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HNType : a diverse trace and migration mechanism in the block based Hierarchical Storage System named HazelNut

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HazelNut is a block based Hierarchical Storage System, in which logical data blocks are migrated among storage tiers to achieve better I/O performance. In order to choose migrated blocks, data block I/O process is traced to collect enough information for migration algorithms. There are many ways to trace I/O process and implement block migration. However, how to choose trace metrics and design block migration algorithm is a big problem for system designers. To address this problem, a diverse trace and migration mechanism HNType is proposed. HNType consists two parts, one is a diverse trace mechanism named HNType-t, and the other is a diverse migration mechanism named HNType-s. HNType-t abstracts four base elements and trace operation interfaces based on VFS design concept, which makes it feasible to customize specific trace metrics and trace operations; HNType-s presents three ways of data migration, each way of migration can use customized migration algorithms according to predefined prototypes. Based on HNType, A series of tests are conducted about how block migration is affected by different trace metrics, and three conclusions are drawn according to the experiment results. First, trace metrics of access times and access sectors are not linearly correlated, as a result, these two metrics bring different migration result; Second, I/O completion time used as trace metrics is able to improve sequential I/O by at least 10%; Third, access times used as metrics have a tendency of more migrations upwards.

Tertiary Keyword (Optional)

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