Java Map Interface

A map contains values on the basis of key, i.e. key and value pair. Each key and value pair is known as an entry. A Map contains unique keys.

A Map is useful if you have to search, update or delete elements on the basis of a key.

Java Map Hierarchy

There are two interfaces for implementing Map in java: Map and SortedMap, and three classes: HashMap, LinkedHashMap, and TreeMap. The hierarchy of Java Map is given below:

Java Map Hierarchy

A Map doesn't allow duplicate keys, but you can have duplicate values. HashMap and LinkedHashMap allow null keys and values, but TreeMap doesn't allow any null key or value.

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A Map can't be traversed, so you need to convert it into Set using *keySet()* or *entrySet()* method.

|  |  |
| --- | --- |
| **Class** | **Description** |
| [HashMap](https://www.javatpoint.com/java-hashmap) | HashMap is the implementation of Map, but it doesn't maintain any order. |
| [LinkedHashMap](https://www.javatpoint.com/java-linkedhashmap) | LinkedHashMap is the implementation of Map. It inherits HashMap class. It maintains insertion order. |
| [TreeMap](https://www.javatpoint.com/java-treemap) | TreeMap is the implementation of Map and SortedMap. It maintains ascending order. |

Useful methods of Map interface

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| --- | --- |
| **Method** | **Description** |
| V put(Object key, Object value) | It is used to insert an entry in the map. |
| void putAll(Map map) | It is used to insert the specified map in the map. |
| V putIfAbsent(K key, V value) | It inserts the specified value with the specified key in the map only if it is not already specified. |
| V remove(Object key) | It is used to delete an entry for the specified key. |
| boolean remove(Object key, Object value) | It removes the specified values with the associated specified keys from the map. |
| Set keySet() | It returns the Set view containing all the keys. |
| Set<Map.Entry<K,V>> entrySet() | It returns the Set view containing all the keys and values. |
| void clear() | It is used to reset the map. |
| V compute(K key, BiFunction<? super K,? super V,? extends V> remappingFunction) | It is used to compute a mapping for the specified key and its current mapped value (or null if there is no current mapping). |
| V computeIfAbsent(K key, Function<? super K,? extends V> mappingFunction) | It is used to compute its value using the given mapping function, if the specified key is not already associated with a value (or is mapped to null), and enters it into this map unless null. |
| V computeIfPresent(K key, BiFunction<? super K,? super V,? extends V> remappingFunction) | It is used to compute a new mapping given the key and its current mapped value if the value for the specified key is present and non-null. |
| boolean containsValue(Object value) | This method returns true if some value equal to the value exists within the map, else return false. |
| boolean containsKey(Object key) | This method returns true if some key equal to the key exists within the map, else return false. |
| boolean equals(Object o) | It is used to compare the specified Object with the Map. |
| void forEach(BiConsumer<? super K,? super V> action) | It performs the given action for each entry in the map until all entries have been processed or the action throws an exception. |
| V get(Object key) | This method returns the object that contains the value associated with the key. |
| V getOrDefault(Object key, V defaultValue) | It returns the value to which the specified key is mapped, or defaultValue if the map contains no mapping for the key. |
| int hashCode() | It returns the hash code value for the Map |
| boolean isEmpty() | This method returns true if the map is empty; returns false if it contains at least one key. |
| V merge(K key, V value, BiFunction<? super V,? super V,? extends V> remappingFunction) | If the specified key is not already associated with a value or is associated with null, associates it with the given non-null value. |
| V replace(K key, V value) | It replaces the specified value for a specified key. |
| boolean replace(K key, V oldValue, V newValue) | It replaces the old value with the new value for a specified key. |
| void replaceAll(BiFunction<? super K,? super V,? extends V> function) | It replaces each entry's value with the result of invoking the given function on that entry until all entries have been processed or the function throws an exception. |
| Collection values() | It returns a collection view of the values contained in the map. |
| int size() | This method returns the number of entries in the map. |

Map.Entry Interface

Entry is the subinterface of Map. So we will be accessed it by Map.Entry name. It returns a collection-view of the map, whose elements are of this class. It provides methods to get key and value.

Methods of Map.Entry interface

|  |  |
| --- | --- |
| **Method** | **Description** |
| K getKey() | It is used to obtain a key. |
| V getValue() | It is used to obtain value. |
| int hashCode() | It is used to obtain hashCode. |
| V setValue(V value) | It is used to replace the value corresponding to this entry with the specified value. |
| boolean equals(Object o) | It is used to compare the specified object with the other existing objects. |
| static <K extends Comparable<? super K>,V> Comparator<Map.Entry<K,V>> comparingByKey() | It returns a comparator that compare the objects in natural order on key. |
| static <K,V> Comparator<Map.Entry<K,V>> comparingByKey(Comparator<? super K> cmp) | It returns a comparator that compare the objects by key using the given Comparator. |
| static <K,V extends Comparable<? super V>> Comparator<Map.Entry<K,V>> comparingByValue() | It returns a comparator that compare the objects in natural order on value. |
| static <K,V> Comparator<Map.Entry<K,V>> comparingByValue(Comparator<? super V> cmp) | It returns a comparator that compare the objects by value using the given Comparator. |

