**Homework #4 Answers**

**CECS 378 – Spring 2021 Cappel**

**Due:** Wednesday, March 10th prior to class (11:59 PM)

**Homework #4 is focused on database and data center security.**

**There are 5 total questions all worth 20 points each (100 pts total).**

**Chapter 5 – Database and Data Center Security**

1. Define the terms *database*, *database management system*, and *query language*.

A **database** is a structured collection of data stored for use by one or

more applications. In addition to data, a database contains the

relationships between data items and groups of data items. A

**database management system (DBMS)**, which is a suite of

programs for constructing and maintaining the database and for

offering ad hoc query facilities to multiple users and applications. A

**query language** provides a uniform interface to the database for users and applications.

1. List and briefly describe some administrative policies that can be used with a RDBMS.

**Centralized administration:** A small number of privileged users may

grant and revoke access rights.

**Ownership-based administration:** The owner (creator) of a table

may grant and revoke access rights to the table.

**Decentralized administration:** In addition to granting and revoking

access rights to a table, the owner of the table may grant and revoke

authorization to other users, allowing them to grant and revoke access rights to the table.

1. What are the disadvantages of database encryption?

**Key management:** Authorized users must have access to the

decryption key for the data for which they have access. Because a

database is typically accessible to a wide range of users and a number

of applications, providing secure keys to selected parts of the database

to authorized users and applications is a complex task.

**Inflexibility:** When part or all of the database is encrypted, it becomes more difficult to perform record searching.

1. The following table provides information on members of a mountain climbing club:

|  |  |  |  |
| --- | --- | --- | --- |
| **Climber-ID** | **Name** | **Skill Level** | **Age** |
| 123 | Edmund | Experienced | 80 |
| 214 | Arnold | Beginner | 25 |
| 313 | Bridget | Experienced | 33 |
| 212 | James | Intermediate | 27 |

The primary key is *Climber-ID*. Explain whether or not each of the following rows can be added to the table. If a row cannot be added, explain why not.

|  |  |  |  |
| --- | --- | --- | --- |
| **Climber-ID** | **Name** | **Skill Level** | **Age** |
| 214 | Abbot | Intermediate | 40 |
|  | John | Experienced | 19 |
| 15 | Jeff | Intermediate | 42 |

It is clear that Climber-ID is the primary key of the table. The first row

cannot be added. If violates the uniqueness property of the key because there is a Climber-ID 214 already in the table. The second row cannot be added. It violates the integrity constraint of the key because there is no value for the primary key. The third row can be added.

1. The following table shows a list of pets and their owners that is used by a veterinarian service.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **P\_Name** | **Type** | **Breed** | **DOB** | **Owner** | **O\_Phone** | **O\_E-mail** |
| Kino | Dog | Poodle | 3/27/07 | M. Downs | 5551236 | md@abc.com |
| Teddy | Cat | Chartreaux | 4/2/08 | M. Downs | 1232343 | md@abc.com |
| Filo | Dog | Poodle | 2/24/02 | R. James | 2343454 | rj@abc.com |
| AJ | Dog | Collie Mix | 11/12/05 | Liz Frier | 3456567 | liz@abc.com |
| Cedro | Cat | Unknown | 12/10/06 | R. James | 7865432 | rj@abc.com |
| Woolley | Cat | Unknown | 10/2/10 | M. Trent | 9870678 | mt@abc.com |
| Buster | Dog | Collie | 4/4/11 | Ronny | 4565433 | ron@abc.com |

1. Describe four problems that are likely to occur when using this table.

(1) Updating an owner’s name or other data must be done in

(potentially) many rows

(2) Possibly incorrect, inconsistent owner data across rows (change

in one row, but not in another)

(3) Entering correct data inconsistently

(4) No place to store owner (your customer) data unless they have a pet

1. Break the table into two tables in a way that fixes the four problems.

