

33 Lecture - CS301

Important Subjective

1. **What is a priority queue using a heap?**

Answer: A priority queue using a heap is a data structure that stores a collection of elements where each element has a priority associated with it. It allows for efficient insertion and retrieval of elements with the highest priority.

2. **How is a priority queue implemented using a heap?**

Answer: A priority queue using a heap is implemented using an array-based binary heap data structure. The heap property ensures that the element with the highest priority is always at the top of the heap.

3. **What is the time complexity of insertion in a priority queue using a heap?**

Answer: The time complexity of insertion in a priority queue using a heap is $O(\log n)$.

4. **What is the time complexity of retrieval of the highest priority element in a priority queue using a heap?**

Answer: The time complexity of retrieval of the highest priority element in a priority queue using a heap is $O(1)$.

5. **How is a new element inserted into a priority queue using a heap?**

Answer: A new element is inserted into a priority queue using a heap by adding it to the end of the heap and then reorganizing the heap to maintain the heap property.

6. **How is the highest priority element removed from a priority queue using a heap?**

Answer: The highest priority element is removed from a priority queue using a heap by removing the element at the top of the heap and then reorganizing the heap to maintain the heap property.

7. **What happens if two elements in a priority queue using a heap have the same priority?**

Answer: If two elements in a priority queue using a heap have the same priority, their order in the heap is determined by their position in the array-based binary heap data structure.

8. **How is the heap property maintained in a priority queue using a heap?**

Answer: The heap property is maintained in a priority queue using a heap by reorganizing the heap after every insertion or removal operation.

9. **What is the difference between a max heap and a min heap?**

Answer: A max heap is a binary heap where the element with the highest priority is at the top of the heap, while a min heap is a binary heap where the element with the lowest priority is at the top of the heap.

10. **What is the advantage of using a priority queue using a heap over other data structures?**

Answer: The advantage of using a priority queue using a heap is that it allows for efficient insertion and retrieval of elements with the highest priority, with a time complexity of $O(\log n)$ for insertion and $O(1)$ for retrieval.