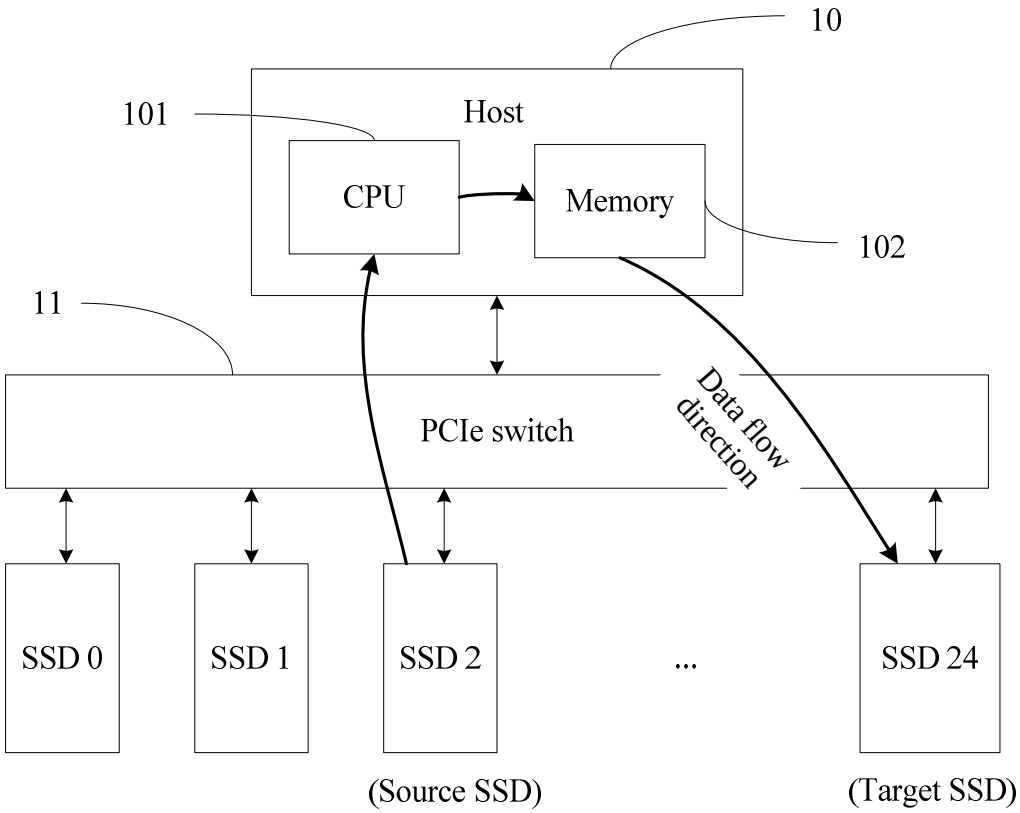

10
101
Host
CPU
Memory
102
11
PCIe switch
Data flow direction
SSD 0
SSD 1
SSD 2
...
SSD 24
(Source SSD)
(Target SSD)

FIG. 1

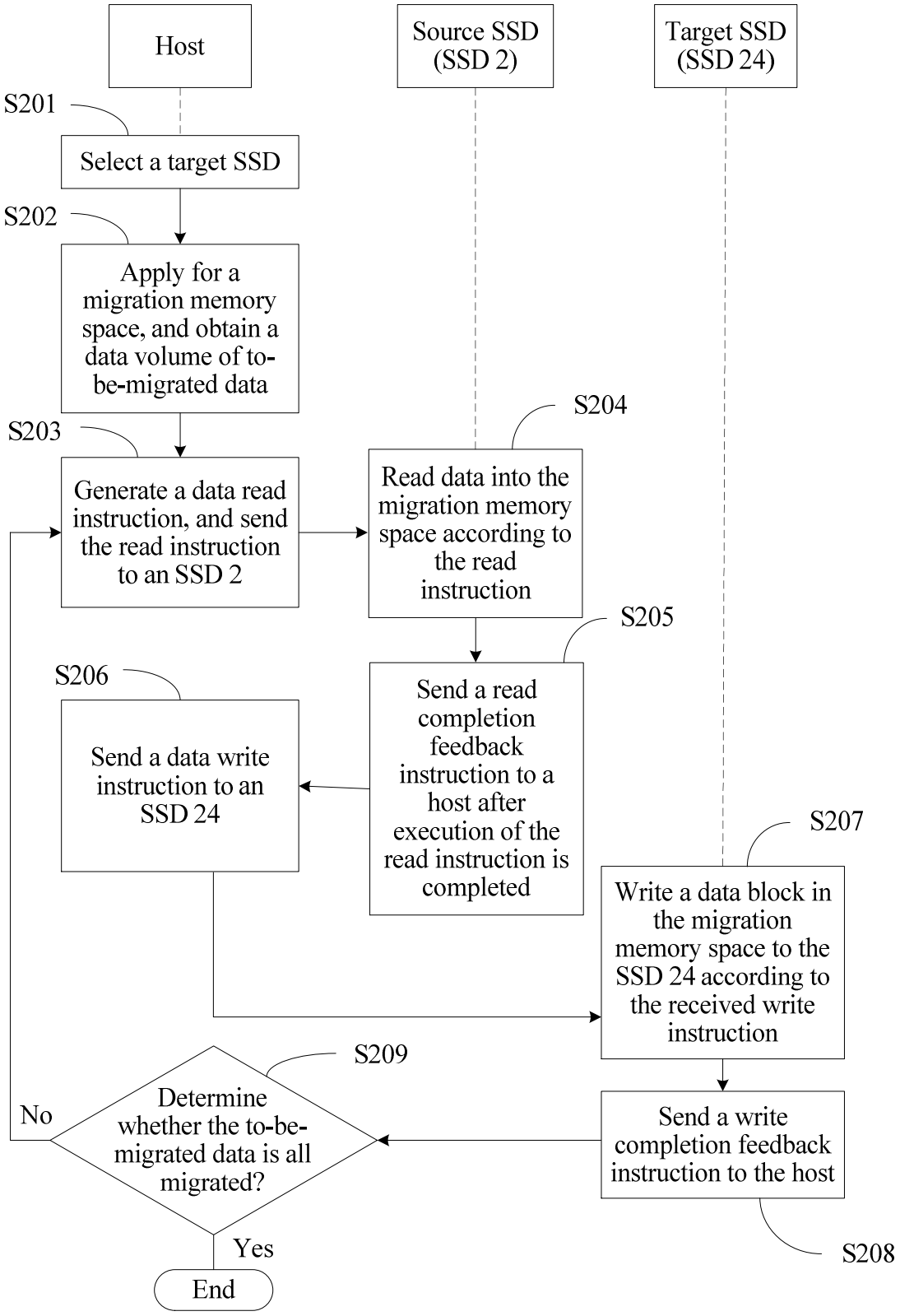

Host
Source SSD (SSD 2)
Target SSD (SSD 24)
S201
Select a target SSD
S202
Apply for a migration memory space, and obtain a data volume of to-be-migrated data
S203
Generate a data read instruction, and send the read instruction to an SSD 2
S204
Read data into the migration memory space according to the read instruction
S205
Send a read completion feedback instruction to a host after execution of the read instruction is completed
S206
Send a data write instruction to an SSD 24
S207
Write a data block in the migration memory space to the SSD 24 according to the received write instruction
S208
Send a write completion feedback instruction to the host
S209
Determine whether the to-be-migrated data is all migrated?
No
Yes
End

