CLAIMS

1. A data storage system ~~for accessing a storage, the storage comprising a first portion and a second portion, the data storage system~~ comprising:

at least one storage drive;

a determination circuit configured to, based on an attribute of first data, determine whether to write first data to ~~the~~(i) a first portion of the at least one storage drive, or ~~to the~~ (ii) a second portion of the at least one storage drive, wherein the first portion comprises a plurality of magnetic recording zones, wherein the plurality of magnetic recording zones comprise (i) a first zone, and (ii) a second zone that overlaps the first zone, wherein the second portion comprises a plurality of non-overlapping storage zones or solid-state memory, and wherein the second portion does not include overlapping magnetic recording zones; and

a control circuit configured to ~~control writing~~, based on the determination, either write (i) the first data to the first portion in a first log structured manner, or (ii) write the first data to the second portion in a random access manner or a second log structured manner.

2. The data storage system according to claim 1, wherein the control circuit is ~~further~~ configured to ~~control writing~~write the first data to the second portion in ~~a~~ the random access manner.

3. The data storage system according to claim 1, wherein ~~to~~ the control ~~writing~~circuit is configured to write the first data to the first portion in the first log structured manner, which comprises:

~~to control~~ writing the first data in ~~the~~a form of a circular log in the first portion, wherein the circular log ~~having~~ includes a header and an end defining the first data written to the first portion; and

~~to append~~appending new data to the header of the circular log, wherein the appending of the new data ~~causing~~ moves the header ~~to move relative to~~toward the end of the circular log.

4. The data storage system according to claim 3, ~~the data storage system~~further comprising~~:~~ a marking circuit configured to mark unwanted old data stored ~~on~~in the first portion.

5. The data storage system according to claim 4, wherein ~~to~~the control circuit in writing the first data to the first portion in the first log ~~structure~~ structured manner ~~comprises: to control~~controls the writing of the new data over some of the old data by (i) appending unmarked portions of the old data to the header, and ~~to remove~~(ii) removing marked portions of the old data.

6. The data storage system according to claim 1, wherein ~~the determination circuit is further configured to determine whether to write data to the first portion or to the second portion based on~~ the ~~attributes of the data~~ attribute is a type of the first data, a size of the first data, or an access frequency of the first data.

7. The data storage system according to claim 1, wherein the determination circuit is ~~further~~ configured to determine whether to write the first data to the first portion or ~~to~~ the second portion based on whether ~~a relevant~~ old data relevant to the first data is located in the first portion or the second portion.

8. The data storage system according to claim 1, ~~the data storage system~~further comprising~~:~~ an access monitor circuit configured to monitor an access pattern of the first data ~~in~~to and from the first portion and the second portion.

9. The data storage system according to claim 8, ~~the data storage system~~further comprising~~:~~ a file migration circuit configured to move the first data between the first portion and the second portion based on the access pattern.

10. The data storage system according to claim 1, wherein the determination circuit is ~~further~~ configured to determine whether the first data is file data or file system metadata.

11. The data storage system according to claim 10, wherein the control circuit is ~~further~~ configured to (i) write the first data to the first portion if the determination circuit determines the first data is file data, and ~~to~~(ii) write the first data to the second portion ~~of the data~~ if the determination circuit determines the first data is file system metadata.

12. The data storage system according to claim 1, ~~the data storage system further comprising:~~wherein:

the second portion comprises ~~a~~ the solid-state memory;

the first data is file system metadata; and

the solid-state memory is configured to store the file system metadata.

13. The data storage system according to claim 12, wherein:

the control circuit is configured to store the file system metadata in the solid-state memory ~~is~~ in ~~the~~ a form of a tree structure;

the tree structure ~~comprising~~comprises a plurality of nodes~~,~~; and

each ~~node~~of the plurality of nodes ~~comprising~~comprises metadata information of a program file or a directory.

14. The data storage system according to claim 12, wherein the control circuit is ~~further~~ configured to write the file system metadata in the ~~memory to the~~ second portion at periodic intervals.

~~15. The data storage system according to claim 1, the data storage system further comprising:~~

~~a metadata database, the metadata database configured to store file system metadata.~~

~~16. The data storage system according to claim 1, the data storage system further comprising the storage, the storage having the first portion and the second portion.~~

~~17. A hard disk comprising: a plurality of shingled magnetic recording zones; and a conventional magnetic recording zone.~~

15. The data storage system according to claim 1, wherein the second portion comprises the plurality of non-overlapping storage zones.

~~18.~~16. The ~~hard disk~~ data storage system according to claim ~~17~~15, wherein a first ~~shingled magnetic recording~~ zone of the plurality of ~~shingled magnetic recording~~non-overlapping storage zones is separated from a second ~~shingled magnetic recording~~ zone of the plurality of ~~shingled magnetic recording~~non-overlapping storage zones by an inter-zone gap.

~~19.~~17. A storage array comprising:

the data storage system of claim 1; and

an array circuit comprising the at least one storage drive, wherein the at least one storage drive comprises a first storage drive and a second storage drive, wherein the first portion comprises the first storage drive, and wherein the second portion comprises the second storage drive~~; and a plurality of hard disks according to claim 17 controlled by the array circuit; wherein the plurality of hard disks comprises: a first portion comprising the shingled magnetic recording zones of the plurality of hard disks; and a second portion comprising the conventional magnetic recording zones of the plurality of hard disks~~.

~~20.~~18. A method of writing first data to ~~a~~ at least one storage drive in a data storage system, wherein the at least one storage ~~having~~ drive comprises a first portion and a second portion, wherein the first portion comprises a plurality of magnetic recording zones, wherein the plurality of magnetic recording zones comprise (i) a first zone, and (ii) a second zone that overlaps the first zone, wherein the second portion comprises a plurality of non-overlapping storage zones or solid-state memory, and wherein the second portion does not include overlapping magnetic recording zones, the method comprising:

based on an attribute of the first data, determining whether to write the first data to (i) the first portion of the at least one storage drive, or ~~to~~ (ii) the second portion of the at least one storage drive; and

based on the determination, ~~controlling~~ writing the first data to either (i) the first portion in a first log structured manner, or (ii) write the first data to the second portion in a random access manner or a second log structured manner.