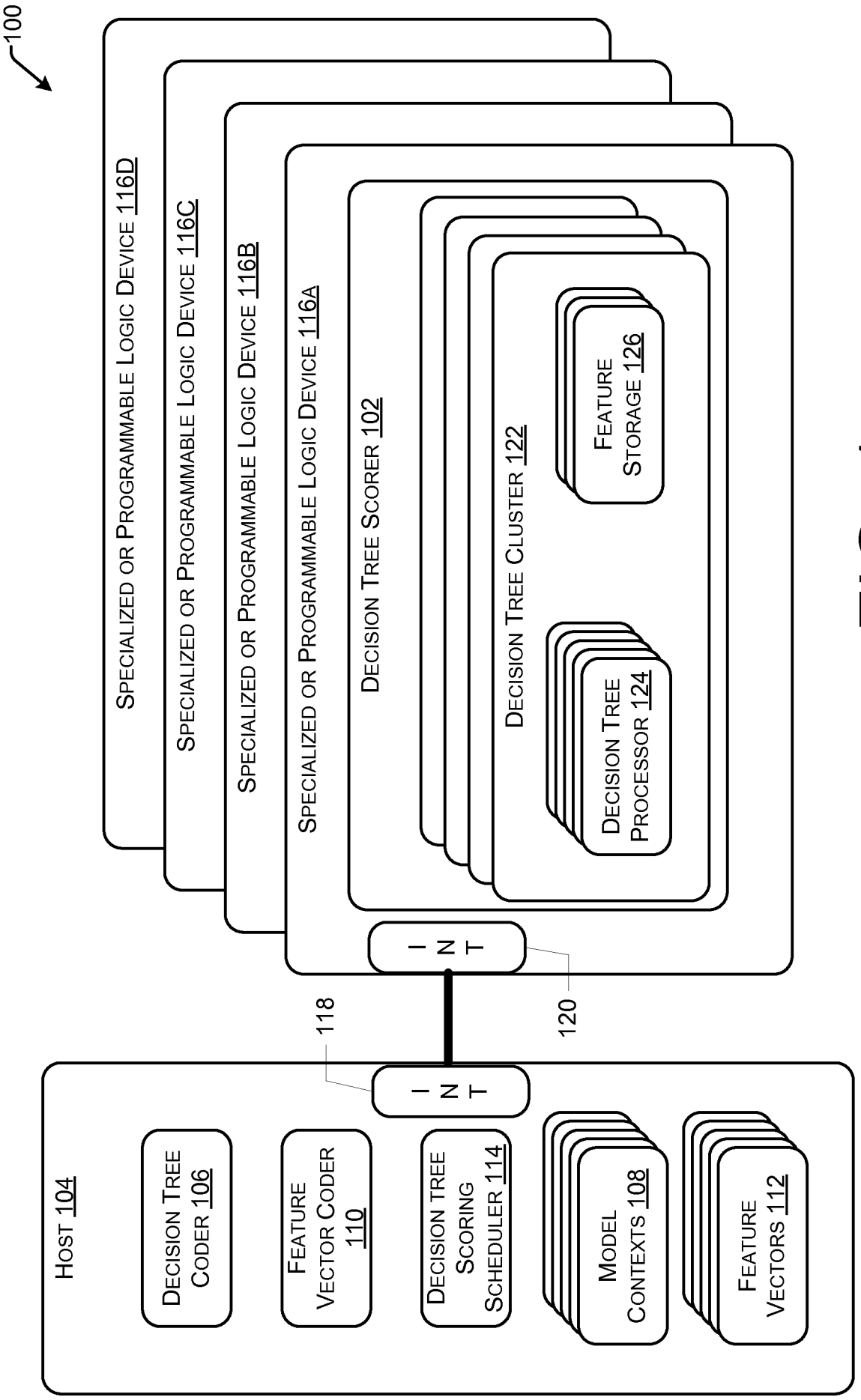
100
SPECIALIZED OR PROGRAMMABLE LOGIC DEVICE 116D
SPECIALIZED OR PROGRAMMABLE LOGIC DEVICE 116C
SPECIALIZED OR PROGRAMMABLE LOGIC DEVICE 116B
SPECIALIZED OR PROGRAMMABLE LOGIC DEVICE 116A
DECISION TREE SCORER 102
DECISION TREE CLUSTER 122
FEATURE STORAGE 126
DECISION TREE PROCESSOR 124
INT
120
118
INT
HOST 104
DECISION TREE CODER 106
FEATURE VECTOR CODER 110
DECISION TREE SCORING SCHEDULER 114
MODEL CONTEXTS 108
FEATURE VECTORS 112

