

CSE 344 Section 4: Relational Algebra, Indexing, Cost Estimation

Problem 1

Consider the following database schema:

Users(uid, name)
Comment(uid, pid, score, txt)
Picture(pid, uid, img)

(a)

Write a Relational Algebra Plan for the SQL query:

```
SELECT DISTINCT U.uid
FROM Users U, Picture P, Comment C
WHERE U.uid = P.uid
AND P.pid = C.pid
AND C.score > 8
GROUP BY U.uid, P.pid
HAVING COUNT(*) > 10
```

(b)

Write a Relational Algebra Plan for the SQL query:

```
SELECT P.pid
FROM Picture P
WHERE NOT EXISTS
  (SELECT *
   FROM Comment C
   WHERE P.pid = C.pid
   AND C.score < 5)
```

Problem 2

Member(mid, name, age)

Picture(pid, year)

Tagged(mid, pid)

Consider a workload consisting of many queries of this kind:

```
SELECT x.name
FROM Member x, Tagged y, Picture z
WHERE x.mid = y.mid
AND y.pid = z.pid
AND z.year = ?;
```

For each index below, indicate if it can potentially speed up the workload, if it is **the only index that exists**. You will assume that the Member and Tagged are **very large relations**, and that only a **very small number of pictures are in any given year**.

- i. (1 point) Index on Picture (year). Yes or no?
- ii. (1 point) Index on Picture (pid) . Yes or no?
- iii. (1 point) Index on Picture (pid, year) . Yes or no?
- iv. (1 point) Index on Picture (year, pid) . Yes or no?
- v. (1 point) Index on Tagged (mid) . Yes or no?
- vi. (1 point) Index on Tagged (pid) . Yes or no?
- vii. (1 point) Index on Tagged (pid, mid) . Yes or no?
- viii. (1 point) Index on Member (mid) . Yes or no?
- ix. (1 point) Index on Member (name) . Yes or no?
- x. (1 point) Index on Member (age) . Yes or no?