COMP 102:Structured Programming

Lecture 1

Problem solving

- Problem Analysis
- Algorithm development and flow chart
- Coding
- Compilation and execution
- Debugging and testing
- Program documentation

Pre-requisites

- Algorithm:

  It is a step by step procedure or formula for solving a problem

- Flowchart

  Diagrammatical representation of algorithm or process showing the steps as boxes of various kinds, and their order by connecting these with arrows

Problem: Find sum of two number

1) START
2) Read first number :X
3) Read second number :Y
4) Add X andY
5) Display Sum
6) STOP

Problem: Compare two number and display larger among two

1) START
2) Read first number :X
3) Read second number :Y
4) Is X>Y

   If yes, then display X

   If no, then displayY
5) STOP

Problem: Find if a number is even or odd

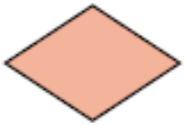
Problem: Find if a number is even or odd

1) START
2) Read first number :**X**
3) Is X divisible by 2

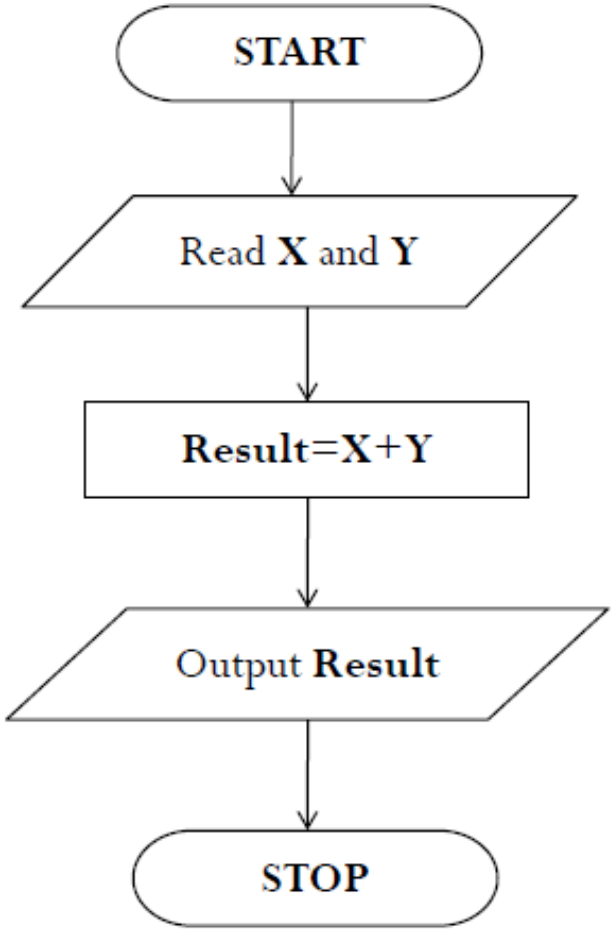
   If yes, then output "X is even"

   If no, then output "X is odd"
4) STOP

Basic Symbols Used in Flowchart

Name	Symbol	Use in Flowchart
Oval (Terminator)		Denotes **Start** and **End** of a program
Arrow		Denotes **Flow of program**
Parallelogram		Denotes **Input** or **output**
Rectangle		Denotes **Process** to be carried out
Diamond		Denotes **decision** to be made
Circle (Connector)		Denotes **breakage in flow line** that will be continued elsewhere.

