Binary, conditional and boolean

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01

Binary number

The number system that we normally use is the decimal number system. It has 10 numbers: 0-9

The binary number system is a base-2 number system. This means it only has two numbers: 0 and 1

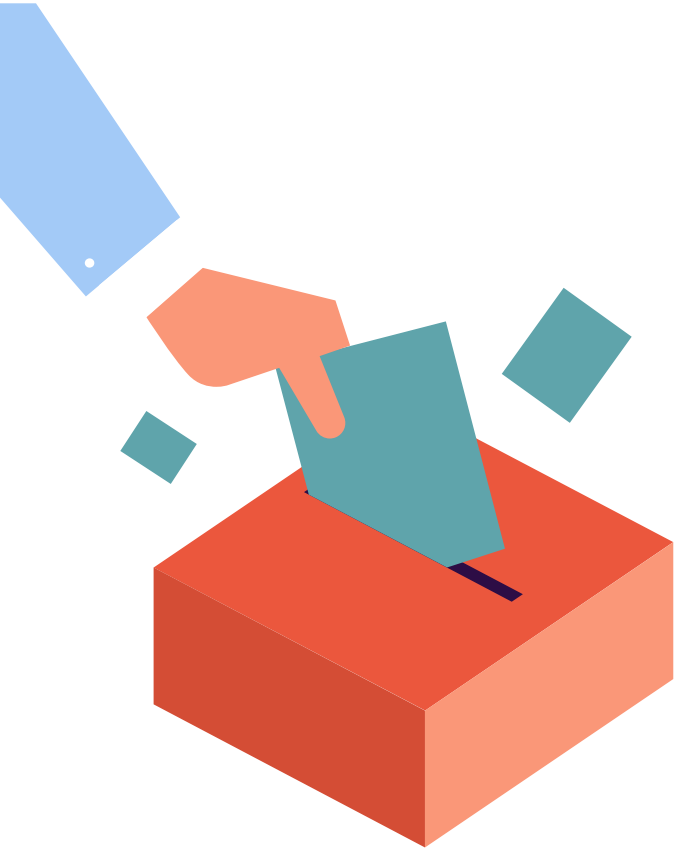
1

0

https://www.youtube.com/watch?v=ewokFOSxabs

How to represent information using Electricity?

Letter	ASCII Code	Binary	Letter	ASCII Code	Binary
a	097	01100001	A	065	01000001
b	098	01100010	B	066	01000010
c	099	01100011	C	067	01000011
d	100	01100100	D	068	01000100
e	101	01100101	E	069	01000101
f	102	01100110	F	070	01000110
g	103	01100111	G	071	01000111
h	104	01101000	H	072	01001000
i	105	01101001	I	073	01001001
j	106	01101010	J	074	01001010
k	107	01101011	K	075	01001011
l	108	01101100	L	076	01001100
m	109	01101101	M	077	01001101
n	110	01101110	N	078	01001110
o	111	01101111	O	079	01001111
p	112	01110000	P	080	01010000
q	113	01110001	Q	081	01010001
r	114	01110010	R	082	01010010
s	115	01110011	S	083	01010011
t	116	01110100	T	084	01010100
u	117	01110101	U	085	01010101
v	118	01110110	V	086	01010110
w	119	01110111	W	087	01010111
x	120	01111000	X	088	01011000
y	121	01111001	Y	089	01011001
z	122	01111010	Z	090	01011010



02
Boolean Datatype and Conditional Operators

The boolean datatype

The computer talks in binary number, and every programming language allow programmers represent the logic with boolean data type with 2 values: True or False

Conditional operators

<

Lesser than

==

Equals to

>

Greater than

<=

Lesser or Equal to

!=

Not equals to

>=

Greater or Equals to

= operator is to assign variable
== operator is for equality comparison

03

Conditional statement with if

Definition

The **if-else** statement in Python allow you to perform actions based on some condition

Example: **if** you are **older than 18**, then you can watch the movie, **else** you can't watch it

Syntax

if condition:

    Statement if true

    ...

```
a = 300
b = 200
if a > b:
  print("a is greater than b")
```

The condition can use any logical operator, as long as they result in **true** or **false**

Python relies on indentation (whitespace or tab at the beginning of a line) to define scope in the code. Other programming languages often use curly-brackets for this purpose.
Not indenting inside if statement will result in an error

Correct

```
a = 33
b = 200
if b > a:
  print("b is greater than a")
```

Not correct

```
a = 33
b = 200
if b > a:
print("b is greater than a") # you will get an error
```

