University of Buea
SECOND SEMESTER EXAMINATION 2013/2014

DEPT: Computer Engineering	COURSE INSTRUCTOR: Mr. Besong Oru
DATE: 18/07/2014	COURSE CODE: CEF 304 COURSE TITLE: Database Management Practice
TIME ALLOWED: 3 Hours	TIME: 08:00
Answer ALL Questions	

INSTRUCTIONS
For multiple choice questions, choose two answers for SOME (not every) question with 2 points.

INTRODUCTION TO POSTGRESQL AND WORKING WITH DATA TYPES (28 Points)

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1. **What is a database? (2pts)**

   _____
   _____
   _____

2. **What is a schema? (2pts)**

   _____
   _____
   _____

3. **What is a table? (2pts)**

   _____
   _____
   _____

4. **PostgreSQL is an ORDBMS, what does the O in ORDBMS stand for?**
   a) Objects
   b) Object Oriented
   c) Order
   d) None of the above
5. **PostgreSQL is a relational database, what does that mean?**
   a) It means the databases are interconnected
   b) It means the Tablespaces are interconnected
   c) It means the views are connected
   d) It means the tables are connected
   e) None of the above
6. **What kind of database management system is PostgreSQL?**
   a) DBMS
   b) RDBMS
   c) ODBMS
   d) ORDBMS
7. **You just left the office and got home and the manager of the Company you work for tells you to connect to the database and check its status remotely, what command will you issue?**
   a) psql –d databasename –h localhost –U username
   b) psql –d databasename –h companyhost –U password
   c) psql –d databasename –h companyhost –U username
   d) psql –d databasename –U username –ip_address companyhost
8. **It's been 2 years since you created your database tables and you don't remember the table definitions you defined two years ago, what command will help you get that information?**
   a) \a
   b) \b
   c) \c
   d) \d

e) DESCRIBE tables

9. **What is the difference between a view and a creating a table using CREATE TABLE ... AS?**
   a) A view is in sync with a table while a CREATE TABLE ... AS is a snapshot.
   b) A view is temporal while a CREATE TABLE ... AS is permanent.
   c) Views are only accessible from the current Postgres Session while CREATE TABLE ... AS are accessible from any session.
   d) None of the above

10. **You work for a very big company with over 10000 employees. You have a table in your database named employees with many columns among which are EMPLOYEE_NAME and EMPLOYEE_ID. The manager asks you how many employees are currently present in the Company. What command do you run? (2 pts)**
   a) Select reltuples from pg_class where relname='employees';
   b) Select relpages from pg_class where relname='employees';
   c) Select count(*) from employees;
   d) Select reltuples(*) from employees;

11. **What data type in PostgreSQL do you use to store large objects > 1Go?**
   a) BLOBs (Binary Large Objects)
   b) BYTEA
   c) OID
   d) lo_import()

12. **Consider the following command below**
   SELECT rentals., customers.customer_id, customers.customer_name*
   FROM rentals, customers
   WHERE customers.customer_id = rentals.customer_id;
   What kind of Join is illustrated here?
   a) Cross join
   b) Inner join
   c) Outer join
   d) Right outer join

13. **What is MVCC?**
   a) Multi Variance Concurrency Control
   b) Minimum Value Concurrency Control
   c) Multi Version Concurrency Control
   d) Maximum Value Concurrency Control

14. **You currently have a Table named USERS and decide to create a temporal table called USERS too for your scrap work then run select * from USERS. What result do you get?**
   a) The create temporal table fails because it has the same name as table USERS
   b) You see data entries for the table USERS
   c) You see data entries for the temporal table USERS
   d) None of the above)

15. **You are going to create a table that will hold over 3 million rows and you are concerned about space. What data type will you use for say names with a maximum of 32 characters?**
   a) TEXT
   b) VARCHAR (32)
   c) CHAR (32)
   d) None of the above

16. **$PGDATA environment variable points to**
   a) Database
   b) Schema
   c) Cluster
   d) Tablespace

17. You work for a Company that has an online database to store DVD movies. Which data type is the best choice to store the movie?

a) BYTEA
b) BLOB
c) OID
d) LO (Large Object)