FIG. 1

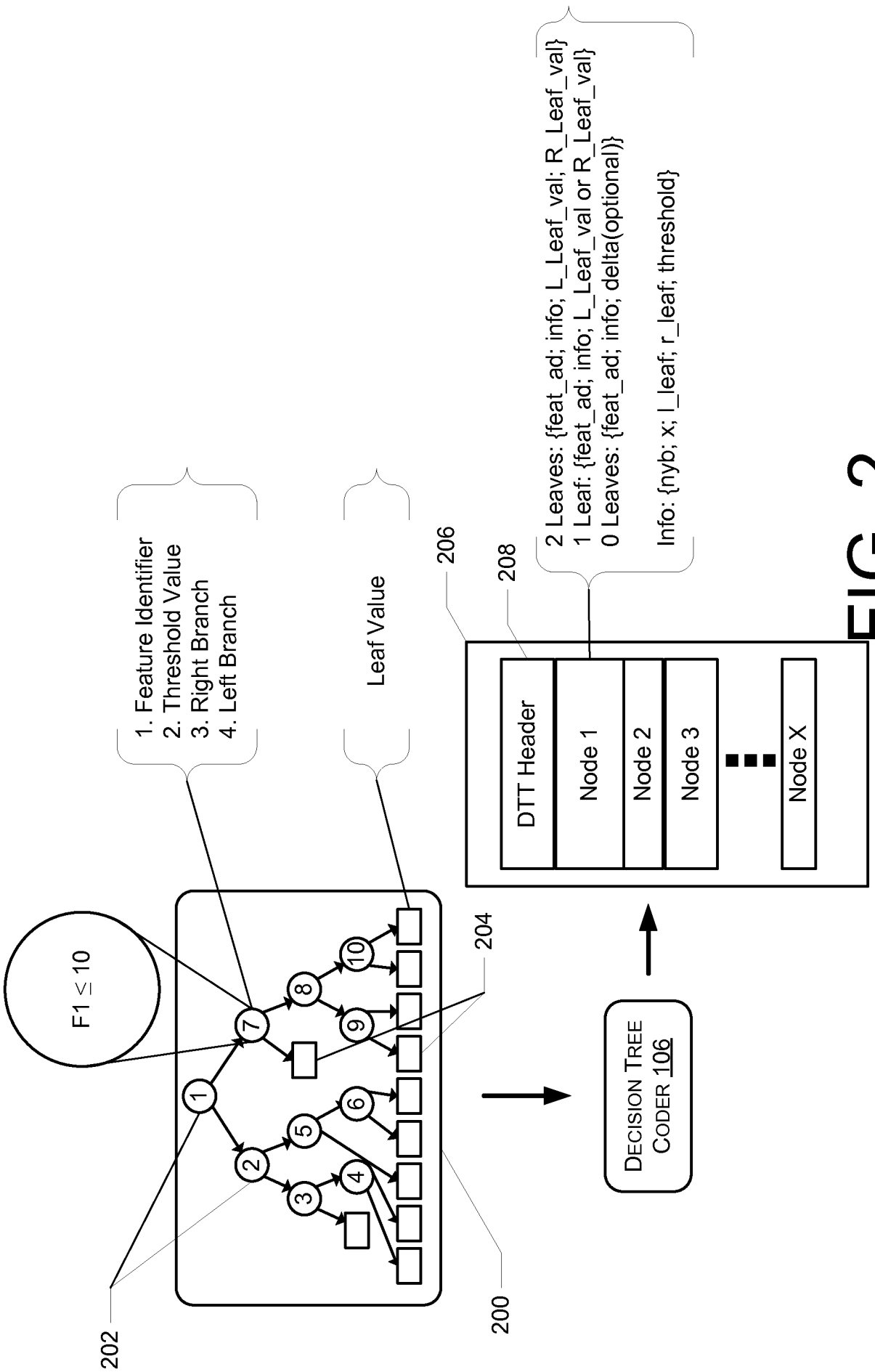
F1 ≤ 10
1. Feature Identifier
2. Threshold Value
3. Right Branch
4. Left Branch
Leaf Value
202
200
204
206
208
DTT Header
Node 1
Node 2
Node 3
Node X
2 Leaves: {feat_ad; info; L_Leaf_val; R_Leaf_val}
1 Leaf: {feat_ad; info; L_Leaf_val or R_Leaf_val}
0 Leaves: {feat_ad; info; delta(optional)}
Info: {nyb; x; l_leaf; r_leaf; threshold}
DECISION TREE CODER 106

FIG. 2

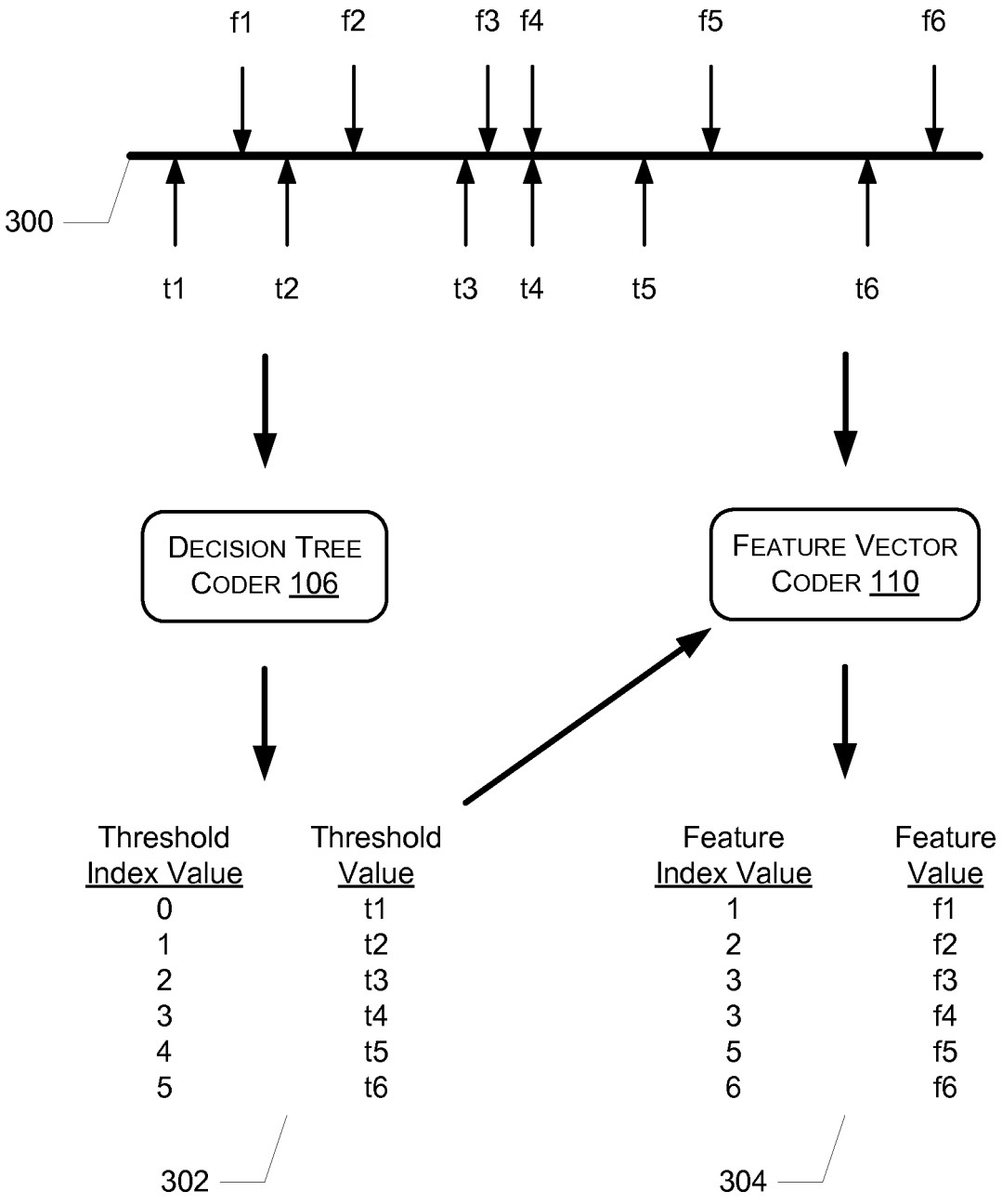
f1
f2
f3
f4
f5
f6
300
t1
t2
t3
t4
t5
t6
DECISION TREE CODER 106
FEATURE VECTOR CODER 110
Threshold Index Value
Threshold Value
0 t1
1 t2
2 t3
3 t4
4 t5
5 t6
302
Feature Index Value
Feature Value
1 f1
2 f2
3 f3
3 f4
5 f5
6 f6
304

