Data And Applications
Project Phase - 3

Team Number : 3

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Note : We removed the phone number as a multivalued attribute and considered it as a simple attribute.

ER Model to Relational Model

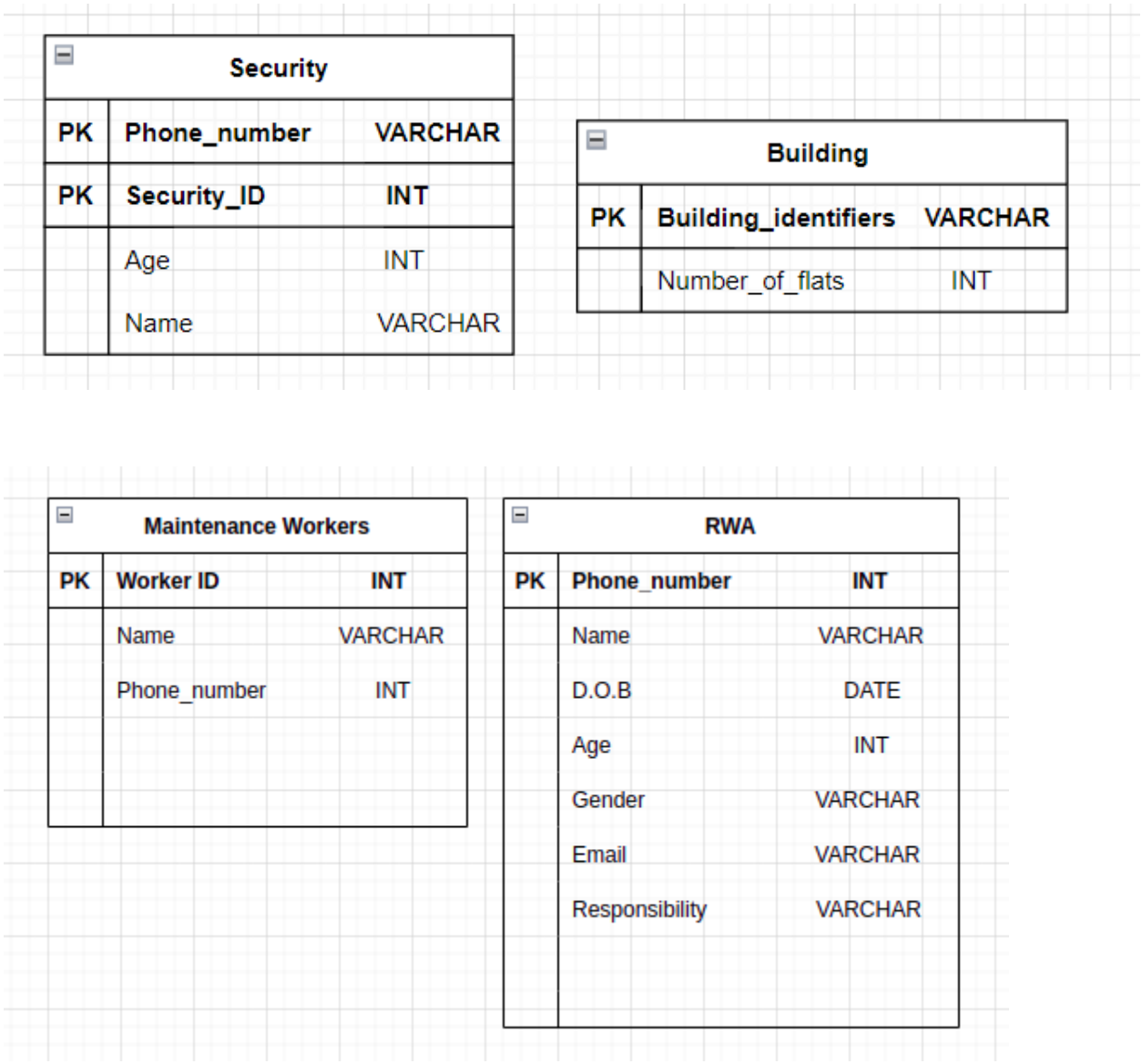
Followed steps from Elmasri Navathe Book Chapter-9,
Concisely :
https://www.tutorialspoint.com/explain-the-conversion-of-er-diagrams-to-tables-in-dbms

Step 1: Mapping of Regular Entity Types

For each regular (strong) entity type in the ER schema, we created a relation that includes all the simple attributes of the Entity.

