# Introduction to Computers
Lab 9
First Year (2017– 2018)

Problem1

- Draw flowchart which represents a program that displays the bonus for employees according to the number of years worked. The bonus is calculated as a percentage of the current salary as shown in table. The output should be in the following form:

  - The bonus is: 23.6

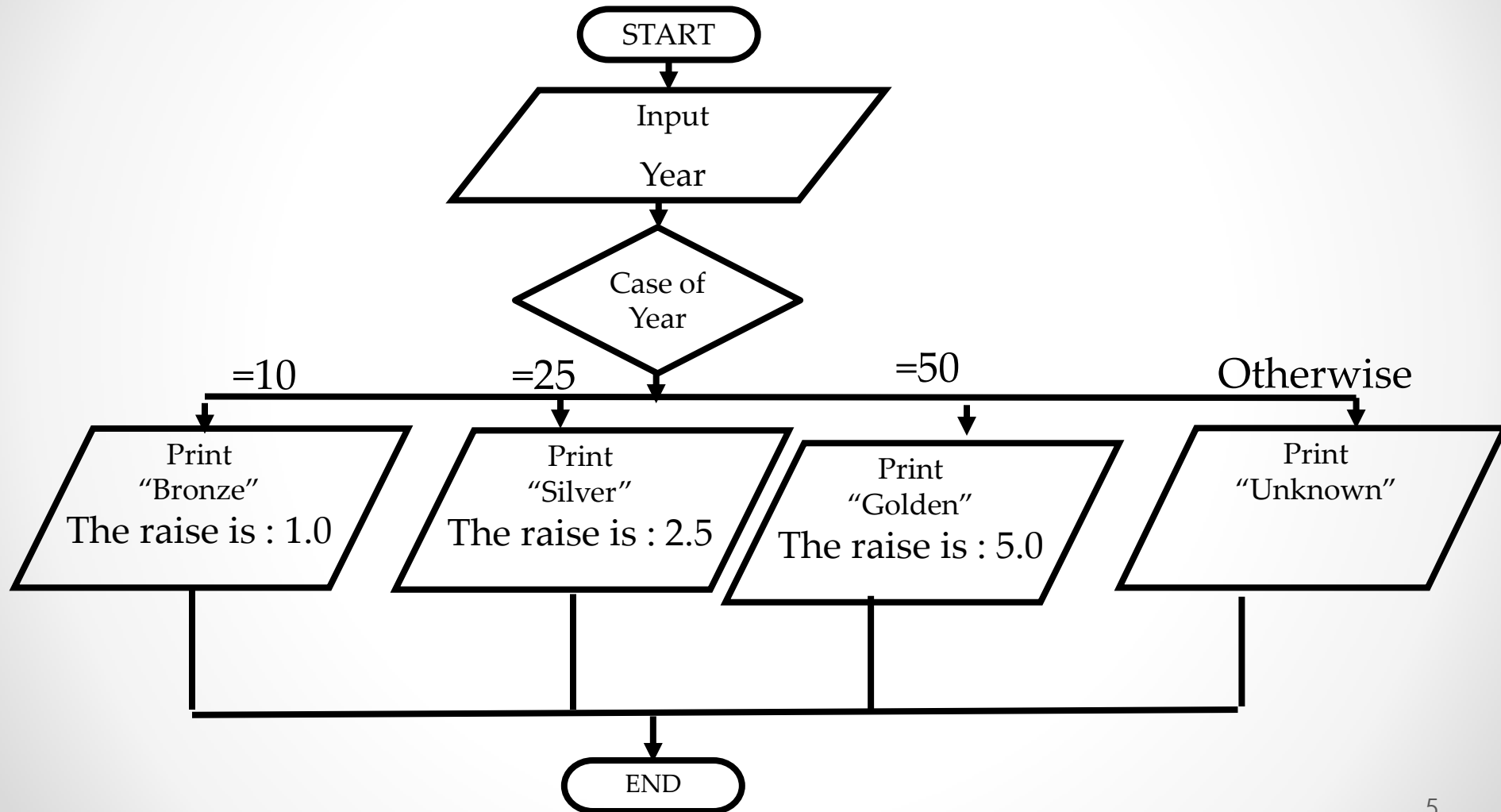| Number of Years	Bonus
1	15%
2	25%
3	35%
Others	50%

Problem 1: Another Solution
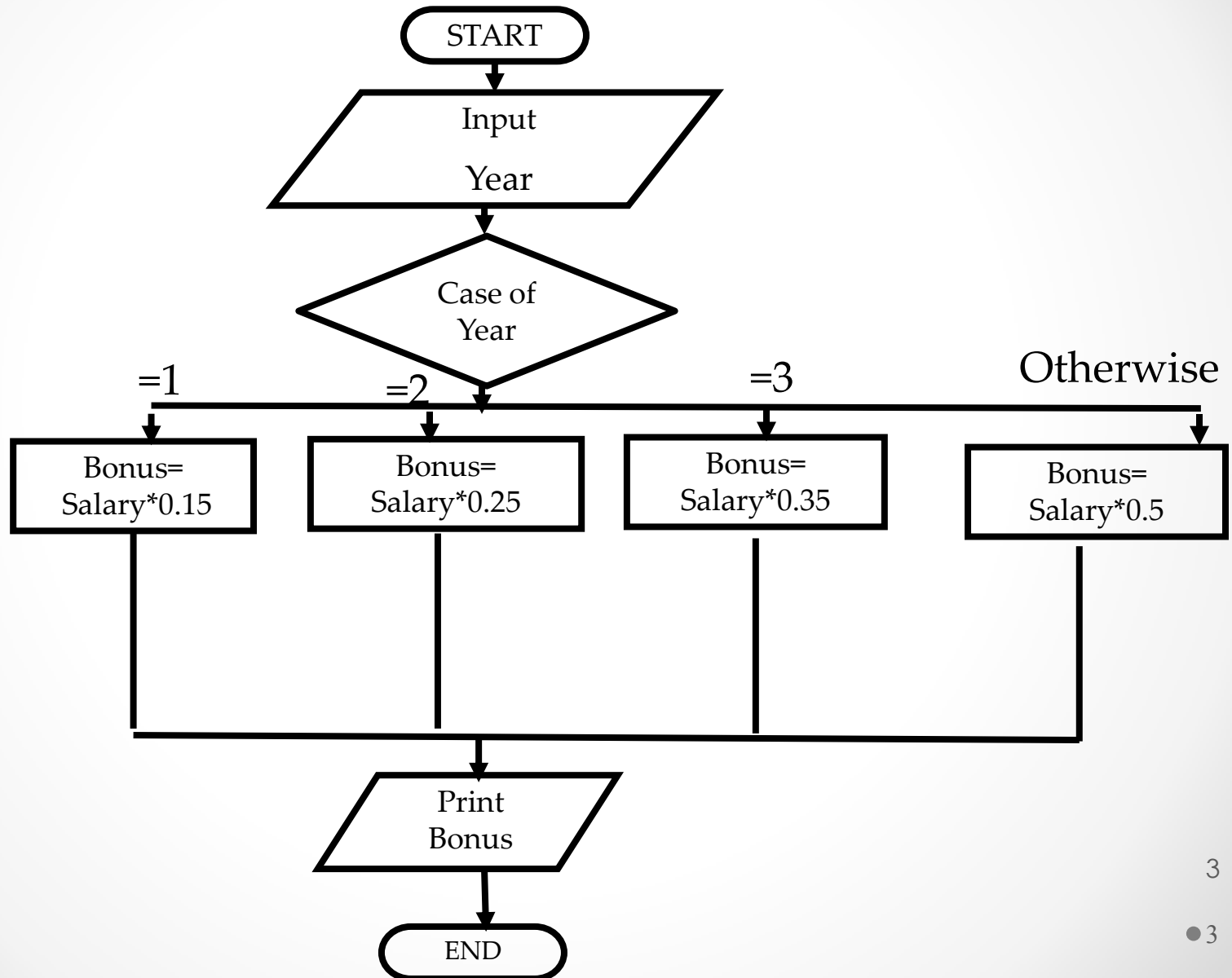
Problem 2

- Draw flowchart which represents a program that reads the number of working years and displays the celebrated company anniversary as shown in table. The program should also display the raise amount for its employees, which is calculated as 10% of the number of years the company has been in business. The output should be in the following form:
  - Silver
  - The raise is : 2.5

Number of Years	Anniversary
10	Bronze
25	Silver
50	Golden
Others	Unknown

4a

● Aaaa`

Problem 2: Another Solution

START

Input

Year

Case of
Year

=10   =25   =50   Otherwise

Print
"Bronze"
The raise is : 1.0

Print
"Silver"
The raise is : 2.5

Print
"Golden"
The raise is : 5.0

Print
"Unknown"
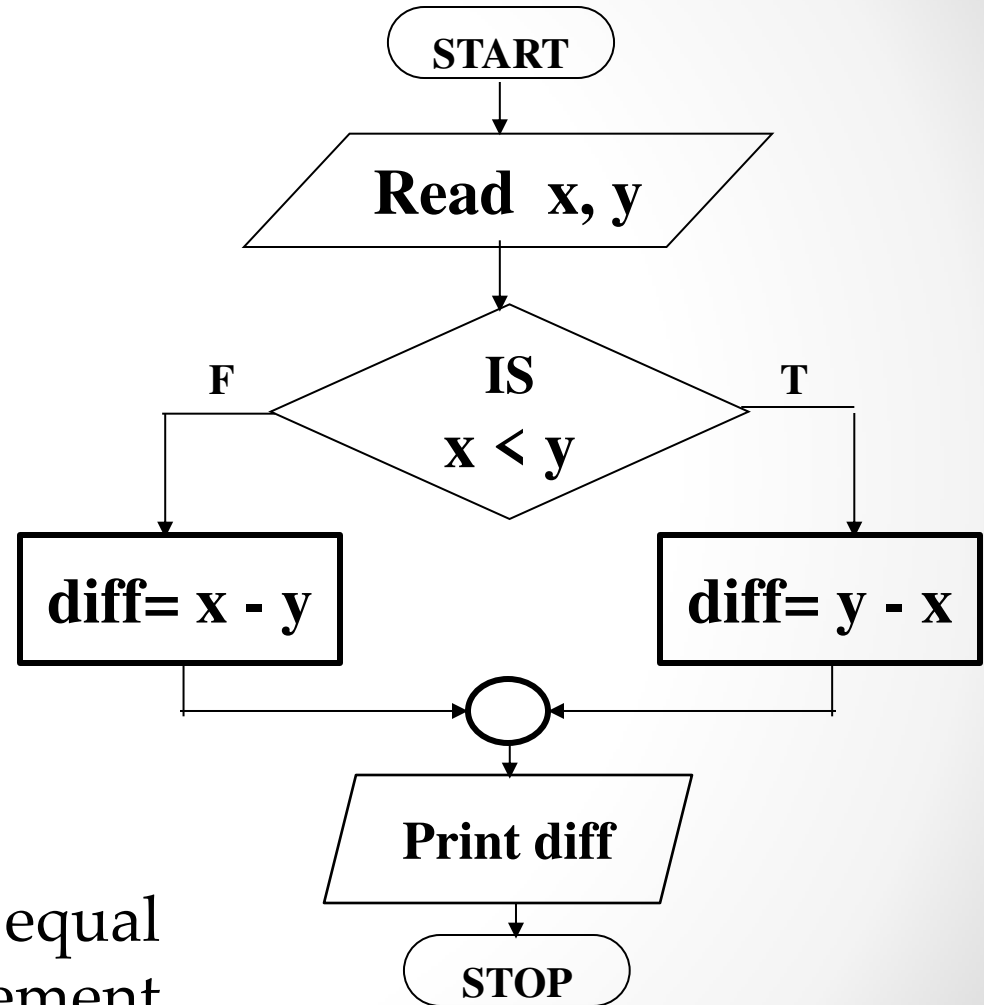
END

Problem 3

- Draw flowchart which represents a program that calculates the absolute difference between two numbers.

