Python – Conditional Structure

if, else & elif

if statement in Python

- In Python, if Statement is used for decision making. It will run the body of code only when if statement is true.

if

```
mark1,mark2 = 53,65
if mark1 >= mark2:
    print (“mark1 >= mark2!" ) # True if mark1 >= mark2.
```

if block of code

```
mark1,mark2 = 53,65
if mark1 >= mark2:
    print (“mark1 >= mark2!”)
    print(mark1+mark2)
```

if block of code is executed once

```
mark1,mark2 = 53,65
if mark1 >= mark2:
    print (“mark1 >= mark2!”)
    print(mark1+mark2)
print("After if block")
```

mark1 >= mark2!

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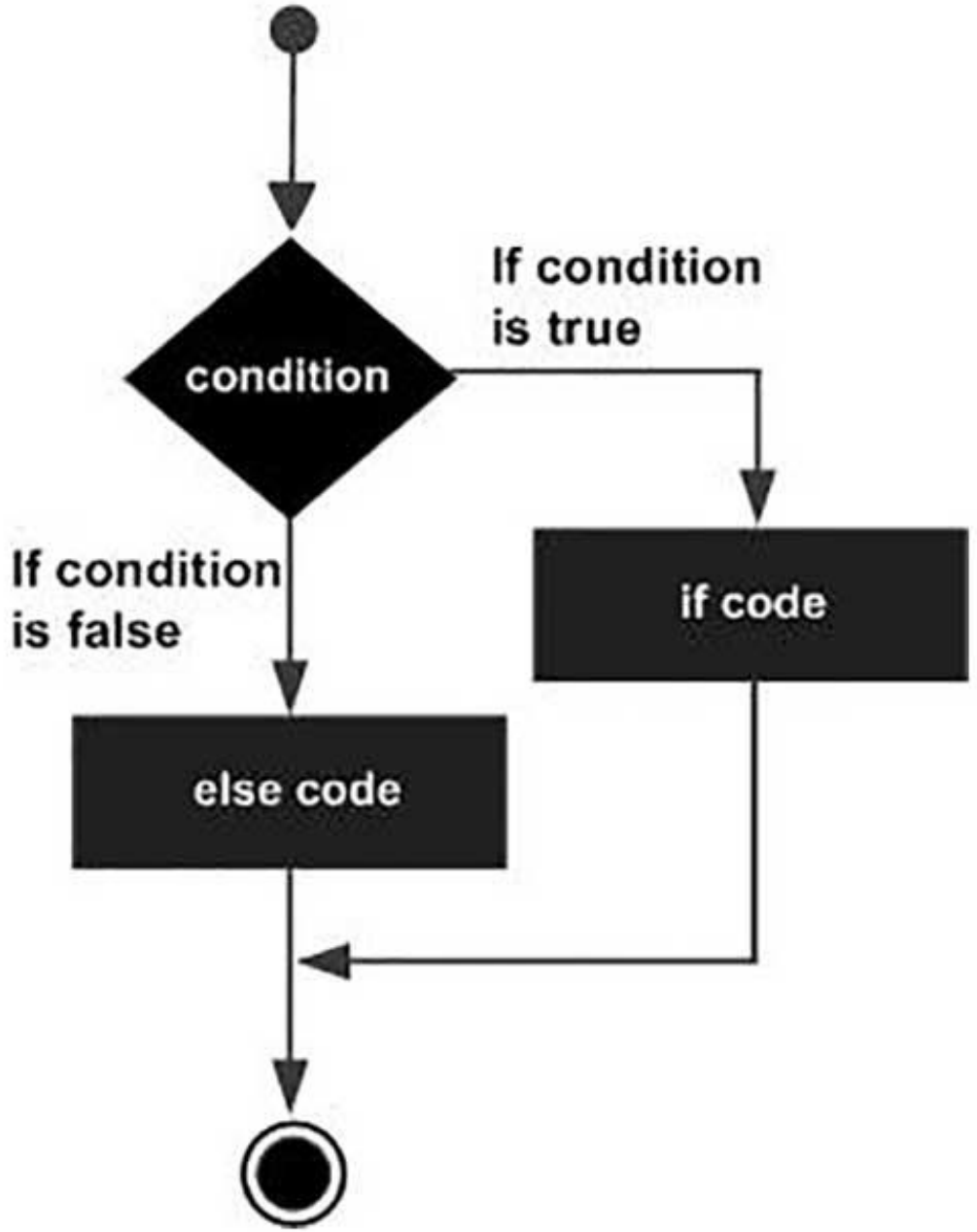
After if block

