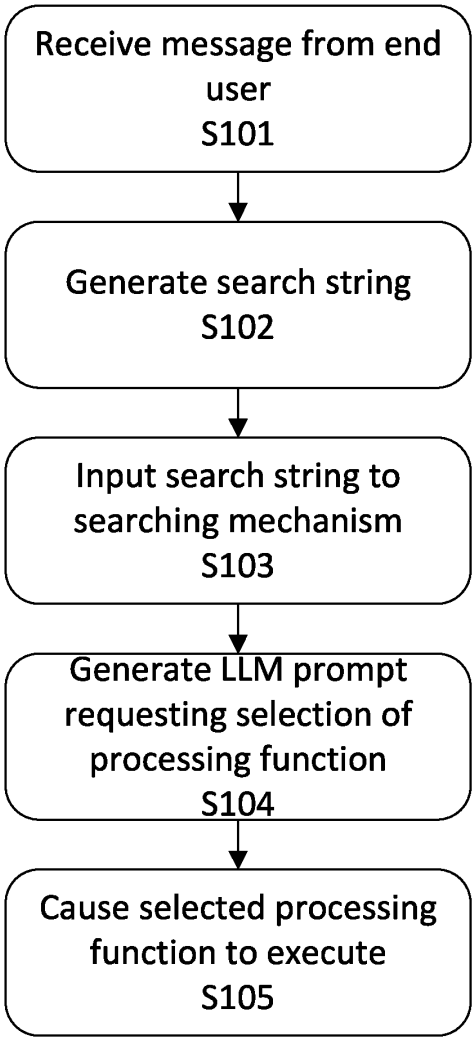

Receive message from end user
S101
Generate search string
S102
Input search string to searching mechanism
S103
Generate LLM prompt requesting selection of processing function
S104
Cause selected processing function to execute
S105

Figure 1A

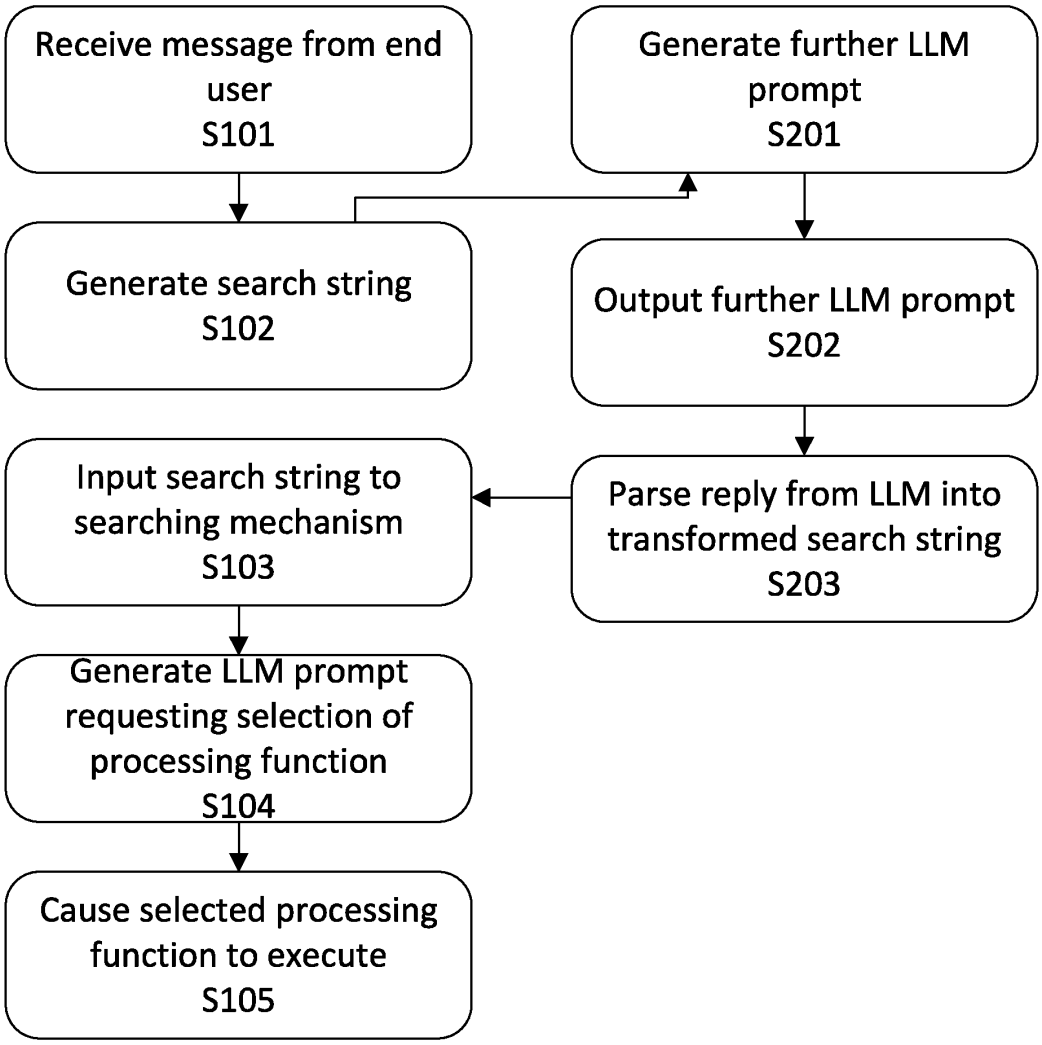

Receive message from end user
S101
Generate search string
S102
Input search string to searching mechanism
S103
Generate LLM prompt requesting selection of processing function
S104
Cause selected processing function to execute
S105
Generate further LLM prompt
S201
Output further LLM prompt
S202
Parse reply from LLM into transformed search string
S203

