**INTRODUCTION TO DATABASE (IT244)**

**ASSIGNMENT 1**

**(LAST DATE TO SUBMIT: 20/10/2016)**

**Q.1 What are the drawbacks of using file system over database management system? [1 Marks]**

Answer:

* 1. Data redundancy and inconsistency
     + Multiple file formats, duplication of information in different files
  2. Difficulty in accessing data
     + Need to write a new program to carry out each new task
  3. Data isolation — multiple files and formats
  4. Integrity problems
     + Integrity constraints (e.g., account balance > 0) become “buried” in program code rather than being stated explicitly
     + Hard to add new constraints or change existing ones
  5. Atomicity of updates
     + Failures may leave database in an inconsistent state with partial updates carried out
     + Example: Transfer of funds from one account to another should either complete or not happen at all
  6. Concurrent access by multiple users
     + Concurrent access needed for performance
     + Uncontrolled concurrent accesses can lead to inconsistencies
     + Example: Two people reading a balance (say 100) and updating it by withdrawing money (say 50 each) at the same time
  7. Security problems
     + Hard to provide user access to some, but not all, data

**Q.2 List three responsibilities of a database-management system.**

**For each responsibility, explain the problems that would arise if the responsibility were not**

**discharged. [1 Marks]**

Answer: A general-purpose database-management system (DBMS) has three responsibilities:

1. Interaction with the file manager.
2. Integrity enforcement.
3. Security enforcement.

If these responsibilities were not met by a given DBMS the following problems can occur, respctively:

1. No DBMS can do without this, if there is no file manager interaction then nothing stored in the

files can be retrieved.

1. Consistency constraints may not be satisfied, for example, an instructor may belong to a non-existent department, two students may have the same ID, and account balances could go below the minimum allowed, and so on.
2. Unauthorized users may access the database, or users authorized to access part of the database may be able to access parts of the database for which they lack authority. For example, a low-level user could get access to national defense secret codes, or employees could find out what their supervisors earn (which is presumably a secret).

**Q.3 Explain the distinctions among the terms primary key, candidate key, and super key.**

**[1 Marks]**

Answer: A superkey is a set of one or more attributes that, taken collectively, allows us to identify uniquely an entity in the entity set. A superkey may contain extraneous attributes. If K is a superkey, then so is any superset of K. A superkey for which no proper subset is also a superkey is called a candidate key. It is possible that several distinct sets of attributes could serve as candidate keys. The primary key is one of the candidate keys that is chosen by the database designer as the principal means of identifying entities within an entity set.

**Q.4 Consider the bank database. [0.5+0.5+1=2 Marks]**

branch(branch name, branch city, assets)

customer (customer name, customer street, customer city)

loan (loan number, branch name, amount)

borrower (customer name, loan number)

account (account number, branch name, balance)

depositor (customer name, account number)

**Give an expression in the relational algebra for each of the following queries:**

a. Find all loan numbers with a loan value greater than $50,000.

b. Find the names of all depositors who have an account with a value greater than $9,000.

c. Find the names of all depositors who have an account with a value greater than $8,000 at the “Uptown” branch.

**Answer:**

a. π*loan number* (σ *amount*> 50000(*loan*)

b. π*customer name* (σ *balance*> 9000 (*depositor X* *account*))

c. π*customer name* (σ *balance*> 8000∧*branch name*=“Uptown” (*depositor X* *account*))