CPE101
Week 1

Winter 2019
@ Cal Poly SLO
By
Toshi

Syllabus

1. Text book
    a. “Think Python” 1st edition by Allen B. Downey
        i. The book is available on line at https://www.greenteapress.com/thinkpython/thinkpython.pdf
2. Exams and Assignments

a.	8 Weekly quizzes:	5% total
b.	10 Labs:	20% total
c.	6 Assignments:	30% total
d.	2 Mid Term Exams:	20% total
e.	Final Exam:	25%

3. Grades (Might be curved)
    a. A: >= 90%
    b. B: >= 80%
    c. C: >= 70%
    d. D: >= 60%

Course Objective

In this course, we are going to use a high-level programming language called “Python” to learn solving problems by programming computers, but not Python itself.

This Week’s Learning Objectives

1. Simple overview of Computer
2. Variables, Expressions, and Statements
3. Functions
4. Structured data using objects

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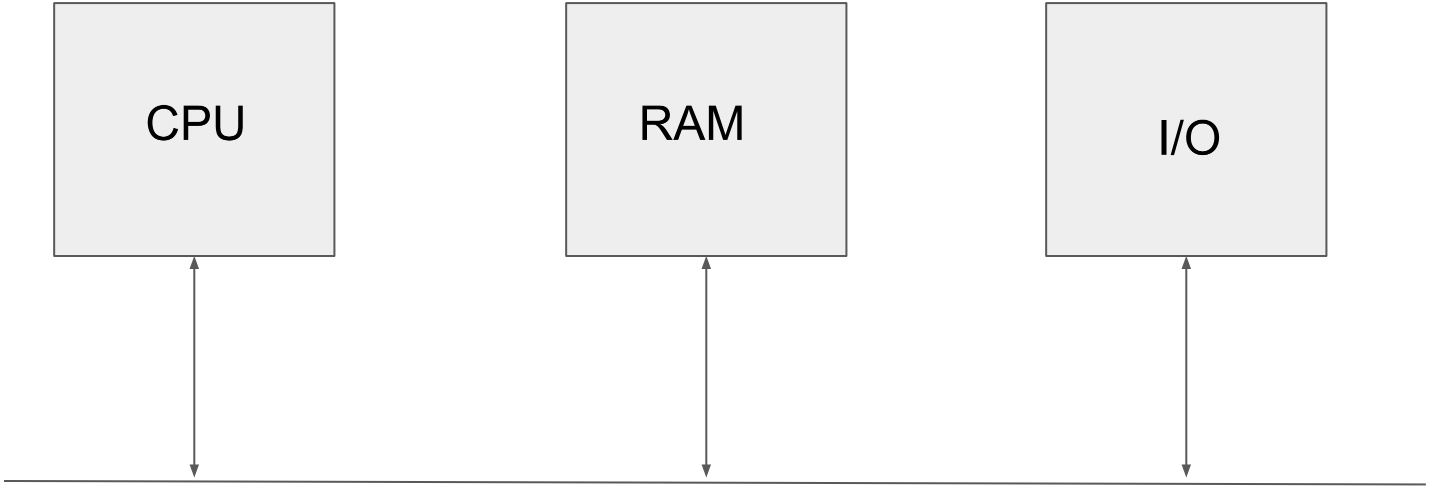
1.1 Simple Overview of Computer

What is a computer?

A computer is a programmable general purpose machine, comprising CPU, memory, and I/O devices.



What is CPU?

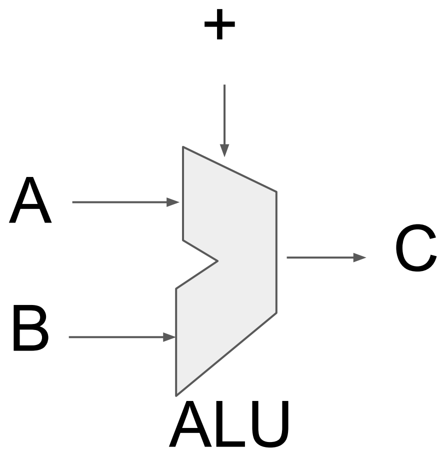
1. CPU stands for Central Processing Unit
2. CPU carries out the instructions of a computer program by performing the basic arithmetic, logic, controlling and input/output (I/O) operations specified by the instructions.
3. CPU comprises Arithmetic Logical Unit (ALU) and registers.

