

Database Design

CmpE 226

Practice Problems

Practice Problem (09)

1. Design a database with at least 10-12 of tables or ((**constraint tables. The constraint tables should use the full power of linear constraints. (For example, the equality constraint $x = 1$ does not use the full power of linear constraints. So don't use only equality constraints in your database.**)) The tables should contain a reasonable number of tuples or (**constraint tuples**), not too few and not too many.
2. Prepare traditional class diagram for the following problems showing at least 10 relationships among the following object classes, including associations, aggregations, and generalizations. Show multiplicities in your diagrams. Your model should have 3-5 attributes and 3-5 operations per class. Use association and role names when needed. As you prepare the diagrams, you may add additional object classes.
3. **If you use MLPQ**, find at least 4 iconic queries or sequence of iconic queries. Explain what they mean and write them down in the style of the examples in the MLPQ system manual. (**Iconic queries are shown in Figure 1 MLPQ Graphical Interface in the MLPQ Specifications, such as Intersection, Union, Difference, Max, Min, etc.**)
4. Find at least 4 SQL queries of each of the following kind: **Basic, Aggregation, Sets, and Nested.** (That is, a total of 16 queries.)

OUTSOURCING

INNOVATION

Abstract

Outsourcing has been taking place for a long time now, but is becoming an essential part of today's global economy. In the earlier days, outsourcing used to be associated to moving customer support call centers to countries like India, etc. But with increasing competition, demand and growth in technology, now Research & Development, IT Operations, Engineering Design, Medicare, and Software Development are also being outsourced to other countries.

Domain

Companies sub-contract to save on costs and to effectively and efficiently perform many operations. The contract companies are globally situated. Companies may choose to send the jobs off shore or to retain it at its homeland depending on various controllable and non-controllable factors.

Description

In this project, we will build a database model which would allow us to retrieve data and analyze contract companies in various countries.

Objectives:

- Impact of outsourcing on economy
- Determine the effectiveness of maintaining services in US
- Reduce costs by deciding operations that have to be outsourced/insourced in the long term.
- Risk management
- Impact on education & jobs

Requirements

1. Calculate operation costs, wages at different regions for both outsourced and insourced companies
2. Determine risk for the operation(s) at different regions and see if we can move critical jobs to low risk regions
3. Calculate the trends in number of graduates available in different region and the correlation it has with the number of jobs available
4. The regions with least operation costs
5. The operations that are mostly outsourced and analyze future outsourcing trends
6. The contribution of this industry towards the country's economy
7. Customer satisfaction at different regions and the key contributors to high satisfaction levels
8. The movement of specific types of jobs from one region to the other over a period of time and the reason behind such a move

Relation or entities names and attributes

Region(regionId, countryId, x, y)

This defines various regions over x and y co-ordinates

regionId – unique ID Identifying each region

countryId – Id of the country

x – x coordinate value for the region

y – y coordinate value for the region

Company(regionId , year, noOfOutsourcedCompanies, noOfInsourcedCompanies)

This has a total number of companies and the outsourced and the insourced companies of each region per year

regionId – *IDF Identifying the region*
noOutsourcedCompany – *number of outsourced companies*
noInsourcedCompany – *number of insourced companies*
year – *the year during which the particular data was applicable*

Job(regionId, year, jobRange, operationId)

This has the jobs range that are present for each operation for each region for each year

regionId – *ID Identifying the region*
year – *the year during which the particular data was applicable*
jobRange – *range of jobs available for the particular operation*
operationId – *ID Identifying the operation*

Wage(wageRange, noOutsourcedCompany, noInsourcedCompany, regionId, year)

This has the number of outsource companies and insourced companies that fall within a wage range for each region for each year

wageRange – *range of wages*
noOutsourcedCompany – *number of outsourced companies*
noInsourcedCompany – *number of insourced companies*
regionId – *IDF Identifying the region*
year – *the year during which the particular data was applicable*

Operation(operationId, operationCost, noOutsourcedCompany, noInsourcedCompany, regionId, year)

This has the number of outsourced and insourced companies with various operations (IT DEV, customer Support, R &D)

operationId – *ID for the operation*
operationCost – *range of operation costs*
noOutsourcedCompany – *number of outsourced companies*
noInsourcedCompany – *number of insourced companies*
regionId – *IDF Identifying the region*
year – *the year during which the particular data was applicable*

Education(noOfGraduate, level , regionId, year)

This has the number of graduates each year for a specific level of study for each region

noOfGraduate – *no of graduates available / passing*