

Database Foundations Gr 82  
Workshop #2 Relational Algebra

Name: Joan Pablo Borja Espitia

Code: 20202020091

I. Based on the Table Apartment shows as follows:

| ApartmentID | Number | Block | Owner              | Area | Rooms |
|-------------|--------|-------|--------------------|------|-------|
| 1           | 101    | 1     | Chad Smith         | 45   | 2     |
| 2           | 102    | 3     | Nerl Pearl         | 60   | 3     |
| 3           | 103    | 1     | Alex Van Halen     | 75   | 3     |
| 4           | 304    | 2     | Eddie Van Halen    | 30   | 1     |
| 5           | 305    | 3     | David Lee Roth     | 50   | 2     |
| 6           | 306    | 1     | Sammy Hagar        | 70   | 3     |
| 7           | 207    | 2     | Michael Anthony    | 40   | 2     |
| 8           | 308    | 3     | Garry Cherone      | 55   | 2     |
| 9           | 409    | 1     | Wolfgang Van Halen | 65   | 3     |
| 10          | 310    | 2     | Valerie Bertinelli | 80   | 3     |

a. Show the number of the apartments with more than 50 Area.

$$\rightarrow \text{Count}(\sigma_{\text{Area} > 50}(\text{Apartments})) = 6$$

b. Show the number and owner of the apartments with more than 2 Rooms and less than 4 rooms.

$$\rightarrow \text{COUNT}(\sigma_{\text{Rooms} > 2}(\text{Apartment}) \cup \sigma_{\text{Rooms} < 4}(\text{Apartment})) = 5$$

$$\rightarrow (\sigma_{\text{Rooms} > 2}(\text{Apartment}) \cup \sigma_{\text{Rooms} < 4}(\text{Apartment})) \pi_{\text{Owner}, \text{Number}}$$

Apartment

| Number | Owner              |
|--------|--------------------|
| 102    | Nerl Pearl         |
| 103    | Alex Van Halen     |
| 306    | Sammy Hagar        |
| 409    | Wolfgang Van Halen |
| 310    | Valerie Bertinelli |

C. Show the number, Owner and Area of the apartments with more than 40 Area and less than 70 Area

$\rightarrow \pi_{\text{Number, Owner, Area} (\text{On } 40 < \text{Area} < 70 \text{ Apartments})}$

| Apartment Number | Owner        | Area |
|------------------|--------------|------|
| 102              | Neil Deaf    | 60   |
| 308              | Gary Cherone | 55   |
| 409              | Wolfgang V.  | 65   |
| 101              | Chad Smith   | 45   |

d. Show all rows of the table Apartment where the owner contains the word "Van Halen" and called "VanHalenApartments".

$\pi_{\text{VanHalenApartments} (\text{On } \text{owner LIKE } \% \text{Van Halen}\%) \text{ (Apartment)}}$

Van Halen Apartments

| Apartment ID | Number | Block | Owner    | Area | Rooms |
|--------------|--------|-------|----------|------|-------|
| 3            | 103    | 1     | Alex VH  | 75   | 3     |
| 4            | 304    | 2     | Eddie VH | 30   | 1     |
| 9            | 409    | 1     | Wg VH    | 65   | 3     |

e. Using next table called "PublicServices", show the number of the apartments with more than 60 Area with all the "PublicServices" available.

| ServiceID | Name          |
|-----------|---------------|
| 1         | "Water"       |
| 2         | "Electricity" |
| 3         | "Gas"         |

$\pi_{\text{number} (\text{On } \text{Area} > 60 \text{ Apartments}) \times \text{PublicServices}}$

| Number | ServiceID | Name        |
|--------|-----------|-------------|
| 103    | 1         | Water       |
| 103    | 2         | Electricity |
| 103    | 3         | Gas         |
| 306    | 1         | Water       |
| 306    | 2         | Electricity |
| 306    | 3         | Gas         |
| 409    | 1         | Water       |
| 409    | 2         | Electricity |
| 409    | 3         | Gas         |
| 310    | 1         | Water       |
| 310    | 2         | Electricity |
| 310    | 3         | Gas         |

