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FACULTY OF ENGINEERING

Data Structure & Algorithm

Lecture 11
Abstract Data Types: Double-Linked Lists

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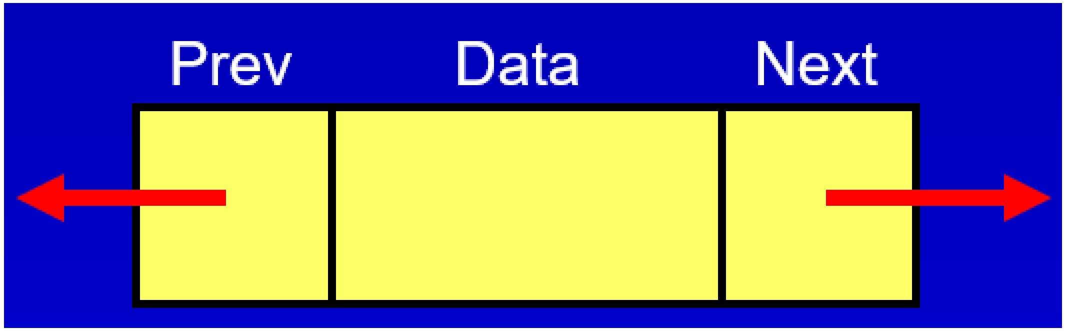
Content

- Abstract Data Types
  - Stacks
  - Queues and Priority Queues
  - Linked Lists – Double/Specialized Lists
  - Abstract Data Types

Double Linked List

- Each link contains a pointer to the previous link as well as to the next link.



Double Linked List

- Why do we need this added pointer in each link?
  - A potential problem with ordinary singly linked lists is that it’s difficult to traverse backward along the list.
  - Consider the following statement:

```
pCurrent = pCurrent->pNext;
```

Double Linked List

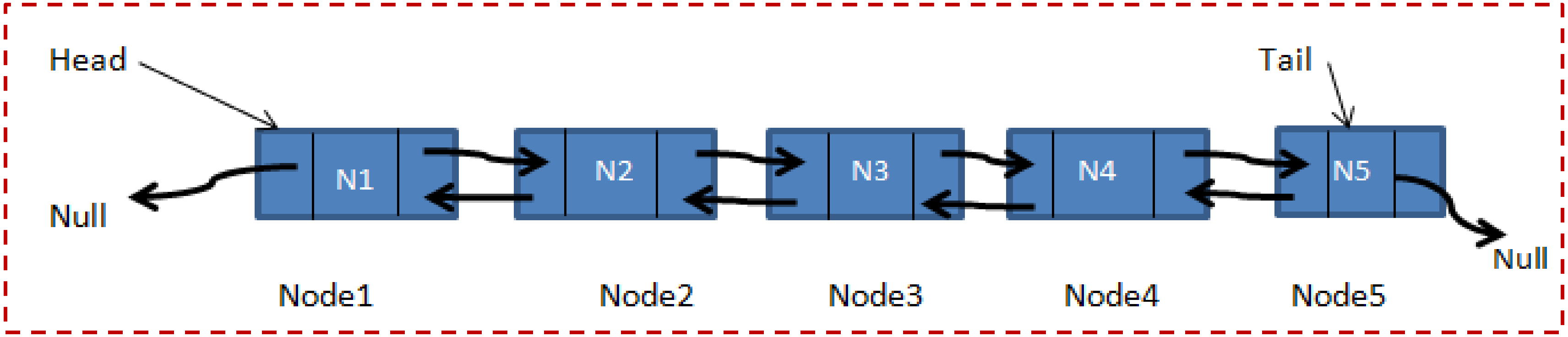
- Suppose, we want to delete a link at tail. Thus, we will execute the above statement until

  pCurrent->pNext = NULL

- Then we arrived tail, before removing we should set pNext of a link before tail, equal to NULL.
- In this case, we cannot move back to a link before tail.

