

# Algorithms

Python, CS and so on

Petr Svarny, 2020

# Class summary T3



## Topics

- Computer Science
- Algorithms
- Programming
- Developer practices

## Tools

- Python 3
- Git
- Sources for self study

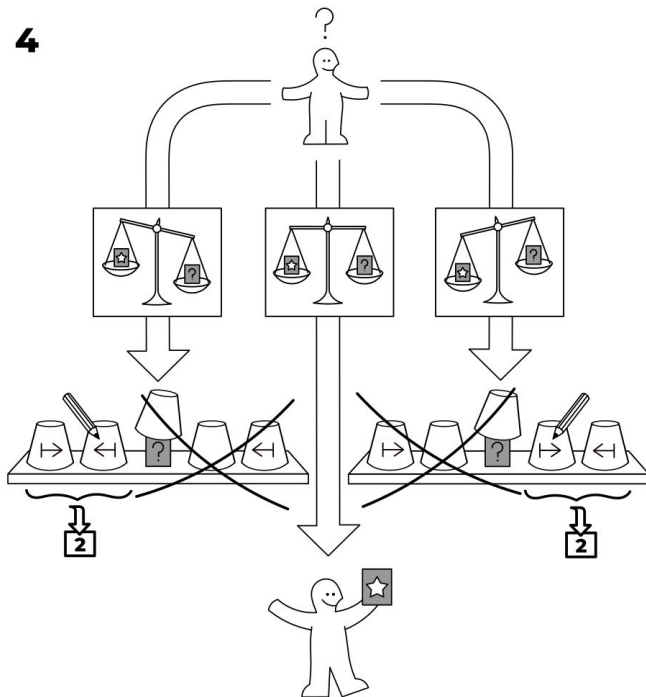
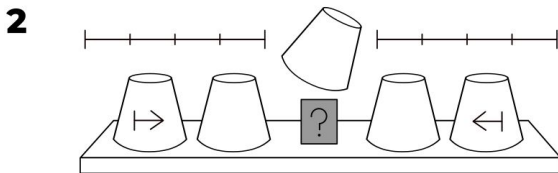
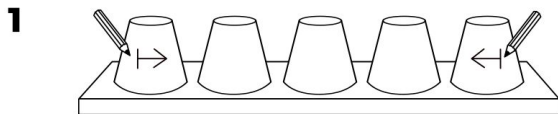
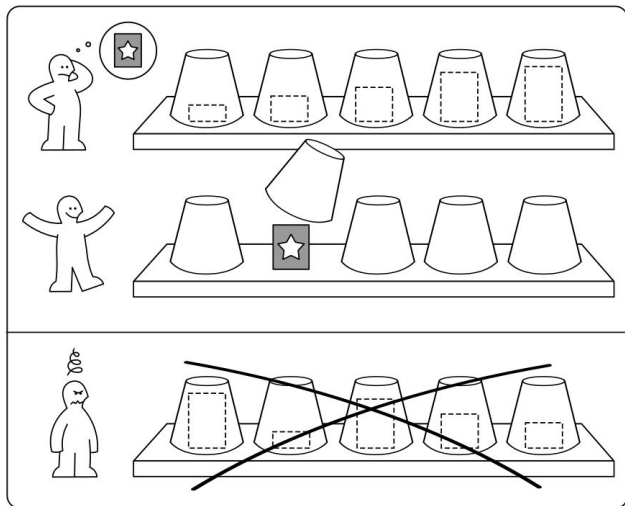
## Tests

- Class assignments
- Homeworks

# BINÄRY SEARCH

idea-instructions.com/binary-search/  
v1.1, CC by-nc-sa 4.0

IDEA



# Reading Sources:

[Python Programming: An Introduction to Computer Science](#)

[Think Python](#)

[RealPython](#)

... [my web](#):

<https://sites.google.com/site/svarnypetr>

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# Programming Sources:

[Python](#)

[HackerRank](#)

[Codility](#)

[Colab notebook](#)

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What is a  
computer  
program?

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# What is a computer program?

“A detailed, step-by-step set of instructions telling a computer what to do.

