

# **Lecture 4**

## **Nesting Conditional Statements**

# Objectives

- After completing the lesson, the student will be able to:
  - ✗ Explain the syntax of the nested if statements.
  - ✗ Write programs using nested if statements and run the program.
  - ✗ Explain the syntax of the multi-way decision statements.
  - ✗ Write programs using if-elif-else statement and run the program.
  - ✗ Describe the output of the programs with nested if statements.

# Nesting Simple Decision Statements

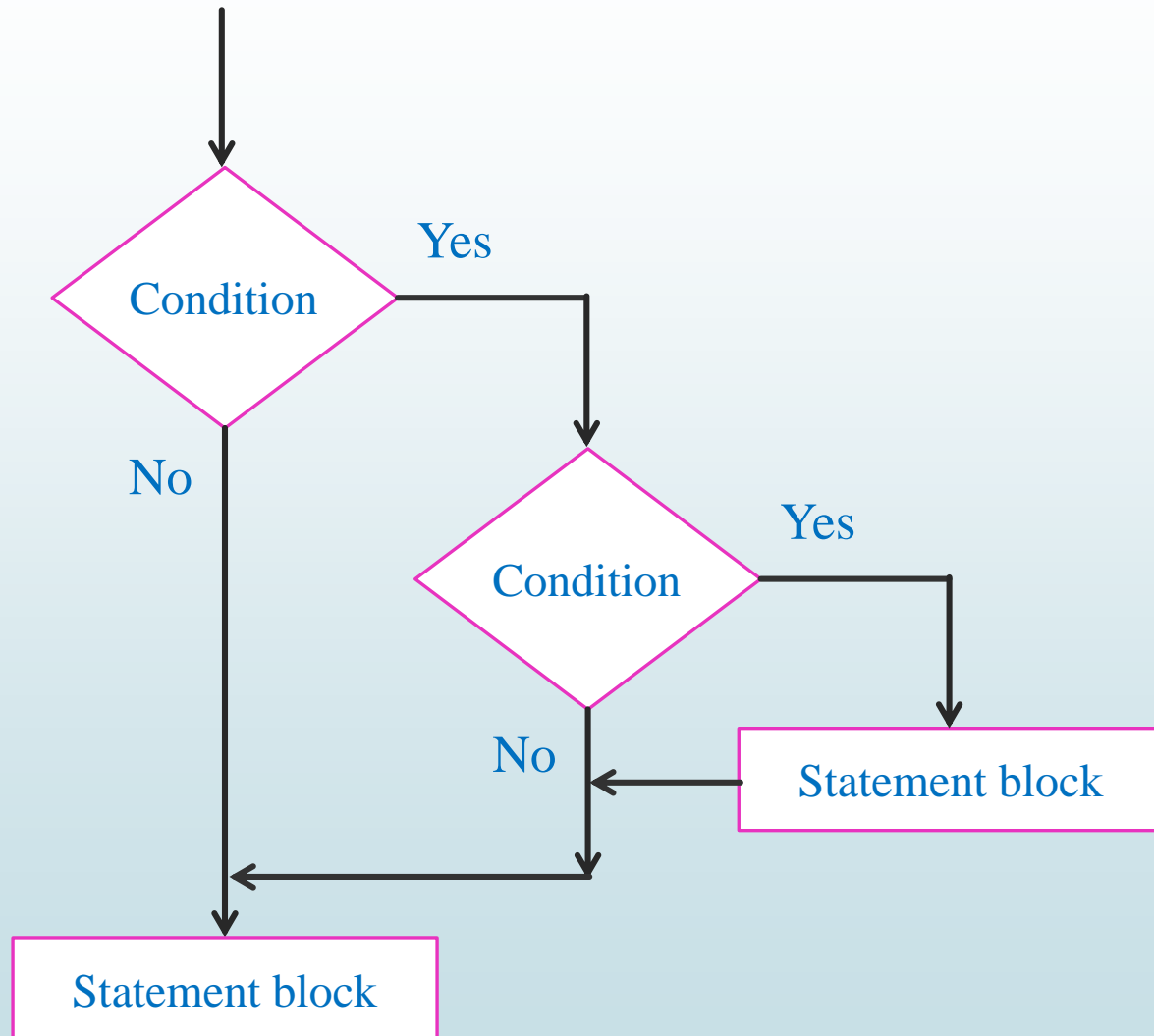
- The form of the nested if statement is

```
if condition:  
    if condition:  
        Statements  
statements
```

