SVKM's NMIMS MPSTME (Shirpur Campus)

Project

Course – B.Tech CS II Year

	Name	Roll No.
Group Members	Nishant Saxena	B235
	Vaishali Sharma	B239
	Bhavya Singh	B243

Blood-Bank Management Database System

Abstract

A database is the single most useful environment in which to store data and an ideal tool to manage and manipulate that data. The benefits of a well-structured database are infinite, with increased efficiency and time-saving benefits. Our team's interest is centred around this area. At the very start, we create a database on blood-bank management system. We use Microsoft SQL Server for this purpose. We determine attributes and entities and figure out relationships among entities. Then we draw the entity-relationship diagram, convert it to a relational model (relational tables) and normalize the tables. We implement the design, create tables and insert values inside the tables using sql server. We execute sample queries on the system and verify that our system contains all required information making retrieval of the information fast and efficient.

Database Design

The Entity-Relationship Model

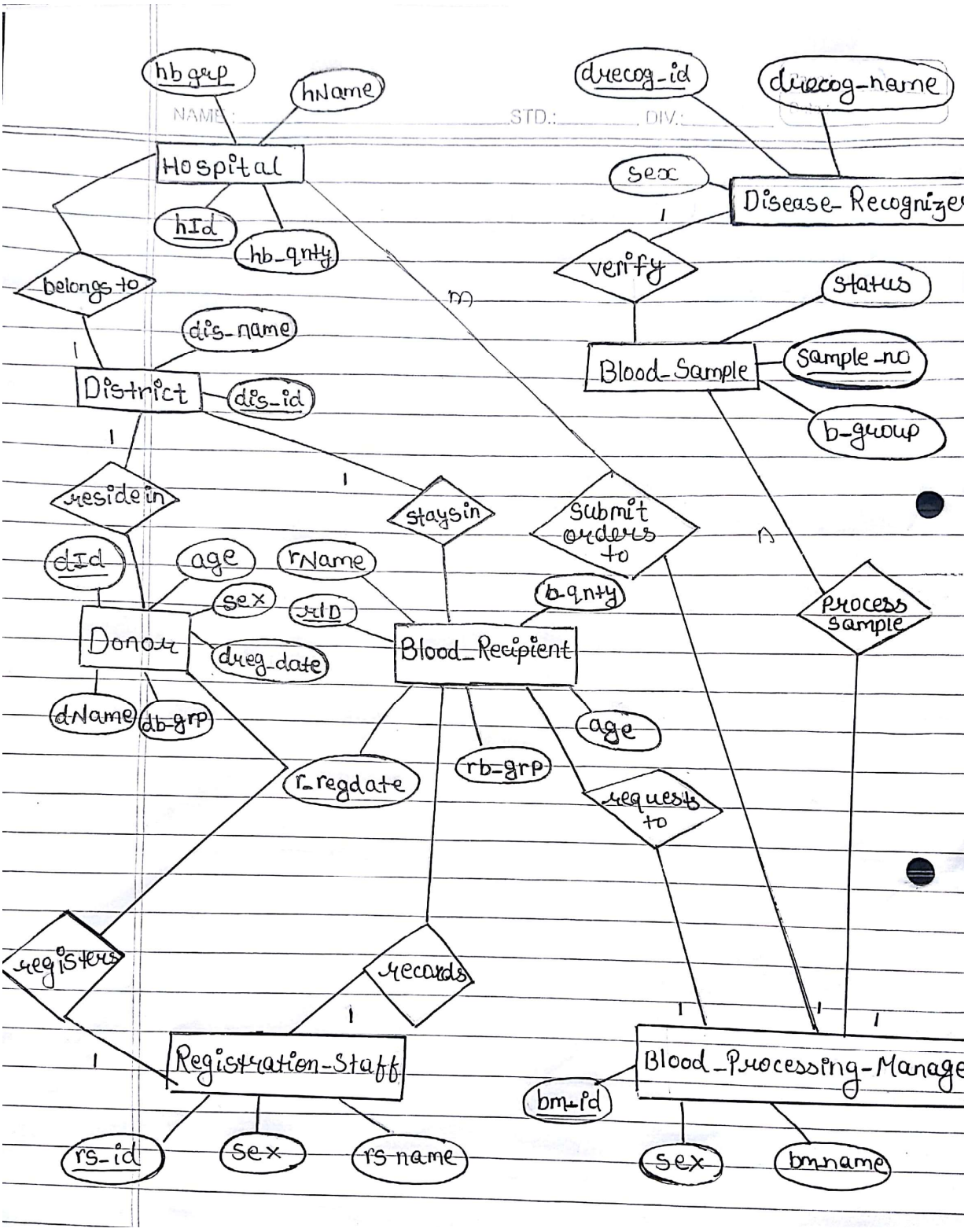
The entity-relationship (E-R) model was developed to facilitate database design by allowing specification of an enterprise schema that represents the overall logical structure of a database.

