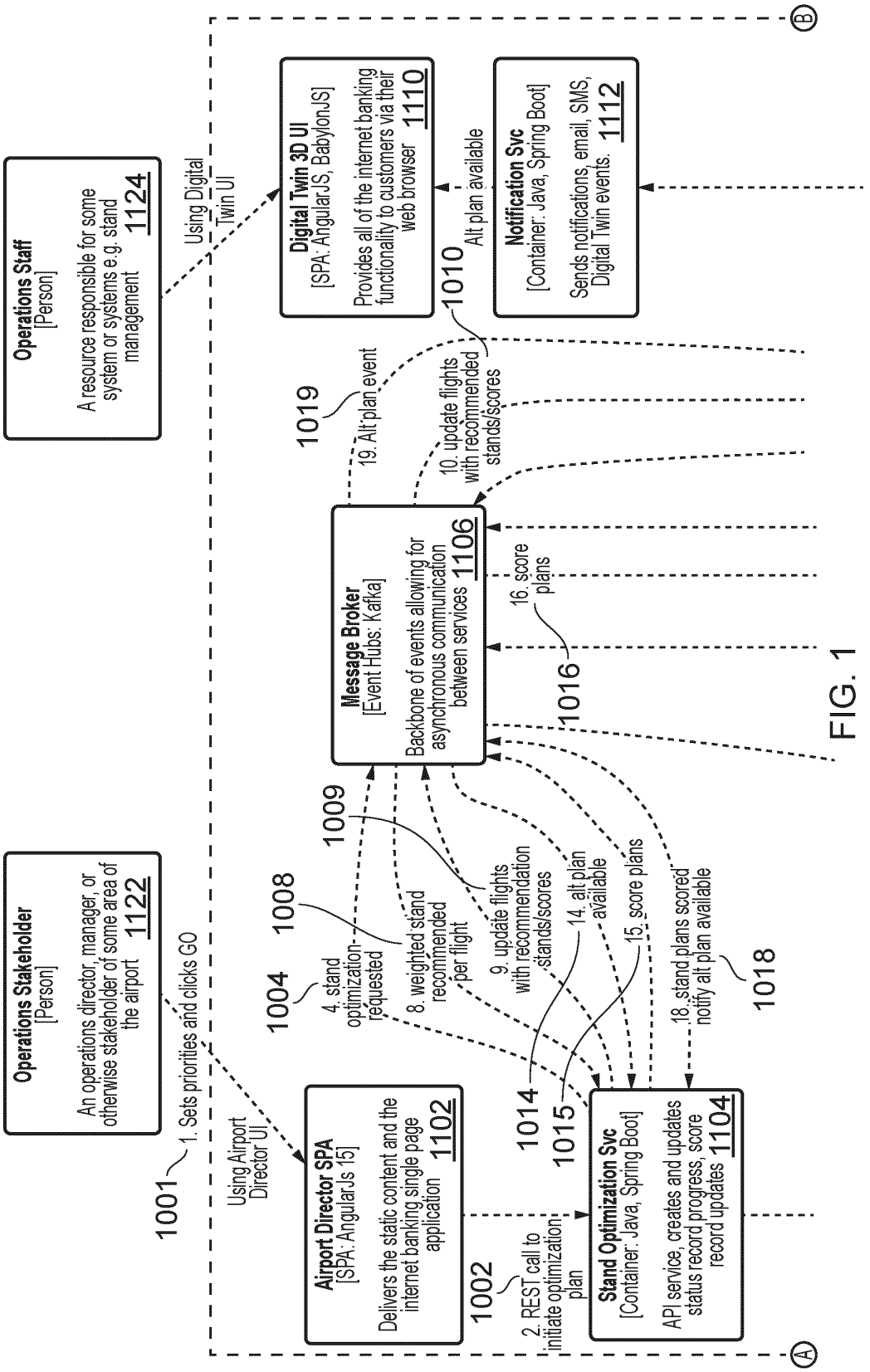

Operations Staff
[Person]
A resource responsible for some system or systems e.g. stand management 1124
Using Digital Twin UI
Digital Twin 3D UI
[SPA: AngularJS, BabylonJS]
Provides all of the internet banking functionality to customers via their web browser 1110
Notification Svc
[Container: Java, Spring Boot]
Sends notifications, email, SMS, Digital Twin events. 1112
1010
Alt plan available
1019
19. Alt plan event
10. update flights with recommended stands/scores
Message Broker
[Event Hubs: Kafka]
Backbone of events allowing for asynchronous communication between services 1106
16. score plans
1016
1009
1008
1004
4. stand optimization-requested
8. weighted stand recommended per flight
