**Mason Shepherd**

**Homework 2: due January 19th 11:59PM.**

**[15 points] 5.12** - Consider the AIRLINE relational database schema shown in Figure 5.8, which describes a database for airline flight information. Each FLIGHT is identified by a flight NUMBER, and consists of one or more FLIGHT\_LEGs with LEG\_NUMBERs 1, 2, 3, etc. Each leg has scheduled arrival and departure times and airports, and has many LEG\_INSTANCEs--one for each DATE on which the flight travels. FARES are kept for each flight. For each leg instance, SEAT\_RESERVATIONs are kept, as is the AIRPLANE used in the leg, and the actual arrival and departure times and airports. An AIRPLANE is identified by an AIRPLANE\_ID, and is of a particular AIRPLANE\_TYPE. CAN\_LAND relates AIRPLANE\_TYPEs to the AIRPORTs in which they can land. An AIRPORT is identified by an AIRPORT\_CODE. Consider an update for the AIRLINE database to enter a reservation on a particular flight or flight leg on a given date.

(a) Give the operations for this update.

Ans: Insert operation, update operation, and operations necessary to prevent violation(s) of constraint(s)

(b) What types of constraints would you expect to check?

Ans: All 4.

**[For Inserting new tuple into relation: SEAT\_RESERVATION]:**

(Domain) each value of the entered tuple must exist in their corresponding attribute’s domain.

(Key) the inserted tuple would have to include info for Flight\_number, Leg\_number, Date, and Seat\_number – the combination of all 4 being unique among every tuple in the SEAT\_RESERVATION relation.

(Entity-Integrity) all aforementioned PK values must not be NULL.

(Referential-Integrity)

* the inserted tuple’s value for Flight\_number must exist in the relation: FLIGHT.
* the combination of the inserted tuple’s values for Flight\_number and Leg\_number must exist in the relation: FLIGHT\_LEG.
* the combination of the inserted tuple’s values for Flight\_number, Leg\_number and Date must exist in the relation: LEG\_INSTANCE.

**[For Updating corresponding value for the attribute Number\_of\_available\_seats in relation: LEG\_INSTANCE]:**

(Domain) the update would add (-1) to Number\_of\_available\_seats. The resulting number can not be < 0 without violating the domain constraint.

(c) Which of these constraints are key, entity integrity, and referential integrity constraints and which are not?

Ans: Described in part (b).

(d) Specify all the referential integrity constraints on Figure 3.8.

Ans: 3.8? (Assuming was supposed to be 5.8…)

Answered in part (b) 🡪 **[Insert operation]** 🡪 (Referential-Integrity)

**[5 points] 5.19** - Consider a STUDENT relation in a UNIVERSITY database with the following attributes (Name, SSN, Local\_phone, Address, Cell\_phone, Age, GPA). Note that the cell phone may be from a different city and state (or province) from the local phone. A possible tuple of the relation is shown below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | SSN | LocalPhone | Address | CellPhone | Age | GPA |
| George Shaw William Edwards | 123-45-6789 | 555-1234 | 123 Main St., Anytown, CA 94539 | 555-4321 | 19 | 3.75 |

a. Identify the critical missing information from the LocalPhone and CellPhone attributes as shown in the example above. (Hint: How do call someone who lives in a different state or province?)

Ans: CellPhone is missing its respective area code (###) and extension (if applicable). LocalPhone does not need this info unless it is going to be used to verify that the number is indeed local.

b. Would you store this additional information in the LocalPhone and CellPhone attributes or add new attributes to the schema for STUDENT?

Ans: update attributes.

c. Consider the Name attribute. What are the advantages and disadvantages of splitting this field from one attribute into three attributes (first name, middle name, and last name)?

Ans: If, for some reason, a particular STUDENT needs to be found in the database but only the first or last name is known, it will be more feasible to narrow down the list of potential candidates with this setup.

Though this will be a more arduous set up as it will be more complicated to operate on and make constraints for the 2 additional attributes created, once the work is done, it may be a more useful setup in a smaller, more chaotic environment.

d. What general guideline would you recommend for deciding when to store information in a single attribute and when to split the information?

Ans:

Keep the size of each attribute’s domain minimal without splitting information that is best

kept together.

IE: units of measurement and their numerical values should be together in one attribute.

Otherwise, only split attributes’ values if doing so is inherently and generally useful enough to justify the required time and labor.