Figure 1B

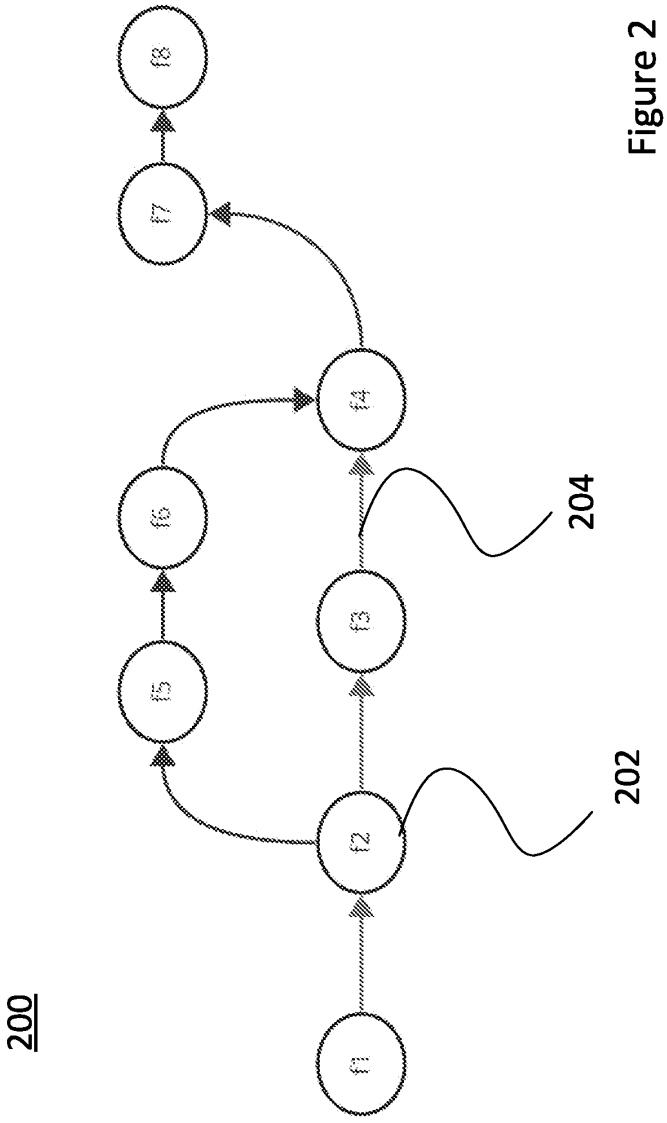


Figure 2

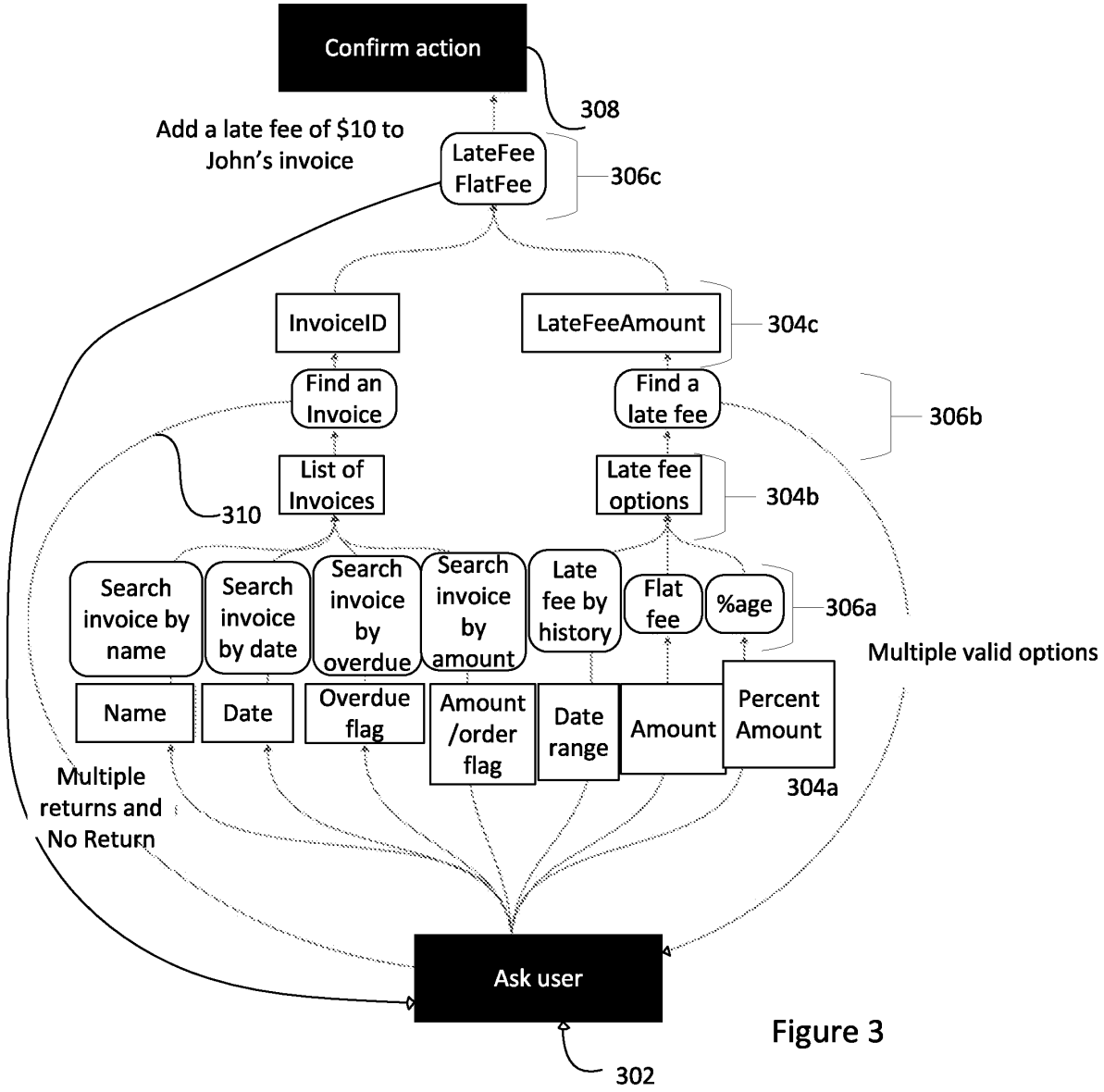

Confirm action
308
Add a late fee of $10 to John's invoice
LateFee FlatFee
306c
InvoiceID
LateFeeAmount
304c
Find an Invoice
Find a late fee
306b
List of Invoices
310
Late fee options
304b
Search invoice by name
Search invoice by date
Search invoice by overdue
Search invoice by amount
Late fee by history
Flat fee
%age
306a
Multiple valid options
Name
Date
Overdue flag
Amount /order flag
Date range
Amount
Percent Amount
304a
Multiple returns and No Return
Ask user
302

