Problem Solving

Object Oriented Programming

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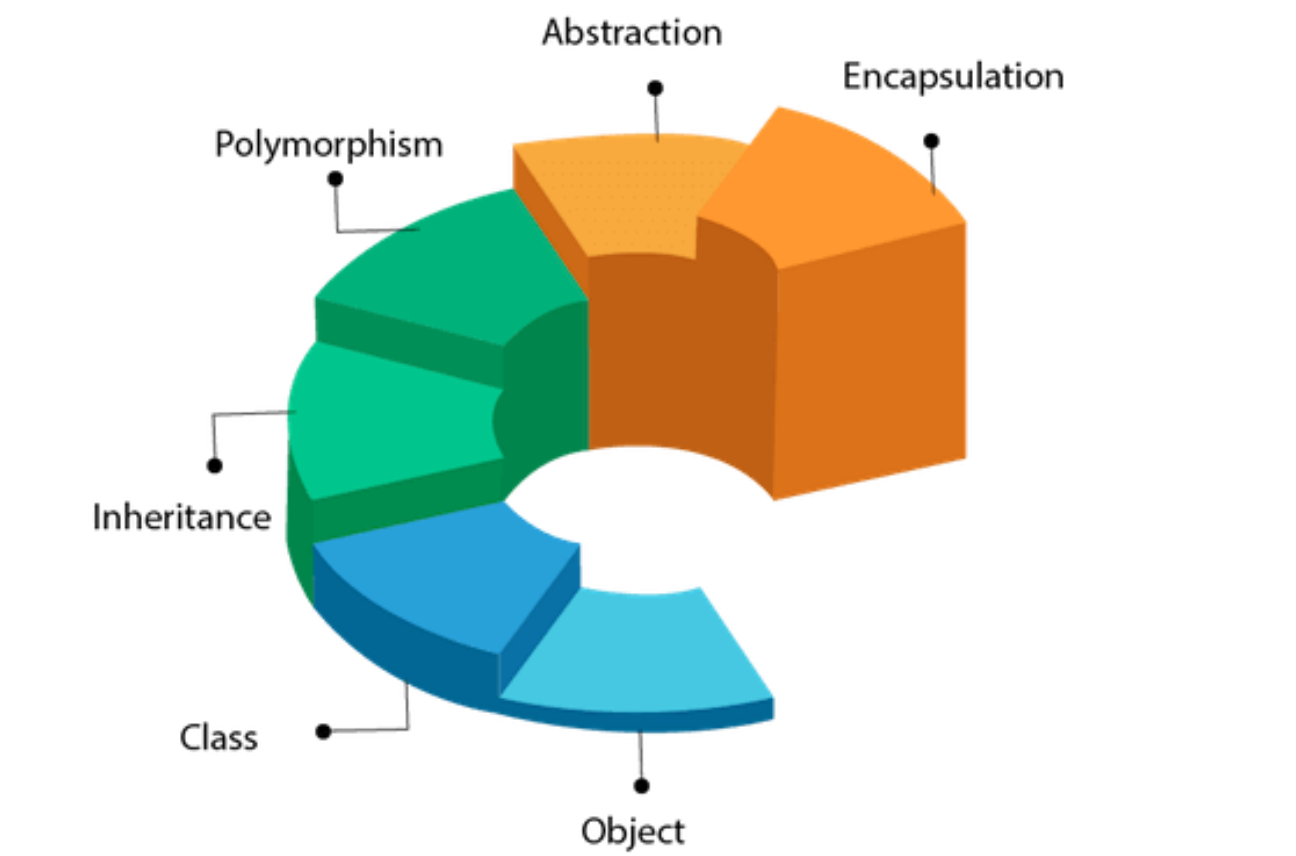


Question: Prepare the Bill for the customers in an Online Sports Shop.

Answer:

Aim: To Prepare a billing system for online sports shop.

Concepts used:

i. Classes and objects to create and store the inventory
ii. Classes and objects to create and store the cart items.
iii. Friend class and friend function to allow class cart to access private data members of class inventory.
iv. Dynamic Memory Allocation to create array of dynamic size
v. Dynamic constructors to initialize the data members of pointer data type.
vi. Destructors to deallocate the dynamically allocated memory to the pointer data type data members of the object and destroy the object
vii. Passing entire array of class objects to a function
viii. Forward Declaration of object.
ix. And many more.

Below is the fully functional application for billing of sports shop.

Users can select the items that they want to buy. After selecting the item, the application puts them into cart. User can keep on adding items in the cart till they want.

The inventory items are saved using the objects of user defined data type i.e class of inventory. Similarly, the cart items are saved using the objects of the class cart.

