U-Mobile

I)

a) U-Mobile

b) Telecommunications (Phone Service Provider)

c) Currently with phone services, customers aren't able to add a line without rigorous in-person identification verification. U-mobile allows for online identification verification of existing plans. Now existing members can now add members to their plan online if they have an e-sim.

d) We chose this organization to allow ease for customers to add lines to existing phone plans without having to undergo long wait times and a service break.

II)

Entity	**Attributes**
Customer	CustomerID, Name, Address, Email, Phone
Device	IMEI, Manufacturer, SIMType (eSIM? SIM?)
Account	AccountNo, Name, BillingAddress(Street, City, Zip, State), AccountSince
Invoice	InvoiceID, BillingAmount, MinPaymentDue, TotalAcctBalance,
Payment	PaymentID, PaymentAmount, PaymentType(AutoPayment, ManualPayment)
Line	*IMEI*, LineActiveDate
Plan	PlanID, PlanType, PlanPrice, PlanStartDate

ENTITY & ATTRIBUTE DESCRIPTIONS

ENTITIES:

Consumer: Any physical person requiring the service

Device: Phone device or any device requiring a data connection

Account: Already Existing Lifetime account, directly connected to the consumer's main owner

Invoice: Payment request sent to the account owner

Payment: The actual amount paid by the consumer (the actual transaction)

Line: Single data line per device

Plan: Collection of lines and type of promotion, or deal the consumer is locked into

ATTRIBUTES:

Customer
Customer: 13-digit Identification Number of Individual Person in System.
Phone Number: 10-Digit Number

Account
Account ID: 8 Digit Identification of Account
IMEI: International Mobile Equipment Identity: ID of SIM in Device.
Billing Address: Address Invoices are sent to.
AccountSince: Account Creation Date

Invoice
Billing Amount: Amount Added for Last Month onto the Account Balance
Account Balance: Total Amount Due on Account
Minimum Payment: Minimum Amount of Payment Amount due to keeping the Account Active.

Device
IMEI (International Mobile Equipment Identity): ID of SIM in Device.
Manufacturer: Maker of the Phone

Payment
PaymentID: 9 Digit Unique VARCHAR.
Payment Amount: Must be >= Minimum Amount on Invoice.

