Arts, Sciences & Technology University in Lebanon

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Telecommunication System📊

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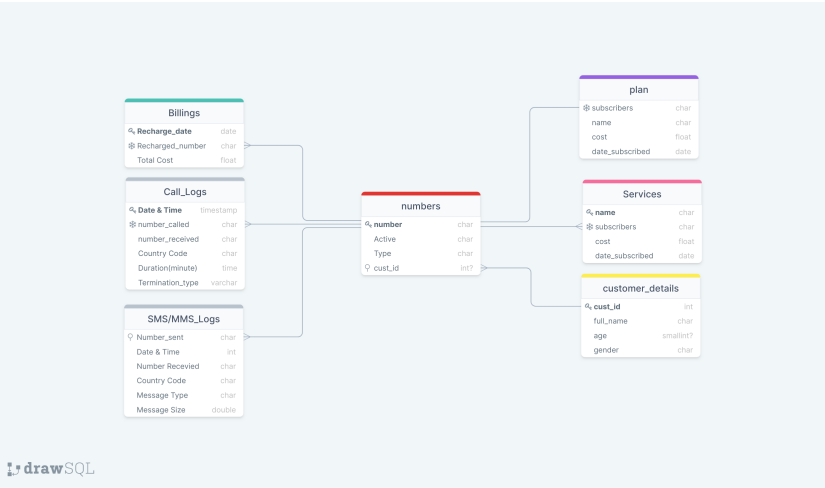
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↗️ Introduction

Due to technological advances, the telecommunication service is becoming increasingly very important and the pressure of many users leads to a change in the telecommunication market. Lately Telecom companies has reaching over millions users in any country exist and with such growing productivity customers data storing and retrieving is becoming extremely important, Therefore the telecommunication services entails a variety of data management and database challenges such: Customer relationship management, evaluation of call detail records, complex billing systems and personalized telecommunication services require very efficient database support.
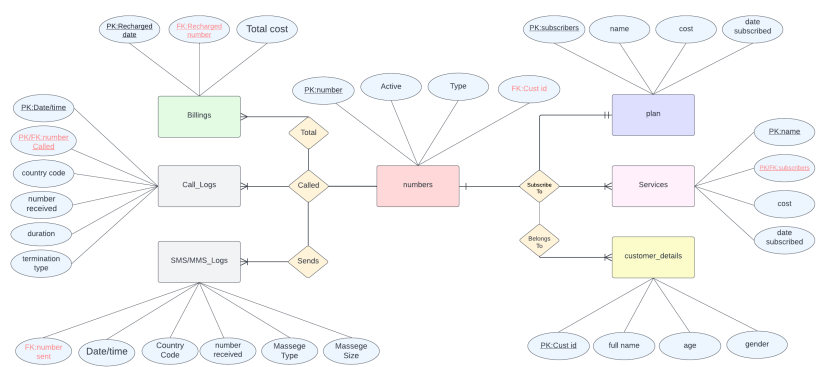
📏 Business Rules

1. Every Customer has one or many numbers

2. Every number can subscribe to one or many services

3. Every number can subscribe to only 1 plan if prepaid

4. Every number has many calls logs but a number cannot call or to be receive a call while calling in the same time

5. Every number can send and receive multiple SMS/MMS at the same time

6. Every prepaid billing is a sum of the subscription services and the plan on which is the expiry date of each has been reached , The postpaid users pay depends on call duration /messages size and subscribed services

📊 Model

Relational Schema

EERD

🎗️ Relation

USER

```
--Creating User in for database With password
CREATE USER Telecom_system IDENTIFIED BY "Admin@Tel$1120#7";
GRANT CONNECT,RESOURCE, DBA TO Telecom_system;
```


ORACLE Database Express Edition

User: TELECOM_SYSTEM

Home

Administration   Object Browser   SQL   Utilities   Application Builder

Tables

Code

Prepaid billing

```
CREATE TABLE Billings (
    Recharge_date DATE NOT NULL,
    Recharged_number CHAR(11) NOT NU
LL,
    Total_Cost FLOAT NOT NULL,
    CONSTRAINT pk_Number_and_date_re
charged PRIMARY KEY (Recharge_date,R
echarged_number),
    CONSTRAINT fk_Recharged_number F
OREIGN KEY (Recharged_number)
    REFERENCES numbers("number")
);
```

