A picture containing outdoor, object, clock, sitting

Description automatically generated

A guide to the course

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# Introduction

Welcome to the *Introduction to the Computational Science*course by School of Energy Systems! My name is IK and I will guide you through the course.

Programming is literacy of the XXI century. Without programming we would not live in the world as it is now. Software is used everywhere and for various purposes, starting from clocks on your phone to controlling spaceships. For us, as engineers, it is useful tool for controlling and designing of the mechanical systems.

During the course you will need only a computer I strongly recommend to use your own computer, because it will make studying easier. Before starting the course

## Why should you learn programming language?

* Self-learner’s advantage: tons of material in internet
* Gaining problem solving and thinking skills
* Becoming more efficient and productive
* Combining technical skills with creativity
* Understanding how software works
* Freedom and flexibility in life
* Improving your communication and collaboration skills
* Becoming self-employed, starting your own business or work as freelancer
* Improving your portfolio

## Structure of the course

We will cover following topics:

* Syntax
* Files System
* Version Control
* Best Coding Practices
* Variables
* Python Objects (String, Dictionary, Tuple, Sequence, Set, Lists)
* Control Flow (Boolean Expressions/Operators, If, Else, Else If)
* Loops (For, While),
* Functions
* Classes
* Matlab Introduction (optional)

## Grading

## Project

Should be submited as Python file 🡪 No report needed

Group of 3 – 4 students

Deadline: 15.02.2020

Will be evaluated by following criterias:

* Creative idea, which is interesting for everybody. Useful for your studies, hobby or everyday life.
* Code is easy to read and maintain
* If used Github or Stackoverflow code must be changed for your needs. **NO COPYPASTING!**

## Assignments

Made during the lecture before break

Will be done in Microsoft Visual Studio Code

Submit Python file (.py extension) via Github, assignments folder

Deadline: Next week

Will be evaluated by following criterias:

* Runs without exceptions
* Code is easy to read

## How you can find me?

You can write me an e-mail to [ilya.kurinov@lut.fi](mailto:ilya.kurinov@lut.fi) or visit at working hours at the office 6614.

What is programming language?

What types of programming languages there are?

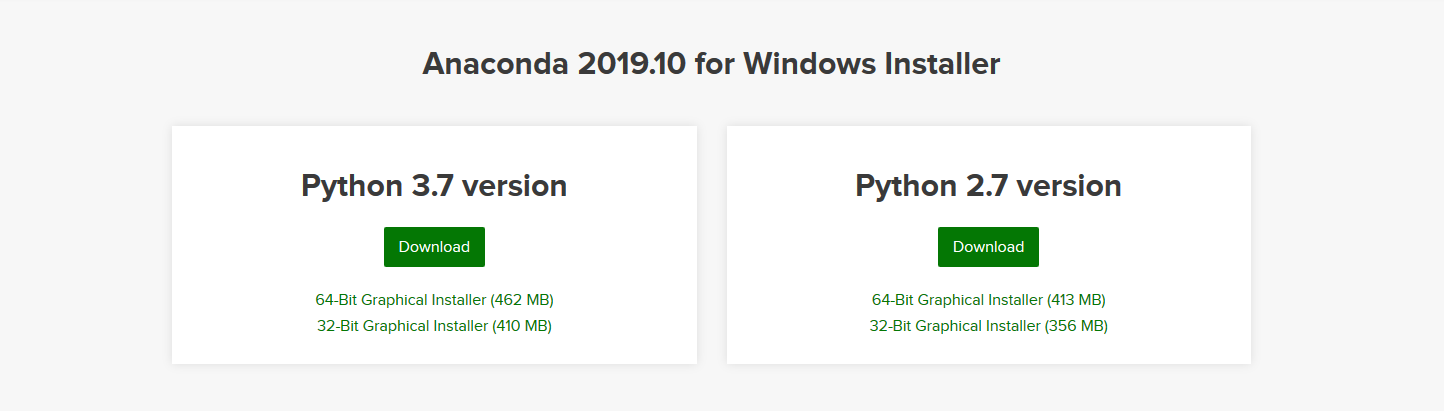
Why Python?