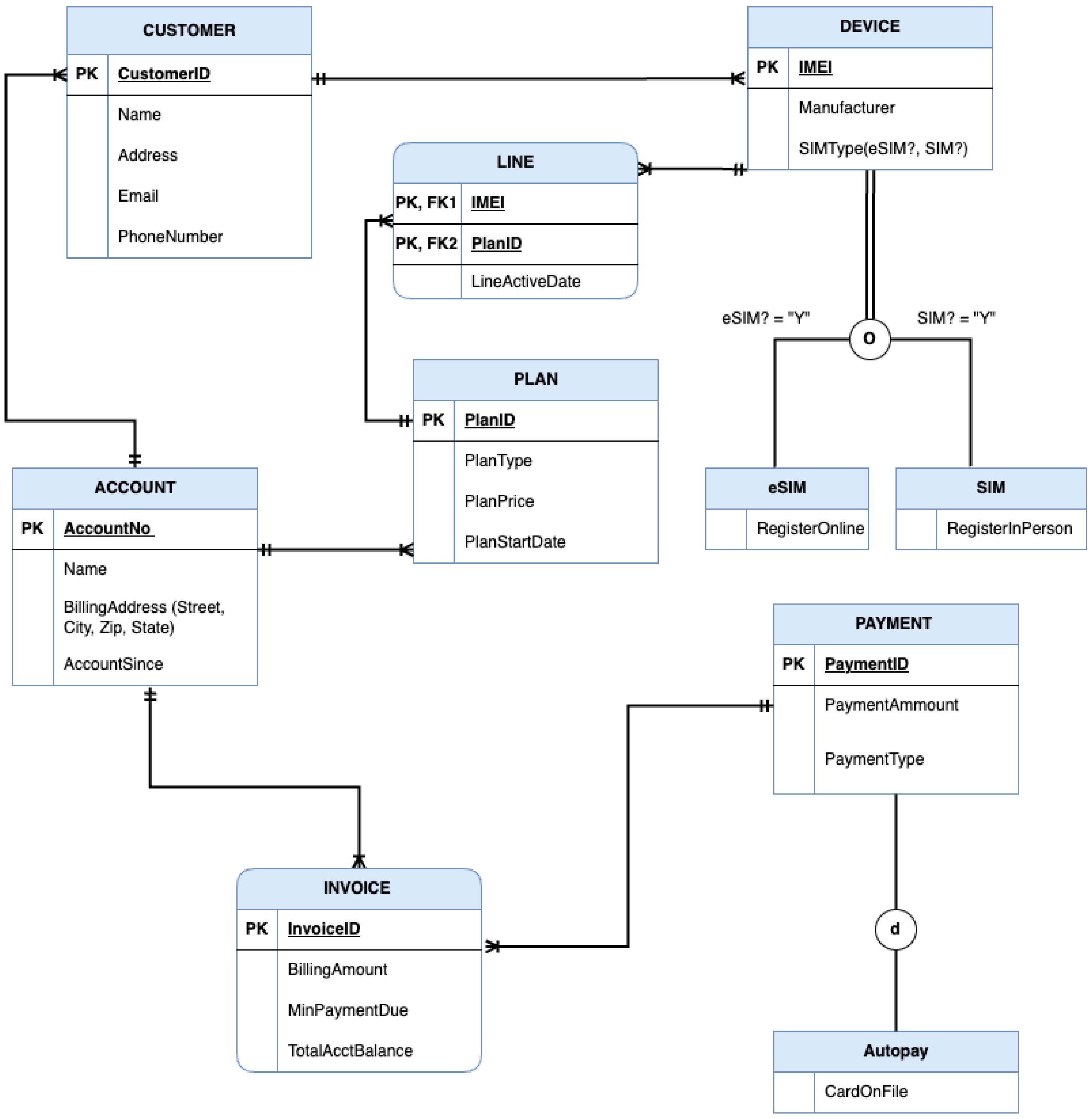
Line
Line ID: 7 VARCHAR that identifies the Line of a Cellular Connection.
LineActiveDate: Date Line was initially activated

Plan
PlanID: Unique 13 VARCHAR that identifies an account plan.
PlanType: Type of Plan (Single or Family)
Plan Price: Monthly Cost of Plan
Plan Start: Date account enrolled into the plan
Plan Duration: Derived by subtracting the current date from Plan Start

