CPCS241-Database I-2nd Semester 2023-Project

[Library Management Database]

DB Design

Group No: 5

Student Name
Leen Abdulaziz
Huda Turkstani
Asil Mufti
Manar Alnahdi

Contents

PART I: Analysis

1 Problem Definition and Data Requirements

1.1 Problem Description

King Abdul-Aziz University Library has a considerable capability to develop and enhance the resources and services to meet the demands of the curricular, instructional, and research programs of the academic community.

The library must have a database management system to maintain the information about the books present in the library. Also borrowing and study rooms services for the library's members. In addition, training courses that provided by the library. This system would keep track of the members of the library and provide a detailed description of books that the library contains. With this system, there will be no loss of books or member records which generally happens when the data is not organized in a specified system.

1.2 Data Requirements

Members (student, staff, out of university):

- Each member has a unique national id and phone number, name (first, last).
- Each member follows a specific borrowing rule.

Students' members:

- Each student has a unique student id.
- Each student has specific degree (Undergraduate (Bachelor, Diploma), postgraduate (PhD, Master))

Staff members:

- Each staff member has a unique job id.
- Each staff has specific position (faculty staff, lecturers, university staff)

Classification of books in the library:

- Each classification has a unique name and a unique number (ex. 305 refers to history).

Subject:

- Each subject has a description and a unique number (ex. .20973 refers to ''history and description about America''.)

Books:

- Each book has a title, author/s, publish year, publisher, edition, number of pages, total number of copies and ISBN.
- Each book has a unique key which contain ISBN with the copy number which keep track to the book's copies.
- Each book belongs to a specific classification which determined by call number.

- Each book may exist in many branches of the library.
- Each book has one call number.

Author:

- Each author has a unique cutter number (the first letter of author's name and a unique author number) and name (first name, last name).

Call number:

- Each call number has unique id.
- Each call number is a unique number composed of 3 parts**:**
  1- Classification number
  2- Subject number
  3- Cutter number

Publisher:

- Each publisher has a unique id.
- Each publisher has a name, address (city and street), email, Tel phone.

Branches:

- Each branch has a unique Id and address.

Borrowing service:

- Each borrowing service has a unique id.
- Each borrowing service has a borrowing date and actual return date and expected return date based on the membership borrowing rule.
- Each borrowing service determine the number of books has been borrowed.
- Each borrowing service needs to record the national id of the member who borrowed.

borrowing rules:

- Each rule has a unique id.
- Each rule determines the maximum number of days and books for each membership type (faculty staff, lecturers, university staff, Postgraduate, undergraduate, out of university)

Study rooms service:

- Each room has a unique number.
- Each student can book a room for specific days and hours.

Training courses:

- Each training course has a unique id.
- Each training course has a title, date (start, end), hour (start, end)
- Each training course is held in a specific place.
- Each training course presented by instructor/s.

Training Place:

- Each place has a unique id.
- Each place has a specific capacity and placed in a specific building, floor, class.

Instructors:

- Each instructor has a unique id.
- Each instructor has name (first, last), email and phone number.

1.3 Business Rules

- A book may have more than one copy, tracked by the key of ISBN and copy number.
- Each copy has a unique (ISBN with the copy number).
- Each book belongs to one specific classification in the library shown in the call number.
- Each classification has several books belong to it in the call number.
- The classification number with subject number and cutter number form the call number.
- Each book must have call number.
- Each call number may have more than one book if the book has more than one copy.
- Each book has one specific call number.
- The book may be available in different branches.
- Each branch has many books.
- The book should be written by one author or more.
- The author can write many books.
- All the authors in the system should write a book exist in the library.
- The book must be published by one publisher.
- The publisher can publish more than one book.
- All the publisher in the system should publish at least one book exist in the library.
- Each book must have a publisher
- The borrowing service depends on the copy number and book's ISBN.
- Each borrowing rule may be followed by more than one member.
- For each member who wants to borrow a book, should follow one of the borrowing rules which determine by their membership.
- The borrowing service offer just for the library members.
- Each member can borrow many times.
- The borrowing service offer for many members.
- In borrowing rules, the maximum days and books for each member is:

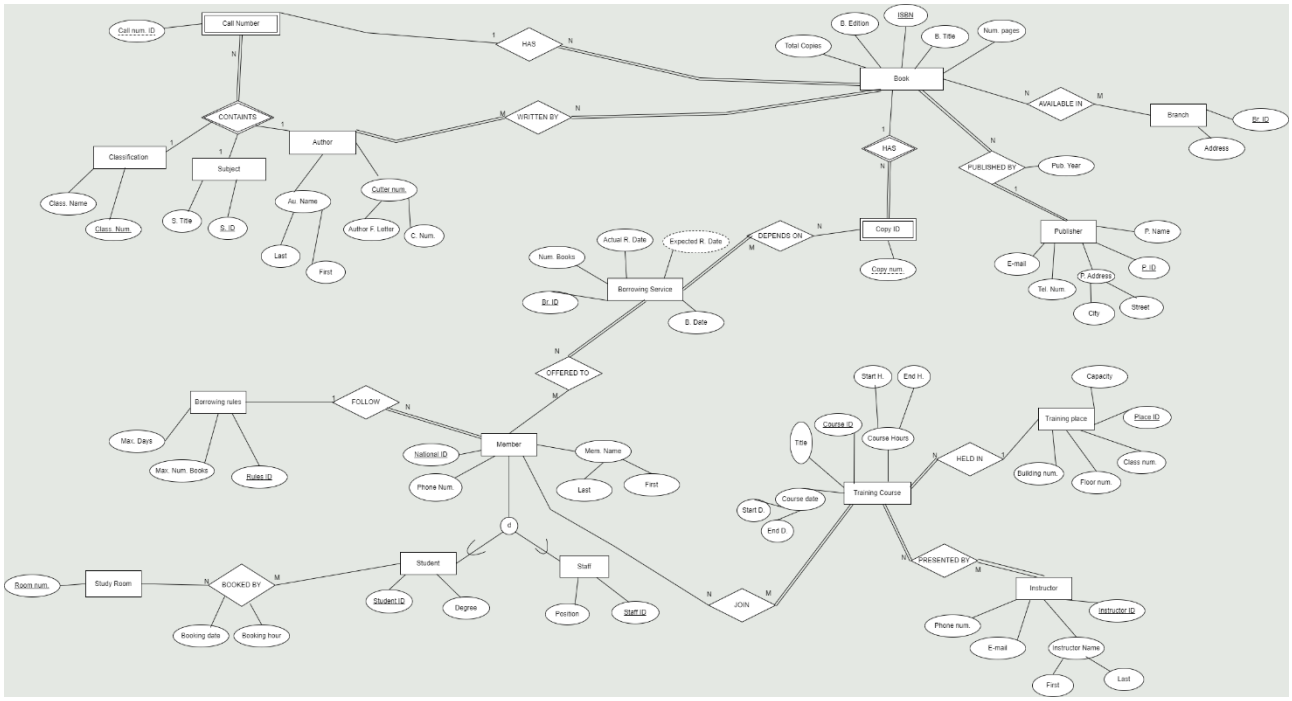
- faculty staff: 15 books and 120 days.
- lecturers: 15 books and 60 days.
- university staff: 4 books and 15 days.
- Postgraduate: 10 books and 30 days.
- undergraduate: 6 books and 15 days.
- out of university: 4 books and 15 days.

- Study rooms are available only for postgraduates.
- The same room can be booked by many students on the same day.
- The student can book different rooms in a different date and hour.
- The member can join to many training courses offered by the library.
- training courses can be joined by many members.
- Training course must have members joined to it.
- Training course must have a place to be held in.
- The place may hold many training courses.
- The Training course will be held in one place.
- Each training course must have an instructor/s.
- All instructors in the system must present a training course/s.

PART II: DB DEISGN

2 ER Diagram Design

2.1 ER diagram



2.2 Design of Business Rules

In this subsection, show how the business rules have been translated into design decisions. Some business rules can be deployed during implementation phase only. Provide sufficient justification.

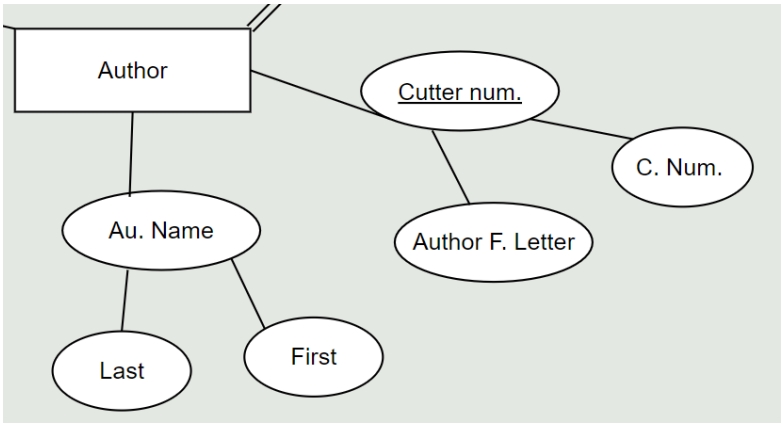
Business Rule	Design Decisions	Justification (if any)
• A book may have more than one copy, tracked by the key of ISBN and copy number.	Week entity Copy ID owned by the book	Copy ID depends on the ISBN for each book
• Each copy has a unique (ISBN with the copy number).	Copy number is a partial key in copy ID entity	Copy ID depend on the ISBN for each book
• Each book belongs to one specific classification in the library shown in the call number. • Each classification has several books belong to it in the call number.	Week entity "call number" owned by "classification" entity	-
• The classification number with subject number and cutter number form the call number.	Week entity "call number" owners by "classification", "subject" and " author " entities	-
• Each book must have call number.	Full patriation from "book" entity to "call number " entity	no book exists in the library without a call number
• Each call number may have more than one book if the book has more than one copy. • Each book has one specific call number.	1: N relationship between "book" and "call number" entities	-
• The book may be available in different branches. • Each branch has many books.	N:M relationship between "book" and "branch" entities	-
• The book should be written by one author or more. • The author can write many books.	N:M relationship between "book" and "author" entities	-
• All the authors in the system should write a book exist in the library.	Full patriation from "author" entity to "book" entity	-

• The book must be published by one publisher. • The publisher can publish more than one book.	N:1 relationship between "book" and "publisher" entities	-
• All the publisher in the system should publish at least one book exist in the library. • Each book must have a publisher	Full patriation from both side of "publisher" and "book" relationship	-
• The borrowing service depends on the copy number and book's ISBN.	relationship between " borrowing service" and "copy number" entities	-
• Each borrowing rule may be followed by more than one member. • For each member who wants to borrow a book, should follow one of the borrowing rules which is determined by their membership.	1:N relationship between "member" and "borrowing rule" entities	-
• The borrowing service offer just for the library members.	Full participation from " borrowing service" entity to "member" entity	-
• Each member can borrow many times. • The borrowing service offer for many members.	N: M relationship between " borrowing service" entity and "member" entity	-
• In borrowing rules, the maximum days and books for each member is: - faculty staff: 15 books and 120 days. - lecturers: 15 books and 60 days. - university staff: 4 books and 15 days. - Postgraduate: 10 books and 30 days. - undergraduate: 6 books and 15 days. - out of university: 4 books and 15 days.	There is an "expected return date" as derivative attribute in borrowing service entity to be compute depending on the membership rule.	*These rules will be insert in the borrowing rule table in implementation phase.*

• Study rooms are available only for postgraduates.	Relationship between study room and student entities	(It will be done through the application interface)
• The same room can be booked by many students on the same day. • The student can book different rooms in a different date and hour.	N:M relationship between "study room" and "student" entity	-
• The member can join to many training courses offered by the library. • training courses can be joined by many members.	N:M relationship between "member" and " training course" entities	-
• Training course must have members joined to it.	Full patriation from " Training course " entity to "member" entity	-
• Training course must have a place to be held in.	Full patriation from " Training course " entity to "place" entity	-
• The place may hold many training courses. • The Training course will be held in one place.	1:N relationship between "training course" and " place" entities	-
• Each training course must have an instructor/s. • All instructors in the system must present a training course/s.	Full patriation from both side of " Training course " and " instructor " relationship	-

