
Flow Control



olsen software

Contents

1. Conditional statements
2. Loops



Demo folder: 03-FlowControl

1. Conditional Statements

- Using if tests
- Nesting if tests
- Using the if-else operator
- Doing nothing
- Testing a value is in a set of values
- Testing a value is in a range

Using if Tests

■ Basic if tests

```
if expression :  
    body ← Executes body if expression is true
```

■ if-else tests

```
if expression :  
    body1 ← Executes body1 if expression is true  
else:  
    body2 ← Otherwise, executes body2
```

■ if-elif tests

```
if expression1 :  
    body1 ← Executes body1 if expression1 is true  
  
elif expression2 :  
    body2 ← Or executes body2 if expression2 is true  
  
elif expression3 :  
    body3 ← Or executes body3 if expression3 is true  
  
...  
else :  
    lastBody ← If all else fails, executes (optional) lastBody
```

■ Notes:

- Test conditions can be any type of expression
- Use indentation to indicate the extent of a block, i.e. don't use {}

Nesting if Tests

- You can nest if tests inside each other
 - Use indentation to indicate level of nesting

- Example:

```
age = int(input("Please enter your age: "))
gender = input("Please enter your gender [M/F]: ").lower()

if age < 18:
    if gender == "m":
        print("Boy")
    else:
        print("Girl")
else:
    if age >= 100:
        print("Centurion")

    if gender == "m":
        print("Man")
    else:
        print("Woman")

print("The End")
```

nestedif.py

Using the if-else Operator

- The if-else operator is an in-situ test
 - *trueResult if condition else falseResult*
- Example:

```
isMale = ...  
age    = ...  
  
togo = (65 - age) if isMale else (60 - age)  
  
print("%d years to retirement" % togo)
```

`ifelseoperator.py`

Doing Nothing

- If you're not sure what to do if a test is true...
 - You can use the `pass` statement
 - Equivalent to a null statement in other languages

- Example:

```
team = input("Who is your favourite football team? ")

if team == "Cardiff":
    pass      # Eeek. we'll need to do something about this!

print("Your favourite team is %s " % team)
```

`pass.py`

Testing a Value is in a Set of Values

- You can test if a value is in a set of allowable values
 - Use the `in` operator

- Example:

```
country = input("Please enter your country: ")

if country in ("Netherlands", "Belgium", "Luxembourg"):
    print("Lowlands country")

elif country in ("Norway", "Sweden", "Denmark", "Finland", "Iceland"):
    print("Nordic country")

elif country in ("England", "Scotland", "Wales", "Northern Ireland"):
    print("UK country")

else:
    print("%s isn't classified in this particular application!" % country) ifin.py
```


Testing a Value is in a Range

- You can test if a value is in a range of allowable values
 - Call `range(start, end)` to return a range
 - The range is inclusive at start, exclusive at the end
- Example:

```
number = int(input("Enter a football jersey number [1 to 11]: "))  
  
if number == 1:  
    print("Goalie")  
  
elif number in range(2, 6):  
    print("Defender")  
  
elif number in range(6, 10):  
    print("Midfielder")  
  
else:  
    print("Striker")
```

`ifinrange.py`

2. Loops

- Using while loops
- Using for loops
- Using for loops with a range
- Unconditional jumps
- Using else in a loop
- Simulating do-while loops

Using while Loops

- The while loop is the most straightforward loop construct

- Test expression is evaluated
- If true, loop body is executed
- Test expression is re-evaluated
- Etc...

```
while expression :  
    loopBody
```

- Note:

- Loop body will not be executed if test is false initially

- Example:

```
print("Numbers from 1-5 inclusive")  
i = 1  
while i <= 5:  
    print(i)  
    i = i + 1
```

while.py

Using for Loops

- The for loop is different than in most languages
 - In Python, a for loop iterates over items in a sequence

```
for item in sequence :  
    loopBody
```

- Example:

```
lottonumbers = [2, 7, 3, 12, 19, 1]
```

```
for item in lottonumbers:  
    print(item)
```

`forlist.py`

Using for Loops with a Range

- You can also use a for loop to iterate over a numeric range
 - Use `range()` to create a range of numbers
 - The for loop will iterate over these numbers
- Example:

```
print("Numbers from 0-4 inclusive")
for i in range(5):
    print(i)

print("Numbers from 6-10 inclusive")
for i in range(6, 11):
    print(i)

print("First 5 odd numbers")
for i in range(0, 9, 2):
    print(i + 1)
```

`forrange.py`

Unconditional Jumps

- Python provides two ways to perform an unconditional jump in a loop
 - break
 - continue
- Example:

```
magicnumber = int(input("what is the magic number? "))

print("This loop terminates if it hits the magic number")
for i in range(1, 21):
    if i == magicnumber:
        break
    print(i)
print("End")

print("\nThis loop skips the magic number")
for i in range(1, 21):
    if i == magicnumber:
        continue
    print(i)
print("End")
```

breakcontinue.py

Using `else` in a Loop

- You can define an `else` clause at the end of a loop
 - Same kind of syntax as `if...else`
 - The `else` branch is executed if the loop terminates naturally (i.e. if it didn't exit because of a `break`)

- Example

```
magicnumber = int(input("what is the magic number? "))

print("This loop does some processing if it doesn't detect the magic number")
for i in range(1, 21):
    if i == magicnumber:
        break
    print(i)
else:
    print("The magic number %d was not detected" % magicnumber)

print("End")
```

`loopelse.py`

Simulating do-while Loops

- Many languages have a do-while loop
 - Guarantees at least one iteration through the loop body
 - The test is at the end, to determine whether to repeat
- Python doesn't have a do-while loop, but you can emulate it as follows

```
while True:
    exammark = int(input("Enter a valid exam mark: "))
    if exammark >= 0 and exammark <= 100:
        break
```

```
print("Your exam mark is %d" % exammark)
```

`simulateddowhile.py`

Any Questions?

