Class 1: Introduction to the environment & version control

Marcin Lewandowski

October 8, 2024

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2: Get you familiar with wonderful Julia package environment!

The very basics of Git & GitHub

Preparing directory

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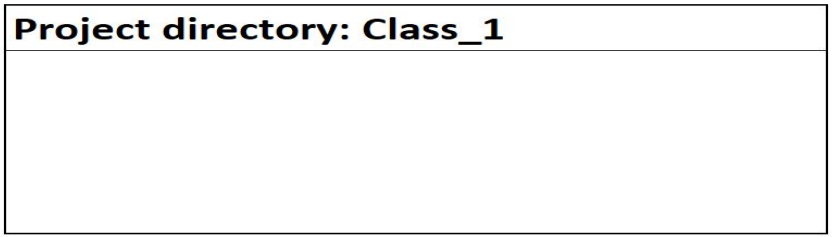
This scheme will now depict the state of our directory:



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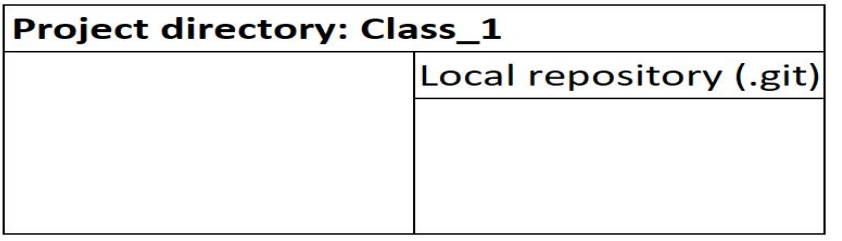

The key concepts of Git

There are four important areas to be aware of when you are working with Git:

- Local repository <- this one you already know
- Working directory
- Staging area
- Commit history

But before we begin...

Go to `https://github.com/` and create an account.

The working directory

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Project directory: Class_1	
Working directory	Local repository (.git)

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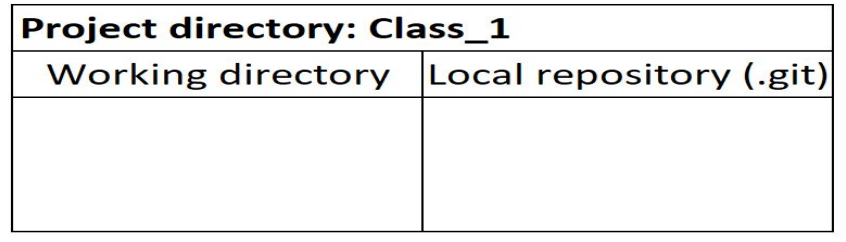

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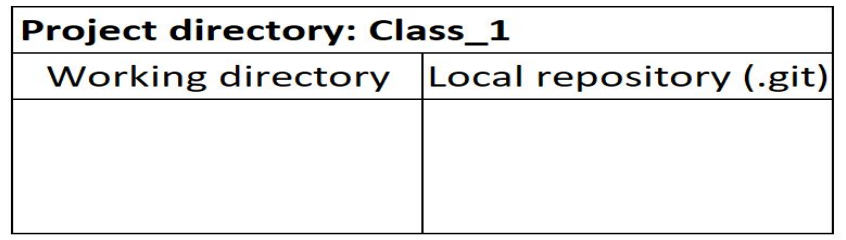
- It is where you add, edit, and delete files and directories.



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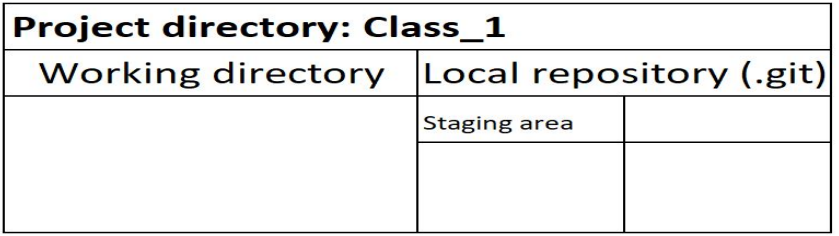