- Which statement is executed if the user enters equal numbers?
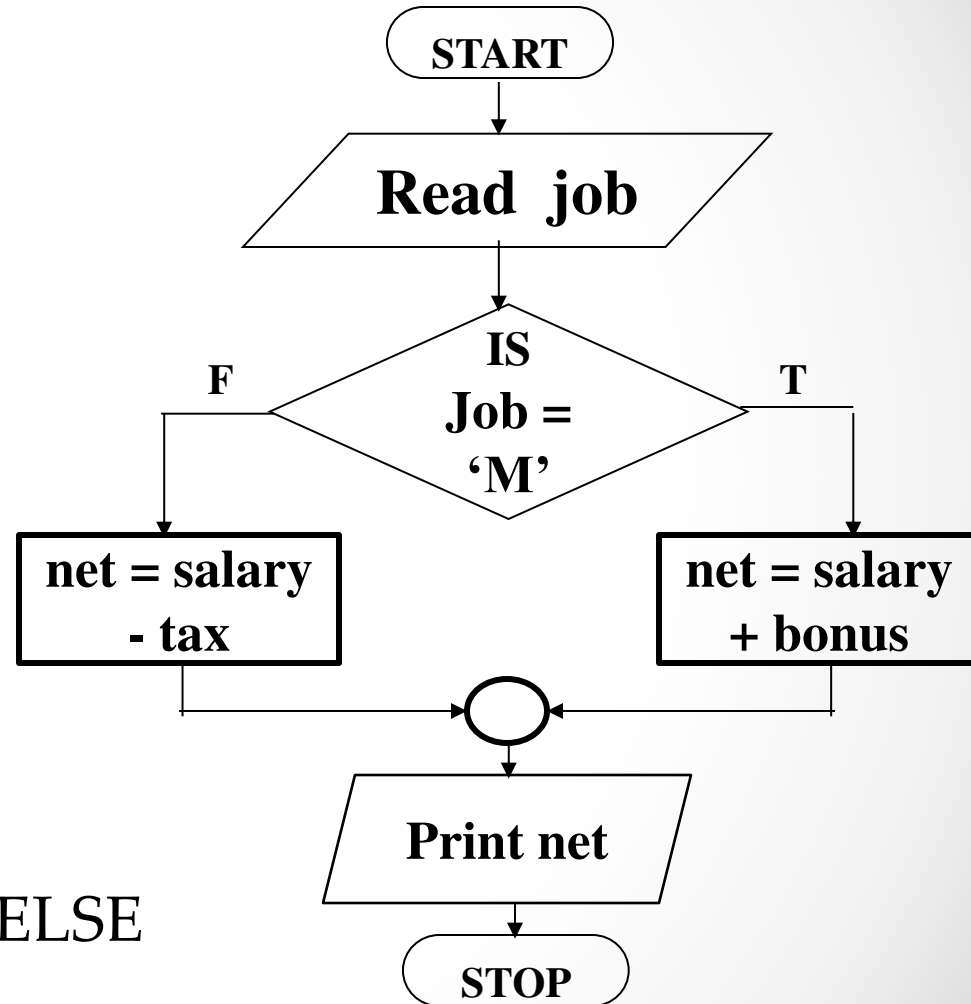
Problem 3: Solution

START

Read x, y

IS
x < y

F   T

diff= x - y   diff= y - x

Print diff

STOP

▸ If the user enters equal numbers, the ELSE statement is executed.

Problem 4

- Draw flowchart which represents a program that calculates the net salary of an employee based on his job: 'M' for manager and 'E' for employee.

- Which statement is executed if the user enters 'A' ?
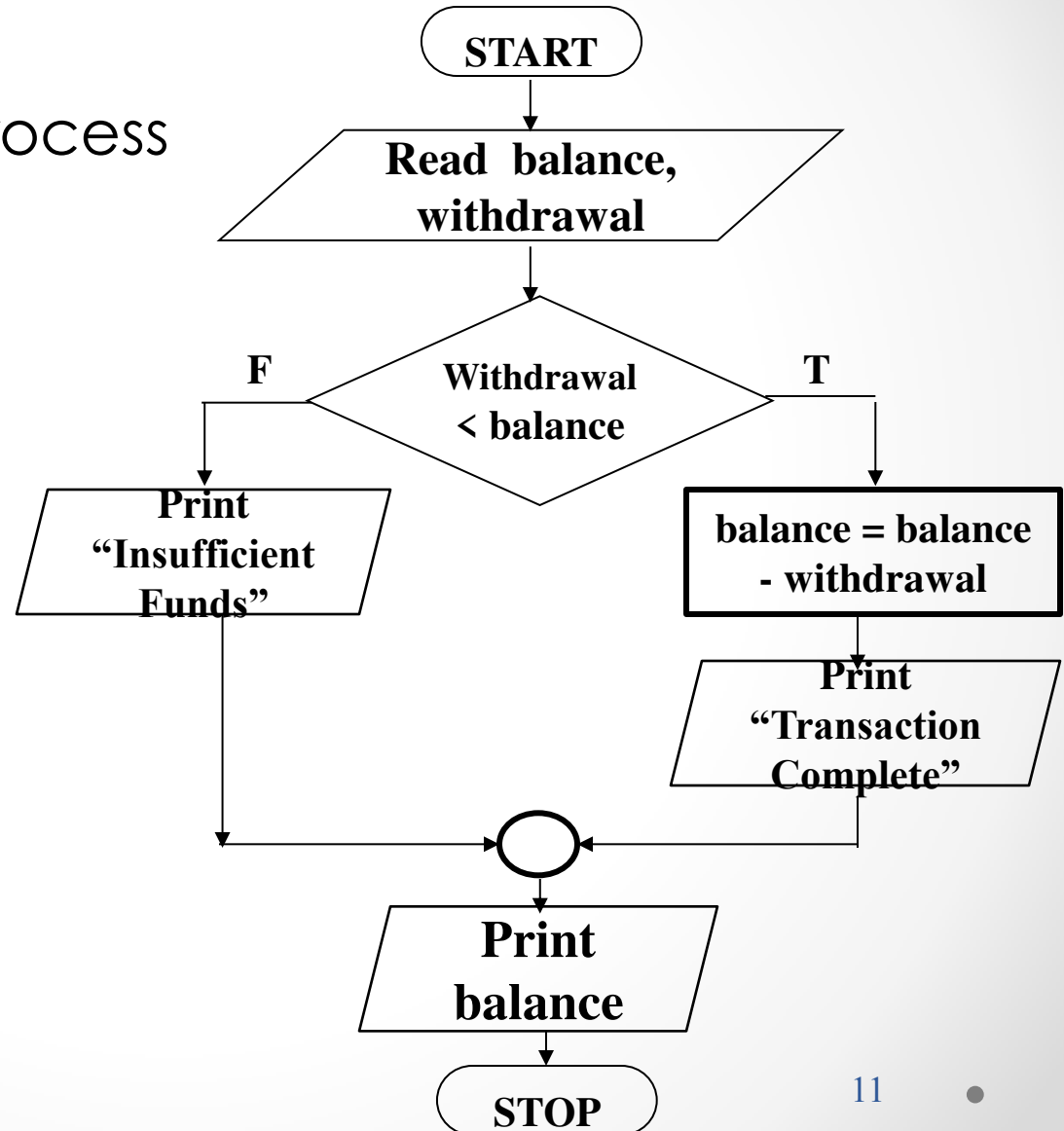
Problem 4: Solution

▸ If the user enters 'A', the ELSE
statement is executed.

Problem 5

- Draw a flowchart for the bank withdrawal process. First the program reads the customer balance and withdrawal amount. The transaction is successfully completed in case the balance covers the required amount. If not, display message insufficient funds. Finally, display the customer balance.

Problem 5: Solution

- Bank Withdrawal Process

START

Read balance, withdrawal

Withdrawal < balance

F

T

Print "Insufficient Funds"

balance = balance - withdrawal

Print "Transaction Complete"

Print balance

STOP

Problem 6

- Draw a flowchart for a program that simulates the doctor diagnosis. It reads a child temperature and displays what a doctor would recommend in such case.

- Doctors assume the child is healthy when his temperature is below or exactly 37°C. Therefore, they recommend normal activities.

- However, if the temperature is little higher than 37 °C but still below 39 °C, then the doctor recommends careful observation.

- Otherwise, the doctors recommend that the child should be admitted to hospital.

Problem 6: Solution
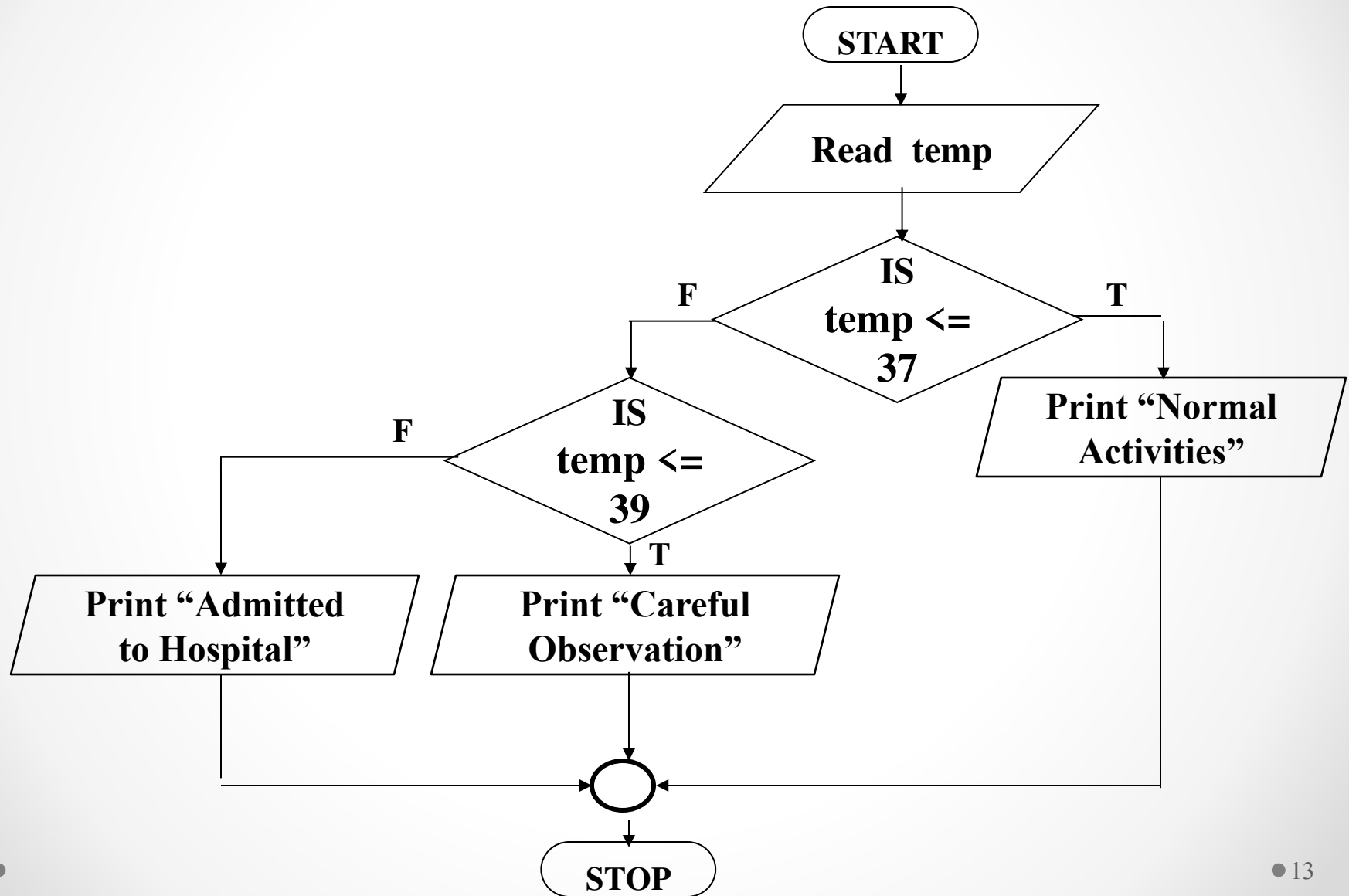
Problem 9

- Algorithm for the electricity company, which charges customers according to their usage rank (1,2 or 3) and reading (watt).

