# ADIL ABUWANI

# DATABASE PROJECT 1

# CSCI331-33

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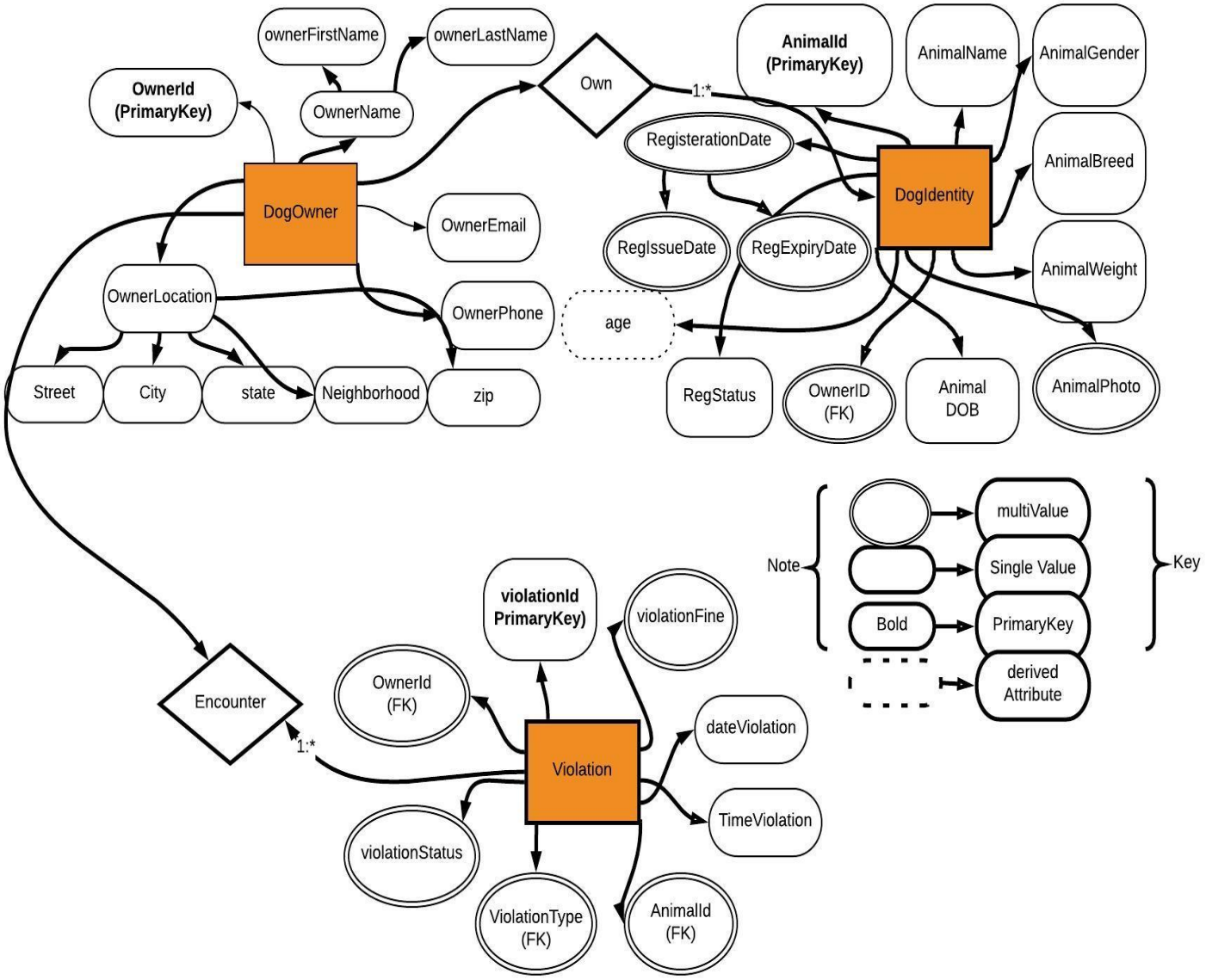
**E-R DIAGRAM:**