Double Linked List: Charateristic

- The doubly linked list also has a head and a tail



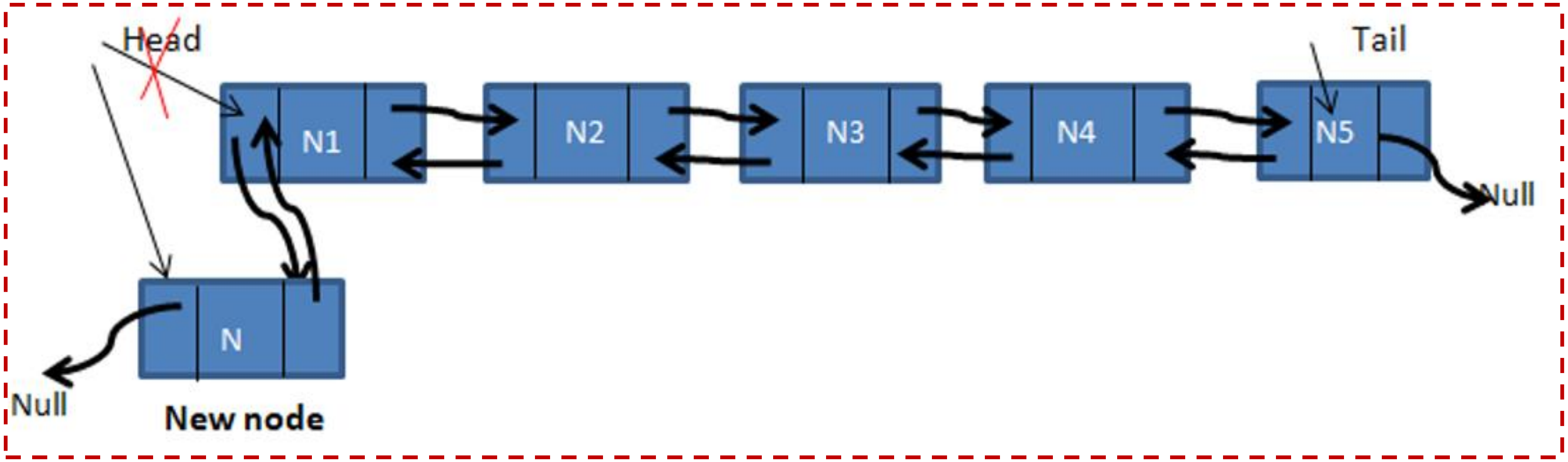
Double Linked List: Basic Operations

- Insertion
- Deletion
- Reverse
- Search

Double Linked List: Insertion

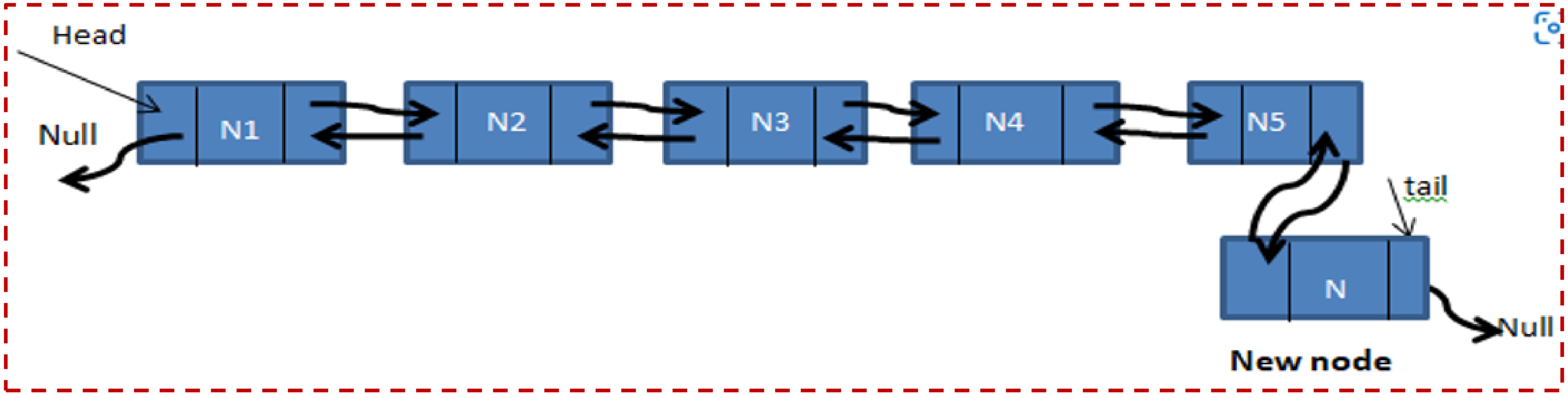
Insertion: inserts a new node in the linked list

