

Your combined question for these two papers is:

*For each of the five rules of the Unwritten SSD Contract (i.e., Request Scale, Locality, Aligned Sequentiality, Group by Death Time, and Uniform Data Lifetime) briefly discuss how **WiscKey** behaves. Specifically: Does WiscKey adhere to each rule? If so, what does WiscKey do in order to follow the rule? If not, how could this harm the system and how might this be fixed?*

Answer:

- 1) Request Scale: Adhere. In WiscKey, only the location of the value is stored in the LSM-tree with the key, while the actual values are stored elsewhere in an SSD-friendly fashion. With this design, for a database with a given size, the size of the LSM-tree of WiscKey is much smaller than that of LevelDB. The smaller LSM-tree can remarkably reduce the write amplification for modern workloads that have a moderately large value size.*
- 2) Locality: Adhere. WiscKey's smaller read amplification improves lookup performance. During lookup, WiscKey first searches the LSM-tree for the key and the value's location; once found, another read is issued to retrieve the value.*
- 3) Aligned Sequentiality: Adhere. WiscKey is optimized for SSD devices by matching its I/O patterns with the performance characteristics of SSD devices. Specifically, sequential writes and parallel random reads are effectively utilized so that applications can fully utilize the device's bandwidth. WiscKey is much smaller than LevelDB (for the same database size), a lookup may search fewer levels of table files in the LSM-tree and a significant portion of the LSM-tree can be easily cached in memory. Hence, each lookup only requires a single random read (for retrieving the value) and thus achieves a lookup performance better than LevelDB.*
- 4) Group by Death Time: Not adhere. Will have performance penalty and write amplification. It can be fixed by using Log-structured File Systems.*
- 5) Uniform Data Lifetime: Not adhere. Will have performance penalty and write amplification. It can be fixed by using Log-structured File Systems.*

Paper review:

Understanding the unwritten contract is crucial for designing high-performance application and file systems. System designing demands more vertical analysis.

The price of SSD is generally higher than that of mechanical hard drives. As technology continues to increase, the price of SSD is getting lower and lower,

and they are coming into the homes of ordinary people. At this stage, many computer geeks will adopt a hybrid solution of SSD+HDD to improve the performance of the computer. However, with the development of solid state drives, higher and higher capacity SSD will gradually replace the mechanical hard disk.