Polytechnic University of Puerto Rico
Electrical and Computer Engineering & Computer Science Department
CECS 2223 – Computer Programming II Lab

Team Project

Name: ______Jorge A. Serrano__________________________ ID#: ___121260__________

Name: ______Jimmy Rivera Luna________________________ ID#: ___133952__________

1. Copy the source code developed for the Team Project and paste it as **text** below. (*15 points*)

Cars.h

```
//Cars.h
#pragma once
#include <iostream>
#include <string>
using namespace std;
class Cars
{
private:
    static int count; // The quantity of Cars objects created
    static size_t brandLength; // the length of the brand field
    static size_t modelLength; // the length of the model field
    string brand; // the car's brand name
    string model; // the car's model name
    int number; // the car's number
    string serialNumber; // the car's serial number
    string setSerialNumber(); // private method to create the serial number
    void setBrandLength(); // private method to set the length of the brand field
    void setModelLength(); // private method to set the length of the model field
    string uppercase(string);
    string setCount(int) const;
    int getNumber() const; // get the number value
public:
    Cars(); // the default constructor
    Cars(string, string); // parameterized constructor
    ~Cars();
    void setBrand(string); // set the car's brand
    void setModel(string); // set the car's model
```

```
        string getBrandName() const; // gets the car's brand name
        string getModelName() const; // gets the car's model name
        string getSerialNumber() const; // gets the car's serial number
        size_t getBrandLength() const; // gets the brand field's length
        size_t getModelLength() const; // gets the model field's length
        void printCar() const; // prints the car's information
    };
```

Dealer.h

```
#pragma once
/*
* CECS 2223, Computer Programming II Lab
* Fall 2025, Sec. 05
* Date: October 14, 2022
* Topic: Lab 5 - Composition
* File name: Dealer.h
* This file declares a class named Dealer
* Name: Prof. de la Cruz
*/
/* A SOLUTION TO THIS EXERCISE WAS DISCUSSED DURING THE OCTOBER 17 LAB
SESSION */
// What to include???
#include "Cars.h"

class Dealer {
private:
int carCount; // total cars in inventory, i.e., the size of the array
Cars** inventory; // array to store the dealer's car inventory
string name; // car dealer's name
public:
Dealer(); // the default constructor
Dealer(string); // parameterized constructor, includes car dealer's name
void setName(string); // set the car dealer's name
void addCarToInventory(string, string); // adds a car to inventory
void sellCar(string, string); // sell a car from inventory
int findCar(string, string) const; // searches for a car in inventory
string getName() const; // to get the dealer's name
int getCarCount() const; // gets the total number of cars in inventory
void printInventory() const; // prints a list of each car in inventory, including the serial number
void orderInventory(); // orders the cars in inventory alphabetically

//Methods Added by Team Project:

void sellCar(string); // sells a car by serial number
int findCar(string) const; // finds a car by serial number
int getBrandCount(string) const; // gets the total number of cars of the same brand
int getModelCount(string) const; // gets the total number of cars of the same brand and model
void printBrandInventory() const; // prints a list of the brands and the counts for each brand
void printModelInventory() const; // prints a list of each different brand and model, and the count
};
```