- Insert a node at the front



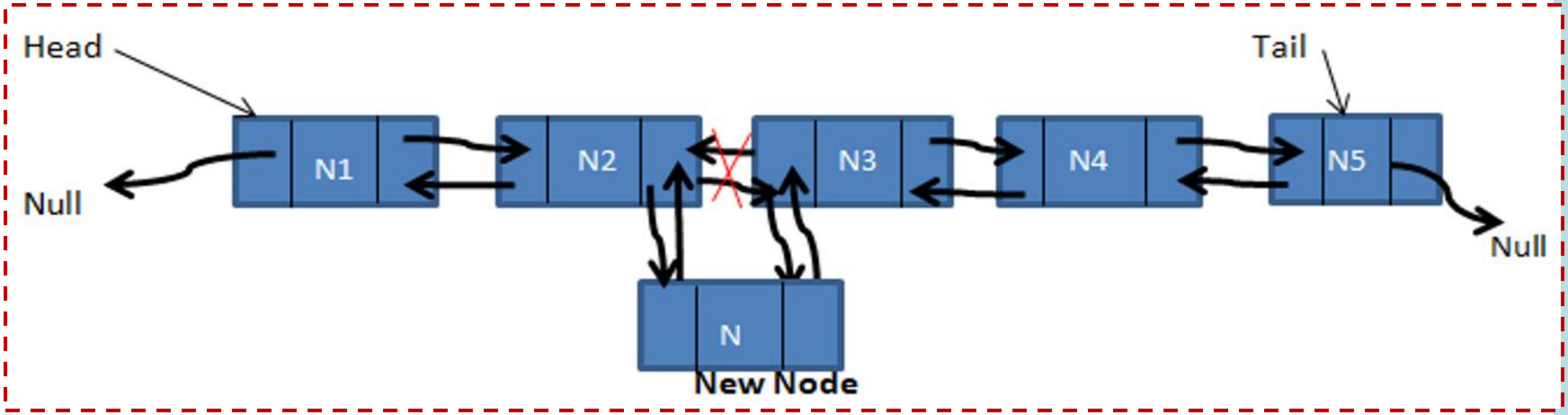
Double Linked List: Insertion

- Insert node at the end



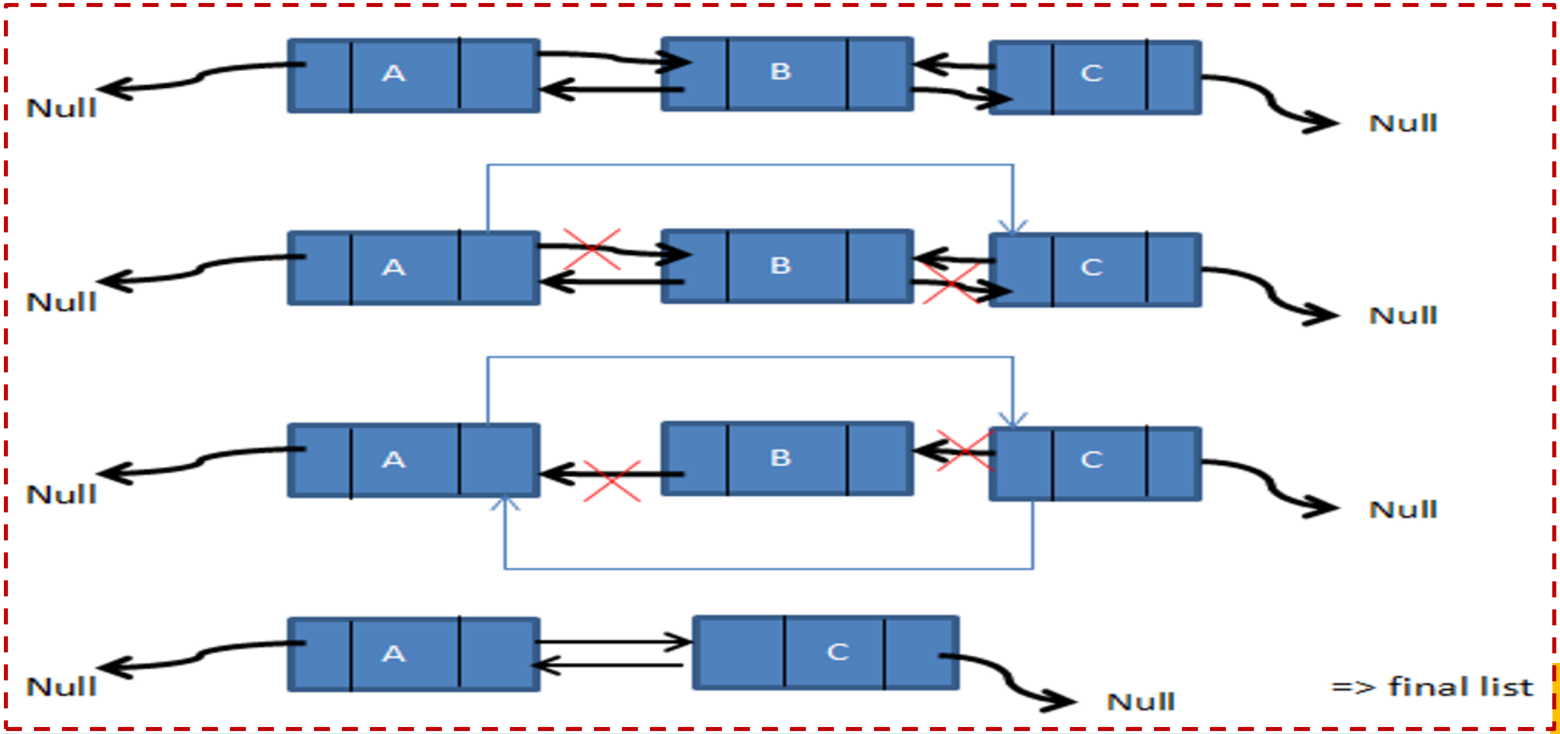
Double Linked List: Insertion

- Insert node before/after given node



