

Simulating performance of disk-to-disk backup from RAID 01 to RAID 0 disks

CS 313: Databases and Information Systems Lab

FINAL REPORT

By:

Sudarshan Kashyap Das(170010010)

Unnati Athwani(170010006)

Sanam Bhanu Prakash(160010024)

Problem Statement:

Use PF layer to simulate the performance of disk-to-disk backup where the disks are within the same controller having a cache of M pages. Assume the database to be on N1 disk spindles in RAID 01, and the backup to be on another set of disks but in RAID 0. Do as much sequential reading/writing as possible. Use as much parallelism in IO across the spindles as possible.

Scenario considered:

A .csv file (test_pf.csv) is taken as the input containing nine rows and three columns, records being both integer and string type. One record is given to one page for simplicity.

Modifications in the original ToyDB code:

- Changes were made in the PF Layer of the given ToyDb code. "Testpf.c" was changed to read the .csv file and save the contents to the disk which is RAID 01 (FILE1 in the directory). Mirroring was implemented for RAID 01.

- Function “backup” opens FILE1 and calls another function “backupfile” which reads pages from FILE1 and calls yet another function “writebackup” which writes the contents in another disk which is RAID 0 (FILE2 in the directory).

Functions created:

- backup: opens the file in the disk (RAID 01, FILE1).
- backupfile: reads pages from FILE1.
- Writebackup: writes the contents of FILE1 to FILE2.

Statistics:

- Total Time to write in the disk with RAID 1: 546.000000 ms
Average Time to write in the disk with RAID 1: 30.333333 ms
- Total Time to read in the disk with RAID 1: 299.000000 ms
Average Time to read in the disk with RAID 1: 33.222222 ms
- Total Backup time from RAID 1 disk to RAID 0 disk: 3733.000000 ms
Average Backup time for one page: 414.777778 ms
- Total Time to read in the disk with RAID 1: 291.000000 ms
Average Time to read in the disk with RAID 1: 32.333333 ms
- Total Time to read in the disk with RAID 0: 296.000000 ms
Average Time to read in the disk with RAID 0: 32.888889 ms

Performance Analysis:

- The average time for each I/O operation (both read and write) is in the range 25-30 ms.
- The number of writes is twice the number of reads in RAID 01 (since it implements mirroring). Hence the total time to write in the disk is expected to be double the total time taken to read. This is (approximately) reflected in the stats produced: total time for write- 546 ms, total time to read- 299 ms.
- Backup time is the time taken for copying the data from the database disk to the backup disk, i.e. from FILE1 to FILE2. Time taken in this case is 3733 ms.
- In addition, backup is taken every 10 seconds. This backup reflects all the changes made in the disk while the code is running.

