Basic Programming in Python

1. Chapter: Organization and Introduction

Lecturer: Daniel Weinhardt

Summer Term 2024

Slides were created by Nohayr Muhammad Abdelmoneim
Thank you very much for sharing!

Overview

- Organization
- Requirements to Pass the Course
- Tentative Content of the Course
- Introduction to Programming
- Introduction to Python

Organization

- Teachers and Tutors
  - Daniel Weinhardt: dweinhardt@uos.de
  - Tutors:
    - Ibrahim Muhip Teczam
    - Deniz Gün
- Course: Time and Place
  - Saturdays, 13th, 20th and 27th of April, 09:00-16:00, 93/E33
- Students:
  - Bachelor Students (Cognitive Science)
  - Master students (Cognitive Science)
- Notes about the course
  - 4 ECTS
  - Ungraded (pass or fail)
  - Examination: 50% of points in homework
- In case of any questions → Write me an E-Mail or use the forum on StudIP

Organizational Issues

- Intended audience:
  - no or very little knowledge in programming
  - If you already have experience in programming
    → "Scientific programming in Python" would be more suitable for you

- What will happen in this course?
  - Lecture slides and tutorials are intended to complete each other, some topics maybe distributed among both
  - Sessions will be given in-class and online
    → Online sessions only for those who cannot attend for a good reason (talk to me about that)
  - All in-class sessions will be livestreamed

Tentative topics to be covered

- Variables assignments, Arithmetic operations, basic data types
- Data structures and types conversions
- Conditional statements, logical operators
- Loops, recursion
- Functions, variable scope
- Strings, string methods
- Plotting
- Dealing with files: input/output
- Numpy Library
- Classes and Object-Oriented Programming*

* These topics are subject to time and flow of the course

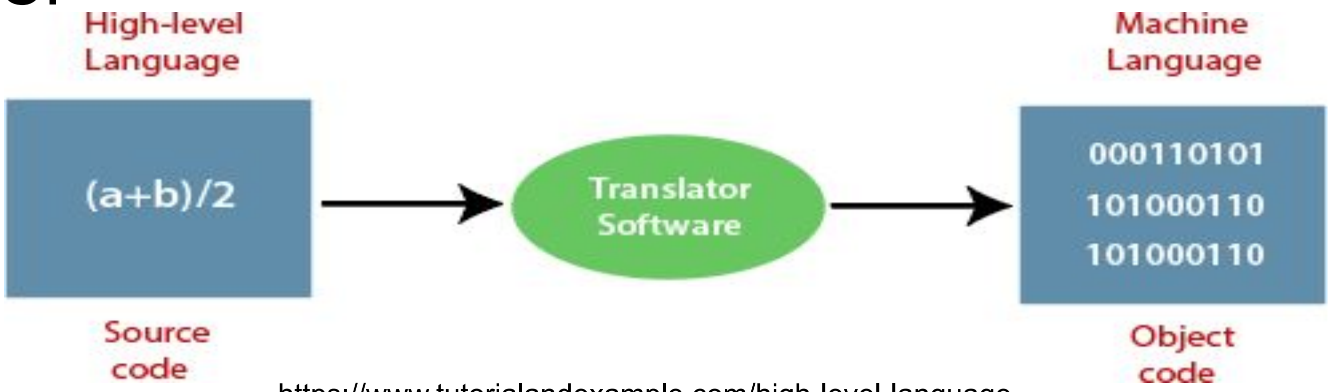
QUESTIONS?

What is programming

- Programming is to instruct the computer to perform certain tasks. No matter how simple or complicated the task is.
- Coding is part of the programming process, where the instructions are written in order for the computer to execute them.
- These instructions or code are written using special languages, called “Programming languages”

What is a programming language

- Machines like computers consist of electric circuits with tiny electric switches which can be either on or off.
- This can be translated to a “Machine language” which consists of 0s and 1s, corresponding to off and on.
- It would be impractical for humans to write instructions using this language.
- A programming language is a predefined high level language that humans can use to write instructions, which is then translated to machine language that is executable by a PC.



