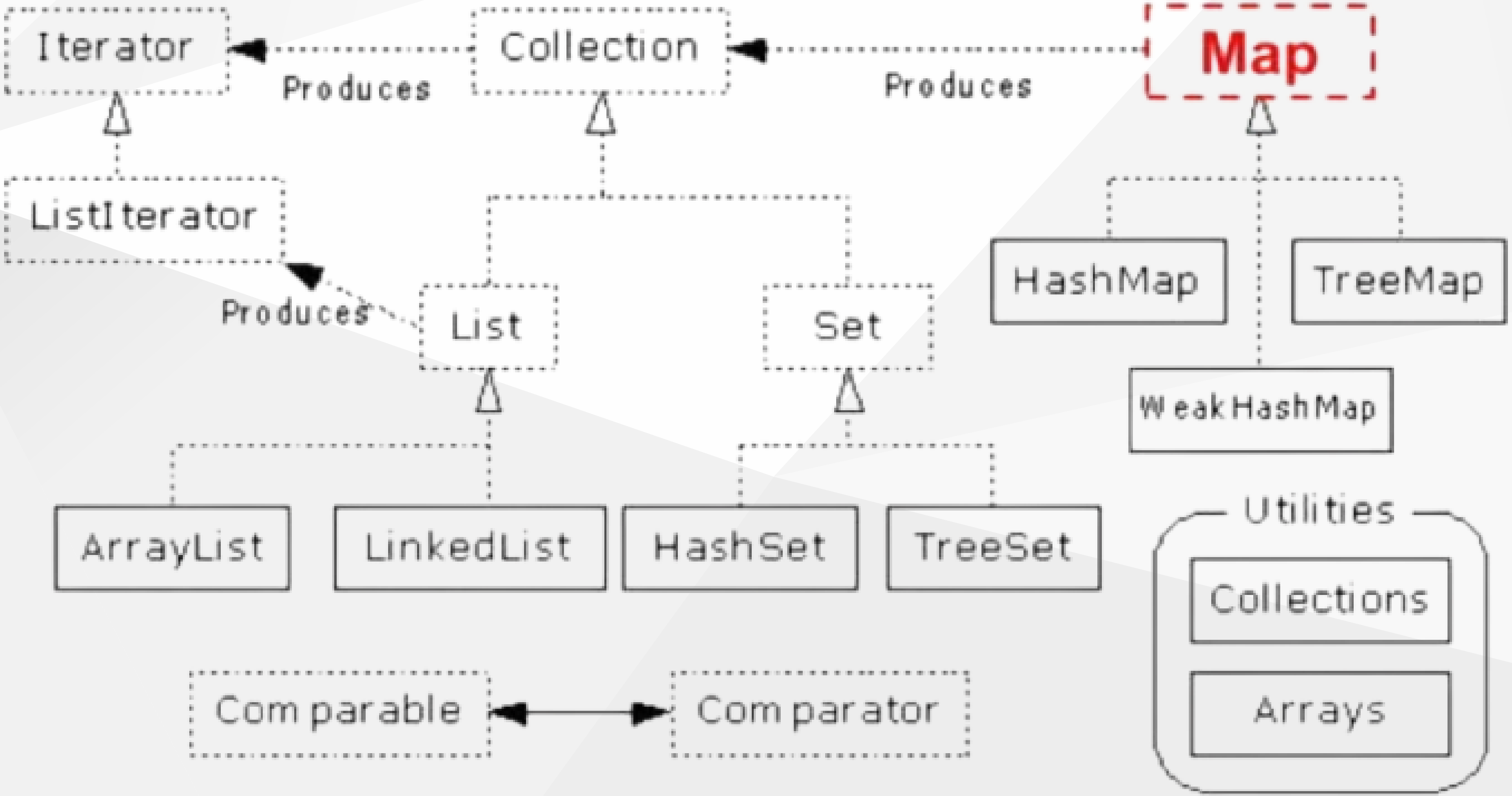
Collection Map

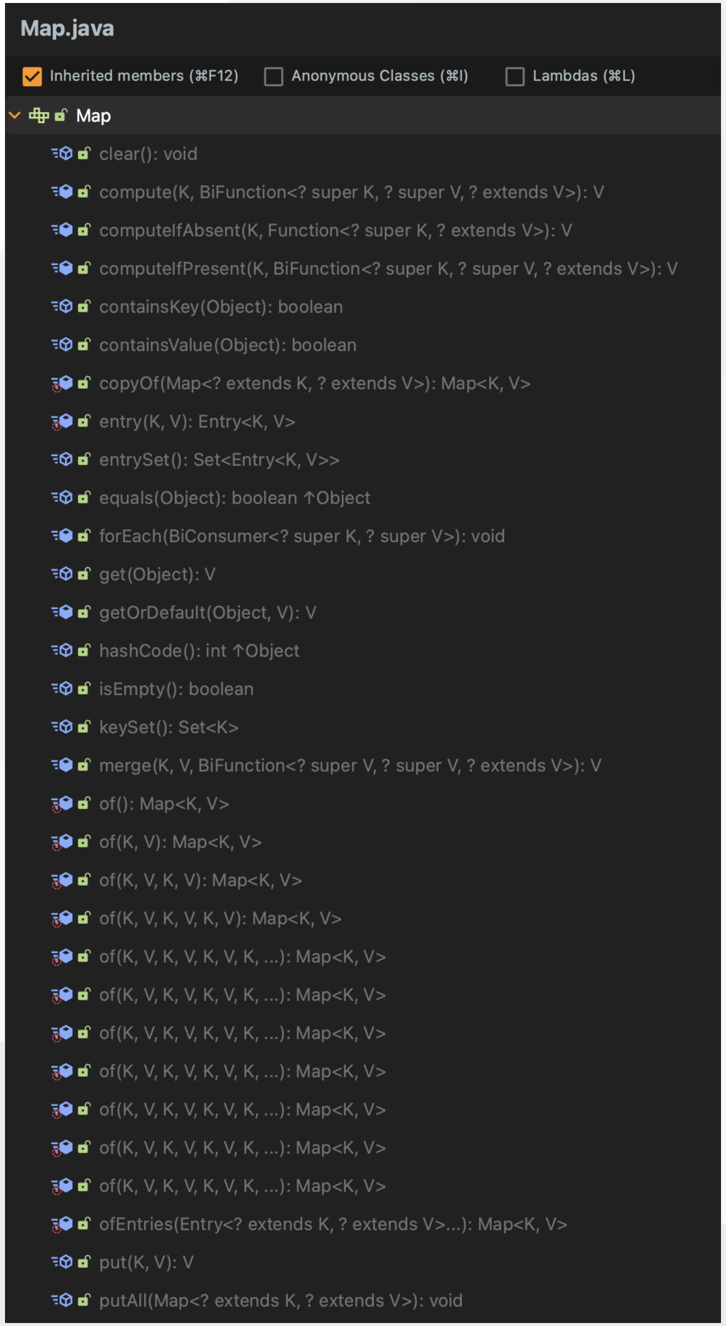
Rawlabs Academy

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.java

☑ Inherited members (⌘F12) □ Anonymous Classes (⌘I) □ Lambdas (⌘L)

```
Map
    clear(): void
    compute(K, BiFunction<? super K, ? super V, ? extends V>): V
    computeIfAbsent(K, Function<? super K, ? extends V>): V
    computeIfPresent(K, BiFunction<? super K, ? super V, ? extends V>): V
    containsKey(Object): boolean
    containsValue(Object): boolean
    copyOf(Map<? extends K, ? extends V>): Map<K, V>
    entry(K, V): Entry<K, V>
    entrySet(): Set<Entry<K, V>>
    equals(Object): boolean ↑Object
    forEach(BiConsumer<? super K, ? super V>): void
    get(Object): V
    getOrDefault(Object, V): V
    hashCode(): int ↑Object
    isEmpty(): boolean
    keySet(): Set<K>
    merge(K, V, BiFunction<? super V, ? super V, ? extends V>): V
    of(): Map<K, V>
    of(K, V): Map<K, V>
    of(K, V, K, V): Map<K, V>
    of(K, V, K, V, K, V): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    of(K, V, K, V, K, V, K, ...): Map<K, V>
    ofEntries(Entry<? extends K, ? extends V>...): Map<K, V>
    put(K, V): V
    putAll(Map<? extends K, ? extends V>): void
```

