Computer Science

Computer Science curriculum with free resources for a self-taught developer.

← All Roadmaps   Share   Download   Suggest Changes

0% DONE   0 completed · 1 in progress · 0 skipped · 197 Total   Share Progress   Track Progress
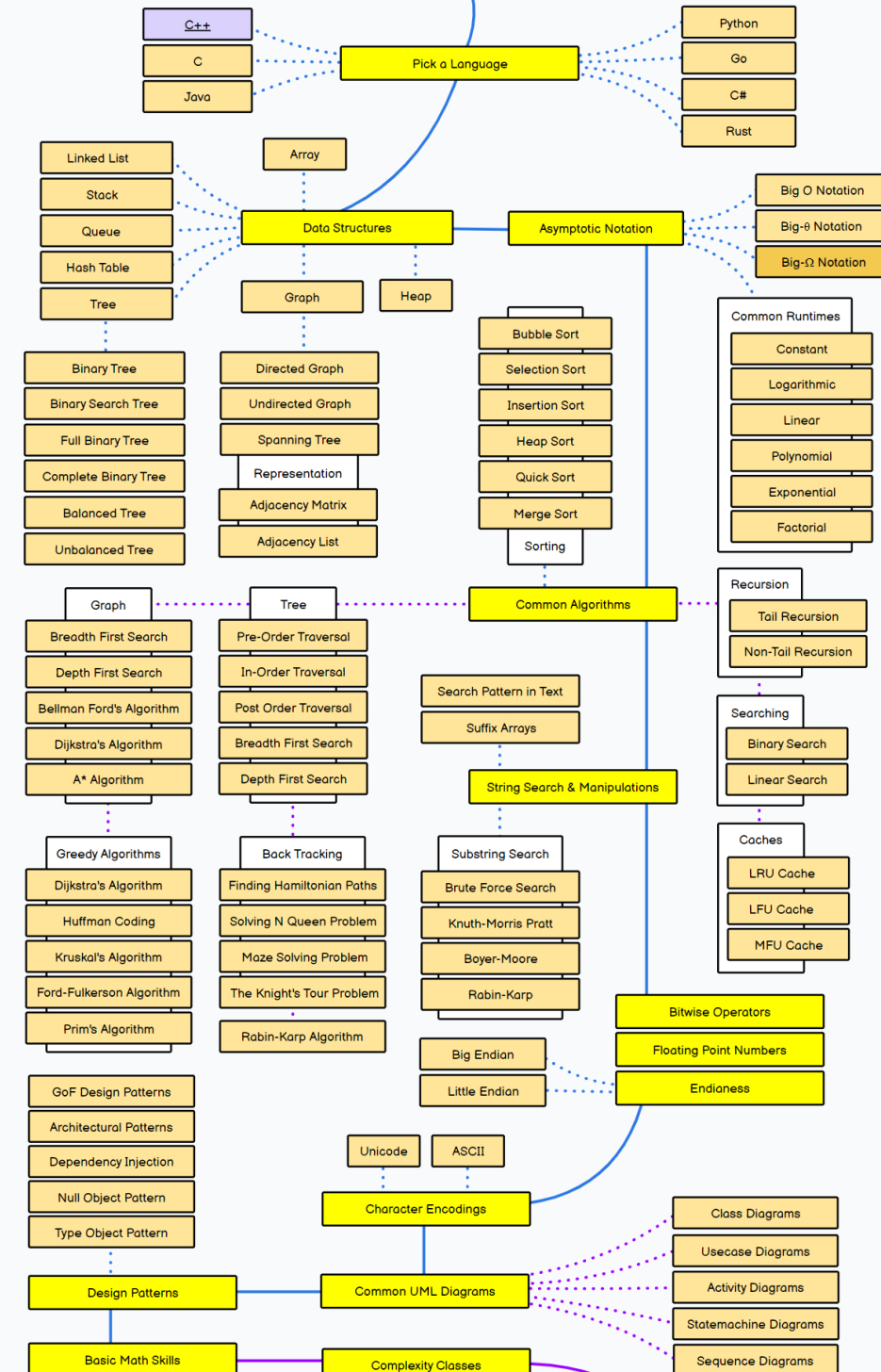
References / Other Resources
- Coding Interview University
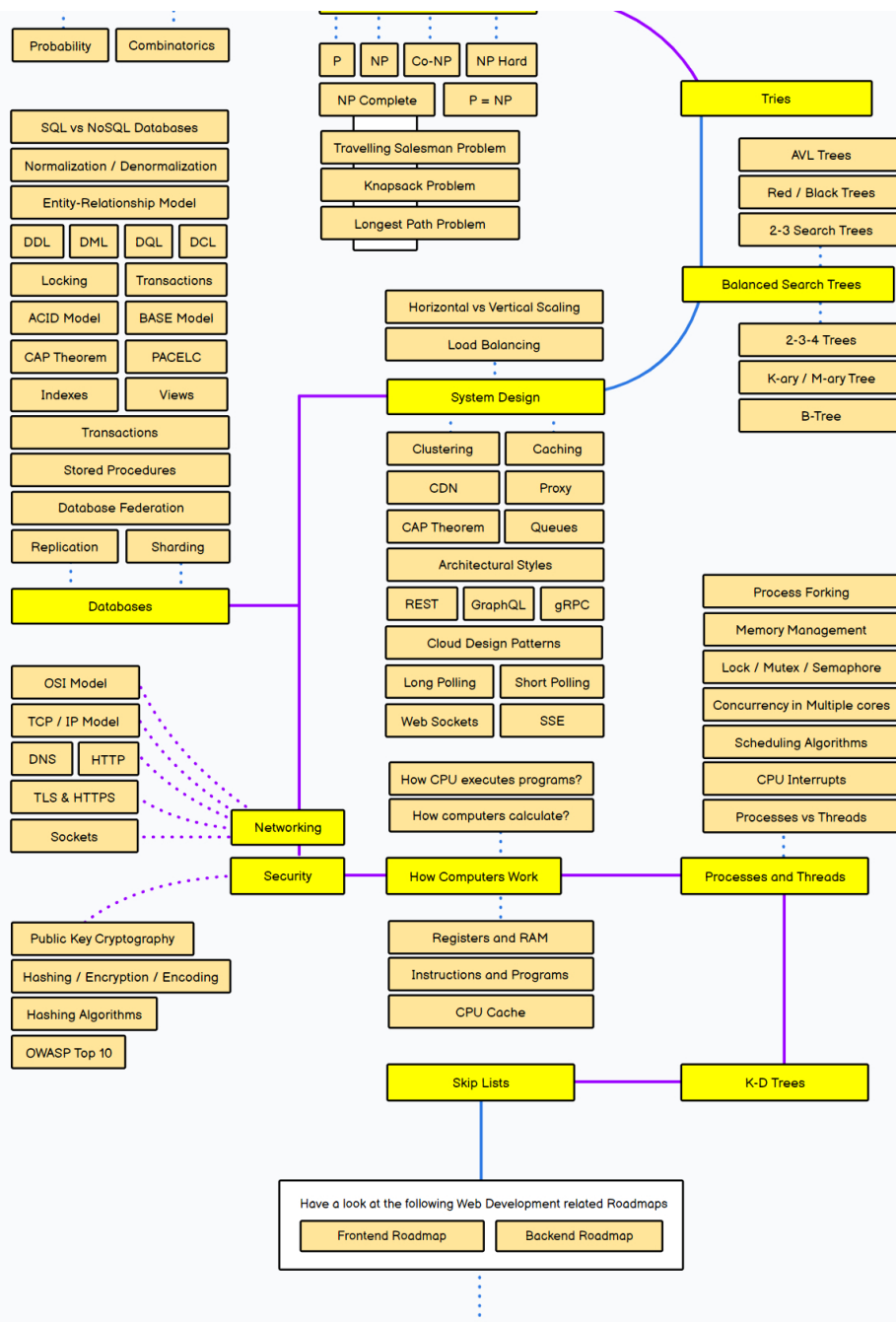- OpenSource Society University - CS
- Teach Yourself Computer Science

