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Foundations of Programming (Python)

Assignment 05

Working with Lists, Dictionaries, and GitHub

Introduction

In this assignment, I outline the process of creating a CD inventory script in python. This script differs from Assignment04.py because it stores data in a list of dictionaries instead of a list of lists. It also includes new functionality allowing users to delete entries from the CD inventory. The script presents users with a menu that gives them six options: 'Load Inventory from File', 'Add CD', 'Display Current Inventory', 'Delete CD from Inventory', 'Save Inventory to File' and 'Exit.' Each menu option has different functionality and is accompanied by code that appends, deletes, displays, or saves data to the CDInventory.txt file. Completing this assignment requires an understanding of loops, dictionaries, lists, and strings. It also draws on some skills we learned in previous weeks such as reading and writing data to external text files. In CDInventory.py, I used a while loop with conditional statements to display the available options and complete the various tasks. Additionally, I used open(), split(), strip(), write(), and close() to read data, add data, and save data to the text file. Lastly, we created a GitHub repository for this assignment in preparation for future work with the powerful version-control tool.

Writing the Script

Displaying the Menu and Accepting User Input

Listing 1 shows the beginning of the while loop and the menu options available. I decided to use a while loop to execute the main content of the program because it allowed me to run in the loop indefinitely. It will run until the user chooses to break out by entering a 'x'. This ensures that users can execute as many commands as they would like before closing the script. Here, users are shown their options each time they iterate through the while loop to remind them of all the available functionality.

```
14 # Main Content
15 print('\nThe Magic CD Inventory\n')
16 while True:
17     # 1. Display menu and get user input
18     print('[l] Load Inventory from File\n[a] Add CD\n[i] Display Current Inventory')
19     print('[d] Delete CD from Inventory\n[s] Save Inventory to File\n[x] Exit (Be sure to save before exiting)')
20     strChoice = input('l, a, i, d, s or x: ').lower()  # convert choice to lower case at time of input
21     print()
```

Listing 1 – Displaying the Menu and Accepting User Input

Exiting the Program

Here, I close the program. This happens when users choose option 'x.'

```
23         if strChoice == 'x':
24             # 2. Exit the program if the user chooses to do so
25             break
```

Listing 2 – Exiting the Program

Loading Existing Data

Listing 3 shows how I open CDInventory.txt to read its contents and convert it to a usable structure. Here, I use the try-except construct to test if the file already exists. If it does, I use the split() function to separate the data in each row and organize it in a list. Then, I used the strip() function to eliminate the '\n' from the end of each list. Then, I use a for loop to reorganize the data into a dictionary structure. If the text file does not exist yet, the except statement runs code to create it for use later in the script. This happens when users choose option 'l.'

```
27     if strChoice == 'l': # no elif necessary, as this code is only reached if strChoice is not 'x'
28         # 3. Load existing data if the user chooses to do so
29         try:
```

```
30          file = open(strFileName, 'r')
31          print('\nReading Data from File...\nThis will overwrite any unsaved data in the current table...')
32          lstTbl = []
33          dum1 = [line.strip().split(',') for line in file]
34          for row in dum1:
35              lstTbl.append({'ID':int(row[0]),'CD Title':row[1],'Artist Name':row[2]})
36          file.close()
37          print('Done\n')
38      except:
39          print('{} does not exist...'.format(strFileName))
40          file = open(strFileName, 'w')
41          file.close()
42          print('The file has now been created!\n')
43      continue
```

Listing 3 – Loading Existing Data

Adding Data to the Table

Listing 4 shows the process of adding new CD data to the inventory. I define the ID number based on the number of lines in the existing inventory and accept user inputs for the CD title and artist name. Then, I consolidate those three data points into a dictionary and add it to the 2D inventory list. This happens when users choose option 'a.'

```
45  elif strChoice == 'a':
46      # 4. Add data to the table (2D List) each time the user chooses to do so
47      ID = len(lstTbl) + 1
48      strTitle = input('Enter the CD\'s Title: ')
49      strArtist = input('Enter the Artist\'s Name: ')
50      newdict = {'ID': ID , 'CD Title': strTitle , 'Artist Name': strArtist}
51      lstTbl.append(newdict)
52      print()
53      continue
```

