Algorithm and Flowchart

Lecture 5

by Hafijur Rahman

Algorithm

•Algorithm is a list of instructions [a finite number of steps]

•Recognition of the problem:
            - identify its input variables
            - list the outputs
            - formulation

Example Problem:

Find the average of a set of numbers.

       The algorithm:

      1.   Give the numbers

      2.   Add the numbers

      3.   Count the numbers (How many numbers)

      4.   Average = [answer to (2)]/ [answer to (3)]

          Average of 2, 4, 6

          1.   Give the numbers 2, 4, 6

          2.   2+ 4 + 6 = 12

          3.   3

          4.   12 / 3 = 4

Algorithm for generating Fibonacci numbers:

A set of numbers where each number is the sum of the two numbers immediately preceding it. The first 10 of them are :1, 1, 2, 3, 5, 8, 13, 21, 34,55. That is:
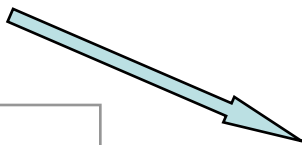
1+1=2
   1+2=3
     2+3=5
       3+5=8
         5+8=13……..

1+1=2
A B S

1+2=3
A B S

2+3=5
A B S

3+5=8
A B S

5+8=13……..

1) Set A, B to 1
2) Let S=A+B
3) Replace A with B (A = B)
4) Replace B with S (B = S)
5) Go to step 2 and proceed through step 5 again

4

Flowchart

- A flowchart is another "language" for describing and expressing algorithms.

- It is used to represent algorithm steps into **graphical format**.

- A flowchart uses, in addition to words, **geometric symbols** to express different types operation.

Advantages of flowchart:-

1.It provides an easy way of communication because any other person besides the programmer can understand the way they are represented.

2.It represents the data flow.

3.It provides a clear overview of the entire program and solution.

4. It checks the accuracy in logic flow.

5. It documents the steps followed in an algorithm.

6. It provides the facility for coding.

7. It provides the way of modification of running program.

8. They show all major elements and their relationship.

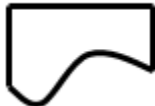| Symbol	Represents
▭	**Terminator**
▱	**Input / Output**
▭	**Process Symbol**
◇	**Decision Symbol**
○	**Connector Symbol**
⌐	**Input / Output as Printed Document**
✛	**Data Flow Symbol.**
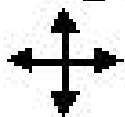
Terminator : This symbol represents the beginning and end point in a program. We use start and stop option in it.

Input / Output Symbol : This symbol is used to take any input or output in the algorithm.

Process Symbol : A rectangle indicates the processing, calculation and arithmetic operations

**Decision Symbol :** It is used when we want to take any decision in the program.

Connector Symbol : This symbol is used to connect the various portion of a flow chart. This is normally used when the flow chart is split between two pages.

Data Flow Symbol : This symbol is used to display the flow of the program. It shows the path of logic flow in a program.

GUIDELINES FOR PRESENTING A FLOW CHART

The following are some guidelines in flowcharting:

- In drawing a proper flowchart, all necessary requirements should be listed out in logical order.

- The flowchart should be clear, neat and easy to follow. There should not be any room for ambiguity in understanding the flowchart.

- The usual direction of the flow of a procedure or system is from left to right or top to bottom.

- Only one flow line should come out from a process symbol.

or
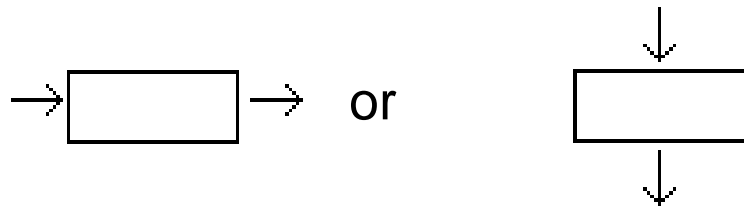
- Only one flow line should enter a decision symbol, but two or three flow lines, one for each possible answer, should leave the decision symbol.


- Only one flow line is used in conjunction with terminal symbol.

- If the flowchart becomes complex, it is better to use connector symbols to reduce the number of flow lines. Avoid the intersection of flow lines if you want to make it more effective and better way of communication.

