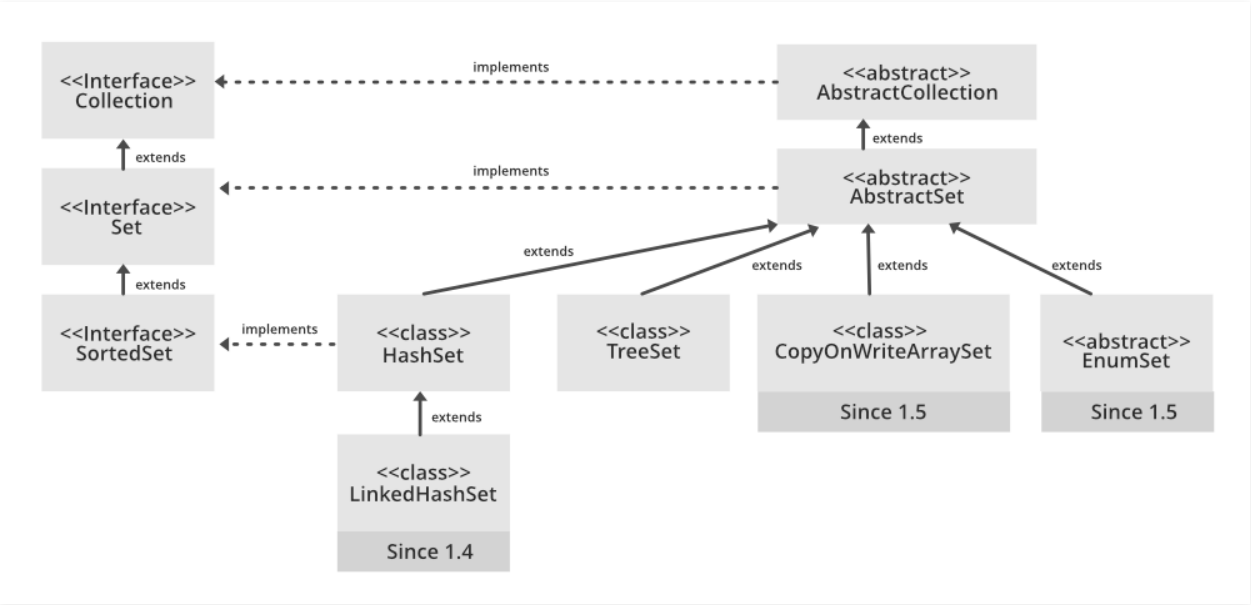
LinkedHashSet in Java with Examples

Difficulty Level : Easy Last Updated : 21 Dec, 2021

The **LinkedHashSet** is an ordered version of HashSet that maintains a doubly-linked List across all elements. When the iteration order is needed to be maintained this class is used. When iterating through a HashSet the order is unpredictable, while a LinkedHashSet lets us iterate through the elements in the order in which they were inserted. When cycling through LinkedHashSet using an iterator, the elements will be returned in the order in which they were inserted.

The Hierarchy of LinkedHashSet is as follows:



Parameters: The type of elements maintained by this set

```
All Implemented Interfaces are as listed below:
Serializable
Cloneable,
Iterable<E>
Collection<E>
Set<E>
```

Syntax: Declaration

```
public class LinkedHashSet<E> extends HashSet<E> implements Set<E>, Cloneable,
```

- Contains unique elements only like HashSet. It extends the HashSet class and

implements the Set interface.
- Maintains insertion order.

Constructors of LinkedHashSet Class

1. LinkedHashSet(): This constructor is used to create a default HashSet

```
LinkedHashSet<E> hs = new LinkedHashSet<E>();
```

2. LinkedHashSet(Collection C): Used in initializing the HashSet with the elements of the collection C.

```
LinkedHashSet<E> hs = new LinkedHashSet<E>(Collection c);
```

3. LinkedHashSet(int size): Used to initialize the size of the LinkedHashSet with the integer mentioned in the parameter.

```
LinkedHashSet<E> hs = new LinkedHashSet<E>(int size);
```

4. LinkedHashSet(int capacity, float fillRatio): Can be used to initialize both the capacity and the fill ratio, also called the load capacity of the LinkedHashSet with the arguments mentioned in the parameter. When the number of elements exceeds the capacity of the hash set is multiplied with the fill ratio thus expanding the capacity of the LinkedHashSet.

```
LinkedHashSet<E> hs = new LinkedHashSet<E>(int capacity, int fillRatio);
```

