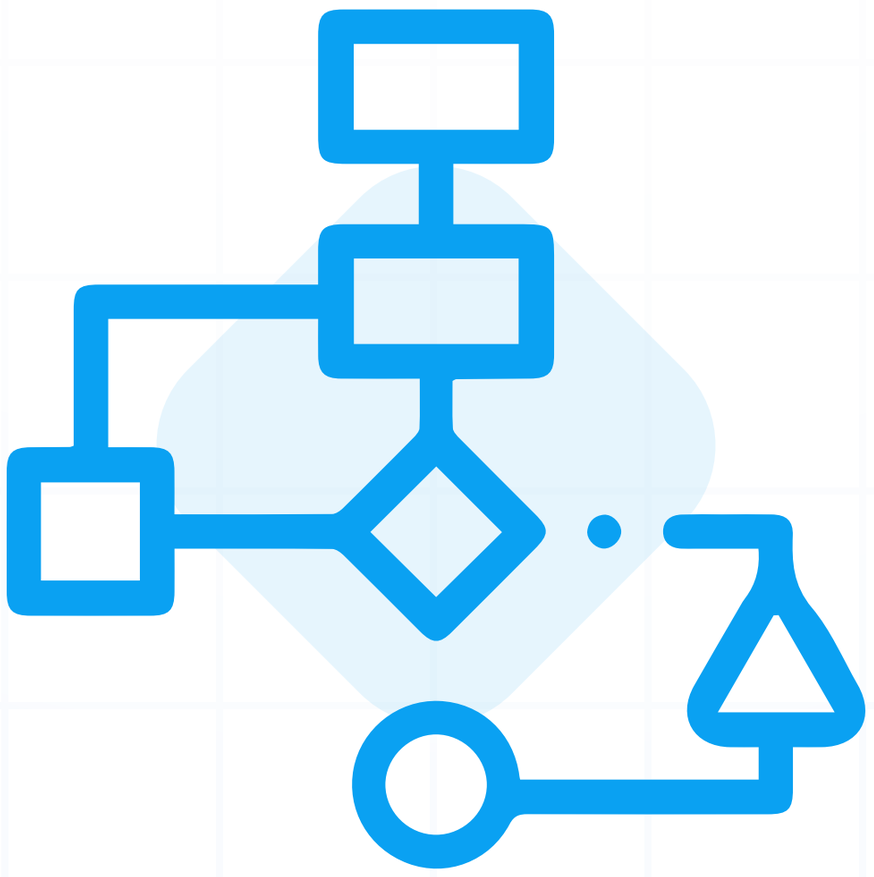
BOSSCODER ACADEMY

14 ALGORITHMS

Every Programmer Should Know



BASIC TO ADVANCE

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1. Searching Algorithms

➤ Linear Search:

Search each and every element of the array till you find the required element

Time Complexity: O (n)

➤ Binary Search:

Searches for the element by comparing it with the middle item of the sorted array. If a match occurs, index is returned, else the searching area is reduced appropriately to either the upper half or lower half of the array

Time Complexity: O ($log_2 n$)

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2. Sorting Algorithms

➤ Bubble Sort:

Works by swapping adjacent elements in repeated passes, if they are not in correct order.High time complexity and not suitable for large datasets

Time Complexity: O (n^2)

➤ Insertion Sort:

The array is split into sorted and unsorted parts. Unsorted elements are picked and placed at their correct position in the sorted part

Time Complexity: O (n^2)

➤ Selection Sort:

The smallest value among the unsorted elements of the array is selected in every pass and inserted to its appropriate position into the array

Time Complexity: O (n^2)

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➤ Heap Sort:

Uses the property of max and min heaps having largest and smallest elements at the root level It is an inplace sorting algorithm

Time Complexity: O (nlogn)

➤ Merge Sort:

Repeatedly divide the array into half, sort the halves and then combine them. It is a divide and conquer algorithm

Time Complexity: O (nlog(n))

➤ Quick Sort:

A pivot element is picked and the partitions made around it are again recursively partitioned and sorted. It is a divide and conquer algorithm.

