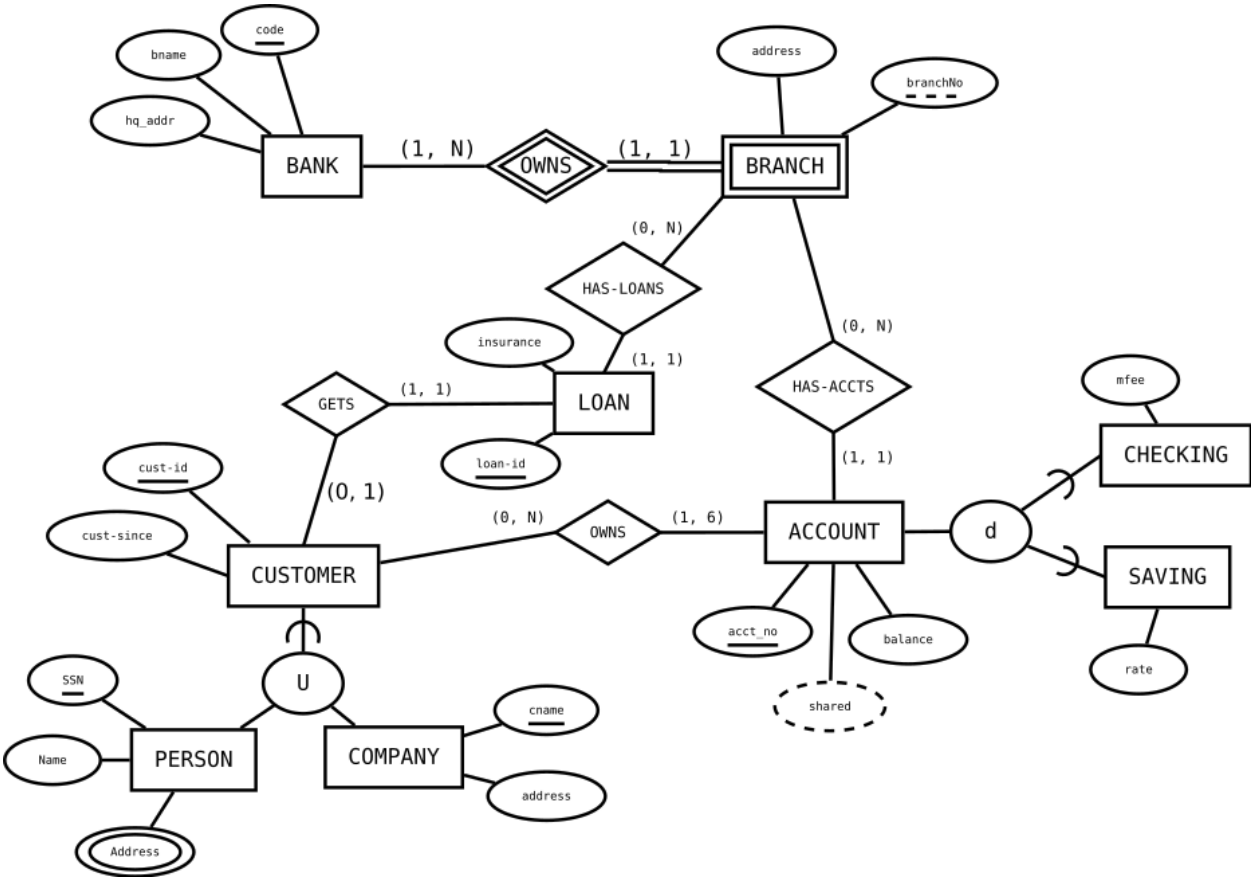
CSC 4710/6710 - HOMEWORK ASSIGNMENT 2

*Please upload your answers to the designated homework folder (**Homework2**) in iCollege. Use a drawing tool for your relational models. Similarly, use a designated drawing tool for your ER diagrams (such as MS Visio, Dia, LucidChart, Draw.io, yEd). Hand-drawn (or scanned) diagrams will not be accepted. Do not forget to add primary key and foreign key constraints to your relational models.*

Question 1 (10 pts)

Given below is the conceptual design of a banking system database. Based on the entities and relationships shown, create a relational model that accurately corresponds to this conceptual design. Make sure to include the foreign key relationships, multi-valued attributes, weak entities, specializations, and union types.



