**What is bytearray in Python?**

In Python, a bytearray is a **mutable sequence of bytes**. It is similar to the built-in bytes type, but unlike bytes (which is immutable), bytearray can be **modified in place**.

**🔹 Why use bytearray?**

* When you need to **manipulate binary data** (like files, images, or network data).
* When performance matters and you want **mutable byte sequences**.
* Ideal for **encoding/decoding data**, **I/O operations**, or **interfacing with low-level binary protocols**.

**🔹 Creating a bytearray**

# From a string (must be encoded)

ba1 = bytearray("hello", "utf-8")

print(ba1) # Output: bytearray(b'hello')

# From a list of integers

ba2 = bytearray([65, 66, 67])

print(ba2) # Output: bytearray(b'ABC')

# Empty bytearray

ba3 = bytearray()

print(ba3) # Output: bytearray(b'')

**🔹 Accessing and Modifying**

ba = bytearray("hello", "utf-8")

print(ba[1]) # Output: 101 (ASCII of 'e')

ba[0] = 72 # ASCII of 'H'

print(ba) # Output: bytearray(b'Hello')

**🔹 Common Methods**

| **Method** | **Description** | **Example** |
| --- | --- | --- |
| append(x) | Appends a single byte | ba.append(33) → b'Hello!' |
| extend(iter) | Extends with bytes from iterable | ba.extend([32, 87]) → b'Hello W' |
| insert(i, x) | Inserts a byte at position i | ba.insert(0, 100) |
| pop([i]) | Removes and returns item at index (default -1) | ba.pop() |
| remove(x) | Removes first occurrence of x | ba.remove(87) |
| reverse() | Reverses in-place | ba.reverse() |

**🔹 Encoding/Decoding Example**

text = "سلام"

ba = bytearray(text, "utf-8")

print(ba) # bytearray of utf-8 encoded Urdu/Arabic

decoded\_text = ba.decode("utf-8")

print(decoded\_text) # Output: سلام

**🔹 Summary**

| **Feature** | **bytes** | **bytearray** |
| --- | --- | --- |
| Immutable | ✅ Yes | ❌ No |
| Mutable | ❌ No | ✅ Yes |
| Type | bytes | bytearray |
| Use case | Read-only binary data | Writable binary data |