LEVEL 2 ASSIGNMENT

STEP PROGRAM

ARRAYS

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SOURCE CODE

LEVEL 2 QUESTION: 1

Q. Create a program to find the bonus of 10 employees based on their years of service and the total bonus amount the company Zara has to pay, along with the old and new salary.

```java
import java.util.Scanner;

public class EmployeeBonus{ public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

double[] salary = new double[10];

 double[] yearsOfService = new double[10];

 double[] bonus = new double[10];

double[]        newSalary        =        new        double[10];
double totalBonus = 0, totalOldSalary = 0, totalNewSalary = 0;

for (int i = 0; i < 10; i++) {

while (true) {

System.out.print("Enter salary for employee " + (i + 1) + ": ");

 salary[i] = sc.nextDouble();

System.out.print("Enter years of service for employee " + (i + 1) + ": ");

yearsOfService[i] = sc.nextDouble();

 if (salary[i] > 0 && yearsOfService[i] >= 0) break;

 System.out.println("Invalid input. Please enter again."); i--;
```

```
        }

    }

    for (int i = 0; i < 10; i++) { bonus[i] = (yearsOfService[i] > 5) ? salary[i] *
    0.05 : salary[i] * 0.02;

    newSalary[i] = salary[i] + bonus[i]; totalBonus += bonus[i];

    totalOldSalary += salary[i];

    totalNewSalary += newSalary[i];

    }

    System.out.println("Total    Bonus    Payout:    "    +    totalBonus);
    System.out.println("Total    Old    Salary:    "    +    totalOldSalary);
    System.out.println("Total New Salary: " + totalNewSalary); sc.close();

    }

    }
```

OUTPUT:

```
Enter salary for employee 1: 30000
Enter years of service for employee 1: 2
Enter salary for employee 2: 40000
Enter years of service for employee 2: 3
Enter salary for employee 3: 50000
Enter years of service for employee 3: 4
Enter salary for employee 4: 60000
Enter years of service for employee 4: 5
Enter salary for employee 5: 70000
Enter years of service for employee 5: 6
Enter salary for employee 6: 80000
Enter years of service for employee 6: 7
Enter salary for employee 7: 90000
Enter years of service for employee 7: 8
Enter salary for employee 8: 100000
Enter years of service for employee 8: 9
Enter salary for employee 9: 110000
Enter years of service for employee 9: 10
Enter salary for employee 10: 150000
Enter years of service for employee 10: 12
Total Bonus Payout: 33600.0
Total Old Salary: 780000.0
Total New Salary: 813600.0
```

LEVEL 1 QUESTION: 2

Q. Create a program to find the youngest friends among 3 Amar, Akbar, and Anthony based on their ages and the tallest among the friends based on their heights

```java
import java.util.Scanner;

public class Friend {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        String[] names = {"Amar", "Akbar", "Anthony"};
```

```java
        int[] ages = new int[3];

        double[] heights = new double[3];

        for (int i = 0; i < 3; i++) {

            System.out.print("Enter age of " + names[i] + ": ");

            ages[i] = sc.nextInt();

            System.out.print("Enter height of " + names[i] + " (in cm): ");

            heights[i] = sc.nextDouble();

        }

        int youngestIndex = 0;

        double tallestIndex = 0;

        for (int i = 1; i < 3; i++) {

            if (ages[i] < ages[youngestIndex]) youngestIndex = i;

            if (heights[i] > heights[(int)tallestIndex]) tallestIndex = i;

        }

        System.out.println("Youngest Friend: " + names[youngestIndex]
+ " (Age: " + ages[youngestIndex] + ")");

        System.out.println("Tallest Friend: " + names[(int)tallestIndex] +
" (Height: " + heights[(int)tallestIndex] + " cm)");

        sc.close();

    }

}
```

```
Enter age of Amar: 19
Enter height of Amar (in cm): 169
Enter age of Akbar: 20
Enter height of Akbar (in cm): 173
Enter age of Anthony: 20
Enter height of Anthony (in cm): 170
Youngest Friend: Amar (Age: 19)
Tallest Friend: Akbar (Height: 173.0 cm)
```

