香港浸會大學理學院
HKBU Faculty of Science

# DEPARTMENT OF COMPUTER SCIENCE

## MPhil Degree Oral Presentation

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| MPhil Candidate: | Mr Shen GAO |
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| External Examiner: | Prof Zili SHAO |
| Time: | 6 May 2013 (Monday)<br>10:30 am – 12:30 pm (35 mins presentation and 15 mins Q & A) |
| Venue: | SCT716, Cha Chi-Ming Science Tower, HSH Campus |

## "Transaction Logging and Recovery on Phase-Change Memory"

# Abstract

Phase-change memory (PCM), as one of the most promising next-generation memory technologies, offers various attractive properties such as non-volatility, byte addressability, bit alterability, and low idle energy consumption. Recently, PCM has drawn much attention from the database community for optimizing query and transaction performance. As a complement to existing work, we present PCMLogging, a novel logging scheme that exploits PCM for both data caching and transaction logging to minimize I/O accesses in disk-based databases. Specifically, PCMLogging caches dirty pages/records in PCM and further maintains an implicit log in the cached updates to support database recovery. By integrating log and cached updates, PCMLogging enables simplified recovery and prolongs PCM lifetime. Furthermore, using PCMLogging, we develop a wear-leveling algorithm, that evenly distributes the write traffic across the PCM storage space, and a cost-based destaging algorithm that adaptively migrates cached data from PCM to external storage. Compared to classical write-ahead logging (WAL), our trace-driven simulation results reveal up to 1~20X and 5X improvements in system throughput and PCM lifetime, respectively.

**\*\*\* ALL INTERESTED ARE WELCOME\*\*\***