

MASTER 2/ Theoretical & Industrial computer science

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FINAL EXAM

ADVANCED DATA BASES (ADB)

Exercise 01: : 09 PTS

Answer the following questions

1. Give the deficiencies of RDBMS that led to the emergence of ORDBMS ?

SQL 92 supports a restricted set of built-in types that accommodate only numbers and strings, but many database applications began to include deal with complex objects such as geographic points, text, and digital signal data.

The second deficiency is that the relational model suffers from certain structural shortcomings. They do not provide good support for nested structures, such as sets and arrays and Subtyping between the objects is hard to represent in the model.

The third deficiency is that RDBMS technology does not take advantage of object-oriented (OO) approaches to software engineering. OO techniques reduce development costs and improve information system quality by adopting an object-centric view of software development.

2. List the full form of UDT and UDR in the context of ORDBMS ? (U: D: T:)

User Defined Type

User Defined Routines

3. Give the definition of the ontology ?

A more formal definition is: "An ontology is a formal, explicit specification of a shared conceptualization" (Tom Gruber,1993)

4. Why using ontologies ?

To share common understanding of the structure of information among people or software agents

To enable reuse of domain knowledge }

To make domain assumptions explicit)

To separate domain knowledge from the) operational knowledge

To analyze domain knowledge)

5. List and define the main three main Knowledge representation languages in SDM?

RDF RDFS OWL

6. Give the syntax of a SPARQL query ?

```
SELECT ?sujet ?predicat ?objet  
  
FROM dataSet_name  
  
WHERE {  
  
    ?sujet ?predicat ?objet .  
  
}
```

7. Give four date's rules of Distributed Data Bases ?

Local autonomy

No reliance on a central site

Continuous operation

Location independence

Location independence

Fragmentation independence

Replication independence

Distributed query processing

Distributed transaction processing

Hardware independence

Operating system

Network independence

Database independence

8. Discuss the security in Distributed Data Bases ?

Security In a centralized system: access to the data can be easily controlled. However, in a distributed DBMS not only does access to replicated data have to be controlled in multiple locations, but the network itself has to be made secure.

9. Give two advantageous of Distributed Data Bases ?

ADVANTAGES

Reflects organizational structure

Improved shareability and local autonomy

Improved availability

Improved reliability

Improved performance

Economics

Modular growth

Integration

Remaining competitive

Exercise 02: 05 PTS

You are tasked with designing a database for the university, and you have the following table of instructors

Last name	First name	Office			Phone number	Speciality	
		center	faculty	num		Domain	Technology
Saidi	Mohamed	Cent3	FNTIC	45	05 55 45 67 89 06 66 67 89 09	DB	Oracle
						network	TCP/IP
						E-commerce	Prestashop
						E-learning	Moodle
Zaidi	Amin	Cent3	FNTIC	66	029 04 50 34 07 70 45 45 45 06 66 78 78 78	Algo	JAVA
						UML	Power AMC
						Security	EBIOS
						Web	JAVASCRIPTS

1. Define the Object Relational Schema (define the tables, and the adequate ADTs). **3 PTS**
2. Insert the two records about instructors in the table. **0,5 PTS**
3. Write the program PL SQL for the count of instructors **0,5 PTS**
4. Create the view that list the instructors in the center 3. **0,5 PTS**
5. Display the total number of instructors's after inserting a new instructor (trigger). **0,5 PTS**

SOLUTION

CREATE OR REPLACE TYPE office AS OBJECT (center char(2),faculty char(1), num number(3)); /

- 1.

```
CREATE OR REPLACE TYPE typListeTelephones AS TABLE OF number (10);
```

```
CREATE OR REPLACE TYPE typSpecialite AS OBJECT ( domain varchar2(15),  
technology varchar2(15) ); /
```

```
CREATE OR REPLACE TYPE typListeSpecialites AS TABLE OF typSpecialite; /
```

```
CREATE TABLE tIntervenant (  
lastname varchar2(20) PRIMARY KEY,  
firstname varchar2(20) NOT NULL,  
office typBureau,  
NESTED TABLE ltelephones ,  
NESTED TABLE lspecialites ) ;
```

