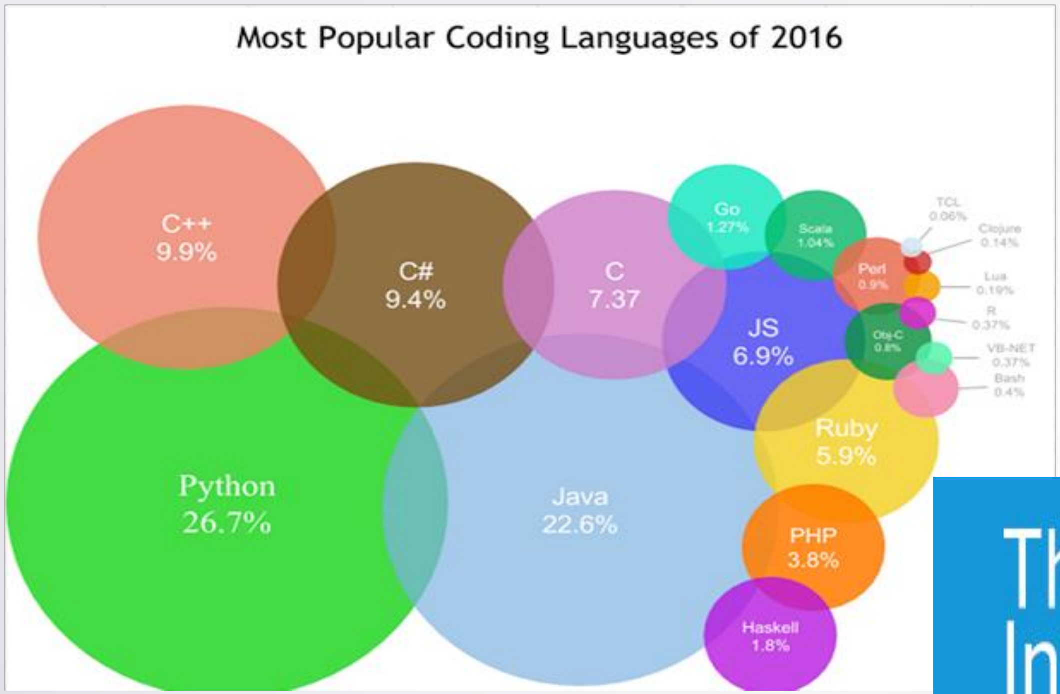
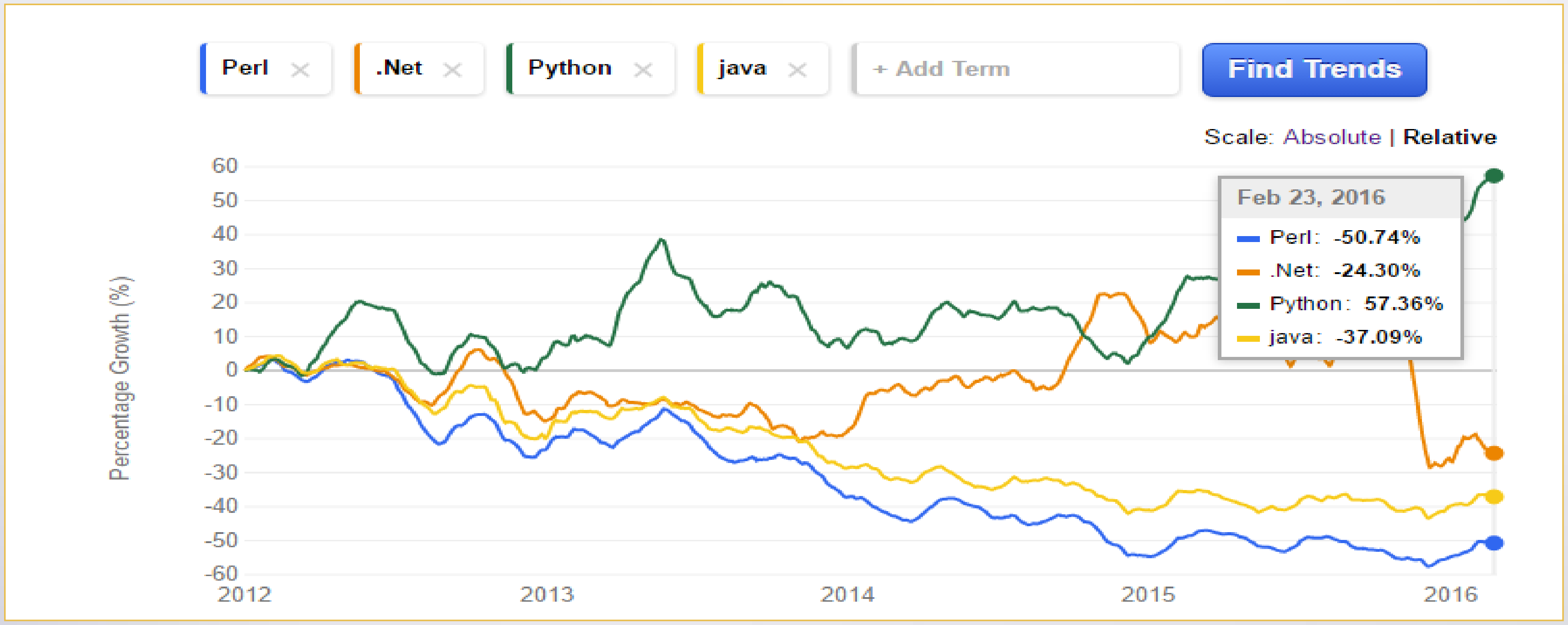

Most Popular Coding Languages of 2016
C++ 9.9%
C# 9.4%
C 7.37
Go 1.27%
Scala 1.04%
TCL 0.06%
Clojure 0.14%
Perl 0.9%
Lua 0.19%
R 0.37%
JS 6.9%
Obj-C 0.8%
VB-NET 0.37%
Bash 0.4%
Ruby 5.9%
Python 26.7%
Java 22.6%
PHP 3.8%
Haskell 1.8%

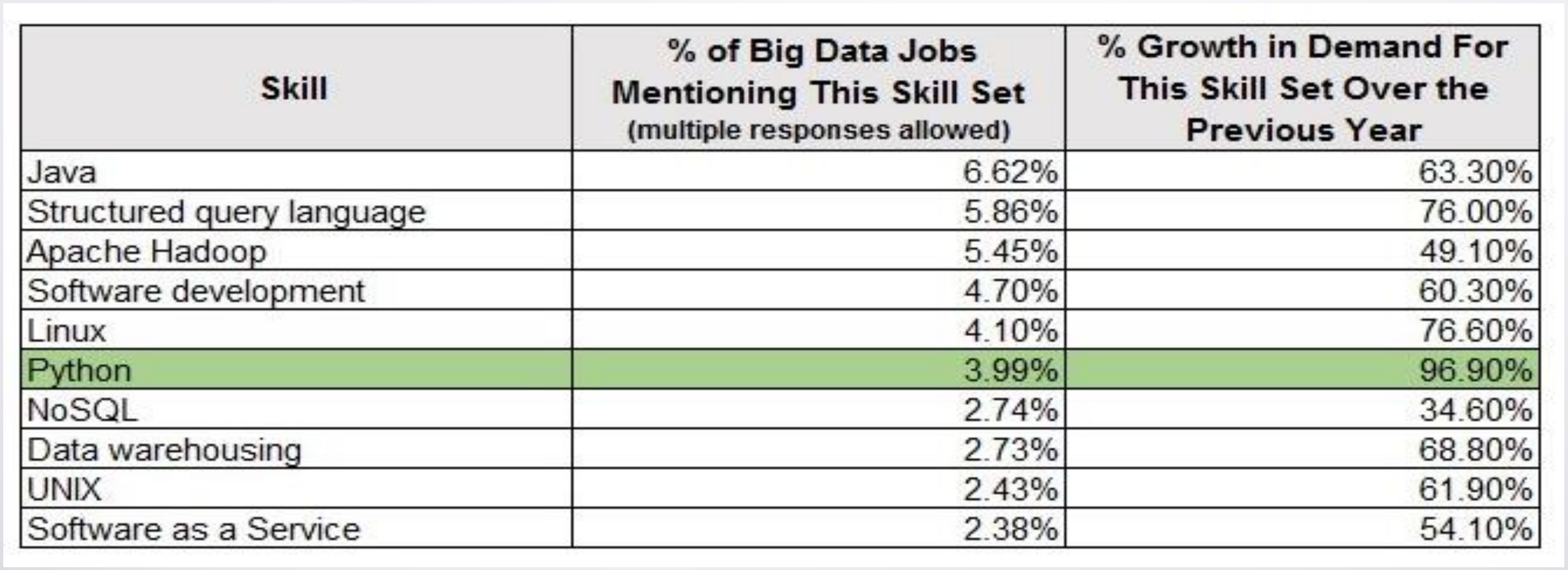
The 9 Most In-Demand Programming Languages 2017
python
C++
C#
java
PHP
iOS
JS
perl
SQL

Job Trend



Per the indeed.com, percentage growth of Python is 500 times more than it's peer Languages.
http://www.indeed.com/jobtrends?q=Perl%2C+.Net%2C+Python%2Cjava&l=&relative=1

Job In Big Data space



Skill	% of Big Data Jobs Mentioning This Skill Set (multiple responses allowed)	% Growth in Demand For This Skill Set Over the Previous Year
Java	6.62%	63.30%
Structured query language	5.86%	76.00%
Apache Hadoop	5.45%	49.10%
Software development	4.70%	60.30%
Linux	4.10%	76.60%
Python	3.99%	96.90%
NoSQL	2.74%	34.60%
Data warehousing	2.73%	68.80%
UNIX	2.43%	61.90%
Software as a Service	2.38%	54.10%

Source: http://www.forbes.com/sites/louiscolumbus/2014/12/29/where-big-data-jobs-will-be-in-2015/

What is Scripting Language?

