Shaked Bason
August-19-2020
Foundations of Programming (Python)
Assignment 06

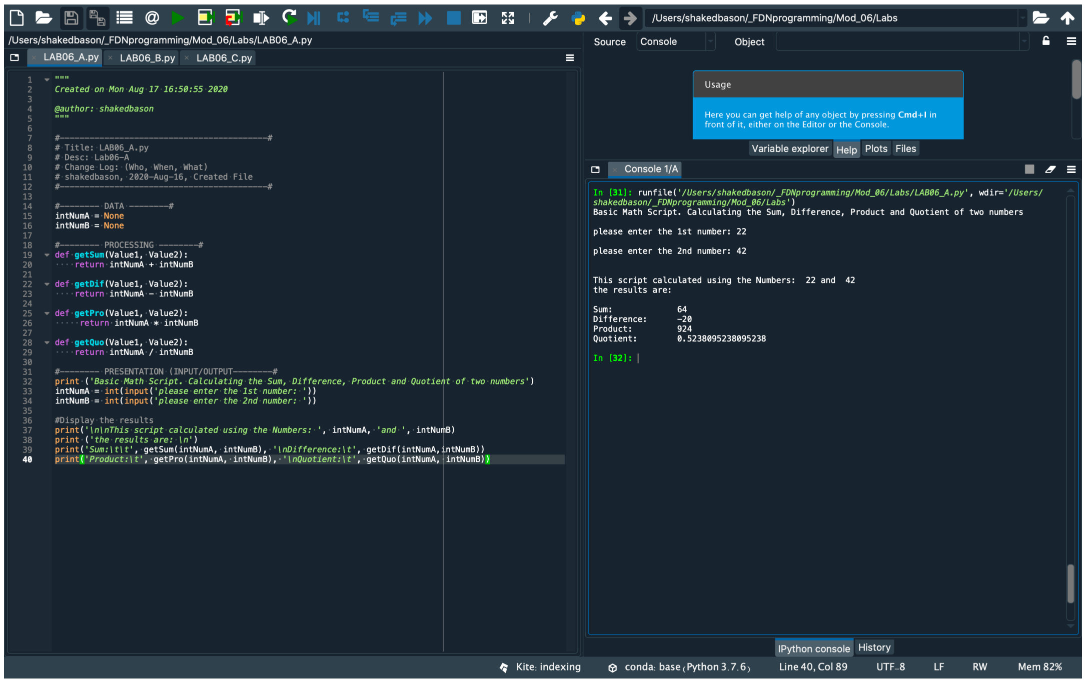
Assignment 06

Instruction

In this assignment, questions such as “What is a function?,” and “What are return values?” were answered. Throughout the assignment, I learned the difference between a global and a local variable, how to use functions, and how to organize my code. I also got familiar with the difference between a function and a class.

Module 6 and Labs – Step by step

1. First, I went to the Module 06 materials list and read the instructions. I watched the module videos and followed them step by step. Then, I continued learning about functions and how to write and define one.
   I learned that calling the function executes the code in the function, returns the results, and continues at the calling point. I used parameters, which in functions allow the option to pass. Variables can also be used as Arguments in functions. Later, I did my first Lab for this module. The lab asked me to create 4 different functions that calculate the sum, difference, product, and quotient of two numbers. After defining these functions, I asked the user to provide 2 numbers and then I called the function over the number that the user provided. Finally, my code printed the answer that the functions formulated.



```
/Users/shakedbason/_FDNprogramming/Mod_06/Labs/LAB06_A.py
```

