Lab 1

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Supermarket inventory

There are several types of products, each having a known constant unit price. In the beginning, we know the quantity of each product.

We must keep track of the quantity of each product, the amount of money (initially zero), and the list of bills corresponding to sales. Each bill is a list of items, quantities sold in a single operation, and their total price.

We have sale operations running concurrently, on several threads. Each sale decreases the amounts of available products (corresponding to the sold items), increases the amount of money, and adds a bill to a record of all sales.

From time to time, as well as at the end, an inventory check operation shall be run. It shall check that all the sold products and all the money is justified by the recorded bills.

Description

Algorithm was implemented in C++ using threads & mutexes in order to synchronise the operations so that the item inventory is not accessed by more than one thread at a time.

Classes

Product

It is used to describe a product... Will be used in Inventory class:

Inventory

It has a map of Product, integer ... This map is used to store information about the quantity of a certain product.

Bill

It has a map of Product, integer ... This map is used to store information about the bought quantity of a certain product in this transaction.

Supermarket

It has two members of type Inventory used to store information about existing products and sold ones.. it also has an array of bills that will be used to check the inventory.

In this class are 2 mutexes that will be used to synchronise information.

Computer specifications

Processor: Apple M1 Max

OS: MacOS Ventura 13.4.1

OS type: 64 bit

Data

Data Amount	Number of Threads	Execution Time/Test
200	1	0.0008968ms
200	3	0.0026933ms
200	5	0.0015597ms
200	30	0.0037644ms
200	100	0.0038507ms
200	200	0.0341587ms