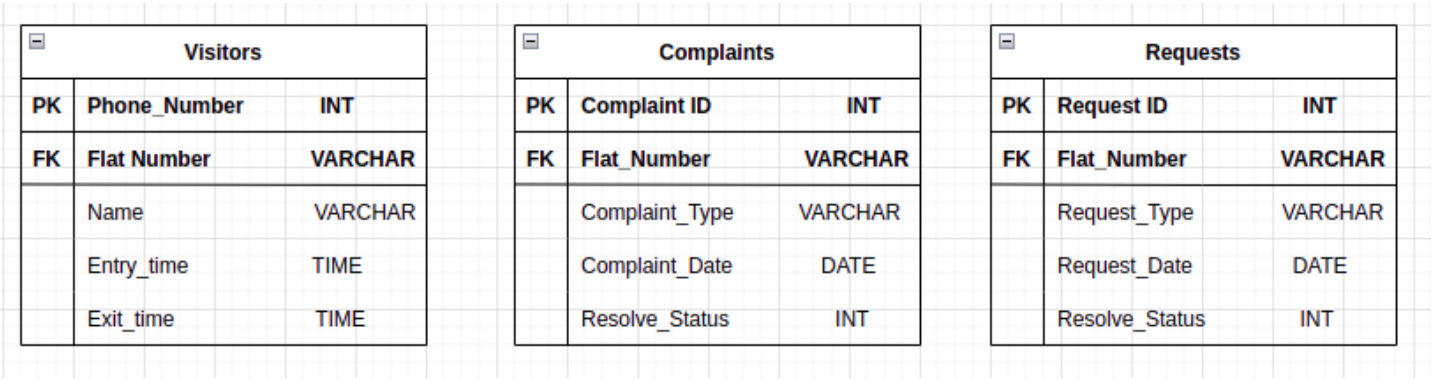
Residents		
PK	Phone_number	VARCHAR
PK	Aadhar_number	INT
	Name	VARCHAR
	D.O.B	DATE
	Age	INT
	Gender	VARCHAR
	Email	VARCHAR
	Flat_number	INT

Flats		
PK	Flat_Number	VARCHAR
	Owner	VARCHAR
	Buuilding_Identifier	VARCHAR
	Number_Of_Residents	INT



* The composite attributes - email , names have not been broken into sub-attributes here but later in the steps ahead.

Step 2: Mapping of Weak Entity Types



Visitors		
PK	Phone_Number	INT
FK	Flat Number	VARCHAR
	Name	VARCHAR
	Entry_time	TIME
	Exit_time	TIME

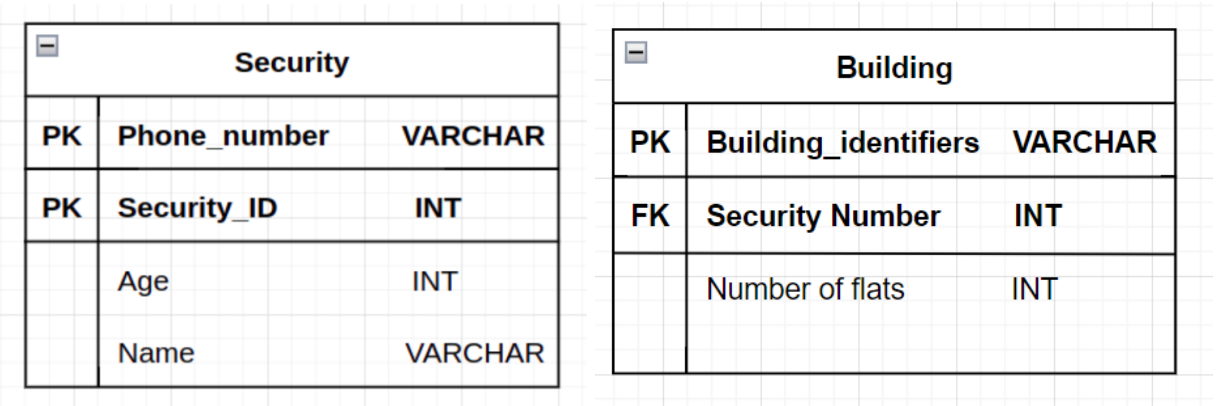
Complaints		
PK	Complaint ID	INT
FK	Flat_Number	VARCHAR
	Complaint_Type	VARCHAR
	Complaint_Date	DATE
	Resolve_Status	INT