- A scripting language is a “wrapper” language that integrates OS functions.
- The interpreter is a layer of software logic between your code and the computer hardware on your machine.

Wiki Says:

- The “program” has an executable form that the computer can use directly to execute the instructions.
- The same program in its human-readable source code form, from which executable programs are derived *(e.g., compiled)*
- Python is scripting language, fast and dynamic.
- Python is called ‘scripting language’ because of it’s scalable interpreter, but actually it is much more than that

What is Python?

Python is a high-level programming language which is:

- **Interpreted:** Python is processed at runtime by the interpreter. (Next Slide)
- **Interactive:** You can use a Python prompt and interact with the interpreter directly to write your programs.
- **Object-Oriented:** Python supports Object-Oriented technique of programming.
- **Beginner's Language:** Python is a great language for the beginner-level programmers and supports the development of a wide range of applications.

Interpreters Versus Compilers

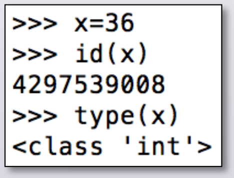
- The first thing that is important to understand about Python is that it is an interpreted language.
- There are two sorts of programming languages: interpreted ones and compiled ones. A compiled language is what you are probably used to if you have done any programming in the past. The
- process for a compiled language is as follows:

- Create source file using text edit→
- Use compiler to syntax check and convert source file into binary →
- Use linker to turn binary files into executable format→
- Run the resulting executable format file in the operating system.

- The biggest difference between interpreted code and compiled code is that an interpreted application need not be “complete.”
- You can test it in bits and pieces until you are satisfied with the results and put them all together later for the end user to use.

Python Features

- **Easy to learn, easy to read and easy to maintain.**
- **Portable**: It can run on various hardware platforms and has the same interface on all platforms.
- **Extendable:** You can add low-level modules to the Python interpreter.
- **Scalable:** Python provides a good structure and support for large programs.
- Python has support for an **interactive mode** of testing and debugging.
- Python has a broad standard **library** cross-platform.
- Everything in Python is an **object**: variables, functions, even code. Every object has an ID, a type, and a value.



```
>>> x=36
>>> id(x)
4297539008
>>> type(x)
<class 'int'>
```

More Features ..

- Python provides interfaces to all major commercial **databases**.
- Python supports functional and structured programming methods as well as **OOP**.
- Python provides very high-level **dynamic** data types and supports dynamic type checking.
- Python supports **GUI** applications
- Python supports automatic **garbage collection**.
- Python can be easily **integrated** with C, C++, and Java.

Why Python

Easy to read	✓ Python scripts have clear syntax, simple structure and very few protocols to remember before programming.
Easy to Maintain	✓ Python code is easily to write and debug. Python's success is that its source code is fairly easy-to-maintain.
Portable	✓ Python can run on a wide variety of Operating systems and platforms and providing the similar interface on all platforms.
Broad Standard Libraries	✓ Python comes with many prebuilt libraries apx. 21K
High Level programming	✓ Python is intended to make complex programming simpler. Python deals with memory addresses, garbage collection etc internally.
Interactive	✓ Python provide an interactive shell to test the things before implementation. It provide the user the direct interface with Python.
Database Interfaces	✓ Python provides interfaces to all major commercial databases. These interfaces are pretty easy to use.
GUI programming	✓ Python supports GUI applications and has framework for Web. Interface to tkinter, WXPython, DJango in Python make it .

History of Python

- Python was conceptualized by Guido Van Rossum in the late **1980s**.
- Rossum published the first version of Python code (0.9.0) in February **1991** at the CWI (Centrum Wiskunde & Informatica) in the Netherlands , Amsterdam.
- Python is derived from **ABC** programming language, which is a general-purpose programming language that had been developed at the CWI.
- Rossum chose the name "Python", since he was a big fan of Monty Python's Flying Circus.
- Python is now maintained by a core development team at the institute, although Rossum still holds a vital role in directing its progress.

https://en.wikipedia.org/wiki/Guido_van_Rossum#/media/File:Guido_van_Rossum_OSCON_2006.jpg

Python Versions

Release dates for the major and minor versions:

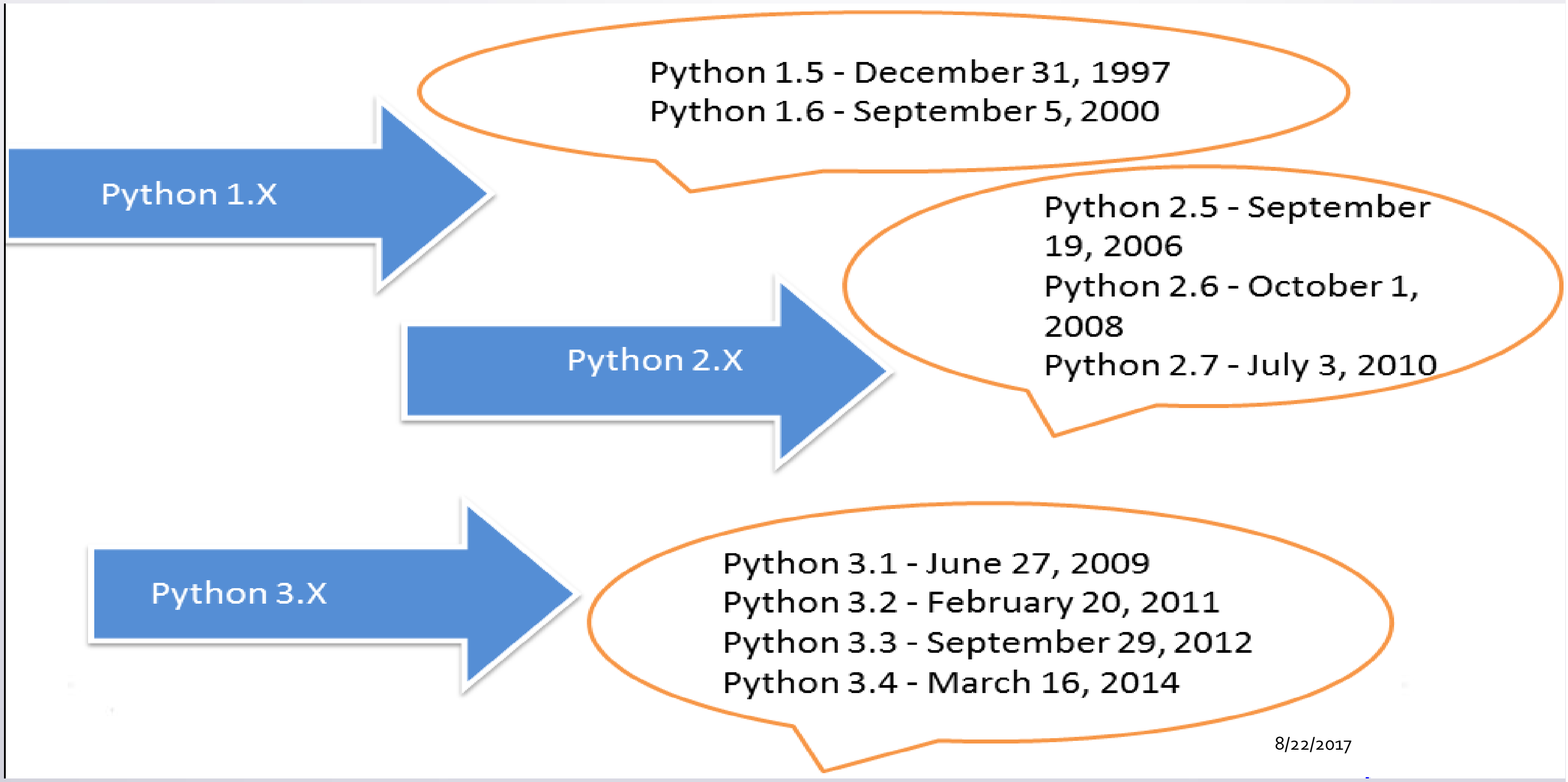
- **Python 1.0** - January **1994**
  - Python 1.5 - December 31, 1997
  - Python 1.6 - September 5, 2000
- **Python 2.0** - October 16, **2000**
  - Python 2.1 - April 17, 2001
  - Python 2.2 - December 21, 2001
  - Python 2.3 - July 29, 2003
  - Python 2.4 - November 30, 2004
  - Python 2.5 - September 19, 2006
  - Python 2.6 - October 1, 2008
  - Python 2.7 - July 3, 2010

Python Versions

Release dates for the major and minor versions:

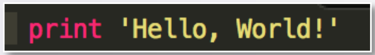
- **Python 3.0** - December 3, **2008**
  - Python 3.1 - June 27, 2009
  - Python 3.2 - February 20, 2011
  - Python 3.3 - September 29, 2012
  - Python 3.4 - March 16, 2014
  - Python 3.5 - September 13, 2015

Python time line

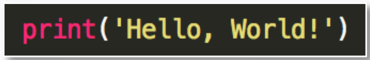

Python 1.X
Python 1.5 - December 31, 1997
Python 1.6 - September 5, 2000
Python 2.X
Python 2.5 - September 19, 2006
Python 2.6 - October 1, 2008
Python 2.7 - July 3, 2010
Python 3.X
Python 3.1 - June 27, 2009
Python 3.2 - February 20, 2011
Python 3.3 - September 29, 2012
Python 3.4 - March 16, 2014

Key Changes in Python 3.0

- Python 2's print statement has been replaced by the **print()** function.

