Exercise 8 "Implementation of Databases"
Due until 17 Dec, 2008 (before exercises)  

8.1  Quant Graphs  
(6 pt.)

Given the following relational database schema:

Frequents (Drinker, Bar)  
Serves (Bar, Beer)  
Likes (Drinker, Beer)

a) Give the following queries as tuple calculus expressions.

- Drinkers that frequent a bar serving a beer that they like.
- Drinkers that frequent the same bar as some drinker who likes “Bitburger” beer (not necessary served by that bar)

b) Build the respective quant graphs. Are they benign or malicious? Explain!

8.2  Quant Graphs  
(8 pt.)

Given the following relational schema:

Student (StudID, Name, Semester, DLNr)  
Driving_License (DLNr, Issue_Date)  
Car (LicenseNr, Color, Type)  
Owner (LicenseNr, StudID, Purchase_Date)  
Driver (DLNr, LicenseNr)

Give the following query as tuple calculus expressions. Build the respective quant graphs. Are they benign or malicious? Explain!

a) All students owning a car.
b) All students owning a red SEAT Ibiza and having a driving license issued before 1/1/2000.
c) All SEAT Ibiza bought before 1/1/2000 and driven by students in the 18th semester.
d) All students having bought a car before passing the (driver's) exam.
8.3 Quant Graphs

Given the following relational schema:

- Passenger (PassportID, Name, Age, FFNr)
- Check-In (SeatNr, TicketNr, Class)
- Ticket (TicketNr, PassportID, Purchase_Date, Airline)
- Frequent_Flyer (FFNr, Entry_Date, Status)

Give the following queries as tuple calculus expressions. Build the respective quant graphs and check if they are benign or not. Explain!

a) All passengers having bought a ticket before 29/7/2003.
b) All passengers booked on economy class and having joined the frequent flyer program after buying the ticket.
c) All business class tickets sold before September 11\textsuperscript{th} 2001 to Homer Simpson who has a frequent flyer gold status.