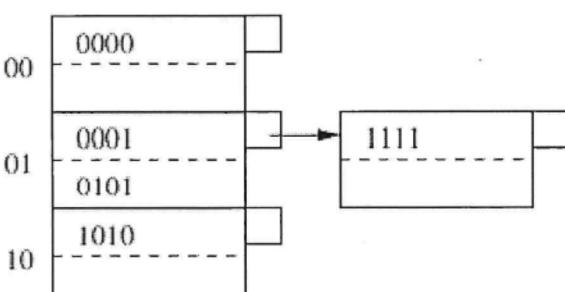
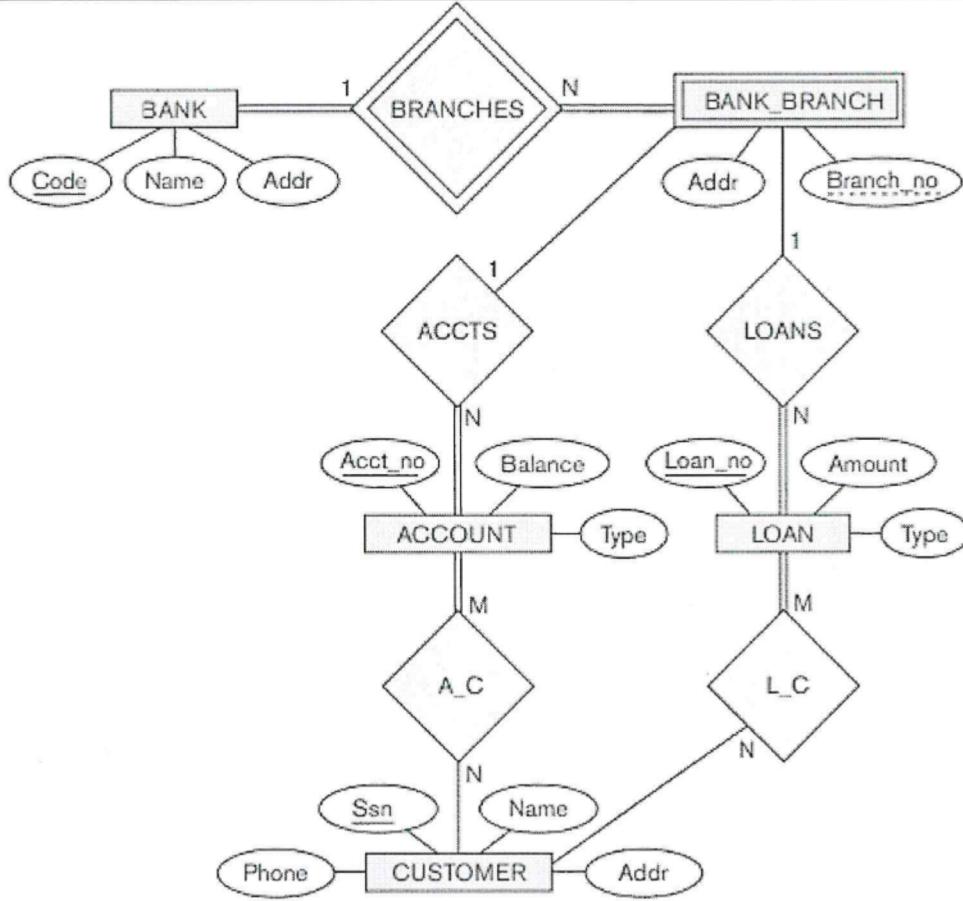


DECEMBER 2021: END SEMESTER ASSESSMENT
B Tech 5th SEMESTER
UE18CS315 - Database Technologies

