Programming for Data Science

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# General

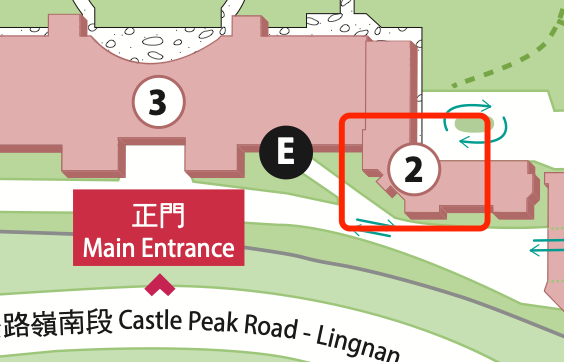
meet him at office time at Wong Administration Building

Office Hour:

Monday 2:00 pm - 4:00 pm

Tuesday 2:00 pm - 4:00 pm

Thursday 2:00 pm - 4:00 pm



## Assessment

attendance and participation 10%

Assignments 40%

Case Study 20%

Examination 30%

GAI is NOT permitted in assignment, case study and examination in this course.

## Required/Essential Readings

I think better to practice other than read of this course

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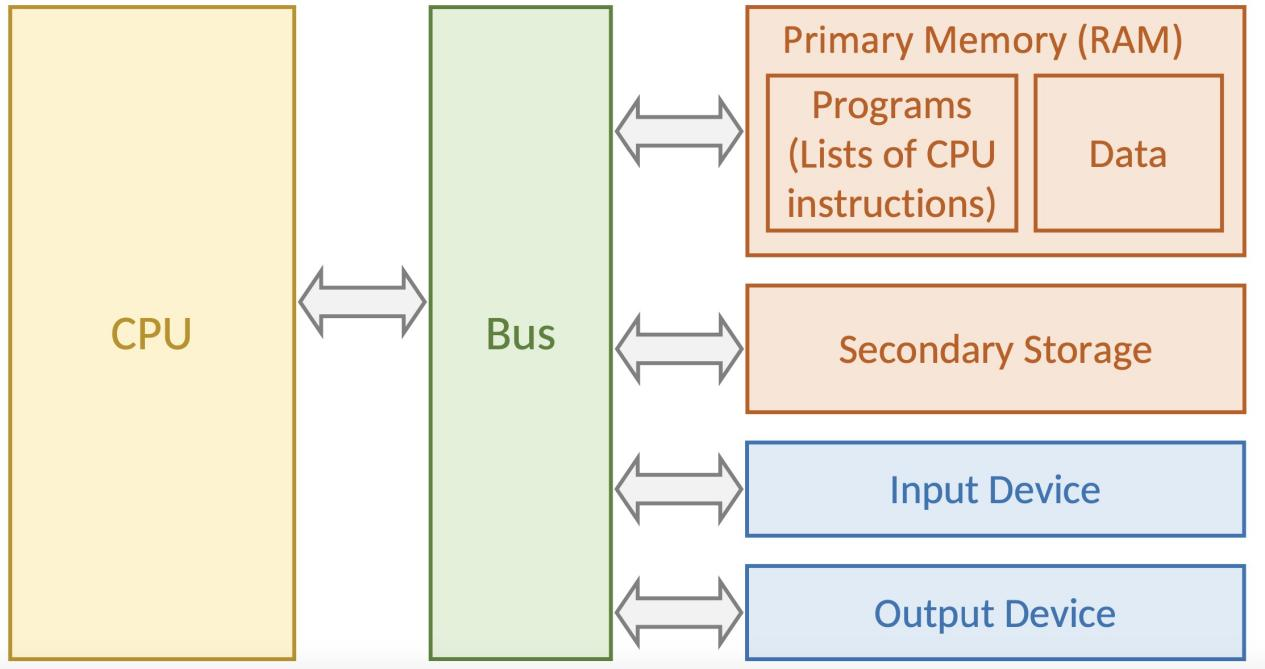
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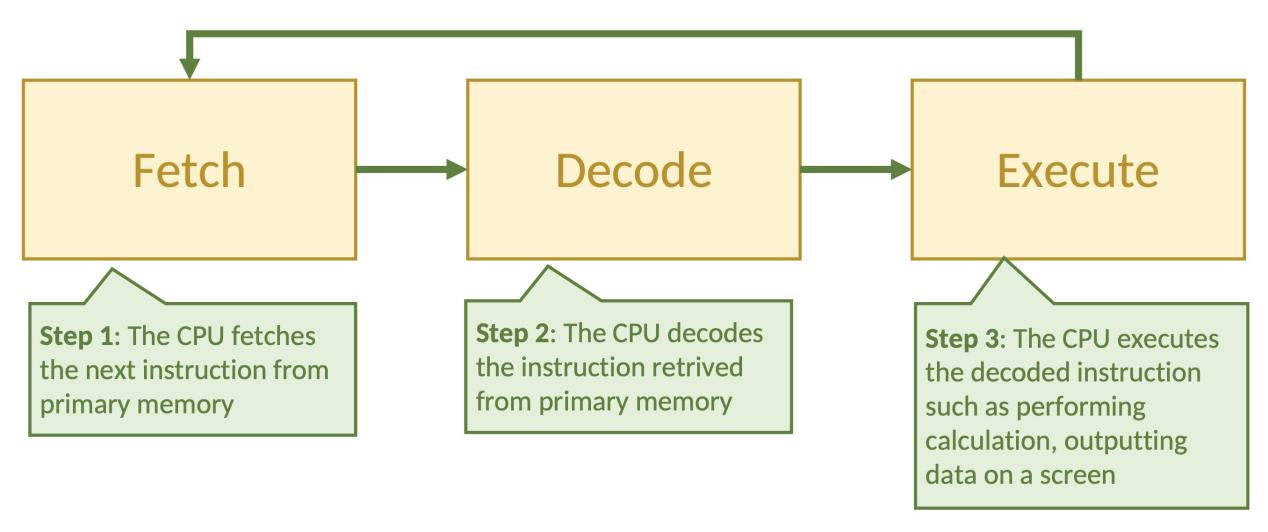
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# Week 1 Lecture 1