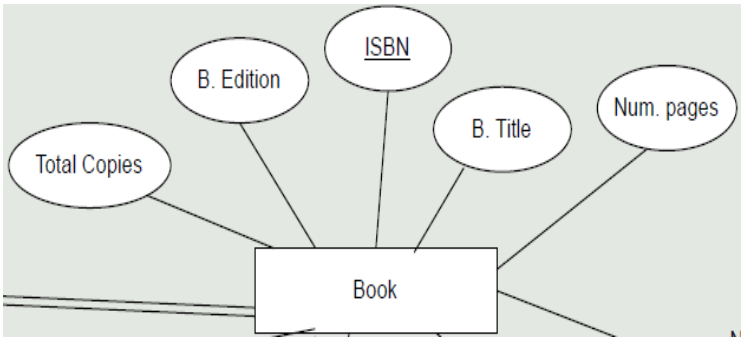
3 ER-to-logical schema mapping

3.1 Mapping of Regular Entity Types and generalization hierarchies



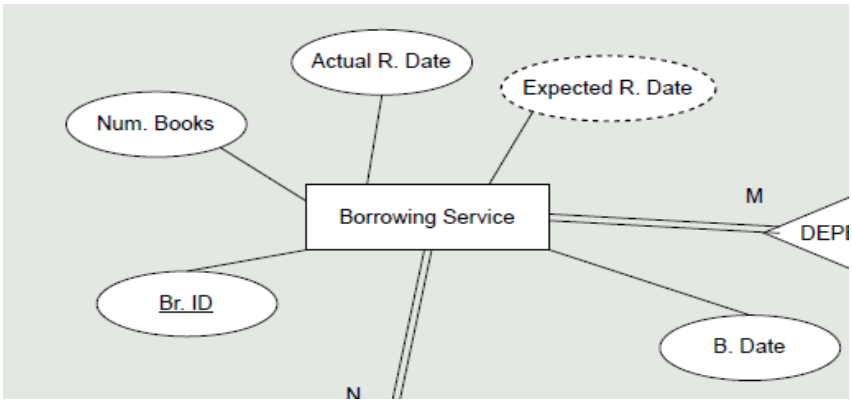
Author

Author_FLetter	C.num	F.name	L.name



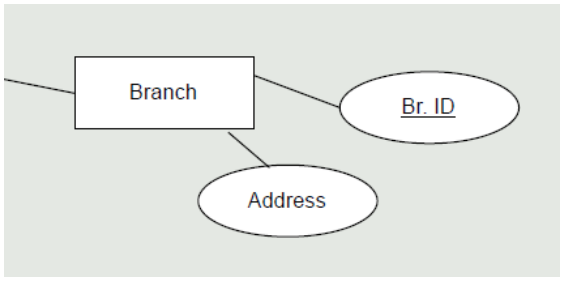
Book

ISBN	B.title	edition	No.pg	Total.Copies



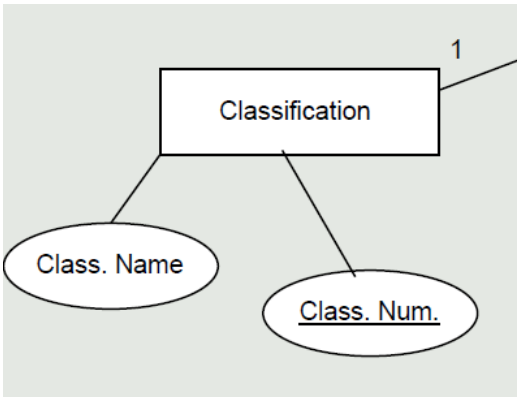
Borrowing Service

Borrow.id	No.Books	Actual.R.Date	Borrow.Date



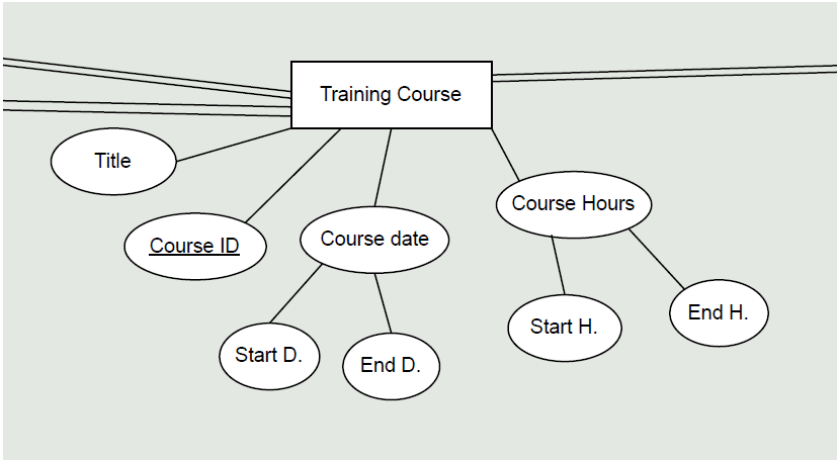
Branch

Br.ID	Address



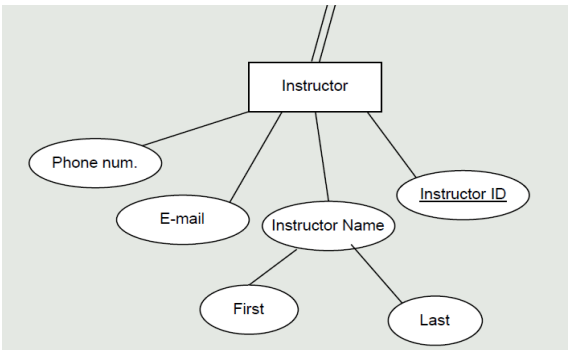
Classification

Clf.num	Clf.Name



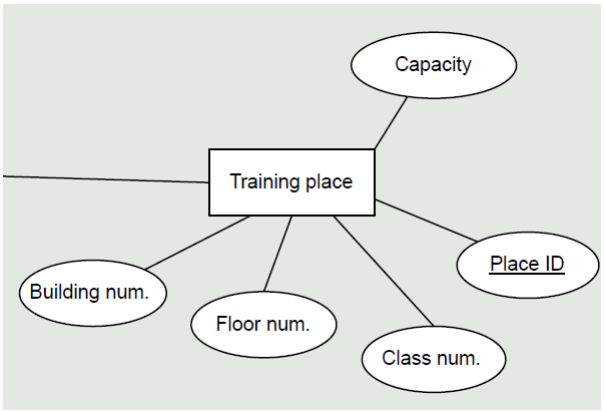
Training Course

Course.ID	Title	Start.Date	End.Date	Start.H	End.H



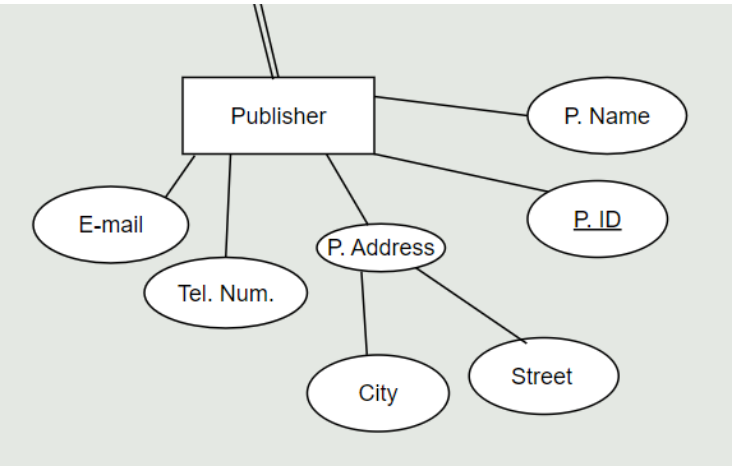
Instructor

inst.ID	Inst.Fname	Inst.Lname	Inst.Email	inst.Phone



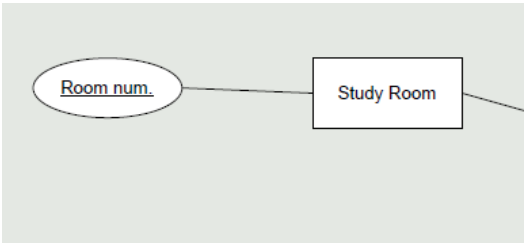
Training Place

Place.ID	Capacity	Build.num	Floor.num	Class.num



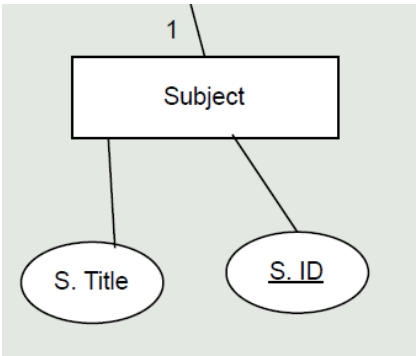
Publisher

Pub.ID	Pub.Name	Pub.City	pub.street	pub.tel	pub.email



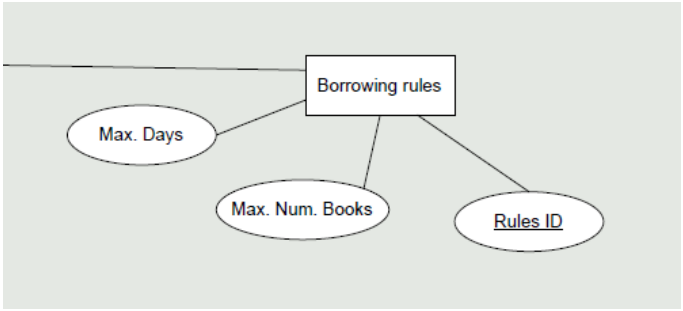
Study Room

Rom.Num



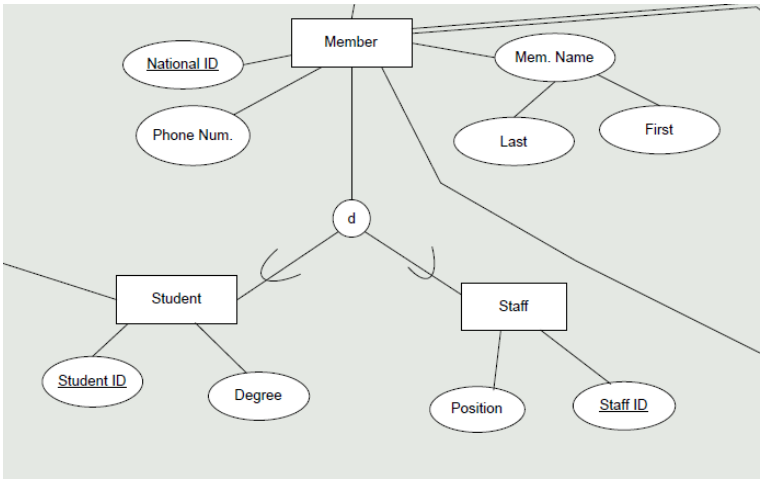
Subject

S.ID	S.title



Borrowing rules

rule's ID	Max. Num. Books	Max. Days



Member

National.ID	M.Fname	M.Lname	M.phone

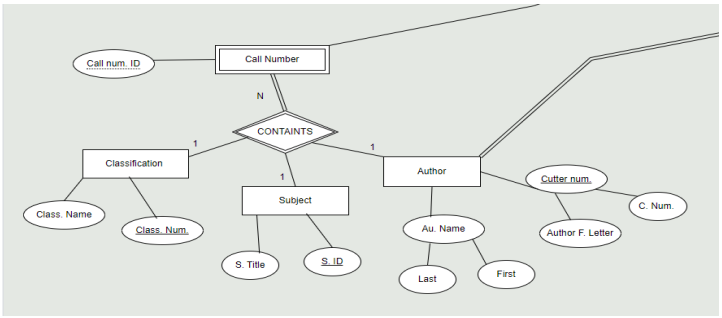
Student

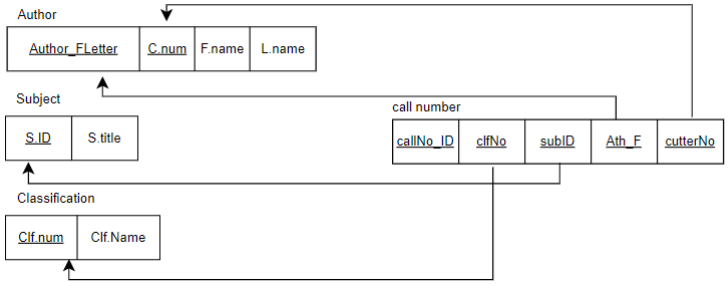
Stnational.ID	Stud.ID	Degree

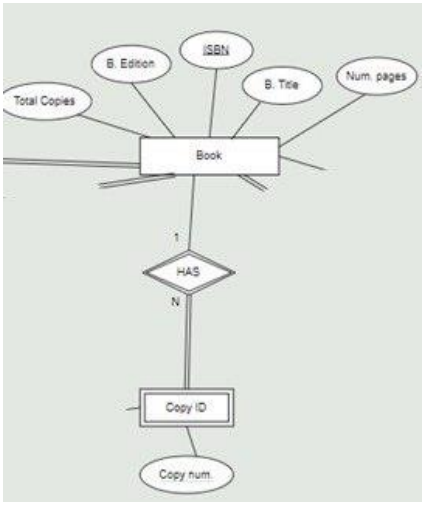
Stuff

Sfnational.ID	Stuff.ID	Position

3.2 Mapping of Weak Entity Types



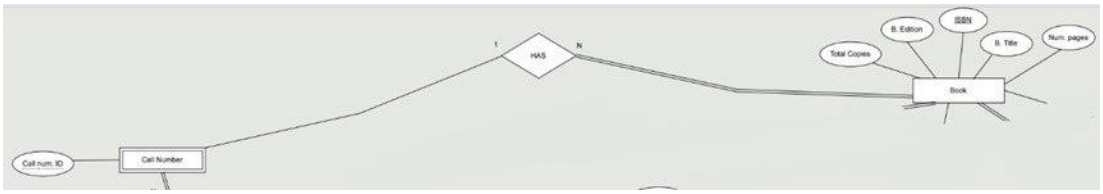


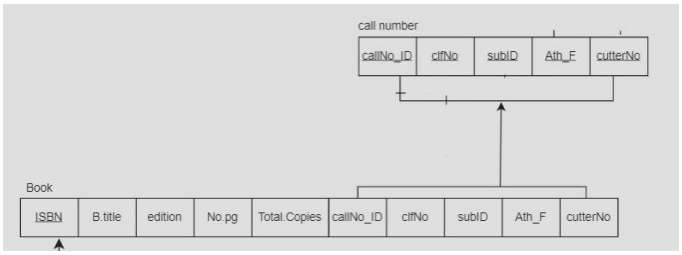


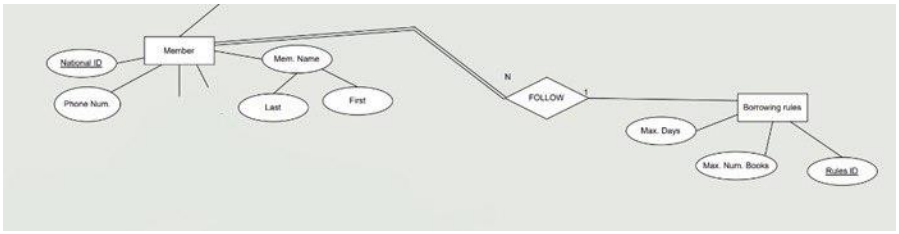
3.3 Mapping of binary 1-1 relationship types

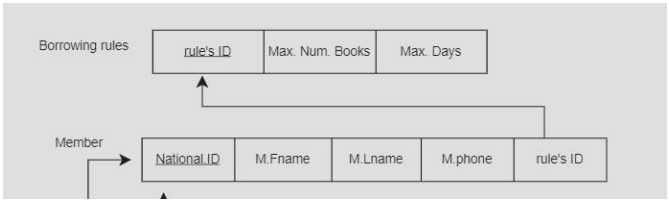
No binary 1-1 relationship in our ER diagram.