Problem: Find sum of two number



Start

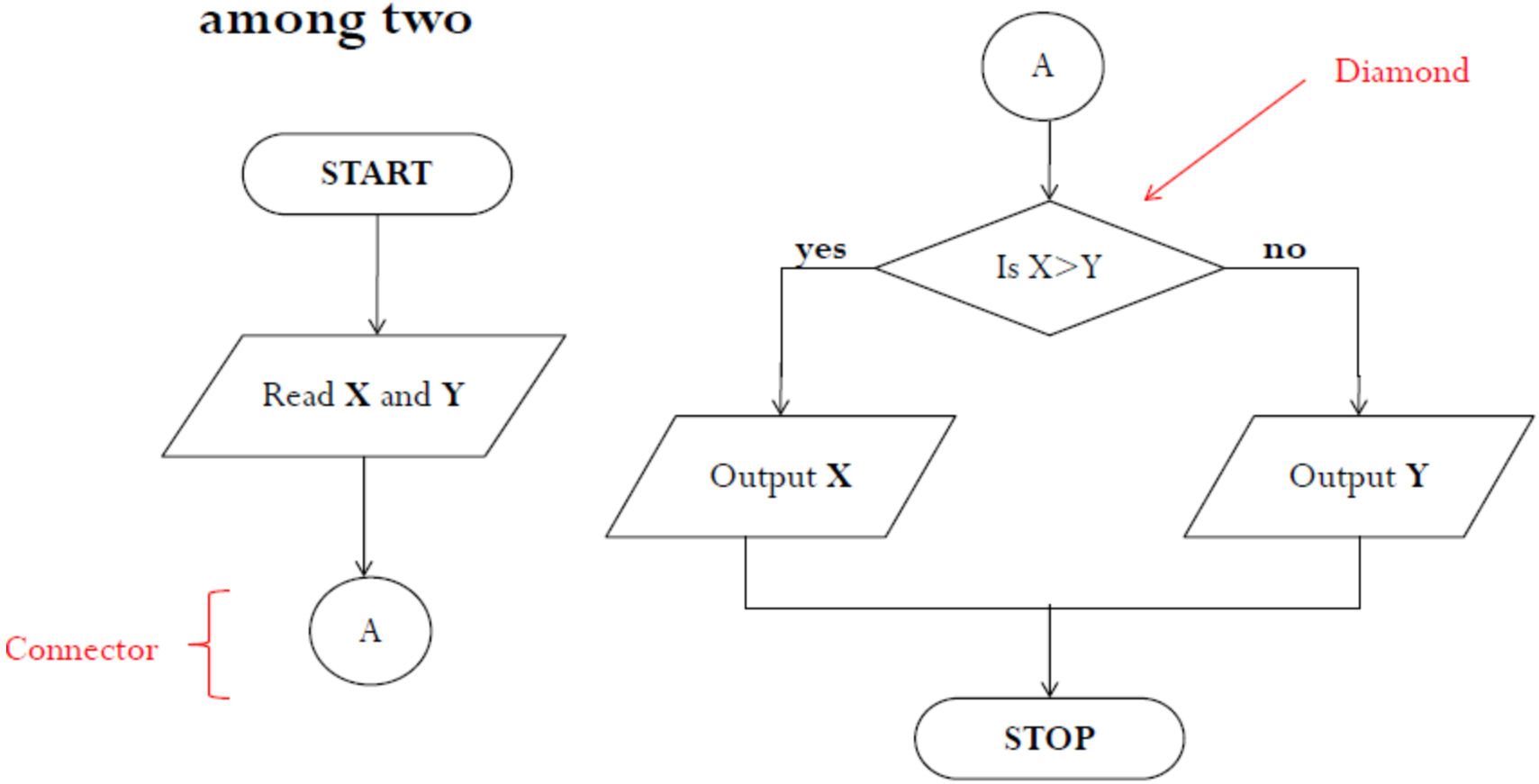
Input

Process (here addition)

