SWINBURNE UNIVERSITY OF TECHNOLOGY
SARAWAK CAMPUS

LECTURE 1

Introduction to Python Programming

What is Python?

- Python is an open source, object-oriented, high-level powerful programming language.
- Developed by Guido van Rossum in the early 1990s.
- Named after Monty Python.

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Python Program

- Python programs are composed of modules.
- Modules contain statements.
- Statements contain expressions.
- Expressions create and process objects.

Python Program

- Available for download from http://www.python.org

Features of Python

- Open source
  - Publicly available open source software, any one can use course code that doesn't cost anything.
- Easy-to-learn
  - Popular language, clear and easy syntax, no type declarations, automatic memory management, high-level data types and operations, design to read (English like syntax) and write fast (shorter code compared to C, C++, and Java)
- High-level language
  - High level of concept from machine language.

Features of Python

- Portable
  - Able to run across all major hardware and software platforms with few or no change in source code.
- Object-oriented
  - Is a full-featured object-oriented programming language, with features such as classes, inheritance, objects, and overloading.
- Interactive
  - Has an interactive console where you get a Python prompt and interact with the interpreter directly to write and test your programs. Useful for mathematical programming.
- Interpreted
  - Takes source code as input, and then compiles each statement and executes it immediately. No compiling or linking is needed.

Features of Python

- Extendable
  - Capable to work in mixed-language environment. Easily extended and can add a new built-in function or modules written in C/C++/Java code.
- Libraries
  - Databases, web services, networking, numerical packages, graphical user interfaces, 3D graphics, others.
- Supports
  - Support from online Python Community.

Python IDLE

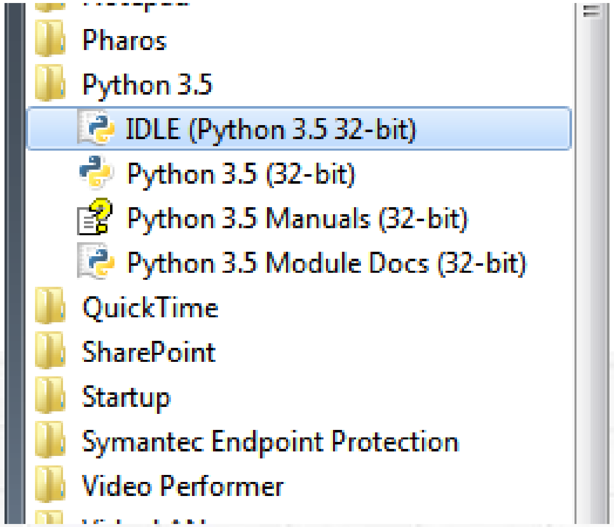
- IDLE is an integrated development environment for Python.
- IDLE is the Python IDE which comes with Python.
- It has two modes: Interactive and Development.

IDLE Features:

- Cross Platform: Works on Unix and Windows
- Multi-window text editor with syntax highlighting and smart indent and other.
- Python shell window with syntax highlighting.

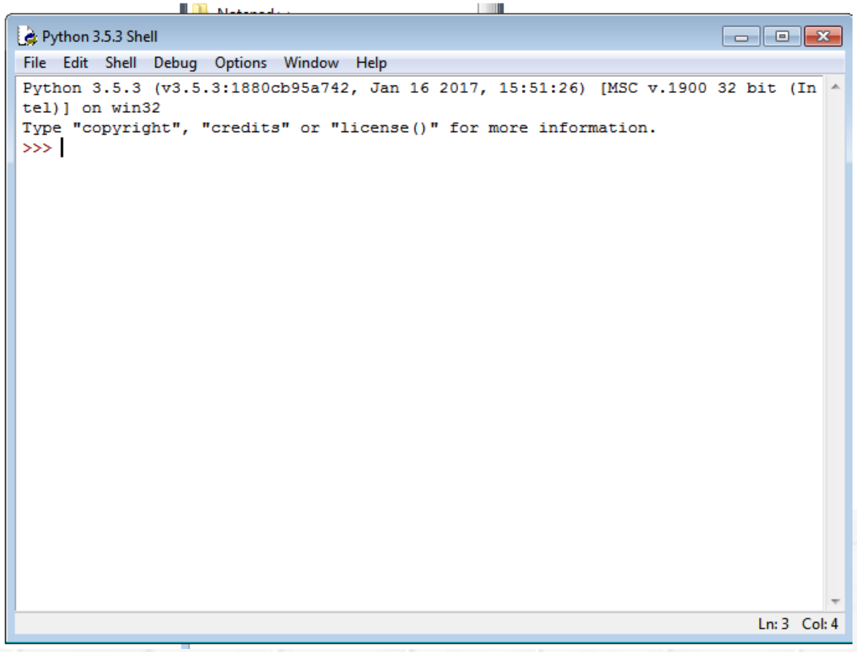
Python IDLE: Interactive Mode

- Click on start button and find Python 3.5 tab in installed programs.
- Then select and click IDLE(Python 3.5 32-bit) icon.



Python IDLE: Interactive Mode

- Now you will see a new window opens up and the cursor is waiting beside '>>>' sign which is called command prompt.



