# *Database Management I (420-D10-HR)*

# *Lab 4 – RDBMS History, Market and SQL queries*

Date assigned: Wednesday, August 31, 2016

Date due: **Friday, September 2, 2016, 2:50pm**

**Learning Objectives**

Upon successful completion of this lab exercise, the student will be able to:

* 1. Demonstrate knowledge of RDBMS and SQL
  2. Perform single table queries on self-referential tables manually and using SQL
  3. Perform simple multi-table queries manually and using SQL
  4. Understand the use of navigating from row to row/table with the use of keys

**To uploaded Moodle:**

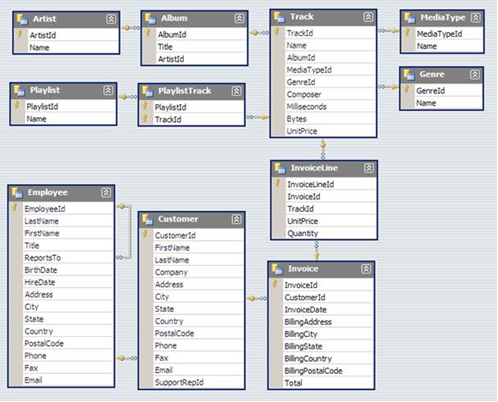
1. Fill in this document with your answers, rename to ***username\_*D10\_L04\_QueriesI.doc** and upload to Moodle.

**To start**

1. This is a continuation of the previous lab using the same database. Startup Oracle SQL Developer and log in as yourself.
2. Answer the questions in this document.

**Marks:**

|  |  |  |
| --- | --- | --- |
| **Question** | **Mark** | **Out of** |
| 1. Definitions (2 marks per definition) |  | 10 |
| 1. DBMS Benefits (4 marks per operation) |  | 16 |
| 1. Costs and Risks (4 marks per cost) |  | 12 |
| 1. Market Research- Top 3 (3 marks per product) |  | 9 |
| 1. Market Research – Database engines (2 marks per row) |  | 10 |
| 1. SQL Facts |  | 12 |
| 1. Queries (4 x 10 questions) |  | 40 |
| Organization |  | 5 |
| **Total** |  | **114** |



# Definitions

***Objectives***: Know the database terms discussed in class.

***Research***: Read the Wk 01 notes and review the class slides.

***Define each of the following terms:***

|  |  |
| --- | --- |
| **Term** | **Definition** |
| Database | **A set of structured data on a computer** |
| DBMS | **Database management system** |
| Key | **A unique identifier for a piece of data** |
| RDBMS | **Relational database management system** |
| CRUD | **Create, retrieve, update, delete** |

# DBMS Benefits

***Objectives***: Understand the benefits of a DBMS

Consider a typical application without a database that stores its data in a binary file.

On startup it reads the binary file directly into its data structures in memory.

It displays the data from the memory.

On updates, creates, or deletes, it updates the memory copy and the binary file copy.

Update the following table to compare the work required for each operation:

|  |  |  |
| --- | --- | --- |
| Operation | File based (sans RDBMS) | RDBMS |
| Add another field in a record. What code changes are required in the application? | You need to go and add a field for the new column and allow the object or string or however you’re creating each new entry to extend by 1 to allow the new column and update it so that it can read the other column as null | Create a new key and it’ll set the value to null for any field that has no value for it. |
| Add another field in a record. Backwards compatibility?  (How backwards compatible is your application with text files that don’t have the added field?) | You have to and create separate cases in the code for files that don’t have the extra field. You need to set it to null for every field | No changes needed, it’ll read in the blank field as null. |
| Two other new applications want access to your data. Provide a solution. | Make sure their system is compatible with reading in directly from a text file and give the application access to it. | You’d need to convert the text file to the file type required by the other applications (unless they use the same language) and then manage the discrepancies between the two different file types as changes get made to either one. |
| Analyze and provide any weaknesses to your solution (above) | The text file has its own special delimiters and fields ordered specifically, so the other applications would have to be able to be set to be compatible with the set up of the text file since there’s no standard for it and it would need to know how to read from it | You have to make sure that the application works with the file type, for example if you’re using sql, and if not then you’d have to convert and keep multiple versions of the same DB. |

# DBMS Costs and Risks

***Objectives***: Understand the cost and risks of a DBMS

Identify 3 costs to using a DBMS and explain.

