ABSTRACT

The x86 architecture has been widely used in various modern computer devices, including processors such as Alder Lake. As computational requirements increase, a deeper understanding of the performance of computer architectures becomes important, especially in memory management. This research focuses on analyzing the performance of x86 architecture by examining memory replacement policies, especially LRU Insertion Policy (LIP). LIP is an algorithm that places new data in the Least Frequently Used (LRU) position in the cache, aiming to reduce cache misses and protect the cache from thrashing, especially for applications with high memory requirements. This study simulates and compares LIP with traditional LRU policy at various cache levels (L1, L2, L3). Results show that LIP can reducecache misses on high-level caches such as L2 and L3, albeit with the trade-off of increased cache replacement. Therefore, the selection of memory replacement policy should consider the cache hierarchy and specific workload.

Keywords: x86 architecture, LRU Insertion Policy (LIP), Least Recently Used (LRU), Cache.