Python List Methods

Introduction
In python, Lists are versatile data structure used to store ordered collections of items. Lists have several built-in methods that allow you to manipulate, modify, and interact with the data they have. In this document, we will explore and explain the functionality of various commonly used Python list methods, with syntax, descriptions, return types, and examples.

Methods

1. append()
   Description:
   Adds an element to the end of a list.
   Syntax:
   list.append(item)
- item: The element to be added to the list.
  Return Type:
- None (modifies the list in place).
  Example:
  my_list = [1, 2, 3]
  my_list.append(4)
  print(my_list) # Output: [1, 2, 3, 4]

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2. extend()
   Description:
   Adds all the elements of an iterable (e.g., list, tuple, etc.) to the end of the list.
   Syntax:
   list.extend(iterable)
- iterable: An iterable (like another list) whose elements will be added to the list.
  Return Type:
- None (modifies the list in place).
  Example:
  my_list = [1, 2]
  my_list.extend([3, 4, 5])
  print(my_list) # Output: [1, 2, 3, 4, 5]

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3. insert()
   Description:
   Inserts an element at a specified position in the list.
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Syntax:
list.insert(index, item)

- index: The position at which to insert the element.
- item: The element to be inserted.

Return Type:

- None (modifies the list in place).

Example:
my_list = [1, 2, 4]
my_list.insert(2, 3)
print(my_list) # Output: [1, 2, 3, 4]

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4. remove()
   Description:
   Removes the first occurrence of a specified element from the list.
   Syntax:
   list.remove(item)

- item: The element to be removed.

Return Type:

- None (modifies the list in place).

Example:
my_list = [1, 2, 3, 4, 2]
my_list.remove(2)
print(my_list) # Output: [1, 3, 4, 2]

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5. pop()
   Description:
   Removes and returns the element at the specified index. If no index is specified, it removes and returns the last item.
   Syntax:
   list.pop(index=-1)

- index: (optional) The position of the element to remove. Defaults to -1 (removes the last item).

Return Type:

- The item that was removed from the list.

Example:
my_list = [1, 2, 3, 4]
removed_item = my_list.pop()
print(removed_item) # Output: 4
print(my_list) # Output: [1, 2, 3]

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6. clear()
   Description:
   Removes all items from the list, making it empty.

Syntax:
list.clear()
Return Type:

- None (modifies the list in place).

Example:
my_list = [1, 2, 3]
my_list.clear()
print(my_list) # Output: []

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7. index()
   Description:
   Returns the index of the first occurrence of a specified element.
   Syntax:
   list.index(item, start=0, end=len(list))

- item: The element to search for.
- start: (optional) The index to start searching from.
- end: (optional) The index to stop searching at.

Return Type:

- The index of the first occurrence of the item.

Example:
my_list = [1, 2, 3, 2]
index_of_2 = my_list.index(2)
print(index_of_2) # Output: 1

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8. count()
   Description:
   Returns the number of occurrences of a specified element in the list.
   Syntax:
   list.count(item)

- item: The element whose occurrences will be counted.

Return Type:

- An integer representing the number of occurrences.

Example:
my_list = [1, 2, 2, 3, 2]
count_of_2 = my_list.count(2)
print(count_of_2) # Output: 3

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9. sort()
   Description:
   Sorts the elements of the list in ascending order (by default) or in a custom order if specified.
   Syntax:
   list.sort(reverse=False, key=None)

- reverse: (optional) A boolean value, where True will sort in descending order and False will sort in ascending order (default is False).
- key: (optional) A function to be used for sorting criteria.
  Return Type:
- None (modifies the list in place).
  Example:
  my_list = [3, 1, 4, 2]
  my_list.sort()
  print(my_list) # Output: [1, 2, 3, 4]

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10. reverse()
    Description:
    Reverses the order of the elements in the list.
    Syntax:
    list.reverse()
    Return Type:
- None (modifies the list in place).
  Example:
  my_list = [1, 2, 3, 4]
  my_list.reverse()
  print(my_list) # Output: [4, 3, 2, 1]

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11. copy()
    Description:
    Returns a shallow copy of the list, meaning a new list with the same elements.
    Syntax:
    list.copy()
    Return Type:
- A new list (shallow copy).
  Example:
  my_list = [1, 2, 3]
  new_list = my_list.copy()
  print(new_list) # Output: [1, 2, 3]

Conclusion
Python lists provide a rich set of methods to manipulate and interact with the data they hold. Understanding these methods is essential for effective list management in Python. The methods described in this document cover a broad range of functionalities, from adding or removing elements to sorting and reversing lists.