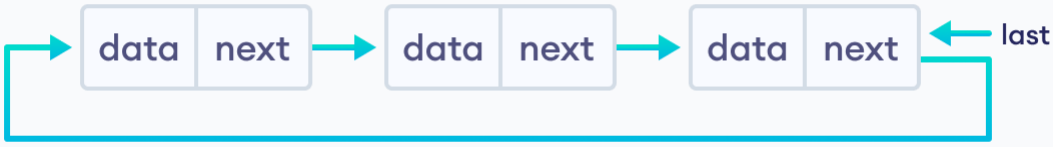
# Circular Linked List

A circular linked list is a type of linked list in which the first and the last nodes are also connected to each other to form a circle.
There are basically two types of circular linked list:

### 1. Circular Singly Linked List

Here, the address of the last node consists of the address of the first node.




Circular Linked List Representation

### 2. Circular Doubly Linked List

Here, in addition to the last node storing the address of the first node, the first node will also store the address of the last node.


Circular Doubly Linked List Representation

> **Note**: We will be using the singly circular linked list to represent the working of circular linked list.

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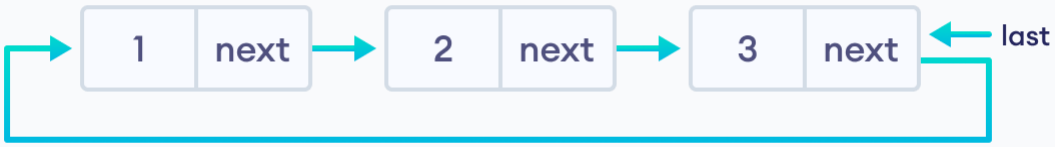
# Representation of Circular Linked List

Let's see how we can represent a circular linked list on an algorithm/code. Suppose we have a linked list:



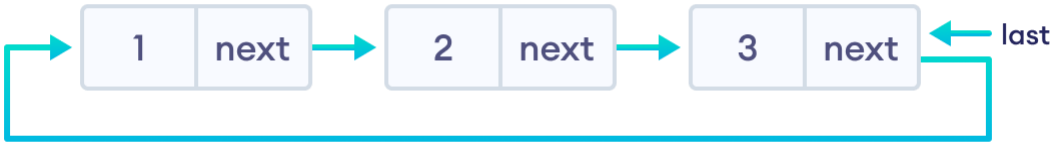

Initial circular linked list

# Insertion on a Circular Linked List

We can insert elements at 3 different positions of a circular linked list:

1. Insertion at the beginning
2. Insertion in-between nodes
3. Insertion at the end

Suppose we have a circular linked list with elements 1, 2, and 3.




Initial circular linked list

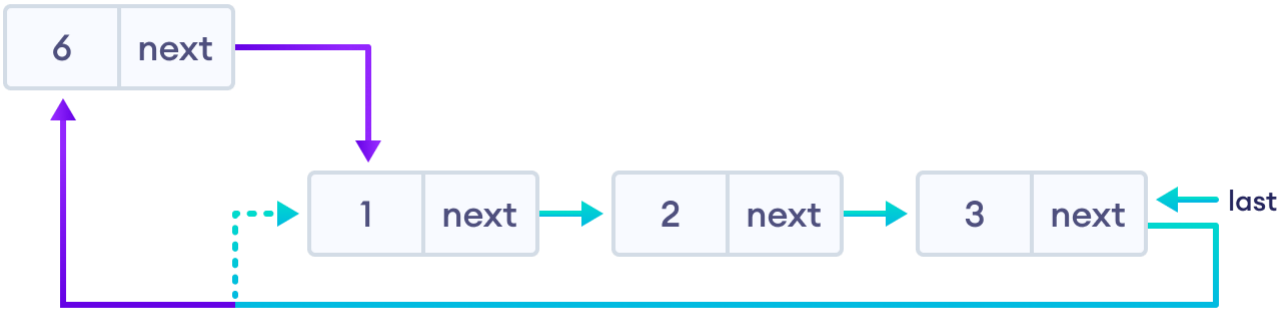
Let's add a node with value 6 at different positions of the circular linked list we made above. The first step is to create a new node.