# Installation

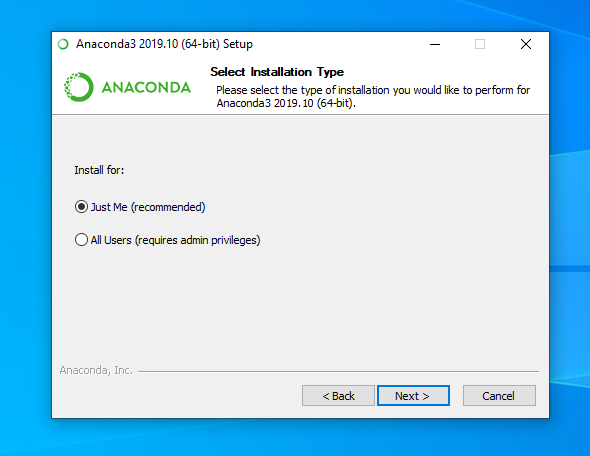
Anaconda is a distribution of Python made for scientific computing applications, such as data science, machine learning and etc. During this course we will use it for learning purposes.

## Installation of Anaconda

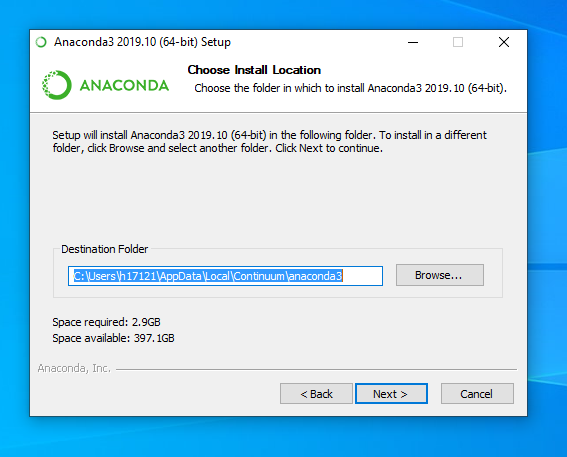
Step 1: Go to <https://www.anaconda.com/distribution/#download-section>. Load Python 3.7 version.



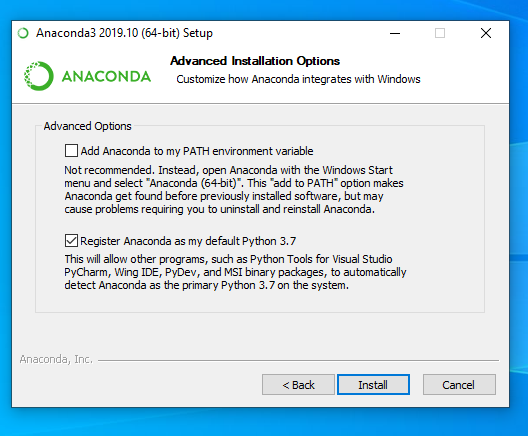
Step 2: Run the .exe file. Use install for **Just Me** option.



Step 3: Install to your user location (default).



