Module 1 Lab Exercises

1.1: Define the following terms:

1. **Data**: Known facts that can be recorded and have implicit meaning.
2. **Database**: A collection of related data.
3. **DBMS**: A computerized system that enables users to create and maintain a database.
4. **Database system**: Includes the database and the DBMS software.
5. **Database catalog:** Holds the complete definition and/or description of the database structure as well as any constraints.
6. **Program-data independence**: The structure of data files is stored in the DBMS catalog separately from the access programs
7. **User view**: External schemas.
8. **DBA**: A **Database Administrator** is a professional responsible for managing and maintaining a database management system (DBMS) or databases within an organization.
9. **End user**: People whose jobs require access to the database for querying, updating, and generating reports; the database primarily exists for their use.
10. **Canned transaction**: Standard types of queries and updates.
11. **Deductive database system**: Some database systems provide capabilities for defining deduction rules for inferencing new information from the stored database facts.
12. **Persistent object**: A complex object in C++ that can be stored permanently in an object-oriented DBMS is said to be persistent, since it survives the termination of program execution and can later be directly retrieved by another program.
13. **Meta-data**: The information stored in the catalog is called meta-data, and it describes the structure of the primary database.
14. **Transaction-processing application**: Applications such as reservation systems or banking databases, and it is made possible by the concurrency control and recovery subsystems of a DBMS.

1.9: Describe the role of concurrency control in DBMS. Support your answer with an example of transactions in a multiuser environment.

Concurrency control software ensures that several users trying to update the same data do so in a controlled manner so that the result of the updates is correct. For example, when several reservation agents try to assign a seat on an airline flight, the DBMS should ensure that each seat can be accessed by only one agent at a time for assignment to a passenger. These types of applications are generally called online transaction processing (OLTP) applications. A fundamental role of multi user DBMS software is to ensure that concurrent transactions operate correctly and efficiently.

1.10: Specify all the relationships among the records of the database shown in Figure 1.2.

The record for Smith in the **STUDENT** file is related to two records in the **GRADE_REPORT** file that specify Smith's grades in two **sections**. Similarly, each record in the **PREREQUISITE** file relates two **course** records: one representing the course and the other representing the prerequisite.

2.12: Think of different users for the database shown in Figure 1.2: What types of applications would each user need? To which user category would each belong, and what type of interface would each need?

1. The Registrar's Office enters student registration, course section, and grade data on each student.

    a. Applications include:
        i. Student registration
        ii. Prerequisite course completion
        iii. Adding/Dropping students from course sections
        iv. Entering grades
        v. Printing Transcripts
2. The Admissions Office enters newly accepted students into the database and uses the same types of interfaces as the Registrar's Office.