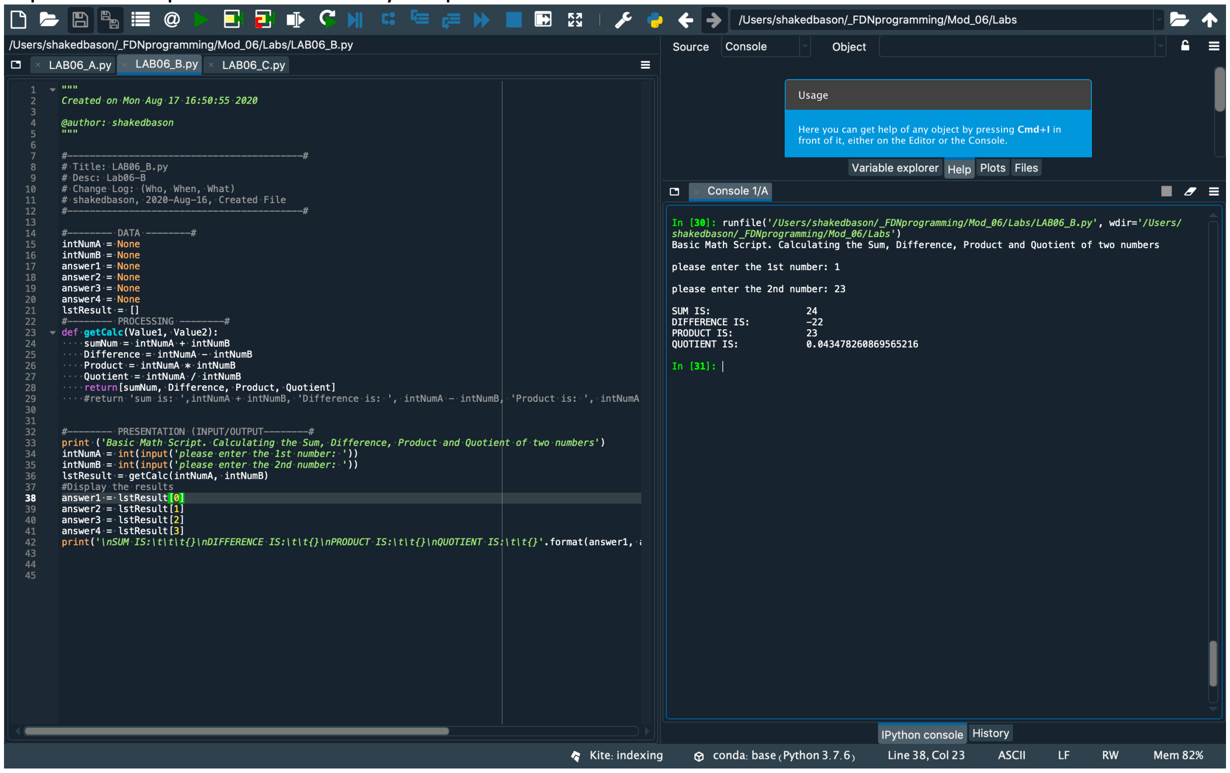
```python
"""
Created on Mon Aug 17 16:50:55 2020

@author: shakedbason
"""

#------------------------------------------#
# Title: LAB06_A.py
# Desc: Lab06-A
# Change Log: (Who, When, What)
# shakedbason, 2020-Aug-16, Created File
#------------------------------------------#

#-------- DATA --------#
intNumA = None
intNumB = None

#-------- PROCESSING --------#
def getSum(Value1, Value2):
    return intNumA + intNumB

def getDif(Value1, Value2):
    return intNumA - intNumB

def getPro(Value1, Value2):
     return intNumA * intNumB

def getQuo(Value1, Value2):
    return intNumA / intNumB

#-------- PRESENTATION (INPUT/OUTPUT--------#
print ('Basic Math Script. Calculating the Sum, Difference, Product and Quotient of two numbers')
intNumA = int(input('please enter the 1st number: '))
intNumB = int(input('please enter the 2nd number: '))

#Display the results
print('\n\nThis script calculated using the Numbers: ', intNumA, 'and ', intNumB)
print ('the results are: \n')
print('Sum:\t\t', getSum(intNumA, intNumB), '\nDifference:\t', getDif(intNumA,intNumB))
print('Product:\t', getPro(intNumA, intNumB), '\nQuotient:\t', getQuo(intNumA, intNumB))
```

```
In [31]: runfile('/Users/shakedbason/_FDNprogramming/Mod_06/Labs/LAB06_A.py', wdir='/Users/
shakedbason/_FDNprogramming/Mod_06/Labs')
Basic Math Script. Calculating the Sum, Difference, Product and Quotient of two numbers

please enter the 1st number: 22

please enter the 2nd number: 42


This script calculated using the Numbers:  22 and  42
the results are:

Sum:            64
Difference:     -20
Product:        924
Quotient:       0.5238095238095238

In [32]: 
```

