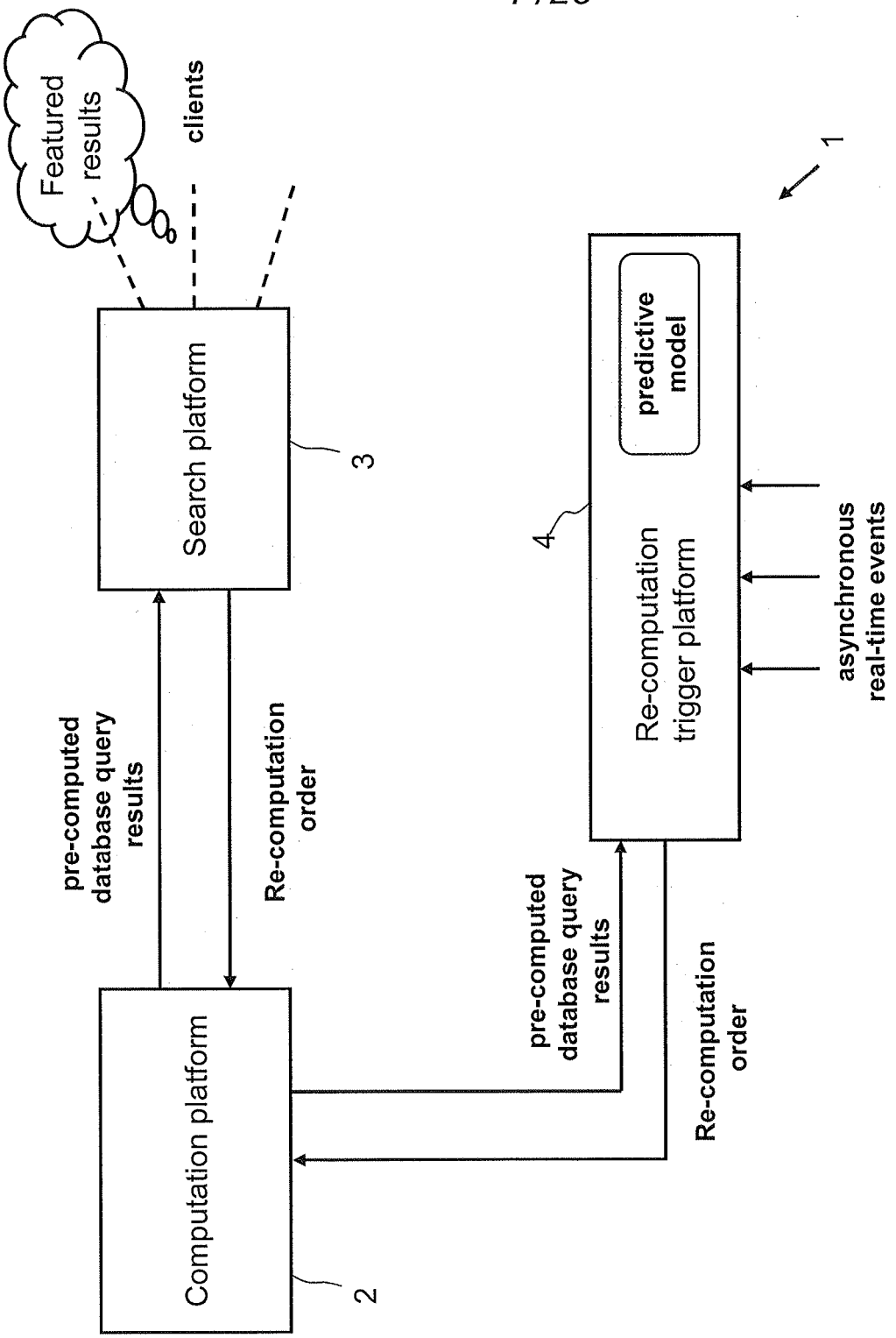

Featured results
clients
Search platform
3
pre-computed database query results
Re-computation order
Computation platform
2
4
predictive model
Re-computation trigger platform
asynchronous real-time events
1
pre-computed database query results
Re-computation order

Fig. 1

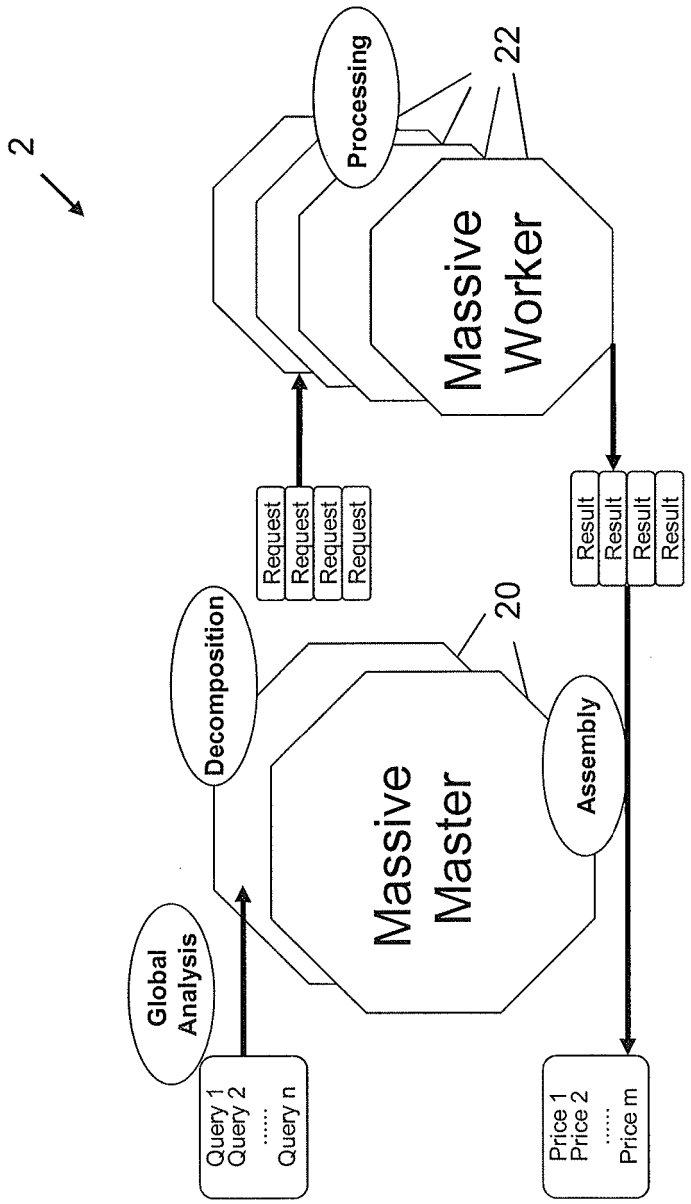

2
Processing
22
Massive Worker
Request
Request
Request
Request
Result
Result
Result
Result
Decomposition
20
Massive Master
Assembly
Global Analysis
Query 1
Query 2
.....
Query n
Price 1
Price 2
.....
Price m

Fig. 2

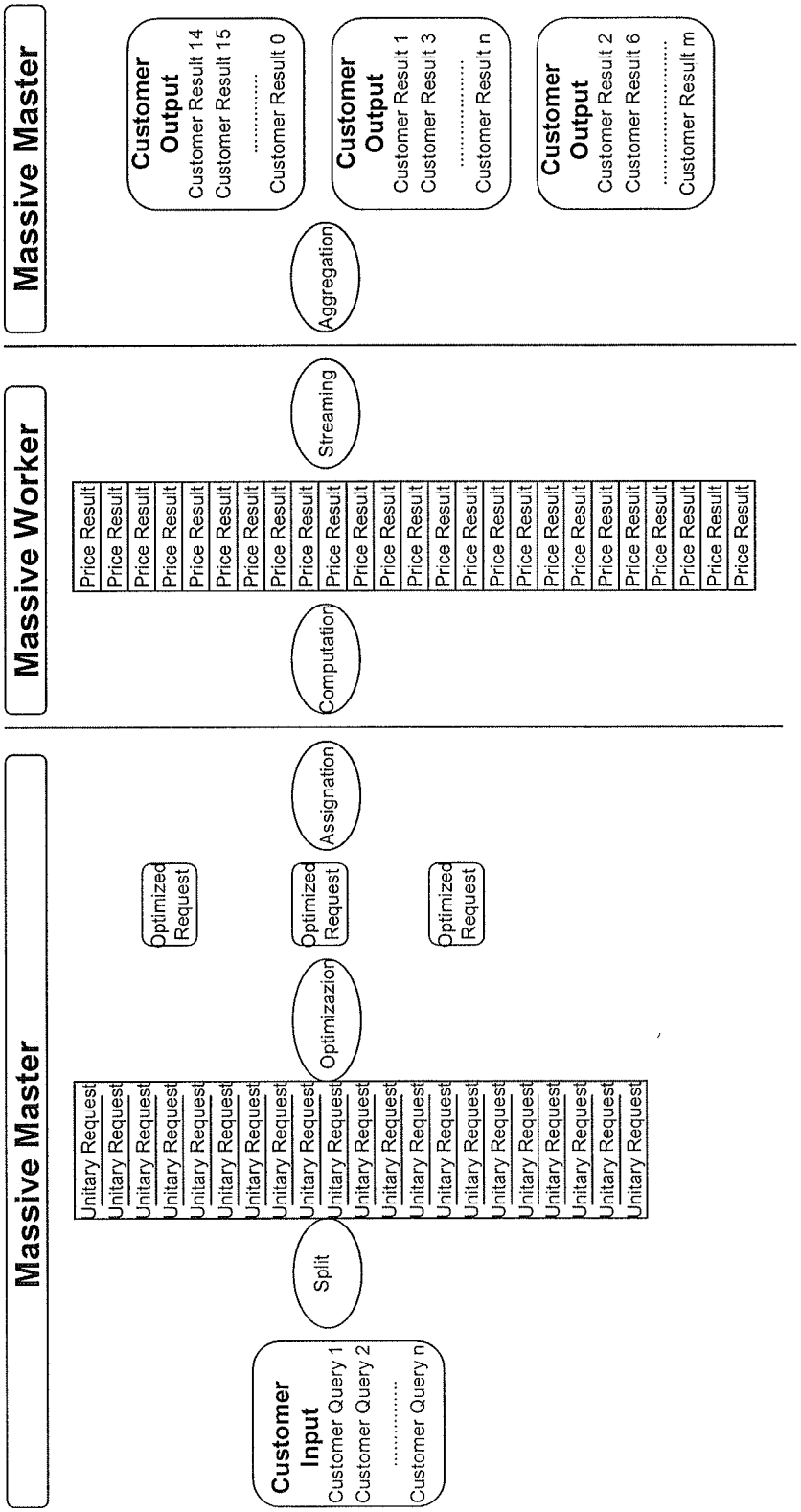

Massive Master
Customer Input
Customer Query 1
Customer Query 2
.....
Customer Query n
Split
Unitary Request
Optimizazion
Optimized Request
Assignation
Massive Worker
Computation
Price Result
Streaming
Massive Master
Aggregation
Customer Output
Customer Result 14
Customer Result 15
.....
Customer Result 0
Customer Output
Customer Result 1
Customer Result 3
.....
Customer Result n
Customer Output
Customer Result 2
Customer Result 6
.....
Customer Result m

