

DBMS GROUP PROJECT

Prepared by Group 12

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Section CS-5



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Problem Statement

Design a database, conceptual and SQL, for management of drug stock of a government hospital.

Need:

It is needed to design and maintain a database for management of drug stock so as to,

- Keep record of details of drugs supplied by the hospital.
- Keep record of received drugs.
- Keep record of consumed drugs.
- Keep track of drugs currently in stock.
- Keep track of expired drugs that need to be destroyed.
- Keep record of patient's consumed drug & its quantity with corresponding OPD visit.
- Keep track of drugs closing in on expiry or going out of stock and need to be reordered.

Many government hospitals in India still use the flat file(manual) method for management of drug stock. But this approach has the following disadvantages:

- Data Redundancy - Tuples with same data with minimal difference.
- Data Inconsistency - Changes done to one row should be replicated to other rows which have same data, otherwise data loses integrity.
- Data Insecurity - No concept of tuple/attribute level access, either access to entire file is granted or no access is granted at all.
- Concurrent Access - Multiple users cannot access the file simultaneously.
- Memory Utilization - Tuples with null values cause wastage of resources.
- Flexibility - Not flexible due to poor memory utilization and no provision of memory access.

In order to remove all these limitations of the file approach, database approach is used which is able to optimally store and retrieve data.

Facts and Requirements:

- Drugs are received at the beginning of the month according to requirement or if they stock out in the middle of the month.
 - Destruction of the expired drugs takes place at the end of every month and the database is updated.
 - Newer drug stocks are not opened until older stock is consumed or expires.
 - In government hospitals in India that use the file approach, two databases are maintained for management of drug stock, viz.,
 1. Stock Register
 2. Consumption Register
- Stock Register contains the stock log of the drugs provided by the hospital's pharmacy which includes the newly obtained stock as well as the current stock together. One page is reserved to store the stock log of each drug. The stock log is made up of serial number(one for each drug), name of drug/medicine, received quantity(of the drug), date(of receipt or consumption of drug), consumption(quantity

consumed at a time in a day) and balance(current day's quantity of the the drug present in stock).

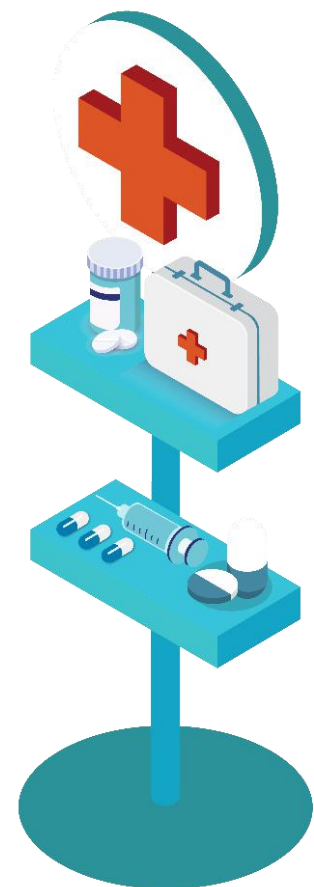
- Consumption Register stores the log of every consumption, i.e. the log of each drug consumed by each OPD Number daily. The consumption log is made up of date, OPD Number(A serialized number generated for each patient that attends the OPD), columns for each drug that the hospital avails to its patients that store quantity of that drug consumed on an OPD Number and at the end of the day the total quantity of each drug consumed is stored.

Samples of the formats of both registers is given on page 4.

- Government hospitals don't deal with brand name of the drug, they only deal with the drug name.
- Steps to receive(from the patients perspective) drugs from a government hospital include:
 1. OPD No. serially assigned to patients before they enter the queue of patients waiting to visit the doctor.
 2. Re. 1(received during registration) prescription is received from the doctor.
 3. Drugs, prescribed, are received on the corresponding OPD No.
- All drugs are cost free, patients are charged Re. 1 for the prescription only.

