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Software

git

Thonny

Programming in Python¹

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Lecture V: Using the “naked” interpreter



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)
```

```
repeatedPrint('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)
```



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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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



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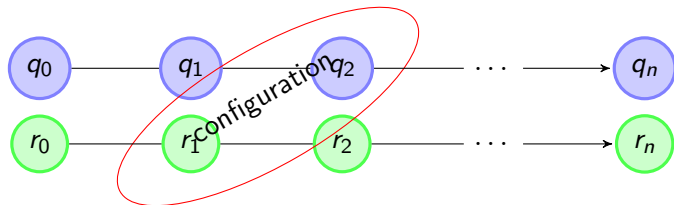
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Software Configuration Management like `git` are tools designed to track all the **revisions** of some set of software **artifacts** (files).



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.



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

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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>