

# **Demux DSM Batches - Curriculum**

## **General Warm-up**

- 1. Idea of running quantities
- 2. Peeking to the other side
- 3. Handling overflows
- 4. Introduction to STL
- 5. Memory layout of C/C++ programs

## **Binary Search**

- 1. The Predicate framework
- 2. Intuitive Search spaces
- 3. Non-intuitive search spaces

### 2 Pointers

- 1. Index based More practice needed
- Window based

### Sorting

- 1. Comparison based iterative sorting
  - a. Applications of sorting
- Custom comparator functions
- 3. Non-comparison based iterative sorting Maximum gap
  - a. Idea of bucketing b. Count sort
- 4. Recursive sorting
  - a. Divide and Conquer Paradigm
  - b. The partition algorithm

### Linked-lists, Stacks and Queues

1. General non-intuitive patterns involving these DS

### Recursion



- 1. General framework for solving recursive problems
- 2. Different types of decisions encountered generally
- 3. A view of sub-problems
- 4. Introduction to back-tracking

### **Backtracking**

- 1. Differences with Recursion
- 2. Classical questions and patterns involving Backtracking

### **Unordered Search Structures**

- 1. Concept of Hashing
- 2. General Patterns in questions involving Hashing
- 3. Need for an order

### **Ordered Search Structures**

- 1. BSTs and Heaps
- 2. General Patterns in questions involving ordered SS

### **Data-structure Design**

1. Use the fundamental Data-structures as building blocks to construct more advanced data-structures

#### Trees

- 1. Traversals in trees
- 2. General patterns in solving hard recursive questions on trees

## **Strings**

- 1. Strings in STL
- 2. Pattern matching KMP
- 3. Manacher's algorithm
- 4. Tries and general patterns involving strings



## **Dynamic Programming**

- 1. General Framework for DP
- 2. 1D DP in O(n)
- 3. 1D DP in O(n^2)
- 4. 2D DP in O(n^2)
- 5. 2D DP in O(n^3)
- 6. Matrix DP
- 7. Other types of decisions
- 8. DP on trees and graphs
- 9. DP and bitmasking

### Graphs

- 1. Representation
- 2. Traversals
- 3. Connectivity
- 4. Cyclicity
- 5. DAGs
- 6. Topological Sorting
- 7. Disjoint Data-structures: Union-find algorithm
- 8. Tarjan's Algorithm
- 9. Shortest paths
- 10. Spanning trees

### **System Design**

- 1. Elements of Systems CAP theorem, load balancing, sharding, etc.
- 2. Case studies of frequently encountered systems like Instagram, Netflix, etc.

### **Web-Development**

- 1. Version Control Git/BitBucket
- 2. AWS EC2 Server, Security Groups, Load Balancer etc
- 3. Building a website using a front-end and a back-end framework Frameworks TBD



- 4. Deploying on AWS Full functional Website
- 5. Integration DNS Config, Domain Name Config

### **Object-oriented systems**

- 1. Fundamentals SQL, ACID, Normalization
- 2. Case studies like Splitwise, Parking-lot order, Unix file-search, etc.
- 3. Design Patterns

# Advanced DS (if needed):

- 1. Segment Trees
- 2. Fenwick trees

Mock-interviews
Assignments and doubt classes
Resume and CV building sessions
Interview experience sessions from Alumni
Weekly hackathons



# **FAQs**

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# • Total program duration and timings?

Total duration of the program is roughly 8 weeks. Sessions generally take place in the evening from 8-12 PM but can change according to availability of students over weekends.

# Does Demux provide placement assistance/Referrals to companies?

Because of this ongoing pandemic, most of our partner companies have stopped hiring. So we cannot promise anything.

However, we'll be having sessions on LinkedIn and profile building as well as sessions from people who got off-campus success so that you can apply off-campus. Apart from that, Demux Alums have already made it to almost every big company in India and they will keep sharing their company specific experiences Intermittently with you.