Listing 4 – Adding Data to the Table

Displaying Current Data

Listing 5 shows the process of printing the current CD Inventory. If it is empty, the code includes a print statement to notify the user. If it has data, the list of dictionaries is displayed to the user. This happens when users choose option 'i.'

```
55  elif strChoice == 'i':
56      # 5. Display the current data each time the user chooses to do so
57      print('\nDisplaying Current Data...')
58      if len(lstTbl) == 0:
59          print('The List of Dictionaries is Currently Empty\n')
60      else:
61          for row in lstTbl:
62              print(row)
63          print()
64      continue
```

Listing 5 – Displaying Current Data

Deleting an Entry

Listing 6 shows new functionality. Here, users can delete an entry based on the ID value of the CD they want to remove. After an entry is deleted, the ID numbers get reassigned to avoid discontinuities in the inventory. This happens when users choose option 'd.'

```
66  elif strChoice == 'd':
67      # 6. Delete an entry from the CD Inventory each time the user chooses to do so
68      print('Deleting an entry from the CD Inventory...')
69      print('What is the ID number of the entry you want to delete?')
70      dum2 = int(input('Enter ID Number Here: '))
71      if dum2 < 1:
72          print('\nID Number Invalid...\nNo Entries Deleted\n')
73      elif dum2 > len(lstTbl):
```

```
74          print('\nID Number Invalid...\nNo Entries Deleted\n')
75      else:
76          lstTbl = list(filter(lambda i: i['ID'] != dum2, lstTbl))
77          print('\nEntry Deleted')
78          print('Relabeling ID Numbers...')
79          i = 1
80          for row in lstTbl:
81              row['ID'] = i
82              i += 1
83          print('ID numbers have been updated\n')
84      continue
```

Listing 6 – Deleting an Entry

Saving the Data

Listing 7 shows how I save the data to CDInventory.txt. I used open(), write(), format(), and close() along with proper indexing techniques to complete this section. This happens when users choose option 's.'

```
86  elif strChoice == 's':
87      # 7. Save the data to a text file CDInventory.txt each time the user chooses to do so
88      print('Saving Updated Inventory...')
89      file = open(strFileName, 'w')
90      for row in lstTbl:
91          values = []
92          items = row.items()
93          for item in items:
94              values.append(item[1])
95          file.write('{},{},{}\n'.format(values[0],values[1],values[2]))
96      file.close()
97      print('Done\n')
98      continue
```

Listing 7 – Saving the Data

Saving the Script

As instructed, I created a folder in C:\ _PythonClass\ called 'Assignment05' and saved my script as CDInventory.py.

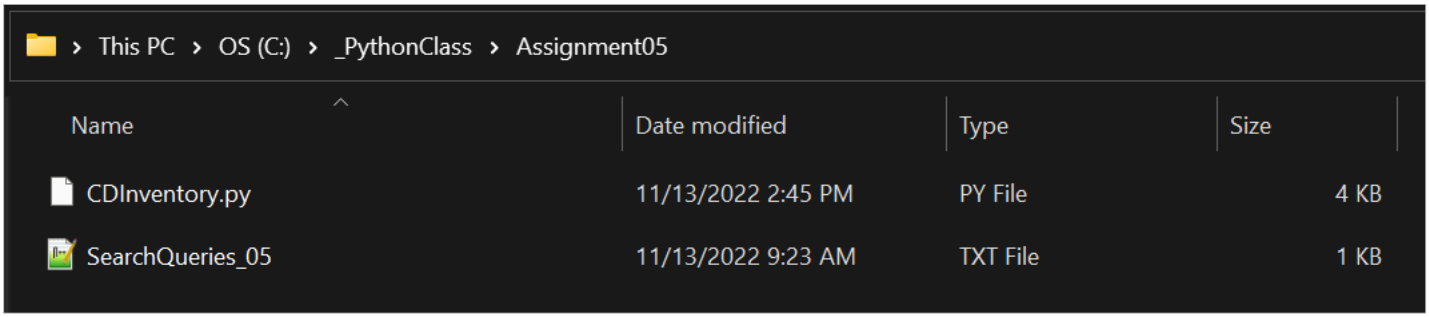


Figure 1 – Saving CDInventory.py

Running the Script

Spyder

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: i


Displaying Current Data...
{'ID': 1, 'CD Title': 'Vitalogy', 'Artist Name': 'Pearl Jam'}
{'ID': 2, 'CD Title': 'JT', 'Artist Name': 'James Taylor'}
{'ID': 3, 'CD Title': 'American Teen', 'Artist Name': 'Khalid'}
```

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: d

Deleting an entry from the CD Inventory...
What is the ID number of the entry you want to delete?

Enter ID Number Here: 2

Entry Deleted
Relabeling ID Numbers...
ID numbers have been updated
```

