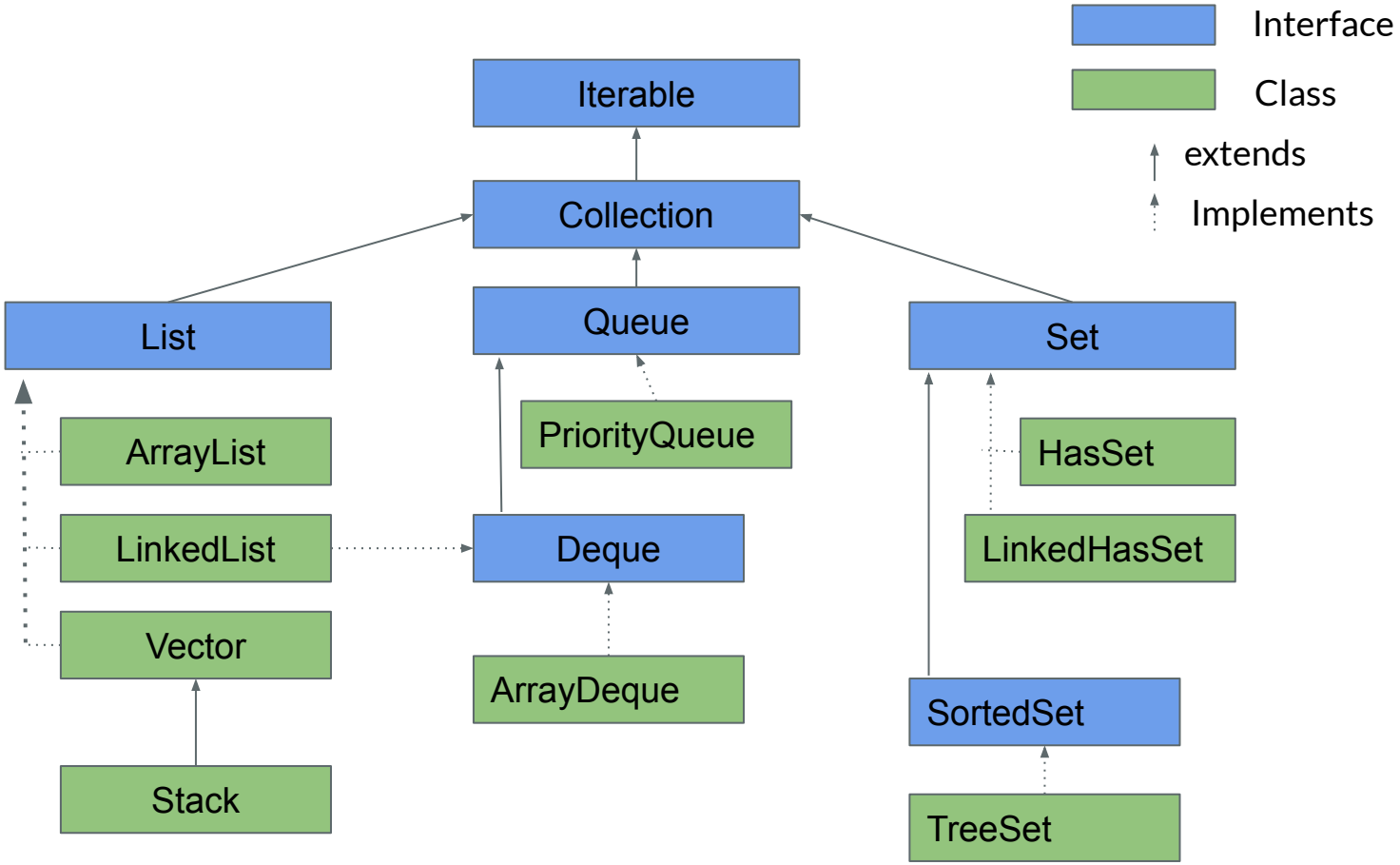
Collections

Dhvani Undhad

Collection framework

- The JAVA collection framework is a collection of Interfaces and classes of helps in storing and processing the data efficiently.
- This framework has several useful classes which have lots of useful functions which makes a program easy to code.
- Basically we can think of a collections is a framework that provides an architecture to store and manipulate the group of object.
- Java collection means a single unit of objects.
- It represent a set of Interfaces and classes.

Hierarchy of Collection Framework



Collection - List

- A List is an ordered collection.
- May contains duplicate elements.
- Elements can be inserted or accessed by their position (Index based)in the list.
- List interface is implemented by the classes ArrayList, LinkedList, Vector and Stack.

To instantiate the List Interface:

```
List <data-type> list1= new ArrayList();
List <data-type> list2 = new LinkedList();
List <data-type> list3 = new Vector();
List <data-type> list4 = new Stack();
```

ArrayList

- The ArrayList implements the List Interface.
- It uses a Dynamic array to store duplicate element of different data types.
- The ArrayList maintains the insertion order and is non-synchronized.
- The elements stored in ArrayList can be randomly accessed.