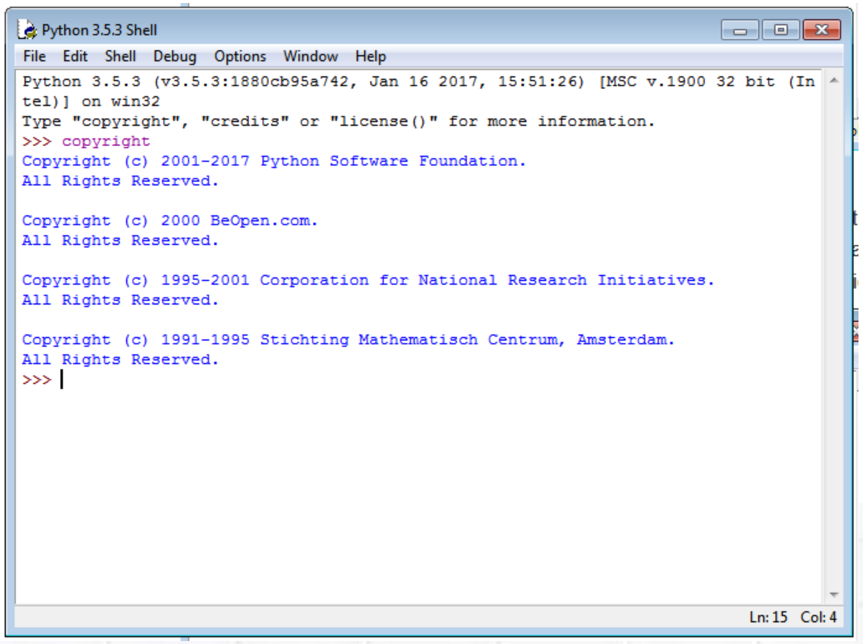
```
Python 3.5.3 (v3.5.3:1880cb95a742, Jan 16 2017, 15:51:26) [MSC v.1900 32 bit (In
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> 
```

Python IDLE: Interactive Mode

- This mode is called interactive mode as you can interact with IDLE directly.
- You can type single unit in a programming language and press enter key, Python will execute it, but you cannot execute your entire program here.

Python IDLE: Interactive Mode

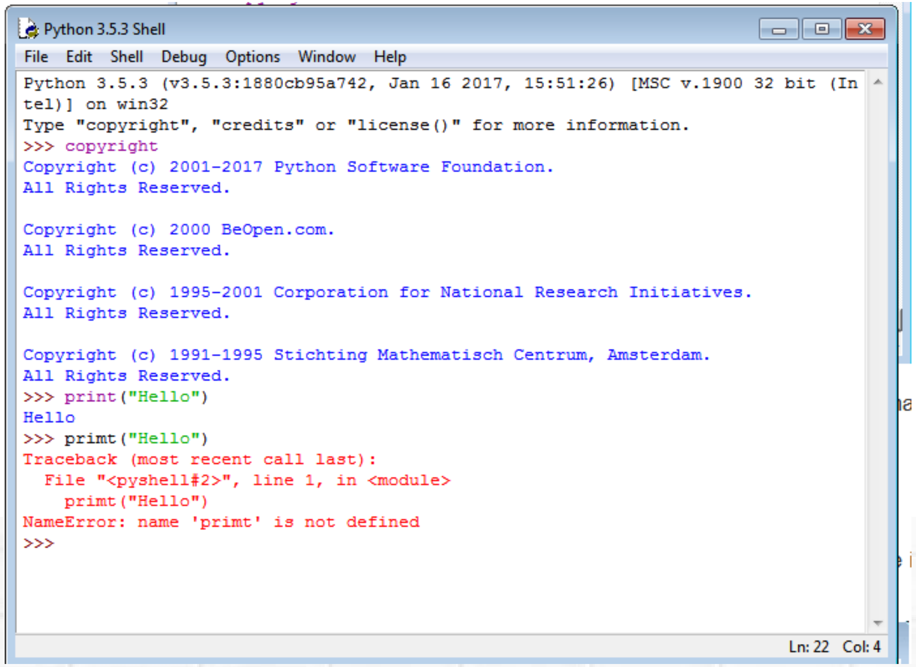
- At the command prompt type copyright and press enter key Python executes the copyright information



```
Python 3.5.3 (v3.5.3:1880cb95a742, Jan 16 2017, 15:51:26) [MSC v.1900 32 bit (In
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> copyright
Copyright (c) 2001-2017 Python Software Foundation.
All Rights Reserved.

Copyright (c) 2000 BeOpen.com.
All Rights Reserved.

Copyright (c) 1995-2001 Corporation for National Research Initiatives.
All Rights Reserved.

Copyright (c) 1991-1995 Stichting Mathematisch Centrum, Amsterdam.
All Rights Reserved.
>>> |
```