ownerFirstName
ownerLastName
OwnerId (PrimaryKey)
OwnerName
Own
1:*
AnimalId (PrimaryKey)
AnimalName
AnimalGender
RegisterationDate
DogOwner
DogIdentity
AnimalBreed
OwnerEmail
RegIssueDate
RegExpiryDate
OwnerLocation
OwnerPhone
age
AnimalWeight
Street
City
state
Neighborhood
zip
RegStatus
OwnerID (FK)
Animal DOB
AnimalPhoto
Note
multiValue
Single Value
Bold
PrimaryKey
derived Attribute
Key
violationId PrimaryKey)
violationFine
Encounter
OwnerId (FK)
1:*
Violation
dateViolation
TimeViolation
violationStatus
ViolationType (FK)
AnimalId (FK)

**OBSERVATION:**

We observe that the ER diagram consist of multiple attributes, and therefore to prevent from data duplication we will split it to form its own relation.

**Concert E-R Diagram to Relations:**

RELATION 1: DogOwner Relation provides all the information about the owner of the dog

**DogOwner (OwnerID(PK), OwnerFirstName, OwnerLastName, OwnerEmail, OwnerPhone, Street, City, State, Neighborhood, Zip)**

Simple representation:

| OID | OFNAME | OLNAME | OEMAIL | OPHONE | STREET | Neighborhood | ZIP |
|---|---|---|---|---|---|---|---|
| **100** | Adil | Abuwani | a@outlook.com | 6462831002 | Queens Blvd | West central queens | 11374 |
| **101** | Sam | So | s@yahoo.com | 347125456 | Jamaica Blvd. | Jamaica | 11101 |
| **102** | Bo | Li | blee@yahoo.com | 456123789 | 74 st Broadway | West Queens | 11373 |

Degree = 10

Tuple=500000 (Assuming the Total number of records of Dog Owners/Rows)

**Domains:**

OwnerID(PK): 0-9

OwnerName-Composite attribute that can be divided into further smaller components.

OwnerFirstName: a-z & A-Z

OwnerLastName: a-z & A-Z

OwnerEmail: a-z & A-Z & 0-9 & (Email format: johndoe@email.com)

OwnerPhone: 10 digits

OwnerLocation-Composite attribute

Street: a-z & A-Z

City: a-z & A-Z

State: a-z & A-Z

Neighborhood: a-z & A-Z

Zip: 5 digits

RELATION 2: DogIdentity relation has all the information about the registered dogs with unique primary keys

**DogIdentity (AnimalID(PK), AnimalName, AnimalGender, AnimalBreed, AnimalWeight, AimalDOB, Age)**

| AID | ANAME | AGENDER | ABREED | AWEIGHT | ADOB | **AGE** |
|---|---|---|---|---|---|---|
| 200 | **Bruno** | **M** | **Bulldog** | **22kg** | **3/3/2015** | **3** |
| 201 | **Prince** | **F** | **Beagle** | **19kg** | **4/4/2015** | **2** |
| 202 | **Boxer** | **M** | **Poodle** | **20kg** | **4/5/2015** | **2** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 203 | **Max** | **M** | **Poodle** | **18kg** | **4/5/2014** | **3** |
| ..... | ..... | ..... | ..... | ..... | ..... | |

Degree = 7

Age: Derived attribute that can be computed from DOB and todays Date

**Domains:**

AnimalID(PK): 0-9

AnimalName: a-z & A-Z

AnimalGender: 1 letter character (M or F)

AnimalBreed: a-z & A-Z

AnimalWeight: 0-9 Kgs

Age: Derived attribute less than 15 years age and derived from DOB and current Date

Animal DOB: MM/DD/YEAR

RELATION 3: Animal_ Registration shows all the dogs that have been registered with respected Owners, that includes the owner's registration start Date, and Ending Date. (This also allows us to track previous owners)

**Animal_ Registration(RegistrationID(PK), AnimalID(FK), OwnerID(FK), AnimalBreed, RegIssueDate, RegExpiryDate, RegStatus)**

