Правительство Российской Федерации

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Факультет компьютерных наук

Департамент программной инженерии

Отчет к домашнему заданию По дисциплине

«Архитектура вычислительных систем»

Работу выполнил:

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Москва 2020

1. Условие

В магазине работают два отдела, каждый отдел обладает уникальным ассортиментом. В каждом отделе работает один продавец. В магазин ходят исключительно забывчивые покупатели, поэтому каждый покупатель носит с собой список товаров, которые желает купить. Покупатель приобретает товары точно в том порядке, в каком они записаны в его списке. Продавец может обслужить только одного покупателя за раз. Покупатель, вставший в очередь, засыпает пока не дойдет до продавца. Продавец засыпает, если в его отделе нет покупателей, и просыпается, если появится хотя бы один. Создать многопоточное приложение, моделирующее работу магазина.

2. Решение

Для реализации программы использовалась стандартная библиотека C++ для работы с потоками. Ниже приведен разбор условия и реализация конкретного пункта в приложении.

В программе было реализовано два класса Shop и Customer. Shop – это магазин в котором есть свой уникальный ассортимент продуктов и один продавец, отвечающий за этот магазин. Customer – это покупатели магазина. При запуске программы пользователю предоставляется возможность ввести количество товаров для двух магазинов [10, 500]. Для каждого магазина создается свой уникальный ассортимент, после чего пользователь вводит число n [1, 100], являющееся количеством покупателей в магазине. У каждого покупателя есть список нужных ему продуктов и при входе в магазине покупатель ищет отдел в котором продается нужный ему товар и встает в очередь в этом отделе. Как только очередь доходит до него, продавец дает ему товар и покупатель выходит из очереди после чего он определяет в каком отделе находится следующий по списку товар и снова занимает очередь в каком-то отделе и так до тех пор пока покупатель не купит все из своего списка продуктов.

3. Тестирование


```
Enter count of kind of items:-10
 Incorrect input!
Enter number again:0
Incorrect input!
Enter number again:3000
Incorrect input!
Enter number again:20
Shop Food has the following assortment of items:  2 20 18 16 3 7 17 8 15 1
Shop Building Materials has the following assortment of items:  4 5 6 9 10 11 12 13 14 19
Enter count of clients:-100
 Incorrect input!
Enter number again:0
Incorrect input!
Enter number again:300
Incorrect input!
Enter number again:10
[Client1] go into the shop.
[Customer 1] a list of items: 6 2 8 2 12
[Client2] go into the shop.
[Customer 2] a list of items: 3 8 17 12 5
[Client3] go into the shop.
[Customer 3] a list of items: 14 13 3 2 17 19 16
[Client4] go into the shop.
[Customer 4] a list of items: 7 12 19 10 13 8 20
[Client5] go into the shop.
[Customer 5] a list of items: 15 4 12 3 14
```

Рисунок 1 – Обработка некорректных данных


```
Enter count of kind of items:25
Shop Food has the following assortment of items:  17 12 10 15 22 5 3 1 2 4 13 14
Shop Building Materials has the following assortment of items:  6 7 8 9 11 16 18 19 20 21 23 24 25
Enter count of clients:7
```

Рисунок 2 – Создание ассортимента продуктов


```
Enter count of clients:7
[Client 1] go into the shop.
[Customer 1] a list of items: 3 12 17 21 18 3
[Client 2] go into the shop.
[Customer 2] a list of items: 17 5 3 4 18 8
[Client 3] go into the shop.
[Customer 3] a list of items: 17 19 21 23 2 22
[Client 4] go into the shop.
[Customer 4] a list of items: 20 13 18 25 11 20 4 12
[Client 5] go into the shop.
[Customer 5] a list of items: 9 24 15 17 12 4 19
[Client 6] go into the shop.
[Customer 6] a list of items: 20 13 8 13 10 24 17
[Client 7] go into the shop.
[Customer 7] a list of items: 4 17 11 16 18 14 7 16 18
```

Рисунок 3 – Создание покупателей и их списков покупок

```
[Customer 1] queued in shop Food for item 3
[Customer 2] queued in shop Food for item 17
[Customer 3] queued in shop Food for item 17
[Customer 4] queued in shop Building Materials for item 20
[Customer 5] queued in shop Building Materials for item 9
[Customer 6] queued in shop Building Materials for item 20
[Customer 7] queued in shop Food for item 4
[Shop Food] give the item to the customer1
[Customer 1] get an item 3
[Shop Building Materials] give the item to the customer4
[Customer 4] get an item 20
[Customer 1] queued in shop Food for item 12
[Customer 4] queued in shop Food for item 13
[Shop Food] give the item to the customer2
[Customer 2] get an item 17
[Shop Building Materials] give the item to the customer5
[Customer 5] get an item 9
[Customer 2] queued in shop Food for item 5
[Customer 5] queued in shop Building Materials for item 24
[Shop Food] give the item to the customer3
[Customer 3] get an item 17
[Shop Building Materials] give the item to the customer6
[Customer 6] get an item 20
[Customer 3] queued in shop Building Materials for item 19
[Customer 6] queued in shop Food for item 13
[Shop Food] give the item to the customer7
[Customer 7] get an item 4
[Shop Building Materials] give the item to the customer5
[Customer 5] get an item 24
[Customer 7] queued in shop Food for item 17
[Shop Food] give the item to the customer1
[Customer 1] get an item 12
[Shop Building Materials] give the item to the customer3
[Customer 3] get an item 19
[Customer 5] queued in shop Food for item 15
[Shop Food] give the item to the customer4
[Customer 4] get an item 13
```