18. SEQUENCES and SERIALS in PostgreSQL almost have the same function. How can you differentiate them?

a) Sequences are data types while Serial is an object
b) Sequences are more dynamic than Serials
c) They are actually the same
d) None of the Above

19. What column is a perfect candidate for an index?

a) A column that we seldom read or write
b) A column that we frequently write and seldom read
c) A column that we frequently read and seldom write
d) None of the above

20. One of the unique features in PostgreSQL is the fact that you can define a column as an array. Which of the following is a correct declaration of an array?

a) monthly_balance DECIMAL(7,2)[12][12]
b) monthly_balance DECIMAL[12](12)
c) monthly_balance[12] DECIMAL(12)
d) None of the Above

21. PostgreSQL is a relational database because it can implement relationships between two or more tables. Which of the following column constraints implements this relationship?

a) References,
b) Relationship
c) Foreign Key
d) Primary Key

22. What kind of index is defined below

CREATE INDEX customer_exchange ON customers (get_exchange(phone))
WHERE
get_exchange(phone) = '235'
OR
get_exchange(phone) = '236'
OR
get_exchange(phone) = '237';

a) Partial Index
b) Functional Index
c) Full Index
d) a and b

23. You decide to create a composite data type to store a User's address. Which definition below is correct?

a) CREATE TYPE address A (street_number VARCHAR, city VARCHAR, state CHAR(2), postal_code VARCHAR);
b) CREATE DATA address A (street_number VARCHAR, city VARCHAR, state CHAR(2), postal_code VARCHAR);
c) CREATE DATATYPE address A (street_number VARCHAR, city VARCHAR, state CHAR(2), postal_code VARCHAR);
d) None of the Above

24. You decide to save your Postgres tables in another location on your Linux console. You create an empty directory /TSPACE then issue the CREATE TABLESPACE command that fails. What could be the possible cause?

a) You are the superuser
b) Your system doesn't support symbolic links
c) The directory is not owned by postgres

d) You are connected remotely

POSTGRESQL SYNTAX AND USE (12 Points)

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1. **If you have been a programmer for more than 2 days, you certainly have understood the importance of commenting your code. Which of the following are valid PostgreSQL comments.**
   a) /* This is a comment */
   b) COMMENT ON DATABASE databasename IS this is a comment
   c) COMMENT ON DATABASE databasename AS 'this is a comment'
   d) None of the Above
2. **Suppose you have a database named FINANCIAL_DATA and you decide to organize your tables in such a way that reflects financial data corresponding to different years. Which of the following is your best choice. (2 pts)**
   a) Organize tables in different years in different tablespaces
   b) Organize tables in different years in different databases
   c) Organize tables in different years in different schemas
   d) Organize tables in different years in different clusters
3. **The createdb command and the CREATE DATABASE command will both create a database. Which of the following are true? (2 pts)**
   a) CREATE DATABASE is used in your OS console
   b) createdb can be used for scripting purposes
   c) CREATE DATABASE is used only within PostgreSQL console
   d) They are both the same.
4. **Which of the following commands will show you the databases currently installed in your PostgreSQL session? (2 pts)**
   a) /d
   b) /l
   c) psql –l
   d) psql –d
5. **As a DBA, you realize that there is a certain column in your table that is queried a lot and whose values need to be unique. You then decide to create an index on that column. Which of the following is true about the index created.**
   a) It physically orders the rows in the table
   b) It logically orders the rows of the table
   c) This index is very costly in terms of space
   d) This index is very costly in terms of table reads

6. **Suppose you u had a table defined as below. And a constraint on the balance column that says it cant be greater than 20. What happens when you run the command UPDATE customers SET balance = balance + 10;** (2 pts)

customer_id	customer_name	phone	birth_date	balance
1	Jones, Henry	555-1212	1970-10-10	0.00
2	Rubin, William	555-2211	1972-07-10	15.00
3	Panky, Henry	555-1221	1968-01-21	0.00
4	Wonderland, Alice N.	555-1122	1969-03-05	3.00
8	Wink Wankel	555-1000	1988-12-25	0.00

   a) The command runs but nothing happens
   b) The first row is updated
   c) Rows with customer_id 1, 3, 4 and 8 are updated
   d) The command will issue an error.
7. **You are connected on your PostgreSQL database and you begin a bank transfer transaction from user A to User B. User A currently has a balance of 60000FCFA. At time T1, you subtract 50000FCFA from User A, at time T2, you add 50000FCFA to User B and at time T3, you decide to check User A's account and find out the balance is still 60000FCFA. What happened? (2 pts)**
   a) There was a dirty read problem

b) The command to subtract 50000 FCFA was not committed
c) There was a phantom read problem
d) There is another transaction running

