# TerraMaster Hyper Cache

Faster and Safer

# Several questions

1. **What is Hyper Cache?**
2. What is Hyper Cache for?
3. What is Hyper Cache operating principle?
4. What are the advantages and disadvantages compared with other competitors?
5. What are Hyper Cache main application scenarios?

# Hybrid Data Storage
# What is hybrid data storage?

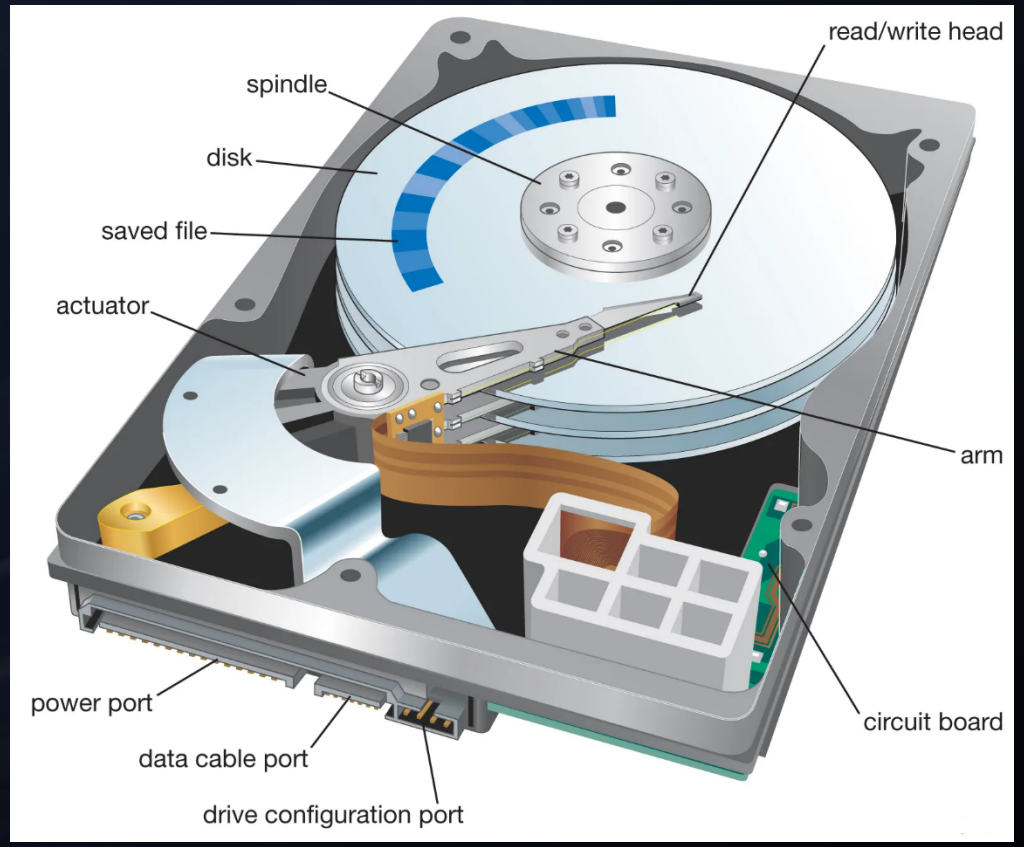
Hybrid data storage is a storage solution composed of different storage media to achieve fast access speed and high cost efficiency.

Due to the rapid increase of data volume, users' demands for storage space are increasing. Some users not only require huge storage space but also have strict requirements for data reading speed. The traditional mechanical hard disk has a large capacity, and the largest hard disk in 2022 could provide up to 22TB storage space. However, the reading speed of SATA/SAS mechanical hard disk (usually only 200~300MB/s) is slow due to its structure and bus restrictions, and its 4K reading and writing performance is even worse. M.2 SSD can provide a high storage speed of 1,000~2,000MB/s with even faster speed and excellent 4K reading and writing performance, but SSD has the following obvious shortcomings: small capacity, high price and short service life. The average life of TLC SSD is less than 1,000 times. In this situation, hybrid data storage is the most popular solution at present. Mechanical hard disk is used to store data and SSD is used to accelerate the cache.