Python IDLE: Interactive Mode

- Now Python is ready to read new command.
  Let’s execute the following commands one by one.



```
Python 3.5.3 (v3.5.3:1880cb95a742, Jan 16 2017, 15:51:26) [MSC v.1900 32 bit (In
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Copyright (c) 2001-2017 Python Software Foundation.
All Rights Reserved.

Copyright (c) 2000 BeOpen.com.
All Rights Reserved.

Copyright (c) 1995-2001 Corporation for National Research Initiatives.
All Rights Reserved.

Copyright (c) 1991-1995 Stichting Mathematisch Centrum, Amsterdam.
All Rights Reserved.
>>> print("Hello")
Hello
>>> primt("Hello")
Traceback (most recent call last):
  File "<pyshell#2>", line 1, in <module>
    primt("Hello")
NameError: name 'primt' is not defined
>>>
```
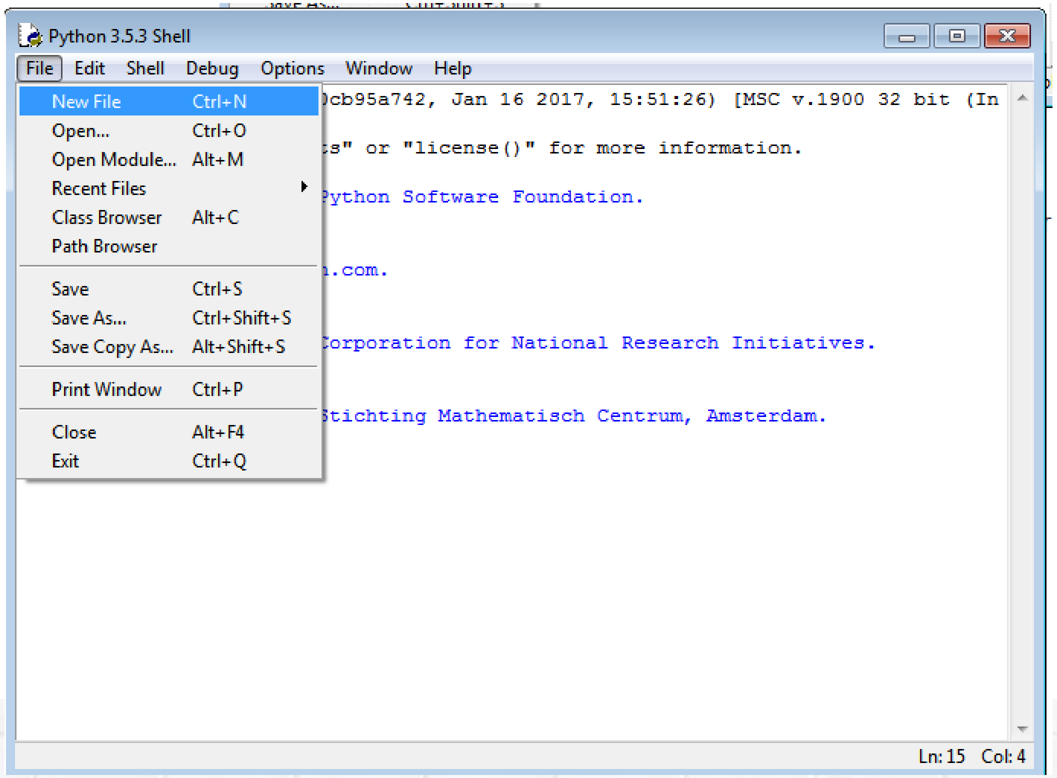

Python IDLE: Development Mode

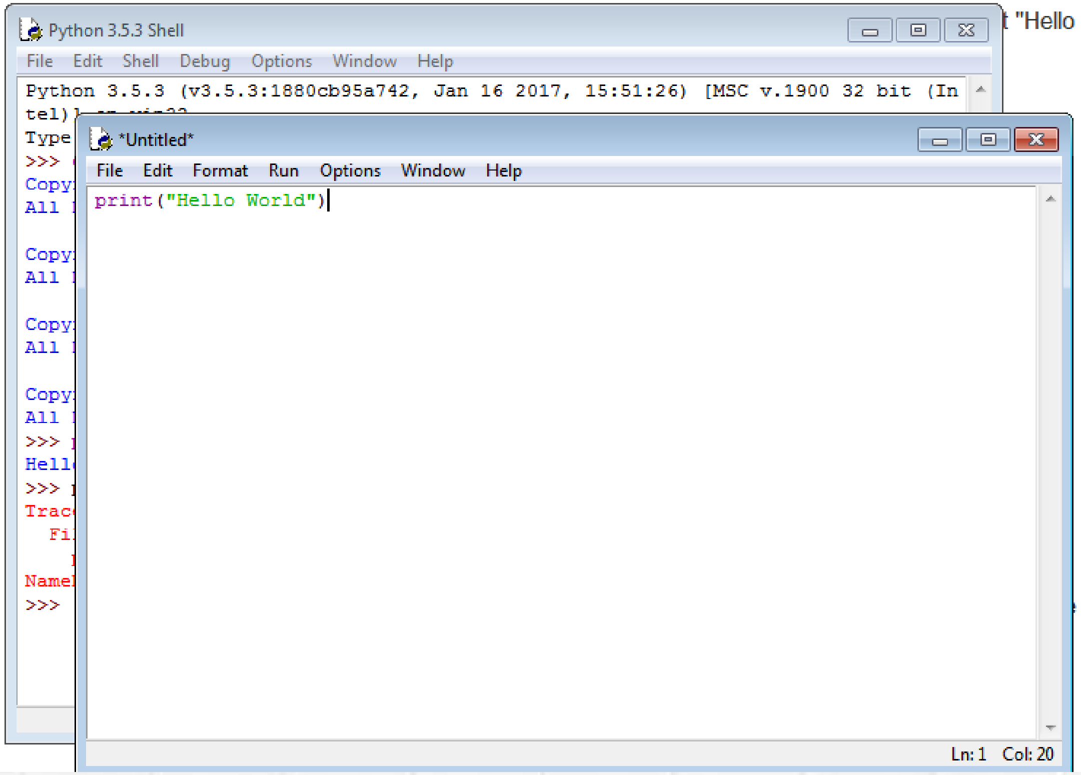
- Click start -> New Window.



```
)cb95a742, Jan 16 2017, 15:51:26) [MSC v.1900 32 bit (In

:s" or "license()" for more information.

Python Software Foundation.

1.com.

Corporation for National Research Initiatives.

Stichting Mathematisch Centrum, Amsterdam.
```

Python IDLE: Development Mode

- Now you can type print(“Hello World”) in the new window.



