Saturday, 16
January 16

Crux

Lecture -1

Basics of Problem Solving :
Flow Charts & Pseudo code

Nidhi Agarwal

CODING
BLOCKS

Course content

- Basics of Problem Solving
- Programming Fundamentals
- Object Oriented Programming
- Data Structures

Course Administration

- Facebook Group
- Regular Assignments
- Laptops
- Doubt Sessions

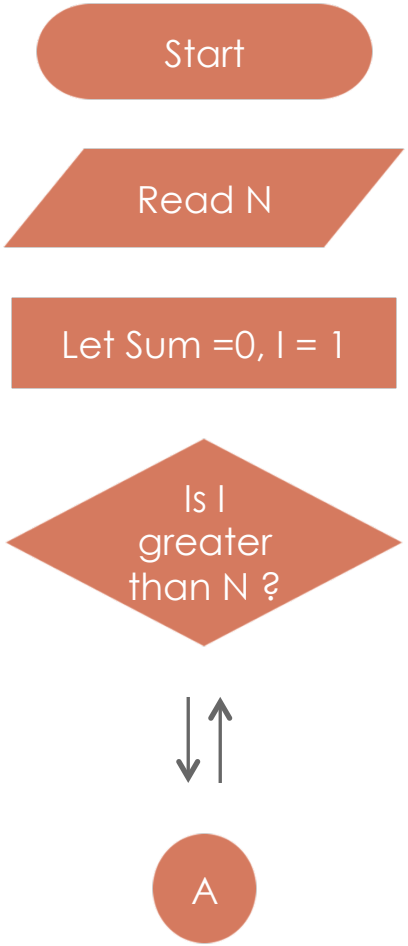
CODING BLOCKS

Flowcharts!

What is a flowchart?

- Diagrammatic representation illustrating a solution to a given problem.
- Allows you to break down any process into smaller steps and display them in a visually pleasing way.

