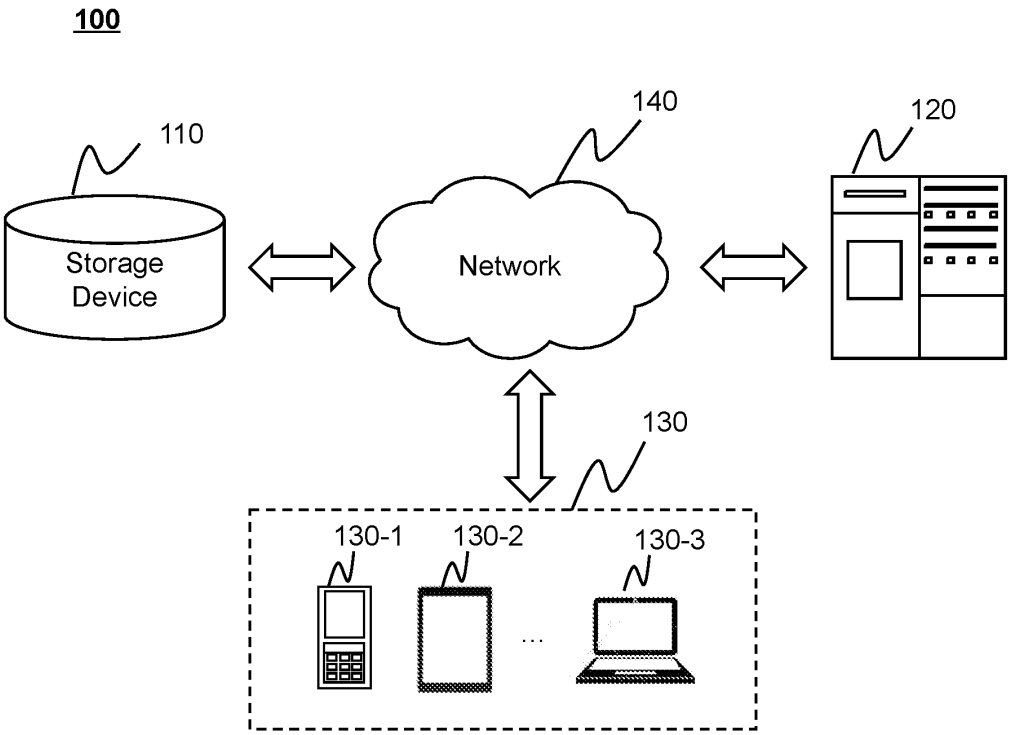


FIG. 1

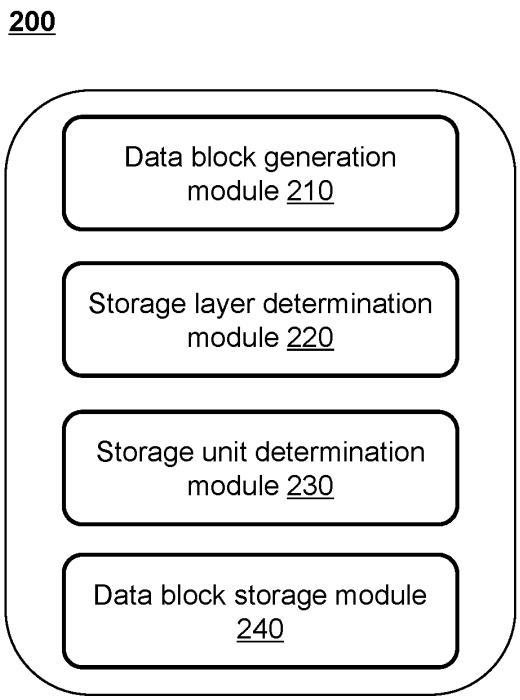

200
Data block generation module 210
Storage layer determination module 220
Storage unit determination module 230
Data block storage module 240