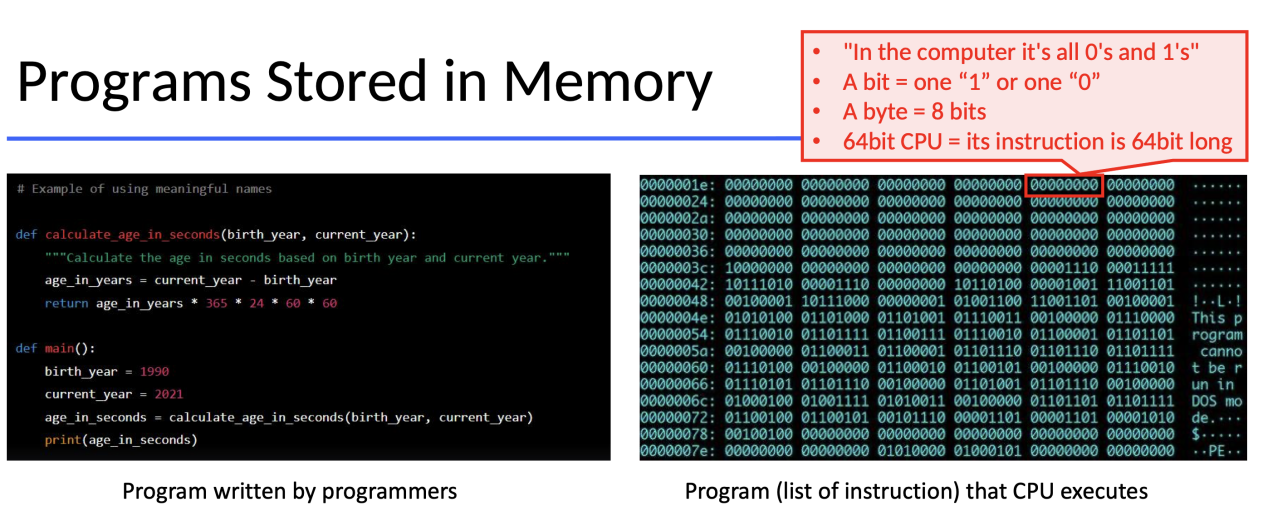
## Simplified Computer Architecture



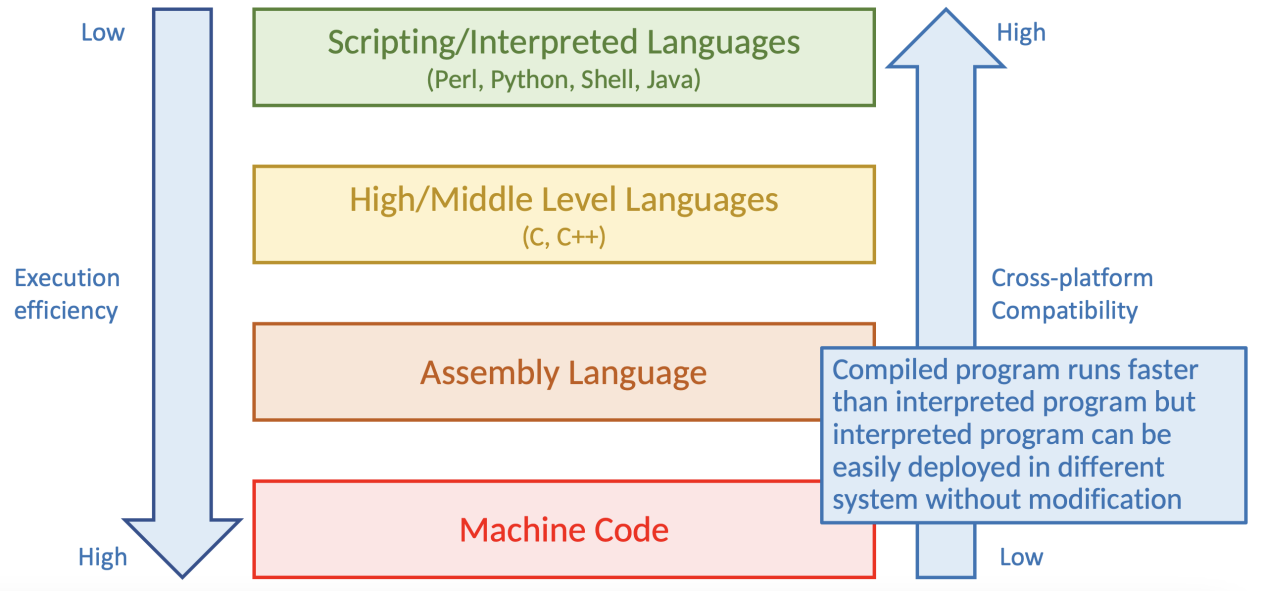
## CPU Execution Cycle



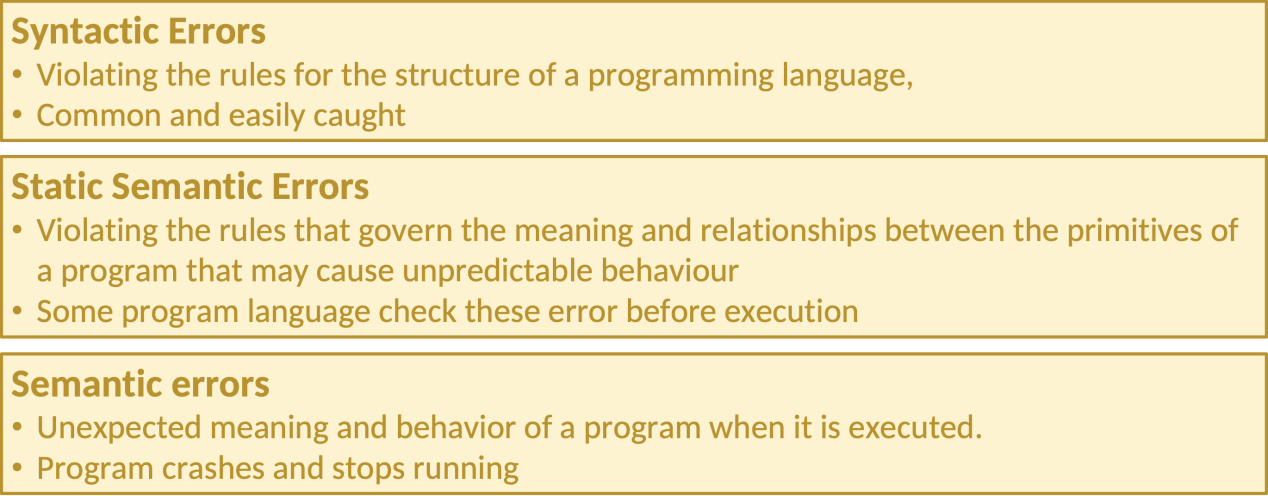
## Programs Stored in Memory



## Types of Programming Language



## Programming Errors



# Week 2 Lecture 2

## What is computation in programming

writing functions to dealing inputs to generate outputs

## What is a good program X

* + Program X is described by step-by-step instructions, i.e. algorithm.
  + Each instruction can be implemented easily.
  + Each instruction is not ambiguous.
  + Each instruction is concise.
  + Program X can be executed quickly on all input instances.
  + Time is money!
  + Program X should be extendable.