Call_logs

```
CREATE TABLE Call_logs (
    "Date/time" TIMESTAMP NOT NULL,
    number_called CHAR(11) NOT NULL,
    number_received CHAR(11) NOT NUL
L,
    country_code CHAR(5),
    "duration" DATE NOT NULL,
    Termination_type CHAR(25) NOT NU
LL,
    CONSTRAINT pk_composite PRIMARY
 KEY ("Date/time",number_called),
    CONSTRAINT fk_number_called FORE
IGN KEY (number_called)
    REFERENCES numbers("number")
);
ALTER SESSION SET NLS_DATE_FORMAT='D
D-MON-YYYY HH24:MI:SS';
```

SMS/MMS_logs

```
CREATE TABLE "SMS/MMS_logs" (
    number_sent CHAR(11) NOT NULL,
    country_code CHAR(5),
    number_received CHAR(11) NOT NUL
L,
    "Date/time" TIMESTAMP NOT NULL,
    "Message Type" CHAR(3) NOT NULL,
    "Message Size" FLOAT NOT NULL,
    CONSTRAINT fk_number_sent FOREIG
N KEY (number_sent)
    REFERENCES numbers("number")
);
```

numbers

```
CREATE TABLE numbers (
    "number" CHAR(11) NOT NULL,
    Active CHAR(1) NOT NULL,
    Type CHAR(10) NOT NULL,
    customer_id INT,
    CONSTRAINT pk_number PRIMARY K
EY ("number"),
    CONSTRAINT fk_customer_id FORE
IGN KEY (customer_id)
    REFERENCES customer_details(cu
st_id)
);
```

plan

```
CREATE TABLE plan (
    subscribers CHAR(11) NOT NULL,
    "name" CHAR(30) NOT NULL,
    cost FLOAT NOT NULL,
    date_subscribed DATE NOT NULL,
    CONSTRAINT pk_plan_subscribers P
RIMARY KEY (subscribers),
    CONSTRAINT fk_plan_subscribers_n
umber FOREIGN KEY (subscribers)
    REFERENCES numbers("number")
);
```

Services

```
CREATE TABLE Services (
    "name" CHAR(30) NOT NULL,
    subscribers CHAR(11) NOT NULL,
    cost FLOAT NOT NULL,
    date_subscribed DATE NOT NULL,
    CONSTRAINT pk_Service_name_subsc
riber PRIMARY KEY ("name",subscriber
s),
    CONSTRAINT fk_Service_subscriber
FOREIGN KEY (subscribers)
    REFERENCES numbers("number")
);
```

Customer_details

```
CREATE TABLE customer_details (
    cust_id INT NOT NULL,
    full_name CHAR(255) NOT NULL,
    age  SMALLINT,
    gender CHAR(6) NOT NULL,
    CONSTRAINT pk_cust_id PRIMARY KE
Y (cust_id)
);
--auto_increment for cust_id
CREATE SEQUENCE cust_id START WITH 5
02022001 NOMAXVALUE;
```

Result

PREPAID_BILLING

Column Name	Data Type	Nullable	Default	Primary Key
RECHARGE_DATE	DATE	No	-	1
RECHARGED_NUMBER	CHAR(11)	No	-	2
TOTAL_COST	FLOAT	No	-	-

1 - 3

Constraint
SYS_C005068
SYS_C005069
SYS_C005070
PK_NUMBER_AND_DATE_RECHARGED
FK_RECHARGED_NUMBER

SERVICES

Column Name	Data Type	Nullable	Default	Primary Key
name	CHAR(30)	No	-	1
SUBSCRIBERS	CHAR(11)	No	-	2
COST	FLOAT	No	-	-
DATE_SUBSCRIBED	DATE	No	-	-

Constraint
SYS_C004899
SYS_C004900
SYS_C004902
SYS_C004904
PK_SERVICE_NAME_SUBSCRIBER
FK_SERVICE_SUBSCRIBER

NUMBERS

Column Name	Data Type	Nullable	Default	Primary Key
number	CHAR(11)	No	-	1
ACTIVE	CHAR(1)	No	-	-
TYPE	CHAR(10)	No	-	-
CUSTOMER_ID	NUMBER	Yes	-	-

