Midterm Exam

CSCI 45000/ECE

46100 8 Questions, total 50

Points

Name : Joshua Hale

Date : 10/25/2022

Start time : 6:00 PM.

End time : 8:30 PM.

Due at : 9:00 PM.

---Internal Use---

Instructions: You have the options of typing in your answers using this word document or submit handwritten answer sheets by attaching to the question paper. Class diagrams can be drawn by hand, but make sure all writings are clear and legible, images can be included in the final submission. Any illegible answers will not be counted. Also make sure your answers are clear and concise – I am not looking for long answers, points will be deducted if you do not clearly answer the question in a concise manner. All class diagrams should follow UML conventions. If you have images of your class diagrams as separate files, please name them using the appropriate question number. Your submission should be a single pdf or zip file containing all your files. If you are submitting hand-written answer sheets, please make sure your handwriting is clear and ligible.

1. [5 pointstotal] Consider the ATM machine system we discussed in class lectures. Identify three different actors that interact with this system. You can use your imagination, but be realistic and should be able to describe how each actor interact with the ATM machine system. [3 points]

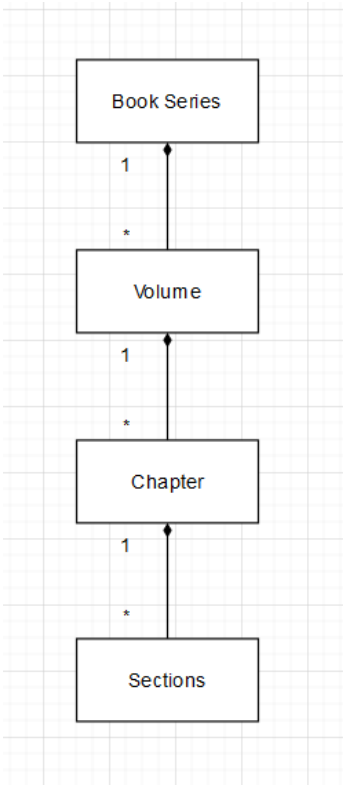
The ATM machine, a bank customer, and the bank's remote server are all actors that interact in this system. The bank customer interfaces with the ATM machine to perform operations on a bank account that the ATM machine is able to authenticate connection to from the bank's datacenter. The data center receives requests and operations from realistically multiple ATM machines, but in the examples discussed it can be simplified to one specific machine.

Can the system under consideration be represented as an actor? Justify your answer. [2 points]

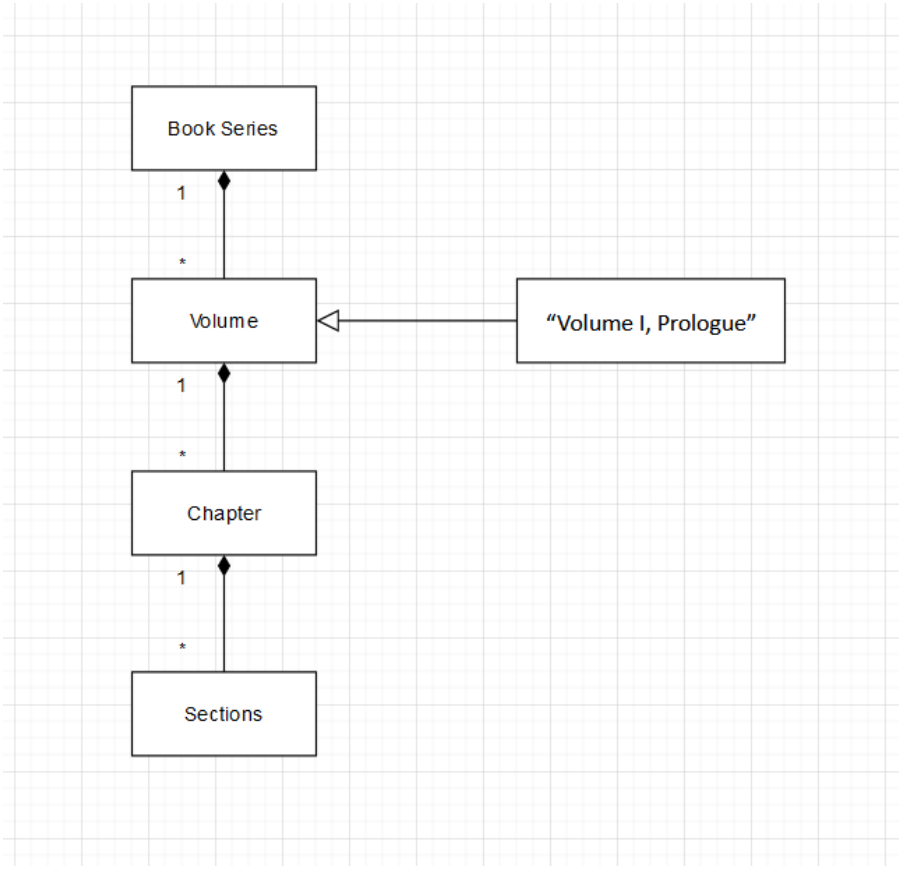
I think the system can be considered an actor, as the bank as a company interacts with this system as a service it can advertise to patrons. Just imagine a greater system of the "Bank" and how this system is a smaller actor within the greater Bank system.

