Assignment 6

● Graded

Group

Krishiv Shreyans Dakwala
Nipun Sanjay Khivansara
View or edit group

Total Points

100 / 100 pts

Question 1

Q1.1. **15** / 15 pts

✔ **– 0 pts** Correct

– 7.5 pts Partially correct

– 15 pts Incorrect

Question 2

Q1.2 **15** / 15 pts

✔ **– 0 pts** Correct

– 7.5 pts Partially correct

– 15 pts incorrect

Question 3

Q1.3 **15** / 15 pts

✔ **– 0 pts** Correct

– 7.5 pts Partially correct

– 15 pts Incorrect

Question 4

Q2 **20** / 20 pts

✔ **– 0 pts** Correct

– 5 pts minor error

– 10 pts half correct

– 15 pts major error

– 20 pts incorrect

Question 5

Q3.1 **10** / 10 pts

✔ **– 0 pts** Correct

– 10 pts Blank

– 5 pts Missing triples

Question 6

Q3.2 **10** / 10 pts

✔ **– 0 pts** Correct

– 10 pts Blank

– 5 pts Incomplete diagram

Question 7

Q3.3 **15** / 15 pts

✔ **– 0 pts** Correct

– 15 pts Blank

Question assigned to the following page: 1

Assignment 6

Team: Nipun Khivansara (NKHIVANS), Krishiv Dakwala (KDAKWALA)

Transactions

Q1: Specify which of the following schedules could be generated by

a) Two phase locking scheduler

b) Rigorous two-phase locking scheduler

If the schedule could be generated by 2PL, specify when transactions would acquire locks and release locks.

If not, explain why the lock request will fail and hence the schedule would not be generated.

Notation: **X -** Exclusive Lock, **S -** Read Lock

1. **w_1 (x) w_2(x) w_1(y) w_2(y) c_1 c_2**

   2PL -

   T1 –> w_1(x) **X(x) X(y)** x released w_1(y) y released c_1

   T2 -> w_2(X) **X(x)** w_2(y) **X(y)** x and y released c_2

   This can be scheduled in 2PL according to the above diagram

   Rigorous 2PL -

   T1 –> w_1(x) **X(x)** w_1(y) y released c_1

   T2 -> w_2(X) **Locked** w_2(y) **X(y)** c_2

   This will fail for rigorous 2PL at W_2(X) as T1 has an exclusive lock on x and cannot release it before committing

Questions assigned to the following page: 2 and 3

2. **w_1(x) w_2(x) w_2(y) w_1(y) c_1 c_2**

T1 –> w_1(x) **X(x) X(y)** x released w_1(y) y released c_1

T2 -> w_2(X) **X(x)** w_2(y) **X(y)(Locked)**
c_2

This will fail for 2PL as exclusive lock on Y cannot be released before w1(y) transaction is done for w_2(y) to be performed. For rigorous 2PL it will fail as T1 has not committed and x not available for w_2(x).

3. **w_1(x) r_2(x) w_3(y) w_2(y) c_1 c_2 c_3**

2PL -

T1 -> w1(x) **X(x)** obtained and released c1

T2 -> r_2(x) **S(x)** w_2(y) **X(y)** c2 locks released

T3 -> w_3(y) **X(y)** obtained and released c3

2PL - Can be scheduled for 2PL according to above diagram

Rigorous 2PL -

T1 - w1(x) **X(x)** c1

T2 - r_2(x) S(x) **(LOCKED)** w_2(y) c2

T3 - w_3(y) X(y) obtained c3

Cannot be scheduled with rigorous 2PL as T2 cannot obtained shared lock on x at r_2(x) as T1 has not committed

Question assigned to the following page: 4

Indexing

Q2: Consider a table employee(e_id, name, manager, department, salary). Suppose it has an index on salary.

Given a query “select * from employee where salary < 100”, find out the times taken to do a linear scan and an index scan and state which is better.

There are 1 billion records on the disk and each record is of size 512B. The block size is 8KB. Rotational latency is 10 ms and disk transfer rate is 50MB/s. The query selectivity is 10%.Time to do a sequential scan of the index is 60 seconds. Assume that to do a linear scan, you need to read entire file.

Time taken for linear scan -

Total size of records = 512 * 10^3 MB

Transfer rate = 50MB/s

Time taken for linear scan = 512000/50 = 10240 sec = 170.66 mins

Time taken for indexing = time for sequential scan index + Time taken to dereference pointer * number of records matching

= 60 sec + time taken to dereference pointer * (1 billion * 10%)

Time taken to dereference pointer = 10ms + 8KB/50MB/s

= 10ms + 8KB/50000KB/s

= 10ms + 8KB/50KB/ms

= 10ms + 0.16ms

= 10.16 ms

Total time = 60 + 10.16 * 10^-3 * 100 * 10 ^ 6 sec

= 60 + 10.16 * 10^ 5

= 1016060 sec

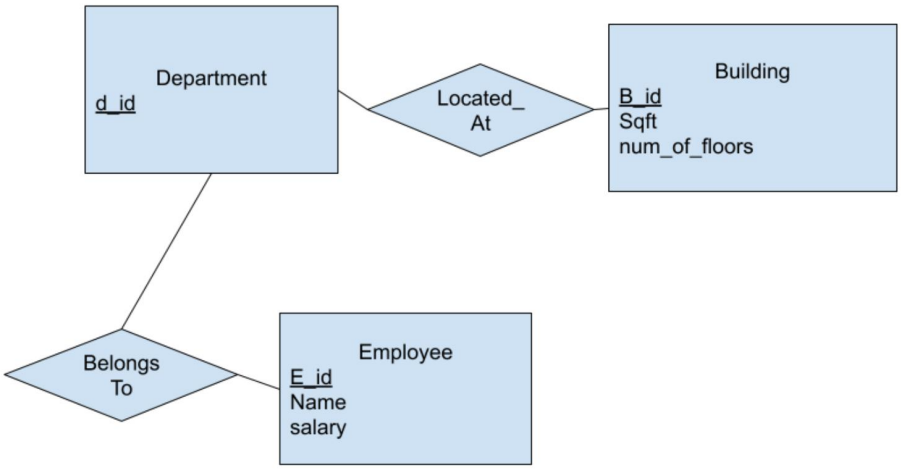
Total time for index scan = 282.23 hours

