

ArrayList

Program:1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure under "ArrayConcepts". The "src" folder contains "org.array" which has "SumofArray.java". Other packages like "Lengthjava", "StringIndex...", etc., are also listed.
- Editor (center-left):** Displays the code for "SumofArray.java". The code initializes an array with values 1 through 10, iterates through it to calculate the sum, and prints the result.

```
1 package org.array;
2
3 public class SumofArray {
4     public static void main(String[] args) {
5
6         int a[] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
7
8         int sum=0;
9         for(int x : a) {
10             sum=sum+x;
11         }
12         System.out.println(sum);
13
14     }
15
16 }
```

- Console (right):** Shows the output of the program: "55".

By,
M.sethu prasath

Program:2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure under "eclipse-workspace - ArrayConcepts/src/org/array". The "SumofArray.java" file is selected.
- Code Editor (center):** Displays the Java code for "SumofArray". The code initializes an array "a" with values 1 through 10, calculates the sum of the array elements, and prints the average.

```
1 package org.array;
2
3 public class SumofArray {
4     public static void main(String[] args) {
5         int a[] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
6
7         float sum=0;
8         for(int x : a) {
9             sum=sum+x;
10        }
11        float Avg= sum/a.length;
12        System.out.println(Avg);
13    }
14
15 }
16
17 }
```

- Console (right):** Shows the output of the program: "5.5".

By,
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Program:3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows various Java projects and source files under the package org.packagearray.
- Editor (center):** Displays the Java code for "DuplicateElement.java". The code creates two ArrayLists, s and s1, and prints the elements of s1 to the console.
- Console (right):** Shows the output of the program, which is a list of unique integers: [10, 20, 50, 60, 80].

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List <Integer> s=new ArrayList<Integer>();
10        s.add(10);
11        s.add(10);
12        s.add(20);
13        s.add(50);
14        s.add(60);
15        s.add(80);
16        s.add(60);
17        s.add(50);
18        List <Integer> s1=new ArrayList<Integer>();
19        for(Integer x:s) {
20            if(!s1.contains(x)) {
21                s1.add(x);
22            }
23        }
24        System.out.println(s1);
25    }
26
27
28 }
29
30
31 }
```

By,
M.sethu prasath

Program:4.1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a large list of Java files under the package `org.packagearray`, including `Lengthjava`, `StringIndex...`, `CharAtjava`, `StringEqual...`, `SumofArray.java`, and `Sample.java`.
- Editor (center-left):** Displays the code for `Sample.java`. The code creates a `ArrayList` named `li` and adds several integers to it. It then prints the list and its size.

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class Sample {
7     public static void main(String[] args) {
8         List li=new ArrayList();
9         li.add(10);
10        li.add(20);
11        li.add(30);
12        li.add(90);
13        li.add(10);
14        li.add(10);
15        li.add(40);
16        li.add(50);
17        System.out.println(li);
18        int size = li.size();
19        System.out.println(size);
20    }
21
22 }
23 }
```

- Console (right):** Shows the output of the program's execution. The output is:
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (21-Dec-2022, 8:11:35 PM)
[10, 20, 30, 90, 10, 10, 40, 50]
8

By,
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Program:4.2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a project named "ArrayPrograms" containing several packages and source files.
- Editor (center):** Displays the Java code for "Sample.java". The code creates a linked list and adds values from 100 to 700, then prints the list and its size.

```
1 package org.packagearray;
2 import java.util.LinkedList;
3 import java.util.List;
4
5 public class Sample {
6     public static void main(String[] args) {
7         List li=new LinkedList();
8         li.add(100);
9         li.add(200);
10        li.add(300);
11        li.add(400);
12        li.add(500);
13        li.add(600);
14        li.add(700);
15        System.out.println(li);
16        int size = li.size();
17        System.out.println(size);
18    }
19
20 }
21 }
```

- Console (right):** Shows the terminal output of the program execution.

```
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (21-Dec-2022, 8:13:05 PM)
[100, 200, 300, 400, 500, 600, 700]
7
```

By,
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Program:4.3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure under "eclipse-workspace - ArrayPrograms/src/org/packagearray". The "src" folder contains a package named "org.packagearray" which contains a class named "Sample.java". Other packages like "ArrayConcepts", "ArrayPrograms", and "StringPrograms" are also listed.
- Editor (center):** Displays the content of "Sample.java". The code creates a Vector list, adds elements (105, 205, 305, 405, 505, 605, 705, 805), prints the list, and then prints the size of the list (8).

```
1 package org.packagearray;
2 import java.util.LinkedList;
3 import java.util.List;
4 import java.util.Vector;
5
6 public class Sample {
7     public static void main(String[] args) {
8         List li=new Vector();
9         li.add(105);
10        li.add(205);
11        li.add(305);
12        li.add(405);
13        li.add(505);
14        li.add(605);
15        li.add(705);
16        li.add(805);
17        System.out.println(li);
18        int size = li.size();
19        System.out.println(size);
20    }
21
22 }
23 }
```

- Console (right):** Shows the output of the application. It starts with "<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (21-Dec-2022, 8:15:56 PM)". Below that, the list [105, 205, 305, 405, 505, 605, 705, 805] is printed, followed by the number 8.