# Advantages and Disadvantages of mechanical hard disk

Advantages: Large capacity, low cost, and long service life.

Disadvantages: Large volume, low efficiency, and especially poor 4K performance.



# Advantages and Disadvantages of flash memory

Advantages: Small size, high speed, and good 4K performance.

Disadvantages: Small capacity, high cost, and short service life.

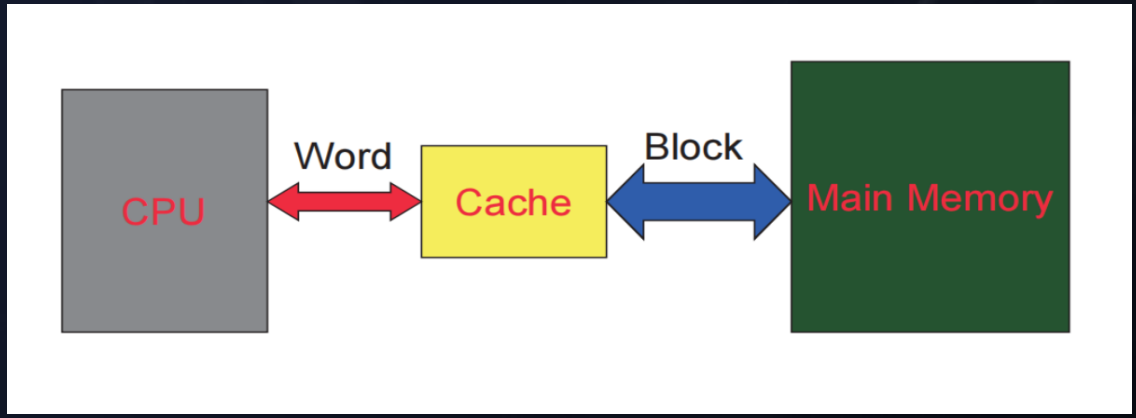
# Service life of flash memory

According to different types of NAND Flash, the erasure life P/E is different. At present, there are three types of NAND Flash: SLC, MLC and TLC. QLC will appear soon. Then, there will be four types. The flash P/E of three types are SLC 5,000~10,000 times, MLC 1,000~3,000 times and TLC 500~1,000 times, respectively. What about QLC? According to the present statement, the flash P/E of QLC structure is only 150 times. Isn’t that completely useless? Don’t worry. Technologies are always improved. This is only the technically verified product at the initial stage, and it will definitely be improved in the future. You might remember that when TLC was listed, the P/E was only 500 times.

# Operating principle of SSD

Principle of locality: The analysis results of a large number of typical programs showed that the storage units accessed by storage instruction or storage data tended to focus on a continuous storage area that is smaller.

SSD cache is actually a second-level cache (memory is a first-level cache). SSD cache is always between CPU and main storage, which is used to store the most active (frequently accessed) instructions and data. CPU can directly obtain instructions or data blocks from cache without accessing main storage to improve efficiency.



