Relational Algebra Exercise 23/10/2024

1. Consider the following relations:

- **Users** (Uid, name, desig, age)
- **Library** (Lid, Ltitle, Lauthor, Lpublisher, Lprice)
- **Bookings** (Uid, Lid, date)

Write the Relational Algebra expressions for the following queries:

(a) Retrieve the title of books reserved by professors who are older than 45 years.
(b) Find the Uid of users who have not reserved any books costing more than Nu. 500.
(c) Retrieve the names of authors and the titles of books reserved on 27-May-2018.
(d) Retrieve the names of users who have reserved books published by 'Penguin Random House'.
(e) Retrieve the names of all users who have reserved a book.

2. Consider the following relations:

- **Customers** (Cid, Cname, Ccity)
- **Orders** (Oid, Odate, Cid, TotalAmount)
- **Products** (Pid, Pname, Pcategory, Pprice)
- **OrderDetails** (Oid, Pid, Quantity)

Write the Relational Algebra expressions for the following queries:

(a) Retrieve the names of customers who have placed orders with a total amount greater than Nu. 1000.
(b) Find the product names and categories of products that have been ordered more than 5 times.
(c) Retrieve the names of customers who have ordered any product in the "Electronics" category.
(d) Retrieve the order ID and total amount of orders placed before 01-Jan-2023.
(e) Retrieve the names of customers from "Thimphu" who have placed at least one order containing more than 3 items of a product.

3. Consider the following relations:

- **Colleges** (Cid, Cname, Clocation)
- **Departments** (Did, Dname, Cid)
- **Faculty** (Fid, Fname, Fage, Did)
- **Courses** (CourseID, Coursename, Did)
- **Enrollment** (Sid, CourseID, Year)

Write the Relational Algebra expressions for the following queries:

(a) Retrieve the names of colleges that offer courses in the "Data Science and Data Analytics" departments.
(b) Find the names of faculty members who are older than 50 and belong to colleges located in "Paro."
(c) Retrieve the names of departments that have more than 5 faculty members.
(d) Find the names of students (Sid) enrolled in courses offered by the "Mathematics" department in 2022.
(e) Retrieve the names of all faculty members teaching in departments located in "Sherubtse College."