Fig. 3

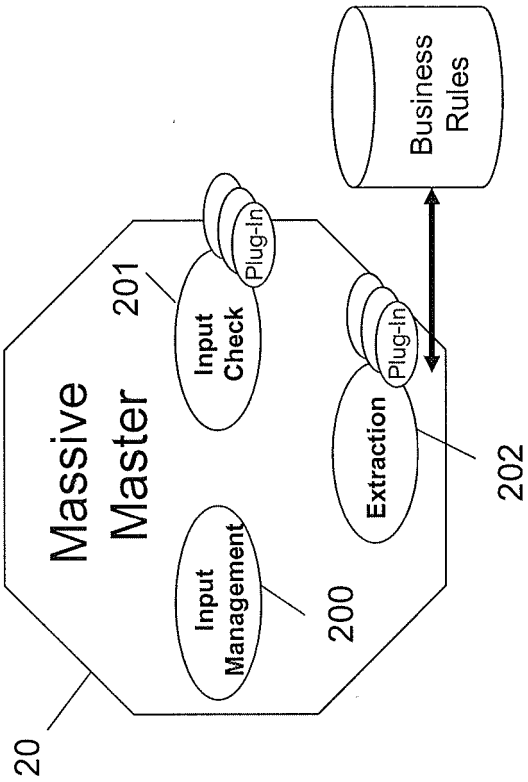

Business Rules
Plug-In
Input Check
201
Plug-In
Extraction
202
Massive Master
Input Management
200
20

Fig. 4

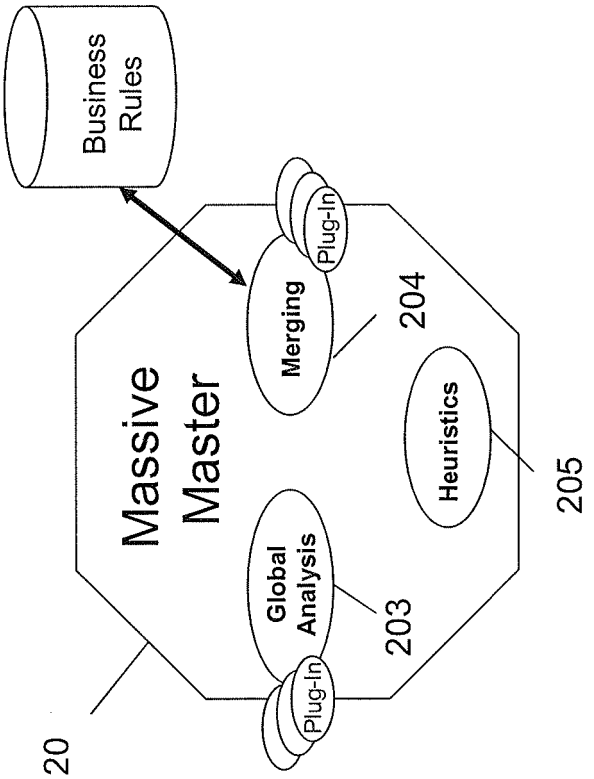

Business Rules
Massive Master
Merging
Plug-In
204
Heuristics
205
Global Analysis
203
Plug-In
20

Fig. 5

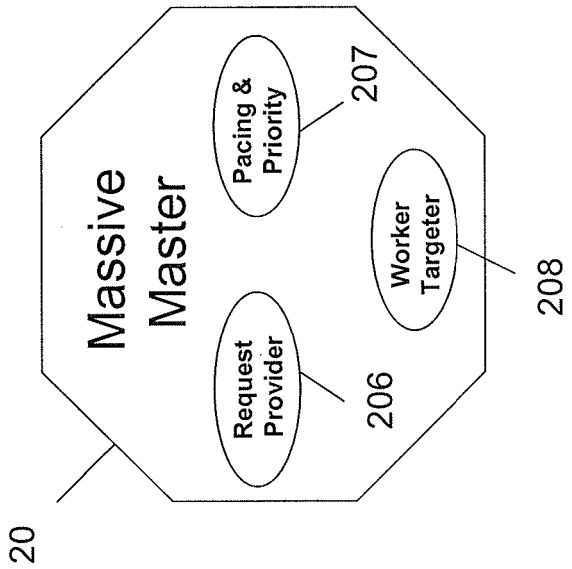

Massive Master
Pacing & Priority
207
Worker Targeter
208
Request Provider
206
20

Fig. 6

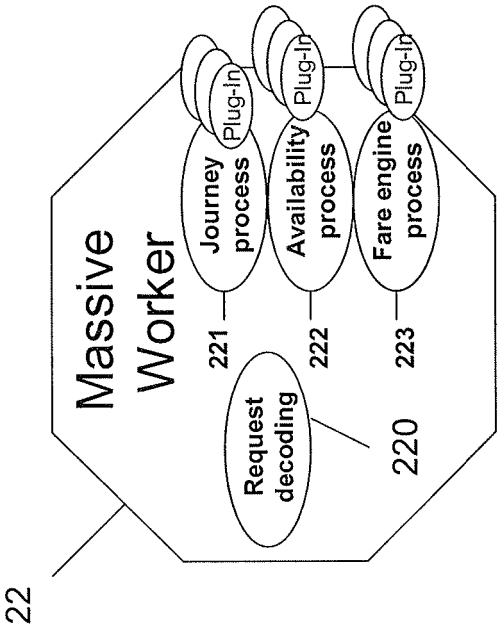

Massive Worker
Journey process
Plug-In
Availability process
Plug-In
Fare engine process
Plug-In
Request decoding
221
222
223
220
22

Fig. 7

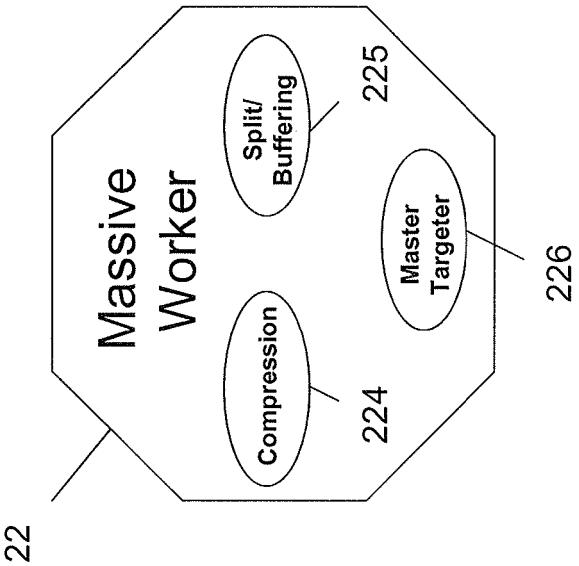

Massive Worker
Split/ Buffering
225
Compression
224
Master Targeter
226
22

Fig. 8

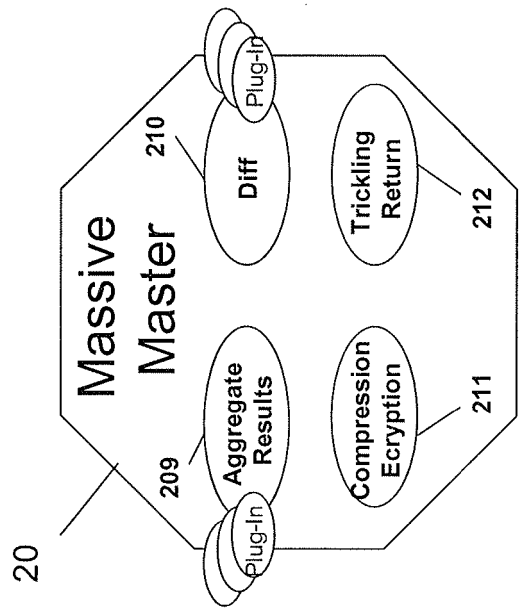

Massive
Master
Diff
Plug-In
Trickling
Return
Aggregate
Results
Plug-In
Compression
Ecryption
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210
211
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Fig. 9

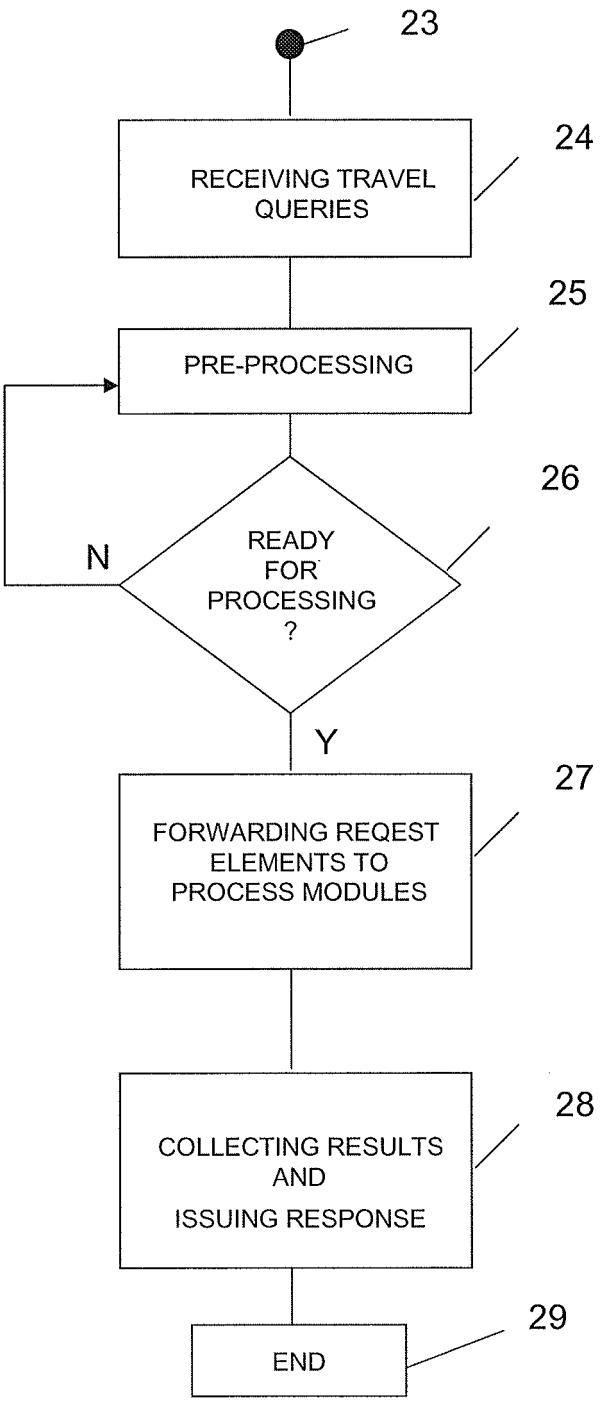

23
RECEIVING TRAVEL QUERIES
24
PRE-PROCESSING
25
READY FOR PROCESSING ?
26
N
Y
FORWARDING REQEST ELEMENTS TO PROCESS MODULES
27
COLLECTING RESULTS AND ISSUING RESPONSE
28
END
29