You need to pay people to build the database, including transferring anything on paper into the database.

You need people to maintain the database. Make sure fields in the database are still relevant, decide if things need to be added to it, ensure that the data is of high integrity, etc

You need to

# Market Research - Top 3

***Objectives***: Learn about the current market place for databases

Identify the top 3 relational databases in with the most market share by revenue. Provide links to your source of information (any report from the last 10 years will do).

|  |  |  |
| --- | --- | --- |
| Database product | Database Vendor | Source of information |
| Oracle | Oracle | http://searchdatamanagement.techtarget.com/ |
| IBM DB2 | IBM | http://searchdatamanagement.techtarget.com/ |
| SQL Server | Microsoft | http://searchdatamanagement.techtarget.com/ |

# Market Research - Database Engines

***Objectives***: Learn about the current market place for databases

Complete the following table and categorize the database products

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Database engine | Vendor | Client/Server or serverless? | Closed vs Open Source? | Platform |
| DB2 | IBM | Client/server | Close | Linux, Windows |
| Access | Microsoft | Serverless | Close | Windows |
| SQL Server | Microsoft | Client/server | Close | Linux, Windows, OSx |
| Oracle | Oracle | Client/server | Close | Linux, Windows, Solaris, OSx, etc |
| PostgreSQL | PostgreSQL | Client/server | Open | Linux, OSx, Windows, etc |

# SQL facts

***Objectives***: The history and design of SQL

***Research***: https://en.wikipedia.org/wiki/SQL

Answer each of the following questions:

## SQL is an acronym. What does SQL stand for?

Structured Query Language

## What was the earlier name of SQL as originally developed at IBM?

SEQUEL

## Why did IBM change the name to SQL?

SEQUEL was a trademark of a company in the UK

## When did SQL become standardized and by what organization(s)?

It became standardized in 1987 by ISO, the international organization for ` standardizations

## How respected is the SQL standard by database vendors? Is SQL fully interoperable? For instance, is SQL that runs on MS SQL Server guaranteed to run on Oracle’s database?

SQL standards aren’t hugely respected between database vendors, there’s a lot of discrepancies between them all.

## Give 3 reasons for lack of SQL portability between database systems.

Between database systems there’s a lot of differences in time syntaxs, string concatenations, comparison case sensitivity, the way ‘NULL’ is used, etc. One of the exceptions to this is PostgreSQL since they try to follow standards more than most other vendors.

# Queries

***Objectives***: Learn the navigate tables with the use of keys.

***Research***: SQL SELECT, AND

Each of these queries is to be done:

* + - 1. manually (no SQL, just examine the data using the Oracle SQL Developer to browse the table and your eyeballs)
      2. using SQL (provide query and result output)

All queries use either the CUSTOMER, EMPLOYEE, ARTIST or ALBUM tables.

***Multi-table samples:***

Find customers that are supported by Steve Johnson sorted by customer last name

select customer.firstname, customer.lastname from employee, customer

where

employee.firstname = 'Steve' and employee.lastname = 'Johnson'

and

customer.SUPPORTREPID = employee.EMPLOYEEID order by customer.lastname;

Short hand notation of the same:

select c.firstname, c.lastname from employee **e**, customer **c**

where

e.firstname = 'Steve' and e.lastname = 'Johnson'

and

c.SUPPORTREPID = e.EMPLOYEEID order by c.lastname;