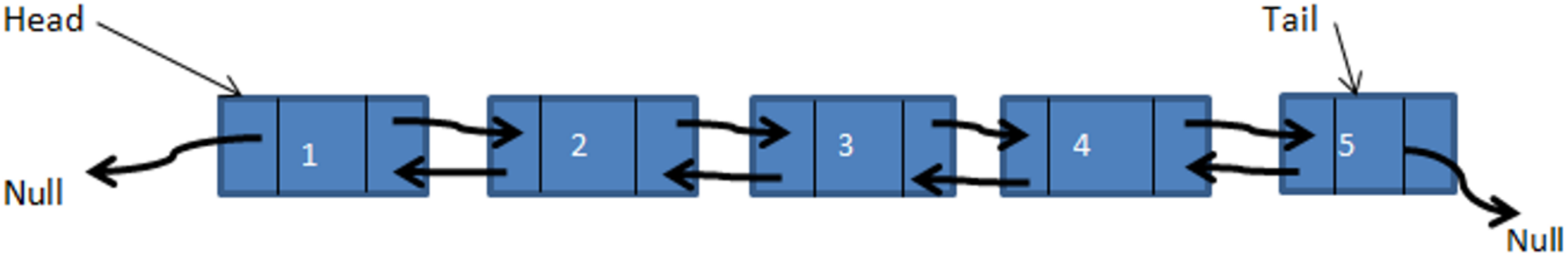
Double Linked List: Deletion

- A node can be deleted from a doubly linked list from any position like from the front, end, or any other given position or given data.

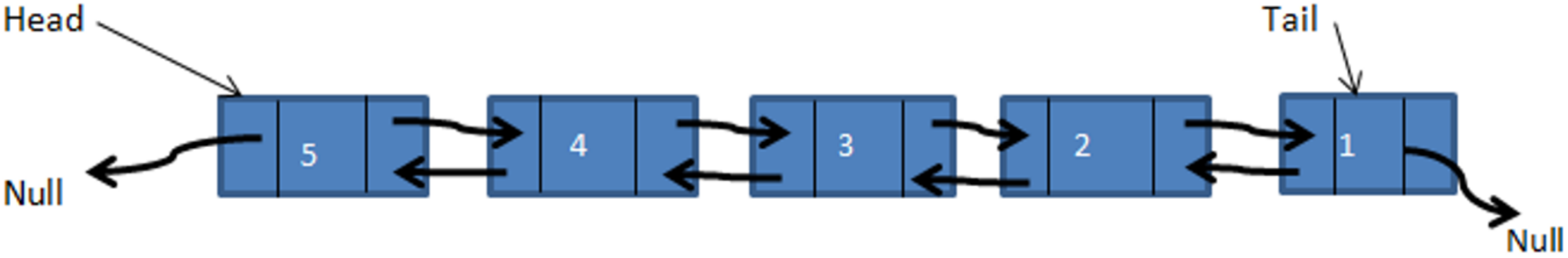


