SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING-IoT Including CS & BCT

COURSE NAME :23ITB201-DATA STRUCTURES & ALGORITHMS

II YEAR / III SEMESTER

Unit II- **STACK ADT & QUEUE ADT**

Topic :Applications Queue

Some common applications of Queue data structure :

1. **Task Scheduling**: Queues can be used to schedule tasks based on priority or the order in which they were received.

2. Resource Allocation: Queues can be used to manage and allocate resources, such as printers or CPU processing time.

3. Batch Processing: Queues can be used to handle batch processing jobs, such as data analysis or image rendering.

4. **Message Buffering**: Queues can be used to buffer messages in communication systems, such as message queues in messaging systems or buffers in computer networks.

5.Event Handling: Queues can be used to handle events in event-driven systems, such as GUI applications or simulation systems.

6.Traffic Management: Queues can be used to manage traffic flow in transportation systems, such as airport control systems or road networks.

7.Operating systems: Operating systems often use queues to manage processes and resources. For example, a process scheduler might use a queue to manage the order in which processes are executed.

8.Network protocols: Network protocols like TCP and UDP use queues to manage packets that are transmitted over the network. Queues can help to ensure that packets are delivered in the correct order and at the appropriate rate.

9.Printer queues : In printing systems, queues are used to manage the order in which print jobs are processed. Jobs are added to the queue as they are submitted, and the printer processes them in the order they were received.

10.Web servers: Web servers use queues to manage incoming requests from clients. Requests are added to the queue as they are received, and they are processed by the server in the order they were received.

11.Breadth-first search algorithm: The breadth-first search algorithm uses a queue to explore nodes in a graph level-by-level. The algorithm starts at a given node, adds its neighbors to the queue, and then processes each neighbor in turn.

Useful Applications of Queue

- ✓ When a resource is shared among multiple consumers. Examples include CPU scheduling, Disk Scheduling.
- ✓ When data is transferred asynchronously (data not necessarily received at the same rate as sent) between two processes. Examples include IO Buffers, pipes, etc.

Applications of Queue in Operating systems:

- ✓ Semaphores
- ✓ FCFS (first come first serve) scheduling, example: FIFO queue
- ✓ Spooling in printers
- ✓ Buffer for devices like keyboard
- ✓ CPU Scheduling
- ✓ Memory management

Some other applications of Queue:

- ✓ Applied as waiting lists for a single shared resource like CPU, Disk, and Printer.
- ✓ Applied as buffers on MP3 players and portable CD players.
- ✓ Applied on Operating system to handle the interruption.
- ✓ Applied to add a song at the end or to play from the front.
- ✓ Applied on WhatsApp when we send messages to our friends and they don't have an internet connection then these messages are queued on the server of WhatsApp.
- ✓ Traffic software (Each light gets on one by one after every time of interval of time.)

MCQ

1. Which of the following scenarios is best suited for using a queue data structure?

A) A system that requires sorting elements in ascending order

B) A system that manages tasks to be processed in the order they are received

C) A system that needs to frequently access the middle element

D) A system that needs to implement a recursive function

Answer: B) A system that manages tasks to be processed in the order they are received

2. In which real-time application is a queue commonly used to handle requests in a FIFO (First In, First Out) manner?

A) Memory management for variable allocation

B) Task scheduling in operating systems

C) Graph traversal algorithms

D) Sorting of elements in an array

Answer: B) Task scheduling in operating systems

3.Which data structure is typically used to implement a printer queue in a print server?

A) Stack

B) Array

C) Queue

D) Linked List

Answer: C) Queue

Any Query????

Thank you……