

CS 327 Spring 2025

Homework 1 - Solution

Basic Concepts/ DBMS Architecture.

Question 1:

- a. List any three advantages of using a database over traditional file storage. [3]

Any three of the following:

- Sharing of data among multiple users.
- Restricting unauthorized access to data.
- Providing multiple interfaces to different classes of users.
- Representing complex relationships among data.
- Enforcing integrity constraints on the database.
- Providing backup and recovery services.
- Potential for enforcing standards.
- Flexibility to change data structures.
- Reduced application development time.
- Availability of up-to-date information.
- Economies of scale.

- b. List any three situations where using a database would be disadvantageous. [3]

Any three out of the following:

- High initial investment and possible need for additional hardware.
- Overhead for providing generality, security, recovery, Integrity, and concurrency control.
- If the database and applications are simple, well defined, and not expected to change.
- If there are stringent real-time requirements that may not be met because of DBMS overhead.
- If access to data by multiple users is not required.
- If the database system is not able to handle the complexity of data because of modeling limitations

Question 2:

- a. Describe in your own words, what is meant by data abstraction. [2]

Data abstraction is the characteristic that allows program-data independence. Data abstraction is used to provide the users with a conceptual representation of data that does not include many of the details of how data is stored.

- b. Write in your own words, the difference between database schema and database instance.

Database schema – structure or definition of the database
Database instance – the data in the database at any given time
The schema remains intact even if all the data in the instance is deleted.

[2]

Question 3: Write brief answers to the following, in your own words:

- a. When starting up your servers, which should you start first: the Apache web server or the MariaDB database server? Why? [3]

The DB server must be started before the web server. This is to prevent users from being able to access the application (which runs on the webserver) and send requests to the DB when the DB server isn't up and running.

- b. What does A_I mean, in the context of a table column? What is it used for? [2]

A_I stands for auto increment. It is used for creating a column in a table that contains an automatically increasing number. This is usually used to create the primary key for the table.

Question 4: Create a database called “college”. In it, create a table called “student.” It should have a numeric ID column that is the primary key, a firstname, a lastname (both 30 characters long), a decimal GPA column, an email column and a phone number column. Only the phone number column is allowed to be null, and the email must be unique.

View the SQL code for the table creation and copy-paste it as the answer to this question. [5]

The exact query may differ slightly, but I'm trying to see if they get the idea of creating a table using the program. So use your judgement, but a query approximately like this should get the full marks.

```
CREATE TABLE `college`.`student` (`ID` INT NOT NULL , `firstname` VARCHAR(30) NOT NULL , `lastname` VARCHAR(30) NOT NULL , `gpa` DECIMAL NOT NULL , `email` VARCHAR(30) NOT NULL , `phonenumber` INT(10) NULL , PRIMARY KEY (`ID`), UNIQUE `email_unique` (`email`(30)) ) ENGINE = InnoDB;
```