Constraint
SYS_C004894
SYS_C004895
SYS_C004896
PK_NUMBER
FK_CUSTOMER_ID

CALL_LOGS

Column Name	Data Type	Nullable	Default	Primary Key
Date/time	TIMESTAMP(6)	No	-	1
NUMBER_CALLED	CHAR(11)	No	-	2
NUMBER_RECEIVED	CHAR(11)	No	-	-
COUNTRY_CODE	CHAR(5)	Yes	-	-
duration	CHAR(20)	No	-	-
TERMINATION_TYPE	CHAR(25)	No	-	-

Constraint
SYS_C004915
SYS_C004916
SYS_C004917
SYS_C004918
SYS_C004919
PK_COMPOSITE
FK_NUMBER_CALLED

PLAN

Column Name	Data Type	Nullable	Default	Primary Key
SUBSCRIBERS	CHAR(11)	No	-	1
name	CHAR(30)	No	-	-
COST	FLOAT	No	-	-
DATE_SUBSCRIBED	DATE	No	-	-

Constraint
SYS_C004907
SYS_C004908
SYS_C004910
SYS_C004912
PK_PLAN_SUBSCRIBERS
FK_PLAN_SUBSCRIBERS_NUMBER

SMS/MMS logs

Column Name	Data Type	Nullable	Default	Primary Key
Date/time	TIMESTAMP(6)	No	-	-
NUMBER_SENT	CHAR(11)	No	-	-
NUMBER_RECEIVED	CHAR(11)	No	-	-
COUNTRY_CODE	CHAR(5)	Yes	-	-
Message Type	CHAR(3)	No	-	-
Message Size	FLOAT	No	-	-

Constraint
SYS_C005056
SYS_C005057
SYS_C005058
SYS_C005059
SYS_C005060
FK_NUMBER_SENT

CUSTOMER_DETAILS

Column Name	Data Type	Nullable	Default	Primary Key
CUST_ID	NUMBER	No	-	1
FULL_NAME	CHAR(255)	No	-	-
AGE	NUMBER	Yes	-	-
GENDER	CHAR(6)	No	-	-