Fig. 10

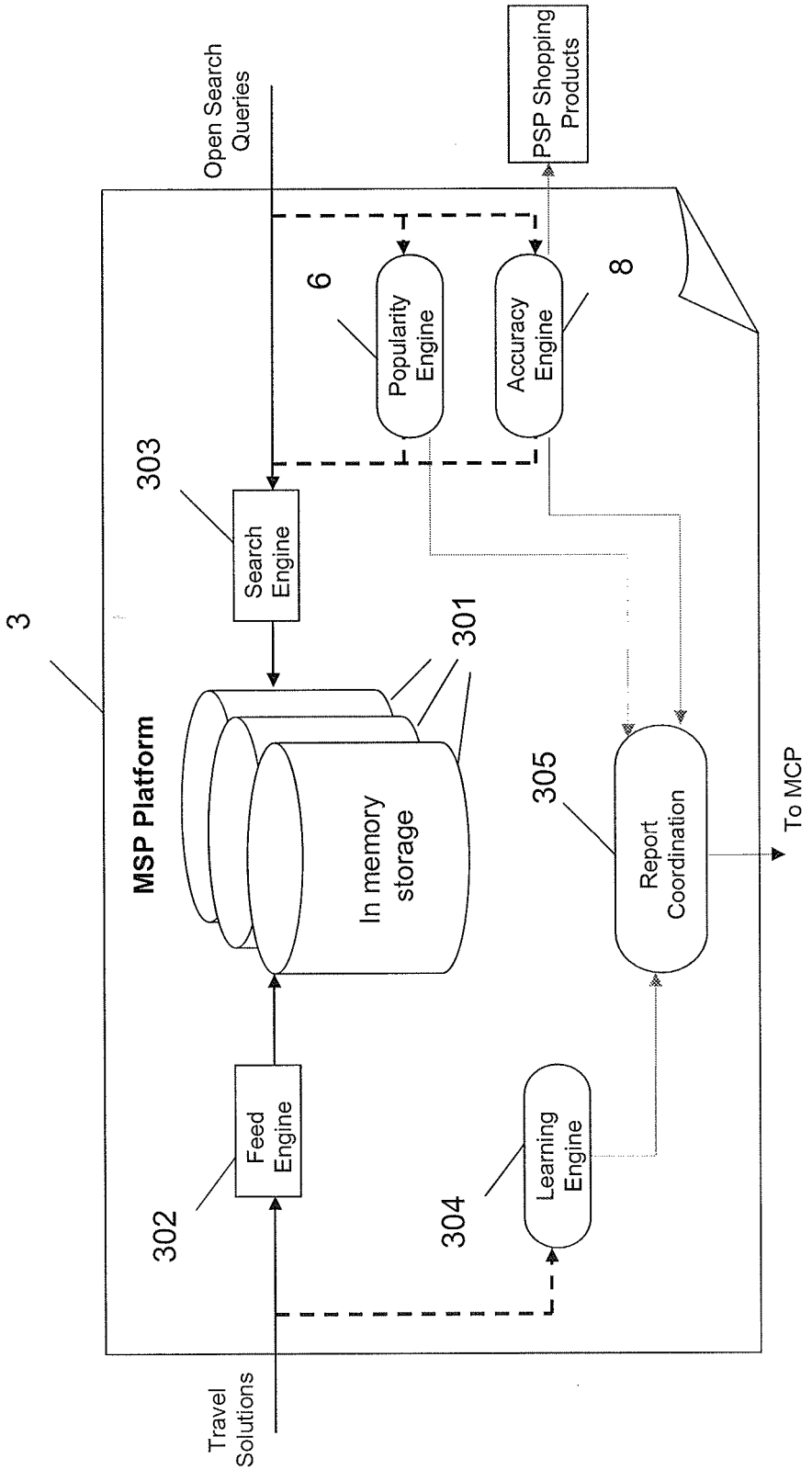

Open Search Queries
PSP Shopping Products
6
Popularity Engine
Accuracy Engine
8
303
Search Engine
3
301
MSP Platform
In memory storage
305
Report Coordination
To MCP
Feed Engine
302
Learning Engine
304
Travel Solutions

Fig. 11

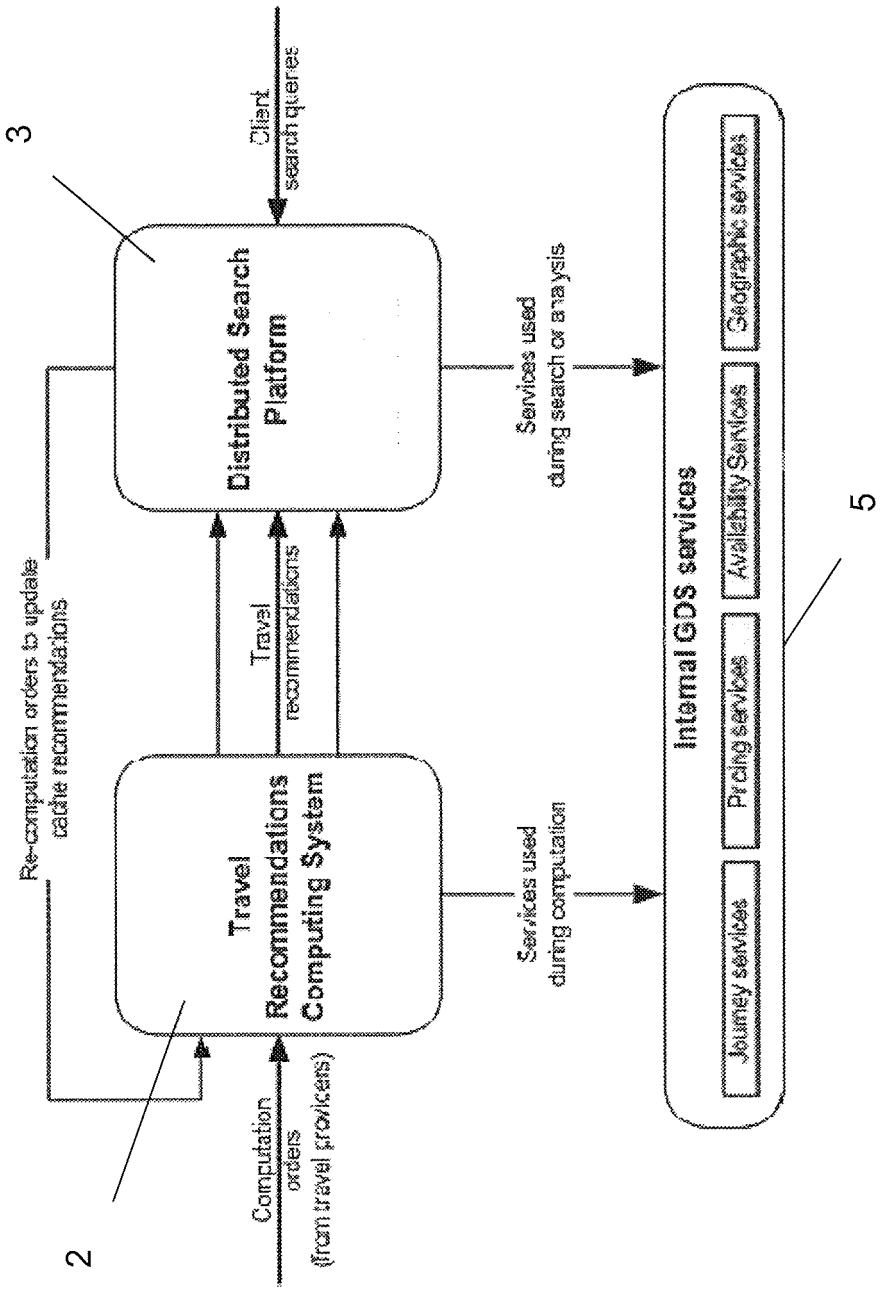

3
Client
search queries
Distributed Search Platform
Re-computation orders to update cache recommendations
Travel recommendations
Services used during search or analysis
Travel Recommendations Computing System
Services used during computation
Computation orders (from travel providers)
2
Internal GDS services
Journey services
Pricing services
Availability Services
Geographic services
5

