**Python Strings: Basics & Operations**

A string in Python is a sequence of characters enclosed in single ('), double ("), or triple (''' """) quotes. Strings are immutable, meaning they cannot be changed after creation.

**1. Creating Strings**

# Using single and double quotes

str1 = 'Hello'

str2 = "World"

# Using triple quotes (for multi-line strings)

str3 = '''This is

a multi-line

string'''

print(str1, str2, str3)

**2. String Concatenation (+ Operator)**

The + operator is used to combine two or more strings.

str1 = "Python"

str2 = "Programming"

# Concatenating strings

result = str1 + " " + str2

print(result) # Output: Python Programming

**Note:**

* Spaces must be added manually (" ") if needed.
* Only strings can be concatenated. Using + with other data types will result in an error.

age = 25

# print("Age is " + age) # ❌ Error: Cannot concatenate string and integer

print("Age is " + str(age)) # ✅ Correct way using str() conversion

**3. Converting to Uppercase (upper())**

The .upper() method converts all lowercase characters to uppercase.

text = "hello world"

uppercase\_text = text.upper()

print(uppercase\_text) # Output: HELLO WORLD

**4. Converting to Lowercase (lower())**

The .lower() method converts all uppercase characters to lowercase.

text = "PYTHON PROGRAMMING"

lowercase\_text = text.lower()

print(lowercase\_text) # Output: python programming

**5. Replacing a Substring (replace())**

The .replace(old, new) method replaces all occurrences of a substring with another string.

text = "I love Python"

new\_text = text.replace("Python", "JavaScript")

print(new\_text) # Output: I love JavaScript

**Replacing Multiple Occurrences**

text = "apple apple apple"

new\_text = text.replace("apple", "orange", 2) # Replaces only first 2 occurrences

print(new\_text) # Output: orange orange apple

**6. Finding a Substring (find())**

The .find(substring) method returns the index of the first occurrence of the substring. If not found, it returns -1.

text = "Hello, welcome to Python programming"

index = text.find("Python")

print(index) # Output: 18

# If substring is not found

index\_not\_found = text.find("Java")

print(index\_not\_found) # Output: -1

**7. Finding Length of a String (len())**

The len() function returns the total number of characters in a string.

text = "Python"

print(len(text)) # Output: 6

**Note:**

Spaces and special characters are also counted.

text = "Hello World!"

print(len(text)) # Output: 12 (Includes space and exclamation mark)

**8. Checking the Type of a String (type())**

The type() function returns the data type of a variable.

text = "Hello"

print(type(text)) # Output: <class 'str'>

**Summary Table**

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| **Operation** | **Description** | **Example** |
| + | Concatenation of strings | "Hello" + " World" → "Hello World" |
| upper() | Converts to uppercase | "hello".upper() → "HELLO" |
| lower() | Converts to lowercase | "HELLO".lower() → "hello" |
| replace() | Replaces substring | "abc".replace("a", "x") → "xbc" |
| find() | Finds substring index | "hello".find("l") → 2 |
| len() | Gets string length | len("hello") → 5 |
| type() | Gets type of variable | type("hello") → <class 'str'> |