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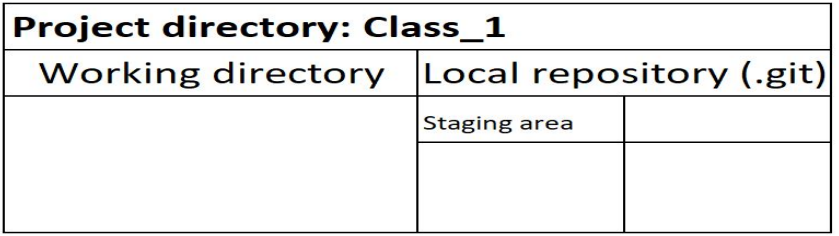

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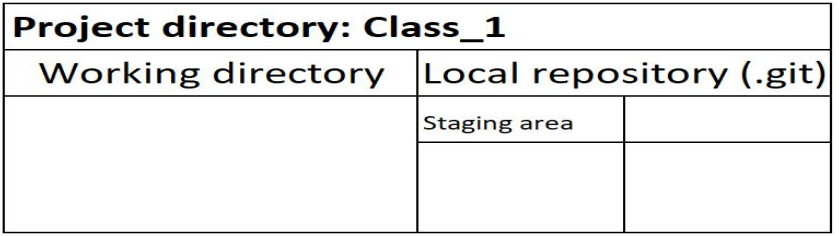

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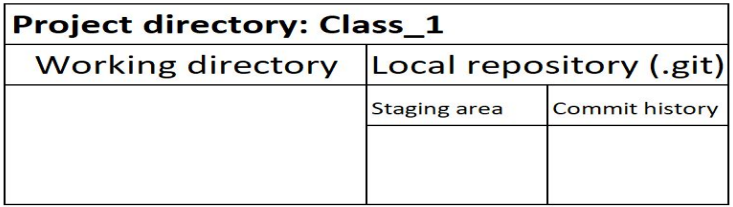

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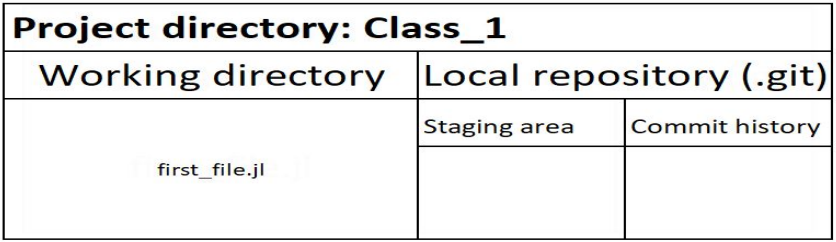

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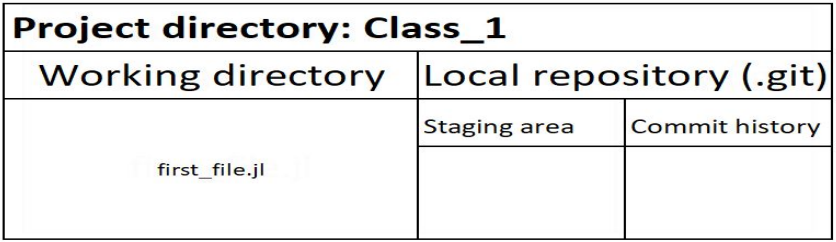

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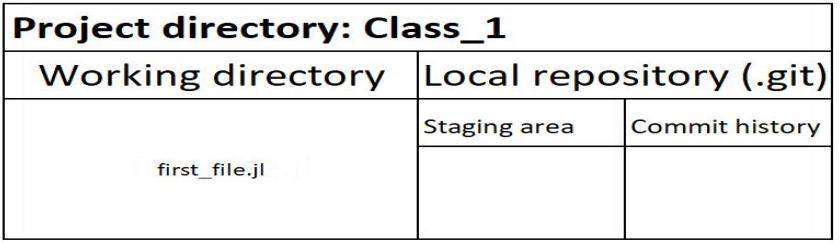

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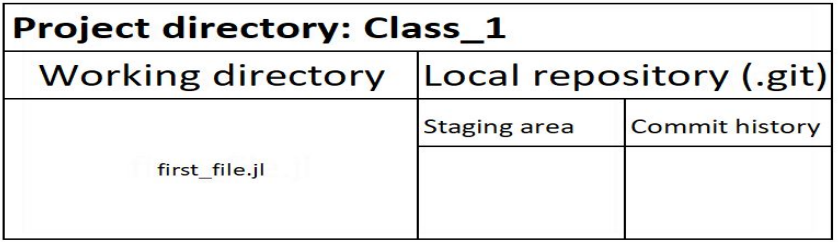

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- Once added to the staging area and committed it becomes a tracked file

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- The first_file.jl is now both in working directory & in the staging area!
- Adding files to the staging are does not move them, it *copies* them.