Fig. 12

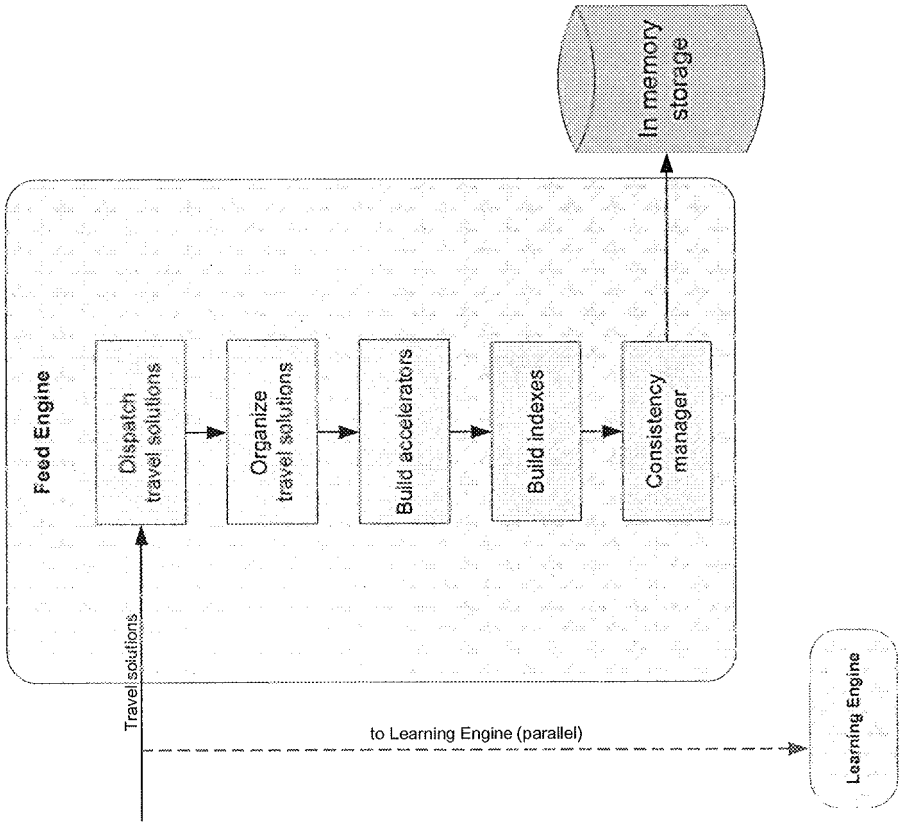

In memory storage
Feed Engine
Dispatch travel solutions
Organize travel solutions
Build accelerators
Build indexes
Consistency manager
Travel solutions
to Learning Engine (parallel)
Learning Engine

Fig. 13

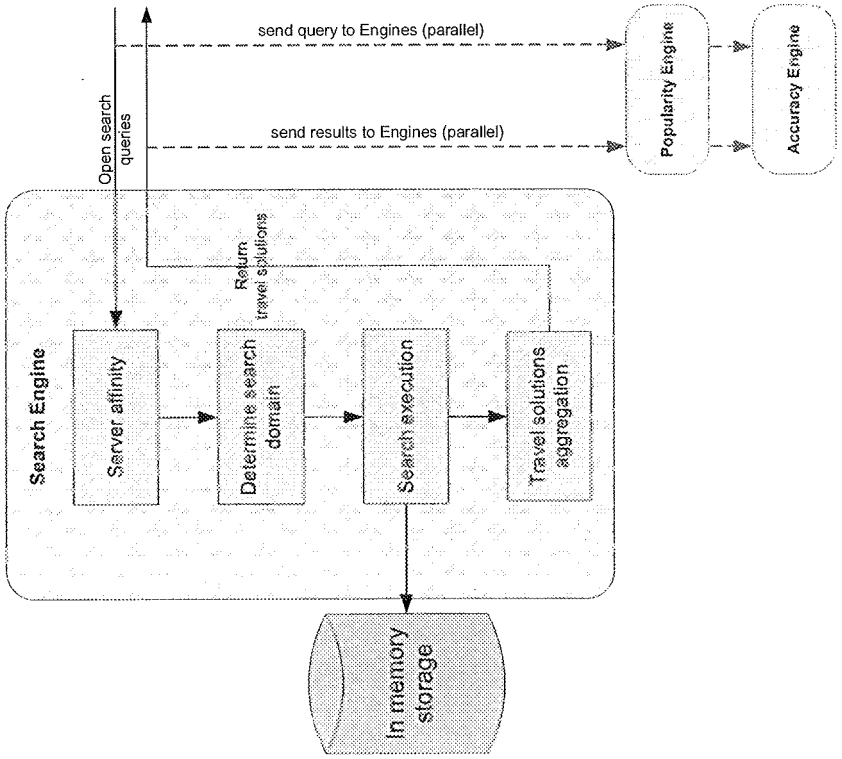

send query to Engines (parallel)
send results to Engines (parallel)
Popularity Engine
Accuracy Engine
Open search queries
Return travel solutions
Search Engine
Server affinity
Determine search domain
Search execution
Travel solutions aggregation
In memory storage

Fig. 14

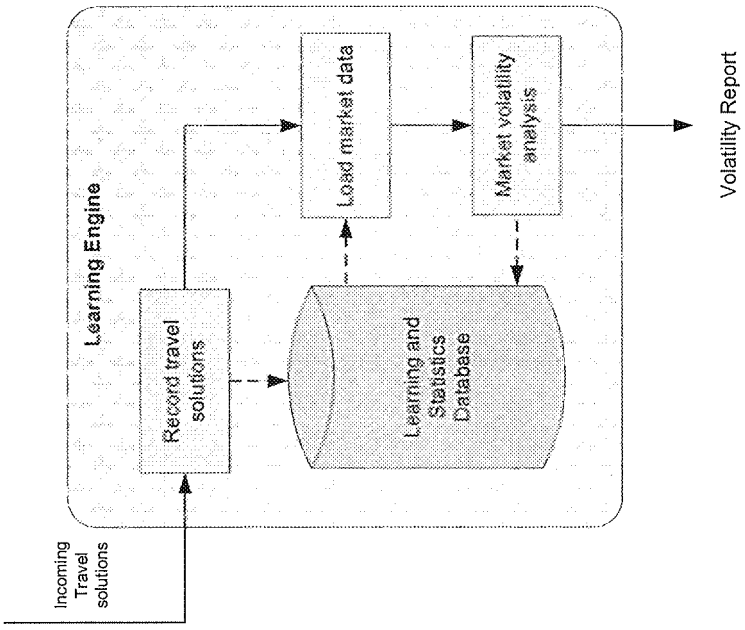

Learning Engine
Record travel solutions
Load market data
Learning and Statistics Database
Market volatility analysis
Volatility Report
Incoming Travel solutions

Fig. 15

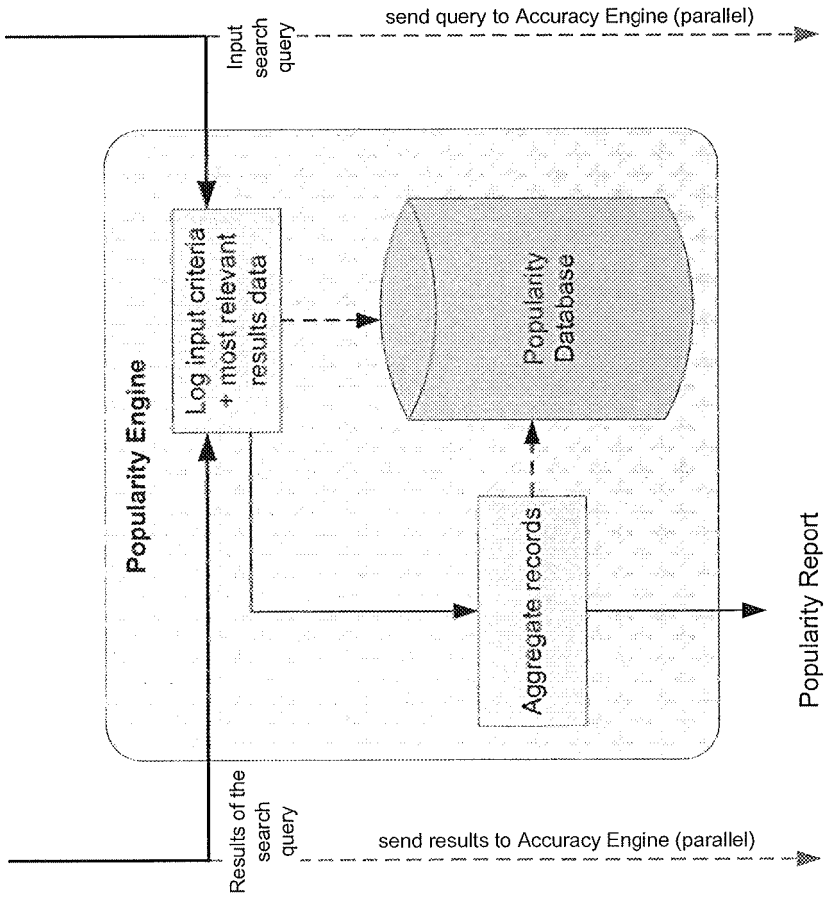

Input search query
send query to Accuracy Engine (parallel)
Popularity Engine
Log input criteria + most relevant results data
Popularity Database
Aggregate records
Popularity Report
Results of the search query
send results to Accuracy Engine (parallel)

Fig. 16

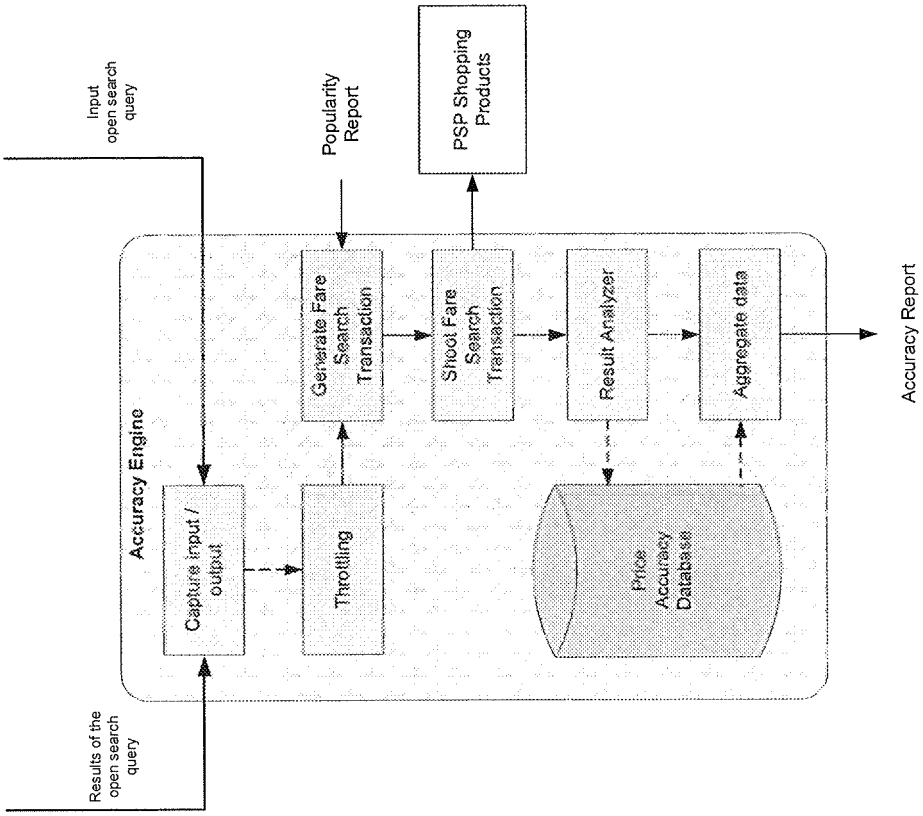

Input open search query
Popularity Report
PSP Shopping Products
Accuracy Engine
Generate Fare Search Transaction
Shoot Fare Search Transaction
Result Analyzer
Aggregate data
Accuracy Report
Capture input / output
Throttling
Price Accuracy Database
Results of the open search query

