

WT Lab06

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Question 1

WAP in Java to implement Binary search in a 1D array

Solution

```
import java.util.Arrays;
import java.util.Scanner;

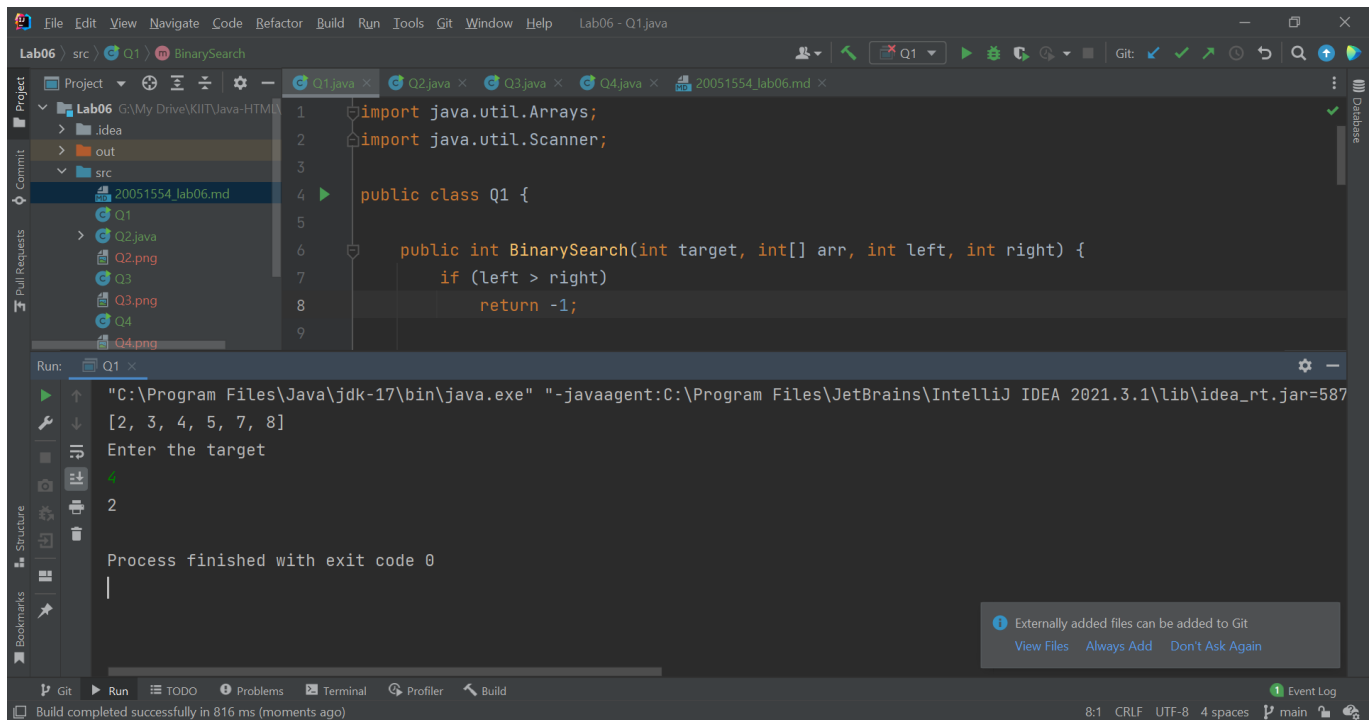
public class Q1 {

    public int BinarySearch(int target, int[] arr, int left, int right) {
        if (left > right)
            return -1;

        int mid = left + (right - left) / 2;
        if (arr[mid] == target)
            return mid;
        if (arr[mid] < target)
            return BinarySearch(target, arr, mid + 1, right);
        else
            return BinarySearch(target, arr, left, mid - 1);
    }

    public static void main(String[] args) {
        Q1 o = new Q1();
        int[] arr = new int[]{3,4,7,2,5,8};
        Arrays.sort(arr);
        System.out.println(Arrays.toString(arr));
        System.out.println("Enter the target");
        int target = new Scanner(System.in).nextInt();
        System.out.println(o.BinarySearch(target, arr, 0, arr.length-1));
    }
}
```

Output



Question 2

Illustrate the execution of constructors in multi-level inheritance with three Java classes – plate(length, width), box(length, width, height), wood box(length, width, height, thickness).

Solution

```
class plate {
    protected int length, width;

    public plate(int length, int width) {
        System.out.println("Plate class constr");
        this.length = length;
        this.width = width;
    }
}

class box extends plate{
    protected int height;

    public box(int l, int b, int height) {
        super(l,b);
        System.out.println("Box class constr");
        this.height = height;
    }
}

class woodBox extends box {
    protected int thickness;

    public woodBox(int l, int b, int height, int thickness) {
```

```

        super(l, b, height);
        System.out.println("WoodBox class constr");
        this.thickness = thickness;
    }

    public void data() {
        System.out.println("length: " + length);
        System.out.println("width: " + width);
        System.out.println("height: " + height);
        System.out.println("thickness: " + thickness);
    }
}

public class Q2 {
    public static void main(String[] args) {
        woodBox obj = new woodBox(20, 30, 1, 5);
        obj.data();
    }
}

```

Output

```

Run: Q2
"C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.3.1\lib\idea_rt.jar=586
Plate class constr
Box class constr
WoodBox class constr
length: 20
width: 30
height: 1
thickness: 5

Process finished with exit code 0