## What is Python programming language

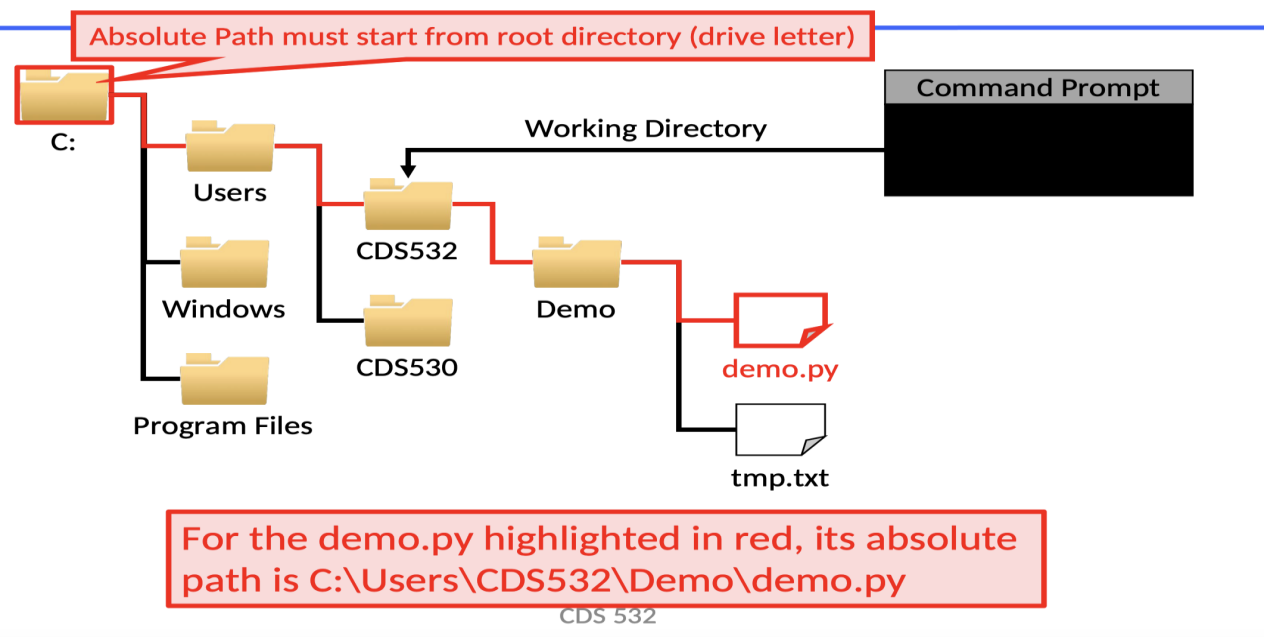
* + Python is a programming language which is:
  + Modern, high-level, general-purpose with multiple paradigms (e.g. procedural, object-oriented, and functional programming)
  + Interpreted (No compilation before execution)
  + Dynamically typed (No need to explicitly define the type of variable)
  + Garbage collection (No need to free memory)
  + Latest Major Release: Python 3
  + Previous major release Python 2 is NOT compatible with Python 3 and is scheduled to be discontinued in 2020.

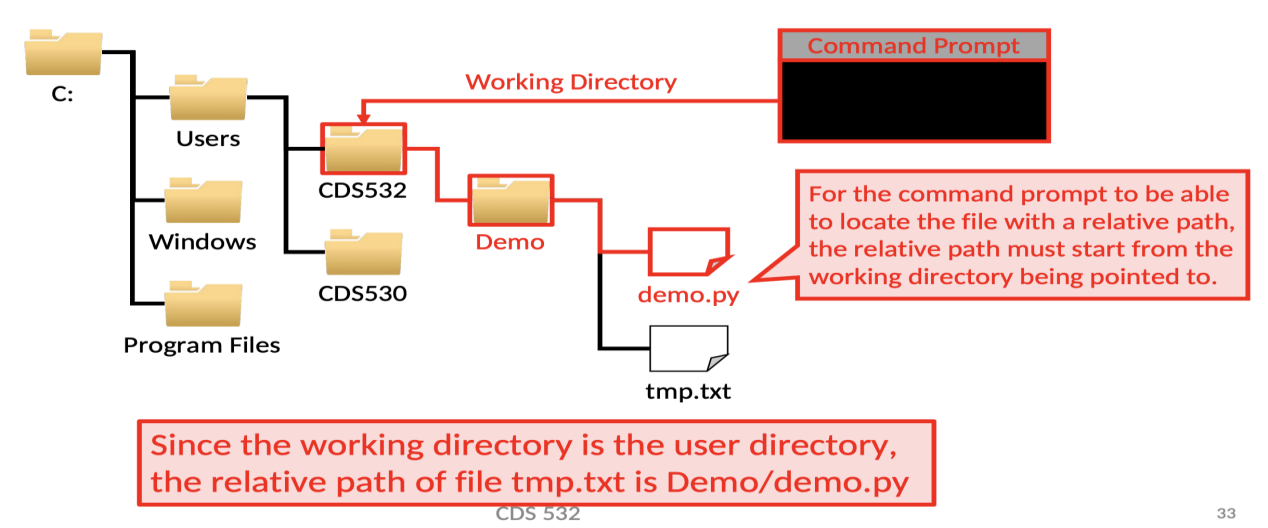
## Relationships among Python Jupyter Pycharm Anaconda