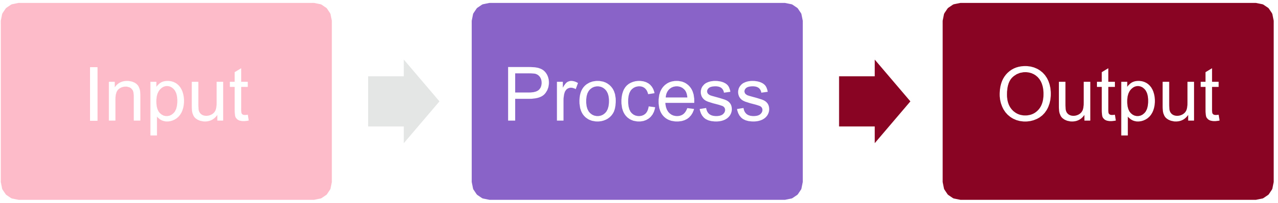
https://www.tutorialandexample.com/high-level-language

How to use a programming language

- In order to be able to write code using a programming language that can be executed by a machine we need:
  - Editor: a space for writing the instructions using a specific programming language
  - Compiler/interpreter: a program that translates and converts the source code written in a programming language into machine language that is executable by PC
- Each programming language has its own syntax and it own rules.
- Examples of programming languages:
  Python, C/C++, Java, JavaScript, LISP, etc.

What is a program

- A program is a set of instructions written to solve a certain task.
- Usually, a program has set of inputs. Then some operations are applied on the inputs, to finally reach the desired output.



How to solve tasks by programming

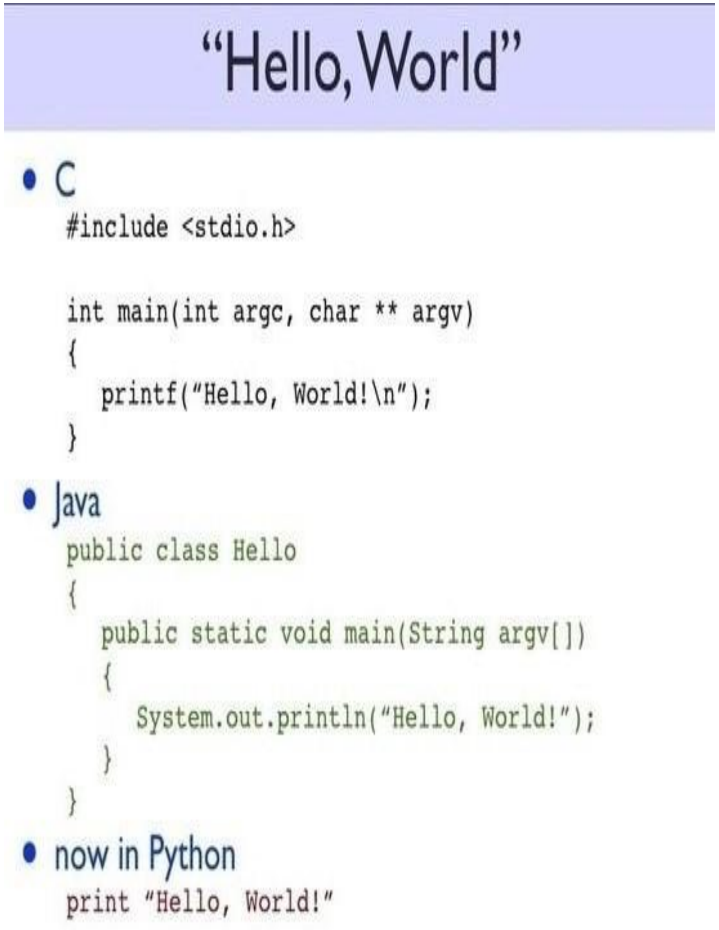
- To solve a task you need to divide it to simple sequential instructions that would eventually lead to solving the problem. This is called an “Algorithm”
- You need to determine the inputs needed to solve the task.
- You need to determine the desired output of the program.
- You need to find a set of executable instructions that would transform the given inputs to the desired outputs.
- The order of the instructions matter. I.e., if there are dependencies between instructions that needs to be taken into consideration.

What is Python?

- Python is a widely-used, interpreted, object-oriented, and high-level programming language with dynamic semantics.
- It was first created and released by “Guido Van Rossum” in 1991.
- The name was inspired from an old BBC television comedy sketch series called “Monty Python’s Flying Circus”.
- Python is an open-source language which many anonymous programmers contribute to developing it.

Why Python?

- Python is considered one of the simplest, yet powerful programming languages to use.
- It is currently the most widely used multi-purpose, high-level programming language.
- Python programs generally are smaller than other programming languages. A program written in Python is 2 to 10 times shorter than that written in other languages.
- Python has a huge collection of libraries that is used in many fields: machine learning, image processing, web scraping, etc.



