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Apartment Database (Project - CS-GY 6083)

New changes over the proposal:

Change 1:

Owner Table and Tenant Table can be combined into one table as Person's Table.
Being an owner and a tenant is very subjective specific to just apartment.

Following are the advantages of combining both tables into one:

1. Since a tenant can be an owner and vice versa, we can avoid duplicate data storing. Saving precious data space in case of Big Data stage.
2. Our database can be scalable and flexible. Since the person ID will both be a primary key and foreign key it can easily be incorporated with other database projects like storing SSN and Tax related info, for storing reservation, police records etc.

Since in our case owner and tenant is subjective to an apartment. I have added a lease table (change 2), that list the owner and tenant who sign the lease. Lease ID is attached to each apartment.
We have an owner's and a tenant's column for each lease and hence for each apartment (indirectly). Both columns will store respective person ID which will be foreign key to the person table.

Following is the schema of the person table:

PERSON table: One record for each person

field	***description***	
pID	Unique Person's ID	PK/FK
name	Person's Name	
email	Email address	
phone	Phone number	

Person table can be scaled to store other person specific information like: SSN, Driver's ID, Age, Sex, and other info, that can act as a foreign key for other database projects. I will be ignoring these fields in this project.

Change 2:

Adding a lease table that can store lease specific data. Thus for a given apartment, the owner and tenant can be accessed through lease table.

LEASE table: One record for each lease

field	***description***	
leaseID	Unique Lease's ID	PK/FK
term	Lease Duration	
inDate	Lease Start Date	
ownerID	Owner's ID	FK
tenantID	Tenant's ID	FK

The final schema for the project can be found in the next page.

APARTMENT DATABASE

PERSON table: One record for each person

field	*description*	*data type*	*field width*	
pID	Unique Person's ID	text	9	**PK**
lastname	Person's Last Name	text	12	
firstname	Person's First Name	text	12	
email	Email address	text	255 varying	
phone	Phone number	text	15	

BUILDING table: One record describing each building

field	*description*	*data type*	*field width*	
bID	Unique Building's ID	text	9	**PK**
name	Building's name	text	24	
street	Street name	text	64 varying	
city	City name	text	64 varying	
state	State name	text	24	
zip	ZIP code	int	5	
desc	Building's description	text	256 varying	

LEASE table: One record for each lease

field	*description*	*data type*	*field width*	
leaseID	Unique Lease's ID	text	9	**PK**
term	Lease Duration (in months)	text	2	
inDate	Lease Start Date	date	10	
ownerID	Owner's ID	text	9	**FK**
tenantID	Tenant's ID	text	9	**FK**

APARTMENT table: One record describing each apartment

field	*description*	*data type*	*field width*	
aID	Unique Apartment's ID	text	9	**PK**
aptNum	Apartment/House Number in the building	text	4 varying	
bedNum	Number of bedrooms	text	1	
bathNum	Number of bathrooms	text	1	
size	Size of the apartment in sqft	text	6 varying	
rent	Apartment's Rent	text	5 varying	
bID	Building's ID	text	9	**FK**
owner	Owner's ID	text	9	**FK**
leaseID	Lease's ID	text	9	**FK**

BANK table: One record for each person's bank account

field	*description*	*data type*	*field width*	
accNum	Account Number	text	9	**PK**
routeNum	Routing Number	text	9	**PK**
bank	Name of the bank	text	12 varying	
pID	Account Holder's ID (tenantID or ownerID)	text	9	**FK**

PK: Primary Key, FK: Foreign Key, All days are European style: yyyy-mm-dd

For Bank table:

According to real world rule #2: *{accNum + routeNum} is a unique identifier.*

PK: (accNum + routeNum)

Design Assumption:

No two oID and tID can be same.
Hence, **Person ID (pID) = {oID *U* tID}**

Database Fields:

1. Apt ID (aID), Apt Number (aptNum), Bed Count (bedNum) Bath Count (bathNum), Size (size), Rent (rent)
2. Building ID (bID), Name (bName), Street (street), City (city), State (state), ZIP (zip), Description (bDesc)
3. Person ID (pID), Person's Name (name), Email (email), Phone Number (phone)
4. Account Number (accNum), Routing Number (routeNum), Person ID (pID), Bank Name (bank)
5. Lease ID (leaseID), Lease Duration (term), Lease Start Date (inDate), Lease Description (leaseDesc)

