Institute of Information Technology

Jahangirnagar University

Professional Masters in IT

2nd Semester Special Final Examination — **Semester: Spring 2019**

Duration: 3 Hours — Full Marks: 60

Course Code: PMIT – 6104 — **Course Title: Database Security**

Do not write anything on the question paper.

There are 7 (Seven) questions. Answer any 5 (Five) of them.

Figures in the right margin indicate marks.

1. a) What is the objective of *data security*? **(2)**

   b) The accounting branch of a large organization requires an application to process expense vouchers. Each voucher must be input by one of many accounting clerks, verified by the clerk's applicable supervisor, then reconciled by an auditor before the reimbursement check is produced. **(3)**

   What *access control technique* should be built into the application to meet the information protection needs and why?

   c) In the context of database security, what is *an inference attack*? Give an example of what this means, and list a few common techniques that are used to defend against them. **(4)**

   d) Define "Discretionary Access Control" and illustrate its application through 'privileges'. **(3)**

2. a) "Once authenticated by the operating system, users can connect to RDBMS more conveniently, even without specifying a user name or password"- this is the usual practice as adopted by major RDBMS. **(4)**

   Do you think any potential thread in this approach in terms of DB security? If so, how to address such threads?

   b) What are the two important cases of the *inference problem*? Explain with necessary example. **(4)**

   c) What are the limitations of *Mandatory access Control (MAC)?* **(2)**

   d) What is the inverse of *confidentiality, integrity, and availability* (C.I.A.) triad in risk management? **(2)**

3. a) What is *Trust Management System*? **(2)**

   b) What are the three components of *Trust Management*? **(3)**

   c) How does *Pretty Good Privacy (PGP)* certificate system works? Explain with necessary figure. **(4)**

   d) What are the challenges in *Trust Management process*? **(3)**

4. a) What is the main goal of Database-As-Service (DAS) model? **(2)**

   b) How client data are organized in the service provider's Database in DAS setup? **(2)**

   c) Consider the following ***Student*** table. Explain the procedure to encrypt the GPA column by using *Partition, Identification and Mapping function*. **(5)**

S_ID	S_Name	Marks_Obtained	GPA
101	Asif	42	D
310	Kamal	66.5	B+
325	Abir	71	A-
425	Rahim	57.5	B-
475	Sabbir	82	A+
510	Sazid	64	B

d) Consider the above mentioned ***Student*** table in question 4(c). (3)
Query: Retrieves all students' name whose marks is greater than 65 and student ID is in between 320 to 450.

5. a) What is meant by *"Data compromise"*? How do you differentiate between positive and negative data compromise? (4)
b) Consider the table "**Patient**" with the attributes (**Age, Sex, Employer, Social Security Number, Diagnosis Type**). If a malevolent user (who knows the age and employer of Mr. X) wants to obtain information about the diagnosis type of a given patient, Mr. X, how will he (malevolent user) infer the required information from the database? (5)
c) How do you secure statistical data by *controlling query set size*? (3)

6. a) What happens when two clients try to write into the same *HDFS file*? (2)
b) If reducers do not start before all mappers finish then why does the progress on MapReduce job shows something like Map(50%) Reduce(10%)? Why reducers progress percentage is displayed when mapper is not finished yet? (2)
c) Draw the Mapreduce diagram to count the number of words of the following box. (5)

Ball Box Table
Table Table Box
Ball Table Box

d) What is *Inverse Document Frequency*? How does it work? (3)

7. a) How can an image be watermarked? Explain with necessary diagram. (3)
b) What will happen if you watermark the watermarked image? Could this be regarded as a kind of attack? If so what is its effect? (3)
c) How do you hide a message into an image LSB steganography method? (4)
d) Can the steganography be used together with cryptography to enhance information hiding and obscuring? Explain. (2)