Algorithm for file updates in Python

Project description

At my organization, access to restricted content is controlled with an allow list of IP addresses. The "allow_list.txt" file identifies these IP addresses. A separate remove list identifies IP addresses that should no longer have access to this content. I created an algorithm to automate updating the "allow_list.txt" file and remove these IP addresses that should no longer have access.

Open the file that contains the allow list

For the first part of the algorithm, I opened the "allow_list.txt" file. First, I assigned this file name as a string to the import_file variable:

import_file = "allow_list.txt"

Then, I used a with statement to open the file:

```
# Build `with` statement to read in the initial contents of the file

with open(import_file, "r") as file:
```

The with statement, combined with .open(), allows the file to be opened safely in read mode ("r") and ensures it is automatically closed when the block completes. The as file syntax assigns the file object to the variable file for use within the block.

Read the file contents

In order to read the file contents, I used the .read() method to convert it into the string.

```
with open(import_file, "r") as file:

  # Use `.read()` to read the imported file and store it in a variable named `ip_addresses`

  ip_addresses = file.read()
```

The .read() method converts the file contents into a single string, which allows me to process and manipulate the data within Python. This string is assigned to the variable ip_addresses.

In summary, this code reads the contents of the "allow_list.txt" file into a string format that allows me to later use the string to organize and extract data in my Python program.

Convert the string into a list

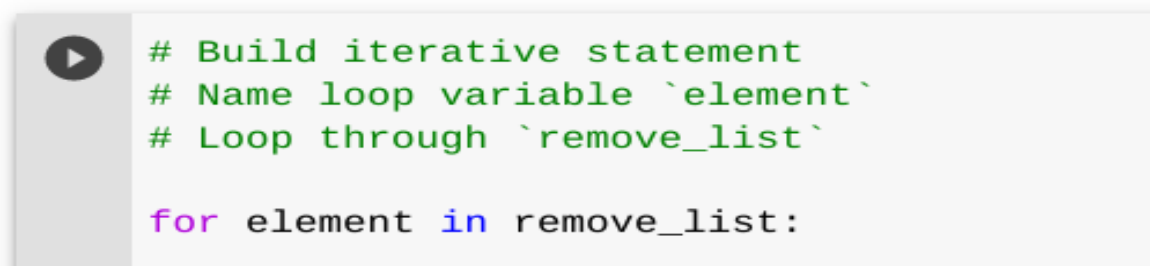
In order to remove individual IP addresses from the allow list, I needed it to be in list format. Therefore, I next used the .split() method to convert the ip_addresses string into a list:

```
# Use `.split()` to convert `ip_addresses` from a string to a list

ip_addresses = ip_addresses.split()
```

By default, .split() separates the string into elements based on whitespace. This converts the string of IP addresses into a list stored in ip_addresses, making it easier to remove elements.Iterate through the remove list

A key part of my algorithm involves iterating through the IP addresses that are elements in the remove_list. To do this, I incorporated a for loop:



The for loop in Python repeats code for a specified sequence. The overall purpose of the for loop in a Python algorithm like this is to apply specific code statements to all elements in a sequence. The for keyword starts the for loop. It is followed by the loop variable element and the keyword in. The keyword in indicates to iterate through the sequence ip_addresses and assign each value to the loop variable element.

Remove IP addresses that are on the remove list

My algorithm requires removing any IP address from the allow list, ip_addresses, that is also contained in remove_list. Because there were not any duplicates in ip_addresses, I was able to use the following code to do this:

```
for element in remove_list:

  # Create conditional statement to evaluate if `element` is in `ip_addresses`

    if element in ip_addresses:

      # use the `.remove()` method to remove
      # elements from `ip_addresses`

        ip_addresses.remove(element)
```

This conditional prevents errors that would occur if .remove() were called on an element not present in the list. Any IP address found in both remove_list and ip_addresses is removed. Then, within that conditional, I applied .remove() to ip_addresses. I passed in the loop variable element as the argument so that each IP address that was in the remove_list would be removed from ip_addresses.

Update the file with the revised list of IP addresses

As a final step in my algorithm, I needed to update the allow list file with the revised list of IP addresses. To do so, I first needed to convert the list back into a string. I used the .join() method for this:

```
# Convert `ip_addresses` back to a string so that it can be written into the text file

ip_addresses = "\n".join(ip_addresses)
```

The .join() method combines all items in an iterable into a string. The .join() method is applied to a string containing characters that will separate the elements in the iterable once joined into a string. In this algorithm, I used the .join() method to create a string from the list ip_addresses so that I could pass it in as an argument to the .write() method when writing to the file "allow_list.txt". I used the string ("\n") as the separator to instruct Python to place each element on a new line.

Then, I used another with statement and the .write() method to update the file:

```
# Build `with` statement to rewrite the original file
with open(import_file, "w") as file:
  # Rewrite the file, replacing its contents with `ip_addresses`
  file.write(ip_addresses)
```

This time, I used a second argument of "w" with the open() function in my with statement. This argument indicates that I want to open a file to write over its contents. When using this argument "w", I can call the .write() function in the body of the with statement. The .write() function writes string data to a specified file and replaces any existing file content.

In this case I wanted to write the updated allow list as a string to the file "allow_list.txt". This way, the restricted content will no longer be accessible to any IP addresses that were removed from the allow list. To rewrite the file, I appended the .write() function to the file object file that I identified in the with statement. I passed in the ip_addresses variable as the argument to specify that the contents of the file specified in the with statement should be replaced with the data in this variable.

Summary

I developed an algorithm to automate updating the "allow_list.txt" file by removing IP addresses listed in a remove_list. The algorithm:

1. Opens the allow list file in read mode.
2. Reads its contents and converts it into a string.
3. Splits the string into a list of IP addresses (ip_addresses).
4. Iterates through remove_list, removing any IP addresses found in ip_addresses.
5. Converts the updated list back into a string and writes it to "allow_list.txt".

This approach ensures that only authorized IP addresses remain in the allow list, efficiently managing access to restricted content.