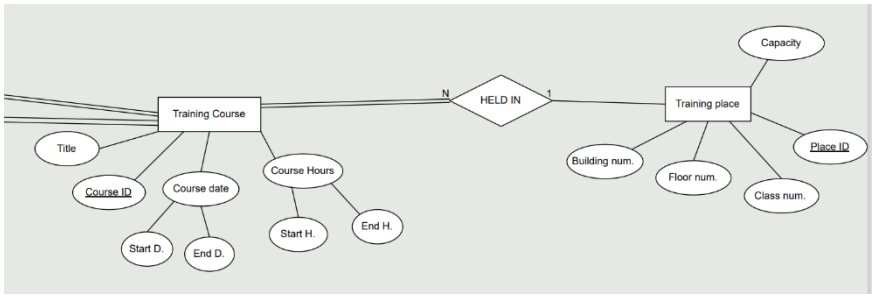
3.4 Mapping of binary 1-N relationship types

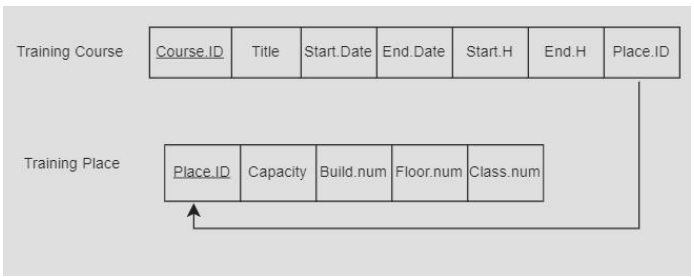


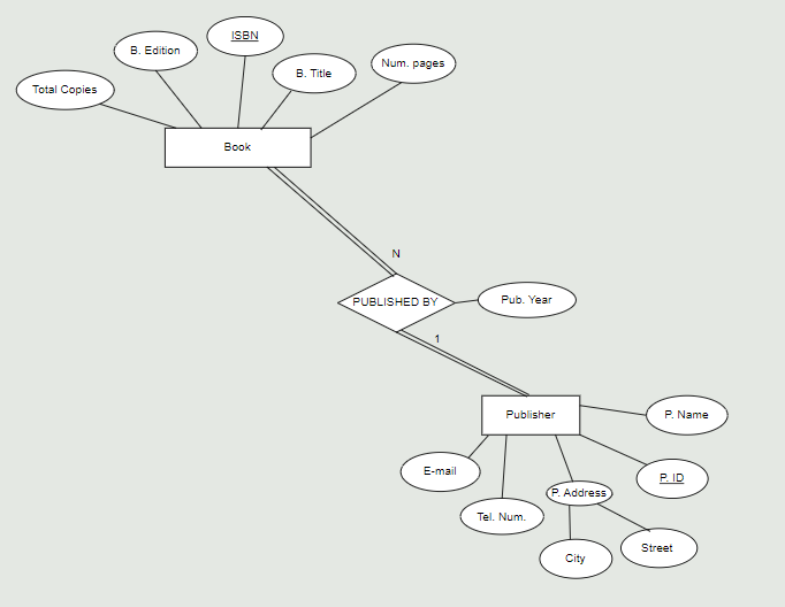


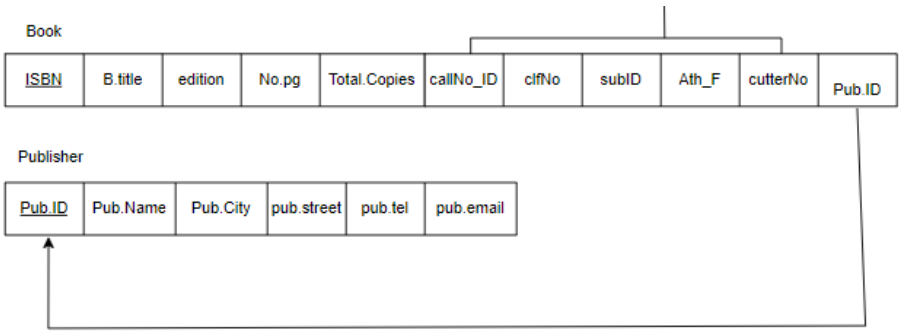




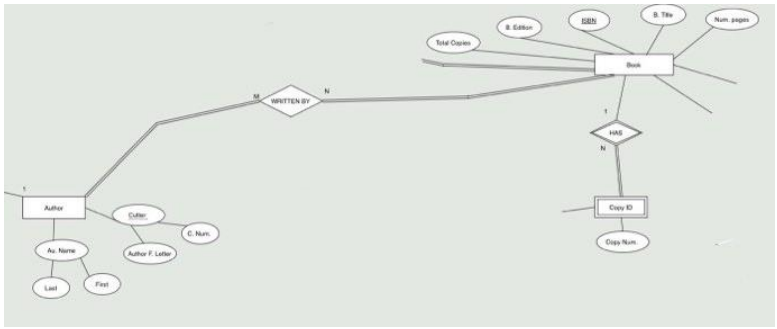


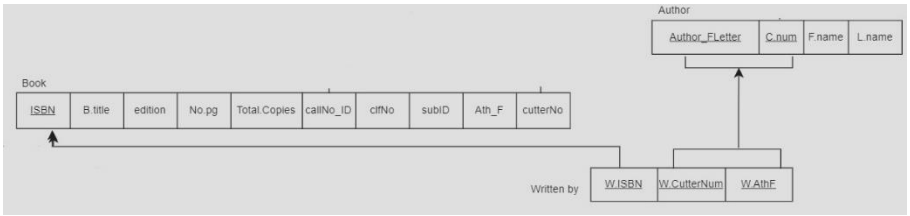


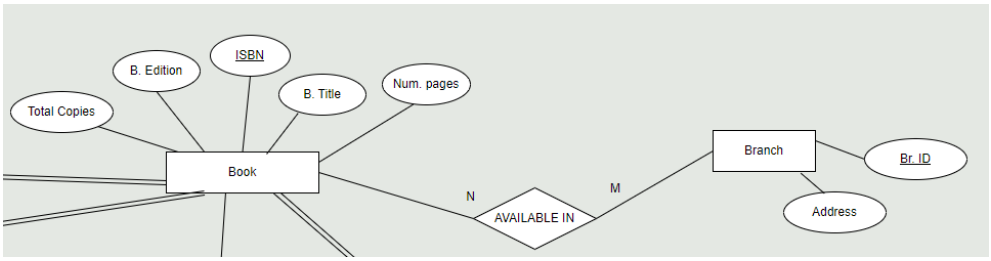


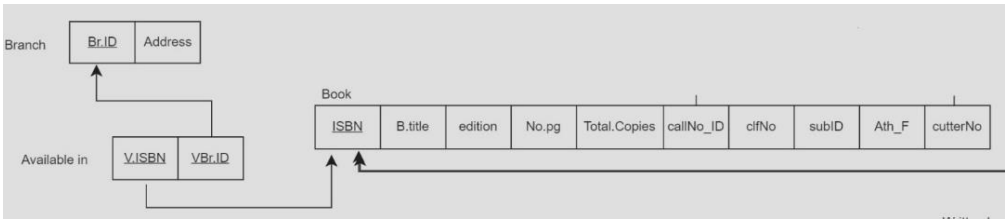


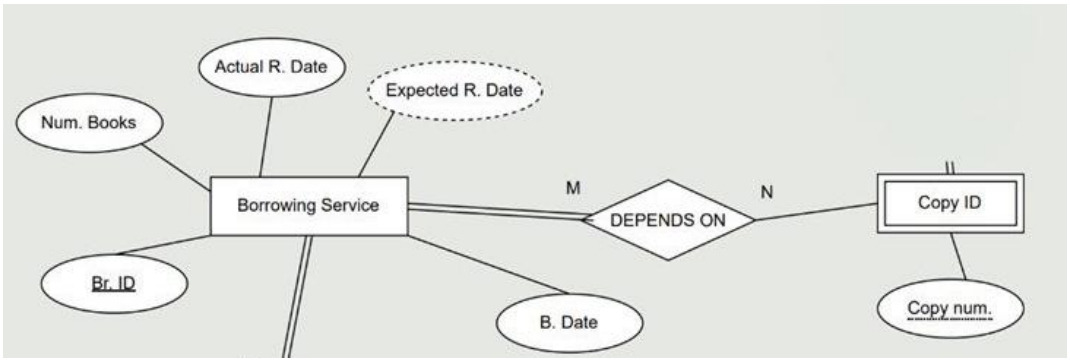
3.5 Mapping of binary M-N relationship types

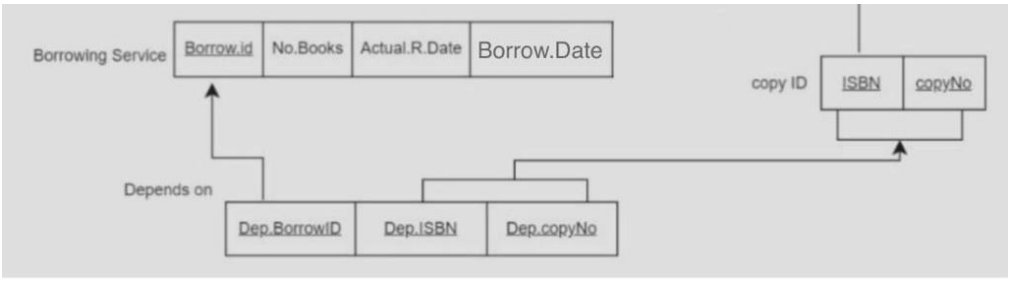


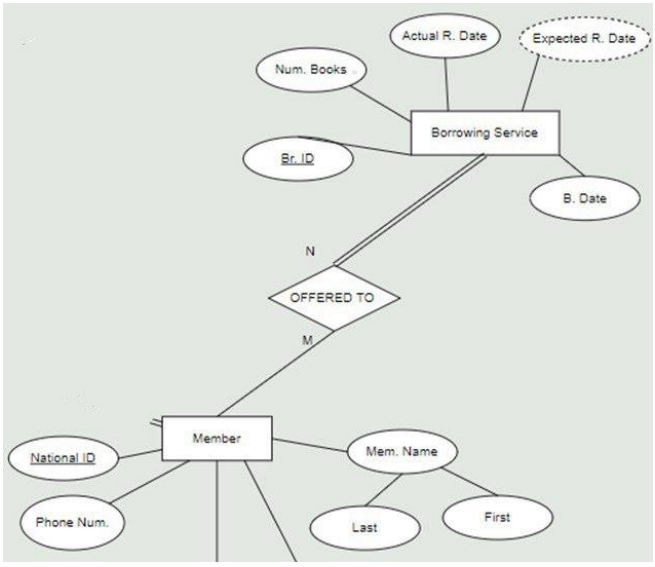


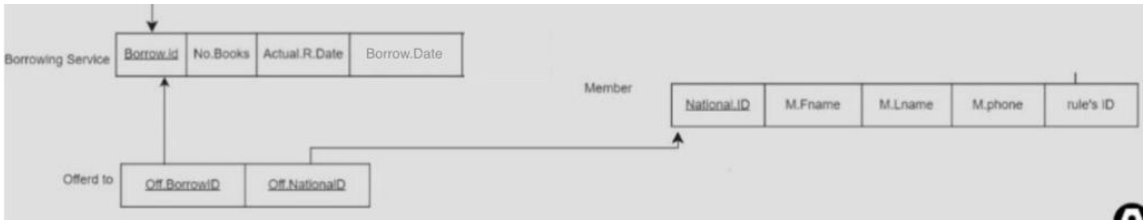

B. Edition
ISBN
B. Title
Num. pages
Total Copies
Book
N
AVAILABLE IN
M
Branch
Br. ID
Address

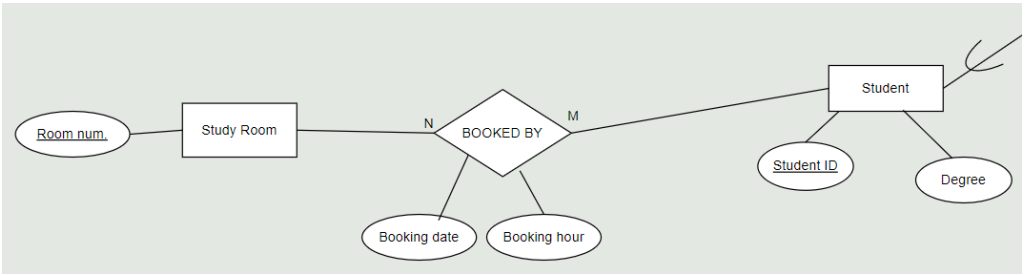

Branch
Br.ID
Address
Book
ISBN
B.title
edition
No.pg
Total.Copies
callNo_ID
clfNo
subID
Ath_F
cutterNo
Available in
V.ISBN
VBr.ID

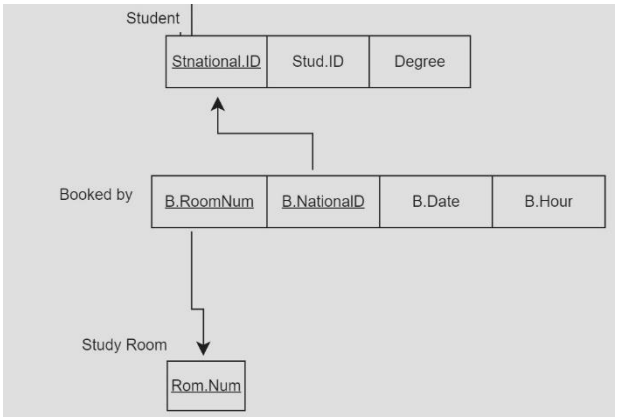

Actual R. Date
Expected R. Date
Num. Books
Borrowing Service
M
DEPENDS ON
N
Copy ID
Br. ID
B. Date
Copy num.

