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**Pg.No:**

# IMPLEMENTATION OF VENDING MACHINE USING MEALY FINITE STATE MACHINE IN C++ LANGUAGE

## OVERVIEW

A vending machine is a machine that dispenses items such as snacks, beverages, and other goods after a customer inserts currency or a credit card. The vending machine uses a Mealy finite state machine (FSM) to control its operations.

The FSM for a vending machine using Mealy consists of several states including idle, coin accepted, item selected, item dispensed, and out of stock.

The idle state is the initial state of the vending machine, where it is waiting for a customer to insert coins or a credit card. When a coin is inserted, the machine transitions to the coin accepted state and waits for the customer to make a selection.

Once an item is selected, the machine transitions to the item selected state and waits for the customer to insert enough coins to pay for the item. If the customer has inserted enough coins, the machine transitions to the item dispensed state and dispenses the selected item.

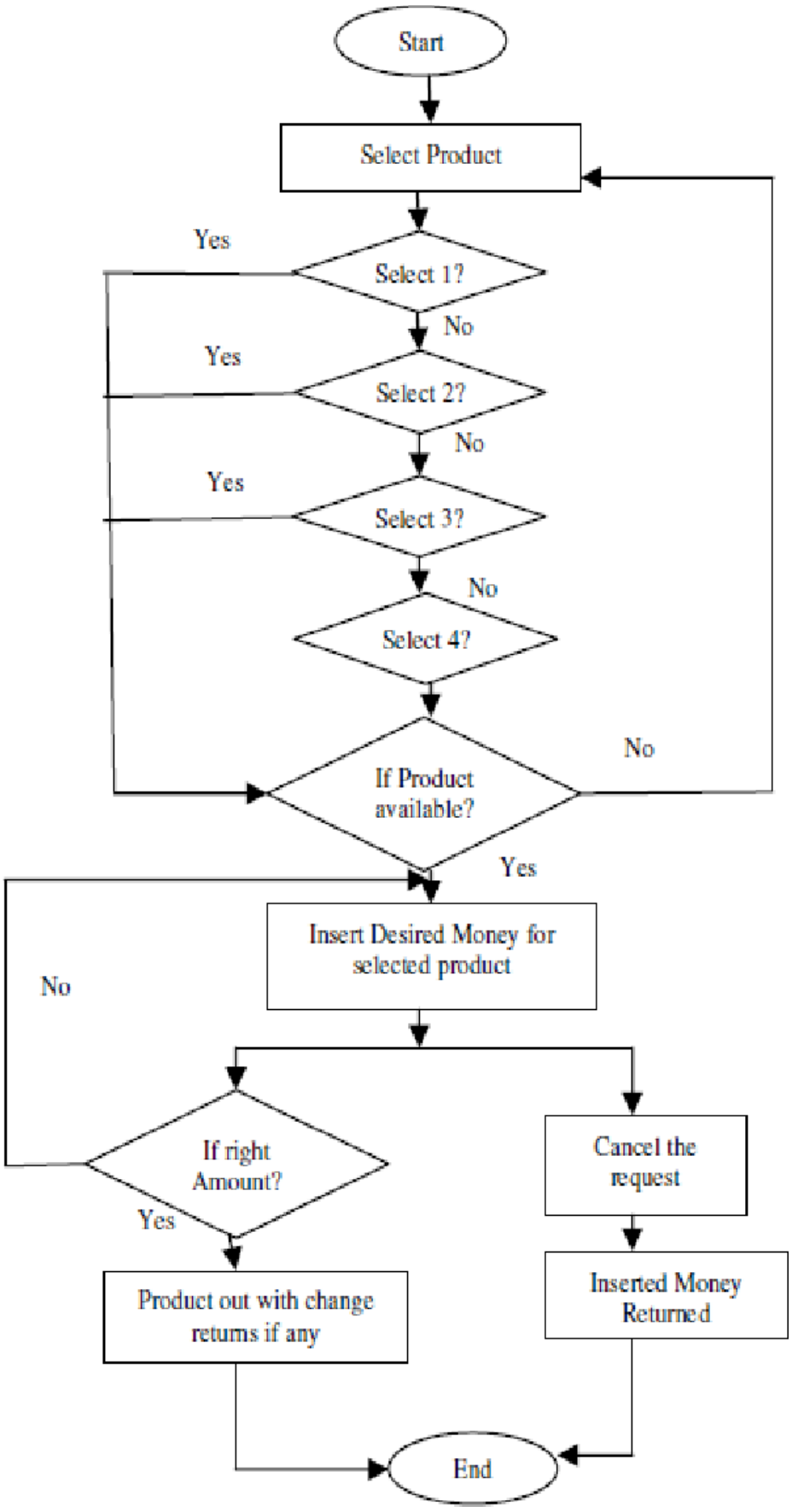
If the selected item is out of stock, the machine transitions to the out-of-stock state and displays a message indicating that the item is not available.

