Non-volatile memory (NVM) technologies are considered as promising candidates of the next-generation main memory. However, the non-volatility of NVMs leads to new security vulnerabilities. Memory encryption can be employed to mitigate the security vulnerabilities, but it increases the number of bits written to NVMs due to the diffusion property and thereby aggravates the NVM wear-out induced by writes. To address these security and endurance challenges, we propose DeWrite, a secure and deduplication-aware scheme to enhance the performance and endurance of encrypted NVMs based on a new in-line deduplication technique and the synergistic integrations of deduplication and memory encryption. Specifically, it performs low-latency in-line deduplication to exploit the abundant cache-line-level duplications leveraging the intrinsic read/write asymmetry of NVMs and light-weight hashing. It also opportunistically parallelizes the operations of deduplication and encryption and allows them to co-locate the metadata for high efficiency. DeWrite was implemented on the gem5 with NVMain.

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