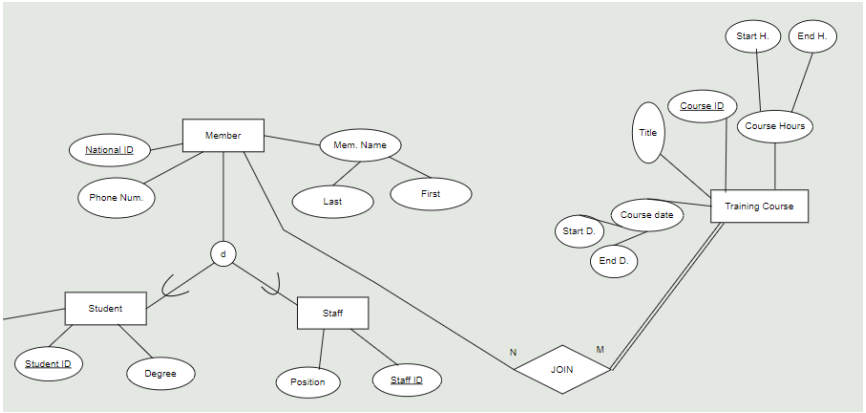

Borrowing Service
Borrow.id
No.Books
Actual.R.Date
Borrow.Date
copy ID
ISBN
copyNo
Depends on
Dep.BorrowID
Dep.ISBN
Dep.copyNo

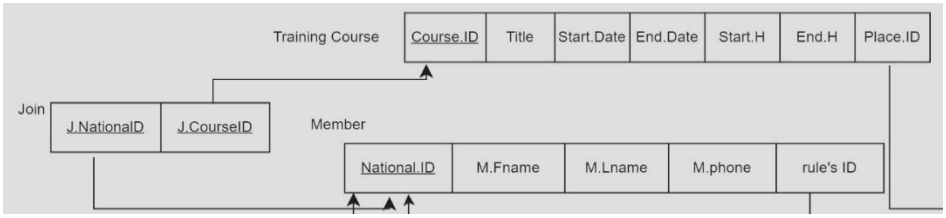

Actual R. Date
Expected R. Date
Num. Books
Borrowing Service
Br. ID
B. Date
N
OFFERED TO
M
Member
National ID
Mem. Name
Phone Num.
Last
First

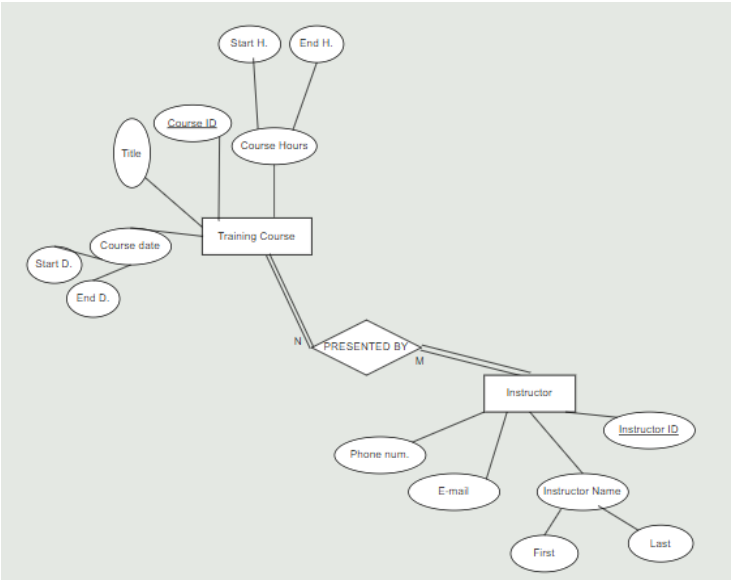

Borrowing Service
Borrow.id
No.Books
Actual.R.Date
Borrow.Date
Member
National.ID
M.Fname
M.Lname
M.phone
rule's ID
Offerd to
Off.BorrowID
Off.NationalID

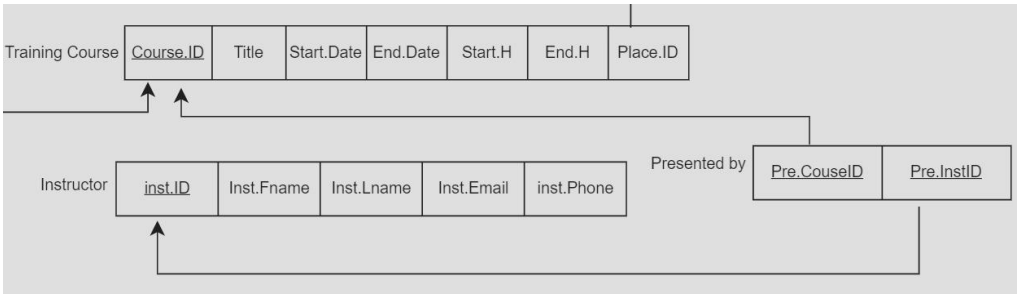

Room num.
Study Room
N
BOOKED BY
M
Student
Student ID
Degree
Booking date
Booking hour


Student
Stnational.ID
Stud.ID
Degree
Booked by
B.RoomNum
B.NationalID
B.Date
B.Hour
Study Room
Rom.Num


Start H.
End H.
Course ID
Title
Course Hours
Training Course
Course date
Start D.
End D.
Member
National ID
Mem. Name
Phone Num.
Last
First
d
Student
Staff
Student ID
Degree
Position
Staff ID
N
M
JOIN


Training Course
Course.ID
Title
Start.Date
End.Date
Start.H
End.H
Place.ID
Join
J.NationalID
J.CourseID
Member
National.ID
M.Fname
M.Lname
M.phone
rule's ID





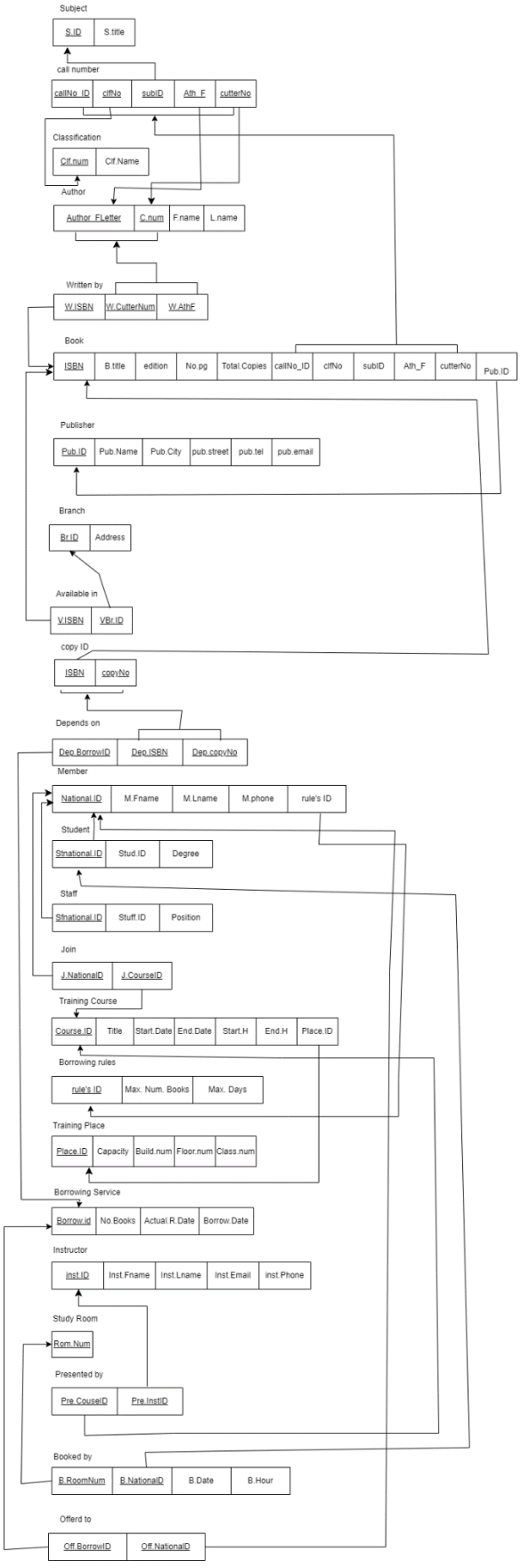
3.6 Mapping of multivalued attributes

No multivalued attributes in our ER diagram.

3.7 Mapping of n-ary relationship types

No n-ary relationship in our ER diagram

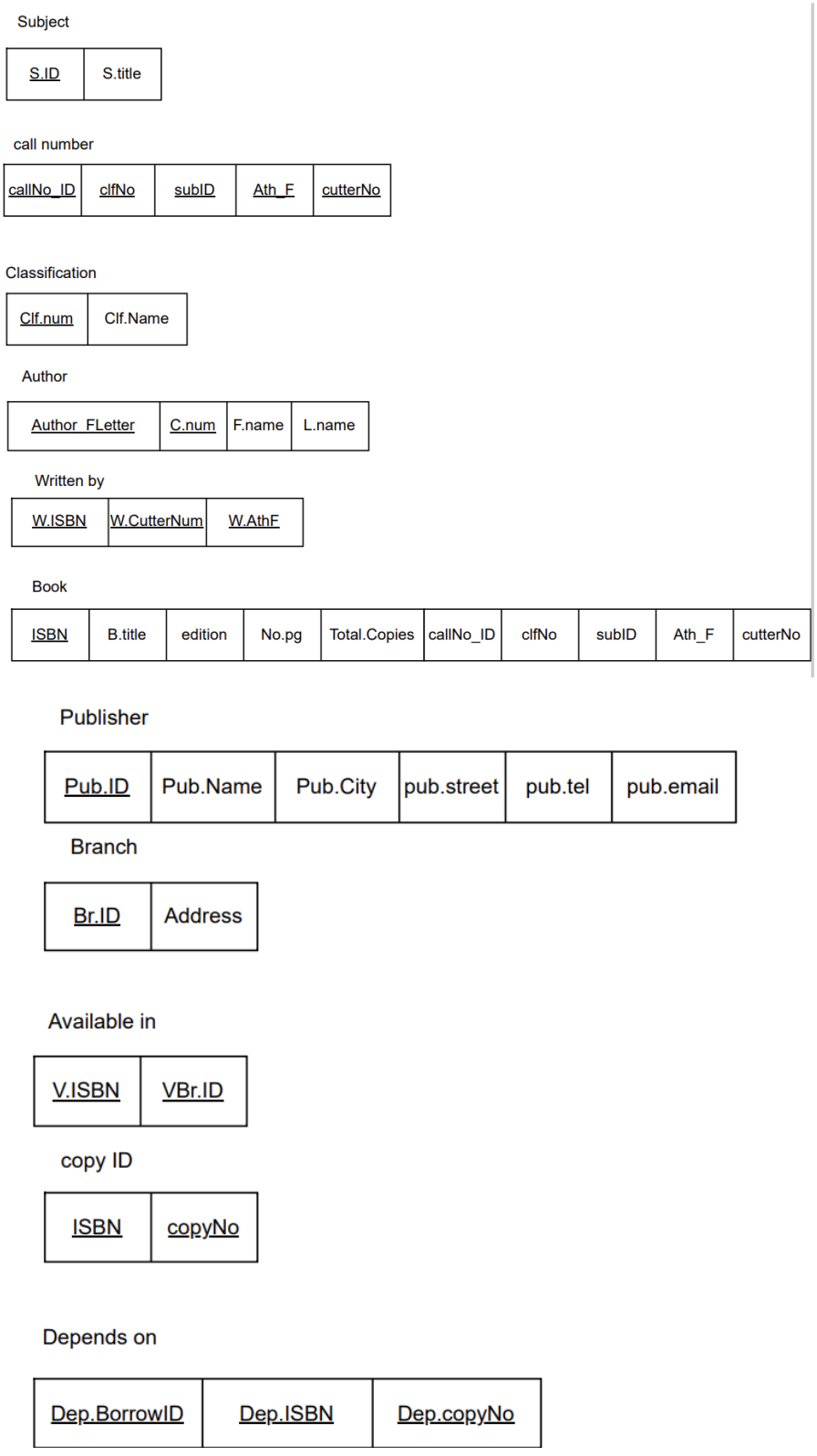
3.8 Schema Diagram



4 Normalization

4.1 First Normal Form

All the relations are in the first normal form (1NF), there are no multivalued attributes or nested relations.



Member

National.ID	M.Fname	M.Lname	M.phone	rule's ID

Student

Stnational.ID	Stud.ID	Degree

Staff

Sfnational.ID	Stuff.ID	Position

Join

J.NationalID	J.CourseID

Training Course

Course.ID	Title	Start.Date	End.Date	Start.H	End.H	Place.ID

Borrowing rules

rule's ID	Max. Num. Books	Max. Days

Training Place

Place.ID	Capacity	Build.num	Floor.num	Class.num

Borrowing Service

Borrow.id	No.Books	Actual.R.Date	Borrow.Date

Instructor

inst.ID	Inst.Fname	Inst.Lname	Inst.Email	inst.Phone

Study Room

Rom.Num

Presented by

Pre.CouseID	Pre.InstID

Booked by

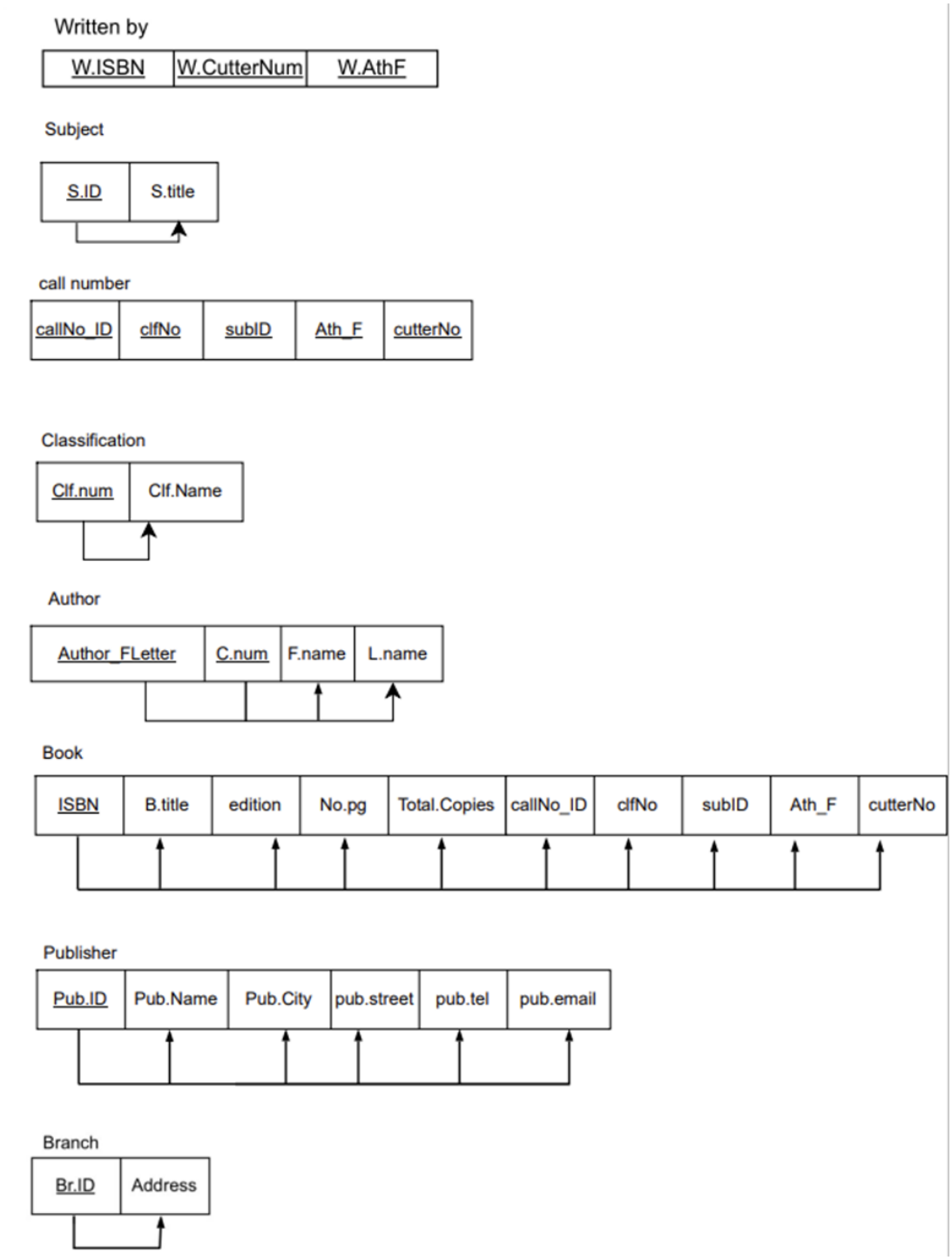
B.RoomNum	B.NationalID	B.Date	B.Hour

Offerd to

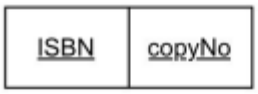
Off.BorrowID	Off.NationalID

4.2 Second Normal Form

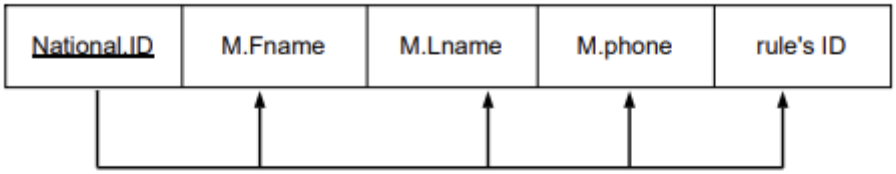
All the relations are in second normal form 2(NF), all of them are in (1NF), and there is no partial functional dependency from a non-prime attribute on the PK.