I already know and ask others

## What Is a File Path

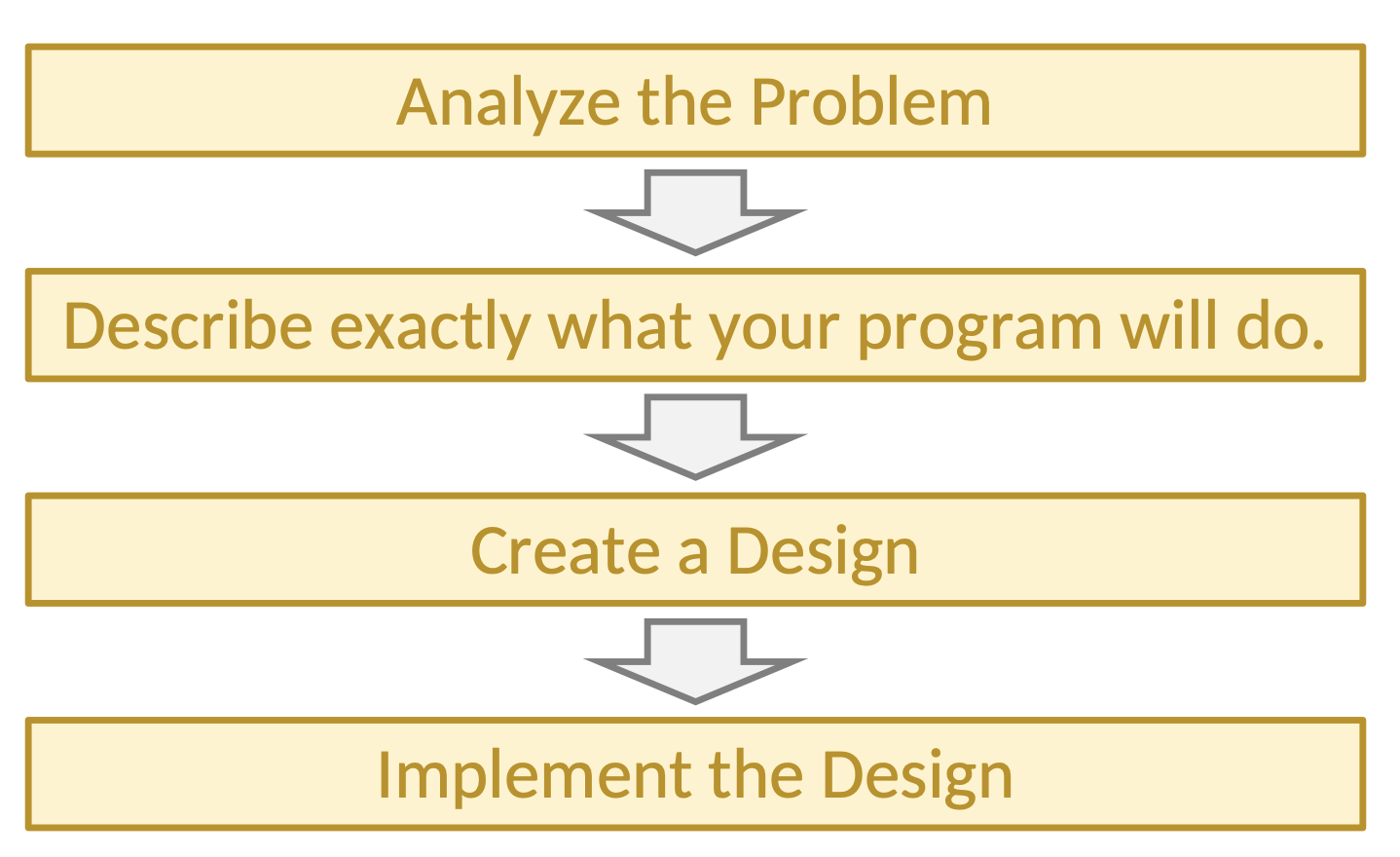
* + Absolute path: It specifies the path to navigate and locate a file from the root directory
  + Relative path: It specifies the path to navigate and locate a file related to the current directory
  + Working directory: The directory that the command prompt is pointing to



