

TERMWORK - 2 :

Design of ER Model for an Educational institute.

Problem statement :

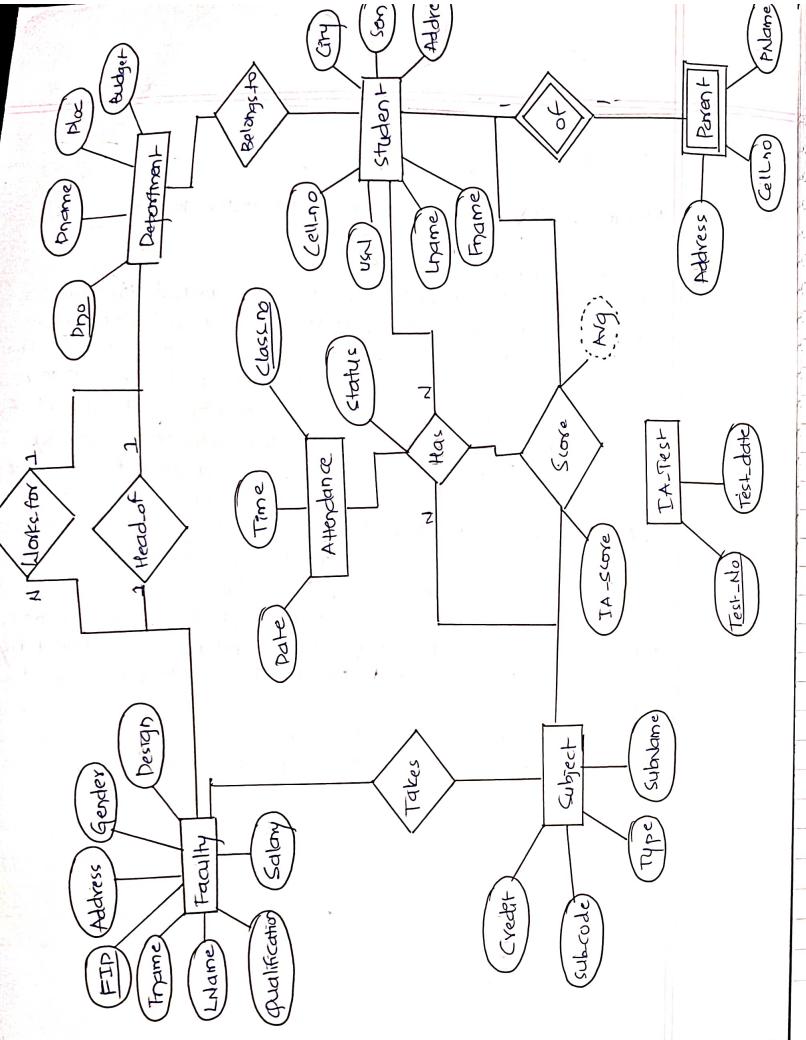
Design an ER Model for an educational institute which is required to record the student's attendance and IA performance in all the subjects and inform the same to their parents. The institute will have many departments, each with its own faculty and head of the department. The subjects the student's study can be either elective or core. A faculty has to take at least one subject and atmost 2 subjects and the subjects are not shared. The students take 3 tests and the average is computed by taking average of best two of the three scores. The model be designed to record only the CIE marks and not SEE marks. After the ER-Model, map it to relational schema by identifying primary and foreign keys. Normalise & do the following :

Create database with all necessary constraints.

Populate each table with appropriate data.

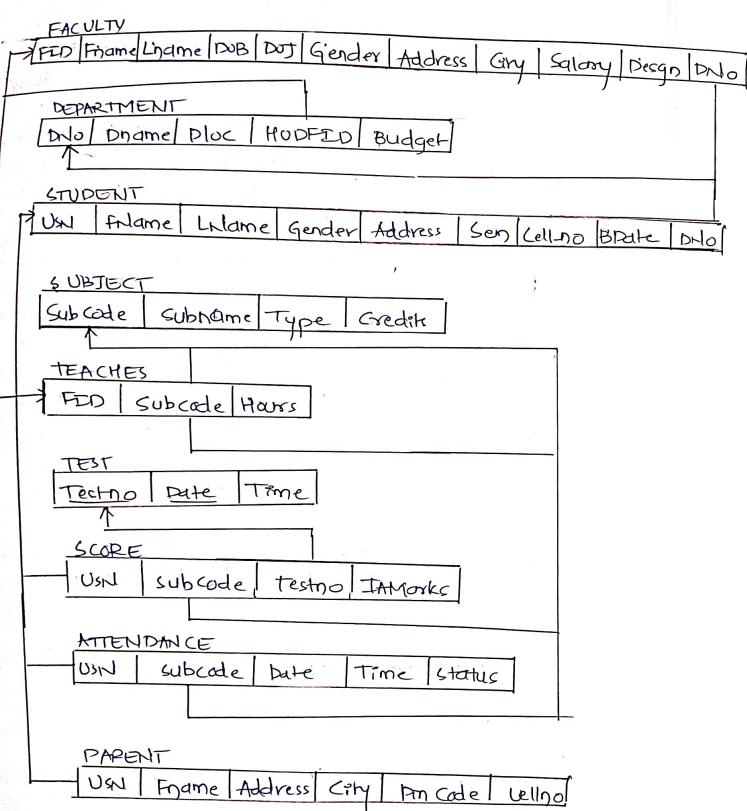
Execute queries on the tables created.