- Example:

```
a = 6  
if a>0:  
    if a%2==0:  
        print(" It is positive and even ")  
print("This is the rest of the program")
```

# 4 Nested Simple Decision Statement - Flowchart

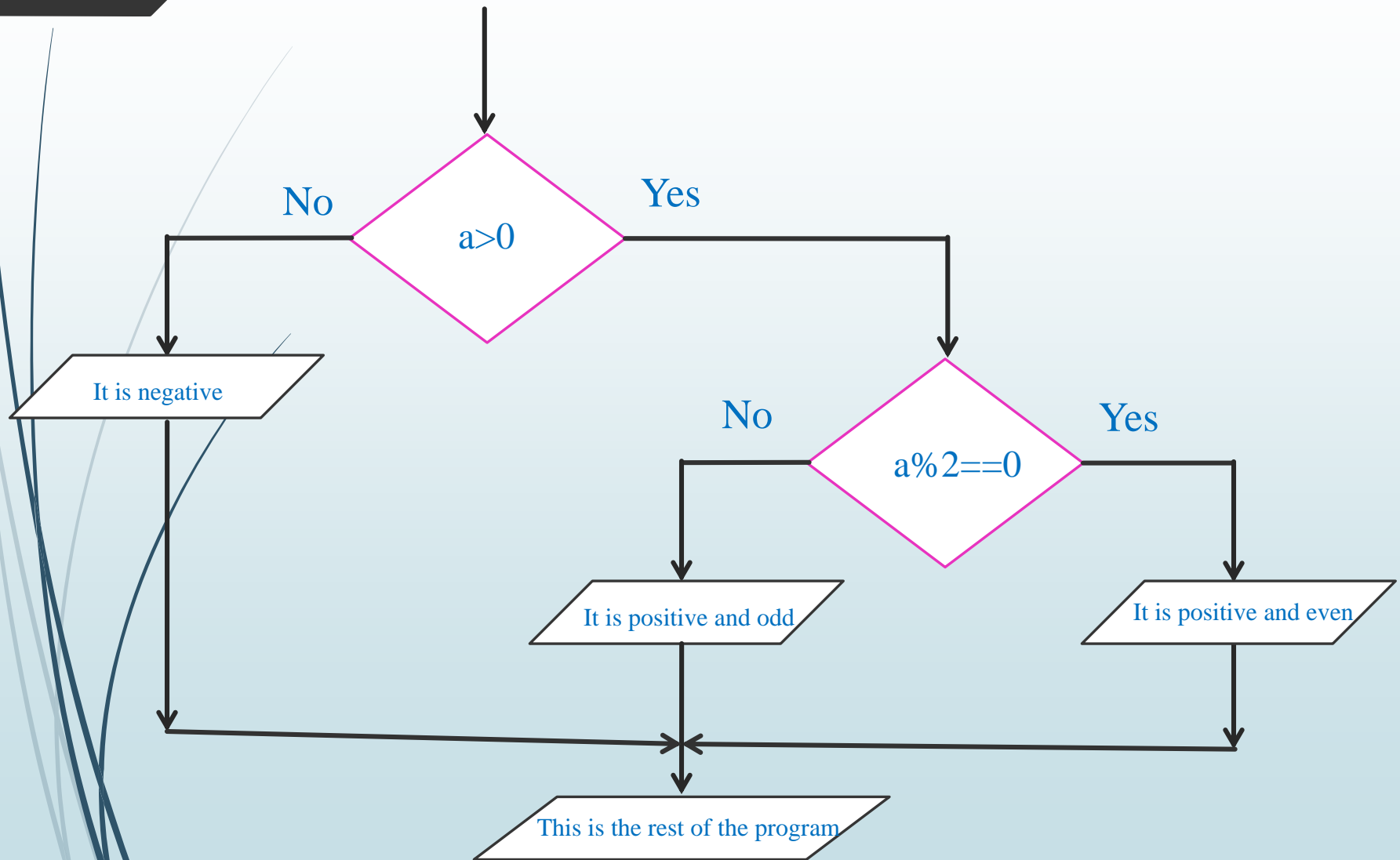


# Nesting Simple Decision Statements

## ► Example:

```
a = 6
if a>0:
    if a%2==0:
        print(" It is positive and even ")
    else:
        print(" It is positive and odd")
else:
    print(" It is negative ")
print("This is the rest of the program")
```

# 6 Nested Simple Decision Statement - Flowchart



# Nesting Simple Decision Statements

- In the above example, both the conditions should be true to print the message.
- If the value of `a` is 5, the first condition is true but the second condition is false.
- If the value of `a` is -5, the first condition is false and the control will not reach for the second condition.

# Nested Simple Decision - Example

- Run the program with -45, 34 and 0.

```
num = int(input("Enter a number: "))
if num >= 0:
    if num == 0:
        print("The input number is Zero")
    else:
        print("The input number is Positive")
else:
    print("The input number is Negative")
```



# Multi-Way Decisions

- Multi-way decision arise when there are multiple conditions and different statements are to be executed under each condition.
- The statement in the elif-clause of an if-elif block can be another if-elif structure.
- This allows us to make more complex selections.

# Multi-Way Decisions

- It takes the following form

```
if condition1:  
    statements  
elif condition2:  
    statements  
elif condition3:  
    statements  
else:  
    default statements
```

# Multi-Way Decisions

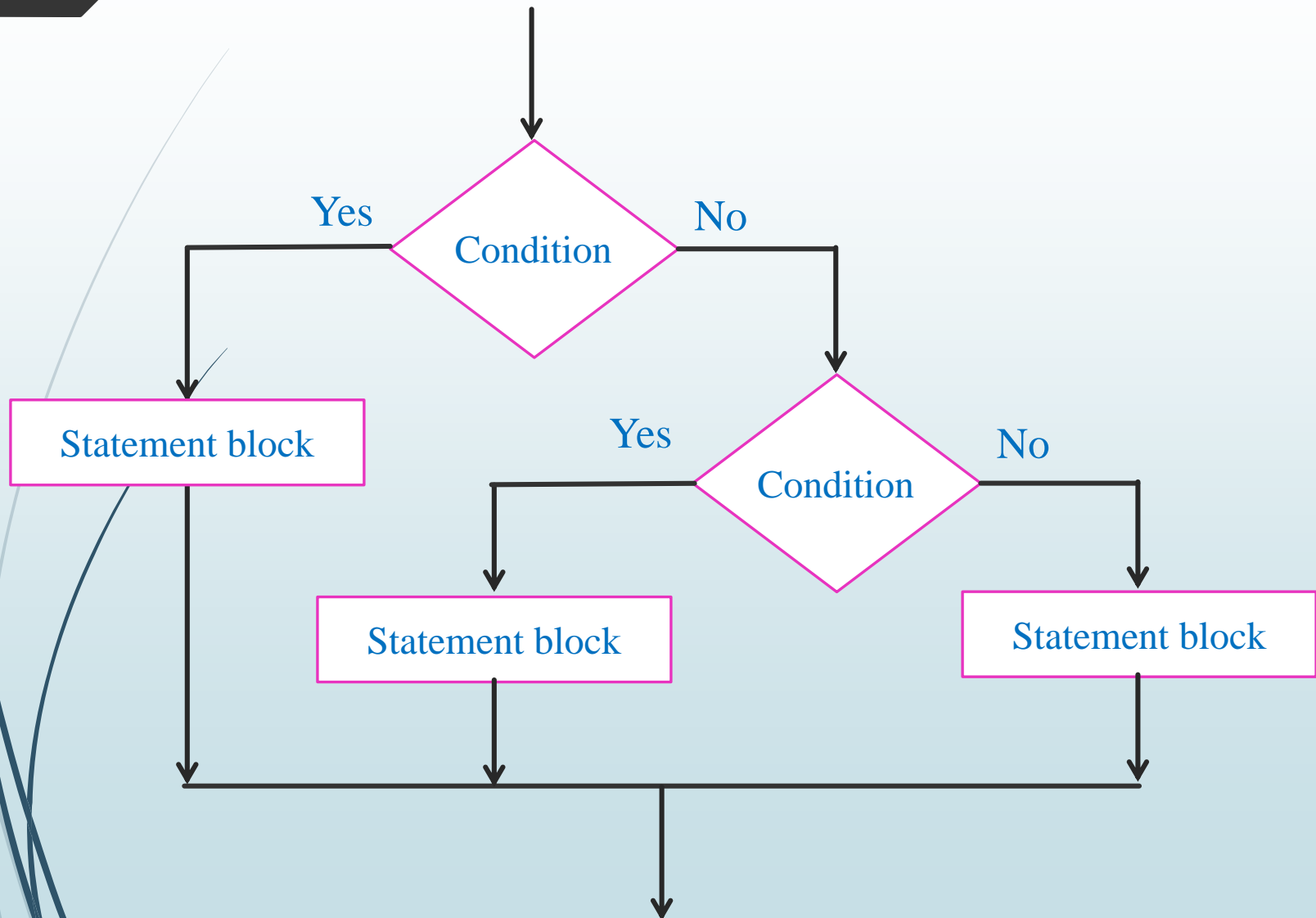
- First it will check the condition after the if statement. If it is false, it will check the next condition and go on checking conditions until it finds a true condition.
- If it finds a true condition, it will execute the statements after that condition.
- If there is no true condition, it will execute the statements after the *else* clause.