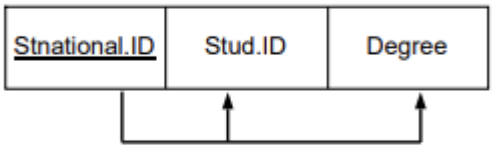
copy ID



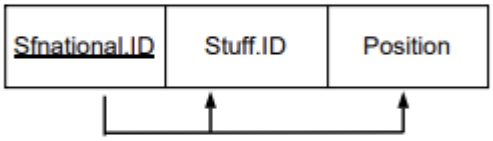
Member



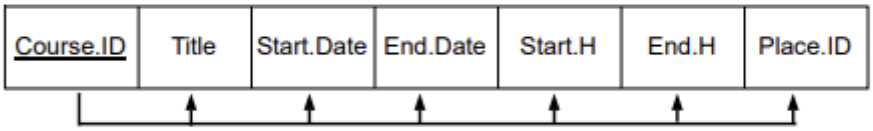
Student



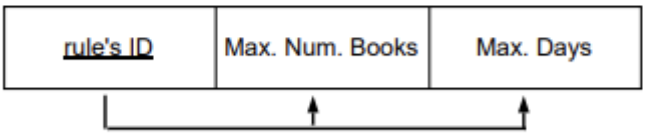
Staff



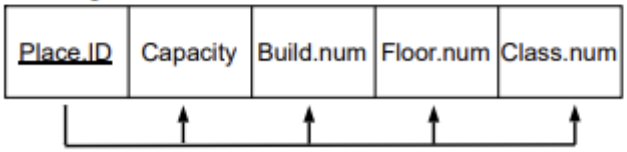
Training Course



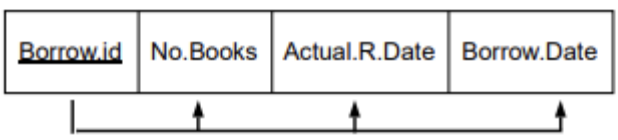
Borrowing rules



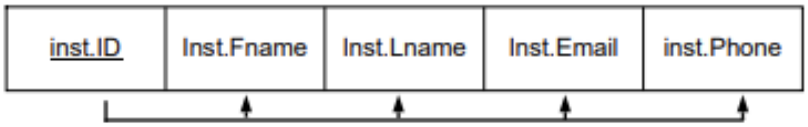
Training Place



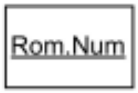
Borrowing Service



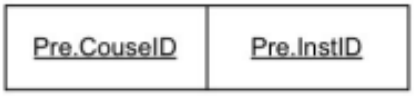
Instructor



Study Room

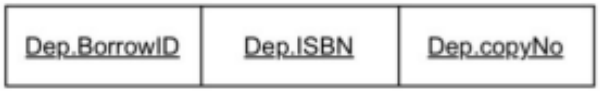


Presented by



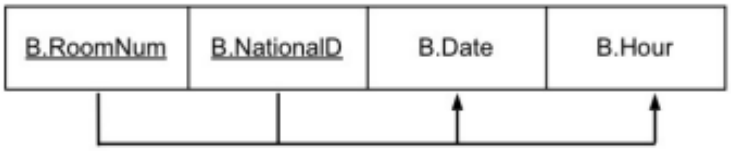
Available in

Depends on

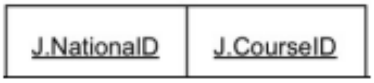


Offerd to

Booked by

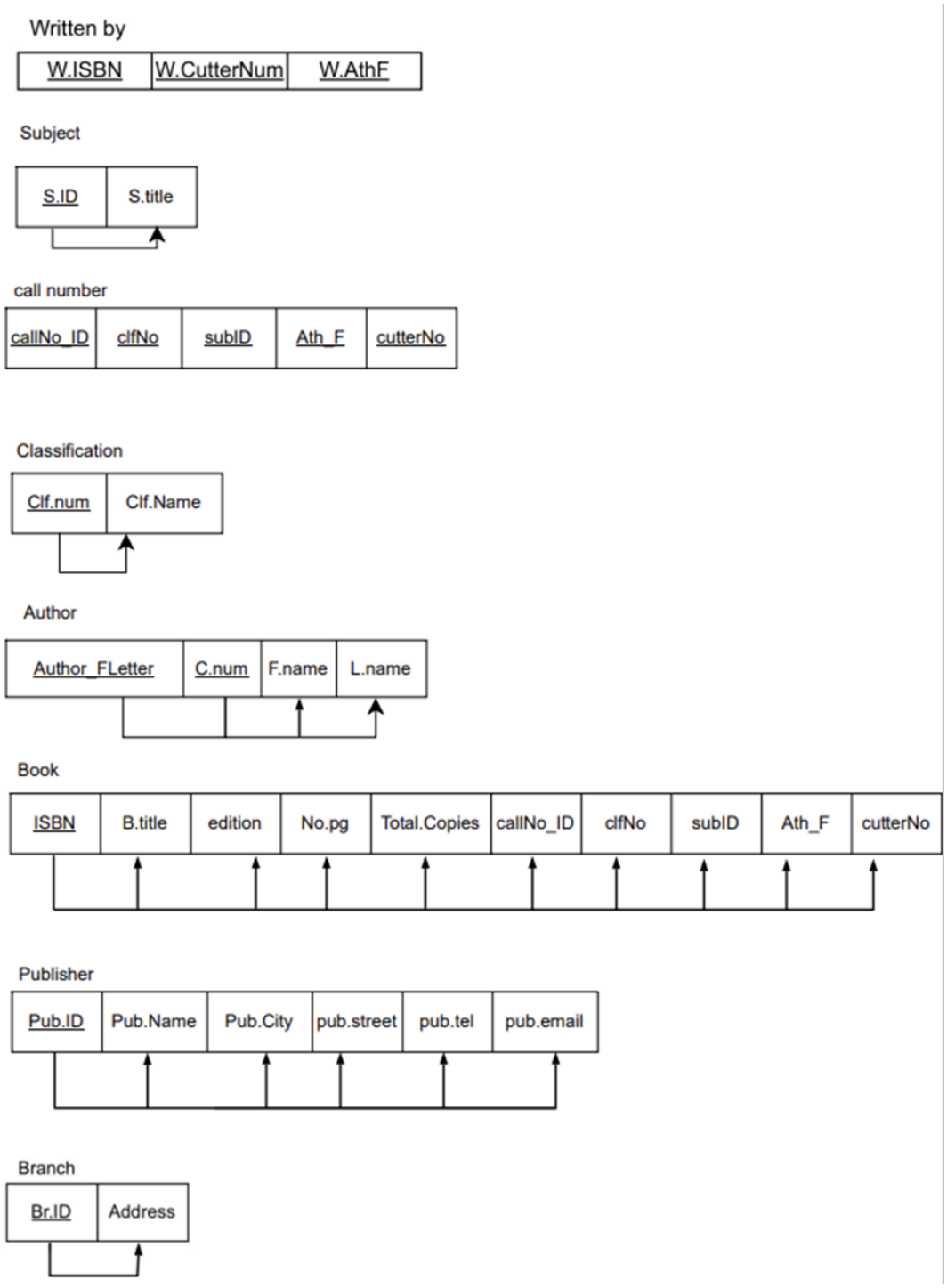


Join



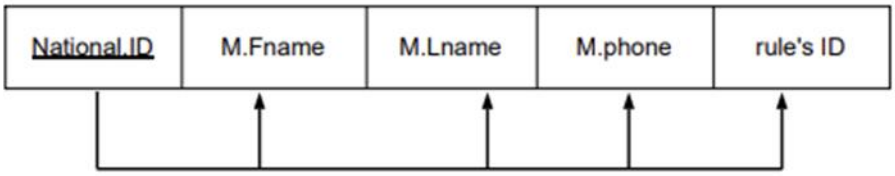
4.3 Third Normal Form

All the relations are in the third normal form (3NF), all of them are in (2NF), and there are no transitive functionality dependency from the non-primary attribute on the PK.

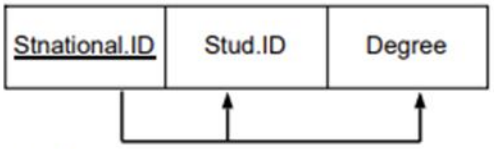


copy ID

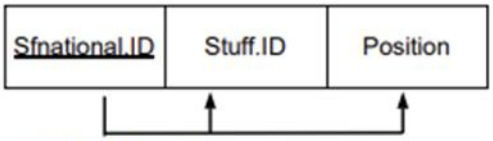
Member



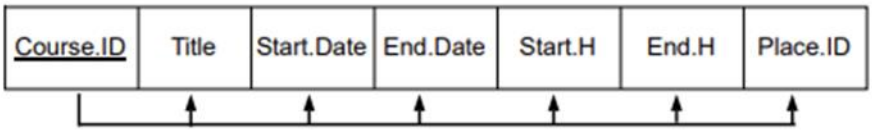
Student



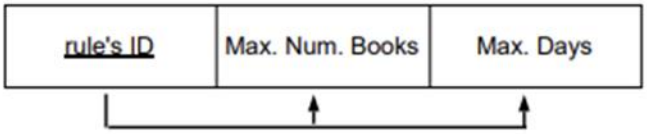
Staff



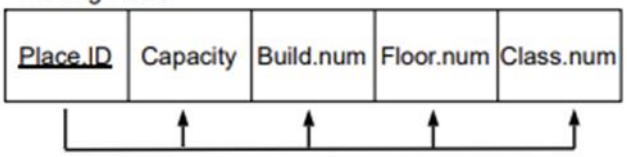
Training Course



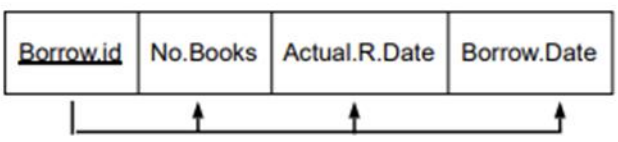
Borrowing rules



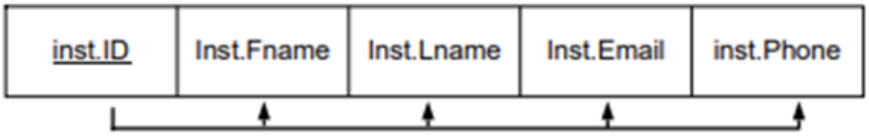
Training Place



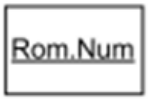
Borrowing Service



Instructor



Study Room



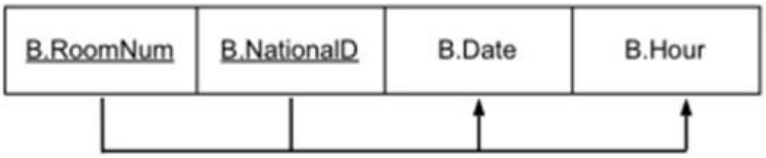
Presented by

Available in

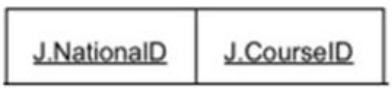
Depends on

Offerd to

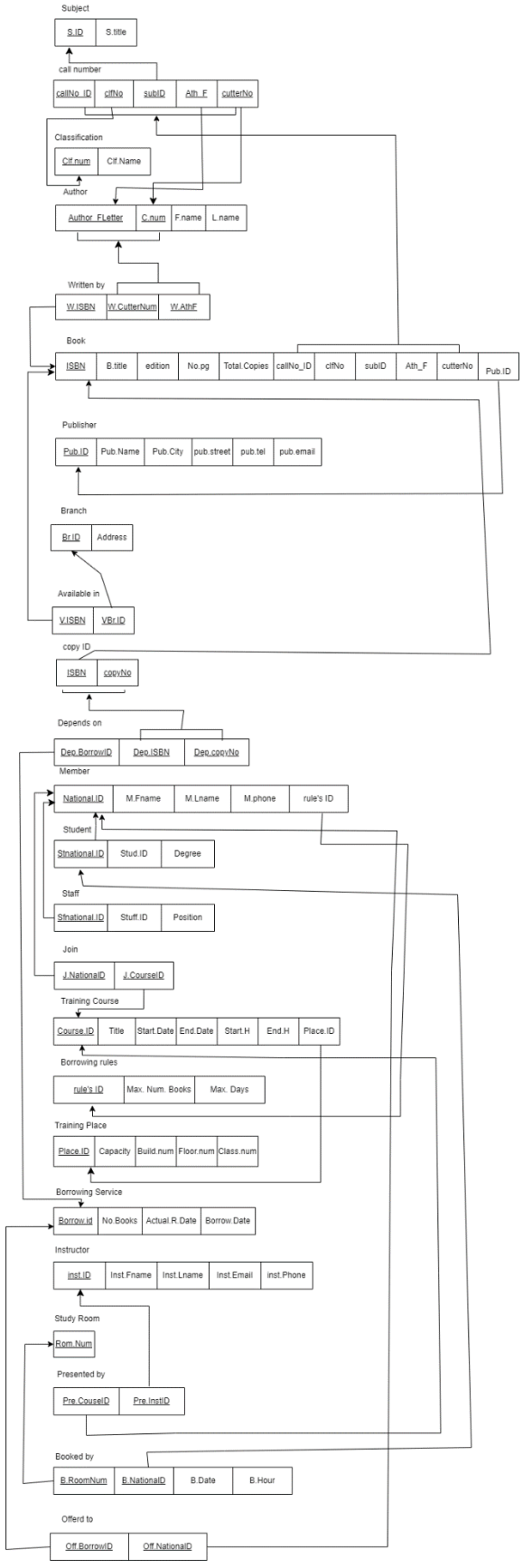
Booked by



Join



5 Final DB Schema Diagram



PART III: IMPLEMENTATION

6 Table Creation Script

In this section, list your table creation scripts. The tables should all be in 3NF. If you have 10 tables then you should have 10 subsections. Please highlight (in yellow) all the constraints in the script including referential integrity and constraints on attributes. Please be organized!

