

Minimizing the cleaning cost in flash based storage sub-systems by proliferating the valid data copying process

ABSTRACT

Flash memory reliability and the performance have been confirmed as an improvement in the storage subsystem technological advancement, especially in supporting an embedded system solution. Conversely, the main constraint of the storage device is the erase-before-write characteristic in handling both write and re-write I/O operations. More attention must be taken into consideration to handle both I/O operations. To overwhelm this constraint, a time-consuming garbage collection scheme has been introduced. This paper presents an optimized cleaning scheme that significantly reduces the required cleaning collection cost without interfering the memory I/O operations. The candidate sector to be erased is being determined by a score factor together with an erasure count before selecting the actual victim sector to be cleaned. The experimental results show the proposed approach assists in reducing the garbage collection cost since the number of sectors used in handling the I/O operations is being minimized. Even the sector becomes the candidates, but the score factor will be the tiebreaker to determine whether the sector needs to be cleaned or not. On the contrary, the proposed scheme increases the number of copy operations due to new sector requirement while the degree of the wear-leveling emulate the standing sector cleaning scheme.

Keyword: Sector; Flash memory; Garbage collection; Storage