Example:

```
// Java Program to Illustrate LinkedHashSet

// Importing required classes
import java.util.LinkedHashSet;

// Main class
// LinkedHashSetExample
public class GFG {

    // Main driver method
```

```
    public static void main(String[] args)
    {

        // Creating an empty LinkedHashSet of string type
        LinkedHashSet<String> linkedset
            = new LinkedHashSet<String>();

        // Adding element to LinkedHashSet
        // using add() method
        linkedset.add("A");
        linkedset.add("B");
        linkedset.add("C");
        linkedset.add("D");

        // Note: This will not add new element
        // as A already exists
        linkedset.add("A");
        linkedset.add("E");

        // Getting size of LinkedHashSet
        // using size() method
        System.out.println("Size of LinkedHashSet = "
                           + linkedset.size());

        System.out.println("Original LinkedHashSet:"
                           + linkedset);

        // Removing existing entry from above Set
        // using remove() method
        System.out.println("Removing D from LinkedHashSet: "
                           + linkedset.remove("D"));

        // Removing existing entry from above Set
        // that does not exist in Set
        System.out.println(
            "Trying to Remove Z which is not "
            + "present: " + linkedset.remove("Z"));

        // Checking for element whether it is present inside
        // Set or not using contains() method
        System.out.println("Checking if A is present="
                           + linkedset.contains("A"));

        // Noew lastly printing the updated LinekdHashMap
        System.out.println("Updated LinkedHashSet: "
                           + linkedset);
    }
}
```

Output

```
Size of LinkedHashSet = 5
Original LinkedHashSet:[A, B, C, D, E]
Removing D from LinkedHashSet: true
Trying to Remove Z which is not present: false
Checking if A is present=true
Updated LinkedHashSet: [A, B, C, E]
```

Performing Various Operations on the LinkedHashSet Class

Let's see how to perform a few frequently used operations on the LinkedHashSet.

Operation 1: Adding Elements

In order to add an element to the LinkedHashSet, we can use the add() method. This is different from HashSet because in HashSet, the insertion order is not retained but is retained in the LinkedHashSet.

Example:

```
// Java Program to Add Elements to LinkedHashSet

// Importing required classes
import java.io.*;
import java.util.*;

// Main class
// AddingElementsToLinkedHashSet
class GFG {

    // Main driver method
    public static void main(String[] args)
    {

        // Creating an empty LinkedHashSet
        LinkedHashSet<String> hs = new LinkedHashSet<String>();

        // Adding elements to above Set
        // using add() method

        // Note: Insertion order is maintained
        hs.add("Geek");
        hs.add("For");
        hs.add("Geeks");
```

```
        // Printing elements of Set
        System.out.println("LinkedHashSet : " + hs);
    }
}
```

Output:

```
LinkedHashSet : [Geek, For, Geeks]
```

Operation 2: Removing Elements

The values can be removed from the LinkedHashSet using the remove() method.

Example:

```
// Java program to Remove Elements from LinkedHashSet

// Importing required classes
import java.io.*;
import java.util.*;

// Main class
// RemoveElementsFromLinkedHashSet
class GFG {

    // Main driver method
    public static void main(String[] args)
    {

        // Creating an empty LinekdhashSet of string type
        LinkedHashSet<String> hs
            = new LinkedHashSet<String>();

        // Adding elements to above Set
        // using add() method
        hs.add("Geek");
        hs.add("For");
        hs.add("Geeks");
        hs.add("A");
        hs.add("B");
        hs.add("Z");

        // Printing all above elements to the console
```

```
            System.out.println("Initial HashSet " + hs);

            // Removing the element from above Set
            hs.remove("B");

            // Again removing the element
            System.out.println("After removing element " + hs);

            // Returning false if the element is not present
            System.out.println(hs.remove("AC"));
        }
    }
```

Output:

```
Initial HashSet [Geek, For, Geeks, A, B, Z]
After removing element [Geek, For, Geeks, A, Z]
false
```

Operation 3: Iterating through LinkedHashSet

Iterate through the elements of LinkedHashSet using the iterator() method. The most famous one is to use the enhanced for loop.

Example:

```
// Java Program to Illustrate Iterating over LinkedHashSet

// Importing required classes
import java.io.*;
import java.util.*;

// Main class
// IteratingLinkedHashSet
class GFG {

    // Main driver method
    public static void main(String[] args)
    {

        // Instantiate an object of Set
        // Since LinkedHashSet implements Set
        // Set points to LinkedHashSet
```

```
        Set<String> hs = new LinkedHashSet<String>();

        // Adding elements to above Set
        // using add() method
        hs.add("Geek");
        hs.add("For");
        hs.add("Geeks");
        hs.add("A");
        hs.add("B");
        hs.add("Z");

        // Iterating though the LinkedHashSet
        // using iterators
        Iterator itr = hs.iterator();

        while (itr.hasNext())
            System.out.print(itr.next() + ", ");

        // New line
        System.out.println();

        // Using enhanced for loop for iteration
        for (String s : hs)
            System.out.print(s + ", ");
        System.out.println();
    }
}
```

Output:

```
Geek, For, Geeks, A, B, Z,
Geek, For, Geeks, A, B, Z,
```

Methods of LinkedHashSet

*Here, **E** is the type of element stored.*

METHOD	DESCRIPTION
spliterator()	Creates a late-binding and fail-fast Spliterator over the elements in this set.