  In rank 1, customers pay 1 L.E./100 watt with minimum 10 L.E.
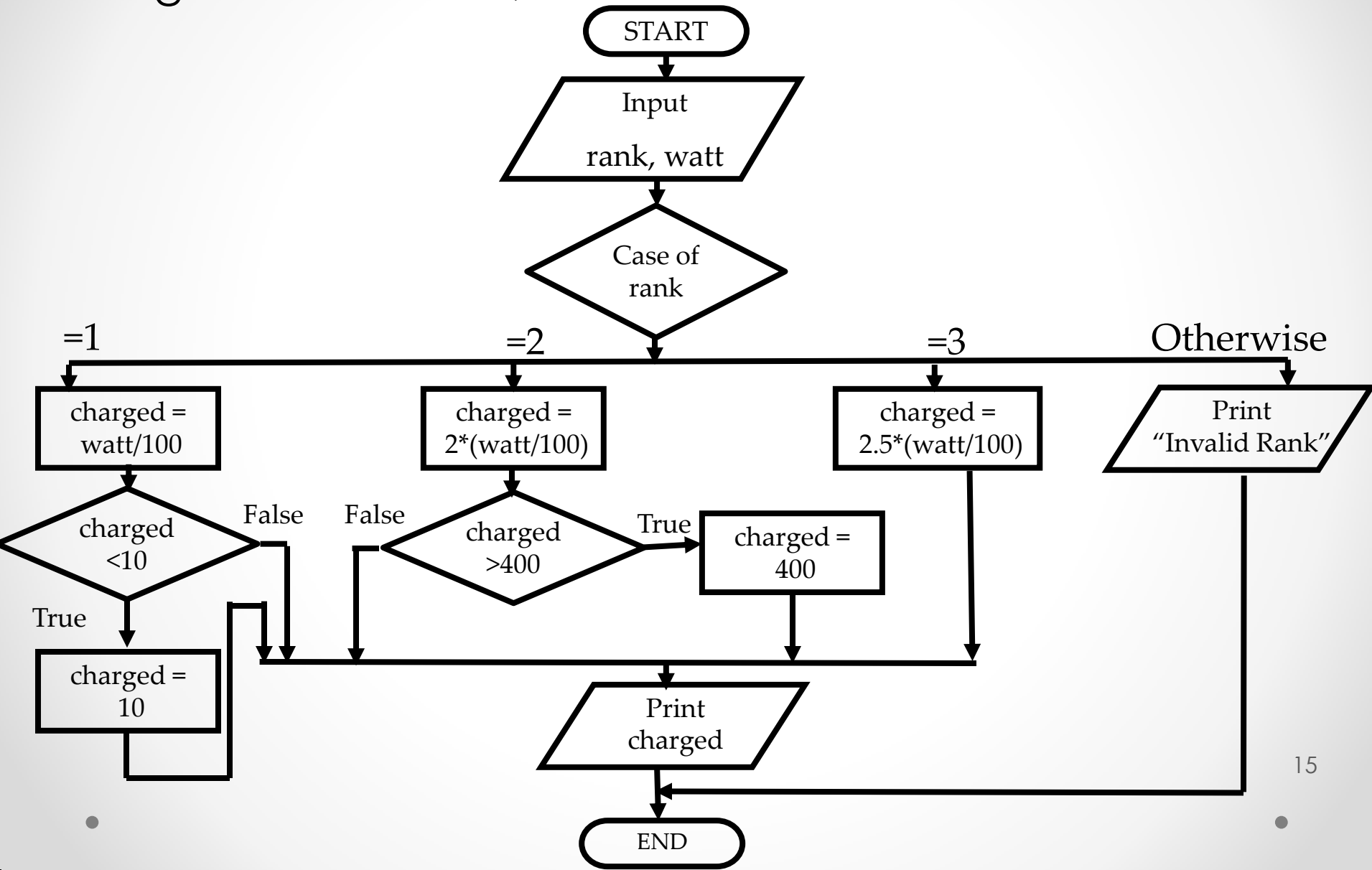
  In rank 2, customers pay 2 L.E./100 watt, but pay at maximum 400 L.E.

  In rank 3, customers pay 2.5 L.E./100 watt.

  Program reads the usage rank and reading and displays the charged amount.
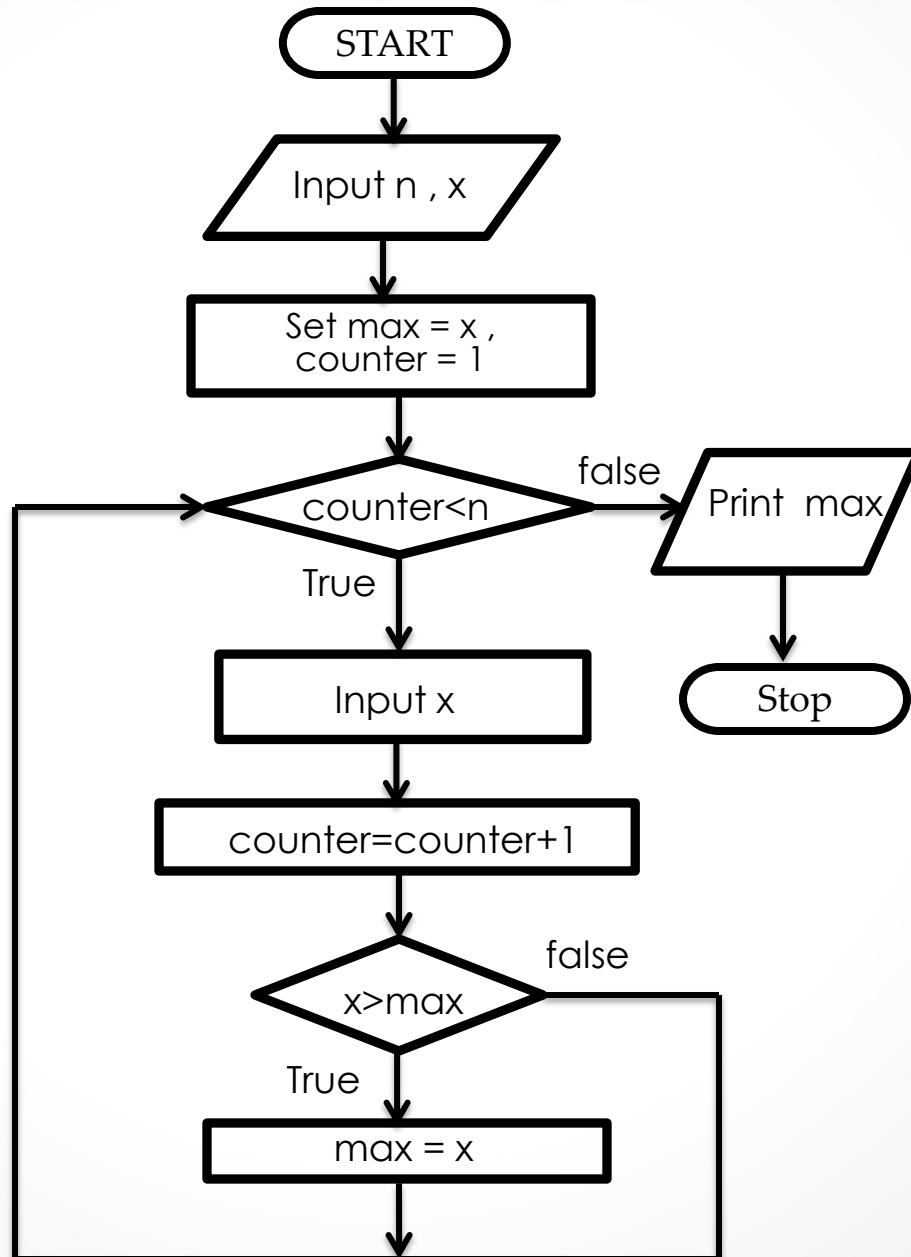
Problem 9 : Solution

- Using case structure, with embedded IF statements

Problem 10

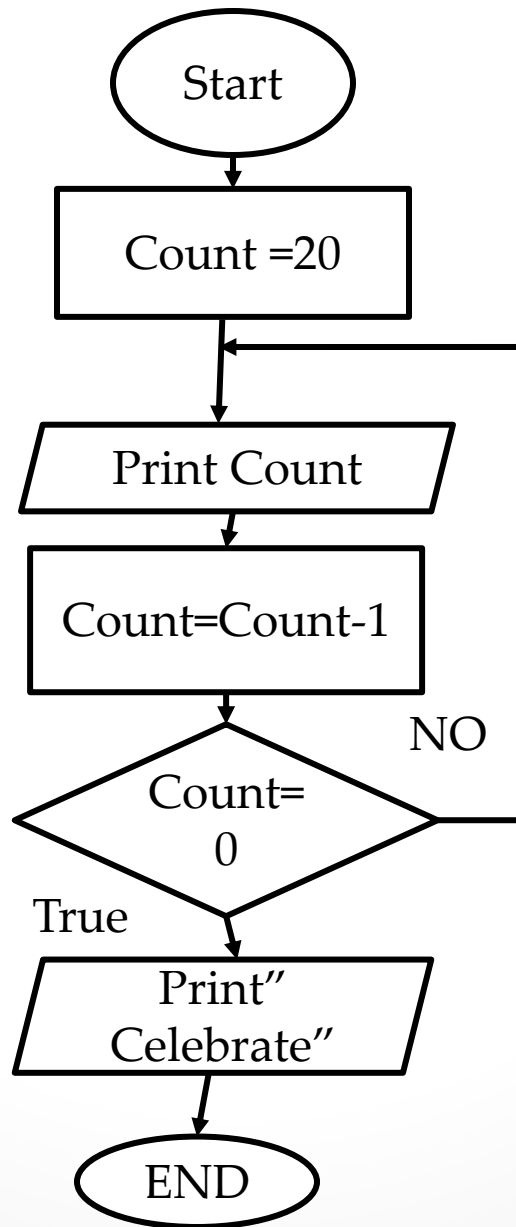- Draw a flowchart to read grades of 10 students and display the top student.

