# LevelDB-Raw: Eliminating File System Overhead for Optimizing Performance of LevelDB Engine

Hak-Su Lim*, Jin-Soo Kim*

*College of Info. & Comm. Engineering, Sungkyunkwan University

haksu.lim@skku.edu, jinsookim@skku.edu

*Abstract*— Key-value store, a kind of NoSQL database, is data storage system for storing and retrieving key-value pairs using unique keys. In this paper, we present LevelDB-Raw, which improves LevelDB, one of the most well-known key-value store engines. LevelDB-Raw opens a raw block device file directly, bypassing the existing file system layer. Instead, it implements a simple, light-weight user-level file system to eliminate file system overhead such as redundant journaling and metadata management. We demonstrate the performance improvement of LevelDB-Raw using ForestDB-Benchmark and YCSB workloads. The results indicate that LevelDB-Raw increases the overall performance by 1.16x-3.45x in HDD and 1.05x-2.26x in SSD for updating database.

*Keyword*— Key-value store, LevelDB, NoSQL

**Hak-Su Lim** received his B.S., degrees in Computer Engineering from Dongguk University, Republic of Korea, in 2013. He also worked at modem development department of Samsung Electronics from 2013 to 2014. He is currently a MS. candidate in Computer Science at Sungkyunkwan University. His research interests include key-value store, storage system, embeded system, operating system**.**

**Jin-Soo Kim** received his B.S., M.S., and Ph.D. degrees in Computer Engineering from Seoul National University, Republic of Korea, in 1991, 1993, and 1999, respectively. He is currently a professor at Sungkyunkwan University. Before joining Sungkyunkwan University, he was an associate professor at Korea Advanced Institute of Science and Technology (KAIST) from 2002 to 2008. He was also with the Electronics and Telecommunications Research Institute (ETRI) from 1999 to 2002 as a senior member of the research staff, and with the IBM T.J. Watson Research Center as an academic visitor from 1998 to 1999. His research interests include embedded systems, storage systems, and operating systems.