Note the short hand notation for the table names, you can assign any label, I choose ‘e’ for employee, can ‘c’ for customer. It saves on the typing and makes the command more terse and (some would say) easier to read.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Query | Manual answer | SQL query | SQL results |
| 1 | List all employees | (too long, not required) | select firstname, lastname from employee; | Andrew Adams  Nancy Edwards  Jane Peacock  Margaret Park  Steve Johnson  Michael Mitchell  Robert King  Laura Callahan |
| 2 | List all employees in the city of Edmonton | (just give names for the manual answers to show that you’ve done an analysis beforehand to validate your SQL results) | select FIRSTNAME, lastname from employee where city='Edmonton'; | Andrew Adams |
| 3 | List the first name, last name and City for all customers from the USA | Find the customer table and filter the country to all to USA. Then scroll to the left and copy the first name, last name and city of all customers from the USA. | select FIRSTNAME, LASTNAME, CITY from CUSTOMER where COUNTRY='USA'; | Frank harrisMountain View  Jack SmithRedmond  Michelle BrooksNew York  Tim Goyer Cupertino  Dan Miller Mountain View  Kathy Chase Reno  Heather Leacock Orlando  John Gordon Boston  Frank Ralston Chicago  Victor Stevens Madison  Richard Cunningham Fort Worth  Patrick Gray Tucson  Julia Barnett Salt Lake City |
| 4 | List all the customers and the name of their support rep; order the results by customer’s last name |  | select c.FIRSTNAME, c.LASTNAME, e.FIRSTNAME, e.LASTNAME  from EMPLOYEE e, CUSTOMER c  where e.title='Sales Support Agent' and c.supportrepid = e.employeeid  order by c.lastname; | Roberto Almeida Jane Peacock  Julia Barnett Steve Johnson  Camille Bernard Margaret Park  Michelle Brooks Jane Peacock  Robert Brown Jane Peacock  Kathy Chase Steve Johnson  Richard Cunningham Margaret Park  Marc Dubois Steve Johnson  João Fernandes Margaret Park  Edward Francis Jane Peacock  Wyatt Girard Jane Peacock  Luís Gonçalves Jane Peacock  John Gordon Margaret Park  Tim Goyer Jane Peacock  Patrick Gray Margaret Park  Astrid Gruber Steve Johnson  Diego Gutiérrez Margaret Park  Bjørn Hansen Margaret Park  Frank Harris Margaret Park  Helena Holý Steve Johnson  Phil Hughes Jane Peacock  Terhi Hämäläinen Jane Peacock  Joakim Johansson Steve Johnson  Emma Jones Jane Peacock  Ladislav Kovács Jane Peacock  Leonie Köhler Steve Johnson  Heather Leacock Margaret Park  Dominique Lefebvre Margaret Park  Lucas Mancini Steve Johnson  Eduardo Martins Margaret Park  Isabelle Mercier Jane Peacock  Dan Miller Margaret Park  Aaron Mitchell Margaret Park  Steve Murray Steve Johnson  Enrique Muñoz Steve Johnson  Kara Nielsen Margaret Park  Hugh O'Reilly Jane Peacock  Manoj Pareek Jane Peacock  Daan Peeters Margaret Park  Jennifer Peterson Jane Peacock  Mark Philips Steve Johnson  Frank Ralston Jane Peacock  Fernanda Ramos Margaret Park  Alexandre Rocha Steve Johnson  Luis Rojas Steve Johnson  Madalena Sampaio Margaret Park  Hannah Schneider Steve Johnson  Niklas Schröder Jane Peacock  Martha Silk Steve Johnson  Jack Smith Steve Johnson  Puja Srivastava Jane Peacock  Victor Stevens Steve Johnson  Ellie Sullivan Jane Peacock  Mark Taylor Margaret Park  François Tremblay Jane Peacock  Johannes Van der Berg Steve Johnson  František Wichterlová Margaret Park  Stanislaw Wójcik Margaret Park  Fynn Zimmermann Jane Peacock |
| 5 | List all employees that report to Andrew Adams |  | select firstname, lastname from employee where reportsto=1; | Nancy Edwards  Michael Mitchell |
