CS 261
Data Structures

Lecture 23

Final Review

Closing Remarks

8/11/22, Thursday

Oregon State University

Odds and Ends

- Assignment 5 due Friday midnight

Lecture Topics:

- Final Review
- Closing Remarks

Final

- 8/12 Friday 3:00 – 3:50 pm
- Same classroom
- Close book, close notes
- No calculator allowed
- Question types: multiple choices, T/F, short answer
  - Similar to the Midterm Exam
- Bring pencil/pen, and your photo ID (student ID/driver license/passport)
- Scratch paper will be provided upon request

Final

- Topics: Week 4-8 (lecture 12-23):
  - Binary Search
  - Binary Search Trees
    - Tree vs. Binary Tree
    - BST Operations and their complexity:
      - Finding an element
      - Inserting an element
      - Removing an element
    - Traversal
      - DFS: Pre-order vs. in-order vs. post order
      - BFS: level order

Final

- Topics: Week 4-8 (lecture 12-23):
  - AVL Tree
    - Balance factor of a node
    - Single rotation vs. double rotation
    - Runtime complexity of AVL tree operations
  - Priority Queues
    - Array-based heap (min/max heap)
    - Operations:
      - Insert, remove
      - Percolations
    - Build a heap from an arbitrary array
    - Heapsort
  - Map and Hash table
  - Graph

		`balanceFactor(N)`	
		-2 (left-heavy)	2 (right-heavy)
`balanceFactor(C)`	-1 (left-heavy)	**Left-left imbalance** Single rotation: right around *N*	**Right-left imbalance** Double rotation: 1. right around *C* 2. left around *N*
	0		**Right-right imbalance** Single rotation: left around *N*
	1 (right-heavy)	**Left-right imbalance** Double rotation: 1. left around *C* 2. right around *N*	

Final

- Topics: Week 4-8 (lecture 12-23):
  - Map and Hash table
    - Hash functions
    - HT operations and their runtime complexity:
      - lookup
      - Insert
      - Remove
    - Resolve Hash collisions
      - Chaining
      - Open Addressing
    - Load factor
    - Tombstone

Final

- Topics: Week 4-8 (lecture 12-23):
  - Graph
    - Representation: adjacency list vs. adjacency matrix
    - Single source reachability
    - DFS vs. BFS in graph
    - Single source lowest-cost paths
      - Dijkstra's Algorithm

Be Confident…

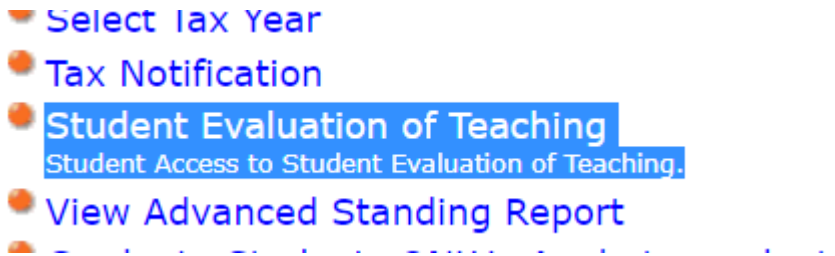
Now you are able to…

- Describe the properties, interfaces, and behaviors of basic abstract data types
- Read an algorithm or program code segment and analyze the time complexity.
- State the time complexity of the fundamental operations associated with a variety of data structures.
- Recall the space utilization of common data structures in terms of the long-term storage needed to maintain the structure, as well as the short-term memory requirements of fundamental operations, such as sorting.
- Design and implement general-purpose, reusable data structures that implement one or more abstractions.
- Compare and contrast the operation of common data structures in terms of time complexity, space utilization, and the abstract data types they implement.

Final Remarks…

- Thank you so much for your commitment to this course

- Future improvements?
  - MyOSU → Student Records →



- ULA position
  - Contact me! And apply through: https://jobs.oregonstate.edu/postings/123195

Final Remarks…

- Submit all your work by the deadline
  - Assignment 5
- Final exam tomorrow, 8/12 3:00 pm
  - Bring your photo ID
  - **Practice Exams (and solutions) are posted on Canvas**
- Grade disputation:
  - By 8/14 6pm