2.

```
INSERT INTO tIntervenant (pknom, prenom, bureau, ltelephones, lspecialites)  
VALUES ('Crozat', 'Stéphane', office ('PG','K',256), typListeTelephones  
(0687990000,0912345678,0344231234), typListeSpecialites (typSpecialite  
('BD','SGBDR'), typSpeciality ('Doc','XML'), typSpecialite ('BD','SGBDRO')));  
INSERT INTO tIntervenant (pknom, prenom, bureau, ltelephones,lspecialites)  
VALUES ('Vincent','Antoine', typBureau ('R','C',123), typListeTelephones  
(0344231235,0687990001), typListeSpecialites (typSpecialite ('IC','Ontologies'),  
typSpecialite ('BD','SGBDRO')))
```

3. Write the program PL/SQL for the count of instructors:

```
``psql  
DECLARE  
    instructor_count NUMBER;  
BEGIN  
    SELECT COUNT(*) INTO instructor_count FROM tIntervenant;  
    DBMS_OUTPUT.PUT_LINE('Total Number of Instructors: ' || instructor_count);  
END;  
/
```

4. Create the view that lists the instructors in the center 3:

```
CREATE OR REPLACE VIEW vInstructorsCenter3 AS
```

```
SELECT *  
FROM tIntervenant  
WHERE bureau.centre = '3';  
````
```

### 5. Display the total number of instructors after inserting a new instructor (trigger):

```
```psql
CREATE OR REPLACE TRIGGER trg_after_insert_tIntervenant
AFTER INSERT ON tIntervenant
FOR EACH ROW
DECLARE
    instructor_count NUMBER;
BEGIN
    SELECT COUNT(*) INTO instructor_count FROM tIntervenant;

    DBMS_OUTPUT.PUT_LINE('Total Number of Instructors: ' || instructor_count);
END;
/
```
```

**Exercise 03 05 PTS**

The following tables form part of a database held in an RDBMS:

Employee (empNo, fName, lName, address, DOB, sex, position, deptNo)

Department (deptNo, deptName, mgrEmpNo)

Project (projNo, projName, deptNo)

WorksOn (empNo, projNo, dateWorked, hoursWorked)

✓ Give the SQL queries:

1. List all the details of employees who are female and born after 1990.
2. List all employees who are not managers and are paid more than 30000 DA .
3. Find how many managers are female.
4. List all employees from The countries of (Ouargla , HMD) in alphabetical order of surname.
5. Remove all projects that are managed by the planning department.

**SOLUTION**

1. List all the details of employees who are female and born after 1990.

```
```sql
```

```
SELECT *  
FROM Employee  
WHERE sex = 'Female' AND YEAR(DOB) > 1990;  
---
```

2. List all employees who are not managers and are paid more than 30000 DA.

```
```sql  
SELECT *
FROM Employee
WHERE position != 'Manager' AND salary > 30000;

```

3. Find how many managers are female.

```
```sql  
SELECT COUNT(*) AS FemaleManagersCount  
FROM Employee  
WHERE position = 'Manager' AND sex = 'Female';  
---
```

4. List all employees from the countries of (Ouargla, HMD) in alphabetical order of surname.

```
```sql  
SELECT *
FROM Employee
WHERE address IN ('Ouargla', 'HMD')
ORDER BY IName;

```

5. Remove all projects that are managed by the planning department.

```
```sql  
DELETE FROM Project
```

```
WHERE deptNo IN (SELECT deptNo FROM Department WHERE  
deptName = 'Planning');
```

``Exercise 04: 01 PTS

WRITE SPARQL QUERY

The semantic data model incorporates essential properties of books, including titles, authors, publication years, and the availability of copies, allowing users to query and extract detailed information about the books in the dataset.

1. Retrieve all book titles and their authors.
2. Find books published after 2020.

Sure, here are SPARQL queries for the tasks you've described:

1. Retrieve all book titles and their authors.

```
SELECT ?title ?author
```

```
WHERE {
```

```
  ?book ex:title ?title ;
```

```
    ex:author ?author .
```

```
}
```

2. Find books published after 2020.

```
SELECT ?title ?publicationYear
```

```
WHERE {
```

```
  ?book ex:title ?title ;
```

```
    ex:publicationYear ?publicationYear .
```

```
  (?publicationYear > 2020)
```

```
}
```