Mapping Cardinality: Mapping cardinalities express the number of entities to which another entity can be associated via a relationship set. Cardinality can be-

- One-to-one
- One-to-many
- Many-to-one
- Many-to-many

E-R diagram: It can express the overall logical structure of a database graphically. A diagram consists of some major components—

Rectangles: represent entity set. # Ellipses: represent attributes. # Diamonds: represent relationships. # Lines: which link attributes to entity sets and entity sets to relationship sets.


hb grp
hName
Hospital
hId
hb_qnty
belongs to
dis_name
District
dis_id
reside in
dId
age
rName
sex
rID
Donor
dreg_date
dName
db-grp
r_regdate
registers
records
Registration-Staff
rs_id
sex
rs name
staysin
drecog_id
drecog_name
Sex
Disease_Recognize
verify
Status
Blood_Sample
Sample_no
b_group
Submit orders to
b-qnty
Blood_Recipient
rb-grp
age
requests to
Process sample
Blood_Processing-Manage
bm_id
sex
bmname
M
1
N

Our E-R diagram represents the Blood-Bank Management system. It has eight entity sets. They are -

a) Donar: (Attributes- dName, dId, sex, age, dreg_date, db_grp, rs_id (fk), dis_id(fk)).
b) District: (Attributes- dis_id, dis_name).
c) Registration_Staff: (Attributes- rs_id, rs_name, sex).
d) Blood_Recipient: (Attributes- rId, sex, age, r_regdate, rName, b_qnty, rb_grp, rs_id (fk), dis_id (fk), bm_id (fk),).
e) Blood_Sample: (Attributes- b_group, sample_no, status, drecog_id (fk), bm_id (fk)).
f) Disease_Recognizer: (Attributes- drecog_id, drecog_name, sex).
g) Blood_Processing_Manager: (Attributes-bm_id, bm_name, sex).
h) Hospital: (Attributes- hId, hName, hb_grp, db_qnty, dis_id(fk), bm_id(fk)).

Abbreviations of all attributes are given in relational schema. Some notes about entity sets, their attributes and cardinalities among them –

- Donar- Who donates blood. When a donar will donate, an id(a serial number will be given for a specific identification (primary key)); age, sex, name, registration date (dreg_date) and blood group will be stored in the database under entity Donar.
- District- Every district's/location's id is different (primary key).
- Registration_Staff- Registration staffs will register the information of donars and the recipients.
- Disease_Recognizer-Disease recognizer will test blood samples whether the samples are contaminated or okay.
- Blood_Processing_Manager- They will take orders from the hospitals and fulfill their needed requirements of blood samples.
- Blood_Sample- The quantities of blood that the Blood_bank has. Their group, sample_no, status will be stored.
- Hospital- Hospitals of each district, where blood samples are needed, also included in the database.
- Blood_Recipient- Who needs blood. A recipient's id, name, age, sex, the blood sample's group information will be stored in database.

Cardinality:

- District & Donar- (Relationship- (stays_in), 1 to many). One donar stays in one district. In one district, many donars can stay.
- Registration_Staff & Donar- (Relationship-(registers), 1 to many). A staff can ensure many donars' registration. One donar can get registered by one staff.
- Registration_Staff & Blood_Recipient- (Relationship-(records), 1 to many). A staff can ensure many blood_recipients' registration. One blood_recipient can get registered by one staff.