Old

| RID | AID | OID | ABREED | RISSUEDATE | REXPITYDATE | **RSTATUS** |
|---|---|---|---|---|---|---|
| 800 | **200** | **100** | **Bulldog** | **4/4/2015** | **4/4/2017** | **Inactive** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 801 | **201** | **100** | **Beagle** | **5/4/2015** | **5/4/2017** | **inactive** |
| 802 | **202** | **101** | **Poodle** | **6/6/2015** | **6/6/2017** | **inactive** |
| 803 | **200** | **102** | **Bulldog** | **4/5/2017** | **4/5/2019** | **active** |

New

Degree = 7

AnimalId(FK)- Multi Value attribute as an owner can have many dogs

OwnerID(FK)- Multi Value attribute as owners can change after an owners registration expires.

RegStatus- is active when the registration is not expired and inactive when the registration is expired.

**Domains:**

RegistrationID(PK): 0-9

AnimalId(FK): a-z & A-Z & all the valid and registered AnimalD's from DogIdentity relation.

OwnerID(FK): 0-9 & all the valid OwnerID'S from DogOwner relation

AnimalBreed: a-z & A-Z

RegIssueDate: MM/DD/YEAR

RegExpiryDate: MM/DD/YEAR

RegStatus: active or inactive

RELATION 4:

Animal_Photo shows all the name of the dogs, their respected owners, and images of the dogs.

**Animal_Photo(AnimalID(FK), OwnerID(FK), AnimalPhoto)**

Degree=3

AnimalPhoto: Multi values as owners can have multiple photos for the same dog.

**Composite Key**: AnimalID(FK), OwnerID(FK), AnimalPhoto can form a unique key for their occurrence as a **primary Key**.

**Domains:**

AnimalID(FK): a-z & A-Z & all the valid and registered AnimalD's from DogIdentity relation.

OwnerID(FK): 0-9 & all the valid OwnerID'S from DogOwner relation

AnimalPhoto: .jpeg format or any Image Format (Multi Value attribute as users can save many images of the dog)

| A.ID | O.ID | A.PHOTO |
|---|---|---|
| **200** | 100 | Pik1.jpeg |
| **200** | 100 | Pik2.jpeg |
| **201** | 101 | Pikdog.jpeg |

RELATION 5:

ViolationReceipt shows the receipt of violation given to a dog owner at the time.

**ViolationReceipt(ViolationID(PK), OwnerID(FK), DateViolation, TimeViolation)**

| VID | DOWNERID | DATEVIOLATION | TIMEVIOLATION |
|---|---|---|---|
| **800** | 100 | 4/4/2017 | 4:56 |

| | | | |
|---|---|---|---|
| **801** | 101 | 4/5/2016 | 5:20 |
| **802** | 100 | 4/5/2014 | 4:50 |
| **803** | 102 | 5/3/2016 | 5:00 |
| **804** | 101 | 5/2/2017 | 3:00 |

Degree: 4

Domains:

ViolationID(PK): 0-9

DogOwnerID(FK): 0-9 and all the Dog owners from DogOwner relation.

DateViolation: Date MM/DD/YEAR

TimeViolation: HH/MM/SECOND

RELATION 6:

Violation_Description describes the violation receipt and the dog information. The violation receipt includes many violations given to the owner.

**Violation_Description(DescriptinID(PK), ViolationID(FK), AnimalID(FK), ViolationType, ViolationFine, ViolationStatus)**

| DID | VID | AID | VTYPE | VFINE | VSTATUS |
|---|---|---|---|---|---|
| 900 | **800** | **200** | **Not vaccinated** | **$100** | **unpaid** |
| 901 | **800** | **201** | **Some violation** | **$50** | **unpaid** |

| | | | | | |
|---|---|---|---|---|---|
| 902 | **800** | **200** | **some violation** | **$10** | **unpaid** |
| 902 | **801** | **202** | **Some violation** | **$20** | **paid** |

Degree: 6

**Domains:**

DescriptinID(PK): 0-9

ViolationID(FK):0-9 & all the valid Violation receiptID's In the ViolationReceipt relation.