Old: 

```
print 'Hello, World!'
```

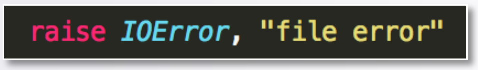
New: 

```
print('Hello, World!')
```

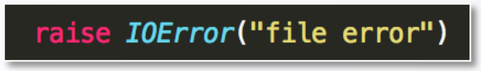
- There is only one integer type left, **int.**
- Some methods such as map() and filter( ) return **iterator** objects in Python 3 instead of lists in Python 2.
- In Python 3, a TypeError is raised as warning if we try to compare unorderable types. e.g. 1 < ' ', 0 > None are ***no*** longer valid
- Python 3 provides Unicode (**utf-8**) strings while Python 2 has ASCII str( ) types and separate unicode( ).
- A new built-in string formatting method **format()** replaces the % string formatting operator.

Key Changes in Python 3.0

- In Python 3, we should enclose the exception argument in parentheses.

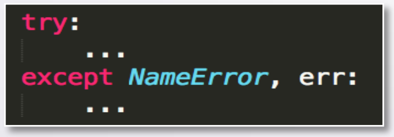
Old: 

```
raise IOError, "file error"
```

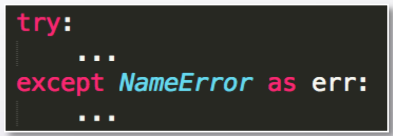
New: 

```
raise IOError("file error")
```

- In Python 3, we have to use the **as** keyword now in the handling of exceptions.

Old: 

```
try:
    ...
except NameError, err:
    ...
```

New: 

```
try:
    ...
except NameError as err:
    ...
```

- The division of two integers returns a **float** instead of an integer. "//" can be used to have the "old" behavior.

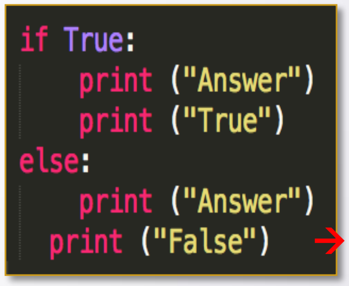
Python Syntax

By Ripal Ranpara

8/22/2017

Basic Syntax

- **Indentation** is used in Python to delimit blocks. The number of spaces is variable, but all statements within the same block must be indented the same amount.
- The header line for compound statements, such as if, while, def, and class should be terminated with a colon (**:**)
- The semicolon (**;**) is optional at the end of statement.



```
if True:
    print ("Answer")
    print ("True")
else:
    print ("Answer")
  print ("False")
```

→Error!

- Printing to the Screen:

```
print ("Hello, Python!")
```

- Reading Keyboard Input:

```
name = input("Enter your name: ")
```

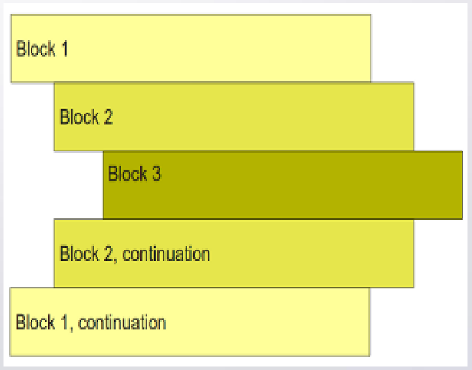
- **Comments**
  - Single line:

```
# This is a comment.
```

  - Multiple lines:

```
'''
print("We are in a comment")
print ("We are still in a comment")
'''
```

- Python files have extension .py



8/22/2017

By Ripal Ranpara

Variables

- Python is dynamically typed. You do not need to declare variables!
- The declaration happens automatically when you assign a value to a variable.
- Variables can change type, simply by assigning them a new value of a different type.
- Python allows you to assign a single value to several variables simultaneously.
- You can also assign multiple objects to multiple variables.

```
counter = 100                # An integer assignment
miles   = 1000.0             # A floating point
name    = "John"             # A string
z = None                     # A null value
```

```
x = 1
x = "string value"
```

```
a = b = c = 1
```

```
a, b, c = 1, 2, "john"
```

Python Data Types

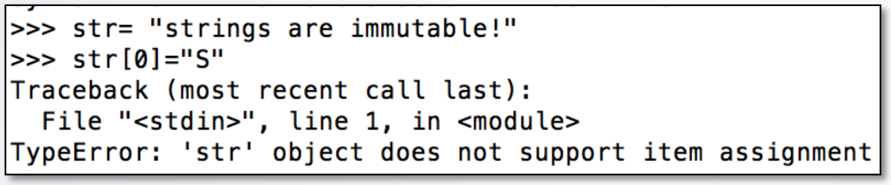
Numbers

- Numbers are **Immutable** objects in Python that cannot change their values.
- There are three built-in data types for numbers in Python3:
  - Integer (int)
  - Floating-point numbers (float)
  - Complex numbers: *<real part>* + *<imaginary part>*j (not used much in Python programming)
- **Common Number Functions**

Function	Description
int(x)	to convert x to an integer
float(x)	to convert x to a floating-point number
abs(x)	The absolute value of x
cmp(x,y)	-1 if x < y, 0 if x == y, or 1 if x > y
exp(x)	The exponential of x: e^x
log(x)	The natural logarithm of x, for x> 0
pow(x,y)	The value of x**y
sqrt(x)	The square root of x for x > 0

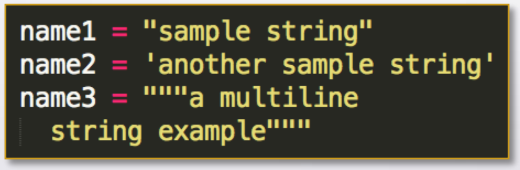
Strings

- Python Strings are **Immutable** objects that cannot change their values.



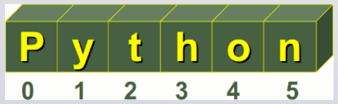
```
>>> str= "strings are immutable!"
>>> str[0]="S"
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: 'str' object does not support item assignment
```

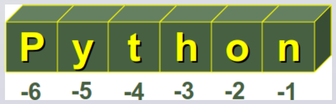
- You can update an existing string by (re)assigning a variable to another string.
- Python *does not* support a character type; these are treated as strings of length one.
- Python accepts single ('), double (") and triple (''' or """) quotes to denote string literals.



```
name1 = "sample string"
name2 = 'another sample string'
name3 = """a multiline
  string example"""
```

- String indexes starting at **0** in the beginning of the string and working their way from **-1** at the end.





Strings

- **String Formatting**

```
>>> num = 6
>>> str= "I have {} books!".format(num)
>>> print(str)
I have 6 books!
```

- **Common String Operators**

Assume string variable a holds 'Hello' and variable b holds 'Python’

Operator	Description	Example
+	**Concatenation** - Adds values on either side of the operator	a + b will give HelloPython
*	**Repetition** - Creates new strings, concatenating multiple copies of the same string	a*2 will give HelloHello
[ ]	**Slice** - Gives the character from the given index	a[1] will give e a[-1] will give o
[:]	**Range Slice** - Gives the characters from the given range	a[1:4] will give ell
in	**Membership** - Returns true if a character exists in the given string	‘H’ in a will give True

Strings

- **Common String Methods**

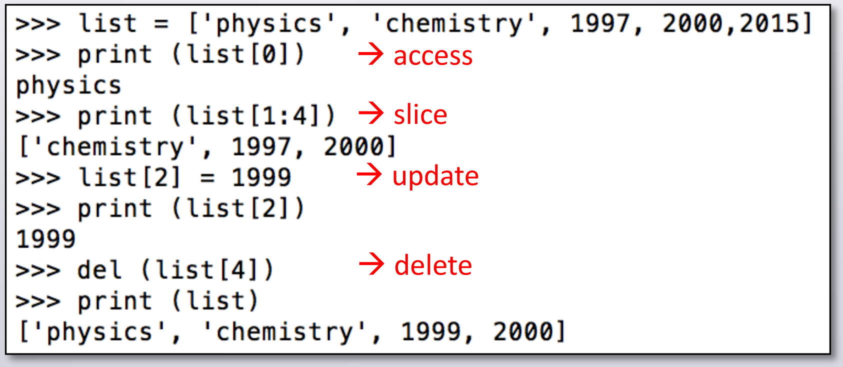
Method	Description
str.**count**(sub, beg= 0,end=len(str))	Counts how many times sub occurs in string or in a substring of string if starting index beg and ending index end are given.
str.**isalpha**()	Returns True if string has at least 1 character and all characters are alphanumeric and False otherwise.
str.**isdigit**()	Returns True if string contains only digits and False otherwise.
str.**lower**()	Converts all uppercase letters in string to lowercase.
str.**upper**()	Converts lowercase letters in string to uppercase.
str.**replace**(old, new)	Replaces all occurrences of old in string with new.
str.**split**(str=‘ ’)	Splits string according to delimiter str (space if not provided) and returns list of substrings.
str.**strip**()	Removes all leading and trailing whitespace of string.
str.**title**()	Returns "titlecased" version of string.