Fig. 17

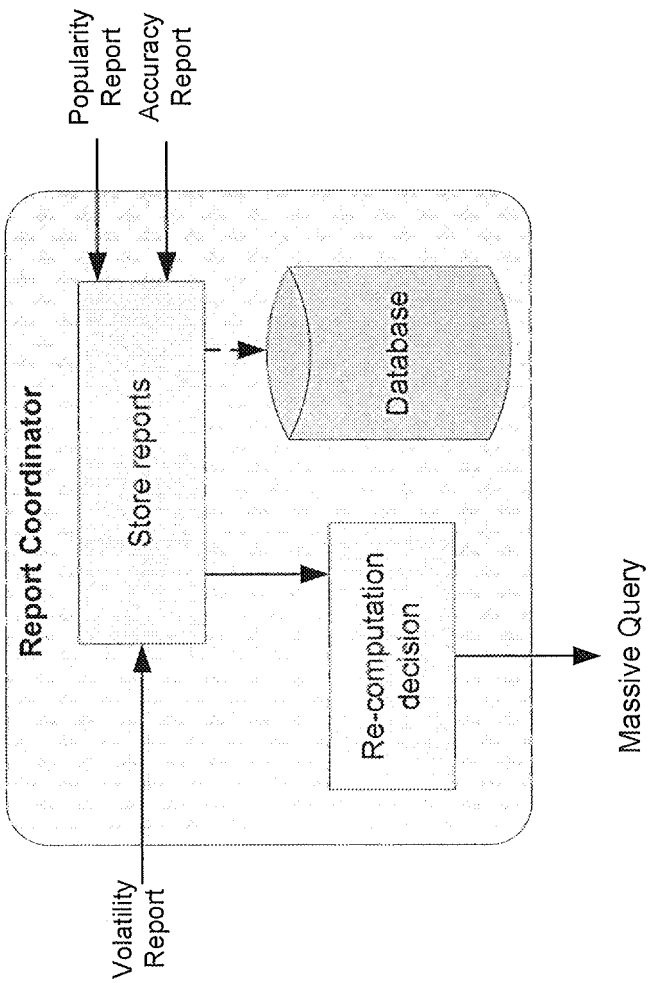

Popularity Report
Accuracy Report
Report Coordinator
Store reports
Database
Re-computation decision
Massive Query
Volatility Report

Fig. 18

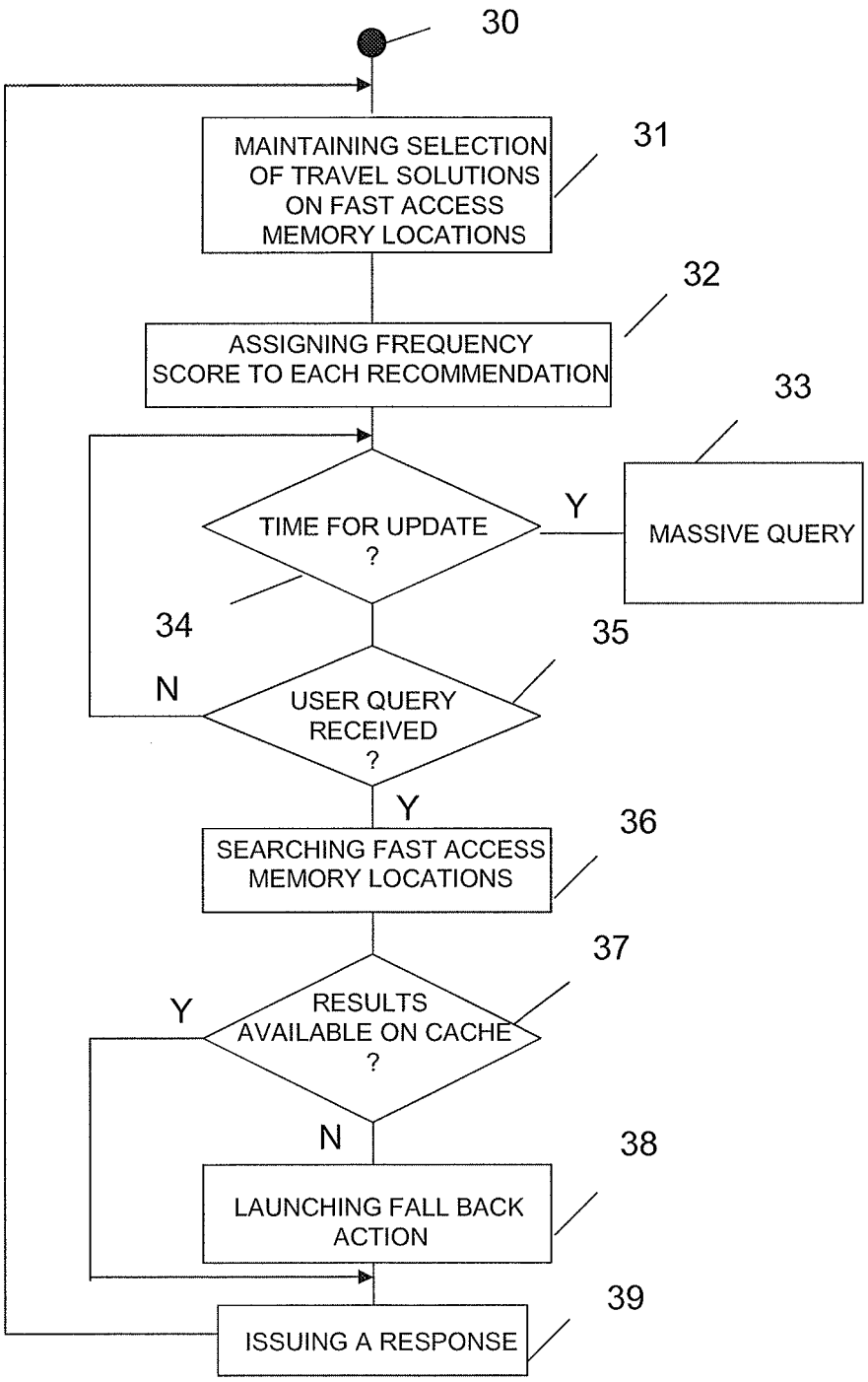

30
MAINTAINING SELECTION OF TRAVEL SOLUTIONS ON FAST ACCESS MEMORY LOCATIONS
31
ASSIGNING FREQUENCY SCORE TO EACH RECOMMENDATION
32
TIME FOR UPDATE ?
Y
MASSIVE QUERY
33
34
N
USER QUERY RECEIVED ?
35
Y
SEARCHING FAST ACCESS MEMORY LOCATIONS
36
RESULTS AVAILABLE ON CACHE ?
37
Y
N
LAUNCHING FALL BACK ACTION
38
ISSUING A RESPONSE
39

Fig. 19

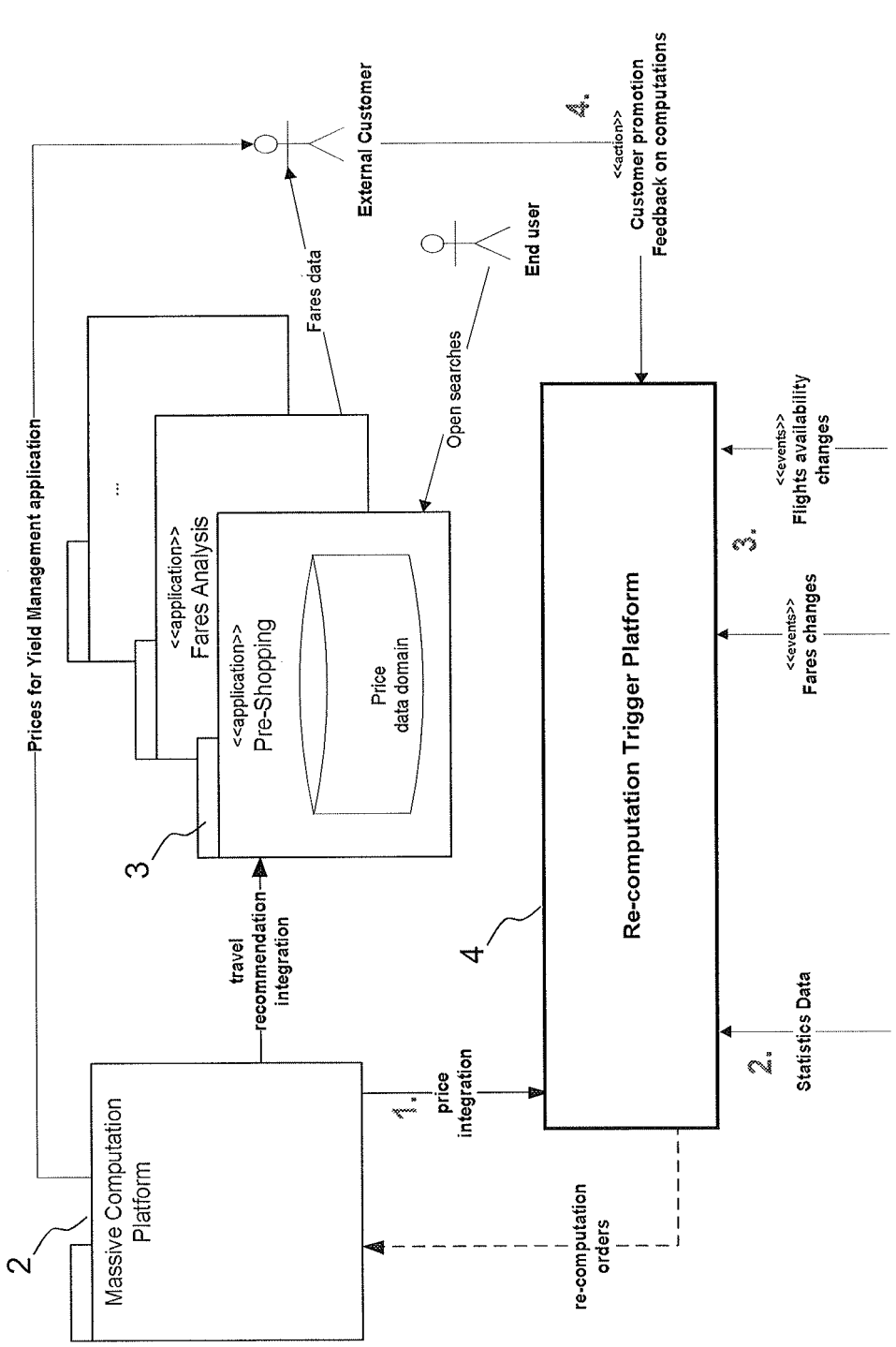

1
Prices for Yield Management application
External Customer
4.
<<action>>
Customer promotion
Feedback on computations
Fares data
End user
Open searches
...
<<application>>
Fares Analysis
<<application>>
Pre-Shopping
Price
data domain
3
travel
recommendation
integration
Massive Computation
Platform
2
1.
price
integration
4
Re-computation Trigger Platform
3.
<<events>>
Flights availability
changes
<<events>>
Fares changes
2.
Statistics Data
re-computation
orders