By,
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Program:4.4

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure under "ArrayPrograms". The "src" folder contains a package named "org.packagearray" which contains a file named "Sample.java". Other packages like "ArrayConcepts", "JRE System Library", and various "HelloWorld" and "Tutorial" programs are also listed.
- Editor (center-left):** Displays the content of "Sample.java". The code creates a linked list and adds several integers to it, then prints the list and its size.
- Console (right):** Shows the output of the program. It prints the list [100, 200, 300, 400, 500, 600, 700] and its size, which is 7.

```
package org.packagearray;
import java.util.LinkedList;
import java.util.List;
import java.util.Vector;
public class Sample {
    public static void main(String[] args) {
        List li=new LinkedList();
        li.add(100);
        li.add(200);
        li.add(300);
        li.add(400);
        li.add(500);
        li.add(600);
        li.add(700);
        System.out.println(li);
        int size = li.size();
        System.out.println(size);
    }
}
```

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Program:5.1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows a tree view of projects and source files. Projects include ArrayConcepts, ArrayPrograms, SampleProgram, SeleniumProject, StringPrograms, and Samale.
- Java Editor:** Displays the file `DuplicateElement.java` containing the following Java code:

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List <Integer> s = new ArrayList<Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        int indexOf = s.indexOf(10);
15        System.out.println(indexOf);
16    }
17
18
19 }
20
21
22 |
```
- Console:** Shows the output of the application run: `<terminated> DuplicateElement [Java Application]` followed by the number `0`.

By,
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Program:5.2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure under "ArrayPrograms". The "src" folder contains a package named "org.packagearray" which contains a file named "Sample.java". Other packages like "ArrayConcepts", "JRE System Library", and various utility classes are also listed.
- Editor (center):** Displays the Java code for "Sample.java". The code creates a linked list and prints its last index of the value 10.

```
1 package org.packagearray;
2 import java.util.LinkedList;
3 import java.util.List;
4 import java.util.Vector;
5
6 public class Sample {
7     public static void main(String[] args) {
8         List li=new LinkedList();
9         li.add(10);
10        li.add(20);
11        li.add(30);
12        li.add(90);
13        li.add(10);
14        li.add(10);
15        li.add(40);
16        li.add(50);
17        System.out.println(li);
18        int lastIndexof = li.lastIndexOf(10);
19        System.out.println(lastIndexof);
20    }
21
22 }
23 }
```

- Console (right):** Shows the terminal output of the Java application. It prints the list [10, 20, 30, 90, 10, 10, 40, 50] and then the integer 5, indicating the index of the last occurrence of the value 10.

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Program:5.3

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** eclipse-workspace - ArrayPrograms/src/org/packagearray/DuplicateElement.java - Eclipse IDE
- Menu Bar:** File Edit Source Refactor Navigate Search Project Run Window Help
- Toolbars:** Standard, Java, Java Development, Java Editor, Java Outline, Java Navigator, Java Problems.
- Left Sidebar (Package Explorer):** Shows the project structure with packages like ArrayConcepts, ArrayPrograms, and SampleProgram, along with various Java files such as Rbjava, Rskjava, Sample.java, Sbjava, Chrome, collegelInformation, Companydetails, EmoloyeeInformatior, EmployeeDetails, Firefox, GreensAddress, Hello, HelloWorld, InternetExplor, Java tutorial, LanguageDetails, MyPhone, PhoneDetails, Samale, and StringPrograms.
- Central Editor:** Displays the Java code for `DuplicateElement.java`. The code creates a `ArrayList<Integer>` named `s`, adds elements 10, 20, 30, 90, 10, 10, 40, and 50, then prints the index of the first occurrence of 90.

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List <Integer> s = new ArrayList<Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        int indexOf = s.indexOf(90);
19        System.out.println(indexOf);
20    }
21
22
23 }
24
25
26 }
```

- Right Sidebar (Console):** Shows the output of the program: `<terminated> DuplicateElement [Java Application] C:\Program Files\Java\jdk-18.0.1\bin\java.exe 3`.

