Data Structures in Java

Manisha Khattar

Course Content

- Basics of Problem Solving

- Programming Fundamentals

- Object Oriented Programming

- Data Structures

Logistics

- Facebook Group

- Laptops

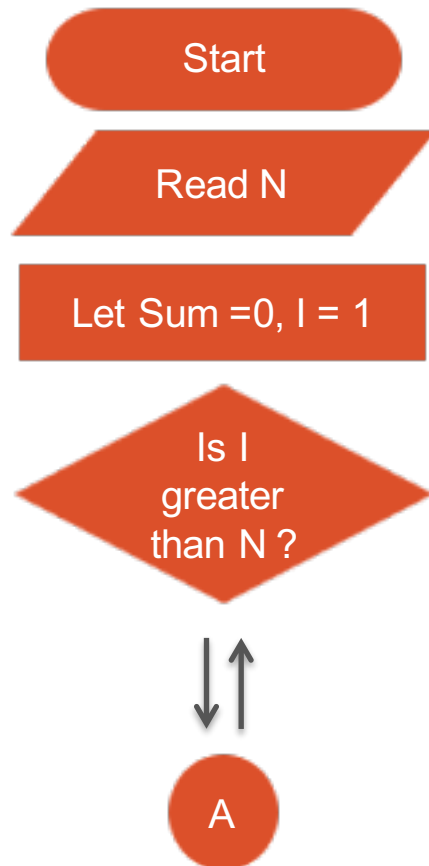- Assignments

- Doubt Sessions

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

Start

Read N

Let Sum =0, I = 1

Is I greater than N ?

