**VINCENT KIMANTHI NJUGUNA**

**SCT221-0690/2022**

**ICS 2204 ASSIGNMENT**

1. **Create a trigger to enforce that employee salaries cannot be increased by more than 10%.**

CREATE TRIGGER salary\_increase\_limit

BEFORE UPDATE ON employees

FOR EACH ROW

BEGIN

IF NEW.salary > OLD.salary \* 1.1 THEN

SIGNAL SQLSTATE '45000'

SET MESSAGE\_TEXT = 'Salary increase cannot exceed 10%';

END IF;

END;

1. **Discuss the activities associated with each of the primary data flows or processes within a data warehouse: inflow, upflow, outflow**

* **Inflow:** Data extraction and cleansing from multiple sources into staging areas.  
  Example: Extracting customer records from CRM and ERP systems.
* **Upflow:** Transformation of data to ensure consistency and loading into the data warehouse.  
  Example: Converting all date formats into a standard format before loading.
* **Outflow:** Delivering processed data to users or applications via reports, dashboards, or queries.  
  Example: Generating monthly sales dashboards for managers.

1. **Describe the architecture, characteristics, and issues associated with each of the following categories of OLAP tools:**

* **MOLAP (Multidimensional OLAP):**
* **Architecture:** Data stored in multidimensional cubes.
* **Characteristics:** Fast query performance, pre-aggregated data.
* **Issues:** Limited scalability due to storage constraints.
* **ROLAP (Relational OLAP):**
* **Architecture:** Relational database backend with OLAP middleware.
* **Characteristics:** Handles large datasets, supports ad hoc queries.
* **Issues:** Slower query performance compared to MOLAP.
* **HOLAP (Hybrid OLAP):**
* **Architecture:** Combines MOLAP and ROLAP features.
* **Characteristics:** Balances speed and scalability.
* **Issues:** Increased complexity.
* **DOLAP (Desktop OLAP):**
* **Architecture:** Data processed and stored locally on client machines.
* **Characteristics:** Offline access.
* **Issues:** Limited data size and performance.

1. **The star, snowflake, and star-flake schemas offer important advantages in a data warehouse environment. Describe these advantages**
2. **Star Schema:**

* **Advantages:** Simple, fast query performance, easy to understand.
* **Example:** Central fact\_sales table connected to dim\_product, dim\_customer, and dim\_time tables.

1. **Snowflake Schema:**

* **Advantages:** Reduced redundancy, normalized dimensions save space.
* **Example:** dim\_customer is normalized into customer\_address and customer\_contact.

1. **Star-Flake Schema:**

* **Advantages:** Combines the simplicity of star and normalization of snowflake schemas.
* **Example:** Hybrid model with some normalized and denormalized tables.

1. **Discuss using examples how the Create table views, store procedures and trigger are implemented database systems**
2. **Create Table:**  
   A **CREATE TABLE** statement defines a new table in the database.  
   **Example:**

CREATE TABLE employees (

id INT AUTO\_INCREMENT PRIMARY KEY,

name VARCHAR(50),

salary DECIMAL(10,2),

department VARCHAR(30)

);

1. **Create View:**  
   A **VIEW** is a virtual table based on the result of a query.  
   **Example:**

CREATE VIEW high\_earners AS

SELECT name, salary

FROM employees

WHERE salary > 7000;

1. **Stored Procedures:**  
   A **Stored Procedure** is a reusable block of SQL statements.  
   **Example:**

DELIMITER //

CREATE PROCEDURE GetDepartmentEmployees(IN dept\_name VARCHAR(30))

BEGIN

SELECT \* FROM employees WHERE department = dept\_name;

END //

DELIMITER ;

1. Triggers:  
   A **Trigger** automatically executes when a specific event occurs (e.g., BEFORE INSERT, AFTER UPDATE).  
   **Example:**

DELIMITER //

CREATE TRIGGER salary\_check

BEFORE UPDATE ON employees

FOR EACH ROW

BEGIN

IF NEW.salary > OLD.salary \* 1.1 THEN

SIGNAL SQLSTATE '45000'

SET MESSAGE\_TEXT = 'Salary increase cannot exceed 10%';

END IF;

END //

DELIMITER ;

1. **Provide examples of important features of data mining tools.**

* **Classification:** Categorizes data into predefined groups.
* **Example:** Classifying emails as “spam” or “non-spam”.
* **Clustering:** Groups similar data into clusters without predefined labels.
* **Example:** Grouping customers based on purchasing behavior.
* **Association Rule Mining**: Identifies relationships between items.
* **Example:** Market Basket Analysis reveals that people who buy bread often buy butter.
* **Regression:** Predicts a numeric outcome based on input variables.
* **Example:** Predicting house prices based on size, location, and age.
* **Outlier Detection:** Identifies unusual patterns in data.
* **Example:** Detecting fraudulent credit card transactions.

1. **Discuss the relationship between data warehousing and data mining.**

* **Data Warehousing:**
* A **data warehouse** is a centralized repository for storing integrated data from multiple sources.
* **Purpose:** Provide a foundation for reporting and analysis.
* **Data Mining:**
* Data mining is the process of analyzing data in a warehouse to discover hidden patterns, trends, and insights.
* **Relationship:**
* Data warehousing provides clean, consolidated data for mining.
* Data mining extracts meaningful information from the warehouse.

**Example:**  
A retail store’s warehouse contains sales data. Data mining tools analyze this data to identify customer purchase patterns, such as "customers who buy diapers often buy baby wipes."

1. **Using example explain the following**
2. **System privilege.**

* Grants permissions to perform operations at the database level.  
  **Example:**

GRANT CREATE USER TO 'admin\_user';

Here, CREATE USER is a system-level privilege that allows a user to create new database users.

1. **Object privilege.**

* Grants permissions on specific database objects such as tables or views.  
  **Example:**

GRANT SELECT, INSERT ON employees TO 'user1';

* . This allows user1 to perform SELECT and INSERT operations on the employees table.

1. **Explain how the following terms are used**
2. **Data definition language**

* Used to define database schema.
* Commands: CREATE, ALTER, DROP.

1. **Data manipulation language**

* Used to manipulate data.
* Commands: SELECT, INSERT, UPDATE, DELETE.

1. **Data control language**

* Controls access permissions.
* Commands: GRANT, REVOKE.

1. **Transaction control language**

* Manages transactions.
* Commands: COMMIT, ROLLBACK, SAVEPOINT.

1. **Explain the following terms are used in database**
2. **SQL variables**

* Temporary storage for values.
* **Example:**

DECLARE v\_salary DECIMAL(10,2);

1. **Assigning variable**

* Using SET or SELECT INTO.
* **Example:**

SET v\_salary = 5000;

SELECT salary INTO v\_salary FROM employees WHERE id = 1;

1. **Declare variable**

* Declares a variable to store data.  
  **Example:**

DECLARE v\_name VARCHAR(50);

1. **Triger transaction**

A transaction initiated within a trigger to maintain data integrity.  
**Example**:

CREATE TRIGGER update\_salary\_log

AFTER UPDATE ON employees

FOR EACH ROW

BEGIN

INSERT INTO salary\_log (employee\_id, old\_salary, new\_salary, update\_time)

VALUES (OLD.id, OLD.salary, NEW.salary, NOW());

END;