Python for JNTUK Students

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Types

Python has 5 data types-Numbers, Strings, Lists, Tuple, Dictionary. In this chapter, we will discuss Numbers and Strings. We will see the other 3 in the next chapter.

Numbers

Numbers are further divided into 4:int, long, float, complex. int and long are used to represent whole numbers. float is used for numbers that have a decimal part. Languages like C have double type for really big floating point numbers. But python only has float.

```
a = 12
print type(a)
#type is a built-in function that returns the type of a variable
b = 12.3
print type(b)
c = 2323231211142342424
print type(c)
d = complex(2,3)
print d
print type(d)
```

```
## <type 'int'>
## <type 'float'>
## <type 'long'>
## (2+3j)
## <type 'complex'>
```

The data type complex represent mathematical complex numbers that have a real and an imaginary part.

Strings

Python doesn't differete between single quotes and double quotes. Unlike in C, the is not difference between char ans string-both are same.

```
name = "sreekanth"
occupation = 'software engineer'
print type(name)
qoute = "I'am good" #observe that a single qoute can be used within double quotes
print "qoute:" + qoute
qoute = "qoute:" + 'He said "I am not going" to her'
print qoute
```

```
## <type 'str'>
## qoute:I'am good
## qoute:He said "I am not going" to her
```

```
qoute = "He said "I am not going" to her" #this will not work.
```

Booleans

Boolean variables can be assigned either `True` or `False`

```
flag = True
print flag
flag = False
print flag
```

```
## True
## False
```

Operators

Variables are assigned values using the `=` operator. Variables are written when they are first assigned a value.

```
number = 10
```

The variable `number` is assigned 10. Note that the type of variable `number` is not declared. This is not required because of the python type inference. Based on the operations we do on a variable, the python will automatic guess its type.

```
#multiple assignments can be done in the same statement simultaneously.
a, b = 10,20
#a is assigned 10 and b is assigned 20.
print a,b
a,b = b,a
#a is assigned the value in b and b is assigned the value in a simultaneously.
#this is a popular way of swapping numbers in python.
print a,b
```

```
## 10 20
## 20 10
```

Logical Operators

There are three logical operators: not, or, and. Also, >, >=, <, <=, ==, !=

```
condition = True
print (not condition)
print (condition or False)
print (condition and False)
```

```
## False
## True
## False
```

`not a` evaluates to the opposite of what `a` is. `a and b` evaluates to True only if both a, b are True. a or b evaluates to False if both a,b are False. They behave like !, ||, && operators in C.

a	not a
True	False

a	not a
False	True

a	b	a and b
True	True	True
True	False	False
False	True	False
False	False	False

a	b	a or b
True	True	True
True	False	True
False	True	True
False	False	False

Membership Operator

The `in` operator is used to determine variable consists of other.

```
isPresent = "sree" in "sreekanth"
print isPresent
```

```
## True
```

We will discuss this operator in more detail in unit-3 once we complete lists.

```
fruits = ["apple", "banana", "orange"]
print "apple" in fruits
#the 'in' operator can be used with the 'not' operator
#to find out if a variable is not present in another
print "banana" not in fruits
```

```
## True
## False
```

Control flow

```
a,b = 3,2
if(a > b):
  print "a is greater than b" #Notice this print stmt is indented
  #this means that the print stmt is within the if block
```

```
## a is greater than b
```

Python seperates blocks based on there indentation. Notice the priNotice unlike other langauges, python doesn't use curly brackets{} to block. The above if statement can also be written as if-else statement.

```
a,b = 10,20
if a > b:
  print "a is greater than b"
```

```
else:
  pass
```

pass is a keyword that represents an empty statement. It's is like an empty ; in C.

```
a,b = 3,2
if a > b:
  print "this statement is within the if block"
  print "this statement aswell"
else:
  print "this statement is in the else block"
  print "this statement is also in the else block"
print "this statement is not in the if block. it's in the global block and will always print"
```

```
## this statement is within the if block
## this statement aswell
## this statement is not in the if block. it's in the global block and will always print
```

Loops

The for loop

```
numbers = range(1,10)
for number in numbers:
  print number
```

```
## 1
## 2
## 3
## 4
## 5
## 6
## 7
## 8
## 9
```

```
for aphlabet in "sreekanth":
  print aphlabet
```

```
## s
## r
## e
## e
## k
## a
## n
## t
## h
```

```
fruits = ["apple", "banana", "orange"]
while len(fruits) != 0:
  print fruits.pop()
print fruits
```

```
## orange
```

```
## banana
## apple
## []
```

```
numbers = range(0,10) #remember range() creates a list [0,1,2...,9]
#program to print even numbers
for i in numbers:
  if i%2 != 0:
    continue
  print i #remember indentation rules: this stmt is in for block but not in if block
print "program end"
```

```
## 0
## 2
## 4
## 6
## 8
## program end
```

