

Rufus Ayeni
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IT FDN 110 A
Assignment 07
<https://github.com/rayeni/IntroToProg-Python-Mod07>
<https://rayeni.github.io/IntroToProg-Python-Mod07/>

Error Handling and Pickling Demo

Introduction:

In Assignment 07, I researched error handling and pickling and applied that research by creating a script that demonstrates the two concepts. I found the following URLs useful in my research because they conveyed the concepts in a clear and concise manner:

The Python pickle Module: How to Persist Objects in Python:

<https://realpython.com/python-pickle-module/>

Introduction to Python Exceptions:

<https://realpython.com/courses/introduction-python-exceptions/>

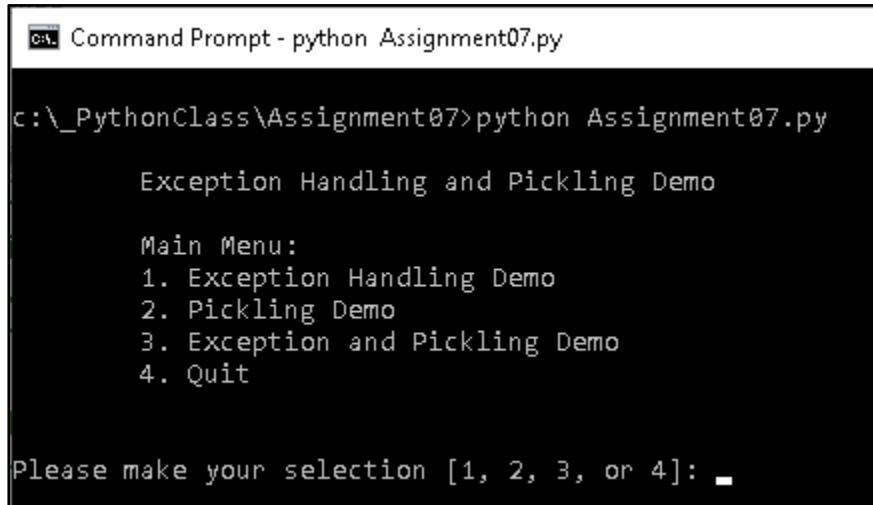
Python Exceptions: An Introduction:

<https://realpython.com/python-exceptions/>

The script is comprised of three demonstrations:

1. Exception handling demo.
2. Pickling demo.
3. Exception and pickling demo.

The above items are presented to the user as options at the start of the script:



```

C:\_PythonClass\Assignment07>python Assignment07.py

Exception Handling and Pickling Demo

Main Menu:
1. Exception Handling Demo
2. Pickling Demo
3. Exception and Pickling Demo
4. Quit

Please make your selection [1, 2, 3, or 4]: 

```

Figure 1

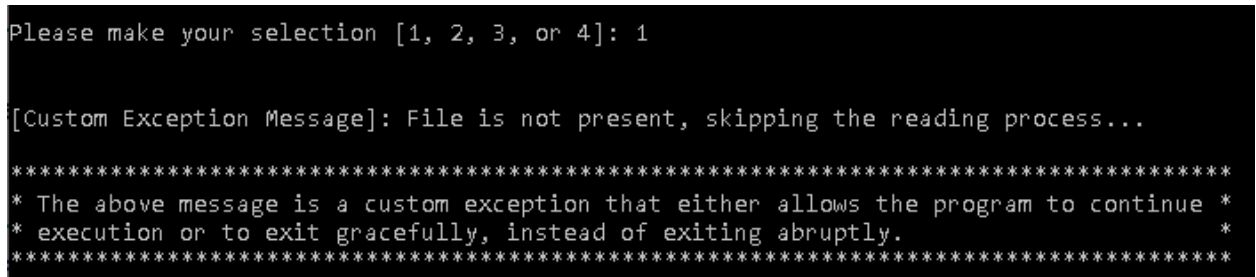
1 Exception Handling Demo:

Bugs are a part of programming. As a programmer, you must anticipate the occurrence of errors and devise methods to catch and handle them. If these errors (*also known as exceptions*) are not anticipated and addressed ahead of time, they can terminate your program abruptly and issue an error message that may not be easily interpreted by the user.

One way to handle exceptions in Python is through the use of the `try` and `except` clauses.

When error occurs in a Python program, if there isn't any exception handling coded into the script, then the program will stop executing and exit abruptly.