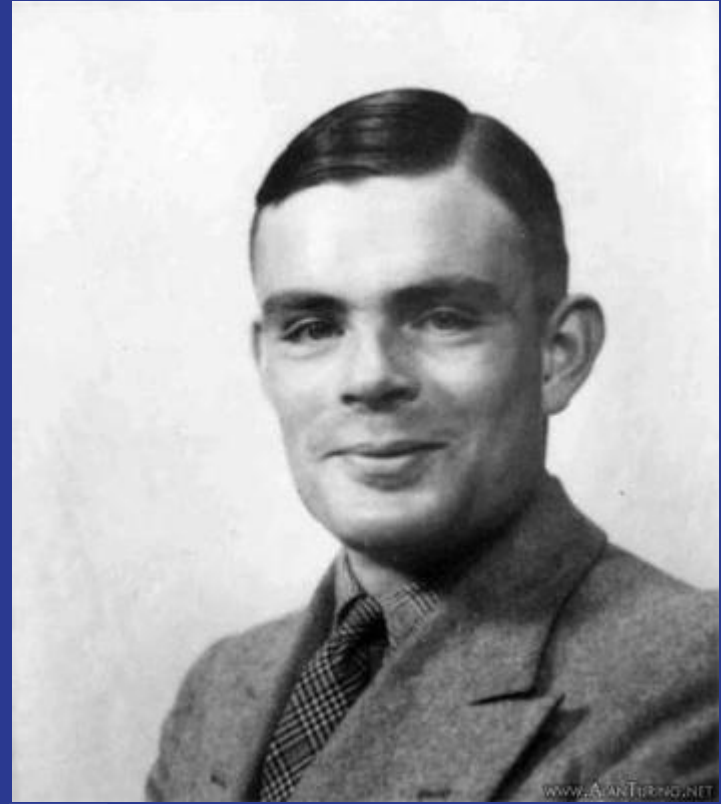
If we change the program, the computer performs a different set of actions or a different task.

The machine stays the same, but the program changes!”

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Can any  
computer run  
any program?

in practice/  
in theory





# What is computer science?

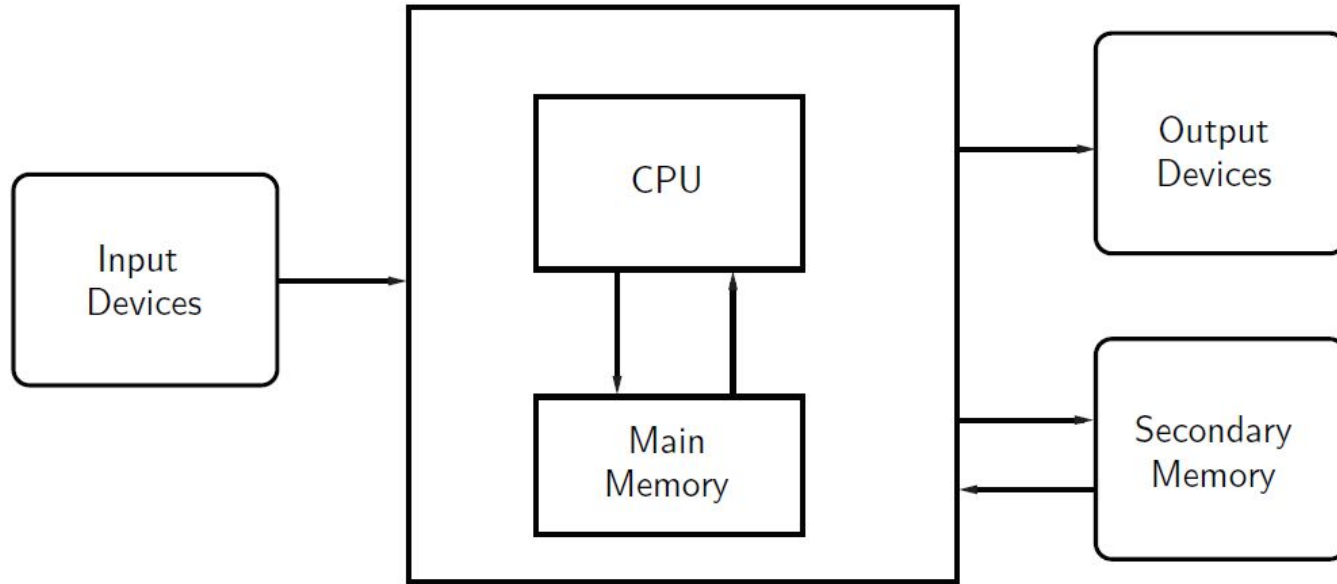
“Computers are to computer science what telescopes are to astronomy.” –

E. Dijkstra

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# Basic (contemporary) HardWare



Fetch-execute cycle and all programs are just in the memory

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# Programming languages

- Unambiguous (to the machine) instructions to the computer
- Syntax and semantics strictly set
- High level (human readable) and low level (closer to the computer's machine language - see [TIS 100](#))



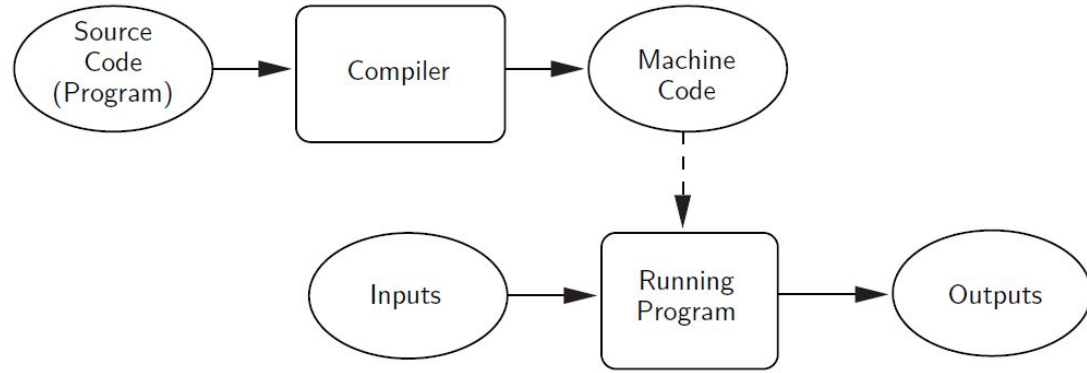
# Interpreters and compilers

- **Compiler** translates programming language into machine code
- **Interpreter** that takes one part of the code at a time