FIG. 2

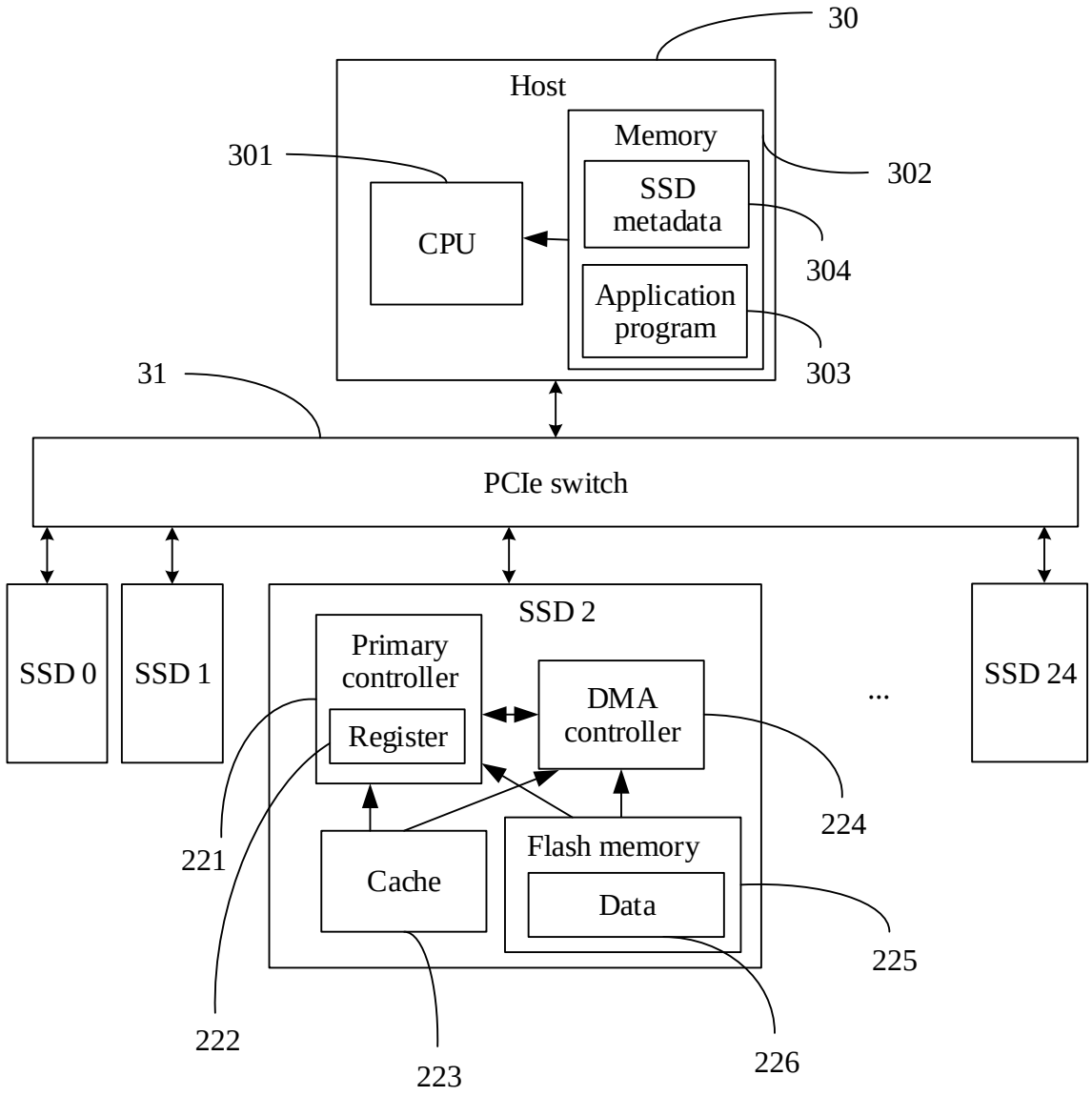

30
Host
Memory
301
302
CPU
SSD metadata
304
Application program
303
31
PCIe switch
SSD 0
SSD 1
SSD 2
SSD 24
Primary controller
Register
DMA controller
...
224
221
Cache
Flash memory
Data
225
222
223
226

