your kwl chart repo. this can be an image that you upload or a text-based outline in a file called prior-knowledge-map. (optional) try mapping out using mermaid syntax, we'll be using other tools that will faciltate rendering later (what we will learn will connect a lot of ideas, mapping out where you start, sets you up for success)

2.10. Questions After Class

2.10.1. How can I create my own actions to run that will create issues and pull requests?

We will learn this a bit later, but you can read ahead in the docs.

2.10.2. What is the purpose of the wiki within GitHub?

To serve as documentation, wiki-style for the repo. It was more common before github added pages. A lot of open source projects now host documentation using github pages. We will learn how this works later, but this website uses pages.

2.10.3. Do we merge the pull request for the experience report into main?

Only when approved (but if you forget, @ me and I can fix it)

2.10.4. Just still how to better navigate github because while I understood most of it was still confusing at points

We will be doing all of these things over and over, so you will get them, it's okay!

2.10.5. Is it possible to rename a committed change?

You can change a commit message, yes!

2.10.6. How do we access the old file after we already commit changes?

On GitHub.com, you go to the commits on the repo (click the ⓘ icon or add `/commits` to the repo's URL) and then choose view at that point.

2.10.7. How can we edit our github using the terminal?

Next class!

3. Working Offline

Today more clear motivation for each thing we do and more context.

Today we will learn to work with GitHub offline, this requires understanding some about file systems and how content is organized on computers.

We will learn:

- relative and absolute paths
- basic bash commands for navigating the file system
- authenticating to GitHub on a terminal
- how to clone a repo
- how fetch and checkout work

everything is a file

3.1. Let's get organized

For class you should have a folder on your computer where you will keep all of your materials.

We will start using the terminal today, by getting all set up.

Open a terminal window. I am going to use `bash` commands

- if you are on mac, your default shell is `zsh` which is mostly the same as bash for casual use. you can switch to bash to make your output more like mine using the command `bash` if you want, but it is not required.
- if you are on windows, your **GitBash** terminal will be the least setup work to use `bash`
- if you have WSL (if you do not, no need to worry) you should be able to set your linux shell to `bash`

Mac warns me that `bash` is not the default, but that is okay.

```
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
```

If you use `pwd` you can see your current path

```
pwd
```

```
/Users/brownsarahm
```

It outputs the absolute path of the location that I was at.

we start at home (~)

We can **c**hange **d**irectory with `cd`

```
cd Documents/inclass/
```

We can **m**a**k** a new **dir**ectory with `mkdir`

```
mkdir systems
```

What you want to have is a folder for class (mine is systems) in a place you can find it. (mine is in my inclass folder, I have a separate teaching folder for outside of class time, like where my draft of these noes is)

You might:

- make a systems folder in your Documents folder
- make an inclass folder in the CSC311 folder you already made
- use the CSC311 folder as your in class working space

```
cd systems/
```

```

```

```
pwd
```

```
/Users/brownsarahm/Documents/inclass/systems
```

```
cd
```

Next, we go back to where we want to be

```
cd Documents/inclass/systems/
```


```
cd Documents/inclass/systems/
```

```
pwd
```

```
/Users/brownsarahm/Documents/inclass/systems
```

To go back one step in the path, (one level up in the tree) we use `cd ..`

```
cd ..
```

`..` is a special file that points to a specific relative path, of one level up.

```
pwd
```

```
/Users/brownsarahm/Documents/inclass
```

```
cd systems/
```

We can use multiple to go up many levels

```
cd ../../../Downloads/
```

If we give no path to `cd` it brings us to home.

```
cd
```

Then we go back to where we want to b

```
cd Documents/inclass/systems/
```

```
pwd
```

```
/Users/brownsarahm/Documents/inclass/systems
```

```
cd ../../
```

```

```

```
pwd
```

```
/Users/brownsarahm/Documents
```

```
cd ../
```

```

```

If you start to tab complete with a nonunique set of characters

```
cd Do
```

```
Documents/ Downloads/
```

it shows you th options and puts what you had back on the propmt.

Then we can tab complete by adding enough letters to be unique.

```
cd Documents/inclass/systems/
```

3.2. A toy repo for in class

this repo will be for *in class* work, you will not get feedback inside of it, unless you ask, but you will answer questions in your kwl repo about what we do in this repo sometimes

only work in this repo during class time or making up class, unless specifically instructed to

Preferred:

1. view the template
2. click the green “use this template” button in the top right
3. make `compsys-progtools` the owner
4. set the name to `gh-inclass-<your gh username>` replacing the `<>` part with your actual name

> **Warning**
>
> If the template link does not work, you are not in the org yet

3.3. Authenticating with GitHub

We have two choices to Download a repository:

1. clone to maintain a link using git
2. download zip to not have to use git, but have no link

we want option 1 beacuse we are learning git

For a public repo, it won't matter, you can use any way to download it that you wuold like, but for a private repo, we need to be authenticated.

3.3.1. Authenticating with GitHub

There are many ways to authenticate securely with GitHub and other git clients. We're going to use *easier* ones for today, but we'll come back to the third, which is a bit more secure and is a more general type of authentication.

1. ssh keys (we will do this later)
2. `gh` CLI / gitscm in GitBash through browser

we will do opiton 2 for today

3.3.1.1. GitBash (windows mostly)

- `git clone` and paste your URL from GitHub
- then follow the prompts, choosing to authenticate in Browser.

3.3.1.2. Native terminal (MacOS X/Linux/WSL)

- GitHub CLI: enter `gh auth login` and follow the prompts.
- then `git clone` and paste your URL from github

3.3.1.3. If nothing else works

Create a personal access token. This is a special one time password that you can use like a password, but it is limited in scope and will expire (as long as you choose settings well).

Then proceed to the clone step. You may need to configure an identity later with `git config`

also go to office hours later to get better authentication

3.3.2. Cloning a repository

We will create a local copy by cloning

```
git clone https://github.com/compsys-progtools/gh-inclass-brownsarahm.git
```

```
Cloning into 'gh-inclass-brownsarahm'...
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 5 (delta 0), reused 4 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (5/5), done.
```

Confirm it worked with:

```
ls
```

```
gh-inclass-brownsarahm
```

this folder was empty, but now we have a folder named like the repo

3.4. What is in a repo?

We can enter that folder

```
cd gh-inclass-brownsarahm/
```

When we compare the local directory to GitHub

```
ls
```

Notice that the `.github/workflows` that we see on GitHub is missing, that is because it is *hidden*. All file names that start with `.` are hidden.

We can actually see the rest with the `-a` for **all** *option* or *flag*. Options are how we can pass non required parameters to command line programs.

```
ls -a
```

```
.       ..      .git    .github
```

We also see some special “files”, `.` the current location and `..` up one directory

`ls` can also take an explicit path as the argument to list a different folder than the current working directory.

```
ls .github/
```

```
workflows
```

We can use it with any relative path.

```
ls .github/workflows/
```

```
create_issues.yml
```

3.5. How do I know what git knows?

`git status` is your friend.

```
git status
```

```
On branch main
Your branch is up to date with 'origin/main'.

nothing to commit, working tree clean
```

this command compares your working directory (what you can see with `ls -a` and all subfolders except the `.git` directorty) to the current state of your `.git` directory.

3.6. Closing an Issue with a commit

Next, we ran the one action in the gh-inclas repo, it creates 3 issues.

Now we can make the about file.

We added a file from the code tab in browser, titled it about.md and put some content in.

In the commit messag, we used `closes #x` where `x` is the issue to close the issue.

If we look locally, we do not see the file.

```
ls
```

With git status, we see it thinks it is still up to date

```
git status
```

```
On branch main
Your branch is up to date with 'origin/main'.

nothing to commit, working tree clean
```

This is because it only compares with the `.git` directory, not the internet. So, we can update that repo without changing the working directory with `fetch`

```
git fetch
```

```
remote: Enumerating objects: 4, done.
remote: Counting objects: 100% (4/4), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Unpacking objects: 100% (3/3), 960 bytes | 240.00 KiB/s, done.
From https://github.com/compsys-progtools/gh-inclass-brownsarahm
   0373342..0e7c990  main       -> origin/main
```

Now, we can do status again.

```
git status
```

```
On branch main
Your branch is behind 'origin/main' by 1 commit, and can be fast-forwarded.
  (use "git pull" to update your local branch)

nothing to commit, working tree clean
```

now it knows we are behind

```
ls
```

```

```

but the working directory is still the same

we can use pull to update our local main branch

```
git pull
```

```
Updating 0373342..0e7c990
Fast-forward
 about.md | 3 +++
 1 file changed, 3 insertions(+)
 create mode 100644 about.md
```

and check the working directory

```
ls
```

```
about.md
```

and it is there!

3.7. Making a branch with GitHub and working offline

First on an issue, create a branch using the link in the development section of the right side panel. See the github docs for how to do that.

First we will update the `.git` directory without changing the working directory using git fetch. We have to tell git fetch where to get the data from, we do that using a name of a remote.

```
git fetch origin
```

```
From https://github.com/compsys-progtools/gh-inclass-brownsarahm
 * [new branch]      1-create-a-readme -> origin/1-create-a-readme
```

and the second, this switches branches.

```
git checkout 1-create-a-readme
```

```
branch '1-create-a-readme' set up to track 'origin/1-create-a-readme'.
Switched to a new branch '1-create-a-readme'
```

again, we check the status

```
git status
```

```
On branch 1-create-a-readme
Your branch is up to date with 'origin/1-create-a-readme'.

nothing to commit, working tree clean
```

now it says we are on a new branch

3.8. Creating a file on the terminal

The `touch` command creates an empty file.

```
touch README.md
```

We can use `ls` to see our working directory now.

```
ls
```

```
README.md       about.md
```

```
git status
```

```
On branch 1-create-a-readme
Your branch is up to date with 'origin/1-create-a-readme'.

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)
```

```
nano README.md
```

we used the nano text editor. `nano` is simpler than other text editors that tend to be more popular among experts, `vim` and `emacs`. Getting comfortable with nano will get you used to the ideas, without putting as much burden on your memory. This will set you up to learn those later, if you need a more powerful terminal text editor.

We put some content in the file, any content then saved and exit.

On the nano editor the `^` stands for control.

and we can look at the contents of it.

Now we will check again with git.

`cat` con**cat**enates the contents of a file to standard out, where all of the content that is shown on the terminal is.

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
```

and we can see the contents

```
git status
```

```
On branch 1-create-a-readme
Your branch is up to date with 'origin/1-create-a-readme'.

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)
```

In this case both say to `git add` to track or to include in what will be committed. Under untracked files is it says `git add <file>...`, in our case this would look like `git add about.md`. However, remember we learned that the `.` that is always in every directory is a special “file” that points to the current directory, so we can use that to add **all** files. Since we have only one,

the two are equivalent, and the `.` is a common shortcut, because most of the time we want to add everything we have recently worked on in a single commit.

`git add` puts a file in the “staging area” we can use the staging area to group files together and put changes to multiple files in a single commit. This is something we **cannot** do on GitHub in the browser, in order to save changes at all, we have to commit. Offline, we can save changes to our computer without commiting at all, and we can group many changes into a single commit.

We will use `.` as our “file” to stage everythign in the current working directory.

```
git add .
```

And again, we will check in with git

```
git status
```

```
On branch 1-create-a-readme
Your branch is up to date with 'origin/1-create-a-readme'.

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

Now that one file is marked as a new file and it is in the group “to be committed”. Git also tells us how to undo the thing we just did.

> **Try this yourself**
>
> Try making a change, adding it, then restoring it. Use git status to see what happens at each point

Next, we will commit the file. We use `git commit` for this. the `-m` option allows us to put our commit message dirctly on the line when we commit. Notice that unlike commiting on GitHub, we do not choose our branch with the `git commit` command. We have to be “on” that branch before the `git commit`.

```
git commit -m 'create readme closes #1'
```

Again, we use a closing keyword so that it will close the issue.

```
[1-create-a-readme c7375fa] create readme closes #1
 1 file changed, 3 insertions(+)
 create mode 100644 README.md
```

one more check

```
git status
```

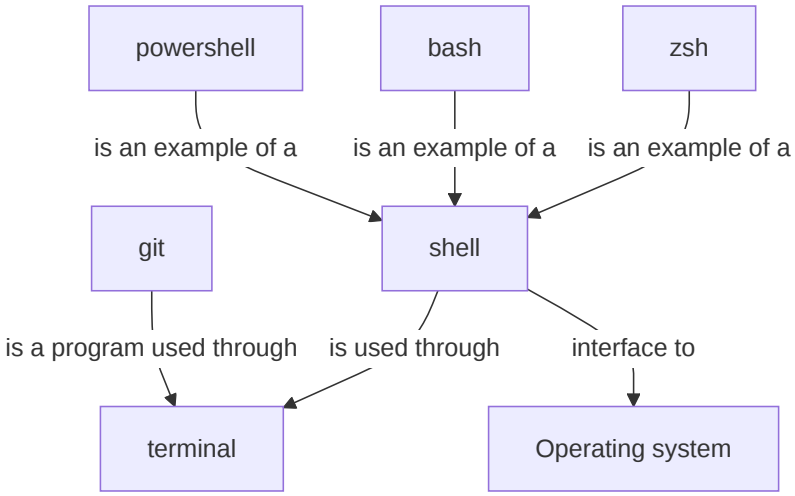
```
On branch 1-create-a-readme
Your branch is ahead of 'origin/1-create-a-readme' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
```

> **Warning**
>
> when you make your first commit you will need to do some config steps to set your email and user name.