Real World Rules:

1. **A person can own/rent multiple apartments and thus sign multiple leases**
   i.e. pID ->> aID
   & pID ->> leaseID
2. **A person can have multiple bank accounts**
   i.e. pID ->> accNum

Thus, accNum + routeNum is a unique identifier

3. **Two banks can have same account number**
   i.e. accNum ->> bank

According to Armstrong, following holds true.

$$If\ \mathbf{X} \rightarrow \mathbf{YZ}\ then\ \mathbf{X} \rightarrow \mathbf{Y}\ and\ \mathbf{X} \rightarrow \mathbf{Z}$$

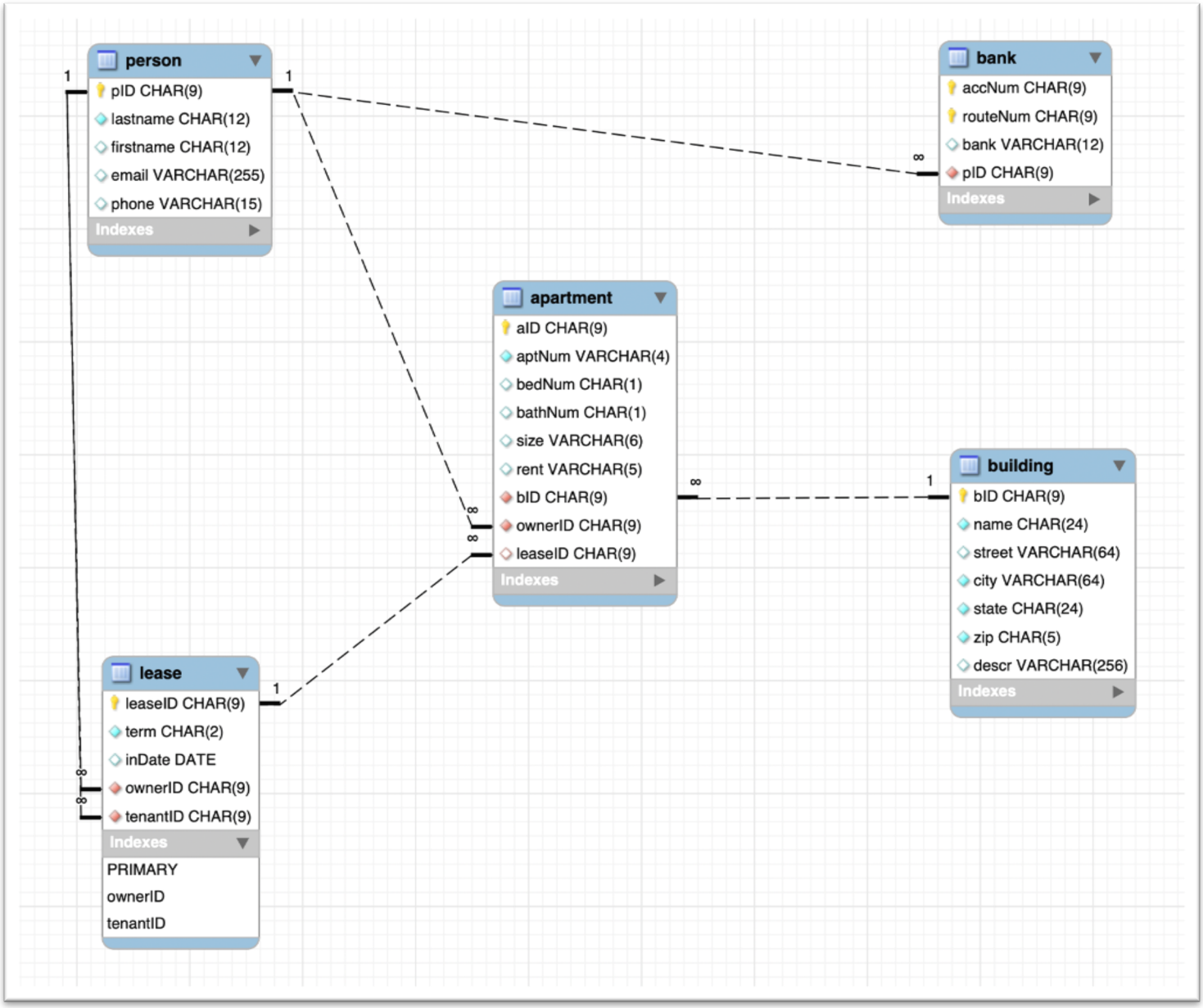
Hence, all the following functional dependency can be broken into single components