LAB06_A.py
LAB06_B.py
LAB06_C.py
/Users/shakedbason/_FDNprogramming/Mod_06/Labs
Source
Console
Object
Usage
Here you can get help of any object by pressing Cmd+I in front of it, either on the Editor or the Console.
Variable explorer
Help
Plots
Files
Console 1/A
IPython console
History
Kite: indexing
conda: base (Python 3.7.6)
Line 40, Col 89
UTF-8
LF
RW
Mem 82%

Figure 1 - LAB06-A

2. In part 2 of this module, I learned more about functions. I learned how to return a single item, as well as multiple items. I was taught how to bundle values into a collection and how to return that collection. Afterwards, I took the Lab06-A script and copied it to a new script. I changed the first lab and modified it to work with a list. Then, I created one function that includes all 4 functions from Lab A. I used this new function on the 2 numbers that I asked the user to provide and then I saved the results under a list of tuples and unpacked them as my output.



```python
"""
Created on Mon Aug 17 16:50:55 2020

@author: shakedbason
"""

#---------------------------------------#
# Title: LAB06_B.py
# Desc: Lab06-B
# Change Log: (Who, When, What)
# shakedbason, 2020-Aug-16, Created File
#---------------------------------------#

#-------- DATA --------#
intNumA = None
intNumB = None
answer1 = None
answer2 = None
answer3 = None
answer4 = None
lstResult = []
#-------- PROCESSING --------#
def getCalc(Value1, Value2):
    sumNum = intNumA + intNumB
    Difference = intNumA - intNumB
    Product = intNumA * intNumB
    Quotient = intNumA / intNumB
    return[sumNum, Difference, Product, Quotient]
    #return 'sum is: ',intNumA + intNumB, 'Difference is: ', intNumA - intNumB, 'Product is: ', intNumA


#-------- PRESENTATION (INPUT/OUTPUT--------#
print ('Basic Math Script. Calculating the Sum, Difference, Product and Quotient of two numbers')
intNumA = int(input('please enter the 1st number: '))
intNumB = int(input('please enter the 2nd number: '))
lstResult = getCalc(intNumA, intNumB)
#Display the results
answer1 = lstResult[0]
answer2 = lstResult[1]
answer3 = lstResult[2]
answer4 = lstResult[3]
print('\nSUM IS:\t\t\t{}\nDIFFERENCE IS:\t\t{}\nPRODUCT IS:\t\t{}\nQUOTIENT IS:\t\t{}'.format(answer1, a
```

