

Proactive Disk Defragmentation through User's File-Access Patterns

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Abstract : This paper shows how the task of disk defragmentation can be handled by modern operating systems in a transparent, automated, efficient, and confined way through user's file-access patterns. Since files tend to gradually fragment from time to time through file creation, deletion, growth, and shrinking, the problem gets even worse when a disk becomes so fragmented that file accesses cannot be made reasonably efficient without performing the operation of defragmentation for the "entire" disk, which is done manually by the user by launching the disk defragmentation utility program normally bundled with the operating system. In this paper, we argue that the disk defragmentation problem described can be solved without having to manually use the utility program to defragment the entire disk. The argument is based on the observation that system users tend to access certain files in a particular time interval like the way observed for programs exhibiting temporal locality of memory references during their execution. The task of disk defragmentation can be initiated and acted upon for those files contained in the current file-access locality detected and identified by the operating system. The paper also discusses how to use the locality of file references approach to quantitatively measure and determine the locality of user's file access patterns on which the task of disk defragmentation is based.

Keywords : operating systems, disk defragmentation, locality of file accesses, system performance

Conference Title : ICICS 2024 : International Conference on Information and Computer Sciences

Conference Location : Las Vegas, United States

Conference Dates : May 20-21, 2024