



# Collection **Set**

Rawlabs Academy

# Set

## Hierarchy



# Comparing Set

**HashSet** vs **LinkedHashSet** vs **TreeSet** vs **EnumSet**

	<b>HashSet</b>	<b>LinkedHashSet</b>	<b>TreeSet</b>	<b>EnumSet</b>
<b>Data Structure</b>	Hash Table	Hash Table + Linked List	Red-Black Tree	Bit Vector
<b>Sorting</b>	No	Insertion Order	Sorted	Natural Order
<b>Iterator</b>	Fail-Fast	Fail-Fast	Fail-Fast	Weakly Consistent
<b>Nulls</b>	Yes	Yes	Depends	No

# Hash Set

- Stores the elements by using a mechanism called **hashing**.
- Contains **unique elements only**.
- Allows null value.
- Class is non synchronize.
- Doesn't maintain the insertion order. Here, elements are inserted on the basis of their hashcode.
- Is the best approach for search operations.
- The initial default capacity of `HashSet` is 16, and the load factor is 0,75.

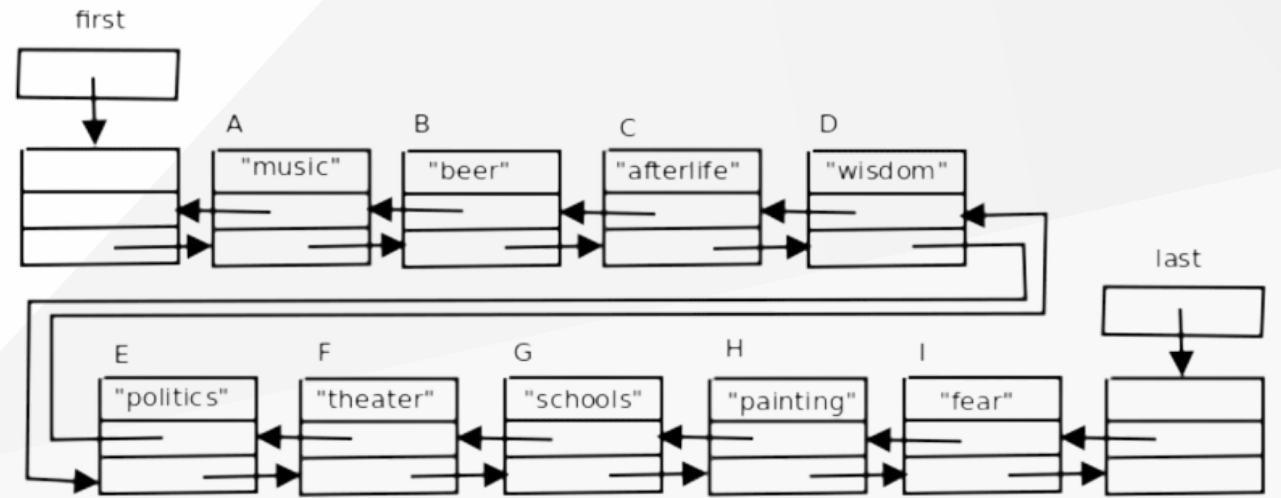
```
HashSet.java
☐ Inherited members (%%F12) ☐ Anonymous Classes (%%I) ☐ Lambdas (%%L)
▼  HashSet
  (m)  HashSet()
  (m)  HashSet(Collection<? extends E>)
  (m)  HashSet(int)
  (m)  HashSet(int, float)
  (m)  HashSet(int, float, boolean)
  (m)  add(E): boolean ↑AbstractCollection
  (m)  clear(): void ↑AbstractCollection
  (m)  clone(): Object ↑Object
  (m)  contains(Object): boolean ↑AbstractCollection
  (m)  isEmpty(): boolean ↑AbstractCollection
  (m)  iterator(): Iterator<E> ↑AbstractCollection
  (m)  readObject(ObjectInputStream): void
  (m)  remove(Object): boolean ↑AbstractCollection
  (m)  size(): int ↑AbstractCollection
  (m)  spliterator(): Spliterator<E> ↑Set
  (m)  writeObject(ObjectOutputStream): void
  (f)  map: HashMap<E, Object>
  (f)  PRESENT: Object = new Object()
  (f)  serialVersionUID: long = -5024744406713321676L
```

# HashSet Example

```
public class Main {  
    public static void main(String[] args) {  
        Set<Integer> age = new HashSet<>();  
        age.add(12);  
        age.add(15);  
        age.add(10);  
        age.add(22);  
        age.add(32);  
  
        System.out.println(age);  
    }  
}
```

# Linked Hash Set

- Java `LinkedHashSet` class contains **unique element** only like `HashSet`.
- Provides all optional set operation and permits **null elements**.
- **Non-synchronized** class.
- Maintains **insertion order**.