9. update flights with recommendation stands/scores
14. alt plan available
15. score plans
18. stand plans scored notify alt plan available
1018
Operations Stakeholder
[Person]
An operations director, manager, or otherwise stakeholder of some area of the airport 1122
1001
1. Sets priorities and clicks GO
Using Airport Director UI
Airport Director SPA
[SPA: AngularJs 15]
Delivers the static content and the internet banking single page application 1102
1002
2. REST call to initiate optimization plan
1014
1015
Stand Optimization Svc
[Container: Java, Spring Boot]
API service, creates and updates status record progress, score record updates 1104
A
B

FIG. 1

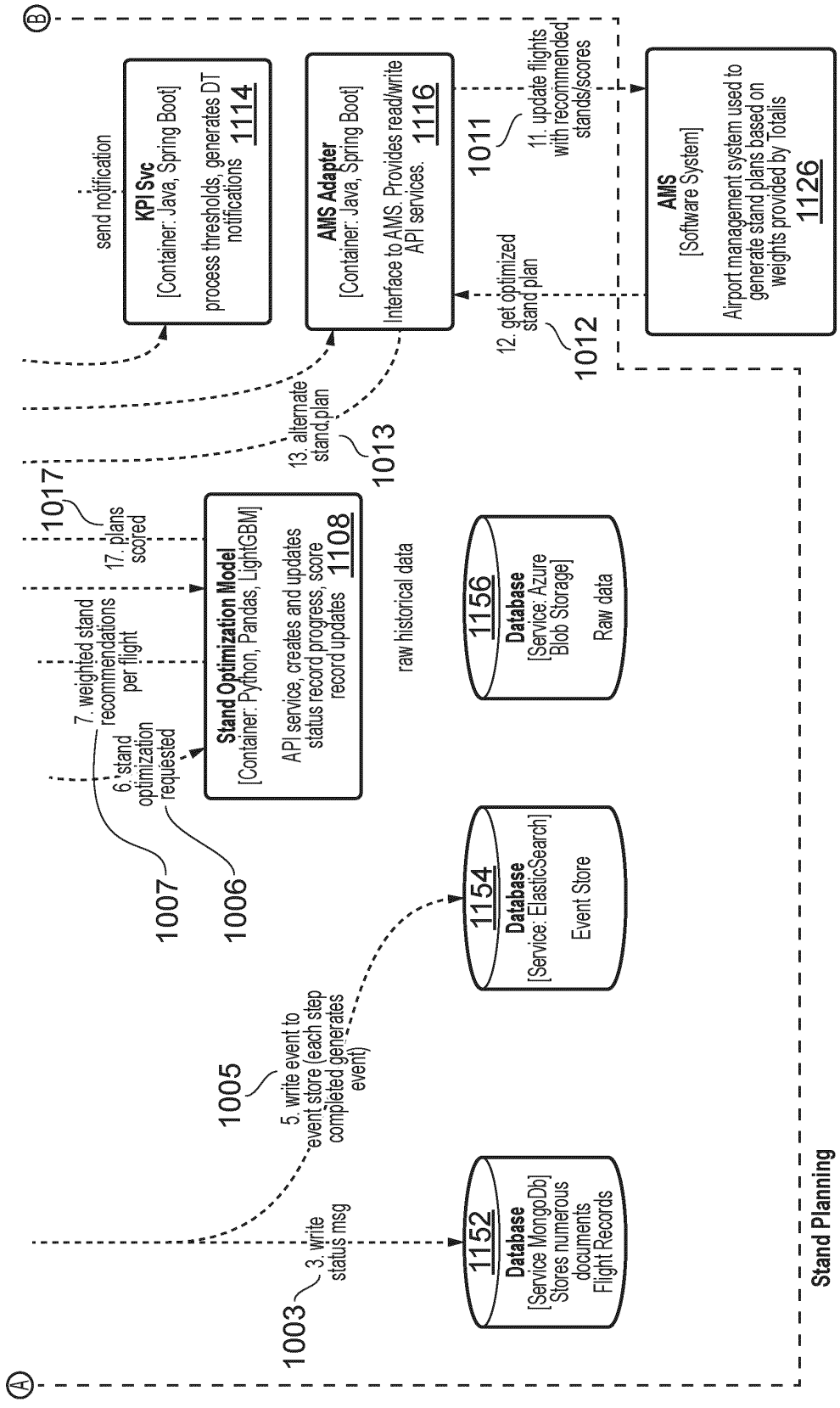


FIG. 1 (continued)