LEVEL 2 QUESTION: 3

Q. Create a program to store the digits of the number in an array and find the largest and second largest element of the array.

```java
import java.util.Scanner;

public class Largest {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter a number: ");

        int number = sc.nextInt();

        int maxDigit = 10;

        int[] digits = new int[maxDigit];

        int index = 0;

        while (number != 0 && index < maxDigit) {

            digits[index++] = number % 10;
```

```java
        number /= 10;

    }

    int largest = 0, secondLargest = 0;

    for (int i = 0; i < index; i++) {

        if (digits[i] > largest) {

            secondLargest = largest;

            largest = digits[i];

        } else if (digits[i] > secondLargest && digits[i] != largest) {

            secondLargest = digits[i];

        }

    }

    System.out.println("Largest digit: " + largest);

    System.out.println("Second largest digit: " + secondLargest);

    sc.close();

  }

}
```

OUTPUT:

```
Enter a number: 500
Largest digit: 5
Second largest digit: 0
```

LEVEL 2 QUESTION: 4

Q. Rework the program 2, especially the Hint f where if index equals maxDigit, we break from the loop. Here we want to modify to Increase the size of the array i,e maxDigit by 10 if the index is equal to maxDigit. This is done to consider all digits to find the largest and second-largest number

```java
import java.util.Scanner;

public class Digits {

  public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    System.out.print("Enter a number: ");

    int number = sc.nextInt();

    int maxDigit = 10;

    int[] digits = new int[maxDigit];

    int index = 0;

    while (number != 0) {

      if (index == maxDigit) {

        maxDigit += 10;

        int[] temp = new int[maxDigit];

        System.arraycopy(digits, 0, temp, 0, digits.length);

        digits = temp;

      }
```

```java
            digits[index++] = number % 10;

            number /= 10;

        }

        int largest = 0, secondLargest = 0;

        for (int i = 0; i < index; i++) {

            if (digits[i] > largest) {

                secondLargest = largest;

                largest = digits[i];

            } else if (digits[i] > secondLargest && digits[i] != largest) {

                secondLargest = digits[i];

            }

        }

        System.out.println("Largest digit: " + largest);

        System.out.println("Second largest digit: " + secondLargest);

        sc.close();

    }

}
```

OUTPUT:

```
Enter a number: 7
Largest digit: 7
Second largest digit: 0
```

LEVEL 2 QUESTION: 5

Q. Create a program to take a number as input and reverse the number. To do this, store the digits of the number in an array and display the array in reverse order

```java
import java.util.Scanner;

public class ReverseNumber {

  public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    System.out.print("Enter a number: ");

    int number = sc.nextInt();

    int temp = number, count = 0;

    while (temp != 0) {

      count++;

      temp /= 10;

    }

    int[] digits = new int[count];

    for (int i = 0; i < count; i++) {

      digits[i] = number % 10;

      number /= 10;

    }

    System.out.print("Reversed number: ");

    for (int i = 0; i < count; i++) {

      System.out.print(digits[i]);
```

```java
    }

    sc.close();

  }

}
```

OUTPUT:

```
Enter a number: 123
Reversed number: 321%
```

LEVEL 2 QUESTION: 6

Q. An organization took up an exercise to find the Body Mass Index (BMI) of all the persons in the team. For this create a program to find the BMI and display the height, weight, BMI and status of each individual

```java
import java.util.Scanner;

public class BMI_Calculator {

  public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    System.out.print("Enter number of persons: ");

    int n = sc.nextInt();

    double[] weight = new double[n], height = new double[n], bmi = new double[n];
```

```java
        String[] status = new String[n];

        for (int i = 0; i < n; i++) {

            System.out.print("Enter weight (kg) of person " + (i + 1) + ": ");

            weight[i] = sc.nextDouble();

            System.out.print("Enter height (m) of person " + (i + 1) + ": ");

            height[i] = sc.nextDouble();

            bmi[i] = weight[i] / (height[i] * height[i]);

            status[i] = bmi[i] <= 18.4 ? "Underweight" : bmi[i] <= 24.9 ? "Normal" : bmi[i] <=
39.9 ? "Overweight" : "Obese";

        }

        System.out.println("\nHeight(m)\tWeight(kg)\tBMI\t\tStatus");

        for (int i = 0; i < n; i++)

            System.out.printf("%.2f\t\t%.2f\t\t%.2f\t%s\n",  height[i],  weight[i],  bmi[i],
status[i]);

        sc.close();

    }

}
```

