ACTIVITY 1 - Do It By Your Self (DREAMHOME)

BRANCH

BRANCHNO	STREET	CITY	POSTCODE
B005	22 Deer Rd	London	SW1 4EH
B007	16 Argyll St	Aberdeen	AB2 3SU
B003	163 Main St	Glasgow	G11 9QX
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

STAFF

STAFFNO	FNAME	LNAME	POSITION	SEX	DOB	SALARY	BRANCHNO
SL21	John	White	Manager	M	10-JAN-45	30000	B005
SG37	Ann	Beech	Assistant	F	11-OCT-60	12000	B003
SG14	David	Ford	Supervisor	M	24-MAR-58	18000	B003
SA9	Mary	Howe	Assistant	F	19-FEB-70	9000	B007
SG5	Susan	Brand	Manager	F	03-JUN-40	24000	B003
SL41	Julie	Lee	Assistant	F	13-JUN-65	9000	B005

REGISTRATION

CLIENTNO	BRANCHNO	STAFFNO	DATEJOINED
CR76	B005	SL41	02-JAN-01
CR56	B003	SG37	11-APR-00
CR74	B003	SG37	16-NOV-99
CR62	B007	SA9	07-MAR-00

PROPERTYFORRENT

PROPERTYNO	STREET	CITY	POSTCODE	TYPE	ROOMS	RENT	OWNERNO	STAFFNO	BRANCHNO
PA14	16 Holhead	Aberdeen	AB7 5SU	House	6	650	CO46	SA9	B007
PL94	6 Argyll St	London	NW2	Flat	4	400	CO87	SL41	B005
PG4	6 Lawrence St	Glasgow	G11 9QX	Flat	3	350	CO40	-	B003
PG36	2 Manor Rd	Glasgow	G32 4QX	Flat	3	375	CO93	SG37	B003
PG21	18 Dale Rd	Glasgow	G12	House	5	600	CO87	SG37	B003
PG16	5 Novar Dr	Glasgow	G12 9AX	Flat	4	450	CO93	SG14	B003

VIEWING

CLIENTNO	PROPERTYNO	VIEWDATE	COMMENTS
CR56	PA14	24-MAY-95	too small
CR76	PG4	20-APR-95	too remote
CR56	PG4	26-MAY-95	-
CR62	PA14	14-MAY-95	no dining room
CR56	PG36	28-APR-95	-

PRIVATE OWNER

OWNERNO	FNAME	LNAME	ADDRESS	TELNO	EMAIL	PASSWORD
CO46	Joe	Keogh	2 Fergus Dr. Aberdeen AB2 7SX	01224-861212	jkeogh@lhh.com	********
CO87	Carol	Farrel	6 Achray St. Glasgow G32 9DX	0141-357-7419	cfarrel@gmail.com	********
CO40	Tina	Murphy	63 Well St. Glasgow G42	0141-943-1728	tinam@hotmail.com	********
CO93	Tony	Shaw	12 Park Pl. Glasgow G4 0QR	0141-225-7025	tony.shaw@ark.com	********

CLIENT

CLIENTNO	FNAME	LNAME	TELNO	PREFTYPE	MAXRENT	EMAIL
CR76	John	Kay	01717745632	Flat	425	john.kay@gmail.com
CR56	Aline	Steward	0141-848-1825	Flat	350	astewart@hotmail.com
CR74	Mike	Ritchie	01475392178	House	750	mritchie01@yahoo.co.uk
CR62	Mary	Tregear	01224196720	Flat	600	maryt@hotmail.co.uk

Based on the tables in Dreamhome database created in Previous Tutorial, write down the Relational Algebra (RA) expressions and the SQL statements for the following queries:

1. To list the information of all clients.

    SQL: SELECT * FROM Client

    RA: σ (Client)

2. To list the information of clients who preferred to rent a flat.

    SQL: SELECT * FROM Client WHERE PrefType = 'Flat'

    RA: σ PrefType = 'Flat' (Client)

3. To list the ClientNo, FName, LName, TelNo and Email of clients who preferred to rent a flat with the rent that is less than 600 dollars.

