Python Programming
Dynamic Typing

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Variables Assignments

- In python, NOT only we can change the value, we can even change the type!
  - It is called Dynamic Typing
- *Take a minute to read the program*
  - Maybe make a guess :)
- Let's trace it

```python
3    var = 55
4
5    # change value in memory
6    var = 10
7    print(var)          # 10
8
9    # Get, Change, Assign
10   var = var + 5
11   print(var)          # 15
12
13   # Change the DATA type to floating point
14   # Python uses Dynamic typing: Change types
15   # Set memory value to 25.5
16   var = 6.5            # 6.5
17   print(var)
18
19   var = 3 * var - var
20   print(var)          # 13.0
21
22   # Change type again to string
23   var = 'Dr Mostafa'
24   print(var)          # Dr Mostafa
```

Variables Assignments

```
3    var = 55
4
```

- **Line 3:**
  - Create variable
    - Name = var
    - Type = int
    - Value = 55

Memory Before

Memory After

Var: 55 (type int)

Variables Assignments

- **Line 6:**
  - ○ Re-assign value 10 to variable var

```
3    var = 55
4
5    # change value in memory
6    var = 10
7    print(var)        # 10
8
```

Memory Before

Var: 55 (type int)

Memory After

Var: **10** (type int)

Variables Assignments

- **Line 10**
  - var = var + 10
  - Evaluate expression var + 10
  - What is var's value in memory? 10
  - What is var + 5? 10 + 5 = 15
  - Re-assign value 15 to var

```
9     # Get, Change, Assign
10    var = var + 5
11    print(var)          # 15
12
```

Memory Before

Var: 10 (type int)

Memory After

Var: **15** (type int)

Variables Assignments

- **Line 16:**
  - Re-assign value 6.5 to variable var
    - But **change type** to float

```
13    # Change the DATA type to floating point
14    # Python uses Dynamic typing: Change types
15    # Set memory value to 25.5
16    var = 6.5          # 6.5
17    print(var)
```

Memory Before

Var: 15 (type int)

Memory After

Var: **6.5** (type float)

Variables Assignments

```
19  var = 3 * var - var
20  print(var)         # 13.0
21
```

- **Line 19**: Re-assign var to expression **3 * var - var**
  - What is var's value in memory? 6.5
  - What is 3 * var - var? 3 * 6.5 - 6.5 = 13.0
  - Re-assign value 15 to var

Memory Before

Var: **6.5** (type float)

Memory After

Var: **13.0** (type float)

Variables Assignments

- **Line 16**
  - Re-assign value 'Dr Mostafa' to variable var
    - But **change type** to string

```
22  # Change type again to string
23  var = 'Dr Mostafa'
24  print(var)            # Dr Mostafa
```

Memory Before
Var: **13.0** (type float)

Memory After
Var: **'Dr Mostafa'** (type string)

Dynamic Typing

- Recall type: int, float, str, etc
  - Can we **change** the variable's type from a line to another?
  - Does the language **check** that: before or during running the code?
- Python is a **dynamically** typed language.
  - The types of variables are checked **during running the program**,
  - **Pros**: Easy development
  - **Cons**: More **errors** at runtime and in shipped code
  - Future reading
- Other languages are called: **statically** typed language
  - Every variable has a specific type that CAN'T be changed (checked **before running**)
  - Example: C++ and Java

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."