Constraint
SYS_C004890
SYS_C004891
SYS_C004892
PK_CUST_ID

⟳INSERTION

```sql
--Table Billings
var number_check CHAR(11)
exec :number_check :='71-821-786'
INSERT INTO Billings (recharged_numb
er,recharge_date,Total_cost) VALUES
 ('71-821-786',TO_DATE('21/08/202
2','DD/MM/YYYY'), (
SELECT DISTINCT CASE WHEN (
SELECT CASE WHEN "Message Type" ='SM
S'
THEN "Message Size"*0.2
ELSE "Message Size"*1.2 END
FROM "SMS/MMS_logs" WHERE "SMS/MMS_l
ogs".number_sent=:number_check) IS N
OT NULL
THEN (
SELECT CASE WHEN "Message Type" ='SM
S'
THEN "Message Size"*0.2
ELSE "Message Size"*1.2
END FROM "SMS/MMS_logs"
WHERE "SMS/MMS_logs".number_sent=:nu
mber_check
) ELSE 0
END AS Total_message_cost
FROM "SMS/MMS_logs" )+ (
SELECT DISTINCT CASE WHEN (
SELECT SUM(Call_logs."duration"
) FROM Call_logs
WHERE Call_logs.number_called=:numbe
r_check
GROUP BY Call_logs.number_called
) IS NOT NULL
THEN (
SELECT SUM(Call_logs."duration")
FROM Call_logs
WHERE Call_logs.number_called=:numbe
r_check
GROUP BY Call_logs.number_called )
ELSE 0 END AS Calculate_Total_Cost
FROM Call_logs )+
( SELECT DISTINCT CASE WHEN (
  SELECT SUM(Services.cost)
FROM Services
WHERE Services.subscribers=:number_c
heck
GROUP BY Services.subscribers
) IS NOT NULL
THEN (
SELECT SUM(Services.cost)
FROM Services
WHERE Services.subscribers=:number_c
heck
GROUP BY Services.subscribers
) ELSE 0 END AS Total_Subs_Services_
cost
FROM Services )+(
SELECT DISTINCT CASE WHEN
(
SELECT SUM(plan.cost)
FROM plan
WHERE plan.subscribers=:number_check
GROUP BY plan.subscribers
) IS NOT NULL
THEN (
SELECT SUM(plan.cost)
FROM plan
WHERE plan.subscribers=:number_check
GROUP BY plan.subscribers
) ELSE 0 END AS Total_plan_cost
FROM plan )
);
```

```sql
--call_logs
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
```

```sql
--TABLE numbers
INSERT INTO numbers VALUES('7
9-131-124','Y','prepaid',5020
22020);
INSERT INTO numbers VALUES('7
6-731-118','Y','postpaid',502
022014);
INSERT INTO numbers VALUES('7
1-464-798','N','prepaid',5020
22010);
INSERT INTO numbers VALUES('7
8-803-512','Y','prepaid',5020
22009);
INSERT INTO numbers VALUES('8
1-723-758','Y','postpaid',502
022015);
INSERT INTO numbers VALUES('7
0-012-078','N','prepaid',5020
22017);
INSERT INTO numbers VALUES('8
1-645-497','Y','prepaid',5020
22005);
INSERT INTO numbers VALUES('7
1-821-786','Y','postpaid',502
022016);
INSERT INTO numbers VALUES('8
1-289-269','Y','postpaid',502
022012);
INSERT INTO numbers VALUES('7
1-602-881','Y','prepaid',5020
22008);
INSERT INTO numbers VALUES('7
1-083-147','Y','prepaid',5020
22011);
INSERT INTO numbers VALUES('7
1-524-830','N','postpaid',502
022003);
INSERT INTO numbers VALUES('0
3-280-963','Y','prepaid',5020
22002);
INSERT INTO numbers VALUES('7
1-668-808','Y','postpaid',502
022001);
INSERT INTO numbers VALUES('0
3-586-479','Y','postpaid',502
022019);
INSERT INTO numbers VALUES('8
1-454-129','N','prepaid',5020
22004);
INSERT INTO numbers VALUES('7
9-319-987','Y','postpaid',502
022006);
INSERT INTO numbers VALUES('7
```

```sql
--Table plan
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 9',9.0,'79-156-264',TO_DATE
('14/04/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 9',9.0,'71-234-123',TO_DATE
('11/10/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 9',9.0,'81-454-129',TO_DATE
('09/09/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 9',9.0,'71-464-798',TO_DATE
('15/07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('A+',15.0,'78-336-983',TO_DATE('06/
07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('A+',15.0,'81-466-456',TO_DATE('06/
07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('A+',15.0,'81-857-016',TO_DATE('06/
07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('A+',15.0,'78-803-512',TO_DATE('06/
07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('A+',15.0,'71-083-147',TO_DATE('06/
07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 17',17.0,'76-965-676',TO_DA
TE('06/07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 17',17.0,'78-235-541',TO_DA
TE('06/07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 17',17.0,'03-280-963',TO_DA