FIG. 3

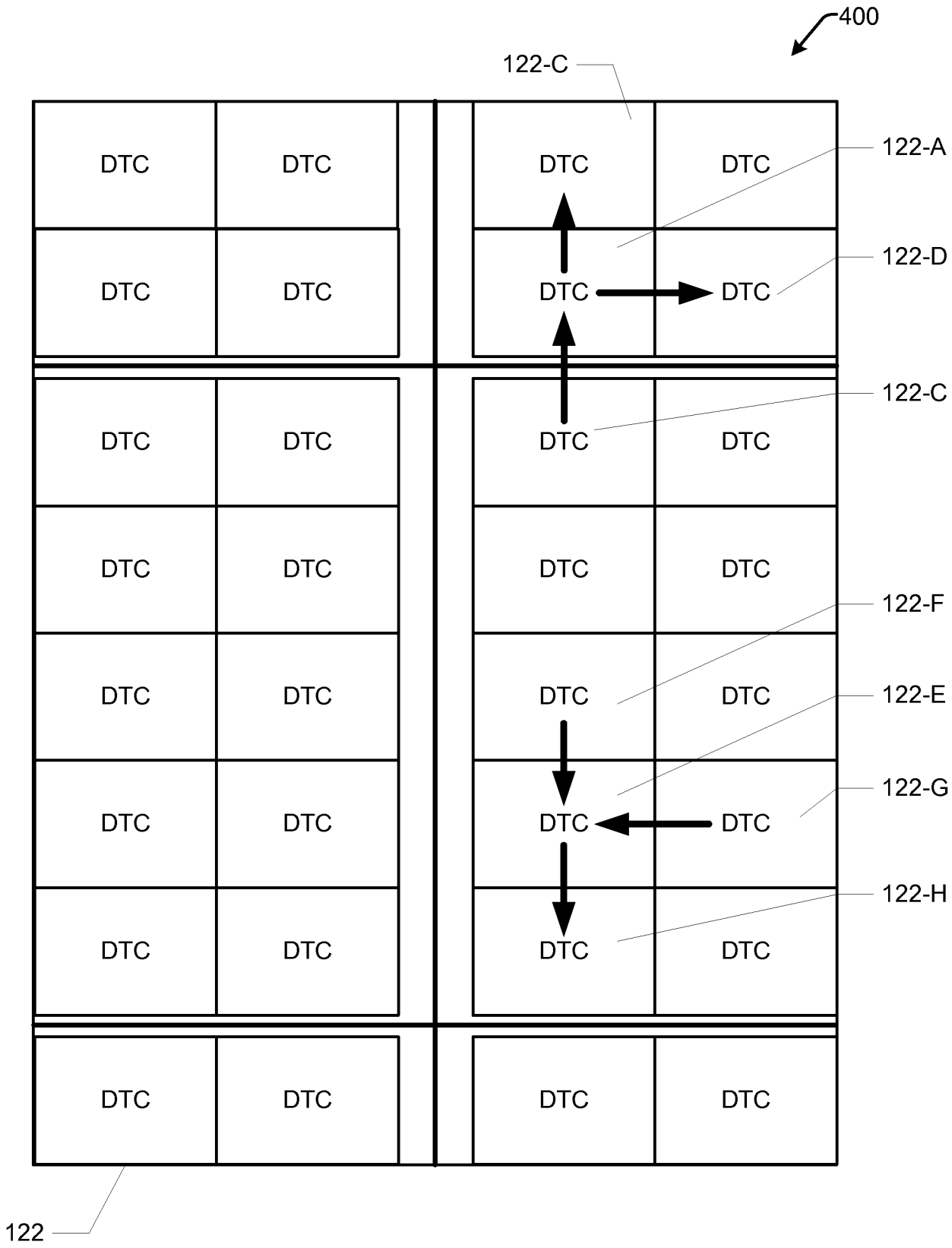


FIG. 4

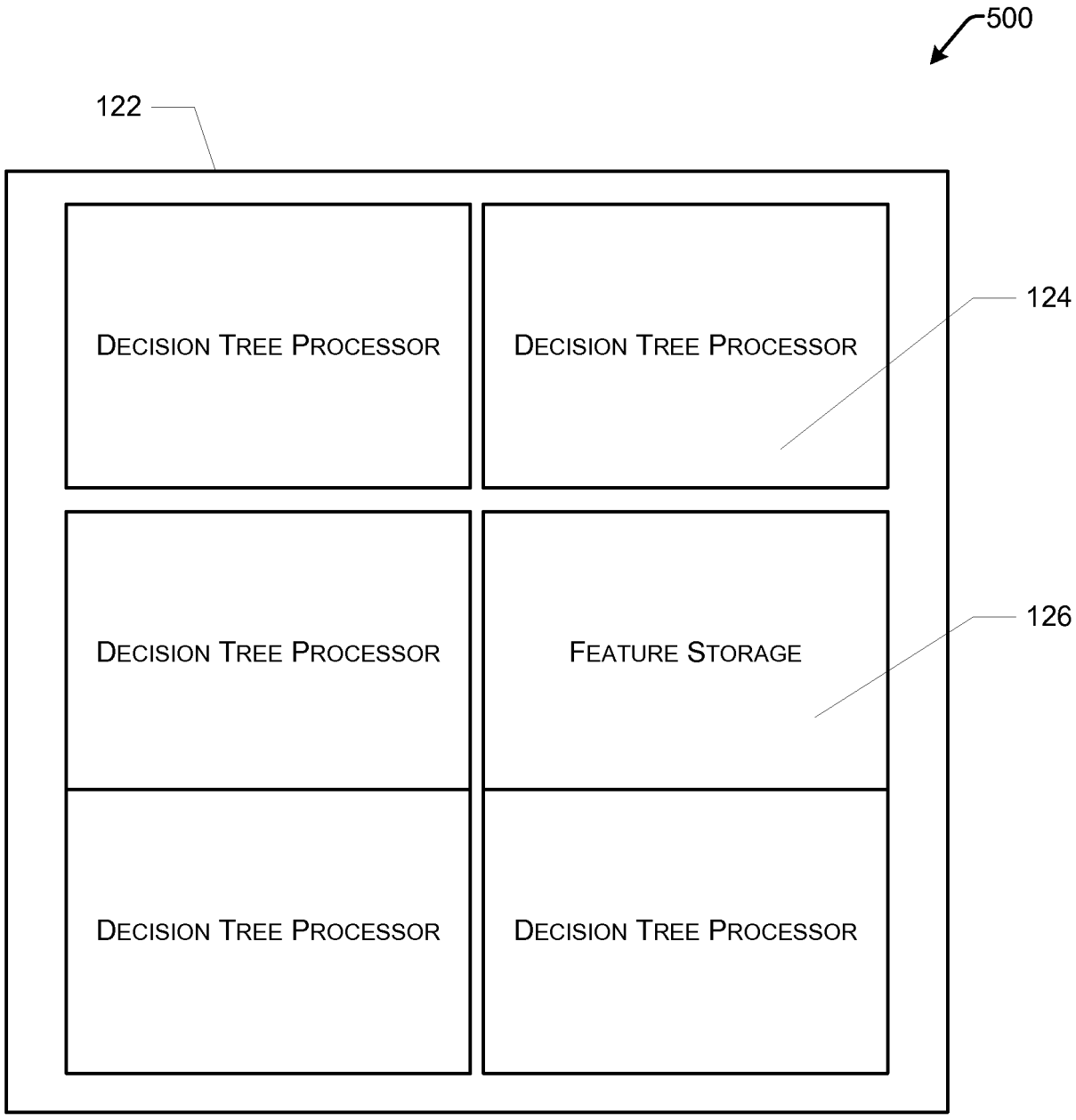
500
122
DECISION TREE PROCESSOR
DECISION TREE PROCESSOR
124
DECISION TREE PROCESSOR
FEATURE STORAGE
126
DECISION TREE PROCESSOR
DECISION TREE PROCESSOR

