

## Home Work #2

**-I certify that every answer on this paper is entirely my own unique work and I have not copied from the internet or anybody else's drafts.**

1. Build a conceptual schema using the Entity-Relationship model (extended if necessary with generalization) from the following natural language description of the requirements.
  - Express your schema using a readable ER diagram.
  - Add any reasonable assumptions you are forced to make.
  - State concisely any constraints that cannot be expressed in the ER schema.
  - *Notation:* **You must use the notation developed in class.** Add an asterisk on a relationship cardinality to indicate that it had to be assumed.

*The airport accommodates a number of airplane models; each model has a unique model number (e.g., DC-10). All airplanes of a specific model have a certain capacity and weight and are assigned an identification number by the manufacturer that is unique among all planes of that model.*

*A number of technicians work at the airport. Each technician is an expert on one or more plane models though the expertise of one technician may well overlap with others. The airport makes sure that there is at least one technician for every airplane model stationed on it. The airport also employs traffic controllers. Each traffic controller must have an annual medical examination and the date of the most recent successful examination must be stored for each of them. All traffic controllers belong to exactly one union; the union membership number must be stored for each of them. The name, employee identification number, address, phone number, and salary of each airport employee must be stored. You can assume that each employee is uniquely identified by the employee id number.*

*All employees (including technicians) belong to a union and are given a union membership number by that union. However, the unions that cater to technicians are disjoint from those that are open to traffic controllers, i.e., a technician cannot belong to a union that a traffic controller can join, and vice-versa.*

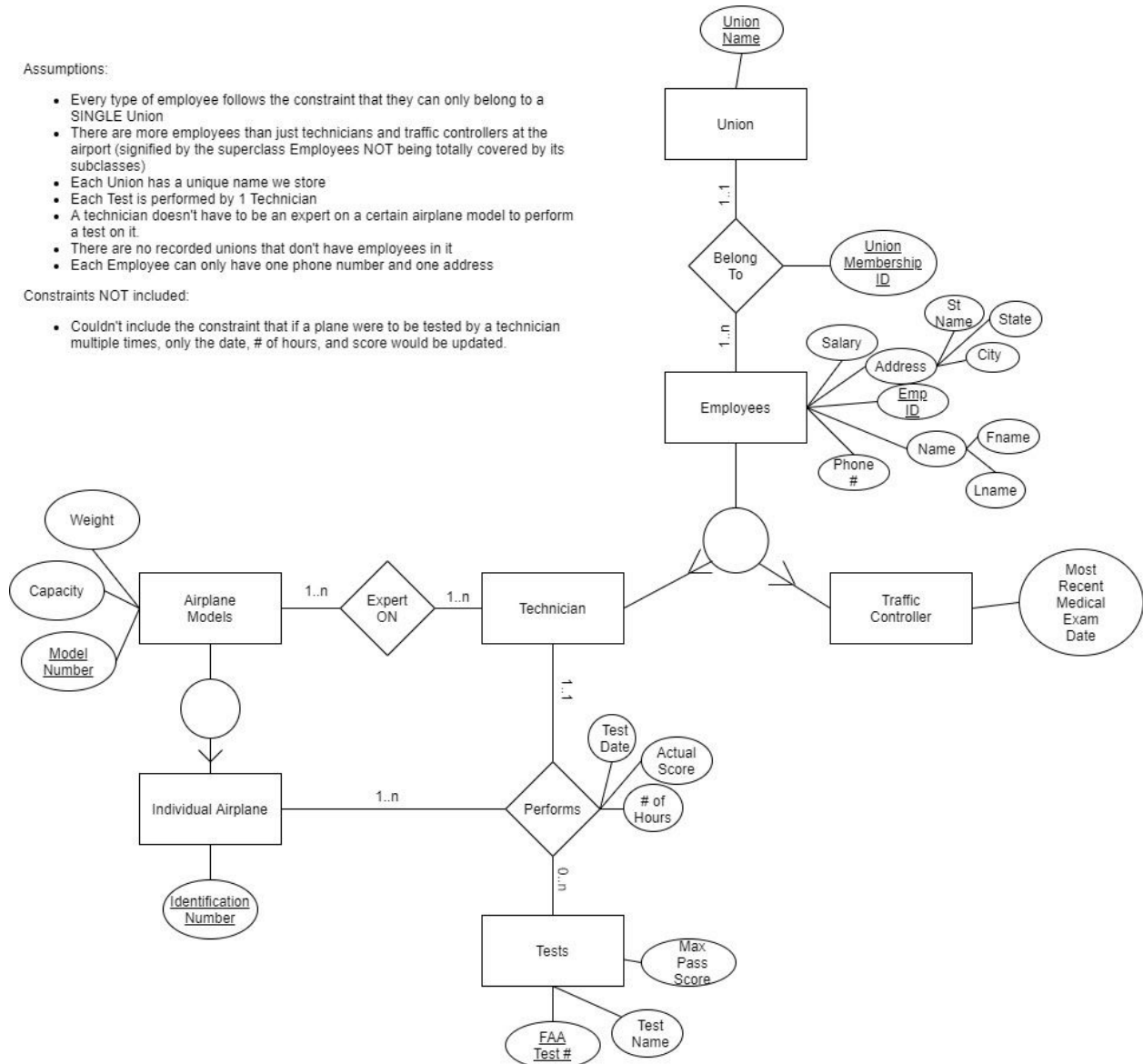
*A number of tests are used periodically to ensure that airplanes are still airworthy. Each test has a unique Federal Aviation Administration (FAA) test number, a test name, and a maximum possible score. While most of these tests apply to all models, some apply to just one. The FAA requires the airport to keep track of which airplane was administered which test and by which technician; the test date, the number of hours the technician spent for the test, and the score the airplane received on the test are all important as well. However, if the same plane undergoes the same test performed by the same technician more than once, only the last of those events needs to be recorded.*

Assumptions:

- Every type of employee follows the constraint that they can only belong to a SINGLE Union
- There are more employees than just technicians and traffic controllers at the airport (signified by the superclass Employees NOT being totally covered by its subclasses)
- Each Union has a unique name we store
- Each Test is performed by 1 Technician
- A technician doesn't have to be an expert on a certain airplane model to perform a test on it.
- There are no recorded unions that don't have employees in it
- Each Employee can only have one phone number and one address

Constraints NOT included:

- Couldn't include the constraint that if a plane were to be tested by a technician multiple times, only the date, # of hours, and score would be updated.



2. Starting with your schema for the above, how succinctly can you capture the following additional constraint:

*The same airplane cannot be tested later by the same technician using different tests.* Explain briefly.

As I currently have it, my diagram states that each test is performed by 1 technician, but that 1 technician can perform multiple tests. The best way I can include this constraint is by changing it so one technician can only perform a certain quantity of tests. I could change the cardinality so each technician can only perform one certain test, and so they wouldn't be able to test an airplane using more than one testing method. This obviously isn't ideal, as it would greatly limit the amount of work done by each technician, and it

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would also limit the amount of tests done to an individual airplane to 1 given the relationship I built, but it's the most succinct way I can capture the constraint without completely changing the ER diagram I designed.