4 - Conditional Execution

(Course: Python Programming)

Python for Everybody

www.py4e.com

If, elif , else Statements

- Let’s begin to learn about **control flow**
- We often only want certain code to execute when a particular condition has been met.
- For example, **if** my dog is hungry (some condition), then I will feed the dog (some action).

- In Python, to control this flow of logic we use some keywords:
    - **if**
    - **elif**
    - **else**

In addition, we also use **Boolean Expressions** which contain operators known as **Comparison Operators**

- Control Flow syntax makes use of **colons** and **indentation** (whitespace), to create **code blocks**

- This indentation system is crucial to Python and is what sets it apart from other programming languages.

- Syntax of an **if** statement

```
if some_condition:
    # execute some code
```

Comparison Operators

- Boolean expressions ask a question and produce a Yes or No result which we use to control program flow
- Boolean expressions using comparison operators evaluate to True / False or Yes / No
- Comparison operators look at variables but do not change the variables

Python	Meaning
<	Less than
<=	Less than or Equal to
==	Equal to
>=	Greater than or Equal to
>	Greater than
!=	Not equal

Remember: “=” is used for assignment.

http://en.wikipedia.org/wiki/George_Boole

Comparison Operators

```
x = 5
if x == 5 :
    print('Equals 5')
if x > 4 :
   print('Greater than 4')
if  x >= 5 :
    print('Greater than or Equals 5')
if x < 6 : print('Less than 6')
if x <= 5 :
    print('Less than or Equals 5')
if x != 6 :
    print('Not equal 6')
```

Equals 5

Greater than 4

Greater than or Equals 5

Less than 6

Less than or Equals 5

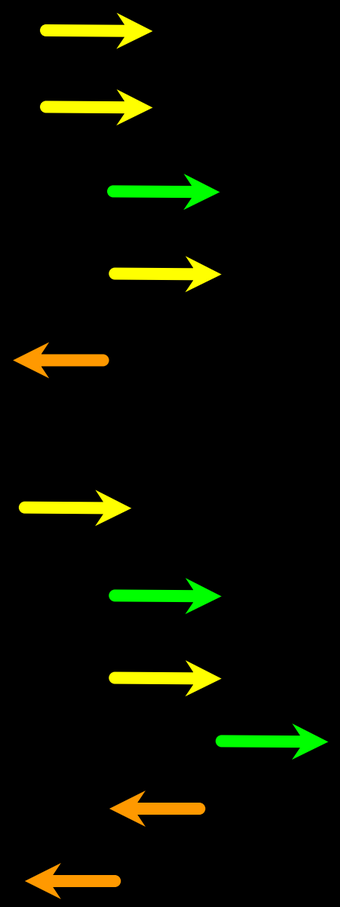
Not equal 6

Indentation

- Increase indent indent after an if statement or for statement (after :)
- Maintain indent to indicate the scope of the block (which lines are affected by the if/for)
- Reduce indent back to the level of the if statement or for statement to indicate the end of the block
- Blank lines are ignored - they do not affect indentation
- Comments on a line by themselves are ignored with regard to indentation