Each time the keyword `continue` is hit, the remaining part of the for loop is not executed

```
numbers = range(0,10)
for i in numbers:
  if i%2 != 0:
    break
  print i
print "program end"
```

```
## 0
## program end
```

Notice that this program produces nothing. When `i=1`, the `if` condition is True, and break statement is hit. When a break statement is hit, the loop, the break statement is in, is immediately exited.

Lists

lists are similar to C arrays but more powerful. Lists store multiple values. unlike C arrays, elements in a python list don't have be of the same type. lists are indexed from 0.

```
fruits = ['apple', 'mango', 'pineapple']
numbers = [10, 20, 30, 40, 50]
#elements in a list can be accessed using index.
print numbers[1]
#even negative index is allowed, in which case length of list is added
#to the index.
print numbers[-1]
fruitsandnumbers =  ['apple', 'mango', 'pineapple', 10, 20, 30, True]
#mixing elements of different types is fine
print fruitsandnumbers
print len(numbers)
#len is a built-in function used to find the length of lists.
integers = range(1,10)
print integers
#range(start,last) is built-in function that creates a list [start, start+1, ..., last-1]
```

```
## 20
```

```
## 50
## ['apple', 'mango', 'pineapple', 10, 20, 30, True]
## 5
## [1, 2, 3, 4, 5, 6, 7, 8, 9]
```

Slicing

Slicing is a simple way of creating a new list from (part of) an old list.

```
    newList = oldList[start:end]
```

```
numbers = [10, 20, 30, 40, 50, 60, 70]
sublist = numbers[1:4]
print sublist
print numbers[0:3]
print numbers[:3] #missing starting number, with replaced with 0
print numbers[4:7]
print numbers[4:] #missing ending number is replaced with length of the list.
#negative indices can also be given.
#In which case, the length of the list is added
print numbers[-2:7]
print numbers[:-1]  #this will print all elements except the last one.
```

```
## [20, 30, 40]
## [10, 20, 30]
## [10, 20, 30]
## [50, 60, 70]
## [50, 60, 70]
## [60, 70]
## [10, 20, 30, 40, 50, 60]
```

As shown in the example, sublist is a new list consisting of elements 1 to 3(remember, 'end' is not inclusive) in the numbers list. you can also specify negative numbers for indexes in which case, the length of list is automatically added. For example `numbers[-2:7]` is equivalent to `numbers[5:7]`.

List methods

Lists are not fixed in length. They increase and decrease when elements are added and removed.

```
numbers = [10,20,30,40,50]  #creating a list
numbers.append(60)  #adds 60 at the end of the list
print numbers
numbers.insert(2, 25) #you can even add an element at a specific index
print numbers
```

```
## [10, 20, 30, 40, 50, 60]
## [10, 20, 25, 30, 40, 50, 60]
```

Notice how the list gets re-adjusted. All the elements after index 1 are moved 1 place right the new element is insert at index 2. you can delete an element from a list by using the keyword `del`.

```
numbers = [10,20,30,40,50]
del numbers[1] #this will remove element at index 1
print numbers
```

```
## [10, 30, 40, 50]
```

Notice how the list is re-adjusted. All the elements after index 1 are moved 1 place left to full the list. The length of list is also reduced by 1.

```
numbers = [10,20,30,40,50]  #creating a list
print numbers.pop() #removes and returns the last element in the list
print numbers
# More methods
print numbers.index(40) #returns the index of the element 40 if present
numbers = [30,20,40,10,50]
numbers.sort()  #sorts list
print numbers
```

```
## 50
## [10, 20, 30, 40]
## 3
## [10, 20, 30, 40, 50]
```

Sets

Sets are like lists but duplicates are not allowed.

```
presentees = {1,5,6, 7, 10, 1, 6, 6, 5}
print presentees
presentees.add(10)
print presentees
presentees.pop()
print presentees
```

```
## set([1, 10, 5, 6, 7])
## set([1, 10, 5, 6, 7])
## set([10, 5, 6, 7])
```