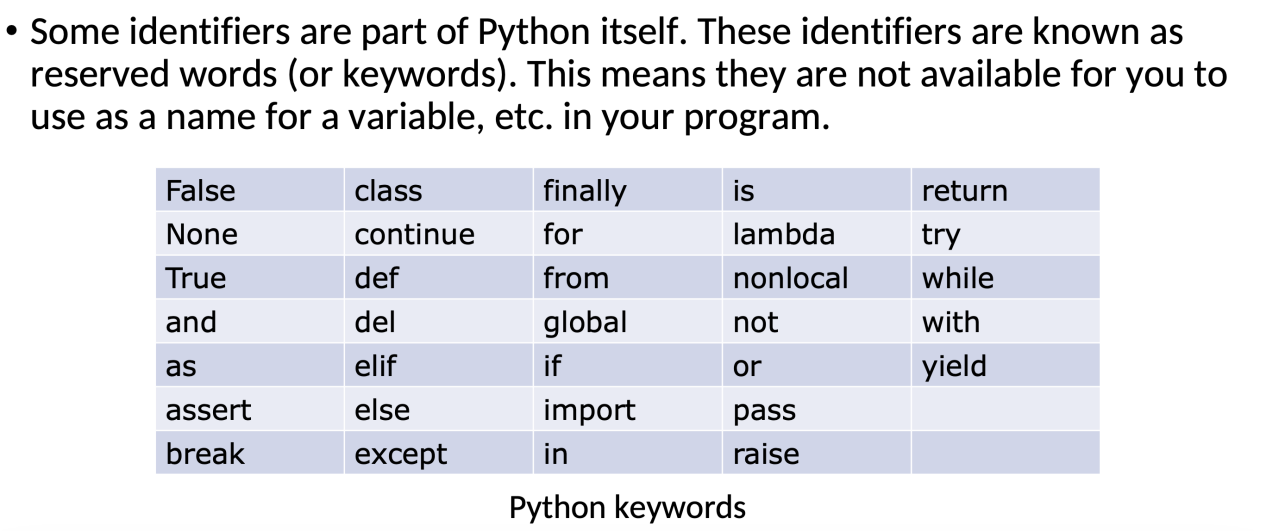


# Week 3 Lecture 3a,3b

## Software Development Process



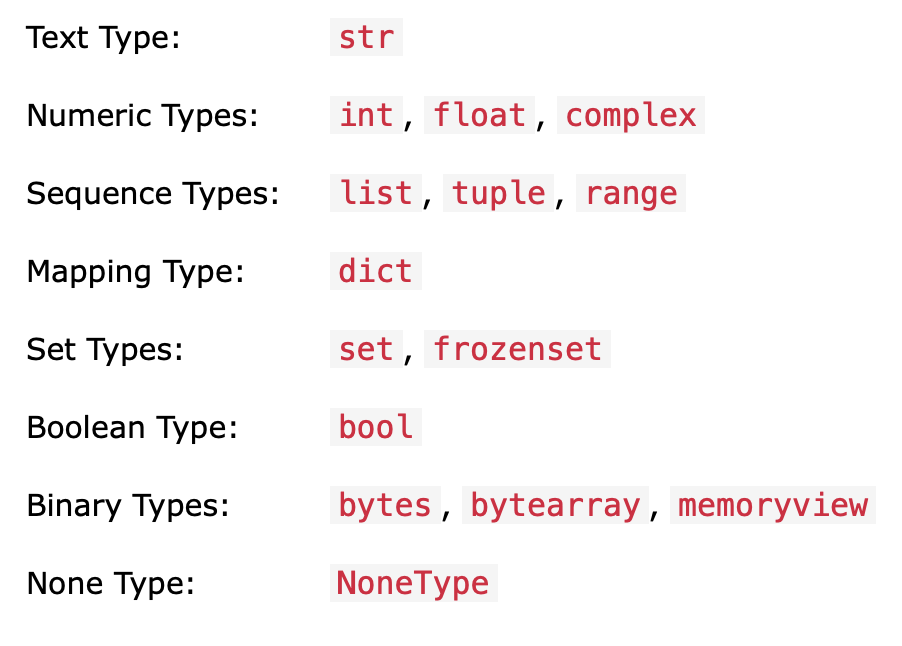
## Python Identifiers



## Python Data Types

Getting the Data Type

print(type(x))



## Python Functions

decision: if: if-else: if-elif-elif-else:

loop: for in: while:

Boolean Operator

()>not>and>or

Numeric Operator

+ - \* / // % \*\*

range(start,end,step)