Problem 10 : Solution

START

Input n , x

Set max = x , counter = 1

counter<n

false → Print max

True

Input x

counter=counter+1

x>max

false

True

max = x

Stop

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Problem 11

- Draw flowchart for a program that counts down starting from 20 and when finished it displays "Celebrate".
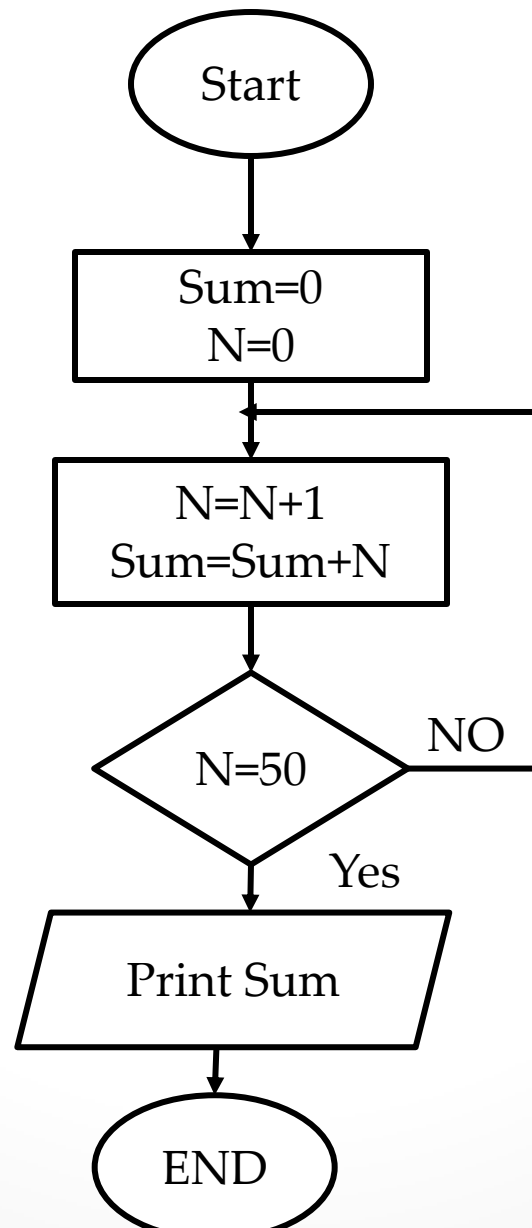
Problem 11: Solution

Problem 12

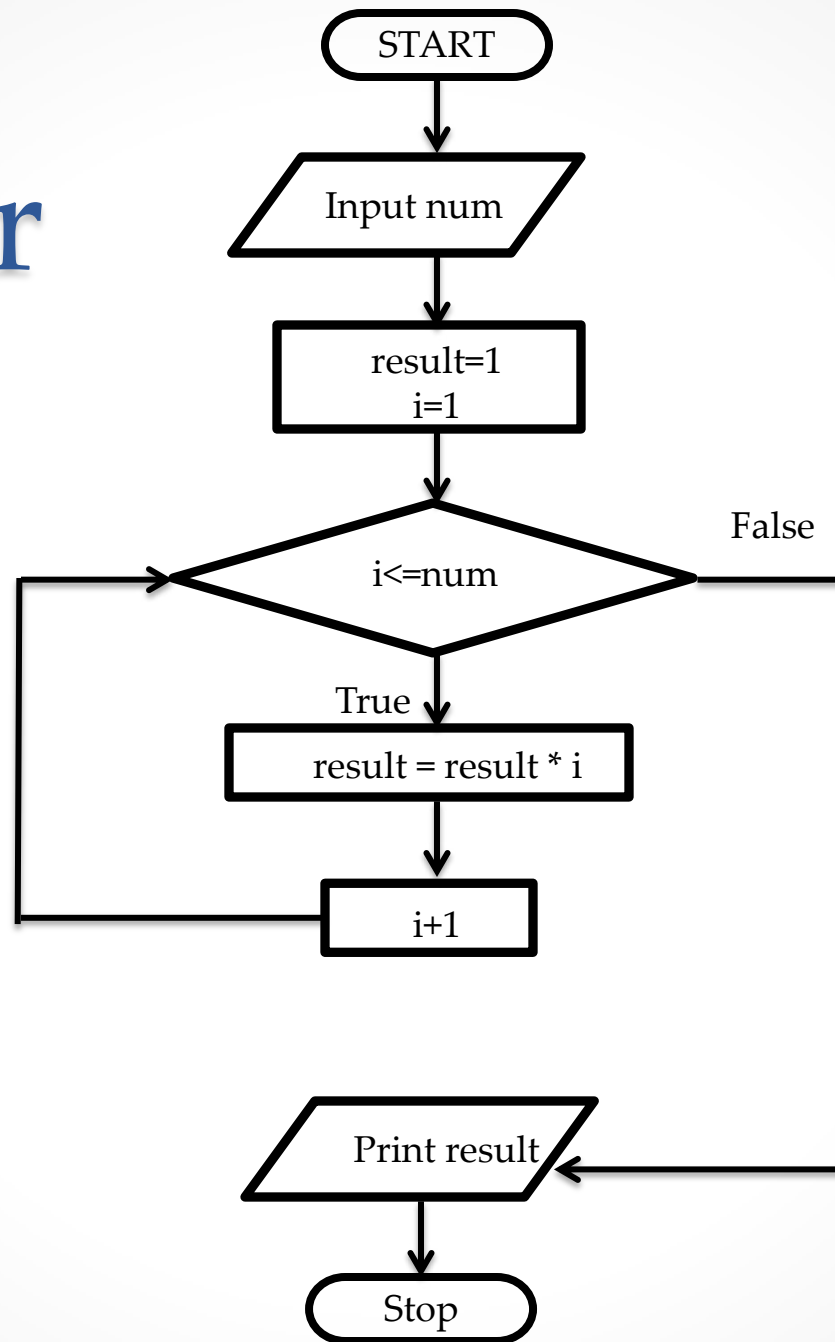- Draw a flowchart to find the sum of the first 50 natural numbers.

Answer

Problem 13

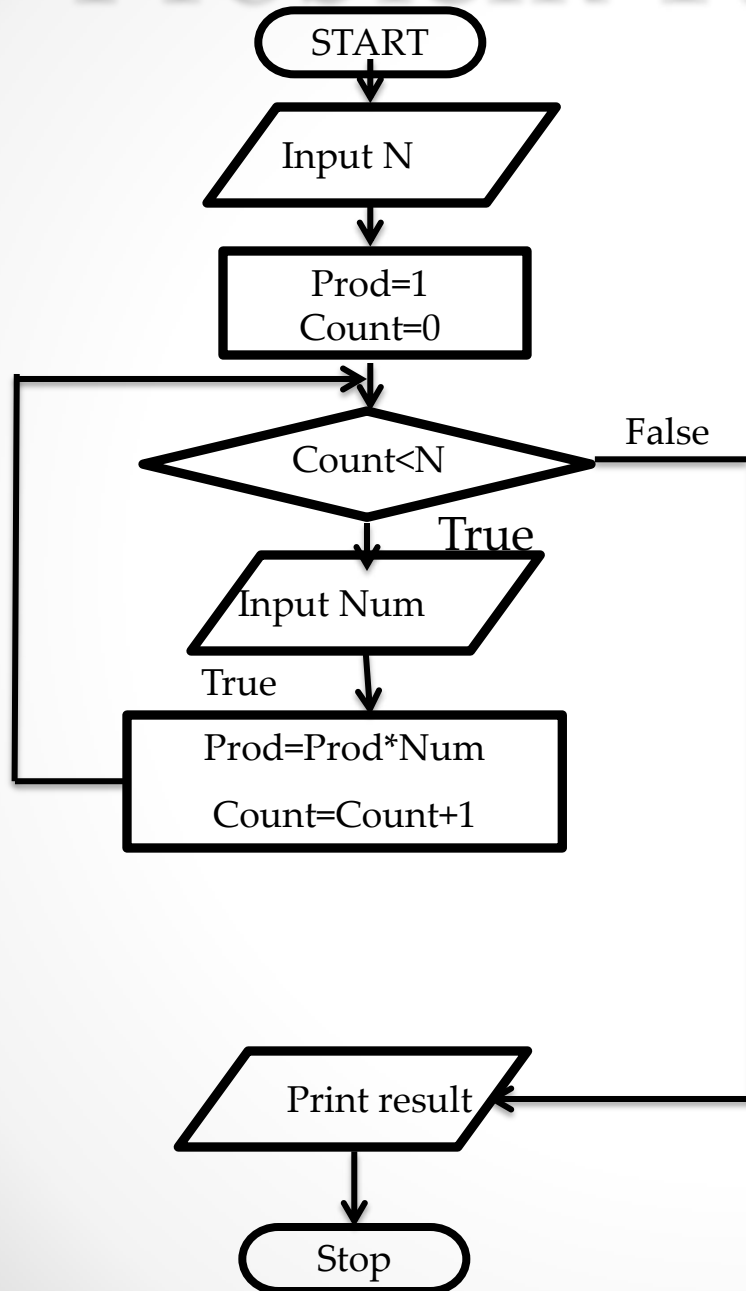- Draw a flowchart for computing factorial N (N!)

Where N! = 1*2*3*....N

Answer

START

Input num

result=1
i=1

i<=num

False

True

result = result * i

i+1

Print result

Stop

Problem 14

- Draw flowchart for program that reads N numbers. It displays their product.

Problem 14: Solution

START

Input N

Prod=1
Count=0

Count<N ── False

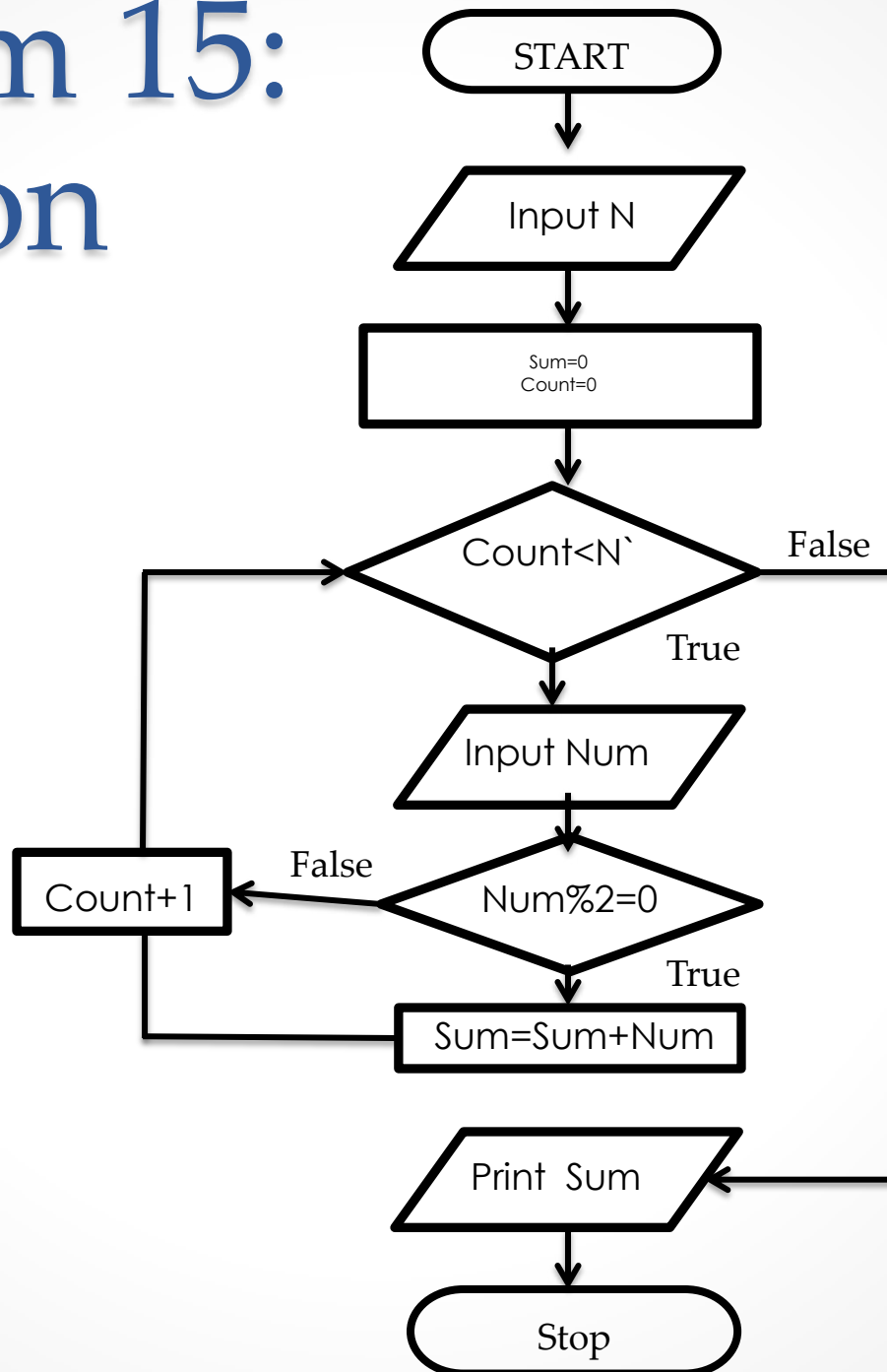True

Input Num

True

Prod=Prod*Num

Count=Count+1

Print result

Stop

Problem 15

- Draw flowchart for program that reads N numbers. It displays the sum of even numbers only.