Making a commit 2

To make a commit means to save a version of a project!

It is good practice to add short message to your commit

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In git Branches "are movable pointers to commits". What does it mean!?

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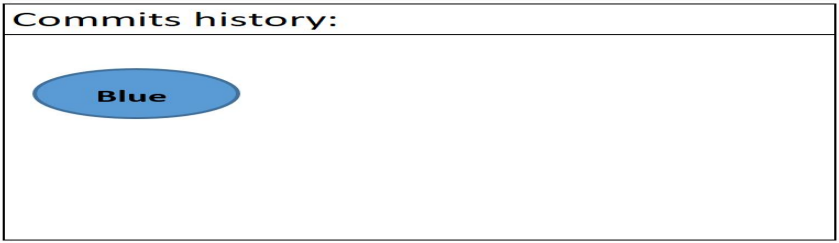
Let us understand branches through commits history



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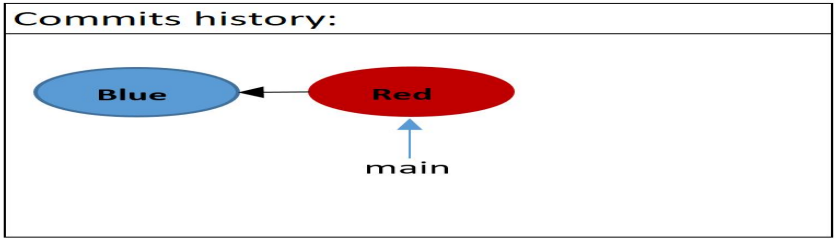

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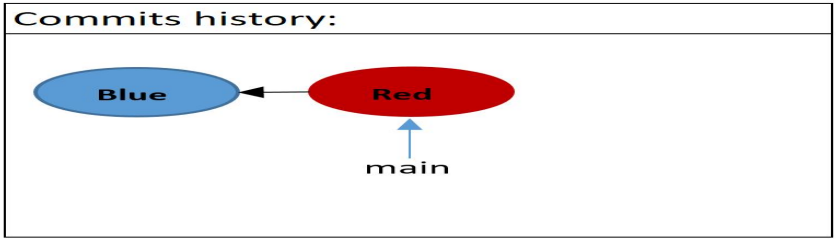

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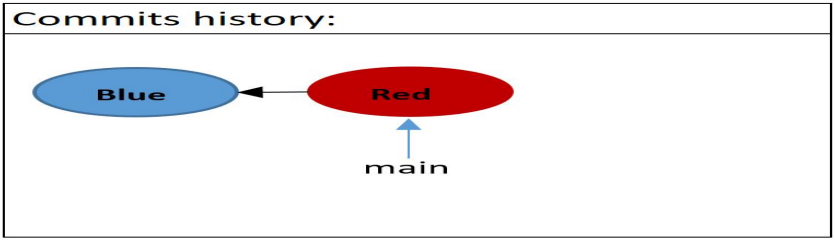

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- The main branch points to the red commit (*it is a pointer*).

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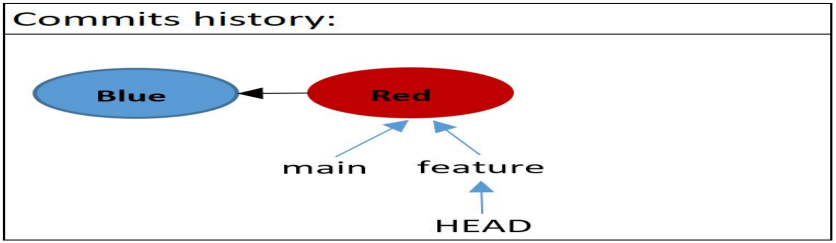

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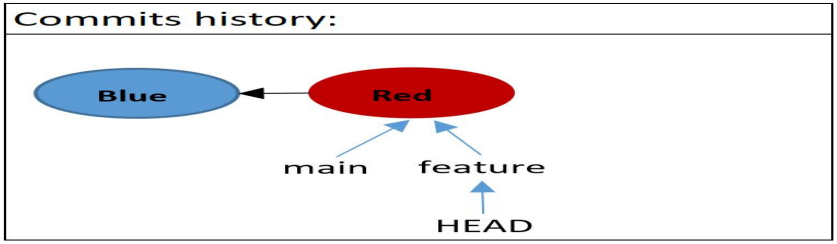