Time: 3 Hours	Answer All Questions	Max Marks: 100
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1.	a) List the characteristics, advantages and disadvantages of RAID level 10	5												
	b) Estimate the secondary storage required in KB for storing 10,000 tuples in the Employee table. Consider fixed length record format, records do not span blocks, Block size = 8kb, block header = 12 bytes and record header = 12 bytes. Estimate the number of bytes wasted in each block.	5												
	<pre>CREATE TABLE Employee(Fname varchar(20) not null, Minit char(1) null, Lname varchar(20) not null, SSN varchar(9) CHECK (SSN like replicate('[0-9]',9)), BirthDate date not null CHECK (Bdate < getdate()), Address varchar(50) not null, Gender varchar(1) null, Salary int not null, Super_ssn varchar(9) null CHECK (Super_ssn like replicate('[0-9]',9)), Dno int null, constraint Employee_PK primary key (SSN));</pre>													
	c) Insert 18, 15, 1, 7, 13, 12, 9, 6 into a Btree with the number of keys in each node being 3	5												
	d) Insert a record whose key hashes to the sequence 1011 into the below linear hash table	5												
<div style="display: flex; align-items: center;"> $i=2$ $n=3$ $r=5$ <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>00</td><td>0000</td><td></td></tr> <tr><td>01</td><td>0001</td><td>→</td></tr> <tr><td></td><td>0101</td><td></td></tr> <tr><td>10</td><td>1010</td><td></td></tr> </table> </div>		00	0000		01	0001	→		0101		10	1010		
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	0101													
10	1010													
														
2.	a) Explain the steps taken by the query processor for executing a query	5												
	b) Consider the relations StarsIn (title, year, starName) Movies (title, year, length, genre, studioName, producer) Using heuristics approach, create the optimal logical query plan for the query Select S.starName, M.studioName From StarsIn s, Movies M Where S.title = M.title and S.year = M.year and S.year = 1996	5												
	c) If $B(S) = B(R) = 10,000$ and $M = 1000$, what is the number of disk I/O's required for a hybrid hash join?	4												

	d) How much memory do we need to use a two-pass, sort-based algorithm for relations of 10,000 blocks each, if the operation is: (a) δ (b) γ (c) a binary operation such as join or union.	6
3.	a) Explain the models of parallel databases	6
	b) What are the advantages of a distributed database management system?	4
	c) Explain two phase commit protocol	5
	d) Explain peer-to-peer database network	5
4.	a) Explain the architecture of in-memory database	5
	b) For the below ER diagram of a Ship Tracking application, recommend an appropriate data storage model for each Entity/Relation in a multi-model database. Justify your recommendation.	10
	<p>The ER diagram illustrates a ship tracking application with the following entities and their relationships:</p> <ul style="list-style-type: none"> SHIP_MOVEMENT: An entity with attributes Time_stamp, Date, Time, Longitude, and Latitude. It has a relationship HISTORY (multiplicity N) to SHIP. HISTORY: A relationship between SHIP_MOVEMENT and SHIP. SHIP: An entity with attributes Sname and Owner. It has relationships HOME_PORT (multiplicity N) to PORT and SHIP_AT_PORT (multiplicity (0,*)). TYPE: A relationship between SHIP and SHIP_TYPE. SHIP_TYPE: An entity with attributes Type, Tonnage, and Hull. PORT: An entity with attribute Pname. It has relationships SHIP_AT_PORT (multiplicity (0,*) to SHIP) and ON (multiplicity N) to SEA/OCEAN/LAKE. PORT_VISIT: An entity with attributes Start_date and End_date. It has a relationship IN (multiplicity 1) to STATE/COUNTRY. STATE/COUNTRY: An entity with attribute Name. It has a relationship IN (multiplicity 1) to PORT_VISIT. SEA/OCEAN/LAKE: An entity with attribute Name. It has a relationship ON (multiplicity 1) to PORT. Continent: An entity with attribute Continent, which is connected to STATE/COUNTRY. 	
5.	c) Explain data processing framework of Apache Spark	5
	a) Explain "Page Rank" algorithm	5
	b) Design a multi-dimensional data model for the below ER diagram	10



c) What is “Event Streaming”? Explain approaches to manage “Event Streaming” data 5