Assumption(for provided formats only, should not affect the solution):

- The hospital provides only four drugs.
- The hospital began providing drugs on January 1, 2001.



Serial No.	Name of Medicine	Received Quantity	Date	Consumption	Balance	Remark
1	Tab Paracetamol 500 mg	100	01/01/2001		100	Checked
			01/01/2001	13	87	Checked
			01/02/2001	5	82	Checked
		50	01/02/2001		132	Checked

Stock Register

Date		01-01-2001			
Serial No.	Drug Name —→ OPD No. ↴	Paracetamol	Cetirizine	Diclofenac	Amoxycillin
1	1	10	5	10	4
2	2	1	3	0	1
3	3	2	0	4	0
4	4	0	0	1	0
Total		13	8	15	5

Consumption Register

Analysis

- There is no need of brand names and cost in the database.
- At a time maximum only two sets of a drug can exist together of which the new one won't be opened until the old one is completely consumed or expires. Similarly, only two expiry dates of a particular drug can exist at a time. But only one batch will be active at a time.
- From the sample tables provided, it is evident that the tables need to be optimized to avoid wastage of space due to redundant data.
- In both the registers, long names of the drugs need to be stored multiple number of times. Therefore, to avoid wastage of resources drugs need to be tagged with IDs which would be used instead of their names and the Name and drug ID(Med_ID) would be the attributes of the entity called Drug and the drug ID(Med_ID), batch number(Batch_No), date of manufacture(Manuf_Date) and Expiry date(Expiry_Date) would be the attributes of the entity called Batch.

Sample of the format of tables Drug and Batch is provided on page 6.

- Expired drugs are to be marked as Expired in Remarks.
- Stock would contain serial number, drug ID(Med_ID), Balance and Remark. Sample of the format of table Stock is provided on page 7.
- Stock register can be divided into two tables(specialization) to avoid resource wastage,
 1. Received stock log
 2. Consumed stock log
 - Received stock log would contain serial number(for every receipt), drug ID(Med_ID), Received(quantity), date(of receipt), balance(at the end of the day).
 - Consumed stock log would contain serial number(for daily consumption), drug ID(Med_ID), Consumption(quantity), date(of consumption), (current)balance.

Samples of the format of Received stock log is provided on page 6 and the Consumed stock log is provided on page 7.

- From the format of Consumption register, it is evident that adding a new column to the table every time a new drug is made available by the hospital would be a cumbersome job and would cause increase in redundant values which would lead to waste of resources. Instead the drugs' IDs would be used.
 - Consumption register would contain Serial number(for consumption of each drug on each OPD Number), Date(of consumption), OPD Number(for each patient), drug ID(Med_ID), Consumed(quantity of a particular drug on a particular OPD Number), Total(quantity of a drug consumed that day currently). At the end of the month when expired drugs are to be destroyed their removal is to be updated in consumption register with OPD Number 0.

Samples of the format of Consumption register is on page 8.

- Hence, the ER Diagram(on page 9) is formed based on the entities and the attributes obtained.
- But it is observed that the Consumption stock log can be obtained by queries on Consumption Register, so it is removed and consumption register is renamed Consumption stock log.

Drug


Name	Med_Id
Paracetamol	1
Cetirizine	2
Diclofenac	3
Amoxycillin	4

Batch

Batch_No	Med_Id	Manuf_Date	Expiry_Date
123	1	01-JAN-00	31-JAN-02
456	2	01-FEB-00	28-FEB-02
789	3	01-JAN-00	31-JAN-02
707	4	01-MAY-00	31-MAY-02

RID

Received stock log



Serial No.	Med_Id	Date	Received
1	1	01-JAN-01	100
2	2	01-JAN-01	100
3	3	01-JAN-01	50
4	4	01-JAN-01	50
5	1	01-FEB-01	50

Consumed stock log

Serial No.	Med_Id	Date	Consumption
1	1	01-JAN-01	13
2	2	01-JAN-01	8
3	4	01-JAN-01	5
4	3	01-JAN-01	15
5	1	01-FEB-01	5

Stock

SID

Serial No.	Med_Id	Balance	Remark
1	1	100	Received and Checked.
2	1	87	Consumed and Checked.
3	2	100	Received and Checked.
4	2	92	Consumed and Checked.
5	3	50	Received and Checked.
6	4	50	Received and Checked.
7	4	45	Consumed and Checked.
8	3	35	Consumed and Checked.
9	1	82	Consumed and Checked.
10	1	132	Received and Checked.