AnimalID(FK): a-z & A-Z & all the valid and registered AnimalD's from DogIdentity relation.

ViolationType: a-z &A-Z (Describes the violation.

ViolationFine: 0-9 in US dollars

ViolationStatus: paid or unpaid.

## Relationship between entities:

DogOwner -> Animal_ Registration :1:* One Dog owner can register and own many dogs.

DogIdentity-> Animal_Registration: 1:* One Dog identification can be registered and assigned to another owner after the owner's registration expires.

DogIdentity-> Animal_Photo: 1:* one Dog identification can have multiple images.

DogOwner-> Animal_Photo: 1:* Each Owner can save multiple images of dogs owned.

DogOwner->ViolationReceipt: 1:* Each dog owner can receive multiple violation tickets on various days.

ViolationReceipt ->Violation_Description: 1:* violation receipt includes many violations given to the owner.

Animal_ Registration -> Violation_Description: *:* Since Dog owners can have multiple dogs, they can receive multiple violation tickets, and also by different owners.

## QUESTIONS:

1. Identify dogs without violations in the last year. Display the owner name, dog name, breed, and email.

A<– π ViolationID ( σ DateViolation >= '3/8/2017' (ViolationReceipt))

B<– π ViolationID(ViolationReceipt) – ViolationID(A)

C<– π ViolationReceipt.ViolationID, ViolationReceipt. DogOwnerID
( σ ViolationReceipt.ViolationID=B. ViolationID (ViolationReceipt × B))

D<– π C.DogOwnerID, Violation_Description.AnimalID ( σ C.ViolationID=.
Violation_Description.ViolationID(C× Violation_Description ))

E<– π D. AnimalID, D. DogOwnerID,
DogIdentity.AnimalName, DogIdentity.AnimalBreed (σ D. AnimalID= DogIdentity.
AnimalID (D × DogIdentity))

Ans <– π DogOwner.OwnerFirstName, DogOwner.OwnerLastName, DogOwner.OwnerEmail, E.
AnimalName, E. AnimalBreed (σ E. DogOwnerID= DogOwner.OwnerID(E× DogOwner))

2. Identify neighborhoods without registered **Beagles** today. Display the neighborhood.

A<– π RegistrationID (σ AnimalBreed= 'Beagle' ∧ RegIssueDate= '3/8/18' (Animal_ Registration))

B<– π RegistrationID (σ AnimalBreed= 'Beagle' (Animal_ Registration))

C<– π RegistrationID(B) - π RegistrationID(A)

D<– π Animal_ Registration.OwnerID ( σ C.RegisterationID= Animal_ Registration.

RegisterationID (C × Animal_ Registration))

Ans<– π DogOwner. Neighborhood (σ DogOwner. OwnerID=D.OwnerID(D × DogOwner)

3. Identify owners without any registered dogs today. Display the owner name and email.

A<– π RegistrationID, OwnerID (σ RegIssueDate= '3/8/18' (Animal_ Registration))

B<– π RegistrationID, OwnerId (Animal_ Registration)

C<– π RegistrationID(B) - π RegistrationID(A)

D<– σ C.RegistrationID=B. RegistrationID (C× B)

Ans<– π DogOwner.OwnerFirstName, DogOwner.OwnerLastName, DogOwner.OwnerEmail(

σ D.OwnerID= DogOwner.OwnerID (D × DogOwner))

4. Identify owners who live **near Queens College** with registered dogs today. Display the owner name and email.

A<– π RegistrationID, OwnerID (σ RegIssueDate= '3/8/18' (Animal_ Registration))

B<– π OwnerID, OwnerFirstName, OwnerLastName, OwnerEmail( σ Street= 'Kissena Blvd' ∧

Zip=11367 ∧ Neighborhood= 'Central Queens' (DogOwner))

Ans<– π B.OwnerFirstName, B.OwnerLastName, B.OwnerEmail( σ B.OwnerID= A.OwnerID (B

× A))

**5**. Identify pictures of female **Beagles** less than five years old. Display the dog name, age and photo(s).

A<– π AnimalID, AnimalName, Age ( σ AnimalBreed = 'Beagle' ∧ AnimalGender= 'F'

∧ Age < 5(DogIdentity))

B<– σ Animal_Photo.AnimalID=A. AnimalID (A × Animal_Photo)

Ans<–π AnimalName, Age, AnimalPhoto(B)

6. Identify dogs owned by **Adil Abuwani** with fines in the **last year**. Display the owner name, dog name, violation, date of violation and fine.

