Tuples in Python

AN INTRODUCTION TO PYTHON DATA STRUCTURES

What is a Tuple?

- A tuple is a collection of ordered and immutable elements in Python.
- Tuples are similar to lists, but they cannot be changed (immutable).

```
tuple_name = (element1, element2, element3, ...)
```

Characteristics of Tuples

- **Ordered**: Tuples maintain the order of elements.
- **Immutable**: Once defined, tuple elements cannot be changed.
- **Allows Duplicates**: Tuples can contain duplicate elements.
- **Mixed Data Types**: Tuples can hold different types of data in a single collection.
- **Indexing and Slicing**: You can access tuple elements using indices and slices.

Creating Tuples

- Example:

```
# Creating a tuple
my_tuple = (1, 2, "Python", 3.5)
print(my_tuple)
```

- Tuple Indexing and Slicing :

```
my_tuple = ('a', 'b', 'c', 'd', 'e')
print(my_tuple[2])   # Output: 'c'
print(my_tuple[1:4]) # Output: ('b', 'c', 'd')
```

Indexing starts at 0, and slicing can retrieve a range of elements.

Nested Tuples

- Tuples can be nested, meaning one tuple can be an element of another tuple.

```
nested_tuple = (1, (2, 3), (4, (5, 6)))
print(nested_tuple[2][1][1])  # Output: 6
```

Immutability of Tuples

- Tuples cannot be modified once created. Any attempt to change an element will result in an error.

```
my_tuple = (10, 20, 30)
my_tuple[1] = 40  # This will raise an error
```

Tuple Operations

- Tuple Concatenation

```
tuple1 = (1, 2)
tuple2 = (3, 4)
result = tuple1 + tuple2
print(result)  # Output: (1, 2, 3, 4)
```

- Tuple Multiplication

```
repeated_tuple = tuple1 * 3
print(repeated_tuple)  # Output: (1, 2, 1, 2, 1, 2)
```

Tuple Methods

- count(): Returns the number of times an element appears in a tuple.
- index(): Returns the index of the first occurrence of an element.

```
my_tuple = (1, 2, 3, 2, 4)
print(my_tuple.count(2))  # Output: 2
print(my_tuple.index(3))  # Output: 2
```

Why Use Tuples?

- Tuples are more memory-efficient than lists.
- Useful for fixed data that shouldn't change during program execution.
- Tuples can be used as dictionary keys (while lists cannot).
- Protects data from accidental modification.

THANK YOU

HAPPY LEARNING!