FIG. 3

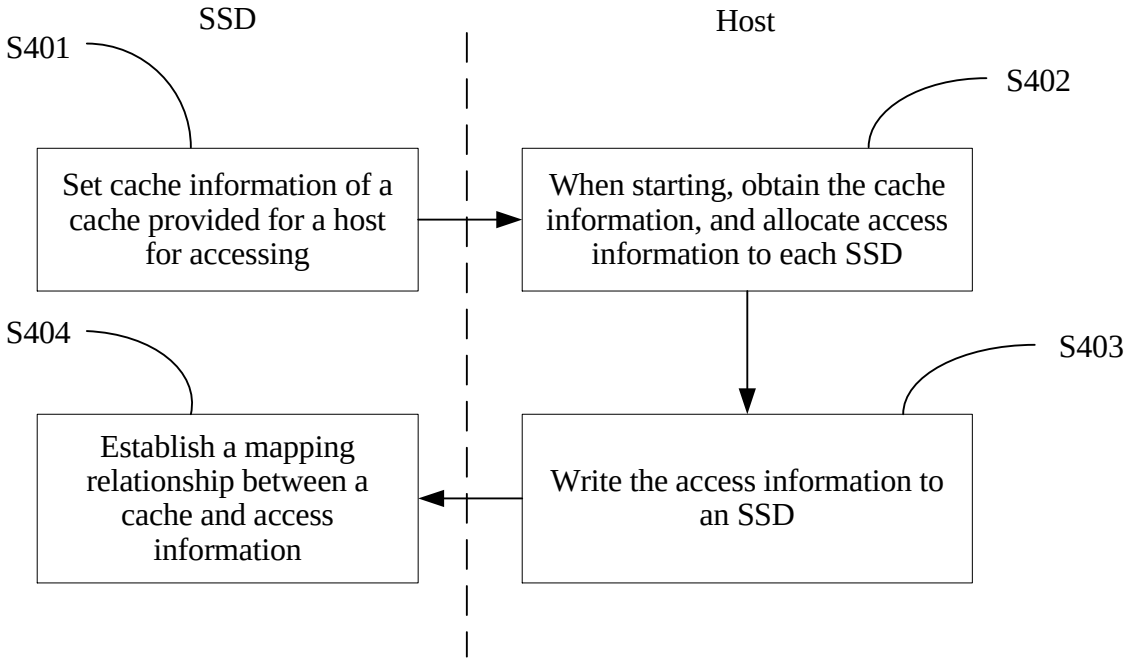

SSD
Host
S401
S402
Set cache information of a cache provided for a host for accessing
When starting, obtain the cache information, and allocate access information to each SSD
S404
S403
Establish a mapping relationship between a cache and access information
Write the access information to an SSD

FIG. 4

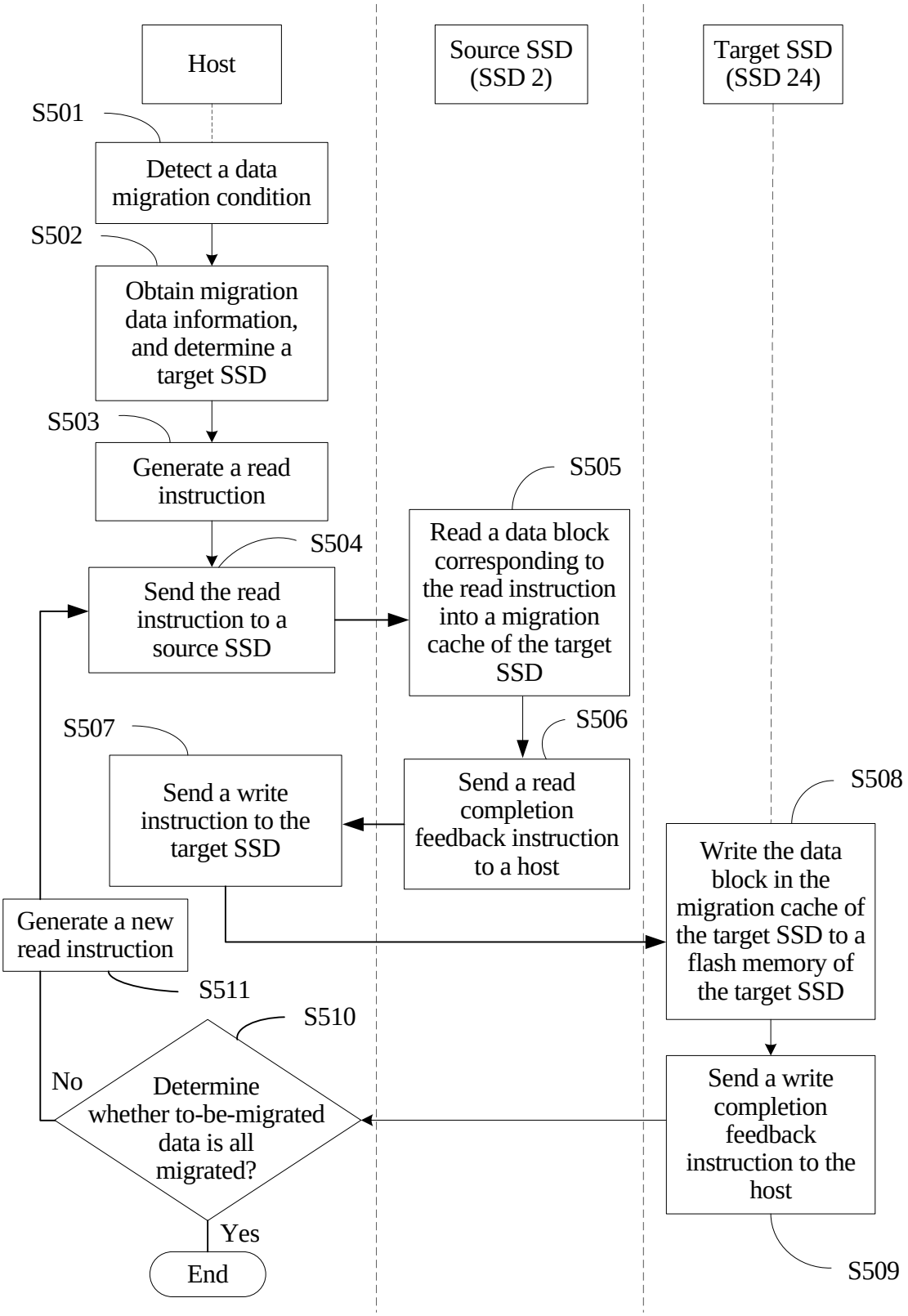

Host
Source SSD (SSD 2)
Target SSD (SSD 24)
S501
Detect a data migration condition
S502
Obtain migration data information, and determine a target SSD
S503
Generate a read instruction
S504
Send the read instruction to a source SSD
S505
Read a data block corresponding to the read instruction into a migration cache of the target SSD
S506
Send a read completion feedback instruction to a host
S507
Send a write instruction to the target SSD
S508
Write the data block in the migration cache of the target SSD to a flash memory of the target SSD
S509
Send a write completion feedback instruction to the host
S510
Determine whether to-be-migrated data is all migrated?
No
Yes
S511
Generate a new read instruction
End

