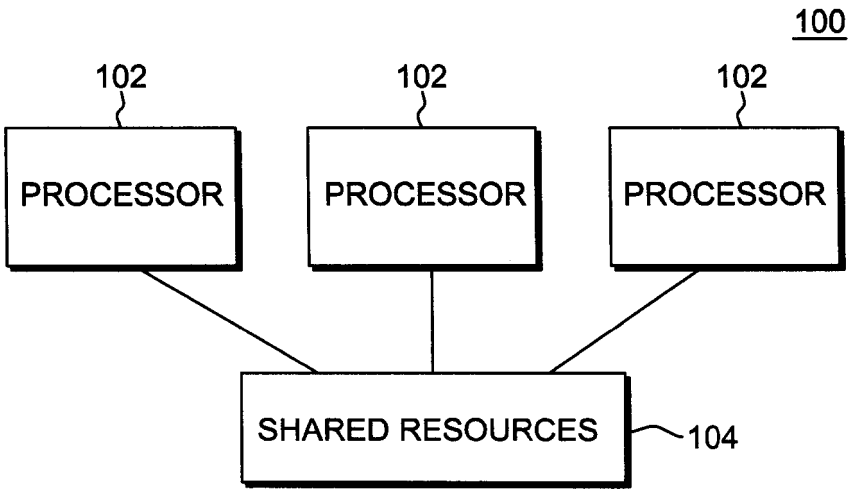
100
102
102
102
PROCESSOR
PROCESSOR
PROCESSOR
SHARED RESOURCES
104

FIG. 1

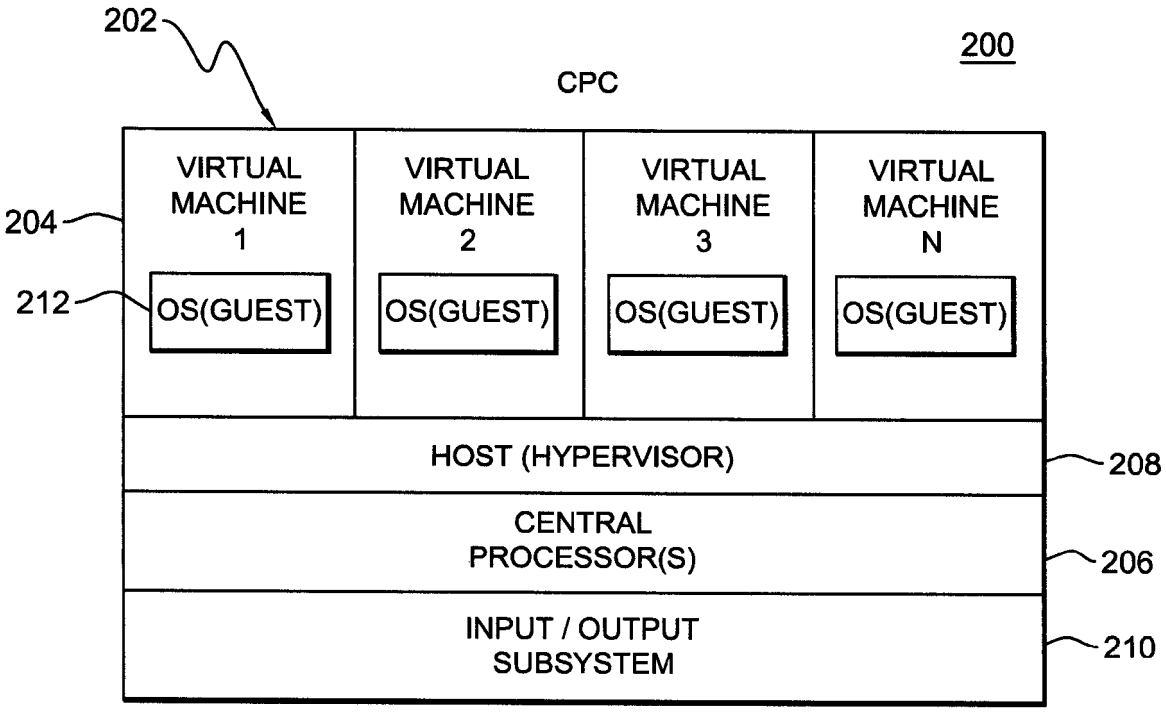
202
200
CPC
VIRTUAL MACHINE 1
VIRTUAL MACHINE 2
VIRTUAL MACHINE 3
VIRTUAL MACHINE N
204
212
OS(GUEST)
OS(GUEST)
OS(GUEST)
OS(GUEST)
HOST (HYPERVISOR)
208
CENTRAL PROCESSOR(S)
206
INPUT / OUTPUT SUBSYSTEM
210

FIG. 2

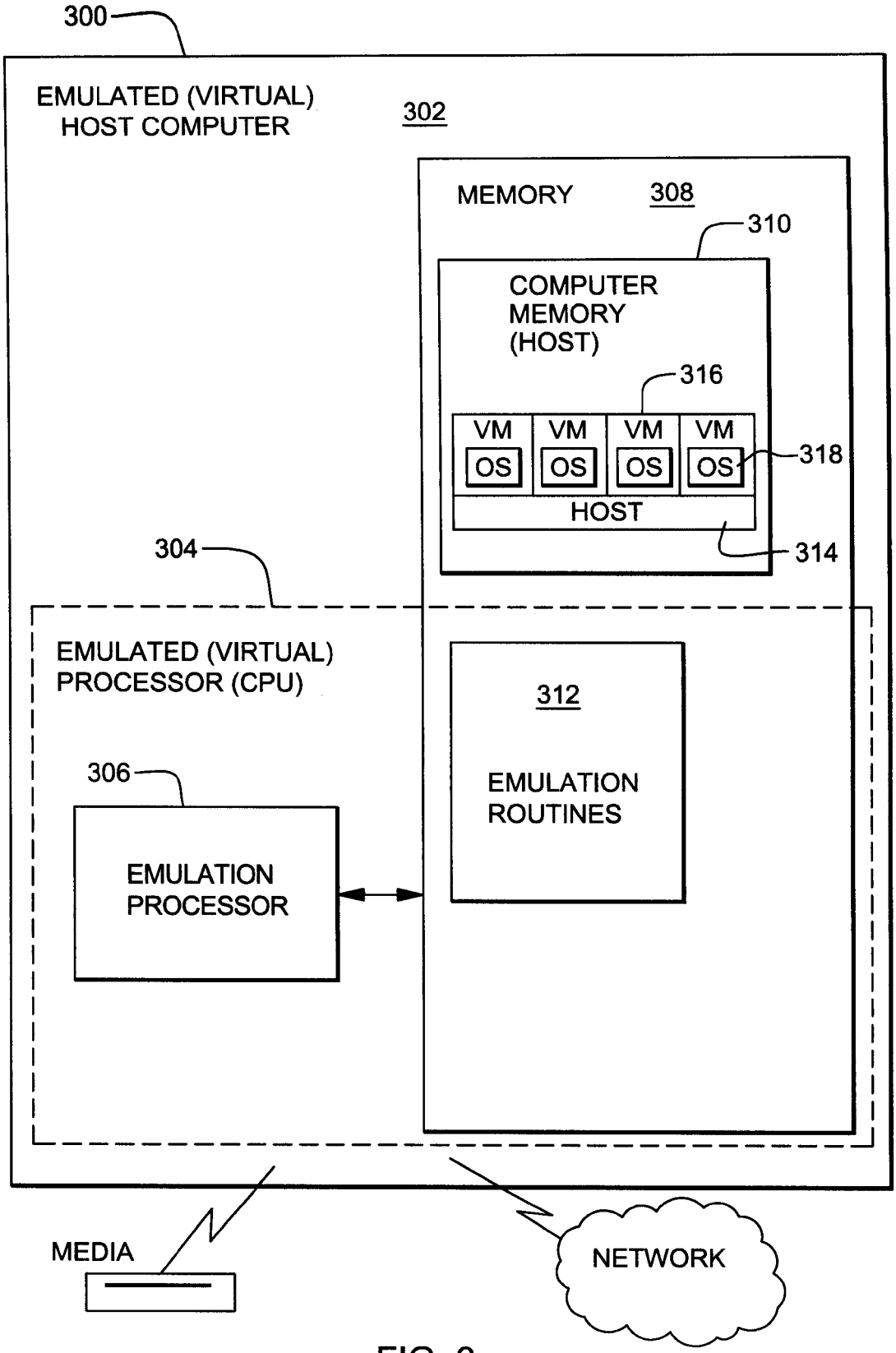
300
EMULATED (VIRTUAL) HOST COMPUTER
302
MEMORY
308
310
COMPUTER MEMORY (HOST)
316
VM
VM
VM
VM
OS
OS
OS
OS
318
HOST
314
304
EMULATED (VIRTUAL) PROCESSOR (CPU)
312
EMULATION ROUTINES
306
EMULATION PROCESSOR
MEDIA
NETWORK

