Wilson Quilli

Professor Elangovan

CMPSC 412: Data Structures Lab

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Lab 9: Report - SmartCart

Introduction

SmartCart is a shopping cart data structure for an e-commerce store for customers to use, such as ordering items through Amazon or Walmart and placing them in a shopping cart. It keeps the order of items that a customer adds them in and lets the program find and change any item quickly. Each item has a name, a price, and a quantity. The goal is to make the cart feel fast, clear, and easy to use.

Design of the Data Structure

SmartCart combines two data structures together. It combines a linked list to store items in the order they were added and a dictionary that points each item's name to its node in the list. The linked list supports smooth functioning through the cart. The dictionary gives instant access to any item by name. Together they give both order and speed.

Justification of Developing the Data Structure

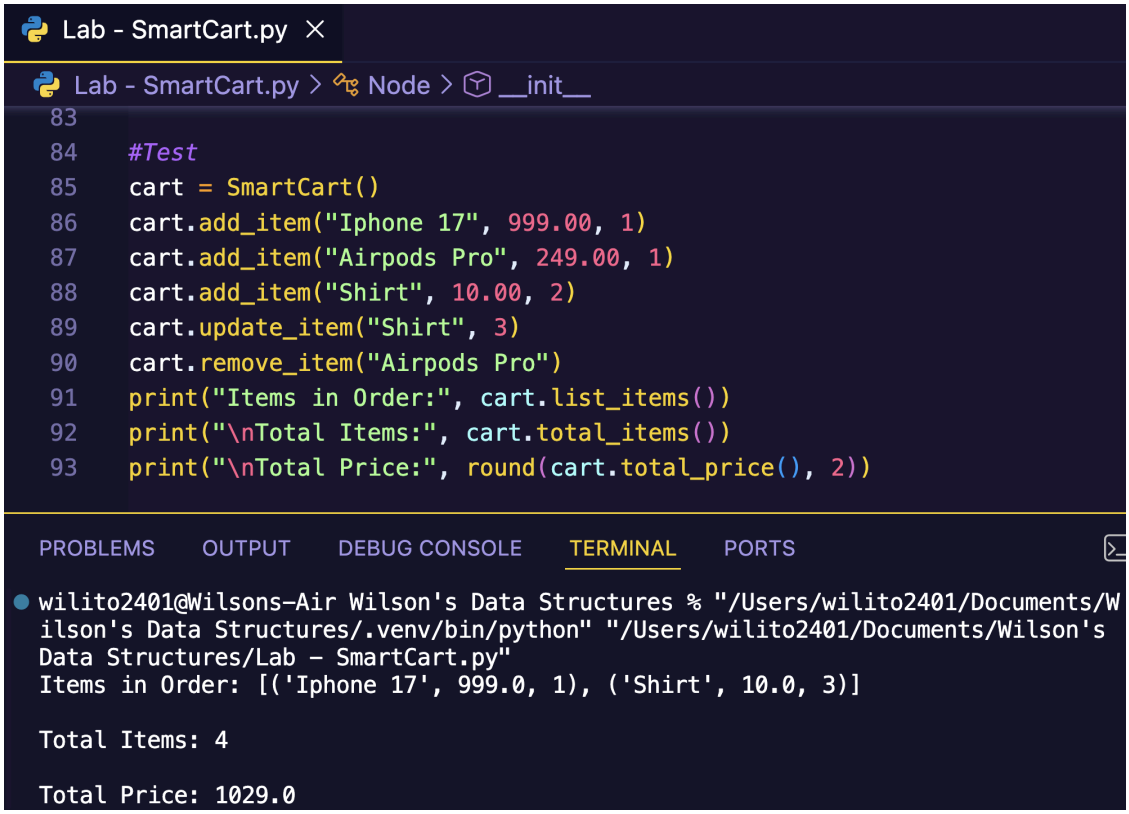
A linked list is slow when you search for a specific product by name and a dictionary alone loses the natural order that users expect to see, since it’s unordered. SmartCart offers the best parts of

both the linked lists and dictionary. Maintaining its simple and clear order for display while also giving fast lookup and edits. This makes the SmartCart feel quick and organized.

Implementation and Results

Code Compiler: https://www.programiz.com/online-compiler/4s9phpftEI6P9

Output Screenshot:



Conclusion

After conducting this lab of creating my own data structure, I understood how to design a data structure to match a real-world example of e-commerce. I saw that one data structure cannot meet every goal and desire of programmers such as the linked list giving order, but slow search and the dictionary giving fast search, but no order. By combining both, I get clear display and

quick edits at the same time, where in the real world, consumers need speed and efficiency when using programs like an e-commerce website. Ultimately, I learned how to create and implement a data structure that could be used in the real-world, by combining two data structures.

Zoom Link:

https://psu.zoom.us/rec/share/hfLft-XKP8GddhS5Thb7Qb81zKOrIRD5vgIZLTmk0hbUEBA5YTfEhtJsaU9ErMSh.vuJB6pkRcDncEYzG