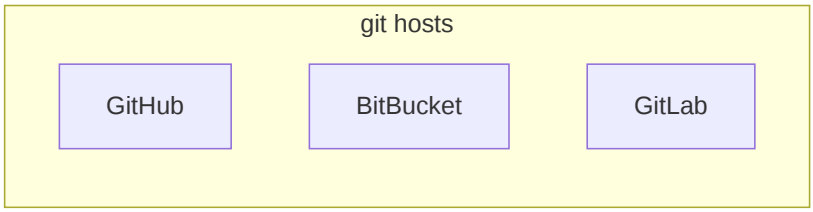
and push to send to gihub.com

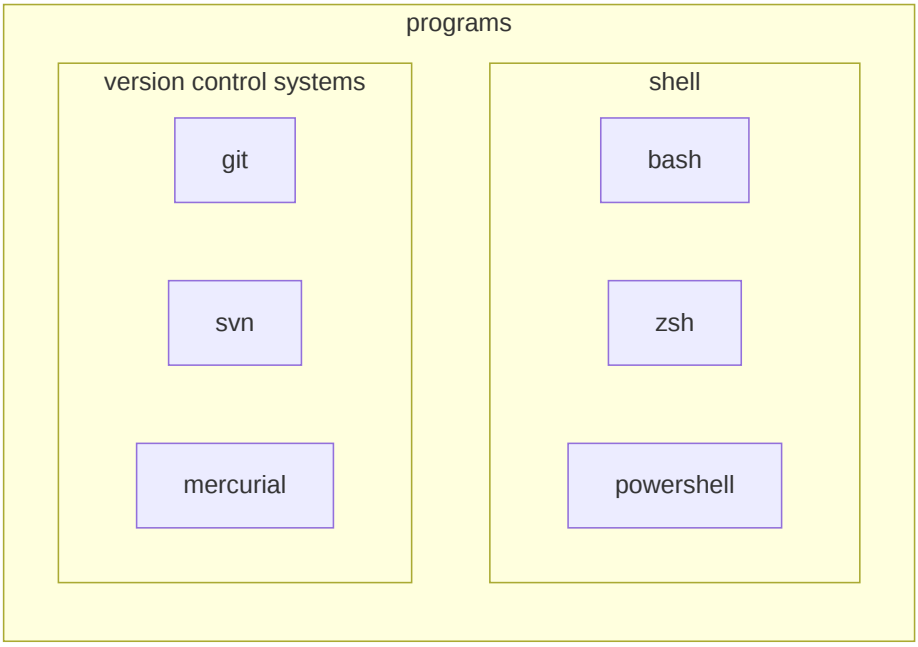
```
git push
```

```
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 353 bytes | 353.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/compsys-progtools/gh-inclass-brownsarahm.git
   0e7c990..c7375fa  1-create-a-readme -> 1-create-a-readme
```



Another way to think abut things (and adds some additional examples to help you differentiate between categories and examples of categories)





Today's bash commands:

command	explanation
`pwd`	print working directory
`cd <path>`	change directory to path
`mkdir <name>`	make a directory called name
`ls`	list, show the files
`touch`	create an empty file

We also learned some git commands

command	explanation
`status`	describe what relationship between the working directory and git
`clone <url>`	make a new folder locally and download the repo into it from url, set up a remote to url
`add  <file>`	add file to staging area
`commit -m 'message'`	commit using the message in quotes

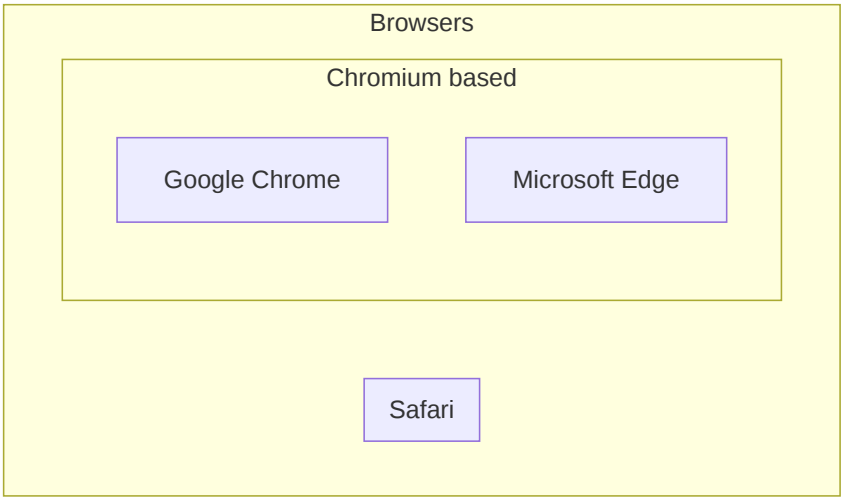
command	explanation
`push`	send to the remote

3.9. Prepare for Next Class

1. Find the glossary page for the course website, link it below. Review the terms for the next class: shell, terminal, bash, git, zsh, powershell, GitHub. Make a diagram using mermaid to highlight how these terms relate to one another. Put this in a file called `terminal-vocab.md` on a branch linked to this issue.
2. Check your kwl repo before class and see if you have recieved feedback, reply or merge accordingly.

3.10. Example

Example “venn diagram “ with mermaid subgraphs



3.11. Badges

Review | **Practice**

Any steps in a badge marked **lab** are steps that we are going to focus in on during the next lab time. Remember the goal of lab is to help you complete the work, not add additional work. The lab checkout will include some other tasks and then we will encourage you to work on this badge while we are there to help. Lab checkouts are checked only for completion though, not correctness, so steps of activities that we want you to really think about and revise if incorrect will be in a practice or review badge.

1. Read the notes. If you have any questions, post an issue on the course website repo.
2. Using your terminal, download your KWL repo. Include the command used in your badge PR.
3. Try using setting up git using your favorite IDE or GitHub Desktop. Make a file gitoffline.md and include some notes of how it went. Was it hard? easy? what did you figure out or get stuck on? Is the terminology consistent or does it use different terms?

4. **lab** Explore the difference between git add and git commit: try committing and pushing without adding, then add and push without committing. Describe what happens in each case in a file called gitcommit.md. Compare what happens based on what you can see on GitHub and what you can see with git status.

3.12. Experience Report Evidence

3.13. Questions After Today's Class

> **Warning**
>
> will be added

4. How do git branches work?

Today we are going to work with branches offline to begin to understand them better.

4.1. Git cheatsheets

High quality, correct refrences are important to gaining an understanding and being able to use tools well.

> **Important**
>
> Checking for factual information is not reliable in LLMs. They can be a helpful coding assistant when you know what you want, buut they generate text that cannot be fact checked.

- visual cheatsheet
- github cheatsheet in many languages
- complete official docs

We are going to work between the browser and locally in order to simulate scenarios that most often occur in collaboration, but can also occur working alone as well.

4.2. Back to the gh-inclass repo

Recall, We can move around and examine the computer's file structure using shell commands.

Open a new terminal window and navigate to your folder for the course (the one that contains other folders)

To confirm our current working directory we print it with `pwd`

```
pwd
```

```
/Users/brownsarahm
```

now change the path

```
cd Documents/inclass/systems/
```

then we can see what is there

```
ls
```

```
gh-inclass-brownsarahm
```

and finally go into the gh-inclass repo

```
cd gh-inclass-brownsarahm/
```

this confirms what we expect

Now let's see what is in our folder:

```
ls
```

```
README.md       about.md
```

and check in with git

```
git status
```

```
On branch 1-create-a-readme
Your branch is up to date with 'origin/1-create-a-readme'.

nothing to commit, working tree clean
```

4.3. Branches do not sync automatically

Now we will look in GitHub and see what is there.

getting to GitHub from your local system

the step below requires that you have the `gh` CLI.

```
gh repo view --web
```

```
Opening github.com/compsys-progtools/gh-inclass-brownsarahm in your browser.
```

Once we are in the browser, we created a PR for the readme branch then merged it.

Once we merge the PR, the closing keyword that was in our commit message applies. The closinng keyword did not apply on the non default branch, but it does once that commit is added to the default branch, which, in this repo is `main`.

```
git  status
```

```
On branch 1-create-a-readme
Your branch is up to date with 'origin/1-create-a-readme'.

nothing to commit, working tree clean
```

Now we go back to the main branch

```
git checkout main
```

```
Switched to branch 'main'
Your branch is up to date with 'origin/main'.
```

It thinks that we are up to date because it does not know about the changes to `origin/main` yet.

```
ls
```

```
about.md
```

the file is missing. It said it was up to date with origin main, but that is the most recent time we checked github only. It's up to date with our local record of what is on GitHub, not the current GitHub.

Next, we will update locally, with `git fetch`

```
git fetch
```

```
remote: Enumerating objects: 1, done.
remote: Counting objects: 100% (1/1), done.
remote: Total 1 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Unpacking objects: 100% (1/1), 911 bytes | 455.00 KiB/s, done.
From https://github.com/compsys-progtools/gh-inclass-brownsarahm
   0e7c990..0c12714  main       -> origin/main
```

Here we see 2 sets of messages. Some lines start with "remote" and other lines do not. The "remote" lines are what `git` on the GitHub server said in response to our request and the other lines are what `git` on your local computer said.

So, here, it counted up the content, and then sent it on GitHub's side. On the local side, it unpacked (remember git compressed the content before we sent it). It describes the changes that were made on the GitHub side, the main branch was

moved from one commit to another. So it then updates the local main branch accordingly (“Updating 6a12db0…caeacb5”).

We can see that if this updates the working directory too:

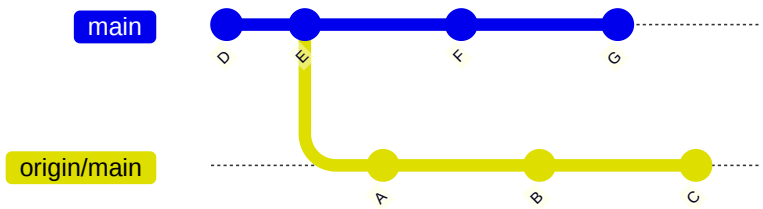
```
ls
```

no changes yet. `fetch` updates the .git directory so that git knows more, but does not update our local file system.

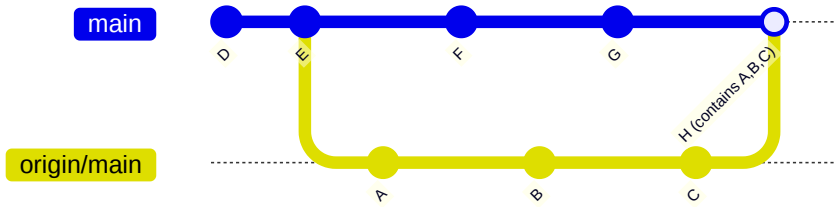
```
about.md
```

4.3.1. Git Merge

When branches need to be merged they could look like this:

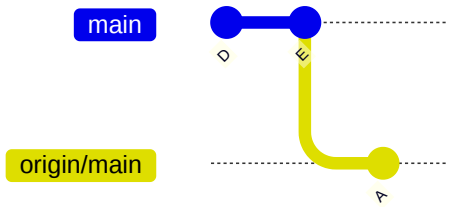


After merge, it looks like this:

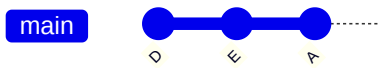


There is a new commit with the content.

In our case it is simpler:

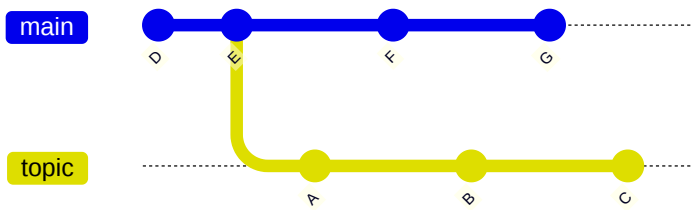


so it will fast forward

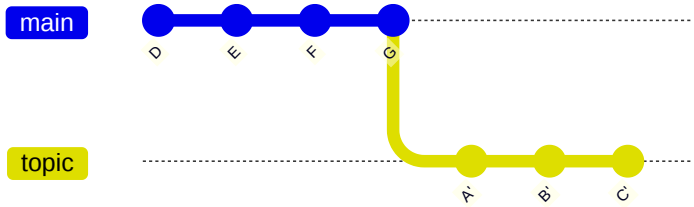


4.3.2. git rebase

If a repo is like this:



after:



4.4. Git Pull

remember git pull does:

1. `git fetch`
2. `git merge` (default, if possible) or `git rebase` (if settings or with option)

```
git pull
```

```
Updating 0e7c990..0c12714
Fast-forward
 README.md | 3 +++
 1 file changed, 3 insertions(+)
 create mode 100644 README.md
```

Now, we can check again

```
ls
```

```
README.md       about.md
```

and it looks as expected

4.5. Viewing Commit History

We can see commits with `git log`

```
git log
```

```
commit 0c1271483e62e69b8b3fc329203617b7093413df (HEAD -> main, origin/main, origin/HEAD)
Merge: 0e7c990 c7375fa
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Tue Sep 17 12:50:51 2024 -0400

    Merge pull request #4 from compsys-progtools/1-create-a-readme

    create readme closes #1

commit c7375faca0043cf3c233d705201851a10e4e53ac (origin/1-create-a-readme, 1-create-a-readme)
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Thu Sep 12 13:42:56 2024 -0400

    create readme closes #1

commit 0e7c990886ec282ba570b3400908ff46698e7dc0
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Thu Sep 12 13:21:42 2024 -0400

    start about file closes #3

commit 03733421ad69f816094fa62e3031a7703aa308e3
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Thu Sep 12 12:57:58 2024 -0400

    Initial commit
```

this is a program, we can use enter/down arrow to move through it and then `q` to exit.

4.6. making a new branch locally

We've used `git checkout` to switch branches before. To also create a branch at the same time, we use the `-b` option.

A few examples:

If we use `checkout` without `-b` and an unkown branch name,

```
git checkout my_branch_checkedout
```

```
error: pathspec 'my_branch_checkedout' did not match any file(s) known to git
```

it give us an error, this does not work

but with `-b` we can make the branch and switch at the same time.

```
git checkout -b my_branch_checkedoutb
```

```
Switched to a new branch 'my_branch_checkedoutb'
```

so we see it is done!

`create` does not exist

```
git branch create my_branch_create
```

```
fatal: not a valid object name: 'my_branch_create'
```

so it tried to treate create as a name and finds that as extra

This version gives us two new observations

```
git branch my_branch; git checkout my_branch
```

```
Switched to branch 'my_branch'
```

It switches, but does not say it's new. That is because it made the branch first, then switched.

The `;` allowed us to put 2 commands in one line.

We can view a list of branches:

```
git branch
```

```
  1-create-a-readme
  main
* my_branch
  my_branch_checkedoutb
```

or again look at the log

```
git log
```

```
commit 0c1271483e62e69b8b3fc329203617b7093413df (HEAD -> my_branch, origin/main, origin/HEAD, my_branch_c
Merge: 0e7c990 c7375fa
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Tue Sep 17 12:50:51 2024 -0400

    Merge pull request #4 from compsys-progtools/1-create-a-readme

    create readme closes #1

commit c7375faca0043cf3c233d705201851a10e4e53ac (origin/1-create-a-readme, 1-create-a-readme)
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Thu Sep 12 13:42:56 2024 -0400

    create readme closes #1

commit 0e7c990886ec282ba570b3400908ff46698e7dc0
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Thu Sep 12 13:21:42 2024 -0400

    start about file closes #3

commit 03733421ad69f816094fa62e3031a7703aa308e3
Author: Sarah Brown <brownsarahm@uri.edu>
```

branches are pointers, so each one is located at a particular commit.

the `-r` option shows us the remote ones

```
git branch -r
```

```
  origin/1-create-a-readme
  origin/HEAD -> origin/main
  origin/main
```

First we'll go back to main

```
git checkout main
```

```
Switched to branch 'main'
Your branch is up to date with 'origin/main'.
```

We will make a branch for our next task.

```
git chckeout fun_fact
```

```
git: 'chckeout' is not a git command. See 'git --help'.

The most similar command is
        checkout
```

I made a typo, but it offers a hint.

then it works when we fix the typo

```
git checkout -b fun_fact
```

```
Switched to a new branch 'fun_fact'
```

4.7. Creating a Merge Conflict

```
nano about.md
```

we used the nano text editor. `nano` is simpler than other text editors that tend to be more popular among experts, `vim` and `emacs`. Getting comfortable with nano will get you used to the ideas, without putting as much burden on your memory. This will set you up to learn those later, if you need a more powerful terminal text editor.

this opens the nano program on the terminal. it displays reminders of the commands at the bottom of th screen and allows you to type into the file right away.

Add any fun fact on the line below your content. Then, write out (save), it will prompt the file name. Since we opened nano with a file name (`about.md`) specified, you will not need to type a new name, but to confirm it, by pressing enter/return.

```
cat about.md
```

```
# Sarah Brown

tenure year: 2027
- i skied competiively in hs
```

```
git status
```

```
On branch fun_fact
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:   about.md

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

```
git add about.md
```

```

```

```
git status
```

```
On branch fun_fact
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   about.md
```

we are going to do it without the `-m` on purpose here to learn how to fix it

```
git commit
```

```
[fun_fact 70759fd] add fun fact
 1 file changed, 1 insertion(+)
```

without a commit message it puts you in vim. Read the content carefully, then press `a` to get into ~insert~ mode. Type your message and/or uncomment the template.

When you are done use `escape` to go back to command mode, the ~insert~ at the bottom of the screen will go away. Then type `:wq` and press enter/return.

What this is doing is adding a temporary file with the commit message that git can use to complete your commit.

