

Tutorial Week 11: Query Processing

Introduction

In the first exercise, we will examine the cost of a query for a specific plan. Next week we will revisit this same query and evaluate competing plans.

Exercise 1. Block-Nested Loops Join

Suppose we have a schema Rel1(A, B, C) and Rel2(C, D). Each A field occupies 4 bytes, each B field occupies 12 bytes, each C field occupies 8 bytes, each D field occupies 8 bytes. Rel1 contains 100,000 records, and Rel2 contains 50,000 records. There are 100 different values for A represented in the database, 1000 different values for B, 50,000 different values for C, and 10,000 different values for D. Rel1 is stored with a sparse, clustered primary B+-tree index on the pair of columns (A,B), and Rel2 is stored with a sparse, clustered primary B+-tree index on C.

General features: assume that each page is 4K bytes, of which 250 bytes are taken for header and array of record pointers. Assume that no record is ever split across several pages. Assume that data entries in any index use the format of (search key, rowid), where rowid uses 4 bytes.

Consider the following query:

```
SELECT Rel1.A, Rel1.B, Rel1.C
FROM Rel1, Rel2
WHERE Rel1.C = Rel2.C AND Rel2.D = 16;
```

and consider the query plan which calculates this as follows:

Form the equi-join of Rel1 and Rel2 by using a block nested loops join with Rel1 as the outer relation, and then filter each tuple of the join to see if the value of D is 16; if so, output the values of A, B and C from that tuple of the join.

How many pages of I/O are needed to compute this plan (assume that we have only the minimal space, say 2 pages worth, for buffering in memory)?

Exercise 2. Reviewing a query plan

You can review the plan used by Oracle for a query with `EXPLAIN PLAN`. You can read documentation for this command at:

http://docs.oracle.com/cd/B19306_01/server.102/b14211/ex_plan.htm

Try using the command to review some queries for the University Schema you've been working with in past tutorials. Can you work out what algorithms are being used, and whether any indexes are used?