# InnoDB DoubleWrite Buffer as Read Cache Using SSDs

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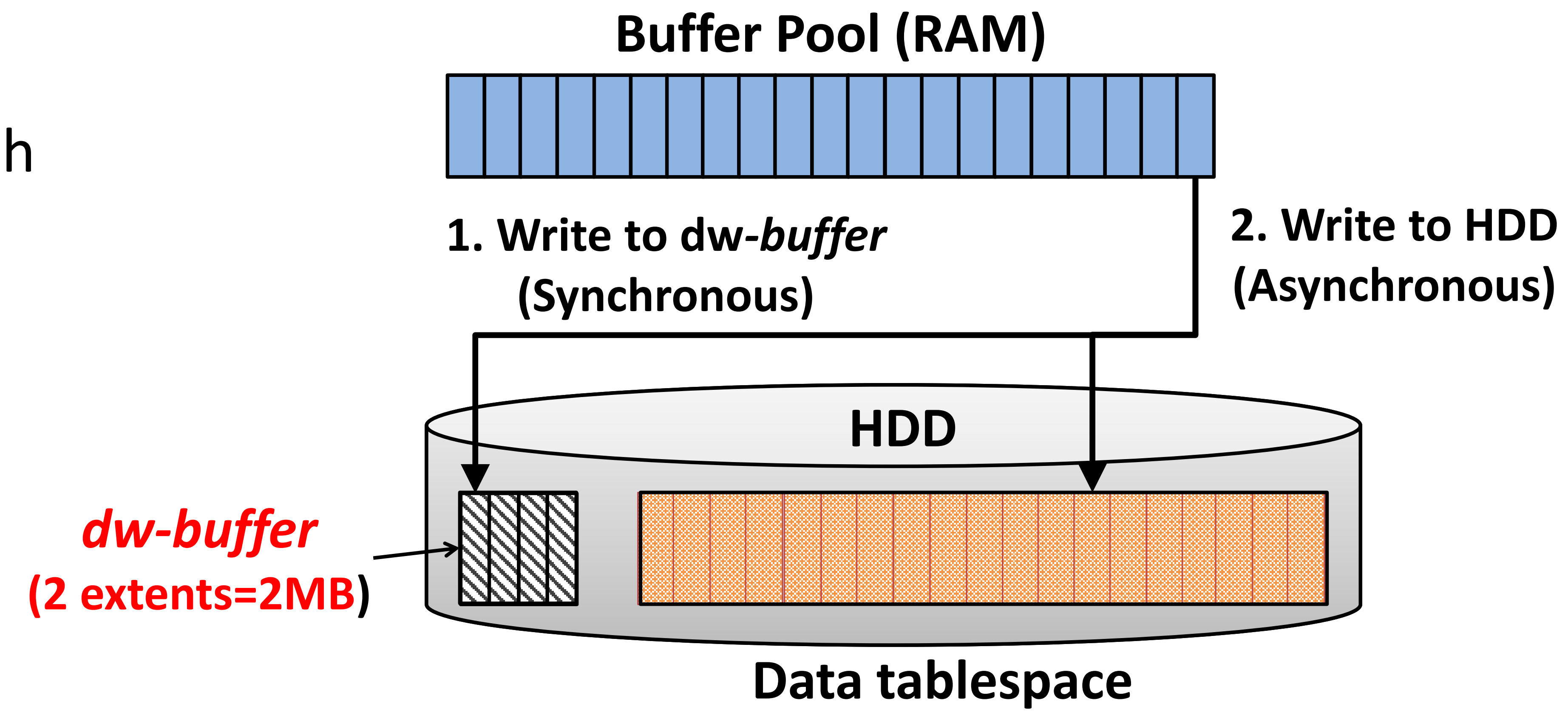
## InnoDB DoubleWrite Buffer