```
git log
```

```
commit 70759fda93a0b9c714a81f9de79df7fdfec3ab88 (HEAD -> fun_fact)
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Tue Sep 17 13:21:33 2024 -0400

    add fun fact

commit 0c1271483e62e69b8b3fc329203617b7093413df (origin/main, origin/HEAD, my_branch_checkedoutb, my_brar
Merge: 0e7c990 c7375fa
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Tue Sep 17 12:50:51 2024 -0400

    Merge pull request #4 from compsys-progtools/1-create-a-readme

    create readme closes #1

commit c7375faca0043cf3c233d705201851a10e4e53ac (origin/1-create-a-readme, 1-create-a-readme)
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Thu Sep 12 13:42:56 2024 -0400

    create readme closes #1

commit 0e7c990886ec282ba570b3400908ff46698e7dc0
Author: Sarah Brown <brownsarahm@uri.edu>
```

Now we will push to github.

```
git push
```

```
fatal: The current branch fun_fact has no upstream branch.
To push the current branch and set the remote as upstream, use

    git push --set-upstream origin fun_fact

To have this happen automatically for branches without a tracking
upstream, see 'push.autoSetupRemote' in 'git help config'.
```

It cannot push, because it does not know where to push, like we noted above that it did not comapre to origin, that was beecause it does not have an “upstream branch” or a corresponding branch on a remote server. It does not work at first because this branch does not have a remote.

To fix it, we do as git said.

```
git push --set-upstream origin fun_fact
```

```
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 8 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 317 bytes | 317.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: Create a pull request for 'fun_fact' on GitHub by visiting:
remote:      https://github.com/compsys-progtools/gh-inclass-brownsarahm/pull/new/fun_fact
remote:
To https://github.com/compsys-progtools/gh-inclass-brownsarahm.git
 * [new branch]      fun_fact -> fun_fact
branch 'fun_fact' set up to track 'origin/fun_fact'.
```

4.8. Merge conflicts

We are going to *intentionally* make a merge conflict here.

This means we are learning two things:

- what *not* to do if you can avoid it
- how to fix it when a merge conflict occurs

Merge conflicts are not **always** because someone did something wrong; it can be a conflict in the simplest term because two people did two types of work that were supposed to be independent, but turned out not to be.

First, in your browser edit the about.md file to have a second fun fact.

Then edit it locally to also have 2 fun facts.

```
nano about.md
```

```
```

```
cat about.md
```

```
# Sarah Brown

tenure year: 2027
- i skied competiively in hs
- i went to Northeastern
```

```
git pull
```

```
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 3 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
Unpacking objects: 100% (3/3), 973 bytes | 324.00 KiB/s, done.
From https://github.com/compsys-progtools/gh-inclass-brownsarahm
   70759fd..462402f  fun_fact   -> origin/fun_fact
Updating 70759fd..462402f
error: Your local changes to the following files would be overwritten by merge:
        about.md
Please commit your changes or stash them before you merge.
Aborting
```

It does not work because we have not committed.

This is helpful beacause it prevents us from losing any work.

```
git status
```

```
On branch fun_fact
Your branch is behind 'origin/fun_fact' by 1 commit, and can be fast-forwarded.
  (use "git pull" to update your local branch)

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:   about.md

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

we can add and commit at the same time using the `-a` option from the `git commit`

```
git commit -a -m 'local second fun fact'
```

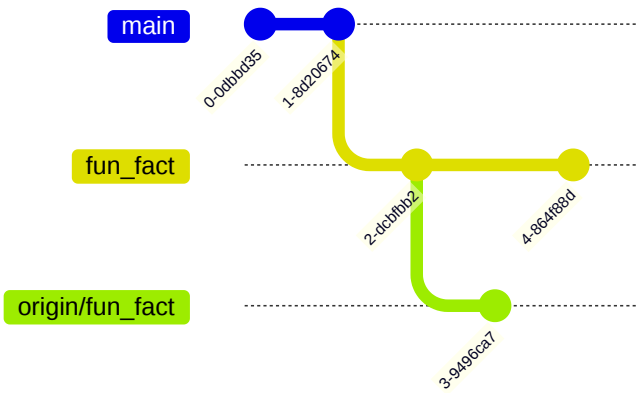
```
[fun_fact 62dcf61] local second fun fact
 1 file changed, 1 insertion(+)
```

Now we try to pull again

```
git pull
```

```
hint: You have divergent branches and need to specify how to reconcile them.
hint: You can do so by running one of the following commands sometime before
hint: your next pull:
hint:
hint:   git config pull.rebase false  # merge
hint:   git config pull.rebase true   # rebase
hint:   git config pull.ff only       # fast-forward only
hint:
hint: You can replace "git config" with "git config --global" to set a default
hint: preference for all repositories. You can also pass --rebase, --no-rebase,
hint: or --ff-only on the command line to override the configured default per
hint: invocation.
fatal: Need to specify how to reconcile divergent branches.
```

Now it cannot work because the branches have diverged. This illustrates the fact that our two versions of the branch `fun_fact` and `origin/fun_fact` are two separate things.



git gave us some options, we will use rebase which will apply our local commits *after* the remote commits.

```
git pull --rebase
```

```
Auto-merging about.md
CONFLICT (content): Merge conflict in about.md
error: could not apply 62dcf61... local second fun fact
hint: Resolve all conflicts manually, mark them as resolved with
hint: "git add/rm <conflicted_files>", then run "git rebase --continue".
hint: You can instead skip this commit: run "git rebase --skip".
hint: To abort and get back to the state before "git rebase", run "git rebase --abort".
hint: Disable this message with "git config advice.mergeConflict false"
Could not apply 62dcf61... local second fun fact
```

it gets most of it, but gets stopped at a conflict.

```
git status
```

```
interactive rebase in progress; onto 462402f
Last command done (1 command done):
   pick 62dcf61 local second fun fact
No commands remaining.
You are currently rebasing branch 'fun_fact' on '462402f'.
  (fix conflicts and then run "git rebase --continue")
  (use "git rebase --skip" to skip this patch)
  (use "git rebase --abort" to check out the original branch)

Unmerged paths:
  (use "git restore --staged <file>..." to unstage)
  (use "git add <file>..." to mark resolution)
        both modified:   about.md

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

this highlights what file the conflict is in

we can inspect this file

```
nano about.md
```

```
# Sarah Brown

tenure year: 2027
- i skied competiively in hs
<<<<<<< HEAD
- i started at uri in 2020
=======
- i went to Northeastern
>>>>>>> "local fun fact"
```

We have to manually edit it to be what we want it to be. We can take one change the other or both.

In this case, we will choose both, so my file looks like this in the end.

```
# Sarah Brown

tenure year: 2027
- i skied competiively in hs
- i started at uri in 2020
- i went to Northeastern
```

```
git status
```

```
interactive rebase in progress; onto 462402f
Last command done (1 command done):
   pick 62dcf61 local second fun fact
No commands remaining.
You are currently rebasing branch 'fun_fact' on '462402f'.
  (fix conflicts and then run "git rebase --continue")
  (use "git rebase --skip" to skip this patch)
  (use "git rebase --abort" to check out the original branch)

Unmerged paths:
  (use "git restore --staged <file>..." to unstage)
  (use "git add <file>..." to mark resolution)
        both modified:   about.md

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

Now, we do git add and commit

```
git commit -a -m 'keep both changes'
```

```
[detached HEAD c3e68a0] keep both changes
 1 file changed, 2 insertions(+)
```

and check again

```
git status
```

```
interactive rebase in progress; onto 462402f
Last command done (1 command done):
   pick 62dcf61 local second fun fact
No commands remaining.
You are currently editing a commit while rebasing branch 'fun_fact' on '462402f'.
  (use "git commit --amend" to amend the current commit)
  (use "git rebase --continue" once you are satisfied with your changes)

nothing to commit, working tree clean
```

Now, we follow the intructions again, and continue the rebase to combine our branches

```
git rebase --continue
```

```
Successfully rebased and updated refs/heads/fun_fact.
```

Once we rebase and everything is done, we can push.

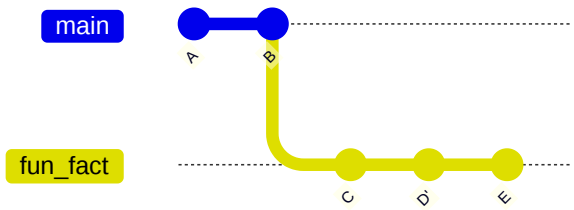
```
git push
```

```
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 8 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 309 bytes | 309.00 KiB/s, done.
Total 3 (delta 2), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://github.com/compsys-progtools/gh-inclass-brownsarahm.git
   462402f..c3e68a0  fun_fact -> fun_fact
```

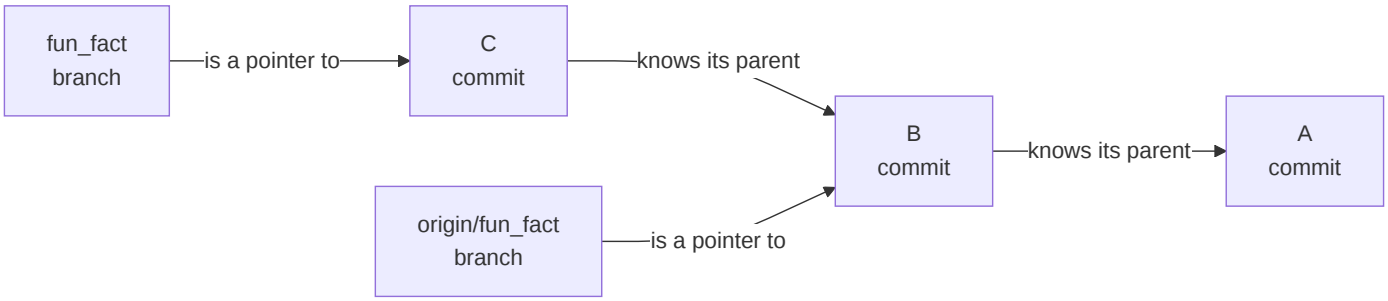
4.9. Summary

- branches do not synch automatically
- branches are pointers to commits
- every commit knows its parents
- if two different commits have the same parent, when we try to merge we will have divergent branches
- divergent branches can be merged by different strategies
- a merge conflict occurs if, when merging branches, a single file has been edited in two different ways

We often visualize git using graphs like subway maps:



However you can also think of what we learned today like this:



Over the next few weeks we will keep refining this understanding.

4.9.1. New bash commands

command	explanation
`cat`	concatenate a file to standard out (show the file contents)

4.9.2. New git commands

command	explanation
`git log`	show list of commit history
`git branch`	list branches in the repo
`git branch new_name`	create a `new_name` branch
`git checkout -b new_Name`	create a `new_name` branch and switch to it
`git pull`	apply or fetch and apply changes from a remote branch to a local branch

4.10. Prepare for Next Class

Examine an open source software project and fill in the template below in a file called software.md in your kwl repo on a branch that is linked to this issue. You do not need to try to understand how the *code* works for this exercise, but instead focus on how the repo is set up, what additional information is in there beyond the code. You may pick any mature open source project, meaning a project with recent commits, active PRs and issues, multiple contributors. In class we will have a discussion and you will compare what you found with people who examined a different project. Coordinate with peers (eg using the class discussion or in lab time) to look at different projects in order to discuss together in class.

```
## Software Reflection

Project : <markdown link to repo>

## README

<!-- what is in the readme? how well does it help you  -->

## Contents

<!-- denote here types of files (code, what languages, what other files) -->


## Automation

<!-- comment on what types of stuff is in the .github directory -->

## Documentation

<!-- what support for users? what for developers? code of conduct? citation? -->

## Hidden files and support
 <!-- What type of things are in the hidden files? who would need to see those files vs not? -->
```

Some open source projects if you do not have one in mind:

- pandas
- numpy
- GitHub CLI

- Rust language
- vs code
- Typescript
- Swift
- Jupyter book
- git-novice lesson

4.11. Badges

Review **Practice**

1. Create a merge conflict in your github in class repo and resolve it using your favorite IDE,. Describe how you created it, show the files, and describe how your IDE helps or does not help in ide_merge_conflict.md. Give advice for when you think someone should resolve a merge conflict manually vs using an IDE. (if you do not regulary use an, IDE, try VSCode)
2. Read more details about git branches(you can also use other resources) add branches.md to your KWL repo and describe how branches work, in your own words. Include one question you have about branches or one scenario you think they could help you with.

4.12. Experience Report Evidence

4.13. Questions After Today's Class

4.13.1. How do I know if everything I submitted was done properly, or see a grade of somesort. I know comments are left but sometimes when I check I don't really know if I did everything right.

If it's approved you completed the badge, if revisions are requested, then you need to revise.

Starting next week, we will learn how to produce a progress report.

4.13.2. Why wouldnt you just use vs code or git hub directly?

Using the terminal is generally faster once you learn it. It also allows you to write scripts.

Some things cannot be done in browser, plus when you are writing code you would be working outside of the browser.

4.13.3. How common are merging issues?

Merge conflicts are very common. It happens whenever a branch is edited in two places.

4.13.4. How can I merge the new branch locally, not from the website?

the `git merge` command

4.13.5. Is it possible to have more than one merge conflict on a line?

on a single line it will count it as a single conflict, because it counts by lines

4.13.6. What is the order of merge and rebase?

THey are two options for the same thing, but they put commits in a different order.

5. When do I get an advantage from git and bash?

so far we have used git and bash to accomplish familiar goals, and git and bash feel like just extra work for familiar goals.

Today, we will start to see why git and bash are essential skills: they give you efficiency gains and time traveling super powers (within your work, only, sorry)

5.1. Setting the stage

To prepare for today's class you examined an open source project.

We noticed that while the contents inside and the distribution of languages used as well as the specific code, or the *content* of the files was all different, a lot of the *organization* was similar.

Most had certain community health files and basic info files:

- `CONTRIBUTING`
- `CODE_OF_CONDUCT`
- `README.MD`
- `LICENSE`
- `GOVERNANCE.MD`

5.2. Important references

Use these for checking facts and resources.

- bash
- git

5.3. Setup

First, we'll go back to our github inclass folder, locally

```
cd gh-inclass-brownsarahm/
```

And confirm we are where we want to be

```
pwd
```

```
/Users/brownsarahm/Documents/inclass/systems/gh-inclass-brownsarahm
```

Next get the files for today's activity:

1. Find your PR that I opened for you today that has the title, "9/19 in class activity"
2. Mark it ready for review to change from draft
3. Merge it

> **Note**
>
> in the issue PR it has the info about draft PRs in a link

Now we pull to get the files locally:

```
git pull
```

```
remote: Enumerating objects: 20, done.
remote: Counting objects: 100% (20/20), done.
remote: Compressing objects: 100% (9/9), done.
remote: Total 19 (delta 1), reused 17 (delta 0), pack-reused 0 (from 0)
Unpacking objects: 100% (19/19), 2.47 KiB | 126.00 KiB/s, done.
From https://github.com/compsys-progtools/gh-inclass-brownsarahm
   0c12714..991ee65  main          -> origin/main
 * [new branch]      organizing_ac -> origin/organizing_ac
Already up to date.
```

Note how many things it got

and check out status

```
git status
```

```
On branch fun_fact
Your branch is up to date with 'origin/fun_fact'.

nothing to commit, working tree clean
```

we are still on fun_fact

5.4. How does git store information?

In class, I received the following question

> Why are we on the `fun_fact` branch, not `main`?

This is because of how a `branch` is implemented and how git runs.