- District & Blood_Recipient - (Relationship-(resides_in), 1 to many). One recipient stays in one district. In one district, many recipients can stay.
- District & Hospital- (Relationship-(belongs to), 1 to many). In a district, there are many hospitals. One hospital belongs to one district.
- Blood_Processing_Manager & Hospital- (Relationship-(submit_orders_to), 1 to many). A blood processing manager can get orders from many hospitals. One hospital submits order to a blood processing manager.
- Blood_Processing_Manager & Blood_Sample-(Relationship-(processes_sample), 1 to many). A manager can process many samples of blood. One blood sample can be processed by one blood processing manager.
- Disease_Recognizer & Blood_sample- (Relationship-(verify), 1 to many). A disease recognizer can verify many blood samples. One blood sample is verified by one disease recognizer.
- Blood_Processing_Manager & Blood_Recipient-(Relationship-(request_to), 1 to many). The samples of blood are given according to the necessity of the recipients, processed by the manager. A manager can process many samples of blood that are requested by the recipients. But one recipient can request only one blood processing manager.

Relational Schemas

Donar

Attribute Name	Description	Type
dName	Name of the donor	varchar
Did	Id of the donor	Int
Sex	Sex of the donor	char
Age	Age of the donor	Int
dreg_date	Registration date of the donor	date
rs_id (fk)	Id of the registration staff	Int
dis_id(fk)	District id	Int
db_grp	Donor's blood group	varchar

District

Attribute Name	Description	Type
dis_id	District id	Int
dis_name	Name of the district	Varchar

Registration_Staff (Reg_Staff)

Attribute Name	Description	Type
rs_id	Id of the registration staff	Int
rs_name	Name of the registration staff	varchar
Sex	Sex of the registration staff	char

Blood_Recipient (BloodR)

Attribute Name	Description	Type
Rid	Id of the recipient	int
Sex	Sex of the recipient	char
Age	Age of the recipient	int
r_regdate	Registration date of the recipient	date
Rname	Name of the recipient	varchar
b_qnty	Needed quantity of blood	int
rb_grp	Recipient's blood group	varchar
rs_id (fk)	Id of the registration staff	int
dis_id (fk)	District id	int
bm_id (fk)	Blood processing manager's id	int

Blood_Sample (BloodS)

Attribute Name	Description	Type
b_group	Blood group of the sample	varchar
sample_no	Sample identification number	int
Status	Status of the blood sample	varchar
drecog_id (fk)	Disease Recognizer's id	int
bm_id (fk)	Blood processing manager's id	int

Disease_Recognizer (DiseaseR)

Attribute Name	Description	Type
drecog_id	Disease Recognizer's id	Int
drecog_name	Disease Recognizer's name	varchar
Sex	Disease Recognizer's sex	char

Blood_Processing_Manager (BPM)

Attribute Name	Description	Type
bm_id	Blood processing manager's id	int
bm_name	Blood processing manager's name	varchar
Sex	Blood processing manager's sex	char

Hospital

Attribute Name	Description	Type
Hid	Hospital's id	int
hb_qnty	Needed quantity of blood in a hospital	int
hb_grp	Needed blood group	varchar
HName	Hospital's Name	varchar
dis_id(fk)	District's id	int
bm_id(fk)	Blood processing manager's id	int