Cars.cpp

```
//Cars.cpp
#include "Cars.h"
#include <string>
// initialize the class variables to 0
int Cars::count = 0; // The quantity of Cars objects created
size_t Cars::brandLength = 0; // the length of the brand field
size_t Cars::modelLength = 0; // the length of the model field
// Define the constructors. Each constructor adds 1 to the
// count class variable. The parameterized constructor calls
// the setSerialNumber method.

// The default constructor
Cars::Cars() {
brand = "";
model = "";
serialNumber = "";
number = ++count;
}

// The parameterized constructor
Cars::Cars(string aBrand, string aModel) {
brand = aBrand;
setBrandLength();
model = aModel;
setModelLength();
number = ++count;
serialNumber = setSerialNumber();
}

Cars::~Cars()
{
cout << "\nDestructor\n";
}

// The setSerialNumber method creates the serial number for the car.
// The serial number is made up of the first three letters of the
// brand plus the first three letters of the model plus three numbers
// from the count. For example, for a Toyota Yaris with count 1 the
// serial number would be TOYYAR001
string Cars::setSerialNumber() {
return uppercase(brand.substr(0, 3) + model.substr(0, 3)) + setCount(getNumber());
}

// The uppercase method is a private method used to convert characters into their
// uppercase representation
string Cars::uppercase(string str) {
for (size_t i = 0; i < str.size(); i++)
str[i] = toupper(str[i]);
return str;
}

// The setCount method converts the count value into a 3 character string
```

```
string Cars::setCount(int aCount) const {
if (aCount < 10)
return "00" + to_string(aCount);
else if (aCount < 100)
return "0" + to_string(aCount);
else
return to_string(aCount);
}

int Cars::getNumber() const {
return number;
}
// The setBrandLength and setModelLength methods determine the size of
// the corresponding field. The size of each field in the longest string
// plus 3 spaces.
void Cars::setBrandLength() {
if (brand.size() + 3 > brandLength)
brandLength = brand.size() + 3;
}

void Cars::setModelLength() {
if (model.size() + 3 > modelLength)
modelLength = model.size() + 3;
}

// Define the setters and getters.
// The setters for brand and model will call the field length methods.
void Cars::setBrand(string aBrand) {
brand = aBrand;
setBrandLength();
if (serialNumber.empty() && !model.empty())
serialNumber = setSerialNumber();
}

void Cars::setModel(string aModel) {
```

```
model = aModel;
setModelLength();
if (serialNumber.empty() && !brand.empty())
serialNumber = setSerialNumber();
}

string Cars::getBrandName() const {
return brand;
}

string Cars::getModelName() const {
return model;
}

string Cars::getSerialNumber() const {
return serialNumber;
}

size_t Cars::getBrandLength() const {
return brandLength;
}

size_t Cars::getModelLength() const {
return modelLength;
}
// The printCar method prints the data for a car in a
// table ready format. The data to be printed is brand,
// model, and serial number. The information must be
// printed in a single line, make sure to add the line
// termination instruction.
// This method DOES NOT print the table header
void Cars::printCar() const {
printf("%-*s%-*s%-s\n", getBrandLength(), getBrandName().c_str(), getModelLength(),
getModelName().c_str(), getSerialNumber().c_str());
}
```