Instead of storing important things in *variables* that only have scope of how long the program is **active** git stores its imporant information in *files* that it reads each time we run a command. All of git's data is in the `.git` directory.

```
ls .git
```

```
COMMIT_EDITMSG  ORIG_HEAD       description     info            packed-refs
FETCH_HEAD      REBASE_HEAD     hooks           logs            refs
HEAD            config          index           objects
```

We will learn more about these files later, but looking at one helps us answer the question

First we will look at the `HEAD` file

```
cat .git/HEAD
```

```
ref: refs/heads/fun_fact
```

`HEAD` is a pointer to the currently checked out branch.

The other files with `HEAD` in their name are similarly pointers to other references, named corresponding to other things.

Next we switch to main, since we want to be there for the files we merged anyway

```
git checkout main
```

```
Switched to branch 'main'
Your branch is behind 'origin/main' by 2 commits, and can be fast-forwarded.
  (use "git pull" to update your local branch)
```

Now we can look at the `HEAD` file again

```
cat .git/HEAD
```

```
ref: refs/heads/main
```

it changed! because one the the things that `git checkout` does is update the head pointer.

So `HEAD` is a pointer to the branch, but the branch is also a pointer to a commit

```
cat .git/refs/heads/main
```

```
0c1271483e62e69b8b3fc329203617b7093413df
```

that file has only the hash of a commit

Each of us will have a unique hash, we'll learn more about why for next week

but if we use `git log`

```
git log
```

Important

`git log` starts a program that you can exit with the `q` key.

The branch pointer matches the lastcommit where the HEAD and main pointers are. (`git log` also reads those files…)

```
commit 0c1271483e62e69b8b3fc329203617b7093413df (HEAD -> main, my_branch_checkedoutb, my_branch)
Merge: 0e7c990 c7375fa
Author: Sarah Brown <brownsarahm@uri.edu>
Date:   Tue Sep 17 12:50:51 2024 -0400
```

Note

This is truncated output for brevity

Now again, we can use git status

```
git status
```

```
On branch main
Your branch is behind 'origin/main' by 2 commits, and can be fast-forwarded.
  (use "git pull" to update your local branch)

nothing to commit, working tree clean
```

We're behind, so the files we merged into main are not here yet

```
ls
```

```
README.md       about.md
```

so, we will pull

```
git pull
```

```
Updating 0c12714..991ee65
Fast-forward
 API.md                 | 1 +
 CONTRIBUTING.md        | 1 +
 LICENSE.md             | 1 +
 _config.yml            | 1 +
 _toc.yml               | 1 +
 abstract_base_class.py | 1 +
 alternative_classes.py | 1 +
 example.md             | 1 +
 helper_functions.py    | 1 +
 important_classes.py   | 1 +
 philosophy.md          | 1 +
 scratch.ipynb          | 1 +
 setup.py               | 1 +
 tests_alt.py           | 1 +
 tests_helpers.py       | 1 +
 tests_imp.py           | 1 +
 tsets_abc.py           | 1 +
 17 files changed, 17 insertions(+)
 create mode 100644 API.md
 create mode 100644 CONTRIBUTING.md
 create mode 100644 LICENSE.md
 create mode 100644 _config.yml
 create mode 100644 _toc.yml
 create mode 100644 abstract_base_class.py
 create mode 100644 alternative_classes.py
 create mode 100644 example.md
 create mode 100644 helper_functions.py
 create mode 100644 important_classes.py
 create mode 100644 philosophy.md
 create mode 100644 scratch.ipynb
 create mode 100644 setup.py
 create mode 100644 tests_alt.py
 create mode 100644 tests_helpers.py
 create mode 100644 tests_imp.py
 create mode 100644 tsets_abc.py
```

5.5. Organizing a project (working with files)

A common question is about how to organize projects. While our main focus in this class session is the `bash` commands to do it, the *task* that we are going to do is to organize a hypothetical python project

Put another way, we are using organizing a project as the *context* to motivate practicing with bash commands for moving files.

A different way to learn this might be to through a slide deck that lists commands and describes what each one does and then have examples at the end. Instead, we are going to focus on organizing files, and I will introduce the commands we need along the ways.

next we are going to pretend we worked on the project and made a bunch of files

I gave a bunch of files, each with a short phrase in them.

- none of these are functional files
- the phrases mean you can inspect them on the terminal

> **Note**
>
> file extensions are for people; they do not specify what the file is actually written like

these are all *actually* plain text files

For example

```
cat API.md
```

```
jupyterbook file to generate api documentation
```

But our older files are as expected

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
```

> **Note**
>
> Here we talked about how those small files do not have a new line character at the end

> **Note**
>
> On Windows, students ge the warning about CRLF and LF
>
> There is setting in git that controls it. For a good explanation, consider this stack overflow question.-,How%20autocrlf%20works%3A,-core.autocrlf%3Dtrue) about how it works.
>
> GitHub also has a whole file on how to work with this.
>
> Wikipedia's history in the Newline article notes that the CRLF that Windows uses actually comes from the era of teletype machines. Unix adopted LF alone and Apple (pre OsX) used CR alone.
>
> more OSs are described in a table

5.5.1. How does `cat` work?

```
cat --help
```

```
cat: illegal option -- -
usage: cat [-belnstuv] [file ...]
```

it doesn't have a help option, but the error still gives us the beginning of its documentation. it says there are options we can provide `[-belnstuv]` and then we pass it a file `[file...]`

If we run it without an explicit file, it uses STDIN which we can see by trying it, or from its docs

```
cat
```

each time we type things into STDIN, it outputs that

```
lksdfldkfds
lksdfldkfds
^C
```

we can ust `CTRL` + `C` (`^C` means that is what I pressed) to exit.

5.6. Files, Redirects, git restore

we will work on a branch so that we can easily recover from any mistakes

```
git checkout -b organization
```

```
Switched to a new branch 'organization'
```

and check status to ensure we are where we want to be and note that no files have been changed

```
git status
```

```
On branch organization
nothing to commit, working tree clean
```

Let's review what is in the README

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
```

Echo repeats things we pass into it

```
echo "its finally fall"
```

```
its finally fall
```

since the `echo` program writes to the STDOUT file, we can change it to write to another file by redirecting it to another file.

```
echo "its finally fall" > README.md
```

```

```

There is no outut of this command

but we can look at the file

```
cat README.md
```

```
its finally fall
```

It wrote over. This would be bad, we lost content, but this is what git is for!

It is *very very* easy to undo work since our last commit.

This is good for times when you have something you have an idea and you do not know if it is going to work, so you make a commit before you try it. Then you can try it out. If it doesn't work you can undo and go back to the place where you made the commit.

As always we start by checking in

```
git status
```

```
On branch organization
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")
```

it gives us a reminder, `use "git restore <file>..." to discard changes in working directory`

So we do that:

```
git restore README.md
```

then check in with git again

```
git status
```

```
On branch organization
nothing to commit, working tree clean
```

and check the file

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
```

back as we wanted!

Typically, when we write to a file, in programming, we also have to tell it what *mode* to open the file with, and some options are:

- read
- write
- append

This could be familiar from:

- `fopen` in C
- or `open` in Python

References

- C language docs from IBM

- Python official docs

C is not an open source language in the typical sense so there is no "official" C docs

We can also **redirect** the contents of a command from stdout to a file in `bash`. Like file operations while programming there is a similar concept to this mode.

There are two types of redirects, like there are two ways to write to a file, more generally:

- overwrite (`>`)
- append (`>>`)
-

We can add contents to files with `echo` and `>>`

```
echo "its finally fall" >> README.md
```

```

```

Then we check the contents of the file and we see that the new content is there.

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
its finally fall
```

We can redirect other commands too:

```
git status > curgit
```

we see this created a new file

```
ls
```

```
API.md                  abstract_base_class.py  scratch.ipynb
CONTRIBUTING.md         alternative_classes.py  setup.py
LICENSE.md              curgit                  tests_alt.py
README.md               example.md              tests_helpers.py
_config.yml             helper_functions.py     tests_imp.py
_toc.yml                important_classes.py    tsets_abc.py
about.md                philosophy.md
```

and we can look at its contents too

```
cat curgit
```

```
On branch organization
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

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

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

this is not a file we actually want, which gives us a chance to learn another new bash command: `rm` for remove

```
rm curgit
```

Note that this is a true, full, and complete DELETE, this does not put the file in your recycling bin or the apple trash can that you can recover the file from, it is **gone** for real.

We will see soon a way around this, because git can help.

use `rm` with great care

```
git status
```

```
On branch organization
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")
```

Now we have made some changes we want, so let's commit our changes.

```
git commit -a -m "add a note"
```

```
[organization 72b85c7] add a note
 1 file changed, 1 insertion(+)
```

```
git status
```

```
On branch organization
nothing to commit, working tree clean
```

```
git status
```

Now we will add some text to the readme

```
echo "|file | contents |
> > | --| -- |
> > | abstract_base_class.py | core abstract classes for the project |
> > | helper_functions.py | utitly funtions that are called by many classes |
> > | important_classes.py | classes that inherit from the abc |
> > | alternative_classes.py | classes that inherit from the abc |
> > | LICENSE.md | the info on how the code can be reused|
> > | CONTRIBUTING.md | instructions for how people can contribute to the project|
> > | setup.py | file with function with instructions for pip |
> > | test_abc.py | tests for constructors and methods in abstract_base_class.py|
> > | tests_helpers.py | tests for constructors and methods in helper_functions.py|
> > | tests_imp.py | tests for constructors and methods in important_classes.py|
> > | tests_alt.py | tests for constructors and methods in alternative_classes.py|
> > | API.md | jupyterbook file to generate api documentation |
> > | _config.yml | jupyterbook config for documentation |
> > | _toc.yml | jupyter book toc file for documentation |
> > | philosophy.md | overview of how the code is organized for docs |
> > | example.md | myst notebook example of using the code |
> > | scratch.ipynb | jupyter notebook from dev |" >> README.md
```

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
its finally fall
|file | contents |
> | --| -- |
> | abstract_base_class.py | core abstract classes for the project |
> | helper_functions.py | utitly funtions that are called by many classes |
> | important_classes.py | classes that inherit from the abc |
> | alternative_classes.py | classes that inherit from the abc |
> | LICENSE.md | the info on how the code can be reused|
> | CONTRIBUTING.md | instructions for how people can contribute to the project|
> | setup.py | file with function with instructions for pip |
> | test_abc.py | tests for constructors and methods in abstract_base_class.py|
> | tests_helpers.py | tests for constructors and methods in helper_functions.py|
> | tests_imp.py | tests for constructors and methods in important_classes.py|
> | tests_alt.py | tests for constructors and methods in alternative_classes.py|
> | API.md | jupyterbook file to generate api documentation |
> | _config.yml | jupyterbook config for documentation |
> | _toc.yml | jupyter book toc file for documentation |
> | philosophy.md | overview of how the code is organized for docs |
> | example.md | myst notebook example of using the code |
> | scratch.ipynb | jupyter notebook from dev |
```

this explains each file a little bit more than the name of it does. We see there are sort of 5 groups of files:

- about the project/repository
- code that defines a python module
- test code
- documentation
- extra files that “we know” we can delete.

We also learn something about bash: using the open quote `"` then you stay inside that until you close it. when you press enter the command does not run until after you close the quotes

Finally, we will commit the changes

```
git commit -a -m 'explain files'
```

```
[organization f17e276] explain files
 1 file changed, 19 insertions(+)
```

5.7. Summary

- stdout is a file, that is displayed on the terminal
- “moving” a file does not re-write the data to a different part of the disk, it updates its adress only
- the wildcard operator `*` allows us to use patterns with bash commands
- `touch` can accept a list of files
- bash lists are space delimited without any brackets
- the `.gitignore` file prevents files from being in your repo

5.7.1. New commands

command	explanation
`echo 'message'`	repeat ‘message’ to stdout
`>`	write redirect
`>>`	append redirect
`rm file`	remove (delete) `file`

5.7.2. New git commands

command	explanation
`git commit -a -m 'msg'`	the `-a` option adds modified files (but not untracked)

5.8. Prepare for Next Class

1. Bring git questions or scenarios you want to be able to solve to class on Thursday (in your mind or comment here if that helps you remember)
2. Try read and understand the workflow files in your KWL repo, the goal is not to be sure you understand *every* step, but to get an idea about the big picture ideas and just enough to complete the following. Try to modify files, on a prepare branch, so that your name is already filled in and `VioletVex` is already requested as a reviewer when your experience badge (inclass) action runs. We will give the answer in class, but especially **do not do this step on the main branch** it could break your action. Hints: Look for bash commands that we have seen before and `cp` copies a file.

5.9. Badges

Review | **Practice**

1. Update your KWL chart with the new items and any learned items.
2. Clone the course website. Append the commands used and the contents of your `fall2024/.git/config` to a terminal_review.md (hint: history outputs recent commands and redirects can work with any command, not only echo). Edit the README.md, commit, and try to push the changes. Describe what the error means and which GitHub Collaboration Feature you think would enable you to push? (answer in the `terminal_review.md`)

5.10. Experience Report Evidence

Save your history with:

```
history > activity-2024-09-19.md
```

5.11. Questions After Today's Class

5.11.1. Would using > and >> locally create a merge conflict if the edited file also has a merge to it on Github?

any edit to a file could create a merge conflict, so yes one wiht a redirect can

5.11.2. I would like to learn more about adding text into files, for example if you can add text in between specific lines when writing to a file

This requires more complex commands than we will use in class time, but it can be done with **`sed`**. A tutorial on this could be a good explore badge.

5.11.3. If I forgot to restore something for a couple of days and then chose to restore it a while later would I still be able to or is there a time limit to doing so?

There is not a *time* limit, but if you did other operations it can require different commands beside `restore`

5.11.4. Can bash be used to trigger cursor events like mouse clicks?

I do not think so, but a headless browser allows you to automate browser operations, including selecting things that are most typically done by users with a mouse click, because in the browser clickable things are labeled in other ways.

This is also a good explore option.

5.11.5. What is different between using echo or nano to add to a file?

Adding to a file with `echo` and a redirect is nice for adding small changes, but not extnsive changes or changes to the middle of a file. `nano` is a full text editor. In class today, `echo` was an easy way to demonstrate redirects, because it is so simple, but redirects are more powerful with more powerful commands.

5.11.6. A question that I have is about git pull, does it run git fetch beforehand to retrieve new content from the online repo Or is git pull just a completely different pocess to bring down content?