Time Complexity: O (nlog(n))
Worst Case Time Complexity: $O(n^2)$

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3. Basic Math Algorithms

➤ Euclid's Algorithm for GCD:

Works by recursively dividing the bigger number with smaller number until the remainder is zero to get the greatest common divisor

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➤ Sieve of Eratosthenes:

Used for finding all prime numbers up to a given number by iteratively marking and removing the multiples of composite numbers

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➤ Bit Manipulations:

Perform operations at the bit-level or to manipulate bits in different ways by using bitwise operators AND, OR, NOT, XOR

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4. Graph Algorithms

Breadth First Search and Depth First Search:

- Breadth First Search is implemented using a queue and starts at one given vertex and all its adjacent vertices are visited first before going to the next vertex

- Depth First Search is implemented using a stack and starts at one given vertex and continues its search through adjacent vertices until there are none left

Time complexity for both is O(V + E)

Dijkstra's Algorithm:

Used to find the shortest path between two vertices in a graph. It is a greedy algorithm

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5. Algorithms Tree

Inorder Traversal:

Traverse the left subtree, visit the root node and then the right subtree

Preorder Traversal:

Visit the root node, traverse the left subtree and then the right subtree

Postorder Traversal:

Traverse the left subtree, then the right subtree and then visit the root node

Time complexity: O(n)

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Kruskal's Algorithm:

Used for finding the minimum spanning tree, by sorting the edges in descending order and adding the smallest edge not added yet to form a tree with all the nodes

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6. Dynamic Programming

Dynamic Programming works by storing the result of subproblems to access when needed without recalculation.

It uses memoization which is a top down approach and tabulation which is a bottom up approach

Floyd-Warshall Algorithm is an algorithm for finding the shortest path between all the pairs of vertices in a weighted graph. This algorithm is dynamic programming based

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7. Backtracking Algorithms

Solving problems by trying to build a solution one piece at a time, removing those solutions that fail to satisfy the constraints of the problem.

Standard questions for backtracking include. The N-queens problem, Sum of Subsets problem, Graph Colouring and Hamiltonian cycles.

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8. Coding Huffman Compression Algorithm

It is a technique of compressing data to reduce its size without losing any of the details. Generally useful to compress data with frequently occurring characters

➤ Involves two major parts:

- Building a Huffman tree
- Traversing the tree and assigning codes to characters based on their frequency of occurrence

ABOUT BOSSCODER

Bosscoder is an online upskilling platform for techies. We help learners upskill in tech roles to get them placed at top tech companies.
We do so through our structured & mentored program designed by industry experts.

USP of our program include:

✨ STRUCTURED CURRICULUM:

Covers everything you need to get placed at top tech companies: Problem solving in DS & Algo, CS Fundamentals, System Design (HLD + LLD), Full stack Projects

✨ LIVE CLASSES:

An active learning classroom program taught by engineers working at companies like Microsoft, PayPal, Amazon

✨ 1:1 MENTORSHIP & MOCK INTERVIEWS:

Personal mentors from top tech companies help you provide the right guidance, feedback, and support.

✨ 24/7 DOUBT SUPPORT:

Through our army of Teaching Assistants

✨ INDUSTRY-RELEVANT PROJECTS:

Full stack specialization with Industry-relevant projects

✨ PLACEMENT SUPPORT:

Providing opportunities to tech engineers in eminent startups & top tech companies.

BUILD YOUR CAREER WITH US

750+ Alumni placed at Top Product-based companies.

Highest package of 86 LPA

Average package of 24 LPA.

Resume reviewed and interview scheduled for 1000+ students

Lakshmi susmitha

Software Engineer II, JP Morgan

Service Based to JP Morgan in 4 months

From a tier-3 college to working in service-based companies, my thirst to join a product-based company didn't go away. Bosscoder helped me provide a very detailed path from coding to system design. The way of teaching, and 1:1 mentorship helped me a lot.