FIG. 2

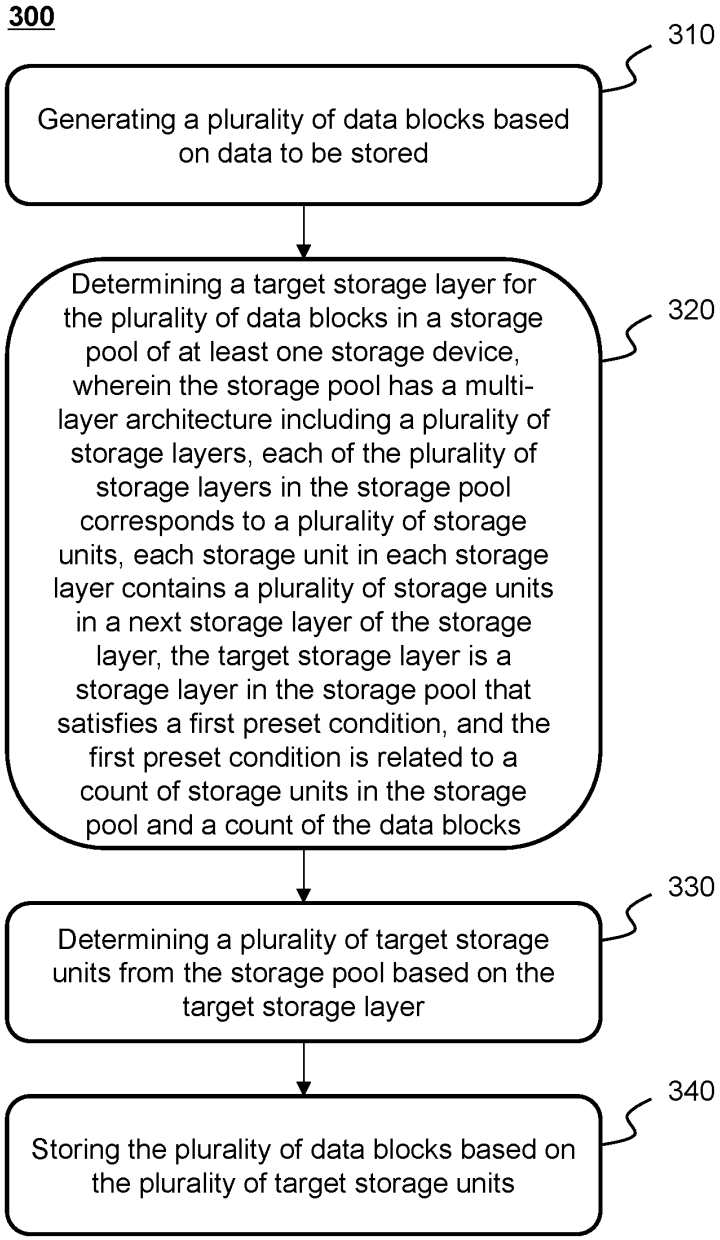

300
310
Generating a plurality of data blocks based on data to be stored
320
Determining a target storage layer for the plurality of data blocks in a storage pool of at least one storage device, wherein the storage pool has a multi-layer architecture including a plurality of storage layers, each of the plurality of storage layers in the storage pool corresponds to a plurality of storage units, each storage unit in each storage layer contains a plurality of storage units in a next storage layer of the storage layer, the target storage layer is a storage layer in the storage pool that satisfies a first preset condition, and the first preset condition is related to a count of storage units in the storage pool and a count of the data blocks
330
Determining a plurality of target storage units from the storage pool based on the target storage layer
340
Storing the plurality of data blocks based on the plurality of target storage units