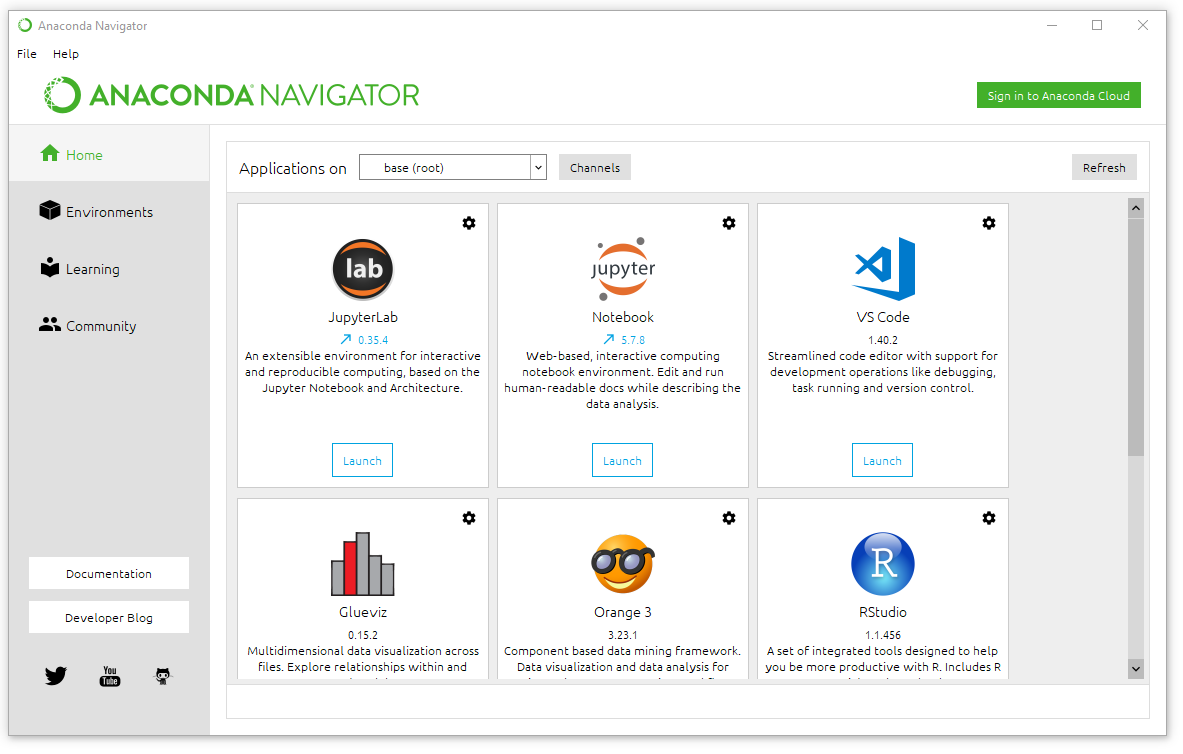
Step 4: Keep everything as default and click install.



