



# Collection **Map**

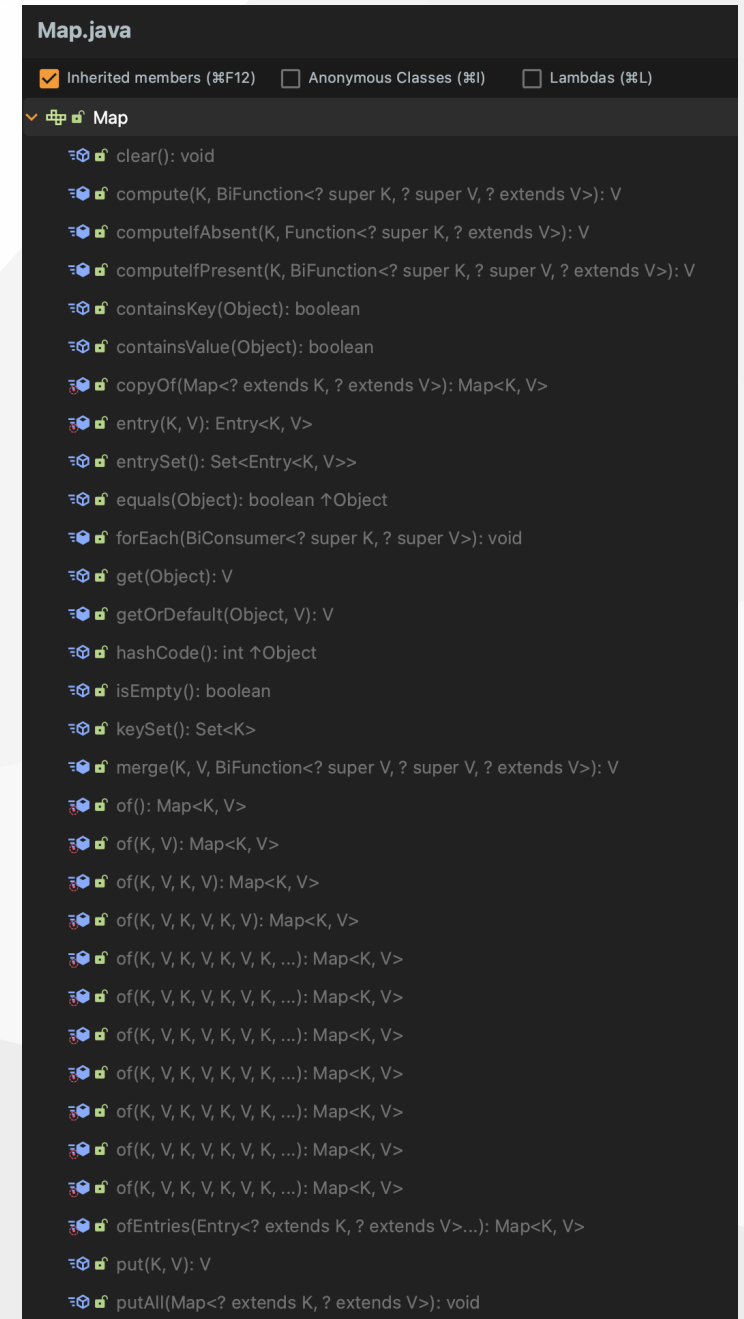
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# Map Hierarchy



# Map Methods

- Store **key** and **value** pairs
- Maps from the key to the value
- Keys are unique
  - A single key only appears once in the **Map**
  - A key can to only **one value**
- Value does not have to be unique



