Assignment #2
Instructor: Engr. Abdul Rahman
SDA (CS-3004), Fall 2021, 05-11-2021

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Question 1: The Defense Central Library (DCL) is a public organization managing the 99 public libraries that operate in Defense Karachi. DCL has decided to redesign its collection material database.

Currently, the database holds information on:

• Books, videos and CDs available for borrowing;

• Every item (book, video, CD) has a unique collection #, a title, and an ISBN# which is unique for every publication; every item may be in good order or damaged. Note that if there are 10 copies of a single book, they have distinct collection #s, but identical ISBN#s;

• Books can be in English, or another language; in either case, the database stores the language the book is written in;

• Books have a publisher and one or more authors; CDs and videos have a unique producer, and one or more artists.

In addition, the database maintains data on library users and their borrowed material:

• Each user has a unique userID, address, phone#; users can be adults, children or seniors; seniors can borrow material for longer periods, while children pay a nominal fine of $0.05/day for un-returned material;

• When a user selects an item to be borrowed, the library clerk updates the database, recording userID, collection#, and date of borrowing;

• When a user returns an item, the library clerk updates the database, recording the date when the item was returned; if the item is overdue, the clerk also collects a fine calculated as DaysLate X fine/day; the fine per day amount is $0.50, $0.05, $1.00 for seniors, children and adult users respectively; the clerk also records (in the database) the fine collected, if any; in addition, the clerk checks if the returned item is damaged, and if so, records this information (in the database, again).

To add new material to the collection, DCL orders it from XYZ Co., a wholesale supplier. When it arrives, it is catalogued (i.e., an entry is added to the database) and it is made available in some library. Damaged and unused material is removed from the collection. This is done once every six months. The process consists of selecting all items that are damaged, or haven't been borrowed in the last year, and physically removing them from the collection.

Read the above scenario, and design the following diagrams:

A. Draw a UML class diagram, identify classes, relationships (realization, aggregation, composition, association, and inheritance), attributes, services, and indicate multiplicity. (Don't use your imagination to identify any new object which is not given in the scenario. However, you need to use your imagination to identify class attributes and functions. Your imagination / assumptions should not contradict any given requirements.). Do not leave any property or attribute in the class diagram of papyrus as "Undefined", please properly define all the datatypes of attributes.

B. Perform two types of Robustness Analysis (i.e., draw 2 of ECB diagrams) for the above scenario, based on the following rules: (**i**) only controller can communicate with entity and boundary. (**ii**) Entities are allowed to communicate with other entities.

Important Note:

1. Date assigned 05-11-2019. Last date of submission is **11-11-2021 11 AM sharp.**

2. Assignments will not be accepted after due date.

3. Students are required to submit the assignment individually.

4. Plagiarism, if detected, will result in zero marks.

5. Assignment must be submitted via slate. Only one submission is allowed.

6. Submit the assignment after making a single zip archive of the assignment files.

7. Folder hierarchy: MS Word document report in /doc folder, generated source code in /code folder (if any), all exported PNG diagrams in /dia folder and Papyrus models and project files in /model directory are required. (See the directory structure as shown in figure above). Use only Papyrus for modeling and submit the project files.

8. Archive the assignment and name it "FASTAssign02YourRollNo.zip"

9. Cover Page of Assignment document must contain: Student name, Roll no, Date of submission.

10. Do not submit assignment on 11th hour, always submit assignment 3-4 hours or one day earlier then deadline, if you do it on 11th hour, then due to connectivity issues you may not be able to submit the assignment on time.

11. Deadline will not extend.