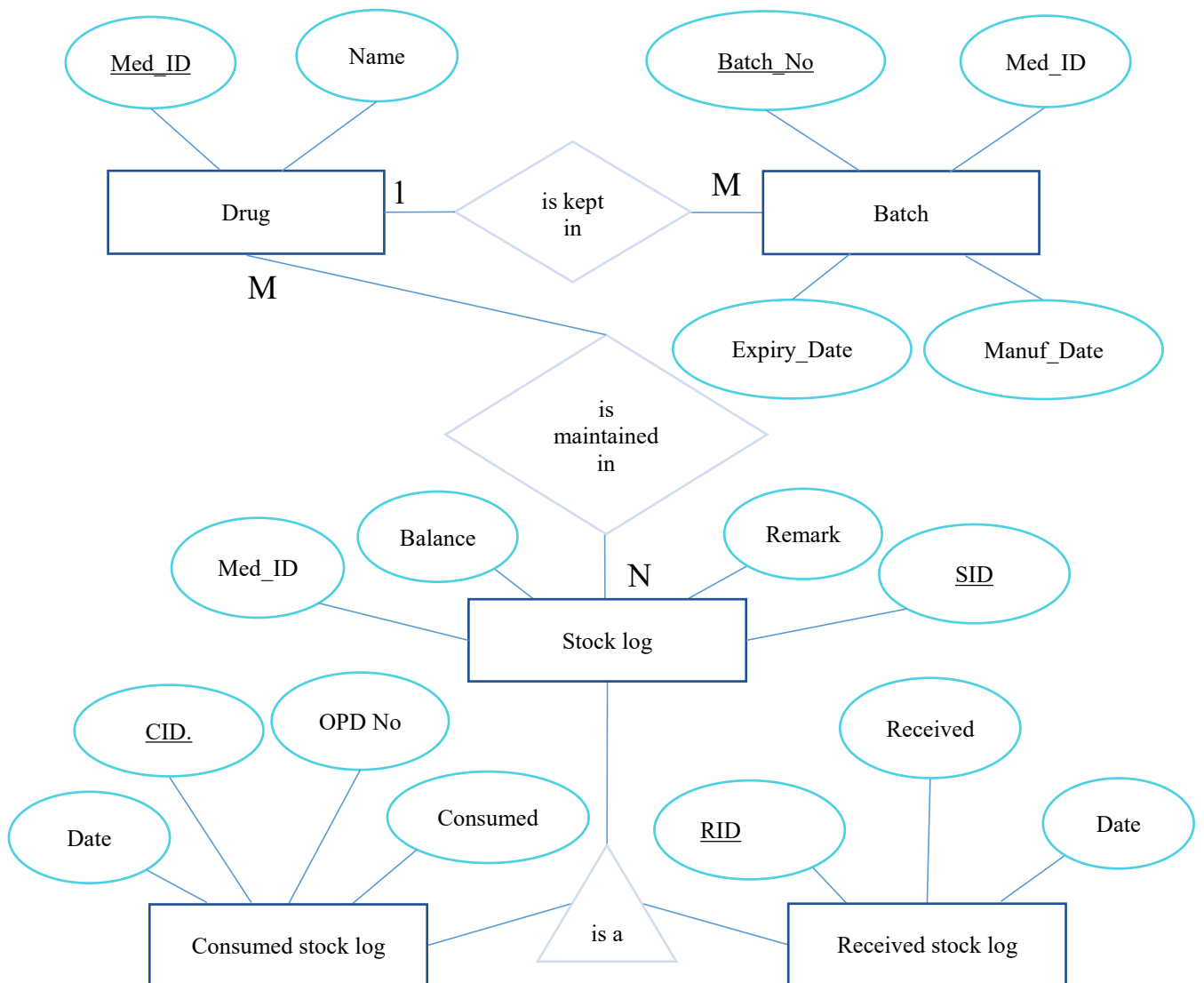
Consumption Register

CID



Serial No.	Date	OPD No.	Med_Id	Consumed
1	01-JAN-01	1	1	10
2	01-JAN-01	1	2	5
3	01-JAN-01	1	3	10
4	01-JAN-01	1	4	4
5	01-JAN-01	2	1	1
6	01-JAN-01	2	2	3
7	01-JAN-01	2	4	1
8	01-JAN-01	3	1	2
9	01-JAN-01	3	3	4
10	01-JAN-01	4	3	1
11	01-FEB-01	5	1	5

ER Diagram:



Relational Schema:

Drug(Med_ID, Name)

Batch(Batch_No, Med_ID, Epiry_Date, Manuf_Date)

Stock_log(SID, Med_ID, Balance, Remark)

Received_stock_log(RID, Received, Date, SID)

Consumed_stock_log(CID, Consumed, Date, OPD_No, SID)

is_maintained_in(Med_ID, SID)

Relational Model(in sqlplus):

```
SQL> create table DRUG(  
  2  Med_Id number constraint drug_mid_pk primary key,  
  3  Name varchar2(20) constraint drug_na_uk unique);
```

Table created.

```
SQL> insert into DRUG values(1,'Paracetamol');
```

1 row created.

```
SQL> insert into DRUG values(2,'Cetirizine');
```

1 row created.

```
SQL> insert into DRUG values(3,'Diclofenac');
```

1 row created.

```
SQL> insert into DRUG values(4,'Amoxycillin');
```

1 row created.

```
SQL> create table BATCH(  
  2  Batch_No number(5) constraint batch_bno_pk primary key,  
  3  Med_Id number constraint batch_mid_nn not null,  
  4  Manuf_Date date constraint batch_date_nn not null,  
  5  Epiry_Date date constraint batch_exdate_nn not null,  
  6  constraint batch_mid_fk foreign key(Med_Id) references DRUG(Med_Id));
```

Table created.

