



Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree in IT
(Specialization: Cyber Security)

Final Examination

Year 3, Semester 2 (2018)

IT347 – Data & Operating Systems Security

October 2018

Duration: Three Hours

Instructions to Candidates

1. This paper contains **FOUR (04) Questions** printed on **SIX (06)** pages.
2. Answer all **FOUR (04)** questions.
3. Use the answer booklet provided.
4. Please write your Student ID on any additional paper you wish to attach.
5. Please write your answer in point form.
6. The entire exam is worth **100 marks** and contributes **60%** to the final grade.

Question 1

(25 marks)

- a.) Risk assessment is the process of identifying threats. Security administrators treat to the identified risks and finally classify the level of treatment. Residual risk is one of the classification levels in the final report. Explain Residual risk with an example. (6 marks)
- b.) Describe why database security is essential to a company using two important facts. (5 marks)
- c.) Describe an advantage and a disadvantage of SQL authentication over Server authentication when creating database connections from applications. (4 marks)
- d.) Explain preventive and detective measures in security. (4 marks)
- e.) A security administrator created a database view from employee table using follows SQL statement.

```
create view Emp_Salary_View
As
Select Employee_ID, Salary, Designation
From Employees
Where Salary > 10000;
```

By looking at database audit logs, Security administrator identified a security issue in this view. He found following SQL command in the audit file which was violating the condition set on the view.

```
insert into Emp_Salary_View (Employee_ID, Salary, Designation)
values (103, 8500, 'SH_CLERK')
```

Explain the security issue and how to fix this issue.

(6 Marks)

Question 2**(25 marks)**

- a.) Describe the importance of audit records. (5 marks)
- b.) Statement auditing, Privilege auditing and Object auditing are three types of audits available in Oracle databases. Briefly explain privilege auditing with a suitable example. (5 marks)
- c.) A Database administrator wants to audit all the successful delete commands on the Employees table in HR database of Queens PVT Ltd. He needs to recode each and every occurrence of the successful delete statements. He has been issued following statement to implement this feature on the database "AUDIT DELETE ON HR.Employees BY SESSION;". Explain the capability of this statement to implement the above feature. (5 marks)
- d.) Explain following AUDIT_TRAIL parameters values. (7 marks)
- a. NONE
 - b. DB
 - c. OS
 - d. XML
 - e. DB,EXTENDED
- e.) Sec_Admin is one of the database schema used by Security administrator of the Queens PVT Ltd. Write a PLSQL command that can be executed by the security administrator to remove all audit options enabled in Employees table in HR database. (3 marks)

Question 3**(25 marks)**

- a.) Pandora Pvt Ltd runs their systems using Oracle databases to store business information. Mr Sampath is a Database Administrator (DBA) in this company and Miss Nelum is a software engineer who is working in the software development team. One day Miss Nelum wants to create two database roles for two business functions.

Account_Cleark is a database role protected by the password (Acc_Ant@156), and it has been assigned following privileges.

- All privileges on General_Ledger table in the Accounts Schema ,
- Select and Update on EMP_ACNT_VIEW in the HR database,

Hr_Cleark is a database role authorized by the procedure in the System schema called Role_Cleark_Auth. It has following privileges assigned:

- All the operation on EMPLOYEES table in HR database,
- Select on CUSTOMER, CUSTOMER_ORDERS tables in Orders database.

Use above business scenario to answer following questions.

- Write commands used by Mr Sampath to create database roles. (4 Marks)
- Write PLSQL commands to assign requested privileges. (4 Marks)
- Write PLSQL commands to grant Account_Cleark to Nimal, Deeptha and Hr_Cleark to Deeptha, Kasun. (2 Marks)
- Write SET commands to assign Account_Cleark role to Nimal and Deeptha. (2 Marks)
- Fill missing parts of the following procedure to SET Hr_Cleark role to Deeptha and Kasun if their manager id is 5340. (Note : Manager and employee details are stored in the Employees table in HR Schema) (5 marks)
 - CREATE OR REPLACE procedure Role_Cleark_Auth AUTHID CURRENT_USER
 - AS
 - v_user varchar2(50);
 - v_manager_id number :=0;
 - BEGIN
 - v_user := lower((sys_context ('userenv','session_user')));
 - SELECT manager_id
 - INTO v_manager_id FROM HR.EMPLOYEES WHERE lower(LOGIN_ID)=v_user;
 - IF _____
 - THEN
 - EXECUTE IMMEDIATE _____ ;
 - ELSE NULL;
 - END IF;
 - END;
- Separation of duties, Delegation of authority and the Flexible architecture are main advantages of role base access control mechanism. Explain delegation of authority using above example. (8 Marks)

Question 4

(25 marks)

- a.) Explain the difference between data masking and data encryption. (4 Marks)
- b.) Explain symmetric key encryption. (2 marks)
- c.) Explain the following sample code and the encryption algorithm used.

