An Enhanced Query-level Energy-Efficient Cache Invalidation Scheme in Mobile Environments

李之中
Information Management
Computer Science and Informatics
leecc@chu.edu.tw

Abstract

Many query-level energy-efficient cache invalidation schemes were proposed to reduce the energy required for a mobile client to access the invalidation reports. However, a cached data item that is not actively queried may be falsely invalidated in these schemes, even though it is still valid. False invalidation is exacerbated when two consecutive queries share few common data items. This is because in such a case most data items will not be actively queried. False invalidation renders low hit rate in cache usage, which, in turn, causes excessive number of uplinks and down-links to the server to access the data items that cause cache miss. To prevent low hit rate, this research proposes, in this paper, to enhance the query-level cache invalidation by timely invalidating the non-queried data items in the cache. Both the queried data items and the non-queried data items that are about to become invalid due to lack of invalidation information are invalidated in each cache invalidation. In a performance study, this research compares the performance among the enhanced query-level, the cache-level and the original query-level energy-efficient cache invalidation scheme in terms of energy consumption and hit rate.

Keyword：Mobile Computing, Cache Invalidation, Energy Efficiency