Problem 15: Solution

START

Input N

Sum=0
Count=0

Count<N`

False

True

Input Num

Num%2=0

False

Count+1

True

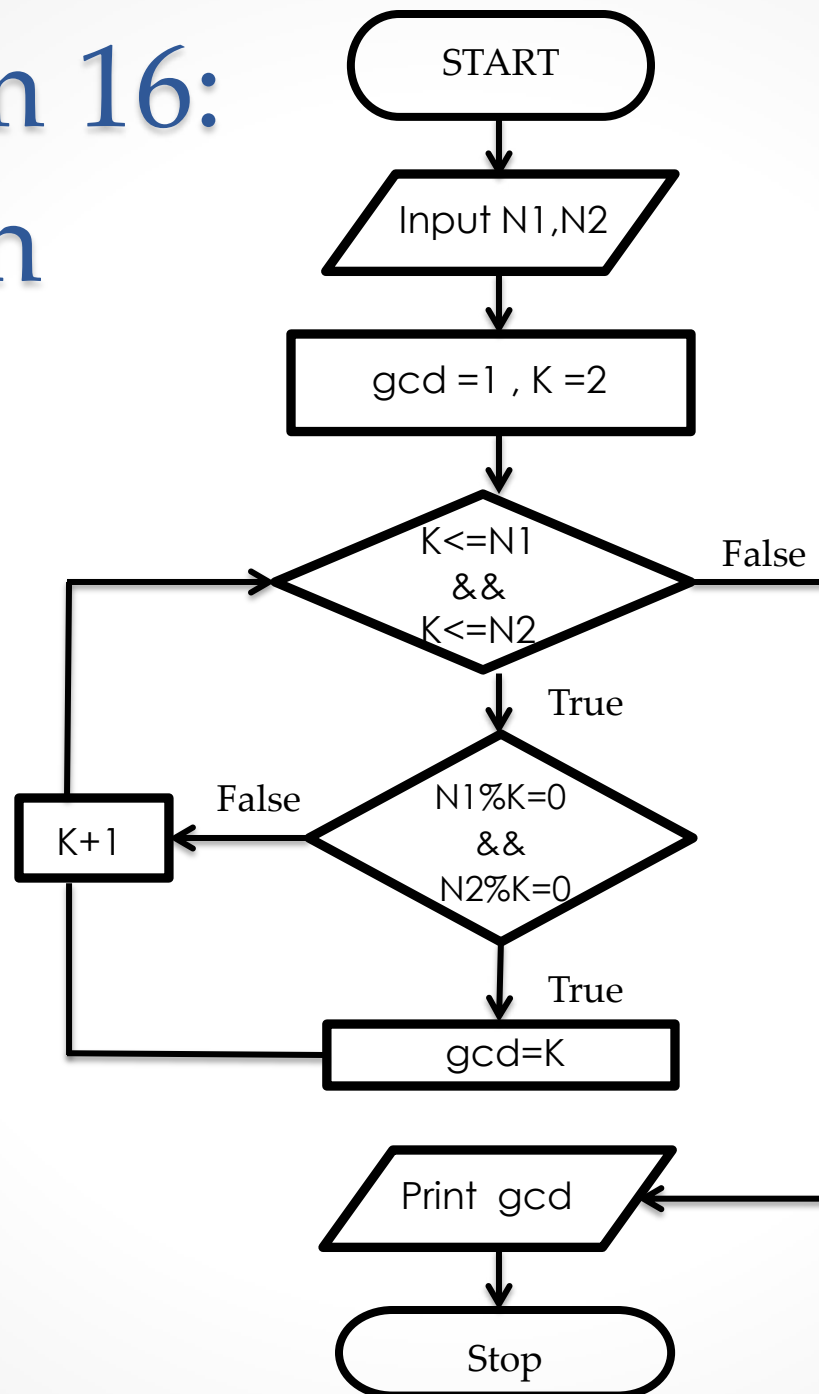Sum=Sum+Num

Print Sum

Stop

Problem 16

- Write a program that prompts the user to enter two positive integers and finds their **greatest common divisor.**

- The greatest common divisor of integers 16 and 24 is 8. So , how do you find the greatest common divisor ?

- Let the two input integers be n1 and n2. Number 1 is a common divisor, but it may not be the greatest commons divisor.

- So, you can check whether k (for k = 2, 3, 4, and so on) is a common divisor for n1 and n2, until k is greater than n1 or n2.

Problem 16: Solution

START

↓

Input N1,N2

↓

gcd =1 , K =2

↓

K<=N1 && K<=N2 — False →

True ↓

N1%K=0 && N2%K=0

False → K+1

True ↓

gcd=K

↓

Print gcd

↓

Stop

# Break 10 minutes

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Microsoft Visual Studio .Net

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What is Visual Studio?

- Visual Studio is a complete set of development tools for building ASP.NET Web applications, XML Web Services, desktop applications, and mobile applications. Visual Basic, Visual C++, Visual C#, and Visual J#.

Microsoft Visual Studio .Net 2013

- This is the IDE (Integrated Development Environment), where we will edit and compile C++ programs.
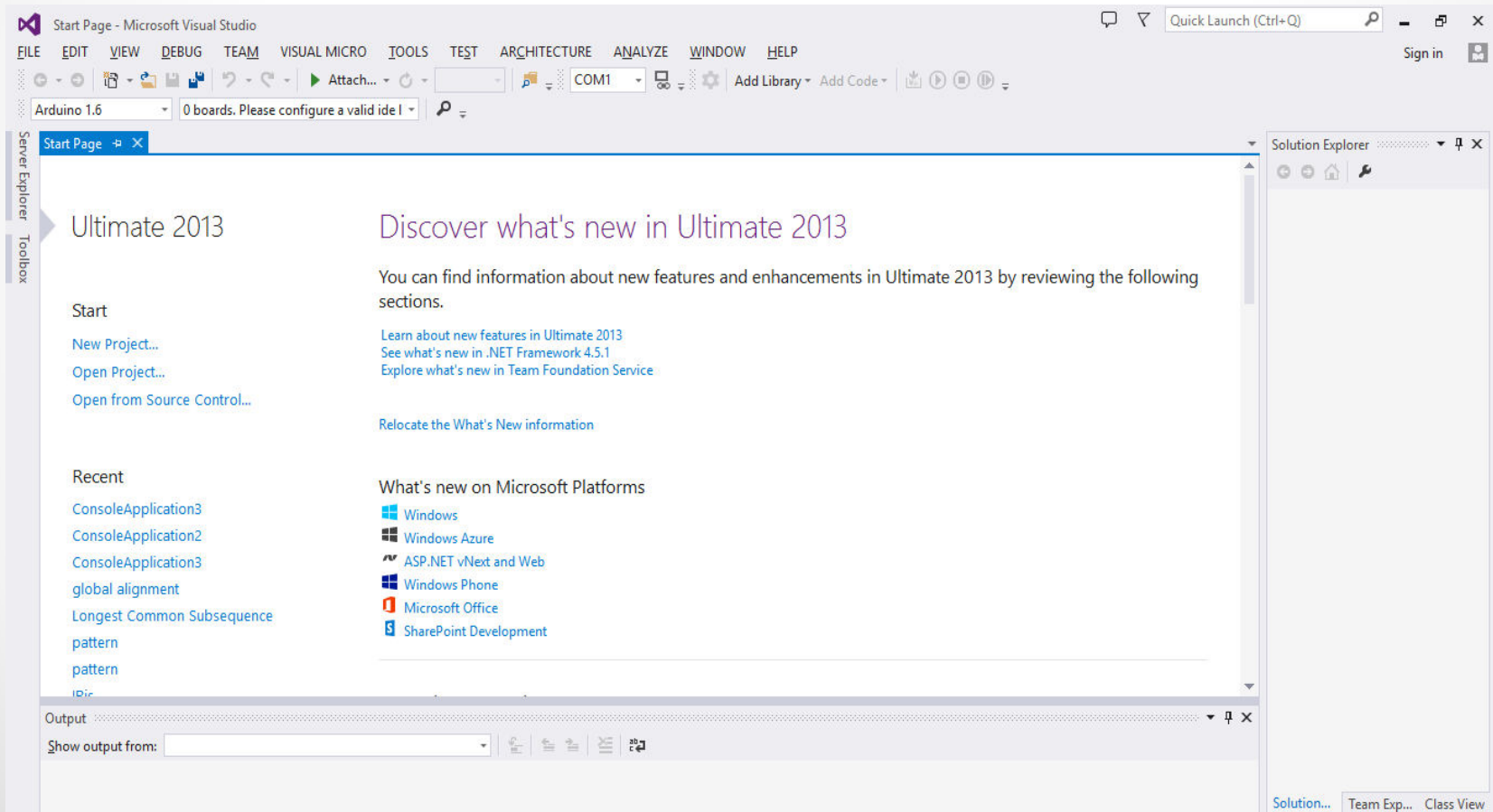
Containers (Solutions and Projects)

- Visual Studio provides two containers to help you efficiently manage the items that are required by your development effort, such as references, data connections, folders, and files. These containers are called solutions and projects.

Solutions as Containers

- A solution can contain multiple projects and a project typically contains multiple items (Items can be files and other parts of your project such as references, data connections, or folders).

- Visual Studio automatically generates a solution when you create a new project. As needed, you can then add other projects to the solution.

Projects as Containers

- Visual Studio projects are used as containers within a solution to logically manage, build, and debug the items that comprise your application.

- The output of a project is usually an executable program (.exe), a dynamic-link library (.dll) file or a module, among others

Program components

- Header Files : (file.h) contain constant, variable, and function declarations needed by a program.

