

Databasesystems 2

Forum: <https://forum-db.informatik.uni-tuebingen.de/c/ss18-db2>

Assignment 6 (05.06.2018)

Submission: Tuesday, 12.06.2018, 10:00 AM

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1. [15 Points] **Loop Swapping Optimization**

Processing a wide table stored as C array, the order of processing can have significant impact on performance. Consider the following table `tbl` of random integers stored *row-wise* in an C array:

```
unsigned int *tbl;

/* initialize table row-by-row with random values */
for (r = 0; r < rows; r++)
    for (c = 0; c < cols; c++)
        tbl[r * cols + c] = (unsigned int) random();
```

If we want to add up all elements of the table, we can process the elements following two different traversal strategies:



The choice of loop order has significant impact on performance:

- Extend the program in `loop-swapping.c` to compute and print the overall sum of all cells in table `tbl` in two different ways: Using two nested loops processing array `tbl`
 - in *row-major* order and
 - in *column-major* order.
- Further extend your program to measure and print the execution time of both variants.
- Compile the program with flag `-O2` and run a test with 1,000,000 rows and 100 columns. Describe the results and explain the difference in performance of both variants.

2. [15 Points] **Logical Conjunction**

In the lecture we discussed how a MAL program would apply logical disjunction found in SQL queries (see slide 9 of slideset 8). Your task is to write the following SQL query using **logical conjunction** as a MAL program:

```
SELECT t.a, t.b
FROM   ternary AS t
WHERE  t.a % 2 = 0 AND t.c < 1;
```

The table used in this query is defined as `ternary` (`a int NOT NULL`, `b text NOT NULL`, `c float`).

We provided you with an incomplete MAL file `conjunction.mal` which you should complete for this task.