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: d

Deleting an entry from the CD Inventory...
What is the ID number of the entry you want to delete?

Enter ID Number Here: 0

ID Number Invalid...
No Entries Deleted
```

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: d

Deleting an entry from the CD Inventory...
What is the ID number of the entry you want to delete?

Enter ID Number Here: 10

ID Number Invalid...
No Entries Deleted
```

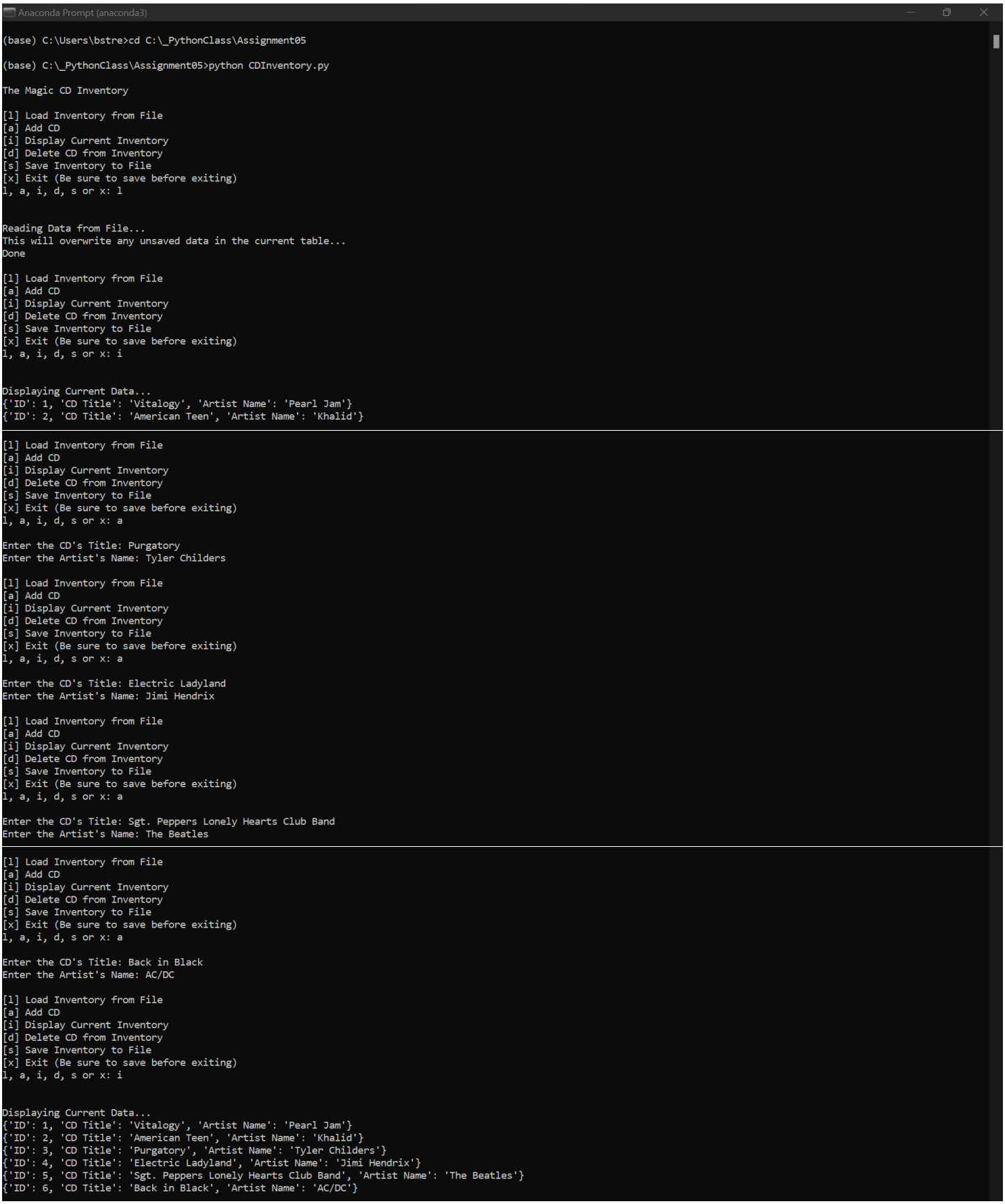
```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: i


Displaying Current Data...
{'ID': 1, 'CD Title': 'Vitalogy', 'Artist Name': 'Pearl Jam'}
{'ID': 2, 'CD Title': 'American Teen', 'Artist Name': 'Khalid'}
```

