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Software

git

Thonny

Programming in Python¹

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A function computes a result

- Returns a useful result

```
def concat_with_a_space(string1: str, string2: str) -> str:
    return string1 + ' ' + string2

# string1 is the _formal_ parameter
# 'foo' is the _actual_ parameter (like an assignment string1 =
# → 'foo')
print(concat_with_a_space('foo','bar'))
```

- Return None

```
def repeated_print(string: str, repetitions: int) -> None:
    for i in range(0, repetitions):
        print(string)

repeated_print('Hello, world!', 3)
```

- Recursive call:

```
def repeatedPrint(string: str, repetitions: int) -> None:
    if repetitions > 0:
        print(string)
        repeatedPrint(string, repetitions - 1)

repeatedPrint('Hello, world!', 3)
```



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Functions are objects too

One can assign functions to variables:

```
def cube(x: int) -> int:
    square = x * x
    return square * x
```

```
mycube = cube
```

```
print(mycube(3))
print(type(mycube))
```

And short functions can even be expressed as literal expressions (lambda expressions)

```
cube = lambda y: y*y*y
```



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Lecture V: Using the “naked” interpreter

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Example: Newton sqrt



Newton's method of successive approximations: whenever we have a guess g for the value of the square root of a number x , we can perform a simple manipulation to get a new guess closer to the actual square root by averaging g with $\frac{x}{g}$.

```
def newton_sqrt(x: float) -> float:
    guess = 1.0
    while not good_enough(guess, x):
        guess = improve_guess(guess, x)
    return guess
```

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The pieces of software



- Python 3.12, with pip (on MS Windows be sure to select it): <https://www.python.org/downloads/>
- You need a text editor: suggested one is <https://thonny.org/>
- Git 2.30+ <https://git-scm.com/downloads>
- (optional, Win and Mac only) Github desktop <https://desktop.github.com/>

Homework assignments will be available via Github Classroom (you will need a Github account).

When you push (hand in) your solution, a suite of tests is run.

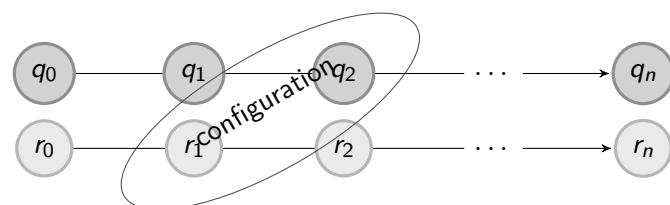
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Software Configuration Management



Software Configuration Management like git are tools designed to track all the revisions of some set of software artifacts (files).



The system configuration itself evolves in different versions. One can have multiple branches of evolution.

A motivating talk on why you should use tools like these in your scientific work.

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Git



git is a powerful tool to manage all this complexity in a very efficient (and distributed) way. It is not an easy tool, however. A good tutorial is here. But for this course we use a very simplistic workflow:

- ① Clone (copy) on your machine a repository `git clone ...` existing on a server (GitHub, probably);
- ② Work on the artifacts (files)
- ③ Add the modified artifacts to the changeset you want to "publish" `git add ...` (this step is important: it makes you think **which** changes you want to "save" forever)
- ④ Commit (save) the changeset `git commit -m "message"` providing a comment about what have you done
- ⑤ Push the changeset on the origin server `git push`
- ⑥ (If someone else is working on the same artifacts you can sync with `git pull`)

All these steps are very easy (almost hidden, especially authentication) if you use Github desktop.

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Programs are data! File extension is conventionally .py

- To edit Python programs you need a **text editor**: something like Notepad, not Word (a word processor)
- Thonny is an editor designed for beginners and it provides an easy way for executing programs step-by-step
- Other good choices: VS Code Atom Notepad++ or any other universal text editor like EMACS or vi

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<https://classroom.github.com/a/ToMoC4Di>