if and else


condition
If condition is true
If condition is false
if code
else code

else statement

- The "else condition" is usually used when you have to judge one statement on the basis of other.
- If one condition goes False, then there should be another condition that should True

if & else

```
mark1,mark2 = 53,65
if mark1 >= mark2:
    print (“mark1 >= mark2!”)
    print(mark1+mark2)
else:
    print (“mark1<mark2!") # executed if mark1<mark2
```

if and else

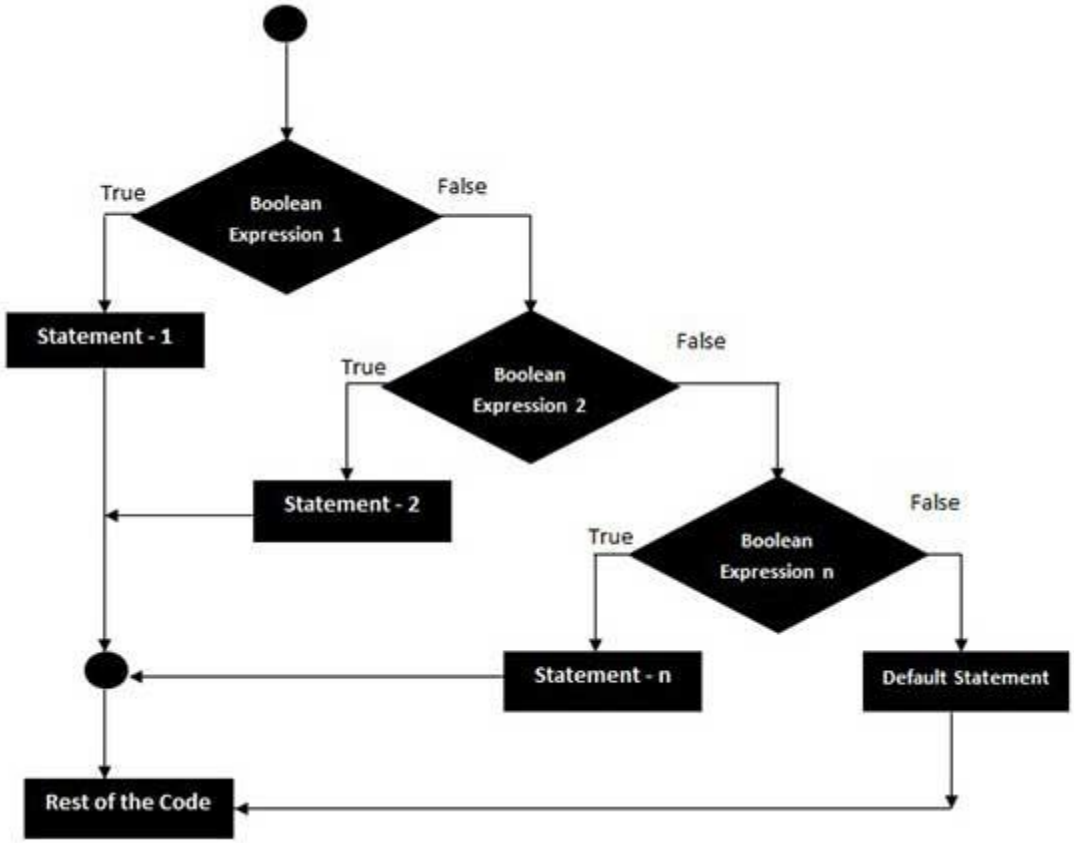
- Deciding on different path of execution.
- In python, decision making is done with **if**, and **else** statements.
- Example of a simple if/else statement:
- **mark = 51**
- **if mark >= 50:**
- **print ("You passed the test!") # executed if mark >= 50.**
- **else:**
- **print ("You failed the test!") # executed if mark < 50**