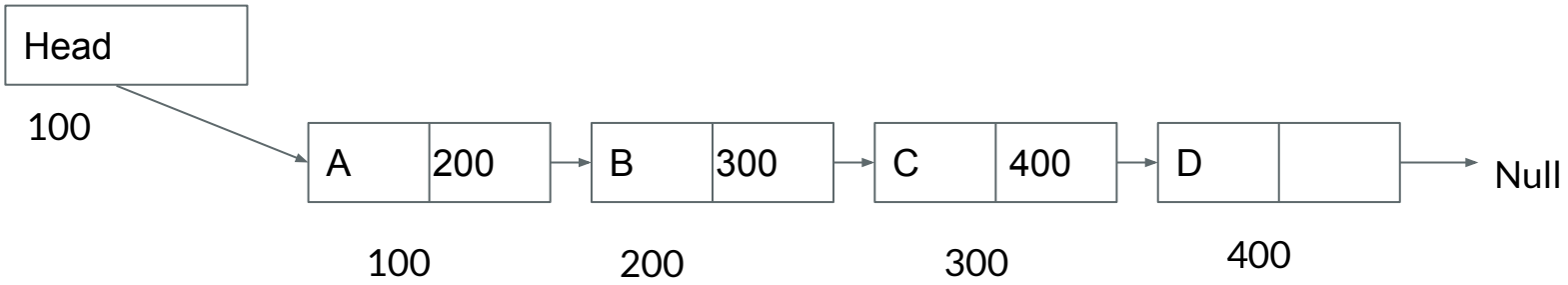
For Example:

```
class Collection1{
public static void main(String args[]){
ArrayList<String> list=new ArrayList<String>();//Creating arraylist
list.add("Dhvani");//Adding object in arraylist
list.add("Meena");
list.add("Manasvi");
list.add("Vineet");
//Traversing list through Iterator
Iterator itr=list.iterator();
while(itr.hasNext()){
System.out.println(itr.next());
}
}
}
```

Output: Dhvani
Meena
Manasvi
Vineet

LinkedList

- LinkedList implements the collection Interface.
- There are two types of LinkedList : 1) Singly LinkedList 2) Doubly LinkedList
- It uses a doubly LinkedList to store an elements internally.
- It can store duplicate elements.
- It maintains the insertion order and is not synchronized.
- Manipulation is fast and easy in LinkedList because no shifting is required.



For Example:

```
public class LinkedList1 {

    public static void main(String args[])
    {
        LinkedList<String> ll = new LinkedList<>();

        ll.add("Dhvani");
        ll.add("Undhad");
        ll.add(1, "Lalitbhai");

        System.out.println(ll);
    }
}
```

Output:
[Dhvani, Lalitbhai, Undhad]

Collection - Set

- A set is an interface and extends collection which do not contains duplicate elements.
- We can store at least one Null value in Set except TreeSet.
- There are three main implementation of Set:

1) HashSet: Stores it's elements in Hash table and does not maintains order.

2) TreeSet : Stores elements based on their values.

3) LinkedHasSet : Maintains orders of it's elements in which they were inserted into Set.

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HashSet

Methods in HashSet:

- **boolean add(Element e)**: It adds the element e to the list.
- **void clear()**: It removes all the elements from the list.
- **Object clone()**: This method returns a shallow copy of the HashSet.
- **boolean contains(Object o)**: It checks whether the specified Object o is present in the list or not. If the object has been found it returns true else false.
- **boolean isEmpty()**: Returns true if there is no element present in the Set.
- **int size()**: It gives the number of elements of a Set.
- **boolean(Object o)**: It removes the specified Object o from the Set.

Set can be instantiated as:

```
1. Set<data-type> s1 = new HashSet<data-type>();
2. Set<data-type> s2 = new LinkedHashSet<data-type>();
3. Set<data-type> s3 = new TreeSet<data-type>();
```

For Example:

```
1.  public class CollectionTest{
2.  public static void main(String args[]){
3.  Set<String> set=new HashSet<String>(); //Creating HashSet and adding duplicate elements
4.  set.add("Dhvani");
5.  set.add("Vijay");
6.  set.add("Dhvani");
7.  Iterator<String> itr=set.iterator();  //Traversing elements
8.  while(itr.hasNext()){
9.  System.out.println(itr.next());
10. }
11. }
12. }
```

Output: Vijay
Dhvani

TreeSet

- It’s same as HashSet except it’s sorts it’s elements in the ascending order while HashSet doesn’t.
- It allows null element.

For Example:

```
1.  TreeSet<String> al=new TreeSet<String>();
2.    al.add("Zayad");
3.    al.add("Shrutil");
4.    al.add("Coby");
5.    //Traversing elements
6.    Iterator<String> itr=al.iterator();
7.    while(itr.hasNext()){
8.     System.out.println(itr.next());
9.    }
```

Output:

Coby
Shruti
Zayad

LinkedHashSet

- It contains only unique elements only like HashSet.
- Maintains the insertion order and is non synchronized.
- It allows Null elements.

For Example:

```
LinkedHashSet<String> set=new LinkedHashSet<String>(); //Creating HashSet and adding duplicate elements
1.  set.add("Dhvani");
2.  set.add("Vijay");
3.  set.add("Dhvani");
4.  set.add(Null);
5.  Iterator<String> itr=set.iterator();  //Traversing elements
6.  while(itr.hasNext()){
7.  System.out.println(itr.next());
8.  }
```

Output:

Dhvani
Vijay
Dhvani
Null