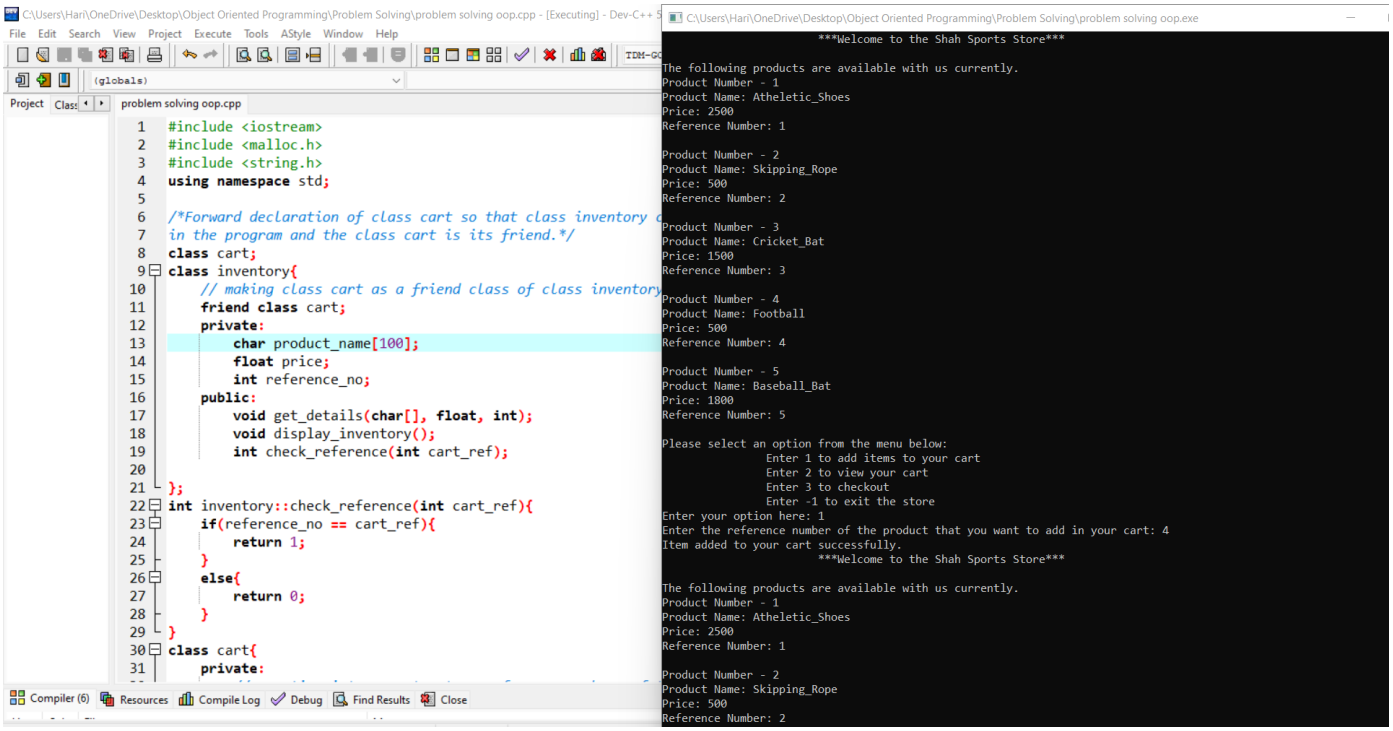
```
#include <iostream>
#include <malloc.h>
#include <string.h>
using namespace std;

/*Forward declaration of class cart so that class inventory can know that class cart exists somewhere
in the program and the class cart is its friend.*/
class cart;
```

```
class inventory{
        // making class cart as a friend class of class inventory so as to access the
private data members of inventory class.
        friend class cart;
        private:
                char product_name[100];
                float price;
                int reference_no;
        public:
                void get_details(char[], float, int);
                void display_inventory();
                int check_reference(int cart_ref);

};
int inventory::check_reference(int cart_ref){
        if(reference_no == cart_ref){
                return 1;
        }
        else{
                return 0;
        }
}
class cart{
        private:
                // creating int array to store reference numbers of the added items
in the cart.
                int *cart_items;
                float total_price;
        public:
                //Creating a constructor to dynamically allocate memory for the
cart_items;
                cart(){
                        // Default size of cart_items is enough to store 10 int
numbers i.e 40 bytes total.
                        cart_items = (int *) (malloc(10 * sizeof(int)));
                        total_price = 0;
                }
                ~cart(){
                        free(cart_items);
                }
                void add_item(int, int);
                void display_cart(int, class inventory p[]);
                void check_out();
```

```
};

void inventory::get_details(char name[100], float p_price, int ref_no){
        strcpy(product_name, name);
        price = p_price;
        reference_no = ref_no;
}

void inventory::display_inventory(){
        cout<<"Product Name: "<<product_name<<endl;
        cout<<"Price: "<<price<<endl;
        cout<<"Reference Number: "<<reference_no;
}

void cart::add_item(int cart_ref, int cart_count){
        cart_items[cart_count + 1] = cart_ref;
        // Dynamically allocating memory for cart_item of the class cart
        cart_items = (int *) (realloc(cart_items, (cart_count + 10) * sizeof(int)));
        cout<<"Item added to your cart successfully."<<endl;
}


void cart::display_cart(int cart_count, class inventory p[]){
        float temp_price = 0;
        cout<<"Below is/are your cart-items."<<endl;
        for(int i = 0; i<=cart_count; i++){
                cout<<"Item number "<< i+1<<endl;
                for(int j = 0; j<5; j++){
                        if(p[j].reference_no == cart_items[i]){
                                p[j].display_inventory();
                                temp_price += p[j].price;
                                cout<<endl<<endl;