> … precisely, `git pull` runs `git fetch` with the given parameters and then depending on configuration options or command line flags, will call either `git rebase` or `git merge` to reconcile diverging branches.
>
> —official docs

example with diagrams in last class notes

5.11.7. How do I create a community badge?

instructions in syllabus

6. Patterns in git and bash

We will continue working in the `gh-inclass` repo

```
cd gh-inclass-brownsarahm/
```

We added a bunch of files so that we can orgaize them.

```
ls
```

```
API.md                  abstract_base_class.py  setup.py
CONTRIBUTING.md         alternative_classes.py  tests_alt.py
LICENSE.md              example.md              tests_helpers.py
README.md               helper_functions.py     tests_imp.py
_config.yml             important_classes.py    tsets_abc.py
_toc.yml                philosophy.md
about.md                scratch.ipynb
```

We left off on a dedicated branch with a clean working tree.

```
git status
```

```
On branch organization
nothing to commit, working tree clean
```

```
pwd
```

```
/Users/brownsarahm/Documents/inclass/systems/gh-inclass-brownsarahm
```

```
ls
```

```
API.md                  abstract_base_class.py  setup.py
CONTRIBUTING.md         alternative_classes.py  tests_alt.py
LICENSE.md              example.md              tests_helpers.py
README.md               helper_functions.py     tests_imp.py
_config.yml             important_classes.py    tsets_abc.py
_toc.yml                philosophy.md
about.md                scratch.ipynb
```

We put an overview in the README:

```
cat README.md
```

```
# GitHub Practice

Name: Sarah Brown
its finally fall
|file | contents |
> | --| -- |
> | abstract_base_class.py | core abstract classes for the project |
> | helper_functions.py | utitly funtions that are called by many classes |
> | important_classes.py | classes that inherit from the abc |
> | alternative_classes.py | classes that inherit from the abc |
> | LICENSE.md | the info on how the code can be reused|
> | CONTRIBUTING.md | instructions for how people can contribute to the project|
> | setup.py | file with function with instructions for pip |
> | test_abc.py | tests for constructors and methods in abstract_base_class.py|
> | tests_helpers.py | tests for constructors and methods in helper_functions.py|
> | tests_imp.py | tests for constructors and methods in important_classes.py|
> | tests_alt.py | tests for constructors and methods in alternative_classes.py|
> | API.md | jupyterbook file to generate api documentation |
> | _config.yml | jupyterbook config for documentation |
> | _toc.yml | jupyter book toc file for documentation |
> | philosophy.md | overview of how the code is organized for docs |
> | example.md | myst notebook example of using the code |
> | scratch.ipynb | jupyter notebook from dev |
```

6.1. Making a folder

First, we'll make a directory with `mkdir`

```
mkdir docs
```

next we will move a file there with `mv`

```
mv philosophy.md docs/
```

move takes 2 inputs: a source and destination.

we can see what happened

```
ls
```

```
API.md                  abstract_base_class.py  setup.py
CONTRIBUTING.md         alternative_classes.py  tests_alt.py
LICENSE.md              docs                    tests_helpers.py
README.md               example.md              tests_imp.py
_config.yml             helper_functions.py     tsets_abc.py
_toc.yml                important_classes.py
about.md                scratch.ipynb
```

```
ls docs/
```

```
philosophy.md
```

what this does is change the path of the file from `.../github-inclass-brownsarahm/philosophy.md` to `.../github-inclass-brownsarahm/docs/philosophy.md`

git does not quite understand though

```
git status
```

```
On branch organization
Changes not staged for commit:
  (use "git add/rm <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        deleted:    philosophy.md

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

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

it sees a missing file (thinks it is deleted) and a new folder

if we stage the folder, it will start tracking it

```
git add docs/
```

```
git status
```

```
On branch organization
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        new file:   docs/philosophy.md

Changes not staged for commit:
  (use "git add/rm <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        deleted:    philosophy.md
```

now it sees a new file and a deleted one

if we add everything

```
git add .
```

```
git status
```

```
On branch organization
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        renamed:    philosophy.md -> docs/philosophy.md
```

now it can tell we renamed

6.2. Undoing a change, only in git

let's first make change to the README

```
echo " ">>README.md
```

```
git status
```

```
On branch organization
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        renamed:    philosophy.md -> docs/philosophy.md

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
```

we can add the readme too

```
git add .
```

```
git status
```

```
On branch organization
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   README.md
        renamed:    philosophy.md -> docs/philosophy.md
```

If we decide to not put these two changes in the same commit, we can *unstage* the file without losing our changes with `restore` and its `--staged` option

```
git restore --staged README.md
```

```
git status
```

```
On branch organization
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        renamed:    philosophy.md -> docs/philosophy.md

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
```

Now only the philosophy change will be commited

Now we make that commit

```
git commit -m 'start organizing (move philosophy)'
```

```
[organization 9120d9d] start organizing (move philosophy)
 1 file changed, 0 insertions(+), 0 deletions(-)
 rename philosophy.md => docs/philosophy.md (100%)
```

Now we can see what git knows

```
git status
```

```
On branch organization
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")
```

and we will commit the README changes

W

I ch
here
one
read

```
git commi -a -m 'fill in description more (README)'
```

```
git: 'commi' is not a git command. See 'git --help'.

The most similar commands are
        commit
        column
        config
```

first I made a typo, but again, `git` tries to help

```
git commit -a -m 'fill in description more (README)'
```

```
[organization 4ceb150] fill in description more (README)
 1 file changed, 1 insertion(+)
```

now we have a clean working tree

```
git status
```

```
On branch organization
nothing to commit, working tree clean
```

6.3. Undoing a commit

We will start by looking at our commit history

```
git log
```

```
commit 4ceb1500582236e98bdb141116821a5857f75a76 (HEAD -> organization)
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Tue Sep 24 12:44:39 2024 -0400

    fill in description more (README)

commit 9120d9d88aa587e4ffda1ee9aa8c3dcf8f764f7e
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Tue Sep 24 12:44:06 2024 -0400

    start organizing (move philosophy)

commit f17e276f43e36a92dd6062cb9e2dae938870c38b
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Thu Sep 19 13:42:19 2024 -0400

    explain files

commit 72b85c7834afb148e1298c153a7bad423e995ce0
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Thu Sep 19 13:33:44 2024 -0400

    add a note

commit 991ee65fa0d0692bd097915daec156aa95eba82f (origin/main, origin/HEAD, main)
```

> **Important**
>
> this opens a program so we press `q` to exit.

recall from the output above, that commit `9120d9` above was like:

```
[organization 9120d9d] start organizing (move philosophy)
 1 file changed, 0 insertions(+), 0 deletions(-)
 rename philosophy.md => docs/philosophy.md (100%)
```

it moved `philosophy.md` to `docs/philosophy.md` and

Now let's undo the organizing one, but keep the reame one my hash begins with `9120d9` so I pass that to `git revert` but you will pass a different hash

```
git revert 9120d9
```

git revert requires a message so vimwill open use `esc` to be sure you are in command mode then type `:wq` and press `enter`/`return` to exit vim

```
[organization a3904a0] Revert "start organizing (move philosophy)"
 1 file changed, 0 insertions(+), 0 deletions(-)
 rename docs/philosophy.md => philosophy.md (100%)
```

note that this is a new `commit, here hash` a3904a0 `and it does the **opposite** of the  one we reverted` 9120d9 `, so it moves` docs/philosphy.md `to` philosophy.md`

```
ls
```

```
API.md                  abstract_base_class.py  setup.py
CONTRIBUTING.md         alternative_classes.py  tests_alt.py
LICENSE.md              example.md              tests_helpers.py
README.md               helper_functions.py     tests_imp.py
_config.yml             important_classes.py    tsets_abc.py
_toc.yml                philosophy.md
about.md                scratch.ipynb
```

With the commit history we can see more clearly that it adds a new commit that is the opposite.

```
git log
```

```
commit a3904a0a5e7adbcbf9fe439c387fb4dbd7846c51 (HEAD -> organization)
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Tue Sep 24 12:46:19 2024 -0400

    Revert "start organizing (move philosophy)"

    This reverts commit 9120d9d88aa587e4ffda1ee9aa8c3dcf8f764f7e.

commit 4ceb1500582236e98bdb141116821a5857f75a76
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Tue Sep 24 12:44:39 2024 -0400

    fill in description more (README)

commit 9120d9d88aa587e4ffda1ee9aa8c3dcf8f764f7e
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Tue Sep 24 12:44:06 2024 -0400

    start organizing (move philosophy)

commit f17e276f43e36a92dd6062cb9e2dae938870c38b
Author: Sarah M Brown <brownsarahm@uri.edu>
Date:   Thu Sep 19 13:42:19 2024 -0400

    explain files
```

6.4. More moving files

```
ls
```

```
API.md                  abstract_base_class.py  setup.py
CONTRIBUTING.md         alternative_classes.py  tests_alt.py
LICENSE.md              example.md              tests_helpers.py
README.md               helper_functions.py     tests_imp.py
_config.yml             important_classes.py    tsets_abc.py
_toc.yml                philosophy.md
about.md                scratch.ipynb
```

we do actually want that folder so we make it again

```
mkdir docs
```

and move the file there

```
mv philosophy.md docs/
```

we can move more files more than one at a time by listing multiple paths it moves all but the last one to the last one, which must be a directory, not a file.

```
mv about.md API.md example.md docs/
```

we can see that it works

```
ls
```

```
CONTRIBUTING.md         alternative_classes.py  tests_alt.py
LICENSE.md              docs                    tests_helpers.py
README.md               helper_functions.py     tests_imp.py
_config.yml             important_classes.py    tsets_abc.py
_toc.yml                scratch.ipynb
abstract_base_class.py  setup.py
```

6.5. Moving with patterns

We can use the `*` wildcard operator to move all files that match the pattern. We'll start with the two `yml` (yaml) files that are both for the documentation.

```
mv *.yml docs/
```

again we use `ls` to see it

```
ls
```

```
CONTRIBUTING.md         docs                    tests_alt.py
LICENSE.md              helper_functions.py     tests_helpers.py
README.md               important_classes.py    tests_imp.py
abstract_base_class.py  scratch.ipynb           tsets_abc.py
alternative_classes.py  setup.py
```

and in the folder:

```
ls docs/
```

```
API.md          _toc.yml        example.md
_config.yml     about.md        philosophy.md
```

6.6. Move is also rename

We see that most of the test files start with `tests_` but one starts with `tsets_`. We can fix this!

We can use `mv` to change the name as well. This is because “moving” a file and is really about changing its path, not actually copying it from one location to another and the file name is a part of the path.

```
mv tsets_abc.py tests_abc.py
```

This changes the path from `.../tsets_abc.py` to `.../tests_abc.py` to. It is doing the same thing as when we use it to move a file from one folder to another folder, but changing a different part of the path.

Next we make a folder for them

```
mkdir tests
```

and move all of the test files there:

If we press `tab` multiple times it shows us what matches the pattern

```
mv tests
```

```
tests/            tests_alt.py      tests_imp.py
tests_abc.py      tests_helpers.py
```

the folder is in there, so if we were to do `mv tests* tests/` it would give us an error because the folder also matches `tests*`

If we add the `_`

```
mv tests_
```

now it’s only what we want to move:

```
tests_abc.py      tests_alt.py      tests_helpers.py  tests_imp.py
```

so we run this

```
mv tests_* tests/
```

```
ls
```

```
CONTRIBUTING.md         alternative_classes.py  scratch.ipynb
LICENSE.md              docs                    setup.py
README.md               helper_functions.py     tests
abstract_base_class.py  important_classes.py
```

```
ls tests/
```

```
tests_abc.py            tests_helpers.py
tests_alt.py            tests_imp.py
```

Finally, we wil move the rest of they python files

```
mkdir src
```

```
mv *_*.py
```

```
mv: important_classes.py is not a directory
```

without the target specified it tried to treat the last one as the destination and it did not work

```
mv *_*.py src/
```

```

```

```
ls
```

```
CONTRIBUTING.md README.md       scratch.ipynb   src
LICENSE.md      docs            setup.py        tests
```

6.7. Hidden files and Ignoring files

We are going to make a special hidden file and an extra one. We will use the following command:

```
touch .secret .gitignore
```

We also learn 2 things about `touch` and `bash`:

- `touch` can make multiple files at a time
- lists in `bash` are separated by spaces and do not require brackets

These files will not show by default

```
ls
```

```
CONTRIBUTING.md README.md       scratch.ipynb   src
LICENSE.md      docs            setup.py        tests
```

but do with thw `-a` option

```
ls -a
```

```
.               .github         CONTRIBUTING.md docs            src
..              .gitignore      LICENSE.md      scratch.ipynb   tests
.git            .secret         README.md       setup.py
```

gitignore lets us *not* track certain files

```
nano .gitignore
```

we will ignore the secret file and all notebook files

```
.secrete
*.ipynb
```

```
git status
```

```
On branch organization
Changes not staged for commit:
  (use "git add/rm <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        deleted:    API.md
        deleted:    _config.yml
        deleted:    _toc.yml
        deleted:    about.md
        deleted:    abstract_base_class.py
        deleted:    alternative_classes.py
        deleted:    example.md
        deleted:    helper_functions.py
        deleted:    important_classes.py
        deleted:    philosophy.md
        deleted:    tests_alt.py
        deleted:    tests_helpers.py
        deleted:    tests_imp.py
        deleted:    tsets_abc.py

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

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

again we will add all so that git can see we moved files

```
git add .
```

```
git status
```

```
On branch organization
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        new file:   .gitignore
        renamed:    API.md -> docs/API.md
        renamed:    _config.yml -> docs/_config.yml
        renamed:    _toc.yml -> docs/_toc.yml
        renamed:    about.md -> docs/about.md
        renamed:    example.md -> docs/example.md
        renamed:    philosophy.md -> docs/philosophy.md
        renamed:    abstract_base_class.py -> src/abstract_base_class.py
        renamed:    alternative_classes.py -> src/alternative_classes.py
        renamed:    helper_functions.py -> src/helper_functions.py
        renamed:    important_classes.py -> src/important_classes.py
        renamed:    tsets_abc.py -> tests/tests_abc.py
        renamed:    tests_alt.py -> tests/tests_alt.py
        renamed:    tests_helpers.py -> tests/tests_helpers.py
        renamed:    tests_imp.py -> tests/tests_imp.py
```

better !

and note that the .secret file is not in the list, git is *ignoring* it.

we will make a commit now

```
git commit -m 'organized files into foleders and ignore private'
```

```
[organization d2d1fac] organized files into foleders and ignore private
 15 files changed, 2 insertions(+)
 create mode 100644 .gitignore
 rename API.md => docs/API.md (100%)
 rename _config.yml => docs/_config.yml (100%)
 rename _toc.yml => docs/_toc.yml (100%)
 rename about.md => docs/about.md (100%)
 rename example.md => docs/example.md (100%)
 rename philosophy.md => docs/philosophy.md (100%)
 rename abstract_base_class.py => src/abstract_base_class.py (100%)
 rename alternative_classes.py => src/alternative_classes.py (100%)
 rename helper_functions.py => src/helper_functions.py (100%)
 rename important_classes.py => src/important_classes.py (100%)
 rename tsets_abc.py => tests/tests_abc.py (100%)
 rename tests_alt.py => tests/tests_alt.py (100%)
 rename tests_helpers.py => tests/tests_helpers.py (100%)
 rename tests_imp.py => tests/tests_imp.py (100%)
```

```
git status
```

```
On branch organization
nothing to commit, working tree clean
```

we can check the files too

```
ls -a
```

```
.               .github         CONTRIBUTING.md docs            src
..              .gitignore      LICENSE.md      scratch.ipynb   tests
.git            .secret         README.md       setup.py
```

we still have the file but git does nto see it

we can confirm by pushing

```
git push
```

```
fatal: The current branch organization has no upstream branch.
To push the current branch and set the remote as upstream, use

    git push --set-upstream origin organization

To have this happen automatically for branches without a tracking
upstream, see 'push.autoSetupRemote' in 'git help config'.
```

but we have to pair this branch to a remote

```
git push --set-upstream origin organization
```

```
Enumerating objects: 22, done.
Counting objects: 100% (22/22), done.
Delta compression using up to 8 threads
Compressing objects: 100% (18/18), done.
Writing objects: 100% (20/20), 2.55 KiB | 2.55 MiB/s, done.
Total 20 (delta 8), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (8/8), completed with 1 local object.
remote:
remote: Create a pull request for 'organization' on GitHub by visiting:
remote:      https://github.com/compsys-progtools/gh-inclass-brownsarahm/pull/new/organization
remote:
To https://github.com/compsys-progtools/gh-inclass-brownsarahm.git
 * [new branch]      organization -> organization
branch 'organization' set up to track 'origin/organization'.
```

in our browser we notice the file is not there, but the .ipynb file still is

let's try editing it

```
nano scratch.ipynb
```

and checkign with git

```
git status
```

```
On branch organization
Your branch is up to date with 'origin/organization'.

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:   scratch.ipynb

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

it is still tracking, because `.gitignore` does not remove files from tracking it only prevents tracking from starting

we can learn about git commands with `--help`

```
git rm --help
```

it is a program we exit with `q`

we want to remove it from git, but not delete it locally, so we use `--cached` option on `git rm`

```
git rm --cached scratch.ipynb
```

```
rm 'scratch.ipynb'
```

we can still see it

```
ls
```

```
CONTRIBUTING.md README.md       scratch.ipynb   src
LICENSE.md      docs            setup.py        tests
```

```
git status
```

```
On branch organization
Your branch is up to date with 'origin/organization'.

