

Python Programming Language

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Lecture 6: If –Else and Problem Solving

Hafsa Sultana

Computer Science and Engineering

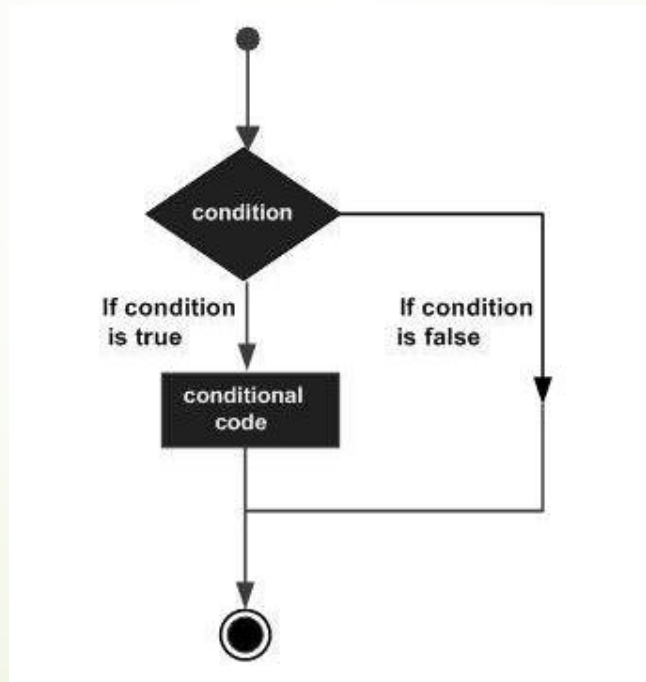
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Today's Learning Objectives

- Decision Making
- Conditional Statements
- If-Else Constructs
- Practical Exercises

Decision Making

Decision structures evaluate multiple expressions that produce TRUE or FALSE as outcome.



What are Conditional Statements?

- **Definition:** Instructions that only run when a certain condition is true.
- **Importance:** Allows programs to make decisions and execute different code paths.

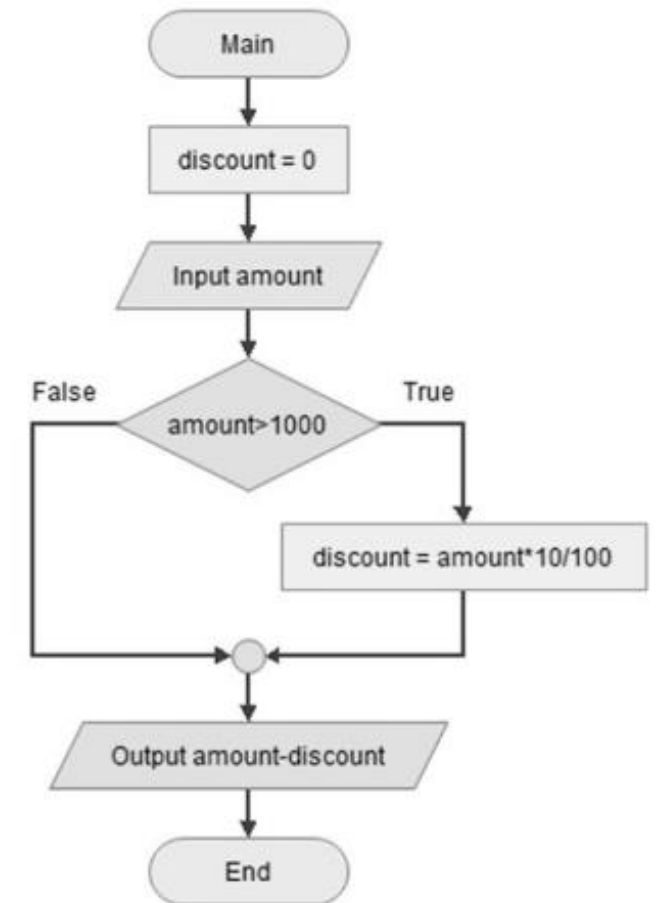
Logical conditions:

- Equals: $a == b$
- Not Equals: $a != b$
- Less than: $a < b$
- Less than or equal to: $a \leq b$
- Greater than: $a > b$
- Greater than or equal to: $a \geq b$

If Statement

- Let us consider an example of a customer entitled to 10% discount if his purchase amount is > 1000 ; if not, then no discount is applicable.