- Source Files : (file.cpp) consists of the program statements comprising a C++ or other programming language program.
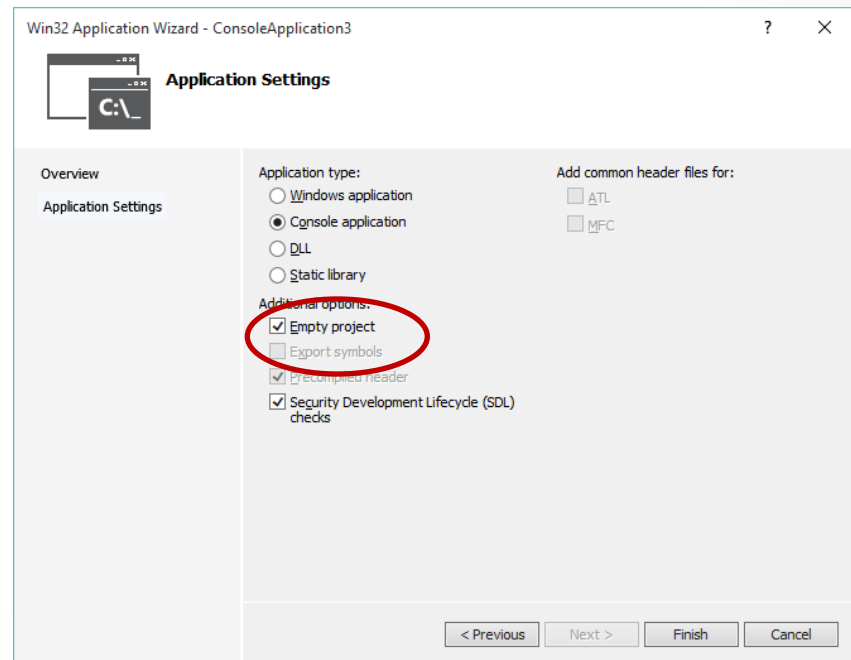
1- Create a new project

- File -> New -> Project.
- choose "Visual C++" and "Win32 Console Application".
- Select Location and specify a project name.
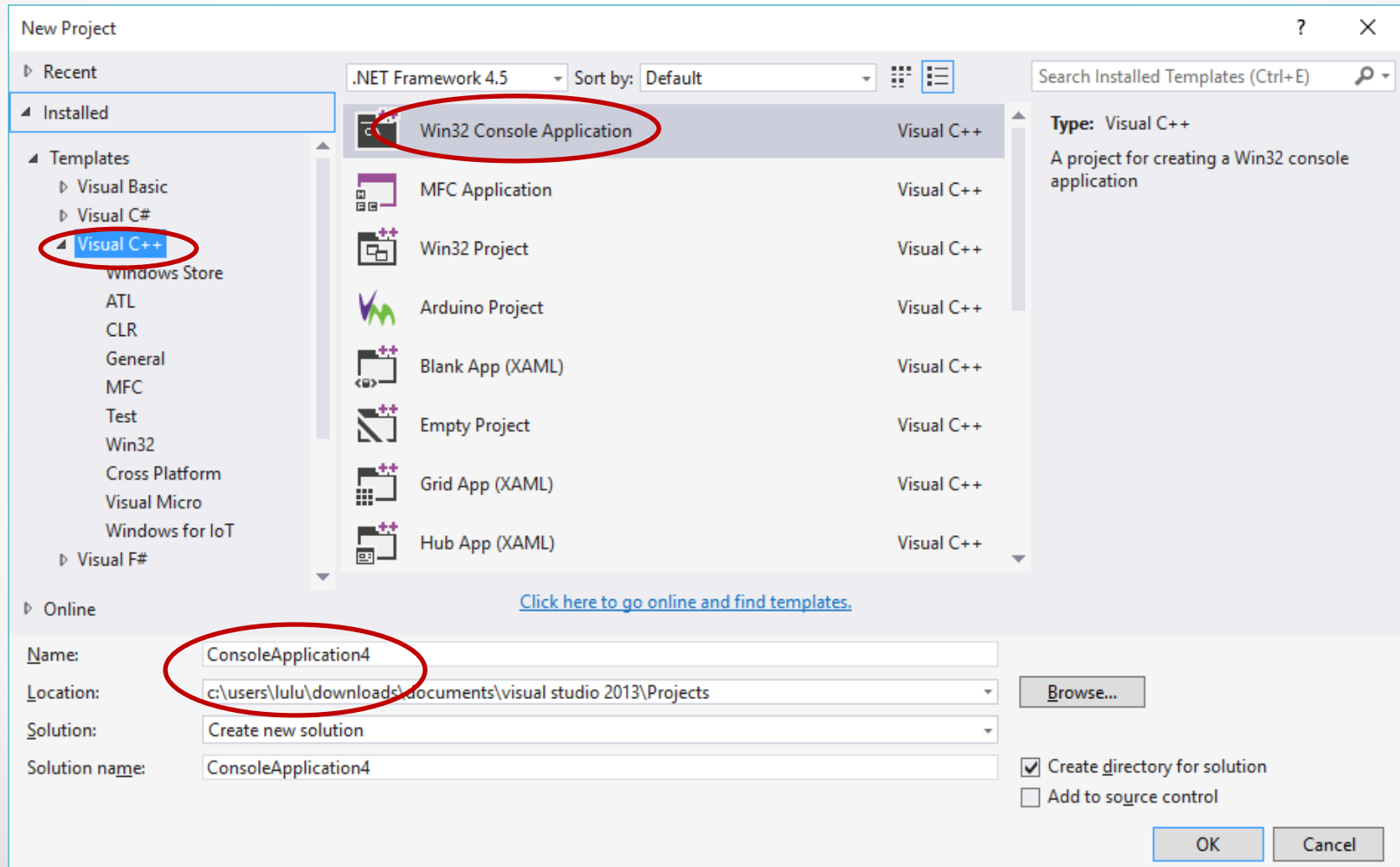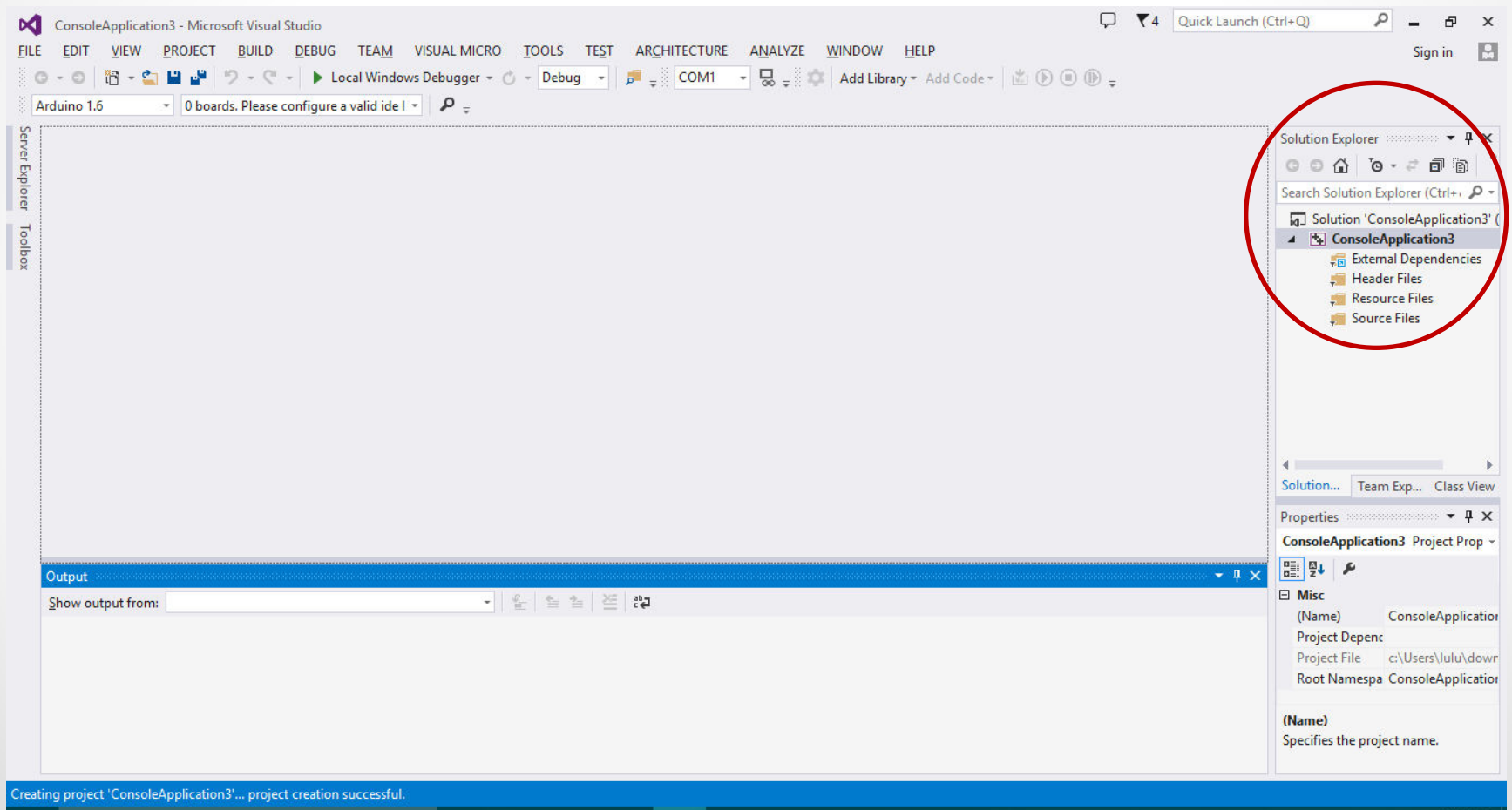
- Click Next,
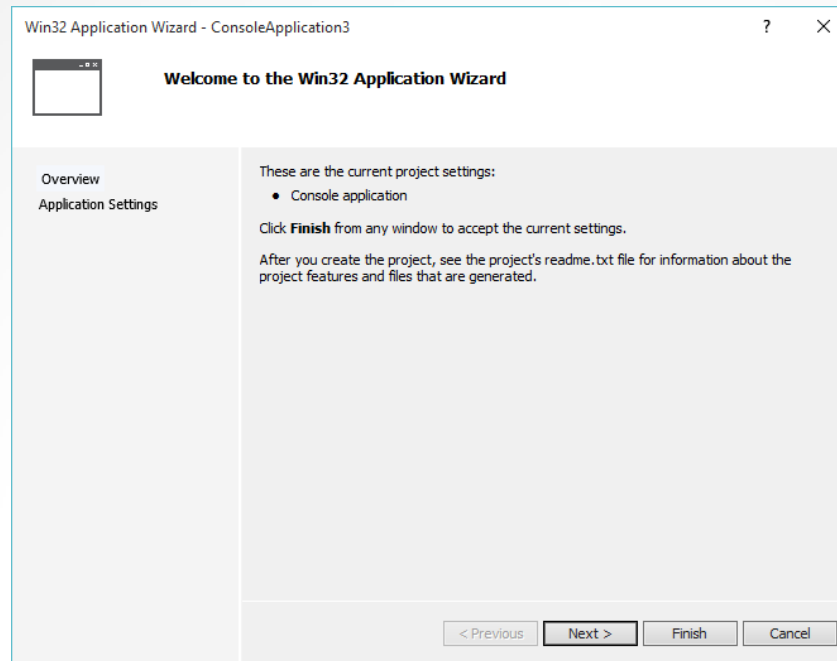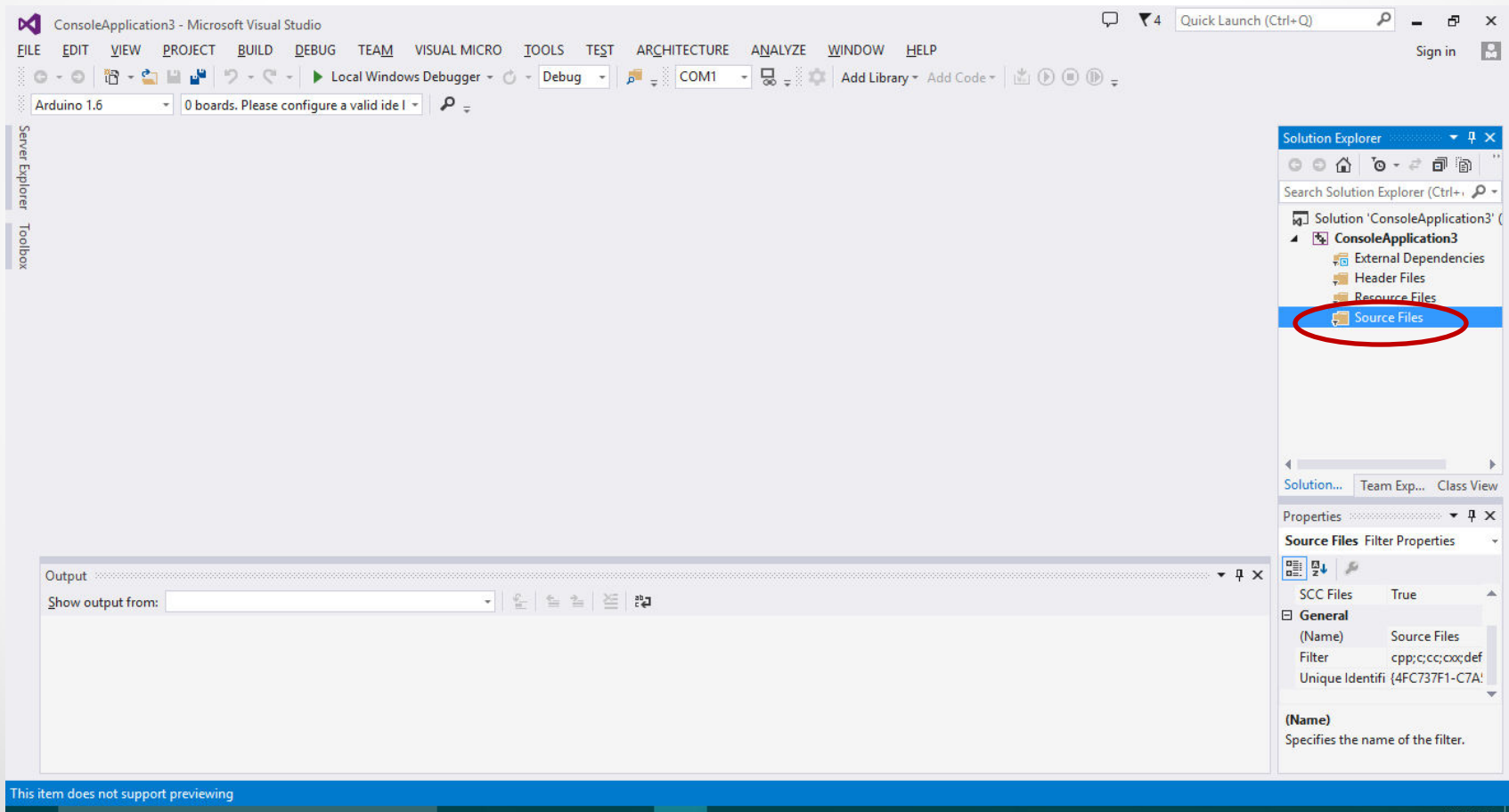