# Linked Hash Set **Methods**

```
LinkedHashSet.java

☐ Inherited members (⌘F12)  ☐ Anonymous Classes (⌘I)  ☐ Lambdas (⌘L)

▼  LinkedHashSet
    LinkedHashMap()
    LinkedHashMap(Collection<? extends E>)
    LinkedHashMap(int)
    LinkedHashMap(int, float)
    spliterator(): Spliterator<E> ↑HashSet
    serialVersionUID: long = -2851667679971038690L
```

# LinkedHashSet Example

```
public class Main {  
    public static void main(String[] args) {  
        Set<Integer> age = new LinkedHashSet<>();  
        age.add(12);  
        age.add(15);  
        age.add(10);  
        age.add(22);  
        age.add(32);  
  
        System.out.println(age);  
    }  
}
```



# Enum Set

- It can **contain only enum values**, and all the values have to belong to the same enum.
- It **doesn't allow to add null values**, throwing `NullPointerException` in an attempt to do so
- It's **not thread-safe**, so we need to synchronize it externally if required.
- **The elements are stored following the order in which they are declared in the enum.**
- It **uses a fail-safe iterator** that works on a copy, so it won't throw a `ConcurrentModificationException` if the collection is modified when iterating over it.

# Enum Set Methods

```
EnumSet.java
☐ Inherited members (%F12) ☐ Anonymous Classes (%I) ☐ Lambdas (%L) 
EnumSet
  m EnumSet(Class<E>, Enum<?>[])
  m access$000(): Enum<?>[]
  m addAll(): void
  m addRange(E, E): void
  m allOf(Class<E>): EnumSet<E>
  m clone(): EnumSet<E> ↑Object
  m complement(): void
  m complementOf(EnumSet<E>): EnumSet<E>
  m copyOf(Collection<E>): EnumSet<E>
  m copyOf(EnumSet<E>): EnumSet<E>
  m getUniverse(Class<E>): E[]
  m noneOf(Class<E>): EnumSet<E>
  m of(): EnumSet<E>
  m of(E, E): EnumSet<E>
  m of(E, E, E): EnumSet<E>
  m of(E, E, E, E): EnumSet<E>
  m of(E, E, E, E, E): EnumSet<E>
  m of(E, E...): EnumSet<E>
  m range(E, E): EnumSet<E>
  m readObject(ObjectInputStream): void
  m typeCheck(E): void
  m writeReplace(): Object
  f elementType: Class<E>
  f serialPersistentFields: ObjectOutputStreamField[] = new java.io.ObjectStreamField[0]
  f universe: Enum<?>[]
  > C SerializationProxy
```

# Enum Set Example

```
public class Main {  
    enum Month {  
        JANUARY, FEBRUARY, MARCH, APRIL, MAY, JUNE, JULY, AUGUST,  
        SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER;  
    }  
    public static void main(String[] args) {  
        Set<Month> months = EnumSet.allOf(Month.class);  
        Iterator<Months> iter = months.iterator();  
        while(iter.hasNext()) {  
            System.out.println(iter.next());  
        }  
    }  
}
```

# Sorted Set

A Set that further provides a **total ordering** on its elements.

The elements are **ordered** either by using **natural ordering** or by using a `Comparator`. All elements which are inserted into a sorted set must implement the `Comparable` interface.



# Tree Set Example

```
public class Main {  
    public static void main(String[] args) {  
        SortedSet<Integer> age = new TreeSet<>();  
        age.add(12);  
        age.add(15);  
        age.add(10);  
        age.add(22);  
        age.add(32);  
  
        System.out.println(age);  
    }  
}
```

# Navigable Set Example

```
public class Main {  
    public static void main(String[] args) {  
        NavigableSet<Integer> age = new TreeSet<>();  
        age.add(10);  
        age.add(12);  
        age.add(15);  
        age.add(22);  
        age.add(32);  
  
        NavigableSet<Integer> ageDesc = age.descendingSet();  
        System.out.println(age);  
        System.out.println(ageDesc);  
    }  
}
```

# Task - Array Merge

Create a program to merge 2 arrays that given and don't have the same name in the data that was merged. And then print out the **descendance data also**.

**Note :** Do not use Brute Force

Sample Test Case :

- input: `['kazuya', 'jin', 'lee']` and `['kazuya', 'feng']`  
output: `['kazuya', 'jin', 'lee', 'feng']`
- input: `['jin', 'lee', 'leo']` and `['kazuya', 'panda', 'leo']`  
output: `['jin', 'lee', 'leo', 'kazuya', 'panda']`