Flowchart Components



Initializer / Terminator

Input / Output

Process

Decision

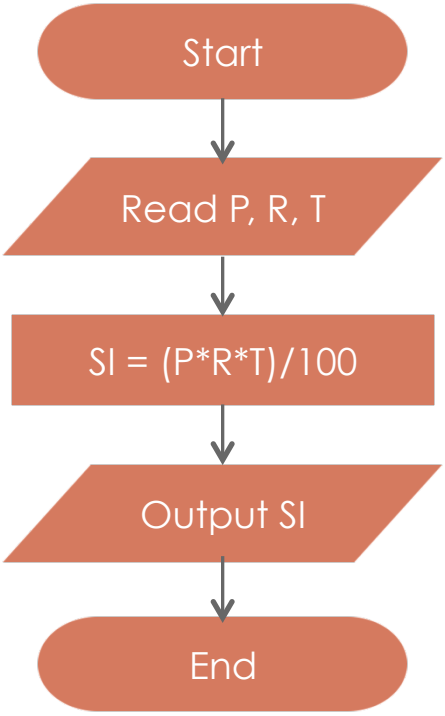
Arrow

Connector

CODING BLOCKS

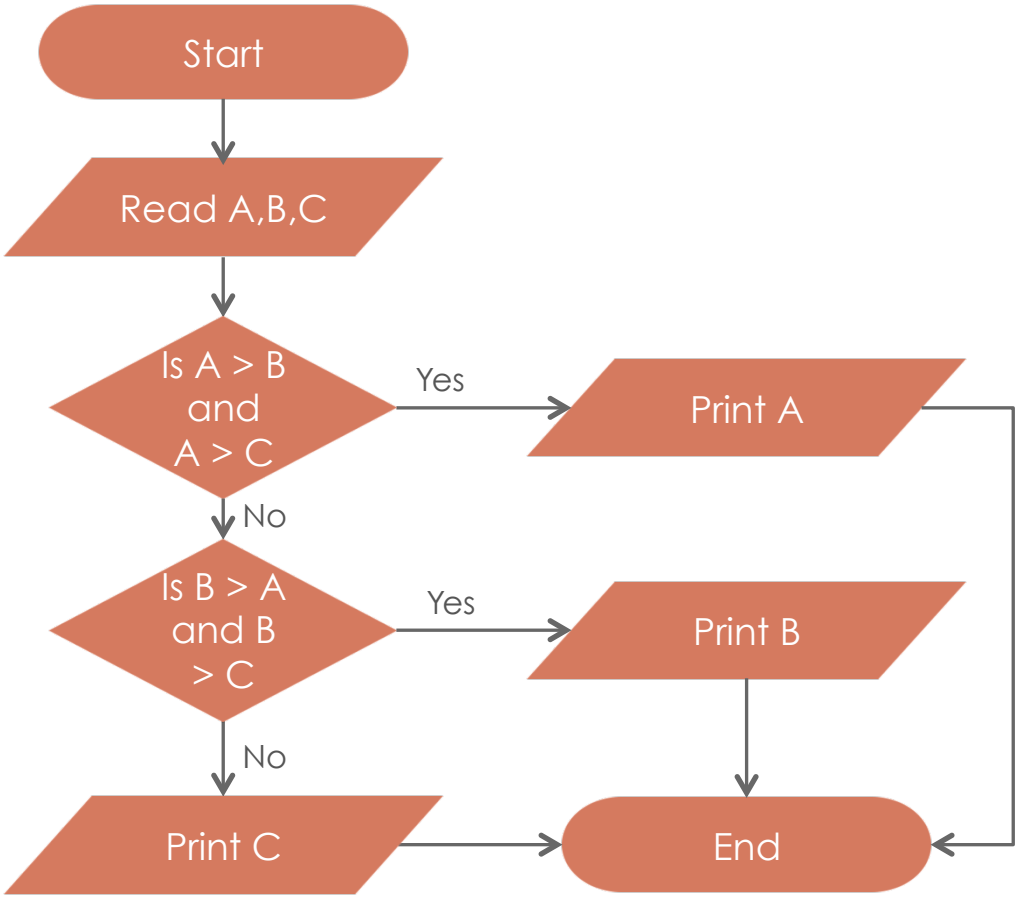
Lets look at few problems and their flowcharts!

