

Performance Model and File System Space Allocation Scheme for SSDs

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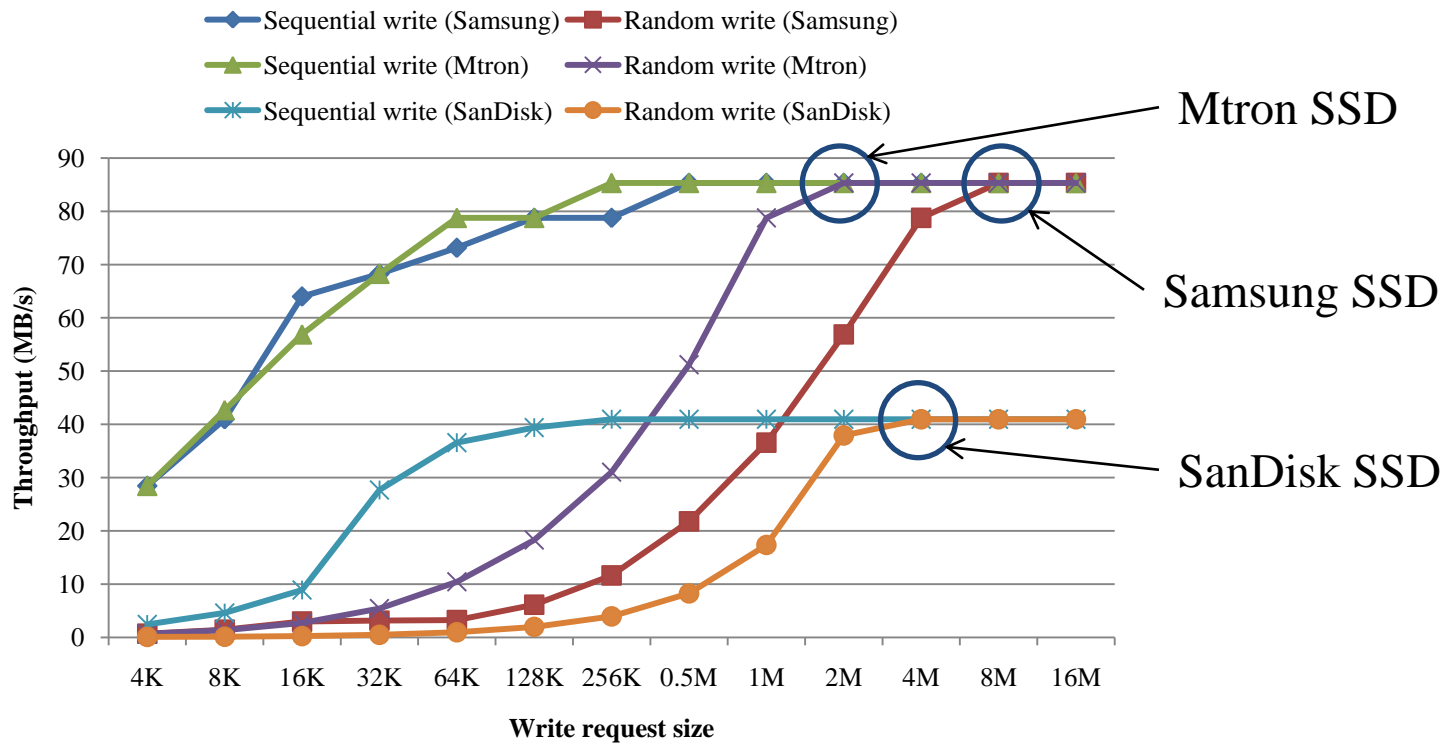
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Introduction

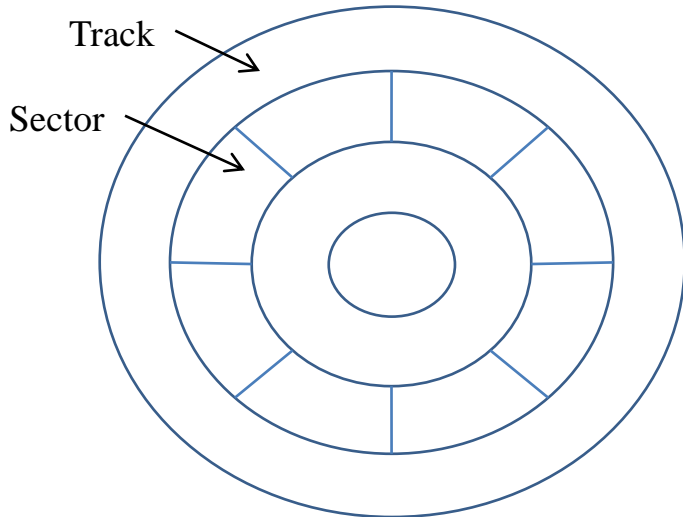
- Flash SSDs (Solid State Drives)
 - Consist of Flash Memory and firmware with no mechanical parts
 - The characteristics is quite different from that of HDD.
 - Laptop, desktop, server market
- How the file system can make better use of SSDs?
 - Derive a simple performance model of SSDs
 - Devise a file system space allocation scheme, called **Greedy-Space**