Find the detailed version of this roadmap along with resources and other roadmaps

https://roadmap.sh

Important Note / Click here

Computer Science

Pick a Language
- C++
- C
- Java
- Python
- Go
- C#
- Rust

Data Structures
- Linked List
- Stack
- Queue
- Hash Table
- Tree
- Array
- Graph
- Heap

Asymptotic Notation
- Big O Notation
- Big-θ Notation
- Big-Ω Notation

Tree
- Binary Tree
- Binary Search Tree
- Full Binary Tree
- Complete Binary Tree
- Balanced Tree
- Unbalanced Tree

- Directed Graph
- Undirected Graph
- Spanning Tree

Representation
- Adjacency Matrix
- Adjacency List

Sorting
- Bubble Sort
- Selection Sort
- Insertion Sort
- Heap Sort
- Quick Sort
- Merge Sort

Common Runtimes
- Constant
- Logarithmic
- Linear
- Polynomial
- Exponential
- Factorial

Common Algorithms

Graph
- Breadth First Search
- Depth First Search
- Bellman Ford's Algorithm
- Dijkstra's Algorithm
- A* Algorithm

Tree
- Pre-Order Traversal
- In-Order Traversal
- Post Order Traversal
- Breadth First Search
- Depth First Search

Recursion
- Tail Recursion
- Non-Tail Recursion

Searching
- Binary Search
- Linear Search

Greedy Algorithms
- Dijkstra's Algorithm
- Huffman Coding
- Kruskal's Algorithm
- Ford-Fulkerson Algorithm
- Prim's Algorithm

Back Tracking
- Finding Hamiltonian Paths
- Solving N Queen Problem
- Maze Solving Problem
- The Knight's Tour Problem
- Rabin-Karp Algorithm

Search Pattern in Text
Suffix Arrays

String Search & Manipulations

Substring Search
- Brute Force Search
- Knuth-Morris Pratt
- Boyer-Moore
- Rabin-Karp

Caches
- LRU Cache
- LFU Cache
- MFU Cache

Bitwise Operators
Floating Point Numbers
Endianess
- Big Endian
- Little Endian

- GoF Design Patterns
- Architectural Patterns
- Dependency Injection
- Null Object Pattern
- Type Object Pattern

Unicode   **ASCII**

Character Encodings

Design Patterns

Common UML Diagrams
- Class Diagrams
- Usecase Diagrams
- Activity Diagrams
- Statemachine Diagrams
- Sequence Diagrams

Basic Math Skills   **Complexity Classes**

Probability | Combinatorics

P | NP | Co-NP | NP Hard
NP Complete | P = NP

Tries

SQL vs NoSQL Databases
Normalization / Denormalization
Entity-Relationship Model
DDL | DML | DQL | DCL
Locking | Transactions
ACID Model | BASE Model
CAP Theorem | PACELC
Indexes | Views
Transactions
Stored Procedures
Database Federation
Replication | Sharding
Databases

Travelling Salesman Problem
Knapsack Problem
Longest Path Problem

AVL Trees
Red / Black Trees
2-3 Search Trees
Balanced Search Trees
2-3-4 Trees
K-ary / M-ary Tree
B-Tree

Horizontal vs Vertical Scaling
Load Balancing
System Design
Clustering | Caching
CDN | Proxy
CAP Theorem | Queues
Architectural Styles
REST | GraphQL | gRPC
Cloud Design Patterns
Long Polling | Short Polling
Web Sockets | SSE

Process Forking
Memory Management
Lock / Mutex / Semaphore
Concurrency in Multiple cores
Scheduling Algorithms
CPU Interrupts
Processes vs Threads

OSI Model
TCP / IP Model
DNS | HTTP
TLS & HTTPS
Sockets

Networking

Security | **How Computers Work** | **Processes and Threads**

How CPU executes programs?
How computers calculate?

Public Key Cryptography
Hashing / Encryption / Encoding
Hashing Algorithms
OWASP Top 10

Registers and RAM
Instructions and Programs
CPU Cache

Skip Lists | **K-D Trees**

Have a look at the following Web Development related Roadmaps
Frontend Roadmap | Backend Roadmap

📖 Related Roadmaps | All Roadmaps →

Frontend	Step by step guide to becoming a frontend developer in 2024
Backend	Step by step guide to becoming a backend developer in 2024
DevOps	Step by step guide for DevOps or operations role in 2024
Design and Architecture	Guide to learn software design and architecture

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THE**NEW**STACK

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