Python List

Summary: in this tutorial, you'll learn about Python List type and how to manipulate list elements effectively.

What is a List

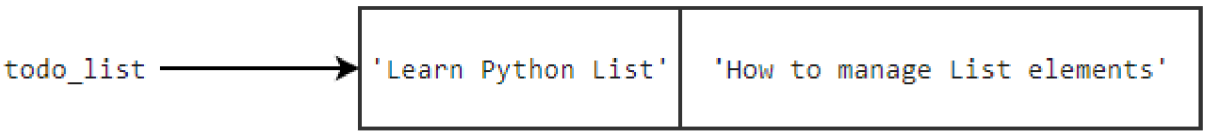
A list is an ordered collection of items.

Python uses the square brackets (`[]`) to indicate a list. The following shows an empty list:

```
empty_list = []
```

Typically, a list contains one or more items. To separate two items, you use a comma (,). For example:

```
todo_list = ['Learn Python List','How to manage List elements']
```



Since a list often contains many items, it's a good practice to name it using plural nouns e.g., `numbers` , `colors` , and `shopping_carts` .

The following example defines a list of six numbers (https://www.pythontutorial.net/python-basics/python-numbers/) :

```
numbers = [1, 3, 2, 7, 9, 4]
```

If you print out the list, you'll see its representation including the square brackets. For example:

```
print(numbers)
```

Output:

```
[1, 3, 2, 7, 9, 4]
```

The following shows how to define a list of strings (https://www.pythontutorial.net/python-basics/python-string/) :

```
colors = ['red', 'green', 'blue']
print(colors)
```

Output:

```
['red', 'green', 'blue']
```

A list can contains other lists. The following example defines a list of lists:

```
coordinates = [[0, 0], [100, 100], [200, 200]]
print(coordinates)
```

Output:

```
[[0, 0], [100, 100], [200, 200]]
```

Accessing elements in a list

Since a list is an ordered collection, you can access its element by indexes like this:

```
list[index]
```

Lists are zero-based index. In other words, the first element has an index 0, the second element has an index 1, and so on.

For example, the following shows how to access the first element of the `numbers` list:

```
numbers = [1, 3, 2, 7, 9, 4]

print(numbers[0])
```

Output:

```
1
```

The `numbers[1]` will return the second element from the list:

```
numbers = [1, 3, 2, 7, 9, 4]
print(numbers[1])
```

Output:

```
3
```

The negative index allows you to access elements starting from the end of the list.

The `list[-1]` returns the last element. The `list[-2]` returns the second last element, and so on. For example:

```
numbers = [1, 3, 2, 7, 9, 4]
print(numbers[-1])
print(numbers[-2])
```

Output:

```
4
9
```

Modifying, adding, and removing elements

A list is dynamic. It means that you can modify elements in the list, add new elements to the list, and remove elements from a list.

1) Modifying elements in a list

To change an element, you assign a new value to it using this syntax:

```
list[index] = new_value
```

The following example shows how to change the first element of the `numbers` list to 10:

```
numbers = [1, 3, 2, 7, 9, 4]
numbers[0] = 10

print(numbers)
```

Output:

```
[10, 3, 2, 7, 9, 4]
```

The following shows how to multiply the second element with 10:

```
numbers = [1, 3, 2, 7, 9, 4]
numbers[1] = numbers[1]*10

print(numbers)
```

Output:

```
[1, 30, 2, 7, 9, 4]
```

And the following divides the third element by 2:

```
numbers = [1, 3, 2, 7, 9, 4]
numbers[2] /= 2

print(numbers)
```

Output:

```
[1, 3, 1.0, 7, 9, 4]
```

2) Adding elements to the list

The `append()` method appends an element to the end of a list. For example:

```
numbers = [1, 3, 2, 7, 9, 4]
numbers.append(100)

print(numbers)
```

Ouput:

```
[1, 3, 2, 7, 9, 4, 100]
```

The `insert()` method adds a new element at any position in the list.

For example, the following inserts the number 100 at index 2 of the `numbers` list:

```
numbers = [1, 3, 2, 7, 9, 4]
numbers.insert(2, 100)

print(numbers)
```

Output:

```
[1, 3, 100, 2, 7, 9, 4]
```

3) Removing elements from a list

The `del` statement allows you to remove an element from a list by specifying the position of the element.

The following example shows how to remove the first element from the list:

```
numbers = [1, 3, 2, 7, 9, 4]
del numbers[0]

print(numbers)
```

Output:

```
[3, 2, 7, 9, 4]
```

The `pop()` method removes the last element from a list and returns that element:

```
numbers = [1, 3, 2, 7, 9, 4]
last = numbers.pop()

print(last)
print(numbers)
```

Output:

```
4
[1, 3, 2, 7, 9]
```

Typically, you use the `pop()` method when you want to remove an element from a list and still want to access the value of that element.

To pop an element by its position, you use the `pop()` with the element's index. For example:

```
numbers = [1, 3, 2, 7, 9, 4]

second = numbers.pop(1)

print(second)
print(numbers)
```

Output:

```
3
[1, 2, 7, 9, 4]
```

To remove an element by value, you use the `remove()` method.

For example, the following removes the element with value 9 from the `numbers` list:

```
numbers = [1, 3, 2, 7, 9, 4]

numbers.remove(9)
print(numbers)
```

Output:

```
[1, 3, 2, 7, 4]
```

Summary

- A list is an ordered collection of items.
- Use square bracket notation `[]` to access a list element by its index. The first element has an index `0`.
- Use a negative index to access a list element from the end of a list. The last element has an index `-1`.

- Use `list[index] = new_value` to modify an element from a list.
- Use `append()` to add a new element to the end of a list.
- Use `insert()` to add a new element at a position in a list.
- Use `pop()` to remove an element from a list and return that element.
- Use `remove()` to remove an element from a list.