

Data Structures and Algorithms

Application of Stacks

Minor Degree Program

Subject Code: M16CSC201

Date: 26 Feb 2018

Question: Application of Stacks

Objective: Understanding the usage of stacks in real time scenarios

Problem:

Hubli city is definitely on a right path while talking towards the city development. To name a few are road construction, city maintenance or building a drainage system etc. Works are being carried out everywhere. Apart from these, good or bad, the city is also slowly adapting to the technology and rural culture. Examples are U-Mall, Urban OASIS Mall, Laxmi Pride Cinemas, KFC, Dominos, etc, etc.

Urban Oasis Mall, is preparing a master plan on how to attract more customers and kind of shops that needs to be started in the remaining spaces of the mall. Also it wants the process to get automated.



Fig: Urban OASIS Mall, Hubli City

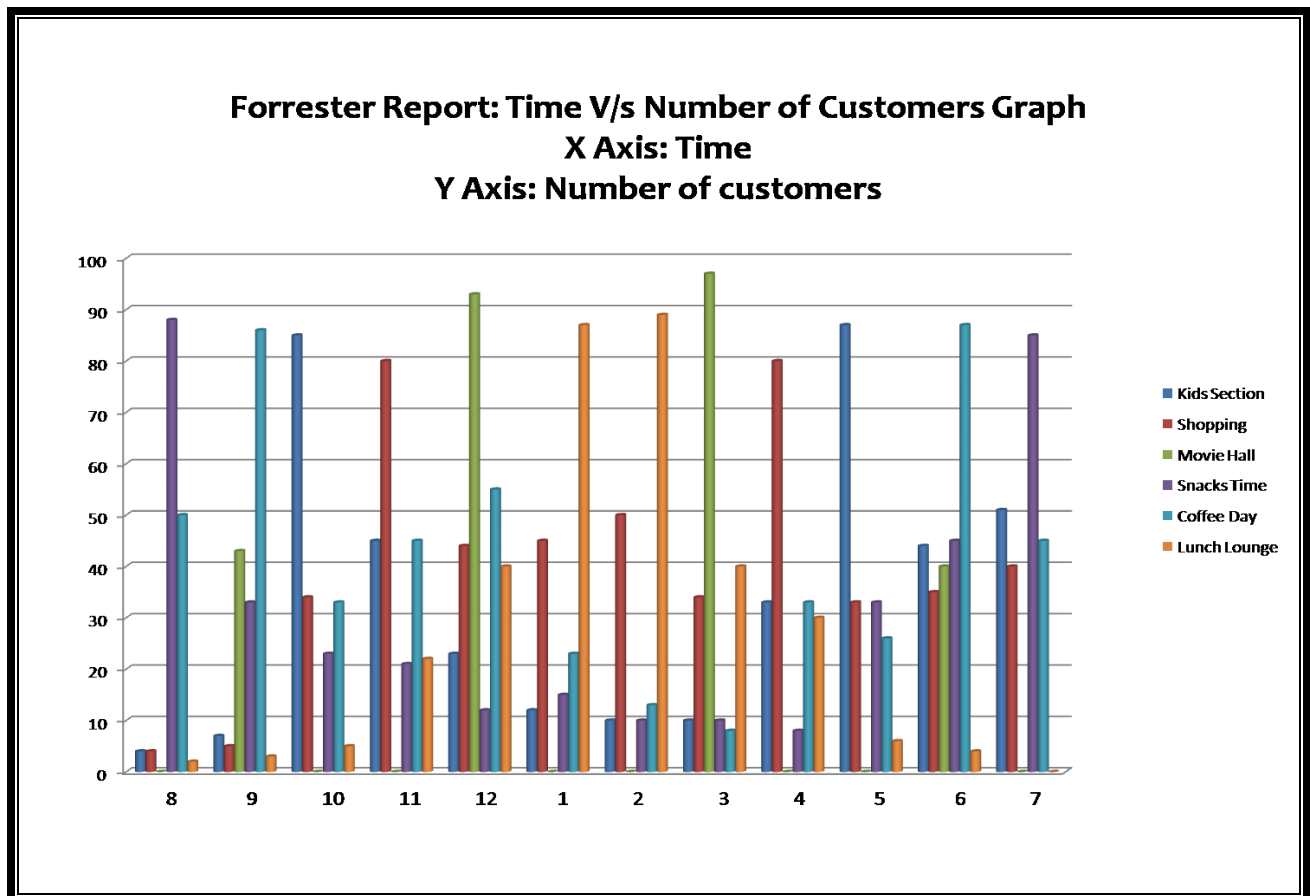
[Image Reference: ebharat.com]

Exercise 01 - Stacks

As the first initiative, the mall wants to attract more customers. And the technique adapted is to send the messages every hour to all the mobiles detected in the nearby locality. (Spanning 0.5km radius)

It was necessary to know the user habits at other malls in order to decide what kind of message would be appropriate to be sent at every hour. The authorities had approached the **Forrester Report** to get the survey done!

Forrester Reports collected the stats for number of customers present at each hour in 20 different malls of India. And after a study for 1 year, here is the **Forrester Report** summary:



According to the survey analysis, at each shop there are more customers at the specified timings:

Kids Section: 10.00 and 5.00

Shopping: 11.00 and 4.00

Movie Hall: 12.00 and 3.00

Snacks Time: 08.00 and 7.00

Coffee Day: 9.00 and 6.00

Lunch Lounge: 1.00 and 2.00

Exercise 01 - Stacks

Here is the peak flow of customers at every hour:

8.00 - Snacks Time
9.00 – Coffee Day
10.00 – Kids Section
11.00 – Shopping
12.00 – Movie Hall
1.00 – Lunch Lounge
2.00 – Lunch Lounge
3.00 – Movie Hall
4. 00 – Shopping
5.00 – Kids Section
6.00 – Coffee Day
7.00 – Snacks Time

Do you observe any pattern above??

At Professor's Desk

After looking at the message pattern, **STACK** looks like the best suitable data structure for the application. But we will have to maintain 2 stacks. At every hour a pop from stack will be push to another stack.

Can you justify why stack is the best one?

A little more help to you.

Use the below structures:

struct advertisement

```
{  
    char message_sent[30];    // Mobile advertisement to be made  
    int time[2];              // Time of broadcast  
};
```

struct stack

```
{  
    int top;                  // The stack top  
    int active;               // Status to indicate if the stack is active  
    struct advertisement items[STACKSIZE]; // Items tracking advertisements  
};
```

typedef struct stack STACK;

Provide the functionalities in main for:

1. Display the message being broadcasted
2. Update Time
3. Print messages left over
4. Print All Messages
5. Exit

Task Description:

1. **Display the message being broadcasted** – Peek into the active stack
2. **Update Time** - Pop the value from one stack and push it to another stack. The advertisement message is being changed
3. **Print messages left over** - Find the active stack and display all the contents
4. **Print All Messages** – Print both the stack contents clearly stating the type of stack
5. **Exit** – Exit from the menu

Exercise 01 - Stacks

Initialize the data in stack statically before providing the above options to the user. Before the above menu is being printed to the user, the initialization function needs to be called which will initialize one stack with respected content and keep the other empty.

Split the code into 3 different files. Test for all pre and post conditions. Some part of the code is already done for you. You need to do the remaining.

**** Happy Coding ****