increase / maintain after if or for

decrease to indicate end of block

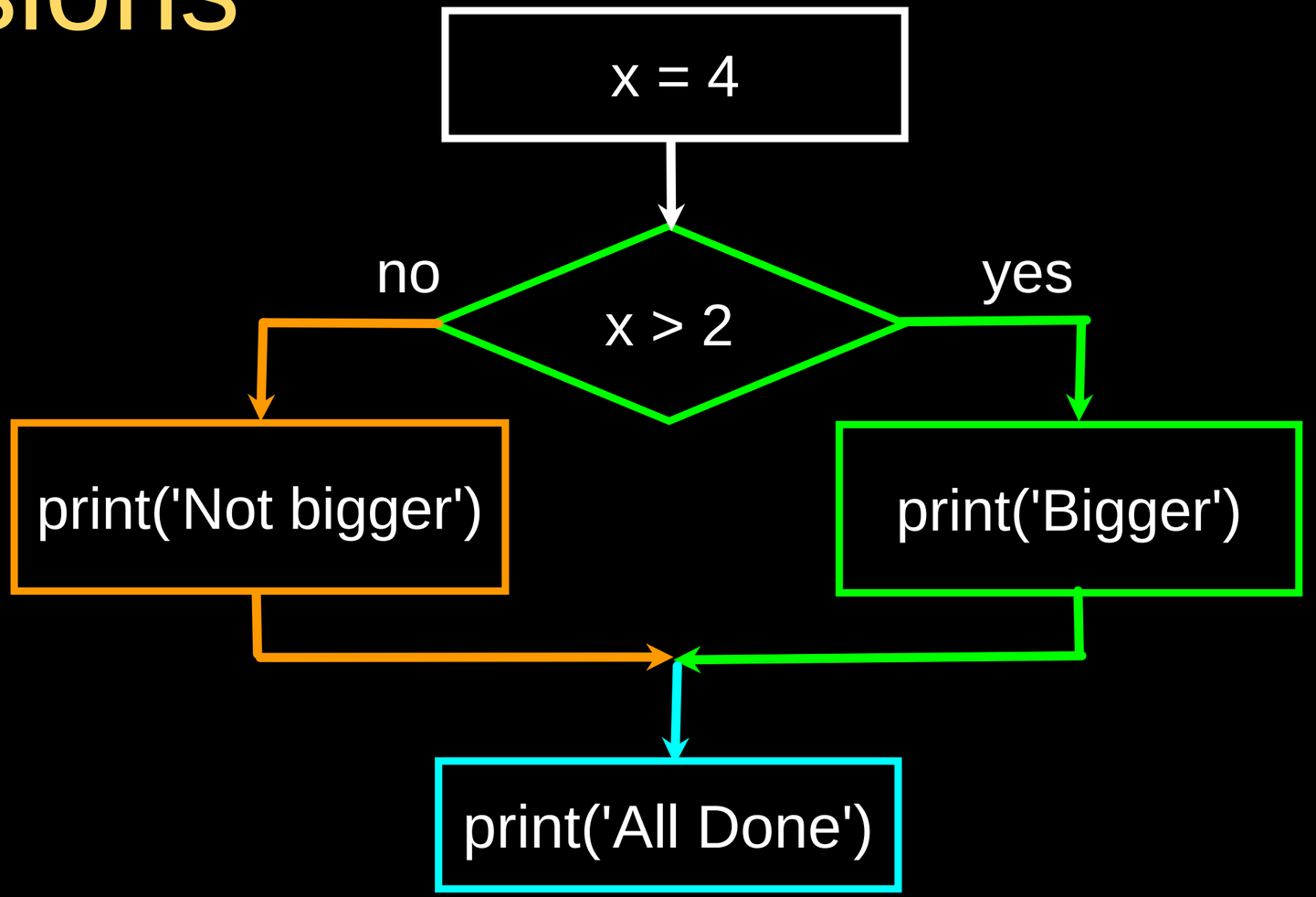


```
x = 5
if x > 2 :
    print('Bigger than 2')
    print('Still bigger')
print('Done with 2')

for i in range(5) :
    print(i)
    if i > 2 :
        print('Bigger than 2')
    print('Done with i', i)
print('All Done')
```

Two-way Decisions

- Sometimes we want to do one thing if a logical expression is true and something else if the expression is false
- It is like a fork in the road - we must choose one or the other path but not both