Requests		
PK	Request ID	INT
FK	Flat_Number	VARCHAR
	Request_Type	VARCHAR
	Request_Date	DATE
	Resolve_Status	INT

For each weak entity type in the ER schema a relation is created which includes all simple attributes of the weak entity as attributes of relation. Each Relation includes the primary key of the owner Entity as a foreign key.

Step 3: Mapping of Binary 1 : 1 Relationship Types

For “GUARDED BY ” Binary 1 : 1 Relationship type in the ER schema, Security Number was added as a foreign key attribute to The Building Entity for which the owner key is Security_ID of Security Entity.



Security		
PK	Phone_number	VARCHAR
PK	Security_ID	INT
	Age	INT
	Name	VARCHAR

Building		
PK	Building_identifiers	VARCHAR
FK	Security Number	INT
	Number of flats	INT

Step 4: Mapping of Binary 1 : N Relationship Types

Relationships:

1. Owns , Resides in : Primary Key of Residents (Phone_number) was added to Flat (Owner_Phoneno) as a foreign key.

2. Dropped by : Primary Key of Flat (Flat_number) was added to Visitors (Flat Number) as a foreign key.

3. Requested by : Primary Key of Flat (Flat_number) was added to Requests (Flat_number) as a foreign key.

4. Lodged by : Primary Key of Flat (Flat_number) was added to Complaints (Flat_number) as a foreign key.

5. Belongs to : Primary Key of Building (Building Identifier) was added to Flat (Building Identifier) as a foreign key.

Residents		
PK	Phone_number	VARCHAR
PK	Aadhar_number	INT
	Name	VARCHAR
	D.O.B	DATE
	Age	INT
	Gender	VARCHAR
	Email	VARCHAR
	Flat_number	INT

Visitors		
PK	Phone_Number	INT
FK	Flat Number	VARCHAR
	Name	VARCHAR
	Entry_time	TIME
	Exit_time	TIME

Complaints		
PK	Complaint ID	INT
FK	Flat_Number	VARCHAR
	Complaint_Type	VARCHAR
	Complaint_Date	DATE
	Resolve_Status	INT

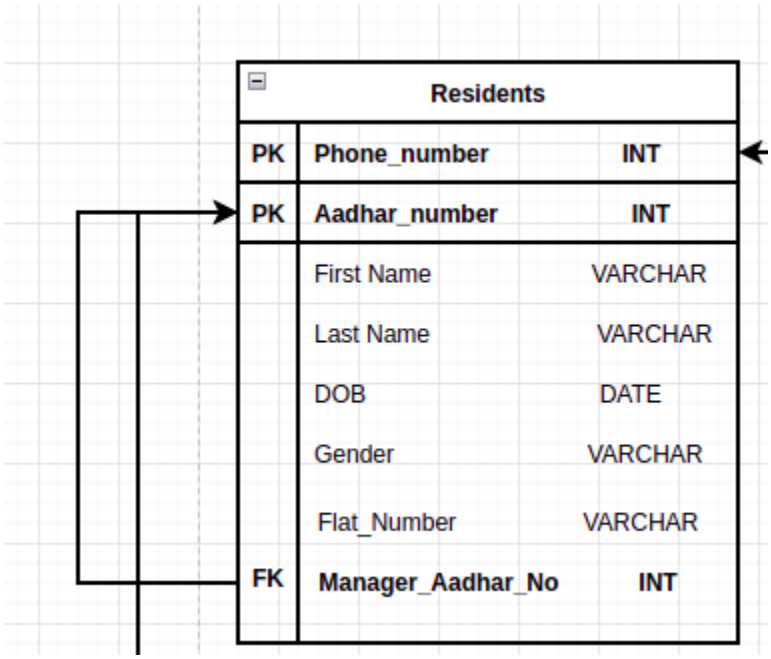
Requests		
PK	Request ID	INT
FK	Flat_Number	VARCHAR
	Request_Type	VARCHAR
	Request_Date	DATE
	Resolve_Status	INT