2. [3 points] Read the following statement about a book series and then draw a class diagram representing a book series as defined by the statement: "A book series is made up of multiple volume.

Each volume is composed of multiple chapters. Each chapter is composed of sections." Your class diagram should identify the correct associations and their multiplicities. No attributes are needed.

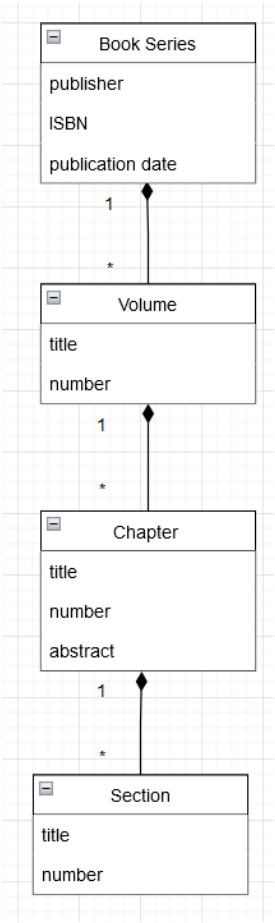


3. [6 points] Assume that first volume of the book is called "Volume I, Prologue". Draw an object diagram representing the first volume of the book named as above, your object diagram should be consistent with the class diagram from Problem 2.

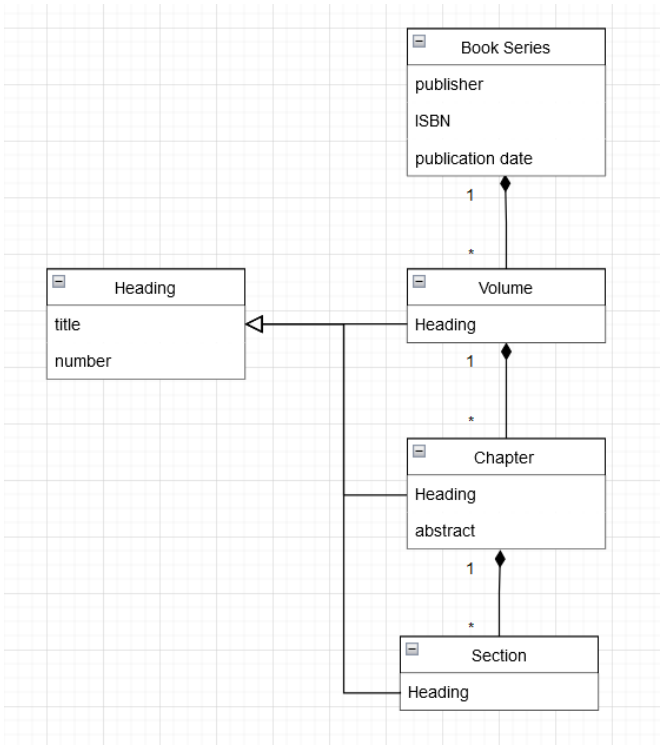


4. [6 points] Extend the class diagram that you made in Problem 2 to include the following attributes:

- a book series has a publisher, an ISBN and a publication date
- a book series volume has a title and a number
- a chapter has a number, a title and an abstract
- a section has a number and a title