- **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

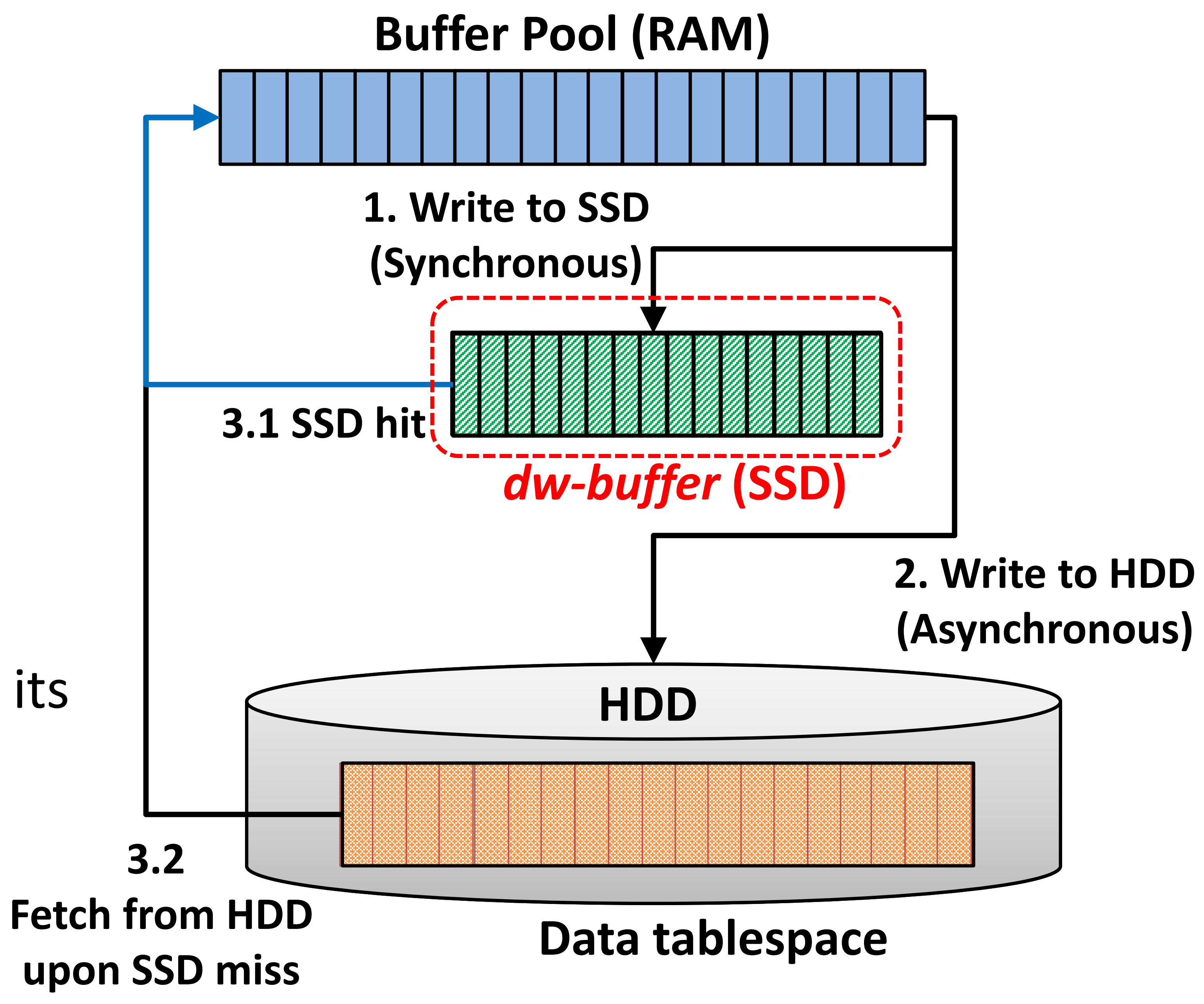
- **Improve the DBMS performance by exploiting *dw-buffer* as read cache**

- **Flash Memory SSD**
  - High **sequential write** performance
    - But, slow random write compared with random read
  - High **random read** performance