Common mathematical set operations like union, intersection can be easily done.

```
setA = {1,2,3,4,5}
setB = {4,5,6,7,8}
print setA.union(setB)
print setA.intersection(setB)
```

```
## set([1, 2, 3, 4, 5, 6, 7, 8])
## set([4, 5])
```

Dictionaries

Dictionaries(commmonly shortened to dict) are {key,value} pair data structures. Each element in a dict is a pair of key and value. Keys have to be uquine. Keys can be thought as indices with names. Dicts are similar to java maps.

```
wordFrequency = {'a':1, 'b':5, 'c':10, 'e':15}
#Here all the strings('a', 'b', 'c', 'e' are keys)
#all the numbers are values(1,5,10,15)
#each key has a associated value.
#For example, wordFrequency can be used to store frequency of alphabets in a string
print wordFrequency['a']
```

```
#key can be used like an index of a list.
del wordFrequency['a']
#deleting is similar to list.
print wordFrequency
```

```
## 1
## {'c': 10, 'b': 5, 'e': 15}
```

Accessing the key that isn't present in the dict can result in an exception. This can be avoided by checking if that key is present before accessing it.

```
wordFrequency = {'a':1, 'b':5, 'c':10, 'e':15}
if('d' in wordFrequency):
  print wordFrequency['d']
else:
  print "not present"
```

```
## not present
```

Strings as lists

In python, strings are lists. So, all the list operations can be done on strings.

```
name = "sreekanth"
print name[0]
print name[1:5] #slicing
print name + "kolamala" # concatination
#
```

```
## s
## reek
## sreekanthkolamala
```

R Markdown

```
> print("hello world")
```

[1] "hello world"

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

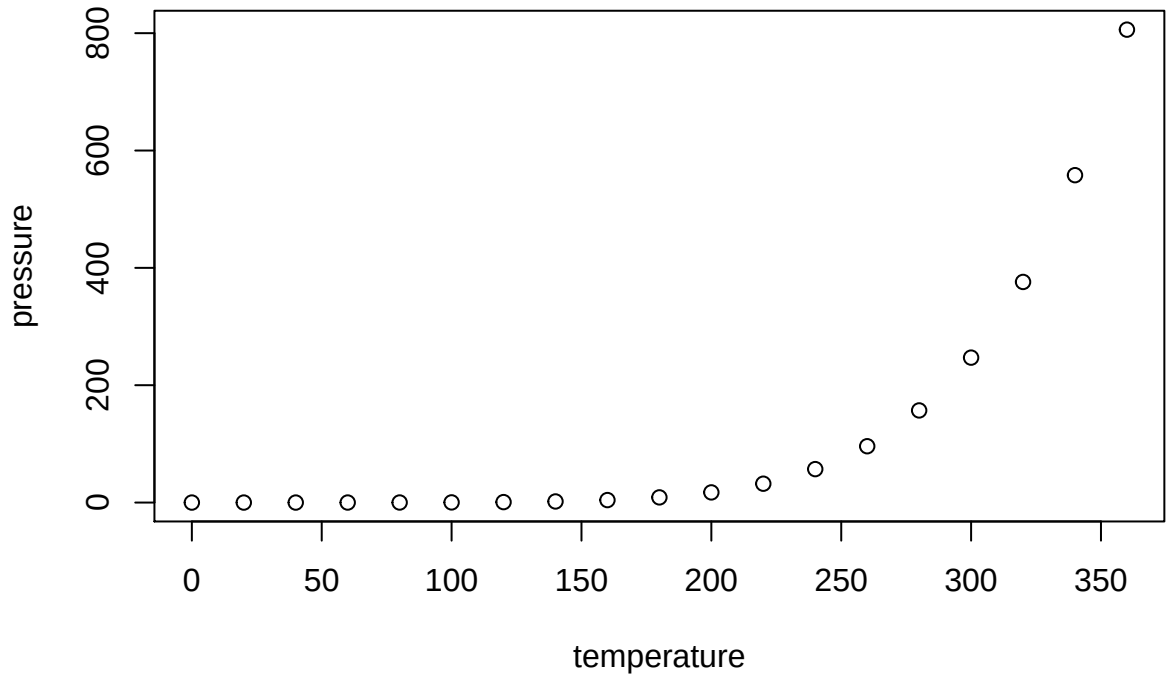
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed           dist
##  Min.   : 4.0   Min.   :  2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean   :15.4   Mean   : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

https://stackoverflow.com/questions/36808263/separate-columns-for-text-and-code-output-in-markdown?noredirect=1&lq=1