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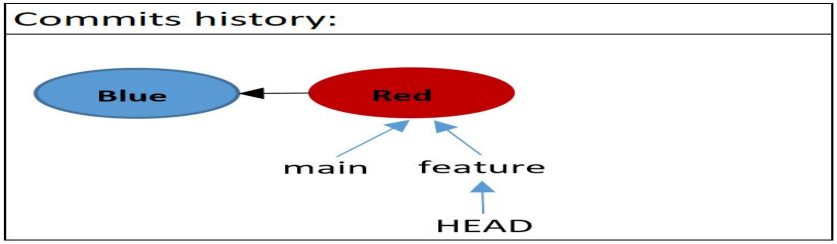

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- One can see it inspecting the HEAD file in .git folder!

Branches - "a versions of a project"

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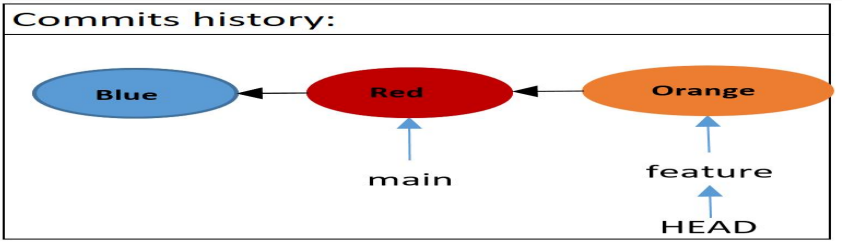

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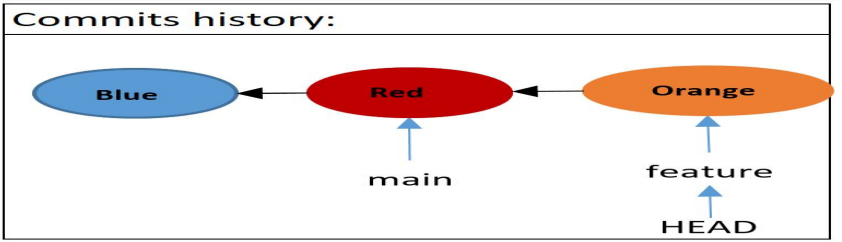

- The "feature" branch is now one commit ahead of main.
- We can switch between the branches!
- It changes the HEAD pointer to point to the branch you are switching onto.
- It populates the staging area with all the files that are part of the relevant commit.

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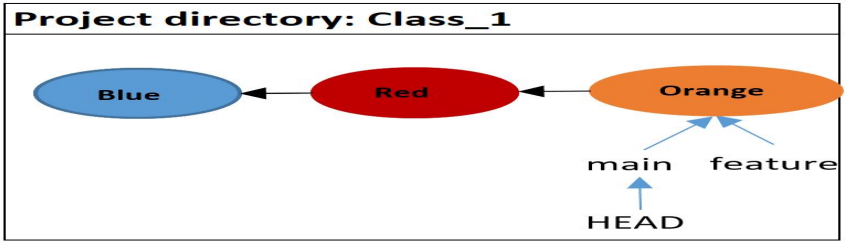
An example of a fast-forward merge:



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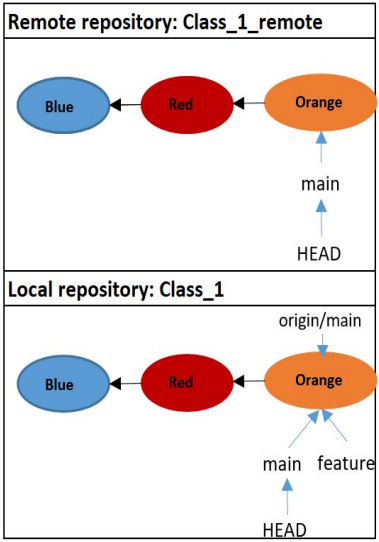

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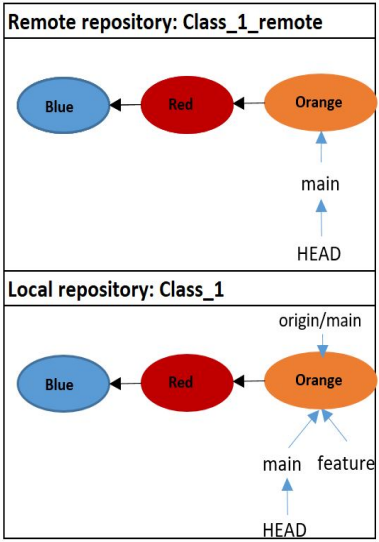