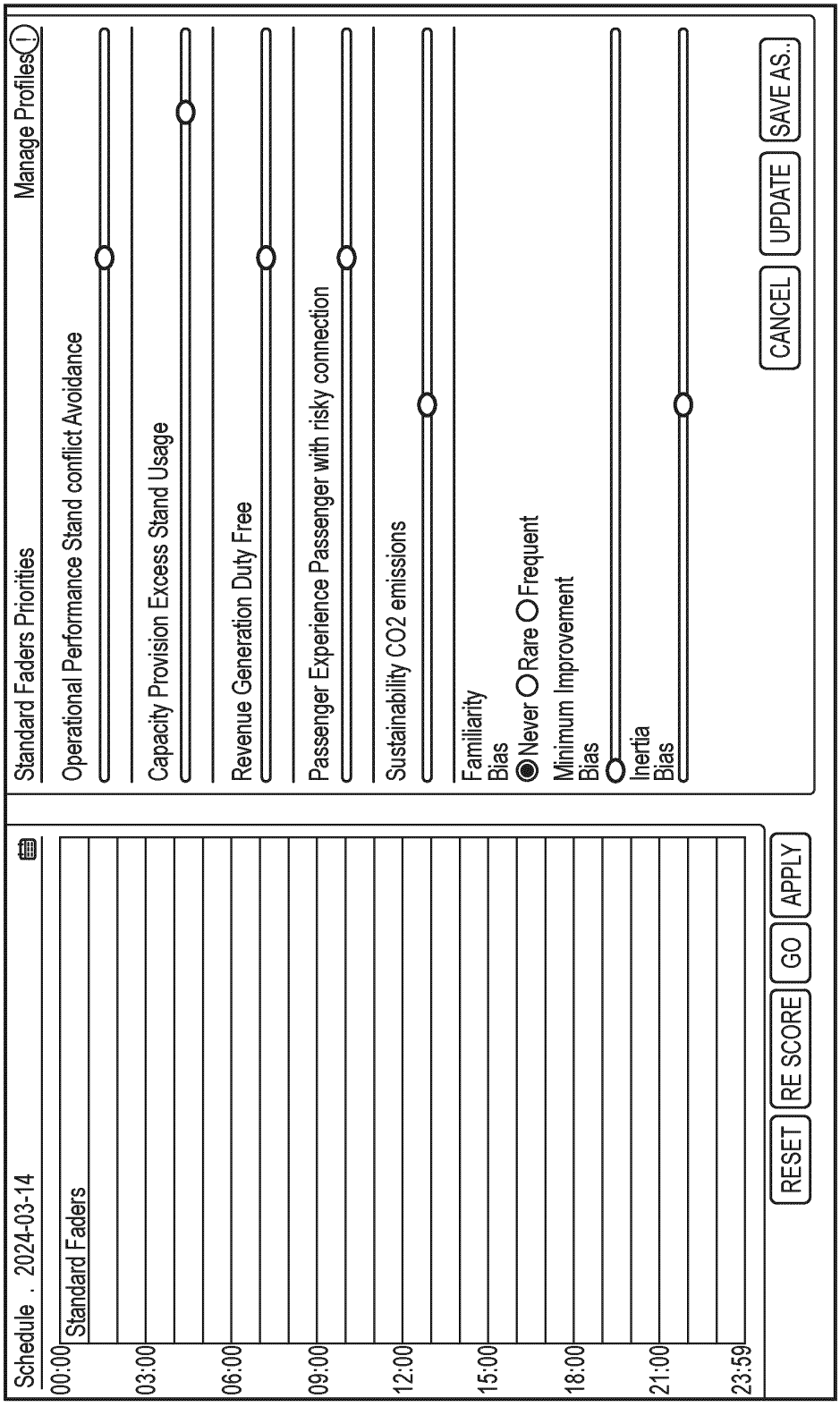

Schedule . 2024-03-14
00:00
Standard Faders
03:00
06:00
09:00
12:00
15:00
18:00
21:00
23:59
RESET
RE SCORE
GO
APPLY
Standard Faders Priorities
Manage Profiles
Operational Performance Stand conflict Avoidance
Capacity Provision Excess Stand Usage
Revenue Generation Duty Free
Passenger Experience Passenger with risky connection
Sustainability CO2 emissions
Familiarity
Bias
Never
Rare
Frequent
Minimum Improvement
Bias
Inertia
Bias
CANCEL
UPDATE
SAVE AS..