FIG. 3

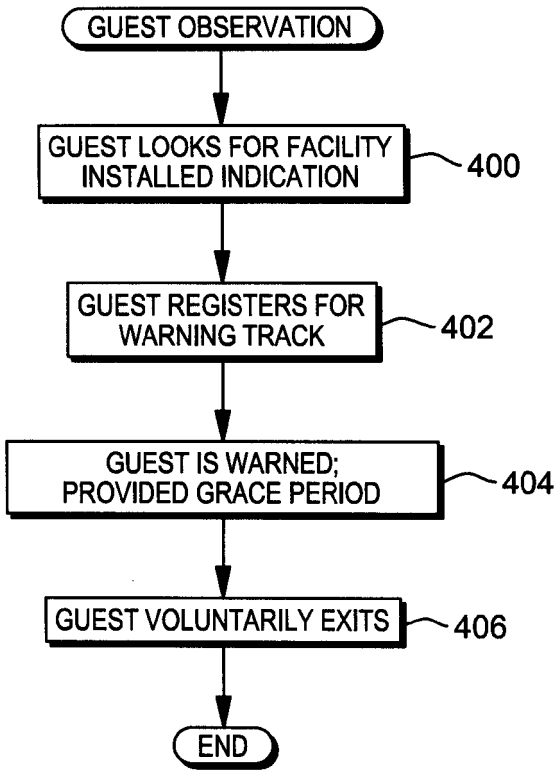
GUEST OBSERVATION
GUEST LOOKS FOR FACILITY INSTALLED INDICATION
400
GUEST REGISTERS FOR WARNING TRACK
402
GUEST IS WARNED; PROVIDED GRACE PERIOD
404
GUEST VOLUNTARILY EXITS
406
END

FIG. 4

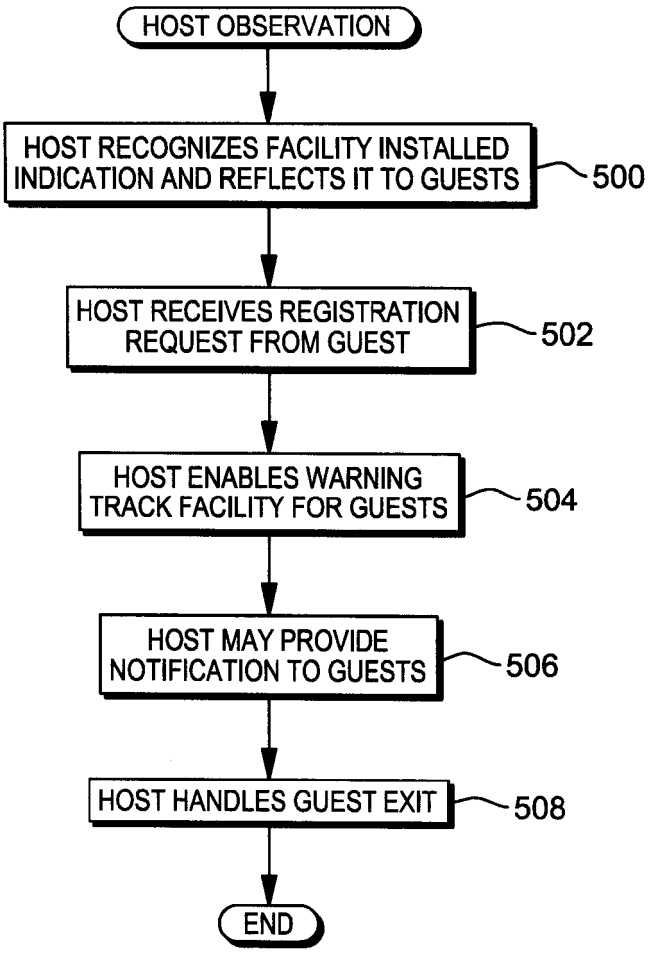
HOST OBSERVATION
HOST RECOGNIZES FACILITY INSTALLED INDICATION AND REFLECTS IT TO GUESTS
500
HOST RECEIVES REGISTRATION REQUEST FROM GUEST
502
HOST ENABLES WARNING TRACK FACILITY FOR GUESTS
504
HOST MAY PROVIDE NOTIFICATION TO GUESTS
506
HOST HANDLES GUEST EXIT
508
END

FIG. 5

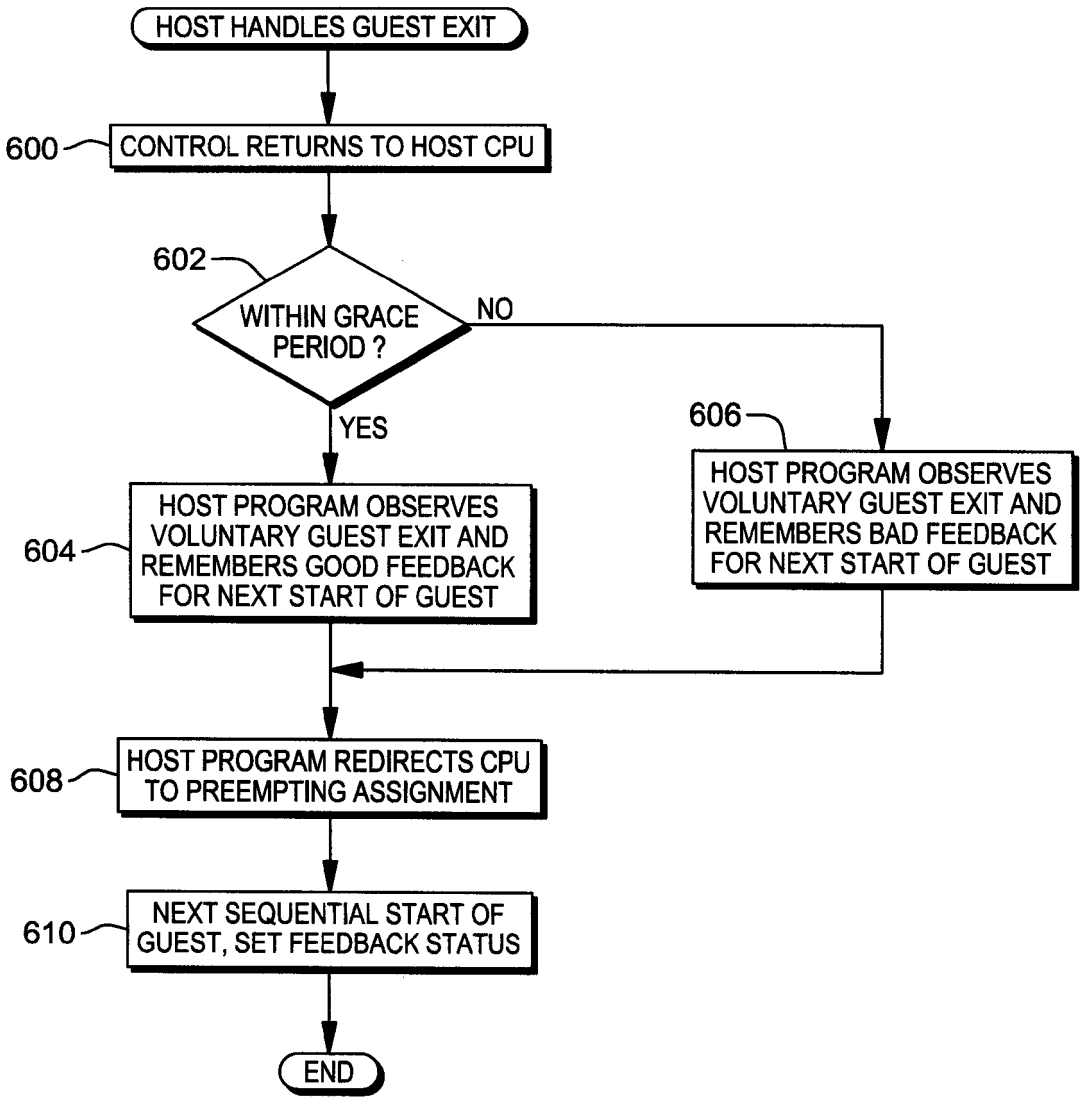
HOST HANDLES GUEST EXIT
600
CONTROL RETURNS TO HOST CPU
602
WITHIN GRACE PERIOD ?
NO
YES
606
HOST PROGRAM OBSERVES VOLUNTARY GUEST EXIT AND REMEMBERS BAD FEEDBACK FOR NEXT START OF GUEST
604
HOST PROGRAM OBSERVES VOLUNTARY GUEST EXIT AND REMEMBERS GOOD FEEDBACK FOR NEXT START OF GUEST
608
HOST PROGRAM REDIRECTS CPU TO PREEMPTING ASSIGNMENT
610
NEXT SEQUENTIAL START OF GUEST, SET FEEDBACK STATUS
END

