Advanced Data Base
(8trd157)

Lab2 *(project: phase 2 of 4)*

Implementation of the Logical Data Model using Oracle 18c/Unix

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Specific Objectives of lab2

- Translate all conceptual data models *(global & partials)* to a normalized relational form
- Create all necessary views according to partial data models
- Consider quantitative constraints for each table specification
- Test a connection to the database **cndb** using **sqlplus** server with **SSH** *(putty)* on dim-ensxcn1.uqac.ca
- Create and load your tables with SQL*Loader
- Test your tables with Oracle SQL using **sqlplus**
- Test some user transaction for each user type

Description

After some analysis, the following constraints have been observed :

- The store has an average of 10,000 parts in stock ; 10 purchasing agents work for the company and each one is responsible for 1,000 parts.
- Purchase orders may be sent by an agent to any of the 200 suppliers. Each supplier may supply an average of 1000 products to this company. Those products may interest more than one purchasing agent.
- Each purchasing agent prepares approximately 10 purchase orders per working day with an average of 5 different products on each one
- The unit price of a part is modified by each purchase order containing a product for that given part. The product unit from the supplier is an *integer [declared as **number(4)** in Oracle]* and the local part unit is an *alphanumeric [**char(15)**in Oracle]*.

Methodology

1. **Test the connection with sqlplus** *(server)* **to the primary database cndb under Oracle 18c with the server dim-ensxcn1.uqac.ca**

   - Use putty with SSH to access dim-ensxcn1.uqac.ca
   - The same Unix user name and password is used to connect Unix and Oracle 18c
   - Do a connection to the primary database *cndb* in your account with *sqlplus* on *dim-ensxcn1.uqac.ca*

```
[pgirard@dim-ensxcn1]$ sqlplus
 SQL*Plus: Release 11.2.0.3.0 Production on Thu Mar 29 15:39:28 2012
 Copyright (c) 1982, 2011, Oracle.  All rights reserved.

 Enter user-name: pgirard
 Enter password:
 Connected to:
 Oracle Database 18c Enterprise Edition Release 11.2.0.3.0 - 64bit Production
 With the Partitioning, OLAP, Data Mining and Real Application Testing options
```

2. Creation of tables and views needed by your logical data model under Oracle 18c

Download the following 10 files from my web site in the Download section

Oracle: Example creation and loading of tables (zip)

Upload them in your own account with EditPlus or ftp

create_tables.sql	*load_tables*	*pa_agent.ctl*	*pa_agent.dat*
purchase_order.ctl	*purchase_order.dat*	*supplier.ctl*	*supplier.dat*
initial.sql	*list_supplier.sql*		

- **create_tables.sql** contains sql commands to create some tables and views with integrity constraints

- **load_tables** contains Oracle utility commands to load data in your tables. This file must be edited with your user/password AND you have to define one **.ctl** file and one **.dat** file for each table. The files **pa_agent.ctl** and the **pa_agent.dat** are examples only. This file executes under Unix with the command **./load_tables** ==> Make it executable with the command **chmod 700 load_tables**

- **initial.sql** is used to re-initialize tables without dropping them

To create your own data, pay attention to each data format, default, null option and integrity constraints.

example 2 of create_tables.sql

```
drop table employee;
drop table department;
create table department
        (name_dept      char(10)        primary key,
        no_dept         number(2)       unique,
        tel_dept        char(8)         default '545-5011',
        budget          number(7)       default 20000);
create table employee
        (emp_number     number(5)       primary key,
        name_emp        char(15)        not null,
        addr            char(25)        default ‘Montreal’,
        commission      number(10),
        salary          number(5)       default 0,
        dept_name_      char(10)        references departement(name_dept));
create index emp_num_idx on employee(emp_number);
```

- An execution of *cretab.sql* with **sqlplus** will show these results

(note: sqlplus assumes a default extension of .sql to a file)

```
SQL>  @create_tables
Table dropped.
Table dropped.
Table created.
Table created.
Index created
```

3. Use **EditPlus** to create your **ctl** and **dat** files, upload them on the server and use **putty** to load each table with **SQL*Loader** as shown in the file **load_tables**

- From my web site, module 5 has some examples ***(****p.9, p.19-36)* of creation of tables, views, constraints & index and **module 6** ***(****p.57-60)* , how to load your tables with *SQL*Loader Method*

- Proceed one table at a time; for example, the table pa_agent *(already created)* need 2 files : pa_agent.ctl and pa_agent.dat. Use the command **sqlldr** to test it. After execution the file pa_agent.bad will be created if there is something wrong and the file pa_agent.log gives the result of the execution of **sqlldr**. Verify the contents of each table with a **select * from *table*;**

- With the same method, create 3 purchasing agents, 6 parts under the responsability of different purchasing agents; at least one part will have at least 2 components and one component will be used by at least 2 parts. Create also 2 suppliers with some products having their product unit > 2 and a different product name than the part_name. Create 2 purchase orders, each one created by a different purchasing agent.
  You will then have twice the number of files **.ctl** and **.dat** than the number of tables. If you have a character type data, use the delimeter apostrophe. (example 'motor 425').