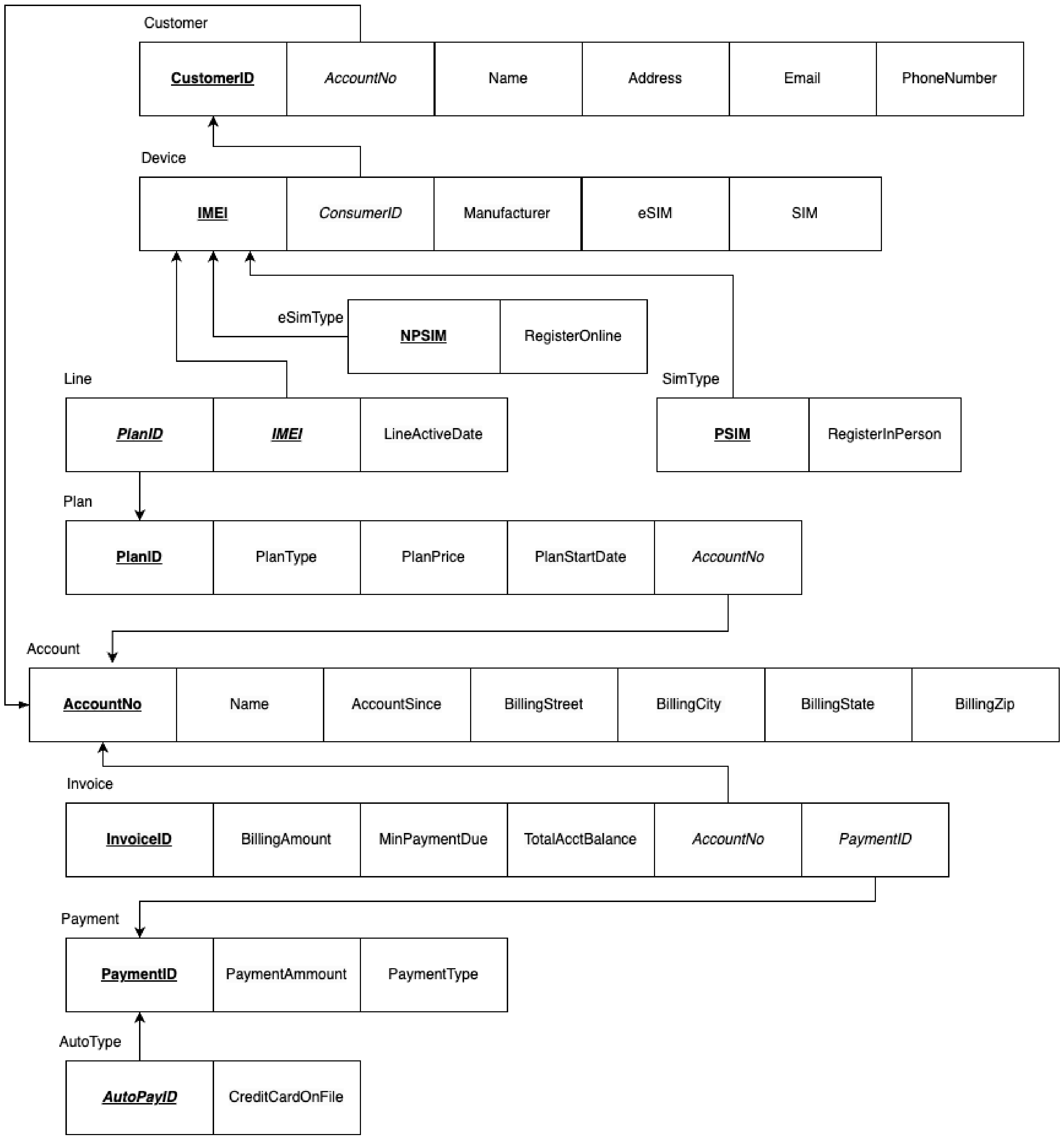
BUSINESS RULES

Each Customer must have at least one device
A device must belong to only one customer
Each device must have at least one line, but can also have many lines
Each line must have only one device
Each Plan must have at least one line
Each Line must have only one plan
Each Account must have only one plan
Each plan must have only one account
Each account must have at least one or many invoices
Each invoice must have only one account
Each invoice must have only one means of payment
Each Payment must have at least one or many invoices
A device may be an eSim device and have a physical SIM at the same time
A payment method may be an autopay method.

ER DIAGRAM


CUSTOMER
PK
CustomerID
Name
Address
Email
PhoneNumber
DEVICE
PK
IMEI
Manufacturer
SIMType(eSIM?, SIM?)
LINE
PK, FK1
IMEI
PK, FK2
PlanID
LineActiveDate
eSIM? = "Y"
o
SIM? = "Y"
PLAN
PK
PlanID
PlanType
PlanPrice
PlanStartDate
ACCOUNT
PK
AccountNo
Name
BillingAddress (Street, City, Zip, State)
AccountSince
eSIM
RegisterOnline
SIM
RegisterInPerson
PAYMENT
PK
PaymentID
PaymentAmmount
PaymentType
d
INVOICE
PK
InvoiceID
BillingAmount
MinPaymentDue
TotalAcctBalance
Autopay
CardOnFile

