Cursor
Cursor is an interface and it is used to retrieve data from collection object, **one by one**
Types of cursor

1) Enumeration
- Applicable only for legacy class hence it is not universal cursor
- We can only perform read operation
- We can only move in forward direction
- It contain two method

Enumeration e = vectorObject.elements();
- hasMoreElements()
- nextElement()

2) Iterator
- We can apply iterator cursor for any collection object hence it is **universal** cursor
- We can perform read and remove operation
- We can move in forward direction hence it is single directional cursor

  Iterator i = v1.iterator()
- Methods
  - hasNext()
  - next()
  - remove()

3) List iterator
- It is only applicable for List type implementation class
- We can perform read, remove, addition of new object and replacement operation
- We can move forward and backward direction hence it is bidirectional cursor
- Only applicable for list implementation classes so it is **not universal** cursor

Method:

hasNext()	**hasPrevious()**
next()	previous()
nextIndex()	
remove()	
set(object)	
add(object()	

Program:

Enumeration	**Iterator**	**ListIterator**
Applicable for Legacy class	Any Collection	Only List classes
Only forward	Only forward	Forward and backward
Only read	Read and remove	Read, write, remove, replace
We can use elements() method	Iterator()	listIterator
hasMoreElement() nextElement()	hasNext() next() remove()	hasNext() hasPrevious() next() previous() nextIndex() nextPrevious() remove() set(object). add(object()

	Hash Set	Linked Hash Set	Tree Set
Implementation class	Set	Set	Set
Null insertion	Only 1	Only 1	Not allowed
Duplicate values	Not allowed	Not allowed	Not allowed
Order of insertion	Random	Maintained	Ascending
Data structure	Hash table	Hybrid (Hash table + Linked list)	Balanced tree
Storage type	Hash table	Hash table	Hash table
Default capacity	16	16	No
		Cash based app	

Program :

```
package CollectiionProg;

import java.util.Enumeration;
import java.util.Iterator;
import java.util.ListIterator;
import java.util.Vector;

public class CursorProg {

	public static void main(String[] args) {

		Vector v1 = new Vector();
		for(int i=0;i<20;i++)
			v1.add(i);
		System.out.println(v1);

//		System.out.println("-----------------");
//		for(int i=0;i<10;i++)
//			System.out.println(v1.get(i));
//		System.out.println("-----------------");
//		for(Object value : v1)
//			System.out.println(value);

		/*//Cursor
//		int i=0;
		System.out.println("Enumeration Cursor Output");
		Enumeration e = v1.elements();
		while(e.hasMoreElements())
		{
			System.out.println(e.nextElement());
//			i++;
//			if(i==10)
//				break;
		}				*/
```

```
		/*System.out.println("Iterator Cursor Output");
		Iterator a = v1.iterator();
		while(a.hasNext())
		{
			int value = (int) a.next();
			if(value%2==0)
			System.out.println(value);
			else
				a.remove();
		}                                          */

		System.out.println("ListIterator Cursor Output");
		ListIterator x = v1.listIterator();

		while(x.hasNext())
		{
			int value1 = (int) x.next();
			if(value1==3)
				x.remove();
			else if(value1==2)
				x.add(2222);
			else if(value1==5)
				x.set(5555);
//			System.out.println(x.next());
		}
		System.out.println(v1);

		System.out.println("---------------------");
		ListIterator y = v1.listIterator();
		while(y.hasNext())
		{
			System.out.println(y.next());     //0

		}
//		System.out.println(y.previous());  //0
//		System.out.println(y.previous());
		System.out.println("---------------------");
		while(y.hasPrevious())
			System.out.println(y.previous());
	}

}

//+ * / -
```