- **Common String Functions**

str(x) :to convert x to a string
len(string):gives the total length of the string

Lists

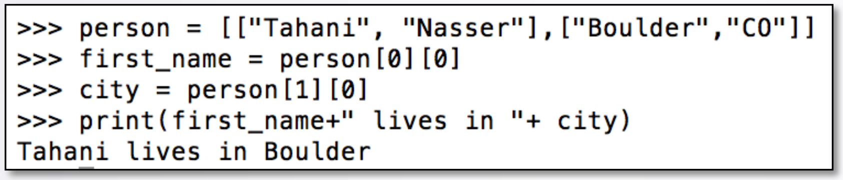
- A list in Python is an **ordered** group of items or elements, and these list elements *don't have* to be of the same type.
- Python Lists are **mutable** objects that can change their values.
- A list contains items separated by *commas* and enclosed within *square brackets*.
- List indexes like strings starting at **0** in the beginning of the list and working their way from **-1** at the end.
- Similar to strings, Lists operations include **slicing** ([ ] and [:]) , **concatenation** (+), **repetition** (*), and **membership** (in).
- This example shows how to *access*, *update* and *delete* list elements:



```
>>> list = ['physics', 'chemistry', 1997, 2000,2015]
>>> print (list[0])    → access
physics
>>> print (list[1:4])  → slice
['chemistry', 1997, 2000]
>>> list[2] = 1999     → update
>>> print (list[2])
1999
>>> del (list[4])      → delete
>>> print (list)
['physics', 'chemistry', 1999, 2000]
```

Lists

- Lists can have sublists as elements and these sublists may contain other sublists as well.



```
>>> person = [["Tahani", "Nasser"],["Boulder","CO"]]
>>> first_name = person[0][0]
>>> city = person[1][0]
>>> print(first_name+" lives in "+ city)
Tahani lives in Boulder
```

- **Common List Functions**

Function	Description
cmp(list1, list2)	Compares elements of both lists.
len(list)	Gives the total length of the list.
max(list)	Returns item from the list with max value.
min(list)	Returns item from the list with min value.
list(tuple)	Converts a tuple into list.

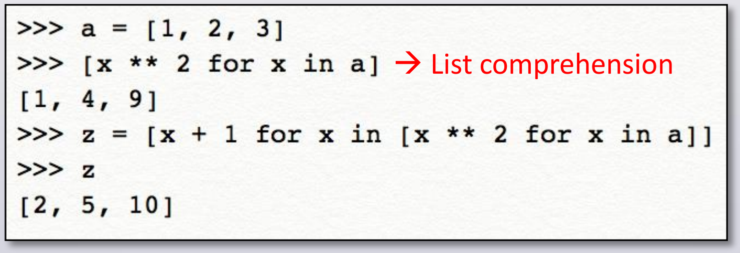
Lists

- **Common List Methods**

Method	Description
list.**append**(obj)	Appends object obj to list
list.**insert**(index, obj)	Inserts object obj into list at offset index
list.**count**(obj)	Returns count of how many times obj occurs in list
list.**index**(obj)	Returns the lowest index in list that obj appears
list.**remove**(obj)	Removes object obj from list
list.**reverse**()	Reverses objects of list in place
list.**sort**()	Sorts objects of list in place

- **List Comprehensions**

Each list comprehension consists of an **expression** followed by a **for** clause.



```
>>> a = [1, 2, 3]
>>> [x ** 2 for x in a] → List comprehension
[1, 4, 9]
>>> z = [x + 1 for x in [x ** 2 for x in a]]
>>> z
[2, 5, 10]
```

Python Reserved Words

A keyword is one that means something to the language. In other words, you can’t use a reserved word as the name of a variable, a function, a class, or a module. All the Python keywords contain lowercase letters only.

and	exec	not
assert	finally	or
break	for	pass
class	from	print
continue	global	raise
def	if	return
del	import	try
elif	in	while
else	is	with
except	lambda	yield

Tuples

- Python Tuples are **Immutable** objects that cannot be changed once they have been created.
- A tuple contains items separated by *commas* and enclosed in *parentheses* instead of square brackets.

```
>>> t = ("tuples", "are", "immutable")
>>> t[0]   → access
'tuples'
>>> t[0]="assignments to elements are not possible"
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: 'tuple' object does not support item assignment → No update
```

- You can update an existing tuple by (re)assigning a variable to another tuple.
- Tuples are **faster** than lists and **protect** your data against accidental changes to these data.
- The rules for tuple **indices** are the same as for lists and they have the same **operations, functions** as well.
- To write a tuple containing a single value, you have to include a *comma*, even though there is only one value. e.g. t = (3,)

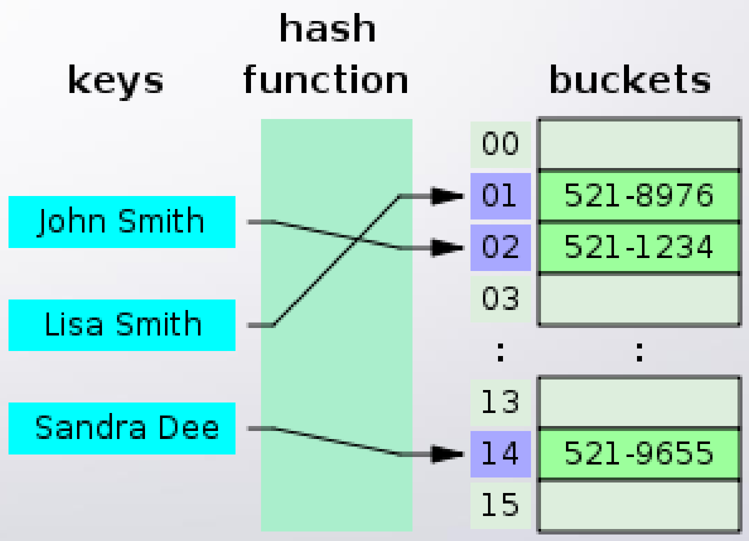
Hash Table

- Hashing is a technique that is used to uniquely identify a specific object from a group of similar objects.

Assume that you have an object and you want to assign a key to it to make searching easy.

To store the key/value pair, you can use a simple array like a data structure where keys (integers) can be used directly as an index to store values.

However, in cases where the keys are large and cannot be used directly as an index, you should use *hashing*.

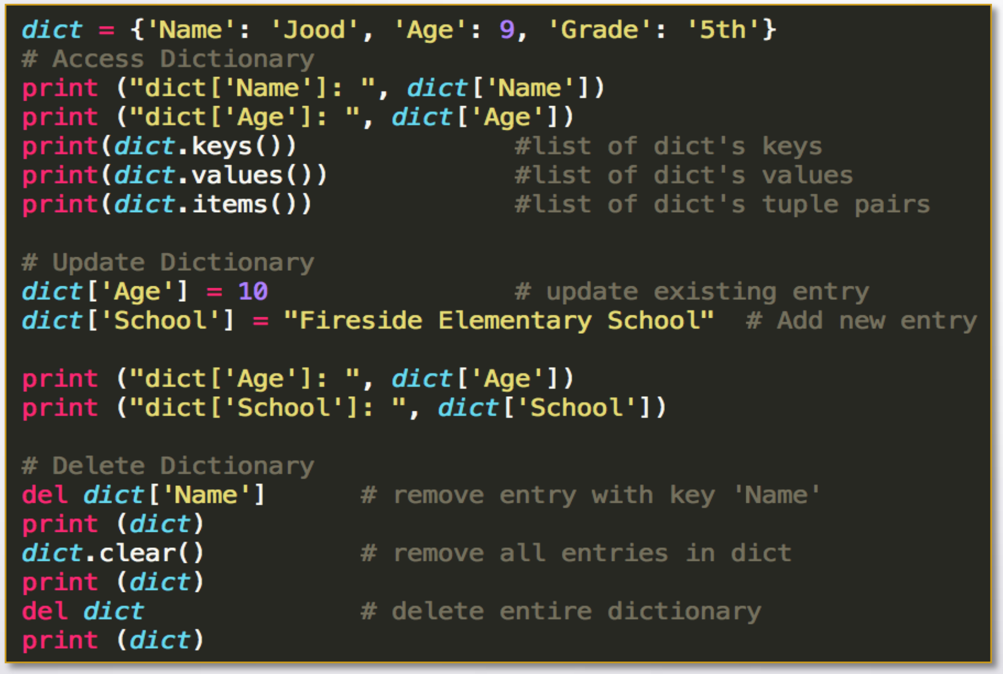


Dictionary

- Python's dictionaries are kind of hash table type which consist of **key-value** pairs of **unordered** elements.
  - Keys : must be immutable data types ,usually numbers or strings.
  - Values : can be any arbitrary Python object.
- Python Dictionaries are **mutable** objects that can change their values.
- A dictionary is enclosed by *curly braces* ({ }), the items are separated by *commas*, and each key is separated from its value by a *colon* (:).
- Dictionary’s values can be assigned and accessed using square braces ([]) with a key to obtain its value.