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        deleted:    scratch.ipynb
```

git thinks it is deleted

so we commit this

```
git commit -m 'stop tracking'
```

```
[organization 87c72ae] stop tracking
 1 file changed, 1 deletion(-)
 delete mode 100644 scratch.ipynb
```

now we can edit it more

```
echo "a change" >> scratch.ipynb
```

and check git

```
git status
```

```
On branch organization
Your branch is ahead of 'origin/organization' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
```

it dose not see!

```
echo "again change" >> scratch.ipynb
```

```
git status
```

```
On branch organization
Your branch is ahead of 'origin/organization' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
```

doesn't see it!

```
git push
```

```
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (2/2), 229 bytes | 229.00 KiB/s, done.
Total 2 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/compsys-progtools/gh-inclass-brownsarahm.git
   d2d1fac..87c72ae  organization -> organization
```

and we note that it is now removed online.

6.8. Copying a file

`cp` copies

```
cp README.md docs/overview.md
```

```
git status
```

```
On branch organization
Your branch is up to date with 'origin/organization'.

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

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

```
git add .
```

```

```

```
git commit -m 'include readmen content'
```

```
[organization 1e2ab92] include readmen content
 1 file changed, 24 insertions(+)
 create mode 100644 docs/overview.md
```

We discussed the solution to the prepare,

- edith `.templates/experience-refletion` for your name
- add `reviwers:VioletVex` at the end of `.github/workflows/experienceinclass.yml`

6.9. Prepare for Next Class

1. Think through and make some notes about what you have learned about design so far. Try to answer the questions below in `design_before.md`. If you do not now know how to answer any of the questions, write in what questions you have.

```
- What past experiences with making decisions about design of software do you have?
- what experiences studying design do you have?
- What processes, decisions, and practices come to mind when you think about designing software?
- From your experiences as a user, how you would describe the design of command line tools vs other GUI t
```

6.10. Badges

Review | **Practice**

3. **lab** Organize the provided messy folder in a Codepsace (details will be provided in lab time). Commit and push the changes. Answer the questions below in your kwl (this) repo in a file called `terminal_organization.md`
4. clone your `messy_repo` locally and append the `history.md` file to your `terminal_organization.md` using a redirect

```
# Terminal File moving reflection

1. How was this activity overall?
1. Did this get easier toward the end?
4. When do you think that using the terminal will be better than using your GUI file explorer?
5. What questions/challenges/ reflections do you have after this?
```

6.11. Experience Report Evidence

append your gh inclass `git log` and `history` from the abovce to a file `evidence-2024-09-24.md` on the branch in your `fall24-` repo

6.12. Questions After Today's Class

6.12.1. What are some other useful git bash commands to ensure safety in

removing, ignoring, moving, renaming, and making?

We have covered a lot of the *most* commonly used ones at this point. We will learn some more, but also looking up different people's bash or git cheatsheets is a good contribution to the site for a community badge. Comparing them extensively could be an explore badge

6.12.2. What are other special files in git?

Next week we will dig into how git works under the hood and that will see more

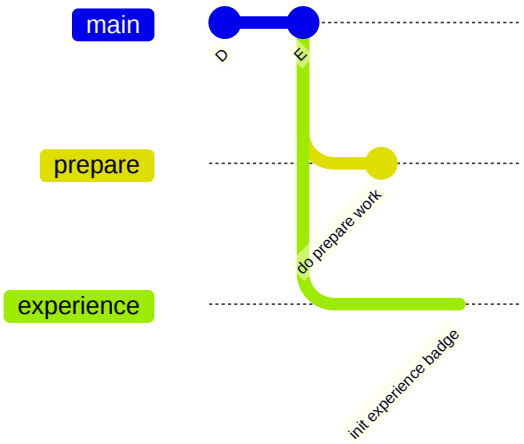
6.12.3. is .gitignore something standard from github or just a git bash thing?

it is standard to *git* no matter what host (github, bitbucket, gitlab) or terminal (mac termnial, gitbash, anaconda prompt) or shell (bash, zsh, powershell) you use.

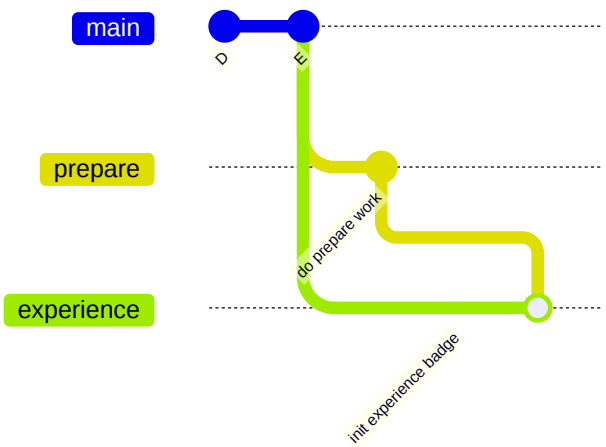
6.12.4. How do I combine pull requests

Pull requests compare two branches.

For example you might have



and have one PR from prepare to main and another from experience to main. If you change the base of the prepare one to be expereince and then merge it, then you have:



and everything will show in the experience PR

KWL Chart

Working with your KWL Repo

> **Important**
>
> The `main` branch should only contain material that has been reviewed and approved by the instructors.

1. Work on a specific branch for each activity you work on
2. when it is ready for review, create a PR from the item-specifc branch to `main`.
3. when it is approved, merge into main.

> **Ti**
>
> You
> on y

Minimum Rows

> **Warning**
>
> To be updated

Required Files

This lists the files for reference, but mostly you can keep track by badge issue checklists.

date	file	type
2024-09-10	brain.md	/_practice
2024-09-12	gitoffline.md	/_review
2024-09-12	gitoffline.md	/_practice
2024-09-17	branches.md	/_review
2024-09-17	branches-forks.md	/_practice
2024-09-19	terminal_review.md	/_review
2024-09-19	software.md	/_prepare
2024-09-24	terminal_organization_adv.md	/_practice
2024-09-26	software.md` about how that project adheres to and deviates from the unix philosophy. Be specific, using links to specific lines of code or specific sections in the documentation that support your claims. Provide at least one example of both adhering and deviating from the philosophy and three total examples (that is 2 examples for one side and one for the other). You can see what badge `software.md	/_practice

Team Repo

> **Warning**
>
> We will not use this in spring 2024

Contributions

Your team repo is a place to build up a glossary of key terms and a “cookbook” of “recipes” of common things you might want to do on the shell, bash commands, git commands and others.

For the glossary, follow the jupyterbook syntax.

For the cookbook, use standard markdown.

to denote code inline `use single backticks`

```
to denote code inline `use single backticks`
```

to make a code block use 3 back ticks

```
```
to make a code block use 3 back ticks
```
```

To nest blocks use increasing numbers of back ticks.

To make a link, `[show the text in squarebrackets](url/in/parenthesis)`

Collaboration

You will be in a “team” that is your built in collaboration group to practice using Git Collaboratively.
There will be assignments that are to be completed in that repo as well. These activities will be marked accordingly. You will take turns and each of you is required to do the initialization step on a recurring basis.

This is also where you can ask questions and draft definitions to things.

Peer Review

If there are minor errors/typos, suggest corrections inline.

In your summary comments answer the following:

- Is the contribution clear and concise? Identify any aspect of the writing that tripped you up as a reader.
- Are the statements in the contribution verifiable (either testable or cited source)? If so, how do you know they are correct?
- Does the contribution offer complete information? That is, does it rely on specific outside knowledge or could another CS student not taking our class understand it?
- Identify one strength in the contribution, and identify one aspect that could be strengthened further.

Choose an action:

- If the suggestions necessary before merging, select **request changes**.
- If it is good enough to merge, mark it **approved** and open a new issue for the broader suggestions.
- If you are unsure, post as a **comment** and invite other group members to join the discussion.

Review Badges

Review After Class

After each class, you will need to review the day’s material. This includes reviewing prismia chat to see any questions you got wrong and reading the notes. Review activities will help you to reinforce what we do in class and guide you to practice with the most essential skills of this class, they represent the minimum bar for C level work.

2024-09-05

related notes

Activities:

2024-09-12

related notes

Activities:

Any steps in a badge marked **lab** are steps that we are going to focus in on during the next lab time. Remember the goal of lab is to help you complete the work, not add additional work. The lab checkout will include some other tasks and then we will encourage you to work on this badge while we are there to help. Lab checkouts are checked only for completion though, not correctness, so steps of activities that we want you to really think about and revise if incorrect will be in a practice or review badge.

1. Read the notes. If you have any questions, post an issue on the course website repo.
2. Using your terminal, download your KWL repo. Include the command used in your badge PR.
3. Try using setting up git using your favorite IDE or GitHub Desktop. Make a file gitoffline.md and include some notes of how it went. Was it hard? easy? what did you figure out or get stuck on? Is the terminology consistent or does it use different terms?
4. **lab** Explore the difference between git add and git commit: try committing and pushing without adding, then add and push without committing. Describe what happens in each case in a file called gitcommit.md. Compare what happens based on what you can see on GitHub and what you can see with git status.

2024-09-12

related notes

Activities:

Any steps in a badge marked **lab** are steps that we are going to focus in on during the next lab time. Remember the goal of lab is to help you complete the work, not add additional work. The lab checkout will include some other tasks and then we will encourage you to work on this badge while we are there to help. Lab checkouts are checked only for completion though, not correctness, so steps of activities that we want you to really think about and revise if incorrect will be in a practice or review badge.

1. Read the notes. If you have any questions, post an issue on the course website repo.
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4. **lab** Explore the difference between git add and git commit: try committing and pushing without adding, then add and push without committing. Describe what happens in each case in a file called gitcommit.md. Compare what happens based on what you can see on GitHub and what you can see with git status.

2024-09-17

related notes

Activities:

1. Create a merge conflict in your github in class repo and resolve it using your favorite IDE,. Describe how you created it, show the files, and describe how your IDE helps or does not help in ide_merge_conflict.md. Give advice for when you think someone should resolve a merge conflict manually vs using an IDE. (if you do not regulary use an, IDE, try VSCode)
2. Read more details about git branches(you can also use other resources) add branches.md to your KWL repo and describe how branches work, in your own words. Include one question you have about branches or one scenario you think they could help you with.

2024-09-19

related notes

Activities:

1. Update your KWL chart with the new items and any learned items.
2. Clone the course website. Append the commands used and the contents of your `fall2024/.git/config` to a terminal_review.md (hint: history outputs recent commands and redirects can work with any command, not only echo). Edit the README.md, commit, and try to push the changes. Describe what the error means and which GitHub Collaboration Feature you think would enable you to push? (answer in the `terminal_review.md`)

2024-09-24

related notes

Activities:

3. **lab** Organize the provided messy folder in a Codepsace (details will be provided in lab time). Commit and push the changes. Answer the questions below in your kwl (this) repo in a file called `terminal_organization.md`
4. clone your `messy_repo` locally and append the `history.md` file to your `terminal_organization.md` using a redirect

```
# Terminal File moving reflection

1. How was this activity overall?
1. Did this get easier toward the end?
4. When do you think that using the terminal will be better than using your GUI file explorer?
5. What questions/challenges/ reflections do you have after this?
```

2024-09-26

related notes

Activities:

1. Read today's notes when they are posted. There are imporant tips and explanation to be sure you did.
2. Most real projects partly adhere and at least partly deviate from any major design philosophy or paradigm. Review the open source project you looked at for the `software.md` file from before and decide if it primarily adheres to or deviates from the unix philosophy. Add a `## Unix Philosophy <Adherance/Deviation>` section to your software.md, setting the title to indicate your decision and explain your decision in that section (pick one). Provide at least two specific examples supporting your choice, using links to specific lines of code or specific sections in the documentation that support your claims.

Prepare for the next class

These tasks are usually not based on material that we have already seen in class. Mostly they are to have you start thinking about the topic that we are *about* to cover before we do so. Often this will include reviewing related concepts that you should have learned in a previous course (like pointers from 211) Getting whatever you know about the topic fresh in your mind in advance of class helps your brain get ready to learn the new material more easily; brains learn by making connections.

Other times prepare tasks are to have you install things so that you can engage in the class.

The correct answer is not as important for these activities as it is to do them **before class**. We will build on these ideas in class. These are evaluated on completion only[1], but we may ask you questions or leave comments if appropriate, in that event you should reply and then we will approve.

2024-09-10

2024-09-17

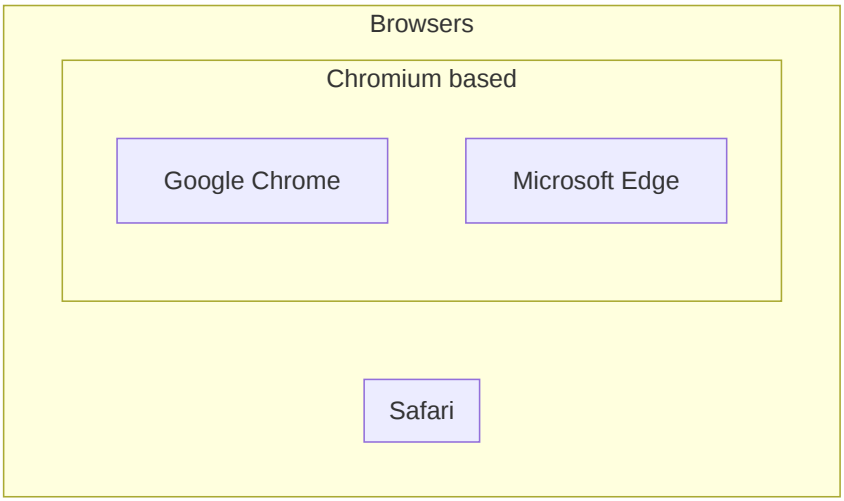
related notes

Activities:

1. Find the glossary page for the course website, link it below. Review the terms for the next class: shell, terminal, bash, git, zsh, powershell, GitHub. Make a diagram using mermaid to highlight how these terms relate to one another. Put this in a file called `terminal-vocab.md` on a branch linked to this issue.
2. Check your kwl repo before class and see if you have recieved feedback, reply or merge accordingly.

Example

Example "venn diagram " with mermaid subgraphs



2024-09-17

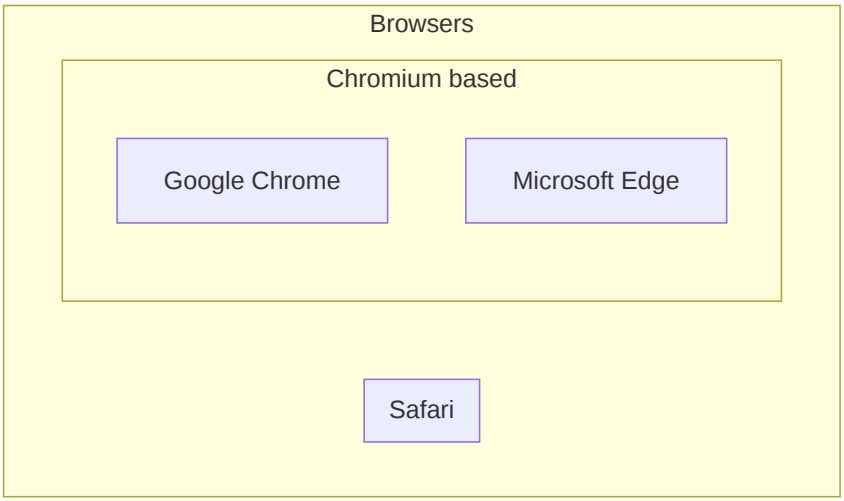
related notes

Activities:

1. Find the glossary page for the course website, link it below. Review the terms for the next class: shell, terminal, bash, git, zsh, powershell, GitHub. Make a diagram using mermaid to highlight how these terms relate to one another. Put this in a file called `terminal-vocab.md` on a branch linked to this issue.
2. Check your kwl repo before class and see if you have recieved feedback, reply or merge accordingly.