| 6 | List the support rep (first and last name) for customer “Frank Harris” | Find frank harris in the customer table and find his support rep id. Go to the employee table and find the cooresponding employee. List their first and last name.  Margaret Park | select e.firstname, e.lastname  from employee e, customer c  where c.supportrepid = e.employeeid  and c.firstname='Frank' and c.lastname='Harris'; | Margaret Park |
| 7 | List the support rep for customer “Frank Harris” and the job title, first and last name of the manager of the support rep | Find frank harris in the customer table and find his support rep id. Go to the employee table and find the cooresponding employee. List their first and last name. Find in the employee table, for that employee, the number in their reportsto column. Find the associated employeeid and write that person’s full name in addition to their job title.  Margaret Park reports to Nancy Edwards, the sales manager | select e1.firstname, e1.lastname, e2.firstname, e2.lastname, e2.title  from employee e1, employee e2, customer c  where c.supportrepid = e1.employeeid  and c.firstname='Frank' and c.lastname='Harris'  and e1.reportsto = e2.employeeid; | Margaret Park Nancy Edwards Sales Manager |
| 8 | List all album titles by the artist “Queen” | Find Queen’s artist id by filtering the artist table to Queen. Find their artistid and filter the album table to their ID. Copy all the names of their albums.  Greatest hits I, Greatest hits II and News of the world | select al.title from album al, artist ar  where al.ARTISTID = ar.ARTISTID  and ar.NAME='Queen'; | Greatest Hits II  Greatest Hits I  News Of The World |
| 9 | List all tracks (title) on Queen’s ‘Greatest Hits I’ album | In the album table, filter the album name column to “Greatest Hits I” album. Find the albumid and filter the track table to the album’s id and copy all tracks titles. | select t.NAME from track t, album a  where t.albumid = a.albumid  and a.TITLE='Greatest Hits I'; | Bohemian Rhapsody  Another One Bites The Dust  Killer Queen  Fat Bottomed Girls  Bicycle Race  You're My Best Friend  Don't Stop Me Now  Save Me  Crazy Little Thing Called Love  Somebody To Love  Now I'm Here  Good Old-Fashioned Lover Boy  Play The Game  Flash  Seven Seas Of Rhye  We Will Rock You  We Are The Champions |
|  | List all songs by Queen.  How many tracks do we have by Queen? | Find Queen’s artist id.  Filter albums to Queen’s id and find all albums.  Filter tracks table to each of Queen’s album’s Id’s and copy the track name field. | select t.Name from track t, album al, artist ar  where t.ALBUMID = al.ALBUMID  and al.ARTISTID = ar.ARTISTID  and ar.name='Queen'; | A Kind Of Magic  Under Pressure  Radio GA GA  I Want It All  I Want To Break Free  Innuendo  It's A Hard Life  Breakthru  Who Wants To Live Forever  Headlong  The Miracle  I'm Going Slightly Mad  The Invisible Man  Hammer To Fall  Friends Will Be Friends  The Show Must Go On  One Vision  Bohemian Rhapsody  Another One Bites The Dust  Killer Queen  Fat Bottomed Girls  Bicycle Race  You're My Best Friend  Don't Stop Me Now  Save Me  Crazy Little Thing Called Love  Somebody To Love  Now I'm Here  Good Old-Fashioned Lover Boy  Play The Game  Flash  Seven Seas Of Rhye  We Will Rock You  We Are The Champions  We Will Rock You  We Are The Champions  Sheer Heart Attack  All Dead, All Dead  Spread Your Wings  Fight From The Inside  Get Down, Make Love  Sleep On The Sidewalk  Who Needs You  It's Late  My Melancholy Blues |