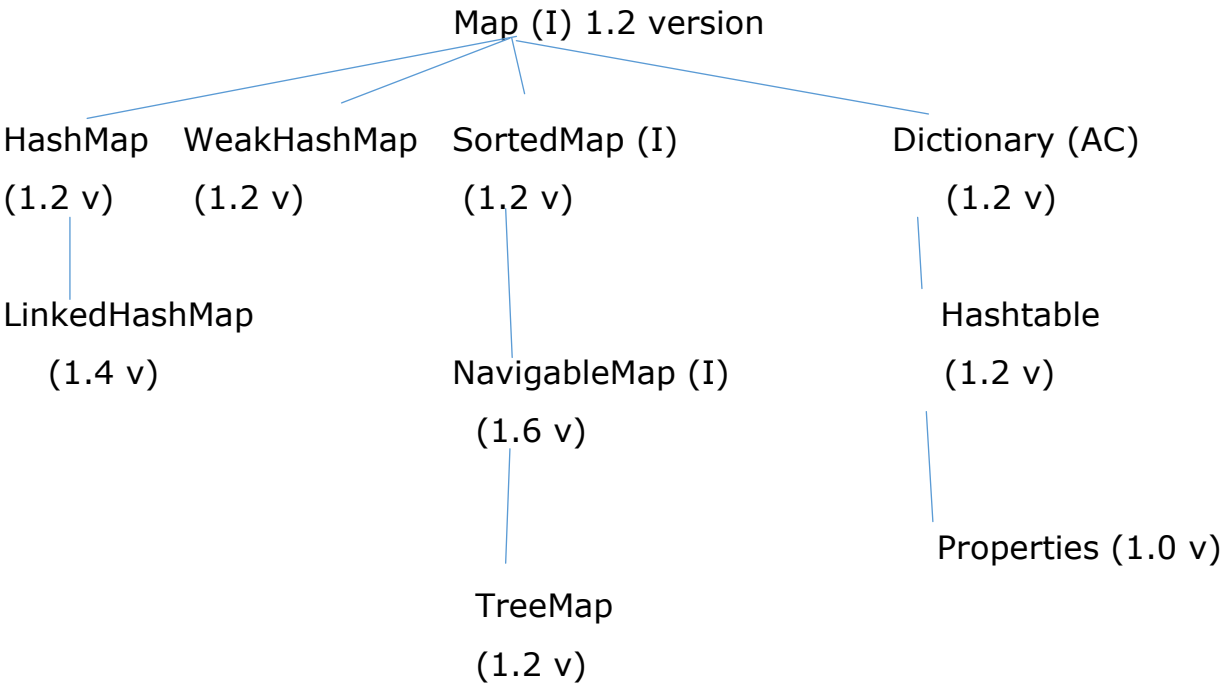
Map

1. Map is not child interface of collection.
2. If we want to represent group of individual objects as key value pair then should go for map.
3. Example- Roll no Name
   101 Sanjay
   102 Ram
   103 Shyam

4. Both key and values are objects, duplicated keys are not allowed, but values may be duplicated.



Methods in Map Interface :

1) Object put(Object key, Object value);
To Add One Key- Value Pair.If the specified Key is Already Available then Old Value will be Replaced with New Value and Returns Old Value.
2) void putAll(Map m)
3) Object get(Object key)
4) Object remove(Object key)

5) booleancontainsKey(Object key)
6) booleancontainsValue(Object value)
7) booleanisEmpty()
8) int size()
9) void clear()
10) Set keySet()
11) Collection values()
12) Set entrySet()

HashMap

A HashMap is class which implements the Map interface

It stores values based on key.

It has 16 size and internally it will increase the size by double, so new size will be 32,64,128.

It is unordered, which means that the key must be unique

It may have null key-null value

For adding elements in HashMap we use the put method

Return type of put method is Object.

Constructors:

1) HashMap m = new HashMap();
Creates an Empty HashMap Object with Default Initial Capacity 16 and Default Fill Ratio 0.75
2) HashMap m = new HashMap(intinitialcapacity);
3) HashMap m = new HashMap(intinitialcapacity, float fillRatio);
4) HashMap m = new HashMap(Map m);

Example-

```
package com.test;
import java.util.HashMap;
import java.util.TreeSet;

public class A {

	public static void main(String[] args) {

		HashMap hm = new HashMap();
		hm.put(10, "ashok");
		hm.put(11, "ram");

		System.out.println(hm);

	}
}
```

LinkedHashMap-

- A LinkedHashMap is a ‘hashtable and linked list implementation of the map interface with a predictable iteration order.
- It is the same as HashMap except it maintains an insertion order i.e. ordered

Example-

```
package com.test;

import java.util.HashMap;
import java.util.LinkedHashMap;
import java.util.TreeSet;
```

```
public class A {

	public static void main(String[] args) {

		LinkedHashMap hm = new LinkedHashMap();
		hm.put(10, "ajay");
		hm.put(11, "ram");
		hm.put(12, "shyam");

		System.out.println(hm);
	}
}
```

Output-

{10=ajay, 11=ram, 12=shyam}

TreeMap-

- The TreeMap is a class which implements NavigableMap interface which is the sub- interface of SortedMap.
- It stores values based on key
- It is ordered but in an Ascending manner
- Keys should be unique
- It cannot have null key at run time but can have null values because the interpreter will not understand how to sort null with other values.

