

Lesson 3: The Snake Makes Decisions

Good programs have to be able to react to different conditions as they happen. Let's learn about how our Python programs can use this powerful concept.

Choose Your Own Adventure using "if"

Let's look at the `if` statement, which helps Python choose an action based on whether a certain condition is true. These conditional statements are very important in Python because they allow programs to react differently depending on what's happening, such as when a user picks one of several choices. Using an `if` statement lets the program handle each choice differently.

There are a couple things to understand about choice functions like `if` in Python:

1. The function statement starts with `if`, then a condition, then a colon (`:`).
2. The lines telling Python what to do only if the condition is met are *indented*. Standard Python uses 4 spaces to indent.
3. When you stop indenting, Python automatically knows the conditional part is over, and it should continue running normally.

Exercise 3-1: What's in the box?

Start up Python 3 by opening your Terminal and typing `python3` at the prompt. Set a value for the number variable `x`, then have Python check its size:

```
x = 5
if x > 3:
    print 'x is more than 3'
```

What happens? What do you think would happen if the variable `x` contained the number 2?

Exercise 3-2: What will happen?

Here is an example of a conditional block, with an extra statement afterward.

```
if myname is 'Paul':
    print('Some output')
print('More output')
```

Look at the program above *carefully*, and then answer this question: If the variable `myname` has a value other than the string `'Paul'`, what will the computer print? Write the answer.

Now test your theory by typing the example into Python. Remember that when the conditional block is over, you need to hit the *Backspace* key to remove the indentation.

Exercise 3-3: Doing the loop-the-loop

Remember that computers aren't very smart, but they can do things very fast. That makes them very good at doing repetitive things that would bore humans or where we might make mistakes. *Loops* allow programs to do things repeatedly.

```
x = 0
while x < 5:
    print(x)
    x = x+1
```

See if you can follow the logic:

1. The variable `x` starts out as zero.
2. Python tests whether `x` is less than 5. That's True, so Python prints out the value of `x`, which is 0, and then resets `x` to be whatever `x` was, plus 1. That's `0 + 1`, or 1.
3. Python goes back to the beginning of the loop. It tests whether `x` is less than 5. It is, so Python prints out the value of `x`, which is 1, and then adds 1 to `x` again, so `x` is now 2...
4. ...and so on, until `x` is 5 at some point. Now when Python tests the value, the condition is False – because `x` is no longer less than 5, it's equal to 5. Now there's nothing else for the computer to do, so it stops.

That's how computers do loops. By the way, if you give a computer a loop where the condition never becomes false, it's called an *infinite loop* – and it will run forever, or until you interrupt the program!

The End

We've reached the end of our mini-course. During this course, you learned:

- Computer programs, also called *software*, are instructions created by humans. Software tells a computer what to do. Without it, a computer wouldn't be very useful!

- You learned how to start up, shut down, and find your way around a free operating system called Linux, which itself includes thousands of free software programs.
- You learned how to start up Python, an easy but powerful computer programming language.
- You learned about *variables* which allow Python to store values for later use, and different types of values such as numbers and *strings*.
- You learned how to take input from the user and how to make Python print output to the screen.
- You learned about conditionals and loops, which allow software to make decisions or act differently depending on certain values or conditions.

Congratulations on your hard work!

Some additional notes

If you look in the folder of your “liveuser” account, you'll find two documents with the following names:

swfk-linux-0.7.7.pdf

IYOCGwP_book1.pdf

These are complete books about Python for kids just like you. They are free, and you can copy them and read them at your convenience. They are quite long, so don't print them unless you get permission from your parents first! If you are interested in learning more about Python and computer programming, you will probably enjoy these books.

Each book has a website address in it where you can download additional copies, or learn more about the authors and their work.

Having you in my class has been a great experience and I enjoyed teaching and learning from each of you. Have a great rest of your year at Conway!