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Simple If Statement

- **Syntax:** if expression:
 statement(s)

if condition:

 # code to execute if the condition is true

Example: Check if a number is positive

```
num = 5
if num > 0:
    print("The number is positive")
```

If-Else Statement

► Syntax:

if condition:

 # code to execute if condition is true

else:

 # code to execute if condition is false

► Example: Check if a number is even or odd.

```
num = 4
```

```
if num % 2 == 0:
```

```
    print("The number is even")
```

```
else:
```

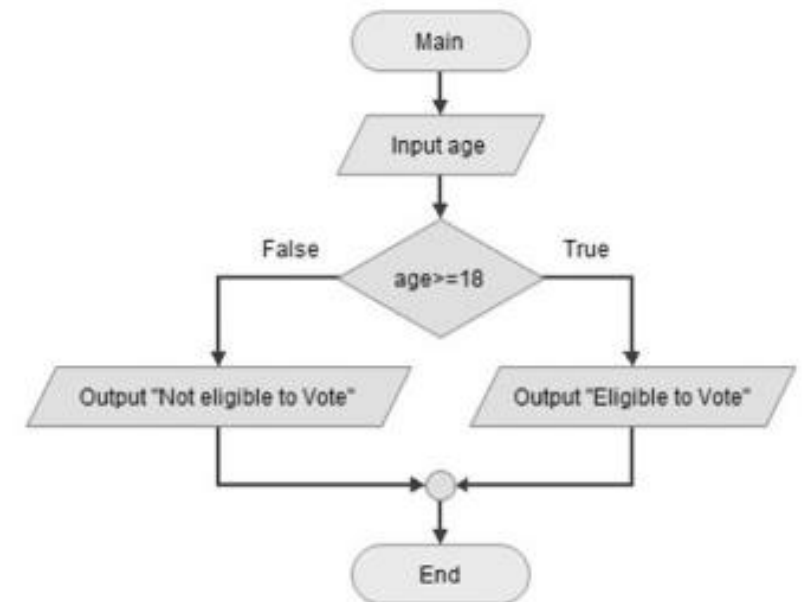
```
    print("The number is odd")
```

If-Else Statement

➤ **Example:** The variable age can take different values. If the expression "age > 18" is true, the message you are eligible to vote is displayed otherwise not eligible message should be displayed.

➤ **Code:**

```
age=25
print ("age: ", age)
if age >=18:
    print ("eligible to vote")
else:
    print ("not eligible to vote")
```



Short Hand If ... Else

➤ Example:

a = 2

b = 330

print("A") if a > b else print("B")

Using Boolean Operators

- **Boolean operators:** and, or, not
- **Example:** Check if a number is positive and less than 10.

```
num = 7
```

```
if num > 0 and num < 10:
```

```
    print("The number is positive and less than 10")
```

If-Else with Strings

➤ **Example:** Check if a string is empty.

```
my_string = ""  
if my_string == "":  
    print("The string is empty")  
else:  
    print("The string is not empty")
```

Practical Example 1

- ▶ Check if a user is old enough to vote.

Input: age

Output: if $\text{age} \geq 18$ then print "You are old enough to vote"
otherwise print "You are not old enough to vote".

Practical Example 2

- Determine if the temperature is hot, cold, or just right.

```
temperature = 25
if temperature > 30:
    print("It's hot")
elif temperature < 15:
    print("It's cold")
else:
    print("The temperature is just right")
```

Common Mistakes

- Forgetting the colon: after the condition.
- Incorrect indentation.
- Using = instead of == for comparison.

Debugging Tips

- Use print statements to check variable values.
- Carefully read error messages.
- Test each condition separately.

Practical Exercise 3

- Title: Guessing Game
- Write a program that
 - The secret number is predefined as 7.
 - The user is prompted to enter their guess.
 - The program checks if the guess is equal to the secret number.
 - If the guess is correct, it prints "You guessed it!".
 - If the guess is incorrect, it prints "Try again!".
- Input1: Guess the number: 7
Output: You guessed it!
- Input2: Guess the number: 3
Output: Try again!

Practical Exercise 4

- Title: Password Check
- Write a program that asks the user to enter a password. If the password matches the predefined password, print "Access granted". If it does not match, print "Access denied".
 - Input1: Enter the password: python123
Output: Access granted
 - Input2: Enter the password: wrong12password
Output: Access denied

Practical Exercise 5

- Title: Leap year
- Write a program that prompts the user to enter a year and checks if the year is a leap year. A year is a leap year if:
 - If a year is evenly divisible by 4 means having no remainder then go to the next step. If it is not divisible by 4. It is not a leap year. For example: 1997 is not a leap year.
 - If a year is divisible by 4, but not by 100. For example: 2012, is a leap year. If a year is divisible by both 4 and 100, go to the next step.
 - If a year is divisible by 100, but not by 400. For example: 1900, then it is not a leap year. If a year is divisible by both, then it is a leap year. So 2000 is a leap year.
- Input1: Enter a year: 2020
Output: The year is a leap year.
- Input2: Enter a year: 1900
Output: The year is not a leap year.

Recap

- Conditional Statements
- If-Else Constructs
- Elif and Nested If Statements
- Practical Examples

Any Question?

References

- <https://www.w3schools.com/python/>
- <https://www.tutorialspoint.com/python/>