Python 3.5.3 Shell
File Edit Shell Debug Options Window Help
Untitled
File Edit Format Run Options Window Help
Ln: 1 Col: 20
t "Hello

```
Python 3.5.3 (v3.5.3:1880cb95a742, Jan 16 2017, 15:51:26) [MSC v.1900 32 bit (In
tel)]
Type
>>>
Copy
All

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All

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All

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>>>
Hell
>>>
Trac
  Fi

Name
>>>
```
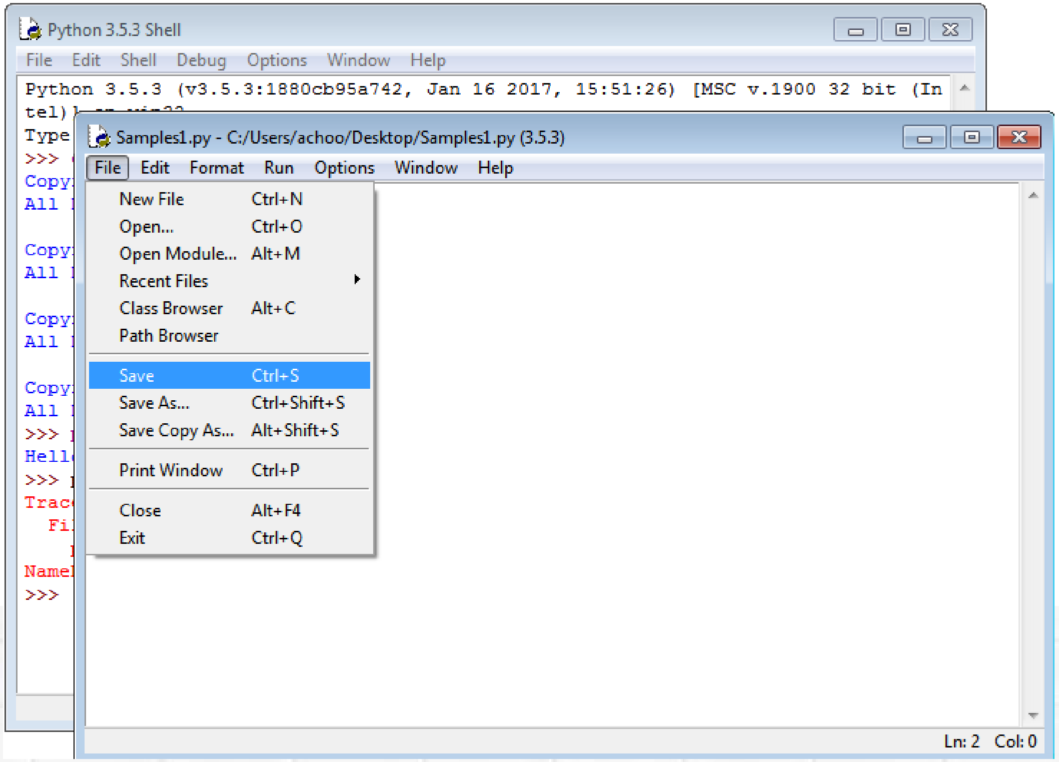

```
print("Hello World")
```

Python IDLE: Development Mode

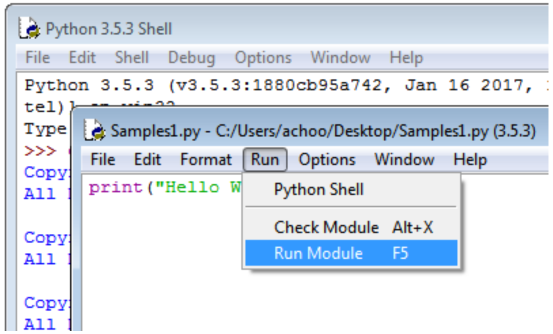
- Let's save the file now before we execute the program.



```
Python 3.5.3 (v3.5.3:1880cb95a742, Jan 16 2017, 15:51:26) [MSC v.1900 32 bit (In
tel)]
Type
>>>
Copy
All

Copy
All

Copy
All

Copy
All
>>>
Hell
>>>
Trac
  Fi

Name
>>>
```

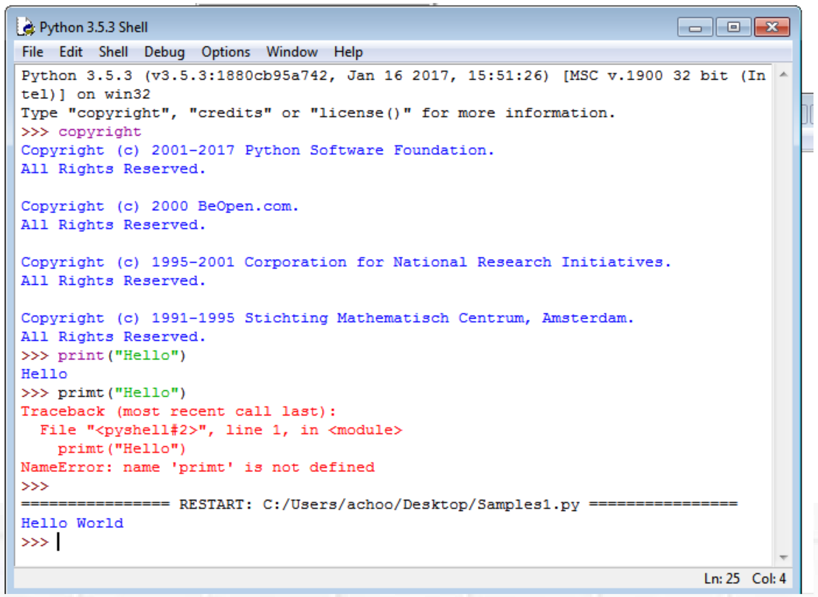
Python IDLE: Development Mode

- To run the program, select Run menu. Click on Run Module or press F5 as a shortcut key to see the result.


