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Python Assignment 4

Python Basics:

Variables & Types

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Robotics Team - VRC 99909A Rising Phoenix

Class Recap

- How do computers run your program?
 - Hard drive permanently stores your program (instructions + data) as a file in the file system.
 - When you run your program, another program (Python interpreter) will translate your program into machine language (binary code) and load it into computer memory.
 - Memory (RAM) temporarily stores instructions + data loaded from hard drive during execution.
 - CPU processes instructions + data fetched from memory one by one
- Variable - a named memory location which temporarily stores some data
 - Variable has a name (identifier) - usually meaningful so that programmers know what information stored in them.
 - Variable binds to a memory location that stores some data
 - Variable has a type - indicates what kind of value it can store

- Python is **dynamically typed** - variables dynamically bind to memory locations that store data when the program is running (at runtime).

E.g. `age = 10`

- 1) Python interpreter process the above assignment statement from right to the left
- 2) First, the number integer 10 is stored somewhere in the memory
- 3) When integer 10 is assigned to variable "age" (the equal sign =), its memory location now binds to variable "age".
- 4) The computer (interpreter) can now infer that variable "age" is of type integer (int) because the memory location of an integer value binds to it.
- 5) If you assign a value of different type (like a string) to that same variable, the variable will bind to that new memory location and its type will change to the new type.

Some other languages (Java, C/C++) are **statically typed**. You, the programmer, have to declare the type of each variable first. A memory location provisioned to store that type of value permanently binds to that variable. Variable types can not be changed.

- Data Type - specifies type of value and what type of mathematical, relational or logical operations can be applied to it. It matters in 2 important ways:
 - Each type of value requires different size of memory (# of bytes) to store it. Computer (interpreter + OS) needs to know the type in order to provision the right amount of memory (bytes) to store it.
 - Operations can only be applied to specific types of values. You can't add or subtract some text (String). That's mathematical operations applied only to numeric values.

Python built-in data types:

- Text Type: **str**
- Numeric Types: **int**, **float**, complex
- Sequence Types: **list**, tuple, range
- Mapping Type: **dict**
- Set Types: set, frozenset
- Boolean Type: **bool**
- Binary Types: bytes, bytearray, memoryview

Assignment 1:

Write your first Python program in Python shell: display "Hello World!" in the console

Assignment 2:

Write your first Python program in Python IDLE and save it to a Python file before running it: display "Hello World!" in the console

Assignment 3:

Write your second Python program - Put "Hello World!" in a variable and print that variable to the console

Assignment 4:

Create some variables and assign some integer values to them. Display the values these variables store to the console

Now assign some values of different types to those same variables. Display the new values these variables store to the console.