start by default 0

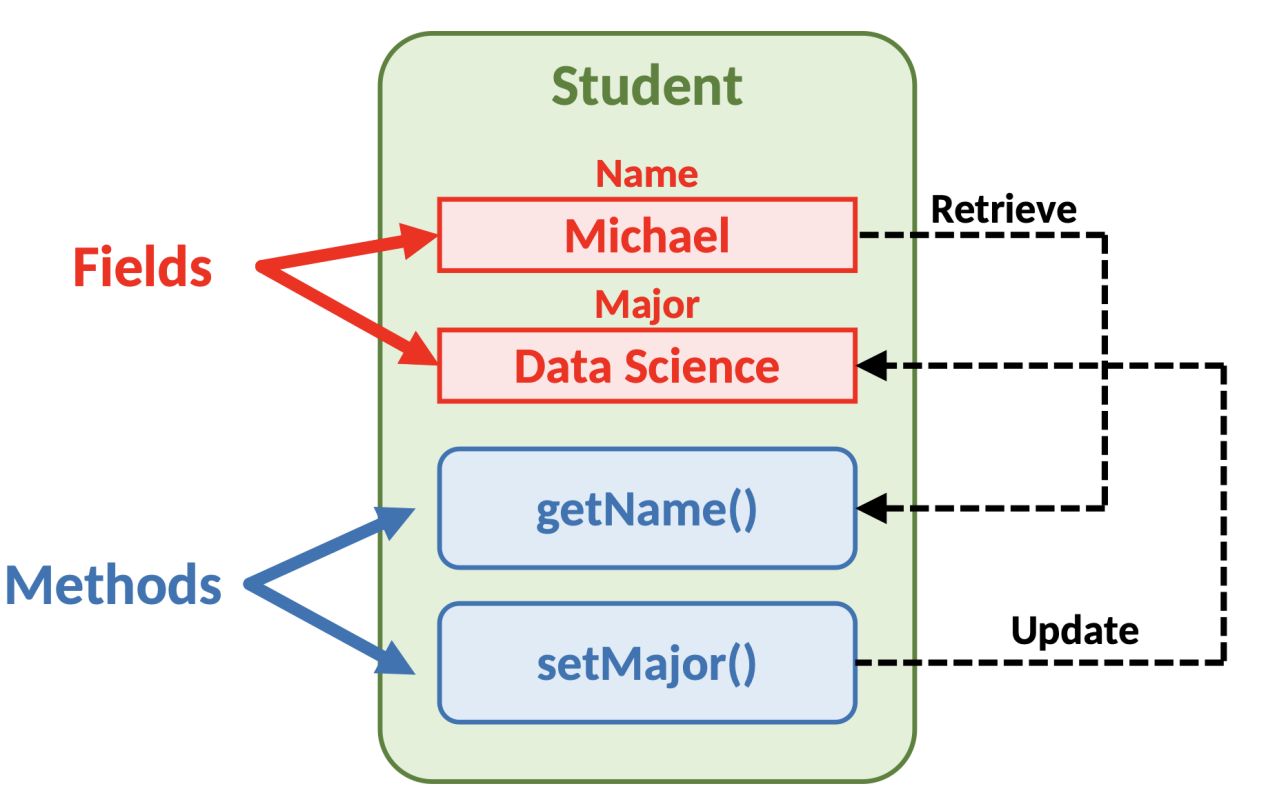
step by default 1

[start,end)

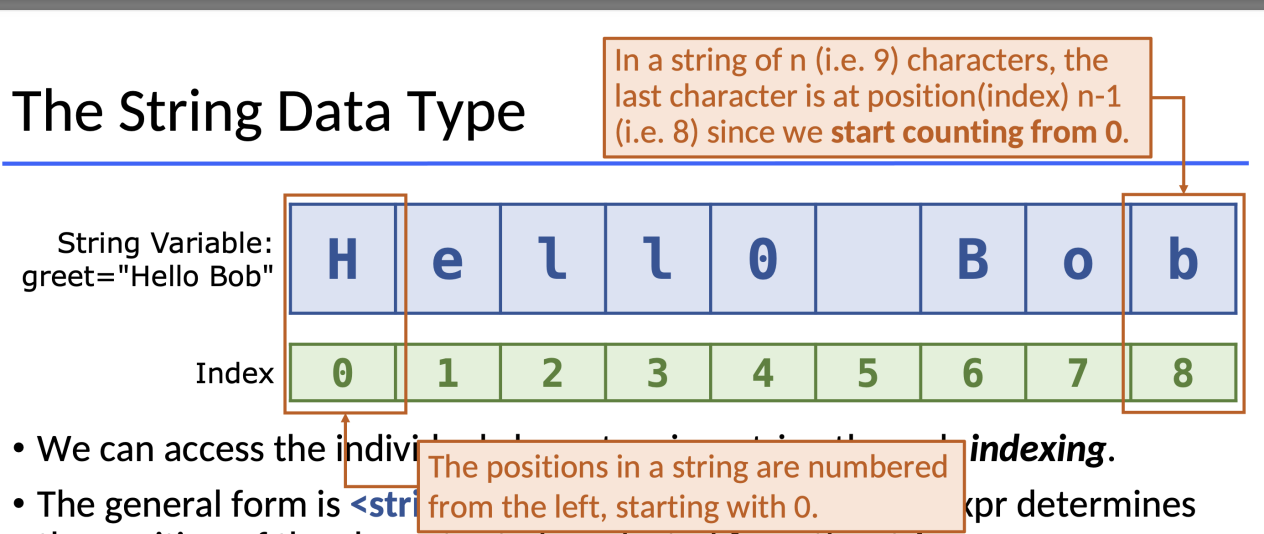
# Week 4 Lecture 4,5,6

## OOP: Object Oriented Programming

variables are classified and managed