Data Structure and Algorithm Practicum
Basic Programming

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1.2 Conditional Statements

1.2.1 Practicum of Conditional Statements

`Questions`

1. Create a program to calculate final score of students with these compositions. 20% of final score comes from assignment score, 35% from midterm score, and 45% from final exam. Each input score ranges from 0 – 100. Once the final score is determined, do the conversion as follows:

Score	**Alphabet**
$80 < N \leq 100$	A
$73 < N \leq 80$	B+
$65 < N \leq 73$	B
$60 < N \leq 65$	C+
$50 < N \leq 60$	C
$39 < N \leq 50$	D
$N \leq 39$	E

   If the acquired alphabets are A, B+, B, C+, C then the student is **passed**. Otherwise, the student is **failed**.

   - The program needs inputs for assignment score, midterm, final exam score
   - The output will be the final score, its alphabet, and information whether they **passed** or **failed**

   `Example:`

```
Program Menghitung Nilai Akhir
======================
Masukkan Nilai Tugas: 85
Masukkan Nilai UTS: 60
Masukkan Nilai UAS: 82
======================
======================
nilai akhir : 74.9
Nilai Huruf :B+
======================
SELAMAT LULUS
```

```java
import java.util.Scanner;

public class ConditonalStatement {
    final static Scanner input = new Scanner(System.in);
    static double AssignmentPercentage = 0.2;
    static double MidtermPercentage = 0.35;
    static double finalExamPercentage = 0.45;
    public static void main(String[] args) {
        System.out.println("Program Menghitung Nilai Akhir");
        bar();
        int assignmentScore =   PromptInput("assignment");
        int midtermScore    =   PromptInput("midterm");
        int finalExamScore  =   PromptInput("finals exam");
        bar();
        double finalScore = (assignmentScore * AssignmentPercentage) +
        ↪  (midtermScore * MidtermPercentage) + (finalExamScore *
        ↪  finalExamPercentage);
        String scorePredicate = scorePredicate(finalScore);
        String status = (finalExamScore > 50) ? "Passed" : "Failed";
        bar();
        System.out.printf("Final score  : %.1f\n", finalScore);
        System.out.printf("Predicate    : %s\n", scorePredicate);
        bar();
        System.out.println(status);
    }
    static void bar() {
        System.out.println("================================");
    }
    static int PromptInput(String prompt) {
        System.out.printf("Enter %-12s score: ",prompt);
        int userInput = input.nextInt();
        input.nextLine();
        return userInput;
    }
    static String scorePredicate(double finalScore) {
        if (finalScore > 80) {
            return "A";
        } else if (finalScore > 73) {
            return "B+";
        } else if (finalScore > 65) {
            return "B";
        } else if (finalScore > 60) {
```

```
            return "C+";
        } else if (finalScore > 50) {
            return "C";
        } else if (finalScore > 39) {
            return "D";
        } else {
            return "E";
        }
    }
}
```

1.3 Loops

1.3.1 Practicum of Loops

Question

1. Create a program that can display the day from Monday to Sunday repetitively with days amount is n, the n will be the last 2 digits from your NIM.
   *if n < 10, then add 10 (n+=10)
   Example:
   Input NIM: 2041720010, then n = 10
   OUTPUT: Monday Tuesday Wednesday Thursday Friday Saturday Sunday Monday Tuesday Wednesday
   2nd Example:
   Input NIM: 2041720002, then n = 12
   OUTPUT: Monday Tuesday Wednesday Thursday Friday Saturday Sunday Monday Tuesday Wednesday Thursday Friday

   Example result:

   ```
   Masukkan NIM :201234501
   ======================
   n : 11
   senin selasa rabu kamis jumat sabtu minggu senin selasa rabu kamis
   ```