Dealer.cpp

```
/*
* CECS 2223, Computer Programming II Lab
* Fall 2022, Sec. 05
* Date: October 14, 2022
* Topic: Lab 5 - Composition
* File name: Dealer.cpp
* This file defines the Dealer class
* Name: Jorge A. Serrano
*/
/* A SOLUTION TO THIS EXERCISE WAS DISCUSSED DURING THE OCTOBER 17 LAB SESSION */
#include "Dealer.h"

// The default constructor initializes carCount to 0, inventory to the null pointer (nullptr)
// and name to the empty string ""
Dealer::Dealer() {
carCount = 0;
inventory = nullptr;
name = "";
}

// The parameterized constructor receives the string with the dealer's name as parameter,
// initializes carCount to 0, and inventory to the null pointer
Dealer::Dealer(string aName) {
carCount = 0;
inventory = nullptr;
name = aName;
}

// The setName method recieves the string with the dealer's name as parameter
void Dealer::setName(string name) {
this->name = name;
}
```

```
// addCarToInventory receives a car's brand and model as parameters, and adds it to
// the inventory array as a pointer to a Cars object. This method increments carCount
// by 1. Once the car has been added to inventory, the method orderInventory
// must be called to order the array.
void Dealer::addCarToInventory(string brand, string model) {
// first, find out if the array exists
if (getCarCount() > 0) { //the array exists
Cars** temp = inventory; // temporary array to store the handles
inventory = new Cars * [++carCount]; // the new array
// Trandfer values from the "old" array to the new one
for (int i = 0; i < getCarCount() - 1; i++)
inventory[i] = temp[i];
delete[] temp;
}
else { // the array must be created
inventory = new Cars * [++carCount]; // the new array
}
// add the handle to the new car into inventory
inventory[getCarCount() - 1] = new Cars(brand, model);
orderInventory();
}

// The sellCar method deletes a Cars object from inventory. It must first make sure that
// the car exists in inventory by calling the findCar method. If the car is not found,
// print the message "The selected car, [brand] - [model], was not found in inventory"
// If the car is found, create a new array with one less position, and copy the
// contents of the old array into the new one, except for the car being sold. Once all
// remaining pointers have been copied to the new array, make usre to call the Cars
// destructor to remove the Cars object. This method decrements carCount by 1.
// Once the car has been removed from inventory, the method orderInventory
// must be called to order the array.
void Dealer::sellCar(string brand, string model) {
const int INDEX = findCar(brand, model);
```

```
if (INDEX > -1) { // the car exists in the array
Cars** temp = inventory;
inventory = new Cars * [--carCount];
int currentIndex = 0;
for (int i = 0; i < getCarCount() + 1; i++) {
if (i != INDEX) { // not the car to be removed
if (currentIndex < getCarCount()) { // the "new" array has space to store values
inventory[currentIndex] = temp[i];
currentIndex++;
}
}
}
temp[INDEX]->~Cars(); // invoke the destructor for the car to be removed
delete[] temp; // release the memory
}
else {
cout << "\nThe selected car, " << brand << " - " << model << ", was not found in inventory\n\n";
}
}

// This method searches inventory to find a match for the given car.
// If found, the method returns the index of the car in the array,
// otherwise, it returns -1.
int Dealer::findCar(string brand, string model) const {

if (getCarCount() > 0) { // the array exists, must search it
for (int i = 0; i < getCarCount(); i++) {
if (brand.compare(inventory[i]->getBrandName()) == 0 && model.compare(inventory[i]->getModelName()) == 0)
return i;
}
return -1;
}
else // the array does not exist
```

```
return -1;
}

// The getter for dealer's name
string Dealer::getName() const {
return name;
}

// getCarCount returns the total number of cars in inventory
int Dealer::getCarCount() const {
return carCount;
}

// This method prints a list of all cars in inventory in a table format.
// The method must print the phrase "Dealer [name] has [carCount] cars in inventory."
// Use the strings "BRAND", "MODEL", and "SERIAL NUMBER" as the table's header.
// Make sure to include code for the case where there are no cars in inventory
void Dealer::printInventory() const {

cout << "Dealer " << getName() << " has " << getCarCount() << " cars in inventory.\n\n";
if (getCarCount() > 0) {
printf("\t%-*s%-*s%-s\n", inventory[0]->getBrandLength(), "BRAND", inventory[0]->getModelLength(), "MODEL", "SERIAL NUMBER"); // table header
for (int i = 0; i < getCarCount(); i++) {
cout << "\t";
inventory[i]->printCar();
}
cout << endl;
}
}

// This methods orders the cars in inventory alphabetically, and has no
// parameters. Implement a selection sort algorithm, where the first item
// to be ordered is the brand name, followed by the model name.
// Recall that inventory ordering is only required if there is more than
// one car in inventory
void Dealer::orderInventory() {

if (getCarCount() > 1) { // there is more than one car in inventory
string lowest = "";
int lowIndex = -1;
Cars* temp = nullptr;
for (int i = 0; i < getCarCount() - 1; i++) {
lowest = inventory[i]->getSerialNumber();
for (int j = i + 1; j < getCarCount(); j++) {
if (lowest.compare(inventory[j]->getSerialNumber()) > 0) {
lowest = inventory[j]->getSerialNumber();
lowIndex = j;
}
}
if (lowIndex > -1) { // a swap is required
temp = inventory[i];
inventory[i] = inventory[lowIndex];
inventory[lowIndex] = temp;
lowIndex = -1;
}
}
}
}

void Dealer::sellCar(string serialNum)
{
const int INDEX = findCar(serialNum);
if (INDEX > -1) { // the car exists in the array
Cars** temp = inventory;
inventory = new Cars * [--carCount];
int currentIndex = 0;
for (int i = 0; i < getCarCount() + 1; i++) {
if (i != INDEX) { // not the car to be removed
if (currentIndex < getCarCount()) { // the "new" array has space to store values
inventory[currentIndex] = temp[i];
currentIndex++;
}
}
}
temp[INDEX]->~Cars(); // invoke the destructor for the car to be removed
delete[] temp; // release the memory
}
else {
cout << "\nThe selected car with the serial number"<<serialNum<< ", was not found in inventory\n\n";
}
}

int Dealer::findCar(string serialNum) const
{
if (getCarCount() > 0)          { // the array exists, must search it
for (int i = 0; i < getCarCount(); i++) {
if (serialNum.compare(inventory[i]->getSerialNumber()) == 0)
return i;
}
return -1;
}
else // the array does not exist
return -1;
return 0;
}

int Dealer::getBrandCount(string brandName) const
{
int brandCount = 0;
for (int i = 0; i < carCount; i++) {
if (brandName.compare(inventory[i]->getBrandName()) == 0) {
```

```
brandCount++;
}
else
{
return 0;
}
}
return brandCount;
}

int Dealer::getModelCount(string modelName) const
{
int modelCount = 0;
for (int i = 0; i < carCount; i++) {
if (modelName.compare(inventory[i]->getModelName()) == 0) {
modelCount++;
}
else
{
return 0;
}
}
return modelCount;
}

void Dealer::printBrandInventory() const
{
cout << "Dealer " << getName() << " has " << getCarCount() << " cars in inventory.\n\n";
if (getCarCount() > 0) {
printf("\t%-*s%-s\n", inventory[0]->getBrandLength(), "BRAND", "COUNT"); // table header
for (int i = 0; i < getCarCount(); i++) {
printf("\t%-*s%-d\n", inventory[i]->getBrandLength(), inventory[i]->getBrandName().c_str(),
getBrandCount(inventory[i]->getBrandName()));
}
```

```
cout << endl;
}
else
{
cout << "There are no cars on inventory." << endl;
}
}

void Dealer::printModelInventory() const
{
cout << "Dealer " << getName() << " has " << getCarCount() << " cars in inventory.\n\n";
if (getCarCount() > 0) {
printf("\t%-*s%-*s%-s\n", inventory[0]->getBrandLength(), "BRAND", inventory[0]-
>getModelLength(), "MODEL", "COUNT");// table header
for (int i = 0; i < getCarCount(); i++) {
printf("\t%-*s%-*s%-d\n", inventory[i]->getBrandLength(), inventory[i]-
>getBrandName().c_str(), inventory[i]->getModelLength(), inventory[i]-
>getModelName().c_str(), getModelCount(inventory[i]->getModelName()));
}

cout << endl;
}
else
{
cout << "There are no cars on inventory." << endl;
}
}
```

