Ch 14 More on evaluating Relational Operators

Considers in enough detail to implement as well as estimate cost

Running Example

Reserves (sid: int, bid: int, day: dates, rname: string)
tuple size 40, bfr = 100, # of pages 1000

Sailors (sid: int, sname: string, rating: integer, age: real)
tuple size 50, bfr = 80, # of page = 500

In determining cost, we
1. considers I/Os only
2. ignore cost of final output (since will be same independent of algorithm for evaluation)

Selection

Suppose had

```
SELECT *
FROM Reserves R
WHERE R.rname = 'Joe'
```

called a simple selection query b/c don't have "and", "or" in where

No index, unsorted Data

$\sigma_{R.attr\ op\ value}(R)$ - to evaluate need to scan relation. So would typically need 1000 I/Os.

No index / Sorted Data

$\sigma_{R.attr\ op\ value}(R)$ - ~~[illegible]~~ binary search + scan to output all matches using in our case ignoring output cost, cost would be $\log_2 1000 \approx 10$ I/Os.

B+ Tree Index

If a clustered B+ index is on R.attr and op ≠ "=" then best strategy for $\sigma_{R.attr\ op\ value}(R)$ is to use the index. Still okay if op = "=" but a better choice would be to have a hash index.

To evaluate find the first index entry that pts to a qualifying tuple then scan adjacent leaf pages until have returned all satisfying values.

~~If clustered~~

Suppose 10% of tuples satisfying condition then cost is

$\approx 1000 \times .10 +$ height of index

≈ 100 I/Os (usually small)

← here are paying attention to output

Note: would be 1000 if unclustered

Hash Index, Equality Selection
cost will be cost to find correct bucket.
+ # of I/Os to return correct tuples from that bucket (might be in several pages)

So 1 or 2 I/Os to find bucket

General Selects

Selection w/o Disjunction

Could ① do file scan to retrieve tuples or use an index that matches some of conjuncts to scan records then cut from output according to non-primary conjuncts
② try to use several indexes

Idea sort rids satisfying conditions
represent using bit map
and maps

Selection w/ Disjunction