6.1 <*subject*> TABLE

create table subject (s_id varchar2(5),s_title varchar2(50),constraint pk_sub primary key(s_id));

```
SQL>
SQL> create table subject(s_id varchar2(5),s_title varchar2(50),constraint pk_sub primary key(s_id) );

Table created.

SQL>
```

6.2 <*classification* > TABLE

create table classification (clf_num varchar2(5),clf_name varchar2(50),constraint pk_clf primary key(clf_num));

```
SQL> create table classification (clf_num varchar2(5),clf_name varchar2(50),constraint pk_clf primary key(clf_num) );

Table created.

SQL>
```

6.3 < author > TABLE

create table author (Author_FLetter varchar2(3),Cutter_num number(10),F_name varchar2(30),l_name varchar2(30),constraint pk_author primary key(Author_FLetter ,Cutter_num));

```
SQL>
SQL> create table author (Author_FLetter varchar2(3),Cutter_num number(10),F_name varchar2(30)
,l_name varchar2(30),constraint pk_author primary key(Author_FLetter,Cutter_num ) );

Table created.

SQL>
```

6.4 < Publisher > TABLE

create table Publisher(Pub_ID number(10),Pub_Name varchar2(60),pub_city varchar2(30), pub_street varchar2(30), pub_tel varchar2(20),pub_email varchar2(50), constraint pk_pub primary key (pub_id));

```
SQL>
SQL> create table Publisher(Pub_ID number(10),Pub_Name varchar2(60),pub_city varchar2(30), pub_street varchar2(30), pub_tel
varchar2(20),pub_email varchar2(50), constraint pk_pub primary key (pub_id));

Table created.
```

6.5 < branch > TABLE

create table branch (br_id number(10),address varchar2(150),constraint pk_br primary key(br_id));

```
SQL> create table branch (br_id number(10),address varchar2(150),constraint pk_br primary key(br_id) );

Table created.

SQL>
```

6.6 < Borrowing_rules > TABLE

create table Borrowing_rules(rules_ID number(10),max_books number(10),max_days number(10), constraint pk_rules primary key (rules_id));

```
Table created.

SQL> create table Borrowing_rules(rules_ID number(10),max_books number(10),max_days number(10), constraint pk_rules primary key (rules_id));

Table created.

SQL>
```

6.7 < Training_Place > TABLE

create table Training_Place(place_ID number(10),capacity number(10),build_num number(10),floor_num number(10),class_num number(10), constraint pk_tp primary key (place_id));

```
SQL> create table Training_Place(place_ID number(10),capacity number(10),build_num number(10),floor_num number(10),class_num number(10), constraint
pk_tp primary key (place_id));

Table created.

SQL>
```

6.8 < instructor > TABLE

create table instructor (inst_ID number(10),inst_fname varchar2(30),inst_lname varchar2(30),inst_email varchar(50),inst_phone varchar2(15), constraint pk_inst primary key (inst_id));

```
SQL> create table instructor (inst_ID number(10),inst_fname varchar2(30),inst_lname varchar2(30),inst_email varchar(50),inst_phone varchar2(15),
 constraint pk_inst primary key (inst_id));

Table created.

SQL>
```

6.9 < borrowing_service > TABLE

create table borrowing_service (Borrow_ID number (10),no_Books number(10),Actual_RDate Date ,Borrow_Date Date,constraint pk_borrowService primary key(Borrow_ID));

```
SQL> create table borrowing_service (Borrow_ID number (10),no_Books number(10),Actual_RDate Date ,Borrow_Date Date,constraint pk_borrowService
primary key(Borrow_ID));

Table created.

SQL>
```

6.10< study_room > TABLE

create table study_room(no_Room number(10),constraint pk_studRoom primary key(no_Room));

```
SQL> create table study_room(no_Room number(10),constraint pk_studRoom primary key(no_Room));

Table created.

SQL>
```

6.11 < call_number > TABLE

create table call_number(callno_id number(10), clf_no varchar2(5), sub_id varchar2(5), author_fletter varchar2(3), cutter_no number(10),constraint pk_callnum primary key(callno_id,clf_no,sub_id,author_fletter,cutter_no),constraint fk_clfno foreign key (clf_no) REFERENCES classification(clf_num),constraint fk_subid foreign key (sub_id) REFERENCES subject(s_id),constraint fk_auth foreign key (author_fletter,cutter_no) REFERENCES author(Author_FLetter,cutter_num));

```
SQL>
SQL> create table call_number(callno_id number(10), clf_no varchar2(5), sub_id varchar2(5), author_fletter varchar2(3), cutter_no number(10),constraint pk_callnum prima
ry key(callno_id,clf_no,sub_id,author_fletter,cutter_no),constraint fk_clfno foreign key (clf_no) REFERENCES classification(clf_num),constraint fk_subid foreign key (su
b_id) REFERENCES subject(s_id),constraint fk_auth foreign key (author_fletter,cutter_no) REFERENCES author(Author_FLetter,cutter_num));

Table created.

SQL>
```

6.12 < book > TABLE

create table book(ISBN number(30), b_title varchar2(50), edition varchar2(20), no_page number(10), total_copies number(10), callNo_ID number(10), clfNo varchar2(5), subID varchar2(5), ath_F varchar2(3), cutterNo number(10), pub_ID number(10), constraint pk_book primary key(ISBN), constraint fk_book_pub foreign key(pub_ID) references publisher(pub_ID), constraint fk_book_callNo foreign key(callNo_ID, clfNo, subID, ath_F, cutterNo) references call_number(callNo_ID, clf_no, sub_id, author_fletter, cutter_no));

```
SQL>
SQL> create table book(ISBN number(30), b_title varchar2(50), edition varchar2(20), no_page number(10), total_copies number(10), callNo_ID number(10), clfNo varchar2(5)
, subID varchar2(5), ath_F varchar2(3), cutterNo number(10), pub_ID number(10), constraint pk_book primary key(ISBN), constraint fk_book_pub foreign key(pub_ID) referen
ces publisher(pub_ID), constraint fk_book_callNo foreign key(callNo_ID, clfNo, subID, ath_F, cutterNo) references call_number(callNo_ID, clf_no, sub_id, author_fletter,
 cutter_no));

Table created.

SQL>
```

6.13 < copy_id > TABLE

create table copy_id(ISBN number(30), copyNO number(30), constraint pk_copy primary key(ISBN, copyNO), constraint fk_copyisbn foreign key (isbn) references book(ISBN));

```
SQL>
SQL> create table copy_id( ISBN number(30), copyNO number(30), constraint pk_copy primary key
(ISBN, copyNO), constraint fk_copyisbn foreign key (isbn) references book(ISBN));

Table created.

SQL>
```

6.14 < member > TABLE

create table member(nationalid number(20), Mfname varchar2(30), Mlname varchar2(30), Mphone varchar2(15), rulesID number(10),constraint pk_member primary key (nationalid), constraint fk_member foreign key (rulesID) references borrowing_rules(rules_id));

```
SQL>
SQL> create table member( nationalid number(20), Mfname varchar2(30), Mlname varchar2(30), Mphone varchar2(15), rulesID number(10),constraint pk_member primary key (nat
ionalid), constraint fk_member foreign key (rulesID) references borrowing_rules(rules_id));

Table created.

SQL>
```

6.15< student > TABLE

create table student(Snational_id number(30), student_id number(30) not null unique, degree varchar2(20), constraint pk_student primary key (Snational_id), constraint fk_student foreign key (Snational_id) references member(nationalid));

```
SQL> create table student( Snational_id number(30), student_id number(30) not null unique, degree
varchar2(20), constraint pk_student primary key (Snational_id), constraint fk_student foreign key
(Snational_id) references member(nationalid));

Table created.

SQL>
```

6.16 < staff > TABLE

create table staff(SFnational_id number(30), staffid number(30) not null unique , position varchar2(20), constraint pk_staff primary key (SFnational_id), constraint fk_staff foreign key (SFnational_id) references member(nationalid));

```
SQL>
SQL> create table staff(SFnational_id number(30), staffid number(30) not null unique , position varchar2(20),
 constraint pk_staff primary key (SFnational_id), constraint fk_staff foreign key (SFnational_id) references
member(nationalid));

Table created.

SQL>
```

6.17 < training_course > TABLE

create table training_course (course_id number(30) , title varchar2(40), start_date date, end_date date, start_hour varchar2(10), end_hour varchar2(10), place_id number(10) , constraint pk_trainc primary key (course_id), constraint fk_trainc foreign key (place_id) references training_place(place_ID));

```
SQL>
SQL> create table training_course (course_id number(30) , title varchar2(40), start_date date, end_date date, start_hour varchar2(10), end_hour varchar2(10), place_id n
umber(10) , constraint pk_trainc primary key (course_id), constraint fk_trainc foreign key (place_id) references training_place(place_ID));

Table created.

SQL>
```

6.18< written_by > TABLE

create table written_by(w_isbn number(30), w_cutternum number(10), w_authorf varchar2(30), constraint pk_written primary key (w_isbn, w_cutternum, w_authorf), constraint fk_writtenisbn foreign key(w_isbn) references book(ISBN), constraint fk_written_author foreign key(w_cutternum, w_authorf) references author(Cutter_num, Author_FLetter));

```
SQL>
SQL> create table written_by( w_isbn number(30), w_cutternum number(10), w_authorf varchar2(3), constraint pk_written primary key (
w_isbn, w_cutternum, w_authorf), constraint fk_writtenisbn foreign key(w_isbn) references book(ISBN), constraint fk_written_author
foreign key(w_cutternum, w_authorf) references author(Cutter_num, Author_FLetter));

Table created.
```

6.19 < available_in > TABLE

create table available_in (v_isbn number(30), v_brID number(10), constraint pk_available primary key(v_isbn, v_brID), constraint fk_visbn foreign key (v_isbn) references book(ISBN), constraint fk_vbranch foreign key (v_brID) references branch(br_id));

```
SQL> create table available_in (v_isbn number(30), v_brID number(10), constraint pk_available primary key(v_isbn, v_brID), constraint
 fk_visbn foreign key (v_isbn) references book(ISBN),  constraint fk_vbranch foreign key (v_brID) references branch(br_id));

Table created.

SQL>
```

6.20 < depends_on > TABLE

create table depends_on (dep_bid number(10), dep_isbn number(30),dep_copynum number(30), constraint pk_depend primary key(dep_bid, dep_isbn, dep_copynum), constraint fk_depb foreign key (dep_bid) references borrowing_service(Borrow_ID), constraint fk_depcopy foreign key (dep_isbn, dep_copynum) references copy_id(ISBN, copyNO));

```
SQL>
SQL> create table depends_on (dep_bid number(10), dep_isbn number(30),dep_copynum number(30), constraint pk_depend primary key(dep_bid, dep_isbn, dep_copynum), constrai
nt fk_depb foreign key (dep_bid) references borrowing_service(Borrow_ID), constraint fk_depcopy foreign key (dep_isbn, dep_copynum) references copy_id(ISBN, copyNO));

Table created.

SQL>
```

6.21 < join > TABLE

create table join (j_nationalid number(30), j_courseid number(30), constraint pk_join primary key(j_nationalid, j_courseid), constraint fk_joinmember foreign key(j_nationalid) references member(nationalid), constraint fk_joincourse foreign key (j_courseid) references training_course(course_id));

```
SQL>
SQL> create table join (j_nationalid number(30), j_courseid number(30), constraint pk_join primary key(j_nationalid, j_courseid), constraint fk_joinmember foreign key (
j_nationalid) references member(nationalid),  constraint fk_joincourse foreign key (j_courseid) references training_course(course_id) );

Table created.

SQL>
```

6.22< presented_by > TABLE

create table presented_by(pre_courseid number(30), pre_instid number(30), constraint pk_presented primary key(pre_courseid, pre_instid), constraint fk_precourse foreign key (pre_courseid) references training_course(course_id), constraint fk_preinst foreign key (pre_instid) references instructor(inst_ID));

```
SQL>
SQL> create table presented_by(pre_courseid number(30), pre_instid number(30), constraint pk_presented primary key(
pre_courseid, pre_instid), constraint fk_precourse foreign key (pre_courseid) references training_course(course_id)
, constraint fk_preinst foreign key (pre_instid) references instructor(inst_ID));

Table created.

SQL>
```

6.23 < booked_by > TABLE

create table booked_by(b_roomnum number(10), b_nationalid number(30),b_date date, b_hour varchar2(10), constraint pk_booked primary key(b_roomnum, b_nationalid), constraint fk_bookedr foreign key (b_roomnum) references study_room(no_Room), constraint fk_bookeds foreign key (b_nationalid) references student (Snational_id));

```
SQL>
SQL> create table booked_by(b_roomnum number(10), b_nationalid number(30),b_date date, b_hour varchar2(10), constraint pk_booked primary key(b_roomnum, b_nationalid), c
onstraint fk_bookedr foreign key (b_roomnum) references study_room(no_Room), constraint fk_bookeds foreign key (b_nationalid) references student ( Snational_id) );

Table created.

SQL>
```

6.24< offered_to > TABLE

create table offered_to(off_borrowid number(10), off_nationalid number(30), constraint pk_offered primary key(off_bid, off_nationalid), constraint fk_offb foreign key (off_bid) references borrowing_service(Borrow_ID), constraint fk_offn foreign key (off_nationalid) references member(nationalid));

```
SQL>
SQL> create table offered_to( off_borrowid number(10), off_nationalid number(30), constraint pk_offered primary key(off_borrowid, off_nationalid), constraint fk_offb fo
reign key (off_borrowid) references borrowing_service(Borrow_ID), constraint fk_offn foreign key (off_nationalid) references member(nationalid));

Table created.
```

7 Constraints Script

In this subsection, show how the business rules have been translated into SQL script. Refer to section 2.2.

