Fast**National University of Computer & Emerging Sciences, Karachi  
Spring-2022 School of Computing (BSCS, BSSE, BSCY, BSAI)  
Midterm 1  
07th Mar 2022, 10:00 am – 11:00 am**

|  |  |  |
| --- | --- | --- |
| **Course Code: CS1004** | **Course Name: Object Oriented Programming** | |
| **Instructor Name: Dr. Farooque Hassan Kumbhar, Dr. Abdul Aziz, Mr. Zain ul Hassan, Ms. Farah Sadia, Ms. Nida Munawar, Ms. Abeer Gauher, Mr. Basit Ali** | | |
| **Student Roll No:** | | **Section No:** |

Instructions:

* Return the question paper and make sure to keep it inside your answer sheet.
* Read questions completely before answering. There are **3 questions, 2 sides on 1 page**.
* In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
* You are **not allowed to write** anything on the question paper (except your ID and section).

**Time**: 60 minutes. **Max Marks**: 49 Marks

1. Write single-line short answers to the following questions: **[10 min, 10 Marks]**
   1. If we add a parameterized constructor, then there is no need for a setter function. Do you agree with this? give an explanation.

And: No, we need setter for update value as constructor only called once.

* 1. Why a constructor does not return anything, although it is a function and function must return.

And: It is called implicitly by the compiler for object construction. Hence, its return type cannot be determined.

* 1. Why do we need to add a NULL constructor, if it does nothing?

And: We sometimes want to create objects without passing any arguments.

* 1. What happens if an attribute does not have a setter function?

Ans: We cannot modify the value of that attribute.

* 1. Why do we need separate setter functions for every data element, we can create a combined setter as well? discuss.

Ans: We need separate setter to manipulate the value of single attribute. If we use combine setter then we may lose the value of other attributes.

* 1. A static function can be called using an object reference, then why is it recommended to use a class reference.

Ans: In order to make it clear that static members are being used it is commonly in practice to use class reference rather than object reference.

* 1. When do we want to declare a function as private?

Ans: When we want restrict direct access or usage of this function. It can only be used within the class.

* 1. What happens if a constructor is declared as private?

Ans: If we do then we cannot create object of that class using that particular constructor.

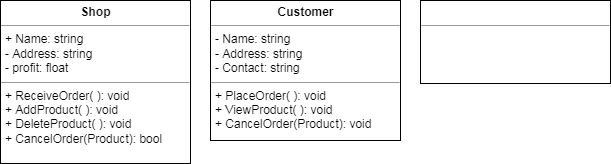
* 1. What should we do to restrict our object to be copied by other objects of the class.

Ans: Make copy constructor private. In Java declare object as final. In C++ make a null copy constructor.

* 1. What is the size of a class with two *int* and one *char* member variables?

Ans: Zero. No size until objects are created.

1. Consider the classes and their members in the diagram given below and perform the tasks that follow: **[25 min, 18 Marks (3 each)]**



1. Convert the entities Shop and Customer in given diagram to OOP classes and write the member variables with their correct access modifiers.
2. Create a new UML/Class Diagram for a third entity named Product. Show some attributes of Product you can think of in your diagram. In your Product UML/Class Diagram, write appropriate function prototypes if we desire functionality to update and read the attributes of Product.
3. Write product class for your Product UML/Class Diagram, write appropriate function if we desire functionality to calculate how many products have been created.
4. Write program of parameterized constructor for each of the three classes.
5. Implement the functions AddProduct and DeleteProduct to allow for creation and removal of a product. You can declare any appropriate parameters for these functions.
6. Implement the functions PlaceOrder to allow for purchase of a product and ReceiveOrder for displaying the total bill. You can declare any suitable parameters for these functions.

**Solution:**

**a)**

|  |  |  |
| --- | --- | --- |
| class Shop  {  string Address;  float Profit;  public:  string Name;  }; | class Customer  {  string Name;  string Address;  string Contact;  }; |  |

**b)**

|  |  |  |
| --- | --- | --- |
| Product  - ID: int  - Price: int  - Description: String  + void setID(int ID)  + int getID()  + void setPrice(int Price)  + int getPrice() |  |  |

**c)**

|  |  |  |
| --- | --- | --- |
| class Product  {  static int productCount;  public:  Product ()  {  productCount += 1;  } };  int Product::productCount = 0; |  |  |

**d)**

|  |  |  |
| --- | --- | --- |
| class Shop  {  public:  Shop(string a, string n)  {  Address = a;  Name = n;  } }; | class Customer  {  public:  Customer(string n, string a, string c)  {  Address = a;  Name = n;  Contact = c;  } }; | class Product  {  public:  Product() { }  Product(int i, int p, string d)  {  ID = i;  Price = p;  Description = d; } }; |

**e)**

|  |  |
| --- | --- |
| class Shop  {  // other code  Product \* p = new Product[10];  int i = 0;  public:  void **AddProduct**( )  {  int price;  string pID, pDescription;  cout << "Enter ID of product";  getline(cin, pID);  cout << "Enter price";  cin >> price;  cout << "Enter description";  getline(cin, pDescription);  p[i] = Product(pID, price, pDescription);  ++i;  }  }; | class Shop  {  // other code  public:  void **DeleteProduct**( Product\* p )  {  delete p;  }  }; |