Read Principal, Rate & Time and Print SI



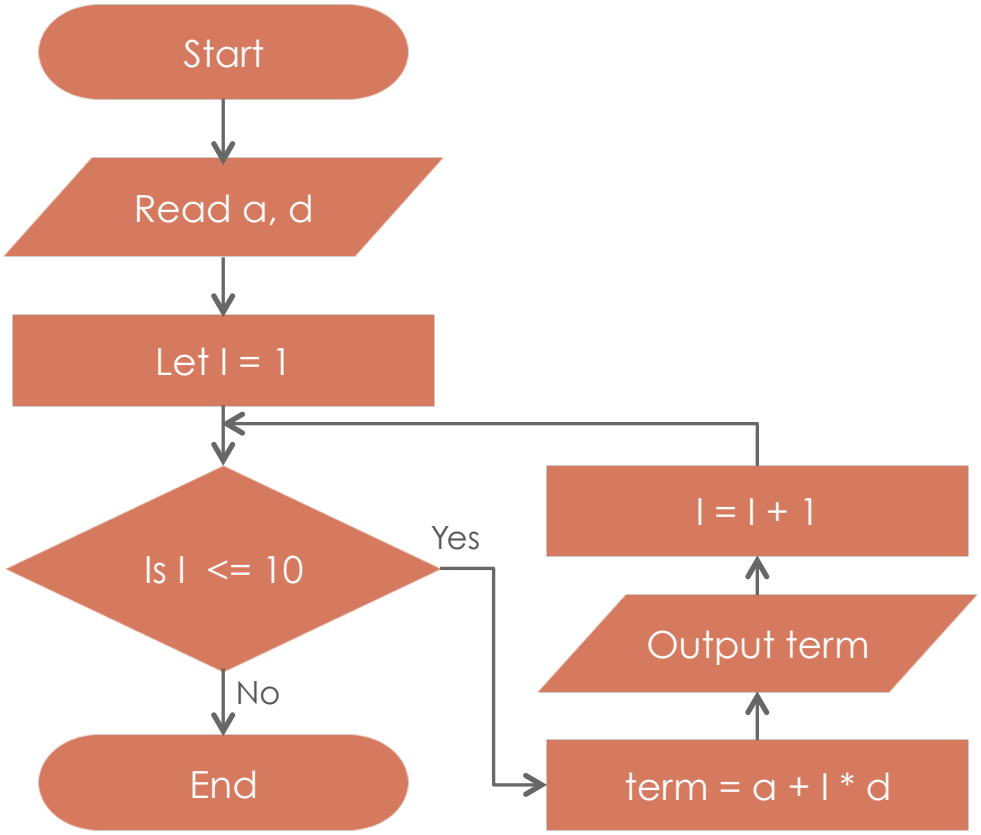
CODING BLOCKS

Find largest of three numbers



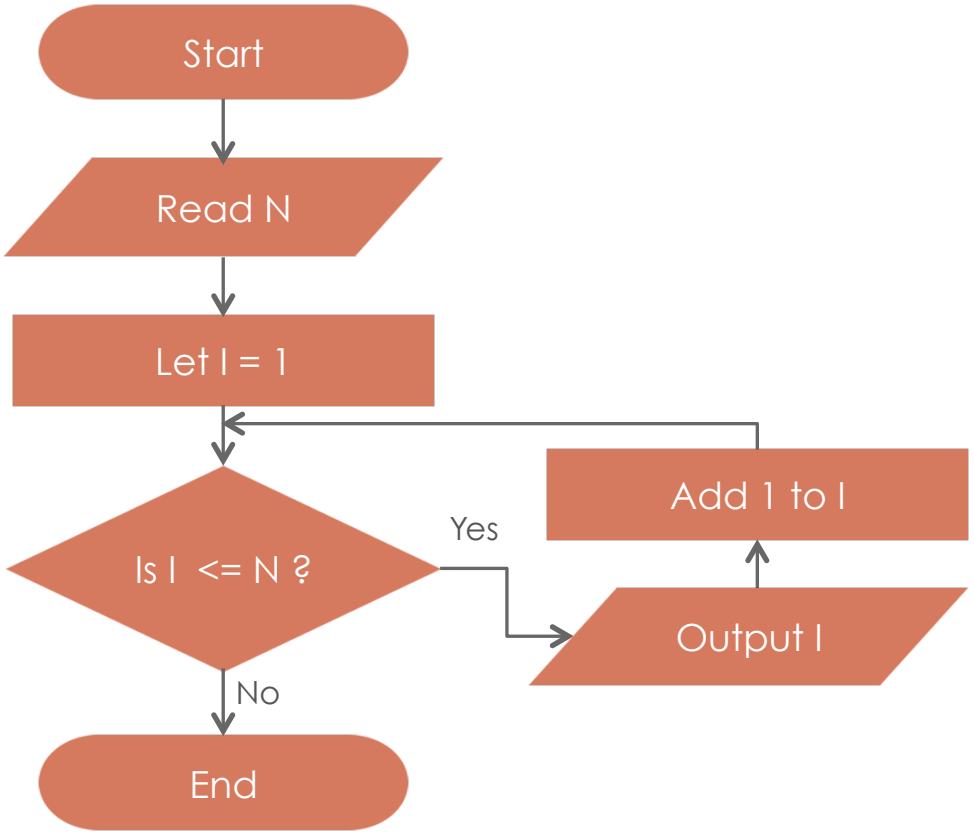
CODING BLOCKS

Read a & d, print 10 numbers of form a+d, a+2d, a+3d...