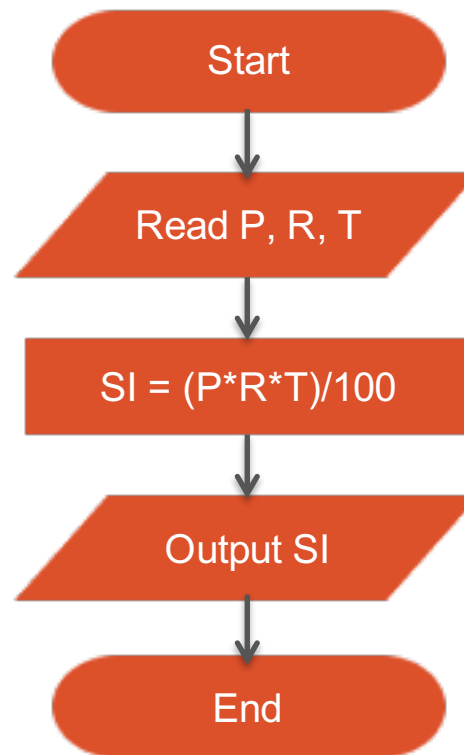A

Terminator

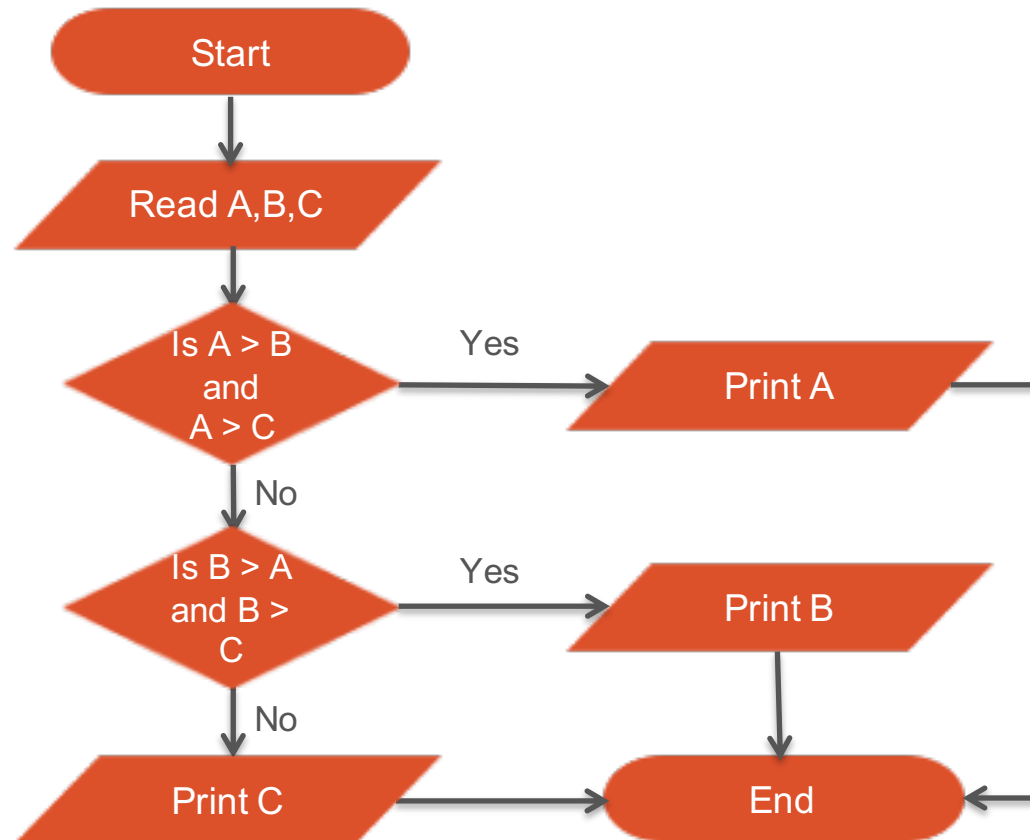Input / Output

Process

Decision

Arrow

Connector

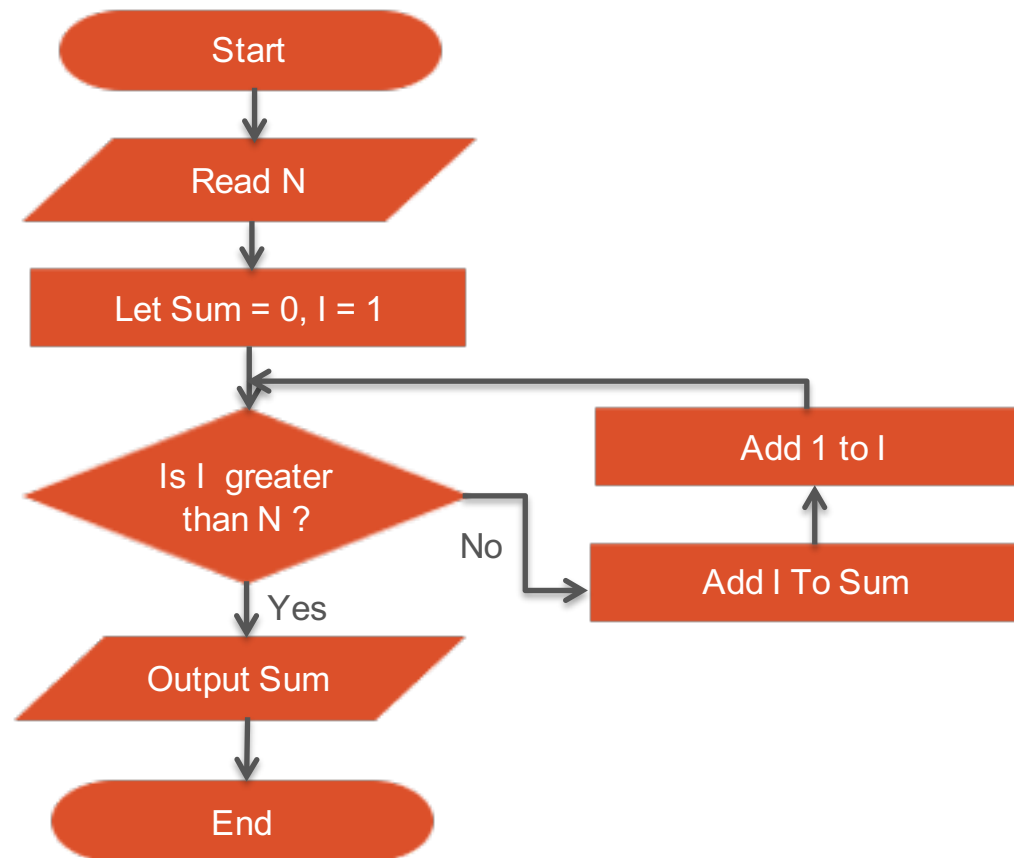Lets look at few problems and their flowcharts!