RELATION MODEL 3NF



```
CREATE SCHEMA IF NOT EXISTS U_Mobile;

USE U_Mobile;

CREATE TABLE Account
   (
    AccountNo           INT               NOT NULL,
    Name                VARCHAR(15)    NOT NULL,
   AccountSince         INT,
   BillingStreet        VARCHAR(15),
   BillingCity          VARCHAR(15),
   BillingState         VARCHAR(2),
   BillingZip           INT               NOT NULL,

      CONSTRAINT Account_PK PRIMARY KEY (AccountNo),
  );

INSERT INTO Account (AccountNo, Name, AccountSince, BillingStreet, BillingCity, BillingState, BillingZip)
VALUES
(778294, ‘John Smith’, 2012,  ‘789 Oak St’, ‘Sonoma’, 12345),
(219912, ‘Allison Moore’, 2009, ‘456 Elm St’, ‘San Francisco’, 56789),
(673354, ‘Joe Taylor’, 2017, ‘123 Main St’, San Bruno, 98765);

CREATE TABLE Customer
   (
     CustomerID   INT   NOT NULL,
     AccountNo    INT    NOT NULL
     Name         VARCHAR(20),
     Address      VARCHAR(50),
     Email        VARCHAR(20),

      CONSTRAINT Cust_PK PRIMARY KEY (CustomerID)
      CONSTRAINT Customer_FK FOREIGN KEY(AccountNo) REFERENCES Account(AccountNo)
  );

INSERT INTO Customer (CustomerID, Name, Address, Email, AccountNo)
VALUES
(2356, ‘John Smith’, ‘123 Francisco Way’, ‘jsmith@gmail.com’,778294),
(4567, ‘Allison Moore’, ‘442 Charter Ln’, ‘amoore@yahoo.com’,219912),
(6859, ‘Joe Taylor’, ‘5539 Sadowa Ct’, ‘jtaylor@hotmail.com’,673354);

CREATE TABLE Device
   (
     IMEI         VARCHAR(15)  NOT NULL,
    CustomerID    INT   NOT NULL,
    Manufacturer  VARCHAR(15),
    eSIM          VARCHAR(25),
    SIM           VARCHAR(25),

      CONSTRAINT Device_PK PRIMARY KEY (IMEI),
      CONSTRAINT Device_FK FOREIGN KEY(CustomerID) REFERENCES Customer (CustomerID)
  );

INSERT INTO Device (IMEI, CustomerID, Manufacturer, eSIM, SIM)
VALUES
(‘479503849411123’, 2356, ‘Apple’, ‘479503844657830’, NULL),
(‘129305786940322’, 4567, ‘Samsung’, NULL, ‘129305787810093’),
(‘745960385628591’, 6859, ‘Apple’, ‘745960385628591’, NULL),
('745960381122456', 2356, 'Motorola', NULL, '745960381122456'),
('129305783345196', 4567, 'LG', NULL, '129305783345196'),
('479503845748294', 6859, 'Samsung', '479503845748294', NULL);

CREATE TABLE eSimType
   (
    NPSIM                    VARCHAR(15)   NOT NULL,
   RegisterOnline            VARCHAR(1)    CHECK (RegisterOnline IN (‘Y’),

     CONSTRAINT Device_PK PRIMARY KEY (NPSIM),
     CONSTRAINT Device_FK FOREIGN KEY(NPSIM) REFERENCES Device (IMEI),
);

INSERT INTO eSimType (NPSIM, RegisterOnline)
VALUES
(‘479503849411123’, ’Y’),
('745960385628591', 'Y'),
('479503845748294', 'Y');

CREATE TABLE SimType
   (
   PSIM                      VARCHAR(15),
   RegisterOnline            VARCHAR(1)    CHECK (RegisterOnline IN (’N’),

     CONSTRAINT Device_PK PRIMARY KEY (PSIM),
     CONSTRAINT Device_FK FOREIGN KEY(PSIM) REFERENCES Device (IMEI),
   );

INSERT INTO SimType (PSIM,RegisterOnline)
VALUES
('129305786940322', 'N'),
( '745960381122456', 'N'),
('129305783345196', 'N');

CREATE TABLE Line
  (
  IMEI                       VARCHAR(15)     NOT NULL,
  PlanID                     INT     NOT NULL,
  LineActiveDate             DATE   NOT NULL,

     CONSTRAINT Line_PK PRIMARY KEY (PlanID, IMEI),
     CONSTRAINT Line_FK FOREIGN KEY(PlanID) REFERENCES Plan (PlanID),
     CONSTRAINT Line_FK FOREIGN KEY(IMEI) REFERENCES Device (IMEI)
  );
```