Figure 3

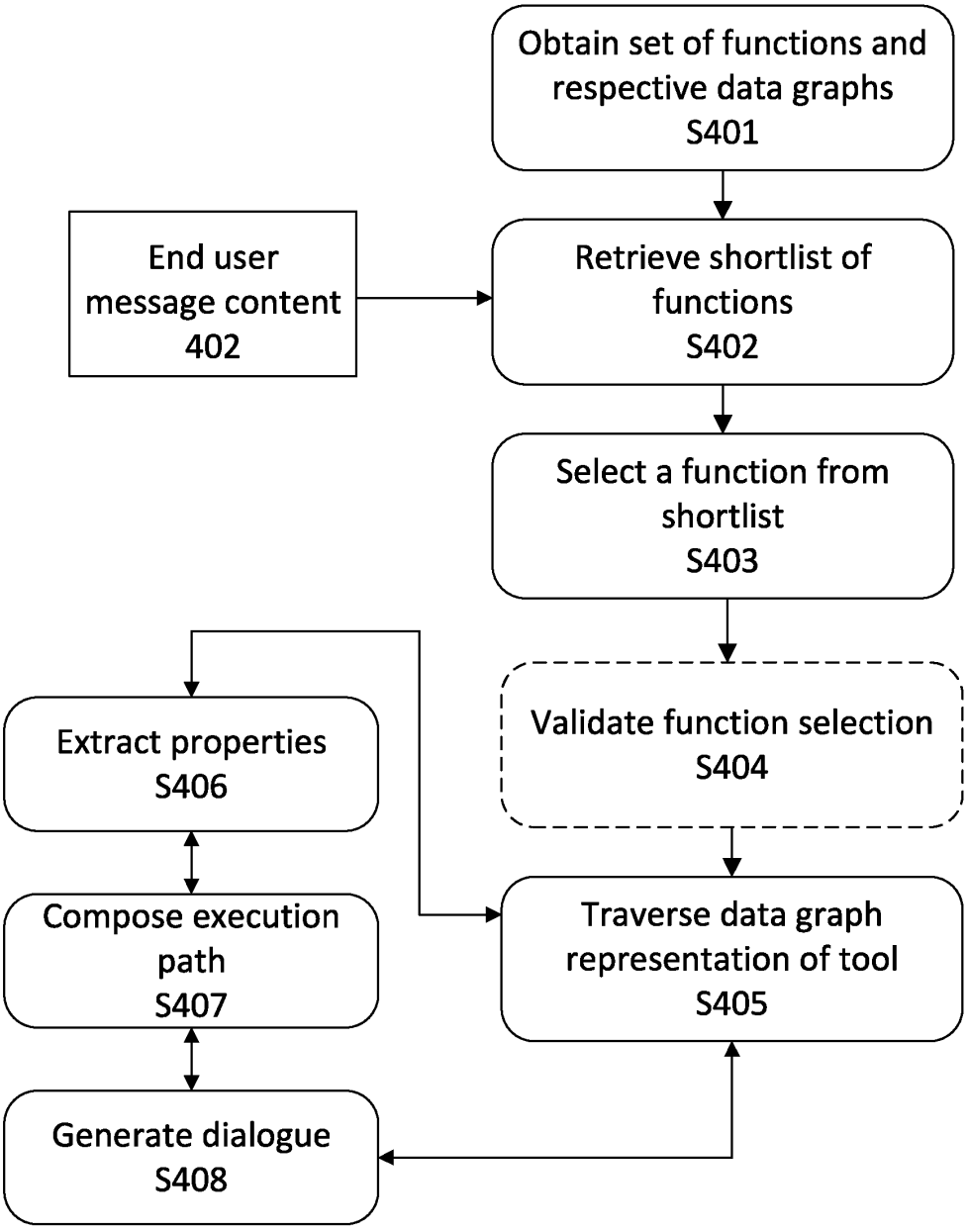

Obtain set of functions and respective data graphs S401
End user message content 402
Retrieve shortlist of functions S402
Select a function from shortlist S403
Validate function selection S404
Extract properties S406
Compose execution path S407
Traverse data graph representation of tool S405
Generate dialogue S408

