Welcome to
INTERNSHIP STUDIO

Module 04 | Lesson 02
NumPy

Introduction to NumPy

What is NumPy?

- NumPy stands for "Numerical Python".

- It is a powerful Python library for numerical computing.

- Provides support for large, multi-dimensional arrays and matrices.

- Offers a collection of mathematical functions to operate on these arrays.

Why use NumPy?

- **Efficient and Fast**: NumPy is written in C, which makes it faster than pure Python.

- **Handling Large Datasets**: NumPy's array objects can handle large datasets efficiently.

- **Mathematical Operations**: NumPy provides a wide range of mathematical functions and operators.

- **Integration**: NumPy seamlessly integrates with other libraries and tools, such as SciPy, Pandas, and Matplotlib.

Key Features of NumPy

1.**N-dimensional Array Object**:

- NumPy's main object is the ndarray (n-dimensional array).
- Efficiently stores and manipulates large, homogeneous arrays of data.

2.**Mathematical Functions**:

- NumPy provides a wide range of mathematical functions for array manipulation.
- Includes functions for linear algebra, Fourier transforms, random number generation, etc.

3.**Broadcasting:**

- NumPy's broadcasting feature allows for element-wise operations on arrays of different sizes.
- It eliminates the need for explicit loops, resulting in cleaner and more readable code.

Installation and importing NumPy

- **<u>Installation</u>**: NumPy can be installed using pip, the Python package manager.

```
$ pip install numpy
```

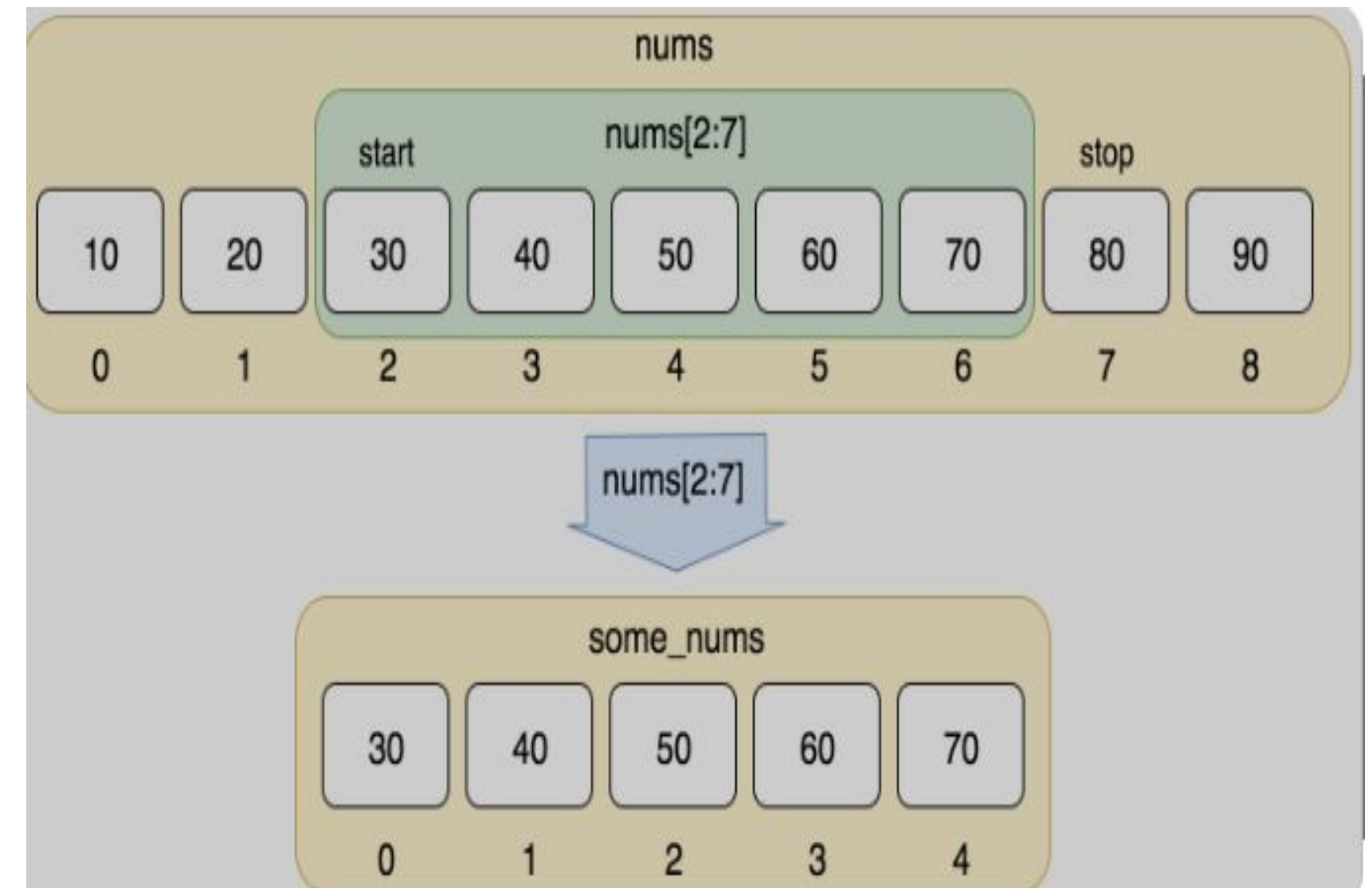- **<u>Importing:</u>**

```
import numpy as np
```

Basic NumPy Operations

1. Creating NumPy Arrays:

     a. Using python lists or tuples
     b. Using NumPy functions

2. Array Indexing and Slicing:

     a. Accessing elements
     b. Slicing arrays

NumPy Applications

1. Mathematical Operations:

    a. Performing element-wise operations on arrays
    b. Linear Algebra operations

2. Data Analysis and Manipulation:

    a. NumPy is widely used in data analysis and manipulation tasks
    b. It integrates well with libraries like Pandas for data processing

Resources

1. NumPy Documentation: https://numpy.org/doc/

2. NumPy User Guide: https://numpy.org/doc/stable/user/index.html

SUMMARY

You got this

- NumPy is a powerful library for numerical computing in Python.

- Offers efficient handling of large arrays and matrices.

- Provides a wide range of mathematical functions and operations.

- Essential for data analysis, scientific computing, and machine learning.

Next session

Creating and manipulating NumPy arrays