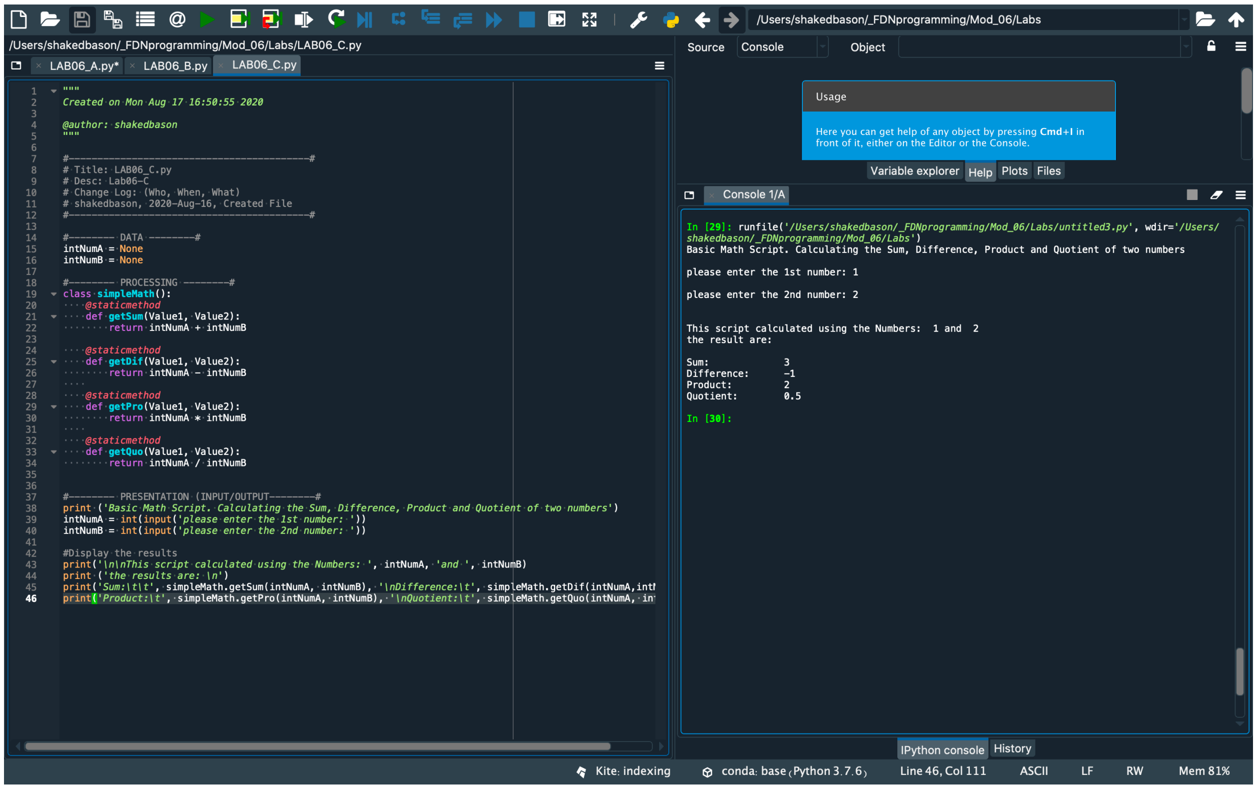
Here you can get help of any object by pressing **Cmd+I** in front of it, either on the Editor or the Console.

```
In [30]: runfile('/Users/shakedbason/_FDNprogramming/Mod_06/Labs/LAB06_B.py', wdir='/Users/
shakedbason/_FDNprogramming/Mod_06/Labs')
Basic Math Script. Calculating the Sum, Difference, Product and Quotient of two numbers

please enter the 1st number: 1

please enter the 2nd number: 23

SUM IS:                 24
DIFFERENCE IS:          -22
PRODUCT IS:             23
QUOTIENT IS:            0.043478260869565216

In [31]: |
```

Figure 2 - LAB06-B

3. In part 3 of this module, I continued my exploration of functions. I learned that it is possible to mix positional and named arguments as well as set a default value to parameters. The default value will be used when the user doesn't provide a parameter to the program. I got to test and use "if" statements and conditions inside functions in order to make them more functional. I also got familiar with the "None" keyword and learned how to use and express it in my code and make it even more useful in functions. I also understood that when working with large data amounts, using references to the data is much faster than copying the data. Finally, I learned what "Scope" means and how to use the "Global" keyword.

4. In the last part of this module, I was taught what “classes” are. I learned that classes are a way of grouping functions, variables, and constants under one umbrella.
   Then, I did Lab06 C. I copied my code from Lab06 A, and modified it to work under class. I took my four functions and put them under one class. Later, when I wanted to show the user his output, I executed my function under my class, so calling the “simpleMath” class I created. Then, I called the specific functions I wanted to use.