Figure 4

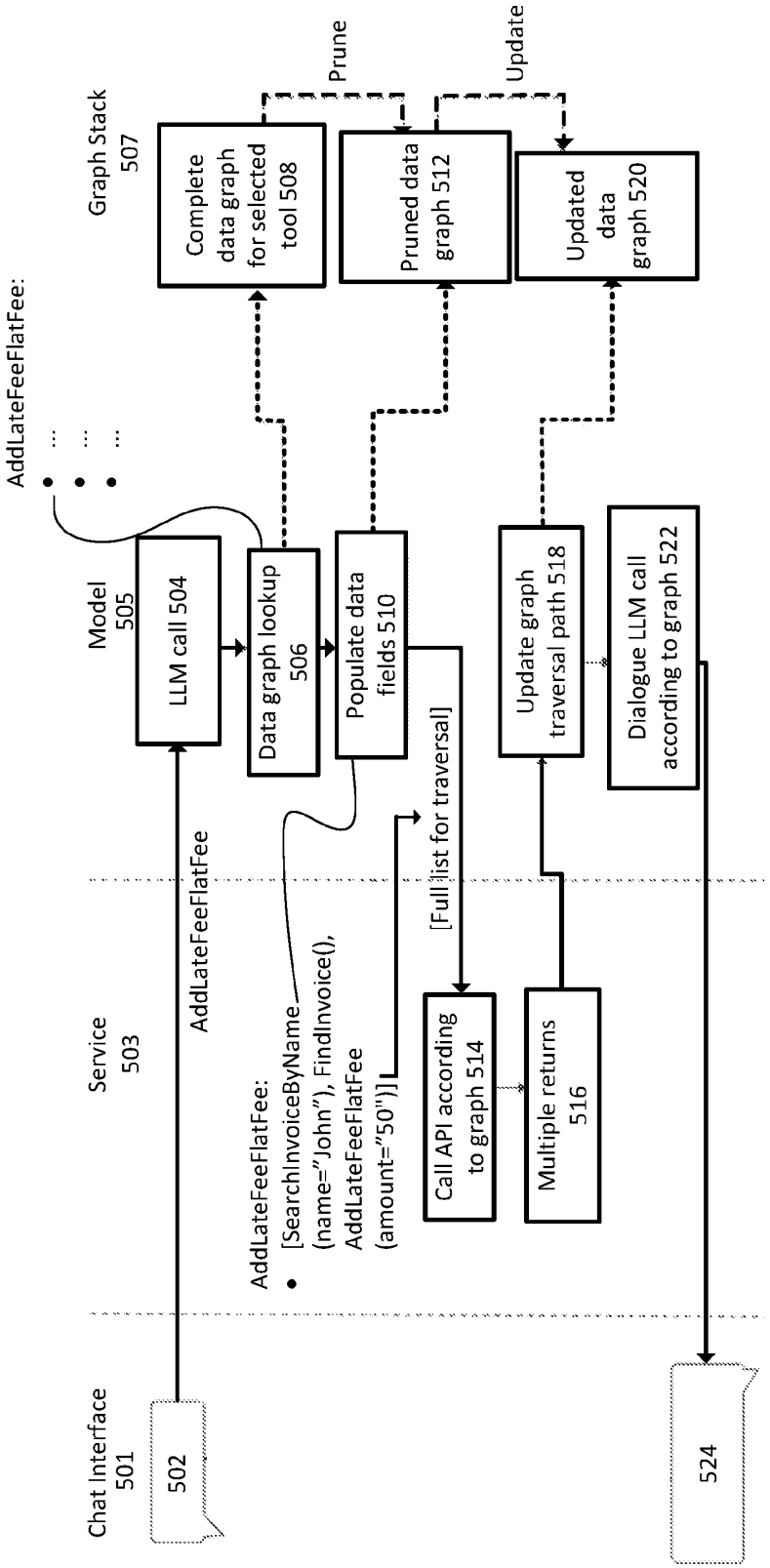

Chat Interface 501
502
Service 503
AddLateFeeFlatFee
Model 505
LLM call 504
Data graph lookup 506
Populate data fields 510
Graph Stack 507
Complete data graph for selected tool 508
Prune
Pruned data graph 512
Update
Updated data graph 520
AddLateFeeFlatFee:
...
AddLateFeeFlatFee:
[SearchInvoiceByName (name="John"), FindInvoice(), AddLateFeeFlatFee (amount="50")]
[Full list for traversal]
Call API according to graph 514
Multiple returns 516
Update graph traversal path 518
Dialogue LLM call according to graph 522
524