   Answer:

```java
import java.util.Scanner;

public class Loops {
    final static Scanner input = new Scanner(System.in);
    public static void main(String[] args) {
        String[] days = {"Monday ", "Tuesday ", "Wednesday ",
        ↪  "Thursday ", "Friday ", "Saturday ", "Sunday "};
        String NIM = getNIM();
        int last2digits = Integer.parseInt(String.format("%c%c",
        ↪  NIM.charAt(NIM.length() - 2), NIM.charAt(NIM.length() -
        ↪  1)));
        int limit = last2digits < 10 ? last2digits + 10 : last2digits;
        for (int i = 0; i < limit; i++) {
            System.out.print(days[i % days.length]);
        }
    }
    static String getNIM() {
        while (true) {
            System.out.print("Enter NIM: ");
            String userInput = input.next();
            if (validateNIM(userInput)) return userInput;
            System.out.println("Please enter a 10 digit number");
        }
    }
    static boolean validateNIM(String numbers) {
        int length = numbers.length();
        if (length != 10) return false;
        for (int i = 0; i < length; i++) {
            switch (numbers.charAt(i)) {
                case '1', '2', '3', '4', '5', '6', '7', '8', '9', '0'
                ↪  -> {
                }
                default -> {
                    return false;
                }
            }
        }
        return true;
    }
}
```

1.4 Array

1.4.1 Practicum of Array

`Question`

1. RoyalGarden is a flower shop that has many branches. Every day, the sold flowers and its stock has recorded as follows

\	Aglaonema	Taro	Alocasia	Rose
Royal Garden 1	10	5	15	7
Royal Garden 2	6	11	9	12
Royal Garden 3	2	10	10	5
Royal Garden 4	5	7	12	9

The price for each Aglaonema is 75.000, Taro is 50.000, Alocasia is 60.000, and Rose is 10.000. Please help RoyalGarden to create a program that can calculate:

   (a) Stock for each flower through all branches

   (b) If there is an additional information about a stock has decreased since the flowers are wither or dead on RoyalGarden 1 branch. Those dead flowers are 1 Aglaonema, 2 Taros, and 5 Roses. Please calculate the income of RoyalGarden 1 if all flowers are sold out.

`Answer:`

```
public class Array {
    public static void main(String[] args) {
        int[][] stock = {
            {10, 5, 15, 7},
            {6, 11, 9, 12},
            {2, 10, 10, 5},
            {5, 7, 12, 9}
        };
        String[] flowerName = {"Aglaonema", "Taro", "Alocasia",
        ↪  "Rose"};
        int[] flowerStock = new int[stock[0].length];
        int[] flowerPrice = {75_000, 50_000, 60_000, 10_000};
        int[] withered = {1, 2, 0, 5};

        for (int flowerID = 0; flowerID < stock[0].length; flowerID++)
        ↪  {
            for (int branchID = 0; branchID < stock.length;
            ↪  branchID++) {
                flowerStock[flowerID] += stock[branchID][flowerID];
            }
```

```
        }
        for (int i = 0; i < flowerName.length; i++) {
            System.out.printf("%-10s: %d\n", flowerName[i],
            ↪  flowerStock[i]);
        }
        int branchProfit = 0;
        for (int flowerID = 0; flowerID < flowerName.length;
        ↪  flowerID++) {
            branchProfit += (stock[0][flowerID]-withered[flowerID]) *
            ↪  flowerPrice[flowerID];
        }
        System.out.printf("Branch 1 income: %,d", branchProfit);
    }
}
```

1.5 Function

1.5.1 Practicum of Function

Question

1. Create 2 functions for:
   (a) Display Fibonacci row using loop
   (b) Display Fibonacci row using recursive function
   Notes:
   Fibonacci row: 0, 1, 1, 2, 3, 5, 8, 13, 21

Answer:

```
public class function {
    static int n1=0,n2=1,n3=0;
    static void printFibonacci(int count){
        if(count>0){
            n3 = n1 + n2;
            n1 = n2;
            n2 = n3;
            System.out.print(" "+n3);
            printFibonacci(count-1);
        }
    }
    public static void main(String[] args) {
```

```
        int secondPrev = 0, prev = 1, cur, limit = 9;
        System.out.printf("%s, %s", secondPrev, prev);
        for (int i = 2; i < limit; ++i) {
            cur = secondPrev + prev;
            System.out.printf(", %s", cur);
            secondPrev = prev;
            prev = cur;
        }
        int count=10;
        System.out.print(n1+" "+n2);
        printFibonacci(count-2);
    }
}
```

1.5.2 Assignment

1. Smile Laundry is a laundry service that costs its customer as follows:

   (a) item Cost for each 1kg clothes is Rp 4.500

   (b) If the customer does laundry more than 10kg clothes, they will get 5% discount