Security		
PK	Phone_number	VARCHAR
PK	Security_ID	INT
FK	Building_id	VARCHAR
	Age	INT
	Name	VARCHAR

Building		
PK	Building_identifiers	VARCHAR
FK	Security Number	INT
	Number of flats	INT

Flats		
PK	Flat_Number	VARCHAR
FK	Owner_Phoneno	INT
FK	Building_Identifier	VARCHAR
	Complaint_Type	VARCHAR
	Number_Of_Residents	INT

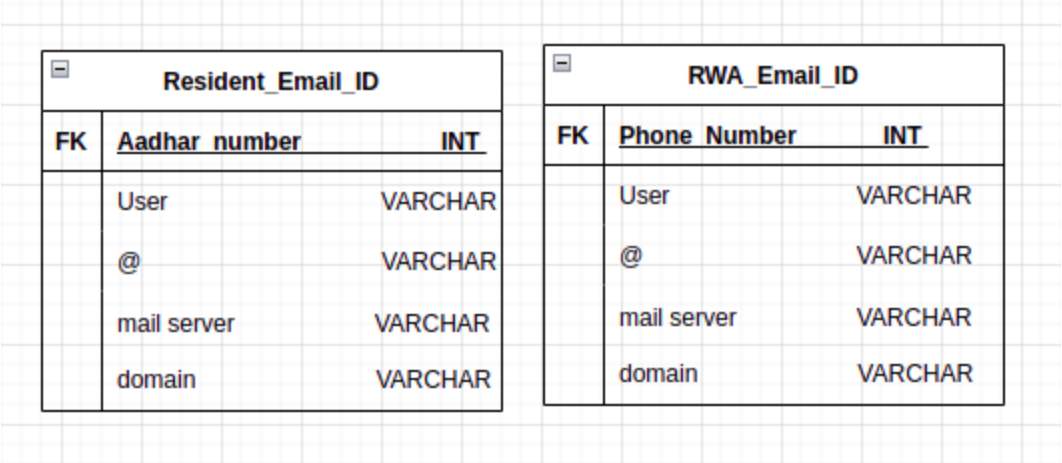
Step 5: Mapping of Binary M:N Relationship Types :



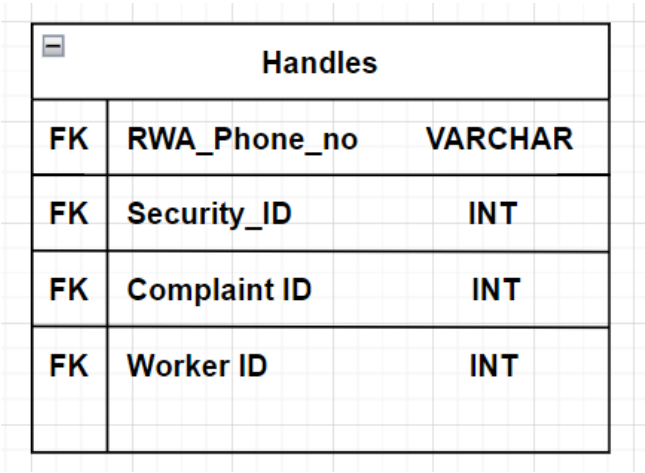
Added Manager_Aadhar_No as a foreign key with primary key as Aadhar Number in Residents Entity.

Step 6: Mapping of Multivalued Attributes :

For Multivalued Attributes such as Email we created new Relations and removed these attributes from the Residents and RWA relations.



Step 7: Mapping of N-ary Relationship types :



For the handles relationship of degree 4 added a new table which contains the references to the primary key of each of the participating entity types.

