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Foundations of Programming: Python

Assignment 08

CD Inventory Script – Modified with class creation and methods

# Introduction

This week’s assignment was to implement Object Oriented Programming into our previous week’s script of a CD Inventory. This includes the use of Classes, Objects, Fields, Constructors, Attributes and Methods. We implemented these new ideas in the creation of a CD class where CD data was stored and the manipulated within other areas of the script.

# Error handling

I found that this week’s assignment had many more areas where the script needed error handling. One of the first places was in my loading of the data file as the program started. Since there was not a file existing yet, I had to run a try/except block that accounted for the FileNotFoundError. Since I was able to handle that last week, it did not come as a surprise to me this week. However, one aggravation that I found was that when the empty file was loaded into the script and passed onto my inventory display function, it threw a NoneType error since it was not able to iterate over an object with the value None. I found this particularly frustrating but eventually found a solution for this problem by implementing an if/else statement within my try/except block in my load\_inventory function. I found that the display inventory function was able to run if the None value was turned into an empty list. Therefore, with my if/else statement, I checked to see if the file was empty and was going to return a None value. If it was, then I had it instead return an empty table so that my display\_inventory function would continue to run without crashing the program.

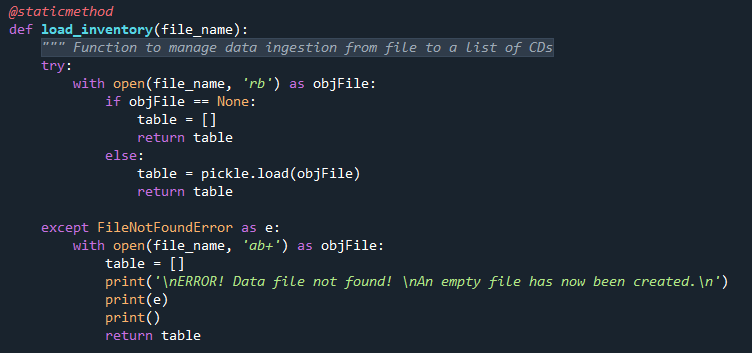


Figure 1 - load\_inventory function showing the implementation of a try/except block to handle FileNotFoundError.

One of the simpler error handlings was within the creation of my CD class. Since I knew that the CD ID was supposed to be an integer, I raised an exception within the properties of the class if the ID was anything other than a number as shown in Figure 2.

Text

Description automatically generated

Figure 2 - CD ID integer exception raised if input was anything but an integer.

# Class creation

While this CD class creation was a fairly simple one to understand, it took several attempts for me to complete the proper constructor, properties and methods that were going to be used throughout this script. I settled on intuitive naming to make it easier to understand in different areas of the script. This helped me when I created the function IO.get\_CD() that was designed to retrieve the input from the user and create an instance of a CD object. I found myself getting an error when I tried to pass attributes onto a tuple that I thought was a CD object. Instead of returning a tuple I found that returning an actually instance the CD class was what needed to be passed into the CD.add\_cd() method as shown below in Figure 3.

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Figure 3 - IO.get\_CD() function that retried the input from the user and returned a CD object that was to be appended to the list of CDs.

# Execution of script

I executed the script in both Spyder and a python terminal window as shown in below in the following pages.

# *Running in Spyder*

In [**271**]: runfile('C:/\_FDProgramming/Assignment\_08/CDInventory.py', wdir='C:/\_FDProgramming/Assignment\_08')

ERROR! Data file not found!

An empty file has now been created.

[Errno 2] No such file or directory: 'CDInventory.dat'

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

======================================

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

Enter ID: 1

What is the CD's title? Thriller

What is the Artist's name? Michael Jackson

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

======================================

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

Enter ID: 2

What is the CD's title? Back in Black

What is the Artist's name? AC/DC

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

======================================

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

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

======================================

Save this inventory to file? [y/n] y

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

======================================

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

Enter ID: Nirvana

ERROR! Entered ID was not an integer.

Please enter an integer ID.

invalid literal for int() with base 10: 'Nirvana'

Enter ID: 33

What is the CD's title? Nevermind

What is the Artist's name? Nirvana

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

33 Nevermind (by: Nirvana)

======================================

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

WARNING: If you continue, all unsaved data will be lost and the Inventory re-loaded from file.

type 'yes' to continue and reload from file. otherwise reload will be canceled. yes

Reloading...

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

======================================

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

Enter ID: 3

What is the CD's title? Nevermind

What is the Artist's name? Nirvana

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

3 Nevermind (by: Nirvana)

======================================

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

WARNING: If you continue, all unsaved data will be lost and the Inventory re-loaded from file.

type 'yes' to continue and reload from file. otherwise reload will be canceled. no

Canceling... Inventory data NOT reloaded. Press [ENTER] to continue to the menu.