CODING BLOCKS

Given N, print all numbers from 1 to N

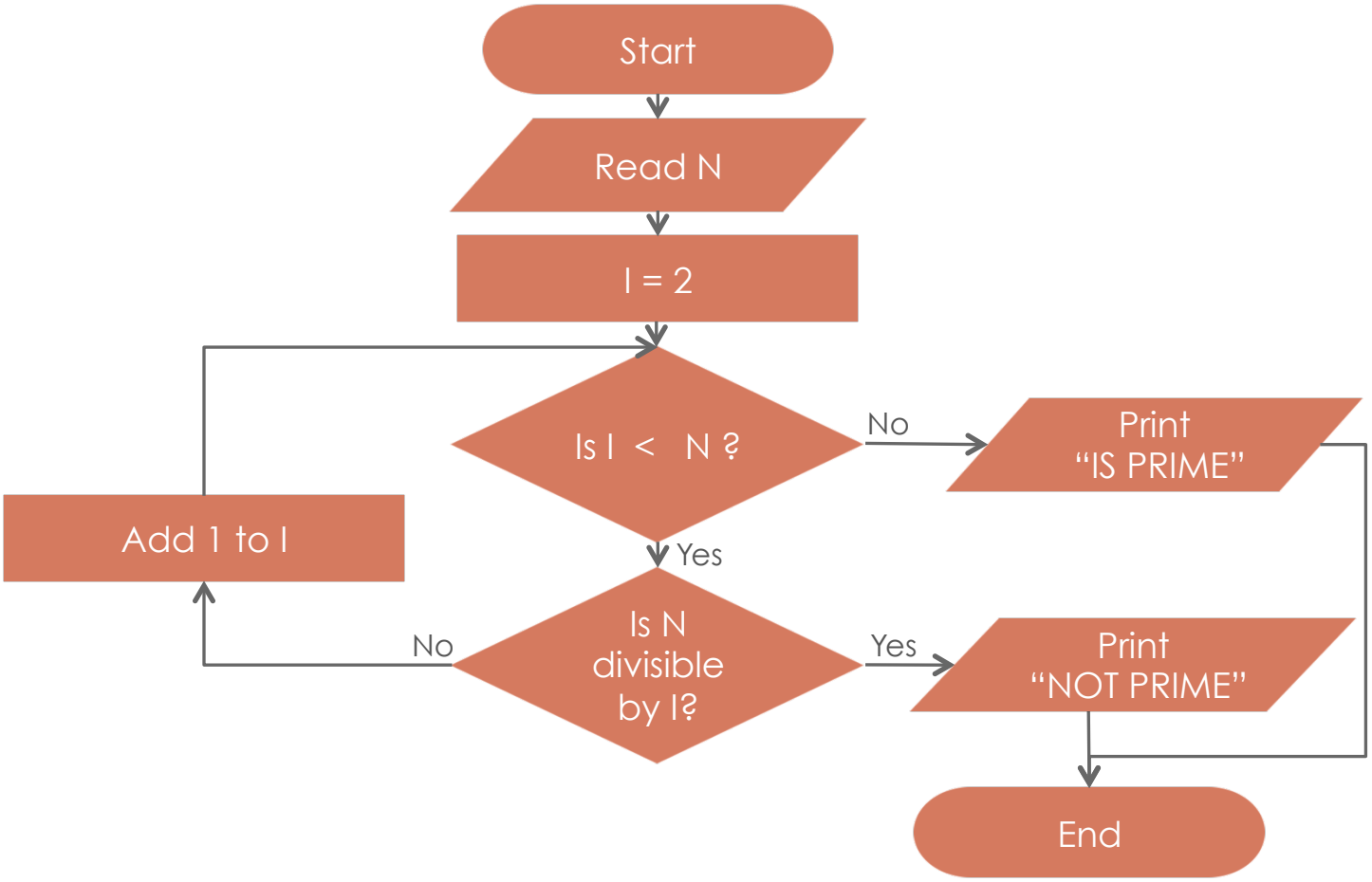


CODING BLOCKS

Time to try?

- Read five numbers and print their average
- Given N, find sum of even numbers from 1 to N
- Given N, check if its prime or not

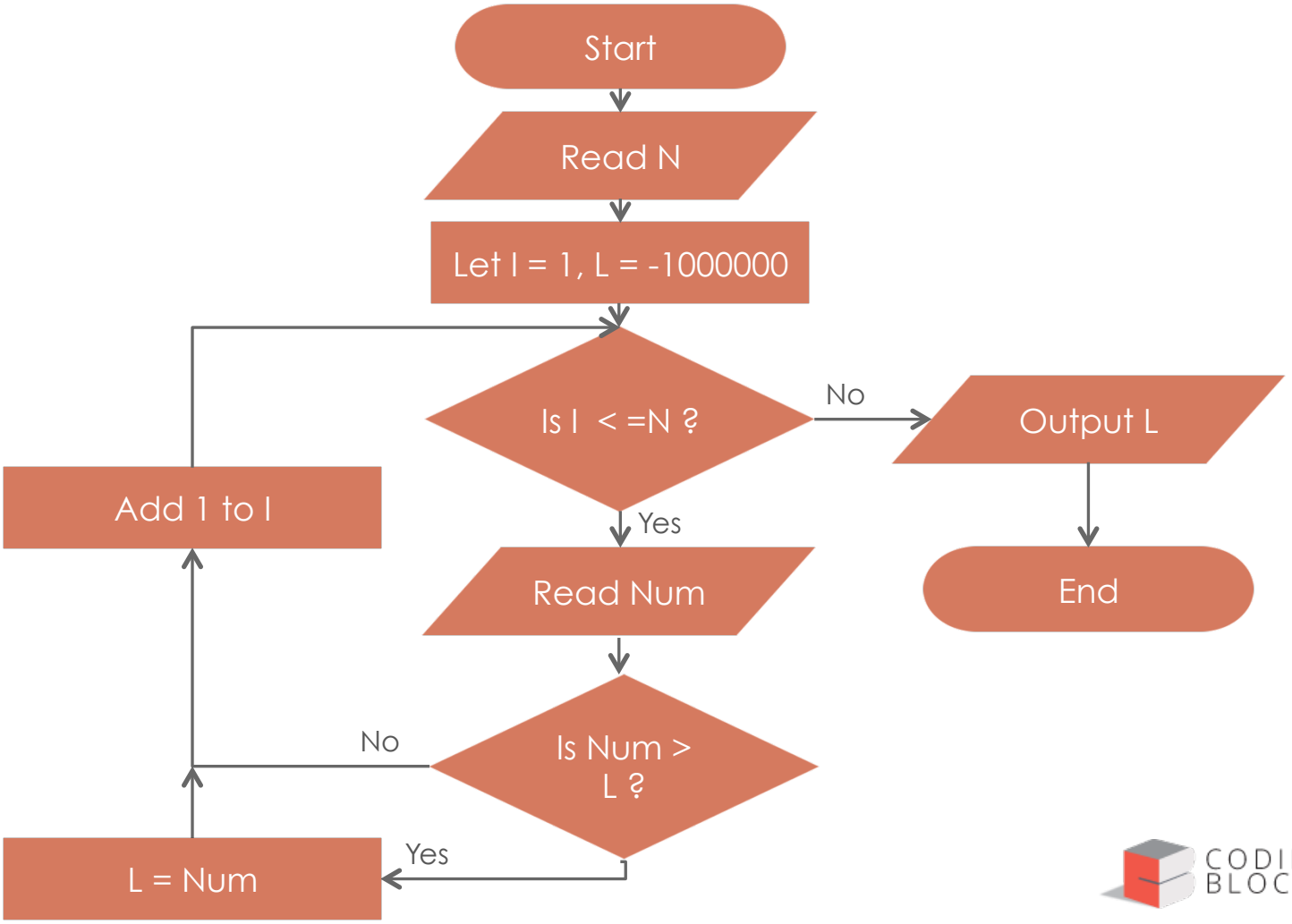
Check if a number is prime or not?