Python 3.5.3 Shell
File Edit Shell Debug Options Window Help
Samples1.py - C:/Users/achoo/Desktop/Samples1.py (3.5.3)
File Edit Format Run Options Window Help
Python Shell
Check Module Alt+X
Run Module F5

```
Python 3.5.3 (v3.5.3:1880cb95a742, Jan 16 2017,
tel)
Type
>>>
Copy
All

Copy
All

Copy
All
```

```
print("Hello W
```



```
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Copyright (c) 2000 BeOpen.com.
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>>> print("Hello")
Hello
>>> primt("Hello")
Traceback (most recent call last):
  File "<pyshell#2>", line 1, in <module>
    primt("Hello")
NameError: name 'primt' is not defined
>>>
================ RESTART: C:/Users/achoo/Desktop/Samples1.py ================
Hello World
>>> |
```

Python IDLE: Syntax and Shell Colors

Syntax	Color	Shell	Color
Keywords	Orange	Console output	Brown
Strings	Green	Stdout	Blue
Comments	Red	Stderr	Dark green
Definitions	Blue	Stdin	Black

Python Syntax

Introduction to Python Programming

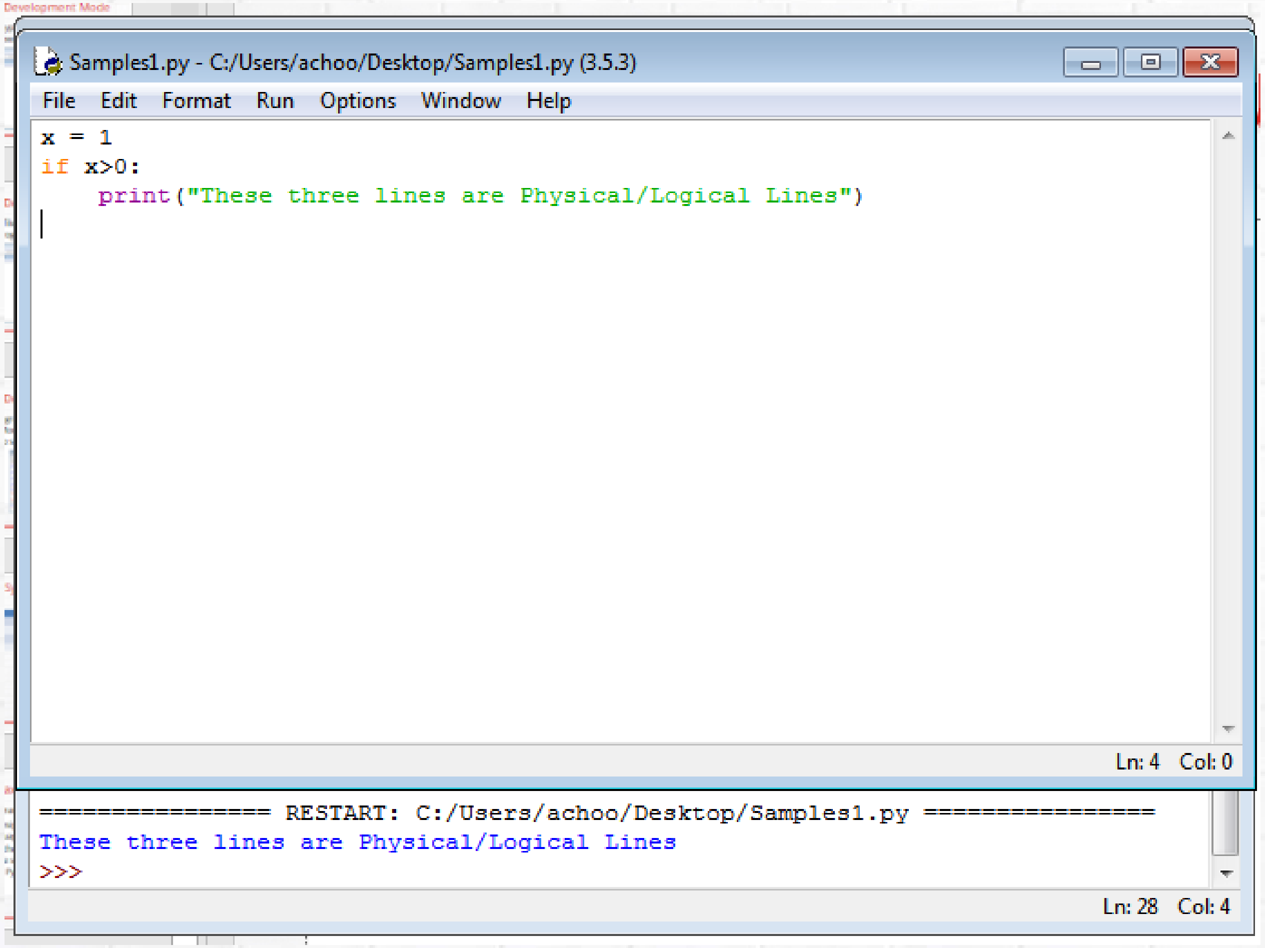
Python Syntax

- A python program is read by a parser.
- Python was designed to be a highly readable language.
- The syntax of the Python programming language is the set of rules which defines how a Python program will be written.

Python Line Structure

- A Python program is divided into a number of logical lines and every logical line is terminated by the token NEWLINE.
- A logical line is created from one or more physical lines.
- A line contains only spaces, tabs, formfeeds possible a comment, is known as a blank line, and Python interpreter ignores it.
- A Physical line is a sequence of characters terminated by an end-of-line sequence.

Python Line Structure



Samples1.py - C:/Users/achoo/Desktop/Samples1.py (3.5.3)
File Edit Format Run Options Window Help
Ln: 4 Col: 0

```
x = 1
if x>0:
    print("These three lines are Physical/Logical Lines")
```