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: s

Saving Updated Inventory...
Done

[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)

l, a, i, d, s or x: x


In [2]:
```

Figure 2 – Running CDInventory.py in Spyder

I opened Spyder on my Windows computer, opened CDInventory.py, and clicked F5 to execute the script. I followed the user prompts and entered ‘l’ to load the CD inventory from CDInventory.txt. The text file did not exist yet, and the program behaved accordingly by creating the file and notifying the user. Then, I chose ‘i’ to display the current CD inventory. It was empty and the program behaved correctly. Next, I used ‘a’ three times to add three CDs and entered the necessary information when prompted. I followed that up with another ‘i’ command to show the inventory of newly added CDs. Afterwards, I used ‘d’ to delete the second CD from the inventory. I also showed that the delete option displays useful information when the user enters an ID number outside of the data range. I used ‘i’ one last time to show the full inventory after the deletions followed by ‘s’ to save the updated inventory to CDInventory.txt. Finally, I entered ‘x’ to exit the program. CDInventory.py ran correctly all the way through. It accepted user inputs, read data, modified data, and saved data as intended. Figure 2 shows that the script functions correctly while running in the Spyder IDE.

Terminal


Anaconda Prompt (anaconda3)
(base) C:\Users\bstre>cd C:_PythonClass\Assignment05
(base) C:_PythonClass\Assignment05>python CDInventory.py
The Magic CD Inventory
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: l
Reading Data from File...
This will overwrite any unsaved data in the current table...
Done
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: i
Displaying Current Data...
{'ID': 1, 'CD Title': 'Vitalogy', 'Artist Name': 'Pearl Jam'}
{'ID': 2, 'CD Title': 'American Teen', 'Artist Name': 'Khalid'}
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: a
Enter the CD's Title: Purgatory
Enter the Artist's Name: Tyler Childers
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: a
Enter the CD's Title: Electric Ladyland
Enter the Artist's Name: Jimi Hendrix
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: a
Enter the CD's Title: Sgt. Peppers Lonely Hearts Club Band
Enter the Artist's Name: The Beatles
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: a
Enter the CD's Title: Back in Black
Enter the Artist's Name: AC/DC
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: i
Displaying Current Data...
{'ID': 1, 'CD Title': 'Vitalogy', 'Artist Name': 'Pearl Jam'}
{'ID': 2, 'CD Title': 'American Teen', 'Artist Name': 'Khalid'}
{'ID': 3, 'CD Title': 'Purgatory', 'Artist Name': 'Tyler Childers'}
{'ID': 4, 'CD Title': 'Electric Ladyland', 'Artist Name': 'Jimi Hendrix'}
{'ID': 5, 'CD Title': 'Sgt. Peppers Lonely Hearts Club Band', 'Artist Name': 'The Beatles'}
{'ID': 6, 'CD Title': 'Back in Black', 'Artist Name': 'AC/DC'}

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: d

Deleting an entry from the CD Inventory...
What is the ID number of the entry you want to delete?
Enter ID Number Here: 6

Entry Deleted
Relabeling ID Numbers...
ID numbers have been updated

[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: i


Displaying Current Data...
{'ID': 1, 'CD Title': 'Vitalogy', 'Artist Name': 'Pearl Jam'}
{'ID': 2, 'CD Title': 'American Teen', 'Artist Name': 'Khalid'}
{'ID': 3, 'CD Title': 'Purgatory', 'Artist Name': 'Tyler Childers'}
{'ID': 4, 'CD Title': 'Electric Ladyland', 'Artist Name': 'Jimi Hendrix'}
{'ID': 5, 'CD Title': 'Sgt. Peppers Lonely Hearts Club Band', 'Artist Name': 'The Beatles'}
```

```
[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: s

Saving Updated Inventory...
Done

[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: exit

Invalid Input
Please choose either l, a, i, d, s or x

[l] Load Inventory from File
[a] Add CD
[i] Display Current Inventory
[d] Delete CD from Inventory
[s] Save Inventory to File
[x] Exit (Be sure to save before exiting)
l, a, i, d, s or x: x


(base) C:\_PythonClass\Assignment05>
```