1. When **Option #1**, *Exception Handling Demo*, is selected, the demo captures the exception (`FileNotFoundException`), and presents a custom message to the user:



```

Please make your selection [1, 2, 3, or 4]: 1

[Custom Exception Message]: File is not present, skipping the reading process...

*****
* The above message is a custom exception that either allows the program to continue *
* execution or to exit gracefully, instead of exiting abruptly.                    *
*****

```

Figure 2

- The code for this demo starts in the `while` loop on lines 239 - 242. It starts by making a function call to the `Processor.demo_exception_handler()` function, and then to the `IO.input_press_enter_to_continue()` function.

The following is a snippet of the code on lines 239 - 242, in **Figure 3**:

```

234 # Main
235 while(True):
236     IO.print_menu_options()
237     menu_choice = IO.input_menu_choice()
238
239     if menu_choice.strip() == "1": # Exception Handling Demo
240         Processor.demo_exception_handler(demo_file_1)
241         IO.input_press_enter_to_continue("\nPress the [Enter] key to return to Main Menu: ")
242         continue

```

Figure 3

The code for the two functions are in **Figures 4 and 5**:

```

39 @staticmethod
40 def demo_exception_handler(file_name):
41     """ Demonstrates how exception handling works"""
42
43     # deletes file to demonstrate exception handling
44     if os.path.exists(file_name):
45         os.remove(file_name)
46
47     # exception handler
48     try:
49         open(file_name, "rb")
50     except FileNotFoundError: # Exception generates following message:
51         print("\n[Custom Exception Message]: File is not present, skipping the reading process...\n")
52         print("*****")
53         print("** The above message is a custom exception that either allows the program to continue **")
54         print("** execution or to exit gracefully, instead of exiting abruptly. **")
55         print("*****")
56

```

Figure 4

```

173 @staticmethod
174 def input_press_enter_to_continue(message):
175     input(message)

```

Figure 5

2 Pickling Demo:

The pickling demo converts a list to a data stream and stores the stream on disk.

1. When **Option #2**, *Pickling Demo*, is selected, the user is presented a brief definition of pickling, and is asked to press [Enter](#) to continue:

```
Please make your selection [1, 2, 3, or 4]: 2

*****
* Pickling is the process of converting an object to *
* a stream of bytes (serialization) that can be saved *
* to disk.                                           *
*****

Press [Enter] to continue: |
```

Figure 6

2. After the user presses [Enter](#) to continue, he/she is presented with a brief comment about the demo:

```
Press [Enter] to continue:

*****
* In this demo we will create a three element list, *
* pickle it, and save it to a binary file.          *
*****

Press [Enter] to continue: |
```

Figure 7

3. The script continues with the task of creating a list of three cars:

```
Press [Enter] to continue:

*****
* Let's create a list of three cars.          *
*****

Press [Enter] to continue:
```

Figure 8

4. After entering three cars into the list, the script asks the user to press [Enter](#) to pickle the list:

```
Press [Enter] to continue:

Enter the first car (ex. Volt, Prius, etc): Accord
Enter the second car (ex. Volt, Prius, etc): Civic
Enter the third car (ex. Volt, Prius, etc): Sonata

Press [Enter] to pickle the list. |
```

Figure 9

5. After the pressing [Enter](#) to pickle the list, the script prints a message to inform the user that the pickled list was saved to a file named [PickleDemo.dat](#). The demo ends with the user pressing [Enter](#) to return to the [Main Menu](#):

```
The pickle list was written to PickleDemo.dat. File will appear when demo quits.

Press the [Enter] key to return to Main Menu:
```

Figure 10

6. The code for the pickling demo entails three function calls to input items, add items to a list, and to pickle the list:

```

244     if menu_choice.strip() == "2": # Pickling Demo
245         demo_item1, demo_item2, demo_item3 = IO.input_demo_list_items()
246         list_demo = Processor.add_data_to_list(demo_item1, demo_item2, demo_item3, list_demo)
247         Processor.pickle_object_to_file(list_demo, demo_pickle_file)
248         IO.input_press_enter_to_continue("\nPress the [Enter] key to return to Main Menu: ")
249         continue

```

Figure 11

7. The code for the functions can be viewed in Figures 12, 13, and 14:

def input_demo_list_items()

```

122     @staticmethod
123     def input_demo_list_items():
124         """Gets demo list items from user """
125
126         print("*****")
127         print("* Pickling is the process of converting an object to  *")
128         print("* a stream of bytes (serialization) that can be saved *")
129         print("* to disk.                                         *")
130         print("*****")
131
132         # Ask user to press Enter to continue with demo.
133         input("\nPress [Enter] to continue: ")
134
135         print("\n*****")
136         print("* In this demo we will create a three element list,      *")
137         print("* pickle it, and save it to a binary file.                *")
138         print("*****")
139
140         # Ask user to press Enter to continue with demo.
141         input("\nPress [Enter] to continue: ")
142
143         print("\n*****")
144         print("* Let's create a list of three cars.                        *")
145         print("*****")
146
147         # Ask user to press Enter to continue with demo.
148         input("\nPress [Enter] to continue: ")
149
150         car1 = input("\nEnter the first car (ex. Volt, Prius, etc): ")
151         car2 = input("Enter the second car (ex. Volt, Prius, etc): ")
152         car3 = input("Enter the third car (ex. Volt, Prius, etc): ")
153
154         return car1, car2, car3