Source Code:

```
create table BPM(bm_id int primary key, bm_name varchar(15), sex varchar(5));
create table Reg_Staff(rs_id int primary key, rs_name varchar(15), sex varchar(5));
create table District(dis_id int primary key,dis_name varchar(15));
create table DiseaseR(drecog_id int primary key, drecog_name varchar(15), sex
varchar(5));
create table BloodR(rId int primary key, sex varchar(5), age int, r_regdate date,
rName varchar(20), b_qnty int, rb_grp varchar(5), rs_id int, dis_id int,bm_id int,
foreign key(bm_id) references BPM(bm_id), foreign key(rs_id) references
Reg_Staff(rs_id), foreign key(dis_id) references District(dis_id));
create table BloodS(b_group varchar(5), sample_no int primary key, status varchar(5),
drecog_id int, bm_id int, foreign key(bm_id) references BPM(bm_id), foreign
key(drecog_id) references DiseaseR(drecog_id));
create table Donar(dName varchar(15), dId int primary key, sex varchar(5), age int,
dreg_date date, rs_id int, dis_id int, db_grp varchar(5),foreign key(rs_id) references
Reg_Staff(rs_id),foreign key(dis_id) references District(dis_id));
create table Hos1(hId int primary key, hName varchar(15), dis_id int, bm_id int,
foreign key(bm_id) references BPM(bm_id), foreign key(dis_id) references
District(dis_id));
create table Hos2(hId int, hb_grp varchar(5), db_qnty int, foreign key(hId) references
Hos1(hId));

insert into BPM values(6,'Deepa','F');
insert into BPM values(36,'Mehrab','M');
insert into BPM values(47,'Urmi','F');
insert into BPM values(74,'Dinar','M');

insert into Reg_Staff values(104,'Bushra','F');
insert into Reg_Staff values(105,'Arafat','M');
insert into Reg_Staff values(730,'Shila','F');
insert into Reg_Staff values(740,'Ony','M');
insert into Reg_Staff values(760,'Tania','F');
insert into Reg_Staff values(763,'Sonia','F');
insert into Reg_Staff values(793,'Sushmita','F');

insert into District values(10,'Dhaka');
insert into District values(20,'Khulna');
insert into District values(30,'Rajshahi');
insert into District values(40,'Chittagong');
insert into District values(50,'Barishal');
insert into District values(60,'Sylhet');
insert into District values(70,'Rangpur');

insert into DiseaseR values(401,'Jamil','M');
insert into DiseaseR values(501,'Mila','F');
insert into DiseaseR values(601,'Helal','M');
insert into DiseaseR values(801,'Shila','F');

insert into BloodR values(44,'M',23,'8-Jan-2010','Tanmay',1,'A+',793,10,6);
insert into BloodR values(87,'F',22,'2-Jan-2010','Swapnil',2,'B+',763,10,36);
insert into BloodR values(88,'M',23,'1-Jan-2010','Shohag',1,'A+',760,10,47);
insert into BloodR values(90,'F',24,'5-Feb-2010','Farzana',1,'O+',793,20,74);

insert into BloodS values('A+',305,'No',601,36);
```

```
insert into BloodS values('A+',401,'Yes',801,6);
insert into BloodS values('B+',405,'Yes',801,47);
insert into BloodS values('O+',202,'Yes',501,74);

insert into Donar values('Nasif',3,'M',23,'2-Jan-2010',105,10,'A+');
insert into Donar values('Nimi',7,'F',22,'2-Jan-2010',104,10,'B+');
insert into Donar values('Jenifer',10,'F',22,'1-Jan-2010',793,10,'O+');
insert into Donar values('Tanzima',14,'F',23,'1-Jan-2010',760,30,'A+');
insert into Donar values('Kaniz',16,'F',22,'3-Jan-2010',740,30,'B+');

insert into Hos1 values(910,'Dhaka Medical',10,6);
insert into Hos1 values(920,'Khula Medical',20,36);
insert into Hos1 values(930,'Rajshahi Hosp.',30,74);
insert into Hos1 values(940,'Chittagong Med',40,47);

insert into Hos2 values(910,'O+',30);
insert into Hos2 values(920,'B+',50);
insert into Hos2 values(930,'A+',10);
insert into Hos2 values(940,'O+',20);
```

Tables with sample values after Normalization

BPM

	bm_id	bm_name	sex
1	6	Deepa	F
2	36	Mehrab	M
3	47	Umi	F
4	74	Dinar	M

Reg_Staff

	rs_id	rs_name	sex
1	104	Bushra	F
2	105	Arafat	M
3	730	Shila	F
4	740	Ony	M
5	760	Tania	F
6	763	Sonia	F
7	793	Sushmita	F

District

	dis_id	dis_name
1	10	Dhaka
2	20	Khulna
3	30	Rajshahi
4	40	Chittagong
5	50	Barishal
6	60	Sylhet
7	70	Rangpur

DiseaseR

	drecog_id	drecog_name	sex
1	401	Jamil	M
2	501	Mila	F
3	601	Helal	M
4	801	Shila	F

BloodR

	rId	sex	age	r_regdate	rName	b_qnty	rb_grp	rs_id	dis_id	bm_id
1	44	M	23	2010-01-08	Tanmay	1	A+	793	10	6
2	87	F	22	2010-01-02	Swapnil	2	B+	763	10	36
3	88	M	23	2010-01-01	Shohag	1	A+	760	10	47
4	90	F	24	2010-02-05	Farzana	1	O+	793	20	74