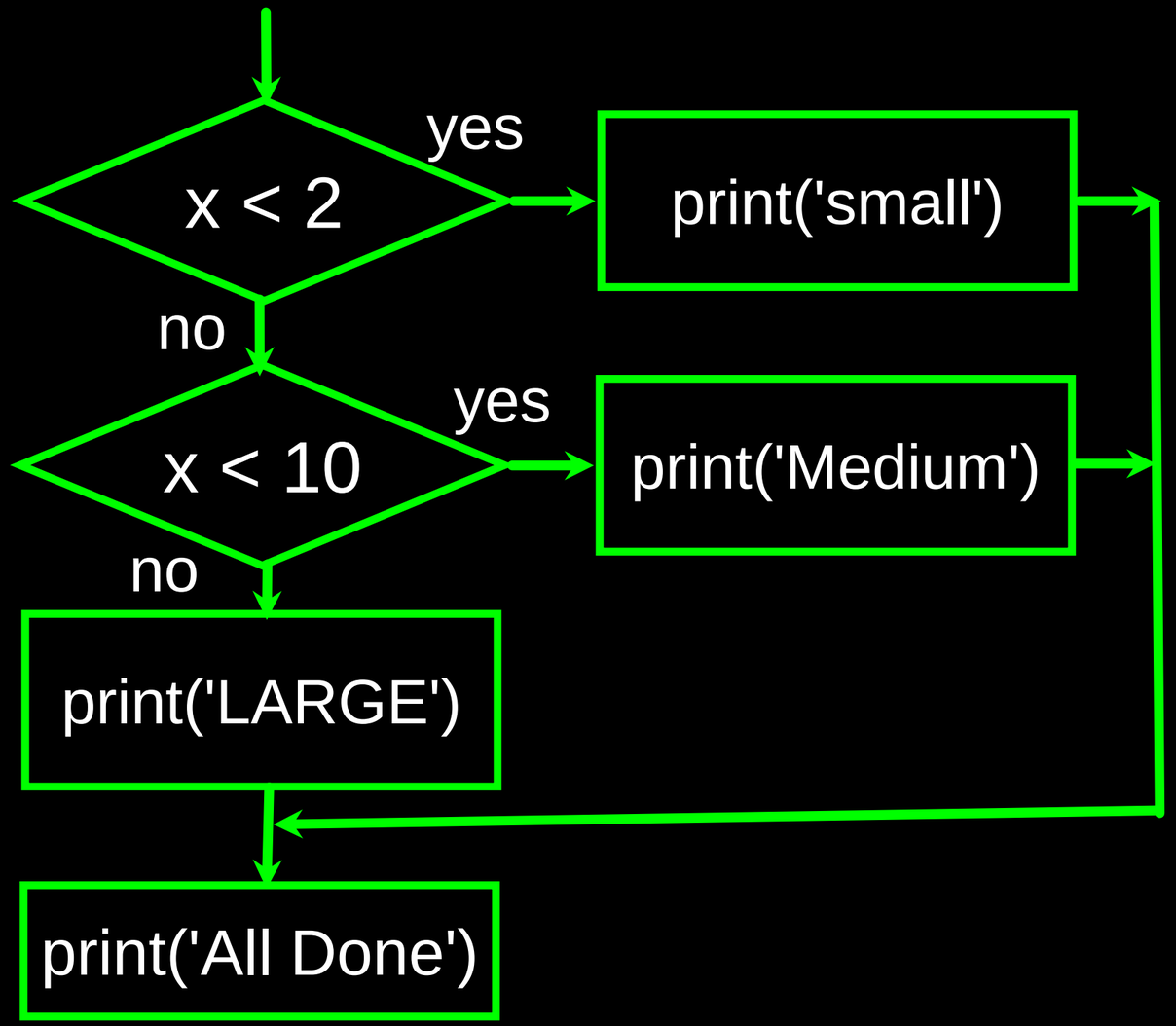


- Syntax of an **if/else** statement

```
if some_condition:
        # execute some code
else:
        # do something else
```

Multi-way

```
if x < 2 :
    print('small')
elif x < 10 :
    print('Medium')
else :
    print('LARGE')
print('All done')
```