```
SQL> insert into BATCH values(123,1,'01-Jan-00','31-Jan-02');
```

1 row created.

```
SQL> insert into BATCH values(456,2,'01-Feb-00','28-Feb-02');
```

1 row created.

```
SQL> insert into BATCH values(789,3,'01-Jan-00','31-Jan-02');
```

1 row created.

```
SQL> insert into BATCH values(707,4,'01-May-00','31-May-02');
```

1 row created.

```
SQL> create table RecStockLog(  
  2  RID number constraint rslog_sno_pk primary key,  
  3  Med_Id number constraint rslog_mid_nn not null,  
  4  Received number constraint rslog_rec_nn not null,  
  5  RsDate date,  
  6  constraint rslog_mid_fk foreign key(Med_Id) references DRUG(Med_Id));
```

Table created.

```
SQL> insert into RecStockLog values(1,1,100,'01-Jan-2001');
```

1 row created.

```
SQL> insert into RecStockLog values(2,2,100,'01-Jan-2001');
```

1 row created.

```
SQL> insert into RecStockLog values(3,3,50,'01-Jan-2001');
```

1 row created.

```
SQL> insert into RecStockLog values(4,4,50,'01-Jan-2001');
```

1 row created.

```
SQL> insert into RecStockLog values(5,1,50,'01-Feb-2001');
```

1 row created.

```
SQL> Create table STOCK(  
  2  SID number constraint stock_sno_pk primary key,  
  3  Med_Id number constraint stock_mid_nn not null,  
  4  Balance number constraint stock_bal_nn not null,  
  5  Remark long constraint stock_rem_nn not null);
```

Table created.

```
SQL> insert into Stock values(1,1,100,'Received. Checked.');
```