FIG. 5

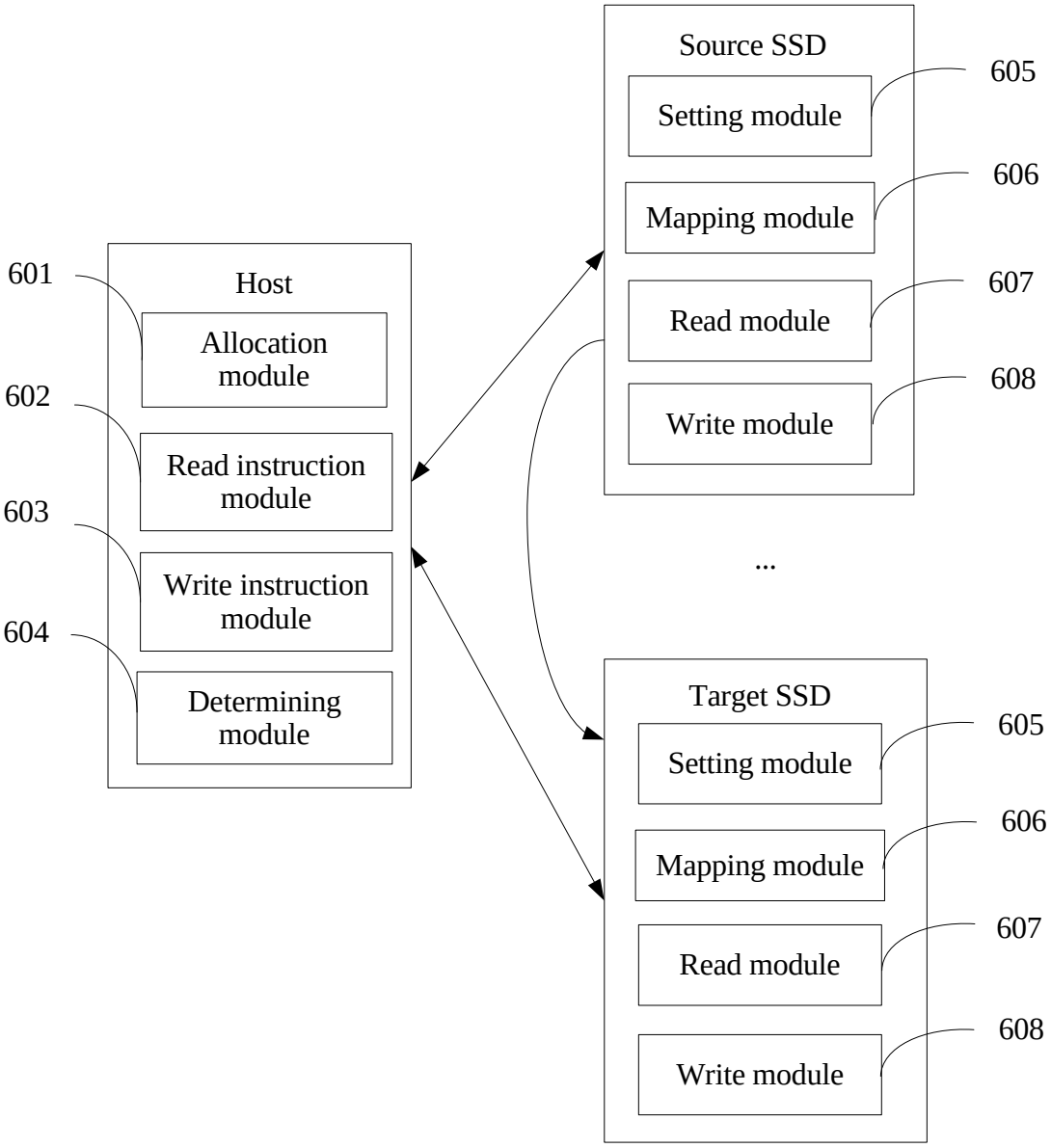

Source SSD
Setting module
Mapping module
Read module
Write module
605
606
607
608
...
601
Host
Allocation module
602
Read instruction module
603
Write instruction module
604
Determining module
Target SSD
Setting module
Mapping module
Read module
Write module
605
606
607
608

FIG. 6

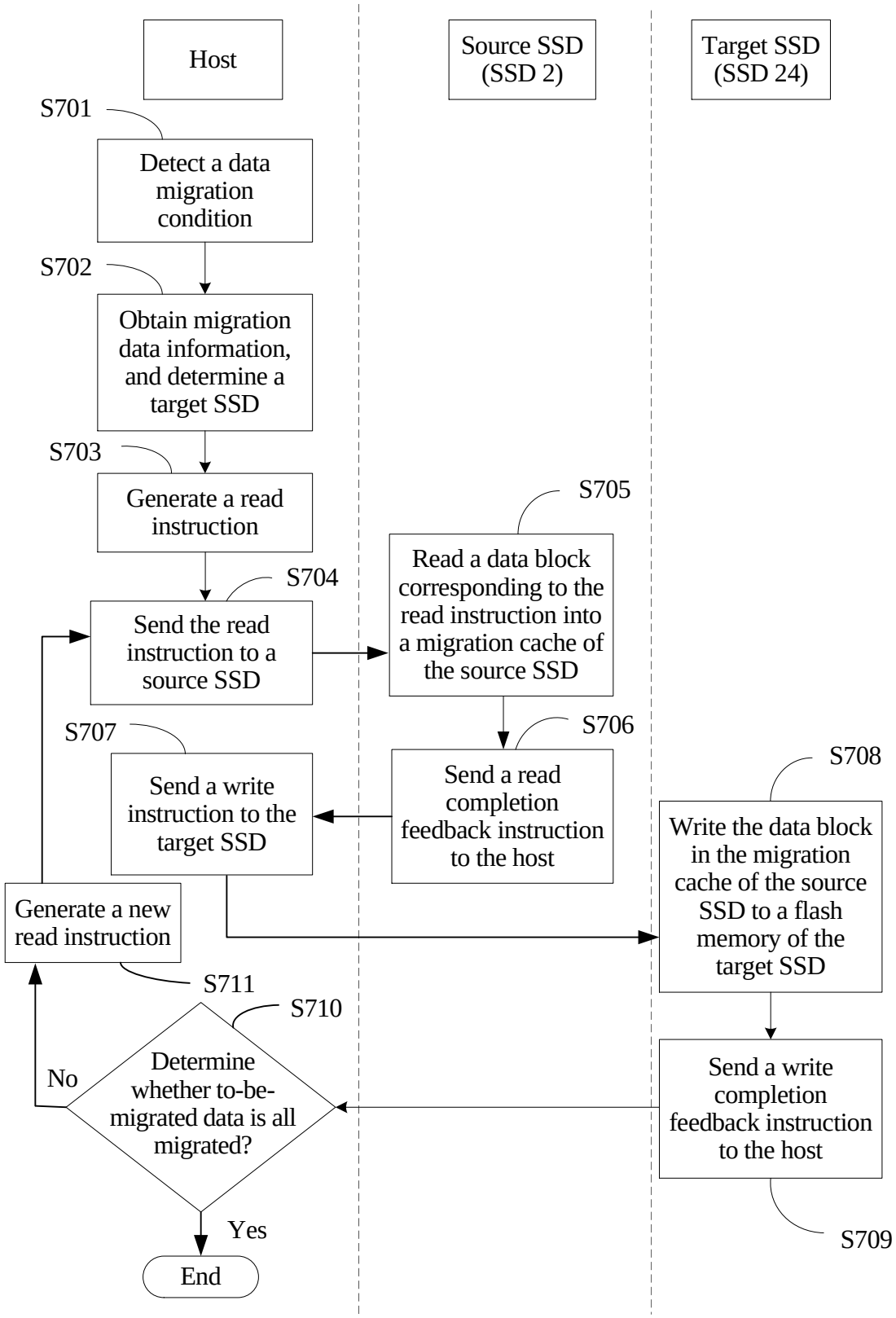

Host
Source SSD (SSD 2)
Target SSD (SSD 24)
S701
Detect a data migration condition
S702
Obtain migration data information, and determine a target SSD
S703
Generate a read instruction
S704
Send the read instruction to a source SSD
S705
Read a data block corresponding to the read instruction into a migration cache of the source SSD
S706
Send a read completion feedback instruction to the host
S707
Send a write instruction to the target SSD
S708
Write the data block in the migration cache of the source SSD to a flash memory of the target SSD
S709
Send a write completion feedback instruction to the host
S710
Determine whether to-be-migrated data is all migrated?
No
Yes
S711
Generate a new read instruction
End