Рисунок 4 – Занятие мест в очереди и получение нужных продуктов.

```
[Customer 1] queued in shop Food for item 17
[Customer 3] queued in shop Building Materials for item 21
[Customer 4] queued in shop Building Materials for item 18
[Shop Food] give the item to the customer2
[Shop Building Materials] give the item to the customer3
[Customer 2] get an item 5
[Customer 3] get an item 21
[Shop Building Materials] give the item to the customer4
[Shop Food] give the item to the customer6
[Customer 4] get an item 18
[Customer 2] queued in shop Food for item 3
[Customer 6] get an item 13
[Customer 3] queued in shop Building Materials for item 23
[Shop Building Materials] give the item to the customer3
[Shop Food] give the item to the customer7
[Customer 3] get an item 23
[Customer 7] get an item 17
[Customer 6] queued in shop Building Materials for item 8
[Customer 4] queued in shop Building Materials for item 25
[Shop Food] give the item to the customer5
[Shop Building Materials] give the item to the customer6
[Customer 6] get an item 8
[Customer 5] get an item 15
[Customer 7] queued in shop Building Materials for item 11
[Shop Food] give the item to the customer1
[Shop Building Materials] give the item to the customer4
[Customer 1] get an item 17
[Customer 4] get an item 25
[Customer 3] queued in shop Food for item 2
[Customer 6] queued in shop Food for item 13
[Customer 5] queued in shop Food for item 17
[Shop Food] give the item to the customer2
[Customer 2] get an item 3
[Shop Building Materials] give the item to the customer7
[Customer 7] get an item 11
[Customer 1] queued in shop Building Materials for item 21
```

Рисунок 5 – Занятие мест в очереди и получение нужных продуктов.

```
[Shop Food] give the item to the customer3
[Customer 3] get an item 2
[Shop Building Materials] give the item to the customer1
[Customer 1] get an item 21
[Customer 4] queued in shop Building Materials for item 11
[Customer 2] queued in shop Food for item 4
[Customer 7] queued in shop Building Materials for item 16
[Shop Food] give the item to the customer6
[Customer 6] get an item 13
[Shop Building Materials] give the item to the customer4
[Customer 4] get an item 11
[Customer 3] queued in shop Food for item 22
[Shop Food] give the item to the customer5
[Shop Building Materials] give the item to the customer7
[Customer 7] get an item 16
[Customer 5] get an item 17
[Customer 1] queued in shop Building Materials for item 18
[Customer 4] queued in shop Building Materials for item 20
[Shop Food] give the item to the customer2
[Customer 2] get an item 4
[Shop Building Materials] give the item to the customer1
[Customer 1] get an item 18
[Customer 6] queued in shop Food for item 10
[Shop Food] give the item to the customer3
[Customer 3] get an item 22
[Customer 3] bought all needed items.
[Shop Building Materials] give the item to the customer4
[Customer 4] get an item 20
[Customer 7] queued in shop Building Materials for item 18
[Customer 5] queued in shop Food for item 12
[Customer 1] queued in shop Food for item 3
[Shop Food] give the item to the customer6
[Customer 6] get an item 10
[Shop Building Materials] give the item to the customer7
[Customer 7] get an item 18
[Customer 2] queued in shop Building Materials for item 18
[Customer 4] queued in shop Food for item 4
[Shop Food] give the item to the customer5
```

Рисунок 6– Занятие мест в очереди и получение нужных продуктов.

```
[Shop Building Materials] give the item to the customer2
[Customer 5] get an item 12
[Customer 2] get an item 18
[Customer 6] queued in shop Building Materials for item 24
[Customer 7] queued in shop Food for item 14
[Shop Building Materials] give the item to the customer6
[Shop Food] give the item to the customer1
[Customer 6] get an item 24
[Customer 1] get an item 3
[Customer 1] bought all needed items.
[Customer 5] queued in shop Food for item 4
[Customer 2] queued in shop Building Materials for item 8
[Shop Food] give the item to the customer4
[Shop Building Materials] give the item to the customer2
[Customer 4] get an item 4
[Customer 2] get an item 8
[Customer 2] bought all needed items.
[Customer 6] queued in shop Food for item 17
[Shop Food] give the item to the customer7
[Customer 7] get an item 14
[Customer 4] queued in shop Food for item 12
[Shop Food] give the item to the customer5
[Customer 5] get an item 4
[Customer 7] queued in shop Building Materials for item 7
[Shop Food] give the item to the customer6
[Shop Building Materials] give the item to the customer7
[Customer 6] get an item 17
[Customer 6] bought all needed items.
[Customer 7] get an item 7
[Customer 5] queued in shop Building Materials for item 19
[Shop Food] give the item to the customer4
[Shop Building Materials] give the item to the customer5
[Customer 4] get an item 12
[Customer 4] bought all needed items.
[Customer 5] get an item 19
[Customer 5] bought all needed items.
[Customer 7] queued in shop Building Materials for item 16
[Shop Building Materials] give the item to the customer7
[Customer 7] get an item 16
[Customer 7] queued in shop Building Materials for item 18
[Shop Building Materials] give the item to the customer7
[Customer 7] get an item 18
```

Рисунок 7– Занятие мест в очереди и получение нужных продуктов.

Рисунок 8 – Занятие мест в очереди и получение нужных продуктов.

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