FIG. 3

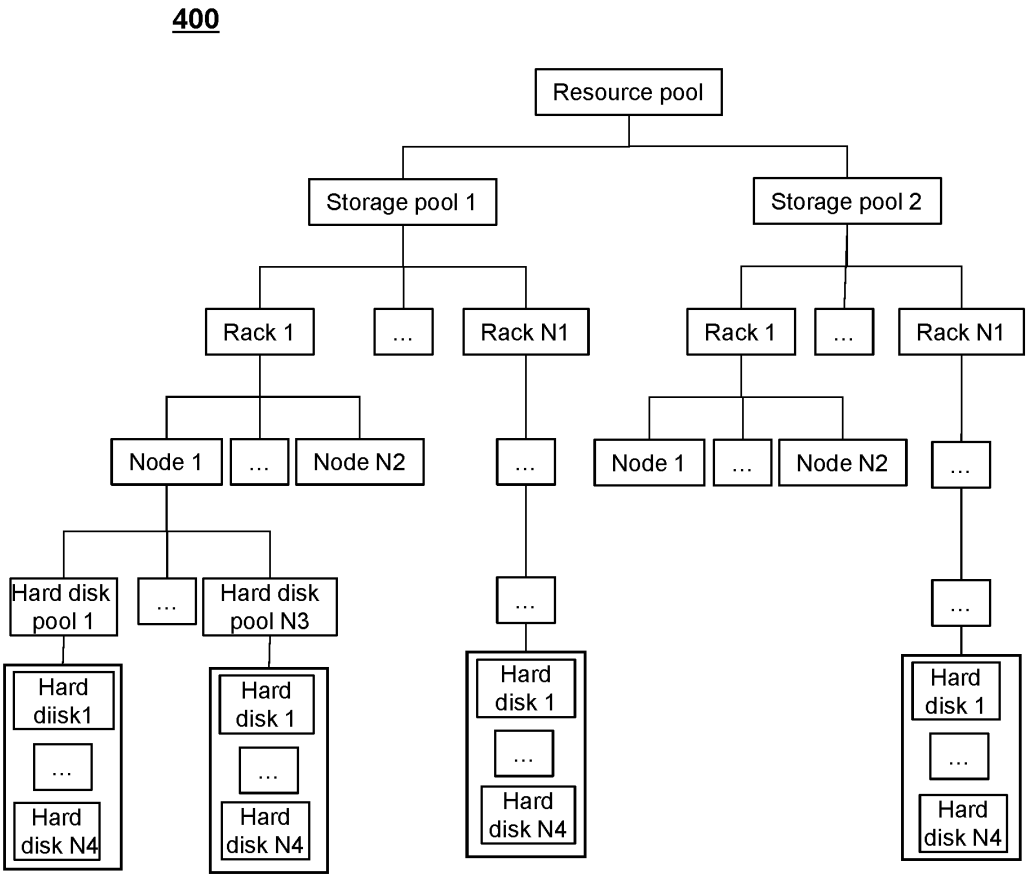

400
Resource pool
Storage pool 1
Storage pool 2
Rack 1
...
Rack N1
Rack 1
...
Rack N1
Node 1
...
Node N2
...
Node 1
...
Node N2
...
Hard disk pool 1
...
Hard disk pool N3
...
...
Hard diisk1
...
Hard disk N4
Hard disk 1
...
Hard disk N4
Hard disk 1
...
Hard disk N4
Hard disk 1
...
Hard disk N4