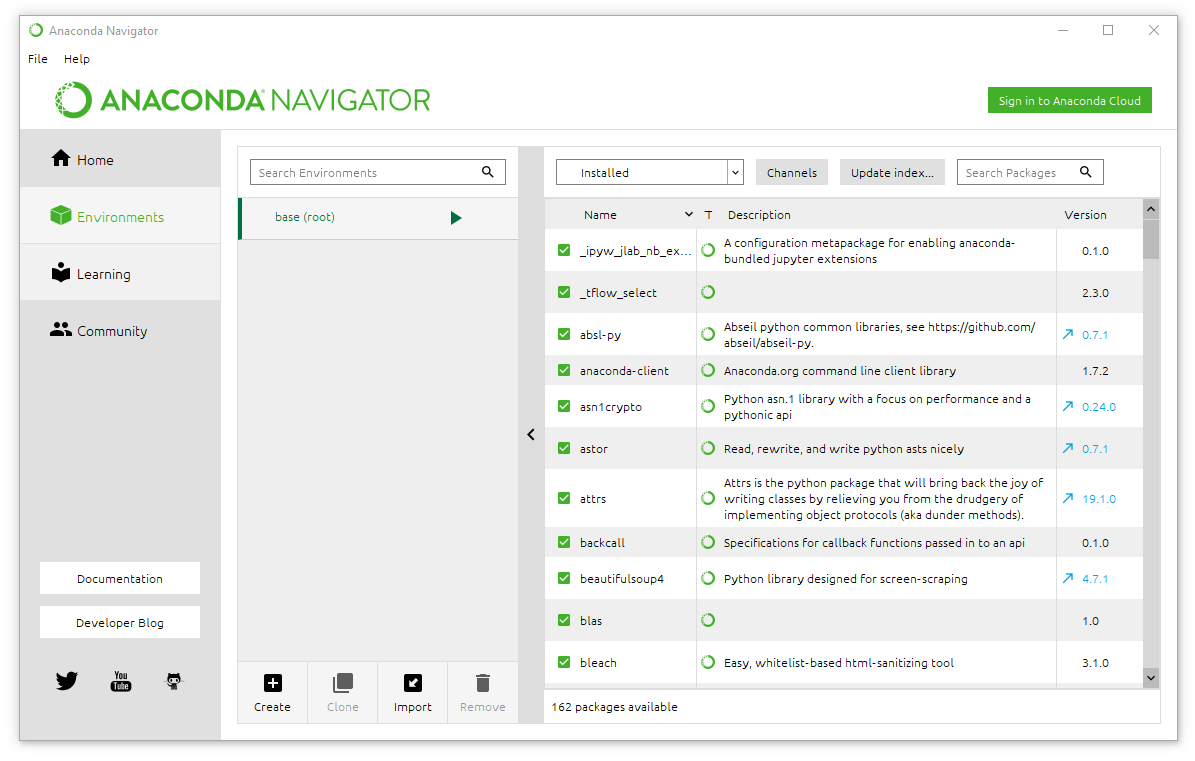
## Preparing of Anaconda

**WARNING! If you use your own computer, you can skip this step.**

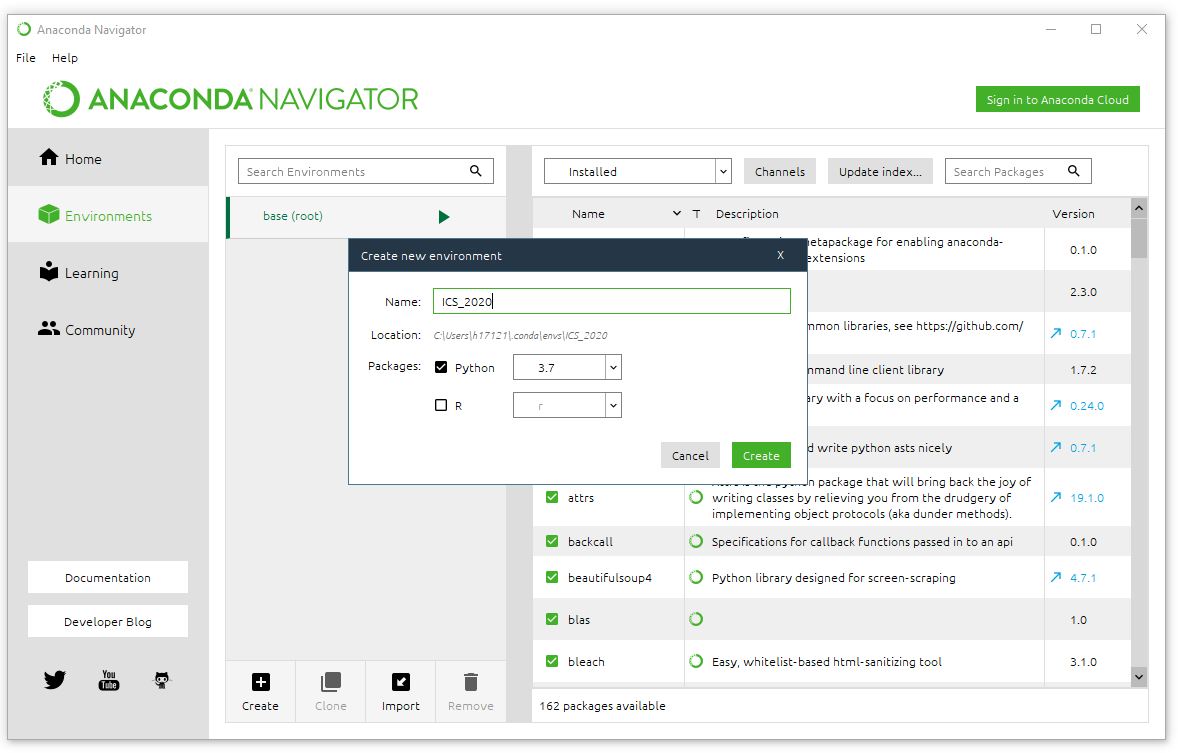
Step 1: Go to Anaconda Navigator. Open the Environments tab.