CLIENTNO	FNAME	LNAME	TELNO	EMAIL
CR76	John	Kay	01717745632	john.kay@gmail.com
CR56	Aline	Steward	0141-848-1825	astewart@hotmail.com

SQL: SELECT ClientNo, FName, LName, TelNo, Email FROM Client WHERE PrefType = 'Flat' AND MaxRent < 600

RA: π ClientNo, FName, LName, TelNo, Email (σ PrefType='Flat' ^ MaxRent < 600 (Client))

4. To list the ClientNo, FName, LName, TelNo and Email of clients who preferred the rent between 300 and 700 dollars.

CLIENTNO	FNAME	LNAME	TELNO	EMAIL
CR76	John	Kay	01717745632	john.kay@gmail.com
CR56	Aline	Steward	0141-848-1825	astewart@hotmail.com
CR62	Mary	Tregear	01224196720	maryt@hotmail.co.uk

SQL: SELECT ClientNo, FName, LName, TelNo, Email FROM Client WHERE MaxRent BETWEEN 300 AND 700

RA: π ClientNo, FName, LName, TelNo, Email (σ MaxRent >= 300 ^ MaxRent <= 700 (Client))

5. To list the information of all branches in London or Bristol.

BRANCHNO	STREET	CITY	POSTCODE
B005	22 Deer Rd	London	SW1 4EH
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

SQL: SELECT * FROM Branch WHERE city = 'London' OR city='Bristol'

RA: σ city = 'London' v city 'Bristol' (Branch)

6. To list the cities of all branches in London, Aberdeen or Bristol (Use IN instead of OR for this question).

BRANCHNO	STREET	CITY	POSTCODE
B005	22 Deer Rd	London	SW1 4EH
B007	16 Argyll St	Aberdeen	AB2 3SU
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

SQL: SELECT * FROM Branch WHERE city IN ('London', 'Bristol', 'Aberdeen')

RA: σ city = 'London' v city 'Bristol' v city 'Aberdeen' (Branch)

7. To list the cities of all properties. Display each city only once.

CITY
London
Aberdeen
Glasgow

SQL: SELECT DISTINCT City FROM PropertyForRent

RA: π City (PropertyForRent)

8. To retrieve street, city and postcode of all properties.

STREET	CITY	POSTCODE
16 Holhead	Aberdeen	AB7 5SU
6 Argyll St	London	NW2
6 Lawrence St	Glasgow	G11 9QX
2 Manor Rd	Glasgow	G32 4QX
18 Dale Rd	Glasgow	G12
5 Novar Dr	Glasgow	G12 9AX

SQL: SELECT Street, City, Postcode FROM PropertyForRent

RA: π City, City, Postcode (PropertyForRent)

9. To retrieve the street, city and postcode for all properties which are located in Glasgow.

STREET	CITY	POSTCODE
6 Lawrence St	Glasgow	G11 9QX
2 Manor Rd	Glasgow	G32 4QX
18 Dale Rd	Glasgow	G12
5 Novar Dr	Glasgow	G12 9AX

SQL: SELECT Street, City, Postcode FROM PropertyForRent WHERE City = 'Glasgow'

RA: π City, City, Postcode (σ city = 'Glasgow' (PropertyForRent))

10. To retrieve the street, city and postcode for all properties which are not located in Glasgow.

STREET	CITY	POSTCODE
16 Holhead	Aberdeen	AB7 5SU
6 Argyll St	London	NW2

SQL: SELECT Street, City, Postcode FROM PropertyForRent WHERE City NOT IN 'Glasgow'

RA: π City, City, Postcode (σ city != 'Glasgow' (PropertyForRent))

11. To retrieve the street, city and postcode for all properties which are located in Glasgow and the properties' type is flat.

STREET	CITY	POSTCODE
6 Lawrence St	Glasgow	G11 9QX
2 Manor Rd	Glasgow	G32 4QX
5 Novar Dr	Glasgow	G12 9AX

SQL: SELECT Street, City, Postcode FROM PropertyForRent WHERE City = 'Glasgow' and Type='Flat'

RA: π City, City, Postcode (σ city = 'Glasgow' ^ Type='Flat' (PropertyForRent))

12. To retrieve the street, city, postcode, room and type for all properties which have 3 or 4 rooms.

STREET	CITY	POSTCODE	ROOMS	TYPE
6 Argyll St	London	NW2	4	Flat
6 Lawrence St	Glasgow	G11 9QX	3	Flat
2 Manor Rd	Glasgow	G32 4QX	3	Flat
5 Novar Dr	Glasgow	G12 9AX	4	Flat

SQL: SELECT Street, City, Postcode, Rooms, Type FROM PropertyForRent WHERE rooms between 3 AND 4

RA: π City, City, Postcode, Rooms, Type (σ rooms >= 3 ^ rooms <=4 (PropertyForRent))

13. To retrieve the street, city, postcode and type for all properties with the rent between 200 and 600.

STREET	CITY	POSTCODE	TYPE
6 Argyll St	London	NW2	Flat
6 Lawrence St	Glasgow	G11 9QX	Flat
2 Manor Rd	Glasgow	G32 4QX	Flat
18 Dale Rd	Glasgow	G12	House
5 Novar Dr	Glasgow	G12 9AX	Flat

SQL: SELECT Street, City, Postcode, Type FROM PropertyForRent WHERE rent between 200 AND 600

RA: π City, City, Postcode, Type (σ rent >= 200 ^ rent <=600 (PropertyForRent))

14. To retrieve the street, city, postcode, owner no and rent for all Flats with 4 rooms.

STREET	CITY	POSTCODE	OWNERNO	RENT
6 Argyll St	London	NW2	CO87	400
5 Novar Dr	Glasgow	G12 9AX	CO93	450

SQL: SELECT Street, City, Postcode, OwnerNo, Rent FROM PropertyForRent WHERE type = 'Flat' and rooms = 4

RA: π City, City, Postcode, OwnerNo, Rent (σ type = 'Flat' ^ rooms = 4 (PropertyForRent))

15. To retrieve fname and telno of clients whose fname begins with 'A'.

FNAME	TELNO
Aline	0141-848-1825

SQL: SELECT FName, TelNo FROM Client WHERE FName LIKE 'A%'

RA: π FName, TelNo (σ FName LIKE 'A%' (Client))

16. To retrieve information about the owner of the properties in Aberdeen, displaying the owner number and address.

OWNERNO	ADDRESS
CO46	2 Fergus Dr. Aberdeen AB2 7SX

SQL: SELECT OwnerNo, Address FROM PrivateOwner WHERE Address LIKE '%Aberdeen%'

RA: π OwnerNo, Address (σ Address LIKE '%Aberdeen%' (PrivateOwner))

17. To retrieve quarterly salaries for all staff together with their staff number and names (Hint: Expected result as shown below).

Staff#	Staff Name	Quarterly Salary
SL21	JohnWhite	7500
SG37	AnnBeech	3000
SG14	DavidFord	4500
SA9	MaryHowe	2250
SG5	SusanBrand	6000
SL41	JulieLee	2250

SQL: SELECT StaffNo as Staff#, FName ||' '|| LName as "Staff Name", (Salary/4) as "Quarterly Salary" FROM Staff

RA: ρ R(Staff#, Staff Name, Quaterly Salary) π StaffNo, FName, LName, (Salary/4) (Staff)

18. There are two clients who registered in year 2000, get the client info by displaying the client number and date joined (Hint: The result as per shown below).

CLIENTNO	DATEJOINED
CR56	11-APR-00
CR62	07-MAR-00

SQL: SELECT ClientNo, DateJoined FROM Registration WHERE dateJoined Between '1-JAN-2000' and '31-DEC-2000'

RA: π ClientNo, DateJoined (σ DateJoined >= '1-JAN-2020' ^ DateJoined = '31-DEC-2020' (Registration))

19. To retrieve staffs' no, First Name and Last Name whose last name begins with 'B'.

STAFFNO	FNAME	LNAME
SG37	Ann	Beech
SG5	Susan	Brand

SQL: SELECT StaffNo, FName, LName FROM Staff WHERE LName LIKE 'B%'

RA: π StaffNo, FName, LName (σ LName LIKE 'B%' (Staff))

20. To retrieve the propertyno, type, rooms and rent for properties located in branch B003.

PROPERTYNO	TYPE	ROOMS	RENT
PG4	Flat	3	350
PG36	Flat	3	375
PG21	House	5	600
PG16	Flat	4	450

SQL: SELECT PropertyNo, Type, Rooms, Rent FROM PropertyForRent WHERE BranchNo ='B003'

RA: π PropertyNo, Type, Rooms, Rent (σ BranchNo = 'B003' (PropertyForRent))

21. Retrieve the total number of properties.

SQL: SELECT COUNT(PopertyNo) FROM PropertyForRent

RA: $\int$ COUNT PopertyNo (PropertyForFRent)

22. Find the average rental price for all properties.

SQL: SELECT AVG(rent) FROM PropertyForRent

RA: $\int$ AVG Rent (PropertyForFRent)

23. List the ownerNo who owned the properties without redundant.

SQL: SELECT DISTINCT OwnerNo FROM PropertyForRent

RA: π OwnerNo (PropertyForFRent)

24. Count the number of properties that are of 'Flat' type.

SQL: SELECT COUNT(PropertyNo) FROM PropertyForRent WHERE Type = 'Flat'

RA: $\int$ COUNT PropertyNo (σ Type = 'Flat' (PropertyForFRent))

25. Find the minimum rental price for properties that are of 'Flat' type.

SQL: SELECT MIN (Rent) FROM PropertyForRent WHERE Type = 'Flat'

RA: $\int$ MIN Rent (σ Type = 'Flat' (PropertyForFRent))

26. Display the PropertyNo, Street, City, Postcode, Type and Rooms of property which have the minimum rental price.

SQL: SELECT PropertyNo, Street, City, Postcode, Type, Rooms FROM PropertyForRent WHERE Rent = (SELECT MIN(Rent) FROM PropertyForRent)

RA: MINRENT <-- $\int$ MIN Rent

π PropertyNo, Street, City, Postcode, Type, Rooms (σ Rent = MINTRENT (PropertyForFRent))

27. Get the details of a property which has the most expensive rental price.

SQL: SELECT PropertyNo, Street, City, Postcode, Type, Rooms FROM PropertyForRent WHERE Rent = (SELECT MAX(Rent) FROM PropertyForRent)

RA: MAXRENT <-- $\int$ MAX Rent

π PropertyNo, Street, City, Postcode, Type, Rooms (σ Rent = MAXRENT (PropertyForFRent))

28. Find the sum of the rental price for all properties.

SQL: SELECT SUM(Rent) FROM PropertyForRent

RA: $\int_{\text{SUM Rent}}$ (PropertyForFRent)

29. Find the sum of the rental price for all properties managed by each staff.

SQL: SELECT StaffNo, SUM(Rent) FROM PropertyForRent GROUP BY StaffNo

RA: StaffNo $\int_{\text{SUM Rent}}$ (PropertyForFRent)

30. Find the number of properties and the average of their rental price for each branch.

SQL: SELECT BranchNo, COUNT(PropertyNo), AVG(Rent) FROM PropertyForRent GROUP BY BranchNo

RA: BranchNo $\int_{\text{COUNT PropertyNo, AVG Rent}}$ (PropertyForFRent)

31. Find the number of properties and the average of their rental price for each branch with more than 2 properties.

SQL: SELECT BranchNo, COUNT(PropertyNo), AVG(Rent) FROM PropertyForRent GROUP BY BranchNo HAVING COUNT(PropertyNo) > 2

RA: BranchMORE2 $\text{<--}\int_{\text{COUNT PropertyNo}}$

BranchNo $\int_{\text{COUNT PropertyNo, AVG Rent}}$ ($\sigma_{\text{BranchMORE2 > 2}}$ (PropertyForFRent))

32. Find the number of properties for each property type.

SQL: SELECT Type, COUNT(PropertyNo) FROM PropertyForRent GROUP BY Type

RA: Type $\int_{\text{COUNT PropertyNo}}$ (PropertyForFRent)

33. Find the number of properties for each property type with more than two properties.

SQL: SELECT Type, COUNT(PropertyNo) FROM PropertyForRent GROUP BY Type HAVING COUNT(PropertyNo) > 2

RA: TypeMORE2 $\text{<--}\int_{\text{COUNT PropertyNo}}$

BranchNo $\int_{\text{COUNT PropertyNo, AVG Rent}}$ ($\sigma_{\text{FMORE2 > 2}}$ (PropertyForFRent))

34. Find the number of properties located in Glasgow for each property type.

SQL: SELECT Type, COUNT(PropertyNo) FROM PropertyForRent WHERE city = 'Glasgow' GROUP BY Type

RA: Type $\int$ COUNT PropertyNo $(\sigma_{\text{city = 'Glasgow'}} (\text{PropertyForFRent}))$

35. Find the number of properties located in Glasgow for each property type with more than two properties.

SQL: SELECT Type, COUNT(PropertyNo) FROM PropertyForRent WHERE city = 'Glasgow' GROUP BY Type HAVING COUNT (PropertyNo) > 2

RA: TypeMORE2 <--$\int$ COUNT PropertyNo

Type $\int$ COUNT PropertyNo $(\sigma_{\text{city = 'Glasgow' ^ TypeMore2 > 2}} (\text{PropertyForFRent}))$

36. Find the number of properties that are of 'Flat' type for each branch.

SQL: SELECT BranchNo, COUNT(PropertyNo) FROM PropertyForRent WHERE type = 'Flat' GROUP BY BranchNo

RA: BranchNo $\int$ COUNT PropertyNo $(\sigma_{\text{type = 'Flat'}} (\text{PropertyForFRent}))$

37. Find the number of properties that are of 'Flat' type for each branch with more than one property of 'Flat' type.

SQL: SELECT BranchNo, COUNT(PropertyNo) FROM PropertyForRent WHERE Type = 'Flat' GROUP BY BranchNo HAVING COUNT (PropertyNo) > 2

RA: TypeMORE2 <--$\int$ COUNT PropertyNo

BranchNo $\int$ COUNT PropertyNo $(\sigma_{\text{type = 'Flat' ^ TypeMORE2 > 2}} (\text{PropertyForFRent}))$

38. Find the total number of females for each branch. Display branchno and the total number of female staff.

SQL: SELECT BranchNo, COUNT(StaffNo) FROM Staff WHERE Sex = 'F' GROUP BY BranchNo

RA: BranchNo $\int$ COUNT Sex, COUNTStaffNo $(\sigma_{\text{Sex = 'F'}} (\text{Staff}))$

39. For each branch office with more than one member of staff, find the number of staff working in each branch. Display branchno and the number of staff in your result.

