GMIT

Multi-Paradigm Programming

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Abstract. Tasked with adding additional functionality to the Shop Program having source code in *C* and *Python* provided using a procedural approach, this report compares the procedural and object-oriented techniques implemented. The procedural implementation in *Python* is the same procedural style as the *C* version; therefore, comparing the procedural *C* (hereafter abbreviated PC) and object-oriented (hereafter abbreviated OO) *Python* versions.

1. Introduction

Each implementation implements and tests user input and provides the same user experience with minor aesthetic console output differences. The specification did not include such requirements and is considered additional functionality; therefore, it will not form part of this report.

Frist version implemented was PC and then OO. The majority of the logic used to implement the PC is evident in the OO.

The report reads sequentially through the shop menu options (*Appendix A*) and analyses each implementations similarities and differences.

2. Similarities and Differences

PC is natural (having breakfast and going to work) [3]. Likewise, the sequential viewpoint works well when planning daily activities, but a city planner must think about thousands of people's routines [3].

Trying to map out a sequence of actions for each individual would quickly get unsustainable - instead likely to start thinking about patterns of behaviours [3].

The PC groups logically related items of different data types to be combined into a *struct* (unlike an *array*). The OO utilises classes describing the possible states and behaviours that every object of a particular type could have.

This report is not about the difference between the different paradigms, but it is necessary to highlight the difference concisely. The PC can be analysed like a recipe, whereas the OO is a collection of objects and patterns of interactions - like the users interacting with menu choices [3].

The compiled PC begins executing at the beginning of the function *main*, whereas the interpreted OO runs the module associated with the main program set to *__main__*.

The PC uses an enumerated data type (*shopMenuChoice* and *customerCartChoice*) to describe a set of integer values being the variables to determine user menu choice. The OO uses a variation of the enumerated data type (*shop_menu_choice* and *live_menu_choice*), also a subclass of *int* [1].

To determine user choice (*shopMenuChoice* and *customerCartChoice*), the PC uses a *switch* statement providing a multi-way branch that is particularly suitable when the condition is some *int* or *char* expression that matches one of a set of constants (enumerated data type) [2]. However, the OO does not provide the *switch* therefore using *control* statements instead.

The PC reads the *CSV* file as a text file requiring memory allocation (*malloc*) on the fly (*createAndStockShop* and *readCustomerCSVFile*), whereas the OO is automatic having a library available to read the *CSV* file (*create_and_stock_shop* and *read_customer*).

3. Conclusion

Each implementation satisfies the requirements of the specification. *Appendix B* provides a walk-through of the test *CSV* files used.

Appendix

A

B

file	customer name	cash/budget	product	price	quantity	state quantity	Pass/Fail
stock		€ 1,000.30	Coke Can	€ 1.10	100	100	Pass
			Bread	€ 0.70	30	30	Pass
			Spaghetti	€ 1.20	100	100	Pass
			Tomato Sauce	€ 0.80	100	100	Pass
			Big Bags	€ 2.50	4	4	Pass
					cash: €	1,000.30	Pass

	customer name				cart total	cart quantity	Customer state quantity	Pass/Fail	Shop state quantity	Pass/Fail
customer.csv	John	€	100.20	Coke Can	€ 11.00	10	10	Pass	90	Pass
				Bread	€ 2.10	3	3	Pass	27	Pass
				Jam	n/a	1	n/a	n/a	n/a	n/a
budget: €	100.20	Pass		customer billed?	€ 13.10	Pass		others unchanged		Pass
customer within budget?	Yes	Pass		Full or Partial or Nil:	Partial	Pass		cash: €	1,013.40	Pass

	customer name				cart total	cart quantity	Customer state quantity	Pass/Fail	Shop state quantity	Pass/Fail
ann.csv	Ann	€	110.70	Coke Can	€ 110.00	100	90	Pass	0	Pass
				Bread	€ 0.70	1	1	Pass	26	Pass
budget: €	110.70	Pass		customer billed?	€ 99.70	Pass		others unchanged		Pass
customer within budget?	Yes	Pass		Full or Partial or Nil:	Partial	Pass		cash: €	1,113.10	Pass

	customer name				cart total	cart quantity	Customer state quantity	Pass/Fail	Shop state quantity	Pass/Fail
ben.csv	Ben	€	1.10	Coke Can	€ 1.10	1	0	Pass	0	Pass
				Tea	n/a	2	n/a	Pass	n/a	n/a
budget: €	1.10	Pass		customer billed?	€ -	Pass		others unchanged		Pass
customer within budget?	Yes	Pass		Full or Partial or Nil:	Nil	Pass		cash: €	1,113.10	Pass

	customer name			cart total	cart quantity	Customer state quantity	Pass/Fail	Shop state quantity	Pass/Fail
james.csv	James	€	1,000.00	Bread	€ 18.90	27	26	Pass	0	Pass
				Spaghetti	€ 120.00	100	100	Pass	0	Pass
budget: €	1,000.00	Pass	customer billed?	€ 138.20	Pass		others unchanged		Pass
customer within budget?	Yes	Pass	Full or Partial or Nil:	Partial	Pass		cash: €	1,251.30	Pass

joe.csv	customer name					cart total	cart quantity	Customer state quantity	Pass/Fail	Shop state quantity	Pass/Fail
joe.csv	Joe	€	2.50		Big Bags	€ 2.50	1	1	Pass	3	Pass
	budget: €		2.50	Pass	customer billed?	€ 2.50	Pass			2	Pass
customer within budget?	Yes			Pass	Full or Partial or Nil:	Full	Pass		cash: €	1,253.80	Pass

zane.csv	customer name					cart total	cart quantity	Customer state quantity	Pass/Fail	Shop state quantity	Pass/Fail
zane.csv	Zane	€	1,000.30	Tomato Sauce	€ 80.00	100	100	Pass	0	Pass
				Big Bags	€ 10.00	4	3	Pass	0	Pass
				Spaghetti	€ 120.00	100	0	Pass	0	Pass
				Coke Can	€ 110.00	100	0	Pass	0	Pass
				Bread	€ 21.00	30	0	Pass	0	Pass
	budget: €	1,000.30	Pass	customer billed?	€ 87.50	Pass			cash: €	1,341.30	Pass
customer within budget?	Yes		Pass	Full or Partial or Nil:	Partial	Pass					

No Money = david.css --- No Products Stockd = deirdre.csv --- Budget not Enough = dan.csv

References

[1] Python, "PEP 435," python.org, Februry 2013.

[2] B. W. Kernighan, D. M. Ritchie, "The C Programming Language," Prentice Hall, 1988.

[3] A. Yarosh,"Object-Oriented Programming in Python," datacamp.com, n.d..