Linked List

why LL? → dynamic

→ arrays are contagious but LL not

→ generic

Head

Node

100
| 10 | 150 |

150
| 20 | 280 |

280
| 30 | 400 |

400
| 40 | NULL |

Tail

Node

Data	Next
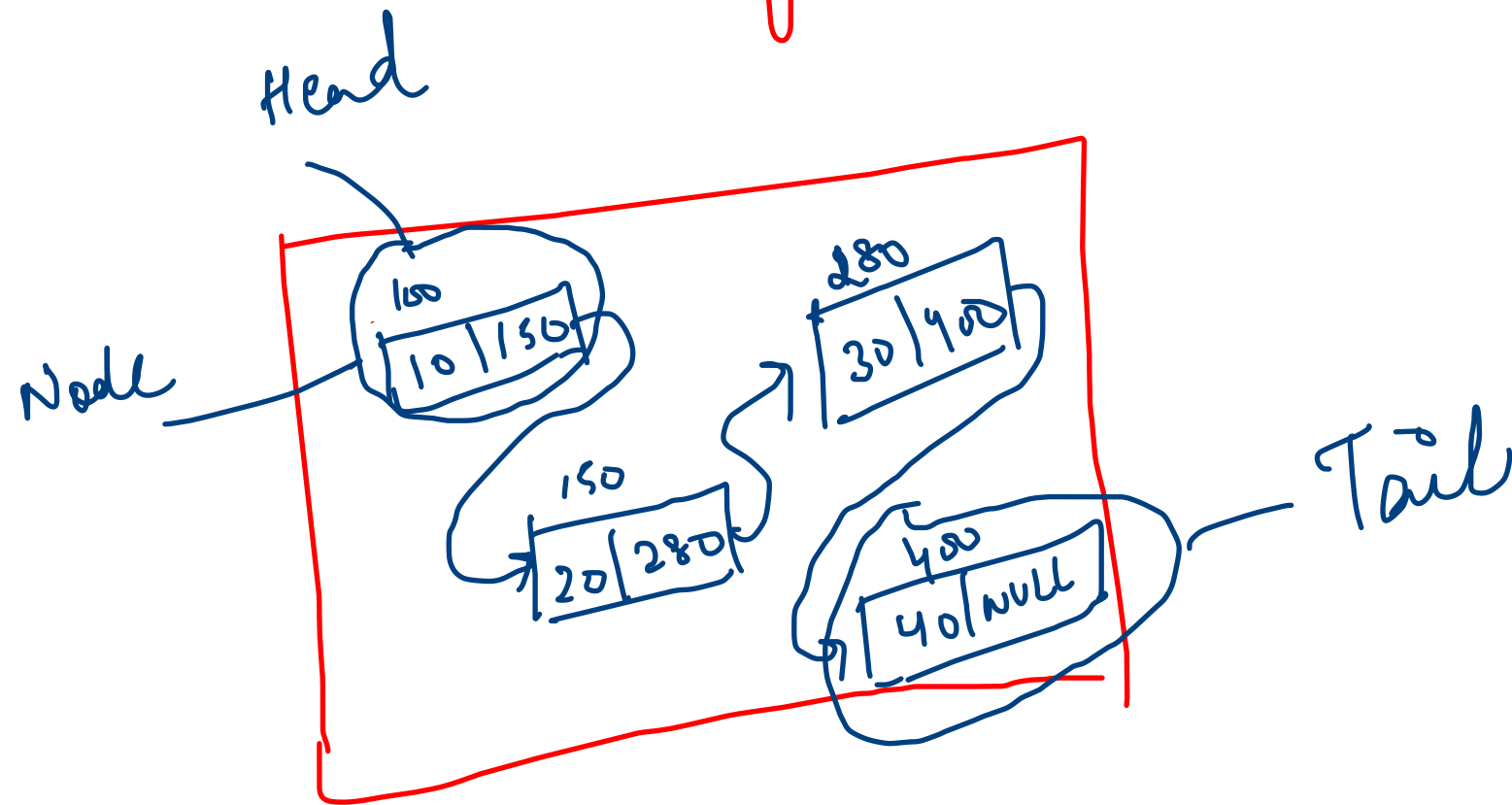
— reference/address/pointer to the next node of list

Syntax

Linked list < DataType> l1 = new LinkedList <>();

(String)

1) Adding Elements

l1. add ("Gunmay");

l2. add (" Sharma");

.addfirst (" ");

.addLast (" ");

Gunmay Sharma
₀ ₁

2) Change Elements

ll.set(0, "mansi");   // Mansi Sharma

3) Size

ll.size();

ll.isEmpty(); // whether LL is empty or not

4) Remove Element

```
ll. remove (index);
ll. remove ("Sharma");
ll. removeFirst();
ll. removeLast();
```

5) LL to Array by using toArray();

```
Object [] a = LL. toArray ();
for (object elem : a)
   syso (elem)
```

```java
import java.util.LinkedList;

class Main {
    public static void main(String[] args) {
        LinkedList<Integer> list = new LinkedList<>();
        list.add(5);
        list.add(10);
        list.add(15);
        System.out.println(list);

        //Object[] a = list.toArray();
        Integer[] a = list.toArray(new Integer[0]);
        for(int elem : a){
            System.out.print(elem + " ");
        }
    }
}
```

Output

```
[5, 10, 15]
5 10 15
=== Code Execution Successful ===
```

LL to String   [toString();

```java
import java.util.LinkedList;

class Main {
    public static void main(String[] args) {
        LinkedList<String> list = new LinkedList<>();
        list.add("abc");
        list.add("ss");
        list.add("15");

        // direct // explicit call
        System.out.println(list.toString());

        System.out.println(list); // implicit
    }
}
```

Output

```
[abc, ss, 15]
[abc, ss, 15]
```

Traversing LL using loops.

```java
import java.util.LinkedList;

class Main {
    public static void main(String[] args) {
        LinkedList<String> list = new LinkedList<>();

        list.add("Gunmay");
        list.add("Sharma");
        list.add("Mansi");
        list.add("Sharma");

          // for loop
        for(int i = 0; i < list.size(); i++){
            System.out.print(list.get(i) + " ");
        }
        System.out.println();

        // for each loop
        for(String str : list){
            System.out.print(str + " ");
        }
    }
}
```

Output

```
Gunmay Sharma Mansi Sharma
Gunmay Sharma Mansi Sharma
=== Code Execution Successful ===
```

$TC \rightarrow O(n)$

except insert/delete
from Head
$O(1)$