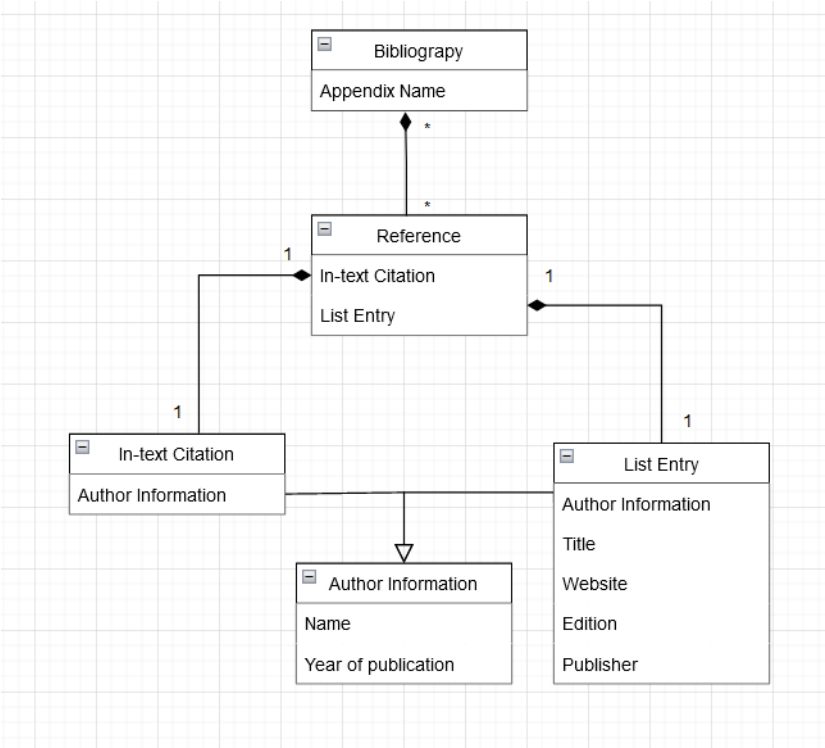
5. [6 points] Consider the class diagram from Problem 4. Identify any redundant information represented in the classes. Then add an abstract class and a generalization relationship to factor out the redundant information into the abstract class and draw an updated class diagram.



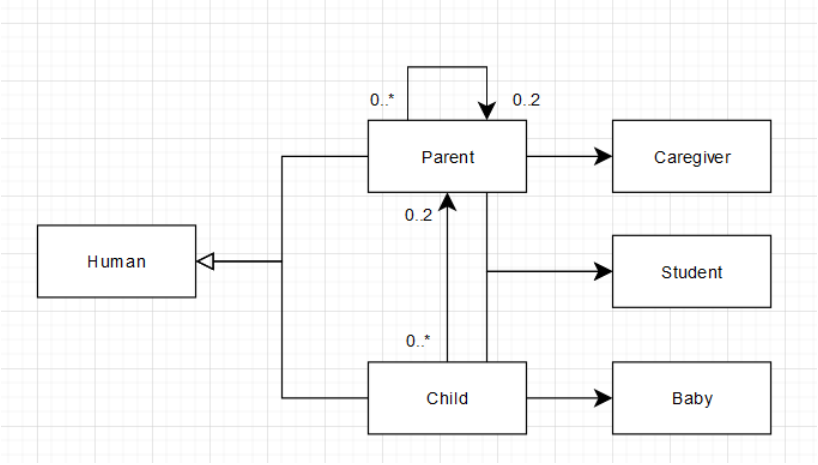
6. [8 points] A publisher of open access journals have asked you to design a software system to process bibliographic references for their publications. They have only given you a sample of bibliographic references from some of their publications. Use the sample to understand the domain of references and then draw a class diagram for bibliographic references. If you are already familiar with the domain of publications, you may skip going though the sample. You should identify the domain classes and the relationships between them.

Your class diagram should demonstrate examples of the following:

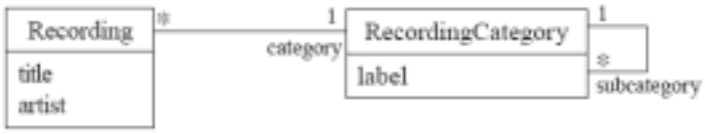
• A generalization hierarchy with an abstract class/interface. [2 points]
• A many to many relationship between at least two of your classes [2 points] • At least two or more concrete classes refining your abstract class. [2 points] • At least one aggregation relationship between two of your classes. [2 points]



7. [8 points] Draw a class diagram representing the relationship between parents and children. You should annotate associations between the classes with roles and multiplicities.



8. [8 points] Write a program in java to demonstrate how would you implement a Reflexive Association as shown in the class diagram below. Your code should compile and run to get full credit. Submit your code using canvas.



---Internal Use---

See attached folder `midterm` run `java .\midterm\ReflexiveAssociationTest.java` to prove

RecordingCategory's reflexiveness.