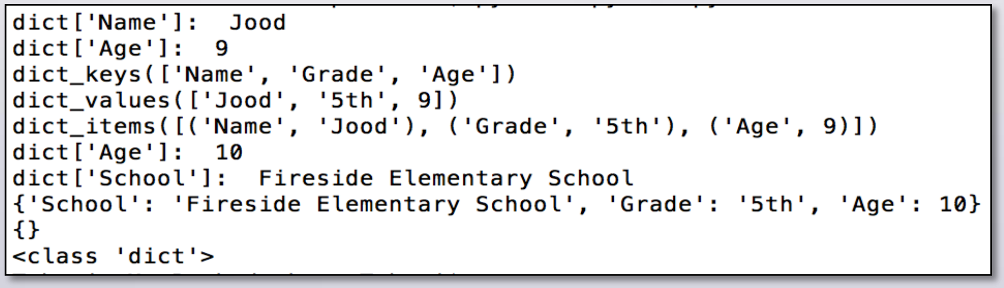
Dictionary

- This example shows how to *access*, *update* and *delete* dictionary elements:



```python
dict = {'Name': 'Jood', 'Age': 9, 'Grade': '5th'}
# Access Dictionary
print ("dict['Name']: ", dict['Name'])
print ("dict['Age']: ", dict['Age'])
print(dict.keys())                #list of dict's keys
print(dict.values())              #list of dict's values
print(dict.items())               #list of dict's tuple pairs

# Update Dictionary
dict['Age'] = 10                  # update existing entry
dict['School'] = "Fireside Elementary School"  # Add new entry

print ("dict['Age']: ", dict['Age'])
print ("dict['School']: ", dict['School'])

# Delete Dictionary
del dict['Name']          # remove entry with key 'Name'
print (dict)
dict.clear()              # remove all entries in dict
print (dict)
del dict                  # delete entire dictionary
print (dict)
```

- The output:



```
dict['Name']:  Jood
dict['Age']:  9
dict_keys(['Name', 'Grade', 'Age'])
dict_values(['Jood', '5th', 9])
dict_items([('Name', 'Jood'), ('Grade', '5th'), ('Age', 9)])
dict['Age']:  10
dict['School']:  Fireside Elementary School
{'School': 'Fireside Elementary School', 'Grade': '5th', 'Age': 10}
{}
<class 'dict'>
```

Dictionary

- **Common Dictionary Functions**
  - **cmp**(dict1, dict2) : compares elements of both dict.
  - **len**(dict) : gives the total number of (key, value) pairs in the dictionary.

- **Common Dictionary Methods**

Method	Description
dict.**keys**()	Returns list of dict's keys
dict.**values**()	Returns list of *dict*'s values
dict.**items**()	Returns a list of *dict*'s (key, value) tuple pairs
dict.**get**(key, default=None)	For key, returns value or default if key not in dict
dict.**has_key**(key)	Returns *True* if key in *dict*, *False* otherwise
dict.**update**(dict2)	Adds *dict2*'s key-values pairs to *dict*
dict.**clear**()	Removes all elements of *dict*

Python Control Structures

By Ripal Ranpara

8/22/2017

Conditionals

- In Python, **True** and **False** are Boolean objects of class '**bool**' and they are **immutable**.
- Python assumes any **non-zero** and **non-null** values as **True**, otherwise it is **False** value.
- Python *does not* provide switch or case statements as in other languages.
- **Syntax:**

if Statement

```
if expression:
   statement(s)
```

***if..else* Statement**

```
if expression:
   statement(s)
else:
   statement(s)
```

if..elif..else Statement

```
if expression1:
   statement(s)
elif expression2:
   statement(s)
elif expression3:
   statement(s)
else:
   statement(s)
```

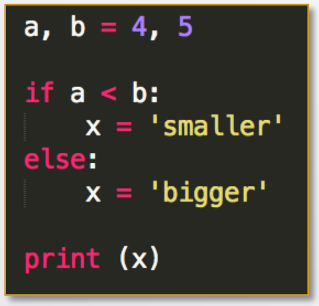
- **Example:**

```
x = int(input("Please enter an integer: "))
if x < 0:
    x = 0
    print('Negative changed to zero')
elif x == 0:
    print('Zero')
elif x == 1:
    print('Single')
else:
    print('More’)
```

Conditionals

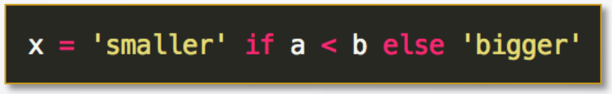
- **Using the conditional expression**

Another type of conditional structure in Python, which is very convenient and easy to read.



```python
a, b = 4, 5

if a < b:
    x = 'smaller'
else:
    x = 'bigger'

print (x)
```

→

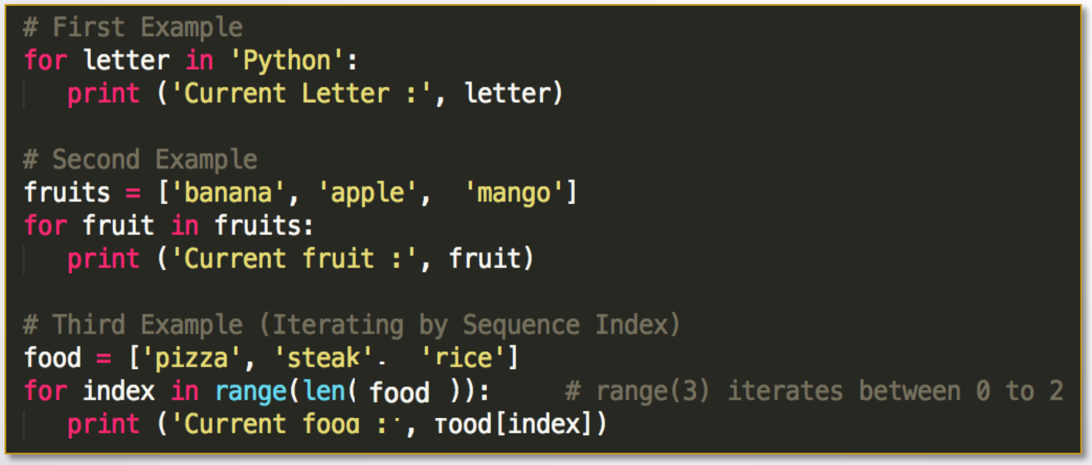


```python
x = 'smaller' if a < b else 'bigger'
```

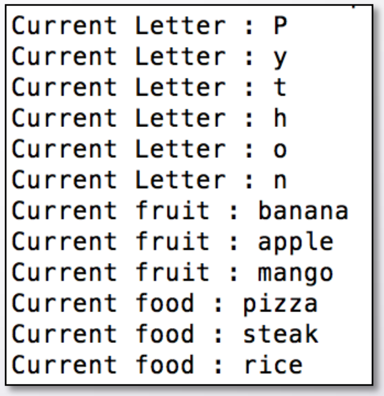
8/22/2017

Loops

The For Loop

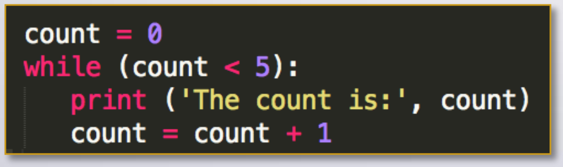


```python
# First Example
for letter in 'Python':
    print ('Current Letter :', letter)

# Second Example
fruits = ['banana', 'apple',  'mango']
for fruit in fruits:
    print ('Current fruit :', fruit)

# Third Example (Iterating by Sequence Index)
food = ['pizza', 'steak',  'rice']
for index in range(len( food )):     # range(3) iterates between 0 to 2
    print ('Current food :', food[index])
```

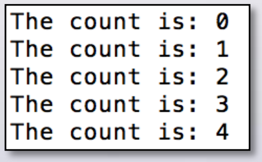


```
Current Letter : P
Current Letter : y
Current Letter : t
Current Letter : h
Current Letter : o
Current Letter : n
Current fruit : banana
Current fruit : apple
Current fruit : mango
Current food : pizza
Current food : steak
Current food : rice
```

The while Loop



```python
count = 0
while (count < 5):
    print ('The count is:', count)
    count = count + 1
```

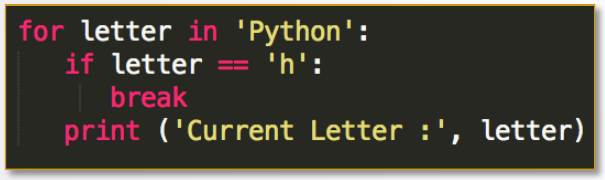


```
The count is: 0
The count is: 1
The count is: 2
The count is: 3
The count is: 4
```

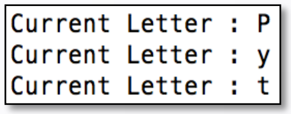
Loops

Loop Control Statements

- **break** :Terminates the loop statement and transfers execution to the statement immediately following the loop.

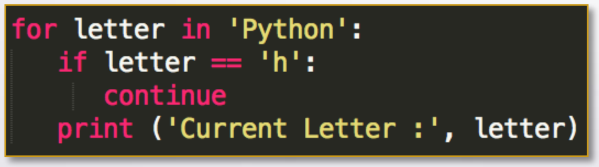


```python
for letter in 'Python':
    if letter == 'h':
        break
    print ('Current Letter :', letter)
```

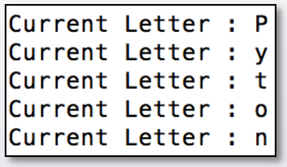


```
Current Letter : P
Current Letter : y
Current Letter : t
```

- **continue** :Causes the loop to skip the remainder of its body and immediately retest its condition prior to reiterating.