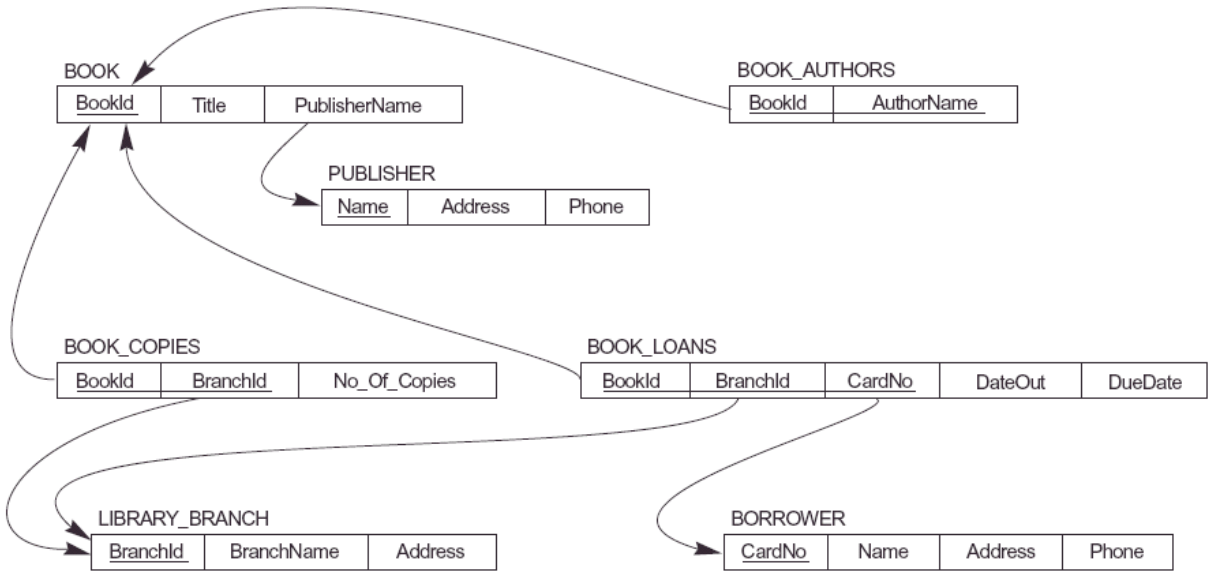
Question 2 (15 pts)

Based on the relational model you created for Question 1, provide relational algebra statements that would return the results for the following queries.

a. Find banks that have more than 100 branches.
b. Find customers whose savings accounts have an interest rate over 2%. Return the names of both types of customers.
c. Find the names of companies who owns a checking account that has more than $100,000 balance.
d. Find the names of the customers who are persons and have a loan with insurance.
e. The derived attribute *shared* shows the number of owners an account has. For each account, return the account number (acct-no) and the value of the *shared* attribute.

Question 3 (10 pts)

Reverse engineer the following relational schema and create an ER diagram corresponding to this relational model. List all your assumptions and provide minimum and maximum cardinalities.



Question 4 (5 pts)

Using the functional dependencies, normalize the following relation to third normal form. Identify the primary keys for all your normalized relations. Are your normalized relations in BCNF?

SONG_PERFORMANCE

Performer-ID	Song-ID	P-Name	Record-Company	P-Address	RC-Address	P-Date	Lyrics	Songwriter

F = {Performer-ID → (P-Name, P-Address),
Performer-ID → Record-Company
Record-Company → RC-Address
Song-ID → (Songwriter, Lyrics)
(Performer-ID, Song-ID) → P-Date
}