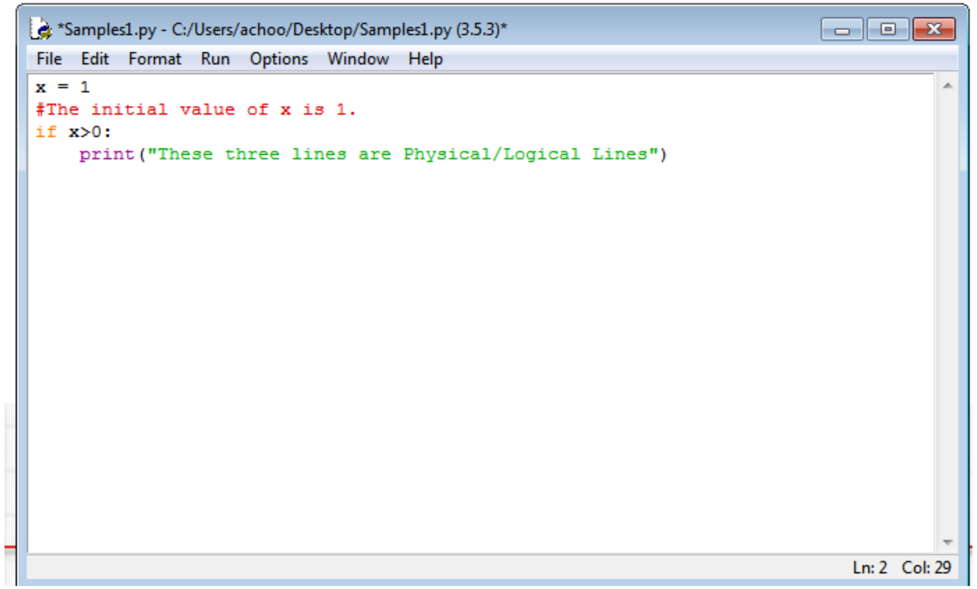
```
================ RESTART: C:/Users/achoo/Desktop/Samples1.py ================
These three lines are Physical/Logical Lines
>>>
```

Comments in Python

- A comment begins with a hash character(#) which is not a part of the string literal and ends at the end of the physical line.
- All characters after the # character up to the end of the line are part of the comment and the Python interpreter ignores them.

Comments in Python

- Note: Python has no multi-lines or block comments facility.



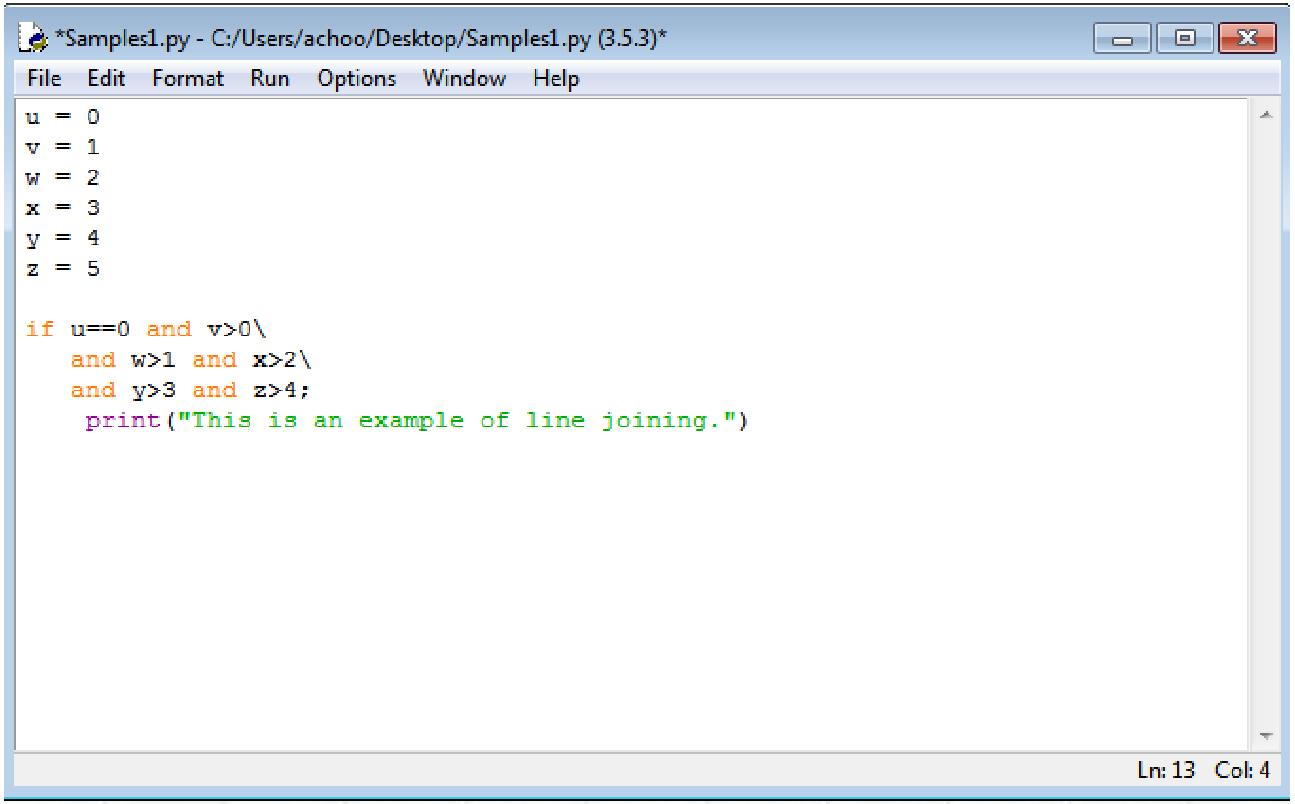
Samples1.py - C:/Users/achoo/Desktop/Samples1.py (3.5.3)
File Edit Format Run Options Window Help
Ln: 2 Col: 29

```
x = 1
#The initial value of x is 1.
if x>0:
    print("These three lines are Physical/Logical Lines")
```

Joining two lines

- When you want to write a long code in a single line you can break the logical line in two or more physical lines using backslash character (\).
- Therefore when a physical line ends with a backslash characters (\) and not a part of a string literal or comment then it can join another physical line.