Figure 3 - Running CDInventory.py in Terminal

I opened terminal on my Windows computer and navigated to the correct folder using the cd (change directory) command. Then, I ran the command 'python CDInventory.py' to execute the script. I followed the user prompts and entered 'l' to load the CD inventory from CDInventory.txt. Then, I used 'i' next to show that the program loaded the data correctly. I ran the script on terminal after I had already run it on Spyder, so there were two CDs in the inventory. Next, I used 'a' four times to add four CDs and entered the necessary information when prompted. I followed that up with another 'i' command to show the updated inventory. Afterwards, I used 'd' to delete the sixth CD from the inventory followed by 'i' once again to show the deletion. I followed that up with the 's' command to save the updated inventory to CDInventory.txt. Finally, I entered 'exit' to show how the program behaves when it receives an invalid input and then 'x' to exit the program. CDInventory.py ran correctly all the way through. It accepted user inputs, read data, modified data, and saved data as intended. Figure 3 shows that the script functions correctly while running in terminal.

Checking the Text File

After running the script in Spyder and then in a terminal window, I opened the text file to verify that it had been created, read, edited, and saved properly. As shown in Figure 4, everything worked correctly and CDInventory.txt had all the right information.

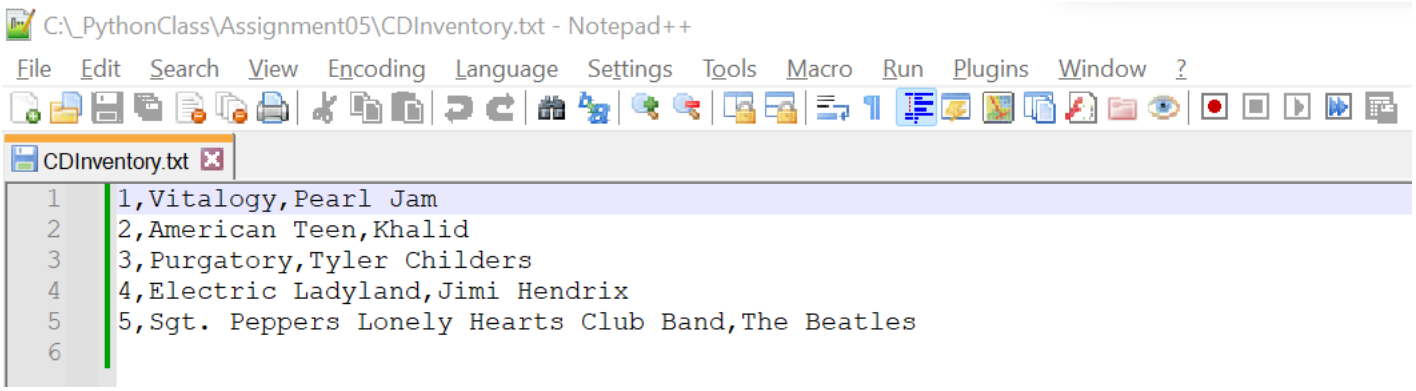


Figure 4 – Verifying Script Functionality

GitHub Setup

I already had a GitHub profile from my undergraduate studies, so I just had to log in and create a repository for Assignment_05.

Assignment_05 Repository

Link: https://github.com/BenStreck/Assignment_05

Summary

I successfully created a python script that fulfills the requirements listed in Assignment 05. I did so by using information from the textbook, the Module 05 videos, and the supplemental learning documents. The script demonstrates my understanding of loops, lists, dictionaries, conditional statements, and data manipulation.

