Lesson 3 : topics

- Control Statements
  - Decision making
  - Loops

Lesson 3 : Control Statements

Control Statements

- Control statements are used to specify the flow of execution of a program.
- They allow the programmer to make decisions, repeat code, and jump to different parts of the program

Decision Making : Real life examples

- If I save enough money this month, I will go on a vacation next month.
- If I wake up early tomorrow, I will go to Gym.
- If I wake up early, I will go to the gym; otherwise, I will walk in my society.
- Based on my year-end bonus, I will decide which bike to buy.

Decision Making

- As humans, we make decisions every day, like what to eat for lunch or whether to wear a raincoat.
- Computer programs also make decisions, using **Boolean expressions**.

- Control statements are used to specify the flow of execution of a program.
- They allow the programmer to make decisions, repeat code, and jump to different parts of the program

Decision Making : Examples

- Check if the given number is Even.
- Ask the user to input two numbers. Compare the numbers and print a message indicating which one is greater, or if they are equal.
- Create a program that takes a single character as input and determines if it's a vowel or a consonant.
- Find the largest number among three numbers.
- Find the largest among five numbers.
- Find out the grade of a student if score is given.

Decision Making Example : Largest of 3 numbers

- Problem : **Find the largest number among three numbers?**

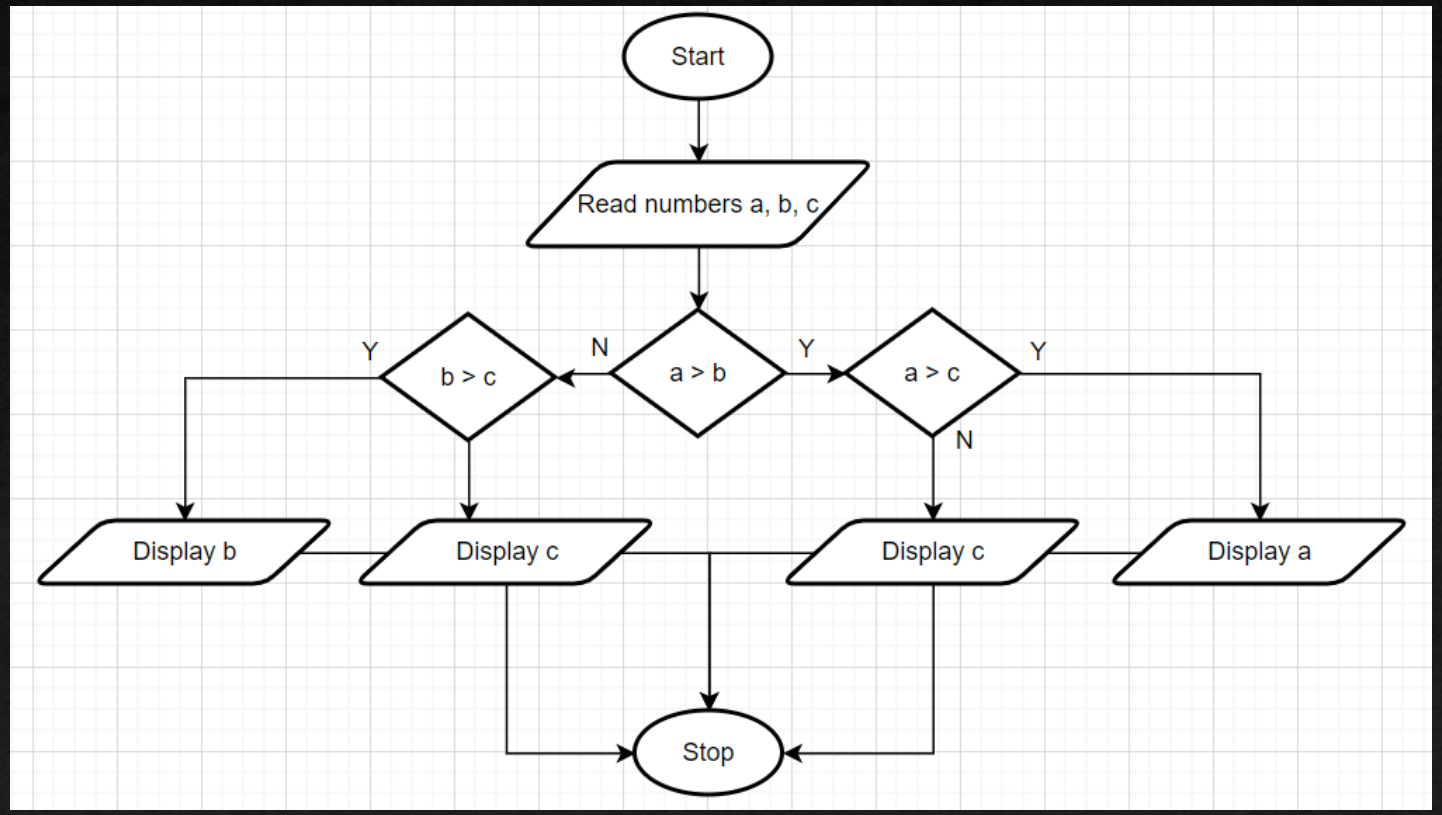
- Algorithm : Largest of three numbers

Step 1 : Start
Step 2 : Declare variables a, b, c.
Step 3 : Read values a, b, c.
Step 4 : If a > b
    If a > c Then display a as largest.
    Else display c as largest.
  Else
    If b > c Then display b as largest.
    Else display c as largest.
Step 5 : Stop

Can you think of any other algorithm for this problem?

Decision Making Example : Largest of 3 numbers

- Problem : **Find the largest number among three numbers?**

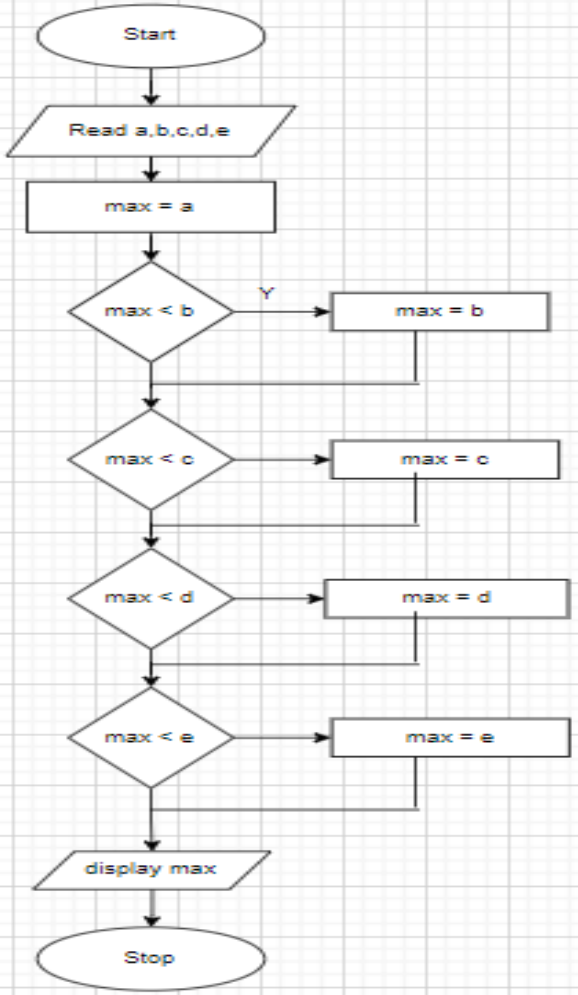


Decision Making: Max of 5 numbers

Max of 5 numbers

Algorithm:

1. Start
2. Declare variables a,b,c,d,e,max
3. Read a,b,c,d,e
4. Set max = a
5. if max < b then max = b
6. if max < c then max = c
7. if max < d then max = d
8. if max < e then max = e
9. Display max
10. Stop



Decision Making : Student Grade from Score

Problem : Find out the grade of a student if score is given.

Score range : 0 to 100

Grades are decided based on below logic :

90 to 100 : A

80 to 89 : B

70 to 79 : C

50 to 69 : D

Below 50 : E

Decision Making : Student Grade from Score

Student Grade from Score

Score range : 0 to 100

Grades are decided based on below logic :