Figure 5A

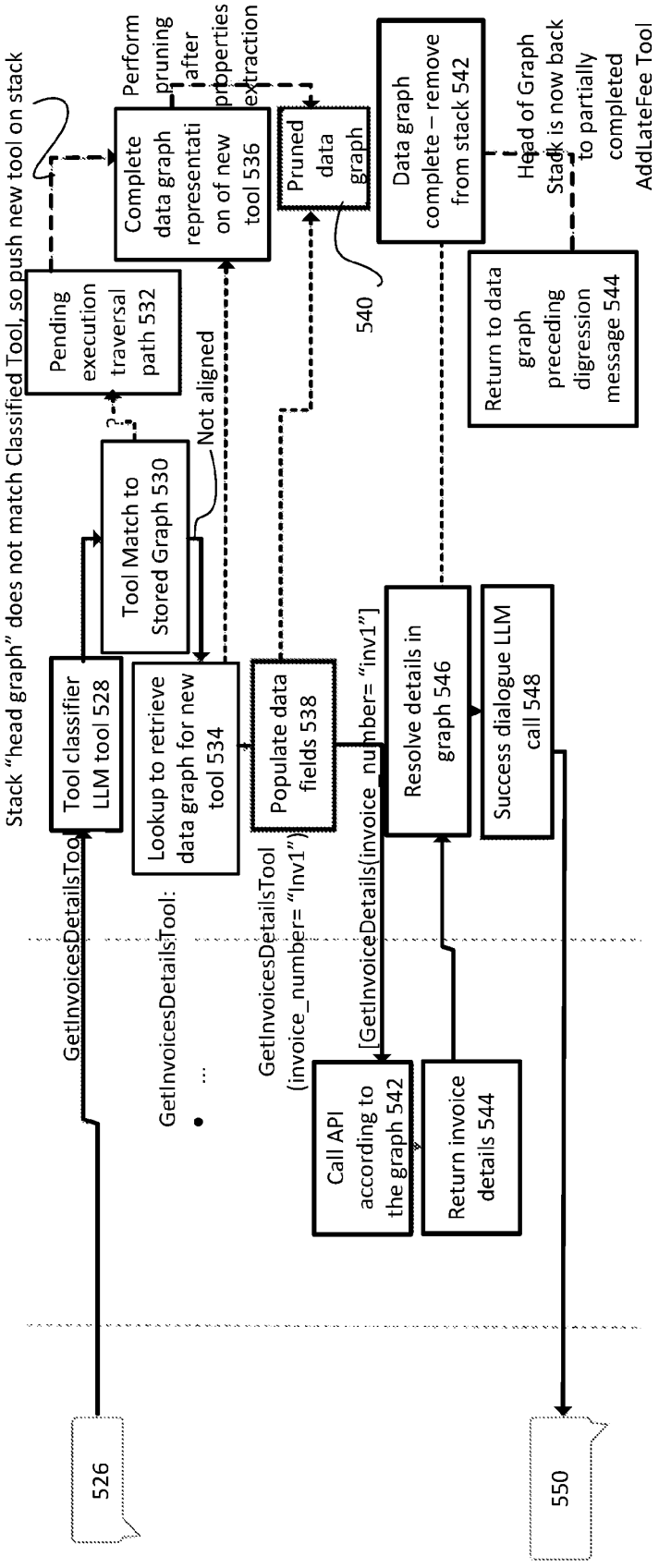

Chat Interface 501
Service 503
Model 505
Graph Stack 507
526
550
GetInvoicesDetailsTool
GetInvoicesDetailsTool:
• ...
Tool classifier LLM tool 528
Lookup to retrieve data graph for new tool 534
Tool Match to Stored Graph 530
Not aligned
Pending execution traversal path 532
Stack "head graph" does not match Classified Tool, so push new tool on stack
Complete data graph representation of new tool 536
Perform pruning after properties extraction
Pruned data graph
540
GetInvoicesDetailsTool (invoice_number= "inv1")
Populate data fields 538
[GetInvoiceDetails(invoice_number= "inv1"]
Call API according to the graph 542
Return invoice details 544
Resolve details in graph 546
Success dialogue LLM call 548
Data graph complete – remove from stack 542
Head of Graph Stack is now back to partially completed AddLateFee Tool
Return to data graph preceding digression message 544

Figure 5B

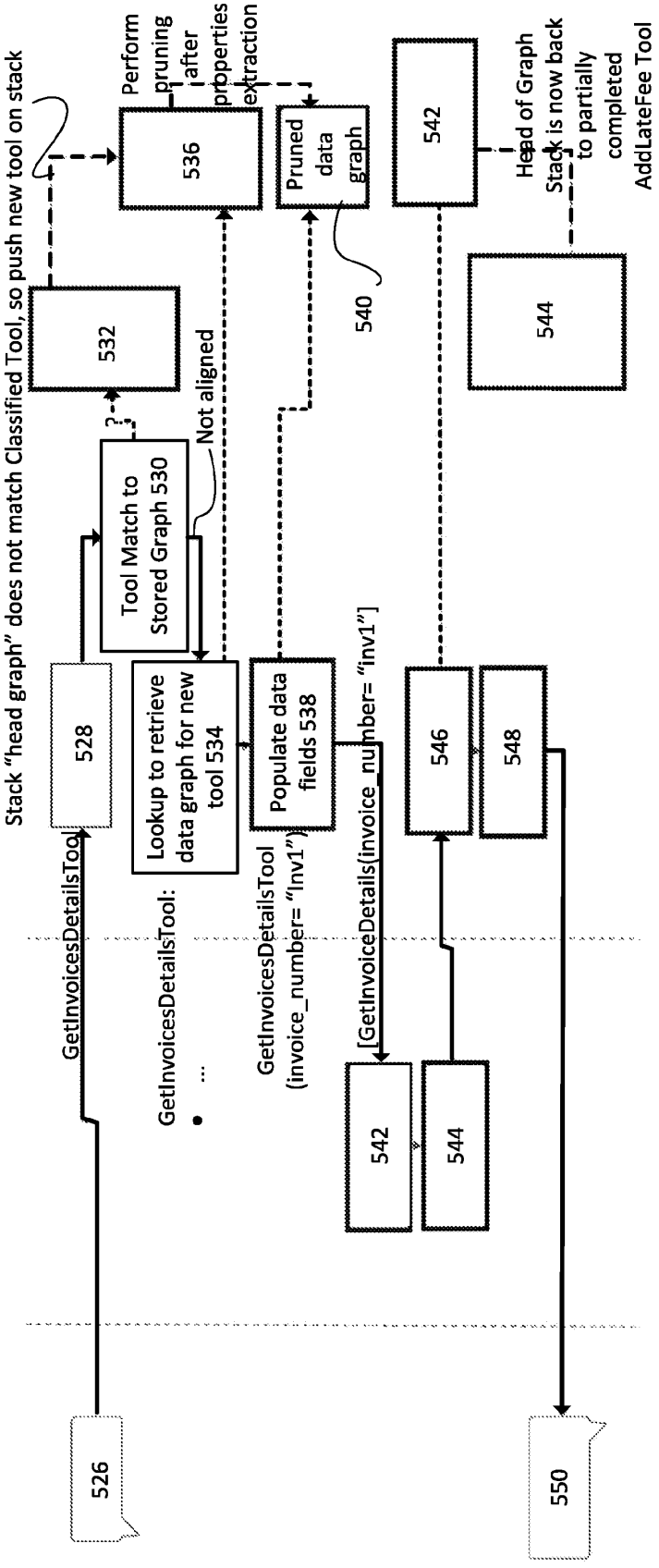

Stack "head graph" does not match Classified Tool, so push new tool on stack
Perform pruning after properties extraction
536
Pruned data graph
542
Head of Graph Stack is now back to partially completed AddLateFee Tool
532
540
544
Graph Stack 507
Not aligned
Tool Match to Stored Graph 530
528
Lookup to retrieve data graph for new tool 534
Populate data fields 538
546
548
Model 505
GetInvoicesDetailsTool
GetInvoicesDetailsTool: • ...
GetInvoicesDetailsTool (invoice_number= "inv1")
[GetInvoiceDetails(invoice_number= "inv1"]
542
544
Service 503
526
550
Chat Interface 501

