

HOW TO use the hands-on material

- ✓ Introduction to *Jupyter Notebooks*
- ✓ Introduction to *Google Colab*
- ✓ Introduction to *GitHub*



Learning Goals

- ✓ Understand what a *Jupyter Notebook* is
- ✓ Use Jupyter Notebooks inside *Google Colab*
- ✓ Use Jupyter Notebooks to write and execute your code
- ✓ Use a *GitHub* repository

Prerequisites

- ✓ Know  python programming language

Introduction to Jupyter Notebooks

- The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain **live code, equations, visualizations and narrative text**. Uses include data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more (1)
- During the seminars, you are going to use Jupyter Notebooks to write interactive code in **Python** programming language, but many other languages are supported.
- To use Jupyter Notebooks you can:
 - Open them online by **Google Colaboratory** (2)

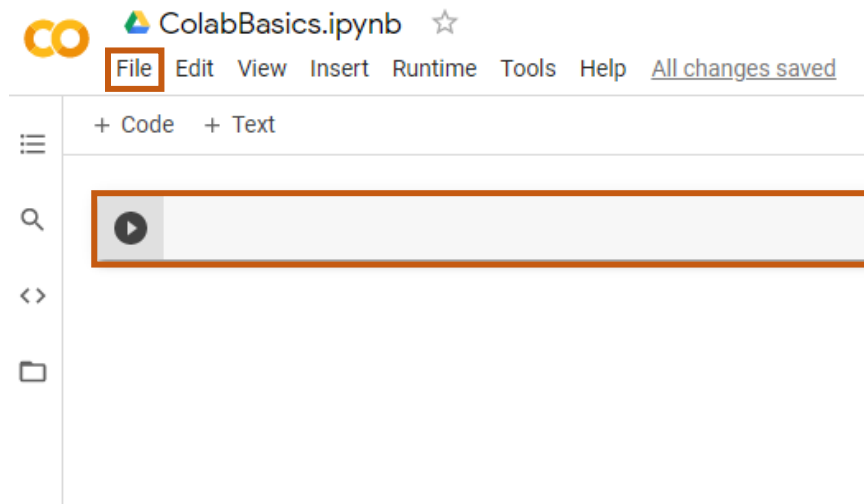
(1) <https://jupyter.org/>

(2) <https://colab.research.google.com/notebooks/intro.ipynb>

Introduction to



- Google Colaboratory (**Colab** for short) is an executable document that lets you write, run and share your code.
- **Colab is simply a Jupyter Notebook stored in Google Drive.**
- The great advantage of using Google Colab is that you do not need to install anything locally on your machine.
- Colab connects your code runtime to a cloud base runtime, enabling you to immediately use all Python libraries.



To create a new Colab notebook you can use the File menu.