TE('06/07/2022', 'DD/MM/YYYY'));
INSERT INTO plan ("name",cost,subscribers,
date_subscribed)
VALUES('U-CHAT 17',17.0,'71-602-881',TO_DA
TE('06/07/2022', 'DD/MM/YYYY'));
```

```sql
--Table Services
    --to_date Function to convert date for
mat
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('Clip Alert',0.5,'71-234-123',TO_DA
TE('05/03/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('Clip Alert',0.5,'03-566-468',TO_DA
TE('14/8/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('Clip Alert',0.5,'78-235-541',TO_DA
TE('30/01/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('Clip Alert',0.5,'76-965-676',TO_DA
TE('12/06/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('Clip Alert',0.5,'78-135-634',TO_DA
TE('31/05/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
```

```sql
    ('03-586-479',TO_DATE('10/03/202
2 12:30:59','DD/MM/YYYY HH24:MI:S
S'),
    '+961','71-524-830','197','Singa
l Failure');
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
    ('71-821-786',TO_DATE('12/03/202
2 8:10:25','DD/MM/YYYY HH24:MI:SS'),
    '+961','78-135-634','155','Singa
l Failure');
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
    ('76-194-163',TO_DATE('24/03/202
2 09:30:07','DD/MM/YYYY HH24:MI:S
S'),
    '+961','78-235-541','645','Singa
l Failure');
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
    ('03-754-583',TO_DATE('15/03/202
2 1:30:15','DD/MM/YYYY HH24:MI:SS'),
    '+961','71-215-568','1112','Decl
ine');
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
    ('81-857-016',TO_DATE('24/06/202
2 2:30:15','DD/MM/YYYY HH24:MI:SS'),
    '+7','3-59874548','876','Declin
e');
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
    ('79-156-264',TO_DATE('05/06/202
2 2:30:15','DD/MM/YYYY HH24:MI:SS'),
    '+1','91-59969739','4836','Decli
ne');
INSERT INTO Call_logs
    (number_called,"Date/time",count
ry_code,number_received,"duration",T
ermination_type)
VALUES
    ('81-454-129',TO_DATE('19/07/202
2 13:45:10','DD/MM/YYYY HH24:MI:S
S'),
    '+1','42-633-365','3000','Declin
e


--SMS/Logs
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
    "Message Size")
VALUES
    ('71-524-830',TO_DATE('25/09/202
2 10:00:00','DD/MM/YYYY HH24:MI:S
S'),
    '+961','81-454-129','MMS',49.0);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
    "Message Size")
VALUES
    ('71-083-147',TO_DATE('12/07/202
2 13:45:10','DD/MM/YYYY HH24:MI:S
S'),
    '+961','79-156-264','SMS',0.1);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
```

```sql
9-156-264','Y','prepaid',5020
22018);
INSERT INTO numbers VALUES('8
1-857-016','Y','prepaid',5020
22007);
INSERT INTO numbers VALUES('0
3-126-885','N','postpaid',502
022020);
INSERT INTO numbers VALUES('8
1-466-456','Y','postpaid',502
022009);
INSERT INTO numbers VALUES('7
1-234-123','N','prepaid',5020
22014);
INSERT INTO numbers VALUES('7
6-563-224','Y','postpaid',502
022016);
INSERT INTO numbers VALUES('7
8-336-983','Y','prepaid',5020
22011);
INSERT INTO numbers VALUES('7
9-687-573','Y','postpaid',502
022004);
INSERT INTO numbers VALUES('7
8-235-541','N','prepaid',5020
22001);
INSERT INTO numbers VALUES('0
3-754-583','Y','postpaid',502
022020);
INSERT INTO numbers VALUES('7
6-194-163','Y','postpaid',502
022020);
INSERT INTO numbers VALUES('7
8-135-634','Y','prepaid',5020
22020);
INSERT INTO numbers VALUES('7
6-965-676','N','prepaid',5020
22018);
INSERT INTO numbers VALUES('0
3-566-468','Y','postpaid',502
022007);
```

```sql
VALUES('VIP',1.5,'79-131-124',TO_DATE('06/
03/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('VIP',1.5,'71-234-123',TO_DATE('14/
8/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('VIP',1.5,'78-235-541',TO_DATE('14/
01/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('VIP',1.5,'81-645-497',TO_DATE('12/
06/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('VIP',1.5,'71-821-786',TO_DATE('31/
05/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('PRIVATE',3.0,'71-083-147',TO_DATE
('06/07/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('PRIVATE',3.0,'71-524-830',TO_DATE