- **'''Ensure that you give : after if and else to begin the block and every statement in the block should be indented at correct column '''**

If block of code & else block of code

```
mark1,mark2 = 53,65
if mark1 >= mark2:
    print (“mark1 >= mark2!”)
    print(mark1+mark2)
else:
    print (“mark1<mark2!") # executed if mark1<mark2
    print(mark1-mark2)
```

if & elif


True
Boolean Expression 1
False
Statement - 1
True
Boolean Expression 2
False
Statement - 2
True
Boolean Expression n
False
Statement - n
Default Statement
Rest of the Code

```
mark = 51
if mark >= 50:
    print (“passed test!" )   # executed if mark >= 50.
    print("Correct Column")
elif mark<50:
    print (“failed test!")    # executed if mark < 50
```

```
mark = 51
if mark >= 50:
    print (“passed test!" )   # executed if mark >= 50.
  print(“Wrong Column")
elif mark<50:
    print (“failed test!")    # executed if mark < 50
```

```
mark1,mark2 = 5,53
if mark1> mark2:
    print("mark1 > mark2")
elif mark1 == mark2:
    print("mark1 == mark2")
else:
    print("mark1 < mark2")
```

elif needs if

- mark1,mark2 = 5,53
- elif mark1 == mark2:
- print("mark1 == mark2")
- else:
- print("mark1 < mark2")

elif needs if

- mark1,mark2 = 5,53
- elif mark1 == mark2:
- print("mark1 == mark2")
- else:
- print("mark1 < mark2")

Introduction to Python – 3.4

- What is the output of following program

```
x=0
if(x):
    print("x=0")
else:
    print("x!=0")
```

...

- x!=0

Introduction to Python – 3.4

- What is the output of following program
- x=0.0
- if(x):
- `    print("x=0.0")`
- else:
- `    print("x!=0.0")`
- ...
- x!=0.0

Introduction to Python – 3.4

- What is the output of following program
- x=''
- if(x):
- print("x='' ")
- else:
- print("x!='' ")
- ...
- x!=''

Exercise 1

''' Take marks of a student in one subject and then display his grade.

70 or Above: You scored an 'A'!.

60 to 69: You scored a 'B'!

50 to 59: You scored a 'C'!

Less than 50: You failed the test!

Use if, elif & else statements

'''

IfDemo1

Exercise 1 : Solution

```
mark = int(input("Enter marks: "))
if mark >= 70:
    print ("You scored an 'A'!" )     # executed if mark >= 70
elif mark >= 60:
    print ("You scored a 'B'!")       # executed if mark >= 60
elif mark >= 50:
    print ("You scored a 'C'!"  )     # executed if mark >= 50
else:
    print ("You failed the test!")    # executed if mark < 50
```

Exercise 2

''' Take three numbers from the user and Find the highest of the three numbers. Give following input prompts

Enter a value

Enter b value

Enter c value

Give one of the outputs

a is highest

or

b is highest

or

c is highest

or

all are equal

Or

’’’

Exercise 2 : Solution

```
a = int(input("Enter a value "))
b = int(input("Enter b value "))
c = int(input("Enter c value "))
if(a>b and a>c):
    print("a is highest")
elif(b>a and b>c):
    print("b is highest")
elif(b>a and c>b):
    print("c is highest")
else:
    print("all are equal")
```

'''In this program, we check if the number is positive or negative or zero and display an appropriate message
'''

'''In this program, we check if the number is positive or negative or zero and display an appropriate message '''

```
num = 3.4

# Try these two variations as well:
# num = 0
# num = -4.5

if num > 0:
    print("Positive number")
elif num == 0:
    print("Zero")
else:
    print("Negative number")
```