Joining two lines

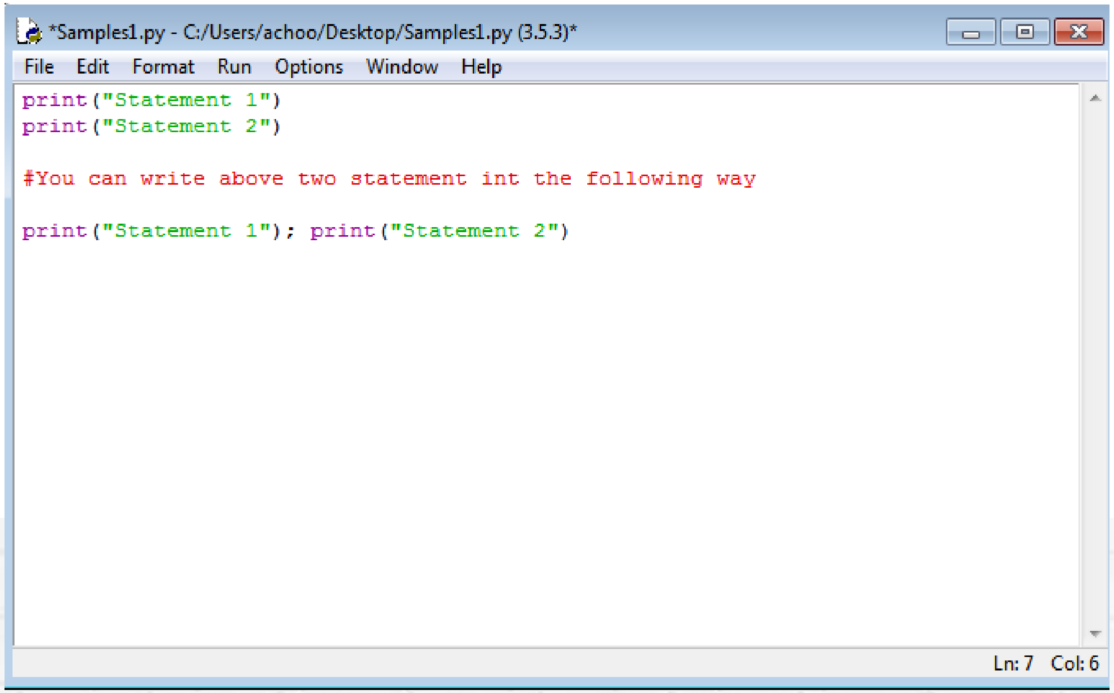


```
u = 0
v = 1
w = 2
x = 3
y = 4
z = 5

if u==0 and v>0\
   and w>1 and x>2\
   and y>3 and z>4;
    print("This is an example of line joining.")
```

Multiple Statements on a Single Line

- You can write two separate statements into a single line using a semicolon(;) character between two lines.



Samples1.py - C:/Users/achoo/Desktop/Samples1.py (3.5.3)
File Edit Format Run Options Window Help

```
print("Statement 1")
print("Statement 2")

#You can write above two statement int the following way

print("Statement 1"); print("Statement 2")
```

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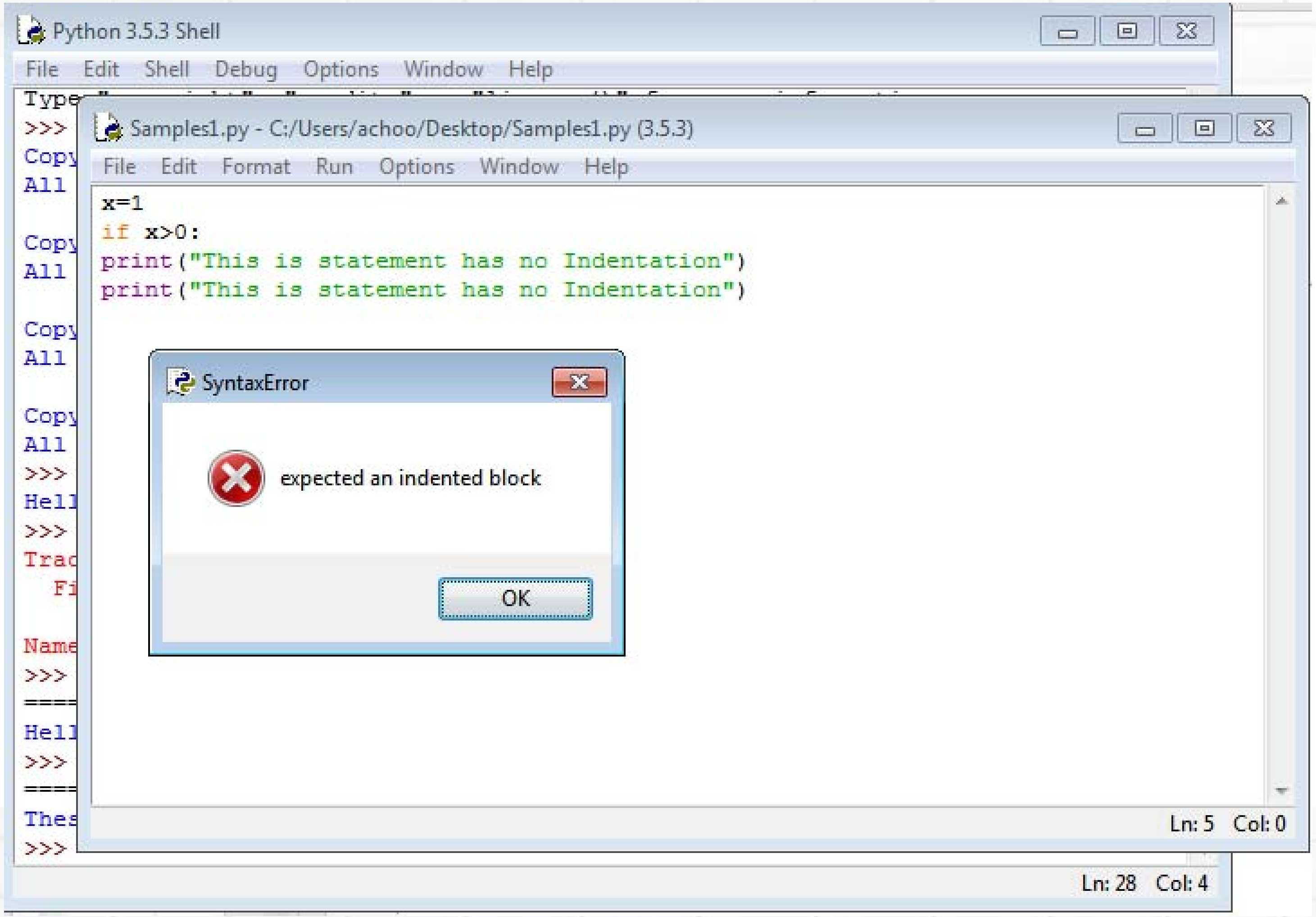
Indentation

