

## Assignment 5

Due: see course homepage

Before we start. Download the file <http://www.itu.dk/~carsten/courses/dbs/assignments/cargo.zip>. This file contains the entire and complete schedule of Lufthansa Cargo flights, which we will study and manipulate in this homework assignment. The file contains a **README** and a file with raw data. The readme file contains four commands. The first one tells you how to access your database from a terminal (for example `ssh.itu.dk`), the second command shows you how to access your database. Recall what your database name was. The third command tells you how to make the **Cargo** table and the fourth and last command tells you how to populate your new table with data from the datafile `LHcargo_FlightSchedule.csv`. You know that your initialization of your database was successful, when you can say `select count(*) from Cargo` and obtain the result 25340. This is how many records are in your database. The meaning of the data is explained in the file <http://www.itu.dk/~carsten/courses/dbs/assignments/cargo.pdf>.

The database is not in good shape. Lufthansa hired someone to design it, who didn't take our SIDD class. But now fortunately, you are here. The idea of this assignment is to have you change database schemas on the fly, without compromising the content of the database, according to the following demands.

*Important: As answers below, we would like to get the SQL statements that you issued in order to satisfy a problem **and** the list of tables and their respective sizes.*

1. Your new boss tells you that the following functional dependencies hold.  $ACTYPE \rightarrow ACTYPEFULLNAME$  and  $AG \rightarrow AGFULLNAME$ , but also that  $ACTYPE \rightarrow AG$ .
  - (a) Write a query to show that our Cargo database respects these three functional dependencies. (4 points)
  - (b) Normalize the database, using normalization technology in class, create new tables, and populate it in the right way, in such a way that you didn't lose information, or you didn't add any spurious information. (8 points)
2. There have been drastic changes in management. The new managers would like to keep a closer eye on all flights of a certain day. The question the managers want to ask is the following `select FNR, DEP, ARR, STD, STA from Cargo where date="11nov10"`; They give you a chance now to restructure your database in such a way that you can more easily find the answers to the query.
  - (a) Draft a new database layout that is sound and complete with the given database schema, and can answer a query such as  

```
select FNR, DEP, ARR, STD, STA from <TABLE> where date="11nov10";
```

where `<TABLE>` might be a join, cartesian product, selection ... of your newly created table structure. (8 points)
  - (b) Migrate all data from the old to the new. (6 points)
  - (c) Show the answer to the aforementioned query of the manager. (2 points)