

Efficient Metadata Management Method for Flash Memory based Filesystem using BPRAM

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A number of work suggested to use Byte Addressable NVRAM (BPRAM) to reduce the mount latency of NAND Flash based file system. CMFS [1] which is a byte addressable NVRAM filesystem based on YAFFS2 [2] saves compressed metadata (checkpoint) for mounting filesystem in BPRAM. We attach 8MByte FRAM which is a type of BPRAM to the memory extension pin on SMDK2440 embedded board. The overall structure is illustrated in Fig 1. We measure mount time of CMFS and YAFFS2 in various partition size which is shown in Fig 2. The partition size of NAND Flash memory is increased from 50Mbyte to 100Mbyte with no data. We assume that checkpoint is valid and is used for mounting filesystem. When the partition size is bigger than 70MByte, the mount time of CMFS is lower than that of YAFFS2. Although there is checkpoint decompression overhead, CMFS can reduce the mount time by reading checkpoint from the FRAM. When the partition size is 100MByte, the mount time of CMFS is reduced by 16%.

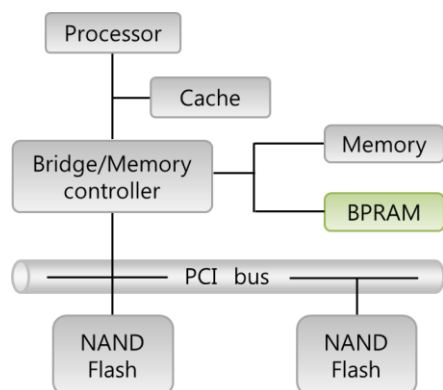


Fig 1. Hierarchical Storage Organization

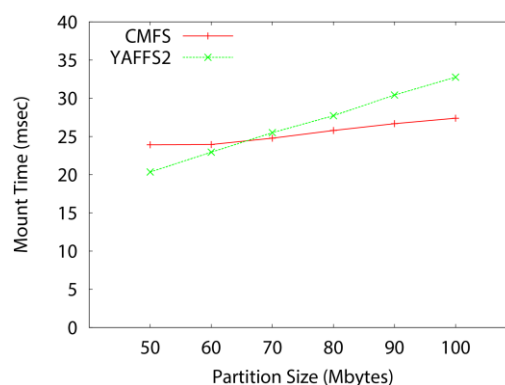


Fig 2. Mount Latency

[1] Quan Taizhong, Jinsoo Yoo, Jaemin Jung, Youjip Won, "Addressing Scalability and Consistency Issues in Hybrid File System for BPRAM and NAND Flash", 7th IEEE International Workshop on Storage Network Architecture and Parallel I/O (SNAPI 2011), Denver, Colorado, USA, May 25, 2011

[2] Aleph One Limited, "Yet Another Flash File System", <http://www.yaffs.net/>