Data Structures and Data Types

- If you’re learning Python from multiple sources, you might encounter the terms data structures and data types being used interchangeably.

- **Definition: **Data structure is a general computer science concept. Its definition reads as follows on Wikipedia:
- **Data structure is a data organization, management, and storage format that enables efficient access and modification.** More precisely, a data structure is a collection of data values, the relationships among them, and the functions or operations that can be applied to the data.
- Whereas Data type is a concept specific to a programming language. In a way, it is a concrete implementation of a data structure in a particular programming language (be it python or any other language).
- **The actual definition of what constitutes a "type" varies among programming languages. **Talking about Python, there are basic data types like int, float, string etc. You can use the built-in types like list, set etc. which we will be covering in this session.

- Calling these data types as data structures won’t be wrong because there is no major difference between the two in Python.

Data Types in Python

- Before we proceed to discuss what data types in Python are, there are some basic questions that we would discuss.** What is data? **\

- Let’s say you are going to meet a friend at her office. When you go to visit her office, the security guard asks you to make an entry in the register before you enter the office. A typical entry register asks for the following information –

Visitor's name
Karen
Visitor's phone number
32 000 000
Visitor's address
Leuven
Entry time
8:30 AM

- The above information that you just provided is data. \

- We see that the data entry in the previous slide has different varieties:
  - Some are english letters,
  - Some are numerical digits, and
  - There are some special characters, dash (-) and colon (:).
  - In this example, our data is divided into 4 categories – name, phone number, address, and time.
  - This** categorization of data**,** **based on their characteristic & our need, is called** data types.**\

- Some of the data types in python include:
  - Integer: whole numbers, positive or negative numbers. Eg: 100
  - Float: Floating-point numbers are real numbers, rational or irrational. In most cases, this means numbers with decimal fractions. Example: 123.45

String: Strings are sequences of characters, or text, enclosed in quotes. Example: "any text", “karen”\

- For further reading**:**
  - operators and data types
- For practice and different data type examples, visit: https://www.w3schools.com/python/python_datatypes.asp

Getting the Data Type

You can get the data type of any object by using the type( ) function:

- **Numerical Types: **int (integer), float (decimal)
- **Text Type: **str (string)
- **Boolean Type:** bool (True or False)

In [4]:
```
a = 4
type(a)
```

Out[4]: int

In [5]:
```
b = 2.5
type(b)
```

Out[5]: float

In [6]:
```
text = 'hello'
type(text)
```

Out[6]: str

In [7]:
```
boolvar = True
type(boolvar)
```

Out[7]: bool