How a program can instruct a computer to perform ..

High Level Languages

- C, C++
- Java, C#
- Python, PHP, Ruby

compiler / interpreter



Machine code

000000 00001 00010 00011

Assembly code

ADD C, A, B

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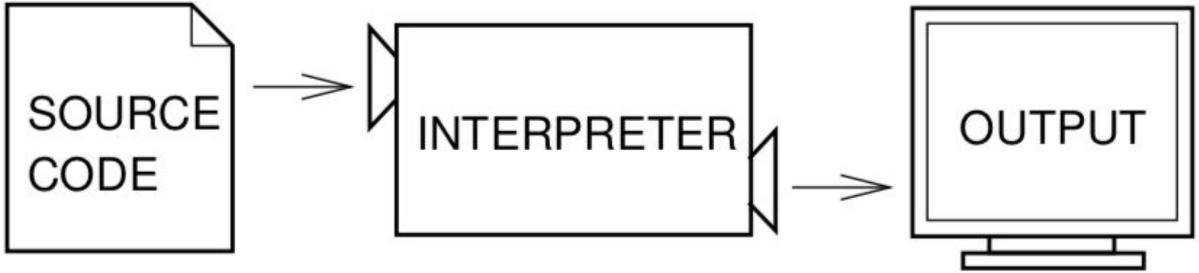
1.2 Introduction to Python

Python

1. Python is a high-level programming language created by Guido Van Rossum, a Dutch computer scientist.
2. A program written in Python is executed by python interpreter.

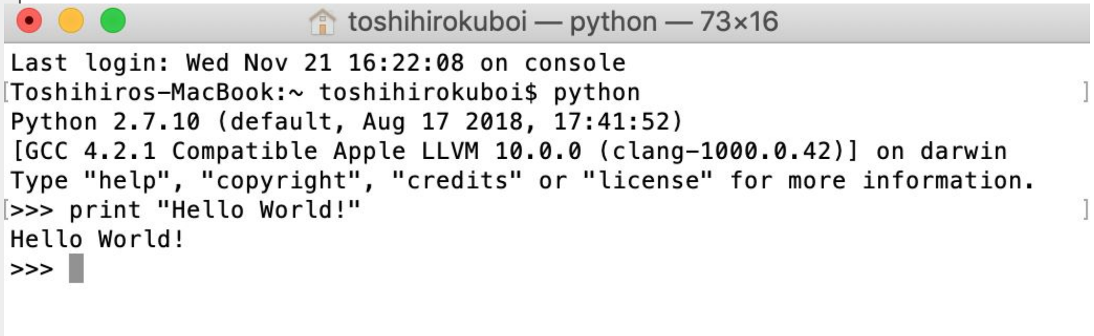


Install Python on your computer!

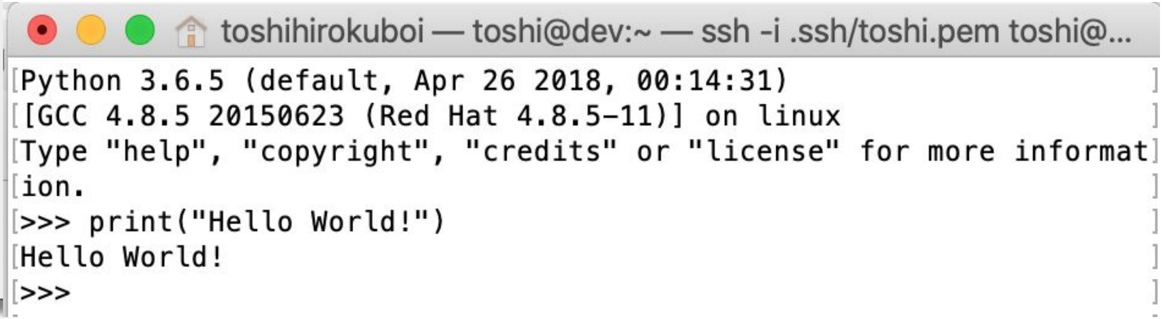
Hello World with Python

```
# in Python 2
print “Hello World!”

# in Python 3
print(“Hello World!”)
```



```
Last login: Wed Nov 21 16:22:08 on console
Toshihiros-MacBook:~ toshihirokuboi$ python
Python 2.7.10 (default, Aug 17 2018, 17:41:52)
[GCC 4.2.1 Compatible Apple LLVM 10.0.0 (clang-1000.0.42)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> print "Hello World!"
Hello World!
>>> 
```



