Python and C++ Learning Roadmap

Python Roadmap

Beginner

- Syntax and Basics: Variables, data types, operators, input/output, comments

- Control Flow: If-else, loops (for, while)

- Data Structures: Lists, Tuples, Dictionaries, Sets

- Functions: def, return, *args, **kwargs

- Error Handling: try, except, finally

Intermediate

- OOP: Classes and Objects, Inheritance, Polymorphism

- File Handling: Read/write, CSV/JSON

- Modules & Packages: Import, create your own

- Comprehensions: List, dict, set

- Decorators & Generators

Advanced

- Lambda, map, filter, reduce

- Regular Expressions

- Multithreading & Multiprocessing

- Memory Management, Garbage Collection

- Virtual Environments & Packaging

- Type Hinting

- Unit Testing (unittest, pytest)

Expert / Real-World

- Frameworks: Flask, Django, Pandas, NumPy, TensorFlow

- APIs and Web Scraping: requests, BeautifulSoup, Selenium

- Databases: SQLite, PostgreSQL

- Design Patterns

- Project Ideas: Chatbot, REST API, Automation tools

C++ Roadmap

Beginner

- Syntax and Basics: Data types, input/output, operators

- Control Structures: if-else, switch, loops

- Functions: Pass-by-value/reference

- Arrays and Strings

- Pointers: Basics, arithmetic, NULL

Intermediate

- OOP: Classes, Constructors, Inheritance, Operator Overloading

- Memory Management: new/delete, smart pointers

- File I/O

- STL: Vectors, Maps, Sets, Algorithms

Advanced

- Templates: Function and class

- Exception Handling

- Multithreading: Threads, Mutex

- Lambda Functions

- Move Semantics (C++11)

- CMake & Build Systems

Expert / Real-World

- Design Patterns

- Networking (Sockets)

- Libraries: Boost, OpenCV, SFML

- System Programming

- Competitive Programming

- Project Ideas: Game engine, Compiler, Database