How to Use the Python Reduce() function to Reduce a List into a Single Value

Summary: in this tutorial, you'll learn how to use the Python reduce() function to process a list.

Reducing a list

Sometimes, you want to reduce a list (https://www.pythontutorial.net/python-basics/python-list/) to a single value. For example, suppose that you have a list of numbers (https://www.pythontutorial.net/python-basics/python-numbers/) :

```
scores = [75, 65, 80, 95, 50]
```

And to calculate the sum of all elements in the `scores` list, you can use a `for` loop (https://www.pythontutorial.net/python-basics/python-for-loop-list/) like this:

```
scores = [75, 65, 80, 95, 50]

total = 0
```

```
for score in scores:
    total += score

print(total)
```

Output:

```
365
```

In this example, we have reduced the whole list into a single value, which is the sum of all elements from the list.

Introduction the Python reduce() function

Python offers a function called `reduce()` that allows you to reduce a list in a more concise way.

Here is the syntax of the `reduce()` function:

```
reduce(fn,list)
```

The `reduce()` function applies the `fn` function of two arguments cumulatively to the items of the list, from left to right, to reduce the list into a single value.

Unlike the `map()` (https://www.pythontutorial.net/python-basics/python-map-list/) and `filter()` (https://www.pythontutorial.net/python-basics/python-filter-list/) functions, the `reduce()` isn't a built-in function in Python. In fact, the `reduce()` function belongs to the `functools` module.

To use the `reduce()` function, you need to import it from the `functools` module using the following statement at the top of the file:

```
from functools import reduce
```

Note that you'll learn more about modules and how to use them in the later tutorial.

The following illustrates how to use the `reduce()` function to calculate the sum of elements of the `scores` list:

```
from functools import reduce

def sum(a, b):
    print(f"a={a}, b={b}, {a} + {b} ={a+b}")
    return a + b


scores = [75, 65, 80, 95, 50]
total = reduce(sum, scores)
print(total)
```

Output:

```
a=75, b=65, 75 + 65 = 140
a=140, b=80, 140 + 80 = 220
a=220, b=95, 220 + 95 = 315
a=315, b=50, 315 + 50 = 365
365
```

As you can see clearly from the output, the `reduce()` function cumulatively adds two elements of the list from left to right and reduces the whole list into a single value.

To make the code more concise, you can use a lambda expression (https://www.pythontutorial.net/python-basics/python-lambda-expressions/) instead of defining the `sum()` function:

```
from functools import reduce

scores = [75, 65, 80, 95, 50]

total = reduce(lambda a, b: a + b, scores)
```

```
print(total)
```

Summary

- Use the Python `reduce()` function to reduce a list into a single value.