- Ensure that the flowchart has a logical *start* and *finish.*

- It is useful to test the validity of the flowchart by passing through it with a simple test data.
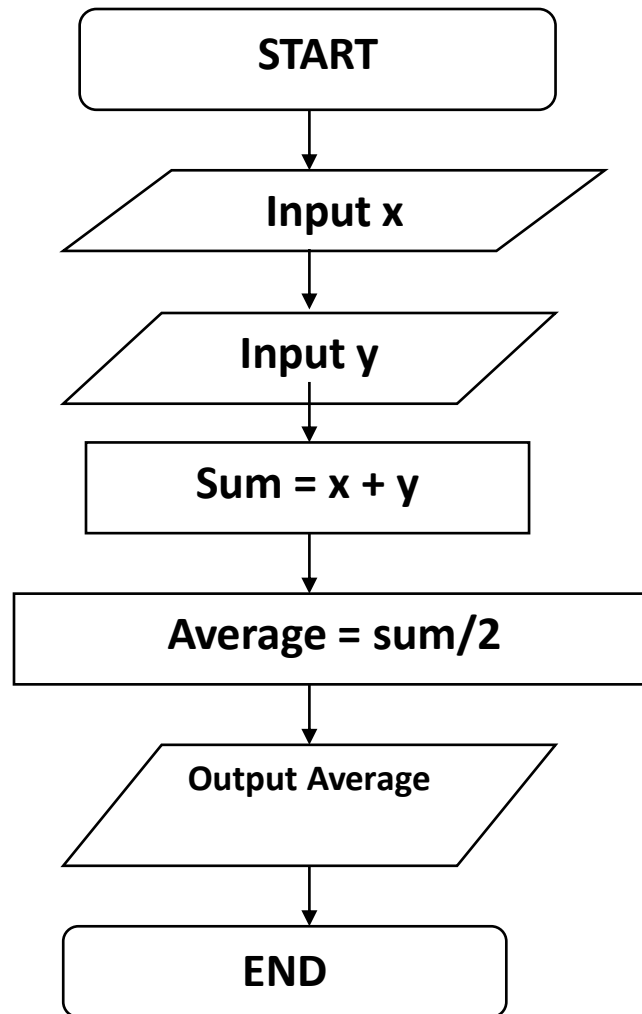
Example 1 of a flowchart

