

# Prolonging the Lifetime of Non-Volatile Last Level Cache Using Spare Blocks

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## ABSTRACT

Non-volatile memory technologies, such as STT-RAM, have high cell density and near-zero leakage power. Thus, non-volatile STT-RAM caches can be considered as a proper candidate to replace traditional SRAM-based caches. Beside the mentioned advantages, non-volatile technologies suffer from low write-endurance and this can lead to short lifetime of non-volatile caches. In this paper, we propose a new method to increase the lifetime of non-volatile last level caches by adding spare blocks in each set. When a block is failed in a set, we simply remove that block from the set and pad a spare block to the set. Evaluation results show that the proposed method can improve over the state-of-the art by 20% and 8% in lifetime and performance.

**Keywords:** Non-Volatile Memory, Last Level Cache, STT-RAM, Write Endurance, Lifetime.