Double Linked List: Reverse

- we simply swap the previous and next pointers of all the nodes and also swap the head and tail pointers.



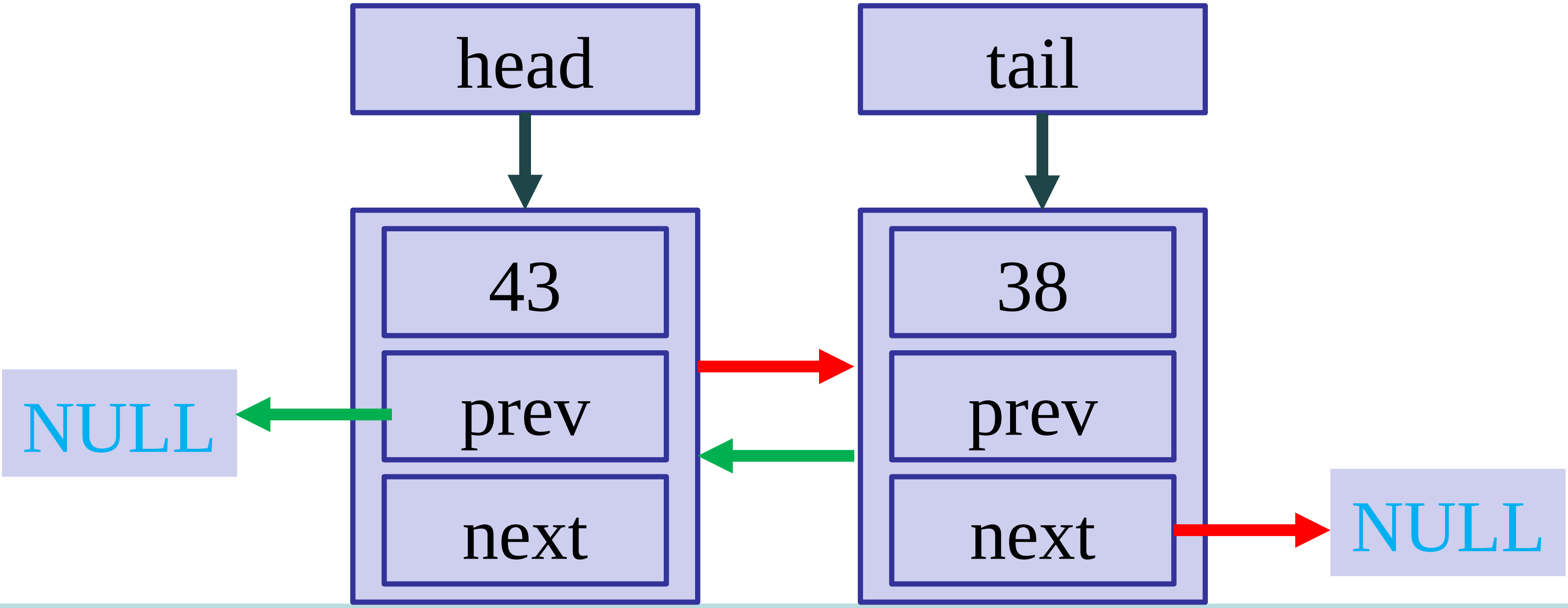
After reversing the linked list the resultant doubly linked list is shown below.