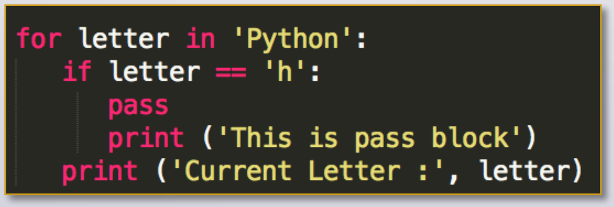


```python
for letter in 'Python':
    if letter == 'h':
        continue
    print ('Current Letter :', letter)
```

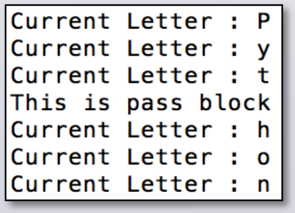


```
Current Letter : P
Current Letter : y
Current Letter : t
Current Letter : o
Current Letter : n
```

- **pass** :Used when a statement is required syntactically but you do not want any command or code to execute.



```python
for letter in 'Python':
    if letter == 'h':
        pass
        print ('This is pass block')
    print ('Current Letter :', letter)
```



```
Current Letter : P
Current Letter : y
Current Letter : t
This is pass block
Current Letter : h
Current Letter : o
Current Letter : n
```

Python Functions

By Ripal Ranpara

8/22/2017

Functions

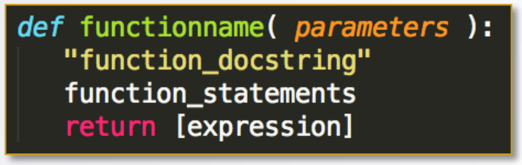
A function is a block of organized, reusable code that is used to perform a single, related action. Functions provide better modularity for your application and a high degree of code reusing.

Defining a Function

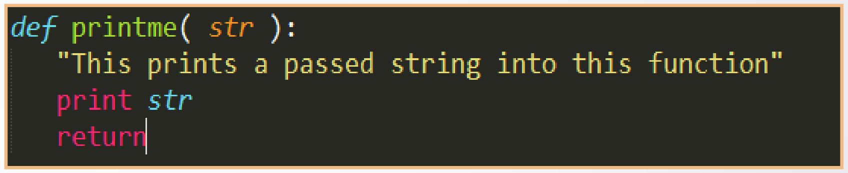
- Function blocks begin with the keyword **def** followed by the function name and parentheses (( )).
- Any input parameters or arguments should be placed within these parentheses. You can also define parameters inside these parentheses.
- The first statement of a function can be an optional statement - the documentation string of the function or *docstring*.
- The code block within every function starts with a colon (:) and is indented.
- The statement return [expression] exits a function, optionally passing back an expression to the caller. A return statement with no arguments is the same as return None.

Functions

Function Syntax



```
def functionname( parameters ):
   "function_docstring"
   function_statements
   return [expression]
```

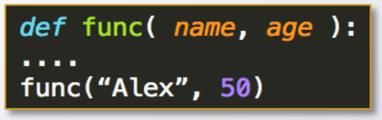


```
def printme( str ):
   "This prints a passed string into this function"
   print str
   return
```

Function Arguments

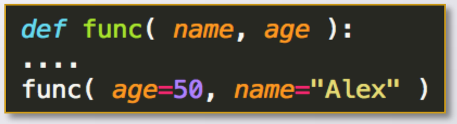
You can call a function by using any of the following types of arguments:

- **Required arguments**: the arguments passed to the function in correct positional order.



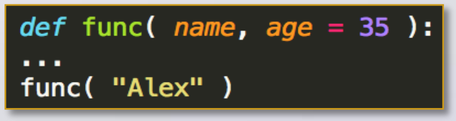
```
def func( name, age ):
....
func("Alex", 50)
```

- **Keyword arguments**: the function call identifies the arguments by the parameter names.



```
def func( name, age ):
....
func( age=50, name="Alex" )
```

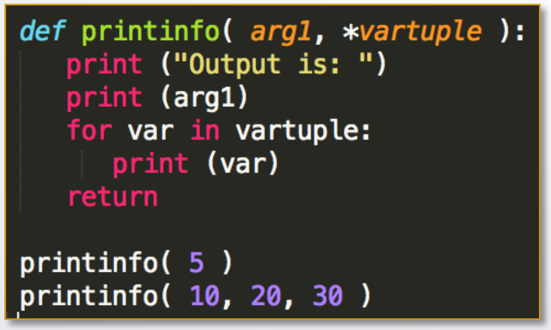
- **Default arguments**: the argument has a default value in the function declaration used when the value is not provided in the function call.



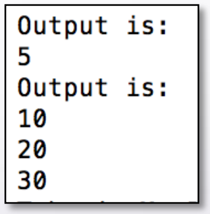
```
def func( name, age = 35 ):
...
func( "Alex" )
```

Functions

- **Variable-length arguments:** This used when you need to process unspecified additional arguments. An asterisk (*) is placed before the variable name in the function declaration.



```python
def printinfo( arg1, *vartuple ):
    print ("Output is: ")
    print (arg1)
    for var in vartuple:
        print (var)
    return

printinfo( 5 )
printinfo( 10, 20, 30 )
```



```
Output is:
5
Output is:
10
20
30
```

8/22/2017

By Ripal Ranpara

Python File Handling

By Ripal Ranpara

8/22/2017

File Handling

- **File opening** fileObject = **open**(file_name [, access_mode][, buffering])

  Common access modes:

  - “**r**” opens a file for reading only.
  - “**w**” opens a file for writing only. Overwrites the file if the file exists. Otherwise, it creates a new file.
  - “**a**” opens a file for appending. If the file does not exist, it creates a new file for writing.

- **Closing a file** fileObject.**close**()

  The close() method flushes any unwritten information and closes the file object.

File Handling

- **Reading a file** fileObject.**read**([count])
  - The ***read()*** method reads the whole file at once.
  - The **readline**() method reads one line each time from the file.
  - The ***readlines()*** method reads all lines from the file in a list.

- **Writing in a file** fileObject.**write**(string)

  The write() method writes any string to an open file.

Python Exception Handling

By Ripal Ranpara

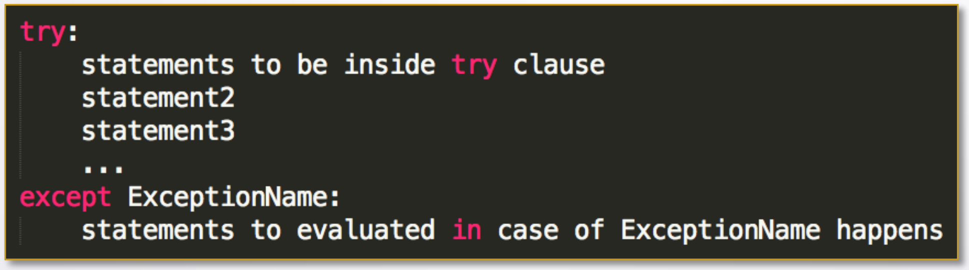
8/22/2017

Exception Handling

- **Common Exceptions in Python:**

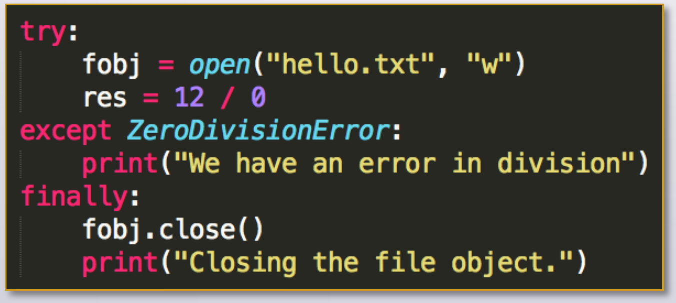
  NameError - TypeError - IndexError - KeyError - Exception

- **Exception Handling Syntax:**



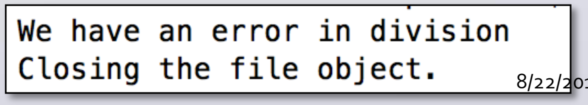
```
try:
    statements to be inside try clause
    statement2
    statement3
    ...
except ExceptionName:
    statements to evaluated in case of ExceptionName happens
```

- An empty except statement can catch any exception.
- ***finally*** clause: always executed before finishing try statements.



```
try:
    fobj = open("hello.txt", "w")
    res = 12 / 0
except ZeroDivisionError:
    print("We have an error in division")
finally:
    fobj.close()
    print("Closing the file object.")
```

→



```
We have an error in division
Closing the file object.
```

EXCEPTION NAME	DESCRIPTION
Exception	Base class for all exceptions
StopIteration	Raised when the next() method of an iterator does not point to any object.
SystemExit	Raised by the sys.exit() function.
StandardError	Base class for all built-in exceptions except StopIteration and SystemExit.
ArithmeticError	Base class for all errors that occur for numeric calculation.
OverflowError	Raised when a calculation exceeds maximum limit for a numeric type.
FloatingPointError	Raised when a floating point calculation fails.
ZeroDivisionError	Raised when division or modulo by zero takes place for all numeric types.
AssertionError	Raised in case of failure of the Assert statement.

AttributeError	Raised in case of failure of attribute reference or assignment.
EOFError	Raised when there is no input from either the raw_input() or input() function and the end of file is reached.
ImportError	Raised when an import statement fails.
KeyboardInterrupt	Raised when the user interrupts program execution, usually by pressing Ctrl+c.
LookupError	Base class for all lookup errors.
IndexError KeyError	Raised when an index is not found in a sequence. Raised when the specified key is not found in the dictionary.
NameError	Raised when an identifier is not found in the local or global namespace.
UnboundLocalError EnvironmentError	Raised when trying to access a local variable in a function or method but no value has been assigned to it. Base class for all exceptions that occur outside the Python environment.

IOError IOError	Raised when an input/ output operation fails, such as the print statement or the open() function when trying to open a file that does not exist. Raised for operating system-related errors.
SyntaxError IndentationError	Raised when there is an error in Python syntax. Raised when indentation is not specified properly.
SystemError	Raised when the interpreter finds an internal problem, but when this error is encountered the Python interpreter does not exit.
SystemExit	Raised when Python interpreter is quit by using the sys.exit() function. If not handled in the code, causes the interpreter to exit.
TypeError	Raised when an operation or function is attempted that is invalid for the specified data type.
ValueError	Raised when the built-in function for a data type has the valid type of arguments, but the arguments have invalid values specified.
RuntimeError	Raised when a generated error does not fall into any category.
NotImplementedError	Raised when an abstract method that needs to be implemented in an inherited class is not actually implemented.