Example

Example “venn diagram “ with mermaid subgraphs



2024-09-19

related notes

Activities:

Examine an open source software project and fill in the template below in a file called software.md in your kwl repo on a branch that is linked to this issue. You do not need to try to understand how the *code* works for this exercise, but instead focus on how the repo is set up, what additional information is in there beyond the code. You may pick any mature open source project, meaning a project with recent commits, active PRs and issues, multiple contributors. In class we will have a discussion and you will compare what you found with people who examined a different project. Coordinate with peers (eg using the class discussion or in lab time) to look at different projects in order to discuss together in class.

```
## Software Reflection

Project : <markdown link to repo>

## README

<!-- what is in the readme? how well does it help you  -->

## Contents

<!-- denote here types of files (code, what languages, what other files) -->


## Automation

<!-- comment on what types of stuff is in the .github directory -->

## Documentation

<!-- what support for users? what for developers? code of conduct? citation? -->

## Hidden files and support
 <!-- What type of things are in the hidden files? who would need to see those files vs not? -->
```

Some open source projects if you do not have one in mind:

- pandas
- numpy
- GitHub CLI
- Rust language
- vs code
- Typescript
- Swift
- Jupyter book
- git-novice lesson

2024-09-24

related notes

Activities:

1. Bring git questions or scenarios you want to be able to solve to class on Thursday (in your mind or comment here if that helps you remember)

2. Try read and understand the workflow files in your KWL repo, the goal is not to be sure you understand *every* step, but to get an idea about the big picture ideas and just enough to complete the following. Try to modify files, on a prepare branch, so that your name is already filled in and `VioletVex` is already requested as a reviewer when your experience badge (inclass) action runs. We will give the answer in class, but especially **do not do this step on the main branch** it could break your action. Hints: Look for bash commands that we have seen before and `cp` copies a file.

2024-09-26

related notes

Activities:

1. Think through and make some notes about what you have learned about design so far. Try to answer the questions below in `design_before.md`. If you do not now know how to answer any of the questions, write in what questions you have.

```
- What past experiences with making decisions about design of software do you have?
- what experiences studying design do you have?
- What processes, decisions, and practices come to mind when you think about designing software?
- From your experiences as a user, how you would describe the design of command line tools vs other GUI t
```

2024-10-01

related notes

Activities:

1. Learn about hacktoberfest
2. check your plan for success PR for comments and reply or merge if approved
3. read about conventional commits and find some opinions about them in dev blogs, forums (eg reddit) or similar

---

[1] you will get full credit as long as all of the things are *done in good faith* even if not correct. However if it looks like you tried to outsource (eg to LLM) or plagiarize a solution, you will not earn credit for that.

Practice Badges

> **Note**
>
> these are listed by the date they were *posted*

Practice badges are a chance to first review the basics and then try new dimensions of the concepts that we cover in class. After each class, you will need to review the day's material. This includes reviewing prismia chat to see any questions you got wrong and reading the notes. The practice badge will also ask you to apply the day's material in a similar, but distinct way. They represent the minimum bar for B-level understanding.

2024-09-05

related notes

Activities:

1. accept this assignment and join the existing team to get access to more features in our course organization.
2. Post an introduction to your classmates on our discussion forum (include link to your comment in PR comment, must accept above to see)
3. Read the notes from today's class carefully
4. Create a profile readme and include a screenshot of your profile
5. Fill in the first two columns of your KWL chart (content of the PR; named to match the badge name)

2024-09-12

related notes

Activities:

Any steps in a badge marked **lab** are steps that we are going to focus in on during lab time. Remember the goal of lab is to help you complete the work, not add additional work. The lab checkout will include some other tasks and then we will encourage you to work on this badge while we are there to help. Lab checkouts are checked only for completion though, not correctness, so steps of activities that we want you to really think about and revise if incorrect will be in a practice or review badge.

1. Read the notes. If you have any questions, post an issue on the course website repo.
2. Using your terminal, download your KWL repo. Include the command used in your badge PR comment.
3. Try using setting up git using your favorite IDE or GitHub Desktop. Make a file gitoffline.md and include some notes of how it went. Was it hard? easy? what did you figure out or get stuck on? Is the terminology consistent or does it use different terms?
4. **lab** Explore the difference between git add and git commit: try committing and pushing without adding, then add and push without committing. Describe what happens in each case in a file called gitcommit_tips.md. Compare what happens based on what you can see on GitHub and what you can see with git status. Write a scenario with examples of how a person might make mistakes with git add and commit and what to look for to get unstuck.

2024-09-12

related notes

Activities:

Any steps in a badge marked **lab** are steps that we are going to focus in on during lab time. Remember the goal of lab is to help you complete the work, not add additional work. The lab checkout will include some other tasks and then we will encourage you to work on this badge while we are there to help. Lab checkouts are checked only for completion though, not

correctness, so steps of activities that we want you to really think about and revise if incorrect will be in a practice or review badge.

1. Read the notes. If you have any questions, post an issue on the course website repo.
2. Using your terminal, download your KWL repo. Include the command used in your badge PR comment.
3. Try using setting up git using your favorite IDE or GitHub Desktop. Make a file gitoffline.md and include some notes of how it went. Was it hard? easy? what did you figure out or get stuck on? Is the terminology consistent or does it use different terms?
4. **lab** Explore the difference between git add and git commit: try committing and pushing without adding, then add and push without committing. Describe what happens in each case in a file called gitcommit_tips.md. Compare what happens based on what you can see on GitHub and what you can see with git status. Write a scenario with examples of how a person might make mistakes with git add and commit and what to look for to get unstuck.

2024-09-17

related notes

Activities:

1. Create a merge conflict in your KWL repo on the branch for this issue and resolve it using your favorite IDE, then create one and resolve it on GitHub in browser (this requires the merge conflict to occur on a PR). Describe how you created it, show the files, and describe how your IDE helps or does not help in merge_conflict_comparison.md. Give advice for when you think someone should resolve a merge conflict in GitHub vs using an IDE. (if you do not regulary use an, IDE, try VSCode) *You can put content in the file for this step for the purpose of making the merge conflicts for this exercise.*
2. Learn about GitHub forks and more about git branches(you can also use other resources)
3. In branches-forks.md in your KWL repo, compare and contrast branches and forks; be specific about their relationship. You may use mermaid diagrams if that helps you think through or communicate the ideas. If you use other resources, include them in your file as markdown links.

2024-09-19

related notes

Activities:

1. Update your KWL chart with any learned items.
2. Get set up so that you can contribute to the course website repo from your local system. Note: you can pull from the `compsys-progtools/fall2024` repo, but you do not not have push permission, so there is more to do than clone. Append the commands used and the contents of your `fll2024/.git/config` to a git-remote-practice.md. Then, using a text editor (or IDE), wrap each log with three backticks to make them fenced code blocks and add headings to the sections.
3. learn about options for how git can display commit history. Try out a few different options. Choose two, write them both to a file (from the command line, not copy&paste), gitlog-compare.md. Then, using a text editor (or IDE), wrap each log with three backticks to make them fenced code blocks and then add text to the file describing a use case where that format in particular would be helpful.

4.

- Hint for working offline
  Read about forks and working with remotes.

2024-09-24

related notes

Activities:

badge steps marked **lab** are steps that you will be encouraged to use lab time to work on. For this one in particular, I am going to give you the messy repo in lab.

3. **lab** Organize the provided messy folder (details will be provided in lab time). Commit and push the changes. Clone that repo locally.
4. Organize a folder on your computer (good candidate may be desktop or downloads folder), using only a terminal to make new directories, move files, check what's inside them, etc. Answer reflection questions in a new file, terminal_organization_adv.md in your kwl repo. Tip: Start with a file explorer open, but then try to close it, and use only command line tools to explore and make your choices. If you get stuck, look up additional commands to do acomplish your goals.

```
# Terminal File moving reflection
1. How was this activity overall?
1. Did this get easier toward the end?
2. How was it different working on your own computer compared to the Codespace form?
3. Did you have to look up how to do anything we had not done in class?
4. When do you think that using the terminal will be better than using your GUI file explorer?
5. What questions/challenges/ reflections do you have after this?
6. Append all of the commands you used in lab below. (not from your local computer's history, from the co
```

2024-09-26

related notes

Activities:

1. Read today's notes when they are posted. There are imporant tips and explanation to be sure you did and ideas for explore/build badges.
2. Most real projects partly adhere and at least partly deviate from any major design philosophy or paradigm. Add a `## Unix Philosophy` section to your software.md about how that project adheres to and deviates from the unix philosophy. Be specific, using links to specific lines of code or specific sections in the documentation that support your claims. Provide at least one example of both adhering and deviating from the philosophy and three total examples (that is 2 examples for one side and one for the other). You can see what badge `software.md` was previously assigned in and the original instructions on the KWL file list.

KWL File List

Explore Badges

> **Warning**
>
> Explore Badges are not required, but an option for higher grades. The logistics of this could be streamlined or the instructions may become more detialed during the penalty free zone.

Explore Badges can take different forms so the sections below outline some options. This page is not a cumulative list of requirements or an exhaustive list of options.

> **Tip**
>
> You might get a lot of suggestions for improvement on your first one, but if you apply that advice to future ones, they will get approved faster.

How do I propose?

Create an issue on your kwl repo, label it explore, and “assign” @brownsarahm.

In your issue, describe the question you want to answer or topic to explore and the format you want to use. There is no real template for this, it can be as short as one sentence, but there may be follow up questions.

If you propose something too big, you might be advised to consider a build badge instead. If you propose something too small, you will get ideas as options for how to expand it and you pick which ones.

Where to put the work?

- If you extend a more practice exercise, you can add to the markdown file that the exercise instructs you to create.
- If its a question of your own, add a new file to your KWL repo.
- If you do the work elsewhere, log it like a community badge but in a file called `external_explore_badges.md`

> **Important**
>
> Either way, there must be a separate issue for this work that is also linked to your PR

What should the work look like?

It should look like a blog post, written tutorial, graphic novel, or visual aid with caption. It will likely contain some code excerpts the way the class notes do. Style-wise it can be casual, like how you may talk through a concept with a friend or a more formal, academic tone. What is important is that it clearly demonstrates that you understand the material.

The exact length can vary, but these must go beyond what we do in class in scope

Explore Badge Ideas:

- Extend a more practice:
  - for a more practice that asks you to describe potential uses for a tool, try it out, find or write code excerpts and examine them
  - for a more practice that asks you to try something, try some other options and compare and contrast them. eg “try git in your favorite IDE” -> “try git in three different IDEs, compare and contrast, and make recommendations for novice developers”
- For a topic that left you still a little confused or their was one part that you wanted to know more about. Details your journey from confusion or shallow understanding to a full understanding. This file would include the sources that you used to gather a deeper understanding. eg:
  - Describe how cryptography evolved and what caused it to evolve (i.e. SHA-1 being decrypted)
  - Learn a lot more about a specific number system
  - compare another git host
  - try a different type of version control
- Create a visual aid/memory aid to help remember a topic. Draw inspriation from Wizard Zines
- Review a reference or resource for a topic
- write a code tour that orients a new contributor to a past project or an open source tool you like.

Examples from past students:

- Scripts/story boards for tiktoks that break down course topics
- Visual aid drawings to help remember key facts

For special formatting, use jupyter book’s documentation.

Build Badges

Build may be individual or in pairs.

Proposal Template

If you have selected to do a project, please use the following template to propose a bulid

```
## < Project Tite >

<!-- insert a 1 sentence summary  -->

### Objectives

<!-- in this section describe the overall goals in terms of what you will learn and the problem you will

### Method

 <!-- describe what you will do , will it be research, write & present? will there be something you build

### Deliverables

<!-- list what your project will produce with target deadlines for each-->

### Milestones
```

The deliverables will depend on what your method is, which depend on your goals. It must be approved and the final submitted will have to meet what is approved. Some guidance:

- any code or text should be managed with git (can be GitHub or elsewhere)
- if you write any code it should have documentation
- if you do experiments the results should be summrized
- if you are researching something, a report should be 2-4 pages, plus unlimited references in the 2 column ACM format.

This guidance is generative, not limiting, it is to give ideas, but not restrict what you *can* do.

Updates and work in Progress

These can be whatever form is appropriate to your specific project. Your proposal should indicate what form those will take.

Summary Report

This summary report will be added to your kwl repo as a new file `build_report_title.md` where `title` is the (title or a shortened version) from the proposal. Use the template below for the summary report.

```
# <your project title> Summary Report

## Abstract
 <!-- a one paragraph "abstract" type overview of what your project consists of.  This should be written

## Reflection
 <!-- a one paragraph reflection that summarizes challenges faced and what you learned doing your project

## Artifacts

<!-- links to other materials required for assessing the project.  This can be a public facing web resour
```

Collaborative Build rules/procedures

- Each student must submit a proposal PR for tracking purposes. The proposal may be shared text for most sections but the deliverables should indicate what each student will do (or be unique in each proposal).
- the proposal must indicate that it is a pair project, if iteration is required, I will put those comments on both repos but the students should discuss and reply/edit in collaboration
- the project must include code reviews as a part of the workflow links to the PRs on the project repo where the code reviews were completed should be included in the reflection
- each student must complete their own reflection. The abstract can be written together and shared, but the reflection must be unique.

Build Ideas

General ideas to write a proposal for

- make a vs code extension for this class or another URI CS course
- port the courseutils to rust. crate clap is like the python click package I used to develop the course utils
- buld a polished documentation website for your CSC212 project with sphinx or another static site generator
- use version control, including releases on any open source side-project and add good contributor guidelines, README, etc

Auto-approved proposals

For these build options, you can copy-paste the template below to create your proposal issue and assign it to `@brownsarahm`.

For working alone there are two options, for working with a partner there is one.