# Compiled languages

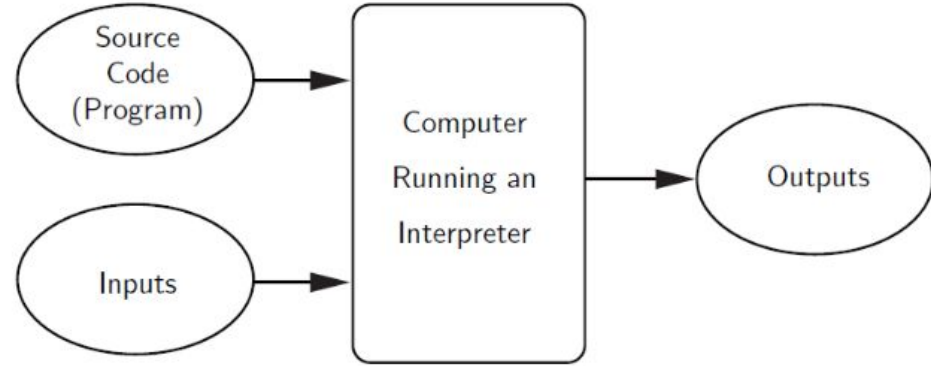
- Compiled program runs faster
- Does not need compiler after compilation
- Cannot be changed after compilation
- Compiled for a given setup
- E.g.: C, C++



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# Interpreted languages

- Needs interpreter to run
  - Can be altered easily
  - Can be run on other setup
  - E.g.: Python, Clojure
- 
- Note on Java and JVM



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# UNIX versus Windows

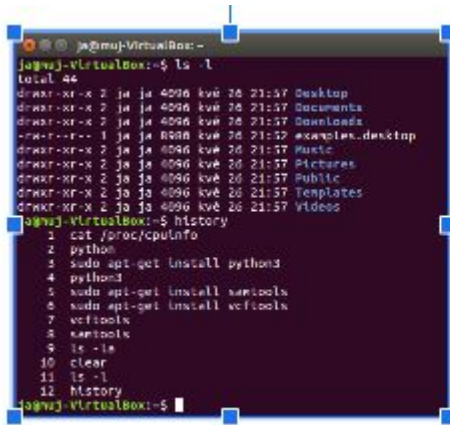
- UNIX is family of operating systems
- Created in Bell Labs in 1969
- In UNIX, users are encouraged to extend and improve the system



# Command Line Interface vs Graphical User Interface

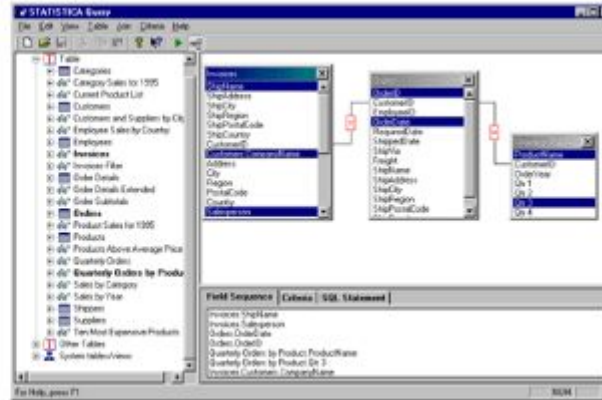
“Graphical user interfaces make easy tasks easy, while command line interfaces make difficult tasks possible”

William E. Shott



```
ja@uj-VirtualBox:~$ ls -l
total 44
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Desktop
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Documents
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Downloads
-rw-r--r-- 1 ja ja 8088 kv6 26 21:57 example.desktop
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Music
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Pictures
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Public
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Templates
drwxr-xr-x 2 ja ja 4096 kv6 26 21:57 Videos

ja@uj-VirtualBox:~$ history
 1 cat /proc/cpuinfo
 2 python
 3 sudo apt-get install python3
 4 python3
 5 sudo apt-get install srs-tools
 6 sudo apt-get install vcftools
 7 vcftools
 8 srs-tools
 9 ls -la
10 clear
11 ls -l
12 history
ja@uj-VirtualBox:~$
```





# Make your life easier with tools

- **Integrated Development Environment** ([PyCharm](#), [Notepad++](#), [Vim](#), ...)
  - Linters
  - Testing
  - Debug tools
  - ...
- **Version-control system** ([Git](#), ...)
- **Notes and journal** (paper, Notepad++, Vim, ...)
- **Processes** (debugging, refactoring, testing, code review ...)



# Working

- Get Python running
  - Own installation (preferred)
  - [Colab notebook](#)