toshihirokuboi — toshi@dev:~ — ssh -i .ssh/toshi.pem toshi@...

```
Python 3.6.5 (default, Apr 26 2018, 00:14:31)
[GCC 4.8.5 20150623 (Red Hat 4.8.5-11)] on linux
Type "help", "copyright", "credits" or "license" for more informat
ion.
>>> print("Hello World!")
Hello World!
>>>
```

Elements in a program file

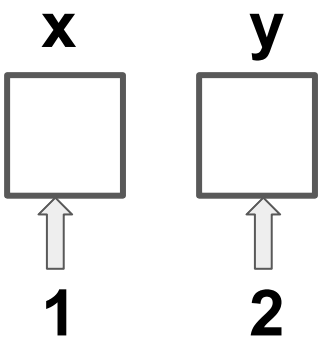
- Program code
  - Expressions
  - Statements
- Comments
- White spaces
  - White spaces are important in Python!

Values and Types

- Integer (int)
  - Whole number
- Floating point number (float)
  - Numbers with fractional parts
- String (str)
  - A string of letters such as “Hello World!”
- Boolean (bool)
  - True / False
- None (NoneType)
  - Null value

Variables

- A variable is a name that refers to a value.
    - Identifier
    - Sort of like a placeholder or box where you can put a value.
- Needs to be defined before used in an expression.



Variable Names

- A variable name can consist of alphabetic letters, numbers, and _ but can not start with numbers.
- Examples
  - name, val1, _var, studentAtCalPoly are legal.
  - 123, student@calpoly, %12 are illegal.

Expressions

- An expression is a combination of values, variables, and operators.
- A value all by itself is considered an expression, and so is a variable.
  - 17
  - x
  - x + 17
- Every expression evaluates to a value.

Arithmetic Expressions

- Addition
  - 1 + 2
- Subtraction
  - 2 - 1
- Multiplication
  - 1 * 2 # 1 x 2
- Division
  - 1 / 2 # it evaluates to 0 in python 2
  - 1.0 / 2.0 # if you want fractional parts, convert values to float in python 2
- Exponentiation
  - 2**2 # 2 to the power of 2

Arithmetic Expressions Continued

- Division continued
  - // gives you only integer part of the quotient of division
  - 11 // 10 => 1
  - 4 // 2 => 2
  - 5 // 2 => 2
- Modulo
  - finds the remainder after division of one number by another.
  - 7 % 2 ⇒ 1
  - 10 % 2 ⇒ 0

Order of arithmetic operations

1. **P**arentheses
2. **E**xponentiation
3. **M**ultiplication and **D**ivision
4. Operators with the same precedence are evaluated from left to right.

1 + 2 * 3 - 4

1 + 6 - 4

(1 + 2) * (3 - 4)
3 * (-1)

Statements

- A statement is a unit of code that the Python interpreter can execute.
    - Examples
        - print statement
        - Assignments
            - x = 1
            - y = ‘Hello!’

Useful operators for updating values of variables

- In order to update the value of a variable based on its current value, you can use any of the following expressions:
    - Addition
        - var = var + 1
        - var += 1
    - Subtraction
        - var = var - 1
        - var -= 1
    - Multiplication
        - var = var * 2
        - var *= 2
    - Division
        - var = var / 2
        - var /= 2

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1.3 Functions

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1.4 Structured Data