Python Data Types and Casting

Data Types in Python

1. Numeric Types

- **int**: Integer values, e.g., `5`, `-10`
- **float**: Floating-point numbers (decimals), e.g., `5.7`, `-3.14`
- **complex**: Complex numbers, e.g., `3 + 2j`

2. Text Type

- **str**: Strings represent sequences of characters, e.g., `"Hello, World!"`

3. Boolean Type

- **bool**: Represents truth values, `True` or `False`

4. Sequence Types

- **list**: A mutable collection of items, e.g., `[1, 2, 3]`
- **tuple**: An immutable collection of items, e.g., `(1, 2, 3)`
- **range**: Represents a sequence of numbers, e.g., `range(6)` (which gives `0, 1, 2, 3, 4, 5`)

5. Mapping Type

- **dict**: A collection of key-value pairs, e.g., `{"name": "Alice", "age": 25}`

6. Set Types

- **set**: An unordered collection of unique items, e.g., `{1, 2, 3}`
- **frozenset**: Immutable version of a set

7. Binary Types

- **bytes**: Immutable sequences of bytes
- **bytearray**: Mutable sequences of bytes
- **memoryview**: Memory views of another object

Type Casting in Python

In Python, **type casting** refers to converting one data type to another. Type casting can be classified into two types:

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1. Implicit Type Casting

In **implicit type casting**, Python automatically converts one data type into another without the need for explicit instructions. Python handles the conversion when it encounters different data types in an expression.

1.1 Implicit Casting with Numeric Types

When performing operations between different numeric types (`int`, `float`, `complex`), Python automatically promotes the lower precision type to the higher precision type.

Example (int and float):

```
x = 5   # int
y = 2.5 # float
z = x + y  # Python implicitly converts x to float
print(z)  # Output: 7.5 (float)
```

2. Explicit Type Casting

In explicit type casting, the user manually converts one data type into another using Python's built-in functions. This is useful when Python cannot automatically convert data types or when you need precise control over the conversion.

Common Explicit Type Casting Functions

2.1 Casting to Integer (`int()`)

Converts a floating-point number or a string (if it contains digits) to an integer.

Example:

```
x = 4.7
y = int(x)  # Converts float to int, removes the decimal part
print(y)  # Output: 4
```