Observation of SSD Write Performance



- If write requests are grouped into logical block size, write performance is maximized.
- Reads are more or less constant for SSDs.

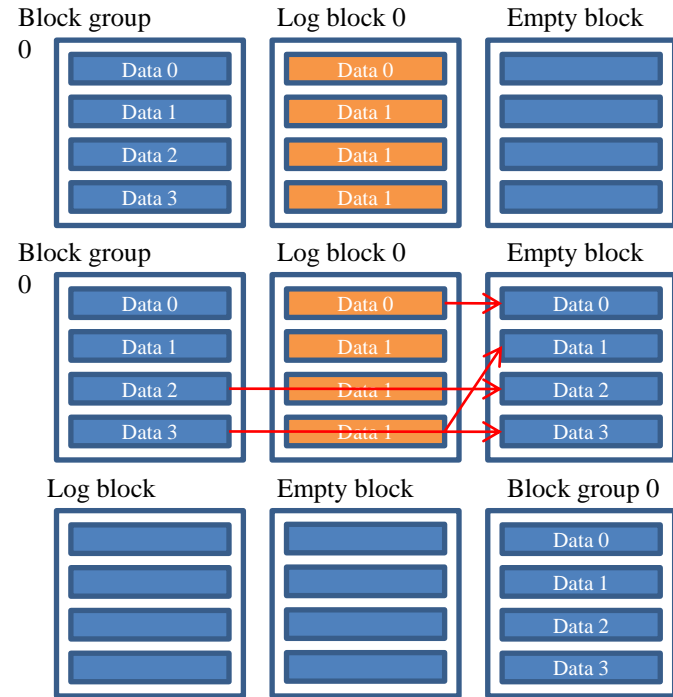
Write Cost Model



$$T_{ns} = T_{pos} + n \frac{S}{B}$$

where, $1 \leq n \leq C$, C is the number of sectors in a cylinder.

(a) Hard Disk Drive



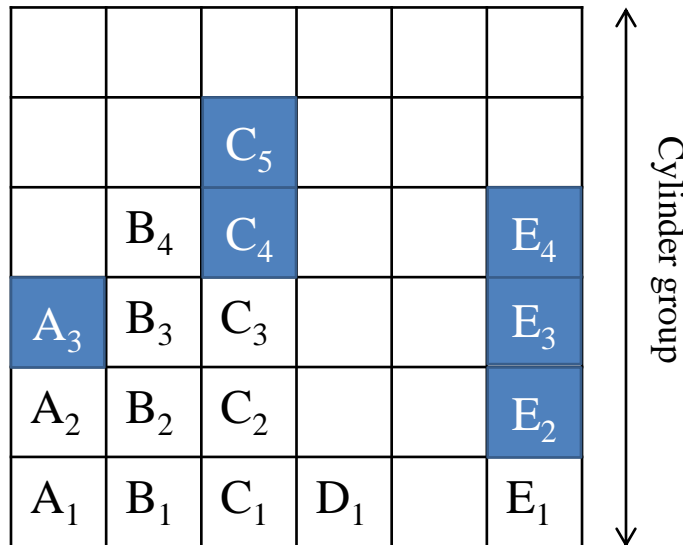
$$T_{Wns} = T_{merge} + n \frac{S}{B} \quad T_{Rns} \approx C$$

Where, $1 \leq n \leq L$, L is the number of sectors in Logical Block.