Fig. 20

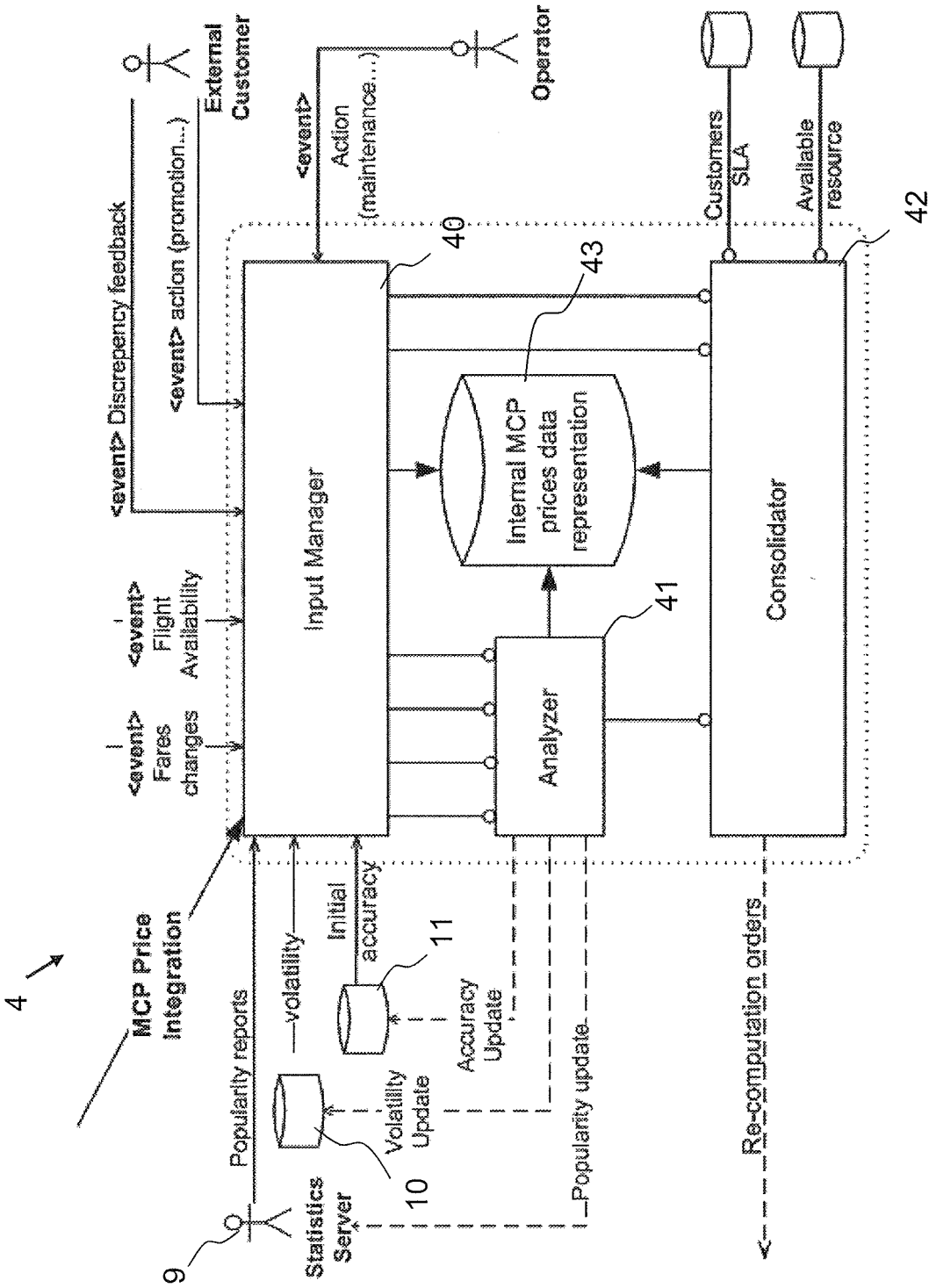

4
MCP Price Integration
9
Statistics Server
10
11
Popularity reports
volatility
Initial accuracy
Volatility Update
Accuracy Update
Popularity update
Re-computation orders
<event> Discrepency feedback
<event> action (promotion...)
External Customer
<event> Fares changes
<event> Flight Availability
Input Manager
40
<event> Action (maintenance...)
Operator
Internal MCP prices data representation
43
Analyzer
41
Consolidator
Customers SLA
Available resource
42

Fig. 21

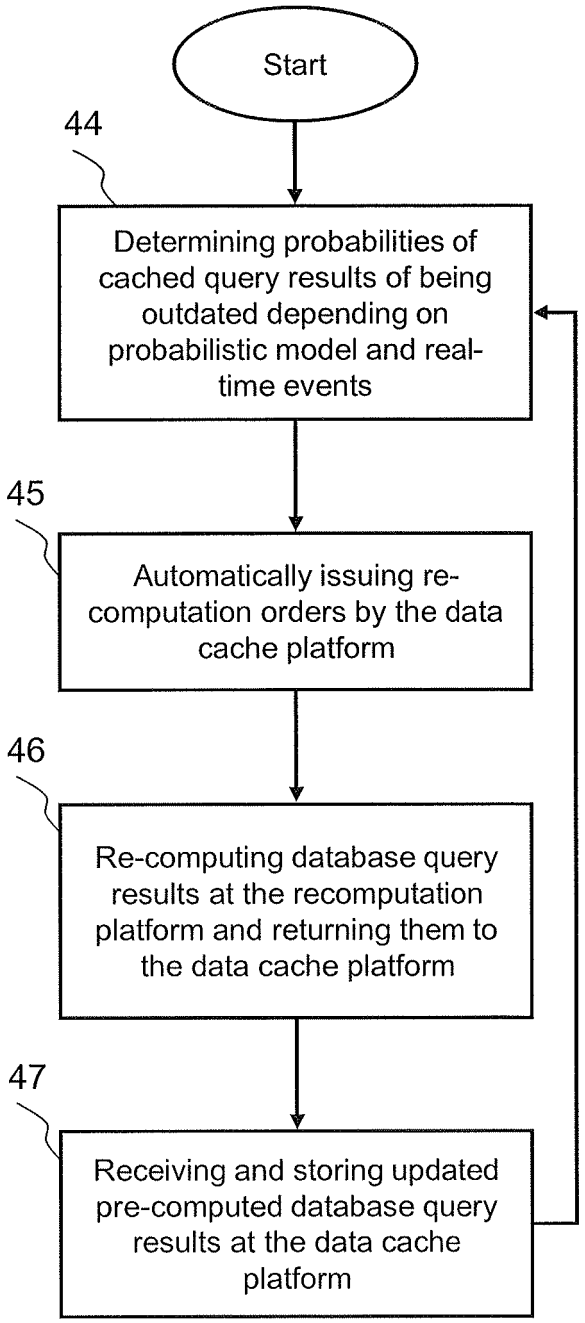

Start
44
Determining probabilities of cached query results of being outdated depending on probabilistic model and real-time events
45
Automatically issuing re-computation orders by the data cache platform
46
Re-computing database query results at the recomputation platform and returning them to the data cache platform
47
Receiving and storing updated pre-computed database query results at the data cache platform

Fig. 22

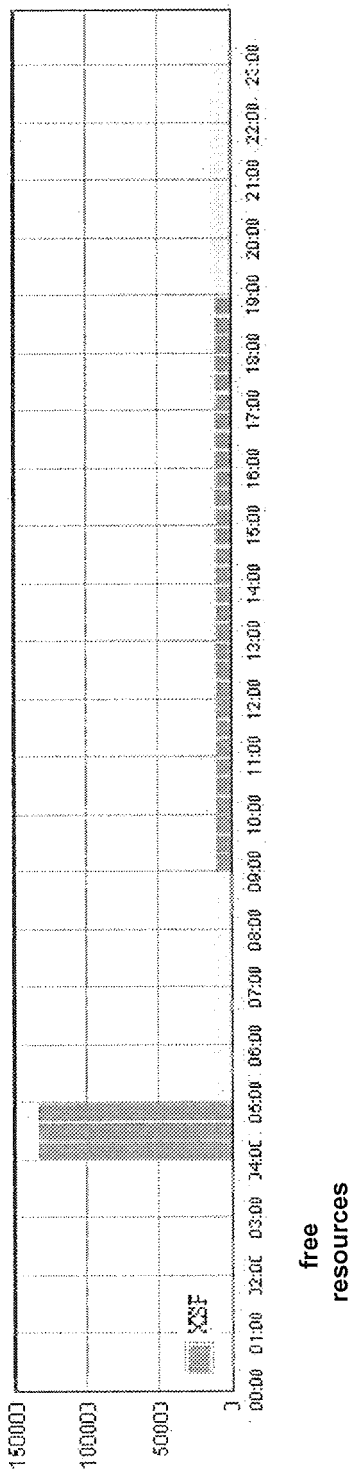

150000
100000
50000
0
XSF
00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
free
resources

