***Assignment I***

* 1) The entity types in the given diagram are:  
  (a) BANK  
  (b) LOAN  
  (c) ACCOUNT  
  (d) CUSTOMER  
  (e) BANK\_BRANCH (Weak Entity type in relation with BANK entity type)
* **Weak Entity name:** BANK\_BRANCH

**Partial Key:** branch\_no **Identifying relation:** Branches (from Bank)

* Constraints to the partial key are : Here, the partial key is **“**Branch\_no**”**   
  It must have the **“not null”** constraint because branch number cannot be null and it should be **“unique”** constraint as there cannot be no two branches with the same branch number.

Constraints to the Identifying Relation: Here, the identifying relation is “**Branches”.**

* From BANK to Branches: Total constraint because every bank has at least one branch.
* From Branches to BANK\_BRANCH: Total constraint because every branch must have a BANK.
* The following relationships exists in the above diagram:  
    
  (A) BANK🡪**Branches**🡪BANK\_BRANCH
* (min, max) from BANK to Branches is (1, N) because every bank has at least one branch but it can have N number of branches.
* (min, max) from Branches to BANK\_BRANCHES is (1,1) because a branch of a bank can be of only one BANK.

(B) BANK\_BRANCH🡪**Loans**🡪LOAN

* (min, max) from BANK\_BRANCHES to Loans is (0, N) as a bank branch may not lended a loan yet and even it can give n number of loans to n people.
* (min, max) from Loans to LOAN is (1,1) because to sanction a loan we must have a branch of a bank behind it and an individual loan cannot be sanctioned by multiple branches.

(C) BANK\_BRANCHES🡪**Accts**🡪ACCOUNT

* (min, max) from BANK\_BRANCHES to ACCOUNT is (0, N): A bank branch may have no accounts issued or it may have N number of accounts.
* (min, max) from Accounts to Account is (1,N): An account has at least 1 BANK\_BRANCH linked to it but we may access our accounts from different branches of the same Bank.  
    
  (D) Customer🡪**L\_C**🡪Loans
* (min, max) from Customers to L\_C is (0, N): A customer may not take a loan from a branch if his financial condition is good but he may take different types of loans such as educational loan etc.
* (min, max) from LOANS🡪LC: (1,N) A bank must have at least one sanctioned loan but it may sanction loan to N number of customers.  
    
  (E) Customers🡪**A\_C**🡪Account
* (min, max) from Customers to A\_C: (0, N) A customer may have no account in a bank but he can access account from another bank in a branch of another bank.  
  Example:- If we have an account in any bank, we can access our ATM card in most of the branches of the bank.
* (min, max) from Accounts to AC: (1, N) Every account must be linked to a customer to be used and a person may have multiple different accounts.
* The following reasons can be given to explain the below ER-Diagram
* A wide range of clients with various financial status may have needed to make a record in one of the branches of a bank.
* People with enough money created an account in bank to store his money and other people who are low at financial status created an account in bank to take loans.
* A bank branch must be connected to the head-quarters of the Bank.

6) a) Every customer must have at least one account in the bank  
 CUSTOMER🡪A\_C🡪ACCOUNT

* (min, max): (1, N) because a customer may have more than one account like Current account, Savings account etc.

b) A customer can take at most 2 loans  
CUSTOMER🡪L\_C🡪LOAN

* (min, max): (0,2): a person may take no loans if his financial condition is good enough.

c) A branch cannot give more than 1,000 loans.  
BANK\_BRANCH->Loans->LOAN

* (min, max): (0,1000): A bank may not lend more than 1000 loans.

2)1)

* BOOK\_TRIBE🡨σ Title=”The Lost Tribe” BOOK
* BTC🡨BOOK\_TRIBEjoinop BOOK\_Tribe.Book\_ID=BOOK\_COPIES.Book\_IDBOOK\_COPIES
* L\_ST🡨 σBranch\_name=”Sharpstown”Library\_Branch
* BOOK\_SHARPSTOWN🡨L\_STjoinopL\_ST.Branch\_ID=B2.Branch\_IDBTC
* LOST\_SHARPSTOWN🡨π~~-~~Count(No\_of\_Copies)BOOK\_SHARPSTOWN

2)2)

* B\_TRIBE🡨 σTitle=”The Lost Tribe” BOOK
* BT\_COPIES=B\_TRIBEjoinopB\_TRIBE.Book\_ID=BOOK\_COPIES.Book\_IDBOOK\_COPIES
* BT\_LIBBRANCH🡨BT\_COPIESjoinopBT\_COPIES.Branch\_ID=LIBRARY\_BRANCH.Branch\_IDLIBRARY\_BRANCH
* BRANCH\_COPIES🡨 πBranch\_name(σcount(No\_of\_Copies)B3) Group By Branch\_name

2)3)

* NO\_LOAN🡨 σDue\_date=NULLBOOK\_LOANS
* BORROWER\_NO.🡨BORROWERjoinopBORROWER.Card\_no=NO\_LOAN.Card\_noNO\_LOAN
* NO\_LOAN\_BORROWER🡨πNameBORROWER\_NO.

2)4)

* L\_SHARP🡨σBranch\_name=”Sharpstown”LIBRARY\_BRANCH
* DUE\_TODAY🡨σDUE\_DATE=”03-01-2018”BOOK\_LOANS
* DUE\_TODAY\_SHARP🡨L\_SHARPjoinopL\_SHARP.Branch\_ID=DUE\_TODAY.Branch\_IDDUE\_TODAY
* BORROWER\_DETAILS🡨DUE\_TODAY\_SHARPjoinopDUE\_TODAY\_SHARP.Card\_no=BORROWER.Card\_noBORROWER
* BORROWER\_BOOK🡨BORROWER\_DETAILSjoinopBORROWER\_DETAILS.Book\_ID=BOOK.Book\_IDBOOK
* DETAILS🡨πName,Title,AddressBORROWER\_BOOK

2)5)

* BOOK\_DETAILS🡨LIBRARY\_BRANCHjoinopLIBRARY\_BRANCH.Branch\_ID=BOOK\_LOANS.Branch\_IDBOOK\_LOANS
* BRANCH\_COPIES🡨πBranch\_name(σcount (due\_data)BOOK\_DETAILS) Group By BRANCH\_NAME.