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PES University, Bangalore

(Established under Karnataka Act 16 of 2013)

UE16CS312

END SEMESTER ASSESSMENT (ESA) B. TECH. 5TH SEMESTER – December 2018

UE16CS312 - Advanced Database Management Systems

Time: 3 Hours | Answer All Questions | Max Marks: 100

Make suitable assumptions when necessary and state them

1.	a	Design a star schema for the following requirement: A fast food chain of restaurants has a number of branches. The city belongs to a state (like Karnataka etc.), state to a region (like South etc.) and region to the country (like India). The fast food chain operates in a number of countries. It sells a number of food items like Idly, vada, dosa, coffee, tea and other items. Item_type refers to whether the food item is food(solid) or beverage(drink). The billing system captures the time and date on which the transaction is made. ***Source Schema:*** item(item_id, item_name, price, item_type). branch(branch_id, locality, city, address, manager_id). bill_header(bill_id, date_time, branch_id) bill_lines(bill_id, line_id, item_id, quantity, price) i. Design and draw a star schema showing all the tables, columns and keys in detail. (4 marks) ii. Identify the dimensional hierarchies in this design. (2 marks) iii. Customers are becoming health conscious. If the manager wants to analyze the sales of items based on whether they have oil or not, what changes should you make and where? (2 marks)	8
	b	Compare OLTP and OLAP for the following features: i. Number of users ii. Type of users iii. Number of records accessed iv. Type of access	4
	c	Write SQL statements for the requirements given below: **sales**(year, month, date, state, city, product_name, sales_amount) i. List the *state*, *product_name*, total *sales_amount* and *rank()* of the product according to its sales for each *state* for the *year* 2017. ii. List the ***three month moving average*** of total *sales_amount* for each *product_name* for the *year* 2017.	4
	d	List and explain any two OLAP operations and any two Data Mining techniques.	4
2.	a	Write the diagram for the three architectures for parallel databases. (4 marks) Which of the three is adopted in NoSQL systems and why? (2 marks)	6
	b	What is I/O parallelism? List and explain the techniques for achieving I/O parallelism.	4
	c	What is data fragmentation and replication? What are the types of fragmentation? What are the advantages and disadvantages of replication?	6

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	d	Explain the steps of the 2 phase commit protocol.	4
3.	a	What is impedance mismatch? Explain with an example. (4 marks) What is aggregate data model? (4 marks)	8
	b	Design a MongoDB Document for a company to display the details of its employees. The details include their picture, personal (date of birth etc.) and contact details (address, email, phone). It also includes various projects and positions they have worked in the past. Explain whether you will have one or more document and the reasons for your choice. Example Data: Employee Sita has a picture, designation, date of birth, joining date, home and office address, email, phone number. Sita was Trainee Engineer between 01/01/2016 and 30/06/2016, Engineer between 01/07/2016 and 31/01/2017 and Senior Engineer from 01/02/2017 till today. She has also worked on three projects (name, start and end date).	8
	c	Give an example for each type of the following actions in MongoDB: i. Create or Insert a document, (1 mark) ii. Find documents by applying a filter to a text column.(1 mark) iii. Find a document using on a number column, say salary between 20000 and 30000. (2 marks)	4
4.	a	What are some (minimum two) applications of i. Key-value databases iii. Graph Databases ii. Column-family databases	6
	b	Are these two Cassandra queries valid and will they get executed? What is the result? Justify. i. SELECT SUM(salary) FROM EMPLOYEE WHERE DEPT = 'FINANCE'; DEPT 'FINANCE' exists in the database. ii. UPDATE EMPLOYEE SET salary = 25000 WHERE emp_id = 1000011; emp_id = 1000011 does not exist but emp_id = 100001 exists (extra 1 was typed in the end).	4
	c	Explain the Neo4J data model with examples. Use the appropriate terms.	6
	d	Give Cypher Queries for CRUD operations in Neo4J.	4
5.	a	What is the motivation for storing all the OLTP data in memory? (2 marks) What are the limitations of current database architecture to store the entire database in memory? (4 marks) What are the key features of VoltDB? (2 marks)	8
	b	List and explain(in 1 or 2 sentences) any four characteristics of Big-Data. (4 marks) Explain how HDFS stores meta-data and data. (4 marks)	8
	c	What are the types of data in spatial databases.	4