FIG. 7

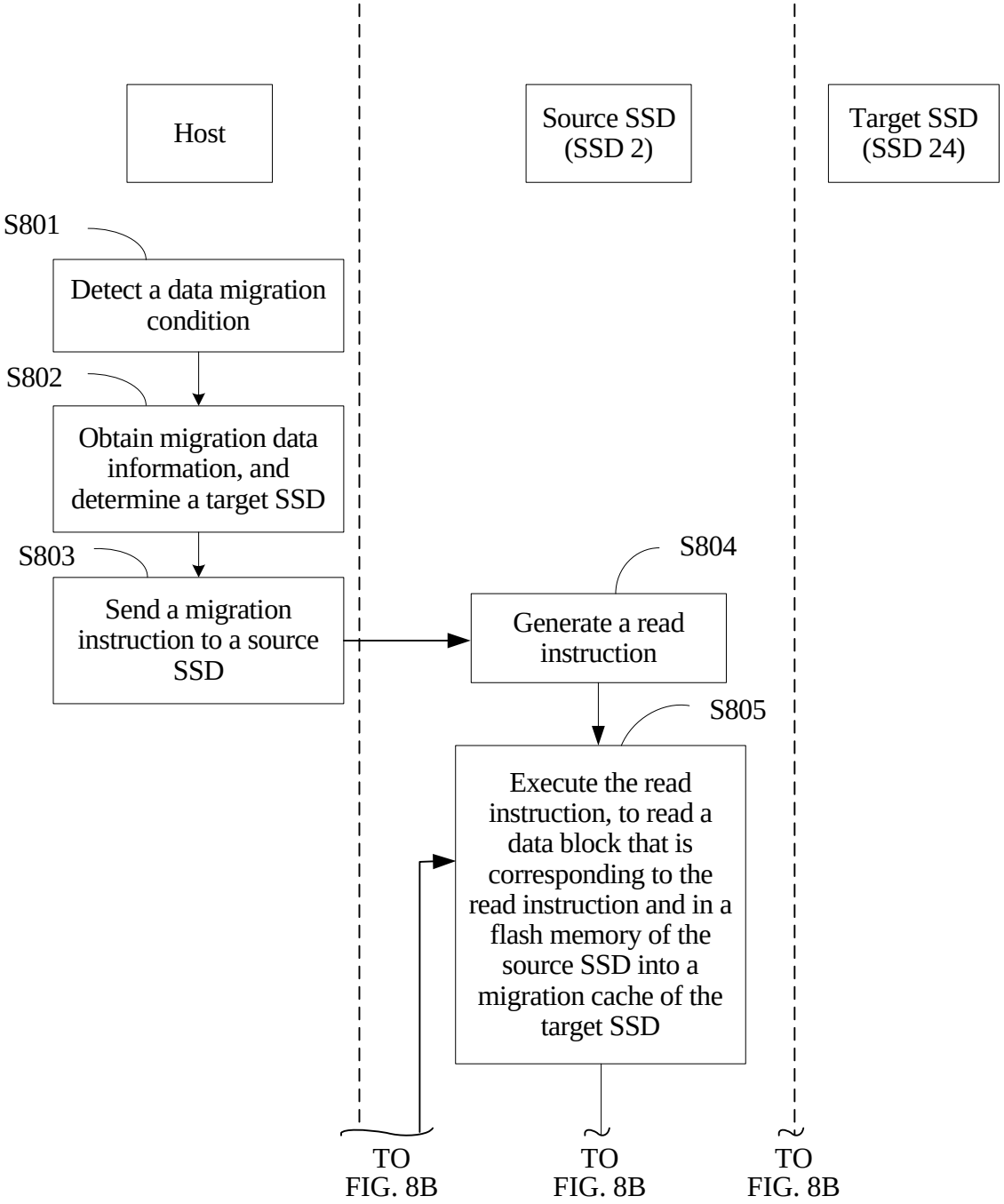

Host
Source SSD (SSD 2)
Target SSD (SSD 24)
S801
Detect a data migration condition
S802
Obtain migration data information, and determine a target SSD
S803
Send a migration instruction to a source SSD
S804
Generate a read instruction
S805
Execute the read instruction, to read a data block that is corresponding to the read instruction and in a flash memory of the source SSD into a migration cache of the target SSD
TO FIG. 8B
TO FIG. 8B
TO FIG. 8B