4. **Apartment ID uniquely identifies following properties**
   i.e. aID -> (aptNum, bedNum, bathNum, size, rent, leaseID. bID, oID, tID, leaseID)
5. **Building ID uniquely identifies following properties**
   i.e. bID -> (bName, street, city, state, zip, bDesc)
6. **Person ID uniquely identifies following properties**
   i.e. pID -> (Person Name, Email, Phone Number)

This point holds true for owner and tenant both (due to design assumption)

7. **Account number and Routing number uniquely identifies person's ID**
   i.e. (accNum, routeNum) -> (Person's ID)
8. **Routing number uniquely identifies bank's name**
   i.e. (routeNum) -> (bank)
9. **Lease ID uniquely identifies following properties**
   i.e. leaseID -> (Lease Term, Lease Start Date, Lease Desc, Owner ID, Tenant ID)

E-R Diagram:


person
pID CHAR(9)
lastname CHAR(12)
firstname CHAR(12)
email VARCHAR(255)
phone VARCHAR(15)
Indexes
bank
accNum CHAR(9)
routeNum CHAR(9)
bank VARCHAR(12)
pID CHAR(9)
Indexes
apartment
aID CHAR(9)
aptNum VARCHAR(4)
bedNum CHAR(1)
bathNum CHAR(1)
size VARCHAR(6)
rent VARCHAR(5)
bID CHAR(9)
ownerID CHAR(9)
leaseID CHAR(9)
Indexes
building
bID CHAR(9)
name CHAR(24)
street VARCHAR(64)
city VARCHAR(64)
state CHAR(24)
zip CHAR(5)
descr VARCHAR(256)
Indexes
lease
leaseID CHAR(9)
term CHAR(2)
inDate DATE
ownerID CHAR(9)
tenantID CHAR(9)
Indexes
PRIMARY
ownerID
tenantID

Tables:

1. Person Table:

pID	lastname	firstname	email	phone
110951449	Eliana	Lang	Lang.Eliana@gmail.com	2904387676
122281063	Samara	Booker	Booker.Samara@hotmail.com	6393765553
175471905	Fernando	Marshall	Marshall.Fernando@yahoo.com	
258252896	Porter	Frost		7077400384
287858332	Jolie	Pennington	Pennington.Jolie@gmail.com	4929346412
352394456	Cassidy	Jackson	Jackson.Cassidy@yahoo.com	3104582537
399912770	Warren	Barrett	Barrett.Warren@yahoo.com	3412475835
528180904	Janet	Kerr	Kerr.Janet@yahoo.com	4863752692
631791606	Nash	Mcmahon	Mcmahon.Nash@hotmail.com	5922176811
632360372	Tyree	Woodard	Woodard.Tyree@hotmail.com	8961938784
646342650	Xander	Benton	Benton.Xander@yahoo.com	4422831787
768598709	Kaylen	Donovan	Donovan.Kaylen@gmail.com	5647330639
799120078	Leonardo	Huang	Huang.Leonardo@yahoo.com	
927937906	Madyson	Harrison		2861518510
975001548	Ada	Barrera	Barrera.Ada@hotmail.com	
NULL	NULL	NULL	NULL	NULL

2. Building Table:

bID	name	street	city	state	zip	descr
111111111	Daydream Lookout	Jefferson Street	Seattle	WA	98104	Full bathroom with good closet space and heating light.
138972306	Forsaken Strand Tower	Lake Way	Miami	FL	33014	Fully equipped with Washer/Dryer. Stainless Steel Appliances. Split Central A/C Units.
224464836	Fusion Tower	Wall Street	New York	NY	10005	"Hardwood, High Ceilings, Renovated, Marble Bath, Granite Kitchen"
304215280	Endurance Pillar	Melrose Avenue	Los Angeles	CA	90038	Central A/C. High ceiling. Full bathroom with good closet space and heating light.
373620673	Landscape Building	Canal Street	New York	NY	10013	"Doorman, Elevator, Health Club, Garage, Lounge, Valet, Roof Deck"
430731998	Diamond Tower	Main Street	Houston	TX	77030	"Doorman, Elevator, Health Club, Garage, Lounge, Valet, Roof Deck"
485255541	World Center	Washington Street	San Francisco	CA	94118	"Doorman, Elevator, Health Club, Garage, Lounge, Valet, Roof Deck"
874120742	Phantom Peak Tower	Chicago Avenue	Chicago	IL	60622	Fully equipped with Washer/Dryer. Stainless Steel Appliances. Split Central A/C Units.
962163458	Calypso Spire	34th Street	New York	NY	10001	"Hardwood, High Ceilings, Renovated, Marble Bath, Granite Kitchen"
999999999	Mirage Place	Hollywood Boulevard	Los Angeles	CA	90028	"Hardwood, High Ceilings, Renovated, Marble Bath, Granite Kitchen"
NULL	NULL	NULL	NULL	NULL	NULL	NULL