OUTPUT:

```
Enter number of persons: 2
Enter weight (kg) of person 1: 70
Enter height (m) of person 1: 168
Enter weight (kg) of person 2: 85
Enter height (m) of person 2: 173

Height(m)          Weight(kg)        BMI              Status
168.00             70.00             0.00        Underweight
173.00             85.00             0.00        Underweight
```

LEVEL 2 QUESTION: 7

Q. Rewrite the above program using multi-dimensional array to store height, weight, and BMI in 2D array for all the persons

```java
import java.util.Scanner;

public class BMI {

  public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    System.out.print("Enter number of persons: ");

    int number = sc.nextInt();

    double[][] personData = new double[number][3];

    String[] weightStatus = new String[number];

    for (int i = 0; i < number; i++) {

      do {

        System.out.print("Enter height (in meters) for person " + (i + 1) + ": ");

        personData[i][0] = sc.nextDouble();

      } while (personData[i][0] <= 0);

      do {

        System.out.print("Enter weight (in kg) for person " + (i + 1) + ": ");

        personData[i][1] = sc.nextDouble();

      } while (personData[i][1] <= 0);
```

```java
        personData[i][2] = personData[i][1] / (personData[i][0] * personData[i][0]);

        if (personData[i][2] < 18.5) weightStatus[i] = "Underweight";

        else if (personData[i][2] < 24.9) weightStatus[i] = "Normal weight";

        else if (personData[i][2] < 29.9) weightStatus[i] = "Overweight";

        else weightStatus[i] = "Obese";

    }

    System.out.println("\nPerson Data:");

    System.out.println("Height (m)  Weight (kg)  BMI  Status");

    for (int i = 0; i < number; i++) {

        System.out.printf("%.2f         %.2f          %.2f     %s\n",  personData[i][0],
personData[i][1], personData[i][2], weightStatus[i]);

    }

    sc.close();

  }

}
```

OUTPUT:

```
Enter number of persons: 2
Enter height (in meters) for person 1: 56
Enter weight (in kg) for person 1: 165
Enter height (in meters) for person 2: 77
Enter weight (in kg) for person 2: 170

Person Data:
Height (m)   Weight (kg)   BMI    Status
56.00        165.00        0.05   Underweight
77.00        170.00        0.03   Underweight
```

LEVEL 2 QUESTION: 8

Q. Create a program to take input marks of students in 3 subjects physics, chemistry, and maths. Compute the percentage and then calculate the grade as per the following guidelines

```java
import java.util.Scanner;

public class StudentGrades {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter number of students: ");

        int n = sc.nextInt();

        int[] physics = new int[n], chemistry = new int[n], maths =
new int[n];

        double[] percentage = new double[n];

        String[] grade = new String[n];

        for (int i = 0; i < n; i++) {
```

```java
        System.out.println("Enter marks for student " + (i + 1) + " (out of 100):");

        physics[i] = getValidMarks(sc, "Physics");

        chemistry[i] = getValidMarks(sc, "Chemistry");

        maths[i] = getValidMarks(sc, "Maths");

        percentage[i] = (physics[i] + chemistry[i] + maths[i]) / 3.0;

        grade[i] = percentage[i] >= 80 ? "A" : percentage[i] >= 70 ? "B" : percentage[i] >= 60 ? "C" :
                percentage[i] >= 50 ? "D" : percentage[i] >= 40 ? "E" : "R";

    }

System.out.println("\nPhysics\tChemistry\tMaths\tPercentage\tGrade");

    for (int i = 0; i < n; i++)

        System.out.printf("%d\t%d\t\t%d\t%.2f%%\t\t%s\n",
physics[i], chemistry[i], maths[i], percentage[i], grade[i]);

    sc.close();

  }

  public static int getValidMarks(Scanner sc, String subject) {
```

```java
    int marks;

    while (true) {

        System.out.print(subject + ": ");

        marks = sc.nextInt();

        if (marks >= 0 && marks <= 100) return marks;

        System.out.println("Invalid input! Enter marks between 0 and 100.");

    }

  }

}
```