FIG. 5

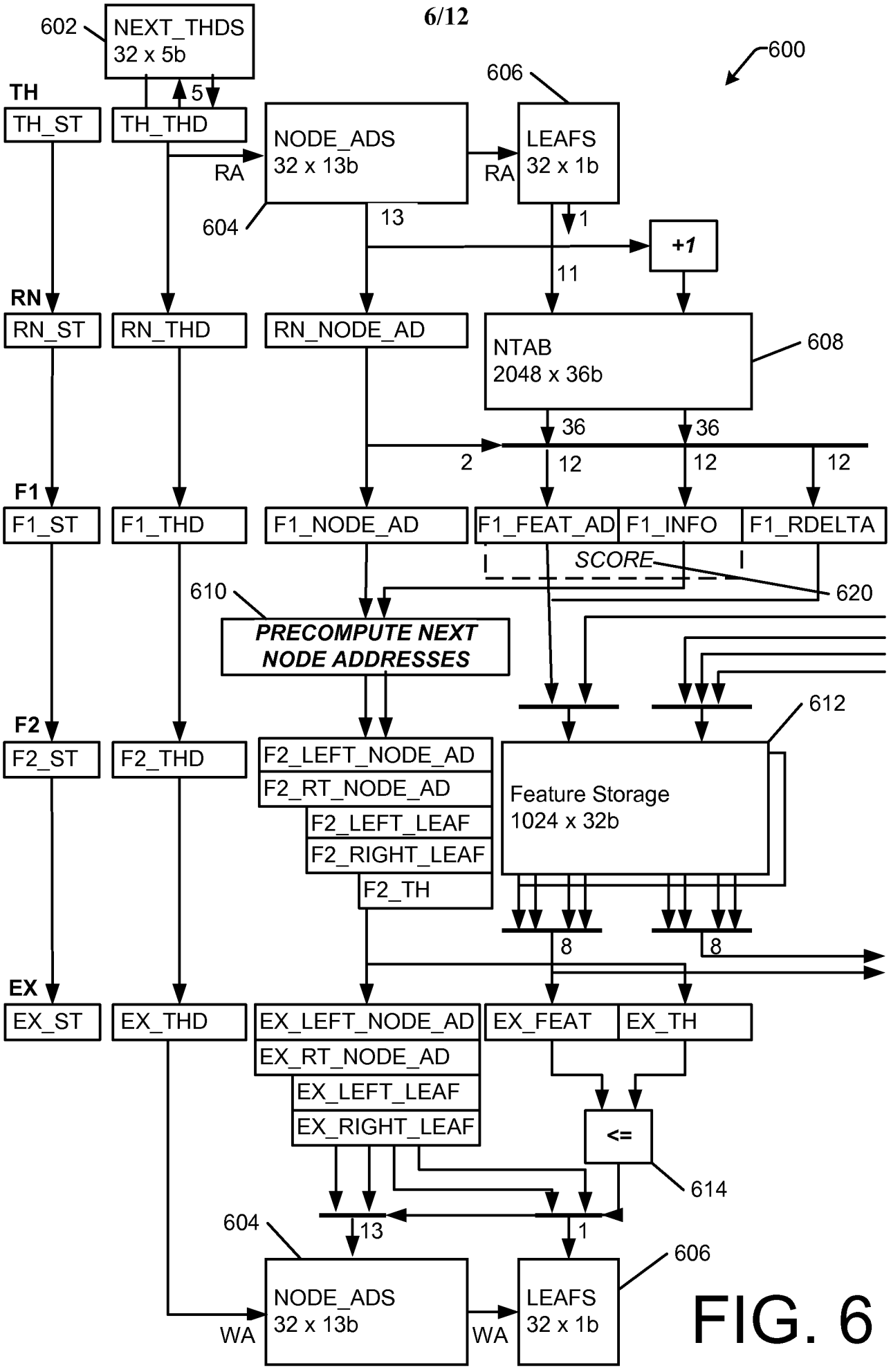
602
NEXT_THDS
32 x 5b
600
606
TH
5
TH_ST
TH_THD
NODE_ADS
32 x 13b
LEAFS
32 x 1b
RA
RA
604
13
1
+1
11
RN
RN_ST
RN_THD
RN_NODE_AD
NTAB
2048 x 36b
608
36
36
2
12
12
12
F1
F1_ST
F1_THD
F1_NODE_AD
F1_FEAT_AD
F1_INFO
F1_RDELTA
SCORE
620
610
PRECOMPUTE NEXT
NODE ADDRESSES
612
F2
F2_ST
F2_THD
F2_LEFT_NODE_AD
F2_RT_NODE_AD
F2_LEFT_LEAF
F2_RIGHT_LEAF
F2_TH
Feature Storage
1024 x 32b
8
8
EX
EX_ST
EX_THD
EX_LEFT_NODE_AD
EX_RT_NODE_AD
EX_LEFT_LEAF
EX_RIGHT_LEAF
EX_FEAT
EX_TH
<=
614
604
13
1
606
WA
NODE_ADS
32 x 13b
WA
LEAFS
32 x 1b