- allocate memory for `newNode`
- assign the data to `newNode`


New node

## 1. Insertion at the Beginning

- store the address of the current first node in the `newNode` (i.e. pointing the `newNode` to the current first node)
- point the last node to `newNode` (i.e making `newNode` as head)

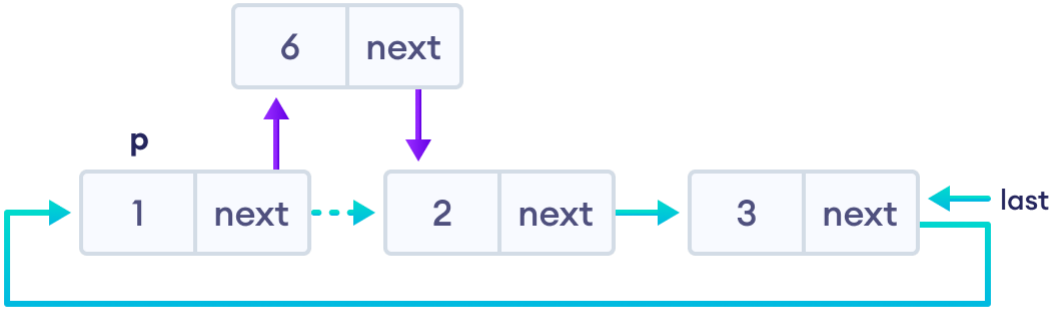



Insert at the beginning

## 2. Insertion in between two nodes

Let's insert newNode after the first node.

- travel to the node given (let this node be `p`)
- point the `next` of `newNode` to the node next to `p`
- store the address of `newNode` at `next` of `p`




Insertion at a node

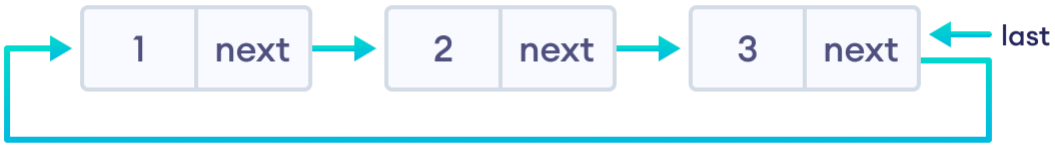
## 3. Insertion at the end

- store the address of the head node to `next` of newNode (making `newNode` the last node)
- point the current last node to `newNode`
- make `newNode` as the last node


Insert at the end

# Deletion on a Circular Linked List

Suppose we have a double-linked list with elements 1, 2, and 3.



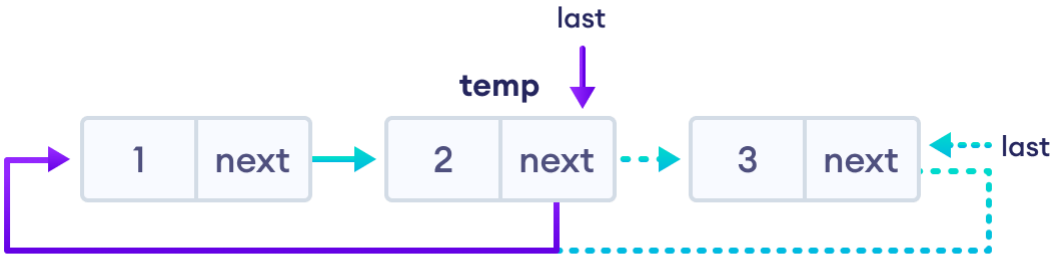

Initial circular linked list

## 1. If the node to be deleted is the only node

- free the memory occupied by the node
- store NULL in `last`

## 2. If last node is to be deleted

- find the node before the last node (let it be `temp`)
- store the address of the node next to the last node in `temp`
- free the memory of last
- make `temp` as the last node




Delete the last node

## 3. If any other nodes are to be deleted

- travel to the node to be deleted (here we are deleting node 2)
- let the node before node 2 be `temp`
- store the address of the node next to 2 in `temp`
- free the memory of 2


Delete a specific node