

Day 3 (27/8/25): Integral Types in Python

1. What are Integral Types?

In Python, **integral types** refer to **whole numbers (integers)** that do not have a fractional or decimal part.

They are represented using the built-in **int** data type.

Example: -100, 0, 42, 999999

2. Characteristics of Integers in Python

1. **No Size Limit** – Unlike languages like C/Java, Python’s int can store arbitrarily large numbers.
 - Example: 100000000000000000000000000000000 is valid.
2. **Positive and Negative Numbers** – Integers can be positive, negative, or zero.
 - Example: -45, 0, 78.
3. **Automatic Conversion** – Python automatically converts large integers into **long integers** (internally), so you don’t need to worry about overflow.
4. **Immutable** – Like all basic data types in Python, integers are **immutable** (cannot be changed after creation).

3. Types of Integral Literals

Python integers can be represented in different **number systems**:

1. **Decimal (Base 10)** – Normal numbers (default system).
 - Example: a = 100
2. **Binary (Base 2)** – Prefix with 0b or 0B.
 - Example: b = 0b1010 # 10 in decimal
3. **Octal (Base 8)** – Prefix with 0o or 0O.
 - Example: c = 0o12 # 10 in decimal
4. **Hexadecimal (Base 16)** – Prefix with 0x or 0X.
 - Example: d = 0xA # 10 in decimal

4. Useful Integer Operations

- Arithmetic: +, -, *, /, //, %, **
- Comparison: <, >, ==, !=
- Bitwise: &, |, ^, ~, <<, >>

5. Example Program – Demonstrating Integral Types

Example: Integral Types in Python

Decimal integer

a = 42

Binary, Octal, and Hexadecimal representations

b = 0b101010 # binary

c = 0o52 # octal

d = 0x2A # hexadecimal

Arithmetic operations

sum_val = a + 10

product = a * 2

power = a ** 2

print("Decimal (a):", a)

print("Binary (b = 0b101010):", b)

print("Octal (c = 0o52):", c)

print("Hexadecimal (d = 0x2A):", d)

print("Sum:", sum_val)

print("Product:", product)

print("Power:", power)

6. Sample Output

Decimal (a): 42

Binary (b = 0b101010): 42

Octal (c = 0o52): 42

Hexadecimal (d = 0x2A): 42

Sum: 52

Product: 84

Power: 1764