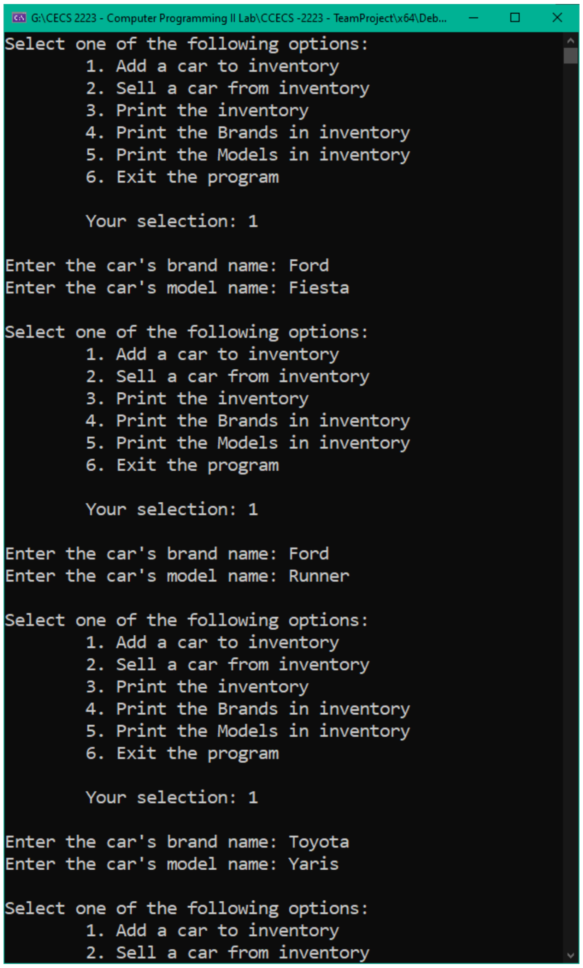
TeamProject.cpp

```
#include "Dealer.h"
#include"Cars.h"
#include <string>
```