8. **You started a transaction on your database and ran the command below and it hanged. Why did it hang?**
INSERT INTO customers VALUES (5, 'Gomez, John', '555-8000', '1960-04-02', 0);
a) It Won't hang because of MVCC
b) There is another user inserting data in the same row in a different transaction.
c) Your PostgreSQL crashed because multiple users were trying to write at the same time
d) None of the above

PERFORMANCE (13 Points)

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1. **You are employed in a company that has a database that has been running for almost 2 years now. As a first task, you want to investigate which tables are most queried. Which view can you exploit? (2 Pts)**
a) pg_class
b) pg_stats
c) pg_statio
d) pg_stat
2. **2 months after being employed as DBA, the queries to table EMPLOYEES are suddenly slow. Which views will you exploit to see where the problem might be coming from?**
a) pg_stat
b) pg_stats
c) pg_statio
d) pg_class
3. **You have an index (record_id_index) defined on a column (record_id) in one of your tables (recalls) that has 3000 Pages. However you realize that your database reads approximately 14560 PAGES when you run the command SELECT * FROM recalls ORDER BY record_id. How could you solve the problem? (2 pts)**
a) ANALYZE recalls;
b) VAVUUM recalls;
c) CLUSTER record_id USING record_id_index;
d) CREATE TEMPORAL TABLE recalls2 AS SELECT * FROM recalls;
4. **For some reason your database is slow and you are trying to find clues as to what is going on. You decide to find out what execution plan your database is using on queries. What command do you run?**
a) VACUUM query;
b) VERBOSE query;
c) ANALYZE query;
d) EXPLAIN query;
5. **You are trying to explain to your Manager that PostgreSQL is a good choice for the Company's database because it has an ARC buffered cache. How would you best explain the ARC cache to him?**
a) Its divided into an LRU and LCU cache
b) Its divided adaptively into an LRU and LFU cache
c) It is divided evenly into an LFU and LRU cache
d) None of the above
6. **You have table Employees in your database and you decide to create another table Employees2 as select * from Employees. Employees has 100 tuples and each tuple is approximately 10K. When you run the command *SELECT reltuples, relpages from pg_class WHERE relname='Employees2'* what result set do you get (reltuples, relpages). (2 pts)**
a) 0, 1

b) 0,0
c) 100, 1
d) 1,1

7. **You are the DBA in a company and the Network Admin tells you that the database is consuming much of the bandwidth. What are your options to solve this while maintaining your database performance?**
   a) Do as much work on the client
   b) Do as much work on the server
   c) Query the database less
   d) Limit the amount of meta data sent from client to server

8. **As a performance routine you decide to run a group of commands that will update your database server statistics. Which of the following group of commands will you run? (2 pts)**
   a) VACUUM, ANALYZE
   b) VACUUM, UPDATE
   c) UPDATE, ANALYZE
   d) EXPLAIN, VACUUM
9. **In PostgreSQL buffer management, to enhance the buffer performance, the LRU buffer was replaced with**
   a) LFU buffer
   b) ABC buffer
   c) ARC buffer
   d) ASR buffer

POSTGRESQL ADMINISTRATION (19 Points)

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1. **In PostgreSQL, sometimes it might be necessary to create new clusters in your information system. Which of the following commands creates a cluster?**
   a) Create cluster -D /usr/newcluster
   b) Initcluster -D /usr/newcluster
   c) Initdb -D /usr/newcluster
   d) Createcluster -D /usr/newcluster
2. **You decide to create a network security in your database system by limiting IP addresses that can access your database. Which file below can you exploit?**
   a) Postgresql.conf
   b) Pg_hba.conf
   c) Pg_ident.conf
   d) None of the above
3. **There were complaints about your database and you decide to take a look at the logs to know exactly what might be going on. Which of the following PostgreSQL directories would you exploit?**
   a) Base
   b) Pg_clog
   c) Pg_log
   d) Pg_xlog
4. **How would you describe the BGWRITER process?**
   a) It runs in the background
   b) It occasionally flushes out modified pages from the buffer
   c) It improves overall performance
   d) All of the above
   e) None of the above
5. **Which of the following creates a user with an unencrypted password, valid only for a minimum of 3 years from now and with no privileges? (2 pts)**
   a) CREATE USER user_name NO CREATEDB CREATEUSER UNENCRYPTED

