CLAIMS

What is claimed is:

1. A method for data storage in a hybrid storage node of a data storage system, the hybrid storage node comprising first and second storage devices having different performance characteristics wherein the first devices comprise at least one high performance non-volatile memory for cache storage and the second storage devices comprise two or more storage devices, the cache storage being shared among the two or more storage devices, the hybrid storage node further comprising processing resources shared among the two or more storage devices for managing data storage in the hybrid storage node so as to implement the method, the method comprising:

receiving a read request to read stored information from the hybrid storage node; and

in response to the read request, accessing both the cache storage in the first storage devices and storage in the second storage devices to locate the stored information using the shared processing resources.

2. The method in accordance with Claim 1 further comprising:

receiving a write request to write information to the hybrid storage node;

in response to the write request, writing the information to the second storage devices; and

in response to the write request, writing the information to the cache storage only if the information meets predetermined criteria.

3. The method in accordance with Claim 2 wherein the predetermined criteria comprises one or more of a size of the information is below a predetermined size threshold and the information comprises hot data.

4. The method in accordance with Claim 3 wherein the cache storage comprises id queue storage which stores identification information associated with data in the id queue storage each time the data is accessed and wherein information comprises hot data when the information comprises data which has associated identification information stored to the id queue storage when the associated identification information is already stored in the id queue storage.

5. The method in accordance with Claim 3 further comprising in response to locating the stored information in the storage in the second storage devices, writing the stored information to the cache storage if it is not already stored in the cache storage and if the stored information comprises hot data.

6. The method in accordance with Claim 1 further comprising performing cache flushing only when predetermined criteria is met, wherein cache flushing comprises deleting data form the cache which is not hot data.

7. The method in accordance with Claim 6 wherein the predetermined criteria comprises criteria selected from (a) cache space utilization is greater than a first threshold and (b) cache space utilization is below the first threshold but above a second threshold and the hybrid storage node is idle.

8. A data storage system comprising one or more hybrid storage nodes, each hybrid storage node comprising:

first storage devices having first performance characteristics;

second storage devices having second performance characteristics different than the first performance characteristics; and

processing resources for managing data storage in the hybrid storage node,

wherein the first performance characteristics are higher performing than the second performance characteristics, and wherein the first storage devices comprise at least one high performance non-volatile memory for cache storage, and wherein the cache storage serves as cache for the second storage devices, and wherein the second storage devices comprise two or more storage devices, and wherein the processing resources and the cache storage are shared among the two or more storage devices.

9. The data storage system in accordance with Claim 8 wherein the first and second performance characteristics comprise data access speeds, and wherein the first performance characteristics comprise faster access speeds than the second performance characteristics.

10. The data storage system in accordance with Claim 8 wherein the processing resources access the cache storage for both read and write operations.

11. The data storage system in accordance with Claim 8 wherein the processing resources include an id queue storage and an id list storage, and wherein the id queue storage comprises a short history buffer storing data identification information which has been accessed from the second storage devices during a

predetermined recent period of time, and wherein the id list storage comprises larger storage than the id queue storage, and wherein the processing resources perform cache loading and cache destaging policies in response to the id list storage.

12. The data storage system in accordance with Claim 11 wherein the id list storage can be implemented in the first storage devices and can serve as the cache storage.

13. The data storage system in accordance with Claim 11 wherein the information associated with data in the id queue storage is read from the second storage devices and stored to the cache storage in response to the associated data in the id queue storage being accessed more than once.

14. The data storage system in accordance with Claim 11 wherein the information associated with data in the id list storage is evicted from the cache storage in response to the associated data in the id list storage not being accessed and moving to the end of the id list storage.

15. The data storage system in accordance with Claim 8 wherein cache architecture reuses an index structure of each of the second storage devices.

16. The data storage system in accordance with Claim 8 wherein the first storage devices comprise non-volatile memory devices.

17. The data storage system in accordance with Claim 8 wherein the second storage devices comprise one or more storage devices, each comprising either hard disk drive storage media or a solid state storage device.

18. The data storage system in accordance with Claim 8 wherein the processing resources comprise a system-on-a-chip comprising a processor and memory resources for at least metadata storage and/or the processing resources comprise a network interface for interfacing over a network with applications.

19. The data storage system in accordance with Claim 18 wherein the processing resources comprise a network interface, and wherein the network interface couples with one or more of a block interface, a file interface, an object interface or a key-value interface.

20. The data storage system in accordance with Claim 8 wherein the data storage system is either file-based or object-based, and wherein when the data storage system is file-based each data access unit is a file and cache architecture of the cache storage is built on top of a file layer shared by the first and second storage devices, and wherein when the data storage system is object-based, and wherein when each data access unit is object-based the cache architecture of the cache storage is built on top of an object layer shared by the first and second storage devices.