By,
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Program:5.4

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** eclipse-workspace - ArrayPrograms/src/org/packagearray/Sample.java - Eclipse IDE
- Menu Bar:** File Edit Source Refactor Navigate Search Project Run Window Help
- Toolbar:** Standard Eclipse toolbar with various icons for file operations.
- Package Explorer:** Shows the project structure with packages like ArrayConcepts, ArrayPrograms, and src, containing files like Lengthjava, StringIndex..., CharAtjava, StringEqual..., SumofArray.java, and Sample.java.
- Editor:** The Sample.java file is open, displaying the following code:

```
1 package org.packagearray;
2 import java.util.LinkedList;
3 import java.util.List;
4 import java.util.Vector;
5
6 public class Sample {
7     public static void main(String[] args) {
8         List li=new LinkedList();
9         li.add(10);
10        li.add(20);
11        li.add(30);
12        li.add(90);
13        li.add(10);
14        li.add(10);
15        li.add(40);
16        li.add(50);
17        System.out.println(li);
18        int indexOf = li.indexOf(90);
19        System.out.println(indexOf);
20    }
21
22 }
```
- Console:** Shows the output of the program:

```
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (21-Dec-2022, 8:39:38 PM)
[10, 20, 30, 90, 10, 10, 40, 50]
3
```

By,
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Program:5.5

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** eclipse-workspace - ArrayPrograms/src/org/packagearray/DuplicateElement.java - Eclipse IDE
- Menu Bar:** File Edit Source Refactor Navigate Search Project Run Window Help
- Toolbar:** Standard Eclipse toolbar with icons for file operations, search, and navigation.
- Left Sidebar (Package Explorer):** Shows the project structure with packages like ArrayConcepts, ArrayPrograms, and JRE System Library, and source folders like src and org.packagearray.
- Central Area:** Two tabs are open: sampleProgram.java and DuplicateElement.java. The DuplicateElement.java tab is active, displaying the following code:

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List<Integer> s = new ArrayList<Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        s.add(10);
19        Integer value = 10;
20        for (int i = 0; i < s.size(); i++) {
21            Integer integer = s.get(i);
22            if (integer == value) {
23                System.out.println(i);
24            }
25        }
26    }
27
28
29 }
30
31
32 }
```

- Right Area:** A Console view window showing the output of the DuplicateElement.java application. The output is:
<terminated> DuplicateElement [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (03-Jan-2023, 8:34:13 PM)
0
4
5
8
- Quick Access:** Located at the top right, showing recent projects and files.

By,
M.sethu prasath

Program:5.6

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** eclipse-workspace - ArrayPrograms/src/org/packagearray/DuplicateElement.java - Eclipse IDE
- Menu Bar:** File Edit Source Refactor Navigate Search Project Run Window Help
- Toolbar:** Standard Eclipse toolbar with various icons for file operations.
- Package Explorer:** Shows the project structure with packages like ArrayConcepts, ArrayPrograms, and JRE System Library, and source folders like src containing files such as DuplicateElement.java, Rbi.java, Rsk.java, Sample.java, and Sbj.java.
- Editor:** The main editor window displays the Java code for `DuplicateElement.java`. The code initializes a list of integers, adds values 10, 20, 30, 40, 50, and 10 again, and then iterates through the list to print the index of each occurrence of the value 10.

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List<Integer> s = new ArrayList<Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        s.add(10);
19        Integer value = 10;
20        for (int i = 0; i < s.size(); i++) {
21            Integer integer = s.get(i);
22            if (integer == value) {
23                System.out.println(i);
24            }
25        }
26    }
27
28 }
29
30
31
32 }
```

- Console:** The console window shows the output of the application: "DuplicateElement [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (03-Jan-2023, 8:35:00 PM)" followed by the terminated message "<terminated>".
- Bottom Status Bar:** Writable, Smart Insert, 19 : 24, and other standard Eclipse status bar elements.

By,
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Program:6.1

The screenshot shows the Eclipse IDE interface with the following details:

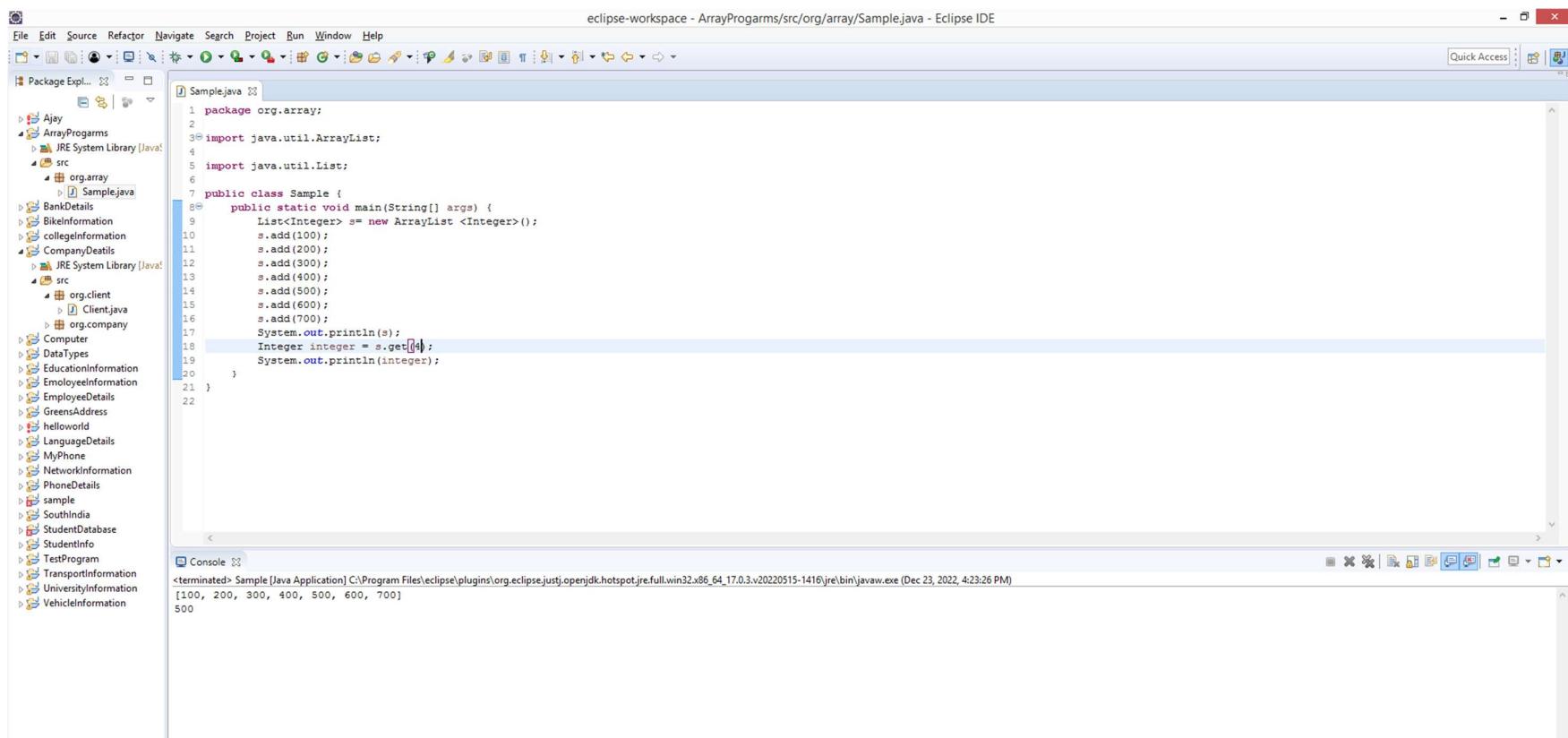
- Top Bar:** File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help.
- Toolbar:** Standard Eclipse toolbar icons.
- Left Sidebar (Package Explorer):** Shows a project structure with packages like Ajax, ArrayPrograms, BankDetails, BikeInformation, collegelInformation, CompanyDetails, Computer, DataTypes, EducationInformation, EmolyeeInformation, EmployeeDetails, GreensAddress, helloworld, LanguageDetails, MyPhone, NetworkInformation, PhoneDetails, sample, SouthIndia, StudentDatabase, StudentInfo, TestProgram, TransportInformation, UniversityInformation, and VehicleInformation. A file named Sample.java is selected under the org.array package.
- Middle Area (Editor):** The Sample.java code is displayed:

```
Sample.java
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Integer> s = new ArrayList <Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(40);
14        s.add(50);
15        s.add(60);
16        System.out.println(s);
17        Integer integer = s.get(2);
18        System.out.println(integer);
19    }
20 }
21
```
- Bottom Area (Console):** Shows the terminal output of the Java application:

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jst.java.core\1.17.0.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 4:22:26 PM)
[10, 20, 30, 40, 50, 60]
30
```

By,
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Program:6.2



The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a large number of Java projects and source files under the package `Ajay`, including `BankDetails`, `Bikelnformation`, `collegenInformation`, `CompanyDeatils`, `Computer`, `DataTypes`, `EducationInformation`, `EmployeeInformation`, `EmployeeDetails`, `GreensAddress`, `helloworld`, `LanguageDetails`, `MyPhone`, `NetworkInformation`, `PhoneDetails`, `sample`, `SouthIndia`, `StudentDatabase`, `StudentInfo`, `TestProgram`, `TransportInformation`, `UniversityInformation`, and `VehicleInformation`. A specific file, `Sample.java`, is selected.
- Code Editor (center):** Displays the following Java code:

```
Sample.java  ☐

1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Integer> s = new ArrayList <Integer>();
10        s.add(100);
11        s.add(200);
12        s.add(300);
13        s.add(400);
14        s.add(500);
15        s.add(600);
16        s.add(700);
17        System.out.println(s);
18        Integer integer = s.get[0];
19        System.out.println(integer);
20    }
21 }
```

The cursor is positioned at the end of the first line of the `get` method call, specifically at the index `[0]`.
- Console (bottom):** Shows the output of the program:

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.v86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 4:23:26 PM)
[100, 200, 300, 400, 500, 600, 700]
500
```

