**Class Participation Week 14**

**Topic: Query execution plans**

**Learning objective:** Practice writing query execution plans for SQL queries.

**Instruction**: Submit your attempt to answer questions 1.a)-1.c) and 2.a)-d) for your class participation credits.

**Questions:**

1. Consider Suppliers(sid int, sname VARCHAR(30) unique not null, address VARCHAR(66), primary key(sid)).

The Suppliers relation has 10,000 tuples. All Suppliers records are stored in one file using a heap file format. A page/block size is 2,048 bytes where only 2,000 bytes are used for storing tuples. Assume that the fixed-length record format is used to store records in a page. The unpacked bitmap page format is used to store records in a page. Assume that as many records are stored in a page as possible.

Assume that one integer takes 4 bytes and one char takes 1 byte.

Draw a query execution plan for the queries below and estimate the cost of each query in terms of the number of disk I/Os. A query execution plan consists of relational algebra operators and the name of the access path (the method/algorithm to retrieve/process the data) for implementing each operator. Assume that there are only two algorithms: full table scan and on-the-fly. On-the-fly takes the input, performs the operation in memory, and passes the output to the next operator.

Timeline

Description automatically generateda)

select sid, sname

from suppliers;

Diagram

Description automatically generatedb)

select sid

from suppliers where sid=10;

Diagram

Description automatically generatedc)

select count(sname)

from suppliers where sid>20;

d)

insert into somesailors

select sid, sname

from suppliers where sid<100;

Suppose there are 100 rows that satisfy the where clause. The cost for this query includes the cost of reading all rows in suppliers and the cost of writing the results to disk. Somesailors is a relation that has only two attributes sid and sname with the same data types as those in the Suppliers table. “Insert into” enters the output of the select statement into somesailors instead of showing the results on screen. The same assumption about the page format and the record format as above applies.

**2.**

create table food (fid int, fname varchar(45) not null unique,

primary key(fid));

create table ingredient (iid int, iname varchar(45) not null unique,

primary key(iid)

);

create table recipe (fid int, iid int, amount varchar(10),

primary key(fid,iid),

foreign key(fid) references food(fid),

foreign key(iid) references ingredient(iid) );

The relational DBMS that stores the above relations automatically creates an index for the primary key, each foreign key that is not the first attribute of the primary key, and each unique attribute. Suppose that this RDBMS keeps a relation in a heap file format using a fixed length record format and a fixed length page format.

A query execution plan consists of relational algebra operators and the name of the access path (the method/algorithm to retrieve/process the data) for implementing each operator. For a query execution plan using indexes, only single index access path plans are supported.Other assumptions are as follows.

* Size of an integer: 4 bytes
* Size of a char: 1 byte
* Disk block/page holds 2048 bytes with 2,000 bytes to store tuples and the rest are to store page header such as bitmaps; as many tuples are stored per page as possible.

For each SQL query below, draw query execution plans using a full-table scan and indexes.

a) What are available indexes?

Food: index on fid (PRIMARY INDEX), another index on fname

Ingredient: index on iid (PRIMARY INDEX), another index on iname

Recipe: index on (fid, iid) (PRIMARY INDEX), index on iid

b) select \* from food;

Graphical user interface

Description automatically generated with medium confidence

c) select fname from food;

Diagram

Description automatically generated

d) select fname from food where fid=2;

Diagram

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e) select iname from ingredient where iname= 'pork';

f) select iname from ingredient where upper(iname)= 'PORK';

f) select \* from recipe where fid=2 and iid >23;