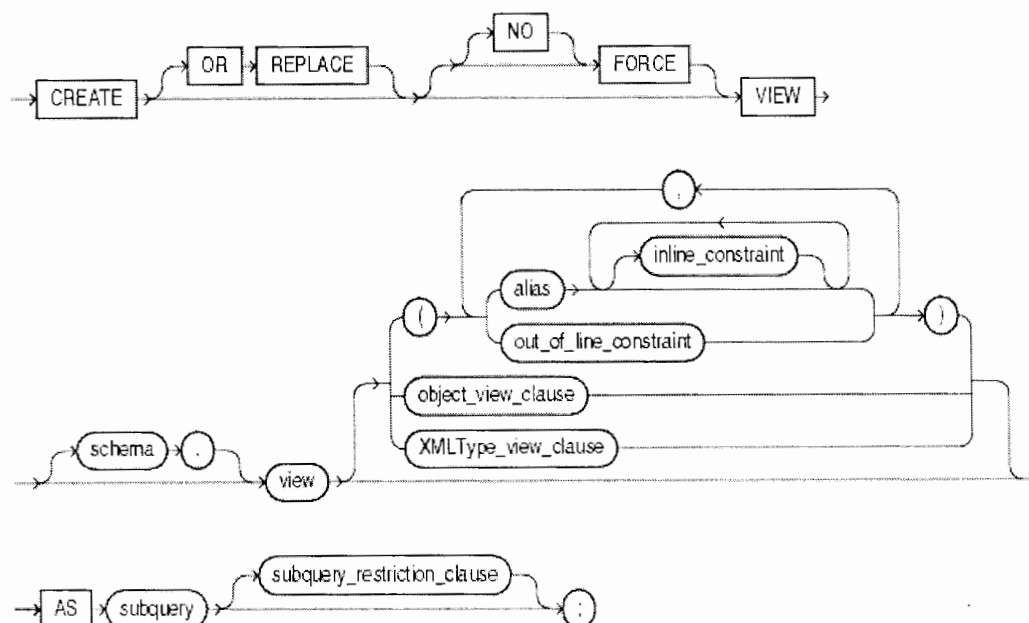
```
encryption_type    PLS_INTEGER := DBMS_CRYPTO.ENCRYPT_DES  
                    + DBMS_CRYPTO.CHAIN_CBC  
                    + DBMS_CRYPTO.PAD_PKCS5;  
  
encryption_key    RAW (32) := UTL_RAW.cast_to_raw('ABC@123');
```

(8 Marks)

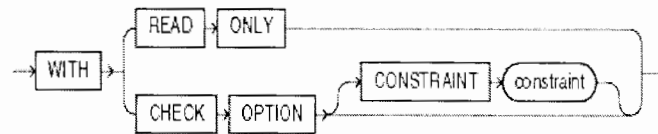
- d.) Describe oracle wallet used in Oracle transparent data encryption. (4 marks)
- e.) Explain the column decryption in Transparent Data Encryption (TDE) using a suitable diagram with the keys involves in this process. (7 Marks)

Command illustration diagrams

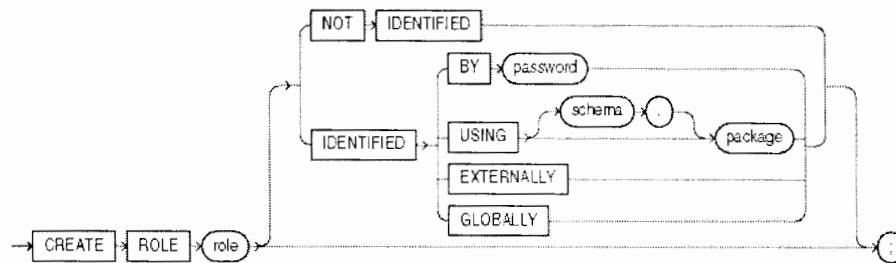
Create view



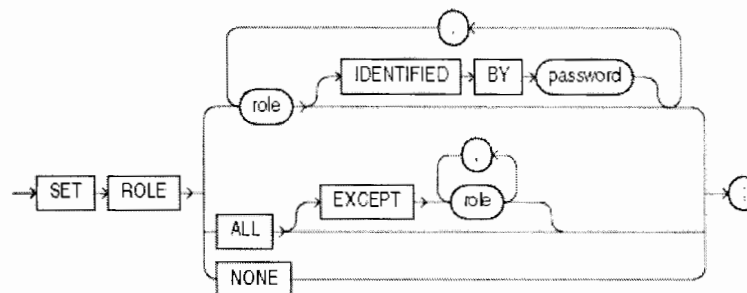
Sub query restriction clauses



Create role



Set role



End of the exam paper