# What is Hyper Cache?

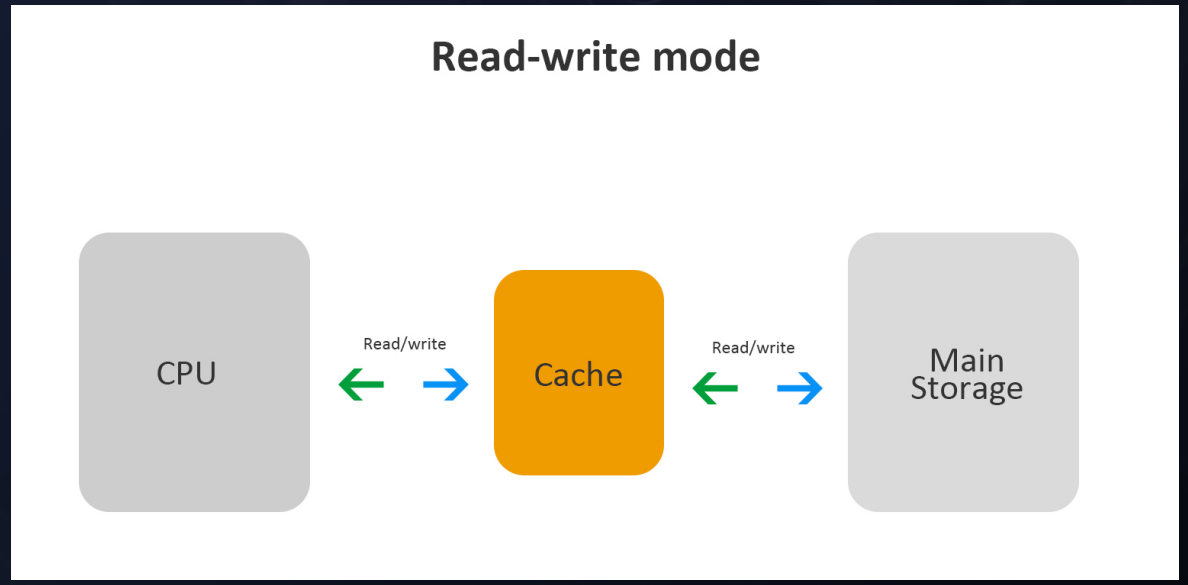
Terra Master Hyper Cache is a unique SSD cache acceleration tool developed by Terra Master. Compared with the traditional SSD cache, Hyper Cache can provide up to 3 cache modes to meet different usage requirements, and it can also create a disk array for SSD replacement to increase cache speed and security. Through Terra Master Hyper Cache, you can create faster and safer SSD cache acceleration for TNAS and realize more efficient and reliable hybrid data storage.

Advantages:

Terra Master Hyper Cache provides users with 3 optional cache working modes: write + read, read-only and balance. Different modes have different characteristics. Combined with Terra Master’s SSD RAID developed for replacement, Hyper Cache allows users to create RAID 0, RAID 1 and RAID 5 with multiple SSDs to provide SSD capacity expansion and redundancy protection. By using the self-defined cache mode to freely match the SSD array combination, the personalized requirements of users for cache speed and data security in different business scenarios can be met.