in object with fields and functions inside



## string is a list of characters



## string operations

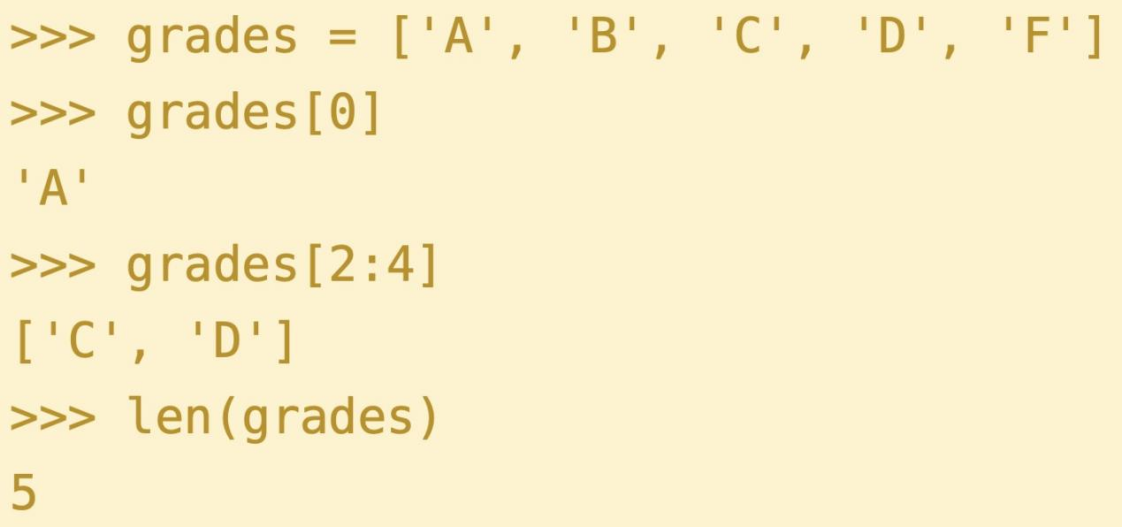
slice a list

list[start : end]

start by default 0

step by default n-1

[start,end)

