C9418: Intro Programming in Python

Spark 2015

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Mar. 15, 2015

Outline

1. Introduction to Programming
2. Introduction to Python
3. Expressions and Variables

Programming

- A program is “a sequence of coded instructions for a computer”
- Programming is the coding of these instructions by humans
- “The purpose of programming is to create a program that exhibits a certain desired behavior.”
- Programming is “writing the source code of computer programs”

General Programming Steps

1. Pick a programming language
2. Write “source code” inside a text file
   - Source code is understandable by humans [who know the language]
   - Each language has different code syntax
3. (For compiled languages) A “compiler” translates source into binary / machine code that is understandable by computers
4. Computer executes code

Writing Python Programs

- Code can be written and saved using special programming environments – file type is .py
- Code can also be written in a normal text editor
  - Notepad, Notepad++, vim, emacs, gedit, textedit
  - NOT Word, OpenOffice, LibreOffice
- We will use Python IDLE, an officially supported integrated development environment
- Python interpreter executes code directly from your source code – Python is an **interpretted language**

Python Interpreter

- The first thing you see after opening Python IDLE is a command prompt
- This is a shell for the Python interpreter
- Go ahead and type stuff into it
- In its most basic form, the interpreter acts like a calculator, supporting all basic mathematical operations and orders of operations
- Of course, the shell is infinitely more powerful than this, and we will slowly build up our knowledge of what Python can do

Writing and Saving Programs

- No code you write into the interpreter is permanent – it will be lost when you close the interpreter
- You can save code into a file so that you can run it whenever you want
- In Python IDLE, File -> New Window opens a Python file, which you can write code into, save, and run

Hello World! Your First Program!

- A programming tradition – your first program simply outputs the text `Hello World!`
- "Output", in this and most cases, means to write text on the screen

```
1  # Program: hello.py
2
3  print "Hello World!"
```

Basic Python syntax

- Python is CASE SENSITIVE!
  - This means that `Print "Hello World!"` is WRONG
- `#` starts a comment
  - Everything on the line after the `#` is the comment
  - Comments have no effect on the program
  - Use them so others can understand your program
- `"` starts and ends a string
  - A string is a sequence of characters
  - If you want the quote character, use `\"`
    - `"\"Hello World!\""` is the string consisting of the characters `"Hello World!"`
- Programs are made up of one-line statements:

```
1 do_this_first
2 then_do_that
3 finally_do_something_else
```

The `print` Statement - Part 1

- This statement is used for outputting text on the screen
- `print "Hello World!"` outputs `Hello World!`
- `print "text"` outputs `text` (literally)
- Don't forget the space after `print`, and the quotation marks!
- The enclosing quotation marks don't show up in the output
- After the text, a line break is output
- Can include line break in string with `\n` character

So wait, can Python do anything besides print messages?

- Yes, it can!
- Python can calculate the results of expressions
- Python can store and manipulate data using variables

Literals

- The building blocks of expressions
- A basic representation of a simple value
- Integer literals - `0`, `17`, `-10`, etc.
- Floating point literals - `1.0`, `3.14159`, etc.
- String literals - `"Hello World!"`, etc.
- Boolean literals - `True`, `False`

The `print` Statement - Part 2

- Can be used to print any literal

```
1  print 17
2  print 3.14159
3  print "Hello World!"
4  print True
5  print False
```

Arithmetic Expressions

Addition (+)	`17+5 => 22`	Subtraction (−)	`17-5 => 12`
Multiplication (*)	`17*5 => 85`	Division (/)	`17/5 => 3`
Modulus (%)	`17%5 => 2`	Parenthesis (())	`(17+5)*2`
Negative (−)	`-(17+5)`		

The `print` Statement - Part 3

- Can be used to print any expression

```
1 print 17 + 5
2 print 17 - 5
3 print 17 % 5
```

- Can print multiple expressions on one line

```
1 print "The value of 17 + 5 is", 17 + 5
```

- IDLE shell can print expressions without typing `print`

Logical (Boolean) Expressions

Equality (==)	`17==5` => `False`
Inequality (!=)	`17!=5` => `True`
Greater than (>)	`17>5` => `True`
Greater than or equal (>=)	`17>=5` => `True`
Less than (<)	`17<5` => `False`
Less than or equal (<=)	`17<=5` => `False`