Figure 5B

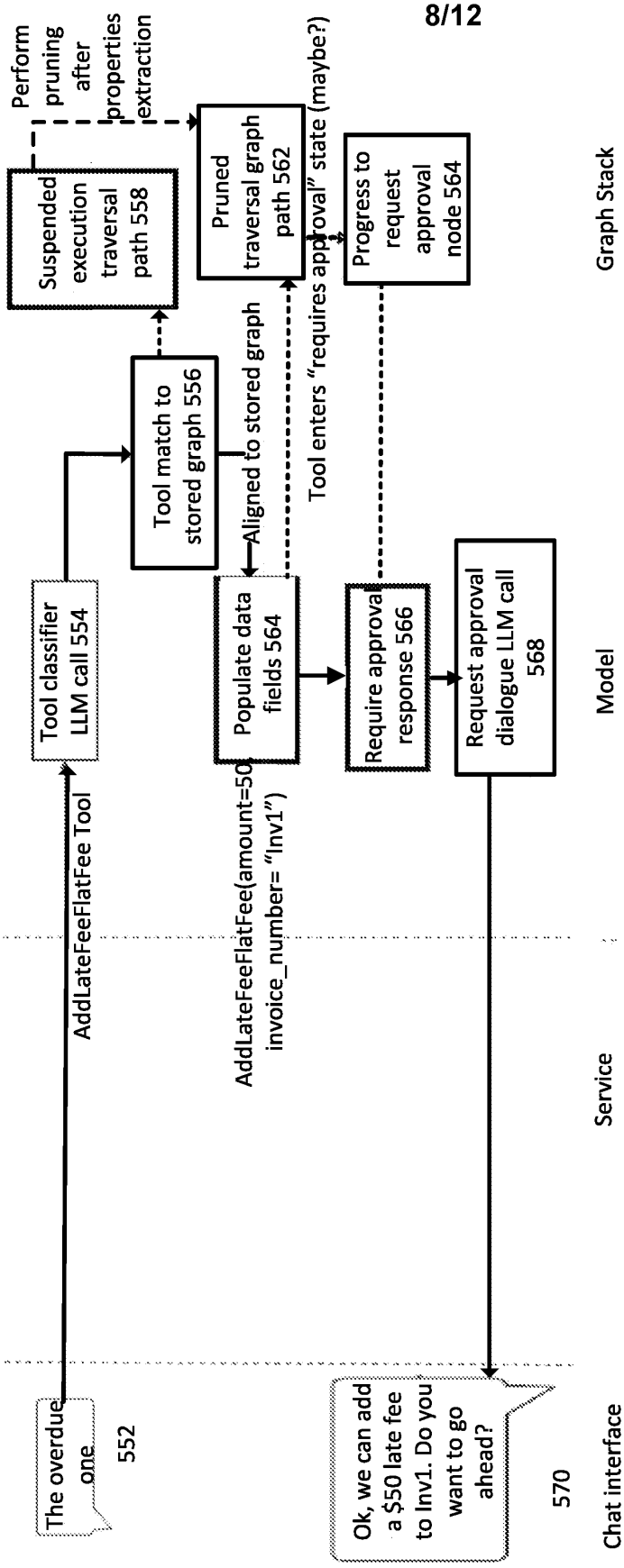

Perform pruning after properties extraction
Suspended execution traversal path 558
Pruned traversal graph path 562
Progress to request approval node 564
Graph Stack
Tool match to stored graph 556
Aligned to stored graph
Tool enters "requires approval" state (maybe?)
Tool classifier LLM call 554
Populate data fields 564
Require approval response 566
Request approval dialogue LLM call 568
Model
AddLateFeeFlatFee Tool
AddLateFeeFlatFee(amount=50, invoice_number= "Inv1")
Service
The overdue one
552
Ok, we can add a $50 late fee to Inv1. Do you want to go ahead?
570
Chat interface

