**Partiel : Administration des bases de données**

## Exercice 1 (9 points)

1) Explain the role of the following components of the Oracle DBMS architecture:

a) SGA and PGA memories.

**Shared Global Area: Contains the data and control informations usefull for the oracle server. does link with the server process; Allocated in virtual memory by the OS, include: A shared zone(share pool) / data cache / a log cache (redo log)**

**PGA: Memory area used by a unique server process. Contains: sort area / UGA(user global area) in case of a dedecated server, session informations(otherwise stored in the shared pool) / state of the cursor…**.

b) Background processes: CKPT and LGWR.

**CKPT: synchronization point; LGWR: writing in the log file. Record the modifications from the log buffer into the logfile. Keep track of the modifications to enable the recovery after a failure.**

2) We are interested in the delayed writing mechanism in DBMS.

a) explain this concept and its interest.

**Write in buffer cache; use a buffer cache to reduce the IO operations.**

b) explain how the DBMS puts in place such a mechanism机制.

There is DatabaseBufferCache in SGA. When the size of contents in SGA greater then the threshold,

c) What are two problems that can be posed by writeback and explain how they are supported by the DBMS?

**Atomicity problem and Durabillity problem.**

**Log files: disk file(to ensure that relevant information is not lost) / Swquential writes; Redo log buffer (lazy writing in the log files); Logging protocol: a Logic that control when to write in the log files.**

3) Explain the link between the DBMS synchronization frequency and the duration of the recovery after a breakdown.

4) How can we create a segment under Oracle?

5) What is preventable row chaining? how can we avoid it?

6) In which situation can data from different tables be stored in the same block of data.

7) Under which conditions (ie, for the backup to be exploitable) can an inconsistent backup be made? Why ?

## Exercice 2 (6 points)

1. Give two logical plans and two physical plans for the following SQL query:

Select F.title, F.realizer From Cinema C1, Movie F Where C1.ville = 'Aubière' and F.title in (Select P.title From Cinema C2, Program P Where C1.name = C2.name and P.name = C2.name)

2. Give an example that shows that projection can not be pushed under set difference.

3. Let R be such that B (R)> M4 (where B (R) is the number of disk blocks required for

store the relation R and M corresponds to the number of buffers available in memory for the DBMS).

(a) Explain how to sort such a relationship?

(b) What is the cost of your algorithm?

4. Let R (X, Y) and S (Y, Z) be two large relations (ie, B (R)> M and B (S)> M, where M denotes the number of buffers available in memory for the DBMS and B (R) denote the number of blocks necessary to store a relation R on the disk). The relations R and S are not sorted at first but we suppose that we have an index sorted on the attribute Y of the relations R.

(a) Give a join algorithm between R and S with the least cost.

(b) What is the cost of your algorithm?

## Exercice 3 (4 points)

We consider a database consisting of the following tables: Customers, Products, Orders, Suppliers, Plans and Invoices.

Table 1 below describes various functions in an enterprise, the tasks associated with each function, and the different types of database access required to complete each task. Table 2 lists the company's staff and the tasks assigned to each staff member.

# Questions

5. Propose a strategy to implement the security of this application.

6. Discuss the advantages and disadvantages of the proposed approach.

7. Staff members perform their various tasks using graphical applications developed by the company. We want to prohibit staff any direct access to different tables in the database to allow access only through the graphical interfaces of different applications. Explain how to implement such a security strategy under Oracle.

# Tableau 1

|  |  |  |
| --- | --- | --- |
| **Function** | **Tasks** | **acces** |
| Commerciale | Prospection | Table ***Clients*** : read |
| sale | Table ***Clients*** : read  Table ***Commandes*** : Insertion/modification |
| Promotion | Table ***Clients*** : read |
| Gestion de la production | Plan | Table ***Produits*** : read Table ***Fournisseurs*** : read  Table ***Plans*** : read/insertion/modification/ suppression |
| delivery | Table ***Commandes*** : read Table ***Fournisseurs*** : read  Table ***Factures*** : insertion/modification |
| Finance | Biling | Table ***Commandes*** : read Table ***Factures*** : read/insertion/ modification/suppression |

**Tableau 2**

|  |  |
| --- | --- |
| **Person** | **Tasks** |
| Dupont | Sale, promote |
| Durant | Planning |
| Toto | deliverying |
| Tata | prospecting, Billing |