A<– π OwnerID, OwnerFirstName, OwnerLastName ( σ OwnerFirstName= 'Adil'

∧ OwnerLastName='Abuwani'(DogOwner))

B<– π A.OwnerID, A.OwnerFirstName, A.OwnerLastName, Animal_ Registration. AnimalID

( σ A. OwnerID = Animal_ Registration.OwnerID(A × Animal_ Registration))

C<– π B.OwnerID, B.OwnerFirstName, B.OwnerLastName, B. AnimalID, DogIdentity.

AnimalName (σ B. AnimalID= DogIdentity.AnimalID (B × DogIdentity))

D <– πViolationID, OwnerID, DateViolation (σ DateViolation>='3/8/2017' (ViolationReceipt))

E <– σ C.OwnerID=D.OwnerID (C x D)

Ans <– E.OwnerFirstName, E.OwnerLastName, E.AnimalName, E.DateViolation,

Violation_Description.ViolationType, Violation_Description.ViolationFine (σ E. ViolationID=

Violation_Description.ViolationID(E x Violation_Description))

7. Identify the number of male dogs by dog name. Display two columns and one row for each dog name. The two output columns are dog name and number of dogs with that name. Use an aggregate function and grouping operation to answer this question.

A<– πAnimalID, AnimalName (σ AnimalGender= ‘M’ (DogIdentity))

$\rho_{\text{answer}}$ (AnimalName, NoOfDog) AnimalName $\mathcal{F}_{\text{Count AnimalID}}$ (A)

8. Identify the number of **Beagles** by neighborhood. Display two columns and one row for each neighborhood. The two output columns are zip code and number of **Beagles** in that zip code. Use an aggregate function and grouping operation to answer this question.

A<– π RegistrationID , OwnerID (σ AnimalBreed= ‘Beagle’ ∧ RegStatus= ‘active’ (Animal_ Registrations))

B<– π A.RegistrationID, DogOwner.Zip (σA.OwnerID= DogOwner. OwnerID (A× DogOwner)

$\rho_{\text{answer}}$ (ZipCode, NoOfPoodles) Zip $\mathcal{F}_{\text{Count RegistrationID}}$ (B)

9. Identify the number and total fines by owner. Display three columns and one row for each owner. The three columns are owner, number of violations and total dollar amount of fines. Use an aggregate function and grouping operation to answer this question.

A<–π ViolationID, OwnerID (ViolationReceipt)

B<– π A.ViolationID, A.OwnerID, Violation_Description. DescriptinID, Violation_Description.ViolationFine (σ Violation_Description.ViolationID= A.ViolationID (A x Violation_Description)

C<– π DogOwner.OwnerFirstName, DogOwner.OwnerLastName, B.ViolationID, B.DescriptinID, B.ViolationFine (σ B.OwnerID=DogOwner.OwnerID (B × DogOwne)

$\rho_{\text{Answer}}$ (OwnerName, NumnerViolation, totalDollarAmount) OwnerFirstName, OwnerLastName $\mathcal{F}_{\text{count DescriptinID, Sum ViolationFine}}$ (B)

10.Identify the number of registered **female Beagles** in the database **today**. Display one row with the number of registered dogs.

A<– π RegistrationID (σ AnimalBreed= ‘Beagle’ ∧ AnimalGender = ‘F’ ∧ RegStatus= ‘active’ ∧ RegIssueDate = ‘3/8/2018’ (Animal_ Registrations))

$$\rho_{\text{Answer}}(\text{NumberRegisteredFemaleBeagles})\,\mathcal{F}_{\text{Count RegistrationID}}(\text{A})$$