Syntax

if condition**:**

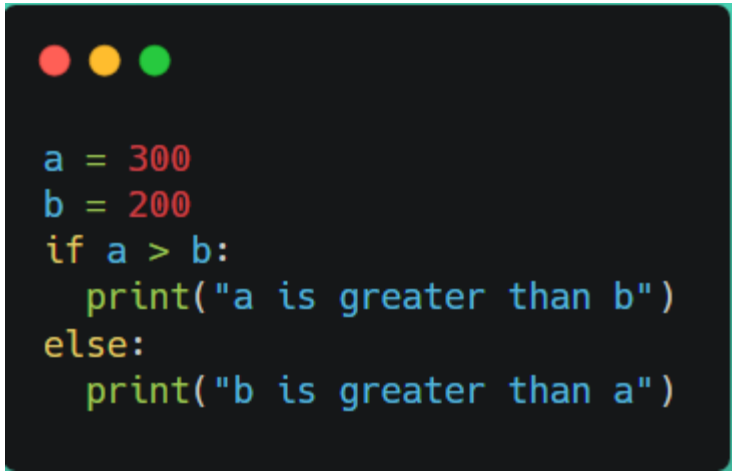
Statement if true

...

else:

Statement if false

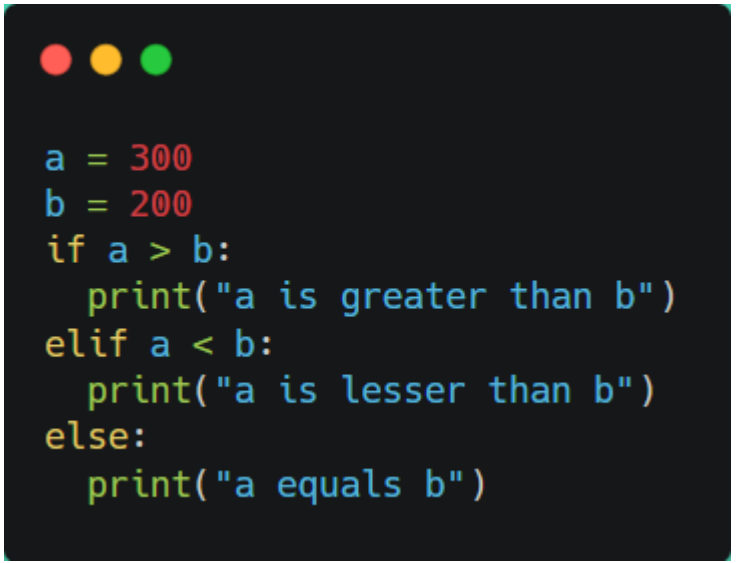
...



```
a = 300
b = 200
if a > b:
  print("a is greater than b")
else:
  print("b is greater than a")
```

Syntax

if condition_1**:**
    Statements if condition_1 is true
    ...
elif condition_2**:**
    Statements if condition_2 is true
    ...
elif condition_3**:**
    Statements if condition_2 is true
    ...
...
else:
    Statements if none is true



```
a = 300
b = 200
if a > b:
  print("a is greater than b")
elif a < b:
  print("a is lesser than b")
else:
  print("a equals b")
```

04

Boolean operators

Boolean logic

and

```
>>> True and True
True
>>> True and False
False
>>> False and True
False
>>> False and False
False
```

or

```
>>> True or True
True
>>> True or False
True
>>> False or True
True
>>> False or False
False
```

not

```
>>> not True
False
>>> not False
True
```

Example of boolean logic with comparison operator

```
age = 20
money = 150
if age >= 18 and money > 200:
    print("You are allowed to enter")
else:
    print("Must must be over 18 and
money over 200 in order to enter")
```

age >= *18* (true)
money > *200* (false)
age >= *18* **and** *money* > *200* (false)
=> Must be over 18 and money over 200 in order to enter


CHALLENGE

Write a program to find largest of three given numbers a, b, c. (a,b,c are real number)

```
Number 1: 4
Number 2: 11
Number 3: 6
The largest number is 11.0
```

Write a program to check if a year is a leap year or not.
- A leap year is exactly divisible by 4 except for century years (years ending with 00). The century year is a leap year only if it is perfectly divisible by 400.
- For example: 1999 is not a leap year
  2000 is a leap year
  2004 is a leap year

```
Enter year: 1996
1996 is a leap year
```

```
Enter year: 2021
2021 is not a leap year
```

```
Enter year: 1900
1900 is not a leap year
```

Write a program to find the real roots of a quadratic equation: $ax^2 + bx + c = 0$
(a,b,c are real numbers and a != 0)

```
a = 2
b = 3
c = 1
Solution:
 x1 = -1.0
 x2 = -0.5
```

```
a = 1
b = 2
c = 1
root = -1.0
```

```
a = 3
b = 2
c = 1
The equation has no solution!!
```

THANKS!

See you in the next lesson!