OUTPUT:

```
Enter number of students: 2
Enter marks for student 1 (out of 100):
Physics: 98
Chemistry: 100
Maths: 97
Enter marks for student 2 (out of 100):
Physics: 99
Chemistry: 95
Maths: 98

Physics Chemistry      Maths   Percentage      Grade
98       100            97      98.33%          A
99        95            98      97.33%          A
```

LEVEL 1 QUESTION: 9

Q. Rewrite the above program to store the marks of the students in physics, chemistry, and maths in a 2D array and then compute the percentage and grade

```java
import java.util.Scanner;

public class StudentGrades2D {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter number of students: ");

        int n = sc.nextInt();

        int[][] marks = new int[n][3];

        double[] percentage = new double[n];

        String[] grade = new String[n];

        for (int i = 0; i < n; i++) {

            System.out.println("Enter marks for student " + (i + 1) + " (out of 100):");

            for (int j = 0; j < 3; j++) {

                marks[i][j] = getValidMarks(sc, j);

            }
```

```java
        percentage[i] = (marks[i][0] + marks[i][1] +
marks[i][2]) / 3.0;

        grade[i] = percentage[i] >= 80 ? "A" : percentage[i] >=
70 ? "B" : percentage[i] >= 60 ? "C" :

            percentage[i] >= 50 ? "D" : percentage[i] >= 40 ?
"E" : "R";

    }


System.out.println("\nPhysics\tChemistry\tMaths\tPercentage\tGrade");

    for (int i = 0; i < n; i++)


System.out.printf("%d\t%d\t\t%d\t%.2f%%\t\t%s\n",
marks[i][0], marks[i][1], marks[i][2], percentage[i],
grade[i]);


    sc.close();

  }

  public static int getValidMarks(Scanner sc, int
subjectIndex) {

    String[] subjects = {"Physics", "Chemistry", "Maths"};
```

```
    int marks;

    while (true) {

        System.out.print(subjects[subjectIndex] + ": ");

        marks = sc.nextInt();

        if (marks >= 0 && marks <= 100) return marks;

        System.out.println("Invalid   input!   Enter   marks
between 0 and 100.");

    }

  }

}
```

OUTPUT:

```
Enter number of students: 2
Enter marks for student 1 (out of 100):
Physics: 99
Chemistry: 100
Maths: 96
Enter marks for student 2 (out of 100):
Physics: 97
Chemistry: 99
Maths: 100

Physics Chemistry       Maths   Percentage      Grade
99      100             96      98.33%          A
97      99              100     98.67%          A
```

LEVEL 2 QUESTION: 10

Q. Create a program to take a number as input find the frequency of each digit in the number using an array and display the frequency of each digit

```java
import java.util.Scanner;

public class DigitFrequency {

  public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    System.out.print("Enter a number: ");

    long num = sc.nextLong();

    int[] frequency = new int[10];

    while (num > 0) {

      frequency[(int)(num % 10)]++;

      num /= 10;

    }

    System.out.println("Digit\tFrequency");

    for (int i = 0; i < 10; i++)

      if (frequency[i] > 0)

        System.out.println(i + "\t" + frequency[i]);
```

```
        sc.close();

    }

}
```

```
Enter a number: 96
Digit    Frequency
6        1
9        1
```