FIG. 6

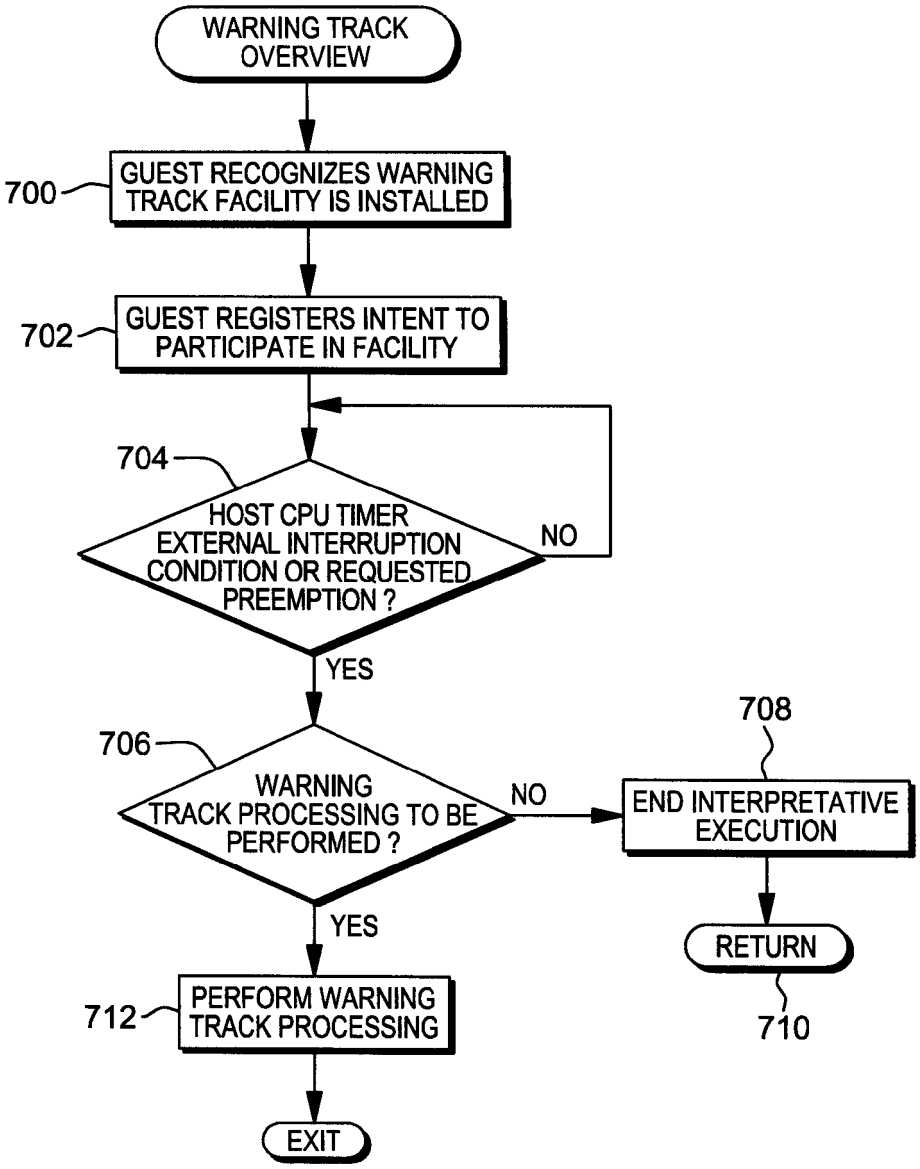
WARNING TRACK OVERVIEW
700
GUEST RECOGNIZES WARNING TRACK FACILITY IS INSTALLED
702
GUEST REGISTERS INTENT TO PARTICIPATE IN FACILITY
704
HOST CPU TIMER EXTERNAL INTERRUPTION CONDITION OR REQUESTED PREEMPTION ?
NO
YES
706
WARNING TRACK PROCESSING TO BE PERFORMED ?
NO
708
END INTERPRETATIVE EXECUTION
RETURN
710
YES
712
PERFORM WARNING TRACK PROCESSING
EXIT

FIG. 7

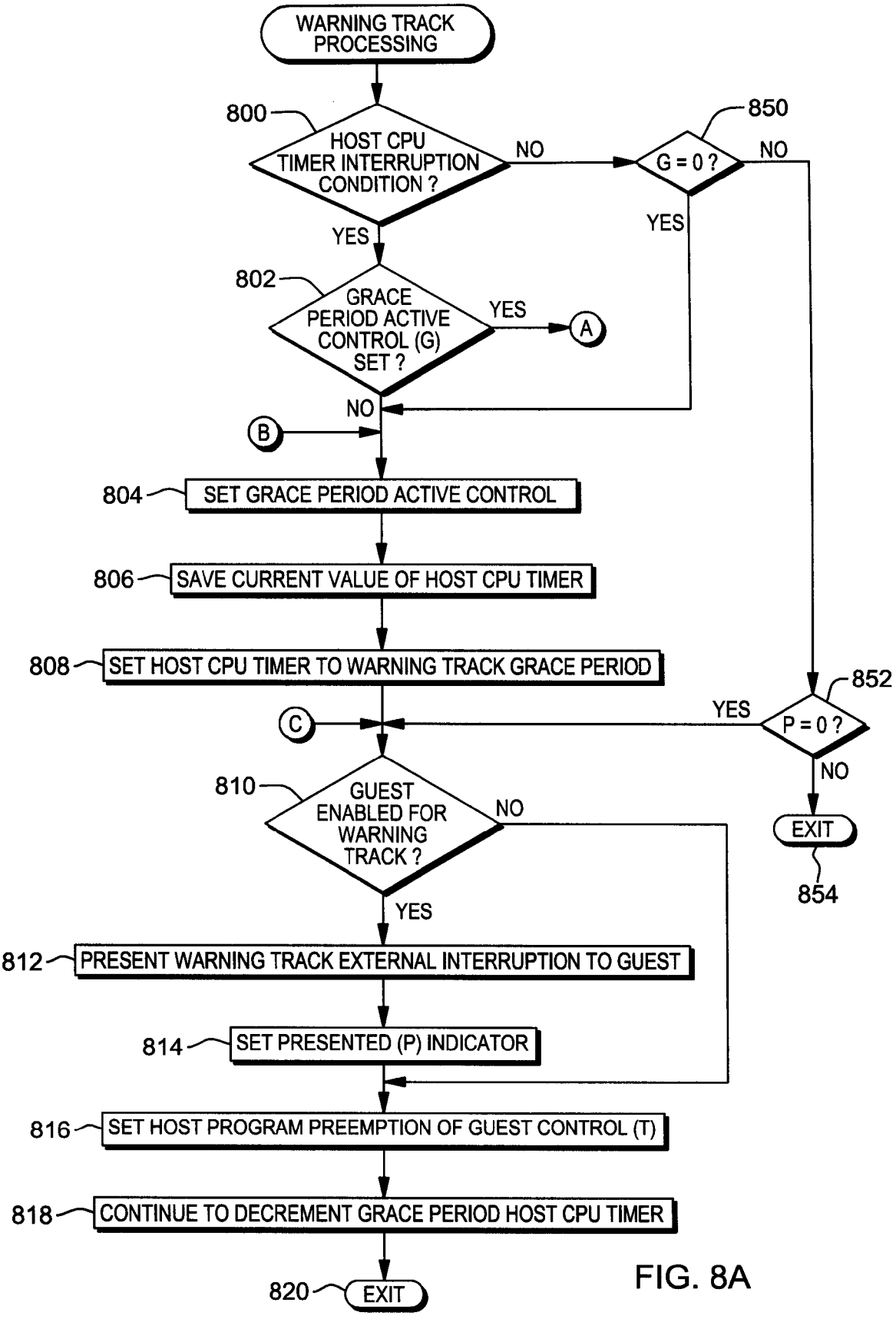
WARNING TRACK PROCESSING
800
HOST CPU TIMER INTERRUPTION CONDITION ?
NO
850
G = 0 ?
NO
YES
YES
802
GRACE PERIOD ACTIVE CONTROL (G) SET ?
YES
A
NO
B
804
SET GRACE PERIOD ACTIVE CONTROL
806
SAVE CURRENT VALUE OF HOST CPU TIMER
808
SET HOST CPU TIMER TO WARNING TRACK GRACE PERIOD
852
YES
C
P = 0 ?
NO
810
GUEST ENABLED FOR WARNING TRACK ?
NO
EXIT
854
YES
812
PRESENT WARNING TRACK EXTERNAL INTERRUPTION TO GUEST
814
SET PRESENTED (P) INDICATOR
816
SET HOST PROGRAM PREEMPTION OF GUEST CONTROL (T)
818
CONTINUE TO DECREMENT GRACE PERIOD HOST CPU TIMER
820
EXIT