Here you can get help of any object by pressing **Cmd+I** in front of it, either on the Editor or the Console.

```python
"""
Created on Mon Aug 17 16:50:55 2020

@author: shakedbason
"""

#-----------------------------------------#
# Title: LAB06_C.py
# Desc: Lab06-C
# Change Log: (Who, When, What)
# shakedbason, 2020-Aug-16, Created File
#-----------------------------------------#

#-------- DATA --------#
intNumA = None
intNumB = None

#-------- PROCESSING --------#
class simpleMath():
    @staticmethod
    def getSum(Value1, Value2):
        return intNumA + intNumB

    @staticmethod
    def getDif(Value1, Value2):
        return intNumA - intNumB
    
    @staticmethod
    def getPro(Value1, Value2):
        return intNumA * intNumB
    
    @staticmethod
    def getQuo(Value1, Value2):
        return intNumA / intNumB


#-------- PRESENTATION (INPUT/OUTPUT--------#
print ('Basic Math Script. Calculating the Sum, Difference, Product and Quotient of two numbers')
intNumA = int(input('please enter the 1st number: '))
intNumB = int(input('please enter the 2nd number: '))

#Display the results
print('\n\nThis script calculated using the Numbers: ', intNumA, 'and ', intNumB)
print ('the results are: \n')
print('Sum:\t\t', simpleMath.getSum(intNumA, intNumB), '\nDifference:\t', simpleMath.getDif(intNumA,int
print('Product:\t', simpleMath.getPro(intNumA, intNumB), '\nQuotient:\t', simpleMath.getQuo(intNumA, in
```

```
In [29]: runfile('/Users/shakedbason/_FDNprogramming/Mod_06/Labs/untitled3.py', wdir='/Users/
shakedbason/_FDNprogramming/Mod_06/Labs')
Basic Math Script. Calculating the Sum, Difference, Product and Quotient of two numbers

please enter the 1st number: 1

please enter the 2nd number: 2


This script calculated using the Numbers:  1 and  2
the result are:

Sum:            3
Difference:     -1
Product:        2
Quotient:       0.5

In [30]:
```