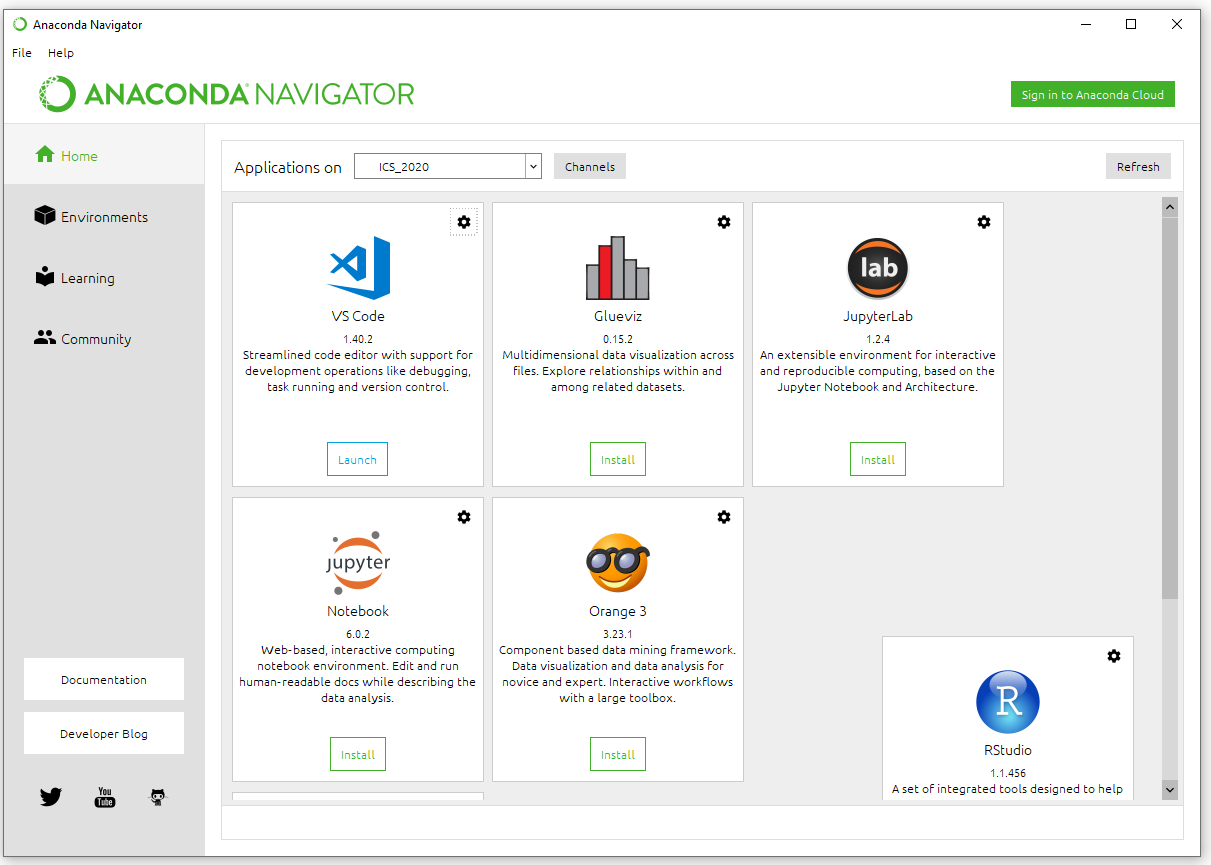
Step 2: Create new environment by hitting Create button.



Step 3: Create a new environment. Make sure that you use Python 3.7 version!



Step 4: The environment is ready for work. Now click Install button under the Jupyter Notebook. If computers asks admin rights, just click cancel.