- Select Empty Project option and Click Finish.

Solution Explorer

- Solution Explorer:
  The tree where all files in the project are listed
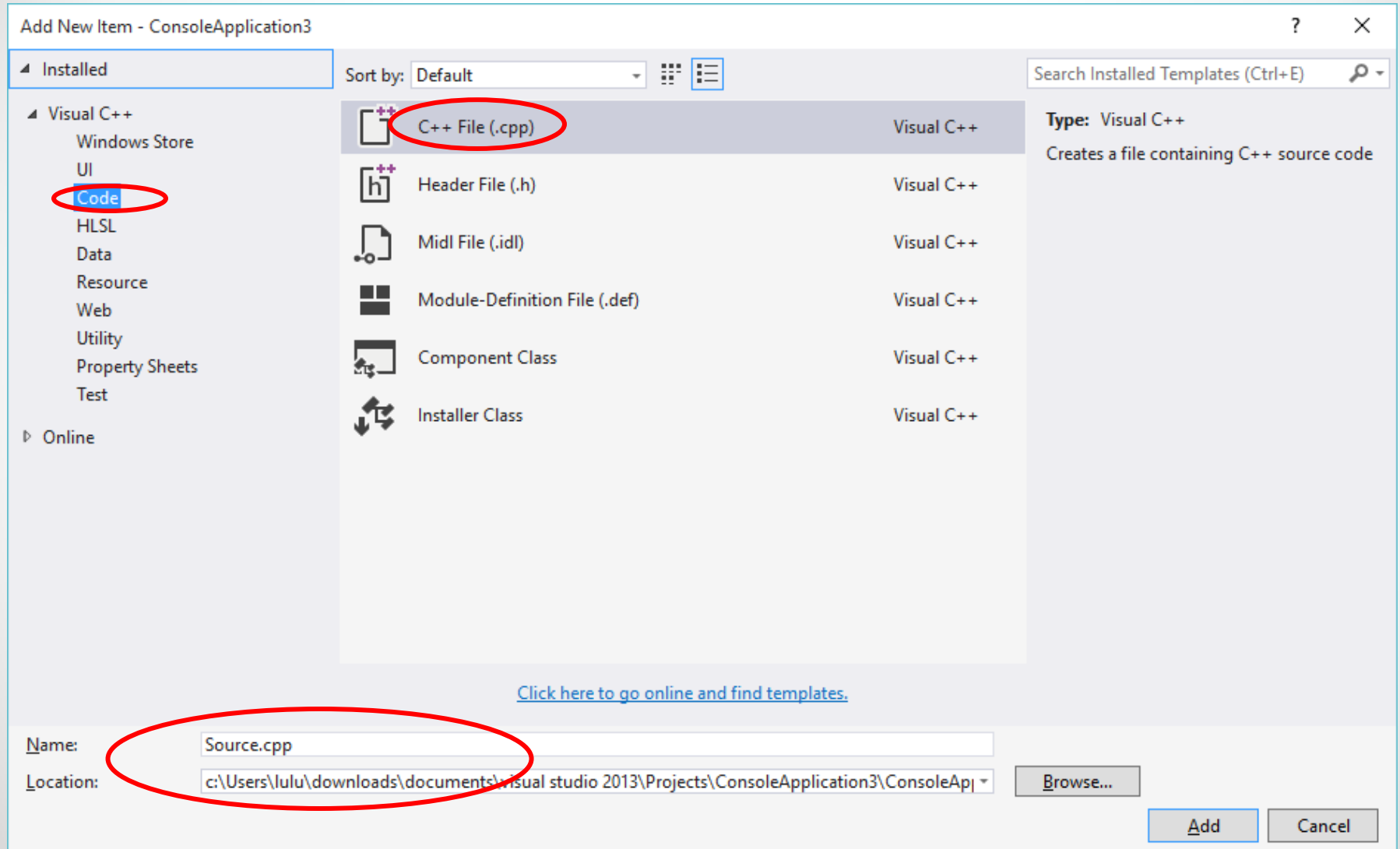** if you didn't find it when you open the VS go to: view\solution explorer
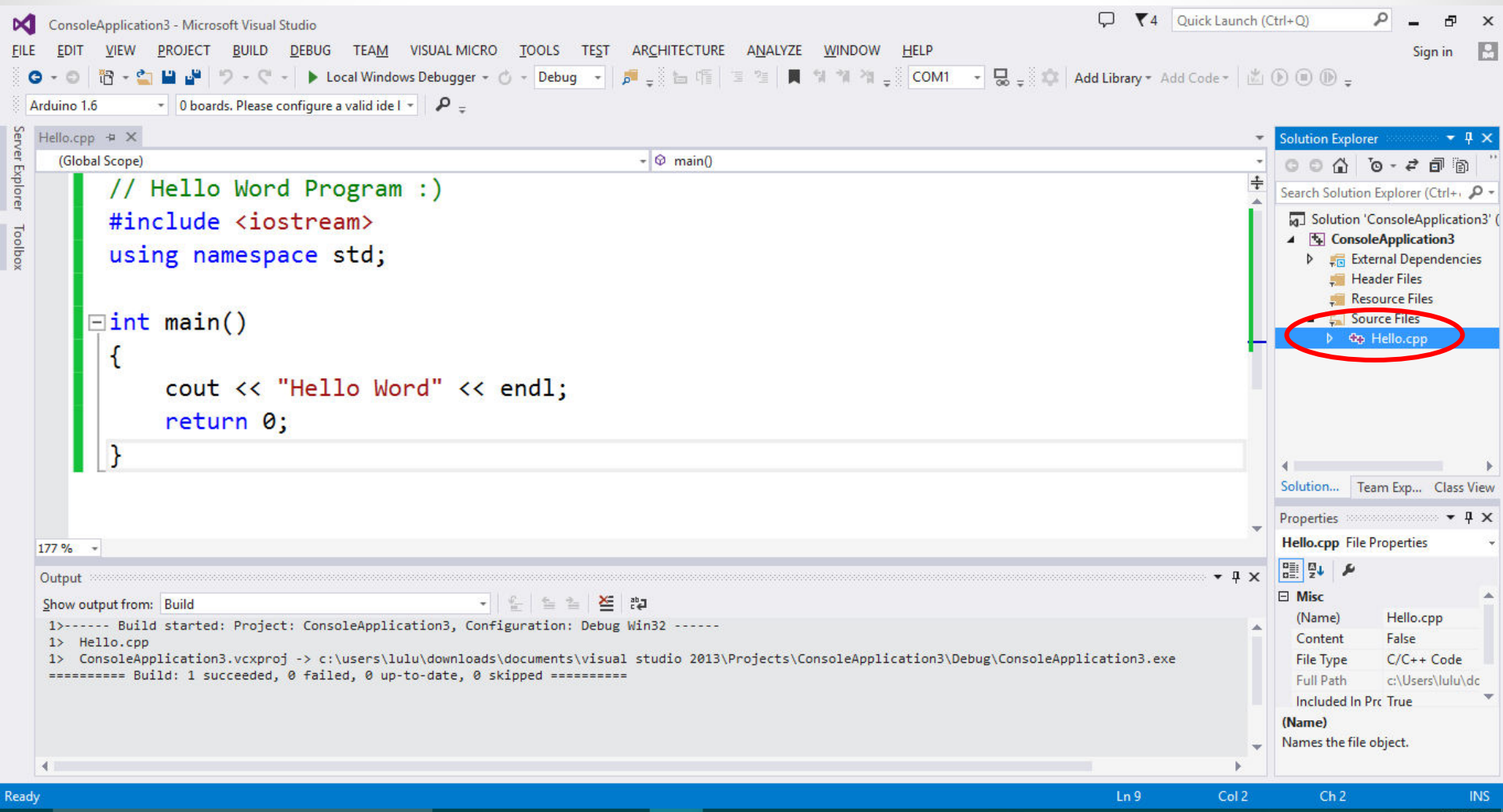
2- Create Source File

- Right click on Source files -> Add -> New Item.
- Create a new source file (.cpp)