FIG. 6

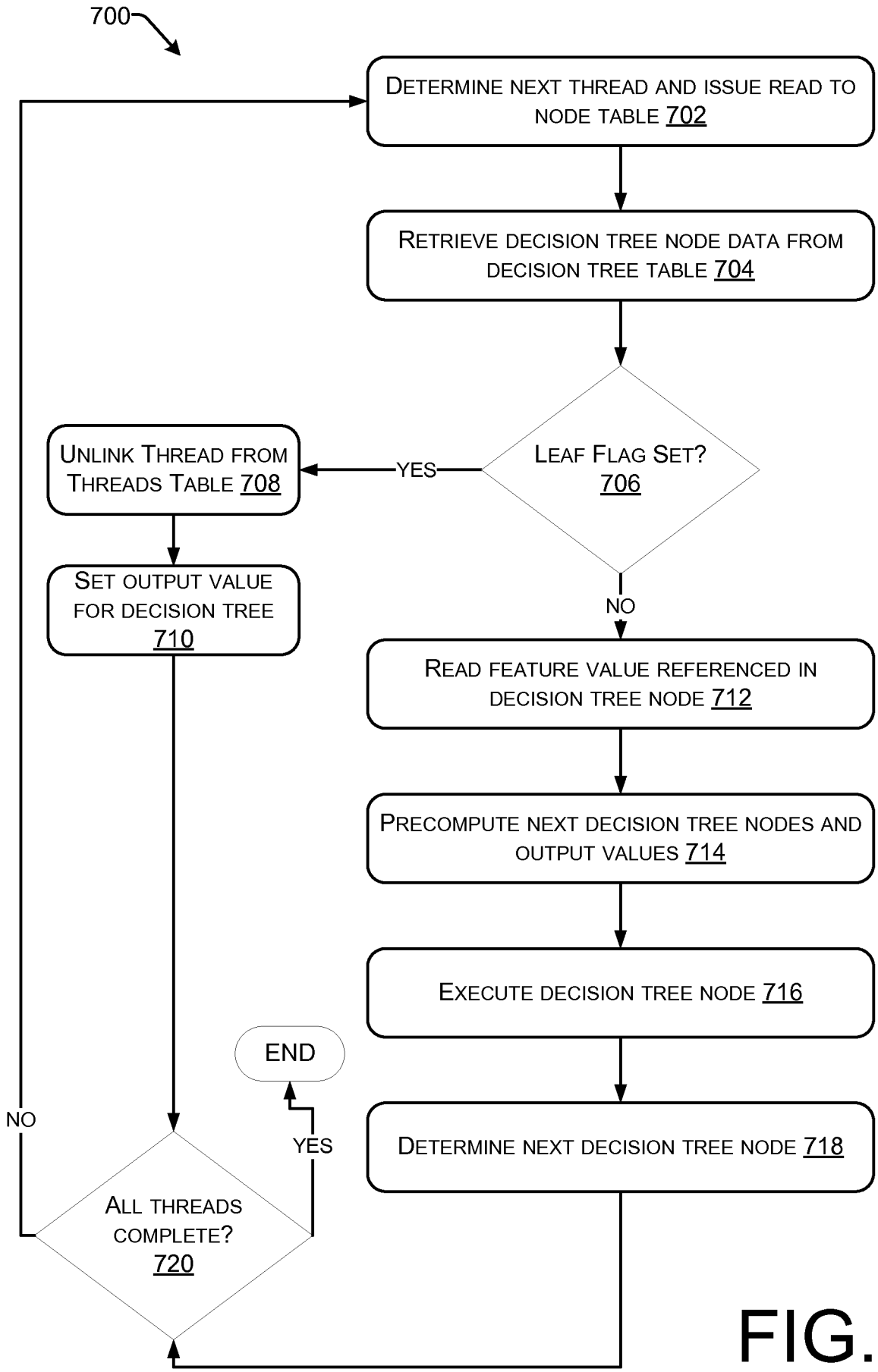
700
DETERMINE NEXT THREAD AND ISSUE READ TO NODE TABLE 702
RETRIEVE DECISION TREE NODE DATA FROM DECISION TREE TABLE 704
LEAF FLAG SET? 706
YES
UNLINK THREAD FROM THREADS TABLE 708
SET OUTPUT VALUE FOR DECISION TREE 710
NO
READ FEATURE VALUE REFERENCED IN DECISION TREE NODE 712
PRECOMPUTE NEXT DECISION TREE NODES AND OUTPUT VALUES 714
EXECUTE DECISION TREE NODE 716
DETERMINE NEXT DECISION TREE NODE 718
END
YES
NO
ALL THREADS COMPLETE? 720