('04/4/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('PRIVATE',3.0,'03-280-963',TO_DATE
('14/12/2022', 'DD/MM/YYYY'));
INSERT INTO Services ("name",cost,subscrib
ers,date_subscribed)
VALUES('PRIVATE',3.0,'78-135-634',TO_DATE
('09/01/2022', 'DD/MM/YYYY'));


--TABLE customer_details
    --cust_id.nextval->for sequence functi
on (AUTO_INCREMENT)
INSERT INTO customer_details
VALUES(cust_id.nextval,'Michael Smith',1
9,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Matthew Anderson',
25,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'John Hammond',3
7,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Nicolas Milani',1
8,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Elizabeth Shelbe
y',65,'Female');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Richard Daoud',3
3,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Tiffany Andreas',2
1,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Jacob Braidy',1
9,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Christine Houran
y',20,'Female');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Anna-Maria Sarki
s',20,'Female');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Joelle Mazraani',2
3,'Female');
INSERT INTO customer_details
VALUES(cust_id.nextval,'George Milani',6
5,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Raymond Al-Ashka
r',55,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Alex Waked',45,'Ma
le');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Dana Naayme',35,'F
emale');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Gabriel Bou-Mirchi
d',39,'Male');
INSERT INTO customer_details
```

```sql
    "Message Size")
VALUES
    ('03-280-963',TO_DATE('19/12/202
2 21:00:10','DD/MM/YYYY HH24:MI:S
S'),
    '+961','03-586-479','SMS',0.5);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
    "Message Size")
VALUES
    ('79-319-987',TO_DATE('18/04/202
2 9:30:00','DD/MM/YYYY HH24:MI:SS'),
    '+961','70-012-078','SMS',8.0);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
    "Message Size")
VALUES
    ('71-821-786',TO_DATE('21/08/202
2 13:45:10','DD/MM/YYYY HH24:MI:S
S'),'+1','42-633-365','MMS',13.5);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
    "Message Size")
VALUES
    ('81-289-269',TO_DATE('14/03/202
2 07:15:00','DD/MM/YYYY HH24:MI:S
S'),
    '+1','90-58848946','MMS',68.5);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country
_code,number_received,"Message Typ
e",
    "Message Size")
VALUES
    ('76-965-676',TO_DATE('11/06/202
2 08:10:21','DD/MM/YYYY HH24:MI:S
S'),
    '+963','89-618-465','MMS',90.5);
```

```sql
VALUES(cust_id.nextval,'Edmond Raphaelle',
28,'Male');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Susan Nassour',2
4,'Female');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Nassir Njem',37,'M
ale');
INSERT INTO customer_details
VALUES(cust_id.nextval,'Alan Dergham',5
2,'Male');


--SMS/Logs
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('71-524-830',TO_DATE('25/09/2022 10:0
0:00','DD/MM/YYYY HH24:MI:SS'),
    '+961','81-454-129','MMS',49.0);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('71-083-147',TO_DATE('12/07/2022 13:4
5:10','DD/MM/YYYY HH24:MI:SS'),
    '+961','79-156-264','SMS',0.1);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('03-280-963',TO_DATE('19/12/2022 21:0
0:10','DD/MM/YYYY HH24:MI:SS'),
    '+961','03-586-479','SMS',0.5);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('79-319-987',TO_DATE('18/04/2022 9:3
0:00','DD/MM/YYYY HH24:MI:SS'),
    '+961','70-012-078','SMS',8.0);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('71-821-786',TO_DATE('21/08/2022 13:4
5:10','DD/MM/YYYY HH24:MI:SS'),'+1','42-63
3-365','MMS',13.5);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('81-289-269',TO_DATE('14/03/2022 07:1
5:00','DD/MM/YYYY HH24:MI:SS'),
    '+1','90-58848946','MMS',68.5);
INSERT INTO "SMS/MMS_logs"
    (number_sent,"Date/time",country_code,
number_received,"Message Type",
    "Message Size")
VALUES
    ('76-965-676',TO_DATE('11/06/2022 08:1
0:21','DD/MM/YYYY HH24:MI:SS'),
    '+963','89-618-465','MMS',90.5);
```