Before
IBM
Application Engineer

→

After
JP Morgan
Software Egineer II

Dheeraj Barik

Software Engineer 2, Amazon

System Engineer at Service Based to SDE 2 at Amazon

Working in Infosys, I was looking for a platform to prepare for interviews of product-based companies. I found Bosscoder has a highly structured program covering DSA, System Design etc. in detail. Top-quality instructors and mock interviews proved helpful for me.

Before
Infosys
Systems Engineer

→

After
Amazon
SDE 2

Vishal Srivastava
Software Developer, Barclays

Service Based to London Based Bank

Doing self-prep, I couldn't even pass online assessments of Top companies. But the change Bosscoder Academy brought into my preparation is phenomenal. Crucial topics taught in Live classes like DSA, HLD, and LLD, and my personal mentor's guidance ensured I clear my dream company.

Before
Cognizant
Programmer Analyst Trainee

→

After
Barclays
Software Developer

Ujesh Nada
Software Development Engineer, Google

Business Development Associate to SDE at Google

I self-prepared DSA for 8 months, without any results. I joined Bosscoder Academy since I wanted to be mentored by industry experts, and it proved to be a great decision for my DSA and System Design preparation. Their 1-on-1 mentor sessions and Live classes helped me transform my career.

Before
Byju's
BDA

→

After
Google
SDE

Rakesh Kumar Satapathy
Sr. Developer, Hashedin

Bsc. Graduate stuck in service based to Hashedin

Stuck in a service-based company with no exposure, I always believed that I can realize my dream life, but didn't know how. Bosscoder Academy showed the right path to coding geek inside me. Their world-class curriculum and personal mentorship enabled me to switch to my dream role.

Before
Wipro
Software Engineer

→

After
Hashedin
Senior Python Developer

Harshith Ravinoothala
R&D Engineer 1, Synopsys

Tier 3 College Student to Product Based Company

I always wanted to get into a product based company, but being a tier 3 college student lacked exposure to coding. Bosscoder Academy helped me gain confidence in DSA and core subjects like OS, DBMS and System Design. Instant Mentor support helped me stay clear of doubts.

Before
G Pulla Reddy Engineering College
Sudent

→

After
Synopsys
R&D Engineer

Sarveshwar Neogi
Consultant, Sprinkler

Clueless college student to Consultant at Sprinkler

I was wasting my time in college, with no idea how to improve my coding skills. The structured roadmap provided by Bosscoder transformed me into a Tech Rockstar. In-depth live lectures and daily handpicked questions helped me become consistent in problem-solving.

Before		After
KIIT B.Tech in CS	→	Sprinkler Consultant

Aarushi Jain
Software Development Engineer, Atlassian

No interest in coding to SDE at Atlassian

My journey in college was a roller coaster ride, and I wasted lots of time in learning from free resources. Bossocder Academy's excellent curriculum helped me become consistent and invest my efforts in right direction. With my mentor's guidance, I received offers from Amazon and Atlassian.

Before		After
NIT Delhi B.Tech in EEE	→	Atlassian SDE

Sumedha Khandelwal
Technical Lead at Jubilant Foodworks

Scared of Technical Interviews to Technical Lead

Having 7 years of experience, I always believed there is more to achieve in my career but failed in technical interviews. Bosscoder helped me gain confidence to face technical interviews and I received many offers. Mock interviews and mentor feedback helped a lot.

Before		After
IHS Markit Software Engineer	→	Jubilant Foodworks Technical Lead

Irshad K
Software Engineer, ByteDance

NIT Delhi to SDE in Singapore

I am among those talented students who require proper guidance to prosper. Cracking ByteDance was possible due to the guidance of my personal mentor at Bosscoder Academy. Their structured curriculum helped me gain confidence in DSA and System Design.

Before		After
NIT Delhi Application Engineer	→	ByteDance SDE

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Want to Upskill?

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ask@bosscoderacademy.com

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