Chapter 1

Compare and contrast data, databases, database (management) systems and information systems.

A database is a collection of related data; data are known facts that can be recorded and have implicit meaning. Therefore, a database contains data. A database management system is a computerized system that enables users to create and maintain a database. Information systems are made up of various computers, storage systems, application software, and databases, and are maintained by IT departments—they have value to the organization. Essentially, the hierarchy of containment is Information System -> Database management system -> Database -> Data.

Compare and contrast database systems with the following, using the main characteristics of the database approach in your discussion.

-data structures and algorithms

Data structures and algorithms are not committed to persistent storage like databases are—once the program stops running, the data is gone. Databases allow for persistent storage, making them optimal for long-term use. Databases are also self-describing, and they separate data from programs. They can also have multiple views, for the stakeholders, users, and security.

-traditional file systems

In traditional file systems, each user defines and implements the files needed for a specific software application as part of programming the application. It is redundant as each user may need access to the same data, which would be replicated for each user. Databases allow simultaneous access in order to avoid wasting memory/space.

Identify the stakeholders of database systems.

One is the database administrator, who is responsible for authorizing access to the database, coordinating and monitoring its use, and acquiring software and hardware resources as needed. The database designer are responsible for identifying the data to be stored in the database and for choosing appropriate structures to represent and store this data. Then there are the end users—casual (occasionally access database, but may need different information each time), naïve or parametric (use standard queries that have been carefully programmed and tested), sophisticated (thoroughly familiarize themselves with the database), and standalone (use ready-made program packages that provide GUIs).

Chapter 2

Explain the significance of the categories of data models. Which type of model is displayed in Figure 2.1?

One category is conceptual data modules, which are close to the way that users perceive data. On the other extreme, there is physical data models, which describe the details of how data is stored on the computer storage media. The median between these two is representational data models, which are

understood by users but closer to how data is stored than conceptual. Figure 2.1 is a representational data model, as the names are easily understood, yet use underscores to denote spaces.

Explain the structure and significance of the three-schema architecture.

There are three levels: 1) The internal level (internal schema), which describes the physical storage structure of the database; 2) The conceptual level (conceptual schema), which describes the structure of the whole database for a community of users; 3) The external level (external schemas), where each external schema describes the part of the database that a particular user is interested in and hides the rest of the database from them. The goal of this is to separate the user applications from the physical database.

Explain the tiers used in a typical web-based information system.

The top tier is the presentation layer, which is viewed by the client and is typically a GUI or web interface. The second tier is the business logic layer, containing the application or web server which serves up application programs or webpages. The final tier is the database services layer, which contains the database server (and by extension the database management system).