Map View

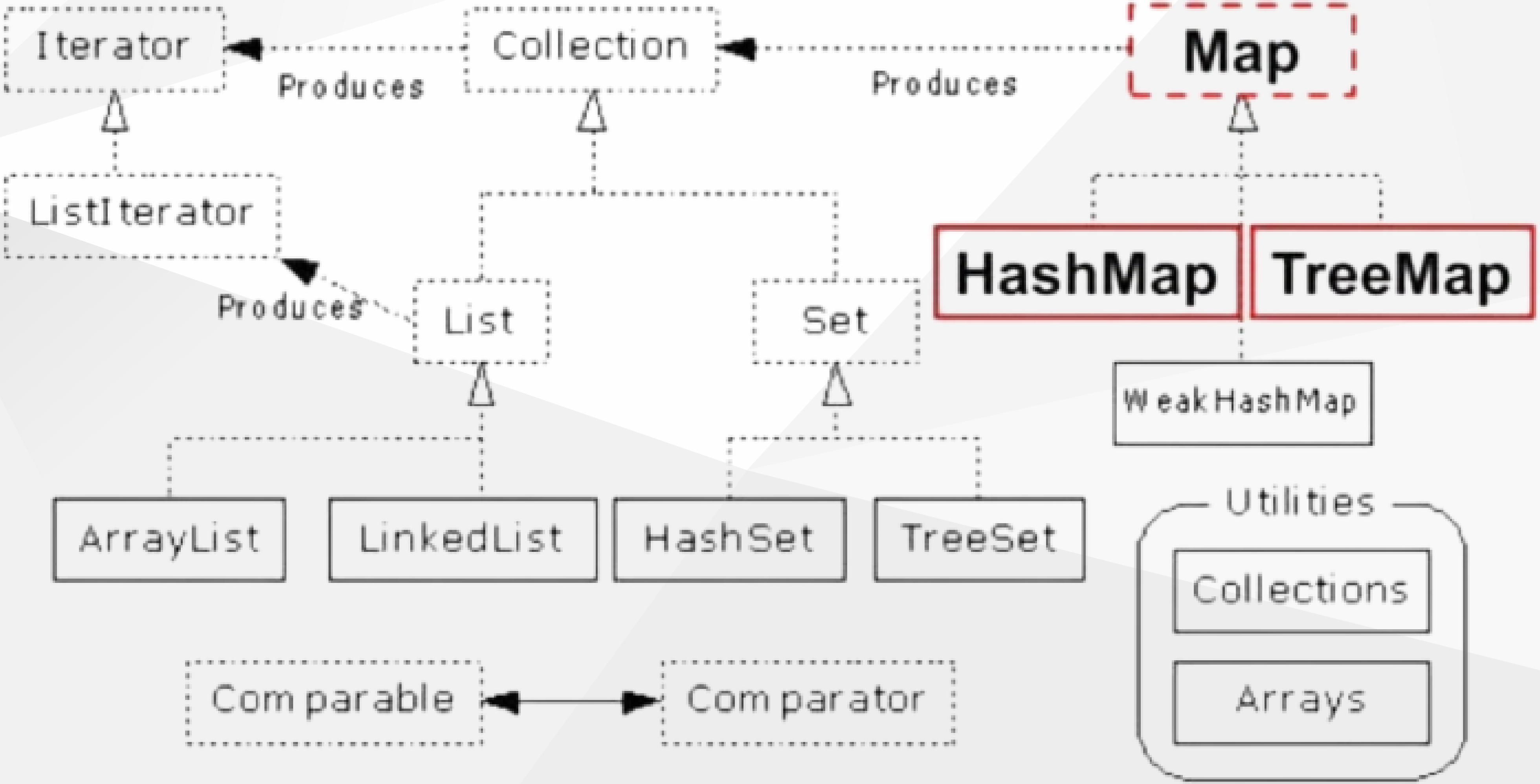
- A means of **iterating** over the **keys** and **value** in a `Map`
- **Set** `keySet()`, returns the Set of keys contained in the `Map`
- **Collection** `values()`, returns the Collection of values contained in the `Map`. This Collection is not a Set, as multiple keys can map to the same value.
- **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

```java
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 **one null key**	**Can't** contain a null key
Doesn't maintain any order	Maintain **ascending** 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.