Time for Linear Scan < Time for Index Scan. Therefore linear scan is quicker

Question assigned to the following page: 5

RDF

Q3: Consider an ER diagram



Instances of the entities are as follows:-

Department -- CS, EECS, Mechanical

Employee -- Alice (CS), Bob (EECS), Carol (Mech), Dennis (CS)

Buildings - DBH (CS), ETower (EECS), EHall (MEch)

Question assigned to the following page: 5

1. Represent the above using RDF triples. Manufacture any information that is not provided.

(101, instanceOf, Employee)

(101, Name, Alice)

(101, Salary, 100)

(102, instanceOf, Employee)

(102, Name, Bob)

(102, Salary, 90)

(103, instanceOf, Employee)

(103, Name, Carol)

(103, Salary, 110)

(104, instanceOf, Employee)

(104, Name, Dennis)

(104, Salary, 90)

(200, instanceOf, Building)

(200, Name, DBH)

(200, Sqft, 10000)

(200, num_of_floors, 4)

(201, instanceOf, Building)

(201, Name, ETower)

(201, Sqft, 15000)

(201, num_of_floors, 2)

(202, instanceOf, Building)

(202, Name, EHall)

(202, Sqft, 9000)

Question assigned to the following page: 5

(202, num_of_floors, 1)

(300, instanceOf, Department)

(300, DepartmentName, CS)

(400, instanceOf, Department)

(400, DepartmentName, EECS)

(500, instanceOf, Department)

(500, DepartmentName, Mech)

(101, BelongsTo, 300)

(102, BelongsTo, 400)

(103, BelongsTo, 500)

(104, BelongsTo, 300)

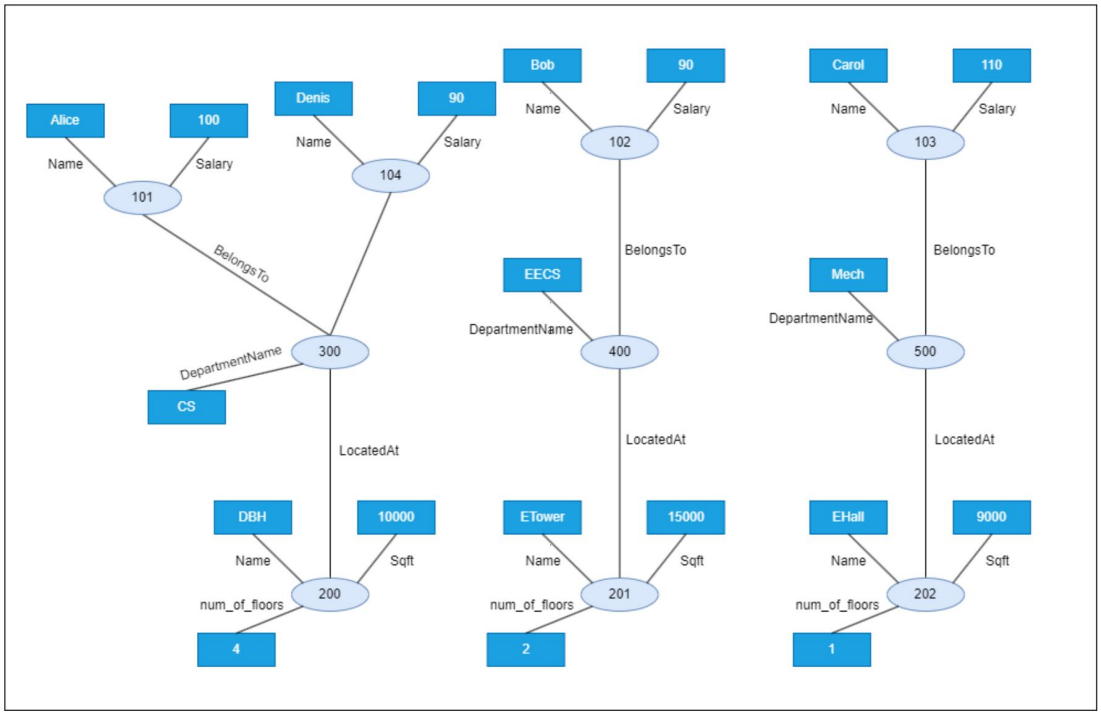
(300, LocatedAt, 200)

(400, LocatedAt, 201)

(500, LocatedAt, 202)

Questions assigned to the following page: 7 and 6

2. Draw the graph view of the RDF data.



3. Find the SparQL query for the following: Retrieve the number of floors of the building Alice works in.

Query -

```
SELECT ?num_of_floors

WHERE{

        ?E_id Name "Alice".

        ?E_id BelongsTo ?d_id.

        ?d_id LocatedAt ?B_id.

        ?B_id num_of_floors ?num_of_floors

}
```