FIG. 4

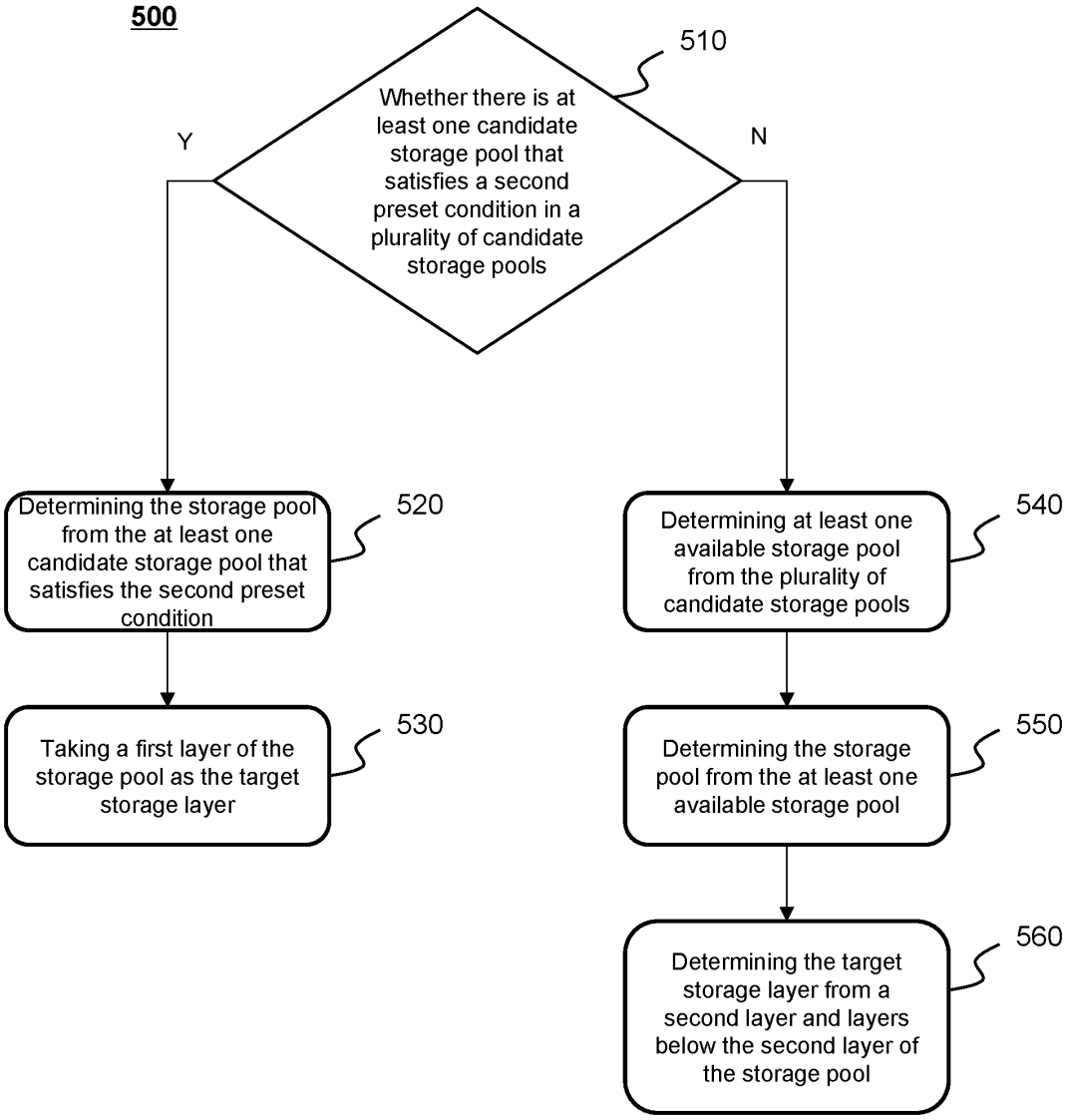

500
510
Whether there is at least one candidate storage pool that satisfies a second preset condition in a plurality of candidate storage pools
Y
N
Determining the storage pool from the at least one candidate storage pool that satisfies the second preset condition
520
Taking a first layer of the storage pool as the target storage layer
530
Determining at least one available storage pool from the plurality of candidate storage pools
540
Determining the storage pool from the at least one available storage pool
550
Determining the target storage layer from a second layer and layers below the second layer of the storage pool
560