Python program to check if the input year is a leap year or not

Python program to check if the input year is a leap year or not

```
year = 2000
# To get year (integer input) from the user
# year = int(input("Enter a year: "))

if (year % 4) == 0:
   if (year % 100) == 0:
      if (year % 400) == 0:
         print("{0} is a leap year".format(year))
      else:
         print("{0} is not a leap year".format(year))
   else:
      print("{0} is a leap year".format(year))
else:
   print("{0} is not a leap year".format(year))
```

Using if & else

- **Exercise: While purchasing certain items, a discount of 10% is offered if the amount purchased is more than 1000. If quantity and price per item are input through the keyboard, write a program to calculate the total expenses.**
- **Enter Price : 100**
- **Enter Quantity : 20**
- **Price= 100 Quantity= 20**
- **amount= 1800.0 discount= 200.0**

- **====== ======**
- **Enter Price : 100**
- **Enter Quantity : 10**
- **Amount = 1000**

```
discount=0
price = int(input("Enter Price : "))
qty = int(input("Enter Quantity : "))
amount = price*qty
if(amount>1000):
    discount = amount*.1
    amount -= discount
    print("Price= ",price, " Quantity= ",qty )
    print("amount= ", amount, " discount= ", discount)
else:
    print("Amount = ",amount)
```

Exercise

/* IfElifElseQuadratic.py */

/* Program to evaluate real roots of quadratic equation

$ax^2 + b x + c = 0$ using quadratic formula

x = (-b +/- sqrt(b*b – 4*a*c)) / (2*a)

Program rejects cases where roots are complex

ie when b*b – 4*a*c is negative or where

a = 0. */

Solution 1

```
from math import*
# Read input data
a = int(input("a = "))
b = int(input("b = "))
c = int(input("c = "))
# Test for complex roots
e = b * b - 4* a * c
if (e < 0):
   print("complex roots ");
# Test for a = 0
elif a == 0:
   print("Error: a = 0");
else:
   d = sqrt(e);
   x1 = (-b + d) / (2*a);
   x2 = (-b - d) / (2*a);
   # Display output */
   print("x1 = ",x1," x2 = ",  x2)
```

Solution 2 : Use bitwise op

```
from math import*
# Read input data
a = int(input("a = "))
b = int(input("b = "))
c = int(input("c = "))
# Test for complex roots
e = b * b - 4* a * c
if (e < 0):
   print("complex roots ");
# Test for a = 0
elif a == 0:
   print("Error: a = 0");
else:
   d = sqrt(e);
   x1 = (-b + d) / (a<<1);
   x2 = (-b - d) / (a<<1);
   # Display output */
   print("x1 = ",x1," x2 = ",  x2)
```

Exercise

/* IfElifElseQuadratic.py */

/* Program to evaluate real roots of quadratic equation

$ax^2 + b x + c = 0$ using quadratic formula

x = (-b +/- sqrt(b*b – 4*a*c)) / (2*a)

Program rejects cases where roots are complex

ie when b*b – 4*a*c is negative or where

a = 0. */

Display when roots r1 == r2 and both +ve

Display when roots r1 == r2 and both -ve

Solution 3

```
from math import*
# Read input data
a = int(input("a = "))
b = int(input("b = "))
c = int(input("c = "))
e = b * b - 4* a * c
if (e < 0):
   print("complex roots ");
elif a == 0:
   print("Error: a = 0");
else:
   d = sqrt(e);
   x1 = (-b + d) / (a<<1);
   x2 = (-b - d) / (a<<1);
   print("x1 = ",x1," x2 = ",  x2)
   if (x1 == x2) and (x1>0 and x2>0):
      print("x1 and x2 both are equal and positive")
      print("x1 = ",x1," x2 = ",  x2)
   if (x1 == x2) and (x1<0 and x2<0):
      print("x1 and x2 both are equal and negative")
      print("x1 = ",x1," x2 = ",  x2)
```