PASSWORD 'password' VALID UNTIL '01/01/2015'

b) CREATE USER user_name NO UNENCRYPTED PASSWORD 'password' VALID UNTIL '01/01/2015'

c) CREATE USER user_name NO CREATEDB NO CREATEUSER ENCRYPTED PASSWORD 'password' VALID UNTIL '01/01/2015'

d) CREATE USER user_name NO CREATEDB NO CREATEUSER UNENCRYPTED PASSWORD 'password'

6. **Last year your company suffered from some disaster and this year you proposed backing up all the databases in your cluster. Which command do you run?**
   a) Pg_dump database
   b) Pg_dumpall
   c) Pg_restore
   d) None of the above
7. **During your routine checks, you run the following commands cd $PGDATA then find . -not -user postgres –ls and get results. What does that mean? (2 pts)**
   a) Your database is secure
   b) Someone else has access to your database
   c) Someone else has access to your database files
   d) Your database might be insecure
8. **During your routine checks, you run the command cd $PGDATA then find . -type d -not -perm 700 –print and get results. What does this mean? (2 pts)**
   a) Some of your PostgreSQL files might have been compromised
   b) Some of your PostgreSQL directories might have been compromised
   c) Everything is OK
   d) Your PostgreSQL permissions have been compromised
9. **You create a database with many tables and many users. All your Employee users (in the EMPLOYEE group) currently have access to all the Employee tables. Your Manager suddenly decides that employees should have no access to the EMPLOYMENT_HISTORY table. What do you do?**
   a) Delete the EMPLOYMENT_HISTORY TABLE
   b) REVOKE ALL ON EMPLOYEE_HISTORY TO GROUP employee
   c) REVOKE ALL ON GROUP employee TO EMPLOYEE_HISTORY
   d) REVOKE ALL ON EMPLOYEE_HISTORY TO employee
10. **What does it mean to CLUSTER a database table using an index?**
    a) It means rearranging the index in order
    b) It means clustering the data in order
    c) It means rearranging the physical data in order
    d) You cannot cluster a table using an index
11. **You want to create high data availability of your company data. What will you propose?**
    a) Create many databases with the same data
    b) Dump data from one database and restore in another database everyday.
    c) Create a replication cluster
    d) It is not possible to create high availability.
12. **Your company decides to expand having more agencies. Your manager wants all the agencies to have the same data. What do you propose?**
    a) Copying data files from the HQ (Head Quarter) to the other agencies and vice versa
    b) Dumping data in the HQ to the other agencies and vice versa
    c) Create a replication cluster with the HQ and the other agencies
    d) Create a WAN (Wide area Network) with one database and create users in the other agencies that can access that database via the WAN.
13. **PostgreSQL uses Slony for replication for a number of reasons; one of which is because data in all the database servers in the cluster must not be in sync at the same time. Some database servers can be out on sync when they go offline and catch up later when they get online. This means the replication cluster is**
    a) One-way
    b) Cascading
    c) Replicating

d) Asynchronous
e) None of the above

14. PostgreSQL uses Slony for replication for a number of reasons; one of which is because data in a master server is read-write and data in the slave servers are read-only. This means the replication cluster is

a) One-way
a) Cascading
b) Replicating
c) Asynchronous
d) None of the above

15. PostgreSQL uses Slony for replication for a number of reasons; one of which is because data can be passed from the master server to another server and from that other server to another slave server. This means the replication cluster is

b) One-way
e) Cascading
f) Replicating
g) Asynchronous
h) None of the above

16. Your company finally decides to deploy a replication cluster. Which command do you use?

a) Create cluster command
b) Make cluster command
c) Init cluster command
d) None of the above

GOOD LUCK ENGINEERS