FIG. 5

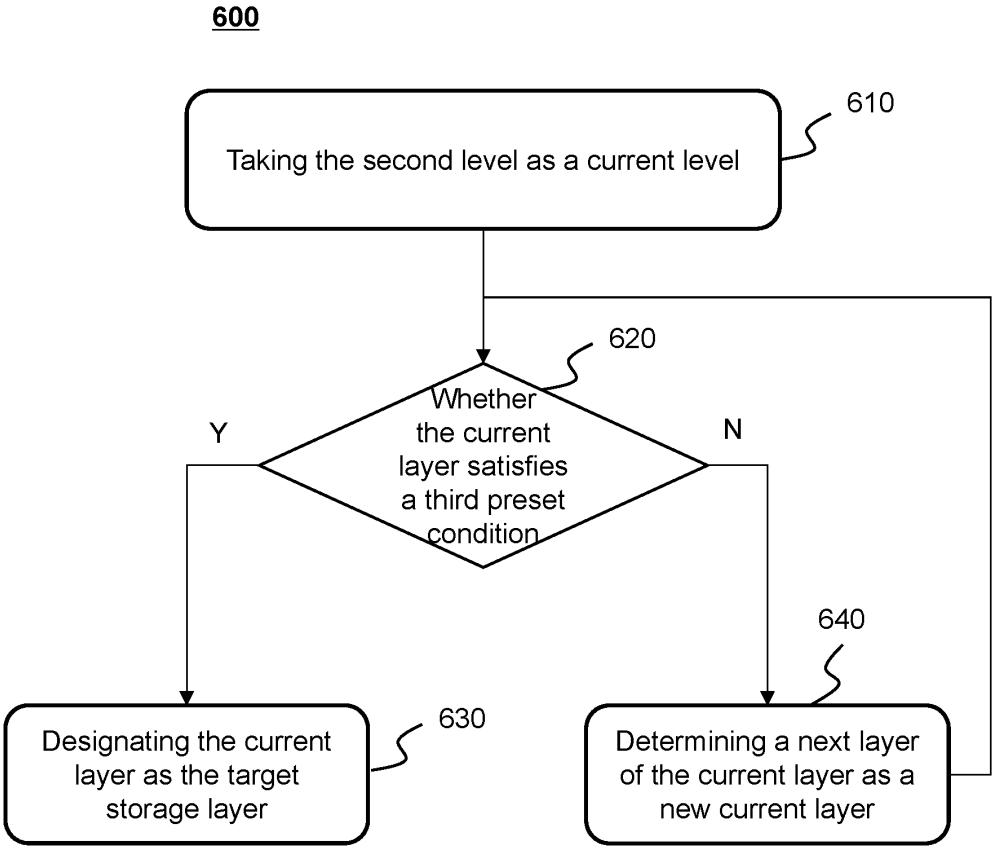

600
610
Taking the second level as a current level
620
Whether the current layer satisfies a third preset condition
Y
N
630
Designating the current layer as the target storage layer
640
Determining a next layer of the current layer as a new current layer