By,
M.sethu prasath

Program:6.3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows a large number of Java projects under the "Ajay" workspace, including "ArrayProgams", "BankDetails", "Bikelnformation", "collegenInformation", "CompanyDeatils", "Computer", "DataTypes", "EducationInformation", "EmployeeInformation", "EmployeeDetails", "GreensAddress", "helloworld", "LanguageDetails", "MyPhone", "NetworkingInformation", "PhoneDetails", "sample", "SouthIndia", "StudentDatabase", "Studentinfo", "TestProgram", "TransportInformation", "UniversityInformation", and "VehicleInformation".
- Sample.java:** The code is as follows:

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Integer> s = new ArrayList<Integer>();
10        s.add(105);
11        s.add(205);
12        s.add(305);
13        s.add(405);
14        s.add(505);
15        s.add(605);
16        s.add(705);
17        s.add(805);
18        System.out.println(s);
19        Integer integer = s.get[8];
20        System.out.println(integer);
21    }
22 }
```

- Console:** Displays the output of the program and the exception stack trace.

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.x86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 4:25:32 PM)
[105, 205, 305, 405, 505, 605, 705, 805]
Exception in thread "main" java.lang.IndexOutOfBoundsException: Index 8 out of bounds for length 8
    at java.base/jdk.internal.util.Preconditions.outOfBounds(Preconditions.java:64)
    at java.base/jdk.internal.util.Preconditions.outOfBoundsCheckIndex(Preconditions.java:70)
    at java.base/jdk.internal.util.Preconditions.checkIndex(Preconditions.java:266)
    at java.base/java.util.Objects.checkIndex(Objects.java:359)
    at java.base/java.util.ArrayList.get(ArrayList.java:427)
    at org.array.Sample.main(Sample.java:19)
```

Activate Windows

By,
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Program:6.4

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows a large number of Java projects under the "Ajax" workspace, including "ArrayPrograms", "BankDetails", "Bikelnformation", "collegenInformation", "CompanyDetails", "Computer", "DataTypes", "EducationInformation", "EmployeeInformation", "EmployeeDetails", "GreensAddress", "helloworld", "LanguageDetails", "MyPhone", "NetworkInformation", "PhoneDetails", "sample", "SouthIndia", "StudentDatabase", "StudentInfo", "TestProgram", "TransportInformation", "UniversityInformation", and "VehicleInformation".
- Editor:** The "Sample.java" file is open in the editor. The code creates a list of integers and prints their indices.

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Integer> s= new ArrayList <Integer>();
10        s.add(105);
11        s.add(205);
12        s.add(305);
13        s.add(405);
14        s.add(505);
15        s.add(605);
16        s.add(705);
17        s.add(805);
18        System.out.println(s);
19        for(int i=0; i<s.size(); i++) {
20            Integer integer = s.get(i);
21            Integer indexOf = s.indexOf(integer);
22            System.out.println(indexOf);
23        }
24    }
25 }
26
27
```

- Console:** The console output shows the indices of the elements in the list: 0, 1, 2, 3, 4, 5, 6, 7.
- Activation Message:** A message at the bottom right says "Activate Windows Go to PC settings to activate Windows."

By,
M.sethu prasath

Program:7.1

The screenshot shows the Eclipse IDE interface with the following details:

- Menu Bar:** File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help.
- Toolbar:** Standard Eclipse toolbar icons.
- Package Explorer:** Shows a large list of Java packages and classes under the root package "Ajax".
- Editor:** The "Sample.java" file is open, displaying the following Java code:

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Object> s = new ArrayList<Object>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(40);
14        s.add(50);
15        s.add(60);
16        System.out.println(s);
17        Object remove = s.remove(2);
18        System.out.println(s);
19    }
20 }
21 }
```

- Console:** Shows the output of the program execution:

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.x86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 5:04:10 PM)
[10, 20, 30, 40, 50, 60]
[10, 20, 40, 50, 60]
```

By,
M.sethu prasath

Program:7.2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows a large number of Java projects under the "Ajax" workspace, including "ArrayPrograms", "BankDetails", "Bikelnformation", "collegenInformation", "CompanyDetails", "Computer", "DataTypes", "EducationInformation", "EmployeeInformation", "EmployeeDetails", "GreensAddress", "helloworld", "LanguageDetails", "MyPhone", "NetworkInformation", "PhoneDetails", "sample", "SouthIndia", "StudentDatabase", "StudentInfo", "TestProgram", "TransportInformation", and "UniversityInformation".
- Sample.java:** The active editor contains the following Java code:

```
package org.array;
import java.util.ArrayList;
import java.util.List;
public class Sample {
    public static void main(String[] args) {
        List<Object> s= new ArrayList<Object>();
        s.add(10);
        s.add(20);
        s.add(30);
        s.add(90);
        s.add(10);
        s.add(10);
        s.add(40);
        System.out.println(s);
        Object remove = s.remove[10];
        System.out.println(s);
    }
}
```
- Console:** The output window shows the execution of the program and an error message:

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.x86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 5:05:32 PM)
[10, 20, 30, 90, 10, 10, 40]
Exception in thread "main" java.lang.IndexOutOfBoundsException: Index 10 out of bounds for length 7
    at java.base/jdk.internal.util.Preconditions.outOfBounds(Preconditions.java:64)
    at java.base/jdk.internal.util.Preconditions.outOfBoundsCheckIndex(Preconditions.java:70)
    at java.base/jdk.internal.util.Preconditions.checkIndex(Preconditions.java:266)
    at java.base/java.util.Objects.checkIndex(Objects.java:359)
    at java.base/java.util.ArrayList.remove(ArrayList.java:504)
    at org.array.Sample.main(Sample.java:18)
```

By,
M.sethu prasath

Program:8.1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows a large number of Java projects under the "Ajax" workspace, including "ArrayPrograms", "BankDetails", "Bikelnformation", "collegenInformation", "CompanyDetails", "Computer", "DataTypes", "EducationInformation", "EmployeeInformation", "EmployeeDetails", "GreensAddress", "helloworld", "LanguageDetails", "MyPhone", "NetworkInformation", "PhoneDetails", "sample", "SouthIndia", "StudentDatabase", "StudentInfo", "TestProgram", "TransportInformation", and "UniversityInformation".
- Sample.java:** The code is as follows:

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Object> s= new ArrayList<Object>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        System.out.println(s);
19        s.add(2, 50);
20        System.out.println(s);
21    }
22 }
23 }
```

- Console:** Displays the output of the program execution.

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.x86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 5:08:00 PM)
[10, 20, 30, 90, 10, 10, 40, 50]
[10, 20, 50, 30, 90, 10, 10, 40, 50]
```

Program:8.2

By,
M.sethu prasath

eclipse-workspace - ArrayProgams/src/org/array/Sample.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Package Expl... Sample.java

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Object> s= new ArrayList<Object>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        System.out.println(s);
19        s.add(70);
20        System.out.println(s);
21    }
22 }
23 }
```

Console

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.x86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 5:09:38 PM)
[10, 20, 30, 90, 10, 10, 40, 50]
[10, 20, 30, 90, 10, 10, 40, 50, 70]
```

By,
M.sethu prasath

Program: 8.3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a large number of Java projects and source files under the package org.array.
- Sample.java (top center):** Contains the following Java code:

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Object> s= new ArrayList<Object>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        System.out.println(s);
19        int lastIndexOf = s.lastIndexOf(10);
20        s.add(lastIndexOf,100);
21        System.out.println(s);
22    }
23 }
24
25 }
```
- Console (bottom center):** Displays the output of the Java application:

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.v86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 5:11:56 PM)
[10, 20, 30, 90, 10, 10, 40, 50]
[10, 20, 30, 90, 10, 100, 10, 40, 50]
```
- Activation Message (bottom right):** "Activate Windows
Go to PC settings to activate Windows."

By,
M.sethu prasath

Program:8.4

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a large number of Java projects and source files under the package `org.array`, including `Sample.java`.
- Code Editor (center):** Displays the `Sample.java` file with the following code:

```
1 package org.array;
2
3 import java.util.ArrayList;
4
5 import java.util.List;
6
7 public class Sample {
8     public static void main(String[] args) {
9         List<Integer> s = new ArrayList<Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        System.out.println(s);
19        s.add(80);
20        System.out.println(s);
21    }
22 }
23
24
```
- Console (bottom):** Shows the output of the program:

```
<terminated> Sample [Java Application] C:\Program Files\eclipse\plugins\org.eclipse.jdt.openjdk.hotspot.jre.full.win32.x86_64_17.0.3.v20220515-1416\jre\bin\javaw.exe (Dec 23, 2022, 5:13:59 PM)
[10, 20, 30, 90, 10, 10, 40, 50]
[10, 20, 30, 90, 10, 10, 40, 50, 80]
```

Activate Windows

By,
M.sethu prasath

Program:9.1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure with packages like ArrayConcepts, ArrayPrograms, and Sample.
- Code Editor (center-left):** Displays the Java code for `DuplicateElement.java`. The code creates a list of integers, adds elements from 100 to 700, finds the index of 300, removes it, and then adds 350 at that index. Finally, it prints the list.

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List <Integer> s=new ArrayList<Integer>();
10        s.add(100);
11        s.add(200);
12        s.add(300);
13        s.add(400);
14        s.add(500);
15        s.add(600);
16        s.add(700);
17        int indexOf = s.indexOf(300);
18        s.remove(indexOf);
19        s.add(indexOf, 350);
20        System.out.println(s);
21    }
22
23
24 }
25
26
27 }
```
- Console (right):** Shows the output of the application's execution, which is a list of integers: [100, 200, 350, 400, 500, 600, 700].

By,
M.sethu prasath

Program:9.2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows a large list of Java projects and source files under the "src" folder of the "ArrayPrograms" project.
- Editor:** Displays the file "DuplicateElement.java" containing the following Java code:

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List <Integer> s = new ArrayList <Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        s.add(10);
19        s.remove(7);
20        s.add(7, 90);
21        System.out.println(s);
22    }
23
24
25 }
26
27
28 }
```

- Console:** Shows the output of the program: [10, 20, 30, 90, 10, 10, 40, 90, 10].

