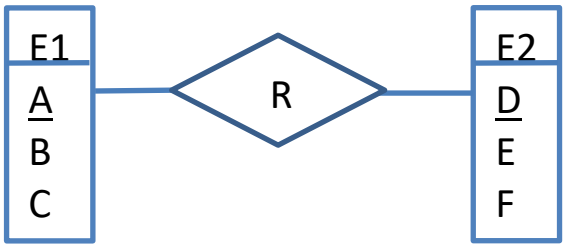
6. Entity-Relationship Diagrams

6. 5 Draw Diagram and Write Schemas

An entity set E1 has the attributes A (primary key), B and C. Another entity set E2 has the attributes D (primary key), E and F.
A relationship set R with cardinality many-to-many exists between E1 and E2. Both E1 and E2 have partial participation in R.

a) Draw an E-R Diagram.
b) Convert the E-R Diagram to Relation Schemas and state any foreign key constraints.
c) The relationship set is given an attribute G. Show the updated E-R Diagram and the updated Relation Schemas.

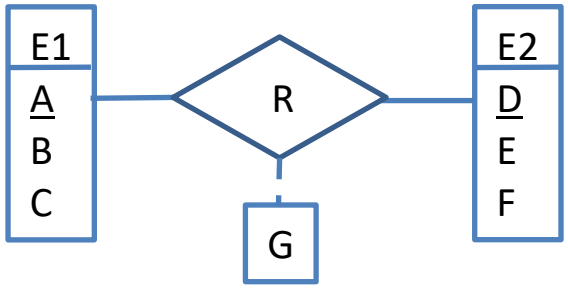
E-R Diagram:



Relation Schemas:
R1(A, B, C)
R2(D, E, F)
R3(A, D)

Foreign keys in R3: A references R1, D references R2.

Updated E-R Diagram and Relation Schemas:



R1(A, B, C)
R2(D, E, F)
R3(A, D, G)

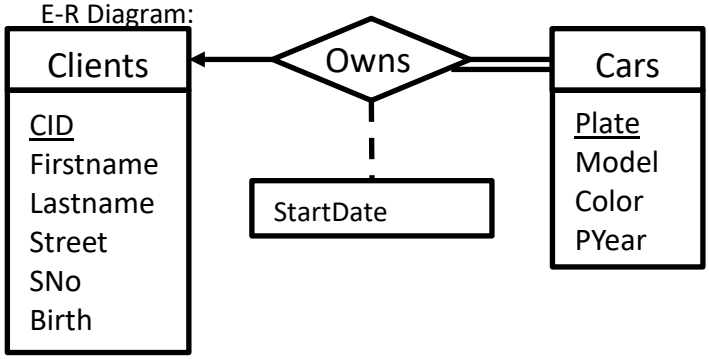
6.6 Sets, Diagram and Instance

A car insurance company wants a database to
(1) track clients with name, address and age,
(2) track cars, with license plate number, model, color and production year, and
(3) track the car ownerships of clients, each with a start date. It is assumed that a car is owned by exactly one client.

a) List Entity Sets and Relationship Sets.
b) Make an E-R Diagram of the Car Insurance Company.
c) Convert the E-R Diagram to Relation Schemas and state any foreign key constraints.
d) Give an example of a Database Instance.

Entity Sets: Clients and Cars
Relationship Sets: Owns

E-R Diagram:



Relation Schemas:
Clients(CID, Firstname, Lastname, Street, SNo, Birth)
Cars(Plate, Model, Color, PYear, CID, StartDate)
Foreign keys in Cars: CID references Clients.

Database Instance:

```
Clients
CID Firstname Lastname Street SNO Birth
101 Adam      Asimov   xroad  243 1995-02-17
102 Brian     Balter   Yroad  408 1963-08-06
103 Thomas    Balter   Zroad  48  1969-09-21

Cars
Plate    Model        Color PYear CID StartDate
ZY43816  Honda Accord Grey  2009  101 2012-09-01
ACE1     Audi A4 2,0  Black 2015  102 2015-02-17
UZ58368  Honda Accord Red   2012  102 2014-04-16
```

6.7 Draw Diagram and Write Schemas

A company needs help keeping track of the transactions through some bank's ATMs. They have requested a simple database to help with this. An ATM has an ID, a location and an associated bank. A transaction has a transaction number and an amount and is identified by the ID from ATM and the transaction number.

a) Make an E-R Diagram describing the company.

b) Convert the E-R Diagram to Relation Schemas and state any foreign key constraints

c) Draw the associated database schema diagram.

E-R diagram:

Relation schemas:

ATM(ATM_ID, Location, AssociatedBank)

Transaction(TransactionNo, ATM_ID, Amount),

Foreign keys in Transaction: ATM_ID references ATM_ID in ATM.

Database schema diagram: