

Assignment—Relational Algebra
Total Point: 10

Student's Name: Gabriel Nulman

Task A:

[(Expression 0.75 + Output relation 0.5) * 4 = 5]

Using the tables in page 2, construct relational algebra expressions to answer the following queries and represent the answer as a relation:

1. First and last names of the clients registered at Branch B003.
 - a. $\Pi_{\text{fname, lname}}(\sigma_{\text{client.clientno} = \text{registration.clientno AND branchno} = \text{"B003"}}(\text{client} \bowtie \text{registration}))$
2. Which staff members were born after 1955?
 - a. $\Pi_{\text{staffno, fname, lname, position, sex, dob, salary}}(\sigma_{\text{dob} > \text{"12-31-1955"}}(\text{Staff}))$
3. List the flats with rent less than \$500.
 - a. $\Pi_{\text{propertyno, street, city, postcode}}(\sigma_{\text{type} = \text{"Flat"} \text{ AND } \text{rent} > 500}(\text{propertyforrent}))$
4. Telephone numbers of the owners who have property at London.
 - a. $\Pi_{\text{telno}}(\sigma_{\text{propertyforrent.ownerno} = \text{privateowner.ownerno AND city} = \text{"London"}}(\text{propertyforrent} \bowtie \text{privateowner}))$

Task B:

[1*5 = 5]

Using the tables in page 2, show the relation (table including column headings) created by the following relational algebra expressions as a two-dimensional table:

1. $\Pi_{\text{fname, lname, rooms, rent}}(\sigma_{\text{type} = \text{preftype}}(\text{Client} \times \text{PropertyForRent}))$

| fname | lname | rooms | rent |
|-------|---------|-------|-------|
| Aline | Stewart | 4 | \$450 |
| Aline | Stewart | 3 | \$375 |
| Aline | Stewart | 3 | \$350 |
| Aline | Stewart | 4 | \$400 |
| Mary | Tregear | 4 | \$450 |
| Mary | Tregear | 3 | \$375 |
| Mary | Tregear | 3 | \$350 |
| Mary | Tregear | 4 | \$400 |

| | | | |
|------|---------|---|-------|
| Mike | Ritchie | 6 | \$650 |
| Mike | Ritchie | 5 | \$600 |
| John | Kay | 4 | \$450 |
| John | Kay | 3 | \$375 |
| John | Kay | 3 | \$350 |
| John | Kay | 4 | \$400 |

2. $\Pi_{\text{LName, position}} (\sigma_{\text{city} = \text{"London"}} (\text{PropertyForRent} \bowtie \text{Staff}))$

| Lname | position |
|-------|-----------|
| Lee | Assistant |

3. $\Pi_{\text{staffNo}} (\text{Registration}) \cap \Pi_{\text{staffNo}} (\text{PropertyForRent})$

| staffNo |
|---------|
| SA9 |
| SG37 |
| SL41 |

4. $\Pi_{\text{branchNo}} (\text{Branch}) - \Pi_{\text{branchNo}} (\text{Staff})$

| branchNo |
|----------|
| B002 |
| B004 |

5. $\Pi_{\text{fName, LName}} (\sigma_{\text{propertyNo IS NULL}} (\text{Staff} \bowtie \text{PropertyForRent}))$

| Fname | Lname |
|-------|-------|
| Susan | Brand |
| John | White |

Branch

| branchNo | street | city | postcode |
|----------|--------------|----------|----------|
| B002 | 56 Clover Dr | London | NW10 6EU |
| B003 | 163 Main St | Glasgow | G11 9QX |
| B004 | 32 Manse Rd | Bristol | BS99 1NZ |
| B005 | 22 Deer Rd | London | SW1 4EH |
| B007 | 16 Argyll St | Aberdeen | AB2 3SU |

Viewing

| clientNo | propertyNo | viewDate | comment |
|----------|------------|-----------|----------------|
| CR76 | PG4 | 4/20/2001 | too remote |
| CR56 | PG36 | 4/28/2001 | |
| CR62 | PA14 | 5/14/2001 | no dining room |
| CR56 | PA14 | 5/24/2001 | too small |
| CR56 | PG4 | 5/26/2001 | |

Client

| clientNo | fName | lName | telNo | prefType | maxRent |
|----------|-------|---------|---------------|----------|----------|
| CR56 | Aline | Stewart | 0141-848-1825 | Flat | \$350.00 |
| CR62 | Mary | Tregear | 01224-196720 | Flat | \$600.00 |
| CR74 | Mike | Ritchie | 01475-392178 | House | \$750.00 |
| CR76 | John | Kay | 0207-774-5632 | Flat | \$425.00 |

PrivateOwner

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

PropertyForRent

| PropertyNo | street | city | Postcode | type | rooms | rent | ownerNo | staffNo | branchNo |
|------------|---------------|----------|----------|-------|-------|----------|---------|---------|----------|
| PA14 | 16 Holhead | Aberdeen | AB7 5SU | House | 6 | \$650.00 | CO46 | SA9 | B007 |
| PG16 | 5 Novar Dr | Glasgow | G12 9AX | Flat | 4 | \$450.00 | CO93 | SG14 | B003 |
| PG21 | 18 Dale Rd | Glasgow | G12 | House | 5 | \$600.00 | CO87 | SG37 | B003 |
| PG36 | 2 Manor Rd | Glasgow | G32 4QX | Flat | 3 | \$375.00 | CO93 | SG37 | B003 |
| PG4 | 6 Lawrence St | Glasgow | G11 9QX | Flat | 3 | \$350.00 | CO40 | | B003 |
| PL94 | 6 Argyll St | London | NW2 | Flat | 4 | \$400.00 | CO87 | SL41 | B005 |

Registration

| clientNo | branchNo | staffNo | dateJoined |
|----------|----------|---------|------------|
| CR56 | B003 | SG37 | 4/11/2000 |
| CR62 | B007 | SA9 | 3/7/2000 |
| CR74 | B003 | SG37 | 11/16/1999 |
| CR76 | B005 | SL41 | 1/2/2001 |

Staff

| staffNo | fName | lName | position | sex | DOB | salary | branchNo |
|---------|-------|-------|------------|-----|------------|-----------|----------|
| SA9 | Mary | Howe | Assistant | F | 2/19/1970 | 9,000.00 | B007 |
| SG14 | David | Ford | Supervisor | M | 3/24/1958 | 18,000.00 | B003 |
| SG37 | Ann | Beech | Assistant | F | 11/10/1960 | 12,000.00 | B003 |
| SG5 | Susan | Brand | Manager | F | 6/3/1940 | 24,000.00 | B003 |
| SL21 | John | White | Manager | M | 10/1/1945 | 30,000.00 | B005 |
| SL41 | Julie | Lee | Assistant | F | 6/13/1965 | 9,000.00 | B005 |