➔**IMPORTANT** : each foreign key data must respect its primary key data.

Annex 2 gives an example of the complete sequence. Under Unix, make **load_tables** executable with the command **chmod**

[chin*****@dim-ensxcn1]$ **chmod 700 load_tables** and execute with
[chin*****@dim-ensxcn1]$ **./ load_tables**

Content of *load_tables* to load data in tables *part* and *component*

```
sqlldr userid=ora*****/password control=part log=part
sqlldr userid=ora*****/ password control=component log=component
```

example of an execution of *load_tables*

```
dim-ensxcn1:ora00101>chmod 700 load_tables
dim-ensxcn1: ora00101>./ load_tables
```

IMPORTANT

If you have a problem loading your data with your editor under Windows *(Windows add at the end of each line **/r/n** characters incompatible with Unix which support only **/n** (line feed))*. To solve the problem you have 2 solutions:
1) add the following instruction at the end of your last column in the **.ctl** file. See the following example

Solution 1

```
LOAD DATA
INFILE 'part.dat'
INTO TABLE part
FIELDS TERMINATED BY ','
(part_num,part_name,unit,unit_price,
qty_min,qty_stock,qty_order TERMINATED BY WHITESPACE)
```

Solution 2

Execute the function **dos2unix** for each data file under Unix

(the example modify the format of the Windows file part.dat to a Unix file format)

```
[pgirard@dim-ensxcn1 lab157]$ dos2unix part.dat
dos2unix: converting file part.dat to UNIX format ...
```

- Execute **initial.sql** to initialize all your tables with **sqlplus** without dropping them.

example of *initial* for tables *part* and *component*

```
delete from part;
delete from component;
```

execution of *initial* with sqlplus

```
SQL>  @initial
```

- Connect to the database with *sqlplus*, display all your tables and test some user transactions to validate your data model.

example of *explosion.sql* displaying the components of part_id 1001

```
SQL> @explosion

Part ID of Component        Part name
--------------------------  ---------------
1003                        'batteries AA'
1005                        'engine 2.0XT'
```

4. Creation of partial views for each user type

- Partial views has been created for some user types for security and confidentiality reasons. Some user types must only access the necessary attributes of some tables. If a user must access all attributes of a table, he will use the complete table, if this is not the case, he will use the view with an appropriate name *(base table_ user type).* The command **create view** is used to do so. *(see module 5).*

For example this command creates the partial view **part_sks** for the store keeper supervisor.

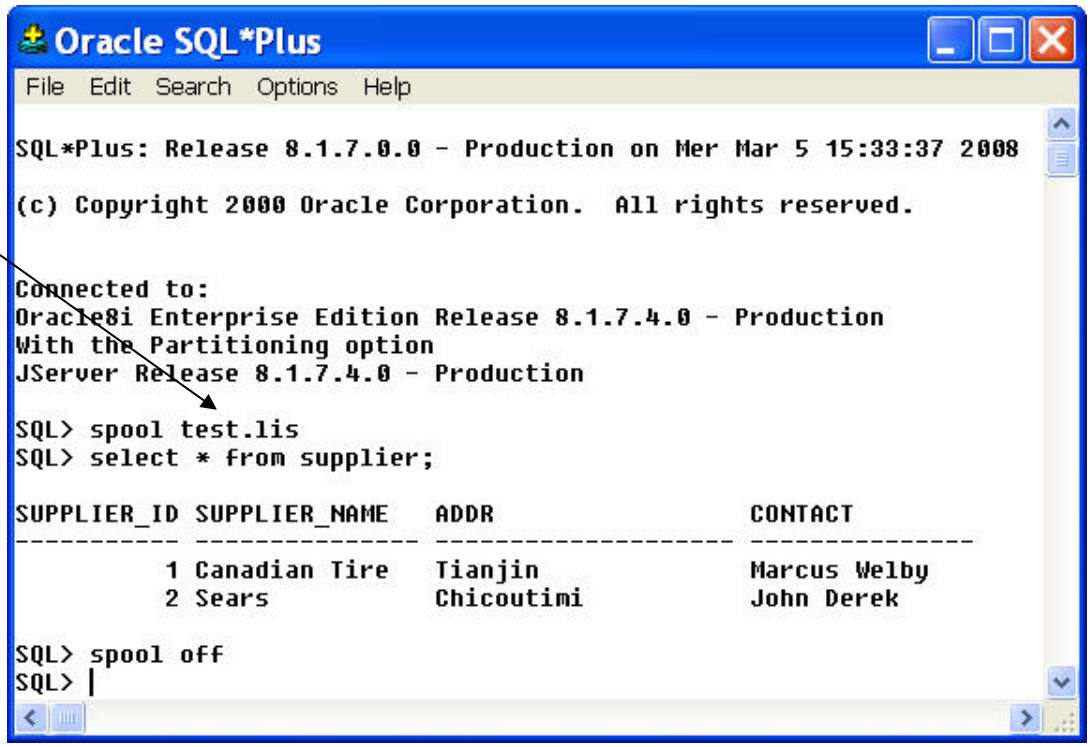
```
create view part_sks as
    select qte_mag, unit_cost from part;
```