CODING BLOCKS

One more example

Find largest of N numbers



CODING BLOCKS

Time for Brain Teasers!

BT - 1: Hour Glasses

You have two hourglasses: a 7 minute one and a 11 minute one. Using just two hourglass, **accurately time 15 minutes**.

BT – 2: Apples and Oranges

There are three closed and opaque cardboard boxes. One is labeled "APPLES", another is labeled "ORANGES", and the last is labeled "APPLES AND ORANGES". You know that the labels are currently misarranged, such that no box is correctly labeled. You would like to correctly rearrange these labels. To accomplish this, you may draw only one fruit from one of the boxes. **Which box do you choose, and how do you then proceed to rearrange the labels?**

BT – 3: Average Salary

Three coworkers would like to know their average salary. However, they are self-conscious and don't want to tell each other their own salaries, for fear of either being ridiculed or getting their houses robbed. **How can they find their average salary, without disclosing their own salaries?**

Pseudocode!

What is a Pseudocode?

Human readable informal description of a algorithm/program

Lets define our own Pseudocode language

- Input [read N]
- Assignment [Sum ← 0]
- Output [print Sum]
- If Else [if I < N then … end else then … end]
- While Loop [while I < N do … end]
- Exit [exit]

Check if a number is Prime?

```
read N
divisor ← 2
while divisor < N do
        if N is divisible by divisor then
                print "NOT PRIME"
                exit
        end
        divisor ← divisor + 1
end
print "IS PRIME"
exit
```

Lets try one more problem!

Write pseudocode to print following pattern!

1

2 3

4 5 6

7 8 9 10

Pseudocode

```
read N
Row ← 0
Value ← 1
while Row < N do
        Col ← 0
        while Col <= Row do
                print Value
                Value ← Value + 1
                Col ← Col + 1
        end
        print "\n"
        Row ← Row + 1
end
exit
```

Time to try?

1. Find Largest of N numbers
2. Reverse a Number
3. Write pseudo-code to print the following pattern

```
    1
   232
  34543
 4567654
567898765
```

BT – 4: Criminal Cupbearers

An evil king has 1000 bottles of wine. A neighboring queen plots to kill the bad king, and sends a servant to poison the wine. The king's guards catch the servant after he has only poisoned one bottle. The guards don't know which bottle was poisoned, but they do know that the poison is so potent that even if it was diluted 1,000,000 times, it would still be fatal. Furthermore, the effects of the poison take one month to surface. The king decides he will get some of his prisoners in his vast dungeons to drink the wine. **Rather than using 1000 prisoners each assigned to a particular bottle, this king knows that he needs to murder no more than 10 prisoners to figure out what bottle is poisoned, and will still be able to drink the rest of the wine in 5 weeks time. How does he pull this off?**

Thank You!

Nidhi Agarwal
nidhi@codingblocks.com