                        }
                }
        }
        total_price = temp_price;
        cout<<"Total Price is RS "<<total_price<<endl;
}
void cart::check_out(){
        free(cart_items);
        cout<<"Thank you for shopping with us. !"<<endl;
        total_price = 0;
}
```

```
int main(){
	class inventory p[5];
	class cart cart_obj;
	int cart_ref, cart_count = -1; //cart_count is -1 signified the cart is emoty.
	p[0].get_details("Atheletic_Shoes", 2500, 1);
	p[1].get_details("Skipping_Rope", 500, 2);
	p[2].get_details("Cricket_Bat", 1500, 3);
	p[3].get_details("Football", 500, 4);
	p[4].get_details("Baseball_Bat", 1800, 5);

	int option = 0;
	while(option != -1){
		cout<<"\t\t\t***Welcome to the Shah Sports
Store***\n"<<endl;
		cout<<"The following products are available with us
currently."<<endl;
		for(int i = 0; i<5; i++){
			cout<<"Product Number - "<<i+1<<endl;
			p[i].display_inventory();
			cout<<endl<<endl;
		}
		cout<<"Please select an option from the menu below:\n \
		Enter 1 to add items to your cart\n \
		Enter 2 to view your cart\n \
		Enter 3 to checkout\n \
		Enter -1 to exit the store"<<endl;
		cout<<"Enter your option here: ";
		cin>>option;

		switch(option){
			case -1:{
				cout<<"Thank You for shopping with us."<<endl;
				break;
			}
			case 1:{
				int flag = 0;
				cout<<"Enter the reference number of the product
that you want to add in your cart: ";
				cin>>cart_ref;
				for(int i = 0; i<5; i++){
					flag = p[i].check_reference(cart_ref);
					if(flag == 1){
```

```
                                        break;
                                }
                        }
                        if(flag == 0){
                                cout<<"Invalid Reference number. Try
adding the item again."<<endl;
                        }
                        else{
                                cart_obj.add_item(cart_ref, cart_count);
                                cart_count += 1;
                        }
                        break;
                }

                case 2:{
                        if(cart_count == -1){
                                cout<<"The cart is empty. Please add some
items in your cart first."<<endl;
                        }
                        else{
                                cart_obj.display_cart(cart_count, p);
                        }

                        break;
                }
                case 3:{
                        if(cart_count == -1){
                                cout<<"The cart is empty. Please add some
items in your cart first."<<endl;
                        }
                        else{
                                cart_obj.display_cart(cart_count, p);
                                cart_obj.check_out();
                                cart_count = -1;
                        }
                        break;
                }

        }
    }
    return 0;
}
```