3. Lease Table:

leaseID	term	inDate	ownerID	tenantID
191238068	24	2019-11-06	528180904	768598709
202782283	24	2019-11-23	352394456	528180904
285750125	12	2020-04-19	258252896	631791606
300376372	12	2019-01-23	631791606	799120078
332507563	24	2019-10-23	927937906	175471905
597568852	6	2019-04-02	287858332	399912770
619014930	12	2019-06-03	528180904	975001548
881938445	12	2019-08-01	110951449	631791606
NULL	NULL	NULL	NULL	NULL

4. Apartment Table:

aID	aptNum	bedNum	bathNum	size	rent	bID	ownerID	leaseID
283871491	12	3	1	2200	12000	224464836	110951449	881938445
285579472	7	1	0	500	2000	430731998	287858332	597568852
318223066	3	2	1	800	2750	111111111	352394456	202782283
405465105	8	4	1	1200	3000	138972306	927937906	332507563
532287020	2	4	1	3450	8000	999999999	631791606	300376372
564812988	1	2	2	1000	4500	874120742	528180904	619014930
736920737	4	2	1	2500	2250	874120742	528180904	191238068
889232111	6	4	2	4500	15000	962163458	258252896	285750125
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

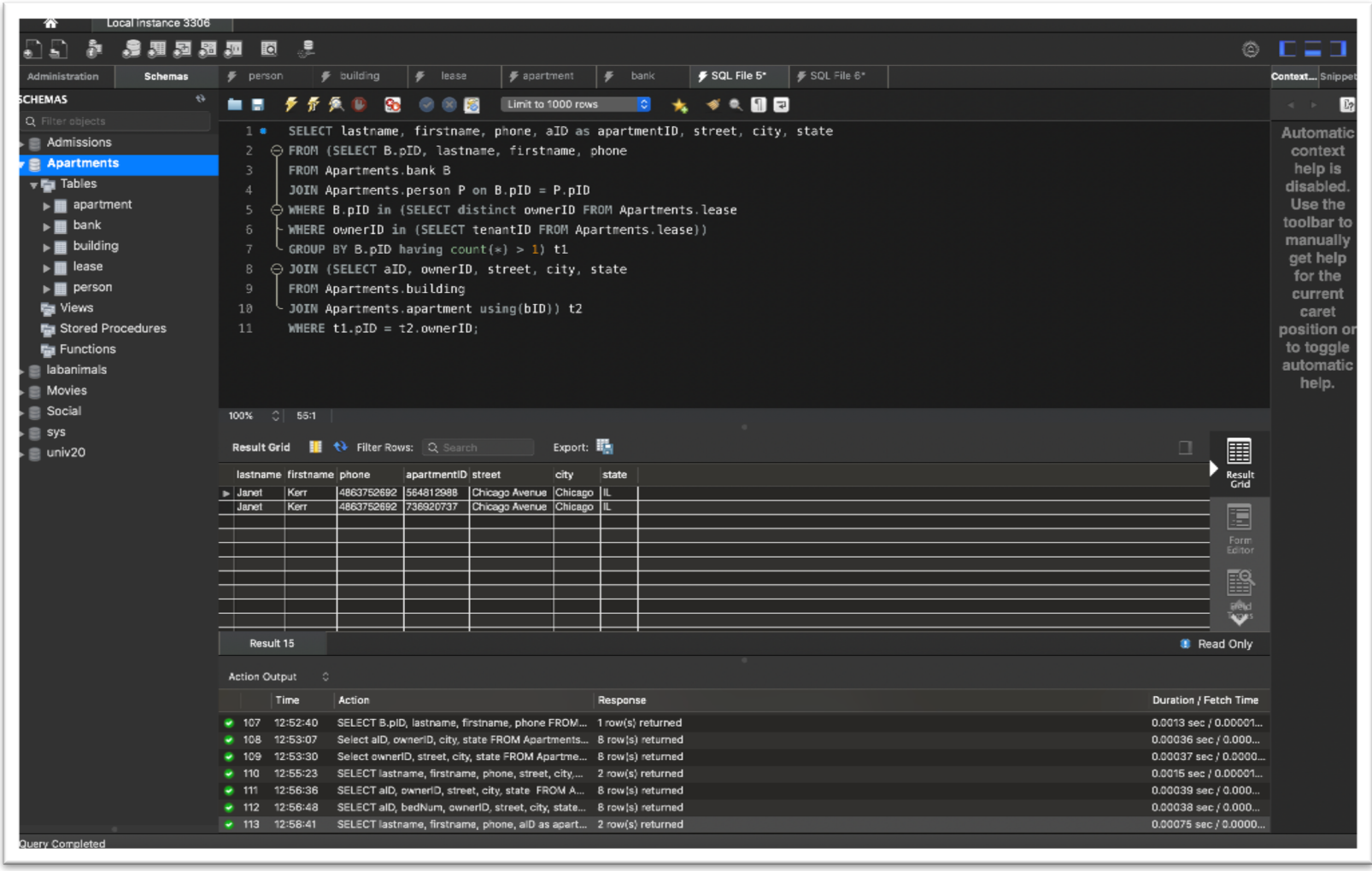
5. Bank Table:

accNum	routeNum	bank	pID
100061298	021000021	JP Morgan	631791606
104618090	042000031	America Bank	927937906
113672086	022900002	Chicago Bank	352394456
113782241	021000021	JP Morgan	975001548
118872142	040000097	CA Bank	646342650
121530783	020500005	M&T Bank	768598709
136110252	022900002	Chicago Bank	799120078
136783826	020500005	M&T Bank	122281063
145105265	022900002	Chicago Bank	975001548
152363168	033980000	TX Bank	399912770
154948937	040500002	Florida Bank	175471905
167701923	023800000	CITI Bank	632360372
168783903	030000819	WA Bank	528180904
168948227	042000031	America Bank	287858332
171454663	020500005	M&T Bank	258252896
182845795	023800000	CITI Bank	110951449
186898174	021000021	JP Morgan	528180904
NULL	NULL	NULL	NULL

Queries:

Q1: Find lastname, firstname, phone number of all persons who is both a tenant and an owner and has more than one bank accounts.
Also display the apartmentID, street, city and state where they own apartments.

SELECT lastname, firstname, phone, aID as apartmentID, street, city, state
FROM (**SELECT** B.pID, lastname, firstname, phone
FROM *Apartments*.bank **B**
JOIN *Apartments*.person **P** on **B**.pID = **P**.pID
WHERE B.pID in (**SELECT** distinct ownerID **FROM** *Apartments*.lease
WHERE ownerID in (**SELECT** tenantID **FROM** *Apartments*.lease))
GROUP BY B.pID **having** count(*) > 1) t1
JOIN (**SELECT** aID, ownerID, street, city, state
FROM *Apartments*.building
JOIN *Apartments*.apartment **using**(bID)) t2
WHERE t1.pID = t2.ownerID;



/* Following query tries to find intentional mistake in the database. */
Q2: Find leaseID, apartmentID, rent and lease end date of all the apartments whose lease is expired
(and thus the database needs to be updated to reflect this). Also find the contact information of the owner and
the recent tenant (to send them an email if they want to extend the lease). Order it by end date.

SELECT L.leaseID, **DATE_ADD**(inDate, **INTERVAL** term month) as EndDate,
A.aID, **A**.rent, **P1**.email OwnerEmail, **P2**.email TenantEmail
FROM *Apartments*.lease **L**
JOIN *Apartments*.apartment **A using**(leaseID)
JOIN *Apartments*.person **P1** on **P1**.pID = **L**.ownerID
JOIN *Apartments*.person **P2** on **P2**.pID = L.tenantID
WHERE DATE_ADD(inDate, **INTERVAL** term month) < **CURDATE**()
ORDER BY EndDate;