Use the spool command of sqlplus AND do a select * for each table and view for the final report

note: The command "spool" of **sqlplus** records a session in a file and gives the possibility to copy and paste the contents in the documentation.

SQL> **spool *filenamer*** to record a session
SQL> **spool off** to stop the recording

Example
(test.lis can be accessed after the SQLPLUS session)



These files will be necessary in the final report of lab6

all .ctl and .dat files AND select * on each table and view

Annex 1

A DBA connection to a database to check some Oracle system tables

Commands in yellow are for the DBA only ➔

- check the memory used by SGA of *cndb*
- display the attributes of the table *dba_tables*,
- display the number of tables owned by the Oracle data dictionary *(dba_tables),*
- display the number of users defined in the database *(dba_users),*
- display the name and the status of *tablespaces* defined in *cndb*
- close the connection with the command *disconnect* and quit with *exit.*

Example of a session under Oracle using the database *cndb*

```
[pgirard@dim-ensxcn1]$  sqlplus
Enter user-name: pgirard
Enter password:

Connected to:
Oracle Database 18c Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing
options

SQL> show sga;
SQL> desc dba_tables;
SQL> select count(*) "Number of tables"  from dba_tables;
SQL> select count(*) "Number of users" from dba_users;
SQL> select tablespace_name, status from dba_tablespaces;
SQL> disconnect;
SQL> exit

[pgirard@dim-ensxcn1 $ logout
```

```
SQL> show sga

Total System Global Area  239198368 bytes
Fixed Size                   73888 bytes
Variable Size              81657856 bytes
Database Buffers          157286400 bytes
Redo Buffers                 180224 bytes

SQL> desc dba_tables;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 OWNER                                     NOT NULL VARCHAR2(30)
 TABLE_NAME                                NOT NULL VARCHAR2(30)
 TABLESPACE_NAME                                    VARCHAR2(30)
 CLUSTER_NAME                                       VARCHAR2(30)
 IOT_NAME                                           VARCHAR2(30)
 PCT_FREE                                           NUMBER
 PCT_USED                                           NUMBER
 INI_TRANS                                          NUMBER
 MAX_TRANS                                          NUMBER
 INITIAL_EXTENT                                     NUMBER
 NEXT_EXTENT                                        NUMBER
 MIN_EXTENTS                                        NUMBER
 MAX_EXTENTS                                        NUMBER
 PCT_INCREASE                                       NUMBER
 FREELISTS                                          NUMBER
 FREELIST_GROUPS                                    NUMBER
```

```
 LOGGING                                                 VARCHAR2(3)
 BACKED_UP                                               VARCHAR2(1)
 NUM_ROWS                                                NUMBER
 BLOCKS                                                  NUMBER
 EMPTY_BLOCKS                                            NUMBER
 AVG_SPACE                                               NUMBER
 CHAIN_CNT                                               NUMBER
 AVG_ROW_LEN                                             NUMBER
 AVG_SPACE_FREELIST_BLOCKS                               NUMBER
 NUM_FREELIST_BLOCKS                                     NUMBER
 DEGREE                                                  VARCHAR2(10)
 INSTANCES                                               VARCHAR2(10)
 CACHE                                                   VARCHAR2(5)
 TABLE_LOCK                                              VARCHAR2(8)
 SAMPLE_SIZE                                             NUMBER
 LAST_ANALYZED                                           DATE
 PARTITIONED                                             VARCHAR2(3)
 IOT_TYPE                                                VARCHAR2(12)
 TEMPORARY                                               VARCHAR2(1)
 SECONDARY                                               VARCHAR2(1)
 NESTED                                                  VARCHAR2(3)
 BUFFER_POOL                                             VARCHAR2(7)
 ROW_MOVEMENT                                            VARCHAR2(8)
 GLOBAL_STATS                                            VARCHAR2(3)
 USER_STATS                                              VARCHAR2(3)
 DURATION                                                VARCHAR2(15)
 SKIP_CORRUPT                                            VARCHAR2(8)
 MONITORING                                              VARCHAR2(3)
 CLUSTER_OWNER                                           VARCHAR2(30)
SQL> select count(*) "Number of tables"  from dba_tables;

Number of tables
----------------
            1157

SQL>  select count(*) "Number of users" from dba_users;

Number of users
---------------
            182

SQL> select tablespace_name, status from dba_tablespaces;

TABLESPACE_NAME                STATUS
------------------------------ ---------
SYSTEM                         ONLINE
TEMPORARY_DATA                 ONLINE
ROLLBACK_DATA                  ONLINE
USER_DATA                      ONLINE
INDEX_DATA                     ONLINE
TOOLS_DATA                     ONLINE
TSDEV_DEMO                     ONLINE

7 rows selected.

SQL> disconnect;
Disconnected from Oracle18c Enterprise Edition Release 8.1.7.4.0 - Production
With the Partitioning option
JServer Release 8.1.7.4.0 - Production

SQL> exit

dim-ensxcn1:pgirard>
```