```

Figure 12

```
def add_data_to_list()
```

```
57     @staticmethod
58     def add_data_to_list(element1, element2, element3, demo_list):
59         """ Adds data to demo_list and returns it """
60
61         demo_list = [element1, element2, element3]
62         return demo_list
```

Figure 13

```
def pickle_object_to_file()
```

```
64     @staticmethod
65     def pickle_object_to_file(demo_list, demo_file):
66         """ Pickles list and adds to file """
67
68         input("\nPress [Enter] to pickle the list. ")
69         print() # whitespace
70         f = open(demo_file, "wb") # open binary file
71         pickle.dump(demo_list, f) # pickle list and write to file
72         f.close() # close file
73         # create a pickle object (only to print to screen in demo)
74         pk_object = pickle.dumps(demo_list)
75         # print confirmation message
76         print(f'The pickle list was written to {demo_file}. File will appear when demo quits. ')
77         return pk_object
```

Figure 14

3 Exception and Pickling Demo:

The exception and pickling demo combines the previous two demos (*exception handling and pickling demos*).

1. When the user selects **Option #3**, *Exception and Pickling Demo*, he/she is presented with a brief overview of the demo:

```
Please make your selection [1, 2, 3, or 4]: 3

*****
* This demo will cover the use of exception handling,      *
* pickling, and saving data to a binary file.              *
*****

Press [Enter] to continue:
```

Figure 15

- When the user presses **Enter** to continue, as seen in the previous demo, he/she is presented with a custom exception message telling him/her that the file is not present for reading. Instead of exiting abruptly, the program continues to run:

```
[Custom Exception Message]: File is not present, skipping the reading process...

*****
* The above message is a custom exception that either allows the program to continue *
* execution or to exit gracefully, instead of exiting abruptly.                      *
*****

Press the [Enter] key to continue: |
```

Figure 16

- After the user presses **Enter** to continue, the user is informed they will enter two movie ratings (*Movie Title, and Rating*):

```
*****
* Let's enter a two movie ratings.
*****

Press [Enter] to continue:
```

Figure 17

- After the user enters his movie ratings, he receives confirmation that the items are in a list, and is asked press **Enter** to see the data in both list and table forms:

```
Enter the first movie: Rambo
Enter the first movie's rating (ex. Excellent, Good, Fair, Bad): Good

Enter the second movie: Avengers
Enter the second movie's rating (ex. Excellent, Good, Fair, Bad): Excellent

*****
* Great. We now have two entries in our list object (table) *
*****

Press [Enter] to see the list object in list and table forms:
```

Figure 18

- After the data is presented to the user in list and table forms, the user is asked to press **Enter** to pickle the list:

```
List Form:

[{'Movie': 'Rambo', 'Rating': 'Good'}, {'Movie': 'Avengers', 'Rating': 'Excellent'}]

Table Form:

***** Movie Ratings *****
* Rambo (Good)
* Avengers (Excellent)
*****

*****
* Next. Let's pickle the list object and save it to a file. *
*****

Press [Enter] to pickle the list. |
```

Figure 19

- After the user presses **Enter** to pickle the list, he is notified that the pickled list can be viewed in a file named **MovieRatings.dat**:

```
The pickle list was written to MovieRatings.dat. File will appear when demo quits.

*****
* Before we end the demo, let's see what both a pickled list and *
* non-pickled list look like                                     *
*****

Press [Enter] to continue: |
```

Figure 20

- After the user presses **Enter** to continue, both lists (*pickled and non-pickled*) are shown to the user for comparison:

```
Press [Enter] to continue:

Non-pickle list:
[{'Movie': 'Rambo', 'Rating': 'Good'}, {'Movie': 'Avengers', 'Rating': 'Excellent'}]

Pickle list:
b'\x80\x04\x95H\x00\x00\x00\x00\x00\x00]\x94(\x8c\x05Movie\x94\x8c\x05Rambo\x9
```