# Multi-Way Decisions

- Example: Print the grade of the student

```
mark = 86
if mark>85:
    print("Higher Distinction ")
elif mark>50:
    print("Pass ")
else:
    print("Fail ")
```

# Multi-Way Decisions - Flowchart



# Multi-Way Decisions - Example

```
grade = int(input("Enter the grade of the student "))  
if grade >= 90:  
    print("Excellent!")  
elif grade >= 80:  
    print("Good job!")  
elif grade >= 60:  
    print("Study harder!")  
else:  
    print("Sorry, you failed.")
```

# Multi-Way Decisions

- Conditions can be combined using logical operators (and).

```
x1,x2,x3 = 20,10,40
if x1 > x2 and x1 > x3:
    max = x1
elif x2 > x3:
    max = x2
else:
    max = x3
print("Maximum number is =", max)
```

# Multi-Way Decisions

## ► Nesting if-else statement

```
x1,x2,x3 = 20, 10, 40
if x1 >= x2:
    if x1 >= x3:
        max = x1
    else:
        max = x3
else:
    if x2 >= x3:
        max = x2
    else:
        max = x3
print("Maximum number is =", max)
```



# Multi-Way Decisions - Example

```
people, cars, buses = 30, 40, 15
if cars > people:
    print("We should take the cars.")
elif cars < people:
    print("We should not take the cars.")
elif buses > cars:
    print("That's too many buses.")
elif buses < cars:
    print("Maybe we could take the buses.")
elif people > buses:
    print("Alright, let's just take the buses.")
else:
    print("Fine, let's stay home then.")
```

# Multi-Way Decisions - Example

```
people, cars, buses = 30, 10, 15

if cars > people:
    print("We should take the cars.")
elif cars < people:
    print("We should not take the cars.")
else:
    print("We can't decide.")

if buses > cars:
    print("That's too many buses.")
elif buses < cars:
    print("Maybe we could take the buses.")
else:
    print("We still can't decide.")
```

# Some Common Errors

- The condition inside the if-statement does not evaluate to a Boolean value.

- Example:

```
number = 0  
if number:  
    statements
```

- Writing `else if` instead of `elif`.

# Some Common Errors

- Using `=` instead of `==` for comparison.

- Example:

```
number = 0
if number = 0:
    some statements here
```

- This should be written as,

```
number = 0
if number == 0:
    some statements here
```