Annex 2
Creation of tables, views and index and loading of tables

```
SQL> @crelab2

View dropped.
View dropped.
View dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table dropped.
Table created.
Table created.
View created.
View created.
Table created.
Table created.
Table created.
Table created.
Table created.
Table created.
View created.
Table created.
Table created.
Table created.
Index created.

SQL> host ./loadlab2

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 2
Commit point reached - logical record count 3

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 6

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 4

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 1
Commit point reached - logical record count 2

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 11

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 6

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 10
Commit point reached - logical record count 11

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:17 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 2
```

```
SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:17 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 1
Commit point reached - logical record count 2

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:17 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 1
Commit point reached - logical record count 2

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:17 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.
Commit point reached - logical record count 3
Commit point reached - logical record count 4

SQL> host more part.log

SQL*Loader: Release 8.1.7.4.0 - Production on Wed Mar 5 13:33:16 2008
 (c) Copyright 2000 Oracle Corporation.  All rights reserved.

Control File:   part.ctl
Data File:      part.dat
  Bad File:     part.bad
  Discard File:  none specified

 (Allow all discards)

Number to load: ALL
Number to skip: 0
Errors allowed: 50
Bind array:     64 rows, maximum of 65536 bytes
Continuation:    none specified
Path used:      Conventional

Table PART, loaded from every logical record.
Insert option in effect for this table: INSERT

   Column Name                  Position   Len  Term Encl Datatype
------------------------------ ---------- ----- ---- ---- ---------------------
PART_ID                           FIRST     *   ,       CHARACTER
PART_NAME                          NEXT     *   ,       CHARACTER
STOCK_QTY                          NEXT     *   ,       CHARACTER
ORDER_QTY                          NEXT     *   ,       CHARACTER
MIN_QTY                            NEXT     *   ,       CHARACTER
UNIT                               NEXT     *   ,       CHARACTER
UNIT_PRICE                         NEXT     *   ,       CHARACTER

Table PART:
  6 Rows successfully loaded.
  0 Rows not loaded due to data errors.
  0 Rows not loaded because all WHEN clauses were failed.
  0 Rows not loaded because all fields were null.

Space allocated for bind array:                  65016 bytes(36 rows)
Space allocated for memory besides bind array:       0 bytes

Total logical records skipped:          0
Total logical records read:             6
Total logical records rejected:         0
Total logical records discarded:        0

Run began on Wed Mar 05 13:33:16 2008
Run ended on Wed Mar 05 13:33:16 2008

Elapsed time was:     00:00:00.08
CPU time was:         00:00:00.02

SQL>
```

Annex 3
Some Unix Commands

- **ls** displays the files in the current directory

- **ls- ls** displays the detailed files in the current directory

- **more *file*** and **cat** *file* displays the content of the file *file*

- **lpr *file*** prints the file *file*

- **pwd** will give you the current path

- **rm *file*** deletes the file le fichier *file* in your current directory

- **mkdir** (**rmdir**) creates (deletes) a directory

- **cd *new_dir*** change the default directory

- **cd ..** goes back to one directory

- **chmod** *** ***file*** modifies the access rights *(read, write, execute)* to a file or a directory for the owner, the group and other

  ex. chmod 700 gives RWE to the owner
  chmod 740 gives all rights to the owner, a read right to the group
  chmod 755 gives all rights to the owner, and a read/execute to all people including the group

- **logout** (or **exit**) ends your session.

note ⟶ use lowercase characters for these commands