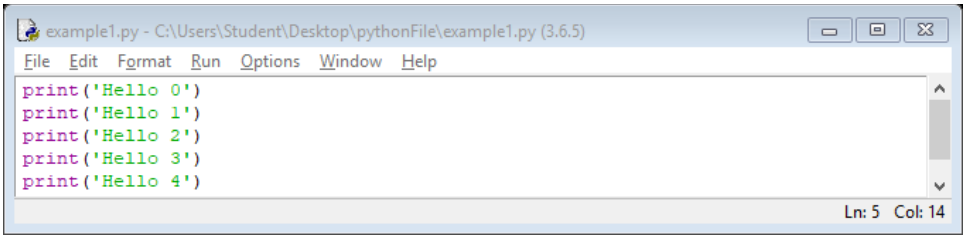
Going Loopy

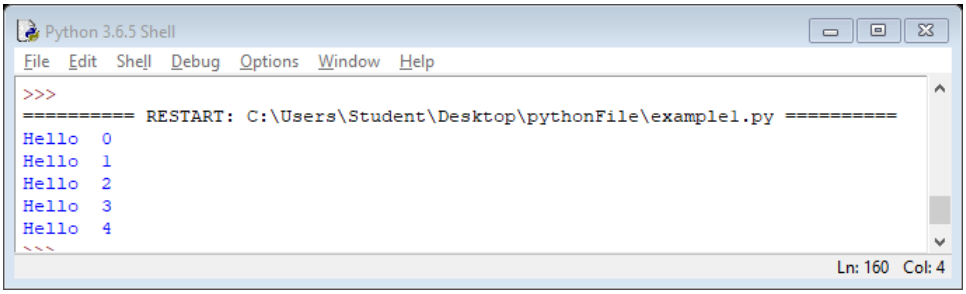
Nothing is worse than having to do the same thing over and over again. Programmers don't particularly like repeating codes. Therefore, programming languages have what is called *loops*, which allow programmers to set the same code to repeat as many as needed, even to set a loop to run infinite time. The most common loops are *for* and *while* loops.

for loops

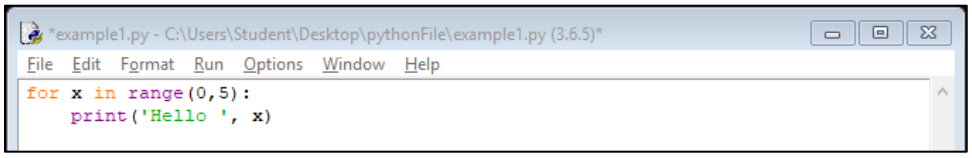
A for loop is used for iterating over a sequence. With the for loop we can execute a set of statements, once for each item in a list, tuple, set etc.

For example, to print hello five times, we could like the following lines of code:

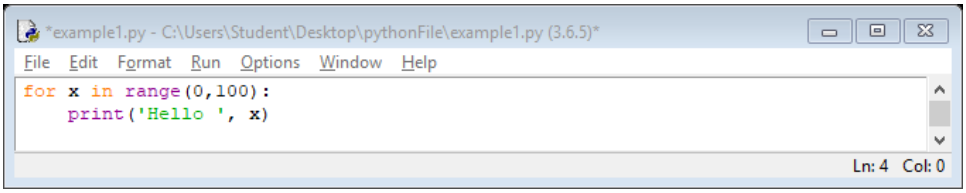




Now, think in what should we do if we need to print the same hello line 100 times? Should we write 100 code of lines? Instead, we can use a *for* loop to reduce the amount of typing and repetition:



For instant, to repeat the same hello line 100 times, we should only change the range:



The *for* loop syntax is:

for loop declaration

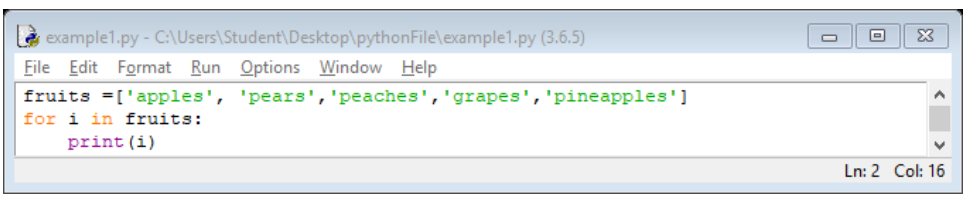
`range` set the initial value for `x` to be 0 and increasing repeat the loop block code up to 5 (exclusive), including

