**336 PROJECT – 2018-(group of 3)**

**Bar-Beer-Drinker PLUS**

We will extend the bar-beer-drinker scheme, with information about specific transactions by customers (drinkers). We will store all “bills” of all drinkers. Drinkers may order both food items (bar food) and beers. In addition, we will have data about bar inventory on each given day – how many beers of each type they keep in their inventory. We assume (unrealistically) that there is always enough food 😊 (Since otherwise we would have to measure recipes etc). Finally, each bar will have different shifts (hours) covered by different bartenders. This data about which bartender is working which shift (i.e hours from – to) has to be stored in your database.

For each bill we will store the details of the transaction – what items were purchased (may be beer, may be food, soft drinks etc), time when the bill was issued, name of the drinker and the transaction id. Each transaction will also total amount paid which will be sum of prices of all items on the bill plus 7% tax. There may also be a tip.

One of the first tasks will be to represent bills/transactions in ER diagram and in your relational scheme

In addition, information about each bar (bar table) must also have opening and closing hours of this bar for each day. These hours may vary from bar to bar.

You will have to populate your database with realistic, but synthetic, tuples. By realistic, I mean names of bars, drinker names, dollar figures etc when appropriate. No a1, b1, c1! No drinker X and drinker Y! You can easily get lists of common names (first and last) on the internet, as well as lists of popular beers, food items, names of bars, cities, streets etc. You do not have to invent these yourselves. The only part which you will have to synthetically generate are relationships: likes, sells, frequents and transactions.

Generate and load your db with the large number of synthetic tuples, may be 5,000? Of course even more transactions, may be 20,000? Each bar should have round 10 bartenders. May be more. It is your choice. But your database instances should not be completely random. The following assertions (patterns) should hold:

**PATTERNS**

1) Transactions/bills cannot be issued at times when the given bar is closed

2) Drinkers cannot frequent bars in different state that they live.

3) For every two beers, b1 and b2, different bars may charge differently for b1 and b2 but b1 should either be less expensive than b2 in ALL bars or more expensive than b2 in ALL bars. Cannot be the case that in one bar Corona is more expensive than Bud and in another Bud is more expensive than Corona. But Corona may be more expensive than Bud in one bar, and have the same price as Bud in another.

4) Bar cannot sell more beers of specific brand, than it has in its inventory

5) A bartender cannot work more than one shift a day.

LOADING YOUR DB: You are not going to load your database manually (just in case you wondered). You will write a program which will load the database for you. Data will be “almost” random, except the pattern(s). The logic of the pattern will be part of your program.

**REQUIREMENTS**

**1)** Correct ER diagram and database scheme definition

**2)** Realistic db instance generation (i.e. names of entities, not symbols) and db loading + Pattern embedding in the instance as well as validation of the pattern using SQL query. Have at least 5,000 tuples in your database instance excluding transactions/bills. At least 20,000 transactions. Provide Verification interface for your five patterns: which allows to us to verify assertions/patterns which you have embedded. Show the SQL query you are using to verify your constraint and return TRUE or FALSE (in case assertion is not satisfied). So there will be five SQL verification queries – one for each pattern – as part of your front end interface (the final design is up to you)

**3) FRONT END - QUERIES**: you should have three pages: Drinker, Bar and Beer

a) **DRINKER PAGE**: Given a drinker, show all his/her transactions ordered by time and grouped by different bars. Show bar graphs of beers s/he orders the most. Also, bar graph of his/her spending in different bars, on different dates/weeks/months.

b) **BAR PAGE**: Given a bar, show bar graphs – 1) for top 10 drinkers who are largest spenders, 2) Rank top 10 beer brands which are most popular in the specified bar on a specified day of the week or weekend. Demonstrate time distribution of sales, show what are the busiest periods of the day and of the week for each bar. Show fraction of bar inventory which is being sold on each day of the week (bargraph). **Bar Analytics:** Rank top 10 bars by sales of each brand of a beer and total sales for each day of the week. Make boxes with drop down menus which allow to specify brand of a beer and day of the week and execute a query ranking bars by their sales of specified beer and specified day.

c) **BEER PAGE**: Given a beer – show bars where this beer sells the most (again only top 10), show also drinkers who are the biggest consumers of this beer as well as time distribution of when this beer sells the most.

d) **SQL QUERY INTERFACE:**  Provide a box where we can type in sql query and get them evaluated on your database. Of course we will have to know the scheme (which will be part of your submission).

e) **BARTENDER PAGE:** Given a bartender (drop down menu) for a given bar (drop down menu), show all shifts of this bartender in the past and how many beers of each brand did he sell. **Bartender analytics**: Given a bar, and a shift (say 8-10PM) and a day of the week, show ranking of bartenders by total number of beers sold. This will compare “apples with apples”, since we will only compare bartenders on the same shift and same day of the week (like Saturday for example, will definitely have higher rev).

f) **MANUFACTURER PAGE:** Given manufacturer, show the regions (cities, states) where their sales are highest in last week. Show cities and states where their beers are liked the most (i.e. where do the most of drinkers who like their beers live) in last week? Sales of manufacturer are total sales of all beers that they produce.

**4)** **FRONT END – UPDATES/DELETIONS/INSERTIONS**: Allow end user modify every table in your databases.

Have MODIFICATION page, with one box for each table. If update not accepted – provide the feedback message “violates foreign key” etc.

The integrity constraints should be implemented

a) **Foreign keys** for each of the three tables – frequents, likes and sells. Drinker, Bar and Beer should be present in tables Drinker, Bar, Beer \*before\* they can participate in tables Frequent, Likes and Sells.

b) **Key constraint** for sells table – on bar, beer (bar, beer -> price)

c) **ASSERTIONS**: All five patterns (1-5) from above have to be enforced as assertions. This means if an update (insert, update) violates the assertion it \*should not be allowed\* and proper warning/explanation has to be displayed – “not accepted due to violation of assertion X”

1. Submit your ER diagram and Relational Schema through Sakai by end of the day, **October 7th**
2. Populate your database with instances, embedded patterns and SQL queries which verify that pattern is satisfied by the data by **October 28th**
3. Front end and creation of power point presentation describing what you did. Final submission of URL where we can test your product and other documentation (ppt, source code etc) – by **November 18**

**FINAL SUBMISSION SHOULD CONTAIN**

1. ER diagram and Relational DB scheme
2. URL where we can access your web application through the front end
3. Power Point Presentation (up to 10-15 slides, explaining what you did)
4. Source code

**GROUPS**

Default is: 2 students per group. This write up is for groups of 3. It is self-selected. We do not want to connect random two students, this does not work! So we will leave it up to you.

You can do this project alone (the winner group last year was a single student). I really do not recommend 3-student groups, you have to do more and it is not clear what it means plus my experience is that 3-student groups often do not work well.

We assume that everyone contributes equally. If it is not the case (one student complains) – we will ask each member of the group to itemize what they did.