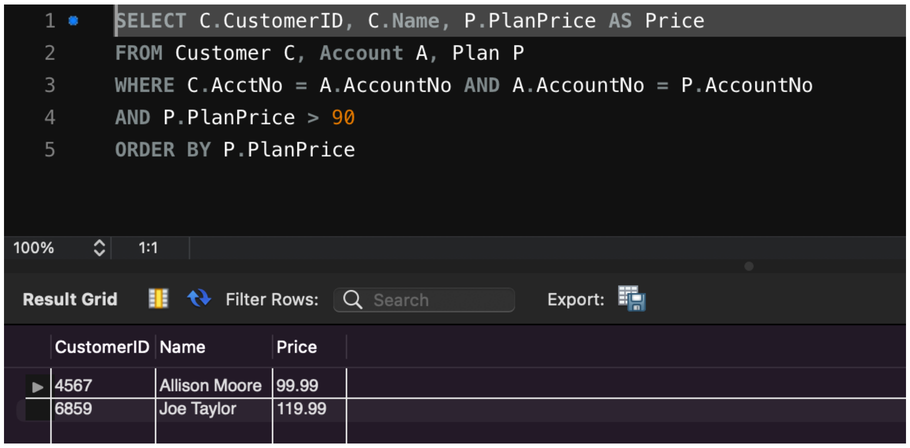
```
INSERT INTO Line (IMEI, PlanID, LineActiveDate)
VALUES
('479503849411123', 472, '2012-03-12'),
('129305783345196', 003, '2012-02-04'),
('129305786940322', 003, '2009-10-06'),
('745960381122456', 278, '2020-08-19'),
('745960385628591', 278, '2017-06-27'),
('479503845748294', 278, '2018-05-12');

CREATE TABLE Plan
   (
    PlanID                INT   NOT NULL,
    AccountNo             INT   NOT NULL,
    PlanType              VARCHAR(15),
    PlanPrice             DECIMAL(2),
    PlanStartDate         DATE   NOT NULL

      CONSTRAINT Plan_PK PRIMARY KEY (PlanID),
      CONSTRAINT Plan_FK FOREIGN KEY(AccountNo) REFERENCES Account (AccountNo),
  );

INSERT INTO Plan (PlanID, AccountNo, PlanType, PlanPrice, PlanStartDate)
VALUES
(472, 778294, ‘Basic’, 79.99, 2012-03-12),
(003, 219912, ‘Extra’, 99.99, 2010-01-01),
(278, 673354, ‘Premium’, 119.99, 2017-09-01);

CREATE TABLE Invoice
   (
     InvoiceID            INT   NOT NULL,
    AccountNo             INT   NOT NULL,
    BillingAmount         DECIMAL(2),
    MinPaymentDue         DECIMAL(2),
    TotalAccntBalance     DECIMAL(2),

      CONSTRAINT Invoice_PK PRIMARY KEY (InvoiceID),
      CONSTRAINT Invoice_FK FOREIGN KEY(AccountNo) REFERENCES Account (AccountNo),
  );

INSERT INTO INVOICE(InvoiceID, AccountNo, BillingAmount, MinPaymentDue, TotalAccntBalance)
VALUES
(14780976 , 778294, 200.50 ,100,1000),
(47370448, 219912, 300.75, 300, 500),
(1859065,673354,500.75 ,250, 2000);
```

```
CREATE TABLE Payment
   (
     PaymentID              INT   NOT NULL,
     InvoiceID              INT   NOT NULL,
     PaymentAmount          DECIMAL(2),
     PaymentType            VARCHAR(10),

      CONSTRAINT Payment_PK PRIMARY KEY (PaymentID),
      CONSTRAINT Payment_FK FOREIGN KEY(InvoiceID) REFERENCES Invoice (InvoiceID),
  );

INSERT INTO Payment(PaymentID, InvoiceID, PaymentAmount, PaymentType)
VALUES
(22861, 14780976, 150, 'CreditCard'),
(75925, 47370448, 175, 'MailCheck'),
(11107, 1859065, 250, 'PayPal');

CREATE TABLE AutoType
   (
    AutoPayID              INT   NOT NULL,
    CreditCardOnFile       VARCHAR(50),

      CONSTRAINT Payment_PK PRIMARY KEY (AutoPayID),
      CONSTRAINT Payment_FK FOREIGN KEY(AutoPayID) REFERENCES Payment (PaymentID),
  );

INSERT INTO AutoType (AutoPayID, CreditCardOnFile)
VALUES
(22861, ‘2345-1029-8593-1938’),
(75925, ‘4756-1029-8478-9982’),
(11107, ‘6628-9984-1829-3744’);
```