FIG. 8A

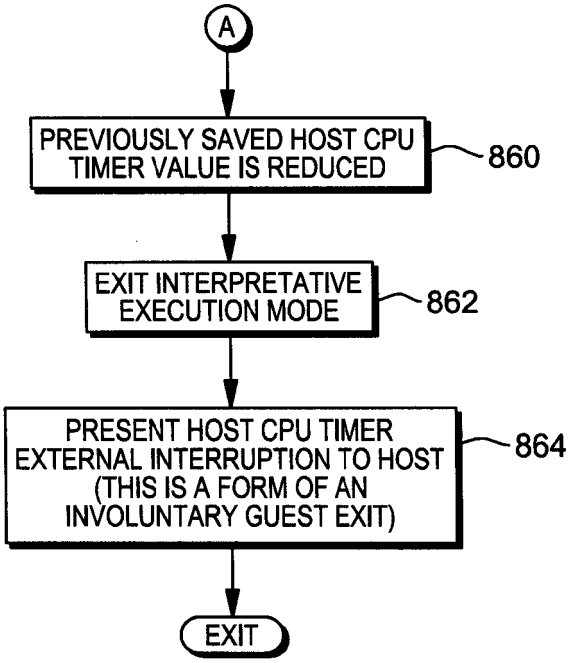
A
PREVIOUSLY SAVED HOST CPU TIMER VALUE IS REDUCED
860
EXIT INTERPRETATIVE EXECUTION MODE
862
PRESENT HOST CPU TIMER EXTERNAL INTERRUPTION TO HOST (THIS IS A FORM OF AN INVOLUNTARY GUEST EXIT)
864
EXIT

FIG. 8B

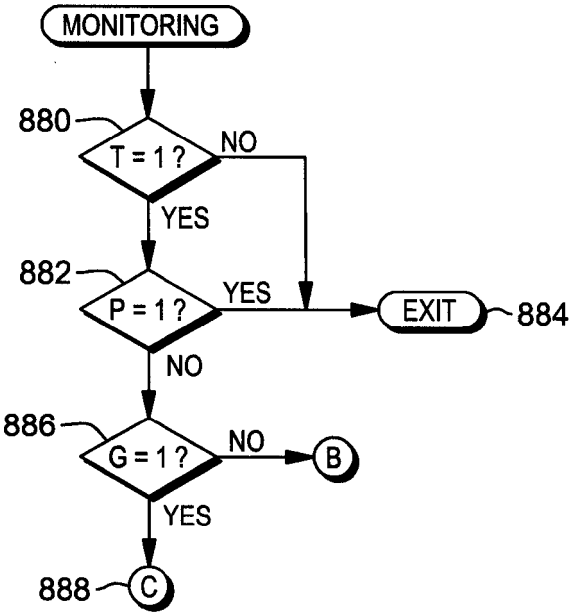
MONITORING
880
T = 1 ?
NO
YES
882
P = 1 ?
YES
EXIT
884
NO
886
G = 1 ?
NO
B
YES
888
C

FIG. 8C

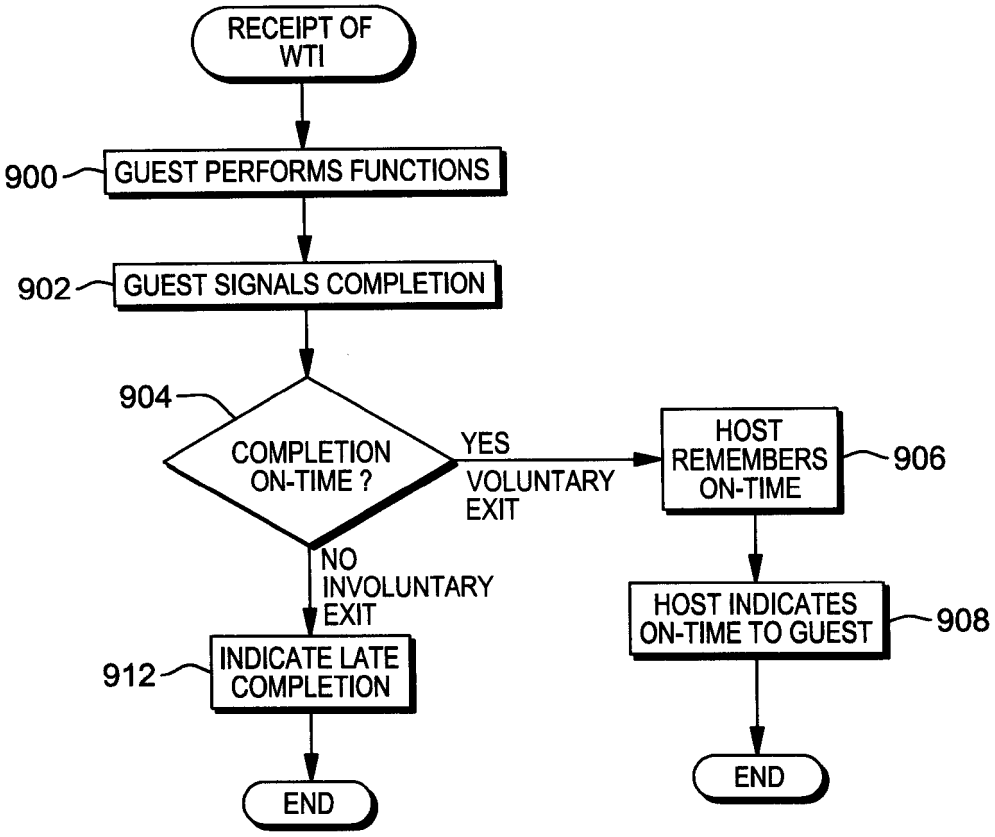
RECEIPT OF WTI
900
GUEST PERFORMS FUNCTIONS
902
GUEST SIGNALS COMPLETION
904
COMPLETION ON-TIME ?
YES
VOLUNTARY EXIT
HOST REMEMBERS ON-TIME
906
NO
INVOLUNTARY EXIT
HOST INDICATES ON-TIME TO GUEST
908
912
INDICATE LATE COMPLETION
END
END

FIG. 9

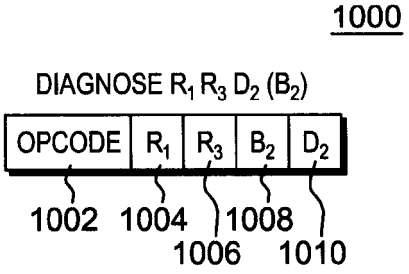
1000
DIAGNOSE R1 R3 D2 (B2)
OPCODE
R1
R3
B2
D2
1002
1004
1006
1008
1010

