**Logical Database Design**

1. Table Design

* Identify all required tables
* Design the columns
  + Names
  + Data types
  + Valid ranges/data
  + Null values allowed?
  + General constraints?
* Identify the Primary Key

1. Association Design

* Resolve many-to-many associations using an ‘association table’
* Use a foreign key to implement each association. Add the FK to the relevant ‘many’ table

Library Sample Table:

**User**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Datatype | Range/Constraints | Description | Not Null? |
| User\_No (PK) | Integer | >0 | Unique User No.  Assigned upon joining | Y |
| Name | VarChar(35) | n/a | User’s name  (forename + surname) | Y |
| Addr1 | VarChar(50) |  | Street Name | Y |
| Addr2 | VarChar(50) |  | Area Name | N |
| City | VarChar(50) |  | City Name | Y |
| County | VarChar(50) |  | County Name | Y |
| Email | VarChar(255) |  | Email Address | N |
| Phone\_Area | Integer | >0 | Area Code | N |
| Phone\_No | Integer | >0 | Phone Number | N |

**Loan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Datatype | Range | Description | Not Null? |
| TimeLimit | Integer | 1 – 14 incl | No. of days  for loan | Y |
| Fine | Decimal |  | Fine collected  on loan, if any | N |
| Loan\_ID (PK) | Integer | Auto-Increment | Unique Loan ID | Y |
| Loan\_Date | Date |  | Date of the Loan | Y |
| Loaned\_To\_User\_No (FK) | Integer |  | Foreign Key to User  Which took out the  Loan | Y |

**Book**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Datatype | Range | Description | Not Null? |
| Topic | VarChar(20) |  | Topic the book  Is written on | Y |
| ISBN | Integer |  | ISBN serial identifier  of the publication | Y |
| Loan\_No\_ID (FK) | Integer |  | ID no. of the Loan  This book is taken on | Y |
| Book\_ID (PK) | Integer |  | Unique ID for this individual  Physical book | Y |
| Title | VarChar(45) |  | Name of the ook | Y |
| Author | VarChar(25) |  | Author of the book | Y |