CMPT 354: Database System I

About Midterm

Midterm Coverage

1. Database History (7.5%)



2. Relational Model (7.5%)



3. SQL (40%)



4. Relational Algebra (25%)

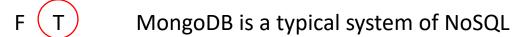


5. Query Processing and Indexing (20%)



Database History (7.5%)

- You need to understand
 - The concepts of OLTP and OLAP
 - Why NoSQL
 - The contents of MapReduce
- Example



Relational Model (7.5%)

- You need to understand
 - Basics of Data Models
 - Terminologies
 - Keys

- Example
- F T A primary key is a single column that uniquely identifies a record in a relation

SQL (40%)

- You need to be familiar with
 - SQL DDL
 - Create/Insert/Alter
 - Constraints
 - SQL DML
 - Selection, Projection
 - Set Operators (UNION, INTERSECT, EXCEPT)
 - Joins (INNER, OUTER)
 - Aggregation, Group By, Having
 - Order By, Distinct, NULL
 - Subqueries
- Example
 - Similar to A1 and A2

Relational Algebra (25%)

- You need to know
 - How to write an RA query
 - How to optimize an RA query
 - How to convert an SQL query to an RA query
- Examples
 - 1. All students whose birth is larger than 1995
 - $\sigma_{birth > 1995}$ (Student)
 - 2. Optimize this query $\sigma_{cNum=354}$ (R \bowtie S)
 - $\sigma_{\text{cNum}=354}$ (R) \bowtie S
 - 3. Convert "SELECT name FROM student" to an RA query
 - π_{name} (Student)

Query Processing and Indexing (20%)

- You need to know
 - Query Processing Steps
 - Why indexing
 - Which index is better/useful?
- Examples
 - What does SQL Parser do?
 - Convert the input SQL text to a logical plan
 - Similar to A3
 - Can the following index make this SQL query faster, slower or the same:

CREATE INDEX newl **ON** Student(name) **SELECT * FROM** Student WHERE id = '301414'

The same!!

Query Processing and Indexing (20%): Additional Hint

- You need to know
 - If you create a relation with primary key, DBMS creates an index for this primary key automatically.
- Example

```
In [5]:
          1 %sql
                                                      In [6]:
                                                                 1 %sql
                                                                 2 EXPLAIN OUERY PLAN
            CREATE TABLE students (
                                                                   SELECT * FROM students WHERE id=1
                 id integer.
                 name varchar(30) NOT NULL,
                                                                * sqlite:///coursys.db
                 gender char(30),
                                                               Done.
                 age integer,
                 PRIMARY KEY(id)
                                                      Out[6]:
                                                                id parent notused
                                                                                                                         detail
                                                                                 SEARCH students USING INTEGER PRIMARY KEY (rowid=?)
         * sqlite:///coursys.db
        Done.
```

(1) Create relation students 'id' is the primary key

(2) Query relation students with clause 'id = 1'

the index of primary key 'id' is used

Notes

- Midterm
 - Wed. 10:30 11:20 am
 - EDB7618
 - Please come to the classroom at least 5 mins earlier

- Bring your Student IDs
- Please budget your time so you get to all questions
- Relax. You are here to learn