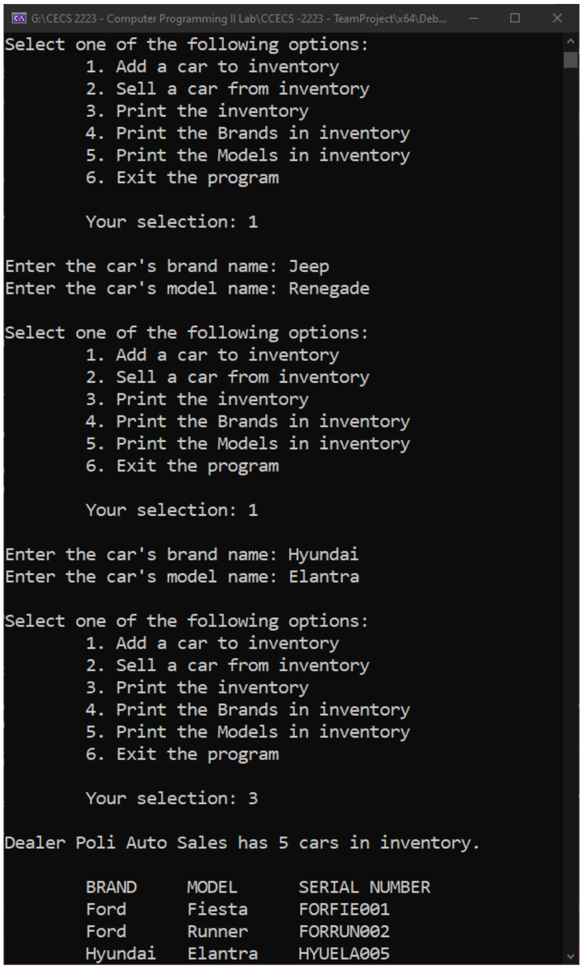
```
using namespace std;
int menu(); // options menu
bool execute(int, Dealer&); // implements the action from the menu
int main() {

Dealer poli("Poli Auto Sales");

while (execute(menu(), poli) == true);


cout << "Program developed by Jorge A. Serrano, ID#121260 and Jimmy Rivera Luna, ID# 133952. "<<endl;

system("pause");
return 0;
}
int menu() {
int option = 0;
cout << "Select one of the following options:\n";
cout << "\t1. Add a car to inventory\n";
cout << "\t2. Sell a car from inventory\n";
cout << "\t3. Print the inventory\n";
cout << "\t4. Print the Brands in inventory\n";
cout << "\t5. Print the Models in inventory\n";
cout << "\t6. Exit the program\n";
cout << "\n\tYour selection: ";
cin >> option;
cout << endl;
cin.ignore(256, '\n'); // to "clear" the stdin buffer
return option;
}
bool execute(int option, Dealer& aDealer) {
string brand = "", model = "";
switch (option) {
case 1:
```

```
cout << "Enter the car's brand name: ";
getline(cin, brand, '\n');
cout << "Enter the car's model name: ";
getline(cin, model, '\n');
aDealer.addCarToInventory(brand, model);
cout << endl;
return true;
case 2:
cout << "Enter the car's brand name: ";
getline(cin, brand, '\n');
cout << "Enter the car's model name: ";
getline(cin, model, '\n');
aDealer.sellCar(brand, model);
cout << endl;
return true;
case 3:
aDealer.printInventory();
return true;
case 4:
aDealer.printBrandInventory(); // prints a list of the brands and the counts for each brand
return true;
case 5:
aDealer.printModelInventory();
return true;
case 6:
cout << "Thank you for using this program!\n\n";
return false;
default:
cout << "\n\tERROR! Option #" << option << " is not valid.\n\tTry again!\n\n";
return true;
}
}
```

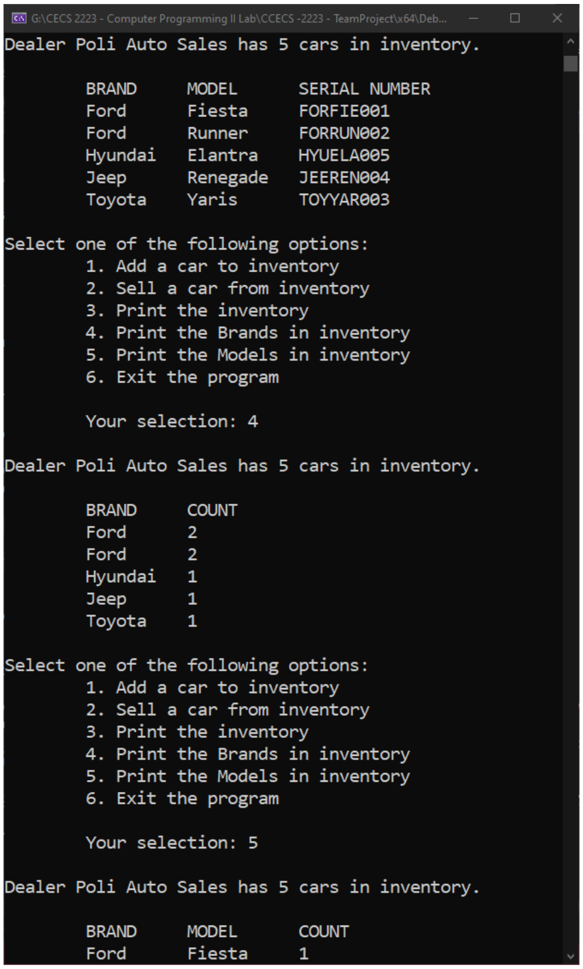
2. Paste the screenshots of the program’s execution below. (*5 points*)


