Java NavigableMap Interface

In this tutorial, we will learn about the Java NavigableMap interface and its methods with the help of a example.

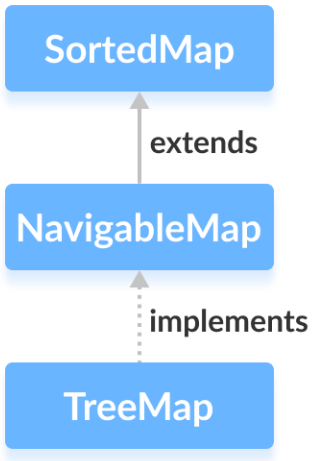
The `NavigableMap` interface of the Java collections framework provides the features to navigate among the map entries.

It is considered as a type of SortedMap.

Class that implements NavigableMap

Since `NavigableMap` is an interface, we cannot create objects from it.

In order to use the functionalities of the `NavigableMap` interface, we need to use the `TreeMap` class that implements `NavigableMap`.



How to use NavigableMap?

In Java, we must import the `java.util.NavigableMap` package to use `NavigableMap`. Once we import the package, here's how we can create a navigable map.

```
// NavigableMap implementation by TreeMap class
NavigableMap<Key, Value> numbers = new TreeMap<>();
```

In the above code, we have created a navigable map named `numbers` of the `TreeMap` class.

Here,

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

Methods of NavigableMap

The `NavigableMap` is considered as a type of `SortedMap`. It is because `NavigableMap` extends the `SortedMap` interface.

Hence, all `SortedMap` methods are also available in `NavigableMap`. To learn how these methods are defined in `SortedMap`, visit Java SortedMap.

However, some of the methods of `SortedMap` (`headMap()`, `tailMap()`, and `subMap()`) are defined differently in `NavigableMap`.

Let's see how these methods are defined in `NavigableMap`.

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headMap(key, booleanValue)

The `headMap()` method returns all the entries of a navigable map associated with all those keys before the specified `key` (which is passed as an argument).

The `booleanValue` is an optional parameter. Its default value is `false`.

If `true` is passed as a `booleanValue`, the method returns all the entries associated with all those keys before the specified `key`, including the entry associated with the specified `key`.

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tailMap(key, booleanValue)

The `tailMap()` method returns all the entries of a navigable map associated with all those keys after the specified `key` (which is passed as an argument) including the entry associated with the specified `key`.

The `booleanValue` is an optional parameter. Its default value is `true`.

If `false` is passed as a `booleanValue`, the method returns all the entries associated with those keys after the specified `key`, without including the entry associated with the specified `key`.

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subMap(k1, bv1, k2, bv2)

The `subMap()` method returns all the entries associated with keys between `k1` and `k2` including the entry associated with `k1`.

The `bv1` and `bv2` are optional parameters. The default value of `bv1` is true and the default value of `bv2` is `false`.

If `false` is passed as `bv1`, the method returns all the entries associated with keys between `k1` and `k2`, without including the entry associated with `k1`.

If `true` is passed as `bv2`, the method returns all the entries associated with keys between `k1` and `k2`, including the entry associated with `k1`.

Other Methods

The `NavigableMap` provides various methods that can be used to locate the entries of maps.

- **descendingMap()** - reverse the order of entries in a map
- **descendingKeyMap()** - reverses the order of keys in a map
- **ceilingEntry()** - returns an entry with the lowest key among all those entries whose keys are greater than or equal to the specified key
- **ceilingKey()** - returns the lowest key among those keys that are greater than or equal to the specified key
- **floorEntry()** - returns an entry with the highest key among all those entries whose keys are less than or equal to the specified key

- **floorKey()** - returns the highest key among those keys that are less than or equal to the specified key
- **higherEntry()** - returns an entry with the lowest key among all those entries whose keys are greater than the specified key
- **higherKey()** - returns the lowest key among those keys that are greater than the specified key
- **lowerEntry()** - returns an entry with the highest key among all those entries whose keys are less than the specified key
- **lowerKey()** - returns the highest key among those keys that are less than the specified key
- **firstEntry()** - returns the first entry (the entry with the lowest key) of the map
- **lastEntry()** - returns the last entry (the entry with the highest key) of the map
- **pollFirstEntry()** - returns and removes the first entry of the map
- **pollLastEntry()** - returns and removes the last entry of the map

To learn more, visit Java NavigableMap (official Java documentation).

Implementation of NavigableMap in TreeMap Class

```
import java.util.NavigableMap;
import java.util.TreeMap;

class Main {

    public static void main(String[] args) {
        // Creating NavigableMap using TreeMap
        NavigableMap<String, Integer> numbers = new TreeMap<>();

        // Insert elements to map
        numbers.put("Two", 2);
        numbers.put("One", 1);
        numbers.put("Three", 3);
        System.out.println("NavigableMap: " + numbers);

        // Access the first entry of the map
        System.out.println("First Entry: " + numbers.firstEntry());

        // Access the last entry of the map
        System.out.println("Last Entry: " + numbers.lastEntry());

        // Remove the first entry from the map
        System.out.println("Removed First Entry: " + numbers.pollFirstEntry());

        // Remove the last entry from the map
        System.out.println("Removed Last Entry: " + numbers.pollLastEntry());
    }
}
```

Output

```
NavigableMap: {One=1, Three=3, Two=2}
First Entry: One=1
Last Entry: Two=2
Removed First Entry: One=1
Removed Last Entry: Two=2
```