© 2013 FIZ Karlsruhe

io-port 05109273

Christodoulakis, Stavros; Zioga, Fenia A.

Database Design Principles for Placement of Delay-Sensitive Data on Disks.

IEEE Transactions on Knowledge and Data Engineering 11, No.03, 425-447 (1999).

Summary: We investigate design principles for placing striped delay-sensitive data on a number of disks in a distributed environment. The cost formulas of our performance model allow us to calculate the maximum number of users that can be supported by n disks, as well as to study the impact of other performance-tuning options. We show that, for fixed probabilities of accessing the delay-sensitive objects, partitioning the set of disks is always better than striping in all of the disks. Then, given a number n of disks and r distinct delay-sensitive objects with probabilities of access p1, p2, ..., pr that must be striped across r different disk partitions (i.e., nonoverlapping subsets of the n disks), we use the theory of Schur functions in order to find what is the optimal number of disks that must be allocated to each partition. For objects with different consumption rates, we provide an analytic solution to the problem of disk partitioning. We analyze the problem of grouping the more- and less-popular delay-sensitive objects together in partitions — when the partitions are less than the objects — so that the number of supported users is maximized. Finally, we analyze the trade-off of striping on all the disks versus partitioning the set of the disks when the access probabilities of the delay-sensitive objects change with time.

Keywords: audio.
doi:10.1109/69.774102