Business Rule	SQL Script	Table
• A book may have more than one copy, tracked by the key of ISBN and copy number.	create table copy_id(ISBN number(30), copyNO number(30),	copy_id
• Each copy has a unique (ISBN with the copy number).	constraint pk_copy primary key(ISBN, copyNO),	copy_id
• Each book belongs to one specific classification in the library shown in the call number. • Each classification has several books belong to it in the call number.	constraint fk_clfno foreign key (clf_no) REFERENCES classification(clf_num),	Call_number
• The classification number with subject number and cutter number form the call number.	constraint pk_callnum primary key(callno_id,clf_no,sub_id,author_fletter,cutter_no),	Call_number
• Each book must have call number.	alter table book modify (callNo_ID not null, clfNo not null, subID not null, ath_F not null, cutterNo not null);	book
• Each call number may have more than one book if the book has more than one copy. • Each book has one specific call number.	constraint fk_book_callNo foreign key(callNo_ID, clfNo, subID, ath_F, cutterNo) references call_number(callNo_ID, clf_no, sub_id, author_fletter, cutter_no));	book
• The book may be available in different branches. • Each branch has many books.	create table available_in (v_isbn number(30), v_brID number(10), constraint pk_available primary key(v_isbn, v_brID), constraint fk_visbn foreign key (v_isbn) references book(ISBN), constraint fk_vbranch foreign key (v_brID) references branch(br_id));	Available_in
• The book should be written by one author or more.	create table written_by(w_isbn number(30), w_cutternum number(10), w_authorf varchar2(30), constraint pk_written primary key (w_isbn, w_cutternum, w_authorf), constraint fk_writtenisbn	written_by

• The author can write many books.	foreign key(w_isbn) references book(ISBN), constraint fk_written_author foreign key(w_cutternum, w_authorf) references author(Cutter_num, Author_FLetter));	
• All the authors in the system should write a book exist in the library.	constraint pk_written primary key (w_isbn, w_cutternum, w_authorf),	written_by
• The book must be published by one publisher. • The publisher can publish more than one book.	constraint fk_book_pub foreign key(pub_ID) references publisher(pub_ID),	book
• All the publisher in the system should publish at least one book exist in the library. • Each book must have a publisher	alter table book modify (pub_ID not null) ;	book
• The borrowing service depends on the copy number and book's ISBN.	create table depends_on (dep_bid number(10), dep_isbn number(30),dep_copynum number(30), constraint pk_depend primary key(dep_bid, dep_isbn, dep_copynum), constraint fk_depb foreign key (dep_bid) references borrowing_service(Borrow_ID), constraint fk_depcopy foreign key (dep_isbn, dep_copynum) references copy_id(ISBN, copyNO));	depends_on
• Each borrowing rule may be followed by more than one member.	constraint fk_member foreign key (rulesID) references borrowing_rules(rules_id));	member
• For each member who wants to borrow a book, should follow one of the borrowing rules which is determined by their membership.	alter table member modify (rulesID not null) ;	member
• The borrowing service offer just for the library members.	constraint fk_offb foreign key (off_bid) references borrowing_service(Borrow_ID), constraint fk_offn foreign key (off_nationalid) references member(nationalid));	offered_to

• Each member can borrow many times. • The borrowing service offer for many members.	create table offered_to(off_borrowid number(10), off_nationalid number(30), constraint pk_offered primary key(off_bid, off_nationalid), constraint fk_offb foreign key (off_bid) references borrowing_service(Borrow_ID), constraint fk_offn foreign key (off_nationalid) references member(nationalid));	offered_to
• In borrowing rules, the maximum days and books for each member is: - faculty staff: 15 books and 120 days. - lecturers: 15 books and 60 days. - university staff: 4 books and 15 days. - Postgraduate: 10 books and 30 days. - undergraduate: 6 books and 15 days. - out of university: 4 books and 15 days.	insert all into Borrowing_rules values(1, 15, 120) into Borrowing_rules values(2, 15, 60) into Borrowing_rules values(3, 4, 15) into Borrowing_rules values(4, 10 , 30) into Borrowing_rules values(5, 6, 15) into Borrowing_rules values(6, 4, 15) select 1 from dual;	*borrowing_rule*
• The same room can be booked by many students on the same day. • The student can book different rooms in a different date and hour.	create table booked_by(b_roomnum number(10), b_nationalid number(30),b_date date, b_hour varchar2(10), constraint pk_booked primary key(b_roomnum, b_nationalid), constraint fk_bookedr foreign key (b_roomnum) references study_room(no_Room), constraint fk_bookeds foreign key (b_nationalid) references student (Snational_id));	Booked_*by*
• The member can join to many training courses offered by the library. • training courses can be joined by many members.	create table join (j_nationalid number(30), j_courseid number(30), constraint pk_join primary key(j_nationalid, j_courseid), constraint fk_joinmember foreign key(j_nationalid) references member(nationalid), constraint fk_joincourse foreign key (j_courseid) references training_course(course_id));	join
• Training course must have members joined to it.	constraint pk_join primary key(j_nationalid, j_courseid),	join
• Training course must have a place to be held in.	alter table training_course modify (place_id not null);	Training_course

• The place may hold many training courses. • The Training course will be held in one place.	constraint fk_trainc foreign key (place_id) references training_place(place_ID));	Training_course
• Each training course must have an instructor/s. • All instructors in the system must present a training course/s.	create table presented_by(pre_courseid number(30), pre_instid number(30), constraint pk_presented primary key(pre_courseid, pre_instid), constraint fk_precourse foreign key (pre_courseid) references training_course(course_id), constraint fk_preinst foreign key (pre_instid) references instructor(inst_ID));	presented_by

8 Queries

In the following subsections, write down five different SQL queries which implements five of the indented output of your system (section 1.4).

8.1 *<Borrowed Books>*

Query in natural language (ENGLISH)

Display the book title and ISBN for the books that exist in the borrowing service that has more than 10 books has been borrowed at the same time.

SQL script

```
Select b_title, isbn
From book
where isbn in(
select dep_isbn
from depends_on
where dep_bid in (
Select borrow_id
from borrowing_service
where no_books>10));
```

Caption of the first five rows of the output

```
SQL>
SQL> Select b_title, isbn From book where  isbn in( select dep_isbn from depends_on where dep_bid in (Select borrow_id from borrowing_service where no_books>10));

B_TITLE                                            ISBN
-------------------------------------------------- ----------
 The philosophy of race                          9.7804E+12
International A Level Mathematics Mechanics      9.7813E+12

SQL>
```

8.2 *<Maximum course>*

Query in natural language (ENGLISH)

Display the maximum number of courses that has been done at the same date.

SQL script

```
select max(count (*)) max_course
from training_course
group by start_date;
```

Caption of the first five rows of the output

```
SQL> select max(count(*)) max_course
  2  from training_course
  3  group by start_date;

MAX_COURSE
----------
         2
```

8.3 *<Active member>*

Query in natural language (ENGLISH)

Display the member information for the members who both borrow a book and join a course in the library (*he is an active member*).

SQL script

```
SQL> Select nationalid ,mfname , mlname
from member
where nationalid in(
select off_nationalid
from offered_to
intersect
select j_nationalid from join );
```

Caption of the first five rows of the output

```
SQL>
SQL>
SQL> Select nationalid ,mfname , mlname from member where nationalid in(select off_nationalid from offered_to intersect select j_nationalid from join );

NATIONALID MFNAME                        MLNAME
---------- ----------------------------- -----------------------------
1144387587 Samira                        Musa
1228758724 Zainab                        Kareem
1263257524 Zahra                         Hamza
2165444532 manal                         omar
2498863477 Rana                          Saleh

SQL>
```

8.4 *<Booked room>*

Query in natural language (ENGLISH)

display the study Room number and the student first name, last name and the national id of students who booked a room on 14 February.

SQL script:

```
SQL> Select snational_id , mfname,mlname ,b_roomnum
From student,member, booked_by
where snational_id= nationalid
and b_nationalid= snational_id
and b_date =to_date('14-02-23','dd-mm-yy');
```

Caption of the first five rows of the output

```
SQL>
SQL> Select snational_id , mfname,mlname ,b_roomnum From student,member, booked_by where snational_id= nationalid and b_nationalid= snational_id and b_date =to_date('14
-02-23','dd-mm-yy' );

SNATIONAL_ID MFNAME                         MLNAME                         B_ROOMNUM
------------ ------------------------------ ------------------------------ ----------
  1145714361 Layan                          Zain                                  101
  1228758724 Zainab                         Kareem                                102

SQL> _
```

8.5 *<books available in branch with '2480' id>*

Query in natural language (ENGLISH)

display the books isbn and call number for the books that available in branch number 2480 order by the book title.

SQL script

```
Select isbn ,b_title , clfno||'.' ||subid||' '|| ath_f||cutterno as call_number
from book
where isbn in(
select v_isbn
from available_in
where v_brid=2480)
order by b_title;
```

Caption of the first five rows of the output

```
SQL> Select isbn ,b_title , clfno||'.' ||subid||' '|| ath_f||cutterno as call_number from book where isbn in( select v_isbn from available_in where v_brid=2480) order b
y b_title;

      ISBN B_TITLE                                          CALL_NUMBER
---------- -------------------------------------------------- --------------------------------------------------
9.7811E+12  Compressed sensing : theory and applications      000.004 S16
9.7818E+12  Oral Pathology : Clinical Pathologic Correlations 600.616 V91
9.7804E+12  The Islamic world                                 200.261 O17
9.7804E+12  The philosophy of race                            100.142 A43
9.7815E+12 3D future internet media                           000.004 C23
9.7813E+12 International A Level Mathematics Mechanics        500.510  J61
9.7833E+12 Introduction To Law                                300.340 K70

7 rows selected.
```

8.6 *<courses with specific place id and period>*

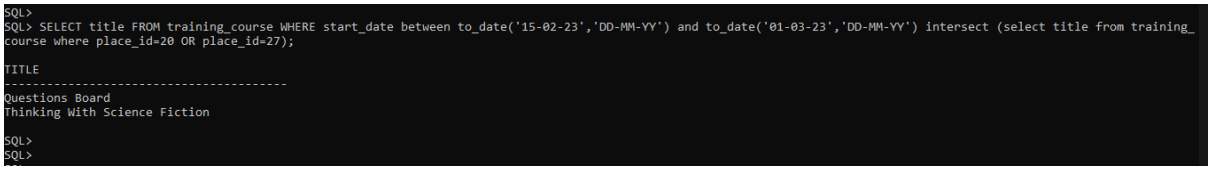
Query in natural language (ENGLISH)

Display the courses titles that start between 15 February 2023 and 1 march 2023 also held in the places with one of the following id '20', '27'

SQL script

```
SELECT title
FROM training_course
WHERE start_date between to_date('15-02-23','DD-MM-YY') and to_date('01-03-23','DD-MM-YY')
intersect
(select title
from training_course
where place_id=20 OR place_id=27);
```

Caption of the first five rows of the output



APPENDIX

For each table, list all the rows (organize!).

6.1 <*subject*> TABLE

```
SQL> select * from subject;

S_ID  S_TITLE
----- --------------------------------------------------
004   Data processing Computer science
030   General encyclopedic works
109   Historical treatment of philosophy
201   Philosophy of Christianity
261   Social theology
340   Law
455   Italian grammar
510   Mathematics
616   Diseases
624   Civil engineering
714   Water features

S_ID  S_TITLE
----- --------------------------------------------------
812   Drama
142   Critical philosophy
160   Logic

14 rows selected.

SQL>
```

6.2 <*classification* > TABLE

```
SQL> select * from classification;

CLF_N CLF_NAME
----- --------------------------------------------------
000   Computer Science, Information, and General Works
100   Philosophy and psychology
200   Religion
300   Social sciences
400   Language
500   Natural sciences and mathematics
600   Technology Applied sciences
700   The arts
800   Literature and rhetoric
900   Geography and history

10 rows selected.
```

6.3 <*Author* > TABLE

```
SQL> select * from author;

AUT CUTTER_NUM F_NAME                          L_NAME
--- ---------- ------------------------------ ------------------------------
C           23 Clarence                       Barnhart
J           61 Joan                           Biella
V           91 Victor                         Cheste
S           16 John                           Bromely
A           43 Arthur                         Reton
K           70 Karl                           Arndt
R           26 Richard                        Doris
O           17 Oakley                         Kenneth
A           10 Ahlam                          Abdulghani
J           50 Jefrey                         Barlough
T           30 Taghreed                       Alofaisan

AUT CUTTER_NUM F_NAME                          L_NAME
--- ---------- ------------------------------ ------------------------------
M           44 Micheal                        Ryan

12 rows selected.

SQL>
```

6.4<*publisher* > TABLE

```
SQL>
SQL> select * from publisher;

    PUB_ID PUB_NAME                                                  PUB_CITY                  PUB_STREET                PUB_TEL            PUB_EMAIL
---------- ------------------------------------------------------------ ------------------------- ------------------------- ------------------ ------------
-----------------------------------
         1 The Natural History Museum                                 London                    Cromwell Road             +44 (0)207 942 5336
         2 The History Press                                          Cheltenham                97 St Georges Place       +44 (0)1242 895310 web@thehistor
ypress.co.uk
         3 HarperCollins                                              Glasgow                   Westerhill Road Bishopbriggs  01484 668148       internationa
l.schools@harpercollins.co.uk
         4 Modern Language Association of America                     New York                  85 Broad Street           646 576-5000
         5 Finnish Literature Society                                 Helsinki                  Hallituskatu 1            +358 201 131 231   sks@finlit.fi

         6 Center for the Scientific Study of Religion                New York                  One Liberty Plaza         (888)-388-3574
         7 Studia editoria e comunicazione a Catania                  Rome                      Via Vicenza               3922505044         info@accademi
aeditorie.it
         8 Detroit Institute of Arts                                  Detroit                   Woodward Avenue           (313) 833-7900
         9 King Saud University Press Computer faculty department     Riyadh                    Shaikh Hasan Ibn Abdullah 96614676176        acksupress@ks
u.edu.sa
        10 INSIDE WASHINGTON PUBLISHERS                               Arlington                 South Eads Street         1-800-424-9068     custsvc@iwpne
ws.com
        11 Arab Studies Institute                                     Beirut                    Hamade Street             703-688-2745       info@arabstud
iesinstitute.org

    PUB_ID PUB_NAME                                                  PUB_CITY                  PUB_STREET                PUB_TEL            PUB_EMAIL
---------- ------------------------------------------------------------ ------------------------- ------------------------- ------------------ ------------
-----------------------------------
        12 Library of Tibetan Works and Archives Gangchen Kyishong    India                     Dharamsala                +91 9218422467     ltwa1970@gmai
l.com

12 rows selected.

SQL>
```