212 Project Solo- Docs focus

Use this option if your team for your 212 project is not currently enrolled in this class or does not want to do a collaborative build. This version focuses on the user docs.

```
## 212 Project Doc & Developer onboarding

Add documentation website and developer onboarding information to your CSC 212 project.

### Objectives

<!-- in this section describe the overall goals in terms of what you will learn and the problem you will

This project will provide information for a user to use the data structure implemented for a CSC 212 proj

### Method

 <!-- describe what you will do , will it be research, write & present? will there be something you build
1. ensure there is API level documentation in the code files
1. build a documentation website using [jupyterbook/ sphinx/doxygen/] that includes setup instructions ar
1. configure the repo to automatically build the documentation website each time the main branch is updat


### Deliverables


- link to repo with the contents listed in method in the reflection file


### Milestones

<!-- give a target timeline -->
```

212 Project Solo- Developer focus

Use this option if your team for your 212 project is not currently enrolled in this class or does not want to do a collaborative build. This version focuses on the contributor experience.

```
## 212 Project Doc & Developer onboarding

Add documentation website and developer onboarding information to your CSC 212 project.

### Objectives

<!-- in this section describe the overall goals in terms of what you will learn and the problem you will

This project will provide information for a user to use the data structure implemented for a CSC 212 proj

### Method

 <!-- describe what you will do , will it be research, write & present? will there be something you build

1. ensure there is API level documentation in the code files
1. add a license, readme, and contributor file
1. add [code tours](https://marketplace.visualstudio.com/items?itemName=vsls-contrib.codetour) that help
1. set up a PR template
1. set up 2 issue templates: 1 for feature request and 1 for bug reporting


### Deliverables


- link to repo with the contents listed in method in the reflection file


### Milestones

<!-- give a target timeline -->
```

212 Project Pair

Use this option if your teammate for your 212 project is in this class and wants to do a collaborative build.

```
## 212 Project Doc & Developer onboarding

Add documentation website and developer onboarding information to your CSC 212 project.

### Objectives

<!-- in this section describe the overall goals in terms of what you will learn and the problem you will

This project will provide information for a user to use the data structure implemented for a CSC 212 proj

### Method

 <!-- describe what you will do , will it be research, write & present? will there be something you build
1. ensure there is API level documentation in the code files
1. build a documentation website using [jupyterbook/ sphinx/doxygen/] that includes setup instructions ar
1. configure the repo to automatically build the documentation website each time the main branch is updat
1. add [code tours](https://marketplace.visualstudio.com/items?itemName=vsls-contrib.codetour) that help
1. set up a PR template
1. set up 2 issue templates: 1 for feature request and 1 for bug reporting



### Deliverables


- link to repo with the contents listed in method in the reflection file


### Milestones

<!-- give a target timeline -->
```

Syllabus and Grading FAQ

How much does activity x weigh in my grade?

How do I keep track of my earned badges?

Also, when are each badge due, time wise?

Who should I request to review my work?

Will everything done in the penalty free zone be approved even if there are mistakes?

Once we make revisions on a pull request, how do we notify you that we have done them?

What should work for an explore badge look like and where do I put it?

Git and GitHub

I can’t push to my repository, I get an error that updates were rejected

My command line says I cannot use a password

Help! I accidentally merged the Badge Pull Request before my assignment was graded

For an Assignment, should we make a new branch for every assignment or do everything in one branch?

```
Doing each new assignment in its own branch is best practice. In a typical software development flow once
```

Other Course Software/tools

Courseutils

This is how your badge issues are created. It also has some other utilities for the course. It is open source and questions/issues should be posted to its issue tracker

Jupyterbook

Changing paths on windows

To edit a path on windows, go to the search bar and type ‘edit environment variables’, click the environment variable button, click on ‘path’ then new, then insert the new path

Avoiding windows security block

The closest thing to work around the security block is to exclude files, to exclude a file, take note of the file and know where to find it, go to windows security, virus protection and threat protection, scroll down to exclusions, add or exclude folders, then add the specific folder that is getting blocked

Glossary

> **Tip**
>
> Contributing glossary terms or linking to uses of glossary terms to this page is eligible for community badges

absolute path

the path defined from the root of the system

add (new files in a repository)

the step that stages/prepares files to be committed to a repository from a local branch

argument

input to a command line program

bash

bash or the bourne-again shell is the primary interface in UNIX based systems

bitwise operator

an operation that happens on a bit string (sequence of 1s and 0s). They are typically faster than operations on whole integers.

branch

a copy of the main branch (typically) where developmental changes occur. The changes do not affect other branches because it is isolated from other branches.

Compiled Code

code that is put through a compiler to turn it into lower level assemlby language before it is executed. must be compiled and re-executed everytime you make a change.

detached head

a state of a git repo where the head pointer is set to a commit without a branch also pointing to the commit

directory

a collection of files typically created for organizational purposes

divergent

git branches that have diverged means that there are different commits that have same parent; there are multipe ways that git could fix this, so you have to tell it what strategy to use

fixed point number

the concept that the decimal point does not move in the number. Cannot represent as wide of a range of values as a floating point number.

floating point number

the concept that the decimal can move within the number (ex. scientific notation; you move the decimal based on the exponent on the 10). can represent more numbers than a fixed point number.

git

a version control tool; it's a fully open source and always free tool, that can be hosted by anyone or used without a host, locally only.

GitHub

a hosting service for git repositories

.gitignore

a file in a git repo that will not add the files that are included in this .gitignore file. Used to prevent files from being unnecessarily committed.

git objects

FIXME something (a file, directory) that is used in git; has a hash associated with it

git Plumbing commands

low level git commands that allow the user to access the inner workings of git.

git Workflow

a recipe or recommendation for how to use Git to accomplish work in a consistent and productive manner

HEAD

a file in the .git directory that indicates what is currently checked out (think of the current branch)

merge

putting two branches together so that you can access files in another branch that are not available in yours

merge conflict

when two branches to be merged edit the same lines and git cannot automatically merge the changes

mermaid

mermaid syntax allows user to create precise, detailed diagrams in markdown files.

hash function

the actual function that does the hashing of the input (a key, an object, etc.)

hashing

transforming an input of arbitrary length to a unique fixed length output (the output is called a hash; used in hash tables and when git hashes commits).

integrated development environment

also known as an IDE, puts together all of the tools a developer would need to produce code (source code editor, debugger, ability to run code) into one application so that everything can be done in one place. can also have extra features such as showing your file tree and connecting to git and/or github.

interpreted code

code that is directly executed from a high level language. more expensive computationally because it cannot be optimized and therefore can be slower.

issue

provides the ability to easily track ideas, feedback, tasks, or bugs. branches can be created for specific issues. an issue is open when it is created. pull requests have the ability to close issues. see more in the docs

Linker

a program that links together the object files and libraries to output an executable file.

option

also known as a flag, a parameter to a command line program that change its behavior, different from an argument

path

the “location” of a file or folder(directory) in a computer

pointer

a variable that stores the address of another variable

pull (changes from a repository)

download changes from a remote repository and update the local repository with these changes.

pull request

allow other users to review and request changes on branches. after a pull request recieves approval you can merge the changed content to the main branch.

PR

short for pull request

push (changes to a repository)

to put whatever you were working on from your local machine onto a remote copy of the repository in a version control system.

relative path

the path defined **relative** to another file or the current working directory; may start with a name, includes a single file name or may start with `./`

release

a distribution of your code, related to a git tag

remote

a copy of the repository hosted on a server

repository

a project folder with tracking information in it in the form of a .git directory in it

ROM (Read-Only Memory)

Memory that only gets read by the CPU and is used for instructions

SHA 1

the hashing function that git uses to hash its functions (found to have very serious collisions (two different inputs have same hashes), so a lot of software is switching to SHA 256)

sh

abbr. see shell

shell

a command line interface; allows for access to an operating system

ssh

allows computers to safely connect to networks (such as when we used an ssh key to clone our github repos)

templating

templating is the idea of changing the input or output of a system. For instance, the Jupyter book, instead of outputting the markdown files as markdown files, displays them as HTML pages (with the contents of the markdown file).

terminal

a program that makes shell visible for us and allows for interactions with it

tree objects

type of git object in git that helps store multiple files with their hashes (similar to directories in a file system)

yml

see YAML

YAML

a file specification that stores key-value pairs. It is commonly used for configurations and settings.

zsh

zsh or z shell is built on top of the bash shell and contains new features

General Tips and Resources

This section is for materials that are not specific to this course, but are likely useful. They are not generally required readings or installs, but are options or advice I provide frequently.

on email

- how to e-mail professors

How to Study in this class

In this page, I break down how I expect learning to work for this class.

Begin a great programmer does not require memorizing all of the specific commands, but instead knowing the common patterns and how to use them to interpret others' code and write your own. Being efficient requires knowing how to use tools and how to let the computer do tedious tasks for you. This is how this course is designed to help you, but you have to get practice with these things.

Using reference materials frequently is a built in part of programming, most languages have built in help as a part of the language for this reason. These tools can help you when you are writing cod eand forget a specific bit of syntax, but these tools will not help you *read* code or debug environment issues. You also have to know how to effectively use these tools. Knowing the common abstractions we use in computing and recognizing them when they look a little bit differently will help you with these more complex tasks. Understanding what is common when you move from one environment to another or to This course is designed to have you not only learn the material, but also to build skill in learning to program. Following these guidelines will help you build habits to not only be successful in this class, but also in future programming.

Why this way?

Learning requires iterative practice. In this class, you will first get ready to learn by preparing for class. Then, in class, you will get a first experience with the material. The goal is that each class is a chance to learn by engaging with the ideas, it is to be a guided inquiry. Some classes will have a bit more lecture and others will be all hands on with explanation, but the goal is that you *experience* the topics in a way that helps you remember, because being immersed in an activity helps brains remember more than passively watching something. Then you have to practice with the material

Preparing for class will be activities that helpy ou bring your prior knowledge to class in the most helpful way, help me mee

You will be making a lot of documentation of bits, in your own words. You will be directed to try things and make notes. This based on a recommended practices from working devs to [keep a notebook]](https://blog.nelhage.com/2010/05/software-and-lab-notebooks/) or keep a blog and notebook.

A new bo
programı
Program
available
that linke

Learning in class

> **Important**
>
> My goal is to use class time so that you can be successful with *minimal frustration* while working outside of class time.

Programming requires both practical skills and abstract concepts. During class time, we will cover the practical aspects and introduce the basic concepts. You will get to see the basic practical details and real examples of debugging during class sessions. Learning to debug something you've never encountered before and setting up your programming environment, for example, are *high frustration* activities, when you're learning, because you don't know what you don't know. On the other hand, diving deeper into options and more complex applications of what you have already seen in class, while challenging, is something I'm confident that you can all be successful at with minimal frustration once you've seen basic ideas in class. My goal is that you can repeat the patterns and processes we use in class outside of class to complete assignments, while acknowledging that you will definitely have to look things up and read documentation outside of class.

Each class will open with some time to review what was covered in the last session before adding new material.

To get the most out of class sessions, you should have a laptop with you. During class you should be following along with Dr. Brown. You'll answer questions on Prismia chat, and when appropriate you should try running necessary code to answer those questions. If you encounter errors, share them via Prismia chat so that we can see and help you.

After class

After class, you should practice with the concepts introduced.
This means reviewing the notes: both yours from class and the annotated notes posted to the course website.
When you review the notes, you should be adding comments on tricky aspects of the code and narrative text between code blocks in markdown cells. While you review your notes and the annotated course notes, you should also read the documentation for new modules, libraries, or functions introduced in that class.

If you find anything hard to understand or unclear, write it down to bring to class the next day or post an issue on the course website.

GitHub Interface reference

This is an overview of the parts of GitHubt from the view on a repository page. It has links to the relevant GitHub documentation for more detail.

Top of page

The very top menu with the ⓘ logo in it has GitHub level menus that are not related to the current repository.

Repository specific page

Code | Issues | Pull Requests | Actions | Projects | Security | Insights | Settings

This is the main view of the project

Branch menu & info, file action buttons, download options (green code button)

File panel

the header in this area lists who made the last commit, the message of that commit, the short hash, date of that commit and the total number of commits to the project.

If there are actions on the repo, there will be a red x or a green check to indicate that if it failed or succeeded on that commit.

the header in this area lists who made the last commit, the message of that commit, the short hash, date of that commit and the total number of commits to the project.

If there are actions on the repo, there will be a red x or a green check to indicate that if it failed or succeeded on that commit. ^^^ file list: a table where the first column is the name, the second column is the message of the last commit to change that file (or folder) and the third column is when is how long ago/when that commit was made

README file

About has basic facts about the repo, often including a link to a documentation page

Releases, Packages, and Environments are optional sections that the repo owner can toggle on and off.

Releases mark certain commits as important and give easy access to that version. They are related to git tags

Packages are out of scope for this course. GitHub helps you manage distributing your code to make it easier for users.

Environments are a tool for dependency management. We will cover thigns that help you know how to use this feature indirectly, but probably will not use it directly in class. This would be eligible for a build badge.

The bottom of the right panel has information about the languages in the project

Language/Shell Specific References

- bash
- C
- Python

Bash commands

command	explanation
`pwd`	print working directory
`cd <path>`	change directory to path
`mkdir <name>`	make a directory called name
`ls`	list, show the files
`touch`	create an empty file
`echo 'message'`	repeat ‘message’ to stdout
`>`	write redirect
`>>`	append redirect
`rm file`	remove (delete) `file`
`cat`	concatenate a file to standard out (show the file contents)

git commands

command	explanation
`status`	describe what relationship between the working directory and git
`clone <url>`	make a new folder locally and download the repo into it from url, set up a remote to url
`add  <file>`	add file to staging area
`commit -m 'message'`	commit using the message in quotes
`push`	send to the remote
`git log`	show list of commit history
`git branch`	list branches in the repo
`git branch new_name`	create a `new_name` branch
`git checkout -b new_Name`	create a `new_name` branch and switch to it
`git pull`	apply or fetch and apply changes from a remote branch to a local branch
`git commit -a -m 'msg'`	the `-a` option adds modified files (but not untracked)

Getting Help with Programming

This class will help you get better at reading errors and understanding what they might be trying to tell you. In addition here are some more general resources.

Asking Questions

One of my favorite resources that describes how to ask good questions is this blog post by Julia Evans, a developer who writes comics about the things she learns in the course of her work and publisher of wizard zines.

Describing what you have so far

Stackoverflow is a common place for programmers to post and answer questions.
As such, they have written a good guide on creating a minimal, reproducible example.

Creating a minimal reproducible example may even help you debug your own code, but if it does not, it will definitely make it easier for another person to understand what you have, what your goal is, and what's working.

Getting Organized for class

The only **required** things are in the Tools section of the syllabus, but this organizational structure will help keep you on top of what is going on.

Your username will be appended to the end of of the repository name for each of your assignments in class.

File structure

I recommend the following organization structure for the course:

```
CSC3392
  |- kwl-
  |- gh-inclass
  |- semYYYY
  |- ...
```

This is one top level folder will all materials in it. A folder inside that for in class notes, and one folder per repository.

Please **do not** include all of your notes or your other assignments all inside your portflio, it will make it harder to grade.

Finding repositories on github

Each assignment repository will be created on GitHub with the `compsys-progtools` organization as the owner, not your personal acount. Since your account is not the owner, they do not show on your profile.

If you go to the main page of the organization you can search by your username (or the first few characters of it) and see only your repositories.

More info on cpus

Resource	Level	Type	Summary
What is a CPU, and What Does It Do?	1	Article	Easy to read article that explains CPUs and their use. Also touches on “buses” and GPUs.
Processors Explained for Beginners	1	Video	Video that explains what CPUs are and how they work and are assembled.
The Central Processing Unit	1	Video	Video by Crash Course that explains what the Central Processing Unit (CPU) is and how it works.

Windows Help & Notes

CRLF Warning

This is GitBash telling you that git is helping. Windows uses two characters for a new line `CR` (cariage return) and `LF` (line feed). Classic Mac Operating system used the `CR` character. Unix-like systems (including MacOS X) use only the `LF` character. If you try to open a file on Windows that has only `LF` characters, Windows will think it’s all one line. To help you,

since git knows people collaborate across file systems, when you check out files from the git database (`.git/` directory) git replaces `LF` characters with `CRLF` before updating your working directory.

When working on Windows, when you make a file locally, each new line will have `CRLF` in it. If your collaborator (or server, eg GitHub) runs not a unix or linux based operating system (it almost certainly does) these extra characters will make a mess and make the system interpret your code wrong. To help you out, git will automatically, for Windows users, convert `CRLF` to `LF` when it adds your work to the index (staging area). Then when you push, it's the compatible version.

git documentation of the feature