By,
M.sethu prasath

Program:9.3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows the project structure under "eclipse-workspace - ArrayPrograms/src/org/packagearray". It includes packages like "ArrayConcepts", "ArrayPrograms", "org.packagearray" (containing "DuplicateElement.java"), and other unrelated packages like "Chrome", "Firefox", etc.
- Editor (center-left):** Displays the Java code for "DuplicateElement.java". The code creates a list of integers and removes duplicates by comparing each element with the rest of the list.

```
1 package org.packagearray;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DuplicateElement {
7
8     public static void main(String[] args) {
9         List <Integer> s = new ArrayList <Integer>();
10        s.add(10);
11        s.add(20);
12        s.add(30);
13        s.add(90);
14        s.add(10);
15        s.add(10);
16        s.add(40);
17        s.add(50);
18        s.add(30);
19        Integer value = 10;
20        for (int i = 0; i < s.size(); i++) {
21            Integer integer = s.get(i);
22            if (integer == value) {
23                s.remove(i);
24                s.add(i, 100);
25            }
26        }
27        System.out.println(s);
28    }
29
30 }
31
32
33
34 }
```
- Console (center-right):** Shows the output of the program: "[100, 20, 30, 90, 100, 100, 40, 50, 30]".
- Bottom Status Bar:** Shows "Writable", "Smart Insert", and "32:1".

By,
M.sethu prasath

Program:10.1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a list of Java packages and classes, including ArrayConcepts, ArrayPrograms, collegelnformation, Companydetails, EmoloyeeInformation, EmployeeDetails, GreensAddress, Hello, HelloWorld, Jave tutorial, LanguageDetails, MyPhone, PhoneDetails, Samale, SampleProgram, and StringPrograms.
- Editor (center):** Displays the `Sample.java` file content. The code creates two `ArrayList` instances, `li` and `s`, and prints their contents to the console.
- Console (right):** Shows the terminal output of the Java application. It prints the following lines:

```
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (25-Dec-2022, 6:14:08 PM)
ArrayList : [10, 20, 30, 90, 10, 10, 40, 50]
ArrayList 2 : [30, 40, 50, 60, 80]
[30, 40, 50]
```

By,
M.sethu prasath

Program:10.2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows various Java packages and classes, including ArrayConcepts, ArrayPrograms, collegelnformation, Companydetails, EmoloyeeInformation, EmployeeDetails, GreensAddress, Hello, HelloWorld, Jave tutorial, LanguageDetails, MyPhone, PhoneDetails, Samale, SampleProgram, and StringPrograms.
- Editor (center):** The active file is `Sample.java`. The code creates two `ArrayList<Integer>` objects, `li` and `s`, and adds elements to them. It then prints the contents of both lists to the console.
- Console (right):** Displays the terminal output of the Java application. The output shows:

```
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (25-Dec-2022, 6:16:29 PM)
ArrayList : [10, 20, 30, 90, 10, 10, 40, 50]
ArrayList 2 : [10, 20, 60, 50, 40, 70, 80, 90]
[10, 20, 90, 10, 10, 40, 50]
```

By,
M.sethu prasath

Program:10.3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows various Java packages and classes, including ArrayConcepts, ArrayPrograms, collegelnformation, Companydetails, EmoloyeeInformation, EmployeeDetails, GreensAddress, Hello, HelloWorld, Jave tutorial, LanguageDetails, MyPhone, PhoneDetails, Samale, SampleProgram, and StringPrograms.
- Editor:** The active file is `Sample.java`. The code creates two `ArrayList<Integer>` objects, `li` and `s`, and adds elements to them. It then prints the lists and performs a retainAll operation.

```
1 package org.packagearray;
2 import java.util.ArrayList;
3
4 public class Sample {
5     public static void main(String[] args) {
6         List<Integer> li=new ArrayList<Integer>();
7         li.add(10);
8         li.add(20);
9         li.add(30);
10        li.add(40);
11        li.add(50);
12        li.add(60);
13        li.add(70);
14        li.add(80);
15        System.out.println("ArrayList : "+li);
16        List<Integer> s=new ArrayList<Integer>();
17        s.add(100);
18        s.add(200);
19        s.add(300);
20        s.add(400);
21        s.add(500);
22        s.add(600);
23        s.add(700);
24        s.add(800);
25        System.out.println("ArrayList 2 : "+s);
26        li.removeAll(s);
27        System.out.println(li);
28    }
29 }
30 }
```

- Console:** Displays the terminal output of the program execution. It shows the contents of both lists and the result of the `removeAll` operation.

```
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (25-Dec-2022, 6:18:36 PM)
ArrayList : [10, 20, 30, 40, 50, 60, 70, 80]
ArrayList 2 : [100, 200, 300, 400, 500, 600, 700, 800]
[]
[]
```

