

CS561: Advanced Topics In Database Systems Spring-2014

Homework 1

Total Points: 40

Release Date: 01/30/2014

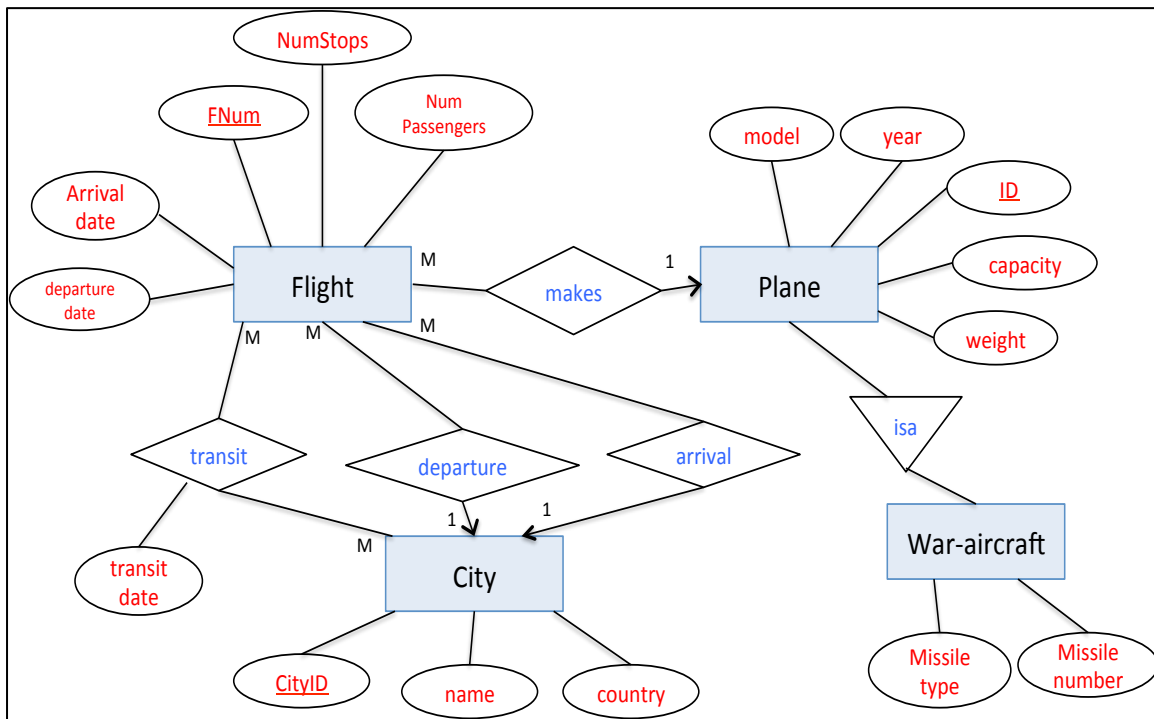
Due Date: 02/07/2014 (11:59PM)

References: Lectures 2 & 3 Slides + Oracle website

Given the following “Airline” application

- We have two types of planes; passenger planes and war aircrafts. Both types of planes have common properties such as ID (unique identifier), model, capacity, year in which it is built, and weight.
- Each passenger plane can make many flights. Each flight has a departure city, arrival city, and it can make transit in many other cities. Also each flight has the departure date, arrival date, and the transit date and duration in each of the transit cities (assume the ‘date’ captures both the date and exact time).
- Each flight has some properties such as: FlightNum (unique identifier), number of transit stops, number of passengers.
- For each city, we have a CityID (unique identifier), name, and country.
- For war aircrafts, we keep track of the missile type carried on the aircraft and the number of missiles.

One possible ER diagram capturing the above requirements (for relational model) is the following:



In the ER diagram, we have the following:

1. Keys of entity sets are underlined
2. The cardinalities of relationships are indicated using the arrow heads as well as the number notation (1-M: One-to-Many) and (M-M: Many-to-Many)
3. ‘isa’ relationship is the inheritance (subclass) relationship.

Question 1 Create DB [10 Points]

Provide an Object-Relational design that is equivalent to the application above. Use the SQL-99 Language specific to Oracle to define the user-defined types and relationships. Your SQL commands should be written in a .txt file and be error free, i.e., they can execute in Oracle database to create all needed types and tables.

- The Plane and War-aircraft should be done through inheritance
- City should be a type and included inside Flight
- Try to use types, inheritance, and Ref whenever possible

Question 2 Populate DB [10 Points]

Write a program (in any language you like) that creates a .txt file and adds "Insert" statements in the file to populate the database. The number of records for each of "Plane", "City", "War-aircraft" should be around 10. And for "Flight" it should be around 100.

The file can be then executed from the SQL Interface using the following command
SQL >@filename

Question 3 Queries [20 Points]

Provide SQL-99 queries over the object-relational model that you designed to answer the following queries:

- 1- Report flights that have more than 2 transit stops. Order flights based on the transit duration.
- 2- Report the war crafts that have weight more that 200 tons.
- 3- Report the departure, arrival, and transit cities of flight number 'FL230'.
- 4- For each city, report the number of flights departed from that city between Jan-2011 and Jan-2012.
- 5- Report the departure and arrival cities of flight "FL230".

Submission Mechanism

Submit electronically using blackboard system (by 11:59pm on the due date).

What to Submit

You should submit either one .txt file containing all SQL commands from the 3 questions above, or submit 3 files (one for each question). In the latter case, the 3 files must be zipped in a single file.

The files should be executable from the SQL interface.

Late Policy:

We follow the late policy stated on the course website.