BloodS

	b_group	sample_no	status	drecog_id	bm_id
1	O+	202	Yes	501	74
2	A+	305	No	601	36
3	A+	401	Yes	801	6
4	B+	405	Yes	801	47

Donar

	dName	dId	sex	age	dreg_date	rs_id	dis_id	db_grp
1	Nasif	3	M	23	2010-01-02	105	10	A+
2	Nimi	7	F	22	2010-01-02	104	10	B+
3	Jenifer	10	F	22	2010-01-01	793	10	O+
4	Tanzima	14	F	23	2010-01-01	760	30	A+
5	Kaniz	16	F	22	2010-01-03	740	30	B+

Hos1

	hId	hName	dis_id	bm_id
1	910	Dhaka Medical	10	6
2	920	Khula Medical	20	36
3	930	Rajshahi Hosp.	30	74
4	940	Chittagong Med	40	47

Hos2

	hId	hb_grp	db_qnty
1	910	O+	30
2	920	B+	50
3	930	A+	10
4	940	O+	20

Queries

1. Show the uncontaminated blood samples verified by Dr. Shila.

```
select sample_no, b_group from BloodS b,DiseaseR dr where
b.drecog_id = dr.drecog_id AND drecog_name ='Shila' AND
status = 'Yes';
```

	sample_no	b_group
1	401	A+
2	405	B+

2. Show the donors having the blood groups that are required by recipients living in the same district. Show the recipient details also.

```
select dId,dName,rName,rId from Donar d, BloodR br where
db_grp = rb_grp AND d.dis_id = br.dis_id;
```

	dId	dName	rName	rId
1	3	Nasif	Tanmay	44
2	3	Nasif	Shohag	88
3	7	Nimi	Swapnil	87

3. Show the donor and recipients details having same blood group registered by staff Tania on the same date.

```
select dId,dName,rId,rName from Donar d, BloodR br,
Reg_Staff where db_grp = rb_grp AND dreg_date = r_regdate
AND d.rs_id = br.rs_id AND rs_name = 'Tania';
```

	dId	dName	rId	rName
1	14	Tanzima	88	Shohag

4. Find out the recipient name who took A+ type blood from the donor(also show donor's name) and both's district ids must be '10'.

```
select dName, rName, dis_name from Donar d, BloodR br
,District ds where d.db_grp = 'A+' AND d.db_grp = br.rb_grp
AND ds.dis_id = 10;
```

	dName	rName	dis_name
1	Nasif	Tanmay	Dhaka
2	Nasif	Shohag	Dhaka
3	Tanzima	Tanmay	Dhaka
4	Tanzima	Shohag	Dhaka

5. Find out donor name, id who is registered by registration staff_id '104' and show the registration staff's name also.

```
select d.dName, dId, rs_name from Donar d, Reg_Staff rs
where d.rs_id = rs.rs_id AND rs.rs_id = 104;
```

	dName	dId	rs_name
1	Nimi	7	Bushra

6. List the name, age and id of donor who is registered by registration staff 'Bushra' or who have B+ blood group

```
select dName, age, dId from Donar d, Reg_Staff rs where
d.rs_id = rs.rs_id AND rs_name = 'Bushra' UNION select
dName, age, dId from Donar where db_grp = 'B+';
```

	dName	age	dId
1	Kaniz	22	16
2	Nimi	22	7

7. Find out all information about hospital_2 which has not been processed by the blood processing manager having id '6'.

```
select hName, hId, bm_id, dis_id from Hos1 where bm_id not
in (select bm_id from BPM where bm_id =6);
```

	hName	hId	bm_id	dis_id
1	Khula Medical	920	36	20
2	Rajshahi Hosp.	930	74	30
3	Chittagong Med	940	47	40

```
select count(sample_no) from BloodS where b_group = 'O+';
```

	(No column name)
1	1

```
select dis_name from Donar d, District dr where d.dis_id = dr.dis_id group by
dis_name;
```

	dis_name
1	Dhaka
2	Rajshahi