FIG. 7

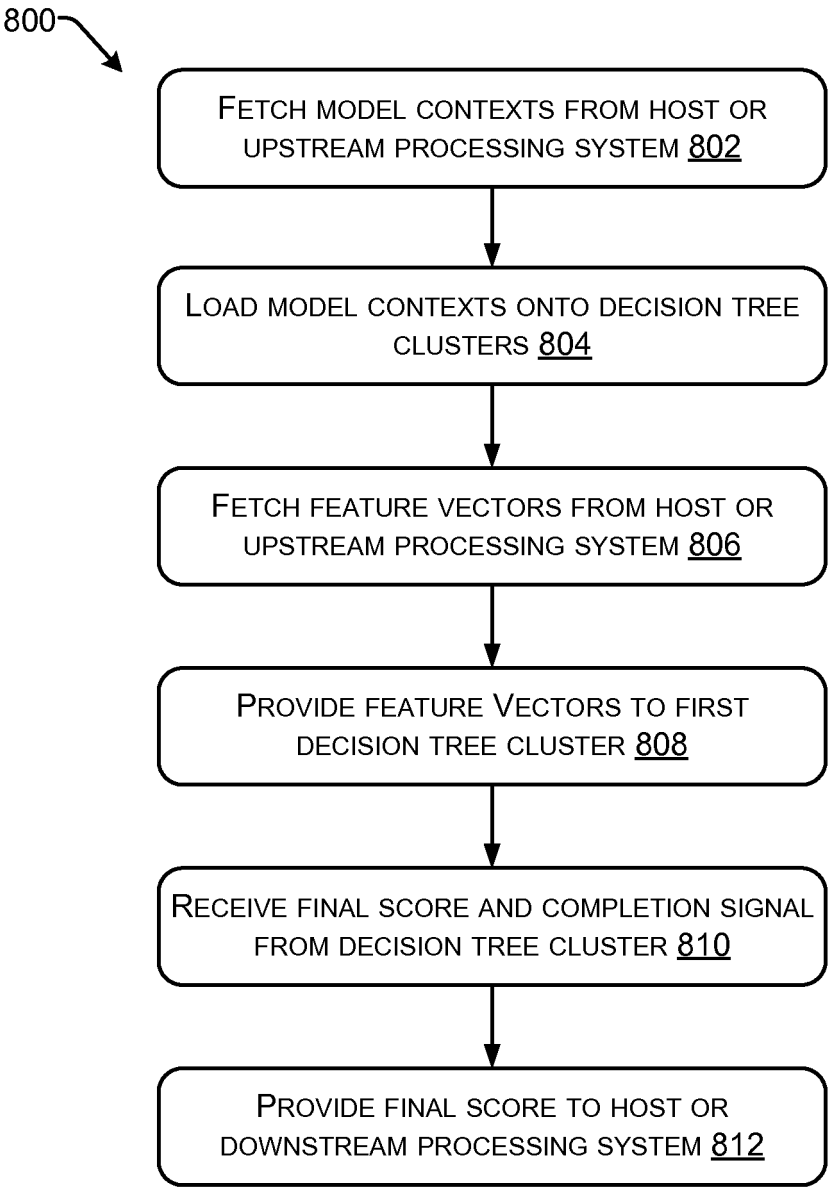
800
FETCH MODEL CONTEXTS FROM HOST OR UPSTREAM PROCESSING SYSTEM 802
LOAD MODEL CONTEXTS ONTO DECISION TREE CLUSTERS 804
FETCH FEATURE VECTORS FROM HOST OR UPSTREAM PROCESSING SYSTEM 806
PROVIDE FEATURE VECTORS TO FIRST DECISION TREE CLUSTER 808
RECEIVE FINAL SCORE AND COMPLETION SIGNAL FROM DECISION TREE CLUSTER 810
PROVIDE FINAL SCORE TO HOST OR DOWNSTREAM PROCESSING SYSTEM 812

FIG. 8

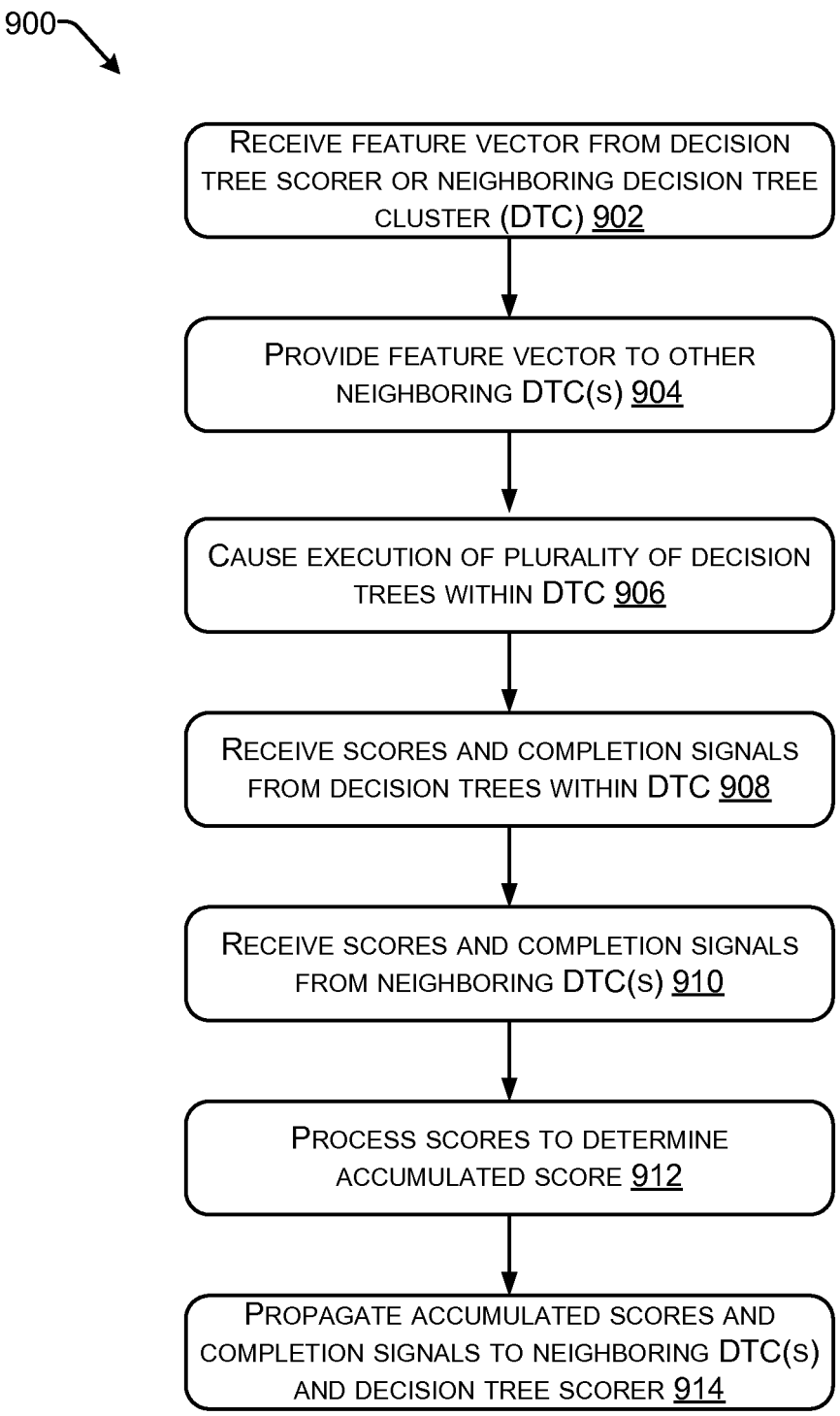
900
RECEIVE FEATURE VECTOR FROM DECISION TREE SCORER OR NEIGHBORING DECISION TREE CLUSTER (DTC) 902
PROVIDE FEATURE VECTOR TO OTHER NEIGHBORING DTC(S) 904
CAUSE EXECUTION OF PLURALITY OF DECISION TREES WITHIN DTC 906
RECEIVE SCORES AND COMPLETION SIGNALS FROM DECISION TREES WITHIN DTC 908
RECEIVE SCORES AND COMPLETION SIGNALS FROM NEIGHBORING DTC(S) 910
PROCESS SCORES TO DETERMINE ACCUMULATED SCORE 912
PROPAGATE ACCUMULATED SCORES AND COMPLETION SIGNALS TO NEIGHBORING DTC(S) AND DECISION TREE SCORER 914