FIG. 10

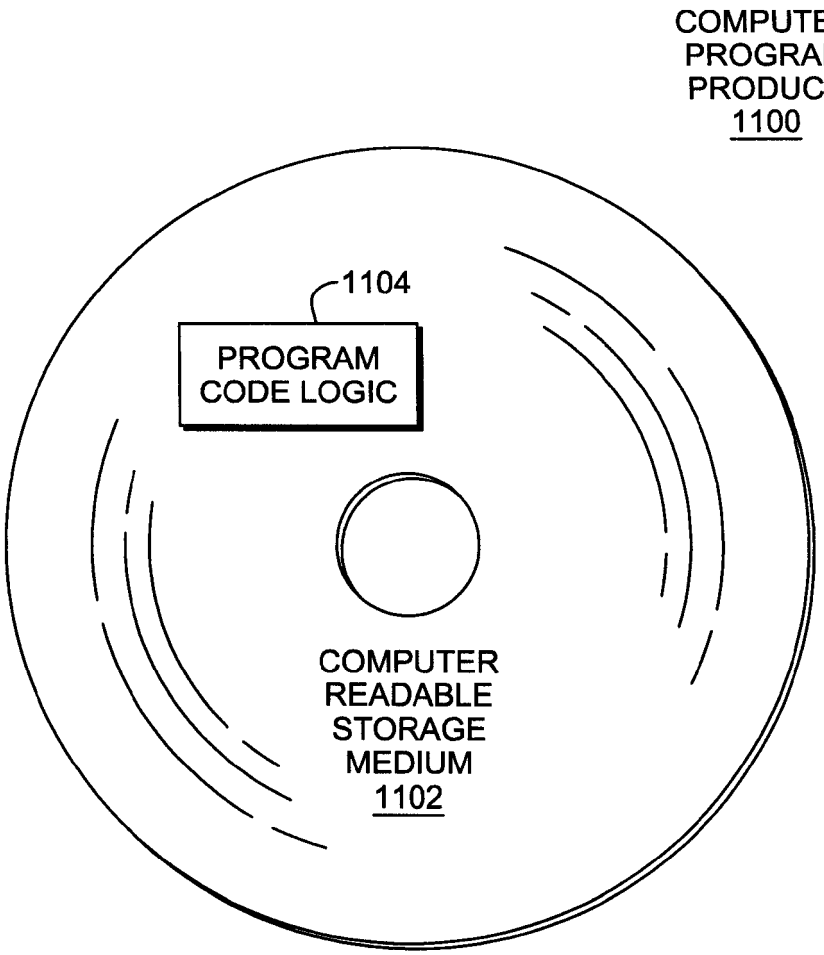
COMPUTER
PROGRAM
PRODUCT
1100
1104
PROGRAM
CODE LOGIC
COMPUTER
READABLE
STORAGE
MEDIUM
1102

FIG. 11

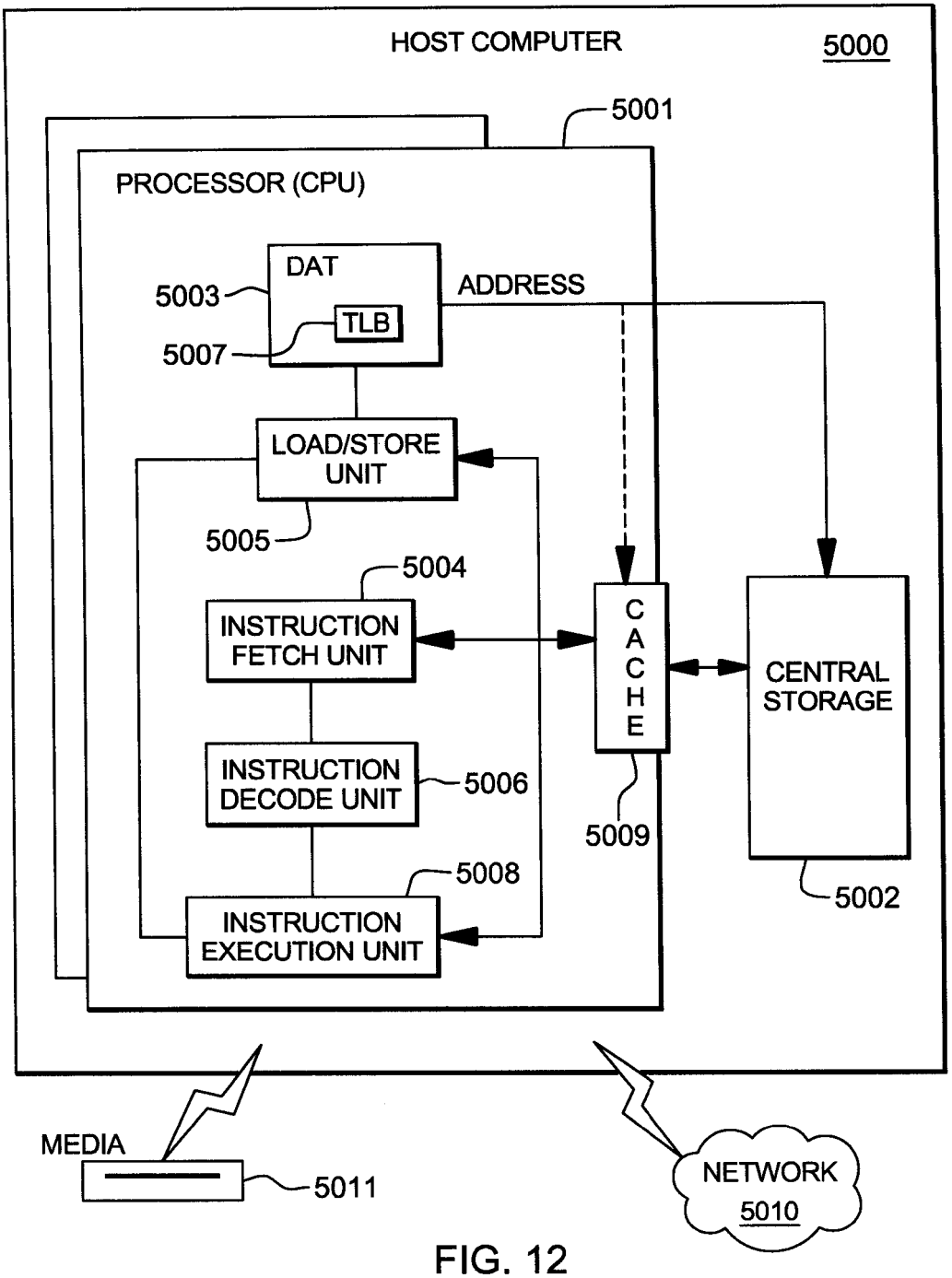
HOST COMPUTER
5000
5001
PROCESSOR (CPU)
DAT
5003
TLB
5007
ADDRESS
LOAD/STORE UNIT
5005
5004
INSTRUCTION FETCH UNIT
INSTRUCTION DECODE UNIT
5006
5008
INSTRUCTION EXECUTION UNIT
CACHE
5009
CENTRAL STORAGE
5002
MEDIA
5011
NETWORK
5010

FIG. 12

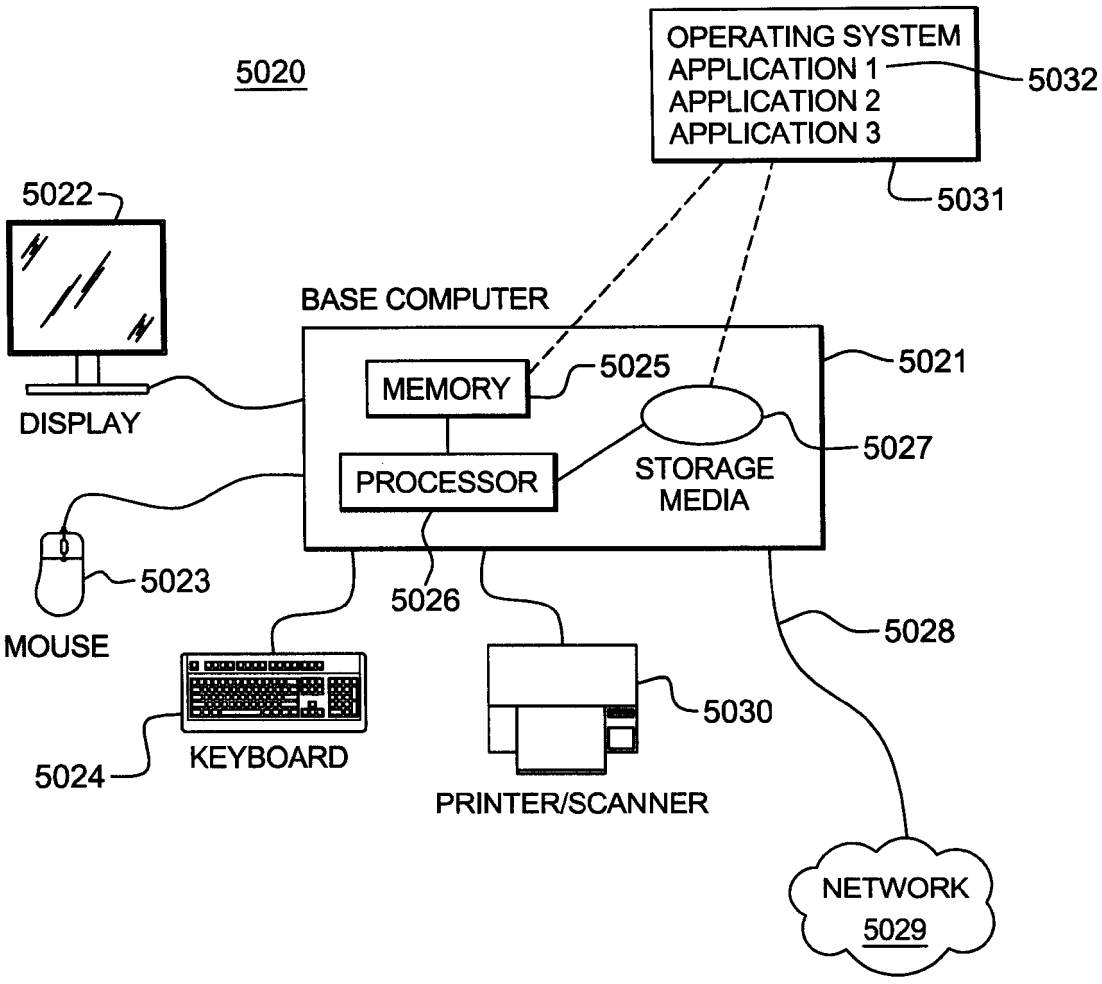
5020
OPERATING SYSTEM
APPLICATION 1
APPLICATION 2
APPLICATION 3
5032
5031
5022
BASE COMPUTER
MEMORY
5025
5021
DISPLAY
PROCESSOR
STORAGE MEDIA
5027
5023
MOUSE
5026
5028
5024
KEYBOARD
5030
PRINTER/SCANNER
NETWORK
5029