SQL: SELECT BranchNo, COUNT(StaffNo) FROM Staff GROUP BY BranchNo HAVING COUNT(StaffNo) > 1

RA: NOOFSTAFF <--f COUNT StaffNo

BranchNo f COUNT Staff (σ NOOFSTAFF > 1 (Staff))

40. Retrieve staff name (fname and lname) and branch city where they worked.

SQL: SELECT FName, LName, City FROM Staff JOIN Branch USING (BranchNo)

RA: π FName, LName, City (σ Staff.BranchNo = Branch.BranchNo (Staff X Branch))

41. Retrieve the full details of Owner (OwnerNo, First Name, Last Name, Address, TelNo, Email, Property's Address (street, city, postcode)) for propertyNo PG36.

SQL: SELECT OwnerNo, FName, LName, Address, TelNo, Email, PropertyNo, street, city, postcode FROM PrivateOwner JOIN PropertyForRent USING (OwnerNo) WHERE PropertNo ='PG36'

RA: π OwnerNo, First Name, Last Name, Address, TelNo, Email, PropertyNo, street, city,

postcode (σ PropertNo ='PG36' (PrivateOwner X PropertyForFRent))

42. List the private owner's first name and telephone number who wants to rent property type 'House'.

OWNERNO	FNAME	LNAME	TELNO
CO46	Joe	Keogh	01224-861212
CO87	Carol	Farrel	0141-357-7419

SQL: SELECT OwnerNo, FName, LName, TelNo FROM PrivateOwner JOIN PropertyForRent USING (OwnerNo) WHERE Type ='House'

RA: π OwnerNo, FName, LName, TelNo (σ Type ='House' (PrivateOwner X PropertyForFRent))

43. Retrieve the full details of staff who handled flat owned by Tony (JOIN OPERATION).

SQL: SELECT S.FName, S.LName, Position, Sex, S.BranchNo, P.PropertyNo, Type FROM Staff S JOIN PropertyForRent P ON (S.StaffNo = P.StaffNo) JOIN PrivateOwner PO ON (P.OwnerNo = PO.OwnerNo) WHERE PO.FName = 'Tony'

RA: C1 ← σ Staff.StaffNo = PropertyForRent.StaffNo ^ PrivateOwner.OwnerNo = PropertyForRent.OwnerNo ^ PropertyForRent.FName = 'Tony'

π S.FName, S.LName, Position, Sex, S.BranchNo, P.PropertyNo, Type (σ C1 (Staff X PropertyForFRent X PrivateOwner)

FNAME	LNAME	POSITION	SEX	BRANCHNO	PROPERTYNO	TYPE
Ann	Beech	Assistant	F	B003	PG36	Flat
David	Ford	Supervisor	M	B003	PG16	Flat

44. Retrieve the full details of staff who handled flat owned by Tony (SUB QUERY OPERATION).
    SQL: SELECT FName, LName, Position, Sex, BranchNo FROM Staff S WHERE StaffNo IN (SELECT StaffNo FROM PropertyForRent WHERE OwnerNo = (Select OwnerNo from PrivateOwner WHERE FName = 'Tony'))

RA: Q1 ← π OwnerNo (σ FName = 'Tony' (PrivateOwner))

Q2 ← π StaffNo (σ OwnerNo = Q1(PropertyForRent))

π FName, LName, Position, Sex, S.BranchNo (σ StaffNo IN Q2 (Staff))

FNAME	LNAME	POSITION	SEX	BRANCHNO
David	Ford	Supervisor	M	B003
Ann	Beech	Assistant	F	B003

45. Find the name of the manager of the branch where Ann Beech works. (First name for Ann Beech is Ann).

SQL: SELECT STAFFNO, FNAME, LNAME, BRANCHNO FROM STAFF WHERE POSITION = 'Manager' AND BRANCHNO = (SELECT BRANCHNO FROM STAFF WHERE FNAME = 'Ann')

RA: S1 ← σ FNAME='Ann' (STAFF)

π STAFFNO, FNAME, LNAME, BRANCHNO (σ S1 ^ POSITION = 'Manager' (BRANCH))

STAFFNO	FNAME	LNAME	BRANCHNO
SG5	Susan	Brand	B003