

PROBLEM STATEMENT

A hospital needs to manage patients in the ER efficiently. Critical patients must be treated immediately, while others wait. Using a **Doubly Linked List**, each patient is stored as a node with:

- patientID
- prev pointer
- next pointer

Supported operations:

1. Insert at beginning – critical patients
2. Insert at end – normal patients
3. Insert at specific position – based on priority
4. Delete from beginning – patient leaves after treatment

PROPOSED SOLUTION

Use a **Doubly Linked List** for dynamic queue management.

Efficiently update head, tail, prev, and next pointers.

Handle edge cases like empty list, single node, and invalid positions.

CONCLUSION

The project shows how a **Doubly Linked List** can manage an ER queue effectively, ensuring critical patients are treated first and the list updates dynamically.

WORKING METHODOLOGY

1. Initialize the ER Queue:

- Start with an empty doubly linked list where head and tail are nullptr.

• Insert Patients Based on Priority:

- **Critical patient:** Use insertAtBeginning() to ensure they are treated first.
- **Normal patient:** Use insertAtEnd() to add them at the end of the queue.
- **Specific priority:** Use insertAtPosition() to place a patient exactly where the nurse decides.

• Update Pointers Dynamically:

- After every insertion or deletion, update the prev and next pointers of neighboring nodes.
- Adjust head and tail if the first or last node changes.

• Delete Treated Patients:

- Use deleteFromBeginning() when a patient is treated and leaves the ER.
- Handle edge cases like deleting from a single-node list.

• Maintain Queue Order:

- Ensure the list always reflects the correct patient order in real-time.
- Forward traversal represents treatment order; backward traversal can verify links.

• Visual Representation:

- Optionally, after each operation, display or draw the list showing patientID and the prev/next connections for clarity.

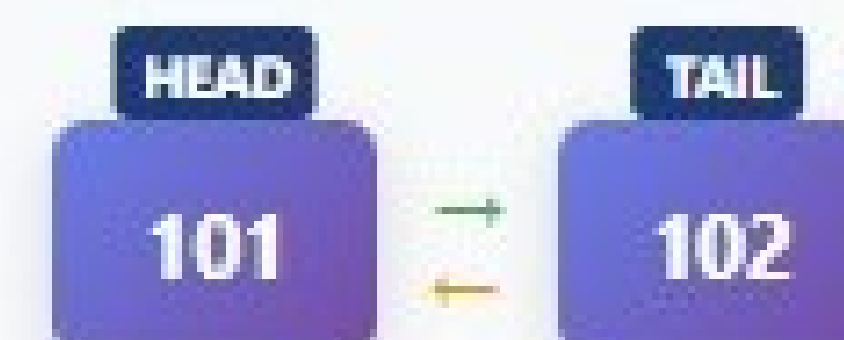
Initial: Empty Queue

[No Patients]

1. insertAtEnd(101)



2. insertAtEnd(102)



3. insertAtBeginning(200) - Critical



4. insertAtPosition(150, 2)



5. deleteFromBeginning() - 200 Treated



6. insertAtEnd(300)

