JAC444 - Lecture 9

Java Collections

Segment 2 - Set

The `Set<E>` Interface

`Set` is a collection that **cannot contain duplicate elements**

`Set` interface inherits from `Collection` adds the restrictions to eliminate the duplicate elopements

Implementations:

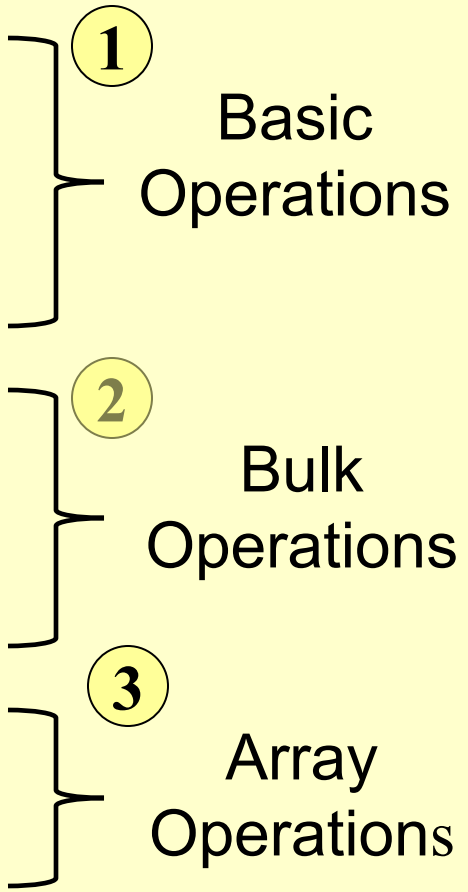
HashSet - stores its elements in a hash table and is the best-performing implementation

TreeSet - The elements are ordered using their natural ordering

LinkedHashSet – Hash table with linked list running through it

The Set<E> Interface

```
public interface Set<E> {
            // Group 1
            int size();
            boolean isEmpty();
            boolean contains(E element);
            boolean add(E element);    // Optional
            boolean remove(E element); // Optional
            Iterator<E> iterator();

            // Group 2
            boolean containsAll(Collection c);
            boolean addAll(Collection c);    // Optional
            boolean removeAll(Collection c); // Optional
            boolean retainAll(Collection c); // Optional
            void clear();                    // Optional

            // Group 3
            Object[] toArray();
            Object[] toArray(Object a[]);
 }
```



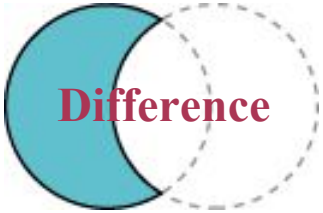
Basic Operations

```
import java.util.*;

public class FindDups {

  public static void main(String args[]) {
    Set<String> s = new HashSet<>();
    for (int i=0; i < args.length; i++)
      if (!s.add(args[i]))
        System.out.println("Duplicate: "+args[i]);

    System.out.println(s.size()+ " distinct : " + s);
  }
}
```

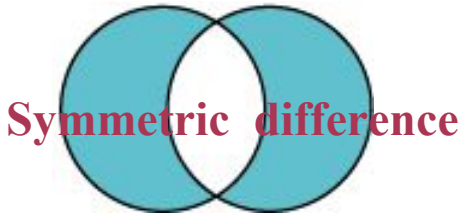
Bulk Operations


```
Set union = new HashSet(s1);
union.addAll(s2);
```


```
Set intersection = new HashSet(s1);
intersection.retainAll(s2);
```




```
Set difference = new HashSet(s1);
difference.removeAll(s2);
```




```
Set symmetricDiff = new HashSet(s1);
symmetricDiff.addAll(s2);

Set tmp = new HashSet(s1);
tmp.retainAll(s2);
symmetricDiff.removeAll(tmp);
```

Duplicate Words Sample

```
import java.util.*;

public class FindDuplicateWords {
  public static void main(String args[]) {
    Set<String> uniques = new HashSet<>();
    Set<String>  dups = new HashSet<>();

    for (int i=0; i < args.length; i++)
       if (!uniques.add(args[i]))
          dups.add(args[i]);

    uniques.removeAll(dups); //Destructive set-difference

    System.out.println("Unique: " + uniques);
    System.out.println("Duplicate: " + dups);
  }
}
```

Set Implementations

1. `HashSet`

   Does not maintain any order of its elements

2. `TreeSet`

   Sorts elements in ascending order

3. `LinkedHashSet`

   Maintains the insertion order