1 row created.

```
SQL> insert into Stock values(2,1,87,'Consumed. Checked.');
```

1 row created.

```
SQL> insert into Stock values(3,2,100,'Received. Checked.');
```

1 row created.

```
SQL> insert into Stock values(4,2,92,'Consumed. Checked.');
```

1 row created.

```
SQL> insert into Stock values(5,3,50,'Received. Checked.');
```

1 row created.

```
SQL> insert into Stock values(6,4,50,'Received. Checked.');
```

1 row created.

```
SQL> insert into Stock values(7,4,45,'Consumed. Checked.');
```

1 row created.

```
SQL> insert into Stock values(8,3,35,'Consumed. Checked.');
```

1 row created.

```
SQL> insert into Stock values(9,1,82,'Consumed. Checked.');
```

1 row created.

```
SQL> insert into Stock values(10,1,132,'Received. Checked.');
```

1 row created.

SQL> select * from DRUG;

MED_ID	NAME
1	Paracetamol
2	Cetirizine
3	Diclofenac
4	Amoxycillin

SQL> select * from BATCH;

BATCH_NO	MED_ID	MANUF_DAT	EXPIRY_DA
123	1	01-JAN-00	31-JAN-02
456	2	01-FEB-00	28-FEB-02
789	3	01-JAN-00	31-JAN-02
707	4	01-MAY-00	31-MAY-02

SQL> select * from RecStockLog;

SNO	MED_ID	RECEIVED	RSDATE
1	1	100	01-JAN-01
2	2	100	01-JAN-01
3	3	50	01-JAN-01
4	4	50	01-JAN-01
5	1	50	01-FEB-01

SQL> select * from STOCK;

SNO	MED_ID	BALANCE	REMARK
1	1	100	Received. Checked.
2	1	87	Consumed. Checked.
3	2	100	Received. Checked.
4	2	92	Consumed. Checked.
5	3	50	Received. Checked.
6	4	50	Received. Checked.
7	4	45	Consumed. Checked.
8	3	35	Consumed. Checked.
9	1	82	Consumed. Checked.
10	1	132	Received. Checked.

10 rows selected.

```
SQL> CREATE TABLE ConStockLog(  
  2  CID number constraint conslog_sno_pk Primary Key,  
  3  ConDate date,  
  4  OPD_No number constraint conslog_ono_nn not null,  
  5  Med_Id number constraint conslog_mid_nn not null,  
  6  Consumed number constraint conslog_cons_nn not null);
```

Table created.

```
SQL> INSERT INTO ConStockLog values(1,'01-Jan-2001',1,1,10);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(2,'01-Jan-2001',1,2,5);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(3,'01-Jan-2001',1,3,10);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(4,'01-Jan-2001',1,4,4);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(5,'01-Jan-2001',2,1,1);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(6,'01-Jan-2001',2,2,3);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(7,'01-Jan-2001',2,4,1);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(8,'01-Jan-2001',3,1,2);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(9,'01-Jan-2001',3,3,4);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(10,'01-Jan-2001',4,3,1);
```

1 row created.

```
SQL> INSERT INTO ConStockLog values(11,'01-Feb-2001',5,1,5);
```

1 row created.

```
SQL> select * from ConStockLog;
```

SERIALNO	CONDATE	OPD_NO	MED_ID	CONSUMED
1	01-JAN-01	1	1	10
2	01-JAN-01	1	2	5
3	01-JAN-01	1	3	10
4	01-JAN-01	1	4	4
5	01-JAN-01	2	1	1
6	01-JAN-01	2	2	3
7	01-JAN-01	2	4	1
8	01-JAN-01	3	1	2
9	01-JAN-01	3	3	4
10	01-JAN-01	4	3	1
11	01-FEB-01	5	1	5

11 rows selected.

```
SQL> spool off
```

References

Based on a voice call interview of the Pharmacist of Netaji Subhash Chandra Bose, District Hospital, Gorakhpur, U.P.