00432

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 2 (2022)

IT1050–Object Oriented Concepts

Duration: 2 Hours

November 2022

Instructions to Candidates:

- This paper has 4 questions.
- Answer all other questions in the booklet given.
- The total marks for the paper is 100.
- This paper contains 6 pages, including the cover page.
- Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.
- This paper is preceded by 10 minutes reading period. The supervisor will indicate when answering may commence.

Question 01 (40 Marks)

Write the answers to the following questions.

a). Explain the following terms using an example
   i) Encapsulation
   ii) Inheritance
   iii) Polymorphism (6 marks)

b) Write the 5 relationships that can exist between classes from strongest to the weakest. (6 marks)

c) Briefly explain the term "Function overriding" with an example. (4 marks)

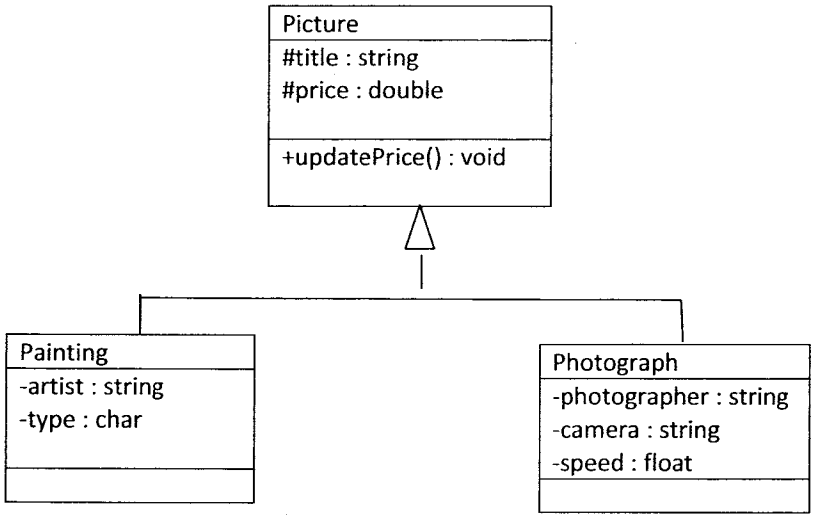
d). Consider the C++ code given below, and answer the questions.

```
class Address
{
   private:
        int house;
        string street;
        string city;
  public:
        Address( int pNo, string pStr, string pCity);
};

class Person
{
  private:
       string name;
       Address *addr;
  public:
       Person(string pname, Address *add)
       {
           name = pname;
           addr = add;
       }
};

int main()
{
    Address *add1=new Address(25,"School ln", "Col-03");

    Person *P1=new Person("Amal", &add1);
}
```

i) What is the relationship between "Address" and "Person" as shown in the code above ? (2 marks)

ii) Draw the UML class diagram to show the relationship correctly. (2 marks)

e) Consider the diagram given below and answer the questions.



i) What the relationship shown between **Painting** and **Picture** ? (2 marks)
ii) What type of a class is **Picture** ? (2 marks)
iii) Write the C++ code for classes **Picture** and **Photograph**. (6 marks)

f). Consider the classes below and write the relationship that can exist between the given classes. Draw the correct UML notation to represent the relationship. Mention the multiplicity where necessary. (10 marks)

i) Folder, File
ii) Bicycle, Wheel
iii) Person, Heart
iv) House, Room
v) Module, Mathematics

Question 02 (25 marks)

Given below is a set of requirements for a project management system of the Past Pupils Association of "Beyond Horizon" school. Analyse the given requirements and answer the questions.

Past Pupils Association (PPA) of "Beyond Horizon" School wants to develop a web application to manage their projects. The system administrator should be able to update information about the executive committee for a particular year to give access to various activities done by the PPA.

On a particular year the PPA does many projects to raise funds and to provide services to school. The executive committee consists of the President, Secretary, Assistant Secretary, Treasurer, Assistant Treasurer, and Committee Member. The secretary of the PPA should be able to enter details of a project, such as the project name, the date scheduled, the name and the contact number of the project coordinator. A project Coordinator is a committee member. The project coordinator should be able to add details of the Project, such as the project committee members, the list of tasks, the person assigned for each task, and the budget plan. The Assistant treasurers should be able to enter the daily account details according to each project (such as the amount of donations collected for each project). The treasurer should be able to generate daily reports to see the income and the expenditure of each project. The treasurer should also be able to generate the monthly reports of all projects to be produce to the internal auditors.

The project coordinator should be able to update the progress of the project completions. At the end of a project the coordinator should update the system with the level of service provided (Excellent, good, satisfactory) by each member of the project group to issues service certificates. Once the system is updated with the service level, then it must be sent to the secretary to approve the service and grant permission to print the certificate.

The system should have a facility for members to apply for PPA membership by filling a form and paying through a given method. The new member must fill the fields of the online form and attach the necessary documents. Then he/she can select annual membership or life membership option and pay the amount through credit/debit/PayPal methods. Once the application is submitted the assistant treasurer can view the application and approve it. Once the application is approved it is notified to the new member and the member can login to system using the credentials sent via an email. A membership card including a barcode will be printed and sent to the member through mail.

a) List the five rejecting rules and write all the nouns in the above description that will be eliminated under each rule. (10 marks)

b) Identify and list the classes in the above scenario. (5 marks)

c) Draw the CRC cards for any 5 classes you have identified in part b). (10 marks)

Question 03 (15 marks)

Consider the following description and draw the class diagram. Clearly show the classes, relationships and multiplicity using UML notations.

