

# SDE Roadmap

*(beginner to advanced)*

**S**

SOFTWARE

**D**

DEVELOPMENT

**E**

ENGINEER

Swipe>>

[codehelping.com](https://codehelping.com)

# 1. Programming Language

Pick any one: **C++ / Java / Python**

## **Learn:**

- **Variables**, loops, functions
- **Arrays**, Strings
- **OOP**: Class, Inheritance, Polymorphism, Encapsulation
- **Exception** Handling
- STL (if C++) or Collections (if Java)



## 2. Data Structures and Algorithms

### Must-Know DS:

Arrays & Strings

Stack & Queue

Linked List

HashMap / HashSet

Binary Tree, BST

Heap / Priority Queue

Graphs (BFS, DFS)

### Must-Know Algorithms:

Sorting

Recursion + Backtracking

Binary Search

Two Pointers, Sliding Window

Greedy

DP (Knapsack, LIS, LCS)

Union Find (Disjoint Set)

**DSA handwritten notes in bio**

## 3. System Design

- **HLD:**

- (Monolith vs Microservices)
- Component Diagram
- Data Flow Design
- API Gateway & Routing
- Caching (Redis, Memcached)
- Load Balancer

- **LLD:**

- Class Diagrams (UML)
- Object-Oriented Design
- Design Patterns



## 4. Databases

### SQL (Must Know):

- CRUD (SELECT, INSERT, UPDATE, DELETE)
- Joins (Inner, Left, Right, Full)
- Group By, Having, Subqueries
- Indexing, Normalization



### NoSQL (Basics):

- Document (e.g., MongoDB)
- Key-Value (e.g., Redis)
- Differences between SQL and NoSQL
- CAP Theorem

## **5. Operating System**

1. Processes & Threads
2. CPU Scheduling (FCFS, SJF, RR, Priority)
3. Interprocess Communication (IPC)
4. Deadlock (Conditions, Banker's Algo)
5. Process Synchronization (Semaphores, Mutex)
6. Memory Management (Paging, Segmentation)
7. Virtual Memory (Page Replacement - LRU, FIFO)
8. File System & Allocation Methods

**(OS handwritten Notes in bio)**

## 6. Computer Networks

- **OSI Model** (7 Layers)
- TCP/IP Model
- IP Addressing (IPv4, Subnetting)
- TCP vs UDP
- Routing & Switching (Router vs Switch)
- DNS, DHCP, HTTP/HTTPS, FTP
- MAC Address & ARP
- Socket Programming Basics



## 7. Projects (2-3 Solid Ones)

### Good project checklist:

- Uses frontend + backend + database
- Has authentication (login/signup)
- Hosted live (Render, Vercel, Netlify)
- Uses API (REST or GraphQL)

### Suggested Projects:

- Blog App (MERN)
- Chat App (Socket.IO / Firebase)
- E-commerce Website





## 8. Apply for Jobs

- **Apply on:**
  - LinkedIn, Naukri
  - Internshala,
  - AngelList, Company Careers page
- Use referrals for big companies
- Keep learning while applying