Overall, the FSM for a vending machine using Mealy helps to control the operations of the machine and ensure that it functions correctly and efficiently for customers.

## TOPICS COVERED

- Classes
- Structures
- Virtual function
- Constructor
- Pointer
- Function overloading/ function overriding
- Exception handling
- Inheritance

## FLOWCHART/BLOCK DIAGRAM



# C++ PROGRAM CODE

```
#include<iostream>
#include <string.h>
#include <iomanip>
using namespace std;

struct softdrink
{
char name[20];
float price;
unsigned quantity;
}drink[5];

class vending
{
public:
virtual void access()
{
strcpy(drink[0].name,"Cola"); drink[0].price=0.75; drink[0].quantity=20;
strcpy(drink[1].name,"Root Beer"); drink[1].price=0.75; drink[1].quantity=20;
strcpy(drink[2].name,"Lemon Lime"); drink[2].price=0.75; drink[2].quantity=20;
strcpy(drink[3].name,"Grape Soda"); drink[3].price=0.80; drink[3].quantity=20;
strcpy(drink[4].name,"Cream Soda"); drink[4].price=0.80; drink[4].quantity=20;
cout << fixed;
cout << setprecision(2);
cout<<" WELCOME TO THE VENDING MACHINE! \n";
cout<<"~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n";
```

```
cout<<"Please select your drink: \n";

cout<<" 1) "<<drink[0].name<<"\t\t\t"<<drink[0].price<<"\t("<<drink[0].quantity<<")
remaining";

cout<<"\n 2) "<<drink[1].name<<"\t\t"<<drink[1].price<<"\t("<<drink[1].quantity<<")
remaining";

cout<<"\n 3) "<<drink[2].name<<"\t\t"<<drink[2].price<<"\t("<<drink[2].quantity<<")
remaining";

cout<<"\n 4) "<<drink[3].name<<"\t\t"<<drink[3].price<<"\t("<<drink[3].quantity<<")
remaining";

cout<<"\n 5) "<<drink[4].name<<"\t\t"<<drink[4].price<<"\t("<<drink[4].quantity<<")
remaining";

cout<<"\n 6) Leave the vending machine \n\n";

}

};


class sell: public vending

{

public:

sell(): vending() {}

void run()

{

cout<<"\n Choose a drink: ";

int choice;

cin>>choice;

while(choice!=6)

{

if(choice >=1 && choice <=5)

{

   if(drink[choice-1].quantity == 0)
```

```
    {
        cout<<"\n No more " << drink[choice-1].name <<" is available, requires refilling of the machine!";
        getchar();
        getchar();
        continue;
    }
}
if(choice == 6)
cout<<"Thank you for using it!";
else if(choice <= 5)
{
float money, price;
cout<<"\n Enter amount inserted: ";
cin>>money;
if(choice>=1 && choice <=3)
{
price = 0.75;
if(money < price)
{
cout<<"\n Enter sufficient amount : ";
getchar();
getchar();
continue;
}
}
else if(choice ==4 || choice ==5)
```

```
{
price = 0.80;
if(money < price)
{
cout<<"\n Enter sufficient amount ";
getchar();
getchar();
continue;
}
}
cout<<"\n Thum, thum, thum, splat..Enjoy your beverage!";
cout<<"\n\nChange calculated: "<< money-price;
drink[choice-1].quantity = drink[choice-1].quantity - 1;
cout<<"\nThere are "<< drink[choice-1].quantity <<" drinks left of that type. \n";
cout<<"Thank you for using it! Have a nice day :D \n";
cout<<"~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n";
getchar();
getchar();
}
try
{
      if(choice>=6)
      throw 6;
}
   catch(int choice)
   {
      cout<<"Out of stock!";
```

```
break;
    }
}
}
};

int main()
{
    vending v;
    vending *vptr;
    vptr=&v;
    vptr->access();
    sell s;
    sell *sptr;
    sptr=&s;
    sptr->run();
    return 0;
}
```

