Module: CA218 - Introduction to Databases
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Independent learning: Solutions

PropertyForRent

propertyNo	street	city	postcode	type	rooms	rent	ownerNo
PA14	16 Holhead Rd	Aberdeen	AB7 5SU	House	6	650	CO46
PL94	6 Argyll St	London	NW2	Flat	4	400	CO87
PG4	6 Lawrence St	Glasgow	G11 9QX	Flat	3	350	CO40
PG36	2 Manor Rd	Glasgow	G32 4QX	Flat	3	375	CO93
PG21	18 Dale Rd	Glasgow	G12	House	5	600	CO87
PG16	5 Novar Dr	Glasgow	G12 9AX	Flat	4	450	CO93

PrivateOwner

ownerNo	fName	lName	address	telNo
CO46	Joe	Keogh	2 Fergus Dr, Aberdeen AB2 7SX	01224-861212
CO87	Carol	Farrel	6 Achray St, Glasgow G32 9DX	0141-357-7419
CO40	Tina	Murphy	63 Well St, Glasgow G42	0141-943-1728
CO93	Tony	Shaw	12 Park Pl, Glasgow G4 0QR	0141-225-7025

Client

clientNo	fName	lName	address	telNo	prefType	maxRent
CR76	John	Kay	56 High St, London SW1 4EH	0207-774-5632	Flat	425
CR56	Aline	Stewart	64 Fern Dr, Glasgow G42 0BL	0141-848-1825	Flat	350
CR74	Mike	Ritchie	18 Tain St, PA1G 1YQ	01475-392178	House	750
CR62	Mary	Tregear	5 Tarbot Rd, Aberdeen AB9 3ST	01224-196720	Flat	600

Solution:

1. Show all the properties in PropertyForRent table.

$$\sigma(\text{PropertyForRent})$$

2. Show the propertyNo of all the properties in PropertyForRent table.

$$\Pi_{propertyNo}\,(\sigma(\text{PropertyForRent}))$$

or

$$\Pi_{propertyNumber}\,(\text{PropertyForRent})$$ --this is preferable

3. Show properties with three rooms.

$$\sigma_{rooms=3}(\text{PropertyForRent})$$

4. Show the city of properties with four rooms

$$\Pi_{city}(\sigma_{rooms=4}(\text{PropertyForRent})$$

5. Show the propertyNo, type and rooms of flats with 4 rooms.

$$\Pi_{propertyNo,\ type,\ rooms}(\sigma_{type\ =' Flat' and\ rooms=4}(\text{PropertyForRent}))$$

6. Show the detail of all the PrivateOwner with fname 'Tina'.

$$\sigma_{fname="Tina"}(\text{PrivateOwner})$$

7. Show the details of owners along with properties they own.

$$(PropertyForRent) \bowtie_{PropertyForRent.ownerNo=PrivateOwner.ownerNo} (PrivateOwner)$$

8. Show the details of PrivateOwners who do not currently own any property.
   First we get the details of all the private owners.

$$\text{allOwners} \leftarrow \sigma(\text{PrivateOwner})$$

   Second, get the details of all PrivateOwners who own properties (see Q7)

$$\text{currentOwners} \leftarrow (\Pi_{ownerNo,\ fname,\ lname,\ address,\ telno} ((PropertyForRent) \bowtie_{PropertyForRent.ownerNo=PrivateOwner.ownerNo} (PrivateOwner)))$$

   Third, subtract the current owners which leaves only those owners who do not currently own a property. Notice that the two relations need to be type compatible, that is why we only select ownerNo, fname, lname, address, telno.

$$\text{Result} \leftarrow \text{allOwners} - \text{currentOwners}$$

   Alternatively using outer join, this option allows you to keep all the private owners, if they don't own properties (i.e. if their ownerNo does not appear on propertiesForRent), the ownerNo will be Null. Filter out the Nulls from the result and you will get owners who do not currently own properties.

$$\sigma_{propertyForRent.ownerNo\ =\ NULL}(\Pi_{ownerNo,\ fname,\ lname,\ address,\ telno}(\text{PrivateOwner}) \bowtie_{PropertyForRent.ownerNo=PrivateOwner.ownerNo} \text{PropertyForRent}))$$