G:\CECS 2223 - Computer Programming II Lab\CCECS -2223 - TeamProject\x64\Deb...

```
Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 1

Enter the car's brand name: Ford
Enter the car's model name: Fiesta

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 1

Enter the car's brand name: Ford
Enter the car's model name: Runner

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 1

Enter the car's brand name: Toyota
Enter the car's model name: Yaris

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
```


G:\CECS 2223 - Computer Programming II Lab\CCECS -2223 - TeamProject\x64\Deb...

```
Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 1

Enter the car's brand name: Jeep
Enter the car's model name: Renegade

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 1

Enter the car's brand name: Hyundai
Enter the car's model name: Elantra

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 3

Dealer Poli Auto Sales has 5 cars in inventory.

        BRAND     MODEL      SERIAL NUMBER
        Ford      Fiesta     FORFIE001
        Ford      Runner     FORRUN002
        Hyundai   Elantra    HYUELA005
```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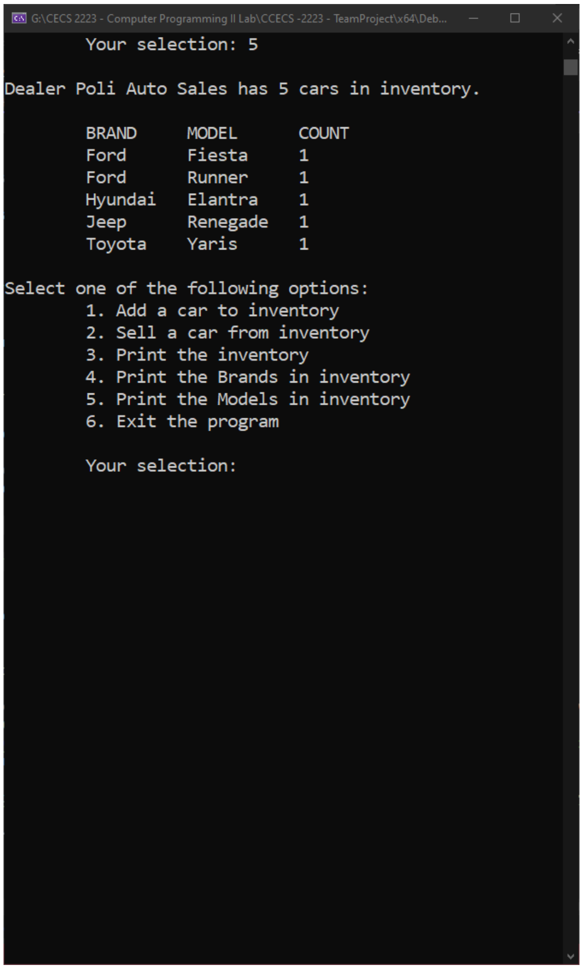
```
Dealer Poli Auto Sales has 5 cars in inventory.

        BRAND     MODEL      SERIAL NUMBER
        Ford      Fiesta     FORFIE001
        Ford      Runner     FORRUN002
        Hyundai   Elantra    HYUELA005
        Jeep      Renegade   JEEREN004
        Toyota    Yaris      TOYYAR003

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 4

Dealer Poli Auto Sales has 5 cars in inventory.

        BRAND     COUNT
        Ford      2
        Ford      2
        Hyundai   1
        Jeep      1
        Toyota    1

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection: 5

Dealer Poli Auto Sales has 5 cars in inventory.

        BRAND     MODEL      COUNT
        Ford      Fiesta     1
```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```
        Your selection: 5

Dealer Poli Auto Sales has 5 cars in inventory.

        BRAND     MODEL      COUNT
        Ford      Fiesta     1
        Ford      Runner     1
        Hyundai   Elantra    1
        Jeep      Renegade   1
        Toyota    Yaris      1

Select one of the following options:
        1. Add a car to inventory
        2. Sell a car from inventory
        3. Print the inventory
        4. Print the Brands in inventory
        5. Print the Models in inventory
        6. Exit the program

        Your selection:
```

3. **In a separate document**, complete your teammate’s review and submit it at the appropriate Blackboard drop. (*5 points*)

The program gave me many problems on the printf() of the printBrandInventory() and printModelInventory(). The program did compile but it wouldn’t print does two options, but after careful considerations I realized that using the getBrandName.c_str() along with the info in the prinCar() method. In the end to solve the problem I made another printf() inside the if statement from the printBrandInventory() and printModelInventory().