LinkedList

LinkedList implements the Collection interface. It uses a doubly linked list internally to store the elements. It can store the duplicate elements. It maintains the insertion order and is not synchronized. In LinkedList, the manipulation is fast because no shifting is required.

**Applications of linked list in real world-**

1. *Image viewer* – Previous and next images are linked, hence can be accessed by next and previous button.
2. *Previous and next page in web browser* – We can access previous and next url searched in web browser by pressing back and next button since, they are linked as linked list.
3. *Music Player* – Songs in music player are linked to previous and next song. you can play songs either from starting or ending of the list.

# Difference between ArrayList and LinkedList

ArrayList and LinkedList both implements List interface and maintains insertion order. Both are non synchronized classes.

However, there are many differences between ArrayList and LinkedList classes that are given below.

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| **ArrayList** | **LinkedList** |
| 1) ArrayList internally uses a **dynamic array** to store the elements. | LinkedList internally uses a **doubly linked list** to store the elements. |
| 2) Manipulation with ArrayList is **slow** because it internally uses an array. If any element is removed from the array, all the bits are shifted in memory. | Manipulation with LinkedList is **faster** than ArrayList because it uses a doubly linked list, so no bit shifting is required in memory. |
| 3) An ArrayList class can **act as a list** only because it implements List only. | LinkedList class can **act as a list and queue** both because it implements List and Deque interfaces. |
| 4) ArrayList is **better for storing and accessing** data. | LinkedList is **better for manipulating** data. |

Methods of Java LinkedList

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| **Method** | **Description** |
| boolean add(E e) | It is used to append the specified element to the end of a list. |
| void add(int index, E element) | It is used to insert the specified element at the specified position index in a list. |
| boolean addAll(Collection<? extends E> c) | It is used to append all of the elements in the specified collection to the end of this list, in the order that they are returned by the specified collection's iterator. |
| boolean addAll(Collection<? extends E> c) | It is used to append all of the elements in the specified collection to the end of this list, in the order that they are returned by the specified collection's iterator. |
| boolean addAll(int index, Collection<? extends E> c) | It is used to append all the elements in the specified collection, starting at the specified position of the list. |
| void addFirst(E e) | It is used to insert the given element at the beginning of a list. |
| void addLast(E e) | It is used to append the given element to the end of a list. |
| void clear() | It is used to remove all the elements from a list. |
| Object clone() | It is used to return a shallow copy of an ArrayList. |
| boolean contains(Object o) | It is used to return true if a list contains a specified element. |
| Iterator<E> descendingIterator() | It is used to return an iterator over the elements in a deque in reverse sequential order. |
| E element() | It is used to retrieve the first element of a list. |
| E get(int index) | It is used to return the element at the specified position in a list. |
| E getFirst() | It is used to return the first element in a list. |
| E getLast() | It is used to return the last element in a list. |
| int indexOf(Object o) | It is used to return the index in a list of the first occurrence of the specified element, or -1 if the list does not contain any element. |
| int lastIndexOf(Object o) | It is used to return the index in a list of the last occurrence of the specified element, or -1 if the list does not contain any element. |
| ListIterator<E> listIterator(int index) | It is used to return a list-iterator of the elements in proper sequence, starting at the specified position in the list. |
| boolean offer(E e) | It adds the specified element as the last element of a list. |
| boolean offerFirst(E e) | It inserts the specified element at the front of a list. |
| boolean offerLast(E e) | It inserts the specified element at the end of a list. |
| E peek() | It retrieves the first element of a list |
| E peekFirst() | It retrieves the first element of a list or returns null if a list is empty. |
| E peekLast() | It retrieves the last element of a list or returns null if a list is empty. |
| E poll() | It retrieves and removes the first element of a list. |
| E pollFirst() | It retrieves and removes the first element of a list, or returns null if a list is empty. |
| E pollLast() | It retrieves and removes the last element of a list, or returns null if a list is empty. |
| E pop() | It pops an element from the stack represented by a list. |
| void push(E e) | It pushes an element onto the stack represented by a list. |
| E remove() | It is used to retrieve and removes the first element of a list. |
| E remove(int index) | It is used to remove the element at the specified position in a list. |
| boolean remove(Object o) | It is used to remove the first occurrence of the specified element in a list. |
| E removeFirst() | It removes and returns the first element from a list. |
| boolean removeFirstOccurrence(Object o) | It is used to remove the first occurrence of the specified element in a list (when traversing the list from head to tail). |
| E removeLast() | It removes and returns the last element from a list. |
| boolean removeLastOccurrence(Object o) | It removes the last occurrence of the specified element in a list (when traversing the list from head to tail). |
| E set(int index, E element) | It replaces the element at the specified position in a list with the specified element. |
| Object[] toArray() | It is used to return an array containing all the elements in a list in proper sequence (from first to the last element). |
| <T> T[] toArray(T[] a) | It returns an array containing all the elements in the proper sequence (from first to the last element); the runtime type of the returned array is that of the specified array. |
| int size() | It is used to return the number of elements in a list. |