I did not encounter any struggles in this week's assignment, but I am excited to continue working with GitHub in the coming weeks. My only exposure to the program came during a 3D printing class last fall and it was very limited. I know that Git is a very useful skill to have, and I look forward to learning more about it.

Appendix

Full Listing – CDInventory.py

```
#------------------------------------------#
# Title: CDInventory.py
# Desc: Starter Script for Assignment 05
# Change Log: (Who, When, What)
# DBiesinger, 2030-Jan-01, Created File
# BStreck, 2022-Nov-13, Replaced list of lists with list of dictionaries
# BStreck, 2022-Nov-13, Added functionality for deleting entries
#------------------------------------------#

# Variables
lstTbl = []  # list of lists to hold data
strFileName = 'CDInventory.txt'  # data storage file

# Main Content
print('\nThe Magic CD Inventory\n')
while True:
    # 1. Display menu and get user input
```

```
    print('[l] Load Inventory from File\n[a] Add CD\n[i] Display Current Inventory')
    print('[d] Delete CD from Inventory\n[s] Save Inventory to File\n[x] Exit (Be sure to save before exiting)')
    strChoice = input('l, a, i, d, s or x: ').lower()  # convert choice to lower case at time of input
    print()

    if strChoice == 'x':
        # 2. Exit the program if the user chooses to do so
        break

    if strChoice == 'l': # no elif necessary, as this code is only reached if strChoice is not 'x'
        # 3. Load existing data if the user chooses to do so
        try:
            file = open(strFileName, 'r')
            print('\nReading Data from File...\nThis will overwrite any unsaved data in the current table...')
            lstTbl = []
            dum1 = [line.strip().split(',') for line in file]
            for row in dum1:
                lstTbl.append({'ID':int(row[0]),'CD Title':row[1],'Artist Name':row[2]})
            file.close()
            print('Done\n')
        except:
            print('{} does not exist...'.format(strFileName))
            file = open(strFileName, 'w')
            file.close()
            print('The file has now been created!\n')
        continue

    elif strChoice == 'a':
        # 4. Add data to the table (2D List) each time the user chooses to do so
        ID = len(lstTbl) + 1
        strTitle = input('Enter the CD\'s Title: ')
        strArtist = input('Enter the Artist\'s Name: ')
        newdict = {'ID': ID , 'CD Title': strTitle , 'Artist Name': strArtist}
        lstTbl.append(newdict)
        print()
        continue

    elif strChoice == 'i':
        # 5. Display the current data each time the user chooses to do so
        print('\nDisplaying Current Data...')
        if len(lstTbl) == 0:
            print('The List of Dictionaries is Currently Empty\n')
        else:
            for row in lstTbl:
                print(row)
            print()
        continue

    elif strChoice == 'd':
        # 6. Delete an entry from the CD Inventory each time the user chooses to do so
        print('Deleting an entry from the CD Inventory...')
        print('What is the ID number of the entry you want to delete?')
        dum2 = int(input('Enter ID Number Here: '))
        if dum2 < 1:
            print('\nID Number Invalid...\nNo Entries Deleted\n')
        elif dum2 > len(lstTbl):
            print('\nID Number Invalid...\nNo Entries Deleted\n')
        else:
            lstTbl = list(filter(lambda i: i['ID'] != dum2, lstTbl))
```

```
77              print('\nEntry Deleted')
78              print('Relabeling ID Numbers...')
79              i = 1
80              for row in lstTbl:
81                  row['ID'] = i
82                  i += 1
83              print('ID numbers have been updated\n')
84          continue
85
86      elif strChoice == 's':
87          # 7. Save the data to a text file CDInventory.txt each time the user chooses to do so
88          print('Saving Updated Inventory...')
89          file = open(strFileName, 'w')
90          for row in lstTbl:
91              values = []
92              items = row.items()
93              for item in items:
94                  values.append(item[1])
95              file.write('{},{},{}\n'.format(values[0],values[1],values[2]))
96          file.close()
97          print('Done\n')
98          continue
99
100     else:
101         print('Invalid Input\nPlease choose either l, a, i, d, s or x\n')
```