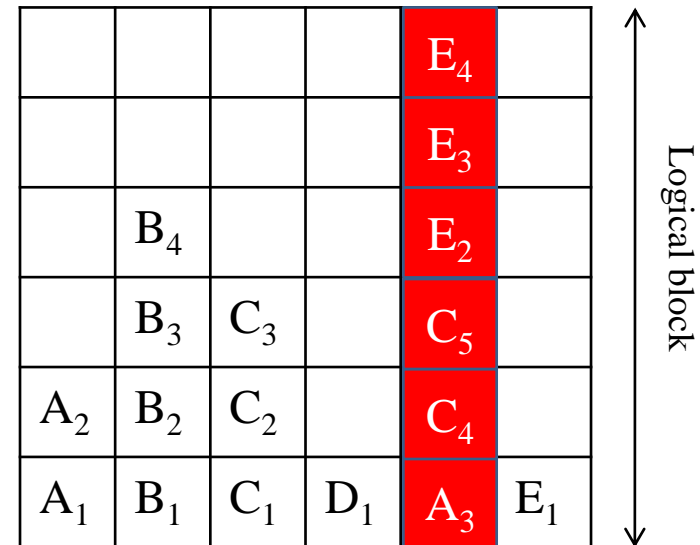
(a) Solid State Drive

Allocation Schemes

Write requests: $A_3, C_4, C_5, E_2, E_3, E_4$

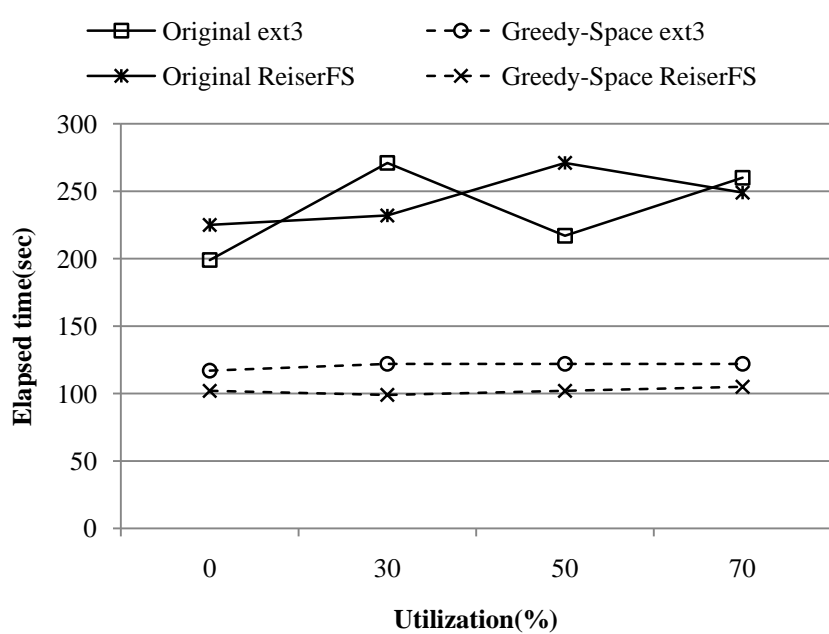


(a) The traditional scheme

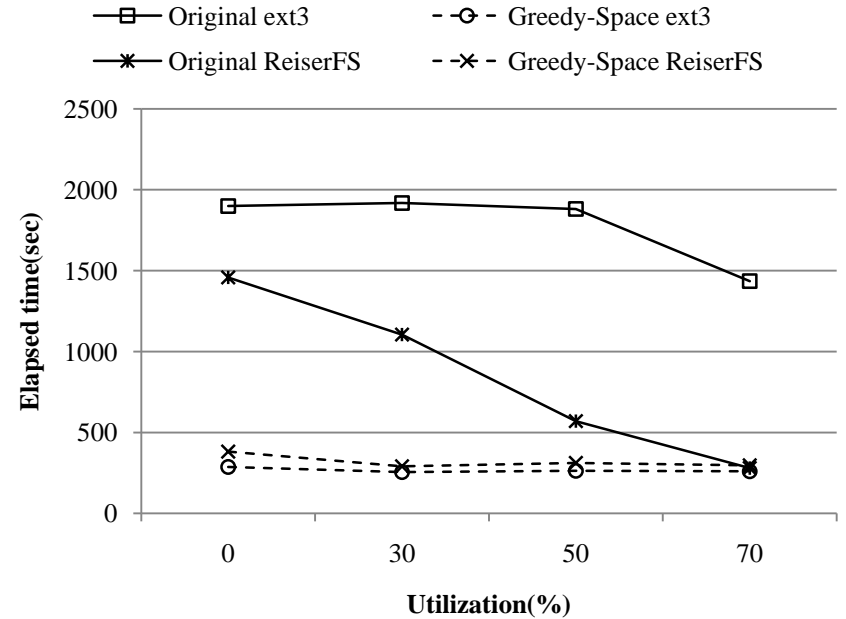


(b) The proposed scheme

Experimental Results



(a) CVFS-Large workload



(b) FSL workload