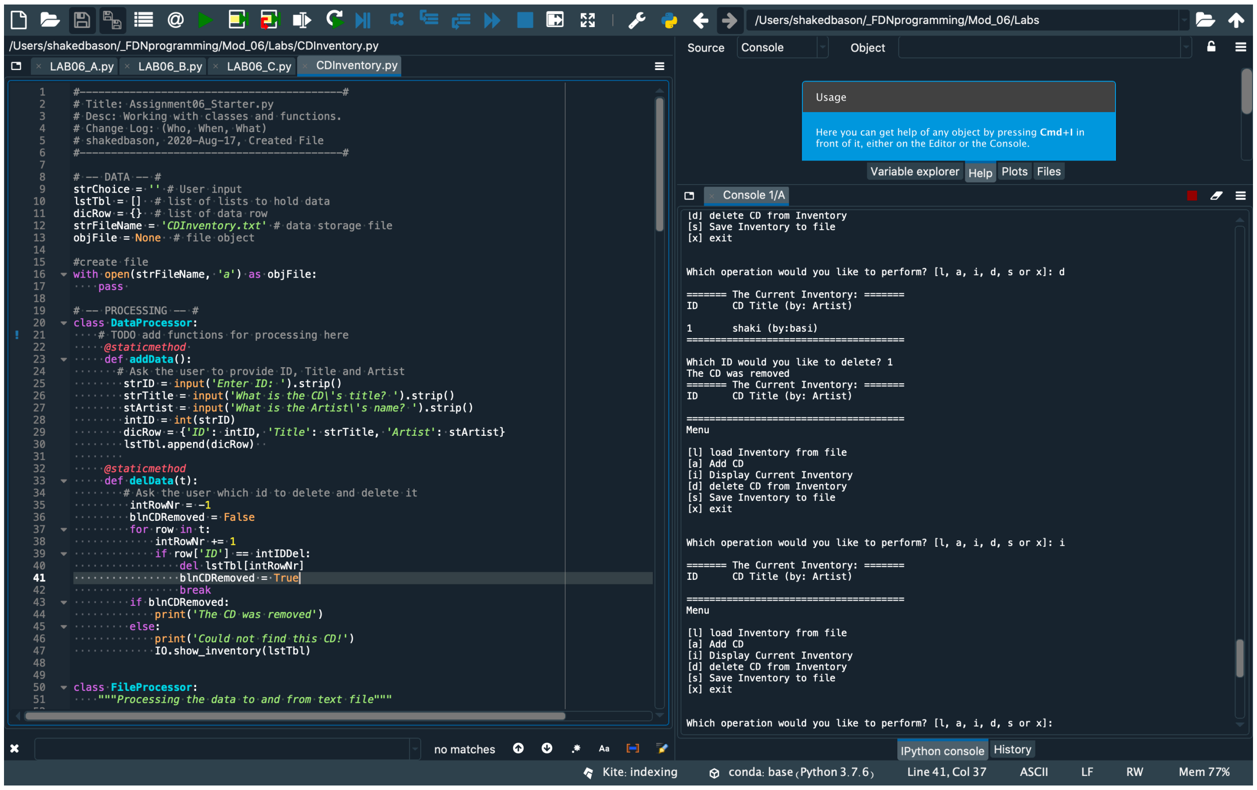
Figure 3 - LAB06-C

5.<u>Creating a program -</u> I noted what the code does and added it to this document using the <u>planet-b</u> website.

Finally, I created my code for this assignment (Appendix01), which I got from my instructor. The code that I received was incomplete and I had to edit my instructor's code which I found challenging. Since I did not write the code, I needed to go through his code, understand it, and then modify what he wrote to create new code that works with the new classes and functions I added.

Appendix #1

The first part of my code defines new classes. The first class, named DataProcessor, includes two functions. One adds data to the CDInventory and the second function deletes from it.
The second class, named FileProcessor, includes the function of read and write. Lastly, the IO class, has the function of print, display, and menu choice.
After I finished defining all of the functions and classes, I used the old familiar CDInventory task and Modified it to use and call the functions and the classes.


/Users/shakedbason/_FDNprogramming/Mod_06/Labs/CDInventory.py

```
#------------------------------------------#
# Title: Assignment06_Starter.py
# Desc: Working with classes and functions.
# Change Log: (Who, When, What)
# shakedbason, 2020-Aug-17, Created File
#------------------------------------------#

# -- DATA -- #
strChoice = '' # User input
lstTbl = []  # list of lists to hold data
dicRow = {}  # list of data row
strFileName = 'CDInventory.txt' # data storage file
objFile = None  # file object

#create file
with open(strFileName, 'a') as objFile:
    pass

# -- PROCESSING -- #
class DataProcessor:
    # TODO add functions for processing here
    @staticmethod
    def addData():
       # Ask the user to provide ID, Title and Artist
        strID = input('Enter ID: ').strip()
        strTitle = input('What is the CD\'s title? ').strip()
        stArtist = input('What is the Artist\'s name? ').strip()
        intID = int(strID)
        dicRow = {'ID': intID, 'Title': strTitle, 'Artist': stArtist}
        lstTbl.append(dicRow)

    @staticmethod
    def delData(t):
        # Ask the user which id to delete and delete it
         intRowNr = -1
         blnCDRemoved = False
         for row in t:
             intRowNr += 1
             if row['ID'] == intIDDel:
                 del lstTbl[intRowNr]
                 blnCDRemoved = True
                 break
         if blnCDRemoved:
             print('The CD was removed')
         else:
             print('Could not find this CD!')
             IO.show_inventory(lstTbl)


class FileProcessor:
    """Processing the data to and from text file"""
```

```
[d] delete CD from Inventory
[s] Save Inventory to file
[x] exit


Which operation would you like to perform? [l, a, i, d, s or x]: d

======= The Current Inventory: =======
ID      CD Title (by: Artist)

1       shaki (by:basi)
======================================

Which ID would you like to delete? 1
The CD was removed
======= The Current Inventory: =======
ID      CD Title (by: Artist)

======================================
Menu

[l] load Inventory from file
[a] Add CD
[i] Display Current Inventory
[d] delete CD from Inventory
[s] Save Inventory to file
[x] exit


Which operation would you like to perform? [l, a, i, d, s or x]: i

======= The Current Inventory: =======
ID      CD Title (by: Artist)

======================================
Menu

[l] load Inventory from file
[a] Add CD
[i] Display Current Inventory
[d] delete CD from Inventory
[s] Save Inventory to file
[x] exit


Which operation would you like to perform? [l, a, i, d, s or x]:
```