Create GUI.



Concepts:

ER is a first step towards building a database application. It helps in identifying various identities, their attributes and the relationship between them. The ER-Model helps the application developers to explain the customers, what all data would be stored and seek their suggestions to include all the data relevant to the application. While designing an ER it is important to include only the attributes relevant to entity types. Further after drawing ER-diagram the structural constraints, namely the cardinality ratios & participation constraints must be correctly indicated. There are 7 mapping rules which must be applied to the ER-diagram after completion to get the Relational model. The relational schema diagram for each relation must be drawn & the primary key & foreign keys must be correctly indicated. Then the DDL statements must be used to create the tables in oracle DBMS. Using INSERT command data to be inserted and using SQL queries the data must be checked for its correctness.



Learning Outcomes:

- ER-Model is a concept to describe data in graphical form
- There are 7 ER-to-Relational mapping rules to get Relational model from ER-Model.
- Relational model is a set of concepts to describe data to RDBMS.
- Relation, tuple, attribute, domain, primary key, foreign key are the concepts in relational model.
- DDL statements helps us to create tables and specify constraints.
- DML statements help us to populate and manipulate the database.
- Design a GUI and write the program to connect to DBMS server and display the data.
- Learnt the use of SQL queries to list data stored in tables.

CREATION STATEMENTS :

DEPARTMENT TABLE

```
CREATE TABLE DEPARTMENT(
    DNO INT,
    DNAME VARCHAR(20) NOT NULL,
    DLOC VARCHAR(20),
    HOD_FID INT,
    BUDGET INT,
    PRIMARY KEY (DNO)
);
```

FACULTY TABLE

```
FACULTY TABLE (
    FID INT,
    FNAME VARCHAR(20) NOT NULL,
    LNAME VARCHAR(20),
    DOD DATE,
    DOJ DATE,
    GENDER CHAR(1),
    ADDRESS VARCHAR(10),
    SALARY INT,
    CITY VARCHAR(10),
    DESIGNATION VARCHAR(10),
    DNO INT,
    PRIMARY KEY (FID),
    FOREIGN KEY(DNO) REFERENCES DEPARTMENT(DNO)
);
```

TABLE SUBJECT:

```
CREATE TABLE SUBJECT(
    SUB-CODE VARCHAR(10),
    SNAME VARCHAR(10) NOT NULL,
    TYPE VARCHAR(10) NOT NULL,
    CREDIT INT,
    PRIMARY KEY (SUB-CODE));
```

STUDENT TABLE:

```
CREATE TABLE STUDENT (
    USN VARCHAR(10),
    FNAME VARCHAR(20) NOT NULL,
    GENDER VARCHAR(10),
    ADDRESS VARCHAR(10),
    SEM INT NOT NULL,
    CELL-NO INT,
    BDATE DATE,
    DNO INT,
    PRIMARY KEY (USN),
    FOREIGN KEY (DNO) REFERENCES DEPARTMENT(DNO)
);
```

TABLE TEACHES:

```
CREATE TABLE TEACHES (
    FID INT,
    SUB-CODE VARCHAR(10),
    HOURS INT,
    PRIMARY KEY (FID, SUB-CODE),
    FOREIGN KEY (FID) REFERENCES FACULTY(FID),
    FOREIGN KEY (SUB-CODE) REFERENCES SUBJECT(SUB-CODE)
);
```

TEST TABLE :

```
CREATE TABLE TEST (
    TEST_NO INT,
    IA-DATE DATE,
    TIME INT,
    PRIMARY KEY(TEST_NO)
);
```

TABLE SCORE :

```
CREATE TABLE SCORE(
    USN VARCHAR(10),
    SUB-CODE VARCHAR(10),
    TEST_NO INT,
    IA-MARKS INT,
    PRIMARY KEY(USN, SUB-CODE, TEST_NO),
    FOREIGN KEY(USN) REFERENCES STUDENT(USN),
    FOREIGN KEY(SUB-CODE) REFERENCES SUBJECT(SUB-CODE),
    FOREIGN KEY(TEST_NO) REFERENCES TEST(TEST_NO)
);
```