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        void display_inventory();
        int check_reference(int cart_ref);

};
int inventory::check_reference(int cart_ref){
    if(reference_no == cart_ref){
        return 1;
    }
    else{
        return 0;
    }
}
class cart{
    private:
```

```
                        ***Welcome to the Shah Sports Store***

The following products are available with us currently.
Product Number - 1
Product Name: Atheletic_Shoes
Price: 2500
Reference Number: 1

Product Number - 2
Product Name: Skipping_Rope
Price: 500
Reference Number: 2

Product Number - 3
Product Name: Cricket_Bat
Price: 1500
Reference Number: 3

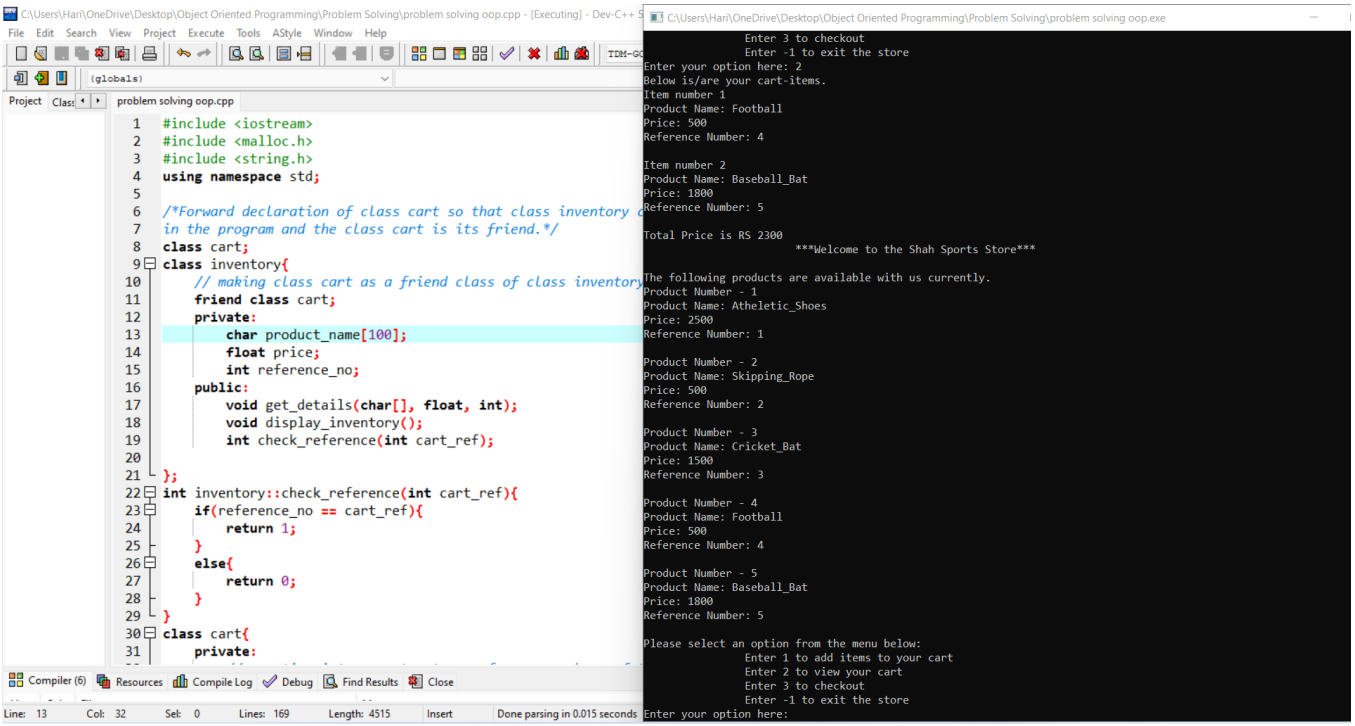
Product Number - 4
Product Name: Football
Price: 500
Reference Number: 4

Product Number - 5
Product Name: Baseball_Bat
Price: 1800
Reference Number: 5

Please select an option from the menu below:
                Enter 1 to add items to your cart
                Enter 2 to view your cart
                Enter 3 to checkout
                Enter -1 to exit the store
Enter your option here: 1
Enter the reference number of the product that you want to add in your cart: 4
Item added to your cart successfully.
                        ***Welcome to the Shah Sports Store***

The following products are available with us currently.
Product Number - 1
Product Name: Atheletic_Shoes
Price: 2500
Reference Number: 1