```

Question 3

Java Program to display the lower triangular matrix

Solution

```

import java.util.Scanner;

public class Q3 {

```

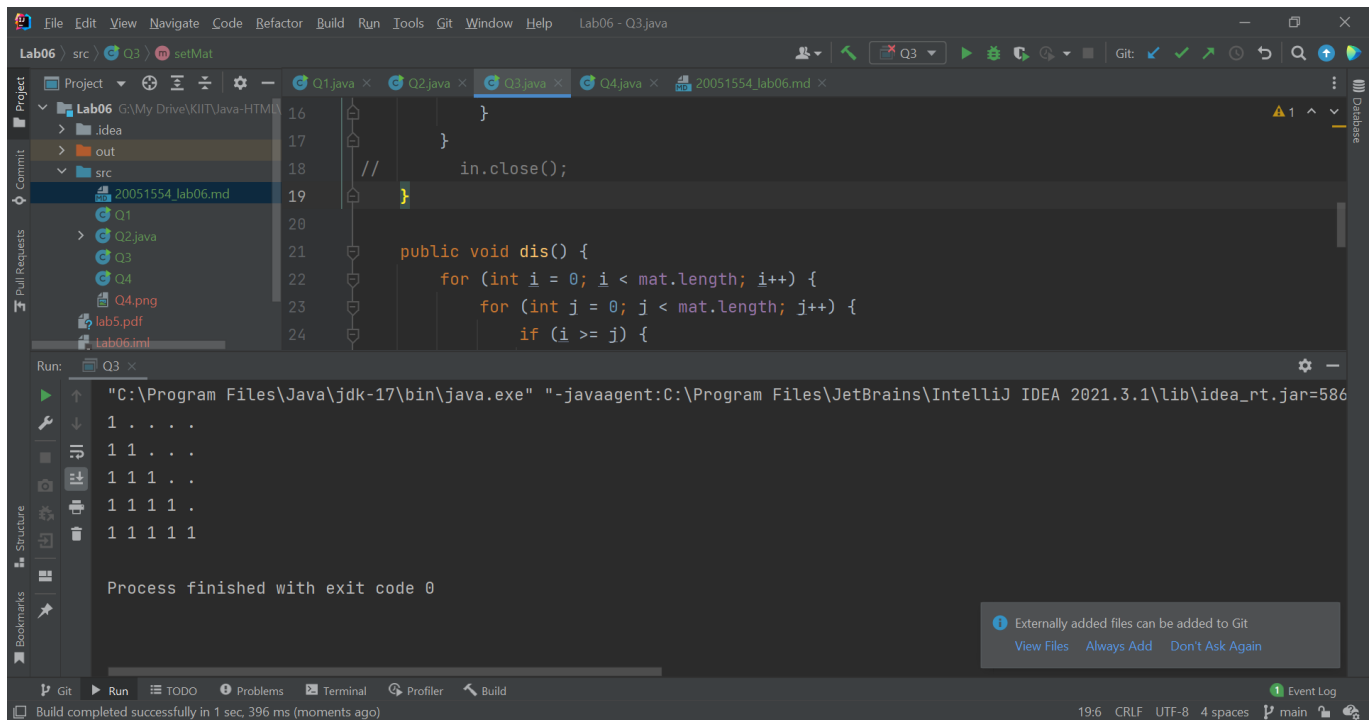
```
int[][] mat;
public Q3 (int N) {
    mat = new int[N][N];
    setMat();
}

private void setMat() {
//    Scanner in = new Scanner(System.in);
    for (int i = 0; i < mat.length; i++) {
        for (int j = 0; j < mat.length; j++) {
//            mat[i][j] = in.nextInt();
            mat[i][j] = 1;
        }
    }
//    in.close();
}

public void dis() {
    for (int i = 0; i < mat.length; i++) {
        for (int j = 0; j < mat.length; j++) {
            if (i >= j) {
                System.out.print(mat[i][j] + " ");
            } else {
                System.out.print(". ");
            }
        }
        System.out.println();
    }
}

public static void main(String[] args) {
    Q3 o = new Q3(5);
    o.dis();
}
}
```

Output



Question 4

Java Program to find the transpose of a given matrix

Solution

```

import java.util.Scanner;

public class Q4 {
    int[][] mat;
    public Q4 (int M, int N) {
        mat = new int[M][N];
        setMat();
    }

    private void setMat() {
        //      Scanner in = new Scanner(System.in);
        int ele = 1;
        for (int i = 0; i < mat.length; i++) {
            for (int j = 0; j < mat[0].length; j++) {
                //      mat[i][j] = in.nextInt();
                mat[i][j] = ele++;
            }
        }
        //      in.close();
    }

    public void transpose() {
        int[][] newMat = new int[mat[0].length][mat.length];
        for (int i = 0; i < newMat.length; i++) {
            for (int j = 0; j < newMat[0].length; j++) {
                newMat[i][j] = mat[j][i];
            }
        }
    }
}

```

```

    }
}
mat = newMat;
}

public void dis() {
    for (int[] row : mat) {
        for (int ele : row) {
            System.out.print(ele + " ");
        }
        System.out.println();
    }
}

public static void main(String[] args) {
    Q4 obj = new Q4(4, 3);
    obj.dis();
    System.out.println();
    obj.transpose();
    obj.dis();
}
}

```

Output

The screenshot shows the IntelliJ IDEA IDE with a project named 'Lab06'. The file '20051554_lab06.md' is open, displaying the Java code. The code defines a class 'Q4' with a constructor taking dimensions (4, 3), a 'dis()' method to display the matrix, and a 'transpose()' method to create and return a transposed matrix. The 'main' method creates a 'Q4' object, displays the matrix, prints a blank line, transposes the matrix, and displays it again.

The 'Run' window at the bottom shows the execution output:

```

1 2 3
4 5 6
7 8 9
10 11 12

1 4 7 10
2 5 8 11
3 6 9 12

```

The process finished with exit code 0. The status bar at the bottom indicates 'Build completed successfully in 785 ms (moments ago)'.