



Course Title: Introduction to Database Systems

(Final exam) CSE 451

Date: Dec. 2018 (First term)

Allowed time: 120 Mins

No. of Pages: (2)

Remarks: (Answer the following questions... assume any missing data)

Question No. (1) (14 Marks two point for each sub question)

Q1-A) What is meant by Data in computer field? Then specify the relation between Data and information?

Q1-B) Write a short note about Database

Q1-C) In the DB context define the relation between Data and meta data?

Q1-D) State the Database systems components?

Q1-E) State the relation between the following terms: (IRS and DBS)-(DB manager, DB server, DB Engine, and DBMS) - (DSL and DBMS)

Q1-F) "Increased impact in case of DBMS failure"; discuss the previous statement?

Q1-G) Different vendors provides us with a variable size of DBMS, specify the reasons of such variation (which size you prefer DBMS with large size or that with small size?).

Question No. (2) (10 Marks two point for each sub question)

Q2-A) Databases can be characterized by their size (the amount of data in them) and their complexity. In the case of relational databases, we could say that the complexity is the number of tables. How complex do you think databases can get in real life? Is there a trade-off between size and complexity?

Q2-B) Explain how does DBMS solve the problem of redundancy in flat file systems

Q2-C) Specify the most important criteria for selecting DBMS in your DB application. write a short note about each ?

Q2-D) What are the Components of a DBMS?

Q2-E) What is meant by system tables? If RDB supports other types list these types.

Question No. (3) (17 Marks)

Q3-A) (4 points) For the following DB schema

WORKS_ON [ESSN, PNo, Hours] - **DEPENDENT** [ESSN, Dep_Name, DOB, Relationship]

write a relational algebra statements that:

- I. Lists the ESSN's of employees who either have dependents or work on projects.
- II. List the ESSN's of employees who have dependents and work on projects
- III. List the ESSN's of employees who have dependents but do not work on projects.

Q3-B) (5points) For the following schema.

Write the relational algebra to find:

- Find names of sailors who've reserved boat #103
- Find names of sailors who've reserved a red boat:
- Find sailors who've reserved a red or a green boat
- Find sailors who've reserved a red and a green boat:

Q3-C) (2 points) State the different Types of Attributes in the E/R diagram

Reserves	sid	bid	day
	22	101	10/10/96
	58	103	11/12/96

Sailors	sid	sname	rating	age
	22	dustin	7	45.0
	31	lubber	8	55.5
	58	rusty	10	35.0

Boats

bid	bname	color
101	Interlake	Blue
102	Interlake	Red
103	Clipper	Green
104	Marine	Red

Q3-D) (6 points) A shipment company has an information system. Shipped items are the heart of the Co. product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the Co. system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute. Create an Entity Relationship diagram that captures this information about the UPS system. Be certain to indicate identifiers and cardinality constraints.

Question No. (4) (14 Marks)

Q4-A) (2 points) What does normalization do? Then specify Why Normalize?

Q4-B) (6 p) State if the following data is normalized or not, else apply the normalization steps

Record #	Order-Num	Order-Date	Product-Num	Product-Desc	Num-Ordered
1	40311	03111993	304	All-purpose	7
			633	Trangam	1
2			684	Super gismo	4
	40312	03111993	128	Steel widget	12
3			304	All-purpose	3
	40313	03121993	304	All-purpose	144

(Q4-C) (6 points) You are designing a database for KW Humane Society. The result is the following set of relations where the type of each relations attribute is given following the attribute :

Animals(ID: integer, Name: string, PrevOwner: string, DateAdmitted: date, Type: string)

Adopter(SIN: integer, Name: string, Address: string, OtherAnimals: integer)

Adoption(AnimalID: integer, SIN: integer, AdoptDate: date, chipNo: integer)

where (a) Animals stores information about the animals currently at the Humane Society. Each is given an ID, and their names together with the SIN of their previous owners, and their date of admission is recorded. Type refers to the type of animal (dog, cat, etc). (b) Adopter is the relation that holds information about animal adopters. The attributes are self-descriptive, except Other Animals which records the number of other animals that the adopter currently has at home. (c) AnimalID in Adoption refers to the ID of Animals. Similarly, SIN in Adoption refers to the SIN of Adopter. Attribute chipNo stores the number on the microchip that is implanted on the animal for tracking. Adopter in Animals refers to the SIN of Adopter (in this case the previous adopter).

Formulate the following queries in SQL; (10 points) (each is worth 2 points:

(a) Retrieve the total number of dogs that were brought to the Humane Society on 18 April 2000.

(b) List the name of the adopter who has adopted every type of animal.

(c) For each animal type, list the animal type and total number of adoptions on 14 June 1999.

Best wishes

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