Product Number - 2
Product Name: Skipping_Rope
Price: 500
Reference Number: 2
```



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};
int inventory::check_reference(int cart_ref){
    if(reference_no == cart_ref){
        return 1;
    }
    else{
        return 0;
    }
}
class cart{
    private:
```
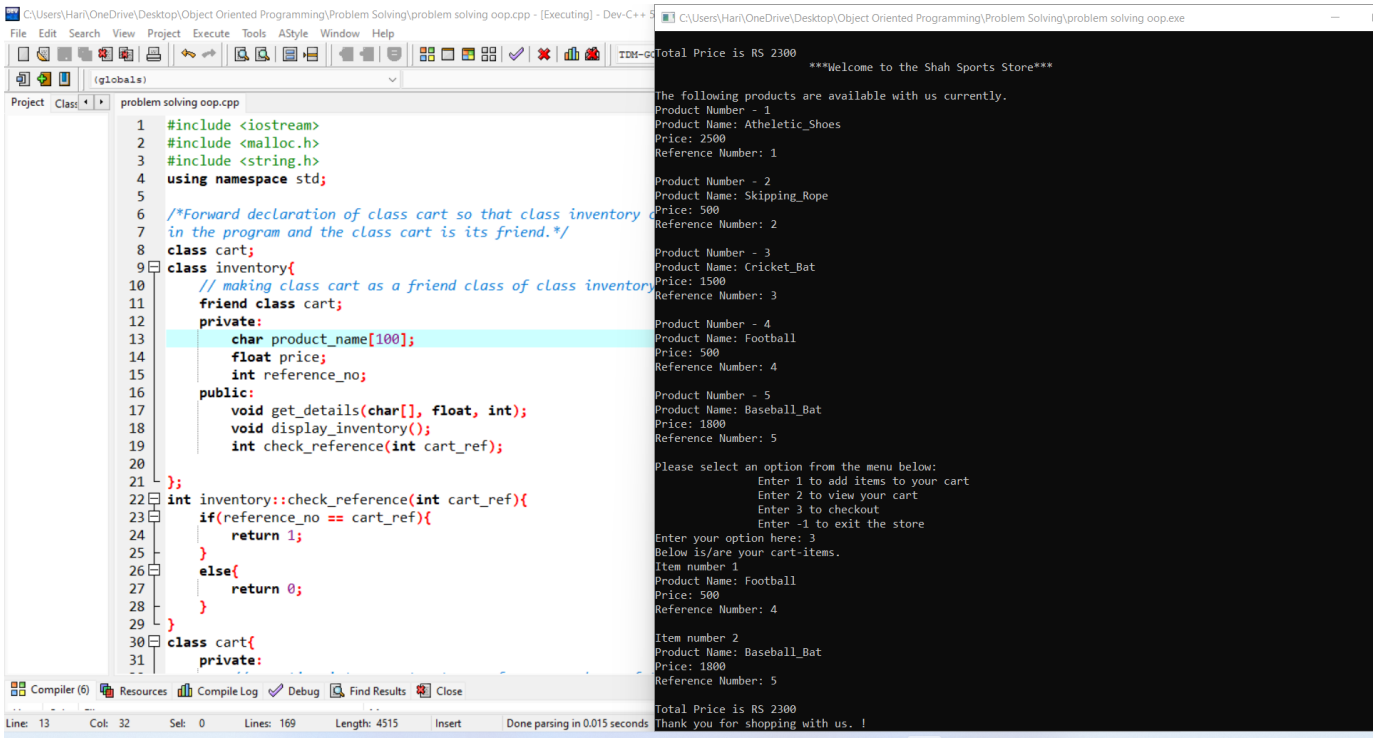

```
                Enter 3 to checkout
                Enter -1 to exit the store
Enter your option here: 2
Below is/are your cart-items.
Item number 1
Product Name: Football
Price: 500
Reference Number: 4

Item number 2
Product Name: Baseball_Bat
Price: 1800
Reference Number: 5

Total Price is RS 2300
                        ***Welcome to the Shah Sports Store***

The following products are available with us currently.
Product Number - 1
Product Name: Atheletic_Shoes
Price: 2500
Reference Number: 1

Product Number - 2
Product Name: Skipping_Rope
Price: 500
Reference Number: 2

Product Number - 3
Product Name: Cricket_Bat
Price: 1500
Reference Number: 3

Product Number - 4
Product Name: Football
Price: 500
Reference Number: 4

Product Number - 5
Product Name: Baseball_Bat
Price: 1800
Reference Number: 5

Please select an option from the menu below:
                Enter 1 to add items to your cart
                Enter 2 to view your cart
                Enter 3 to checkout
                Enter -1 to exit the store
Enter your option here:
```



Hand Written Explanation

User defined data type.

Class Inventory

Char product name[100];
float price;
int reference_no;

Class is a model.

Instances of class.

→ objects.

P[0]

Atheletic_Shoes

2500

1

P[1]

Skipping_rope

500

2

P[2]

Cricket_ball

1500

3

P[3]

Football

500

4

P[4]

Baseball_bat

1800

5.

Friend class Cart of Class Inventory. —access granted.→ All the members of the class Inventory.

Class Cart cart_obj;

Immediately after cart_obj is created, it is initialized by explicitly created constructor by the user.

~~what do~~

Here, constructor initializes the size of cart_items which is a dynamical array.

also, it sets total_price to 0.

Also, destructor gets called when the object goes out of range.

Here, destructor frees memory that was allocated to cart_items which is a dynamically size allocated array using free() function.