# Version Control

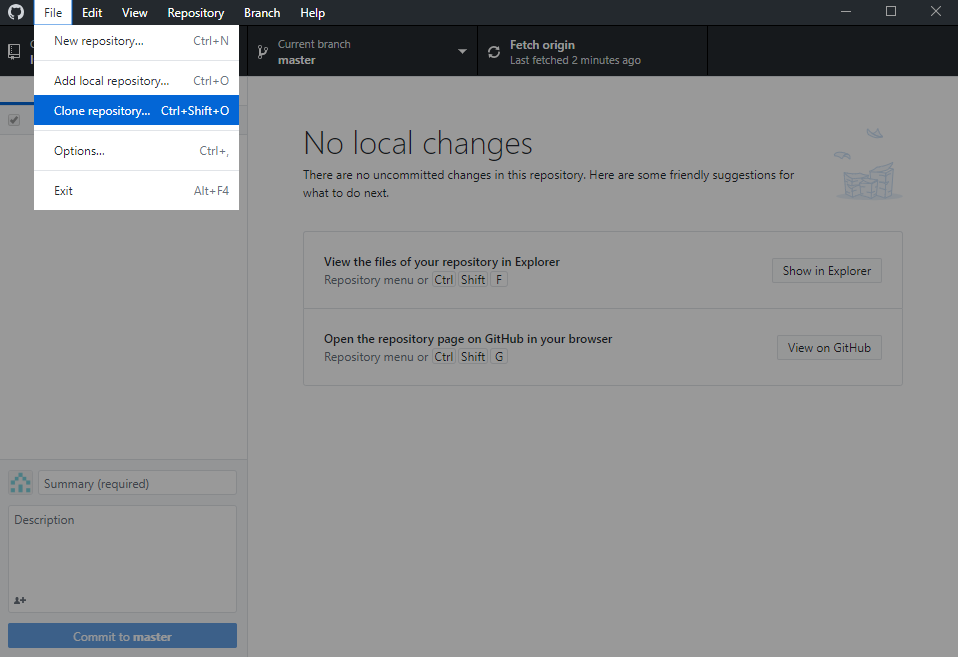
## What is Github?

GitHub is a platform for version control and collaborative work on code. It allows team of developers to work on the same project and track what was done before.

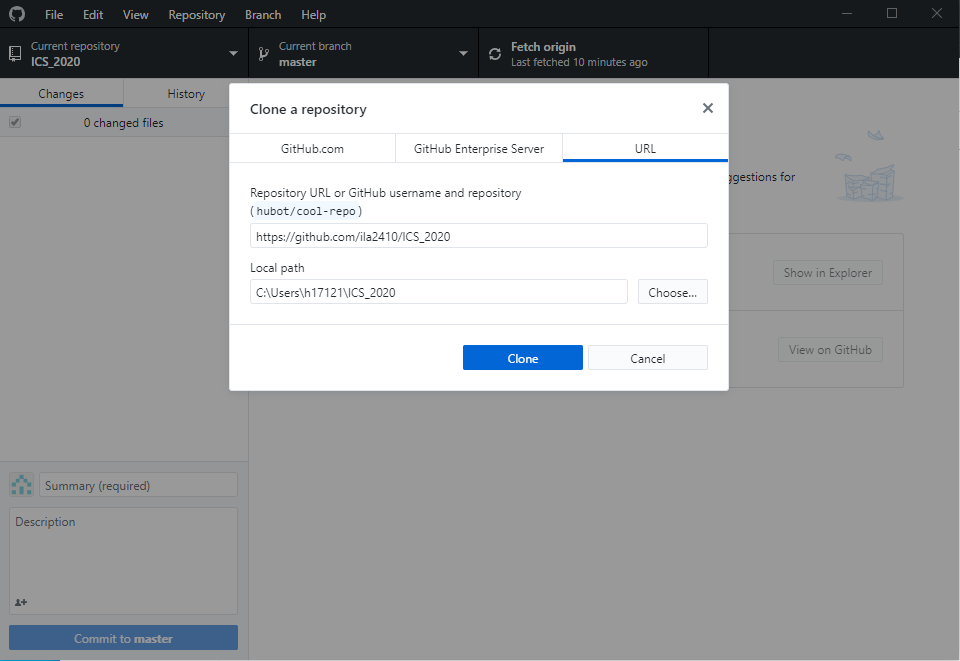
## Cloning Github repository

During this course all materials and assignment are located at the course Github repository. You should clone the repository using Github Desktop. You can clone repository by following these steps:

