CSE 530 – Midterm Exam

Name:

(Print ***CLEARLY***)

Question	Points Possible	Points Earned
1	25	
2	15	
3	20	
4	25	
Total	85	

Question 1 – Transactions and Locking

(6 points) Transactions are said to abide by four properties called the ACID properties. Some of these properties can be manipulated by programmers/administrators while other properties are tightly controlled by the system. Name at least one ACID property that can be modified by a database programmer/administrator and explain how it can be modified.

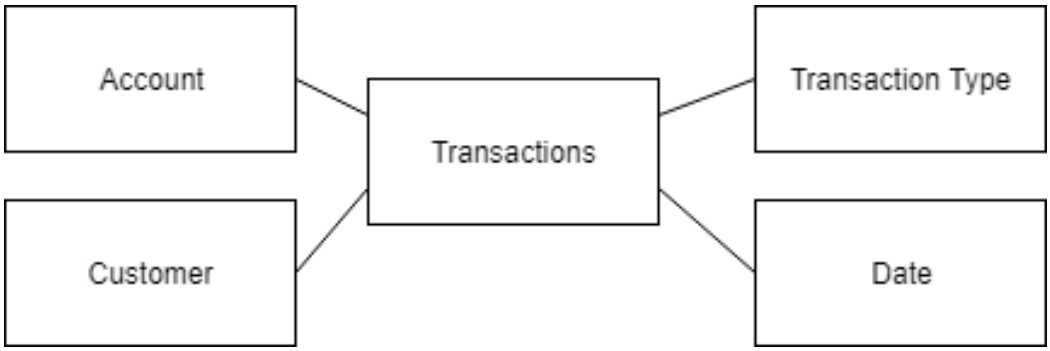
(6 points) In class we used a precedence graph to determine whether schedules were serializable or not. Give at least two reasons why this technique is not used in typical database implementations.

(7 points) Does strict two-phase locking prevent deadlock? If yes, explain how. If no, provide an example of a schedule that obeys two-phase locking but also creates deadlock.

(6 points) What is an intention lock? Name at least one way that intention locks can lead to increased performance.

Question 2 – Data Warehousing

You are given the following star schema:



(3 points) What is the granularity of the above data warehouse?

(2 points) Name a measure that you would expect to find in this data warehouse.

(10 points) Starting with a base cube that contains all of the dimensions (Account, Transaction Type, Customer, Date) state which cube operations would be necessary to examine all deposit transactions that took place in Q3 of 2017 for customers that have two or more cars in the state of Missouri.

Question 3 – Distributed Databases

(7 points) Explain at least two differences between how transactions are handled in a distributed database vs. a centralized database.

(7 points) What is the difference between reliability and availability? How does distribution affect the reliability and availability of a system?

(6 points) Under what circumstances would it be preferable to use a distributed catalog as opposed to a centralized catalog?

Question 4 – MongoDB

(25 points) In class we discussed how MongoDB allows us to have much more flexibility with our database design. We also discussed how the design choices we make involve tradeoffs.

For this problem, you need to design a MongoDB database for a simple social network. This social network allows users to create posts and also allows users to like posts that have been made. Your designs should include user information (username, email address), post information (title, content) as well as a way of tracking what user made each post and what users have liked each post.

You must come up with two different designs. Once you have created your database designs, discuss the tradeoffs that exist between them.

Design 1:

Design 2:

What tradeoffs exist between the two designs that you have created? Name at least two advantages and disadvantages of each design.