FIG. 6

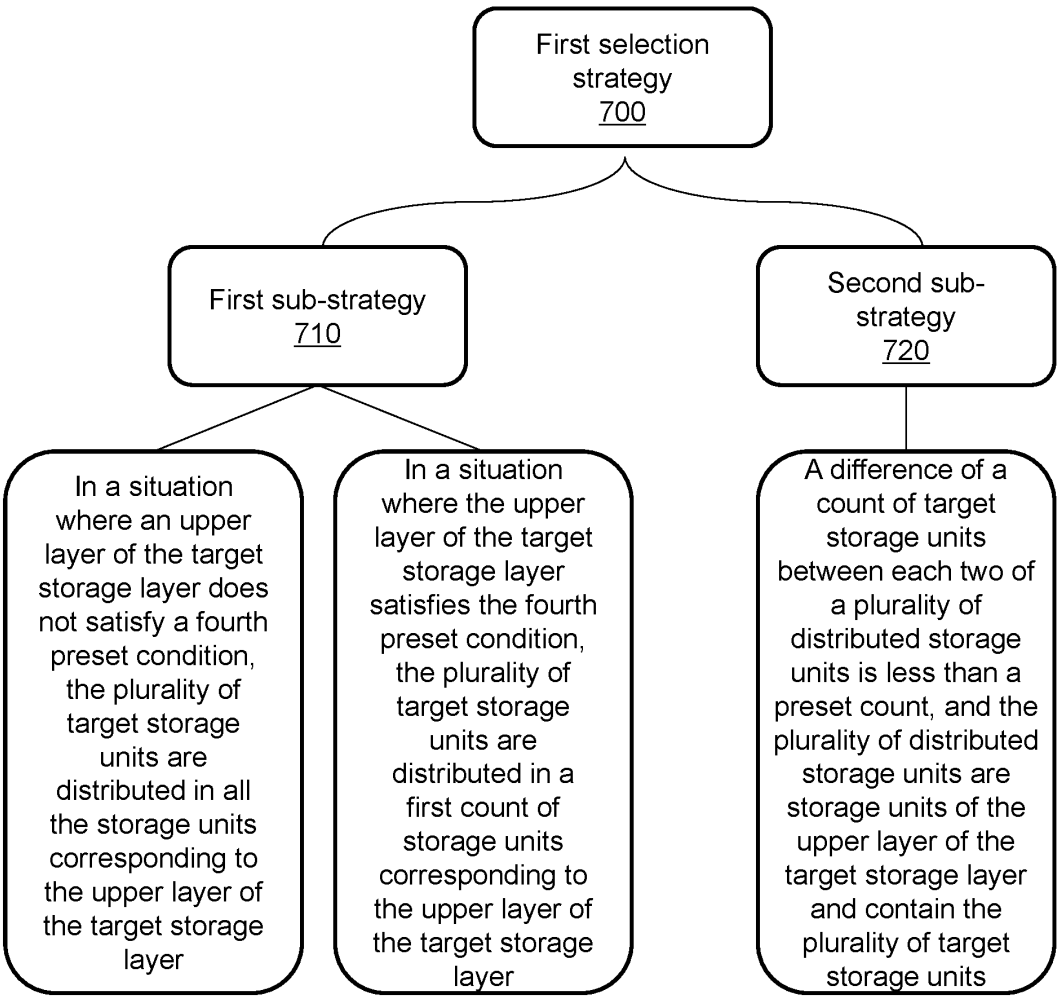

First selection strategy 700
First sub-strategy 710
Second sub-strategy 720
In a situation where an upper layer of the target storage layer does not satisfy a fourth preset condition, the plurality of target storage units are distributed in all the storage units corresponding to the upper layer of the target storage layer
In a situation where the upper layer of the target storage layer satisfies the fourth preset condition, the plurality of target storage units are distributed in a first count of storage units corresponding to the upper layer of the target storage layer
A difference of a count of target storage units between each two of a plurality of distributed storage units is less than a preset count, and the plurality of distributed storage units are storage units of the upper layer of the target storage layer and contain the plurality of target storage units