- Python uses whitespace (spaces and tabs) to define program blocks whereas other languages like C, C++ use braces ({}) to indicate blocks of codes for class, functions or flow control.
- The number of whitespaces (spaces and tabs) in the indentation is not fixed, but all statement within the block must be the indented same amount.

Indentation



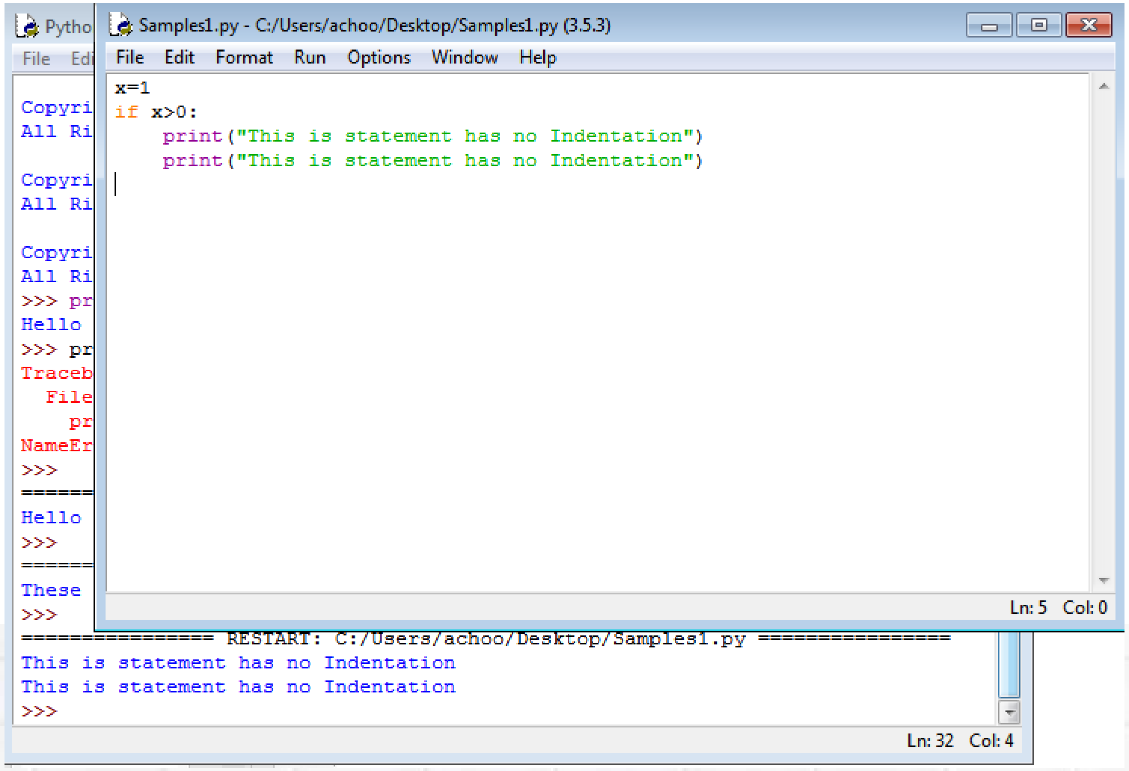
Python 3.5.3 Shell
File Edit Shell Debug Options Window Help
Samples1.py - C:/Users/achoo/Desktop/Samples1.py (3.5.3)
File Edit Format Run Options Window Help
SyntaxError
OK
Ln: 5 Col: 0
Ln: 28 Col: 4

```
x=1
if x>0:
print("This is statement has no Indentation")
print("This is statement has no Indentation")
```

expected an indented block

Indentation

- The program with single tab indentation.


Pytho
File Edi
Samples1.py - C:/Users/achoo/Desktop/Samples1.py (3.5.3)
File Edit Format Run Options Window Help
Ln: 5 Col: 0
Ln: 32 Col: 4

```
x=1
if x>0:
    print("This is statement has no Indentation")
    print("This is statement has no Indentation")
```

```
Copyri
All Ri

Copyri
All Ri

Copyri
All Ri
>>> pr
Hello
>>> pr
Traceb
  File
    pr
NameEr
>>>
======
Hello
>>>
======
These
>>>
================ RESTART: C:/Users/achoo/Desktop/Samples1.py ================
This is statement has no Indentation
This is statement has no Indentation
>>>
```

Python Coding Style

- Use 4 spaces per indentation and no tabs.
- Do not mix tabs and spaces. Tabs create confusion and it is recommended to use only spaces.
- Maximum line length: 79 characters which help users with a small display.
- Use blank lines to separate top-level function and class definitions and single black line to separate methods definitions inside a class and larger blocks of code inside functions.

Python Coding Style

- When possible, put inline comments (should be complete sentences).
- Use spaces around expressions and statements.

Python Reserve words

- An identifiers are used as reserved words of the language, and cannot be used as ordinary identifiers.

False	class	finally	Is	return
None	continue	for	lambda	try
True	def	from	nonlocal	while
and	del	global	not	with
as	el	if	or	yield
assert	else	import	pass	
break	except	in	raise	