InnoDB DoubleWrite Buffer

- **DoubleWrite Buffer**(dw-buffer)
  - Special reserved area in the InnoDB to cope with *partial page write*
  - All dirty pages written to dw-buffer prior to its main storage
  - 2MB size area resides in the System tablespace
- **IO Pattern** : Sequential write

Motivation and Goals

- **Improve the DBMS performance by exploiting dw-buffer as read cache**
- **Flash Memory SSD**
  - High *sequential write* performance
  - But, slow random write compared with random read
  - High *random read* performance
- **Deploy SSD as a storage device for dw-buffer**
  - DoubleWrite
  - Support atomic write with faster speed, because it is sequential write pattern
  - Exploit dw-buffer as read cache
  - Enjoy random read performance of SSD

Proposed Scheme

- **Move dw-buffer from the HDD to the SSD**
  - Support Atomic Write for recovery : it is the same purpose of the original one
  - Enlarge the size of dw-buffer enough to cache recently evicted pages
  - Use dw-buffer as read cache to improve performance
- **Write and Read operation**
  - Write : Dirty pages, like the original InnoDB, are sequentially written first to dw-buffer. Then, written to its main location in HDD
  - Read : Search dw-buffer first, if found, read from it. Otherwise, fetch the requested page from HDD

Performance Evaluation

- **Evaluation environment**
  - Database size : 30GB
  - Buffer Pool : 50MB, dw-buffer size : 1GB
  - HDD : 8 x 15k rpm (raid0), SSD : Samsung S470(256GB)
- **SSD as read cache : performance gain more than 50% compared with dw-buffer in HDD**
  - Just deploy SSD as dw-buffer does not show remarkable results : 8 raided HDD has better sequential write
  - Exploit SSD as read cache : hit ratio comes to about 40% only 1GB cache