DATA RETRIEVAL (SELECT STATEMENT)

1) Show customerIDs and customer names of customers who have plan prices above $90. Show the prices lowest to highest.

SELECT C.CustomerID, C.Name, P.PlanPrice AS Price
FROM Customer C, Account A, Plan P
WHERE C.AccountNo = A.AccountNo AND A.AccountNo = P.AccountNo
AND P.PlanPrice > 90
ORDER BY P.PlanPrice

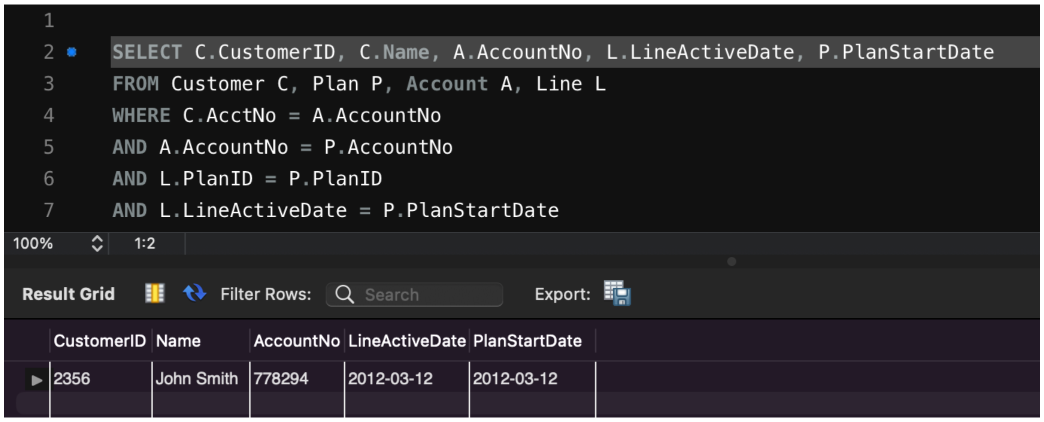


```
SELECT C.CustomerID, C.Name, P.PlanPrice AS Price
FROM Customer C, Account A, Plan P
WHERE C.AcctNo = A.AccountNo AND A.AccountNo = P.AccountNo
AND P.PlanPrice > 90
ORDER BY P.PlanPrice
```

CustomerID	Name	Price
4567	Allison Moore	99.99
6859	Joe Taylor	119.99

2) Show customer ID, AccountNo, and customer name for customer(s) who have the same dates for both the line activation and Plan start date

SELECT C.CustomerID, C.Name, A.AccountNo, L.LineActiveDate, P.PlanStartDate
FROM Customer C, Plan P, Account A, Line L
WHERE C.AccountNo = A.AccountNo
AND A.AccountNo = P.AccountNo
AND L.PlanID = P.PlanID
AND L.LineActiveDate = P.PlanStartDate