The time scheduling system should let the architects register their daily appointments details with their clients. the information to be stored include the name of the client, with whom the appointment/ meeting is arranged, venue, the time, duration and the description of the appointment. When a meeting involves many architects the system should automatically find a common slot in the daily appointment files (diaries) of each concerned architect, and arrange the meeting. (i.e. make relevant entries in the diaries of all the concerned architects) at the time of registration. While the concerned architects should be informed of the details about the scheduled meetings through emails the schedule file should also be updated on every scheduled meeting.

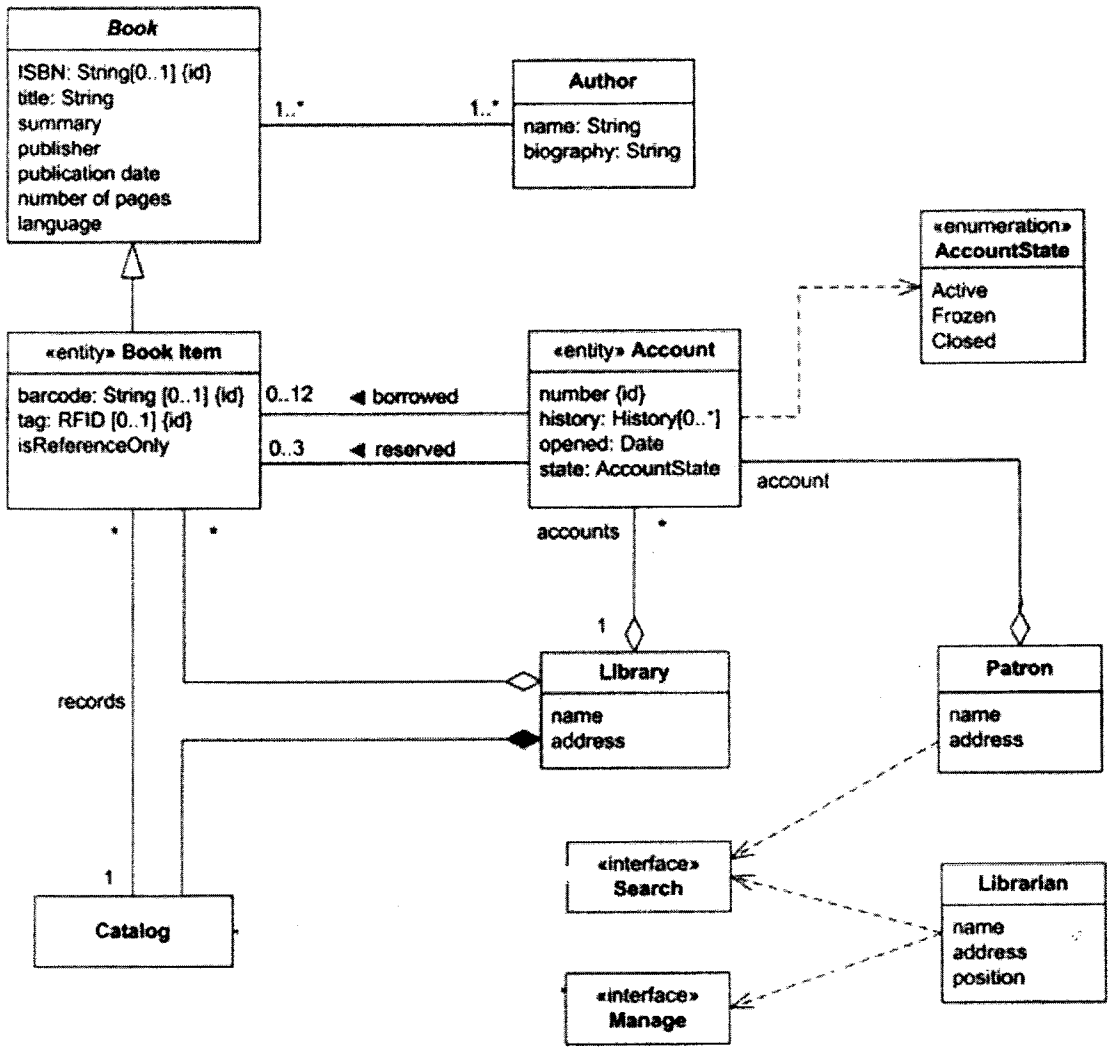
Every day, in the morning the time scheduling system should send a reminding email to all architects about their appointments for the corresponding day. Besides registering their appointments or meetings, the architects might mark periods of which they plan to be on leave in the diary. Also, architects might them mention in their diaries any other engagements they have.

Other features to be supported by the system are the following:

Time scheduling system should be able to provide several types of statistics (several documents) for the top level managers, such as which architects spent how much time on a meeting, for which project how many meetings were organized and for what duration and how many man hours were devoted for such meetings.

Question 04 (20 marks)

Consider the following class diagram and write the C++ code for the classes shown in the diagram. (Add methods with implementations ONLY when you need to show the relationships)



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