# Mock Interview Debrief

CSE 332 Summer 2020

**Instructor:** Richard Jiang

**Teaching Assistants:**

Hamsa Shankar Kristin Li Winston Jodjana

Maggie Jiang Hans Zhang Michael Duan

Jeffery Tian Annie Mao

*Lecture Q&A: pollev.com/332summer*

*Lecture clarifications: tinyurl.com/332-08-21A*

# Lecture Outline

- **Mock Interview Debrief**
  - KMerge
  - General Guidance
  - Tips for Improving
- Common Interview Question Patterns
- Staff Q&A!

*pollev.com/332summer :: tinyurl.com/332-08-21A*

# KMerge: Problem Statement

- You are given **k** sorted arrays, each with **n** numbers in them. Give an algorithm for merging these arrays into a single sorted array of numbers.

- Time Complexity Constraint of **O(nklog(k))**.

- Input:
```
[[1, 3, 3, 6, 7],
 [2, 4, 5, 6, 10],
 [1, 6, 8, 9, 9],
 [3, 5, 7, 8, 11]]
```

- Output:
```
[1,1,2,3,3,3,4,5,5,6,6,6,7,7,8,8,9,9,10,11]
```

# KMerge: Brute Force Solutions

- **Brute Force 1:** Move everything into an array, run your favorite sorting algorithm on it.
  - **Runtime?**

- **Brute Force 2:** Move everything into an heap, remove elements from the heap one by one and put it into a resulting array.
  - **Runtime?**

# KMerge: More Sophisticated Solutions

- **The Heap Way:** Create a heap and only keep *k* elements in it, one from each subarray. Remove an element, put it in the result array, and replace it in the heap with the next element from the same subarray.
  - Why can we only keep *k* elements in the heap?
  - Why do we need to keep track of where elements come from?
  - **Runtime?**

# KMerge: More Sophisticated Solutions

- **The Merge Way:** Divide and conquer the subarrays, once you reach the base case of 1 subarray, merge the arrays on the way up.
  - What is the merge runtime?
  - How much work per level?
  - How tall is the recursive tree?
  - **Runtime?**

# KMerge: Takeaways and General Guidance

- **Always begin with clarifying questions:**
  - About edge cases, input, output, clarify your interpretation
- **Explain your approach before coding:**
  - Explain the brute force way first
  - Explore different data structures, talk about trade-offs
  - Plan with psudeocode/whiteboarding
  - Figure out the runtime before starting
- **Keep talking while coding:**
  - Relate what you are coding back to your pseudocode
  - If you make a change/optimization, explain why, flex your good coding skills

# KMerge: Takeaways and General Guidance

- **After you finish…**
  - Run through your code with sample input
  - Talk about some tests you might write for the code
- **Keep it a conversation with your interviewer**
  - Don't get stuck up on syntax, ask your interviewer if they know or if you can mock it
  - If you get stuck, you can always ask your interview for a directed hint
- When approaching problems, try to notice the special properties of the problem

# Practice Tips

- Review common interview question types/patterns
- Practice writing pseudocode and explaining runtime
- Talk to yourself and explain while you code
- Record yourself and watch it back to see where you can improve
- Keep mock interviewing! Ask your friends to mutually interview each other.

# Lecture Outline

- Mock Interview Debrief
  - KMerge
  - General Guidance
  - Tips for Improving
- **Common Interview Question Patterns**
- Staff Q&A!

*pollev.com/332summer :: tinyurl.com/332-08-21A*

# Valid Parentheses

- Given a string containing just the characters `'('`, `')'`, `'{'`, `'}'`, `'['` and `']'`, determine if the input string is valid.

- An input string is valid if:
  - Open brackets must be closed by the same type of brackets.
  - Open brackets must be closed in the correct order.
  - Note that an empty string is also considered valid.

- Any useful data structures?

# Valid Parentheses

- Given a string containing just the characters `'('`, `')'`, `'{'`, `'}'`, `'['` and `']'`, determine if the input string is valid.

# Maximum Subarray Sum

- Given an integer array `nums`, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum.