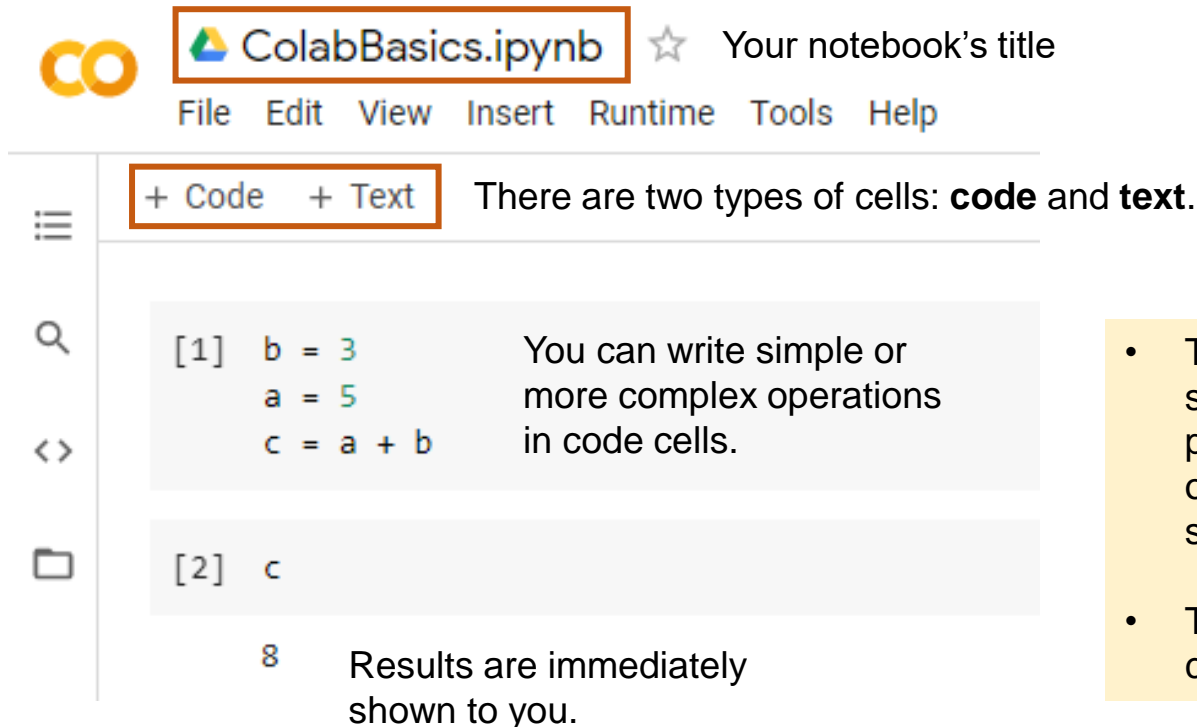
This is a code cell

Now, let's see how to use it!

Introduction to



- The document you are reading is not a static web page, but an **interactive environment**.

A screenshot of the Google Colaboratory web interface. At the top, the 'CO' logo is on the left, and the notebook title 'ColabBasics.ipynb' is in the center, with a star icon and the text 'Your notebook's title' to its right. Below the title is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help'. On the left side, there is a sidebar with icons for a menu, search, code editor, and file explorer. In the main area, there are two code cells. The first cell, labeled '[1]', contains the code 'b = 3', 'a = 5', and 'c = a + b'. To its right, text says 'You can write simple or more complex operations in code cells.' The second cell, labeled '[2]', contains the code 'c'. Below the second cell, the number '8' is shown, followed by the text 'Results are immediately shown to you.' Above the code cells, there are two buttons: '+ Code' and '+ Text', which are highlighted with an orange border. To the right of these buttons, text says 'There are two types of cells: **code** and **text**.'

- To **execute** the code in a cell, select it with a click and either press the **play button** to the left of the code, or use the keyboard shortcut "**Shift+Enter**".