FIG. 8A

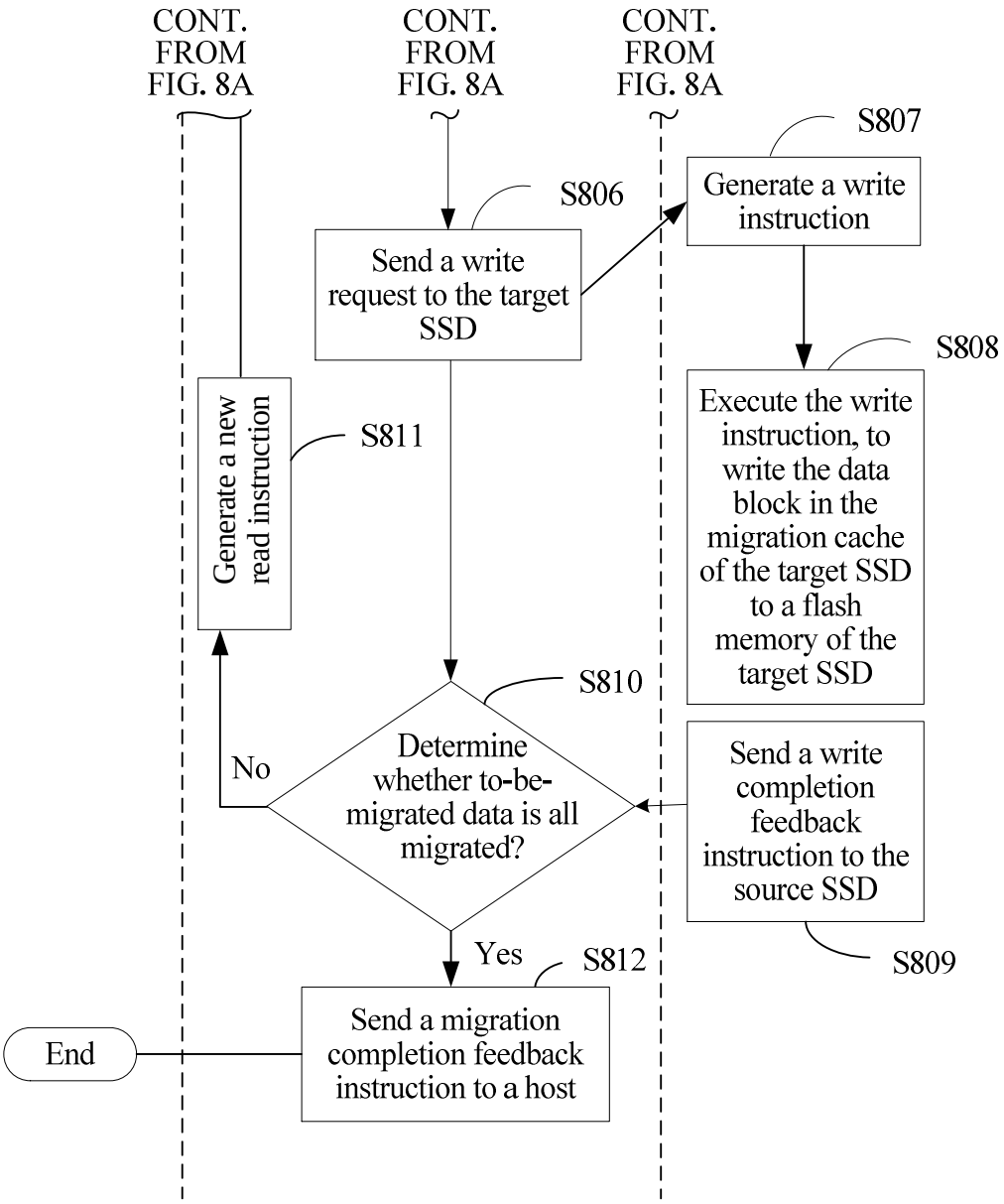

CONT. FROM FIG. 8A
CONT. FROM FIG. 8A
CONT. FROM FIG. 8A
S807
Generate a write instruction
S806
Send a write request to the target SSD
S808
Execute the write instruction, to write the data block in the migration cache of the target SSD to a flash memory of the target SSD
Generate a new read instruction
S811
S810
Determine whether to-be-migrated data is all migrated?
No
Send a write completion feedback instruction to the source SSD
S809
Yes
S812
Send a migration completion feedback instruction to a host
End

FIG. 8B

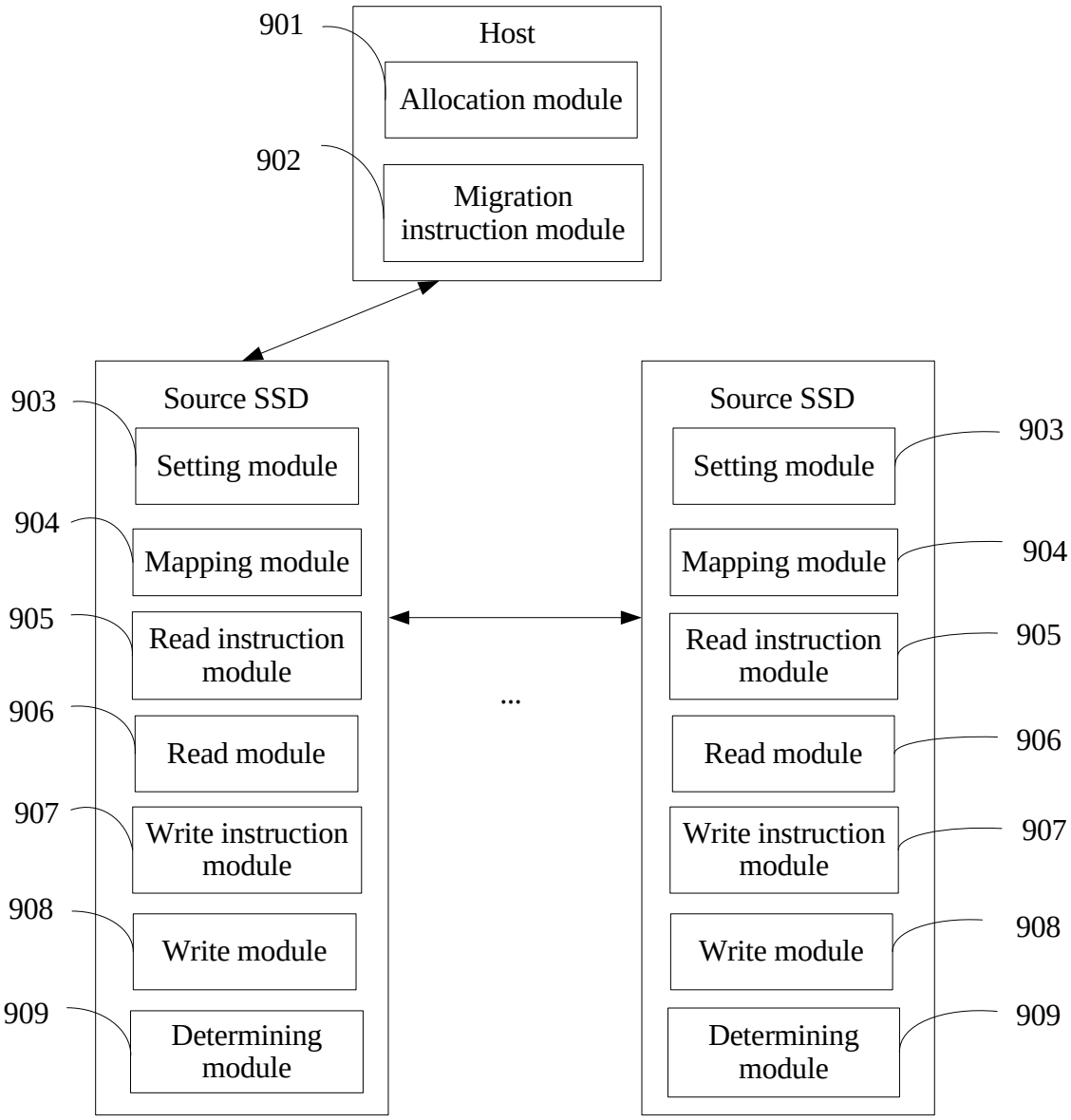

901
Host
Allocation module
902
Migration instruction module
903
Source SSD
Setting module
904
Mapping module
905
Read instruction module
906
Read module
907
Write instruction module
908
Write module
909
Determining module
...
Source SSD
Setting module
Mapping module
Read instruction module
Read module
Write instruction module
Write module
Determining module
903
904
905
906
907
908
909