2. Based on the table Owner Shows as follows:

| OwnerID | Name               | Age | Children | Pets |
|---------|--------------------|-----|----------|------|
| 1       | Chad Smith         | 50  | 2        | 1    |
| 2       | Nerl Pearl         | 45  | 1        | 0    |
| 3       | Alex V. Halen      | 60  | 3        | 2    |
| 4       | Eddie V. Halen     | 58  | 2        | 1    |
| 5       | David L. Roth      | 55  | 1        | 0    |
| 6       | Sammy Hagar        | 65  | 2        | 1    |
| 7       | Michael Anthony    | 50  | 3        | 2    |
| 8       | Gary Cherone       | 40  | 1        | 0    |
| 9       | Wolfgang V. Halen  | 38  | 0        | 0    |
| 10      | Valerie Bertinelli | 65  | 2        | 1    |

a. Show the name of the owners with more than 50 age

↓ name (where age > 50 (owner))

Owner

| Name               |
|--------------------|
| Chad Smith         |
| Alex Van Halen     |
| Eddie Van Halen    |
| David Lee Roth     |
| Sammy Hagar        |
| Michael Anthony    |
| Valerie Bertinelli |

b. Show the name, age, of the owners with more than 1 children and less than 3 children.

$\pi_{\text{name}, \text{age}} (\text{or}_{\text{children} > 1} \text{owner}) \cup (\text{or}_{\text{children} < 3} \text{owner})$

Owners

| Name          | age |
|---------------|-----|
| Chad Smith    | 50  |
| Eddie V. Hale | 60  |
| Sammy Hagar   | 65  |
| Veronica Bert | 65  |

c. Show the name, age and children of the "owners" with more than 40 age and less than 60 age.

$\pi_{\text{name}, \text{age}, \text{children}} (\text{or}_{40 < \text{age} < 60} \text{owner})$

Owners

| Name       | Age | Children |
|------------|-----|----------|
| Chad S.    | 50  | 2        |
| Nest P.    | 55  | 1        |
| Eddie V.H. | 58  | 2        |
| David R.   | 55  | 1        |

d. Show all rows of the table "owner" where there is a "ar" substring in the name and called R Owners.

$\rho_{\text{R Owners}} (\text{or}_{\text{name like "ar%}}} \text{owner})$

## R Owners

| OwnerID | Name          | Age | Children | Pets |
|---------|---------------|-----|----------|------|
| 2       | Neil Pearl    | 45  | 1        | 0    |
| 6       | Sommy Hogar   | 65  | 2        | 1    |
| 8       | Garry Chevare | 90  | 1        | 0    |

- Q) Show the name of the owners with more than 1 Pets and less than 2 Children.

$\rightarrow JT_{name} (Ow \text{ (Owner)}) \cup (Ow \text{ (Owner)})$   $\Rightarrow$  Empty table  
 Children  $\leftarrow$

## Owner

| Name |
|------|
|      |
|      |
|      |
|      |

3. Based on the table "Reservations" shows as follows:

- a. Show the ApartmentNumber, Owner and CommonSpace of the reservations with Date 2020-01-01 and called NewYearReservations.

$\rightarrow P_{NewYearReservations} (JT_{ApartmentNumber, owner, CommonSpace} (Og \text{ Date} = 2020-01-01))$   $\text{Reservations}$

## NewYearReservations

| Apartment Number | Owner | CommonSpace |
|------------------|-------|-------------|
|                  |       |             |

- b. Show the Owner of the Reservations after 2024-01-02 date, and the CommonSpace is Pool or the ApartmentNumber is 104 or 102.

$$\pi_{\text{Owner}} \left( \left( \cup_{\text{date} > 2024/01/02} (\text{Reservations}) \right) \cup \left( \cup_{\text{CommonSpace} = "pool"} (\text{Reservations}) \right) \right) \cap \left( \cup_{\text{Apt.\#} = 102} (\text{Reservations}) \cap \cup_{\text{Apt.\#} = 102} (\text{Reservations}) \right)$$

## Reservations

| Owner          |
|----------------|
| Neil Pearl     |
| Alex Van Halen |
| Neil Pearl     |
| Alex Van Halen |
| Chad Smith     |
| Neil Pearl     |
| Chad Smith     |

C. Show the ReservationID and CommonSpace of Reservations

JT ReservationID, CommonSpace (Reservations)

## Reservations

| ReservationID | CommonSpace  |
|---------------|--------------|
| 1             | Soccer Field |
| 2             | pool         |
| 3             | Gym          |
| 4             | pool         |
| 5             | Soccer Field |
| 6             | Gym          |
| 7             | pool         |
| 8             | Gym          |
| 9             | Soccer Field |
| 10            | pool         |

## 4. ER Diagram