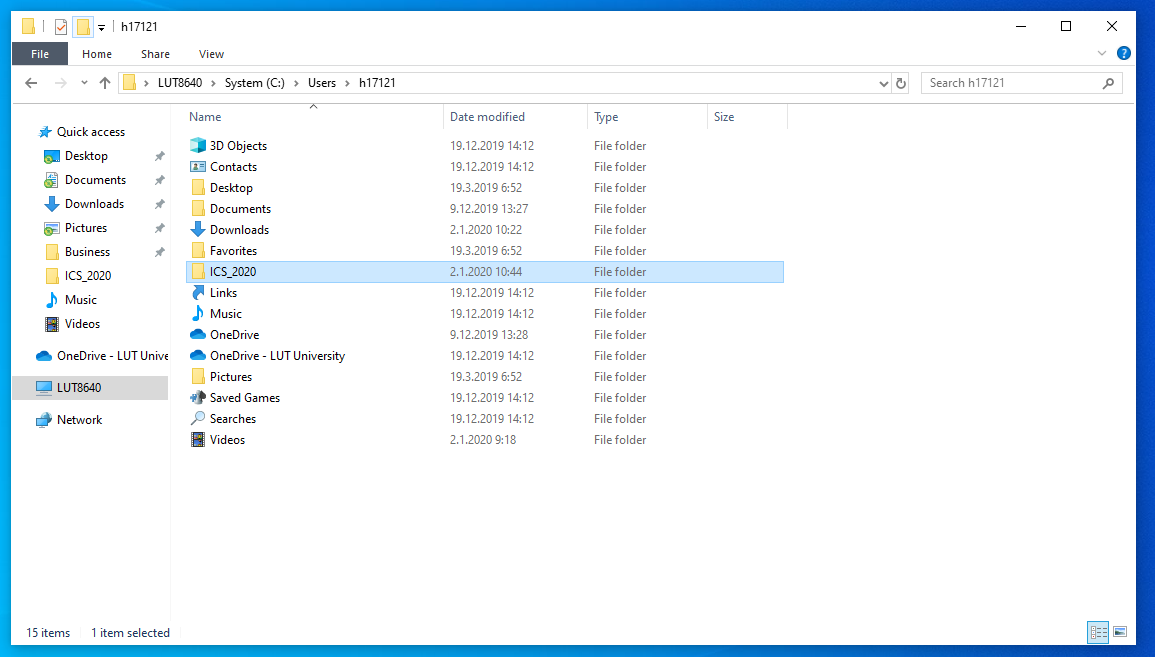
Step 1: Open Github Desktop. Go to File🡪Clone repository



Step 2: Go to URL tab, put URL of the repository (<https://github.com/ila2410/ICS_2020>) and choose path where to clone it. Then click clone button. **WARNING! If you are using LUT computer save to your C:\Users\your\_user\_number (for example C:\Users\n5198) folder, otherwise, it would not save anything.**



Step 3: Open File Explorer and go to the path. Now you will have all needed materials.

0

## How to work in groups

# Best Coding Practices

Pseudocode

# Syntax

# Operators

## Arithmetic operators

## Comparison operators

These operators compare the values on either side of them and decide the relation among them. They are also called Relational operators.

## Assignment operators

## Logical operators

## Other operators

# Variables

A data in the real world can be represented by numerical and text data.

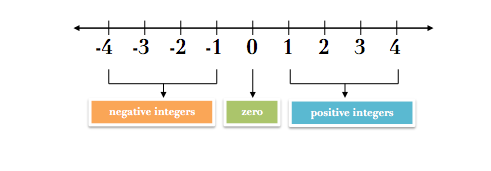
## Boolean

True or false variables.

## Numerical values

Python supports four different numerical types: integers(int), float, long and complex.

Integers are whole numbers, which can be negative or equal to zero, as shown at the figure below.



float (floating point real values)

complex (complex numbers)

## String

## Conversion

# Objects

## List

## Dictionary

# Control Flow

## Boolean Expressions

## If – Else

## ElseIf

# Loops

## For loop

## While loop

# Functions

# Classes