**Key Components:**

Structure:

softdrink: Stores information about a drink (name, price, quantity).

Classes:

vending: Base class representing a vending machine.

access(): Displays available drinks and their details.

sell: Derived class inheriting from vending, handling drink sales.

run(): Manages user interaction, money handling, and drink dispensing.

Code Flow:

Main Function:

Creates instances of vending and sell classes.

Calls vptr->access() to display the vending machine's menu.

Calls sptr->run() to initiate the drink purchase process.

access() Function:

Initializes drink information (names, prices, quantities).

Prints the available drinks and their prices.

run() Function:

Prompts the user to choose a drink.

Enters a loop until the user chooses to leave (option 6).

Within the loop:

Checks for drink availability.

Handles payment (prompting for money, checking if enough is inserted).

Dispenses the drink (if payment is sufficient).

Updates remaining quantity.

Displays change and a thank you message.

Handles out-of-stock situations.

Additional Points:

The code uses a try-catch block to manage errors related to out-of-stock drinks.

Formatting is applied to output for price display.

getchar() is used twice in some cases to pause execution for user input.

# OUTPUT

```
WELCOME TO THE VENDING MACHINE!
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Please select your drink:
 1) Cola            0.75    (20) remaining
 2) Root Beer       0.75    (20) remaining
 3) Lemon Lime      0.75    (20) remaining
 4) Grape Soda      0.80    (20) remaining
 5) Cream Soda      0.80    (20) remaining
 6) Leave the vending machine


Choose a drink : 5
Enter amount inserted : 3
Thum, thum, thum, splat..Enjoy your beverage!

Change calculated : 2.20
There are 19 drinks left of that type.
Thank you for using it! Have a nice day :D
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Enter amount inserted : 2
Thum, thum, thum, splat..Enjoy your beverage!

Change calculated : 1.20
There are 18 drinks left of that type.
Thank you for using it! Have a nice day :D
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

```
WELCOME TO THE VENDING MACHINE!
~~~
Please select your drink:
1) Cola         0.7500  (20) remaining
 2) Root Beer       0.7500  (20) remaining
 3) Lemon Lime      0.7500  (20) remaining
 4) Grape Soda      0.8000  (20) remaining
 5) Cream Soda      0.8000  (20) remaining
 6) Leave the vending machine


 Choose a drink : 7
 out of stock
```

## CONCLUSION

Thus, our application of mealy finite state machine using C++, that is the implementation of a vending machine, is successfully automated with the mentioned software requirements. The records that are entered in are automatically updated in the database. The above mentioned testing techniques are also performed and our application is finally ready to be deployed to our customers. This has the advantage of maintaining the records properly without any manual stress. Hence, it becomes easier to view the details later. The maintenance of our system completely depends on the customer's risk.

## REFERENCES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2) Computer Science with C++, Sumita Arora, 2019.
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4) https://www.sourcecodesolutions.in/2010/09/petrol-vending-machine-system.html