Result

Billings

RECHARGE_DATE	RECHARGED_NUMBER	TOTAL_COST
02-APR-22	81-857-016	891
21-AUG-22	71-821-786	172.7
12-JUN-22	71-234-123	11
09-OCT-22	03-586-479	197
14-JUL-22	81-209-269	82.2
29-JAN-22	71-083-147	18.02

Call_logs

Date/time	NUMBER_CALLED	NUMBER_RECEIVED	COUNTRY_CODE	duration	TERMINATION_TYPE
24-MAR-22 09.30.07.000000000 AM	76-194-163	78-235-541	+965	645	Singal Failure
15-MAR-22 01.20.15.000000000 AM	03-754-583	71-215-568	+965	1112	Decline
24-JUN-22 02.30.15.000000000 AM	81-857-016	3-59874548	+7	576	Decline
05-JUN-22 02.30.15.000000000 PM	79-156-264	51-59969739	+1	4836	Decline
19-JUL-22 01.45.10.000000000 PM	81-454-129	42-633-365	+1	3000	Decline
10-MAR-22 12.30.59.000000000 PM	03-586-479	71-524-630	+965	197	Singal Failure
12-MAR-22 08.10.25.000000000 AM	71-821-786	78-135-634	+965	155	Singal Failure

SMS/MMS_logs

Date/time	NUMBER_SENT	NUMBER_RECEIVED	COUNTRY_CODE	Message Type	Message Size
18-APR-22 09.30.00.000000000 AM	79-319-987	70-012-976	+965	SMS	0
21-AUG-22 01.45.10.000000000 PM	71-821-786	42-633-365	+1	MMS	13.5
14-MAR-22 07.15.00.000000000 AM	81-209-269	50-58949940	+1	MMS	60.5
11-JUN-22 06.10.21.000000000 AM	76-965-676	49-659-465	+965	MMS	90.5
12-JUL-22 01.45.10.000000000 PM	71-083-147	79-156-264	+965	SMS	0.1
19-DEC-22 09.00.10.000000000 PM	03-280-963	03-586-479	+965	SMS	0.5

numbers

number	ACTIVE	TYPE	CUSTOMER_ID
71-464-798	N	prepaid	50202010
78-803-512	Y	prepaid	50202009
01-721-758	Y	postpaid	50202015
79-131-124	Y	prepaid	50202020
76-721-118	Y	postpaid	50202014
70-012-976	N	prepaid	50202017
81-645-497	Y	postpaid	50202005
71-821-786	Y	postpaid	50202016
81-209-269	Y	prepaid	50202012
71-602-881	Y	prepaid	50202008
71-083-147	Y	prepaid	50202011
71-524-630	N	postpaid	50202003
03-280-963	Y	prepaid	50202002
71-668-308	Y	postpaid	50202001
03-586-479	Y	prepaid	50202019
81-454-129	N	prepaid	50202004
79-319-987	Y	prepaid	50202006
79-156-264	Y	postpaid	50202018
81-857-016	Y	prepaid	50202007
71-526-881	N	postpaid	50202020

plan

SUBSCRIBERS	name	COST	DATE_SUBSCRIBED
03-280-963	U-CHAT 17	17	06-JUL-22
71-602-881	U-CHAT 17	17	06-JUL-22
79-156-264	U-CHAT 9	9	14-APR-22
71-234-123	U-CHAT 9	9	11-OCT-22
81-454-129	U-CHAT 9	9	09-SEP-22
71-464-798	U-CHAT 9	9	15-JUL-22
78-336-983	A+	15	06-JUL-22
81-466-456	A+	15	06-JUL-22
81-857-016	A+	15	06-JUL-22
78-803-512	A+	15	06-JUL-22
71-083-147	A+	15	06-JUL-22
76-965-676	U-CHAT 17	17	06-JUL-22
78-235-541	U-CHAT 17	17	06-JUL-22

Services

name	SUBSCRIBERS	COST	DATE_SUBSCRIBED
Clip Alert	71-234-123	0.5	05-MAR-22
Clip Alert	03-586-468	0.5	14-AUG-22
Clip Alert	78-235-541	0.5	30-JAN-22
Clip Alert	76-965-676	0.5	12-JUN-22
Clip Alert	78-135-634	0.5	31-MAY-22
VIP	79-131-124	1.5	06-MAR-22
VIP	71-234-123	1.5	14-AUG-22
VIP	78-235-541	1.5	14-JAN-22
VIP	81-645-497	1.5	12-JUN-22
VIP	71-821-786	1.5	31-MAY-22
PRIVATE	71-083-147	3	06-JUL-22
PRIVATE	71-524-630	3	04-APR-22
PRIVATE	03-280-963	3	14-DEC-22
PRIVATE	78-135-634	3	09-JAN-22

customer_details

CUST_ID	FULL_NAME	AGE	GENDER
50202003	John Hammond	37	Male
50202004	Nicolas Milani	18	Male
50202005	Elizabeth Shelbey	65	Female
50202006	Richard Daoud	33	Male
50202007	Tiffany Andreas	21	Male
50202008	Jacob Brady	19	Male
50202009	Christine Hourany	20	Female
50202010	Anne Marie Sarks	20	Female
50202011	Joelle Macnani	23	Female
50202012	George Milani	65	Male
50202013	Raymond Al Ashkar	55	Male
50202014	Alex Makni	45	Male
50202015	Dana Naayme	35	Female
50202016	Gabriel Bou Mitchel	39	Male
50202017	Edmond Raphaelle	28	Male
50202018	Susan Nassour	34	Female
50202019	Nassir Njeim	37	Male
50202020	Alan Deegham	52	Male
50202001	Michael Smith	19	Male
50202002	Matthew Anderson	25	Male

📝Query's

```
--Display all customers having more one number line
SELECT customer_details.full_name,numbers."number",number
s.Type
FROM customer_details
INNER JOIN  numbers
ON  customer_details.cust_id = numbers.customer_id
WHERE numbers.customer_id IN
    (
        SELECT numbers.customer_id
        FROM customer_details
        INNER JOIN numbers
        ON customer_details.cust_id = numbers.customer_id
        GROUP BY numbers.customer_id
        HAVING COUNT(*)>1
    )
ORDER BY 1;
```

