Thomas Nord

08-10-2022

Foundations of Programming (Python)

Recap of Module 06 – Functions & Classes

<https://github.com/nordthomas/IntroToProg-Python-Mod06>

Creating a To Do List Program using Classes and Functions

# Introduction

This week we’re going to be looking at our To Do List program again, but this time we’ll create/modify some custom classes and functions to use instead of re-writing entire blocks of code. This will help us avoid errors by reusing chunks of code rather than re-typing them when needed. We’ll also look at how we can separate our processing layer from our presentation layer.

# Getting Started

We start with the Assignment06\_starter\_updated.py file which has a good amount of code already in it. Our job this week is to figure out what is missing and write the code that will allow the program to function properly. The script uses 2 custom classes: Processor() and IO(). These classes represent our processing layer and our presentation layer, respectively. Inside each class are a number of custom functions written to carry out some bit of logic. We’ll explore these in more detail as we go through the assignment. We also have 2 additional sections, or areas of concern: one for Data and the other for the main body of our script.

The variables we’ll need are much like the ones from last week. We’ll need to identify the name of the file we want to write to (file\_name\_str) as well as our file handle (file\_obj). We’ll be adding our data to dictionary rows and then those rows will be added to a list (table\_lst). Finally, we’ll capture the user’s menu choice (choice\_str).

# Completing our Logic

My approach to completing the assignment is to walk through the logical flow of the program. I’ll start with setting up the file then move on to displaying our menu, and then walking through the menu of options and ensuring each one is wired up correctly.

## Creating the File/Reading the File’s Data

The very first thing I want to do is borrow some code from Module 05 for creating a new document if one isn’t already on disk. This is an incredibly helpful bit of code that saves time during testing as I can just delete the old file and programmatically generate a new one.

# Step 0 - When the program starts, if there is no file on disk, create one  
if file\_obj == None:  
 file\_obj = open(file\_name\_str, "a")  
 file\_obj.close()

In this conditional we evaluate the file\_obj variable to see if it is set to None (i.e. there is no file already). If there isn’t we open a new one in append mode which creates the file. We then immediately close the file as we will re-open it whenever we need to access it.

The code to read the existing data from the file is already in place so we don’t need to do anything there. The code for the initial display of that data and to display our menu is also already in place so other than a few minor tweaks to the formatting we’ll leave it alone.

## Entering a New Task

We then move on to entering a new task for our To Do List. This section of the main body of our script is in place but there is one change I need to make here. The parameters for the Processor.add\_data\_to\_list function share names with our global variables, task and priority. As I feel this to be unnecessarily confusing, I modified them to add some clarity.

table\_lst = Processor.add\_data\_to\_list(task\_to\_add=task, priority\_to\_add=priority, list\_of\_rows=table\_lst)

Now when I see task in the code, I know exactly what the code is referring to. Don’t forget to update your docstrings with the new names as well!

**Tip:** You can make quick work of the renaming by choosing the Refactor option in PyCharm.

If we scroll up to our functions in the script, we see we have our first bit of code to write (Figure 1).

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Figure 1: Need code to capture user input

We’re starting off with an easy one. We need code that takes no arguments but returns a user’s input, in this case a task and its priority. We’ve covered capturing a user’s input many times before so that is straightforward. However, now we have to return those captured values to the script so we add a return at the end followed by the name of our variables we assigned the user input to. Again, because we already have global variables for task and priority I name the variables inside the function something more specific to the action, task\_name and priority\_level.

Now we see when we select option 1 from the menu that we are asked to input a task and its priority. Once we do that our updated list of tasks is returned to us (Figure 2).

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Figure 2: Entering a task/priority

## Deleting a Task

This section is going to require a bit more work. We have two functions and both are going to need code (Figure 3).

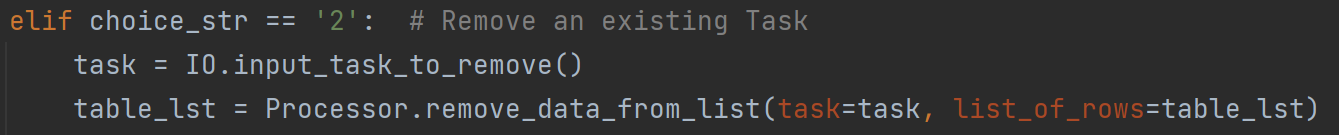


Figure 3: Two functions, both needing code

The first function we need to tackle is input\_task\_to\_remove which receives no arguments, but will need to return a string for the task we want to remove (Figure 4).