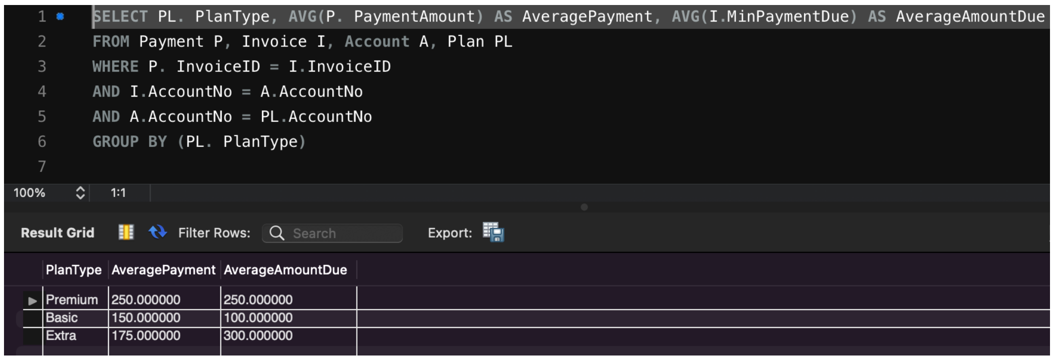


```

SELECT C.CustomerID, C.Name, A.AccountNo, L.LineActiveDate, P.PlanStartDate
FROM Customer C, Plan P, Account A, Line L
WHERE C.AcctNo = A.AccountNo
AND A.AccountNo = P.AccountNo
AND L.PlanID = P.PlanID
AND L.LineActiveDate = P.PlanStartDate
```

CustomerID	Name	AccountNo	LineActiveDate	PlanStartDate
2356	John Smith	778294	2012-03-12	2012-03-12

3) Display the Average Minimum Amount and Payment Amount for Each Account Type.
USE U_Mobile;

SELECT PL.PlanType, AVG(P.PaymentAmount) AS AveragePayment, AVG(I.MinPaymentDue) AS AverageAmountDue
FROM Payment P, Invoice I, Account A, Plan PL
AND A.AccountNo = PL.AccountNo
GROUP BY(PL.PlanType);

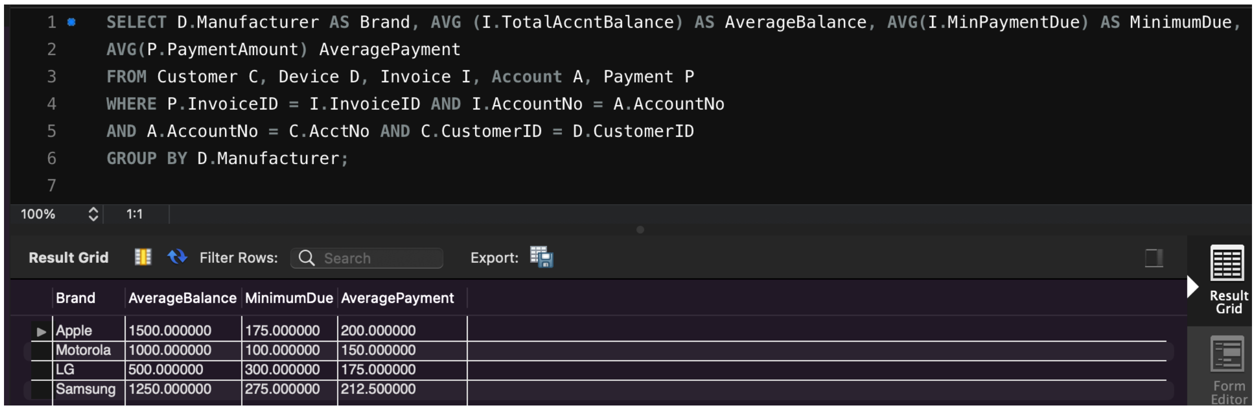


```
SELECT PL. PlanType, AVG(P. PaymentAmount) AS AveragePayment, AVG(I.MinPaymentDue) AS AverageAmountDue
FROM Payment P, Invoice I, Account A, Plan PL
WHERE P. InvoiceID = I.InvoiceID
AND I.AccountNo = A.AccountNo
AND A.AccountNo = PL.AccountNo
GROUP BY (PL. PlanType)
```

PlanType	AveragePayment	AverageAmountDue
Premium	250.000000	250.000000
Basic	150.000000	100.000000
Extra	175.000000	300.000000