90 to 100 : A

80 to 89 : B

70 to 79 : C

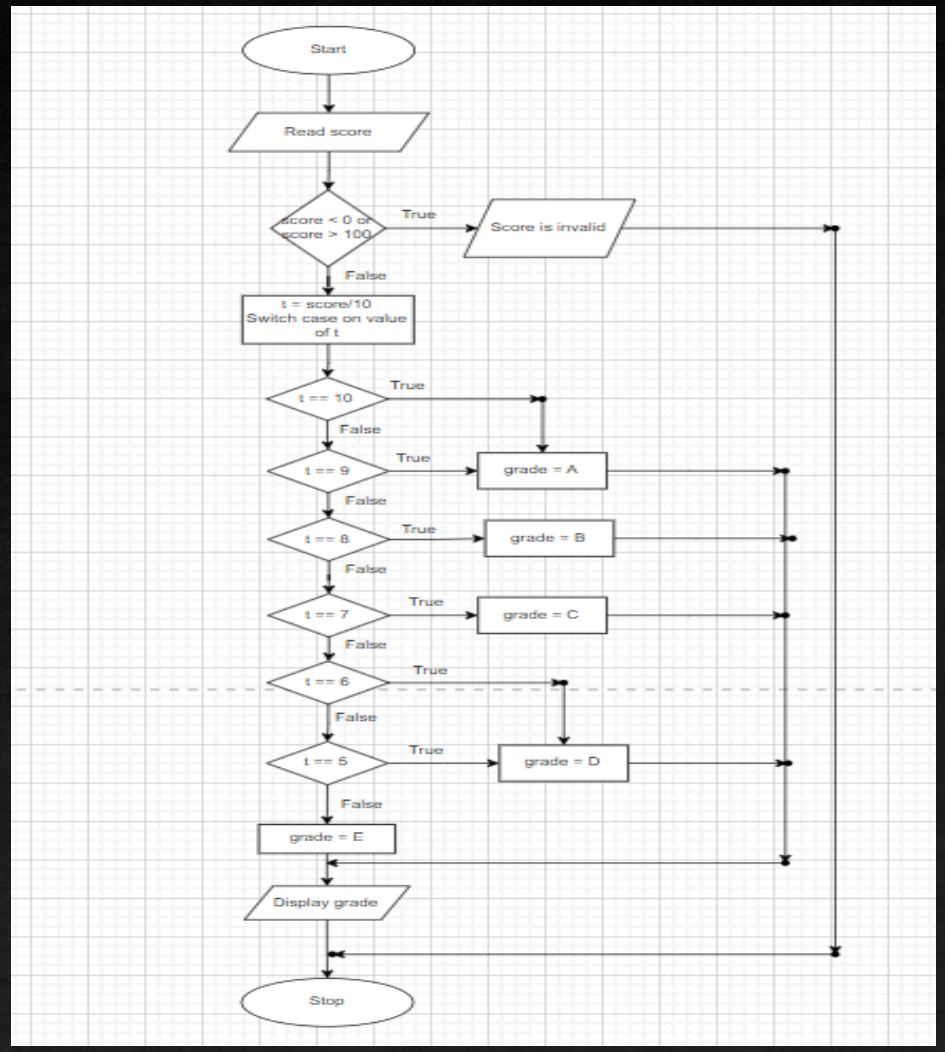
50 to 69 : D

Below 50 : E

Algorithm

1. Start
2. Declare variables score, t, grade
3. Read score
4. if score < 0 or score > 100 :
   display error, go to step-7
4. t = score/10
5. Switch case based on value of "t"
   case 10 :
   case 9 : grade=A, break
   case 8 : grade=B, break
   case 7 : grade=C, break
   case 5 :
   case 6 : grade=D, break
   default : grade=E
6. Display grade
7. Stop

Decision Making : Student Grade from Score



Loops : Real life example

- **Cooking:** Imagine you are stirring a pot of soup on the stove. You continue to stir until the soup reaches the desired consistency. In this case, stirring is a repetitive action performed until a condition (the desired consistency) is met.

- **Fitness Routine:** Consider a workout routine where you perform a set of exercises for a certain number of repetitions or for a specific duration. You repeat this set until you complete the planned workout, creating a loop of exercises.

- **Traffic Lights:** Traffic lights cycle through a sequence of colors (red, green, yellow) in a loop. Each color is displayed for a specific duration, and the loop continues to regulate traffic flow.

Loops in programming

- Loops are used to repeat a block of code until the specified condition is met.

- A loop statement allows programmers to execute a statement or group of statements multiple times without repetition of code.