W11 – Lab 11

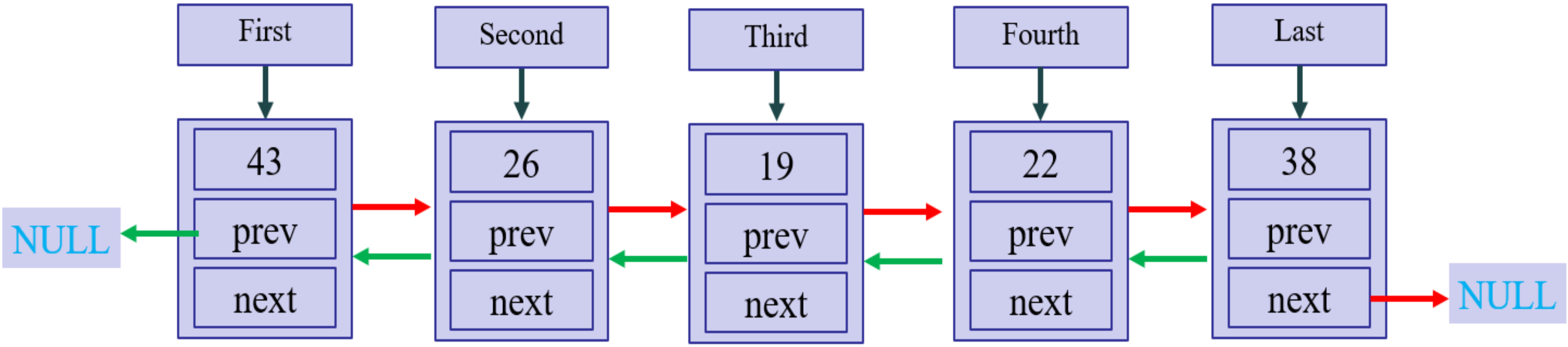
Exercise – 1

- Create the Double Linked List which contains the head and tail of the store data as shown below
- Write a loop to print the list forward direction
- Write a loop to print the list backward direction



Exercise – 2

- Create the Double Linked List which contains the head and tail of the store data as shown below
- Write a loop to print the list forward direction
- Write a loop to print the list backward direction



Exercise – Team work

Create class of Double Linked List with the following operations:

- Insertion
- Deletion
- Reverse
- Search

Thanks!