FIG. 7

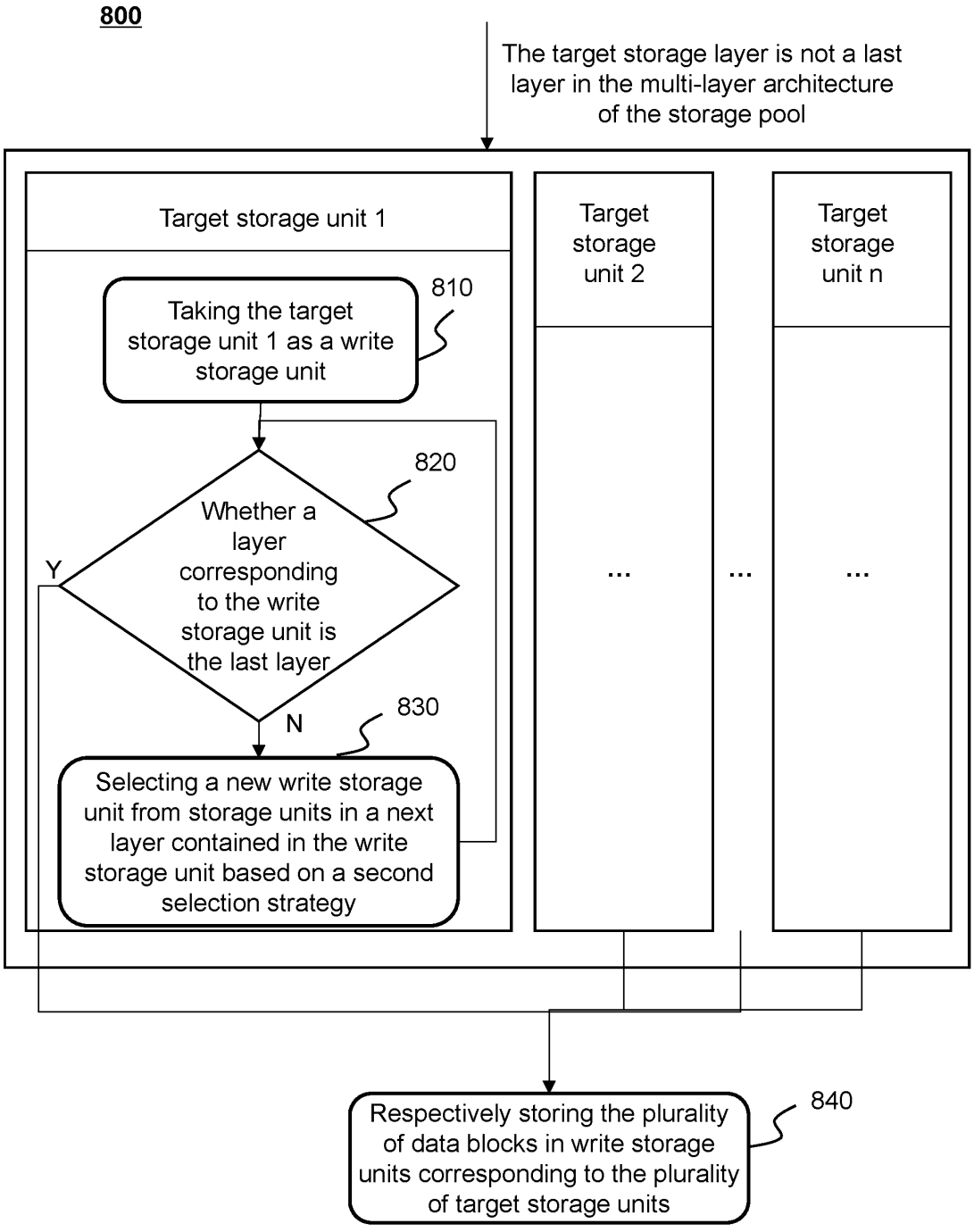

800
The target storage layer is not a last layer in the multi-layer architecture of the storage pool
Target storage unit 1
Target storage unit 2
Target storage unit n
Taking the target storage unit 1 as a write storage unit
810
Whether a layer corresponding to the write storage unit is the last layer
820
Y
N
Selecting a new write storage unit from storage units in a next layer contained in the write storage unit based on a second selection strategy
830
Respectively storing the plurality of data blocks in write storage units corresponding to the plurality of target storage units
840

FIG. 8

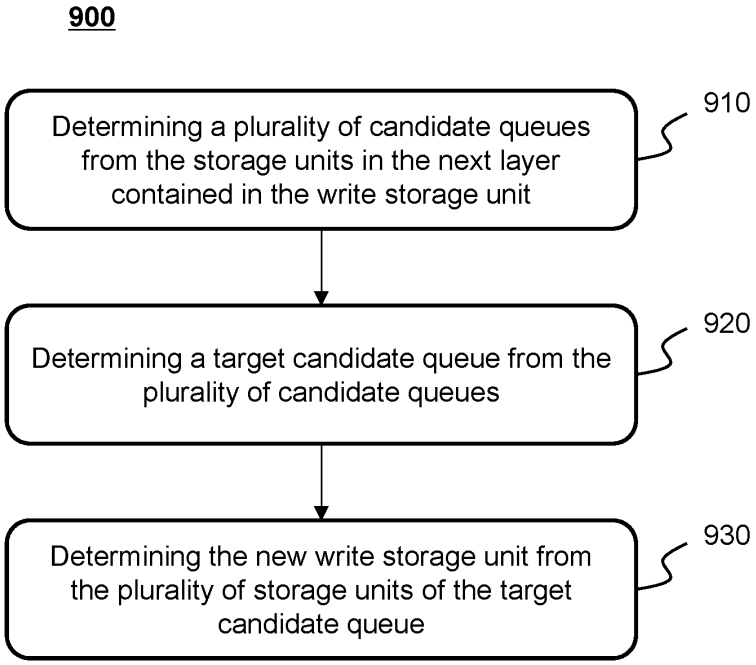

900
Determining a plurality of candidate queues from the storage units in the next layer contained in the write storage unit
910
Determining a target candidate queue from the plurality of candidate queues
920
Determining the new write storage unit from the plurality of storage units of the target candidate queue
930