**f)**

|  |  |
| --- | --- |
| class Customer  {  //other code  Shop \* s;  public:  void PlaceOrder( )  {  string prod;  cout << "Enter ID of product you want to buy";  getline(cin, prod);  s = new Shop("Nursery, Karachi", "Mart");  s -> ReceiveOrder(prod); }  }; | class Shop  {  // other code  public:  void ReceiveOrder(string prod)  {  for(int i = 0;i < 10; i++)  {  if(prod.equals(p[i]))  {  cout << "Order placed";  break;  }  } } }; |

1. Design a class VideoTape whose data members are private. The data members are labelled: string Title is a programme title, int Duration is the running time of the programme in minutes, double Size is the video size in GB's, string Created is a const data member of a class and it stores created date and time, string Resolution is given in pixels, and string Classification of the programme(Comedy, Drama, or Talk Show). **[25 min, 20 Marks (5 each)]**
   1. The default constructor of the class should initialize Title is "TITLE", Duration is 0, Size is 5.02, Created is "2010-07-09,21:42:40", Resolution is "1920 X 1080 pixels", and Classification is "CLASSIFICATION". A parameterized constructor (string Title, int Dur, double Size, string Created, string Resolution, string Classification) should initialize VideoTape's data members just make sure classification should be from given range as given above. If classification does not match from above mentioned programme list, assign the right value using SetClassification().
   2. Create a VT1 and VT2 objects with a given Title, Duration, Size, Created, Resolution, and Classification. Create VT3 and copy VT1 data in it.
   3. Implement the following functions:
      1. string getTitle(); - Return VideoTape's Title
      2. int getDuration(); - Return VideoTape's Duration
      3. void setDuration(int); Update VideoTape's Duration
      4. double getSize(); - Return VideoTape's Size
      5. string getCreated(); - Return VideoTape's Created
      6. string getResolution(); - Return VideoTape's Resolution
      7. string getClassification(); - Return VideTape's classification
      8. void setClassification(string);
   4. Compare method is a member function of a class VideoTape, in this function compare VT2 and VT3 and display only the maximum duration Tape details using display function. Also void Display () - print the details of the video tape to the output terminal in the following format: Title (Classification) Duration minutes, Size GBs.

SOLUTION:

|  |
| --- |
| #include<iostream>  using namespace std;  class VideoTape {  string Title, Resolution;  mutable string Classification;  int \*Duration;  double Size;  const string Created;  public:  VideoTape():Title("TITLE"),Size(5.02),Created("2010-07-09,21:42:40"),Resolution("1920 X 1080 pixels"),Classification("CLASSFICATION"){  Duration=new int;  \*Duration=0;  }  VideoTape(string Title, int Dur, double Size, string Created, string Resolution, string Classification):Title(Title),Size(Size),Created(Created),Resolution(Resolution){  Duration =new int;  \*Duration=Dur;  if(Classification=="Comedy" || Classification=="Talk Show" || Classification=="Drama")  this->Classification=Classification;  else{  cout<<"Re-Enter Classification from these(Comedy, Talk Show, Drama): ";  getline(cin,Classification);  setClasssification(Classification);  }  }  VideoTape( VideoTape &B):Created(B.Created) {  Title=B.Title;  Duration=new int;  \*Duration=\*(B.Duration);  Size=B.Size;  Resolution=B.Resolution;  Classification=B.Classification;  }  string getTitle() {  return Title;  }  int getDuration() {  return \*Duration;  }  void setDuration(int du){  \*Duration=du;  }  double getSize(){  return Size;  }  string getCreated(){  return Created;  }  string getResolution(){  return Resolution;  }  string getClassification() {  return Classification;  }  void setClasssification(string clas)const{  Classification=clas;  }  VideoTape& compare(VideoTape &VT\_old) {  if (\*Duration > \*(VT\_old.Duration)) {  return \*this;  }  else  return VT\_old;  }  void display(){  cout<<getTitle()<<" ( "<<getClassification()<<" ) "<<getDuration()<<" minutes, "<<getSize()<<"GB\'s."<<endl;  }  ~VideoTape(){  if(Duration!=NULL){  delete Duration;  cout<<"END"<<endl;  }  }  };  int main(){  VideoTape VT1("PariZaad",45,8.04,"2021-03-03,21:22:23","1980 X 1190 pixels","Drama");  VideoTape VT2("hasb-e-haal",30,7.5,"2022-01-02,20:00:00","1950 X 1090 pixels","Talk Show");  VideoTape VT3(VT1);  VT1.display();  VT2.display();  VT3.display();  VT2.setClasssification("Comedy");  VT1.setDuration(60);  VT1.display();  VT2.display();  VT3.display();  VideoTape T=VT2.compare(VT3);  T.display();    return 0;  } |

***BEST OF LUCK!***