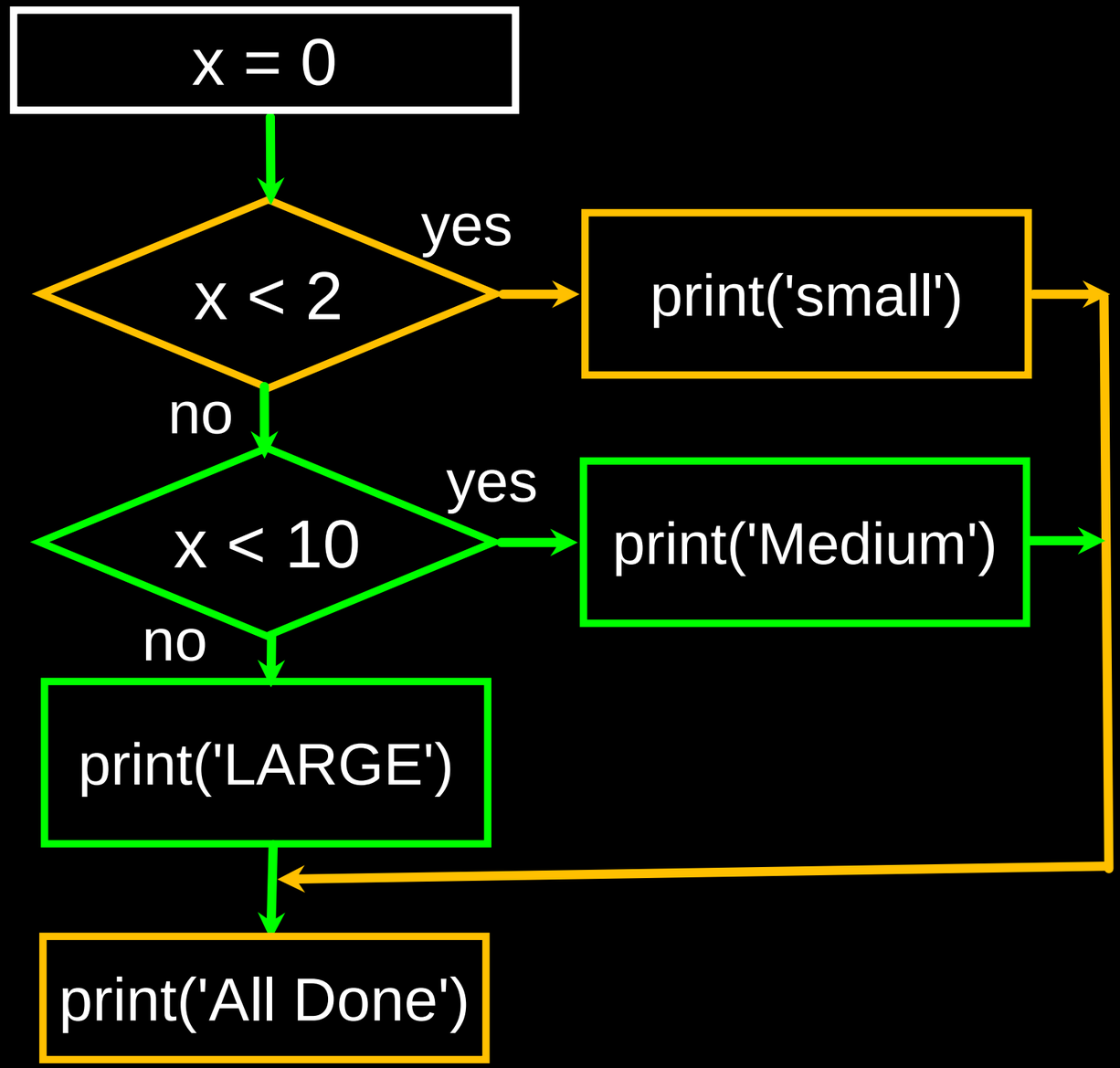


- Syntax of an **if/else** statement

```
if some_condition:
        # execute some code
elif some_other_condition:
        # do something different
else:
        # do something else
```

Multi-way

```
x = 0
if x < 2 :
    print('small')
elif x < 10 :
    print('Medium')
else :
    print('LARGE')
print('All done')
```



Exception Handling

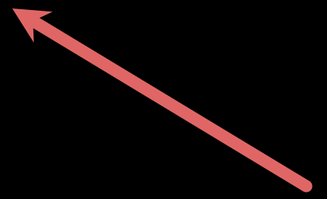
- Sometimes your Python code may raise a runtime error (also known as exceptions).
- When this happens, the program terminates abruptly. This is not a good thing to happen.
- Instead, we would like to handle the runtime error or exception, so that the program can bypass the code where exception occurs and can terminate gracefully
- This is done by using try/except structure

The try / except Structure

- You surround a dangerous section of code with try and except
- If the code in the try works - the except is skipped
- If the code in the try fails - it jumps to the except section

```
$ cat notry.py
astr = 'Hello Bob'
istr = int(astr)
print('First', istr)
astr = '123'
istr = int(astr)
print('Second', istr)
```

```
$ python3 notry.py
Traceback (most recent call last):
File "notry.py", line 2, in <module>
istr = int(astr)ValueError: invalid literal
for int() with base 10: 'Hello Bob'
```



All
Done

The program stops here

```
$ cat notry.py
astr = 'Hello Bob'
istr = int(astr)
```

```
$ python3 notry.py
Traceback (most recent call last):
File "notry.py", line 2, in <module>
istr = int(astr)ValueError: invalid literal
for int() with base 10: 'Hello Bob'
```

All Done

Sample try / except

```
rawstr = input('Enter a number:')
try:
    ival = int(rawstr)
except:
    ival = -1

if ival > 0 :
    print('Nice work')
else:
    print('Not a number')
```

```
$ python3 trynum.py
Enter a number:42
Nice work
$ python3 trynum.py
Enter a number:forty-two
Not a number
$
```

Summary

- Comparison operators
  == <= >= > < !=
- Indentation
- One-way Decisions
- Two-way decisions:
  if: and else:
- Nested Decisions
- Multi-way decisions using elif
- try / except to compensate for errors

Exercise

Rewrite your pay computation to give the employee 1.5 times the hourly rate for hours worked above 40 hours.

```
Enter Hours: 45
Enter Rate: 10

Pay: 475.0
```

475 = 40 * 10 + 5 * 15

Exercise

Rewrite your pay program using try and except so that your program handles non-numeric input gracefully.

```
Enter Hours: 20
Enter Rate: nine
Error, please enter numeric input

Enter Hours: forty
Error, please enter numeric input
```

Thanks