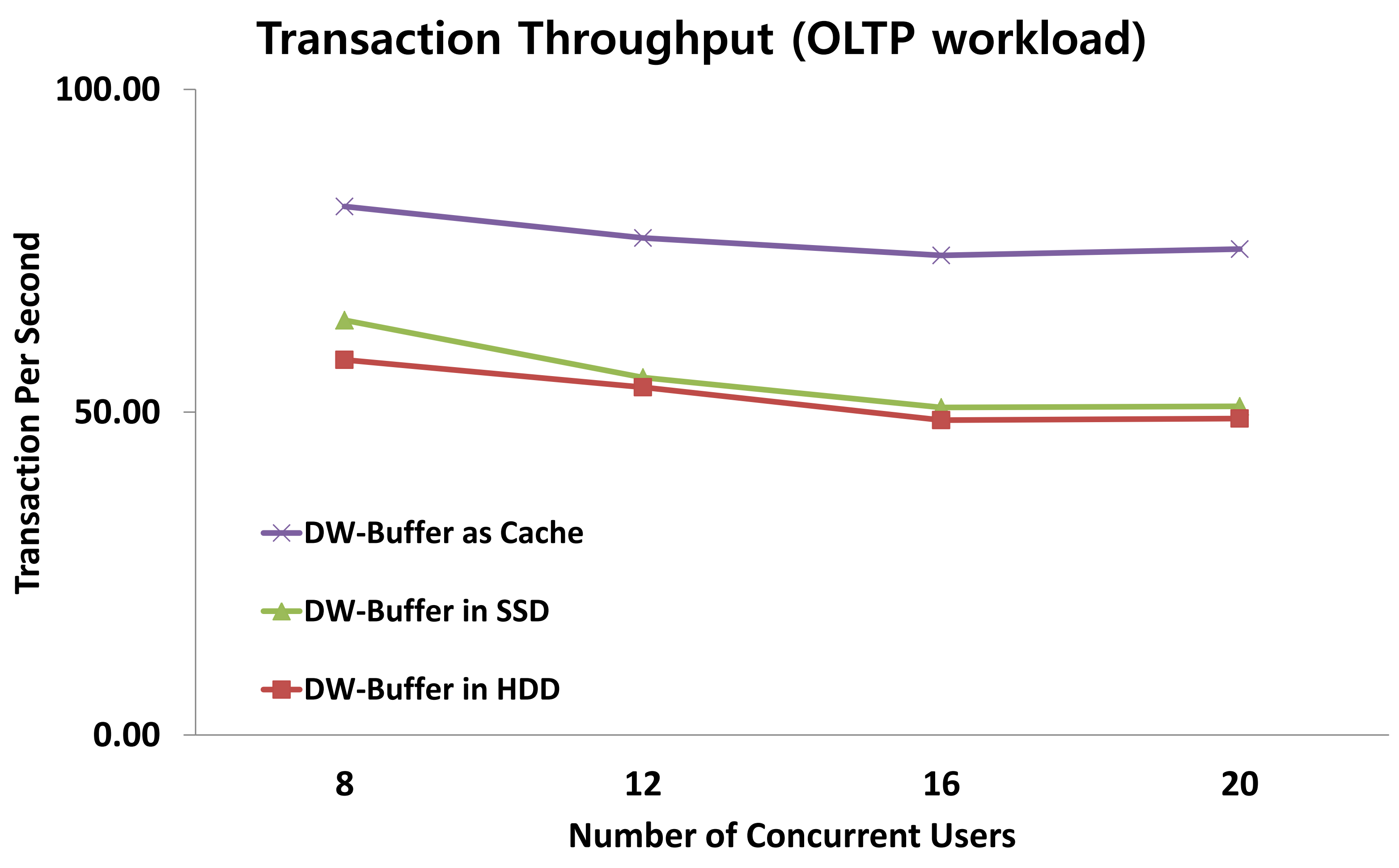
- **Deploy SSD as a storage device for *dw-buffer***
  - DoubleWrite
    - Support atomic write with faster speed, because it is sequential write pattern
  - Exploit dw-buffer as read cache
    - Enjoy random read performance of SSD

## 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