4) Display Customers with either Apple or Samsung, their Average: Account Balance, Minimum Payment, and PaymentDue

SELECT D.Manufacturer AS Brand, AVG (I.TotalAccntBalance) AS AverageBalance, AVG(I.MinPaymentDue) AS MinimumDue,
AVG(P.PaymentAmount) AveragePayment
FROM Customer C, Device D, Invoice I, Account A, Payment P
WHERE P.InvoiceID = I.InvoiceID AND I.AccountNo = A.AccountNo
AND A.AccountNo = C.AccountNo AND C.CustomerID = D.CustomerID
GROUP BY D.Manufacturer;

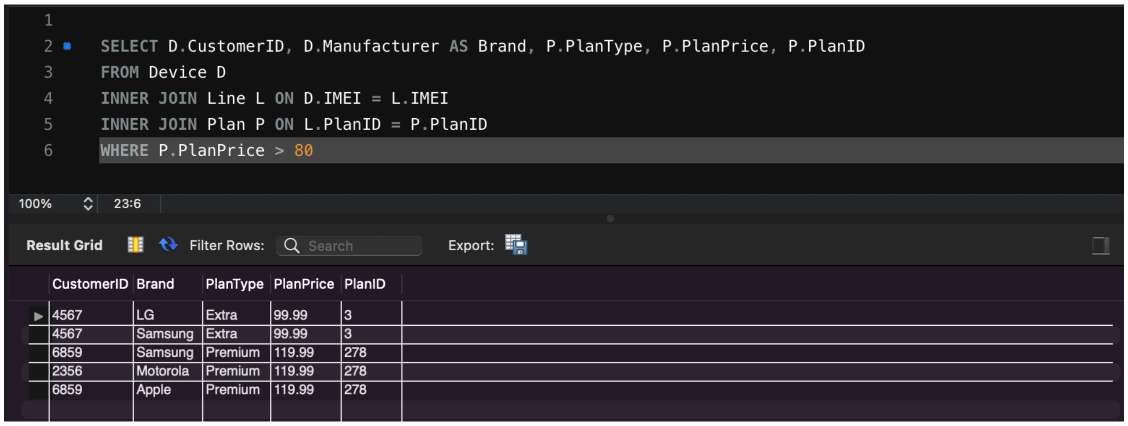


```
SELECT D.Manufacturer AS Brand, AVG (I.TotalAccntBalance) AS AverageBalance, AVG(I.MinPaymentDue) AS MinimumDue,
AVG(P.PaymentAmount) AveragePayment
FROM Customer C, Device D, Invoice I, Account A, Payment P
WHERE P.InvoiceID = I.InvoiceID AND I.AccountNo = A.AccountNo
AND A.AccountNo = C.AcctNo AND C.CustomerID = D.CustomerID
GROUP BY D.Manufacturer;
```

Brand	AverageBalance	MinimumDue	AveragePayment
Apple	1500.000000	175.000000	200.000000
Motorola	1000.000000	100.000000	150.000000
LG	500.000000	300.000000	175.000000
Samsung	1250.000000	275.000000	212.500000

5) Show Device manufacturer, plan ID, plan type, and plan prices for each plan that has a price above $80.

SELECT D.CustomerID, D.Manufacturer AS Brand, P.PlanType, P.PlanPrice, P.PlanID
FROM Device D
INNER JOIN Line L ON D.IMEI = L.IMEI
INNER JOIN Plan P ON L.PlanID = P.PlanID
WHERE P.PlanPrice > 80



```
SELECT D.CustomerID, D.Manufacturer AS Brand, P.PlanType, P.PlanPrice, P.PlanID
FROM Device D
INNER JOIN Line L ON D.IMEI = L.IMEI
INNER JOIN Plan P ON L.PlanID = P.PlanID
WHERE P.PlanPrice > 80
```

CustomerID	Brand	PlanType	PlanPrice	PlanID
4567	LG	Extra	99.99	3
4567	Samsung	Extra	99.99	3
6859	Samsung	Premium	119.99	278
2356	Motorola	Premium	119.99	278
6859	Apple	Premium	119.99	278