6.5 < branch > TABLE

```
SQL>
SQL> select * from branch;

     BR_ID ADDRESS
---------- --------------------------------------------------------------------------------------------------------
------------------------------------------------------------
      2480 Prince Majid Rd, King AbdulAziz University, 7823, Jeddah 22252
      7168 Abdullah Sulayman St, King AbdulAziz University, 2820, Jeddah 22252
      8386 Ring Rd, Gharb Al Dhahran, Dhahran 34461
      7252 King Abdullah University of Science and Technology, 3323, Thuwal 23955
      6326 As Salam Branch Rd, Al Jamiah, Al Madinah Al Munawwarah 42351
      3722 Al Jamiah, Al Madinah Al Munawwarah 42351
      7808 King Khaled International Airport, 3230, Riyadh 13412
      7633 King Saud University, Riyadh 13412
      1724 King Faisal University, Al Hofuf 36362
      8355 Al Qassim University, Buraydah 52571

10 rows selected.

SQL>
```

6.6 < Borrowing_rules > TABLE

```
SQL> select * from borrowing_rules;

  RULES_ID  MAX_BOOKS   MAX_DAYS
---------- ---------- ----------
         1         15        120
         2         15         60
         3          4         15
         4         10         30
         5          6         15
         6          4         15

6 rows selected.

SQL>
```

6.7 < Training_Place > TABLE

```
SQL> select * from training_place;

  PLACE_ID   CAPACITY  BUILD_NUM  FLOOR_NUM  CLASS_NUM
---------- ---------- ---------- ---------- ----------
        20         30         61          1        119
        21         60         67          1        116
        22         25          7          2        145
        23         40         64          2        135
        24         40          2          2        101
        25         55         65          3        127
        26         65         56          3        128
        27         23         42          1        110
        28         32         14          2        105
        29         15          4          3        143

10 rows selected.

SQL>
```

6.8 < instructor > TABLE

```
SQL> select * from instructor;

   INST_ID INST_FNAME                INST_LNAME                INST_EMAIL
                     INST_PHONE
---------- ------------------------- ------------------------- ------------------------------------------- --------------
         1 Dana                      Al-Sulaiman               dana.alsulaiman@kaust.edu.sa
                     0524759251
         2 DERYA                     BARAN                     derya.baran@kaust.edu.sa
                     0511251820
         3 IKRAM                     BLILOU                    ikram.blilou@kaust.edu.sa
                     0514897102
         4 LEENA                     ALI-IBRAHIM               leena.ibrahim@kaust.edu.sa
                     0540448063
         5 SAHIKA                    INAL                      sahika.inal@kaust.edu.sa
                     0577894833
         6 MAHA                      ALQAHTANI                 qahtanima@ksau-hs.edu.sa
                     0560546067
         7 HIAM                      MULLA                     hiamula@ksau-hs.edu.sa
                     0553146098
         8 AREEJ                     ALYAHYAWI                 yahyawia@ksau-hs.edu.sa
                     0569946090
         9 BASHAER                   ALSHAREEF                 barakatib@ksau-hs.edu.sa
                     0552245715
        10 GAHDI                     ALSHARIF                  sharifg@ksau-hs.edu.sa
                     0597446084

10 rows selected.

SQL>
```

6.9 < borrowing_service > TABLE

```
SQL> select * from borrowing_service;

 BORROW_ID   NO_BOOKS ACTUAL_R BORROW_D
---------- ---------- -------- --------
         1          3 12/11/22 01/11/22
         2          5 12/11/22 04/11/22
         3         10 10/01/23 02/01/23
         4          1 20/01/22 10/01/22
         5          6 13/02/22 07/02/22
         6          7 18/05/22 03/05/22
         7         12 06/01/23 01/01/23
         8          4          10/02/23
         9          8          01/02/23
        10          5          15/01/23

10 rows selected.

SQL>
```

6.10< study_room > TABLE

```
SQL> select * from study_room;

   NO_ROOM
----------
       101
       102
       103
       104
       105
       201
       202
       203
       204
       205
       301

   NO_ROOM
----------
       302
       303

13 rows selected.
```

6.11 < call_number > TABLE

```
SQL>
SQL> select * from call_number;

 CALLNO_ID CLF_N SUB_I AUT   CUTTER_NO
---------- ----- ----- --- ----------
         1 000   004   C             23
         2 100   142   A             43
         3 300   340   R             26
         4 100   160   A             10
         5 200   261   O             17
         6 400   455   R             26
         7 300   340   K             70
         8 600   616   V             91
         9 500   510   J             61
        10 000   004   S             16

10 rows selected.

SQL>
```

6.12 < book > TABLE

```
SQL> select * from book;

     ISBN B_TITLE                                          EDITION             NO_PAGE TOTAL_COPIES  CALLNO_ID CLFNO SUBID ATH   CUTTERNO    PUB_ID
--------- -------------------------------------------------- ------------------- ---------- ------------ ---------- ----- ----- --- ---------- ----------
9.7815E+12 3D future internet media                           1st ed                 302            2        1 000   004   C           23          4
9.7804E+12  The philosophy of race                           1st ed                 305            4        2 100   142   A           43          3
9.7804E+12   Learning the Law                                 1st ed                 264            2        3 300   340   R           26          1
9.7816E+12  Fuzzy Logic                                       1st ed                 235            2        4 100   160   A           10          3
9.7804E+12  The Islamic world                                 1st ed                 678            1        5 200   261   O           17          4
 844280542 Italian verbs and essentials of grammar            1st ed                 239            2        6 400   455   R           26          5
9.7833E+12 Introduction To Law                                1st ed                 397            1        7 300   340   K           70          6
9.7818E+12  Oral Pathology : Clinical Pathologic Correlations 1st ed                 268            1        8 600   616   V           91          9
9.7813E+12 International A Level Mathematics Mechanics        1st ed                 184            6        9 500   510   J           61          8
9.7811E+12  Compressed sensing : theory and applications       1st ed                 544            2       10 000   004   S           16          7

10 rows selected.
```

6.13 < copy_id > TABLE

```
SQL> select * from copy_id;

      ISBN     COPYNO
---------- ----------
9.7815E+12          1
9.7815E+12          2
9.7804E+12          1
9.7804E+12          2
9.7804E+12          3
9.7804E+12          4
9.7804E+12          1
9.7804E+12          2
9.7816E+12          1
9.7816E+12          2
9.7804E+12          1

      ISBN     COPYNO
---------- ----------
 844280542          1
 844280542          2
9.7833E+12          1
9.7818E+12          1
9.7813E+12          1
9.7813E+12          2
9.7813E+12          3
9.7813E+12          4
9.7813E+12          5
9.7813E+12          6
9.7811E+12          1

      ISBN     COPYNO
---------- ----------
9.7811E+12          2

23 rows selected.
```

6.14 < member > TABLE

```
SQL>
SQL> select * from member;

NATIONALID MFNAME                       MLNAME                       MPHONE           RULESID
---------- ---------------------------- ---------------------------- -------------- ----------
2165444532 manal                        omar                         0557384921              1
2595498532 Arwa                         Salem                        0592649020              3
2498863477 Rana                         Saleh                        0592982320              2
1164275623 Reem                         Ali                          0591896490              2
1003189649 Huda                         Mazen                        0515186457              1
1111973854 Dina                         Ahmad                        0591264957              1
1147542723 Wafa                         Amer                         0591970293              3
1112735478 Noor                         Yaser                        0591780461              3
1785247854 Leen                         Nawaf                        0556783457              2
1038364926 Layla                        Naser                        0569594286              1
1145714361 Layan                        Zain                         0566783658              4

NATIONALID MFNAME                       MLNAME                       MPHONE           RULESID
---------- ---------------------------- ---------------------------- -------------- ----------
1632571124 Yara                         Khalid                       0568263981              5
1263257524 Zahra                        Hamza                        0553912648              5
1298572524 Zahra                        Hatem                        0553867868              5
1228758724 Zainab                       Kareem                       0559579090              4
1144387587 Samira                       Musa                         0569770733              4
1149382734 Hanan                        Hassan                       0592756764              5
2734647312 Amal                         Zayd                         0559187314              5
2733816312 Aya                          Jamal                        0510217832              4
2271587578 Asil                         Rami                         0517256373              5
2738572778 Iman                         Yehya                        0510972301              6
1132754873 Farah                        Issa                         0512736701              6

NATIONALID MFNAME                       MLNAME                       MPHONE           RULESID
---------- ---------------------------- ---------------------------- -------------- ----------
1172319673 Reham                        Tariq                        0512923672              6
1072389696 Renad                        Talal                        0527547812              6
1009266963 Jamila                       Malek                        0557213812              6

25 rows selected.
```

6.15< student > TABLE

```
SQL>
SQL> select * from student;

SNATIONAL_ID STUDENT_ID DEGREE
------------ ---------- --------------------
  1145714361    2198334 PhD
  1228758724    2042334 Master
  1144387587    1942754 Master
  2733816312    2210890 PhD
  1632571124    2110890 Bachelor
  1263257524    2010790 Diploma
  1298572524    2212790 Diploma
  1149382734    1810590 Bachelor
  2734647312    1813480 Bachelor
  2271587578    2010899 Diploma

10 rows selected.
```

6.16 < staff > TABLE

```
SQL> select * from staff;

SFNATIONAL_ID    STAFFID POSITION
------------- ---------- --------------------
   2165444532    1528423 faculty staff
   1003189649    1628423 faculty staff
   1111973854    1627683 faculty staff
   1038364926    1791383 faculty staff
   2498863477    1782383 lecturer
   1164275623    1774213 lecturer
   1785247854    1598433 lecturer
   2595498532    1587233 university staff
   1147542723    1480433 university staff
   1112735478    1481273 university staff

10 rows selected.

SQL>
```

6.17 < training_course > TABLE

```
SQL>
SQL> select * from training_course;

 COURSE_ID TITLE                                START_DA END_DATE START_HOUR END_HOUR     PLACE_ID
---------- ------------------------------------ -------- -------- ---------- ---------- ----------
         1 The Art of Successful Speech         15/02/23 15/02/23 11:00AM    12:00PM            26
         3 Thinking With Science Fiction        17/02/23 17/02/23 10:00AM    12:00PM            20
         5 Balanced personality                 20/02/23 21/02/23 5:00PM     6:30PM             25
         7 Questions Board                      01/03/23 01/03/23 1:00PM     2:30PM             27
         9 Benefit Them                         01/03/23 01/03/23 8:00AM     2:00PM             21
        11 Open Banking                         23/03/23 23/03/23 8:00AM     9:30AM             29
        13 Moral Leadership                     11/04/23 11/04/23 12:00PM    2:00PM             23
        15 University Balance in Students Life  11/04/23 11/04/23 12:00PM    2:00PM             23
        17 First Aid                            19/04/23 21/04/23 2:00PM     5:00PM             22
        19 My Health is Precious                26/04/23 26/04/23 9:00AM     10:30AM            28

10 rows selected.

SQL>
```

6.18< written_by > TABLE

```
SQL>
SQL> select * from written_by;

    W_ISBN W_CUTTERNUM W_A
---------- ----------- ---
9.7815E+12          23 C
9.7815E+12          91 V
9.7804E+12          43 A
9.7804E+12          26 R
9.7816E+12          10 A
9.7804E+12          17 O
9.7804E+12          26 R
9.7804E+12          16 S
 844280542          26 R
9.7833E+12          70 K
9.7818E+12          91 V

    W_ISBN W_CUTTERNUM W_A
---------- ----------- ---
9.7813E+12          61 J
9.7811E+12          16 S

13 rows selected.

SQL>
```

6.19 < available_in > TABLE

```
SQL> select * from available_in;

    V_ISBN     V_BRID
---------- ----------
9.7815E+12       2480
9.7804E+12       7168
9.7804E+12       8386
9.7816E+12       7252
9.7804E+12       6326
9.7833E+12       7808
9.7818E+12       7633
9.7813E+12       1724
9.7811E+12       8355
9.7804E+12       2480
9.7804E+12       2480

    V_ISBN     V_BRID
---------- ----------
9.7833E+12       2480
9.7818E+12       2480
9.7813E+12       2480
9.7811E+12       2480

15 rows selected.
```

6.20 < depends_on > TABLE

```
SQL> select * from depends_on;

   DEP_BID   DEP_ISBN DEP_COPYNUM
---------- ---------- -----------
         1  844280542           1
         2 9.7804E+12           4
         3 9.7815E+12           2
         4 9.7804E+12           1
         5 9.7816E+12           2
         1 9.7816E+12           2
         2 9.7813E+12           3
         2  844280542           2
         1  844280542           2
         5 9.7811E+12           2
         5 9.7804E+12           3

   DEP_BID   DEP_ISBN DEP_COPYNUM
---------- ---------- -----------
         5 9.7804E+12           1
         6 9.7813E+12           4
         6 9.7818E+12           1
         7 9.7813E+12           3
         7 9.7804E+12           3

16 rows selected.
```

6.21 < join > TABLE

```
SQL> select * from join;

J_NATIONALID J_COURSEID
------------ ----------
  2165444532          3
  1164275623          5
  1003189649          5
  1147542723          3
  1038364926          7
  1263257524          3
  1298572524          1
  1228758724          9
  1144387587          5
  2498863477         11

10 rows selected.
```

6.22< presented_by > TABLE

```
SQL> select * from presented_by;

PRE_COURSEID PRE_INSTID
------------ ----------
           1          3
           3          1
           5          5
           7          2
           5          2
          11          1
          13          3
           9          4
           1         10
           7          4

10 rows selected.
```

6.23 < booked_by > TABLE

```
SQL> select * from booked_by;

 B_ROOMNUM B_NATIONALID B_DATE   B_HOUR
---------- ------------ -------- ----------
       101   1145714361 14/02/23 8:00AM
       102   1228758724 14/02/23 9:00AM
       103   1144387587 16/02/23 12:00PM
       104   2733816312 16/02/23 10:00AM
       201   1145714361 16/02/23 10:00AM
       202   1228758724 17/02/23 1:30PM
       205   1144387587 18/02/23 8:00AM
       301   2733816312 22/02/23 9:30AM
       301   1145714361 22/02/23 12:00PM
       302   1228758724 25/02/23 1:00PM
       303   1144387587 26/02/23 11:00AM

11 rows selected.
```

6.24< offered_to > TABLE

```
SQL> select * from offered_to;

OFF_BORROWID OFF_NATIONALID
------------ --------------
           1     2738572778
           2     2498863477
           3     1145714361
           4     1144387587
           5     2498863477
           6     1785247854
           7     2165444532
           8     1785247854
           9     1228758724
          10     1263257524

10 rows selected.
```