“Hello, World”

- C

```
#include <stdio.h>

int main(int argc, char ** argv)
{
   printf(“Hello, World!\n”);
}
```

- Java

```
public class Hello
{
   public static void main(String argv[])
   {
      System.out.println(“Hello, World!”);
   }
}
```

- now in Python

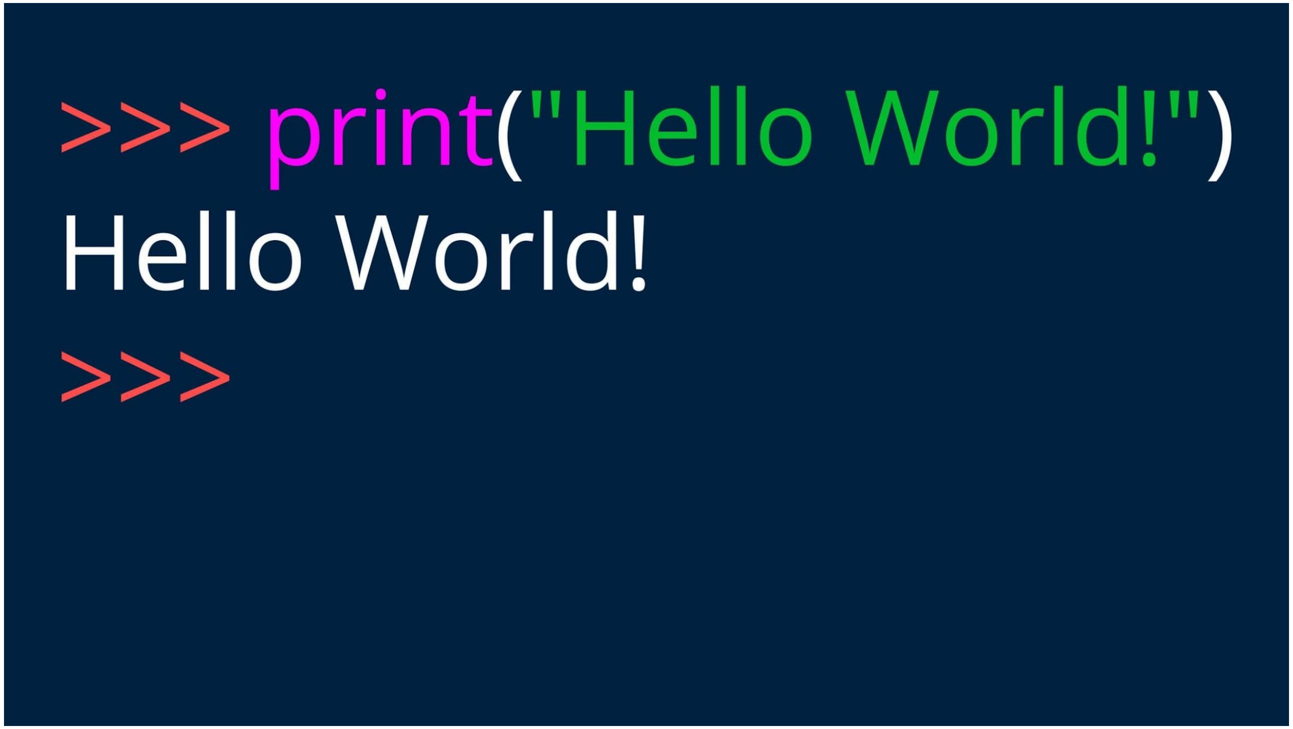
```
print “Hello, World!”
```

https://analyticsprofile.com/business-analytics/why-should-you-learn-python/

How to code in Python

- There are different ways to code in Python:
  - Colab: or “colaboratory” supported by google research allows you to write and execute Python code without configuration, with access to GPUs and easy to share.
  - Jupyter notebook: similar to colab but is executed on your own machine and needs configuration of Python and other libraries.
  - Editor and compiler/interpreter: to install an editor where you can write the code. A compiler/interpreter is also needed to translate and execute the code.
- You will learn more about each of these methods in details in the tutorials.
- You need to have an installed version of Python for the rest of the semester.

Your first Python program



```
>>> print("Hello World!")
Hello World!
>>>
```

Next..

Content of the next chapter:

- How to write a simple program in Python.
- What are variables and how to use them.
- Rules for variable names.
- Arithmetic operators and their precedence.
- Assignment operators.
- Comparison operators.
- Logical operators.
- Indentation in Python.
- If statement.

QUESTIONS?