Read Principal, Rate & Time and Print SI

Find largest of three numbers

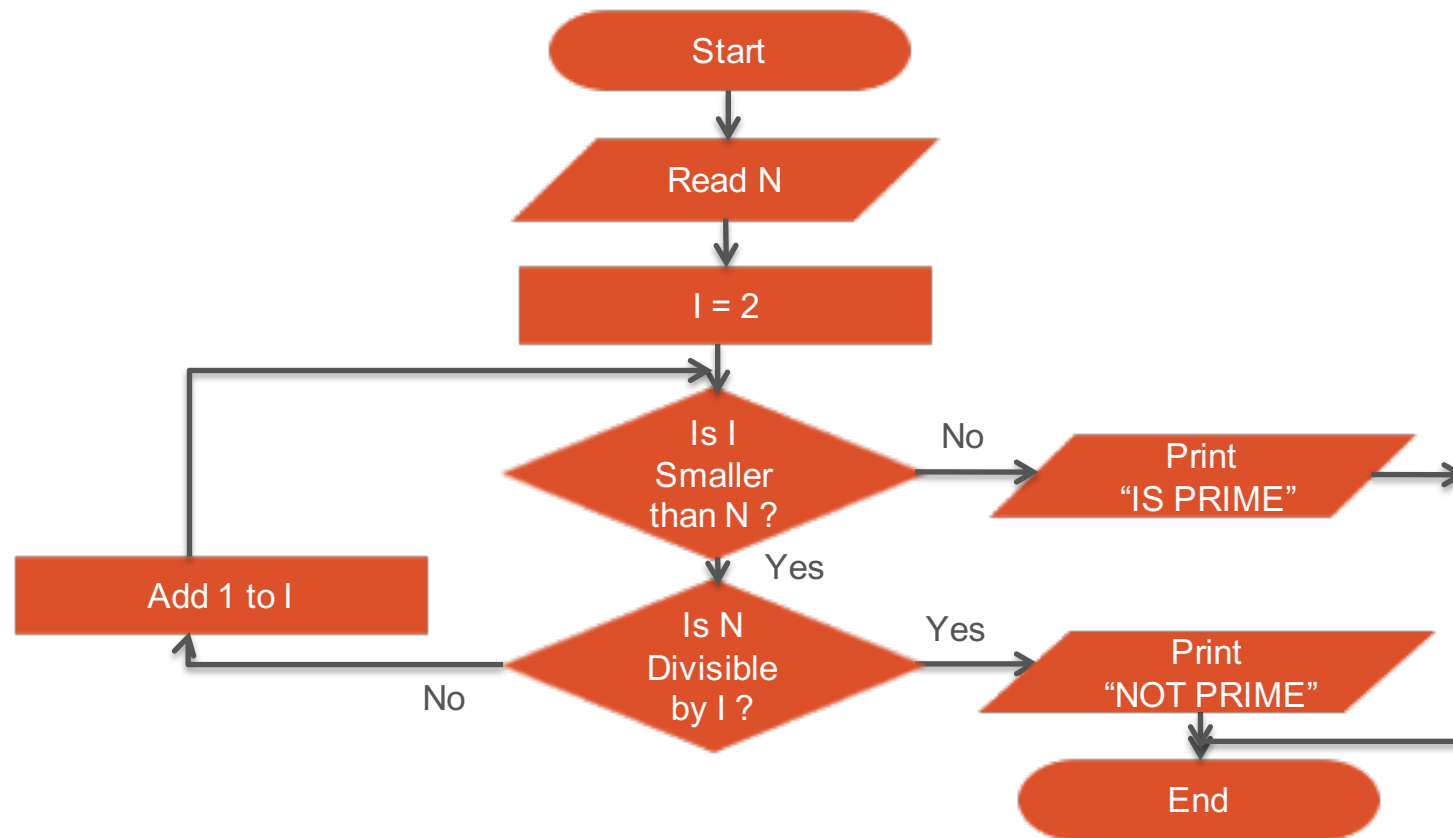# Find Sum of numbers from 1 to N

Time to Try?

- Given a Number N, check if it's Prime or Not?

- Given a Number N, check if it's a member of Fibonacci Sequence?

Check if a number Is Prime?

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.

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?**

What is a Pseudocode?

