ESRC Business and Local Government Data Research Centre

An Introduction to Python

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3rd October 2018

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What is Python

- High-level programming language.
- Supports multiple programming paradigms.
  - Object oriented
  - Functional
  - Procedural

Python Programming Language

- Python is free and Open Source.
- Cross platform support.
- Interpreted language.
- Managed by the Python Software Foundation.

Uses for Python

- Used as scripting language for ArcGIS.
- Web applications.
- Graphics and gaming.
  - Soya3D 3D game engine.
- User Interface development.
- Maths and Scientific packages.

WHO USES PYTHON ?

Similarity to Python

- Tcl- an application language.
- Perl – Unix scripting language.
- R – Statics based language.

Statements

- Print – outputs messages to stdout.
- If – conditional executes a statement.
- For – iterates over a block of code.
- While – executes while condition is true.
- Class – executes a block of code within namespace (OOP).

If Statement

```
if condition: # if true execute block
    indentedStatementBlock

if condition: # if true execute block
    indentedStatementBlockForTrue
else: # other execute block
    indentedStatementBlockForFalse
```

Loops

```
# while variable is in range execute block
for variable in range(start, end step):
        indentedStatementBlock

while condition: # a statement is true
        indentedStatementBlock
```

Class

```
class ClassName:
        def __int__(self, <parameter>)
                identedStatementBlock

        def myFunction(self,
<parameter>)
                indentedStatementBlock
```

Statements

- With – encloses a block of code.
- Assert – used during debugging to check conditions.
- Import – imports modules.

With Statement

```
# manages a resource such as a file
# after the block finishes the resource is closed.

with <open resource> as <variable>:
    indentedStatementBlock
```

Assert Statement

used for debugging Python code.

assert 2+2==5, “Houston we have a problem”

Import Statement

- Loads an external library

import <nameOfLibrary>

Expressions

Symbol	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
**	Exponential
==	Comparison
is	Object Comparison
@	Matrix multiplier
and, or, not	Boolean operators

Data Types

Type	Mutable	Description
str	Immutable	String
bytearray	Mutable	Byte sequence
bytes	Immutable	Byte sequence
list	Mutable	List of mixed types
tuple	Immutable	List of mixed types
set	Mutable	Unordered set with unique values
frozenset	Immutable	Unordered set with unique values
dict	Mutable	Array of key value pairs
float	Immutable	Floating point number
int	Immutable	Integer
complex	Immutable	Complex number
bool	Immutable	Boolean value

Reading from File

```
with open('filename') as f:
    # read each line of the file
    lines = f.readlines()
    lines = f.readlines(lines.rstrip('\n'))
```

Write to File

```
# Using a loop to write to file


with open("C:\\Users\\rskeggs\\Desktop\\GINF1.csv",
"a") as outf:
    for bottles in range(10, 0, -1):
        outf.write("%s green bottles hanging from the wall"
% (bottles))
        outf.write("And if one green bottle should
accidentally fall")
        outf.write(" There will be %s green bottles hanging
from the wall" % (bottles - 1))
```

NumPy

A fundamental package for scientific computing.

- N-dimentional array
- Tools for integrating C/C++
- Integration with MATLAB
- Linear algebra

NumPy

- Data access is faster.
- Lists more compact.
- Designed for use with big data.

Execution

- No need for IDE.
- Files saved with .py extension.
- Programs run command line.
  - Python helloworld.py

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Any Questions?

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5 April 2018

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