Figure 5C

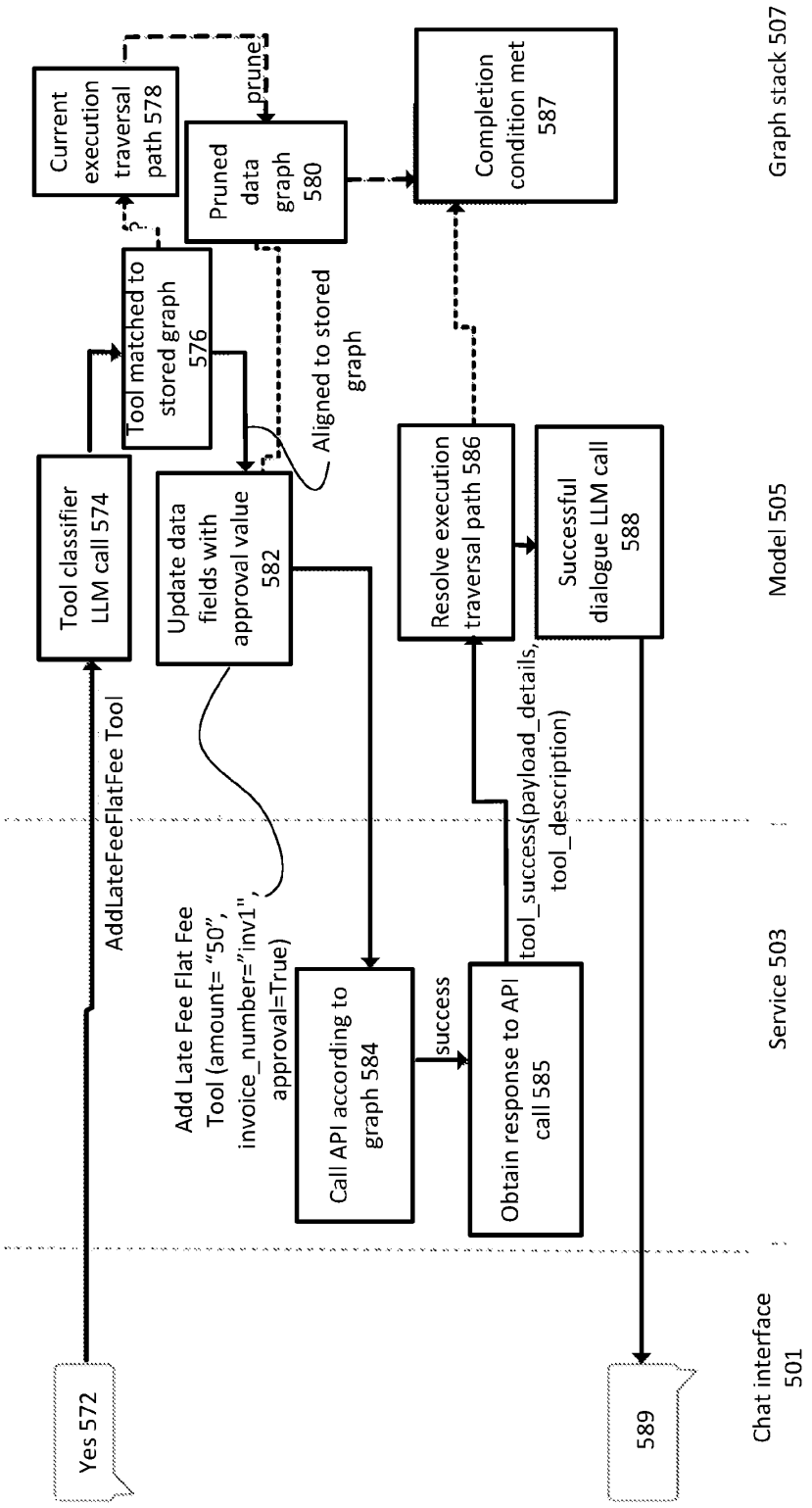

Graph stack 507
Model 505
Service 503
Chat interface 501
Current execution traversal path 578
prune
Pruned data graph 580
Completion condition met 587
Tool matched to stored graph 576
Aligned to stored graph
Tool classifier LLM call 574
Update data fields with approval value 582
Resolve execution traversal path 586
Successful dialogue LLM call 588
AddLateFeeFlatFee Tool
Add Late Fee Flat Fee Tool (amount= "50", invoice_number="inv1", approval=True)
Call API according to graph 584
success
Obtain response to API call 585
tool_success(payload_details, tool_description)
Yes 572
589