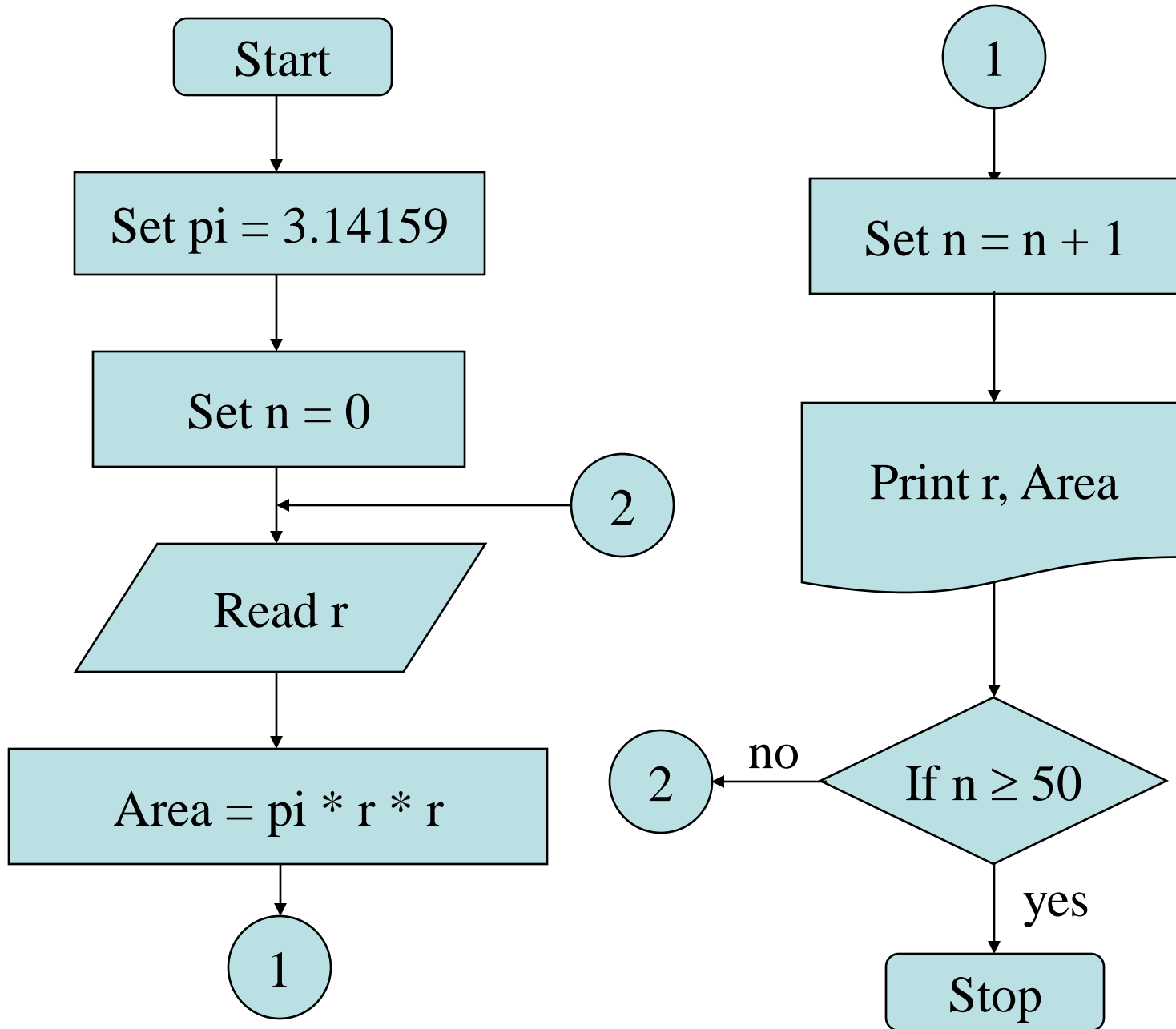**Get two numbers and show which one is greater.**
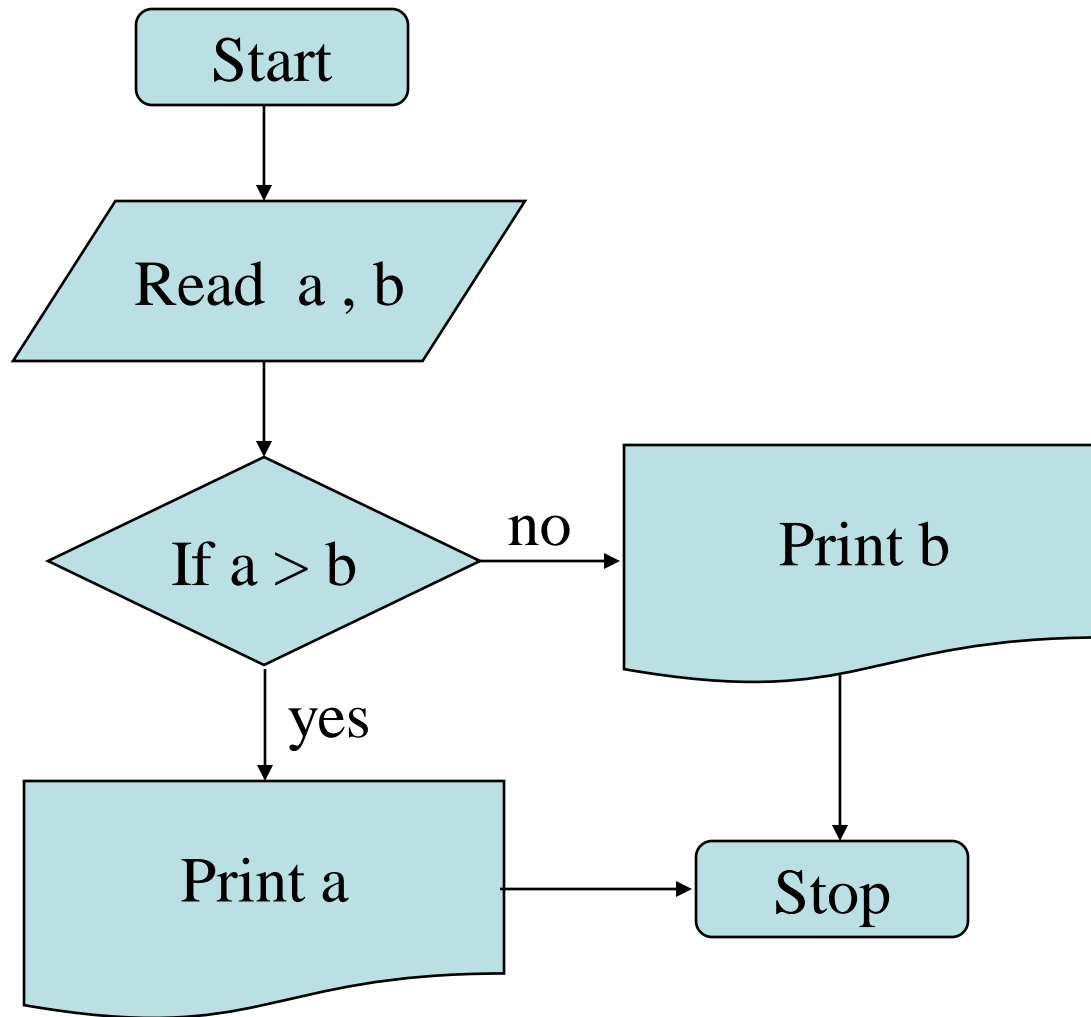
Example 2 of a flowchart

Draw the flowchart for finding the average of two numbers

```
                  START
                    │
                    ▼
                 Input x
                    │
                    ▼
                 Input y
                    │
                    ▼
               Sum = x + y
                    │
                    ▼
             Average = sum/2
                    │
                    ▼
             Output Average
                    │
                    ▼
                  END
```

Draw flowcharts for the following problem:

- Find the area of 50 circles.

Start

Set pi = 3.14159

Set n = 0

2

Read r

Area = pi * r * r

1

1

Set n = n + 1

Print r, Area

no ← If n ≥ 50

2

yes

Stop

14

Thanks