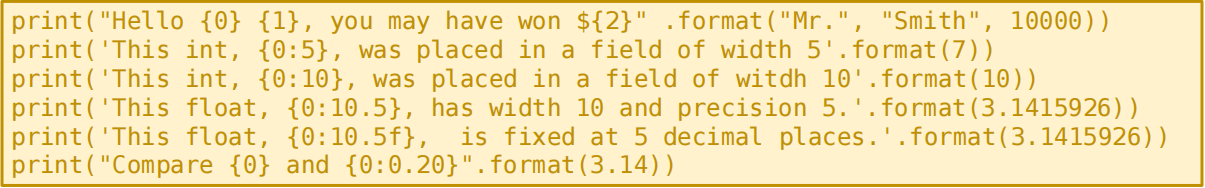


# Week 5 Lecture 6

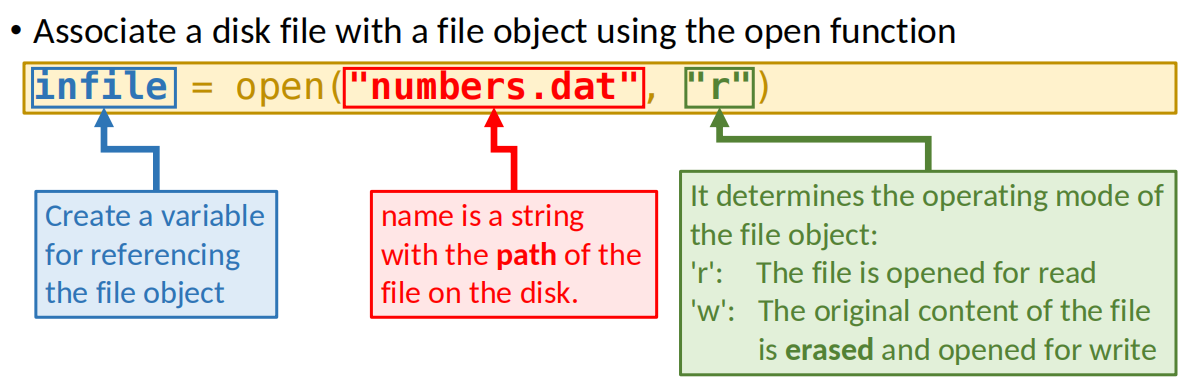
## String Representation

|  |  |
| --- | --- |
| Method | Meaning |
| numeric\_code = ord("A") | returns the ordinal code of a single character |
| character = chr(97) | converts a numeric code to the character |
| float(<expr>) | convert expr to a floating point value |
| int(<expr>) | convert expr to an integer value |
| str(<expr>) | return a string representation of expr |
| eval(<string>) | evaluate string as an expression |
| s.capitalize() | Copy of s with only the first character capitalized |
| s.title() | Copy of s with first character of each word capitalized |
| s.count(sub) | Count the number of occurrences of sub in s |
| s.find(sub) | Find the first position where sub occurs in s |
| s.rfind(sub) | Like find, but returns the right-most position |
| s.split() | Split s into a list of substrings, taking space as delimiter |
| s.join(list) | Concatenate list of strings into one large string using s as separator |
| s.replace (oldsub,newsub) | Replace occurrences of oldsub in s with newsub |
| s.center(width) | Center s in a field of given width |
| s.ljust(width) | Like center, but s is left-justified |
| s.rjust(width) | Like center, but s is right-justified |
| s.upper() | Copy of s in all uppercase letters |
| s.lower() | Copy of s in all lowercase letters |
| s.lstrip() | Copy of s with leading whitespace removed |
| s.rstrip() | Copy of s with trailing whitespace removed |

## String Formatting



## File Processing



# Week 6 Lecture 7

## Lists vs String

A list is very similar to a string. In fact, string is a special version of list.

Lists are mutable, meaning they can be changed. Strings cannot be

changed.

Operations of String can also be applied to list!

## What is Dictionary

Dictionaries can be created in Python by listing key-value pairs inside of

curly braces

score = {"Peter":"80", "John":"78", "Bill":"90"}

## Dictionary Operations

...

## Why use dictionary

Example Program: Word Frequency

counts[w] = counts[w] + 1

# Week 7 Lecture 8

## Function

Functions can be used to reduce code duplication and make programs more

easily understood and maintained.

## Modify Parameters

Data values are copied and not modified to original ones whereas sited values are changed directly to original ones.

# Week 8 Lecture 9