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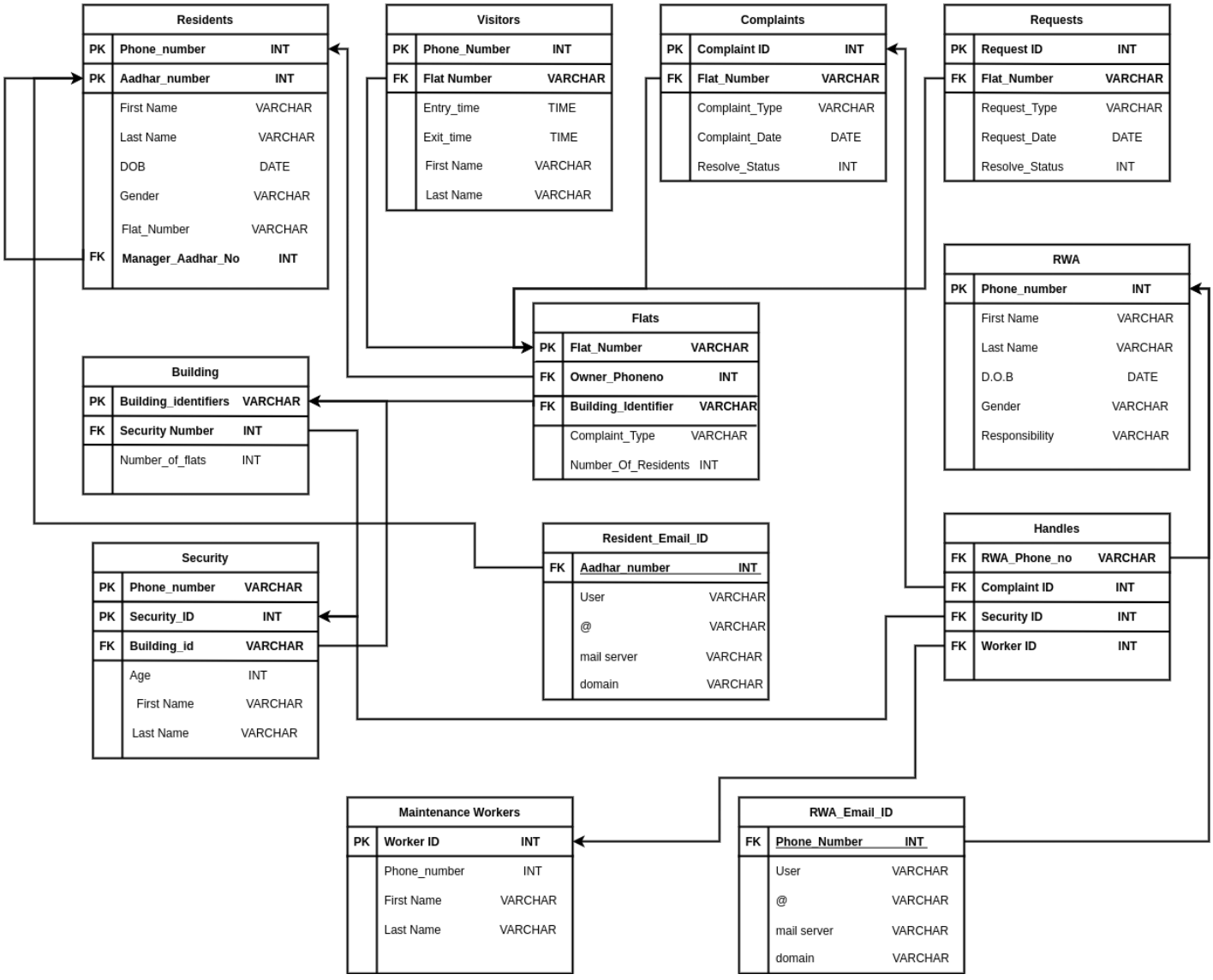
Final Relational Model Obtained from the ER:

Can also be found at the following link for better clarity: https://github.com/schlechter-afk/Data-And-Applications/blob/main/rdbmodel.png



Conversion of Relational Model to 1NF

The relational model is already in 1NF as new relations for multivalued attributes were created and composite attributes were converted to atomic attributes in the steps of conversion to Relational Model.