Human readable informal description of a algorithm/program
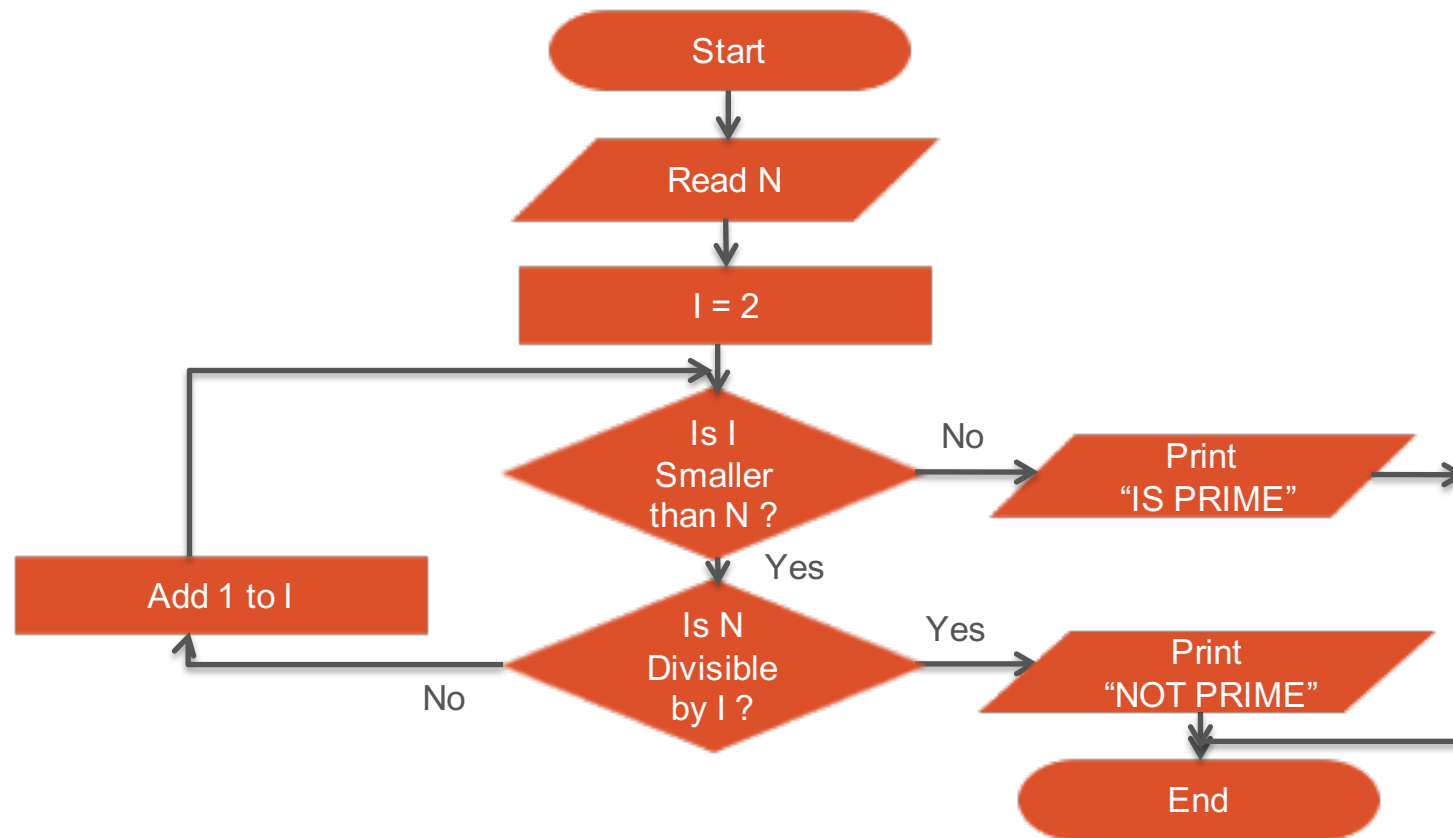
Why Learn It?

- Language Independent.

- Structure your code before writing it.

- Fastest way to verify.

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?

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 psuedocode to print following pattern!
1
2 3
4 5 6
7 8 9 10

Pseudocode

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

Time to try?

- Write pseudocode to print the following pattern
  ```
      1
     232
    34543
   4567654
  567898765
  ```
- Find sum of reverse of two numbers.
- Write a program to swap two numbers without using third variable.

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 !! ☺

Manisha Khattar
manisha@codingninjas.in