TABLE ATTENDANCE

```
CREATE TABLE ATTENDANCE(
    USN VARCHAR(10),
    SUB-CODE VARCHAR(8),
    AT-DATE DATE,
    AT-TIME INT,
    STATUS CHAR(2),
    PRIMARY KEY(USN, SUB-CODE, AT-DATE),
    FOREIGN KEY(USN) REFERENCES STUDENT(USN),
    FOREIGN KEY(SUB-CODE) REFERENCES SUBJECT(SUB-CODE),
    );
);
```

TABLE PARENT ;

```
CREATE TABLE PARENT (
    USN VARCHAR(10),
    PNAME VARCHAR(15),
    ADDRESS VARCHAR(15),
    CITY VARCHAR(15),
    PINCODE INT,
    CELLNO INT,
    PRIMARY KEY(USN, PNAME)
);
```

DESCRIPTION :

DESC FACULTY;

Name	Null?	Type
FID	NOT NULL	NUMBER(3,8)
FNAME	NOT NULL	VARCHAR2(20)
LNAME		VARCHAR2(20)
DOB		DATE
DOJ		DATE
GEN DER		CHAR(1)
ADDRESS		VARCHAR2(20)
CITY		VARCHAR2(20)
SALARY		NUMBER(3,8)
DESIGNATION		VARCHAR2(20)
DNO		NUMBER(3,8)

DESC DEPARTMENT;

Name	Null?	Type
PNO	NOT NULL	NUMBER(38)
DNAME	NOT NULL	VARCHAR2(20)
LOC		VARCHAR2(20)
HOD_FID		NUMBER(38)

DESC STUDENT;

Name	Null?	Type
USN	NOT NULL	VARCHAR2(10)
FNAME	NOT NULL	VARCHAR2(20)
LNAME		VARCHAR2(20)
GENDER		CHAR(1)
ADDRESS		VARCHAR2(10)
SEM		NUMBER(38)
MOB_NO	NOT NULL	NUMBER(38)
BDATE		DATE
DNO		NUMBER(38)

DESC SUBJECT;

Name	Null?	Type
SUB_CODE	NOT NULL	VARCHAR2(8)
SNAME	NOT NULL	VARCHAR2(20)
TYPE	NOT NULL	VARCHAR2(10)
CREDIT		NUMBER(38)
FID		NUMBER(38)

DESC TEACHES;

Name	NULL?	Type
FID	NOT NULL	NUMBER(38)
SUB-CODE	NOT NULL	VARCHAR2(10)
HOURS		NUMBER(38)

DESC TEST;

Name	NULL?	Type
TEST_NO	NOT NULL	NUMBER(38)
IA-DATE		DATE
TIME		NUMBER(38)

DESC SCORE;

Name	NULL?	Type
USN	NOT NULL	VARCHAR2(10)
SUB-CODE	NOT NULL	VARCHAR(10)
TEST-NO	NOT NULL	NUMBER(38)
IA-MARKS		NUMBER(38)

DESC ATTENDANCE;

Name	NULL?	Type
USN		VARCHAR2(10)
SUB-CODE	NOT NULL	VARCHAR2(8)
AT-DATE	NOT NULL	DATE
AT-TIME	NOT NULL	NUMBER(38)
STATUS		CHAR(1)

INSERT STATEMENTS:

INSERT INTO FACULTY VALUES (1, 'Vijay', 'R', '12-Dec-1980,
'17-Mar-2010', 'M', 'Tilakwadi', 'Belagavi', 110000, 'Professor', 11);
INSERT INTO FACULTY VALUES (2, 'Santosh', 'S', '30-May-1975',
'01-Jan-2000', 'M', 'RC Nagar', 'Belagavi', 100000, 'Professor', 22);
INSERT INTO FACULTY VALUES (3, 'Kiran', 'T', '21-Jun-1978',
'15-Mar-2002', 'M', 'Anagol', 'Belagavi', 95000, 'Associate', 33);
INSERT INTO FACULTY VALUES (4, 'Seena', 'F', '01-SEP-1989',
'01-Oct-2021', 'F', 'Shahapur', 'Belagavi', 30000, 'Assistant', 11);
INSERT INTO FACULTY VALUES (5, 'Kuldeep', 'S', '15-Dec-1986',
'01-SEP-2006', 'M', 'Vadgaon', 'Belagavi', 90000, 'Associate', 11);