Result

FULL_NAME	number	TYPE
Alan Dergham	78-135-634	prepaid
Alan Dergham	03-126-885	postpaid
Alan Dergham	03-754-583	postpaid
Alan Dergham	76-194-163	prepaid
Alan Dergham	79-131-124	prepaid
Alex Waked	71-234-123	prepaid
Alex Waked	76-731-118	postpaid
Christine Hourany	81-466-456	postpaid
Christine Hourany	78-803-512	prepaid
Gabriel Bou-Mirchid	76-563-224	postpaid
Gabriel Bou-Mirchid	71-821-786	postpaid
Joelle Mazraani	78-336-983	prepaid
Joelle Mazraani	71-083-147	prepaid
Michael Smith	71-668-808	postpaid
Michael Smith	78-235-541	prepaid
Nicolas Milani	81-454-129	prepaid
Nicolas Milani	79-687-573	prepaid
Susan Nassour	76-965-676	prepaid
Susan Nassour	79-156-264	prepaid
Tiffany Andreas	81-857-016	prepaid

```
--display all records for international calls and message
 made before 'July 2022'
SELECT call_logs.number_called,call_logs.country_code,
    call_logs.number_received,call_logs."Date/time"
FROM call_logs
WHERE call_logs."Date/time" < TO_DATE('01/07/2022','DD/MM/
YYYY')
    AND
    call_logs.country_code <> '+961'
UNION
SELECT "SMS/MMS_logs".number_sent,"SMS/MMS_logs".country_c
ode,
        "SMS/MMS_logs".number_received,"SMS/MMS_logs"."Dat
e/time"
FROM "SMS/MMS_logs"
WHERE "SMS/MMS_logs"."Date/time" < TO_DATE('01/07/2022','D
D/MM/YYYY')
    AND
    "SMS/MMS_logs".country_code <> '+961'
ORDER BY 4;
```

Result

NUMBER_CALLED	COUNTRY_CODE	NUMBER_RECEIVED	Date/time
81-289-269	+1	90-58848946	14-MAR-22 07.15.00.000000000 AM
79-156-264	+1	91-59969739	05-JUN-22 02.30.15.000000000 AM
76-965-676	+963	89-618-465	11-JUN-22 08.10.21.000000000 AM
81-857-016	+7	3-59874548	24-JUN-22 02.30.15.000000000 AM

```
--display all active numbers and plan name of customers ag
e between 18 27 Having PRIVATE Service Enabled
SELECT DISTINCT plan.subscribers,plan."name" AS "Active Pl
an",Services."name" AS "Services"
FROM Services,plan
INNER JOIN numbers
ON numbers."number"=plan.subscribers
WHERE plan.subscribers IN
    (
        SELECT Services.subscribers
        FROM Services
        INNER JOIN numbers
        ON  numbers."number"=Services.subscribers
        WHERE numbers.active='Y' AND Services."name"='PRIV
ATE'
    )
AND
    plan.subscribers IN
    (
        SELECT numbers."number"
        FROM customer_details
        INNER JOIN numbers
        ON  numbers.customer_id=customer_details.cust_id
        WHERE customer_details.age BETWEEN 18 AND 27
    )
AND
    Services."name"='PRIVATE';
```

Result

SUBSCRIBERS	Active Plan	Services
71-083-147	A+	PRIVATE
03-280-963	U-CHAT 17	PRIVATE

```
--Display total cost of postpaid calls made in dollar and
 in lebanese pound rate(1515)
SELECT Billings.recharged_number,
CONCAT('$',total_cost) AS total_cost_$,
CONCAT(total_cost*1515,'L.L')AS LBP
FROM Billings
INNER JOIN call_logs
ON number_called=Billings.recharged_number;
```

Result

RECHARGED_NUMBER	TOTAL_COST_$	LBP
03-586-479	$197	298455LL
71-821-786	$172.7	261640.5LL
81-857-016	$891	1349865LL

📎Conclusion

It Satisfies Our Basic Needs Information technology and the ability to connect and communicate is a fundamental part of how our society operates. In today's digital ecosystem, telecommunication has become the foundation for businesses, governments, communities, and families to seamlessly connect and share information.

Using my database course I applied a smaller version of an complex database concept By the help of some research unleashing the full knowledge of the basic/advanced Oracle Express in a small demo in order to Apply what've learned

overall the concept and the application Satisfies me as I did the most of what I can do