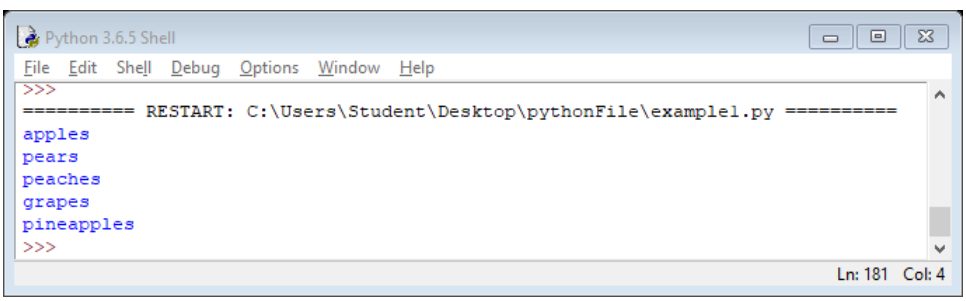
```
for x in range(0,5):
    print('Hello ', x)
```

loop block

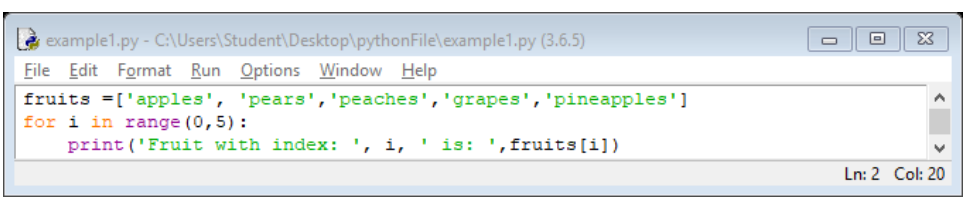
`x` is the iteration variable or counter variable

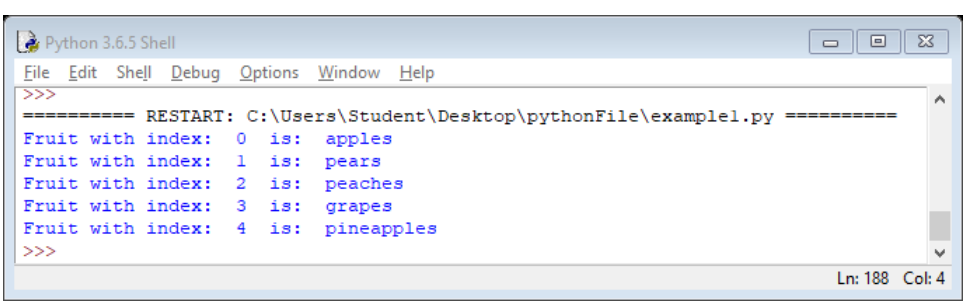
We can also use the *for* loop to print lists. For example, we can create a list of *fruits* and use *for* loop to print each of the value inside the list:





We can also print the list as the following:





The `range()` function with three argument

The **`range()`** function defaults to increment the sequence by 1, however it is possible to specify the increment value by adding a third parameter:

Initial value **Increment**

```
for x in range(2, 30, 3):
```

End value (not included)
exclusive value

Example) Use a for loop to print numbers between 2 and 30 with an increment of 3

```
print("\n-- numbers 2 and 30 with an increment of 3--\n")
for num in range(2, 30, 3):
    print(num)
```

```
-- numbers 2 and 30 with an increment of 3--

2
5
8
11
14
17
20
23
26
29
```

Example) Use a for loop to print numbers between 0 and 10 with a decrement of 2

```
print("\n-- numbers between 0 and 10 with a decrement of 2--
for num in range(10, 0, -2):
    print(num)
```

```
-- numbers between 0 and 10 with a decrement of 2--

10
8
6
4
2
```

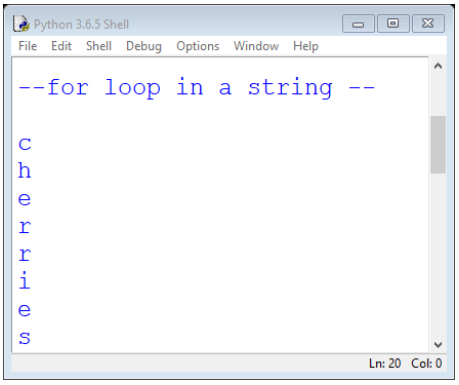
Looping through a string

Since string is a list of characters, we can use for loop to print of a sequence of characters of a given string.