FIG. 13

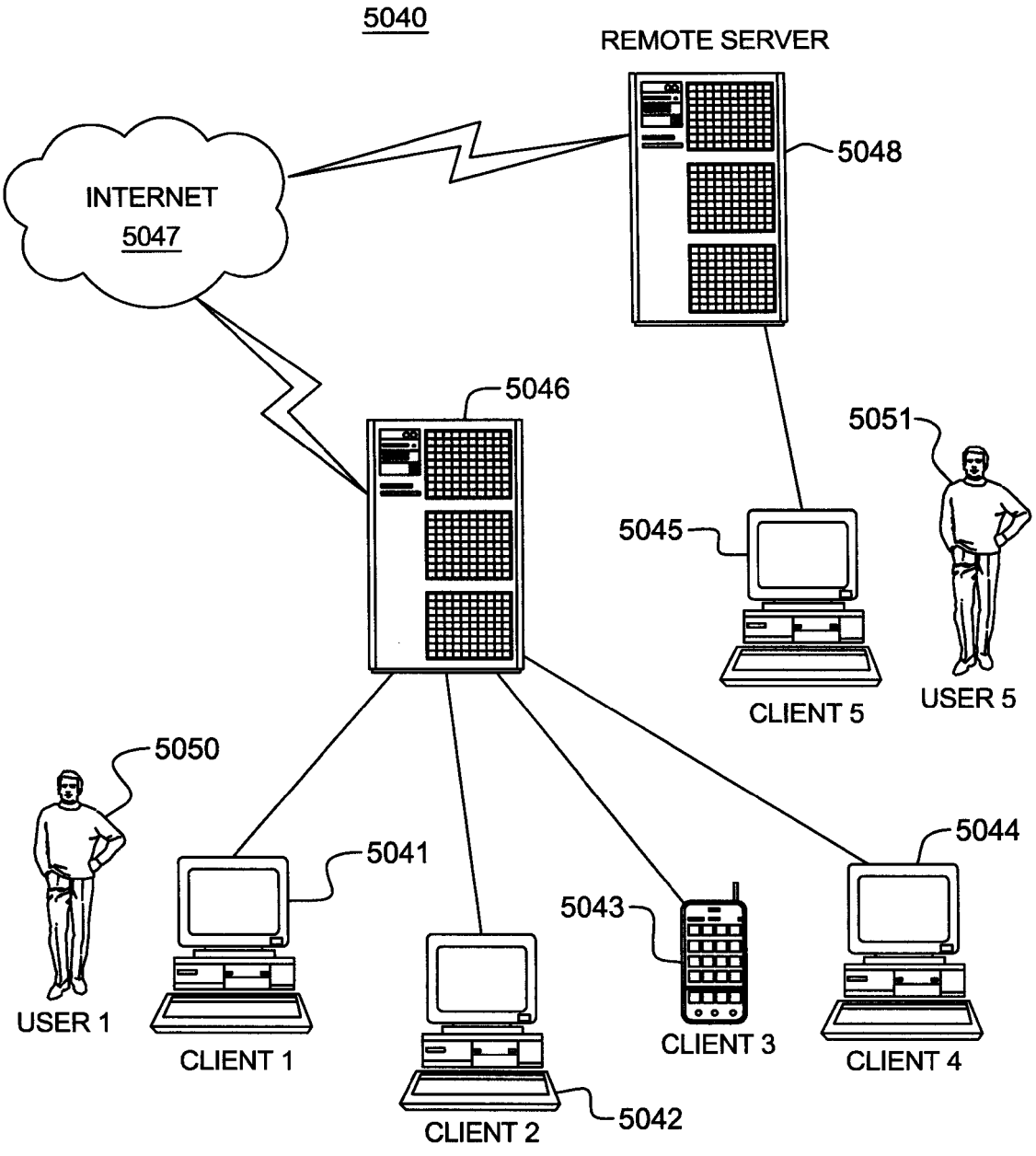
5040
REMOTE SERVER
5048
INTERNET
5047
5046
5051
5045
CLIENT 5
USER 5
5050
5041
5044
5043
USER 1
CLIENT 1
CLIENT 3
CLIENT 4
CLIENT 2
5042

FIG. 14

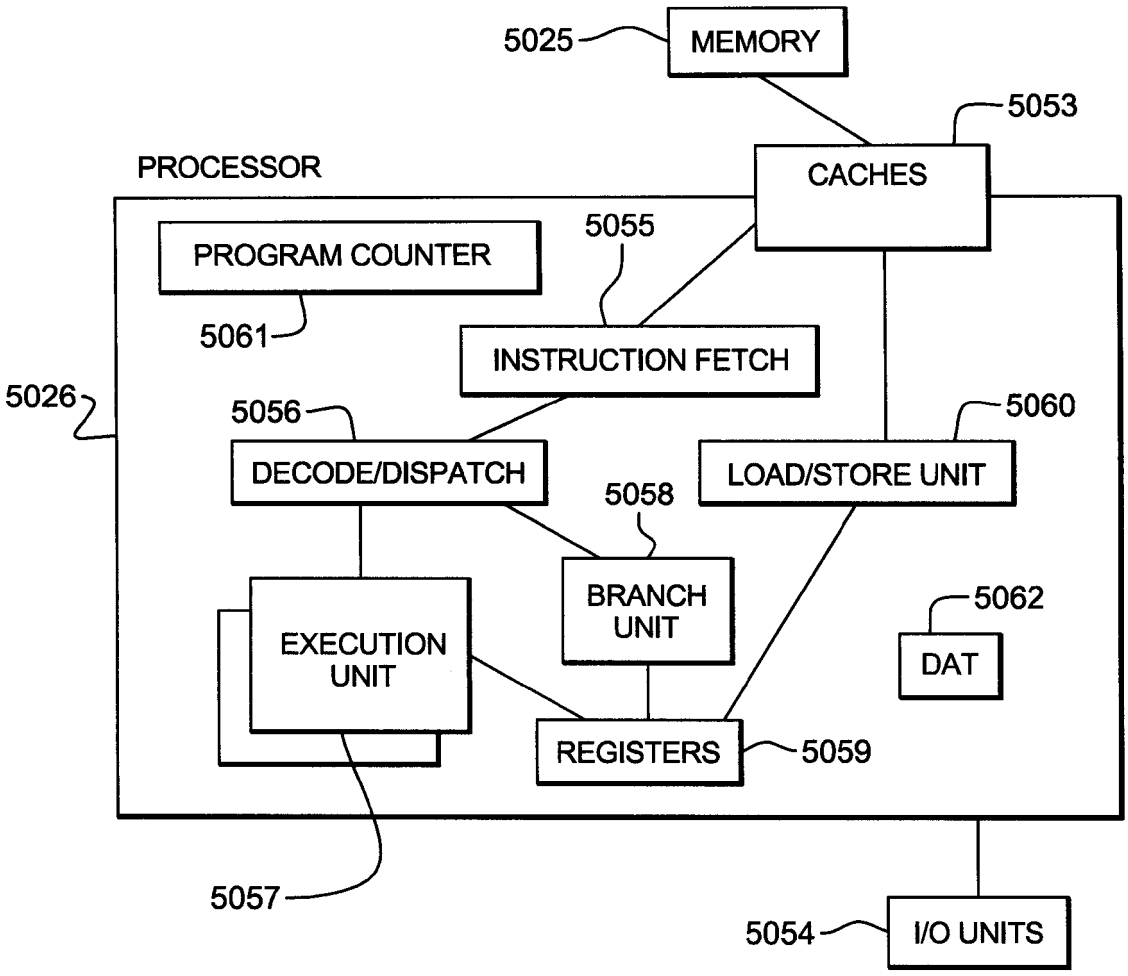
5025
MEMORY
5053
CACHES
PROCESSOR
PROGRAM COUNTER
5055
5061
INSTRUCTION FETCH
5026
5056
5060
DECODE/DISPATCH
LOAD/STORE UNIT
5058
BRANCH UNIT
5062
DAT
EXECUTION UNIT
REGISTERS
5059
5057
5054
I/O UNITS

