

CSCI 2120:

Software Design & Development II

UNIT 2: Collections Framework & Generics
Iterate on HashMaps

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Introduction

In this lecture, we will learn how to **iterate HashMap in Java**. Java provides multiple convenient ways to iterate over a HashMap.

We can iterate over keys, values, or both. We can also remove an element from a map while iterating over it.

Example 1: Iterating HashMap using Iterator

Let's take an example program where we will iterate HashMap in java using **java iterator** concept. Look at the following source code.

Example 1: Iterating HashMap using Iterator

```
import java.util.HashMap;
import java.util.Iterator;
import java.util.Map.Entry;
public class IterateHashMapTester1 {
    public static void main(String[] args) {
        HashMap<Character, String> hmap = new HashMap<>(); // Creating a hash map.

        hmap.put('V', "Violet");
        hmap.put('I', "Indigo");
        hmap.put('B', "Blue");
        hmap.put('G', "Green");
        hmap.put('Y', "Yellow");
        hmap.put('O', "Orange");
        hmap.put('R', "Red");

        // entrySet is a method that is used to get view of entries of a hash map.
        Iterator<Entry<Character, String>> itr = hmap.entrySet().iterator();
        System.out.println("Iterating Entries of HashMap");
        while(itr.hasNext()) {
            Object key = itr.next();
            System.out.println(key);
        }
        // keySet is a method that is used to get view of keys of a hash map.
        Iterator<Character> itr2 = hmap.keySet().iterator();
        System.out.println("Iterating Keys of HashMap");
        while(itr2.hasNext()) {
            Object keyView = itr2.next();
            System.out.println(keyView);
        }
        // values is a method that is used to get values of keys of a hash map.
        Iterator<String> itr3 = hmap.values().iterator();
        System.out.println("Iterating Values of HashMap");
        while(itr3.hasNext()) {
            Object valuesView = itr3.next();
            System.out.println(valuesView);
        }
    }
}
```

Example 1: Iterating HashMap using Iterator

Output:

```
Iterating Entries of HashMap
B=Blue
R=Red
V=Violet
G=Green
I=Indigo
Y=Yellow
O=Orange
Iterating Keys of HashMap
B
R
V
G
I
Y
O
Iterating Values of HashMap
Blue
Red
Violet
Green
Indigo
Yellow
Orange
```

Example 2: Remove Entry with Iterator

Let's create another program where we will remove the last entry of a HashMap returned by the Iterator.

Example 2: Remove Entry with Iterator

```
import java.util.HashMap;
import java.util.Iterator;
import java.util.Map.Entry;
public class IterateHashMapTester2 {
    public static void main(String[] args) {
        HashMap<Integer, String> hmap = new HashMap<>();

        hmap.put(5, "Five");
        hmap.put(10, "Ten");
        hmap.put(15, "Fifteen");
        hmap.put(20, "Twenty");
        hmap.put(25, "Twenty-five");
        hmap.put(30, "Thirty");

        // entrySet is a method that is used to get view of entries of a map.
        Iterator<Entry<Integer, String>> itr = hmap.entrySet().iterator();
        System.out.println("Iterating Entries of HashMap");
        while(itr.hasNext()) {
            Object key = itr.next();
            System.out.println(key);
        }
        // Removing Last entry returned by Iterator
        itr.remove(); // removes last entry of a hashmap while iterating.
        System.out.println("Entries of HashMap after removing: " +hmap.entrySet());
    }
}
```


Example 2: Remove Entry with Iterator

Output:

```
Iterating Entries of HashMap
```

```
20=Twenty
```

```
5=Five
```

```
25=Twenty-five
```

```
10=Ten
```

```
30=Thirty
```

```
15=Fifteen
```

```
Entries of HashMap after removing: [20=Twenty, 5=Five, 25=Twenty-five, 10=Ten, 30=Thirty]
```

Example 3: Iterate over keys or values using `keySet()` and `value()`

This technique is useful when you want to get a set view of keys or values of a `HashMap`. Using `keySet()`, `values()`, and for-each loop, you can iterate over keys or values of a hash map.

Let's take an example program where we will iterate over keys or values of a `HashMap` using `keySet()` and `values()` methods.

`keySet()` method returns a set view of the keys from a hash map and `values()` method returns a collection-view of values from a `HashMap`.

Example 3: Iterate over keys or values using keySet() and value()

```
import java.util.HashMap;
public class IterateHashMapTester3 {
    public static void main(String[] args) {
        HashMap<Integer, String> hmap = new HashMap<>();

        hmap.put(5, "Five");
        hmap.put(10, "Ten");
        hmap.put(15, "Fifteen");
        hmap.put(20, "Twenty");
        hmap.put(25, "Twenty-five");
        hmap.put(30, "Thirty");

        // Iterating over keys of a hashmap using keySet() method.
        for (Integer num : hmap.keySet())
            System.out.println("Number: " + num);
        System.out.println();

        // Iterating over values of a hashmap using values() method.
        for (String word : hmap.values())
            System.out.println("Word: " + word);
    }
}
```

Example 3: Iterate over keys or values using keySet() and value()

Output:

Number: 20

Number: 5

Number: 25

Number: 10

Number: 30

Number: 15

Word: Twenty

Word: Five

Word: Twenty-five

Word: Ten

Word: Thirty

Word: Fifteen

Example 4: Iterate Map using Map.Entry<K,V> method

Let's create a program where we will iterate entry of a hash map using `Map.Entry<K,V>` method. We will use the following methods for iteration.

Example 4: Iterate Map using Map.Entry<K,V> method

```
import java.util.HashMap;
import java.util.Map.Entry;
public class IterateHashMapTester4 {
    public static void main(String[] args) {
        HashMap<Integer, String> hmap = new HashMap<>();

        hmap.put(1012, " John");
        hmap.put(1202, " Ricky");
        hmap.put(1303, " Deep");
        hmap.put(1404, " Mark");
        hmap.put(1505, " Maya");

        // Iterating over entries of a map using entrySet() method.
        for (Entry<Integer, String> entry : hmap.entrySet()) {
            System.out.println("Id: " + entry.getKey() + ", Name: " + entry.getValue());
        }
    }
}
```

Example 4: Iterate Map using Map.Entry<K,V> method

Output:

```
Id: 1505, Name:  Maya  
Id: 1202, Name:  Ricky  
Id: 1012, Name:  John  
Id: 1303, Name:  Deep  
Id: 1404, Name:  Mark
```

Example 5: Iterate Map using forEach() method

Let's take an example program based on the `forEach()` method. This is the best efficient and simple way. In this program, we will use lambda expression inside the `forEach()` method to display each entry of the hash map.

Example 5: Iterate Map using forEach() method

```
import java.util.HashMap;
public class IterateHashMapTester5 {
    public static void main(String[] args) {
        HashMap<String, String> hmap = new HashMap<>();

        hmap.put("India", " Delhi");
        hmap.put("USA", " Washington, D.C.");
        hmap.put("Australia", " Canberra");
        hmap.put("New Zealand", " Wellington");
        hmap.put("Switzerland", " Bern");

        //Iteration over map using forEach() method.
        hmap.forEach((k,v) -> System.out.println("Country: " + k + ", Capital: " + v));
    }
}
```

Example 5: Iterate Map using forEach() method

Output:

```
Country: New Zealand, Capital:  Wellington  
Country: USA, Capital:  Washington, D.C.  
Country: Australia, Capital:  Canberra  
Country: Switzerland, Capital:  Bern  
Country: India, Capital:  Delhi
```

END