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COMP 378

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Introduction to database management

Assignment 2

1. A)

Referential integrity is established between tables by means of the primary keys within one table appearing in other, which is called a Foreign Key.(Ibm, 2022)

For instance we can establish referential integrity through minimally 2 tables by establishing one as primary key and within the other table this key will reoccur within the second table but it will become a foreign key at this point.

|  |  |
| --- | --- |
| Emp\_ID | Station\_num |
| 339944 | #003 |
| 334467 | #002 |
| 778994 | #001 |

|  |  |
| --- | --- |
| Station\_num | Job\_title |
| #003 | Clerk |
| #002 | Administrator |
| #001 | Supervisor |

The Station number within the first table is the primary key and it reoccurs within table 2 as a foreign key, and in this instance establishes referential integrity.

An index is created not as part of the SQL table but as a shortcut to values and to address performance issues and are created after the table is.

The factors that must be considered when creating an index for an SQL column are

The size of the table - as an index on a smaller table would not be necessary but on larger tables could provide ease of use.

Index lookup results - if the results returned are not specific enough or return too many values to sort through this may also be a determining factor.

Procedures are combinations of SQL statements which perform specified tasks and can be executed by the user manually, but a trigger is a a kind of procedure that is only executed automatically when either the insert,update or delete is fired on the table the trigger is referencing. (tutorialspoint, 2022)Transaction procedures can be used inside of stored procedures and not within triggers.

Stored procedures are able to return values, but triggers cannot. This makes them advantageous for user specified tasks, having parameters and being able to return multiple sets of results.

There are certain advantages of triggers like better protection of data, inhibiting invalid transactions, keeping tables in sync, enforced referential integrity, useful in auditing and event logging.(GeeksforGeeks, 2020)

The DB program of my choosing for this assignment is the one I am most familiar with which is called “DB browser for SQLite”, so any Query in this assignment is done within the scope of that specific program. The word transaction is a keyword so therefor to access it simply as a table squared brackets are needed.

1. SELECT DISTINCT COUNT(C\_ID) FROM [TRANSACTION]
2. SELECT name FROM TRAVEL\_AGENT ORDER BY age Desc LIMIT 1
3. SELECT COUNT(\*)from [TRANSACTION] where amount\_paid > 1000 group by TA\_no
4. SELECT name, age FROM TRAVEL\_AGENT WHERE name in

(SELECT TA\_no FROM [TRANSACTION] WHERE name = ‘John Smith’) order by age desc;

e.SELECT \*

FROM Customer

INNER JOIN [TRANSACTION] on [TRANSACTION].C\_ID = CUSTOMER.C\_ID

INNER JOIN TRAVEL\_AGENT on [TRANSACTION].TA\_no = TRAVEL\_AGENT.TA\_no

1. SELECT age FROM TRAVEL\_AGENT WHERE name in

(SELECT travel\_agent name FROM [TRANSACTION] WHERE CUSTOMER name =

(SELECT name from customer where name ='John Smith' and destination ='Ottawa'));

H.--

1. Select name FROM TRAVEL\_AGENT WHERE (TA\_no < 5);
2. Select name FROM TRAVEL\_AGENT WHERE (Journeys < 10

3.

CREATE VIEW IF NOT EXISTS AgentsOfTheYear(

AS SELECT RealtorAgent.name, RealtorAgent.address, Transaction.price\_sold)

FROM RealtorAgent

INNER JOIN [Transaction] ON Transaction.price\_sold =Transaction.price\_sold;

WHERE sum(Transaction.price\_sold)<=3,000,000);

4.

select distinct i.name

from Registration r inner join Instructor i on r.instructor\_no = i.instructor\_no

where r.course\_no = 'COMP 378' and r.session in ('Winter 2020', 'Winter 2021')

and r.instructor\_no not in

(select instructor\_no from Registration where course\_no = 'COMP 418' and session in ('Winter 2020', 'Winter 2021'));

1. A)

Within the client server environment the distribution of application logic is important, and the ways in which they are distributed defines the architecture. The three components of application logic are I/O, processing logic, and storage logic.

The idea of database security pertains to accidental or intentional threats to the databases integrity and access.

The most important features of data management software are being up to date on latest security requirements, Views/abstraction, Integrity Controls, Authentication and Encryption.

Security updates are important because software is constantly changing and so are the security measures and while this may be true hackers are also constantly learning and adapting to these features as well. (dbta, 2019)

Controlling who can see and has access to certain information is a concept that runs very deep in software engineering, and computer science. It is also prevalent in databases. This is done by means of “Views” which are made by querying base tables and producing a version of these tables for the user, while hiding any unnecessary or sensitive information.

Integrity Controls limit values a field may hold and any actions that may be performed on this data which protects data from unauthorized updates and usage. Types of Integrity controls are Assertions, triggers and stored procedures but more generally integrity controls are practices that control the integrity of the database.

Authentication and Encryption are two sides of the same coin. Encryption scrambles data so that it cannot be deciphered by a human, which is automatically applied by some database management systems when being stored or sending over communication channels. Authentication is when someone is prompted to enter some sort of information identifying them that must match what is in the system, in order to gain access otherwise they are blocked from entry.

C)

The threats that must be addressed in a comprehensive data security plan include human error/accidents, theft and fraud, loss of privacy, loss of data integrity and availability.

Hardware maintenance and software update procedures should take care of accidental loss of information or corruption. A firewall can be established to prevent theft and fraud, and activities logged and regulated in terms of data access. State laws are in place to enforce security measurements of sensitive data and also holding any criminal accountable. Data corruption can be prevented through backup of data whereas the availability of data being compromised from network or hardware failure which is mainly combated by antivirus software and wellness checks of the system in place.

Protection from these various threats would also include the above listed integrity controls, authentication and encryption, abstraction/views.

D.

Locking is a process where data is retrieved by a user for alteration, it is then locked so that until the update is complete no other users can access this data.This can encompass various types of locks and is more broad and falls within the category of concurrent control, which is to manage various users trying to access a database at the same time so there is no issues.

Shared locking is to allow transactions to read but not to update the record. A shared lock on a resource can be owned by several tasks at the same time, and shared locks support read integrity.

Exclusive Locks are a technique that prevent access to a record while it is being updated until it is unlocked. This kind of lock can only be owned by one transaction at a time.

“Exclusive locks can be active or retained; shared locks can only be active”(ibm, 2022)

Two problems that would occur from concurrent execution within this table are Inconsistent analysis problem, or Lost update problem.

When a transaction is accessing data multiple times but the values change after the first read. This is similar to a dirty read but it only selects committed data, this is known as inconsistent analysis.

Lost updates happen when multiple transactions are accessing the same database simultaneously which interrupts their operation as they are unaware that the other transaction is trying to make an update and this results in lost data. (careerride,2022)

7.

For figure one since the client is merely connecting to the web server and not the database, a simple firewall would be needed and likely no other adcanced verification. In the second instance, the dynamic page request would need a verification step for a user to access this internal database, and use encryption when passing messages from the database over the server.

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