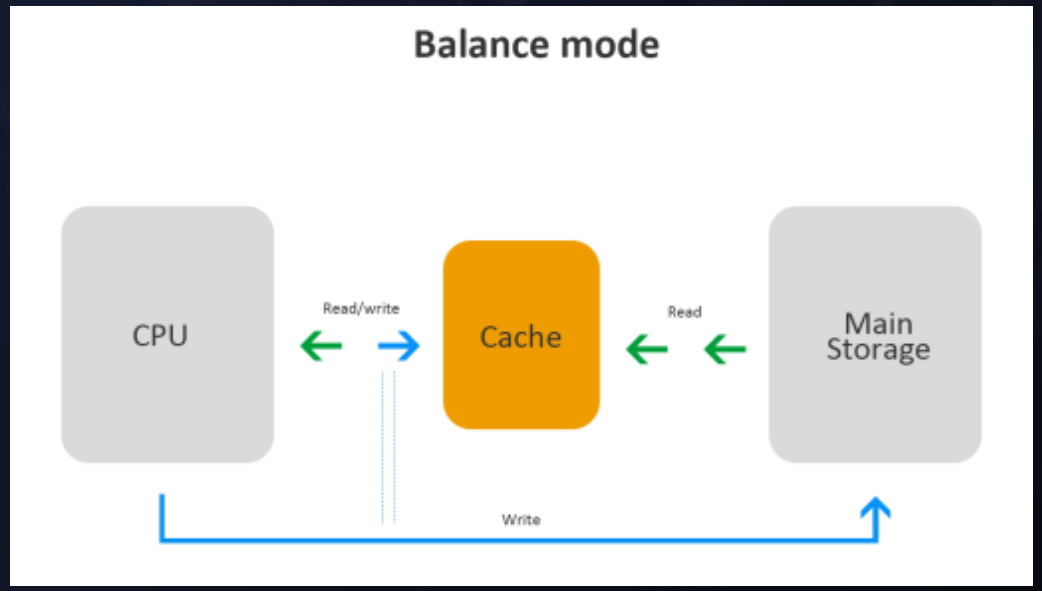
# Read-write mode

This mode provides read and write cache acceleration. Data will be written to SSD cache first, and then to hard disk later. The disadvantage of read-write mode is that it is not safe enough. If the SSD fails, or the power is cut off halfway, the data may be lost. If it is necessary to improve the security of read-write mode, multiple SSDs can be used to form RAID 1 or RAID 5 array to provide redundancy for cache SSDs. This can not only increase the cache capacity but also avoid the risk of data loss caused by SSD fault. Read-write mode is suitable for users who have high requirements for cache reading and writing performance.



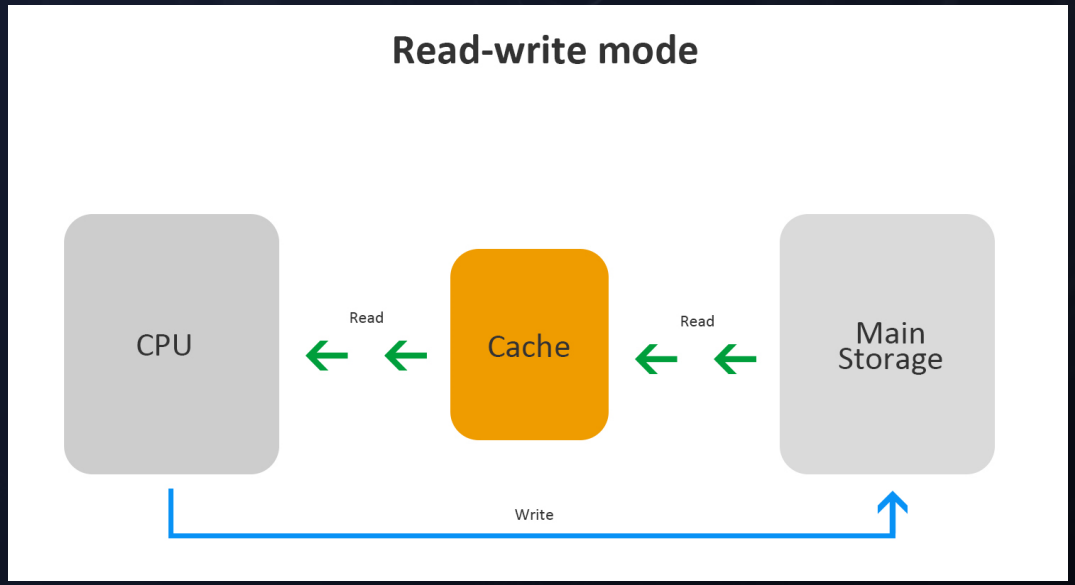
# Balance mode

This mode provides pre-loaded read cache acceleration. Data will be written into SSD cache and hard disk simultaneously, and the writing speed of data will be reduced to some extent but the reading speed can be improved. Balance mode can avoid the risk of SSD fault or loss caused by power fault. In this mode, the read and write speed of the cache can be improved by using 2 SSDs to form a RAID 0 array. Balance mode is suitable for users who have low requirements for write cache performance but high requirements for read cache performance.



# Read-only mode

This mode only provides read cache acceleration. Data will be written directly to the hard disk but not to the cache. The fault of SSD will not affect the security of data. If 2 SSDs are used to form a RAID 0 array in the read-only mode, the read speed of the cache can be improved. Read-only mode is suitable for users who have high requirements for data security but low requirements for cache writing performance.



# Case 1

Video non-linear editing professionals have a high requirement for the reading speed of video files. Meanwhile, because of the large capacity of video files, the cache capacity is relatively high, and a HD video script is often as high as several hundred GB. At this moment, users choose 2 SSDs to replace the components. If the configuration of read-write mode and RAID 0 array is selected, the access speed of large video files can be improved.

# Case 2

The website database is featured by low writing but high concurrent reading, which requires high performance of 4K reading. If the configuration of balance mode and RAID 0 is adopted, the writing security can be guaranteed, and the reading speed can be achieved.

# Thank you

The End ◀◀◀