Variables and Data Types in Python

In Python, a variable is a name that refers to a value stored in memory. Variables themselves have no fixed type; instead, they reference objects of some type.

Example:

```
x = 5        # x refers to an integer object (int)
y = "Alice"     # y refers to a string object (str)
```

Python is dynamically typed; the type is inferred from the value:

```
x = 10       # int
x = "hello"     # str (now x is a string)
```

Variable naming rules:

- Can include letters, digits, and underscores.

- Cannot start with a digit.

- Case-sensitive.

- Should not use reserved keywords.

Checking type:

```
name = "Jane"
age = 30
print(type(name))    # str
print(type(age))     # int
```

Major Data Types:

1. int: Whole numbers.

2. float: Decimal numbers.

3. complex: Numbers with a real and imaginary part.

4. str: Text (strings).

5. bool: Boolean values (True, False).

6. list: Ordered, mutable collection.

7. tuple: Ordered, immutable collection.

8. set: Unordered collection of unique items.

9. dict: Unordered collection of key-value pairs.

Mutable vs. Immutable:

- Mutable: list, dict, set

- Immutable: int, float, str, tuple, bool

Examples:

list_example = [1, 2, 3]

tuple_example = (1, 2, 3)

set_example = {1, 2, 3}

dict_example = {"name": "Alice", "age": 30}