Figure 21

8. The contents of MovieRating.dat can be seen in **Figure 22**:

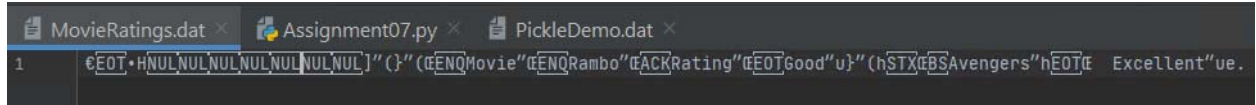
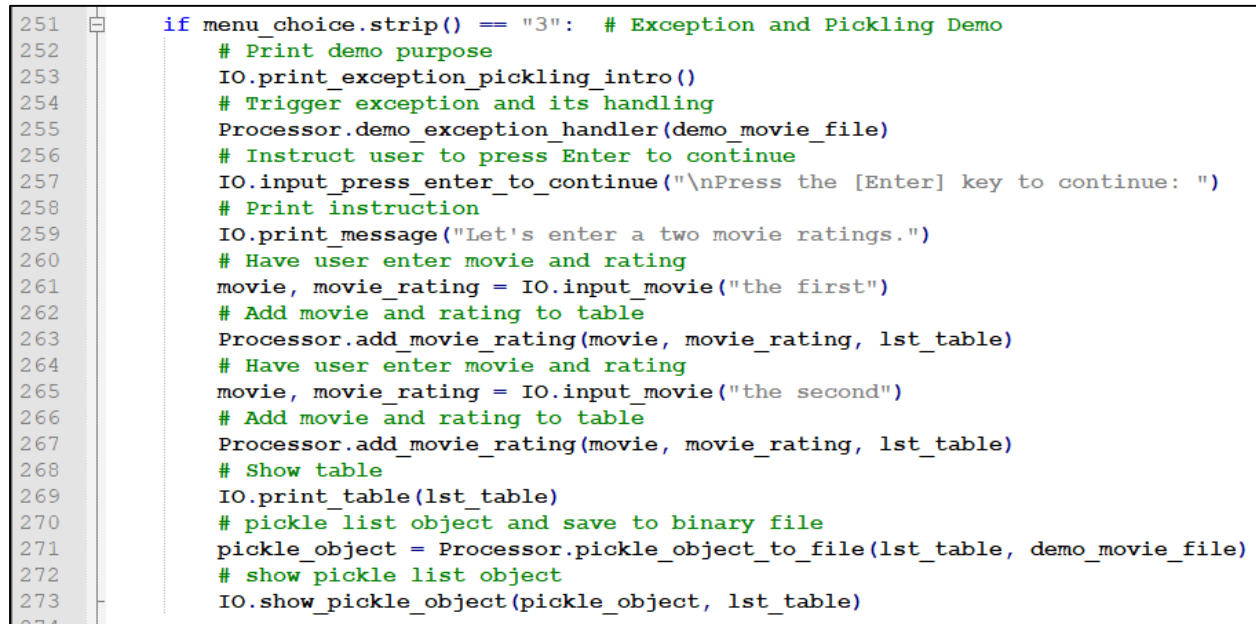


Figure 22

9. The code for exception and pickling demo entails 11 function calls as seen in **Figure 23**:



```

251 if menu_choice.strip() == "3": # Exception and Pickling Demo
252     # Print demo purpose
253     IO.print_exception_pickling_intro()
254     # Trigger exception and its handling
255     Processor.demo_exception_handler(demo_movie_file)
256     # Instruct user to press Enter to continue
257     IO.input_press_enter_to_continue("\nPress the [Enter] key to continue: ")
258     # Print instruction
259     IO.print_message("Let's enter a two movie ratings.")
260     # Have user enter movie and rating
261     movie, movie_rating = IO.input_movie("the first")
262     # Add movie and rating to table
263     Processor.add_movie_rating(movie, movie_rating, lst_table)
264     # Have user enter movie and rating
265     movie, movie_rating = IO.input_movie("the second")
266     # Add movie and rating to table
267     Processor.add_movie_rating(movie, movie_rating, lst_table)
268     # Show table
269     IO.print_table(lst_table)
270     # pickle list object and save to binary file
271     pickle_object = Processor.pickle_object_to_file(lst_table, demo_movie_file)
272     # show pickle list object
273     IO.show_pickle_object(pickle_object, lst_table)

```

Figure 23

Summary:

In this assignment, I created a Python script that demonstrates exception handling and pickling. Exception handling is an important concept in programming that requires programmers to anticipate and capture errors that users may trigger as a result of faulty programming logic. Pickling is the conversion of a Python object to a byte stream. In other programming languages, this is called serialization. The purpose of serializing Python objects is to lower the time it takes to read and write data to disk.