By,
M.sethu prasath

Program:11.1

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows a package named "org.packagearray" containing several Java files: Lengthjava, StringIndex..., CharAtjava, StringEqual..., ParternProg..., and Sample.java.
- Editor (center):** Displays the content of the Sample.java file. The code creates two ArrayLists, li and s, both containing integers from 10 to 50. It then removes all elements from li except the first one (10) and prints both lists.

```
1 package org.packagearray;
2 import java.util.ArrayList;
3
4 public class Sample {
5     public static void main(String[] args) {
6         List<Integer> li=new ArrayList<Integer>();
7         li.add(10);
8         li.add(20);
9         li.add(30);
10        li.add(90);
11        li.add(10);
12        li.add(10);
13        li.add(40);
14        li.add(50);
15        System.out.println("ArrayList : "+li);
16        List<Integer> s=new ArrayList<Integer>();
17        s.add(30);
18        s.add(40);
19        s.add(50);
20        s.add(60);
21        s.add(80);
22        System.out.println("ArrayList 2 : "+s);
23        li.removeAll(s);
24        System.out.println(li);
25    }
26 }
27 }
```

- Console (right):** Shows the terminal output of the program execution. It prints the contents of both ArrayLists: ArrayList [10, 20, 30, 90, 10, 10, 40, 50] and ArrayList 2 : [30, 40, 50, 60, 80]. The final state of ArrayList li is printed as [10, 20, 90, 10, 10].

By,
M.sethu prasath

Program:11.2

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows various Java packages and classes, including ArrayConcepts, ArrayPrograms, collegenInformation, Companydetails, EmolyeeInformation, EmployeeDetails, GreensAddress, Hello, HelloWorld, Jave tutorial, LanguageDetails, MyPhone, PhoneDetails, Samale, SampleProgram, and StringPrograms.
- Editor:** The current file is "Sample.java". The code creates two ArrayLists, "li" and "s", both containing integers from 10 to 90. It then prints both lists to the console.
- Console:** Displays the output of the program execution. The output shows two ArrayLists: the first contains [10, 20, 30, 90, 10, 10, 40, 50] and the second contains [10, 20, 30, 40, 50, 60, 70, 80, 90].

```
package org.packagearray;
import java.util.ArrayList;

public class Sample {
    public static void main(String[] args) {
        List<Integer> li=new ArrayList<Integer>();
        li.add(10);
        li.add(20);
        li.add(30);
        li.add(90);
        li.add(10);
        li.add(10);
        li.add(40);
        li.add(50);
        System.out.println("ArrayList : "+li);
        List<Integer> s=new ArrayList<Integer>();
        s.add(10);
        s.add(20);
        s.add(30);
        s.add(40);
        s.add(50);
        s.add(60);
        s.add(70);
        s.add(80);
        s.add(90);
        System.out.println("ArrayList 2 : "+s);
        li.removeAll(s);
        System.out.println(li);
    }
}
```

By,
M.sethu prasath

Program:11.3

The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer (left):** Shows various Java packages and classes, including ArrayConcepts, ArrayPrograms, collegelnformation, Companydetails, EmoloyeeInformation, EmployeeDetails, GreensAddress, Hello, HelloWorld, Jave tutorial, LanguageDetails, MyPhone, PhoneDetails, Samale, SampleProgram, and StringPrograms.
- Editor (center):** Displays the `Sample.java` file content. The code creates two `ArrayList` instances, `li` and `s`, and adds integer values to them. It then prints the contents of both lists to the console.
- Console (right):** Shows the terminal output of the program execution. The output includes the printed lists and their sizes.

```
1 package org.packagearray;
2 import java.util.ArrayList;
3
4 public class Sample {
5     public static void main(String[] args) {
6         List<Integer> li=new ArrayList<Integer>();
7         li.add(10);
8         li.add(20);
9         li.add(30);
10        li.add(90);
11        li.add(10);
12        li.add(10);
13        li.add(40);
14        li.add(50);
15        System.out.println("ArrayList : "+li);
16        List<Integer> s=new ArrayList<Integer>();
17        s.add(100);
18        s.add(200);
19        s.add(300);
20        s.add(400);
21        s.add(500);
22        s.add(600);
23        s.add(700);
24        s.add(800);
25        System.out.println("ArrayList 2 : "+s);
26        li.removeAll(s);
27        System.out.println(li);
28    }
29 }
30
31
32 }
```

```
<terminated> Sample [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (25-Dec-2022, 6:24:18 PM)
ArrayList : [10, 20, 30, 90, 10, 10, 40, 50]
ArrayList 2 : [100, 200, 300, 400, 500, 600, 700, 800]
[10, 20, 30, 90, 10, 10, 40, 50]
```

By,
M.sethu prasath

By,
M.sethu prasath