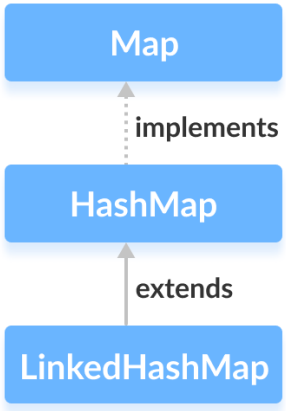
# Java LinkedHashMap

In this tutorial, we will learn about the Java LinkedHashMap class and its operations with the help of examples.

The `LinkedHashMap` class of the Java collections framework provides the hash table and linked list implementation of the Map interface.

The `LinkedHashMap` interface extends the HashMap class to store its entries in a hash table. It internally maintains a doubly-linked list among all of its entries to order its entries.

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## Creating a LinkedHashMap

In order to create a linked hashmap, we must import the `java.util.LinkedHashMap` package first. Once we import the package, here is how we can create linked hashmaps in Java.

```
// LinkedHashMap with initial capacity 8 and load factor 0.6
LinkedHashMap<Key, Value> numbers = new LinkedHashMap<>(8, 0.6f);
```

In the above code, we have created a linked hashmap named `numbers`.

Here,

- `Key` - a unique identifier used to associate each element (value) in a map
- `Value` - elements associated by the keys in a map

Notice the part `new LinkedHashMap<>(8, 0.6)`. Here, the first parameter is **capacity** and the second parameter is **loadFactor**.

- **capacity** - The capacity of this linked hashmap is 8. Meaning, it can store 8 entries.
- **loadFactor** - The load factor of this linked hashmap is 0.6. This means, whenever our hash map is filled by 60%, the entries are moved to a new hash table of double the size of the original hash table.

### Default capacity and load factor

It's possible to create a linked hashmap without defining its capacity and load factor. For example,

```
//LinkedHashMap with default capacity and load factor
LinkedHashMap<Key, Value> numbers1 = new LinkedHashMap<>();
```

By default,

- the capacity of the linked hashmap will be 16
- the load factor will be 0.75

**Note**: The `LinkedHashMap` class also allows us to define the order of its entries. For example

```
// LinkedHashMap with specified order
LinkedHashMap<Key, Value> numbers2 = new LinkedHashMap<>(capacity, loadFactor, accessOrder);
```

Here, `accessOrder` is a boolean value. Its default value is `false`. In this case entries in the linked hashmap are ordered on the basis of their insertion order.

However, if `true` is passed as `accessOrder`, entries in the linked hashmap will be ordered from least-recently accessed to most-recently accessed.

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## Creating LinkedHashMap from Other Maps

Here is how we can create a linked hashmap containing all the elements of other maps.

```
import java.util.LinkedHashMap;

class Main {
    public static void main(String[] args) {
        // Creating a LinkedHashMap of even numbers
        LinkedHashMap<String, Integer> evenNumbers = new LinkedHashMap<>();
        evenNumbers.put("Two", 2);
        evenNumbers.put("Four", 4);
        System.out.println("LinkedHashMap1: " + evenNumbers);

        // Creating a LinkedHashMap from other LinkedHashMap
        LinkedHashMap<String, Integer> numbers = new LinkedHashMap<>(evenNumbers);
        numbers.put("Three", 3);
        System.out.println("LinkedHashMap2: " + numbers);
    }
}
```

### Output

```
LinkedHashMap1: {Two=2, Four=4}
LinkedHashMap2: {Two=2, Four=4, Three=3}
```

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## Methods of LinkedHashMap

The `LinkedHashMap` class provides methods that allow us to perform various operations on the map.

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## Insert Elements to LinkedHashMap

- `put()` - inserts the specified key/value mapping to the map
- `putAll()` - inserts all the entries from the specified map to this map

- `putIfAbsent()` - inserts the specified key/value mapping to the map if the specified key is not present in the map

For example,

```
import java.util.LinkedHashMap;

class Main {
    public static void main(String[] args) {
        // Creating LinkedHashMap of even numbers
        LinkedHashMap<String, Integer> evenNumbers = new LinkedHashMap<>();

        // Using put()
        evenNumbers.put("Two", 2);
        evenNumbers.put("Four", 4);
        System.out.println("Original LinkedHashMap: " + evenNumbers);

        // Using putIfAbsent()
        evenNumbers.putIfAbsent("Six", 6);
        System.out.println("Updated LinkedHashMap(): " + evenNumbers);

        //Creating LinkedHashMap of numbers
        LinkedHashMap<String, Integer> numbers = new LinkedHashMap<>();
        numbers.put("One", 1);

        // Using putAll()
        numbers.putAll(evenNumbers);
        System.out.println("New LinkedHashMap: " + numbers);
    }
}
```