   Today, the laundry has 4 customers, those are Ani, Budi, Bina, and Cita. Ani brought 4kg clothes, Budi brought 15kg clothes, Bina brought 6kg, and Cita brought 11kg. Create a program to calculate the income of Smile Laundry at that day.

```
public class Assignment1 {
     static double income = 0;
     public static void calculatePrice(String name, int laundry)
      ↪  {
         double pricePerkilo = 4_500;
         double discount = 1.00;
         if (laundry > 10) discount = 0.95;
         double cost = laundry * pricePerkilo * discount;
         income += cost;
         System.out.printf("%s laundries cost: %.0f\n", name,
          ↪  cost);
     }
     public static void main(String[] args) {
         int[] customerLaundries = {4, 15, 6, 11};
         String[] customerName = {"Ani", "Budi", "Bina", "Cita"};
```

```
            for (int i = 0; i < customerLaundries.length; i++) {
                calculatePrice(customerName[i],
                ↪  customerLaundries[i]);
            }
            System.out.printf("Total income: %.0f\n", income);
        }
    }
```

2. Somebody saves 1 million rupiahs in a bank. With its interest is 2% for each month, then in what month does the customer balance reach 1.5 million? Create a program for this case study.

```
public class Assignment2 {
    public static void main(String[] args) {
        double balance = 1_000_000;
        double target = 1_500_000;
        int month = 0;
        System.out.printf("Initial balance: %,.2f\n", balance);
        while (balance < target) {
            balance *= 1.02;
            month++;
            System.out.printf("%d month balance: %,.2f\n", month,
            ↪  balance);
        }
        System.out.printf("It takes %d month to reach the target
        ↪  of %,.0f\n", month, target);
    }
}
```

3. Create a program that can display even numbers from 2 until nth row, unless the even number is a multiple of 4.
Example:
Input of n: 5
output: 2, 6, 10, 14, 18

```
import java.util.Scanner;

public class Assignment3 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Input of n: ");
        int limit = input.nextInt();
        int currentNumber = 2;
```

```
            input.close();

            System.out.print("output: ");
            for (int i = 0; i < limit; i++) {
                if (currentNumber % 4 != 0) System.out.printf("%d, ",
                ↪  currentNumber);
                else --i;
                currentNumber += 2;
            }
        }
    }
```

4. Create a program that includes a function to:
   (a) Menu (to choose a calculation for area of triangle / rectangle / circle)
   (b) Calculate area of triangle
   (c) Calculate area of rectangle
   (d) Calculate area of circle

```
import java.util.Scanner;

public class Assignment4 {
    static Scanner input = new Scanner(System.in);
    static void menu() {
        System.out.println("Choose a shape to calculate the area
        ↪  of");
        System.out.println("Type in the number");
        System.out.println("1. Calculate area of triangle");
        System.out.println("2. Calculate area of rectangle");
        System.out.println("3. Calculate area of circle");
        System.out.print("Menu: ");
        String menu = input.next();
        switch (menu) {
            case "1" -> calculateAreaOfTriangle();
            case "2" -> calculateAreaOfRectangle();
            case "3" -> calculateAreaOfCircle();
        }
    }
    static void calculateAreaOfTriangle() {
        System.out.print("Enter length of the side: ");
        double side = input.nextDouble();
        System.out.print("Enter length of the height: ");
```

```
            double height = input.nextDouble();


            double area = 0.5 * side * height;
            System.out.printf("The area of triangle with side of %.2f
            ↪  and height of %.2f is %.2f", side, height, area);
        }
        static void calculateAreaOfRectangle() {
            System.out.print("Enter length of the width: ");
            double width = input.nextDouble();
            System.out.print("Enter length of the length: ");
            double length = input.nextDouble();

            double area = width * length;
            System.out.printf("The area of rectangle with width of
            ↪  %.2f and length of %.2f is %.2f", width, length,
            ↪  area);
        }
        static void calculateAreaOfCircle() {
            double pi = Math.PI;
            System.out.print("Enter length of the radius: ");
            double radius = input.nextDouble();

            double area = pi * radius * radius;
            System.out.printf("The area of circle with radius of %.2f
            ↪  is %.2f", radius, area);
        }
        public static void main(String[] args) {
            menu();
        }
    }
```