Python Modules

By Ripal Ranpara

8/22/2017

Modules

- A module is a file consisting of Python code that can define functions, classes and variables.
- A module allows you to organize your code by grouping related code which makes the code easier to understand and use.
- You can use any Python source file as a module by executing an ***import*** statement

```
import module1[, module2[,... moduleN]
```

- Python's ***from*** statement lets you import **specific** attributes from a module into the current namespace.

```
from modname import name1[, name2[, ... nameN]]
```

- ***import **** statement can be used to import **all** names from a module into the current namespace

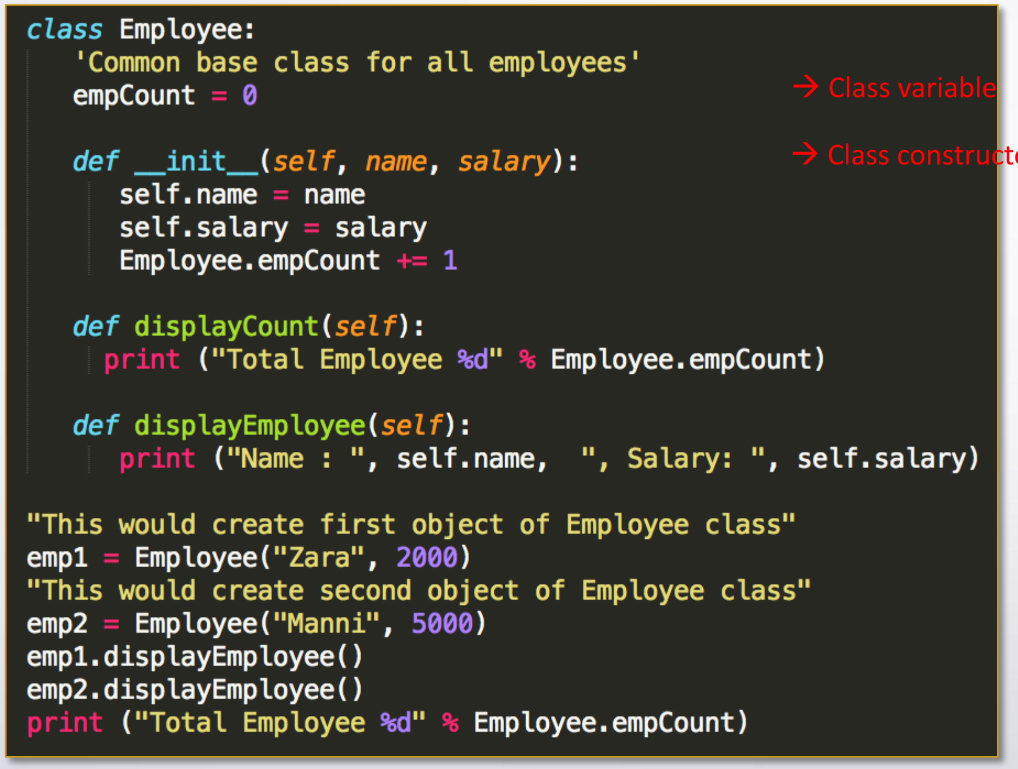
```
from modname import *
```

Python Object Oriented

By Ripal Ranpara

8/22/2017

Python Classes



```
class Employee:
    'Common base class for all employees'
    empCount = 0

    def __init__(self, name, salary):
        self.name = name
        self.salary = salary
        Employee.empCount += 1

    def displayCount(self):
      print ("Total Employee %d" % Employee.empCount)

    def displayEmployee(self):
        print ("Name : ", self.name,  ", Salary: ", self.salary)

"This would create first object of Employee class"
emp1 = Employee("Zara", 2000)
"This would create second object of Employee class"
emp2 = Employee("Manni", 5000)
emp1.displayEmployee()
emp2.displayEmployee()
print ("Total Employee %d" % Employee.empCount)
```

→ Class variable

→ Class constructor

Output →

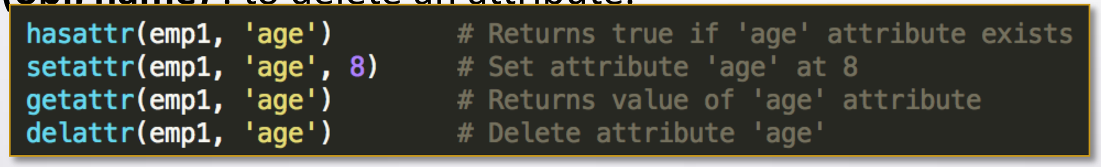
```
Name :  Zara , Salary:  2000
Name :  Manni , Salary:  5000
Total Employee 2
```

8/22/2017

By Ripal Ranpara

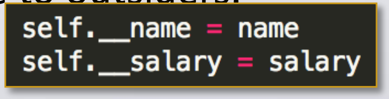
Python Classes

- **Built-in class functions**
  - **getattr(obj, name[, default])** : to access the attribute of object.
  - **hasattr(obj,name)** : to check if an attribute exists or not.
  - **setattr(obj,name,value)** : to set an attribute. If attribute does not exist, then it would be created.
  - **delattr(obj, name)** : to delete an attribute.



```python
hasattr(emp1, 'age')       # Returns true if 'age' attribute exists
setattr(emp1, 'age', 8)    # Set attribute 'age' at 8
getattr(emp1, 'age')       # Returns value of 'age' attribute
delattr(emp1, 'age')       # Delete attribute 'age'
```

- **Data Hiding** You need to name attributes with *a double underscore prefix*, and those attributes then are not be directly visible to outsiders.



```python
self.__name = name
self.__salary = salary
```

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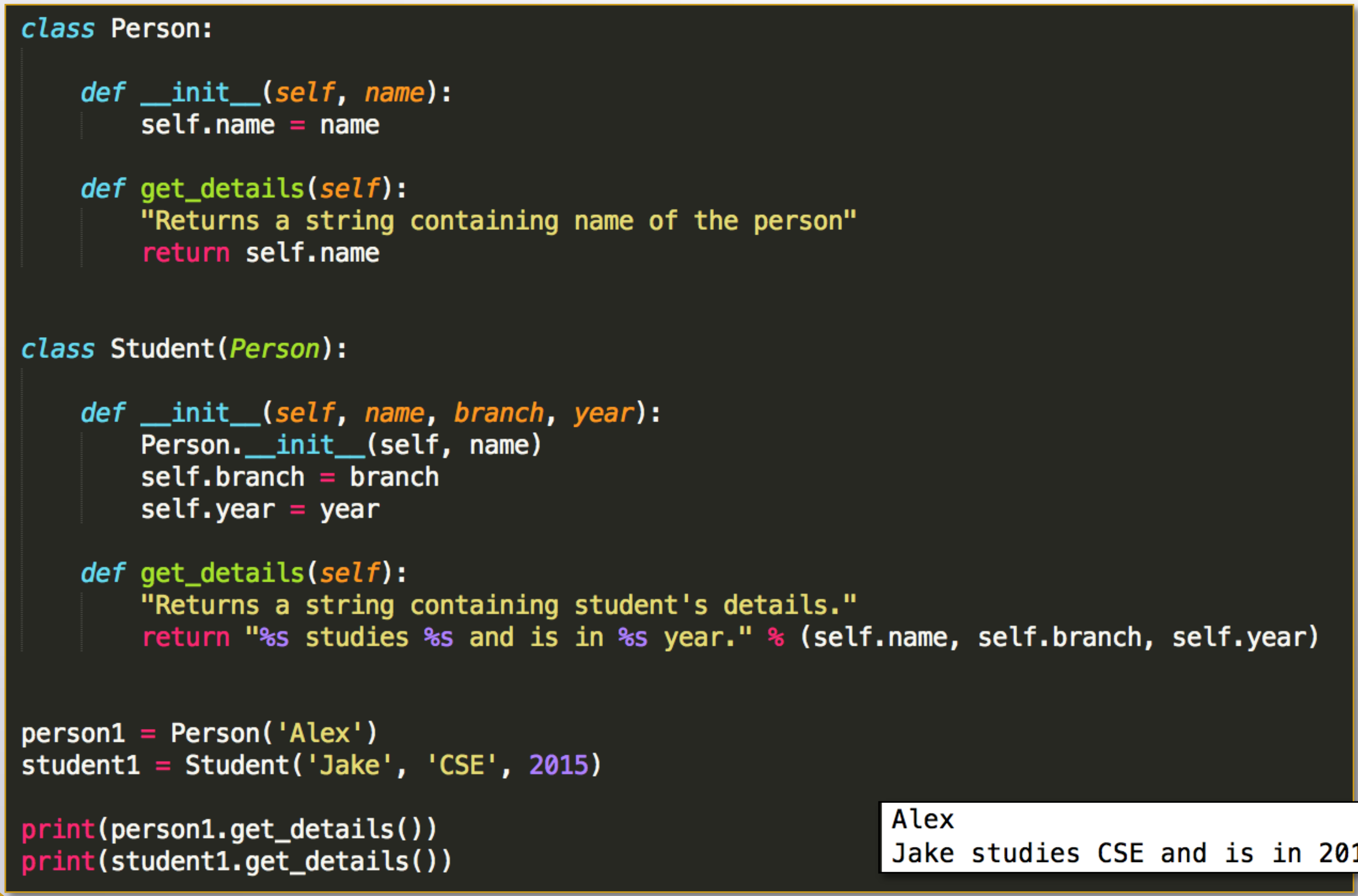
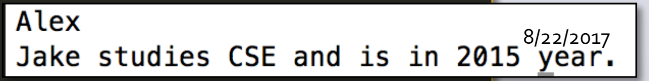
Class Inheritance



```python
class Person:

    def __init__(self, name):
        self.name = name

    def get_details(self):
        "Returns a string containing name of the person"
        return self.name


class Student(Person):

    def __init__(self, name, branch, year):
        Person.__init__(self, name)
        self.branch = branch
        self.year = year

    def get_details(self):
        "Returns a string containing student's details."
        return "%s studies %s and is in %s year." % (self.name, self.branch, self.year)


person1 = Person('Alex')
student1 = Student('Jake', 'CSE', 2015)

print(person1.get_details())
print(student1.get_details())
```



```
Alex
Jake studies CSE and is in 2015 year.
```