- Select "Code" from left tree and then select "C++ file (.cpp)" from right list,
- Specify a name and location for the file, normally its location is in the same folder of the project.
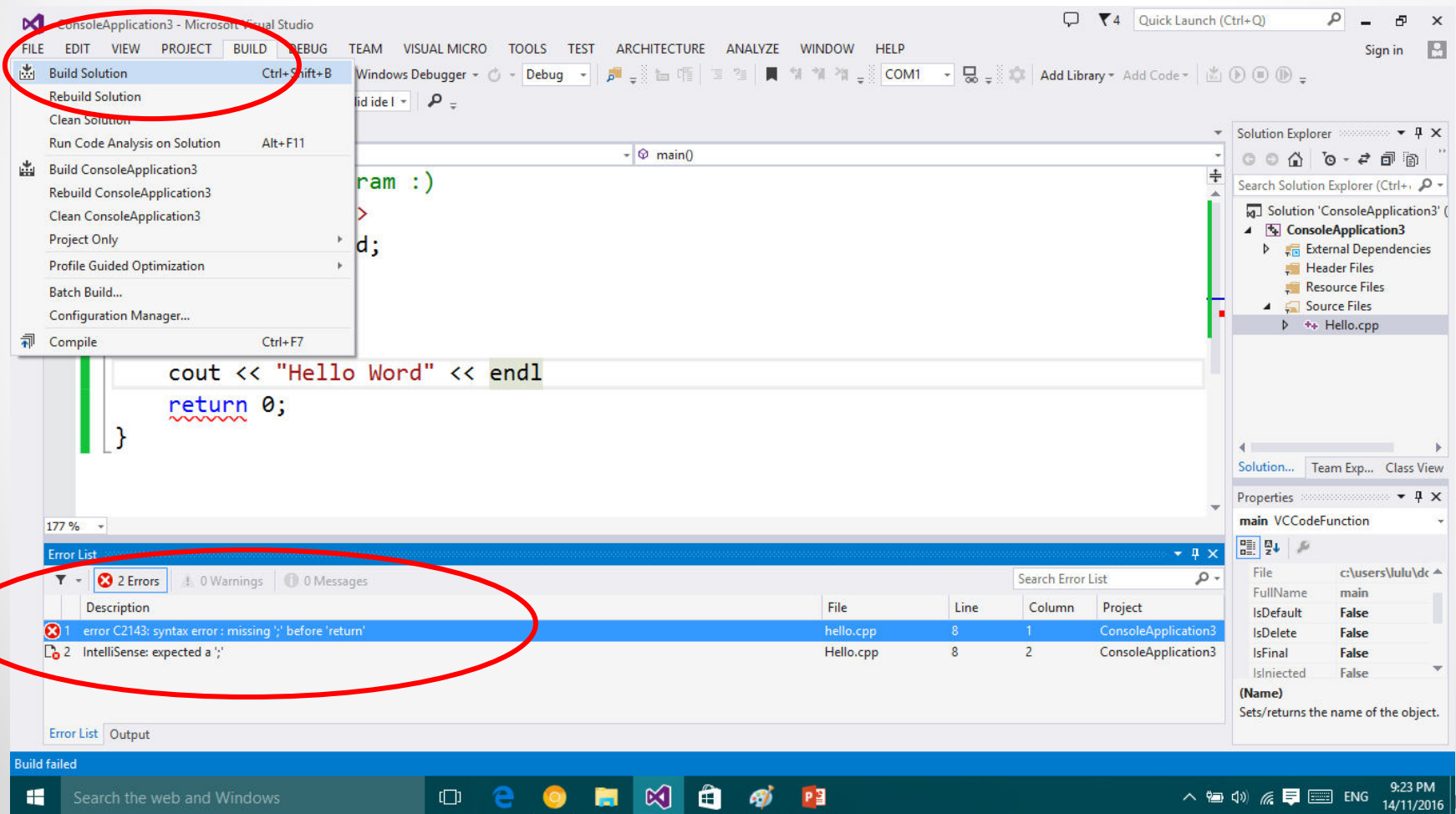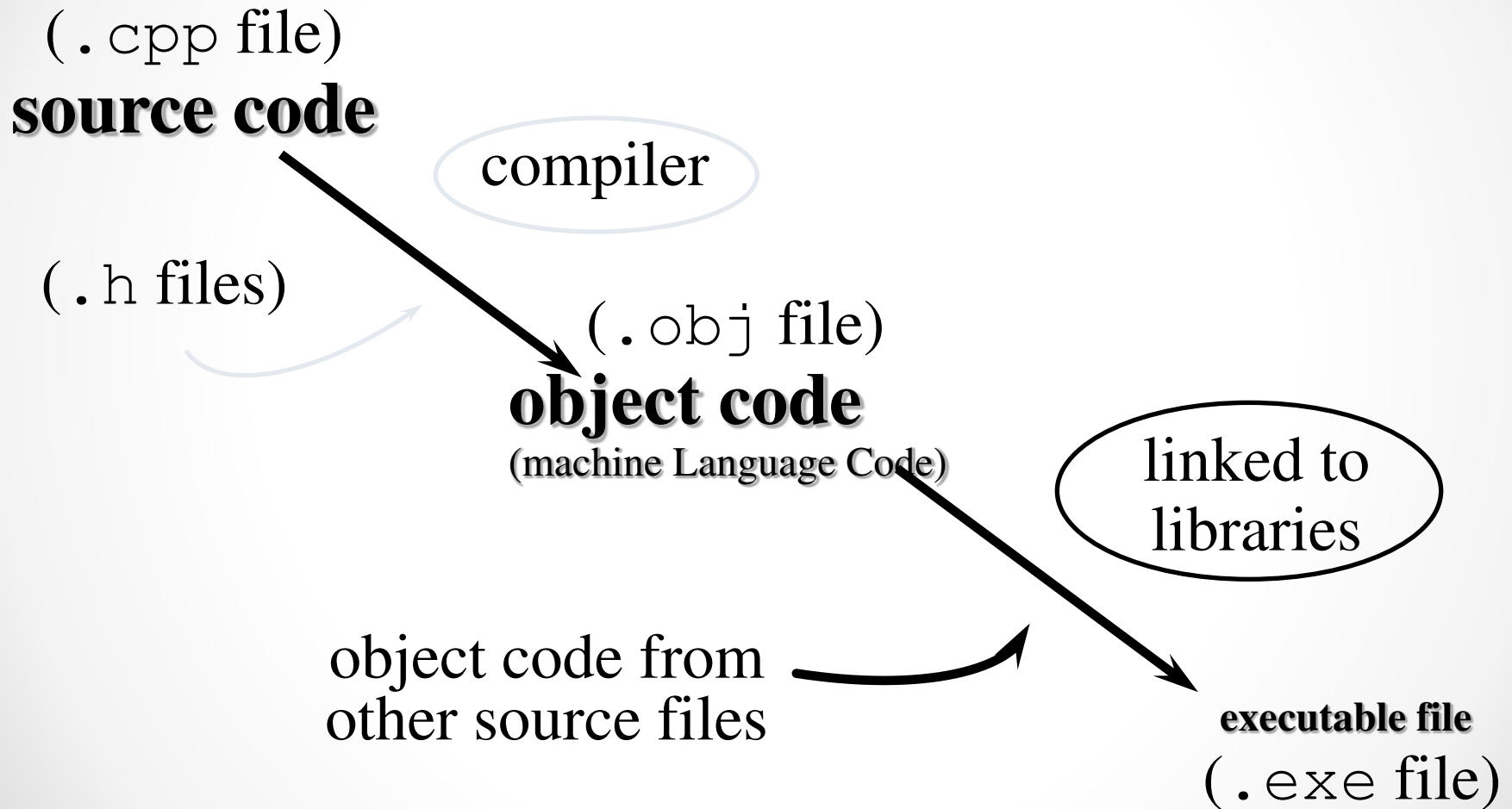
3- Edit program

4- Build/Compile Project

Build/Compile project to produce (.0bj file)
Check for errors

Compiling / Building

(`.cpp` file)
source code

compiler

(`.h` files)

(`.obj` file)
object code
(machine Language Code)

linked to libraries

object code from other source files

executable file
(`.exe` file)
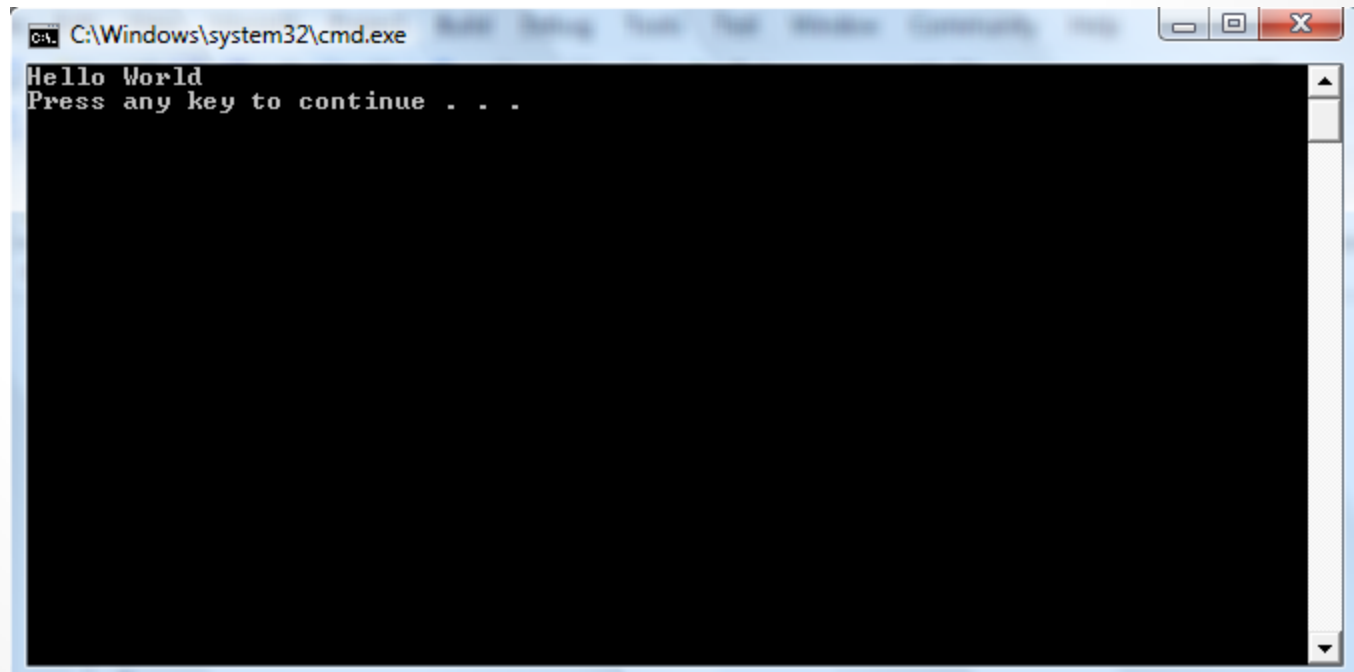
5- Run the program
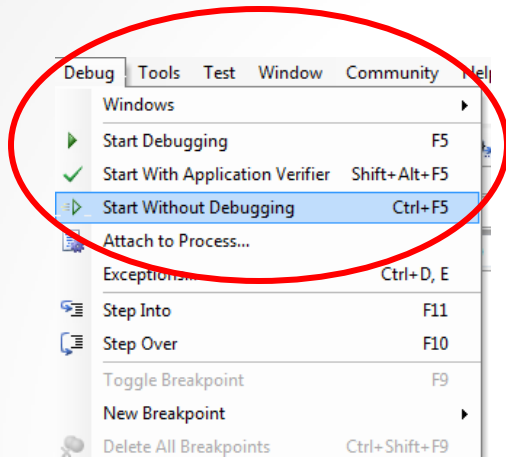
Console Application

Build versus Compile

- <u>Build</u> (F6) means compile and link *only* the source files that have changed since the last build, while <u>Rebuild</u> means compile and link *all* source files regardless of whether they changed or not. Build is the normal thing to do and is faster.

- <u>Compile</u> just compiles the source file *currently being edited*. Useful to quickly check for errors when the rest of your source files are in an incomplete state that would prevent a successful build of the entire project. Ctrl-F7 is the shortcut key for Compile.

Error, error… does not compute!

- ## Syntax Errors (Typing Errors)

  Syntax refers to the structure of a program and the rules about that structure

  o Errors in programming language rules.
  o You can use the compiler or interpreter to uncover syntax errors.
  o You must have a good working knowledge of error messages to discover the cause of the error.

- ## Logic or Meaning Errors
  o Errors that indicate the logic used when coding the program failed to solve the problem.
  o You do not get error messages with logic errors.
  o Your only clue to the existence of logic errors is the production of wrong solutions.

- ## Run-time Errors (Exceptions)
  o Code does something illegal when it is run (hence runtime)
    - E.g., divide by zero

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Program 1

- Create a program that displays *Hello World*.

```cpp
#include <iostream>
using namespace std;
int main()
{
    // This is my first C++ program
    cout << "Hello World" << endl;
    return 0;
}
```

Program 2

- Create a program that displays information about the student (ID, name and age), each displayed on a separate line.

```cpp
#include <iostream>
using namespace std;
int main()
{
    cout << "ID: 23" << endl;
    cout << "My name is Aly" << endl;
    cout << "I am 19 years old" << endl;
    return 0;
}
```

Thank You