Methods Declared in class java.util.AbstractSet

METHOD	DESCRIPTION
equals(Object o)	Compares the specified object with this set for equality.
hashCode()	Returns the hash code value for this set.
removeAll(Collection c)	Removes from this set all of its elements that are contained in the specified collection (optional operation).

Methods declared in class java.util.AbstractCollection

METHOD	DESCRIPTION
addAll (Collection<? extends E> c)	Adds all of the elements in the specified collection to this collection (optional operation).
containsAll (Collection<?> c)	Returns true if this collection contains all of the elements in the specified collection.
retainAll (Collection<?> c)	Retains only the elements in this collection that are contained in the specified collection (optional operation).
toArray()	Returns an array containing all of the elements in this collection.
toArray(T[] a)	Returns an array containing all of the elements in this collection; the runtime type of the returned array is that of the specified array.
toString()	Returns a string representation of this collection.

Methods declared in interface java.util.Collection

METHOD	DESCRIPTION
parallelStream()	Returns a possibly parallel Stream with this collection as its source.

METHOD	DESCRIPTION
removeIf(Predicate<? super E> filter)	Removes all of the elements of this collection that satisfy the given predicate.
stream()	Returns a sequential Stream with this collection as its source.

Methods declared in class java.util.HashSet

METHOD	DESCRIPTION
add(E e)	Adds the specified element to this set if it is not already present.
clear()	Removes all of the elements from this set.
clone()	Returns a shallow copy of this HashSet instance: the elements themselves are not cloned.
contains(Object o)	Returns true if this set contains the specified element.
isEmpty()	Returns true if this set contains no elements.
iterator()	Returns an iterator over the elements in this set.
remove(Object o)	Removes the specified element from this set if it is present.
size()	Returns the number of elements in this set (its cardinality).

Methods declared in interface java.lang.Iterable

METHOD	DESCRIPTION

METHOD	DESCRIPTION
forEach(Consumer<? super T> action)	Performs the given action for each element of the Iterable until all elements have been processed or the action throws an exception.

Methods declared in interface java.util.Set

METHOD	DESCRIPTION
add(element)	This method is used to add a specific element to the set. The function adds the element only if the specified element is not already present in the set else the function returns False if the element is already present in the Set.
addAll(Collection c)	This method is used to append all of the elements from the mentioned collection to the existing set. The elements are added randomly without following any specific order.
clear()	This method is used to remove all the elements from the set but not delete the set. The reference for the set still exists.
contains(element)	This method is used to check whether a specific element is present in the Set or not.
containsAll(Collection c)	This method is used to check whether the set contains all the elements present in the given collection or not. This method returns true if the set contains all the elements and returns false if any of the elements are missing.
hashCode()	This method is used to get the hashCode value for this instance of the Set. It returns an integer value which is the hashCode value for this instance of the Set.
isEmpty()	This method is used to check whether the set is empty or not.
iterator()	This method is used to return the iterator of the set. The elements from the set are returned in random order.
remove(element)	This method is used to remove the given element from the set. This method returns True if the specified element is present in the Set otherwise it returns False.

METHOD	DESCRIPTION
removeAll(collection)	This method is used to remove all the elements from the collection which are present in the set. This method returns true if this set changed as a result of the call.
retainAll(collection)	This method is used to retain all the elements from the set which are mentioned in the given collection. This method returns true if this set changed as a result of the call.
size()	This method is used to get the size of the set. This returns an integer value which signifies the number of elements.
toArray()	This method is used to form an array of the same elements as that of the Set.
toArray(T[] a)	Returns an array containing all of the elements in this set; the runtime type of the returned array is that of the specified array.

Following is the difference between LinkedHashMap and LinekdHashSet:

Categories	LinkedHashMap	LinekdHashSet
Operation	Usd to store key-value pairs.	Used to store collection of things
Duplicates	Take unique an no duplicate keys but can takeduplicate values	Stores no duplicate element
Implements	HashMap	HashSet
Example	Map<String, Integer> lhm = new LinkedHashMap<String, Integer>();	Set<String> lhs = new LinkedhashSet<String>();

Note: *Keeping the insertion order in both LinkedHashmap and LinkedHashset have additional associated costs, both in terms of spending additional CPU cycles and ne eding more memory. If you do not need the insertion order maintained, it is recomm ended to use the lighter-weight HashSet and HashMap instead.*

This article is contributed by **Pratik Agarwal**. If you like GeeksforGeeks and would like to contribute, you can also write an article using write.geeksforgeeks.org or mail your article to review-team@geeksforgeeks.org. See your article appearing on the GeeksforGeeks's main page and help other Geeks. Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above.