Algolab
(index.html#Chapters)
Out[1]:

Module 2: Algorithm and Data Structures Lab

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v0.10.1

Today

15 Dic 2016

- `GenericTree` see Trees chapter (trees.html)

See you

And then, for the lab part:

Date	**Hour**	**Topic**
Thursday 15 Dec	9:00-11:00	Trees
Monday 19 Dec	16:00-18:00	Graphs
Wednesday 21 Dec	**14:00-16:00**	**Exam simulation**
Thursday 22 Dec	9:00-11:00	String algos / Exam simulation discussion
Thursday 12 Jan	**TBD**	**Lab midterm**

Course website

Theory

See Alberto Montresor website:

http://cricca.disi.unitn.it/montresor/teaching/scientific-programming (http://cricca.disi.unitn.it/montresor/teaching/scientific-programming)

Lab

davidleoni.github.io/algolab (https://davidleoni.github.io/algolab)

Chapters

Worksheets are meant to be used online - pdf quality is not very good, if they result unreadable please tell me

0. Testing (testing.html) (pdf (pdf/testing.pdf))
1. Lists (lists.html) (pdf (pdf/lists.pdf))
2. Data Structures (data-structures.html) (pdf (pdf/data-structures.pdf))
3. Trees (trees.html) (pdf (pdf/trees.pdf))

Commandments

> **WARNING: If you don't follow the Commandments, bad things happen!**

> **1) You shall test!**

To run tests, enter the following command in the terminal:

```
python -m unittest my-file
```

> **WARNING: In the call above, DON'T append the extension *.py* to *my-file***
> **WARNING: Still, on the hard-disk the file MUST be named with a *.py* at the end, like *my-file.py***

> **2. You shall also write on paper!**

> **3. You shall copy *exactly the same* function definitions as in the exercises!**

For example don't write :

```
def MY_selection_sort(A):
```

> **4. You shall never ever reassign function parameters:**

```
def myfun(i, s, L, D):

        # You shall not do any of such evil, no matter what the type of the p
arameter is:
        i = 666            # basic types (int, float, ...)
        s = "666"          # strings
        L = [666]          # containers
        D = {"evil":666}   # dictionaries

        # For the sole case of composite parameters like lists or dictionarie
s,
        # you can write stuff like this IF AND ONLY IF the function specifica
tion
        # requires you to modify the parameter internal elements (i.e. sortin
g a list
        # or changing a dictionary field):

        L[4] = 2          # list
        D.my_field = 5    # dictionary
```

> **5. You shall use *return* command only if you see written *return* in the pseudocode!**

If there is no `return` in the pseudocode, the function is intended to return `None`. In this case you don't even need to write `return None`, as Python will do it implicitly for you.

Slides

Lab 1 Slides

3 Nov 2016

Lab Goals

- Going from theory taught by Prof. Alberto Montresor to implementation
- Pseudo code --> Python

How

- Hands-on approach
- Performance considerations
- Focus on correct code
- Few Python functions

Lab Midterm?

Probably not. Still, will provide exam example.

Lab 2 Slides

Date: Nov 11th, 2016

- More practical than last time!
- Finish selection_sort and gap implementation
- midlab pause ;-)
- implement a Python class

Lab 3 Slides

Nov 17th, 2016

- Recursion
  - `gap_rec`, `binary_search_rec`
- `binary_search_iter`
- Will give you more tests
- Write also on paper!
- Copy *exactly the same* function definitions!
  - For example don't write `def MY_selection_sort(A):`
- use `return` command *only* if you see written `return` in the pseudocode!
  - If there is no `return` in the pseudocode, the function is intended to return `None`. In this case you don't even need to write `return None`, as Python will do it implicitly for you.

Lab 4 Slides

Nov 18th, 2016

- Divide et Impera
  - binary_search_iter
- Implement ComplexNumber

New Commandment:

You shall never ever reassign function parameters:

```
def myfun(L, i, s):

    # You shall not do any of this evil:
    L = [666]
    i = 666
    s = "666"
```

Previous commandments:

- You shall also write on paper!
- You shall copy exactly the same function definitions as in the exercises!
- For example don't write def MY_selection_sort(A):
- You shall use return command only if you see Written return in the pseudocode!
- If there is no return in the pseudocode, the function is intended to return None. In this case you don't even need to write return None, as Python will do it implicitly for you.

Lab 5 slides

24 Nov 2016

- Implement ComplexNumber
- Implement Stack

Lab 6 slides

1 Dic 2016

- Implement `CappedStack`
- Implement `UnorderedList`

Lab 7 slides

- UnorderedList

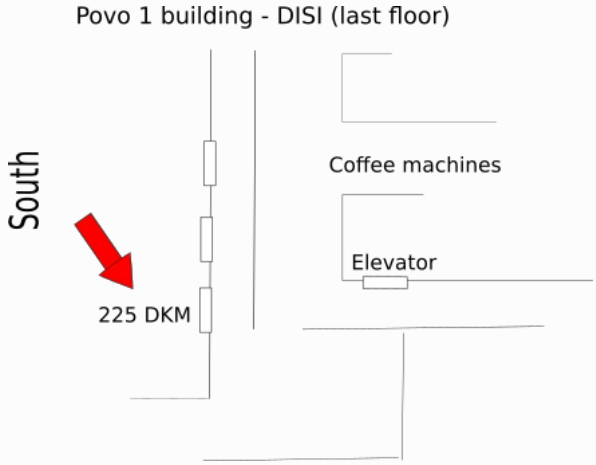
Lab 8 slides

- will start writing tests (will be required during exams)
- invariants in particular
- `UnorderedList` until fast `size()` and `append()` included

Office hours

You can schedule a meeting by emailing me at david.leoni [AT] unitn.it , more or less I'm available every day until 19.00

Then you will find me in Povo 1 building at DISI, in room 225 DKM :



Resources

- Online book: Problem Solving with Algorithms and Data Structures using Python (http://interactivepython.org/runestone/static/pythonds/index.html) by Brad Miller and David Ranum
- Theory slides (http://cricca.disi.unitn.it/montresor/teaching/scientific-programming/slides/) by Alberto Montresor
- Will try to be consistent with other lab module notes (http://disi.unitn.it/~teso/courses/sciprog/index.html) of Stefano Teso and Toma Tebaldi
- PythonTutor (http://www.pythontutor.com/visualize.html#mode=edit), a visual virtual machine (*very useful*! can also be found in examples inside the book!)
- Source code (https://github.com/DavidLeoni/algolab) of these worksheets (download zip (https://github.com/DavidLeoni/algolab/archive/master.zip)), in Jupyter Notebook (http://jupyter.org) format.
- The internet ....

Editors

- Jupyter Notebook (http://jupyter.org): Nice environment to execute Python commands and display results like graphs. Allows to include documentation in Markdown format
- Spyder (https://pythonhosted.org/spyder/): Should be a fine editor, although I haven't used it in a long time