INSERT INTO DEPARTMENT VALUES (11, 'CSE', 'CC', 1, 8);
INSERT INTO DEPARTMENT VALUES (22, 'ECE', 'Mainblock', 2, 5);
INSERT INTO DEPARTMENT VALUES (33, 'ISE', 'CC', 3, 3);

INSERT INTO STUDENT VALUES ('2GI21CS400', 'Sangangouda',
'Patti', 'M', 'Tilakwadi', 2, 99999999, '01-Jun-2003', 11);
INSERT INTO STUDENT VALUES ('2GI21CS401', 'Jay', 'P', 'M',
'RC Nagar', 2, 88888888, '31-May-2004', 11);
INSERT INTO STUDENT VALUES ('2GI21CS402', 'Nilesh', 'K', 'M',
'Anagol', 4, 788788788, '12-Apr-2003', 11);
INSERT INTO STUDENT VALUES ('2GI21CS403', 'Darshana',
'Null', 'F', 'Shahapur', 4, 9898989898, '22-Dec-2002', 11);
INSERT INTO STUDENT VALUES ('2GI21CS404', 'Branjal',
'Chavan', 'F', 'Vadgaon', 2, 7676787878, '11-May-2001', 11);

INSERT INTO SUBJECT VALUES ('18CS41', 'SE', 'ELECTIVE', 2);
INSERT INTO SUBJECT VALUES ('18CS42', 'OS', 'CORE', 4);
INSERT INTO SUBJECT VALUES ('18CS43', 'DBMS', 'CORE', 4);
INSERT INTO SUBJECT VALUES ('18CS44', 'PYTHON', 'INTEGRATED', 3);

INSERT INTO SCORE VALUES ('2GID21CS400', '18CS41', 1, 22);
INSERT INTO SCORE VALUES ('2GID21CS400', '18CS42', 1, 18);
INSERT INTO SCORE VALUES ('2GID21CS400', '18CS43', 1, 20);
INSERT INTO SCORE VALUES ('2GID21CS400', '18CS44', 1, 21);
INSERT INTO SCORE VALUES ('2GID21CS400', '18CS42', 2, 24);

INSERT INTO TEACHES VALUES (1, '18CS41', 20);
INSERT INTO TEACHES VALUES (6, '18CS43', 30);
INSERT INTO TEACHES VALUES (4, '18CS42', 30);
INSERT INTO TEACHES VALUES (5, '18CS44', 40);

INSERT INTO PARENT VALUES ('2GID21CS400', 'Patil',
'Tilakwadi', 'Belagavi', 590001, 66666666);
INSERT INTO PARENT VALUES ('2GID21CS401', 'Pormekar',
'RC Nagar', 'Belagavi', 590002, 77777777);
INSERT INTO PARENT VALUES ('2GID21CS402', 'Kusvinkop',
'Anagol', 'Belagavi', 590008, 88888888);
INSERT INTO PARENT VALUES ('2GID21CS404', 'Chavan',
'Shahapur', 'Belagavi', 590006, 9999999999);

INSERT INTO TEST VALUES(1, '28-JUN-2022', 10);
INSERT INTO TEST VALUES(2, '11-AUG-2022', 12);
INSERT INTO TEST VALUES(3, '02-SEP-2022', 9);

INSERT INTO ATTENDANCE VALUES('2G121CS400', '18CS41', '01-JUL-2022',
'10-11', 'P');

INSERT INTO ATTENDANCE VALUES('2G121CS400', '18CS42',
'01-JUL-2022', '11-12', 'A');

INSERT INTO ATTENDANCE VALUES('2G121CS400', '18CS43',
'02-JUL-2022', '12-1', 'P');

INSERT INTO ATTENDANCE VALUES('2G121CS400', '18CS41',
'01-JUL-2022', '10-11', 'P');

INSERT INTO ATTENDANCE VALUES('2G121CS400', '18CS42',
'01-Jun-2022', '11-12', 'A');

SELECT STATEMENTS :

SELECT * FROM SCORE;

U3N	SUB-CODE	TESTNO	IAMARKS
2G121CS400	18CS41	1	22
2G121CS400	18CS42	1	18
2G121CS400	18CS43	1	20
2G121CS400	18CS44	1	21
2G121CS400	18CS42	2	24

We learnt to use the open-source ER-design tool dia & created the ER-Model for the above said problem statement. Converted the ER-diagram into relational schema diagram by applying the ER to relational rules. We identified primary & foreign keys & created all the relational sets in oracle DBMS using PDL statements. Further, the database was populated with real data using insert statements. The content of each table was displayed using SELECT SQL statements. We learnt about update and delete SQL statements and also learnt about alter table command to modify or add constraints to the table structure after they are created. Learnt how a GUI can be built to connect to a back-end database in oracle / MySQL using JAVA.