FIG. 9

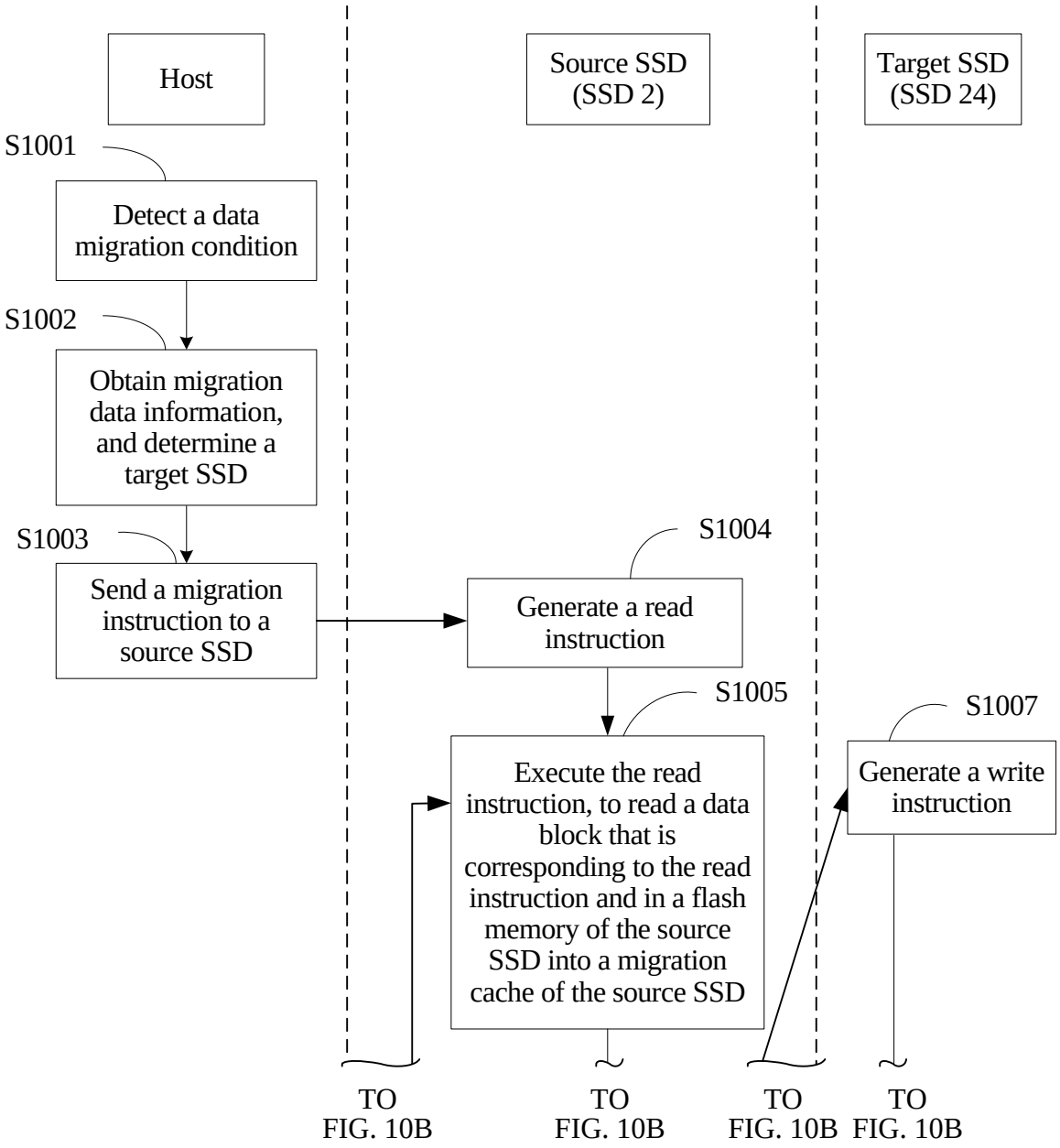

Host
Source SSD (SSD 2)
Target SSD (SSD 24)
S1001
Detect a data migration condition
S1002
Obtain migration data information, and determine a target SSD
S1003
Send a migration instruction to a source SSD
S1004
Generate a read instruction
S1005
Execute the read instruction, to read a data block that is corresponding to the read instruction and in a flash memory of the source SSD into a migration cache of the source SSD
S1007
Generate a write instruction
TO FIG. 10B
TO FIG. 10B
TO FIG. 10B
TO FIG. 10B