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

3 Nevermind (by: Nirvana)

======================================

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

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

3 Nevermind (by: Nirvana)

======================================

Save this inventory to file? [y/n] y

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

3 Nevermind (by: Nirvana)

======================================

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

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

3 Nevermind (by: Nirvana)

======================================

------Menu------

[l] Load Inventory from file

[a] Add CD

[i] Display Current Inventory

[s] Save Inventory to file

[x] Exit

======= The Current Inventory: =======

ID CD Title (by: Artist)

1 Thriller (by: Michael Jackson)

2 Back in Black (by: AC/DC)

3 Nevermind (by: Nirvana)

======================================

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

Ending program...

In [**272**]:

# *Running in python terminal window*

Text

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Text

Description automatically generated

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Description automatically generated

# Github

My Github address is located at this [website](https://github.com/dfredin/Assignment_08) (external reference).[[1]](#footnote-1)

# Summary

Overall, this week’s assignment was a tough one to make it through. While we were introduced to Object Oriented Programming this week, we have utilized parts of it throughout the semester without even knowing. Such parts we have already used are Methods. In previous weeks have implemented functions within difference classes such as IO or DataProcessing. While we did not create the class, we did utilize the methods that we created within those classes. This week however, we created a new class CD as well as all its attributes, methods, and its constructor. I found this a particularly hard concept to grasp at first and had to keep reminding myself of its explanation. Especially the instantiations of the object class. I understand the underlying premise of being able to call the object with its attributes or to call it with an attached method but again implementing it within the CD Inventory script was difficult to execute. I found myself error checking nearly every function or method that I designed. And then when I fixed one error, another one cropped up. In all, I feel that I did a decent job at finding all the problems that could go wrong and error checking them.

# Appendix

Using [saravji’s website](https://www.saravjishut.org/syntax) (external reference)[[2]](#footnote-2) to properly highlight my source code for CDInventory.py.