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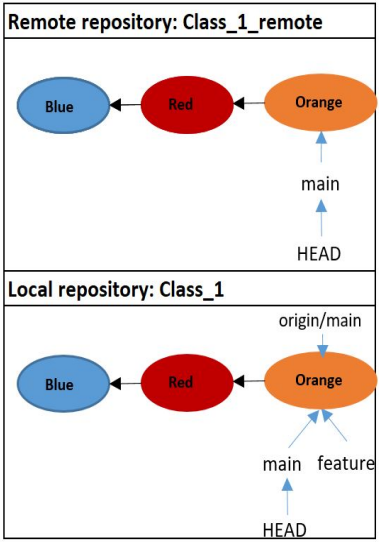

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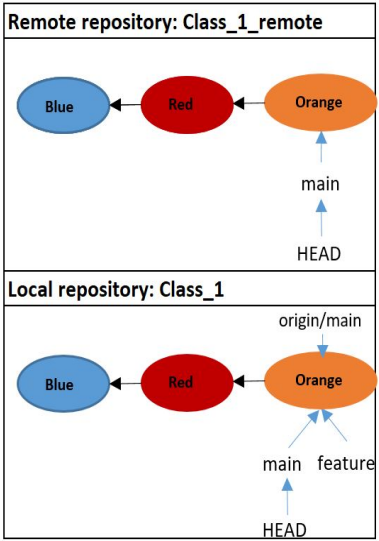
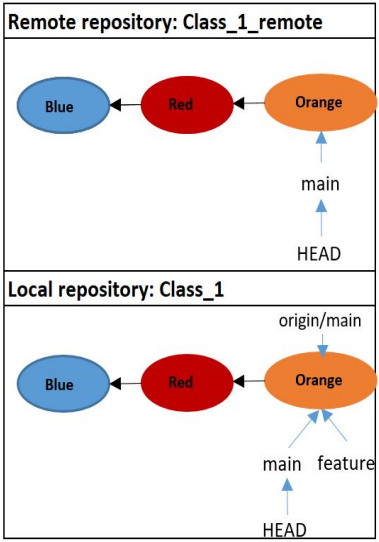
- Origin is the default shortname Git associates with a remote repository



Remote repositories

- Note: only the active branch was pushed!
- .git -> refs contents changed; local repository now has a "remote-tracking branch"
- Origin is the default shortname Git associates with a remote repository
- Now let's edit our first_file.jl in the remote repository and pull the changes!



Concept check!

In-class excercise:

1. Create a new file second_file.jl in our Class_1 folder, write a line of code.
2. Add the file to the staging area
3. Commit it with a proper message
4. Push those changes to the remote repository
5. Edit the second_file.jl in the remote repository
6. Pull changes from the remote repository

Back to the thre-way merges

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VS code has an extremely useful editor to deal with merge conflicts

You can simultaneously compare:

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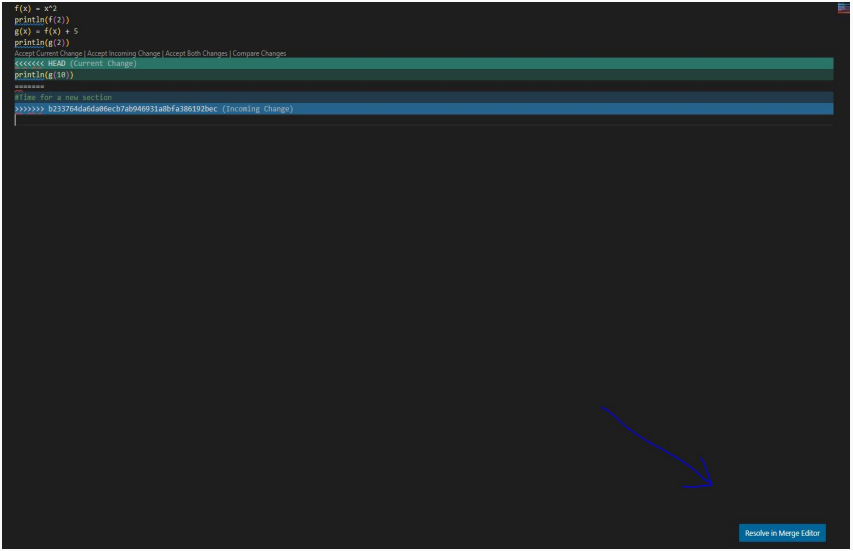
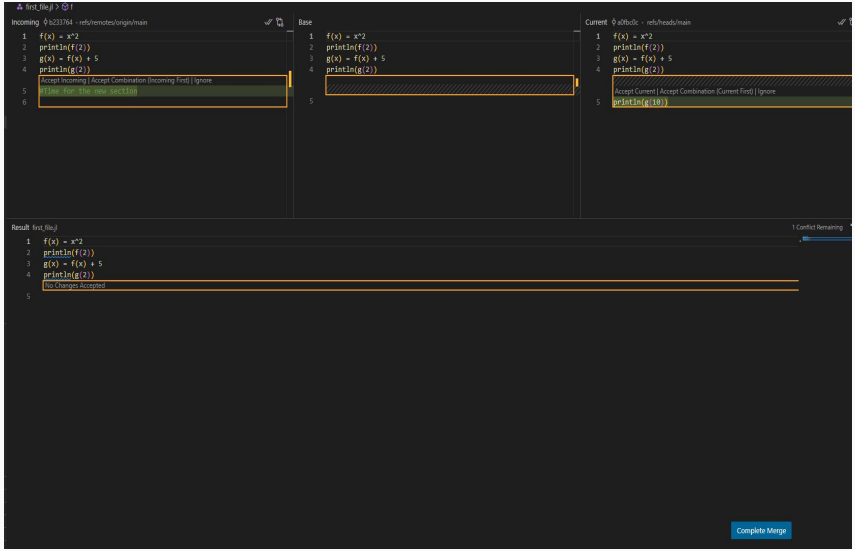
Simply click on the "Resolve in Merge Editor" button.
Then:

1. Track the number of remaining conflicts
2. Accept either current, incoming or keep the way code was written in base!

Go into Merge Editor



Conflict resolution view



Concept check!

Learn how to deal with the merge conflicts!

1. Edit second_file.jl in the remote repository.
2. Edit the second_file.jl (in the same place) locally, commit, push.
3. Integrate the changes in the local branch of the local repository (merge).
4. Push the commit with resolved conflicts to the remote repository.

Cloning the remote repository

Cloning is an essential part of collaborative process!

- In home you can clone the repository you created, make some changes, and push it.

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Here we want you to clone repository with the class materials.

Do not make any changes to your local class materials repository

It will create conflict as we update the materials (it will not be an issue for us, it will be an issue for you)

Possible workflow:

1. Clone official "Class materials" repository.

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Possible workflow:

1. Clone official "Class materials" repository.
2. Pull materials at the beginning of each class.

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Possible workflow:

1. Clone official "Class materials" repository.
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3. Create your own repository.

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Possible workflow:

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4. Copy the relevant scripts into your own "Class_materials" folder.

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Concept check: implement those steps right now!

Homework rules

You have to subimt it via Github!

1. Team-up in groups of 4/5 students
2. Create a repository for your group
3. Share the link with us via email!
4. Submit the homework in the repository

Additional resoruces:

1. There are a ton of online tutorials: e.g. `https://swcarpentry.github.io/git-novice/`
2. This class very closely follows the "Learning Git" book by Anna Skoulikari
3. For the resources in VS code specifically, see those short clips:
   - `https://www.youtube.com/watch?v=i_23KUAEtUM`
   - `https://www.youtube.com/watch?v=HosPml1qkrg`
4. And the entire playlist!

Setting up work environment: packages in Julia

The concept of a package

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To manage the latter we will use Julia fantastic Package manager.

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The relevant information about libraries and its dependencies is stored in the:

- Project.toml
- Manifest.toml

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- If you cloned the repo and want to download all the required packages use the "instantiate" command.

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Let's test "instantiate" command with the "Example" package.
`https://github.com/JuliaLang/Example.jl/blob/master/src/Example.jl`

Some other useful commands:

- status
  - Displays where the file managing the dependencies in this environment is located (Project.toml).
  - Displays which packages are installed in this environment.
- remove XYZ removes XYZ package from the environment.
- help in package manager mode gives you all the commands with short description
- "Backspace" KEY will return you from package manager to Julia REPL.

Let us now experiment with package manager in Julia!