FIG. 10A

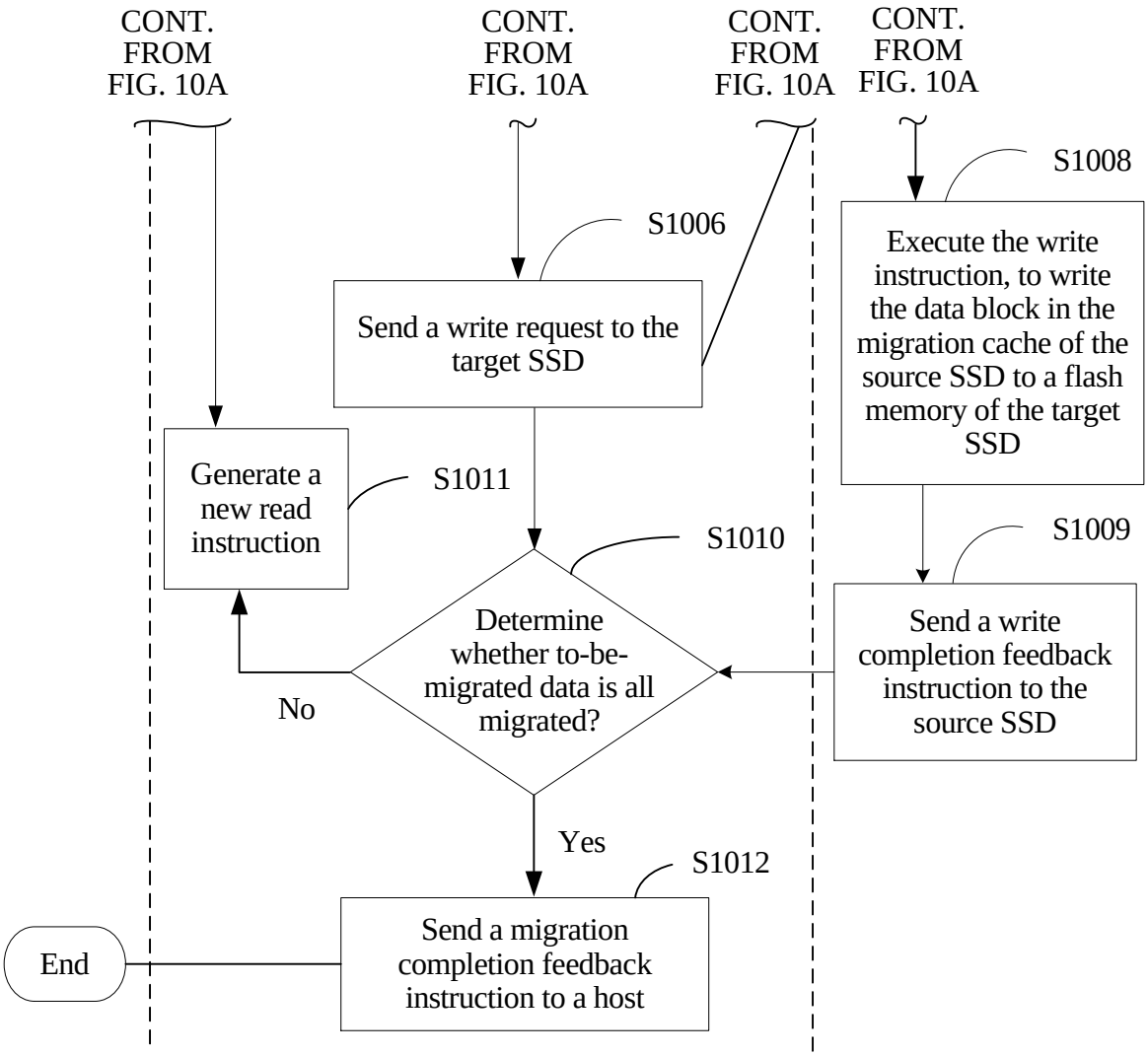

CONT. FROM FIG. 10A
CONT. FROM FIG. 10A
CONT. FROM FIG. 10A
CONT. FROM FIG. 10A
S1008
Execute the write instruction, to write the data block in the migration cache of the source SSD to a flash memory of the target SSD
S1006
Send a write request to the target SSD
Generate a new read instruction
S1011
S1010
Determine whether to-be-migrated data is all migrated?
No
S1009
Send a write completion feedback instruction to the source SSD
Yes
S1012
Send a migration completion feedback instruction to a host
End

FIG. 10B

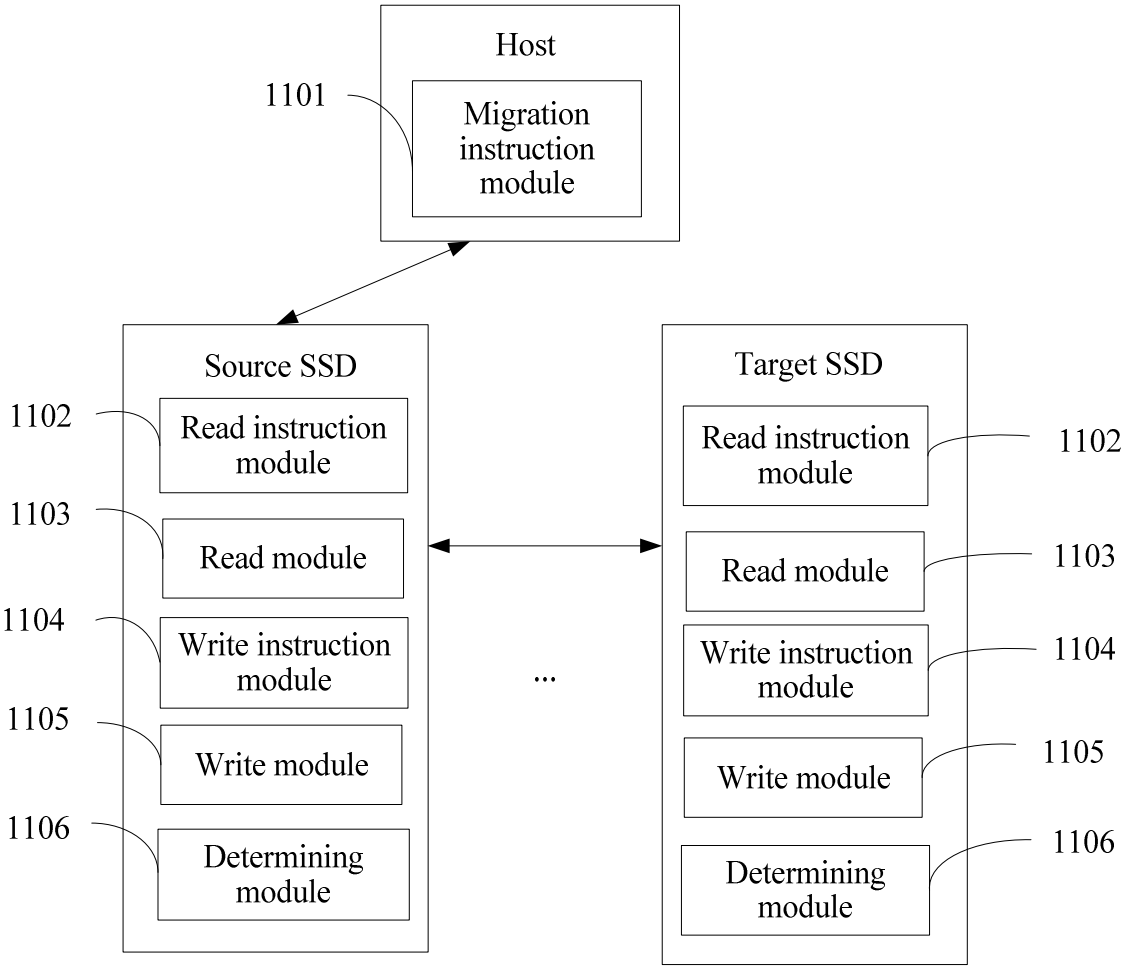

Host
1101
Migration instruction module
Source SSD
1102
Read instruction module
1103
Read module
1104
Write instruction module
1105
Write module
1106
Determining module
...
Target SSD
Read instruction module
1102
Read module
1103
Write instruction module
1104
Write module
1105
Determining module
1106

FIG. 11