|  |  |
| --- | --- |
| 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61  62  63  64  65  66  67  68  69  70  71  72  73  74  75  76  77  78  79  80  81  82  83  84  85  86  87  88  89  90  91  92  93  94  95  96  97  98  99  100  101  102  103  104  105  106  107  108  109  110  111  112  113  114  115  116  117  118  119  120  121  122  123  124  125  126  127  128  129  130  131  132  133  134  135  136  137  138  139  140  141  142  143  144  145  146  147  148  149  150  151  152  153  154  155  156  157  158  159  160  161  162  163  164  165  166  167  168  169  170  171  172  173  174  175  176  177  178  179  180  181  182  183  184  185  186  187  188  189  190  191  192  193  194  195  196  197  198  199  200  201  202  203  204  205  206  207  208  209  210  211  212  213  214  215  216  217  218 | *#------------------------------------------#*  *# Title: CD\_Inventory.py*  *# Desc: Assignnment 08 - Working with classes*  *# Change Log: (Who, When, What)*  *# DBiesinger, 2030-Jan-01, created file*  *# DBiesinger, 2030-Jan-01, added pseudocode to complete assignment 08*  *# Dfredin, 2022-Nov-28, added code to create classes and methods*  *#------------------------------------------#*  *# -- DATA -- #*  lstOfCDObjects = []  strFileName = 'CDInventory.dat' *# data storage file*  objFile = **None** *# file object*  flag = bool() *# boolean flag for file check*  **import** **pickle** *# allows storage to .dat files*  **class** **CD**:  *""" Stores data about a CD:*  *properties:*  *cd\_id: (int) with CD ID*  *cd\_title: (string) with the title of the CD*  *cd\_artist: (string) with the artist of the CD*  *methods:*  *add\_cd: Function that takes new CD data and creates a new CD while appending to list*  *"""*  *#--- Fields ---#*  numCDs = 0  *#--- Constructor ---#*  **def** \_\_init\_\_(self, ID, title, artist):  *#--- Attributes ---#*  self.\_\_cd\_id = ID  self.\_\_cd\_title = title  self.\_\_cd\_artist = artist  CD.numCDs +=1    *#--- Properties ---#*  @property  **def** cd\_id(self):  **return** self.\_\_cd\_id    @cd\_id.setter  **def** cd\_id(self, value):  **if** **not** str(value).isnumeric():  **raise** **Exception**('The CD ID must be a number!')  **else**:  self.\_\_cd\_id = value    @property  **def** cd\_title(self):  **return** self.\_\_cd\_title    @property  **def** cd\_artist(self):  **return** self.\_\_cd\_artist    *#--- Methods ---#*  @staticmethod  **def** add\_cd(newCD):  *""" Adds new CD to list of CDs (lstOfCDObjects)*  *Args:*  *newCD (CD): Object CD consisting of CD data.*  *Returns:*  *None.*  *"""*  lstOfCDObjects.append(newCD)    *# -- PROCESSING -- #*  **class** **FileIO**:  *""" Processes data to and from file:*  *properties:*  *None.*  *methods:*  *save\_inventory(file\_name, lst\_Inventory): -> None*  *load\_inventory(file\_name): -> (a list of CD objects)*  *"""*  *#--- Methods ---#*  @staticmethod  **def** load\_inventory(file\_name):  *""" Function to manage data ingestion from file to a list of CDs*  *Reads the data from file identified by file\_name into a 2D table*  *(list of CDs) table one line in the file represents one CD row in table.*  *Args:*  *file\_name (string): name of file used to read the data from*  *table (list of CDs): 2D data structure (list of CDs) that holds the data during runtime*  *Returns:*  *table (list of CDs): 2D data structure that contains the file data.*  *"""*  **try**:  **with** open(file\_name, 'rb') **as** objFile:  **if** objFile == **None**:  table = []  **return** table  **else**:  table = pickle.load(objFile)  **return** table  **except** **FileNotFoundError** **as** e:  **with** open(file\_name, 'ab+') **as** objFile:  table = []  print('**\n**ERROR! Data file not found! **\n**An empty file has now been created.**\n**')  print(e)  print()  **return** table    @staticmethod  **def** save\_inventory(file\_name, table):  *""" Function that overwrites the new data input by the user into the named dat file*  *Args:*  *file\_name (string): name of file used to write the data to.*  *table (list): data structure that holds the data during runtime.*  *Returns:*  *None.*  *"""*  **with** open(file\_name, 'wb') **as** objFile:  pickle.dump(table, objFile)  *# -- PRESENTATION (Input/Output) -- #*  **class** **IO**:  *""" Retrieves input from the user and displays output of menu and inventory:*  *properties:*  *None.*  *methods:*  *print\_menu: Displays a menu of choices to the user*  *menu\_choice: Gets user input for menu selection*  *show\_inventory: Displays current inventory table*  *get\_CD: Retrieves input from user and returns an object CD*  *"""*  *#--- Methods ---#*  @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('[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', 's', 'x']:  choice = input('Which operation would you like to perform? [l, a, i, 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 CDs): 2D data structure (list of CDs) that holds the data during runtime.*  *Returns:*  *None.*  *"""*  print('======= The Current Inventory: =======')  print('ID**\t**CD Title (by: Artist)**\n**')  **for** cd **in** table:  print('**{}\t{}** (by: **{}**)'.format(cd.cd\_id, cd.cd\_title, cd.cd\_artist))  print('======================================')    @staticmethod  **def** get\_CD():  *""" Retrieves input from user and returns an object CD*  *Returns:*  *CD: Object of CD that contains ID, CD title, and CD artist.*  *"""*  **while** **True**:  **try**:  strID = int(input('Enter ID: ').strip())  **break**  **except** **ValueError** **as** e:  print('**\n**ERROR! Entered ID was not an integer. **\n**Please enter an integer ID.**\n**')  print(e)  print()  strTitle = input('What is the CD**\'**s title? ').strip()  strArtist = input('What is the Artist**\'**s name? ').strip()  **return** CD(strID, strTitle, strArtist)    *# -- Main Body of Script -- #*  lstOfCDObjects = FileIO.load\_inventory(strFileName) *# File not found error handling*  **while** **True**:  IO.print\_menu()  IO.show\_inventory(lstOfCDObjects)  strChoice = IO.menu\_choice()  **if** strChoice == 'x':  print('Ending program...')  **break**  **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...')  lstOfCDObjects = FileIO.load\_inventory(strFileName)  **else**:  input('Canceling... Inventory data NOT reloaded. Press [ENTER] to continue to the menu.')  **continue**  **elif** strChoice == 'a':  CD.add\_cd(IO.get\_CD())  **elif** strChoice == 'i':  IO.show\_inventory(lstOfCDObjects)  **elif** strChoice == 's':  IO.show\_inventory(lstOfCDObjects)  strYesNo = input('Save this inventory to file? [y/n] ').strip().lower()  **if** strYesNo == 'y':  FileIO.save\_inventory(strFileName, lstOfCDObjects)  **else**:  input('The inventory was NOT saved to file. Press [ENTER] to return to the menu.')  **continue** *# start loop back at top.*  **else**:  print('General Error') |

1. Retrieved 3 Dec 2022 (https://github.com/dfredin/Assigment\_08) [↑](#footnote-ref-1)
2. Retrieved 3 Dec 2022 [↑](#footnote-ref-2)