Figure 4 - Assignment output

Summary

Module 6 taught me how to use functions and classes, what the difference is between a global and a local variable, how functions help you program using the “Separations of Concerns" pattern, as well as more new concepts.
I continued improving my usage of Loops, Sequences, Strings, and Dictionaries and modified them into functions. I used Spyder as my IDE on this assignment.

Appendix

#1 CDInventory.py

```
#------------------------------------------#
# Title: Assignment06_Starter.py
# Desc: Working with classes and functions.
# Change Log: (Who, When, What)
# shakedbason, 2020-Aug-17, Created File
#------------------------------------------#

# -- DATA -- #
strChoice = '' # User input
lstTbl = []  # list of lists to hold data
dicRow = {}  # list of data row
strFileName = 'CDInventory.txt' # data storage file
objFile = None  # file object

#create file
with open(strFileName, 'a') as objFile:
    pass

# -- PROCESSING -- #
class DataProcessor:
    # TODO add functions for processing here
     @staticmethod
     def addData():
       # Ask the user to provide ID, Title and Artist
        strID = input('Enter ID: ').strip()
        strTitle = input('What is the CD\'s title? ').strip()
        stArtist = input('What is the Artist\'s name? ').strip()
        intID = int(strID)
        dicRow = {'ID': intID, 'Title': strTitle, 'Artist': stArtist}
        lstTbl.append(dicRow)

     @staticmethod
     def delData(t):
        # Ask the user which id to delete and delete it
         intRowNr = -1
         blnCDRemoved = False
         for row in t:
             intRowNr += 1
             if row['ID'] == intIDDel:
                 del lstTbl[intRowNr]
                 blnCDRemoved = True
                 break
         if blnCDRemoved:
             print('The CD was removed')
         else:
             print('Could not find this CD!')
             IO.show_inventory(lstTbl)


class FileProcessor:
    """Processing the data to and from text file"""

    @staticmethod
    def read_file(file_name, table):
        """Function to manage data ingestion from file to a list of dictionaries

        Reads the data from file identified by file_name into a 2D table
        (list of dicts) table one line in the file represents one dictionary row in
table.

        Args:
            file_name (string): name of file used to read the data from
            table (list of dict): 2D data structure (list of dicts) that holds the data
during runtime

        Returns:
            None.
        """
        table.clear()  # this clears existing data and allows to load data from file
        objFile = open(file_name, 'r')
        for line in objFile:
            data = line.strip().split(',')
            dicRow = {'ID': int(data[0]), 'Title': data[1], 'Artist': data[2]}
            table.append(dicRow)
        objFile.close()

    @staticmethod
    def write_file(file_name, table):
# Save data to a file
        objFile = open(strFileName, 'w')
        for row in lstTbl:
            lstValues = list(row.values())
            lstValues[0] = str(lstValues[0])
            objFile.write(','.join(lstValues) + '\n')
        objFile.close()

