Bangladesh University of Business & Technology (BUBT)

Department of Computer Science and Engineering

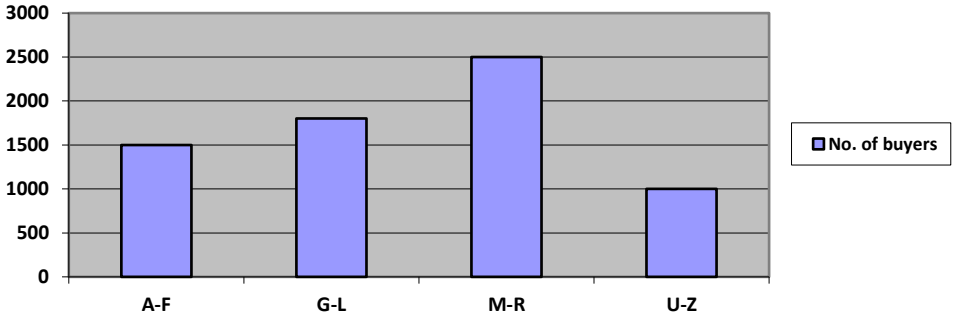
Final Examination: Spring 2021

Course Code: CSE 417 | Course Title: Distributed Database Management Systems

Intake: 38th Section: All Program: BSc in CSE

Marks: 40

[*Answer all the questions*]

COs	SN	Question	Marks
CO1	1(a)	Why is view concept necessary in Distributed DBMS? How can we maintain and update view table? Write example where it is necessary.	**5**
	(b)	What do you mean by distributed query optimization? Discuss various issues of it writing appropriate examples and explanations.	**5**
CO3	2(a)	 Consider the given histogram analysis for the relation BUYER used in question 1. Every character in a bin has the same number of names under it. What will be the histogram selectivity if the query is to find the names starting Q.	**5**
	(b)	Assume that relation PROJ is fragmented **as** $PROJ1 = \sigma PNO \leq "P2" (PROJ)$ $PROJ2 = \sigma PNO > "P2" (PROJ)$ Furthermore, relation ASG is indirectly fragmented as $ASG1 = ASG \bowtie_{PNO} PROJ1$ $ASG2 = ASG \bowtie_{PNO} PROJ2$ and relation EMP is vertically fragmented as $EMP1 = \pi ENO, ENAME (EMP)$ $EMP2 = \pi ENO, TITLE (EMP)$	**5**

Now, Transform the following query into a reduced query on fragments:

```
SELECT ENAME, TITLE
FROM EMP, ASG, PROJ
WHERE PROJ.PNO = ASG.PNO
AND EMP.ENO = ASG.ENO
AND PNAME= “Database Develop.”
AND DUR>=24
```

CO4 3(a) Apply the dynamic query optimization algorithm to the query **5**

```
SELECT ENAME, PNO
FROM EMP, ASG, PROJ, PAY
WHERE EMP.ENO = ASG.ENO
AND ASG.PNO = PROJ.PNO
AND PNAME = "CAD/CAM"
AND EMP.TITLE= PAY.TITLE
AND RESP= “Manager”
AND SAL>30000
```

and illustrate the successive detachments and substitutions by giving the mono-relation sub-queries.

CO3 3(b) Consider the following schema: **5**

BUYER (<u>BID</u>, BNAME, MOBILE)
SELLER (<u>SID</u>, SNAME, ADDRESS)
PRODUCT (<u>PID</u>, PNAME, PRICE, TYPE, SID)
TRANSACTION (<u>BID</u>, <u>PID</u>, QUANTITY, COST)

Consider the multilevel relation TRANSACTION. Assuming that there are only three classification levels for attributes (S, C and U) where S>C>U, **propose** an allocation of TRANSACTION on three sites using fragmentation and replication that avoids covert channels on read queries. **Discuss** the constraints on updates for this allocation to work.

BID	SL1	PID	SL2	QUANTITY	SL3	COST	SL4
B1	C	P5	S	1	U	5000	C
B2	C	P2	U	1	S	120	S
B2	S	P1	S	2	S	2200	C
B4	C	P3	C	2	C	3500	C
B1	C	P6	S	4	U	1700	S

CO4 4(a) Calculate the total cost and response time for the figure bellow, which computes the answer to a query at site 3 with data from sites 1 and 2. For simplicity, we assume that only communication cost is considered, which is 20 for per unit data transfer and message initiation time is 12 unit. Size of x and y are 22 and 25 units respectively. **5**

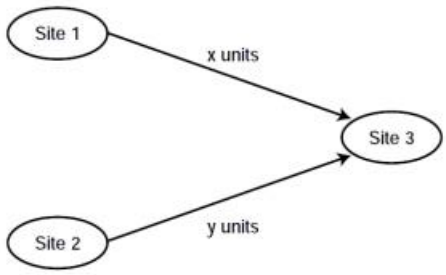


Fig: Data Transfer Operation

(b) Simplify the following query: **5**

```
SELECT ENAME
FROM EMP, ASG, PAY
WHERE (DUR > 18 OR RESP= “Analyst”)
AND EMP.ENO = ASG.ENO
AND (RESP= “Analyst” OR PNO<= P2 )
AND (DUR > 18 OR SAL>30000)
AND EMP.TITLE= PAY.TITLE
```

and transform it into an optimized operator tree using the restructuring algorithm where select and project operations are applied as soon as possible to reduce the size of intermediate relations**.**