FIG. 9

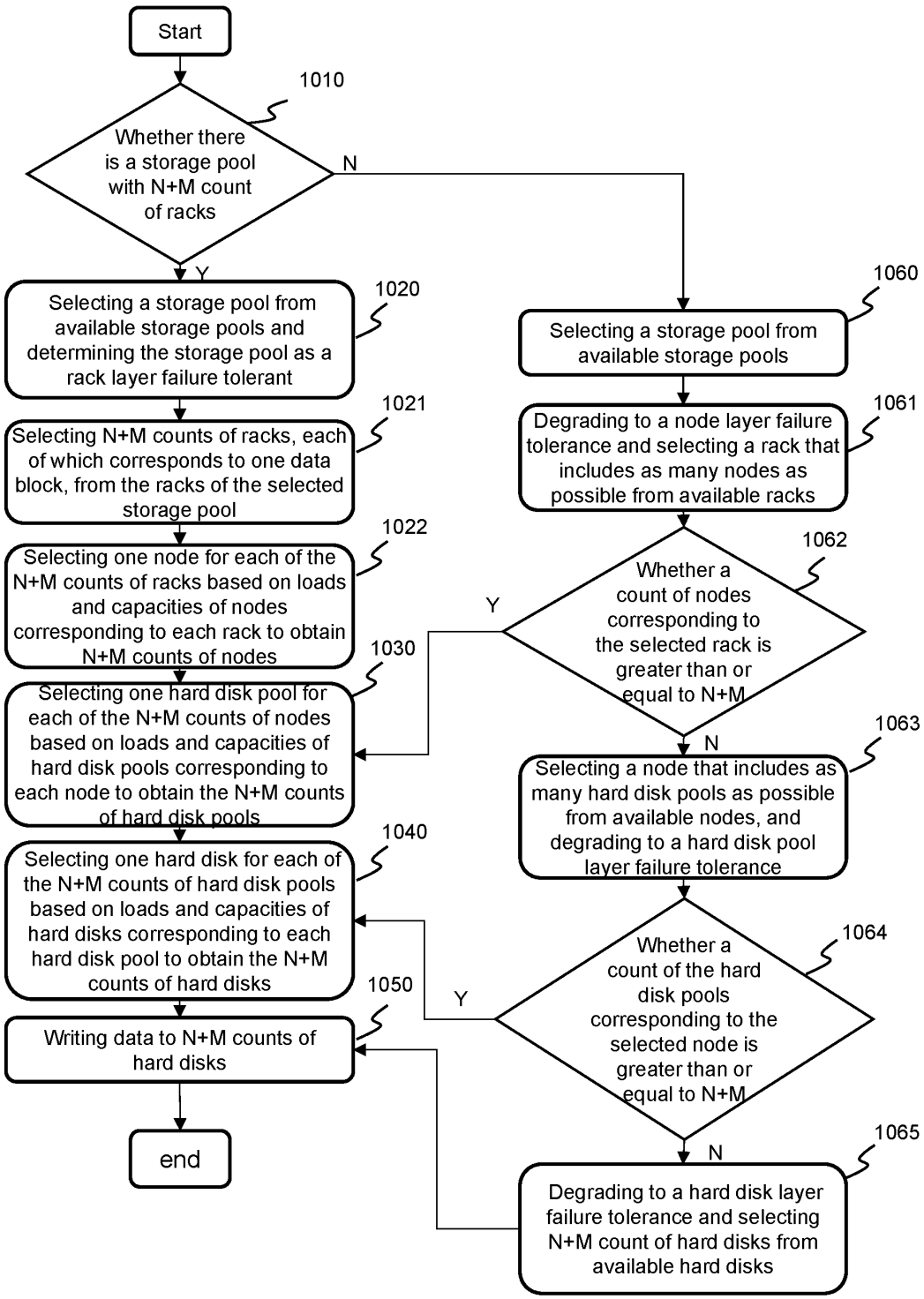

1000
Start
1010
Whether there is a storage pool with N+M count of racks
N
Y
1020
Selecting a storage pool from available storage pools and determining the storage pool as a rack layer failure tolerant
1021
Selecting N+M counts of racks, each of which corresponds to one data block, from the racks of the selected storage pool
1022
Selecting one node for each of the N+M counts of racks based on loads and capacities of nodes corresponding to each rack to obtain N+M counts of nodes
1030
Selecting one hard disk pool for each of the N+M counts of nodes based on loads and capacities of hard disk pools corresponding to each node to obtain the N+M counts of hard disk pools
1040
Selecting one hard disk for each of the N+M counts of hard disk pools based on loads and capacities of hard disks corresponding to each hard disk pool to obtain the N+M counts of hard disks
1050
Writing data to N+M counts of hard disks
end
1060
Selecting a storage pool from available storage pools
1061
Degrading to a node layer failure tolerance and selecting a rack that includes as many nodes as possible from available racks
1062
Whether a count of nodes corresponding to the selected rack is greater than or equal to N+M
Y
N
1063
Selecting a node that includes as many hard disk pools as possible from available nodes, and degrading to a hard disk pool layer failure tolerance
1064
Whether a count of the hard disk pools corresponding to the selected node is greater than or equal to N+M
Y
N
1065
Degrading to a hard disk layer failure tolerance and selecting N+M count of hard disks from available hard disks

FIG. 10