FIG. 15

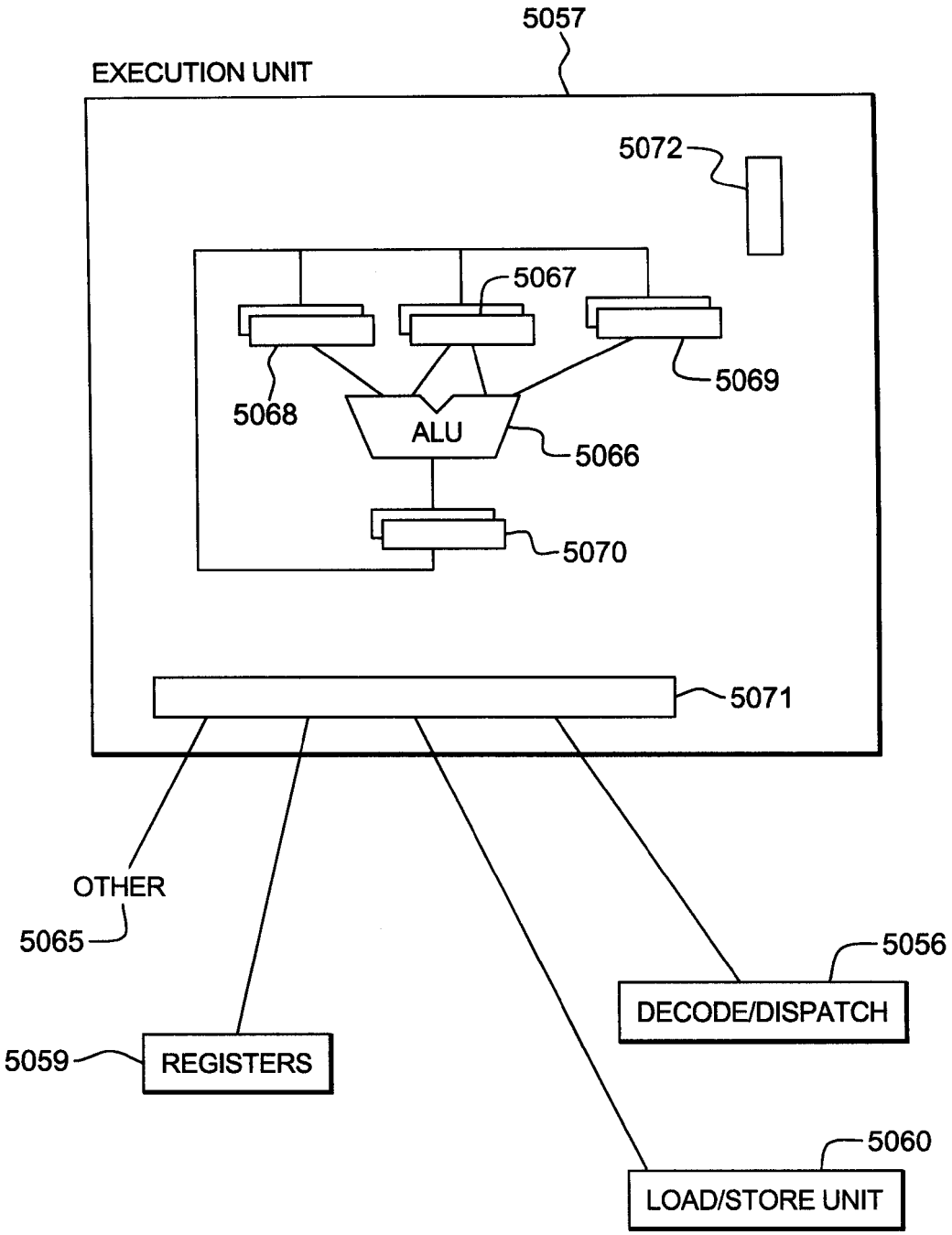
5057
EXECUTION UNIT
5072
5067
5068
5069
ALU
5066
5070
5071
OTHER
5065
5056
DECODE/DISPATCH
5059
REGISTERS
5060
LOAD/STORE UNIT

FIG. 16A

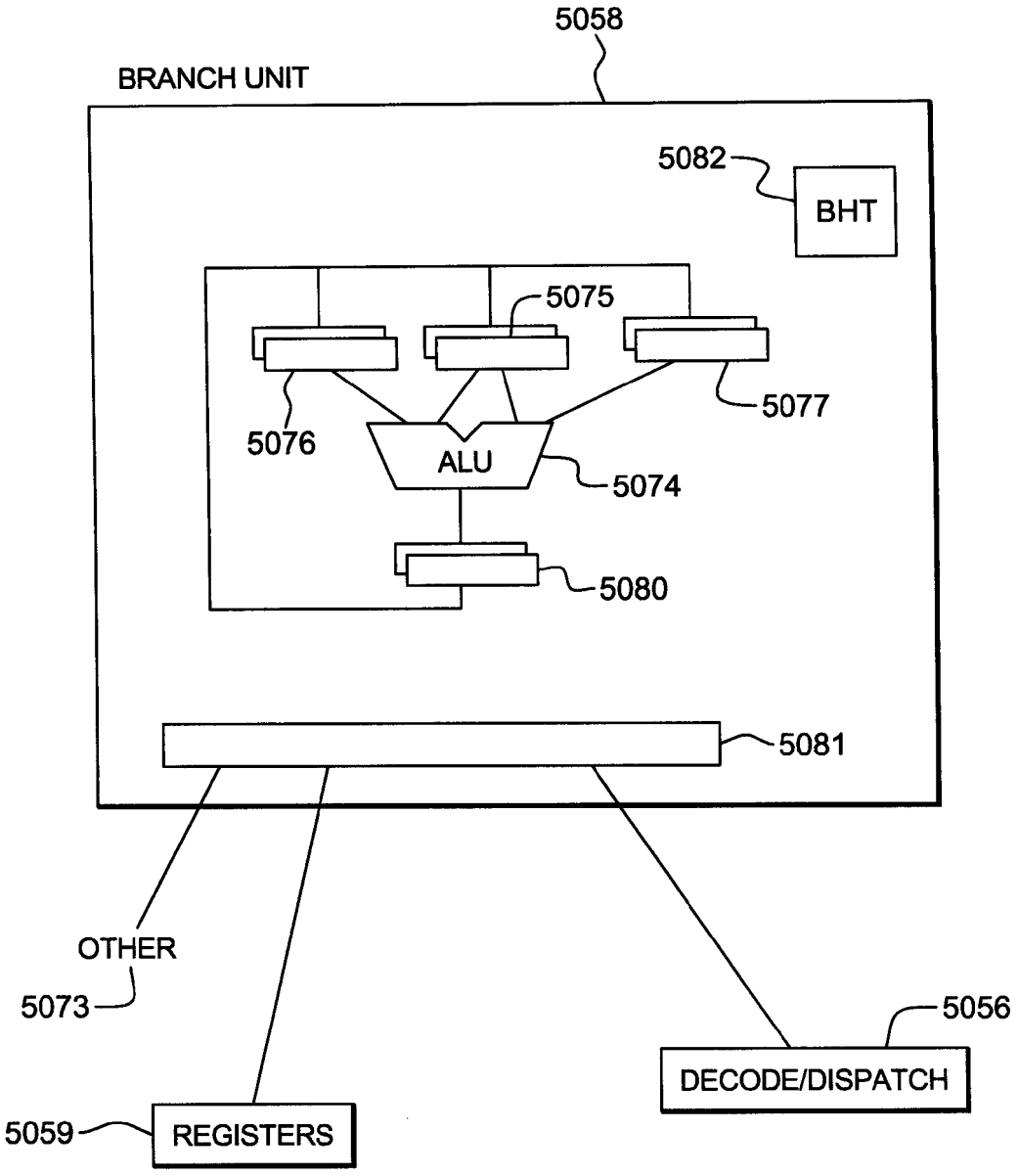
5058
BRANCH UNIT
5082
BHT
5075
5076
5077
ALU
5074
5080
5081
OTHER
5073
5056
DECODE/DISPATCH
5059
REGISTERS