- To **edit** the code, just click the cell and start editing.

Introduction to



- Colab notebooks allow you to combine **executable code** and **rich text** in a single document, along with **images**, **HTML**, **LaTeX** and more.
- Finally, you can export your notebook to GitHub or share it through a Google Drive link.

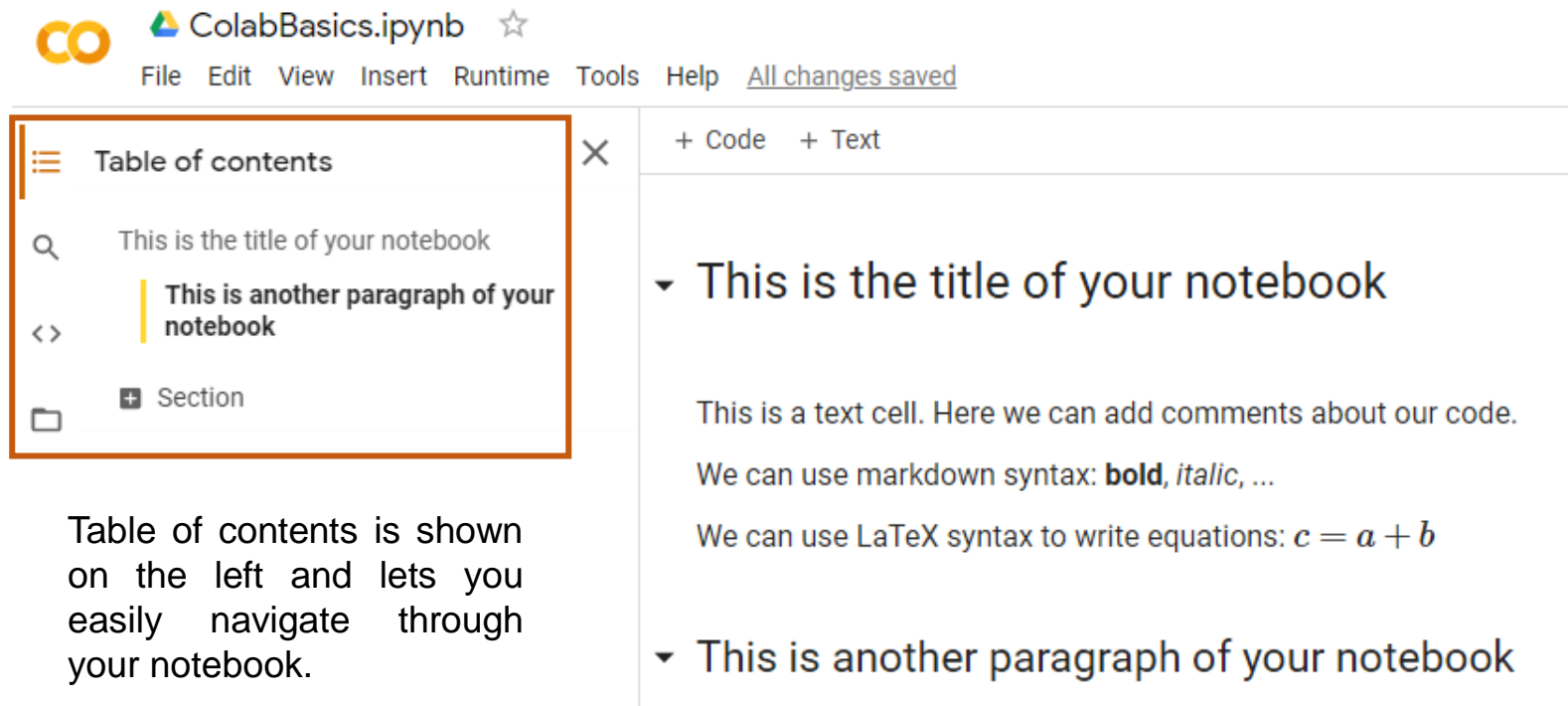
A screenshot of a Google Colaboratory notebook interface. At the top, there is a header bar with the Colab logo, the text 'ColabBasics.ipynb', a star icon, and a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', 'Help', and a status message 'All changes saved'. Below the header, the notebook is split into two main sections. On the left, a 'Table of contents' sidebar is open, showing a list of sections: 'This is the title of your notebook', 'This is another paragraph of your notebook', and 'Section'. The first two sections are highlighted with a yellow bar. On the right, the main content area shows the first two sections of the notebook. The first section is titled 'This is the title of your notebook' and contains a text cell with the text 'This is a text cell. Here we can add comments about our code. We can use markdown syntax: **bold**, *italic*, ... We can use LaTeX syntax to write equations: $c = a + b$ '. The second section is titled 'This is another paragraph of your notebook'.