Loops : Print numbers from 1 to N

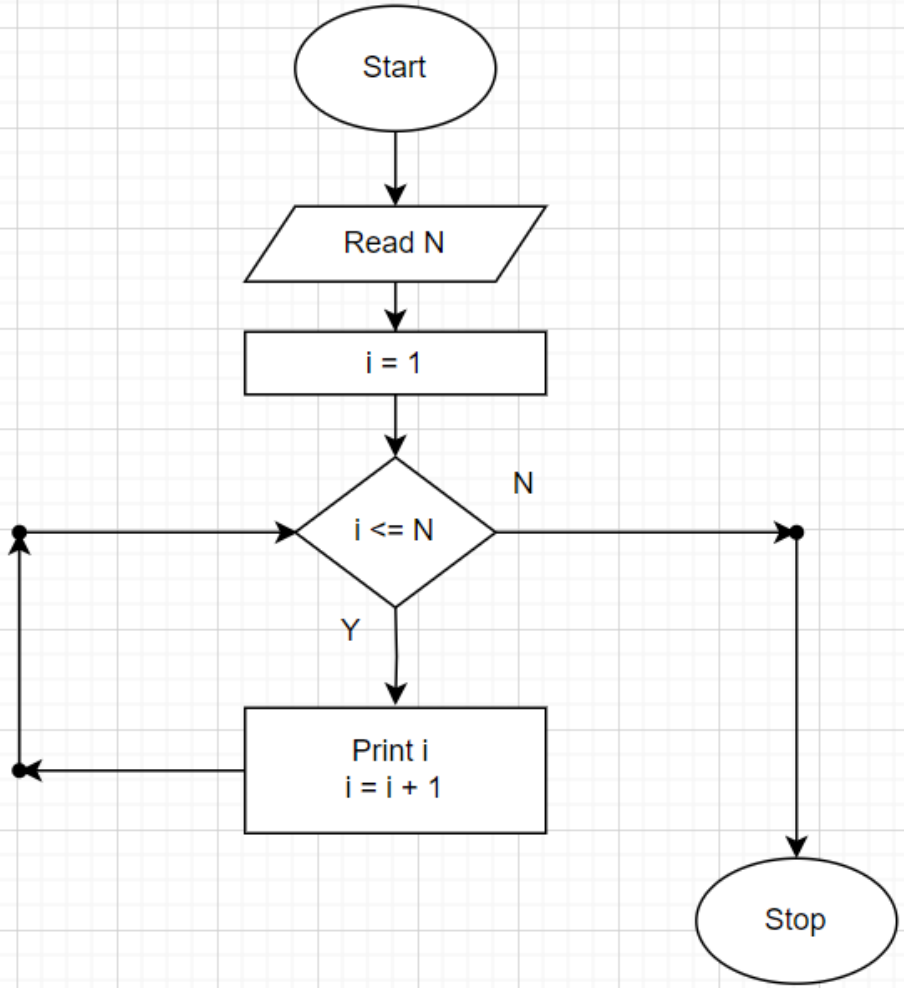
Algorithm:

1. Start
2. Declare variables i, N
2. Read N
3. Set i = 1
4. Repeat below steps until i <= N
    Display value of i
    Increment i
5. Stop

Loops : Print numbers from 1 to N..

Algorithm:

1. Start
2. Declare variables i,N
2. Read N
3. Set i = 1
4. Repeat until i <= N
   Display i
   Increment i
5. Stop



Loops : Display patterns

Problem : Display patterns like below for given number of rows.

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

Loops : Display patterns

Algorithm:

1. Start
2. Declare i, j, N
3. Read N
4. i=1, repeat till i <= N
   - j =1, repeat till j <= i
     - Print j
5. Stop

Sample Patterns for N=5

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

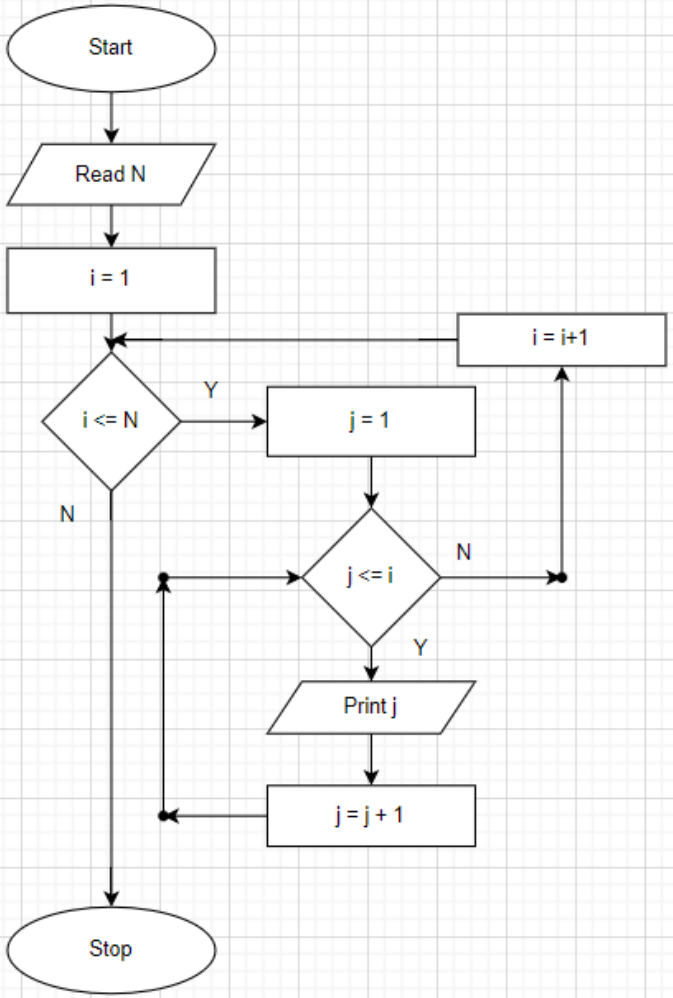
Loops : Display patterns

Display Patterns

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

Algorithm:

1. Start
2. Declare i, j, N
3. Read N
4. i=1, repeat till i <= N
   - j =1, repeat till j <= i
     - Print j
5. Stop



Lesson 3: Summary

Here is what we learned

- Control Statements
  - Decision Making
  - Loops