**List Methods**

List Comprehension

**--** **How to create a list in python?**

1. Using For Loop:

-- The most common type of loop is the for loop. You can use a for loop to create a list of elements in three steps:

1. Instantiate an empty list.
2. Loop over an iterable or [range](https://realpython.com/python-range/) of elements.
3. [Append](https://realpython.com/python-append/) each element to the end of the list.

-- If you want to create a list containing the first ten perfect squares, then you can complete these steps in three lines of code:

squares = []

*for* i in range(10):

    squares.append(i \* i)

print(squares)

-- Here, you instantiate an empty list, squares. Then, you use a for loop to iterate over range(10). Finally, you multiply each number by itself and append the result to the end of the list.

2. Using map() Object:

-- map() provides an alternative approach that’s based in functional programming.

-- You pass in a function and an iterable, and map() will create an object.

-- This object contains the output you would get from running each iterable element through the supplied function.

-- As an example, consider a situation in which you need to calculate the price after tax for a list of transactions:

txns = [1.09, 23.56, 57.84, 4.56, 6.78]

TAX\_RATE = .08

def *get\_price\_with\_tax*(txn):

*return* txn \* (1 + TAX\_RATE)

final\_prices = map(get\_price\_with\_tax, txns)

print(list(final\_prices))

-- Here, you have an iterable txns and a function get\_price\_with\_tax(). You pass both of these arguments to map(), and store the resulting object in final\_prices. You can easily convert this map object into a list using list().

3. Using List Comprehension:

-- List comprehensions are a third way of making lists.

-- With this elegant approach, you could rewrite the for loop from the first example in just a single line of code:

squares = [i \* i *for* i in range(10)]

print(squares)

-- Rather than creating an empty list and adding each element to the end, you simply define the list and its contents at the same time by following this format:

new\_list = [expression for member in iterable]

-- Every list comprehension in Python includes three elements:

1. **expression** is the member itself, a call to a method, or any other valid expression that returns a value. In the example above, the expression i \* i is the square of the member value.
2. **member** is the object or value in the list or iterable. In the example above, the member value is i.
3. **iterable** is a list, set, sequence, [generator](https://realpython.com/introduction-to-python-generators/), or any other object that can return its elements one at a time. In the example above, the iterable is range(10).

-- Because the **expression** requirement is so flexible, a list comprehension in Python works well in many places where you would use map().

-- You can rewrite the pricing example with its own list comprehension:

txns = [1.09, 23.56, 57.84, 4.56, 6.78]

TAX\_RATE = .08

def *get\_price\_with\_tax*(txn):

*return* txn \* (1 + TAX\_RATE)

final\_prices = [get\_price\_with\_tax(i) *for* i in txns]

print(final\_prices)

-- The only distinction between this implementation and map() is that the list comprehension in Python returns a list, not a map object.

**-- Benefits of Using List Comprehension**

-- List comprehensions are often described as being more Pythonic than loops or map().

-- One main benefit of using a list comprehension in Python is that it’s a single tool that you can use in many different situations.

-- In addition to standard list creation, list comprehensions can also be used for mapping and filtering. You don’t have to use a different approach for each scenario.

-- List comprehensions are also more **declarative** than loops, which means they’re easier to read and understand.

-- Loops require you to focus on how the list is created.

-- You have to manually create an empty list, loop over the elements, and add each of them to the end of the list.

-- With a list comprehension in Python, you can instead focus on what you want to go in the list and trust that Python will take care of how the list construction takes place.

**-- How To Supercharge Your Comprehensions**

-- In order to understand the full value that list comprehensions can provide, it’s helpful to understand their range of possible functionality.

1. Using Conditional Logic

-- Earlier, you saw this formula for how to create list comprehensions:

new\_list = [expression for member in iterable]

-- While this formula is accurate, it’s also a bit incomplete. A more complete description of the comprehension formula adds support for optional **conditionals**.

-- The most common way to add conditional logic to a list comprehension is to add a conditional to the end of the expression:

new\_list = [expression for member in iterable (if conditional)]

-- Here, your conditional statement comes just before the closing bracket.

-- Conditionals are important because they allow list comprehensions to filter out unwanted values, which would normally require a call to filter():

sentence = "India's Chandrayan-3 mission is a huge success!"

vowels = [i *for* i in sentence *if* i in 'aeiou']

print(vowels)

-- In this code block, the conditional statement filters out any characters in sentence that aren’t a vowel.