Some Research Directions in FlashDB*

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Abstract. Flash memory based SSDs (flash SSDs) are becoming popular as an alternative storage to harddisk, and it is not unrealistic to witness in the foreseeable future that flash SSDs replace harddisks as the main secondary storage in enterprise databases. In fact, Oracle has already started to use flash SSDs as its main storage in performing TPC-C benchmark [1]. In this talk, we will outline some personal research directions in flash memory database (in short, FlashDB) under way. First of all, we will show the multipurpose uses of the log in flash memory, which has been mainly regarded as a write performance booster in flash memory [2][3]. As one of specific examples, we will explain how the concept of log in the in-page logging scheme can be extended to support multiversions and fast recovery in flash memory in a very effective way with a modest overhead. Second, we are investigating on a hybrid architecture of flash memory and phase change ram (i.e. PRAM). Although some advocates of non-volatile memory have predicted that flash memory will give way to non-volatile memory soon (e.g. by the year 2012), the performance of PRAM is far lagging behind its promise. For this reason, we believe that they will co-exist, complementing each other, for a while. As a hybrid architecture of flash memory and PRAM, we suggest to use PRAM as the log area in in-page logging [4], report a preliminary performance result, and explain its several architectural advantages. Third, we are exploring how to leverage flash SSDs as cache in memory hierarchy. As an alternative design, we suggest FlashCache scheme and report its preliminary performance result.

Keywords: Flash Memory, SSD, Database.

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