Python vs. Java

Code Examples

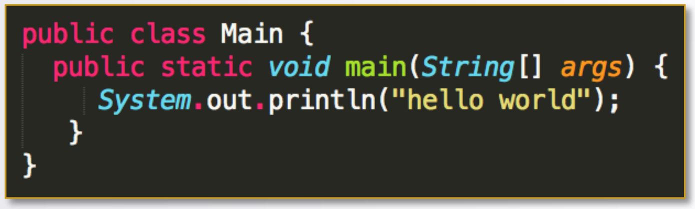
By Ripal Ranpara

8/22/2017

Python vs. Java

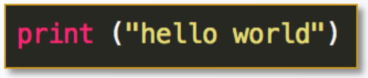
- **Hello World**

Java



```java
public class Main {
  public static void main(String[] args) {
     System.out.println("hello world");
   }
}
```

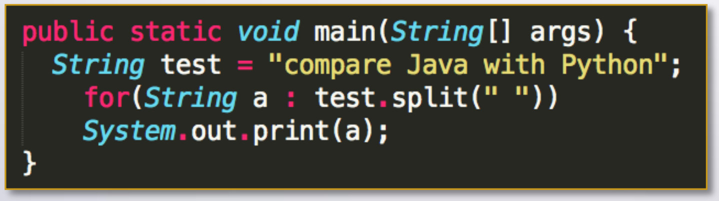
Python



```python
print ("hello world")
```

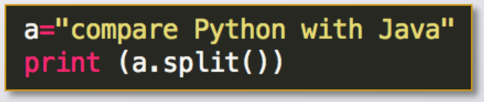
- **String Operations**

Java



```java
public static void main(String[] args) {
  String test = "compare Java with Python";
    for(String a : test.split(" "))
    System.out.print(a);
}
```

Python

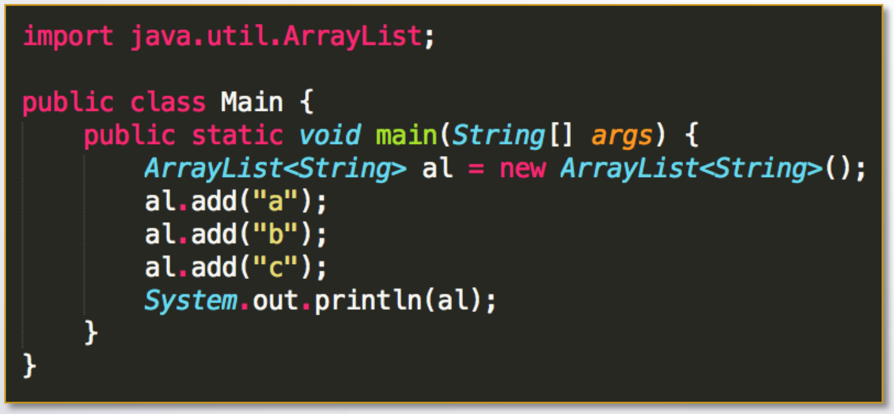


```python
a="compare Python with Java"
print (a.split())
```

Python vs. Java

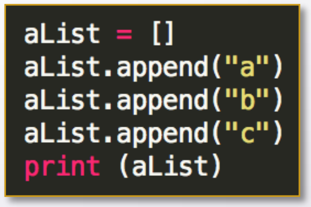
- Collections

Java



```java
import java.util.ArrayList;

public class Main {
    public static void main(String[] args) {
        ArrayList<String> al = new ArrayList<String>();
        al.add("a");
        al.add("b");
        al.add("c");
        System.out.println(al);
    }
}
```

Python

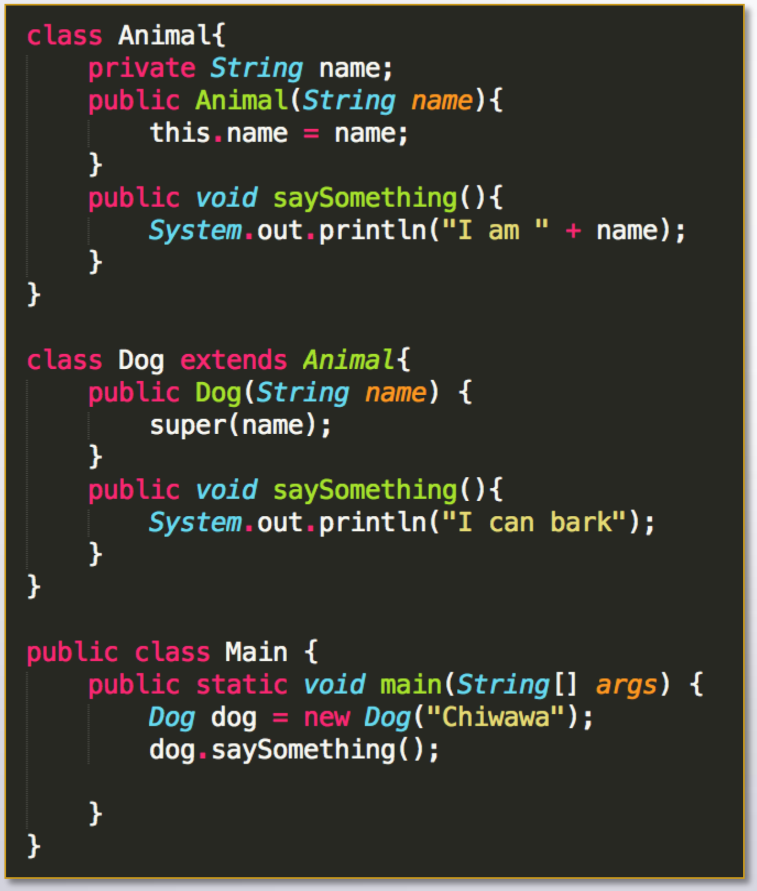


```python
aList = []
aList.append("a")
aList.append("b")
aList.append("c")
print (aList)
```

Python vs. Python Java

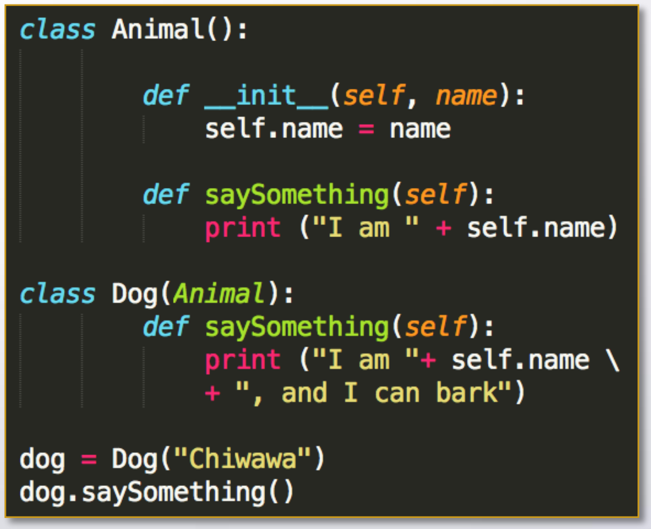
- Class and Inheritance

Java



```java
class Animal{
    private String name;
    public Animal(String name){
        this.name = name;
    }
    public void saySomething(){
        System.out.println("I am " + name);
    }
}

class Dog extends Animal{
    public Dog(String name) {
        super(name);
    }
    public void saySomething(){
        System.out.println("I can bark");
    }
}

public class Main {
    public static void main(String[] args) {
        Dog dog = new Dog("Chiwawa");
        dog.saySomething();

    }
}
```

Python



```python
class Animal():

        def __init__(self, name):
            self.name = name

        def saySomething(self):
            print ("I am " + self.name)

class Dog(Animal):
        def saySomething(self):
            print ("I am "+ self.name \
            + ", and I can bark")

dog = Dog("Chiwawa")
dog.saySomething()
```

→
```
I am Chiwawa, and I can bark
```

Python Useful Tools

By Ripal Ranpara

8/22/2017

Useful Tools

- Python IDEs
  - Vim
  - Eclipse with PyDev
  - Sublime Text
  - Emacs
  - Komodo Edit
  - PyCharm

Useful Tools

- **Python Web Frameworks**
    - Django
    - Flask
    - Pylons
    - Pyramid
    - TurboGears
    - Web2py

Who Uses Python?

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Organizations Use Python

- **Web Development** :Google, Yahoo
- **Games** :Battlefield 2, Crystal Space
- **Graphics** :Walt Disney Feature Animation, Blender 3D
- **Science** :National Weather Service, NASA, Applied Maths
- **Software Development** :Nokia, Red Hat, IBM
- **Education** :University of California-Irvine, SchoolTool
- **Government** :The USA Central Intelligence Agency (CIA)