Example) Use for loop to print each character of **cherries**

```
print("\n--for loop in a string --\n")

for x in "cherries":
     print(x)
```



Looping through a list

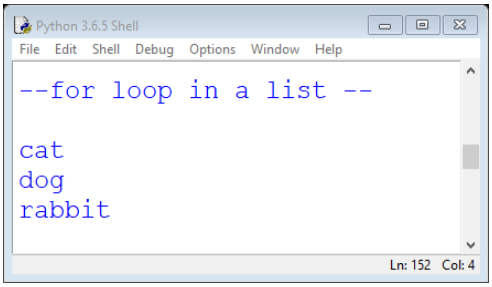
You can loop through the list items by using a for loop from the beginning to the end of the list without using **`range()`** function.

Example) Print each item in list **`animals`**

```
print("\n--for loop in a list --\n")

animals=["cat","dog","rabbit"]

for counter in animals:
    print(counter)
```



The break and continue statement

The other way to stop a loop is using a **`break`**. A *break* will terminate a loop if the condition meets the break even if the while condition is true.

The **`continue`** statement we can stop the current iteration, and continue with the next iteration

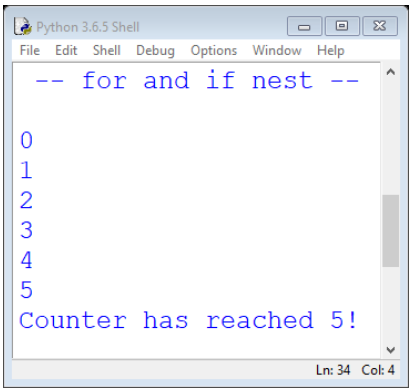
Nesting for loop and if statement

We can also nest an `if` statement inside of a `for` loop.

Example) Use a for loop to print numbers from 0 to 10 exclusive and break the for loop when the counter reaches to 5

```
print("\n -- for and if nest --\n")

for counter in range(11):
    print(counter)
    if counter == 5:
        print("Counter has reached 5!")
        break
```

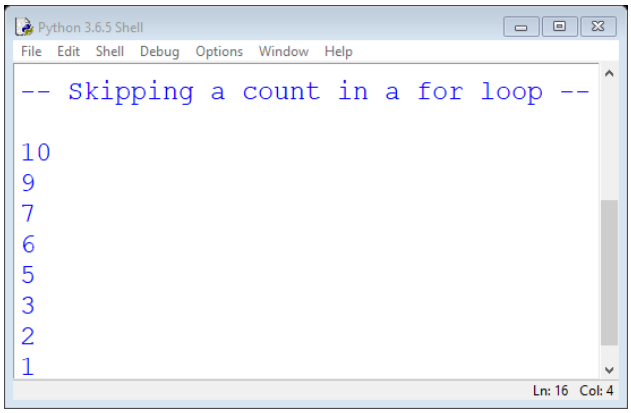


`break` in the **`if`** statement ends the program when the **`if`** condition is TRUE.

Example) Use a `for` loop to print numbers from 10 to 0 and skip numbers that are multiple of 4.

```
print("\n-- Skipping a count in a for loop --\n")

for counter in range(10,0,-1):
    if counter%4==0:
        continue
    print(counter)
```



else statement in a for loop

The **`else`** keyword in a **`for`** loop specifies a block of code to be executed when the loop is finished.

Example) Print all numbers from 0 to 6, and print a message **`Finally finished!`** when the loop has ended

```
print("\n-- else statement in a for loop --\n")

for x in range(7):
    print(x)
else:
    print("Finally finished!")
```