## Output

```
Original LinkedHashMap: {Two=2, Four=4}
Updated LinkedHashMap: {Two=2, Four=4, Six=6}
New LinkedHashMap: {One=1, Two=2, Four=4, Six=6}
```

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## Access LinkedHashMap Elements

### 1. Using entrySet(), keySet() and values()

- `entrySet()` - returns a set of all the key/value mapping of the map
- `keySet()` - returns a set of all the keys of the map
- `values()` - returns a set of all the values of the map

For example,

```java
import java.util.LinkedHashMap;

class Main {
    public static void main(String[] args) {
        LinkedHashMap<String, Integer> numbers = new LinkedHashMap<>();

        numbers.put("One", 1);
        numbers.put("Two", 2);
        numbers.put("Three", 3);
        System.out.println("LinkedHashMap: " + numbers);

        // Using entrySet()
        System.out.println("Key/Value mappings: " + numbers.entrySet());

        // Using keySet()
        System.out.println("Keys: " + numbers.keySet());

        // Using values()
        System.out.println("Values: " + numbers.values());
    }
}
```

### Output

```
LinkedHashMap: {One=1, Two=2, Three=3}
Key/Value mappings: [One=1, Two=2, Three=3]
Keys: [One, Two, Three]
Values: [1, 2, 3]
```

### 2. Using get() and getOrDefault()

- `get()` - Returns the value associated with the specified key. If the key is not found, it returns `null`.
- `getOrDefault()` - Returns the value associated with the specified key. If the key is not found, it returns the specified default value.

For example,

```
import java.util.LinkedHashMap;

class Main {
    public static void main(String[] args) {

        LinkedHashMap<String, Integer> numbers = new LinkedHashMap<>();
        numbers.put("One", 1);
        numbers.put("Two", 2);
        numbers.put("Three", 3);
        System.out.println("LinkedHashMap: " + numbers);

        // Using get()
        int value1 = numbers.get("Three");
        System.out.println("Returned Number: " + value1);

        // Using getOrDefault()
        int value2 = numbers.getOrDefault("Five", 5);
        System.out.println("Returned Number: " + value2);
    }
}
```

## Output

```
LinkedHashMap: {One=1, Two=2, Three=3}
Returned Number: 3
Returned Number: 5
```

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## Removed LinkedHashMap Elements

- `remove(key)` - returns and removes the entry associated with the specified `key` from the map
- `remove(key, value)` - removes the entry from the map only if the specified `key` mapped to be the specified `value` and return a boolean value

For example,

```java
import java.util.LinkedHashMap;

class Main {
    public static void main(String[] args) {

        LinkedHashMap<String, Integer> numbers = new LinkedHashMap<>();
        numbers.put("One", 1);
        numbers.put("Two", 2);
        numbers.put("Three", 3);
        System.out.println("LinkedHashMap: " + numbers);

        // remove method with single parameter
        int value = numbers.remove("Two");
        System.out.println("Removed value: " + value);

        // remove method with two parameters
        boolean result = numbers.remove("Three", 3);
        System.out.println("Is the entry Three removed? " + result);

        System.out.println("Updated LinkedHashMap: " + numbers);
    }
}
```

## Output

```
LinkedHashMap: {One=1, Two=2, Three=3}
Removed value: 2
Is the entry {Three=3} removed? True
Updated LinkedHashMap: {One=1}
```

## Other Methods of LinkedHashMap

| Method | Description |
| --- | --- |
| `clear()` | removes all the entries from the map |
| `containsKey()` | checks if the map contains the specified key and returns a boolean value |
| `containsValue()` | checks if the map contains the specified value and returns a boolean value |
| `size()` | returns the size of the map |
| `isEmpty()` | checks if the map is empty and returns a boolean value |

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## LinkedHashMap Vs. HashMap

Both the `LinkedHashMap` and the `HashMap` implements the `Map` interface. However, there exist some differences between them.

- `LinkedHashMap` maintains a doubly-linked list internally. Due to this, it maintains the insertion order of its elements.
- The `LinkedHashMap` class requires more storage than `HashMap`. This is because `LinkedHashMap` maintains linked lists internally.
- The performance of `LinkedHashMap` is slower than `HashMap`.