- **Input:** [-2, 1, -3, 4, -1, 2, 1, -5, 4]
- **Output:** 6 –> [4, -1, 2, 1]

- What's the brute force way?
- Can we make it O(n)?

# Maximum Subarray Sum

- **Input:** [-2, 1, -3, 4, -1, 2, 1, -5, 4]
- **Output:** 6 –> [4, -1, 2, 1]

# Alien Dictionary

- An alien gives you a page of their dictionary and tells you that it is in **alphabetical order** for their language. Can you figure out the ordering of their letters?

- **Input:** Rar -> Rah -> Raah -> Tuh -> Tttr -> Thr -> Thu
- **Output:** r -> u -> t -> h -> a

- What's the special property of the input?
- What data structures might be useful?

# Alien Dictionary

- **Input:** Rar -> Rah -> Raah -> Tuh -> Tttr -> Thr -> Thu
- **Output:** r -> u -> t -> h -> a

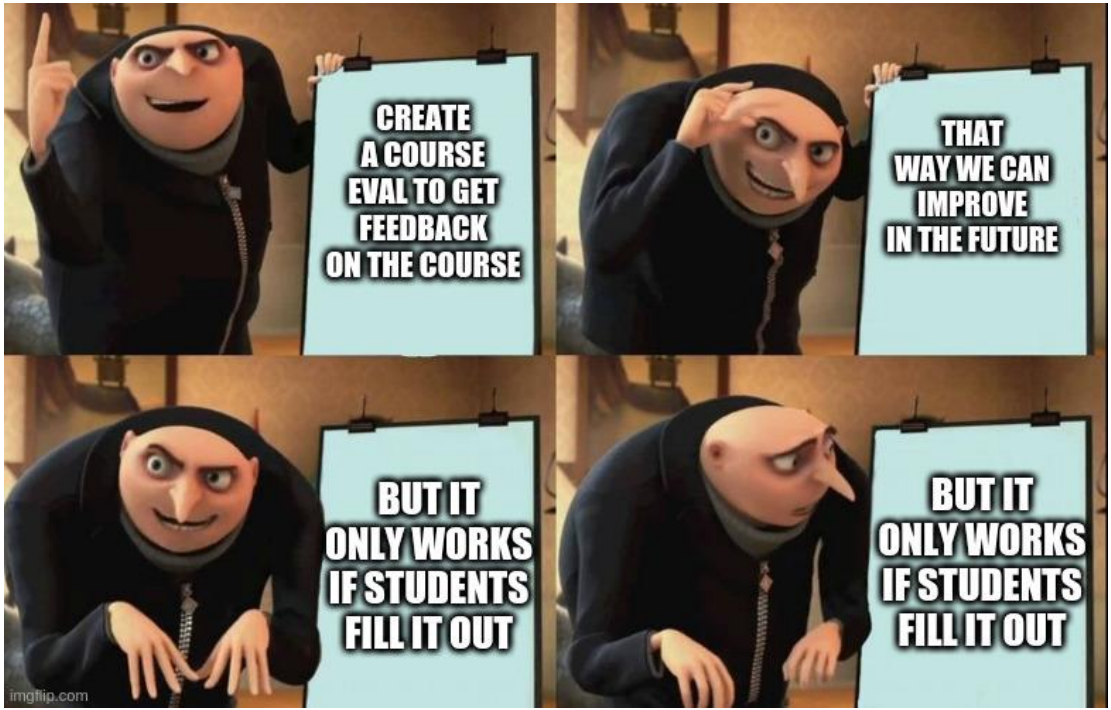
# Some other types of questions

- **Class Design:**
  - Can you design a deck that represent a deck of cards? Or schedules meeting rooms?
  - Very important for these types of questions to ask clarifying questions.
  - Common twist – Concurrency!

- **Dynamic Programming:**
  - Way to complicated to dive into now
  - Essentially, save partial answers to save time
  - This is taught in Algos, CSE 421

# Course Evals!

https://uw.iasystem.org/survey/228732



# You've made it!

# Staff Q&A Time

Please don't be shy in the halls, come say hi!

# Ask us anything!