Fig. 23

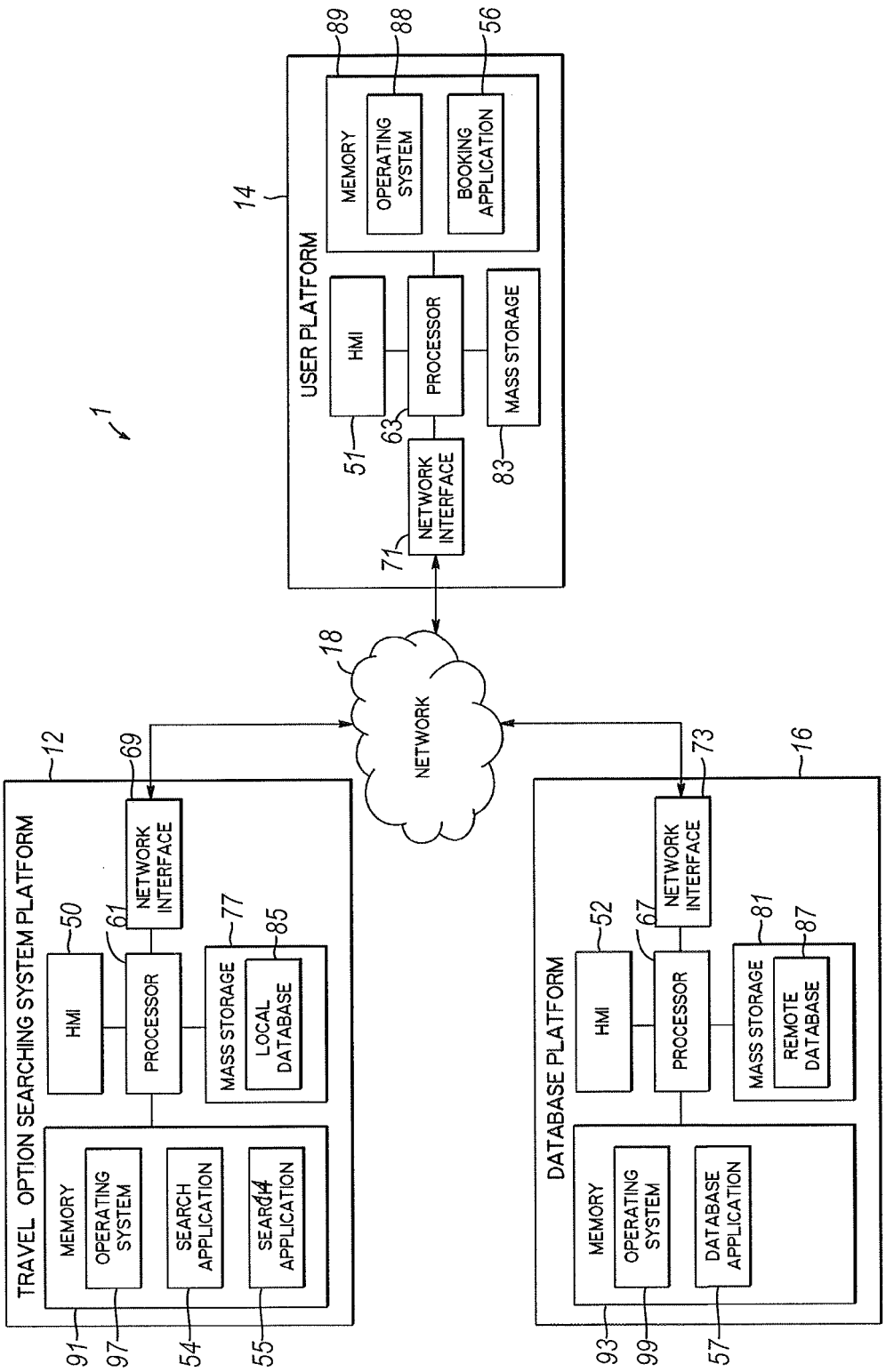

1
14
USER PLATFORM
MEMORY
OPERATING SYSTEM
BOOKING APPLICATION
HMI
PROCESSOR
MASS STORAGE
NETWORK INTERFACE
89
88
56
51
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69
TRAVEL OPTION SEARCHING SYSTEM PLATFORM
HMI
PROCESSOR
NETWORK INTERFACE
MASS STORAGE
LOCAL DATABASE
MEMORY
OPERATING SYSTEM
SEARCH APPLICATION
SEARCH APPLICATION
50
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73
DATABASE PLATFORM
HMI
PROCESSOR
NETWORK INTERFACE
MASS STORAGE
REMOTE DATABASE
MEMORY
OPERATING SYSTEM
DATABASE APPLICATION
52
67
81
87
93
99
57

Fig. 24

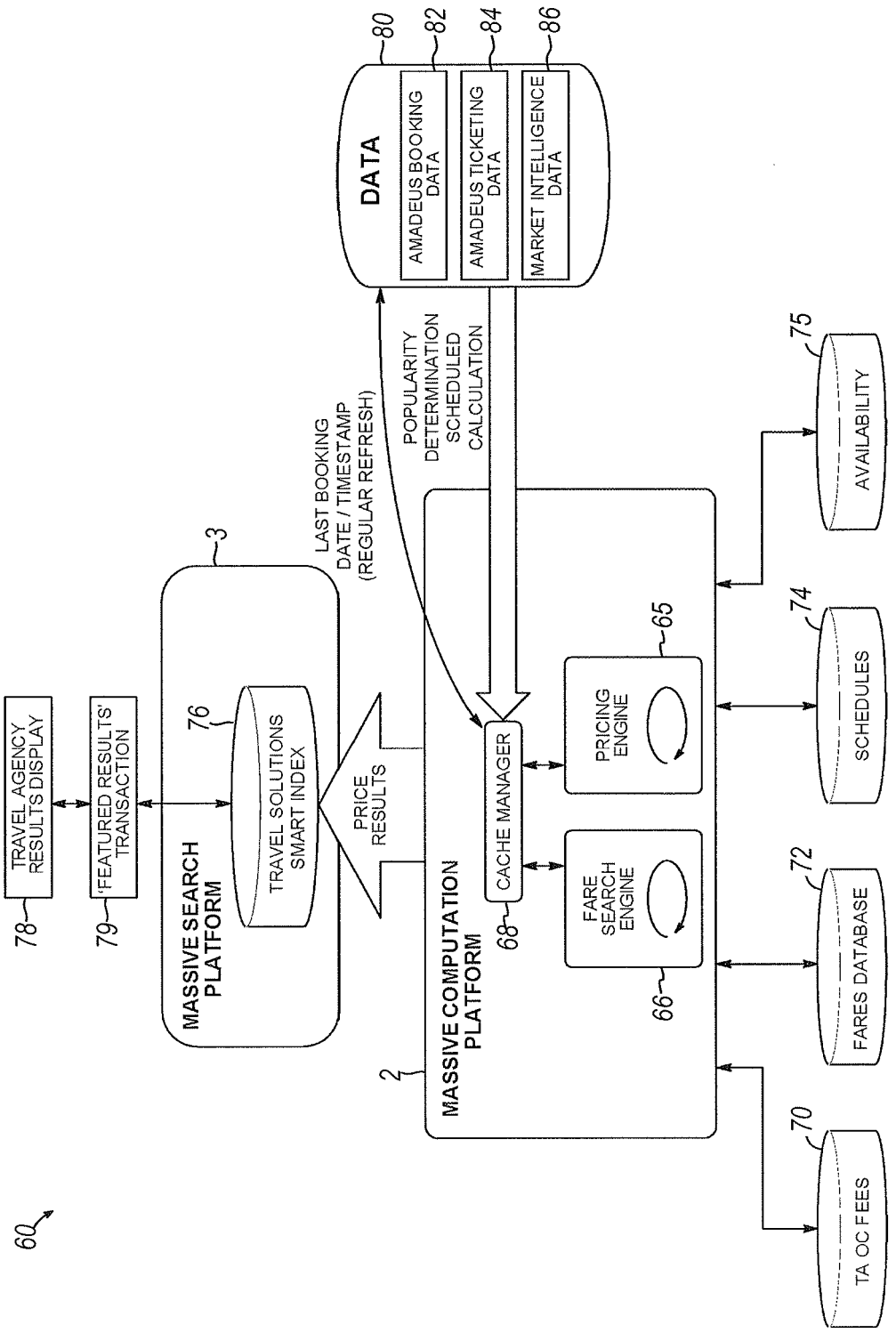

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78
TRAVEL AGENCY RESULTS DISPLAY
79
FEATURED RESULTS' TRANSACTION
MASSIVE SEARCH PLATFORM
3
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2
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65
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66
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80
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82
AMADEUS TICKETING DATA
84
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86
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72
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Fig. 25