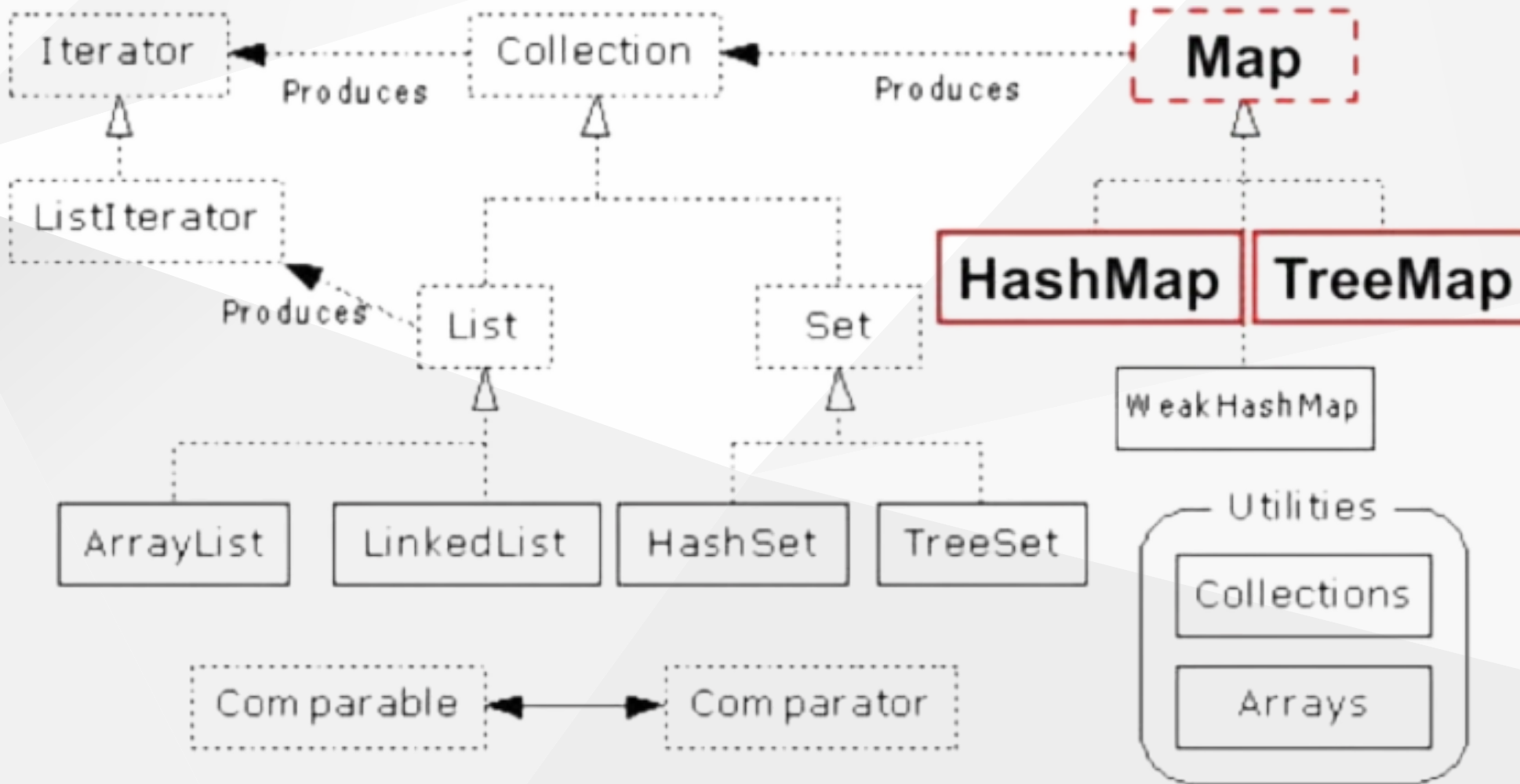
# Map View

- A means of **iterating** over the **keys** and **value** in a `Map`
- **Set** `keySet()`, returns the Set of keys contained in the `Map`
- **Collection** `values()`, returns the Collection of values contained in the `Map`. This Collection is not a Set, as multiple keys can map to the same value.
- **Set** `entrySet()`, returns the Set of **key-value** pairs contained in the `Map`. The `Map` interface provides a small nested interface called `Map.Entry` that is the type of the elements in this Set.

# Map **Entry** Example

```
public class Main {  
    public static void main(String[] args) {  
        Map<Integer, String> map = new HashMap<>();  
        map.put(1, "Calvin");  
        map.put(2, "Joe");  
        map.put(3, "Maverick");  
  
        for (Map.Entry<Integer, String> m : map.entrySet()) {  
            System.out.println(m.getKey() + " :: " + m.getValue());  
        }  
    }  
}
```

# HashMap and TreeMap Hierarchy



# HashMap and TreeMap

- **HashMap**
  - The keys are a set - unique, **unordered**
  - Fast
- **TreeMap**
  - The keys are a set - unique, **ordered**
  - Same options for ordering as a **TreeSet**
    - Natural order **Comparable**, **compareTo(Object)**
    - Special order **Comparator**, **compare(Object, Object)**

# HashMap

- A `HashMap` contains **values** based on the **key**
- It contains only **unique elements**
- It may have **one null key** and **multiple null values**
- It maintains **no order**



# HashMap Example

```
public class Main {  
    public static void main(String[] args) {  
        Map<Integer, String> map = new HashMap<>();  
        map.put(1, "Java");  
        map.put(2, "Python");  
        map.put(3, "Ruby");  
  
        System.out.println("Values before remove : " + map);  
        map.remove(2);  
  
        System.out.println("Values after remove : " + map);  
    }  
}
```

# HashMap **vs** TreeMap

HashMap	TreeMap
Can contain <b>one null key</b>	<b>Can't</b> contain a null key
Doesn't maintain any order	Maintain <b>ascending</b> order

# Task 1 - Array Appears Once

Create a method that functions to identify numbers that appear once from a string that is input. String contains a collection of numbers.

## Test Case :

- Input : "76523752"  
Output : [6, 3]
- Input : "1122"  
Output: []

## Task 2 - Array Unique

Create a method to identify the unique value between 2 array.

### Test Case :

- Input : [1, 2, 3, 4] and [1, 3, 5, 10, 16]  
Output : [2, 4, 5, 10, 16]
- Input : [3, 8] and [2, 8]  
Output : [3, 2]

## Task 3 - Search Book

Create class `BookPriceList` and have fields are `name`, `price` and `discount`. Add some **object** and **value** of that class.

Create method to check discount and calculate the final price of the book you are looking for.

```
Input book which you want to check : java
Book name : Java from Zero to Hero
Discount : 15%
Price : IDR xxx,-
```

**Note :** `Price` is represent the **final price** after discount.