1) TreeMap t = new TreeMap(); For Default Natural Sorting Order.
2) TreeMap t = new TreeMap(Comparator c); For Customized Sorting Order.
3) TreeMap t = new TreeMap(SortedMap m); Inter Conversion between Map Objects.
4) TreeMap t = new TreeMap(Map m);

Example-

```
package com.test;
import java.util.HashMap;
import java.util.LinkedHashMap;
import java.util.TreeMap;
import java.util.TreeSet;

public class A {

	public static void main(String[] args) {

		TreeMap hm = new TreeMap();
		hm.put(10, "Ajay");
		hm.put(11, "ram");
		hm.put(12, "shyam");

		System.out.println(hm);
	}
}
```

Output-

{10=Ajay, 11=ram, 12=shyam}

Hashtable-

- Hashtable is a class which implements Map interface and extends Dictionary class.
- It stores values based on key
- It is unordered and the key should be unique

- It cannot have null keys or null values. It gives runtime error if we try to add any null keys or values but will not show an error at compile time.
- It has synchronised methods and slower than hashmap.

Example-

```
package com.test;
import java.util.Hashtable;
public class A {

	public static void main(String[] args) {

		Hashtable ht = new Hashtable();
		ht.put(10, "ram");
		ht.put(11, "sohan");
		System.out.println(ht);
	}
}
```

Output-

{10=ram, 11=sohan}

Example- 1

```
package com.hashmap;
import java.util.*;
public class HashMapDemo {

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

```
            HashMap<Integer, String> map = new HashMap<Integer,
String>();
            map.put(10, "Ram");
            map.put(20, "yogesh");
            map.put(30, "sohan");

            Set<Integer> s = map.keySet(); // s contain all the keys only.
            for (int i : s) {
                  System.out.println("Key==" + i);
                  System.out.println("value=" + map.get(i));
                  /*
                   * get method used to get the respective value of key.
                   */
            }
      }
}
```

Comparison between HashMap, LinkedHashMap, TreeMap and HashTable:

Topic	HashMap	LinkedHashMap	TreeMap	HashTable
Duplicate Key	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Ordering	Unordered	Maintains insertion order	Maintains in Accessing order	Unordered
Null (Key Value)	Allow	Allow	key Not allowed but value is Iterator	Not Allowed
Accessing Elements	Iterator	Iterator	Iterator	Iterator
Thread Safety	No	No	No	Yes

Example-2

```
package com.hashmap;
import java.util.*;
public class HashMapDemo2 {

	public static void main(String[] args) {

		HashMap<Integer, String> map = new HashMap<Integer,
String>();
		map.put(10, "Ram");
		map.put(20, "yogesh");
		map.put(30, "sohan");

		Set<Integer> s = map.keySet();
		Iterator<Integer> itr = s.iterator();
		while (itr.hasNext()) {

			int i = itr.next();
			System.out.println("key=" + i);
			System.out.println("value=" + map.get(i));
		}

	}
}
```

Example-3

```
package com.hashmap;
import java.util.*;
```

```
public class LinkedHashMapDemo {

	public static void main(String[] args) {

		LinkedHashMap<Integer, String> map = new
LinkedHashMap<Integer, String>();
		map.put(10, "Ram");
		map.put(10, "yogesh"); //override

		Set<Integer> s = map.keySet();
		Iterator<Integer> itr = s.iterator();
		while (itr.hasNext()) {

			int i = itr.next();
			System.out.println("key=" + i);
			System.out.println("value=" + map.get(i));
		}

	}
}
```

Example-4

```
package com.setdemo;

import java.util.HashMap;
import java.util.Iterator;
import java.util.Map;

public class HashMapDemo {
```

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

		Map<String, String> map = new HashMap<String, String>();
		map.put("ram", "patil");
		map.put("ajay", "deshmukh");

		// using iterators
		Iterator<Map.Entry<String, String>> itr =
map.entrySet().iterator();

		while (itr.hasNext()) {
			Map.Entry<String, String> entry = itr.next();
			System.out.println("Key = " + entry.getKey() + ", Value =
" + entry.getValue());
		}
	}
}
```

Example-5

```
package com.setdemo;

import java.util.HashMap;
import java.util.Iterator;
import java.util.Map;

public class HashMapDemo {

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

```
            Map<String,String> map = new HashMap<String,String>();
        // enter name/url pair
        map.put("ram", "patil");
        map.put("shyam", "deshmukh");
        // forEach(action) method to iterate map
        map.forEach((k,v) -> System.out.println("Key = "
              + k + ", Value = " + v));
        }
}
```

Example- 4

```
package com.hashmap;
import java.util.*;
public class TreeMapDemo {
        public static void main(String[] args) {

            TreeMap<String,String> treeMap= new
TreeMap<String,String>(); //sorted elements based on key
            treeMap.put("20","velocity");
            treeMap.put("50","pune");
            treeMap.put("10","software");
            //System.out.println(treeMap);
            Set<String> s=treeMap.keySet();
            for(String i: s) {
                System.out.println("key="+i);
                System.out.println("value="+treeMap.get(i));
            }
        }
}
```