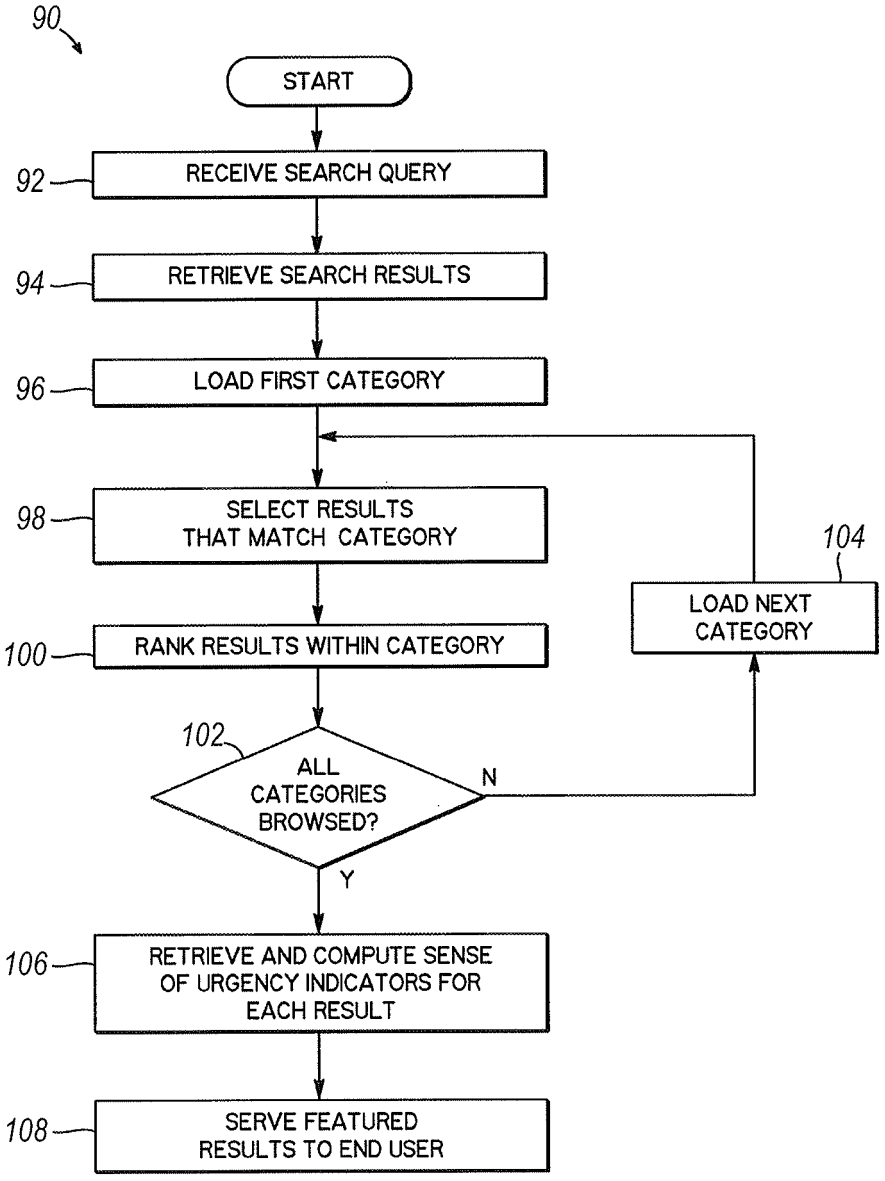

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92
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94
RETRIEVE SEARCH RESULTS
96
LOAD FIRST CATEGORY
98
SELECT RESULTS THAT MATCH CATEGORY
100
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102
ALL CATEGORIES BROWSED?
N
Y
104
LOAD NEXT CATEGORY
106
RETRIEVE AND COMPUTE SENSE OF URGENCY INDICATORS FOR EACH RESULT
108
SERVE FEATURED RESULTS TO END USER

Fig. 26

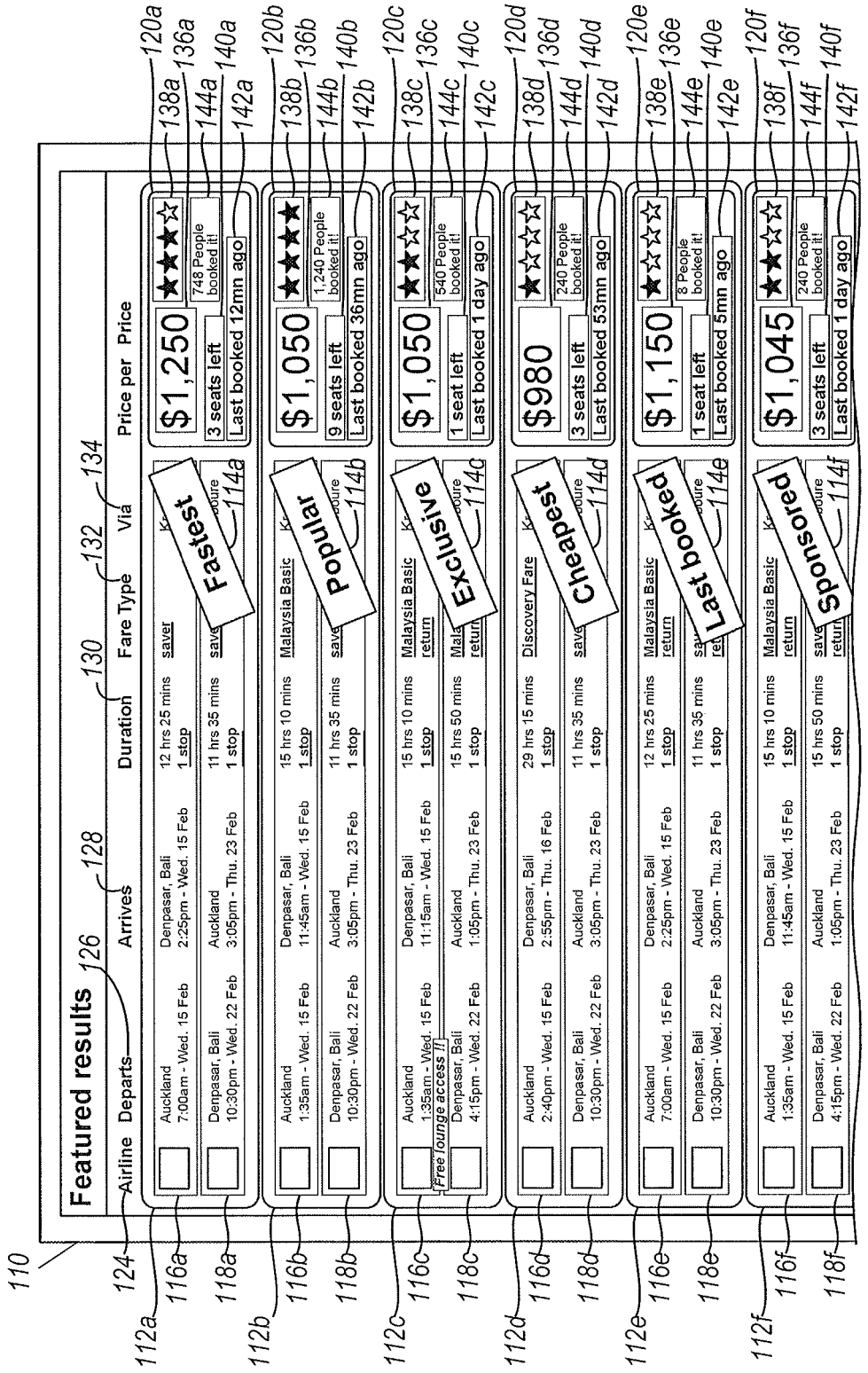

110
Featured results
126
128
130
132
134
Airline
Departs
Arrives
Duration
Fare Type
Via
Price per
Price
Fastest
Popular
Exclusive
Cheapest
Last booked
Sponsored
$1,250
$1,050
$1,050
$980
$1,150
$1,045
748 People booked it!
1,240 People booked it!
540 People booked it!
240 People booked it!
8 People booked it!
240 People booked it!
3 seats left
9 seats left
1 seat left
3 seats left
1 seat left
3 seats left
Last booked 12mn ago
Last booked 36mn ago
Last booked 1 day ago
Last booked 53mn ago
Last booked 5mn ago
Last booked 1 day ago
Free lounge access !!!
112a
112b
112c
112d
112e
112f
116a
116b
116c
116d
116e
116f
118a
118b
118c
118d
118e
118f
120a
120b
120c
120d
120e
120f
136a
136b
136c
136d
136e
136f
138a
138b
138c
138d
138e
138f
140a
140b
140c
140d
140e
140f
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142b
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142d
142e
142f
144a
144b
144c
144d
144e
144f

Fig. 27

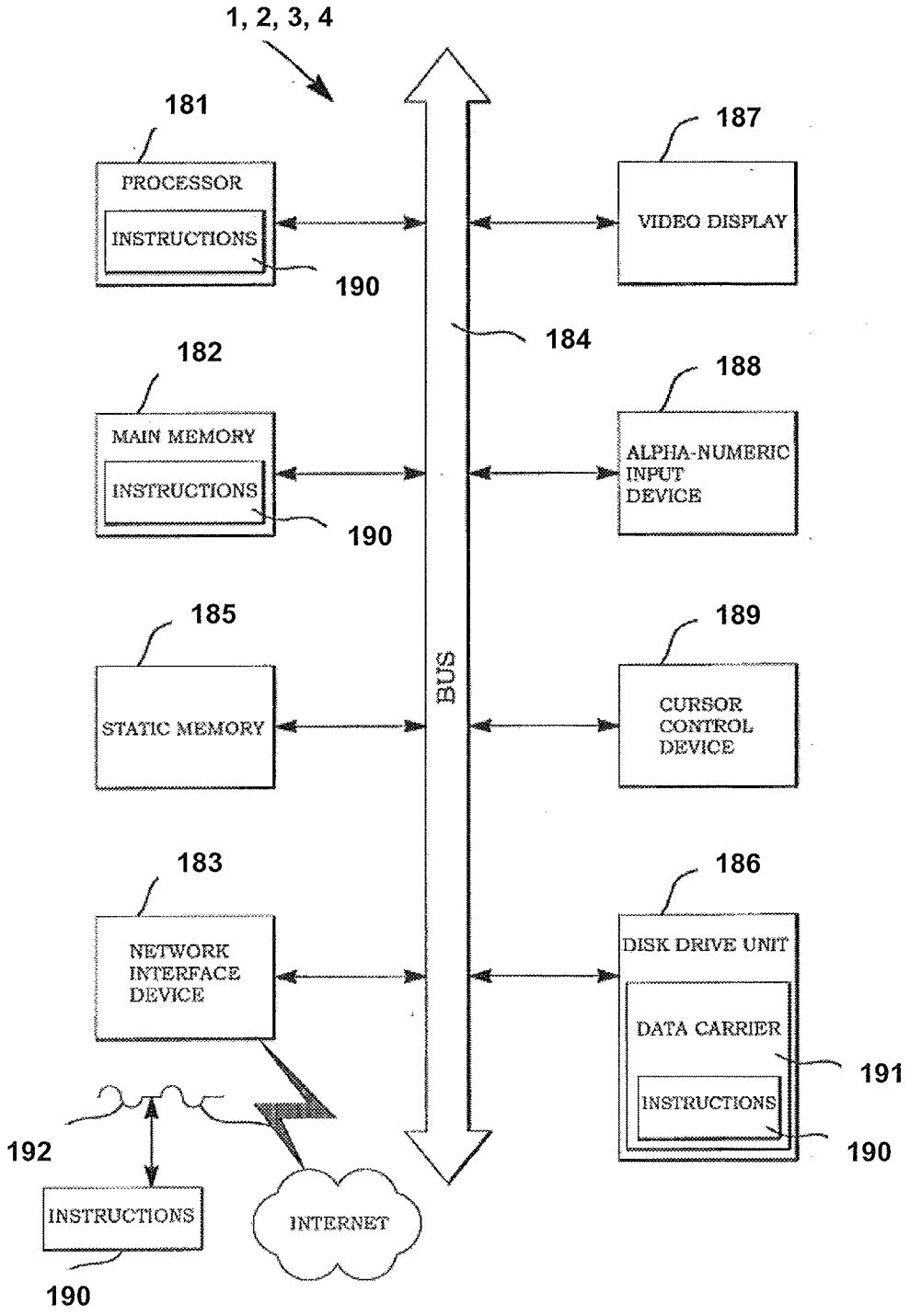

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DISK DRIVE UNIT
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Fig. 28