Figure 5D

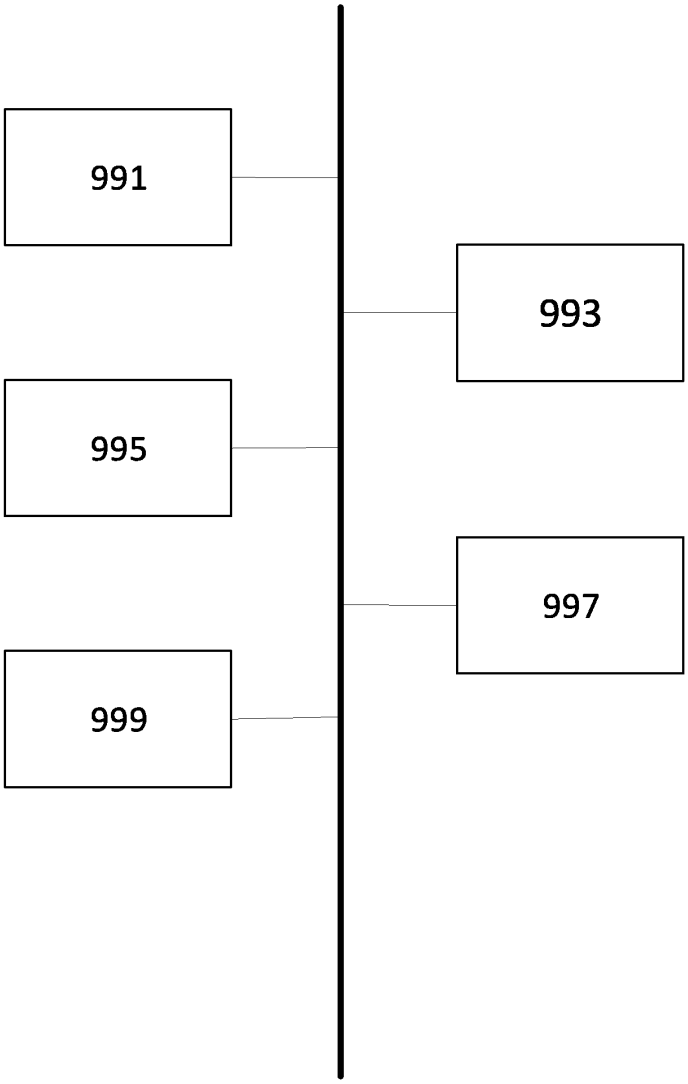


Figure 6

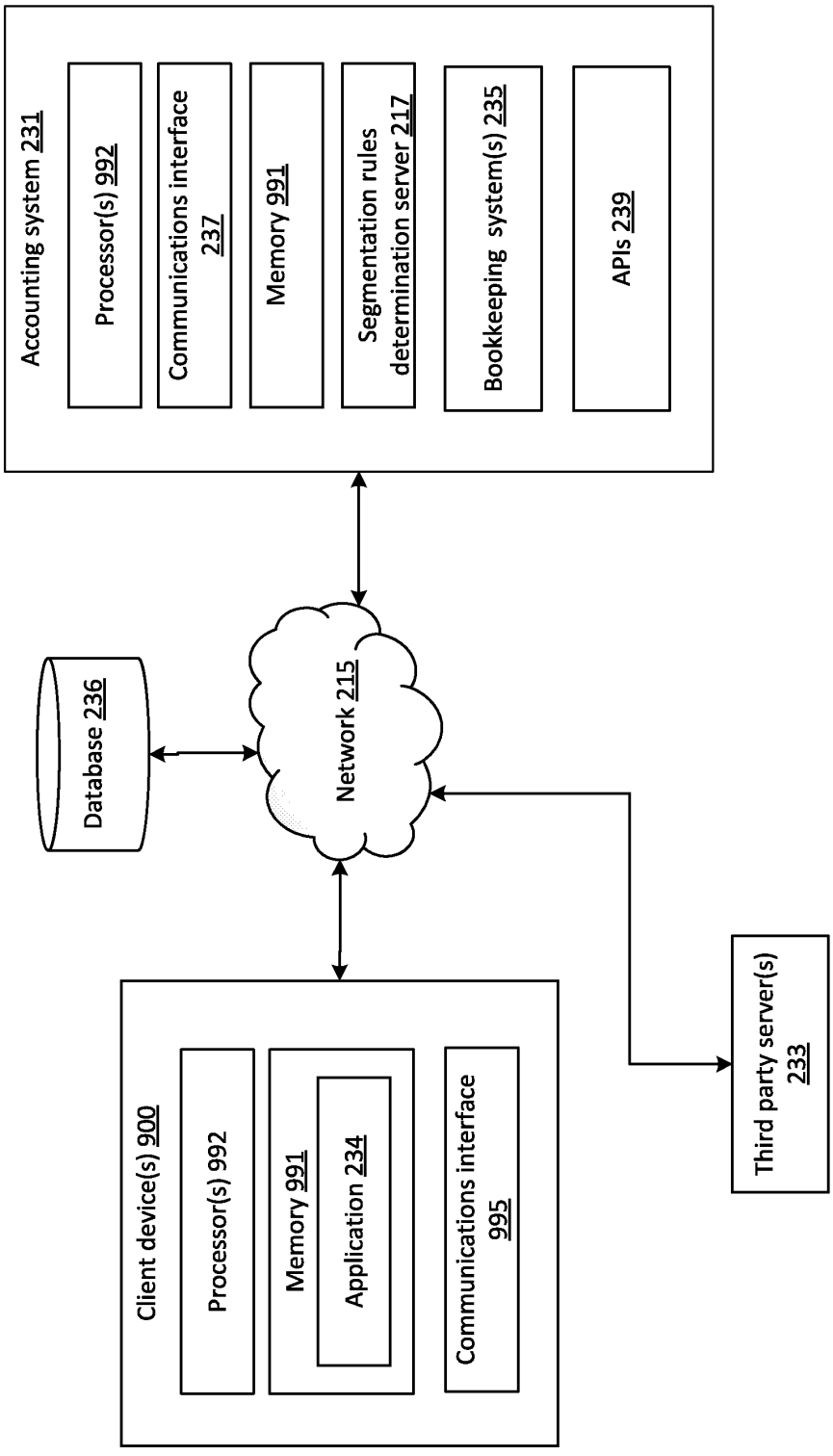

Accounting system 231
Processor(s) 992
Communications interface 237
Memory 991
Segmentation rules determination server 217
Bookkeeping system(s) 235
APIs 239
Network 215
Database 236
Client device(s) 900
Processor(s) 992
Memory 991
Application 234
Communications interface 995
Third party server(s) 233

Fig. 7

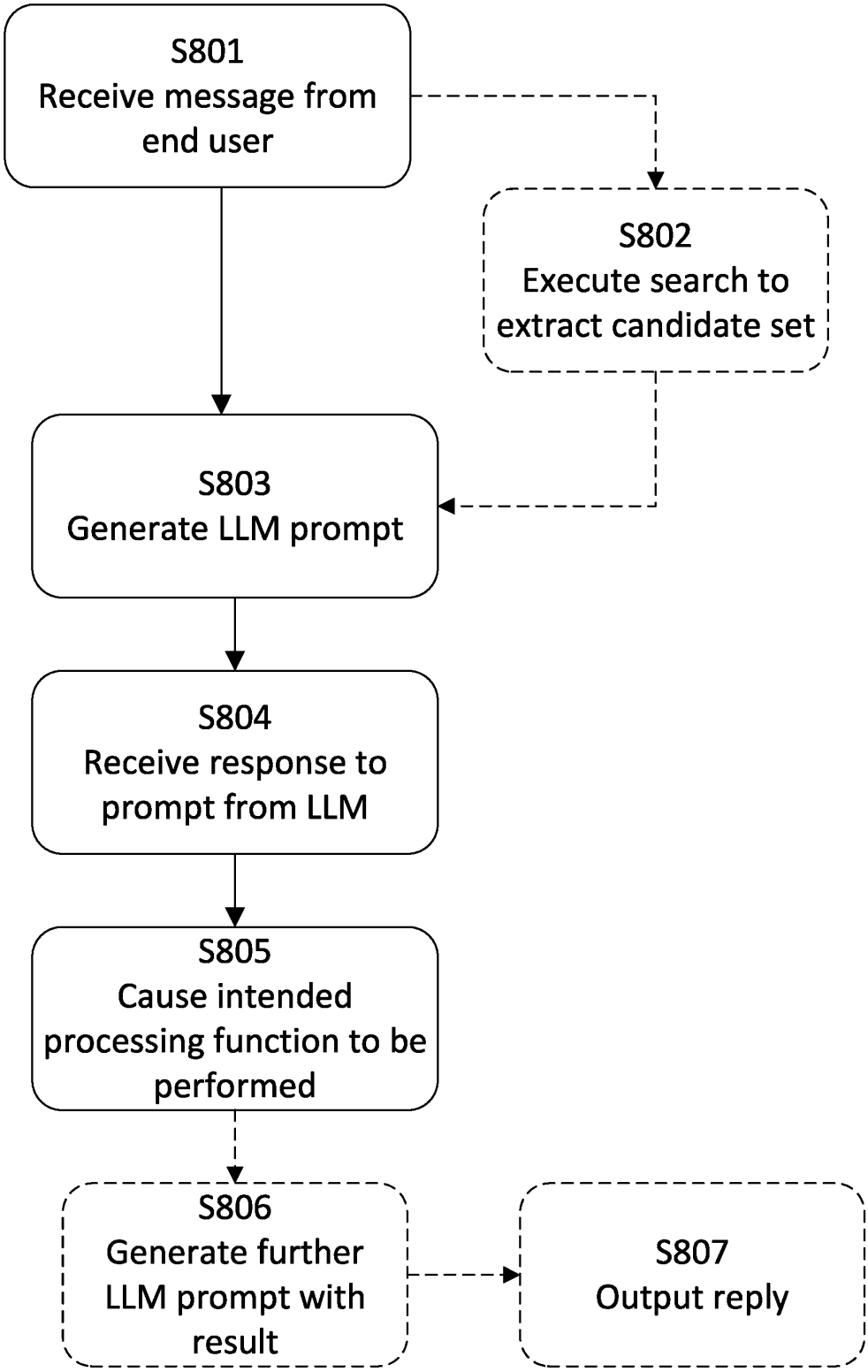

S801
Receive message from end user
S802
Execute search to extract candidate set
S803
Generate LLM prompt
S804
Receive response to prompt from LLM
S805
Cause intended processing function to be performed
S806
Generate further LLM prompt with result
S807
Output reply

FIGURE 8