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Figure 4: Task removal function

This code should be very familiar as we’re just assigning the user’s input to a variable and returning that variable.

remove = str(input("Enter the name of the task you wish to remove: ")).strip()  
return remove

Let’s look at what we have already for the Processor.remove\_data\_from\_list function (Figure 5).

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**Figure 5: Need to update variables and add logic**

The first order of business for our removal code is to update the parameter for the function like we did earlier for adding to our list. Again, don’t forget to you can use the Refactor option in PyCharm to update so only the local variables, but also the docstring.

@staticmethod  
def remove\_data\_from\_list(task\_to\_del, list\_of\_rows):

We see that we’ll need to pass in the name of the task we want to delete (task\_to\_del) and our table (list\_of\_rows) then return an updated table (list\_of\_rows).

The next bit of code needs to evaluate the string in the task\_to\_del argument we pass to it to see if it matches any of the Tasks in our table. We’ll do this with a for loop to read through each of the rows in our table and compare our task\_to\_del argument against each value in the Task keys of the dictionary rows. If we find a match we’ll remove that row and confirm to the user that a task was removed.

for row in list\_of\_rows:  
 if row["Task"].lower() == task\_to\_del.lower():  
 list\_of\_rows.remove(row)  
 print("Task removed.")

All that’s left is to return an updated list\_of\_rows to the main script and present it to the user.

return list\_of\_rows

A quick test of our code reveals we are able to successfully remove erroneous rows (Figure 6).

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Figure 6: We probably shouldn’t paint the cat

## Saving to a File

Saving our data to a file won’t require any code changes to the main script so let’s look at the Processor.write\_data\_to\_file function (Figure 7).

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Figure 7: We’ve got some work to do

We can see from the existing parameters that we’ll need to be able to pass in our file’s name (file\_name) and our table (list\_of\_rows). We’ll also need to return our table (list\_of\_rows).

I want to start by displaying the current data that will be saved to the file. Luckily, we already have this code written elsewhere in the script under the IO.output\_current\_tasks\_in\_list function so I’ll just borrow that.

print("\*\*\*\*\*\*\* The current items ToDo are: \*\*\*\*\*\*\*")  
for row in list\_of\_rows:  
 print(row["Task"] + "(" + row["Priority"] + ")")  
print("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*")

No point in rewriting the wheel, er, script. This could probably have been its own function but we’ll save that for another time. Next, we’ll open our file in write mode. This code should be pretty familiar now as we used something similar in Assignment 05. Of course, here we need to make sure we are using our local variables and that those variables don’t exist outside the scope of this function.

for dicRow in list\_of\_rows:  
 objFile.write(dicRow["Task"] + "," + dicRow["Priority"] + "\n")

This will iterate through all the rows in our list\_of\_rows argument and write each one to the file. Don’t forget to close the file when you’re done! I’ll add an input statement at the end to let the user know their data was saved and ask them to press Enter to return to the menu.

## Exiting the Program

No new code was needed here.

# Testing Our Program

We’ve seen our program running in PyCharm throughout its development. Let’s fire up Command Prompt and make sure it is working there (Figure 8).

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Figure 8: Our menu appears

We’re off to a great start. Let’s try the first option and see if we can add a new task and priority (Figure 9).

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Figure 9: Task and priority added

Oops! I misspelled one of my tasks. It’s a good thing my removal code is working (Figure 10).

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Figure 10: Delete successful

Now that we have a list of tasks let’s save them off to a file and confirm the data is there (Figures 11.1 and 11.2).

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Figures 11.1 and 11.2: Our data was saved and appears in the text file

One last test: can we properly exit the program (Figure 12).

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Figure 12: Goodbye!

# Summary

This week we took another look at generating a to do list but using custom classes and functions instead of using only linear code. We also worked on further separating our code in to processing and presentation layers.