```

```
•
•   # -- PRESENTATION (Input/Output) -- #
•
•   class IO:
•       """Handling Input / Output"""
•
•       @staticmethod
•       def print_menu():
•           """Displays a menu of choices to the user
•
•           Args:
•               None.
•
•           Returns:
•               None.
•           """
•
•           print('Menu\n\n[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\n')
•
•       @staticmethod
•       def menu_choice():
•           """Gets user input for menu selection
•
•           Args:
•               None.
•
•           Returns:
•               choice (string): a lower case sting of the users input out of the choices
    l, a, i, d, s or x
•
•           """
•           choice = ' '
•           while choice not in ['l', 'a', 'i', 'd', 's', 'x']:
•               choice = input('Which operation would you like to perform? [l, a, i, d, s
    or x]: ').lower().strip()
•           print()  # Add extra space for layout
•           return choice
•
•       @staticmethod
•       def show_inventory(table):
•           """Displays current inventory table
•
•
•           Args:
```

```
•             table (list of dict): 2D data structure (list of dicts) that holds the data
    during runtime.
•
•         Returns:
•             None.
•
•         """
•         print('======= The Current Inventory: =======')
•         print('ID\tCD Title (by: Artist)\n')
•         for row in table:
•             print('{}\t{} (by:{})'.format(*row.values()))
•         print('======================================')
•
•
• # 1. When program starts, read in the currently saved Inventory
• FileProcessor.read_file(strFileName, lstTbl)
•
• # 2. start main loop
• while True:
•     # 2.1 Display Menu to user and get choice
•     IO.print_menu()
•     strChoice = IO.menu_choice()
•
•     # 3. Process menu selection
•     # 3.1 process exit first
•     if strChoice == 'x':
•         break
•     # 3.2 process load inventory
•     if strChoice == 'l':
•         print('WARNING: If you continue, all unsaved data will be lost and the
    Inventory re-loaded from file.')
•         strYesNo = input('type \'yes\' to continue and reload from file. otherwise
    reload will be canceled')
•         if strYesNo.lower() == 'yes':
•             print('reloading...')
•             FileProcessor.read_file(strFileName, lstTbl)
•             IO.show_inventory(lstTbl)
•         else:
•             input('canceling... Inventory data NOT reloaded. Press [ENTER] to continue
    to the menu.')
•             IO.show_inventory(lstTbl)
•         continue  # start loop back at top.
•
•     # 3.3 process add a CD
•     elif strChoice == 'a':
•         # 3.3.1 Ask user for new ID, CD Title and Artist
•         DataProcessor.addData()
•         IO.show_inventory(lstTbl)
•         continue  # start loop back at top.
•     # 3.4 process display current inventory
```

```

    elif strChoice == 'i':
        IO.show_inventory(lstTbl)
        continue  # start loop back at top.

    # 3.5 process delete a CD
    elif strChoice == 'd':
        # 3.5.1 get Userinput for which CD to delete
        # 3.5.1.1 display Inventory to user
        IO.show_inventory(lstTbl)
        intIDDel = int(input('Which ID would you like to delete? ').strip())
        DataProcessor.delData(lstTbl)
        IO.show_inventory(lstTbl)
        continue  # start loop back at top.

    # 3.6 process save inventory to file
    elif strChoice == 's':
        # 3.6.1 Display current inventory and ask user for confirmation to save
        IO.show_inventory(lstTbl)
        strYesNo = input('Save this inventory to file? [y/n] ').strip().lower()
        # 3.6.2 Process choice

        if strYesNo == 'y':
             FileProcessor.write_file(strFileName, lstTbl)
        else:
            input('The inventory was NOT saved to file. Press [ENTER] to return to the menu.')
        continue  # start loop back at top.
    # 3.7 catch-all should not be possible, as user choice gets vetted in IO, but to be save:
    else:
        print('General Error')
```