FIG. 9

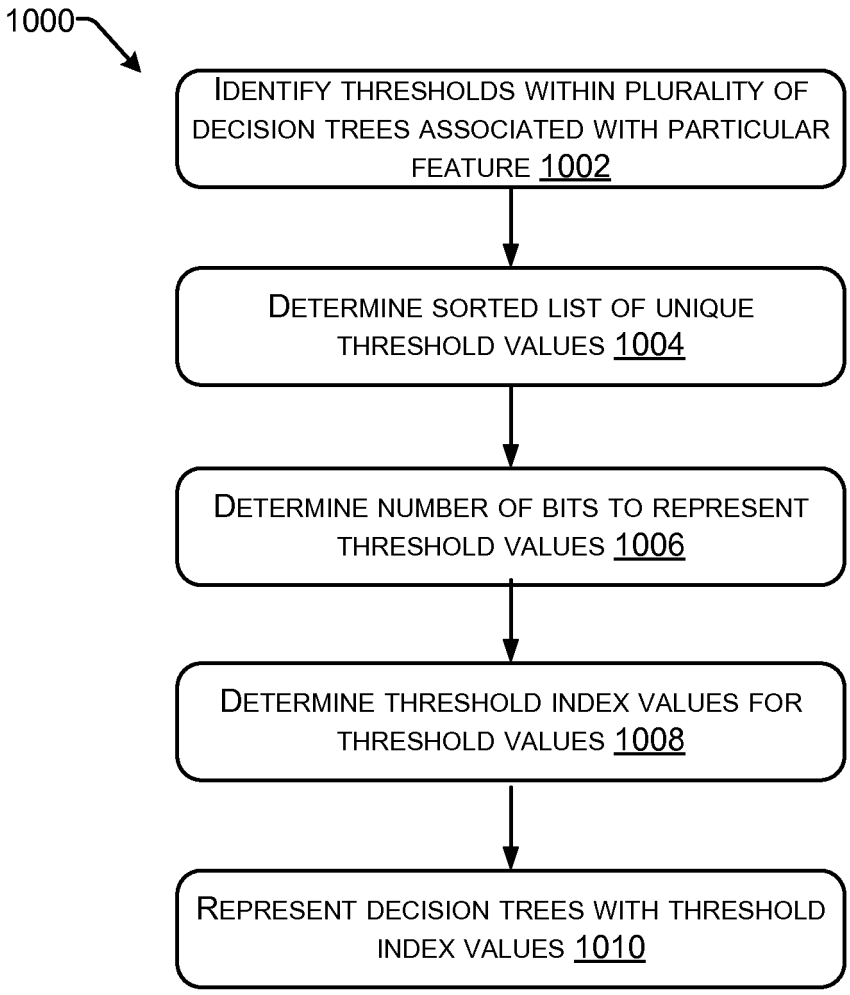
1000
IDENTIFY THRESHOLDS WITHIN PLURALITY OF DECISION TREES ASSOCIATED WITH PARTICULAR FEATURE 1002
DETERMINE SORTED LIST OF UNIQUE THRESHOLD VALUES 1004
DETERMINE NUMBER OF BITS TO REPRESENT THRESHOLD VALUES 1006
DETERMINE THRESHOLD INDEX VALUES FOR THRESHOLD VALUES 1008
REPRESENT DECISION TREES WITH THRESHOLD INDEX VALUES 1010

FIG. 10

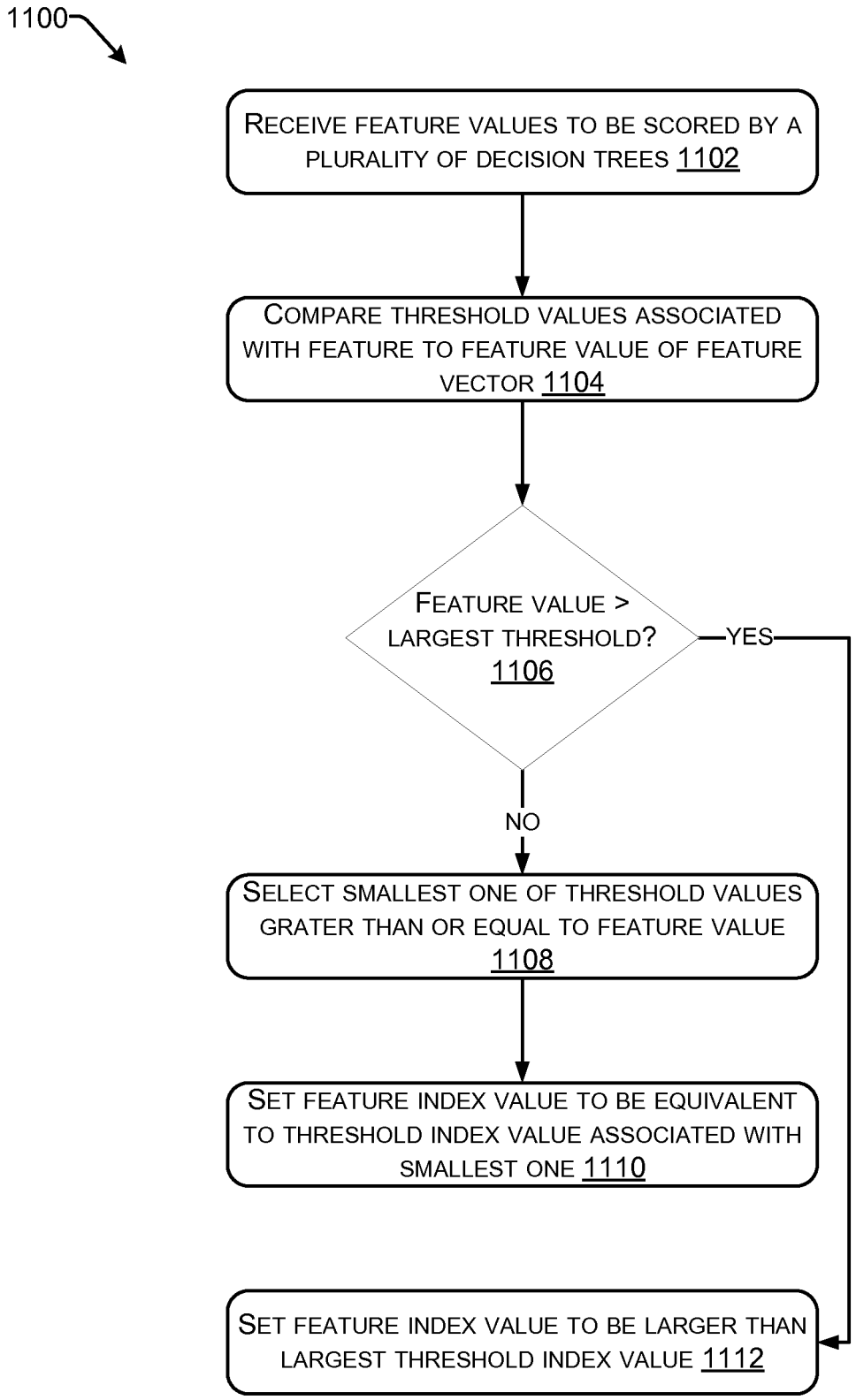
1100
RECEIVE FEATURE VALUES TO BE SCORED BY A PLURALITY OF DECISION TREES 1102
COMPARE THRESHOLD VALUES ASSOCIATED WITH FEATURE TO FEATURE VALUE OF FEATURE VECTOR 1104
FEATURE VALUE > LARGEST THRESHOLD? 1106
YES
NO
SELECT SMALLEST ONE OF THRESHOLD VALUES GRATER THAN OR EQUAL TO FEATURE VALUE 1108
SET FEATURE INDEX VALUE TO BE EQUIVALENT TO THRESHOLD INDEX VALUE ASSOCIATED WITH SMALLEST ONE 1110
SET FEATURE INDEX VALUE TO BE LARGER THAN LARGEST THRESHOLD INDEX VALUE 1112