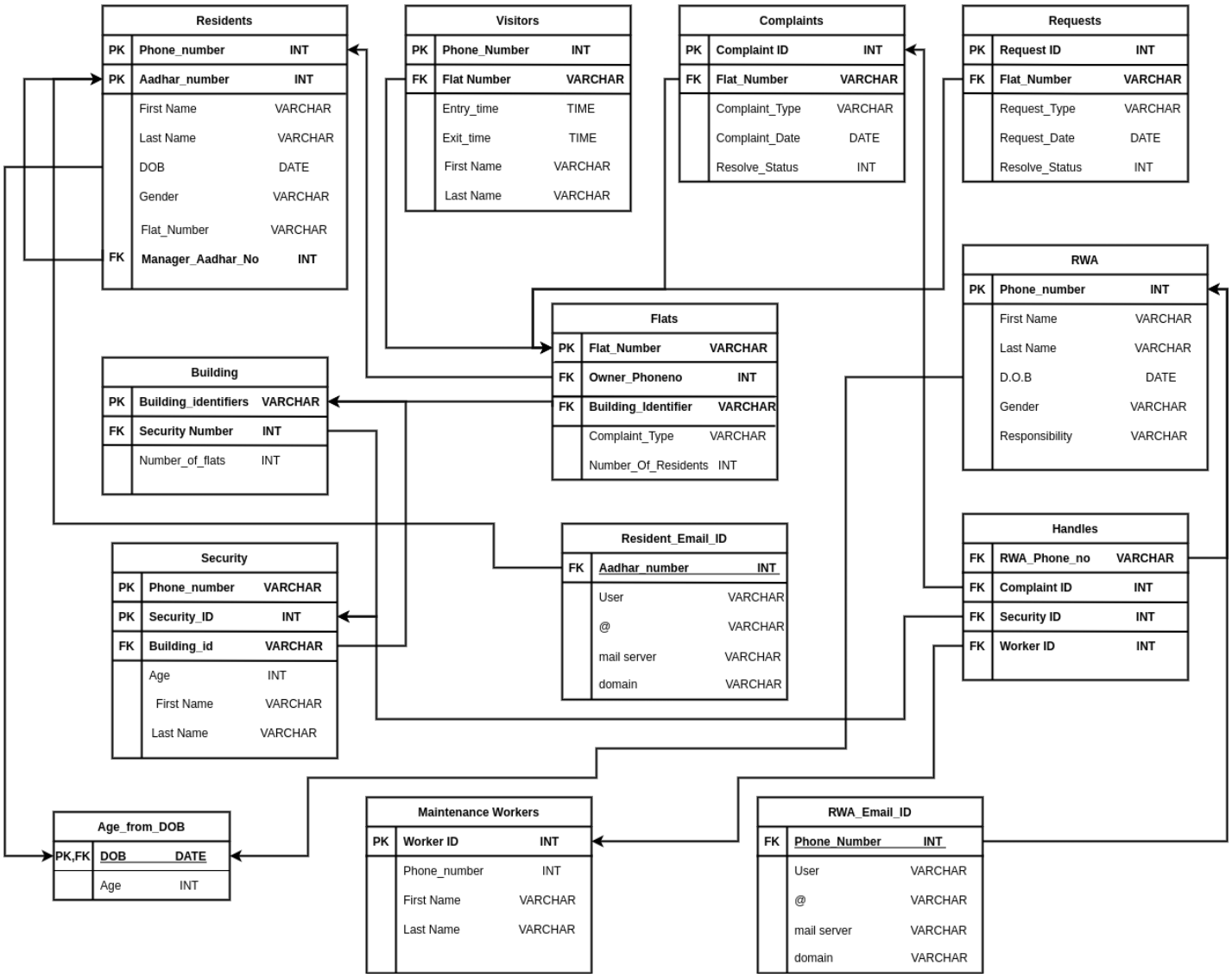
Conversion of 1 NF to 2 NF

The relational model is already in 2NF as all of its primary keys have exactly one attribute. Also it does not have any non-prime attribute that is functionally dependent on any proper subset of any candidate key of the relation.

Conversion of 2 NF to 3 NF

https://github.com/schlechter-afk/Data-And-Applications/blob/main/db_model_proj-3.png

Changes made :
For the derived attribute age (derived from DOB) created a new relation table named Age_from_DOB and linked it to the DOB attribute in Residents and RWA.



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