Table of contents is shown on the left and lets you easily navigate through your notebook.

Introduction to GitHub



- Whether you're **visualizing data** or building a new game, there's a whole community and set of tools on GitHub that can help you do it even better (1).
- GitHub is a **development platform**, where you can host and review code, manage projects, and build software alongside 50 million developers (2).
- GitHub helps you to:
 - ***Write better code***
 - ***Manage a research project***
 - ***Share code with your team-mates*** (private repositories) or with the entire GitHub community (public repositories)

(1) <https://lab.github.com/>

(2) <https://github.com/>

GitHub Basics

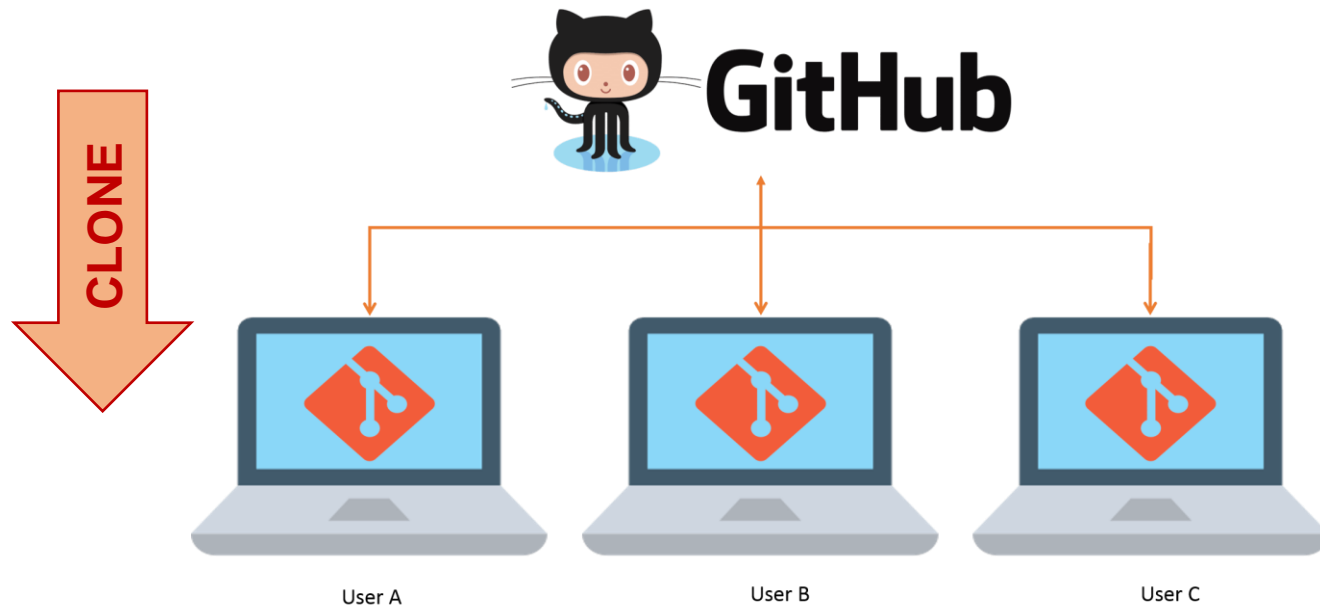


- Create an account on <https://github.com/> (it's free!)
- Create your first repository
- Share with your collaborators
- If you are a Windows user, download **GitHub Desktop** app (1)
- If you are a Linux user, you don't need to download anything (you will update your repositories by terminal)
- There are four fundamental actions you can perform using GitHub:
 - **Clone** a repository
 - **Commit** a change inside a repository
 - **Push** the committed change to GitHub
 - **Pull** an update from GitHub

(1) <https://desktop.github.com/>

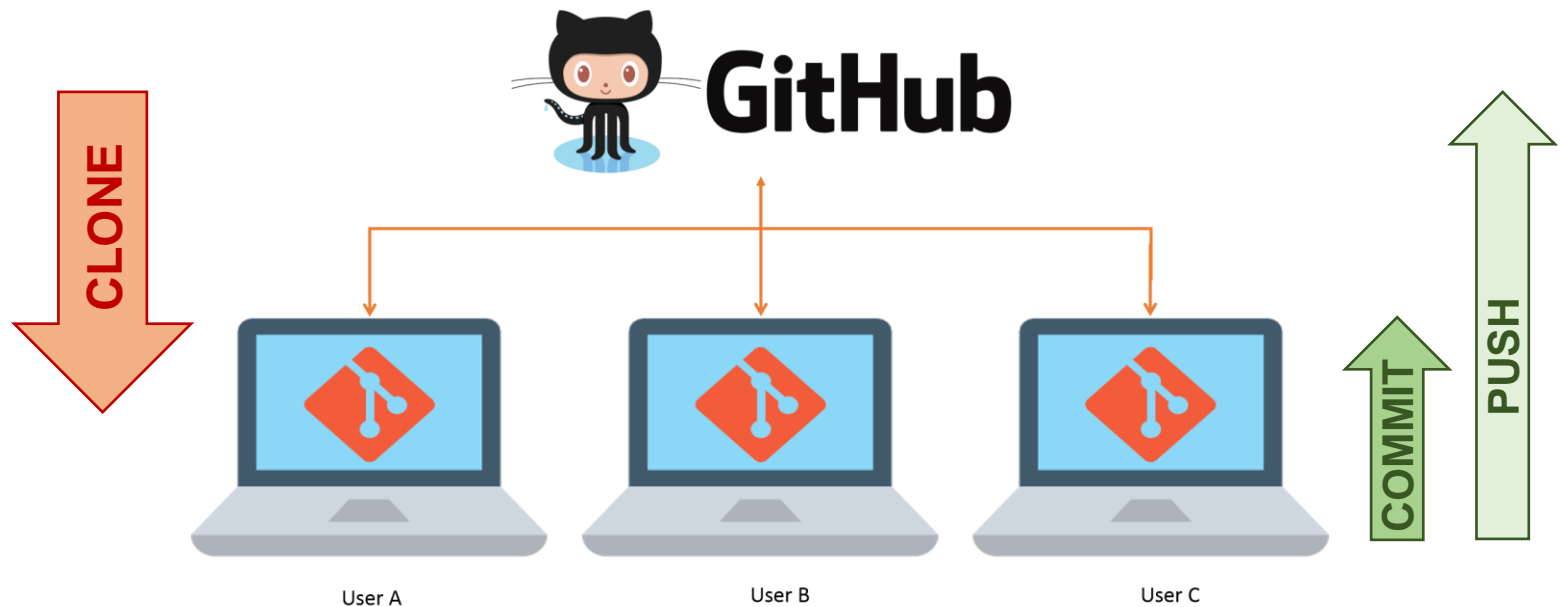
Clone, Commit, Push & Pull

- You can create your own repository or open an existing one (e.g. shared with you by one of your team-mates)
- Once you have your own repository in GitHub, to use it on your laptop, you must **CLONE** it (*you must perform this step only once, each time you want to use a new repository*)



Clone, Commit, Push & Pull

- Now, you have a new local folder, and you can begin to work on it
- When you finish your local work, to update changes and to share changes with other collaborators, you must **COMMIT** changes and **PUSH** them to GitHub (*you must perform this step every time you have something new to update/share*)



Clone, Commit, Push & Pull

- Finally, if you want to update your repository with changes made by other collaborators you must **PULL** the changes from GitHub (*you must perform this step every time you have something new to download*)