Java Map Example: Non-Generic (Old Style)

* 1. //Non-generic
  2. **import** java.util.\*;
  3. **public** **class** MapExample1 {
  4. **public** **static** **void** main(String[] args) {
  5. Map map=**new** HashMap();
  6. //Adding elements to map
  7. map.put(1,"Amit");
  8. map.put(5,"Rahul");
  9. map.put(2,"Jai");
  10. map.put(6,"Amit");
  11. //Traversing Map
  12. Set set=map.entrySet();//Converting to Set so that we can traverse
  13. Iterator itr=set.iterator();
  14. **while**(itr.hasNext()){
  15. //Converting to Map.Entry so that we can get key and value separately
  16. Map.Entry entry=(Map.Entry)itr.next();
  17. System.out.println(entry.getKey()+" "+entry.getValue());
  18. }
  19. }
  20. }

Output:

1 Amit

2 Jai

5 Rahul

6 Amit

Java Map Example: Generic (New Style)

* 1. **import** java.util.\*;
  2. **class** MapExample2{
  3. **public** **static** **void** main(String args[]){
  4. Map<Integer,String> map=**new** HashMap<Integer,String>();
  5. map.put(100,"Amit");
  6. map.put(101,"Vijay");
  7. map.put(102,"Rahul");
  8. //Elements can traverse in any order
  9. **for**(Map.Entry m:map.entrySet()){
  10. System.out.println(m.getKey()+" "+m.getValue());
  11. }
  12. }
  13. }

Output:

102 Rahul

100 Amit

101 Vijay

Java Map Example: comparingByKey()

* 1. **import** java.util.\*;
  2. **class** MapExample3{
  3. **public** **static** **void** main(String args[]){
  4. Map<Integer,String> map=**new** HashMap<Integer,String>();
  5. map.put(100,"Amit");
  6. map.put(101,"Vijay");
  7. map.put(102,"Rahul");
  8. //Returns a Set view of the mappings contained in this map
  9. map.entrySet()
  10. //Returns a sequential Stream with this collection as its source
  11. .stream()
  12. //Sorted according to the provided Comparator
  13. .sorted(Map.Entry.comparingByKey())
  14. //Performs an action for each element of this stream
  15. .forEach(System.out::println);
  16. }
  17. }

Output:

100=Amit

101=Vijay

102=Rahul

Java Map Example: comparingByKey() in Descending Order

* 1. **import** java.util.\*;
  2. **class** MapExample4{
  3. **public** **static** **void** main(String args[]){
  4. Map<Integer,String> map=**new** HashMap<Integer,String>();
  5. map.put(100,"Amit");
  6. map.put(101,"Vijay");
  7. map.put(102,"Rahul");
  8. //Returns a Set view of the mappings contained in this map
  9. map.entrySet()
  10. //Returns a sequential Stream with this collection as its source
  11. .stream()
  12. //Sorted according to the provided Comparator
  13. .sorted(Map.Entry.comparingByKey(Comparator.reverseOrder()))
  14. //Performs an action for each element of this stream
  15. .forEach(System.out::println);
  16. }
  17. }

Output:

102=Rahul

101=Vijay

100=Amit

Java Map Example: comparingByValue()

* 1. **import** java.util.\*;
  2. **class** MapExample5{
  3. **public** **static** **void** main(String args[]){
  4. Map<Integer,String> map=**new** HashMap<Integer,String>();
  5. map.put(100,"Amit");
  6. map.put(101,"Vijay");
  7. map.put(102,"Rahul");
  8. //Returns a Set view of the mappings contained in this map
  9. map.entrySet()
  10. //Returns a sequential Stream with this collection as its source
  11. .stream()
  12. //Sorted according to the provided Comparator
  13. .sorted(Map.Entry.comparingByValue())
  14. //Performs an action for each element of this stream
  15. .forEach(System.out::println);
  16. }
  17. }

Output:

100=Amit

102=Rahul

101=Vijay

Java Map Example: comparingByValue() in Descending Order

* 1. **import** java.util.\*;
  2. **class** MapExample6{
  3. **public** **static** **void** main(String args[]){
  4. Map<Integer,String> map=**new** HashMap<Integer,String>();
  5. map.put(100,"Amit");
  6. map.put(101,"Vijay");
  7. map.put(102,"Rahul");
  8. //Returns a Set view of the mappings contained in this map
  9. map.entrySet()
  10. //Returns a sequential Stream with this collection as its source
  11. .stream()
  12. //Sorted according to the provided Comparator
  13. .sorted(Map.Entry.comparingByValue(Comparator.reverseOrder()))
  14. //Performs an action for each element of this stream
  15. .forEach(System.out::println);
  16. }
  17. }

Output:

101=Vijay

102=Rahul

100=Amit