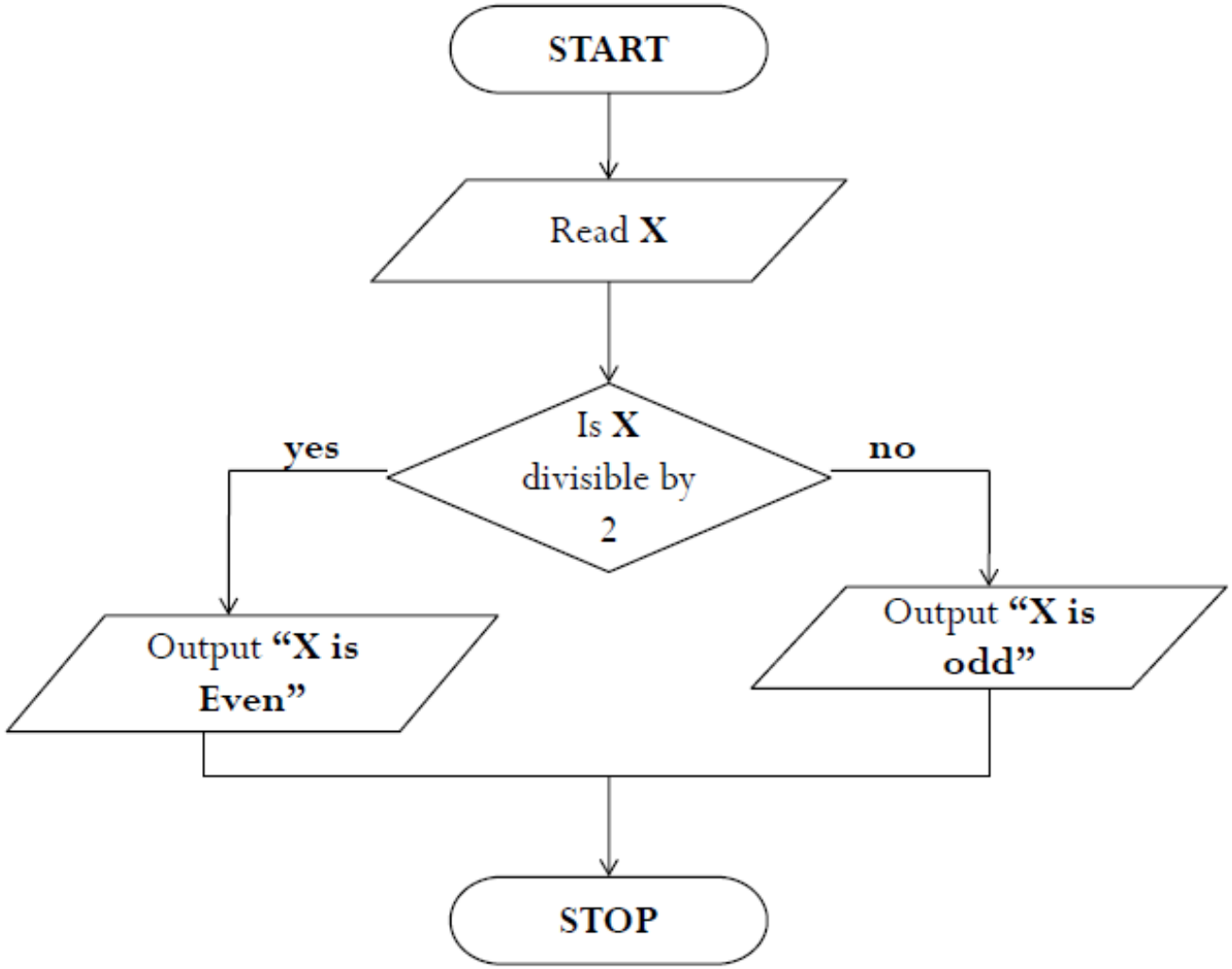
Output

End

Problem: Compare two number and display larger among two



Problem: Find if a number is even or odd


START
Read X
Is X divisible by 2
yes
no
Output "X is Even"
Output "X is odd"
STOP

C

- Developed by Dennis Ritchie in 1970 at Bell Telephone Laboratories, Inc.
- Its features were derived from an earlier Basic Combined programming language called "B"
- Structured programming language
- Reliable, simple and easy to use

Basic structure of C programming

Documentation Section
Link Section
Definition Section
Global Declaration Section

main( )
{
Main Program Section
}

Subprogram Section User defined functions

Basic structure (Contd.)

- Documentation section
  - consists of comment lines giving the name of the program ,the author and other details. These comments beginning with the two Characters * and ending with the characters *\.
- Link section
  - instruct the compiler to include C preprocessors such as header files before compiling the C program
- Definition section
  - defines all symbolic constants
- Global Declaration Section
  - The variables are declared before the main ( ) function as well as user defined functions
- main()
  - means "start here"
- Subprogram section
  - contains all the user defined functions

hello.c

```
/*
    hello.c is first C program
*/

#include<stdio.h>

void main()
{
        printf("Hello World");
}
```

Documentation Section

Link Section

Main Program Section

C doesn't care much about spaces

```
/*
    hello.c is first C program
*/
#include<stdio.h>
void main()
{
        printf("Hello World");
}
```

Execution of C

- Create a program and save it with filename "hello.c"

- Compiling and Linking

  gcc hello.c

- Executing

  ./a.out

Complier

- A program that translates *source code* into *object code*
  - Source code: consists of instructions in a particular language, like C
  - Object code: Machine readable format