FIG. 16B

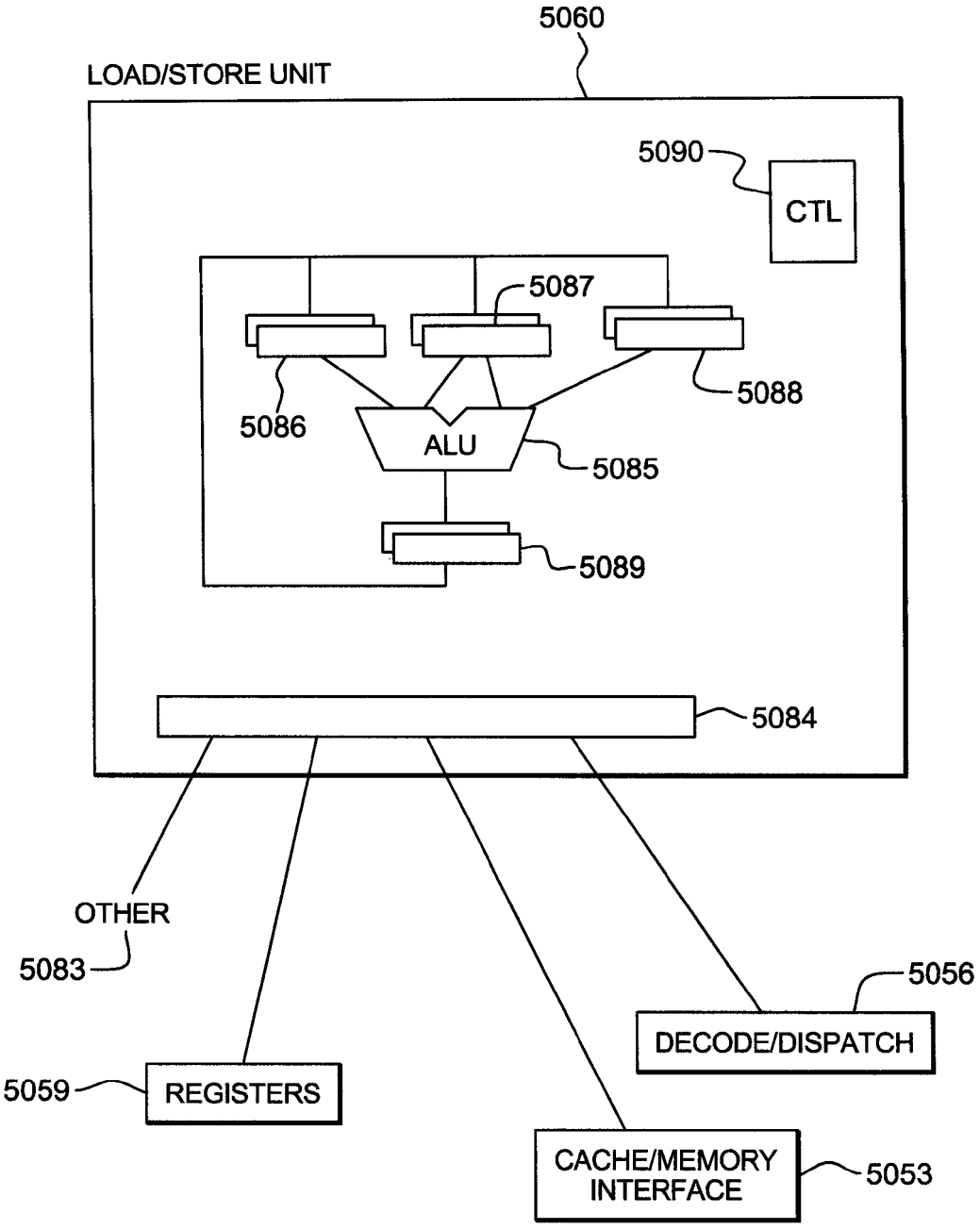
5060
LOAD/STORE UNIT
5090
CTL
5087
5086
5088
ALU
5085
5089
5084
OTHER
5083
5056
DECODE/DISPATCH
5059
REGISTERS
CACHE/MEMORY
INTERFACE
5053

FIG. 16C

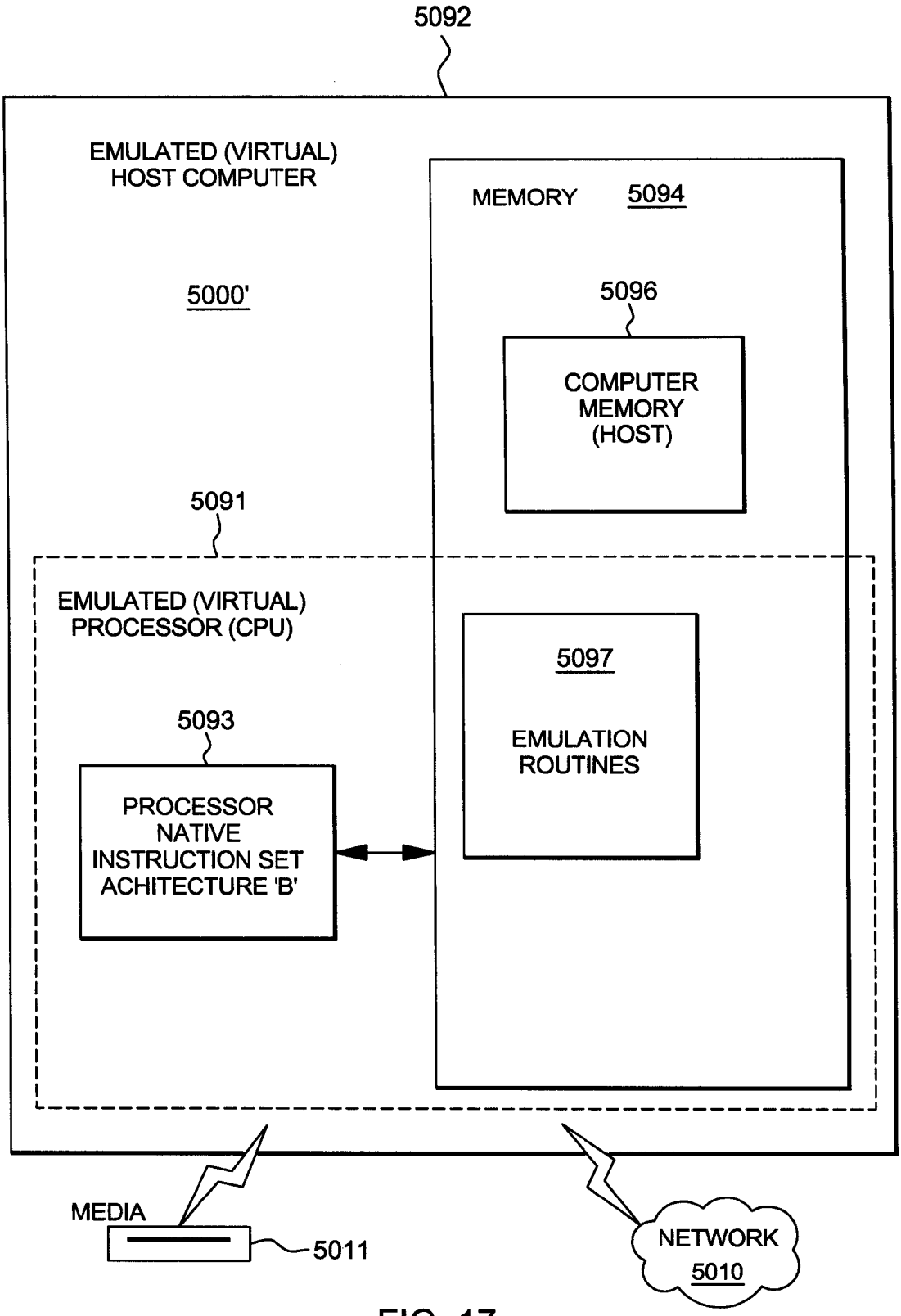
5092
EMULATED (VIRTUAL)
HOST COMPUTER
5000'
MEMORY 5094
5096
COMPUTER
MEMORY
(HOST)
5091
EMULATED (VIRTUAL)
PROCESSOR (CPU)
5097
EMULATION
ROUTINES
5093
PROCESSOR
NATIVE
INSTRUCTION SET
ACHITECTURE 'B'
MEDIA
5011
NETWORK
5010

FIG. 17