FIG. 11

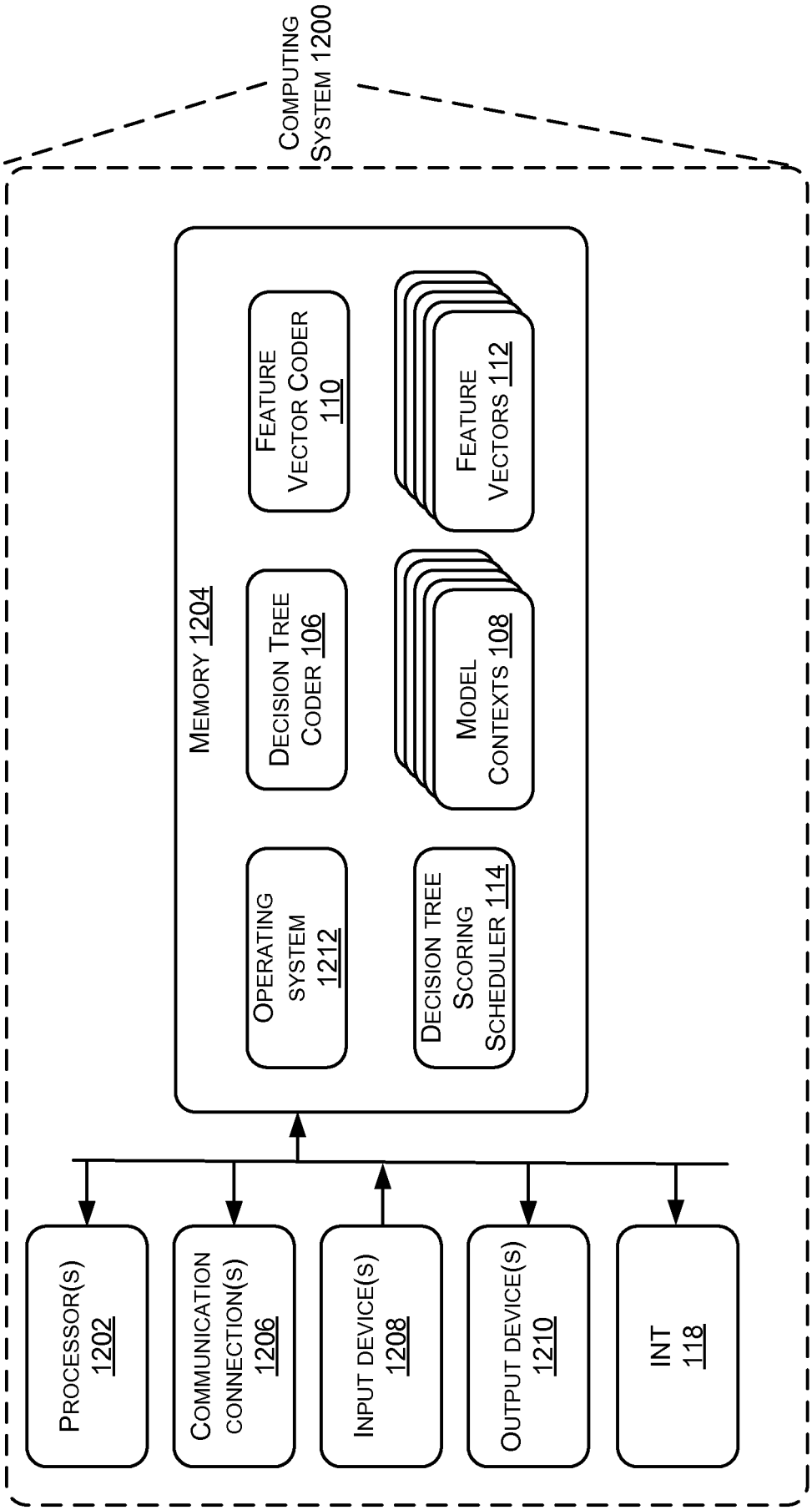
COMPUTING SYSTEM 1200
MEMORY 1204
FEATURE VECTOR CODER 110
FEATURE VECTORS 112
DECISION TREE CODER 106
MODEL CONTEXTS 108
OPERATING SYSTEM 1212
DECISION TREE SCORING SCHEDULER 114
PROCESSOR(S) 1202
COMMUNICATION CONNECTION(S) 1206
INPUT DEVICE(S) 1208
OUTPUT DEVICE(S) 1210
INT 118

FIG. 12