FIG. 2

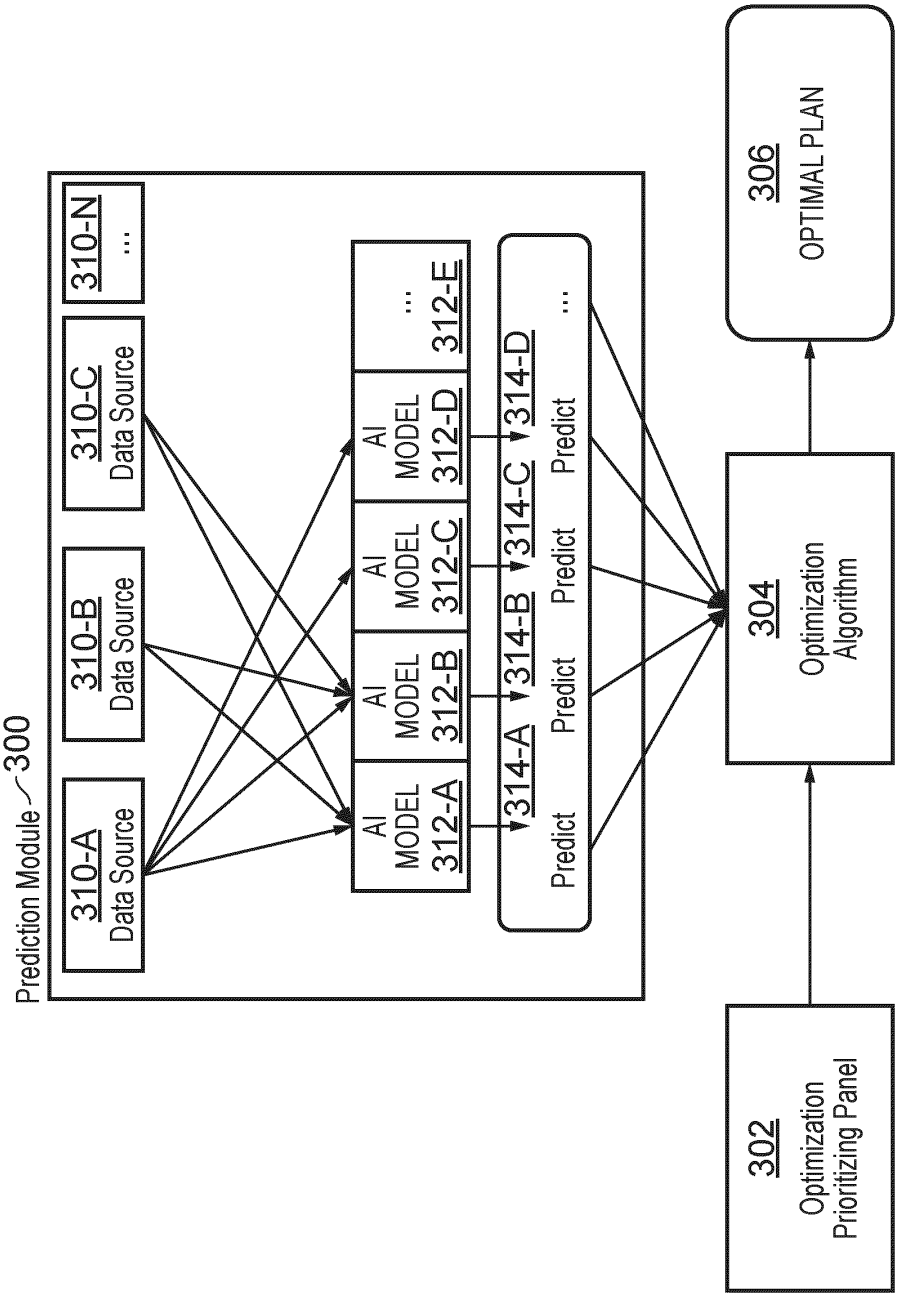

Prediction Module 300
310-A Data Source
310-B Data Source
310-C Data Source
310-N ...
AI MODEL 312-A
AI MODEL 312-B
AI MODEL 312-C
AI MODEL 312-D
... 312-E
314-A Predict
314-B Predict
314-C Predict
314-D Predict ...
304 Optimization Algorithm
306 OPTIMAL PLAN
302 Optimization Prioritizing Panel

FIG. 3

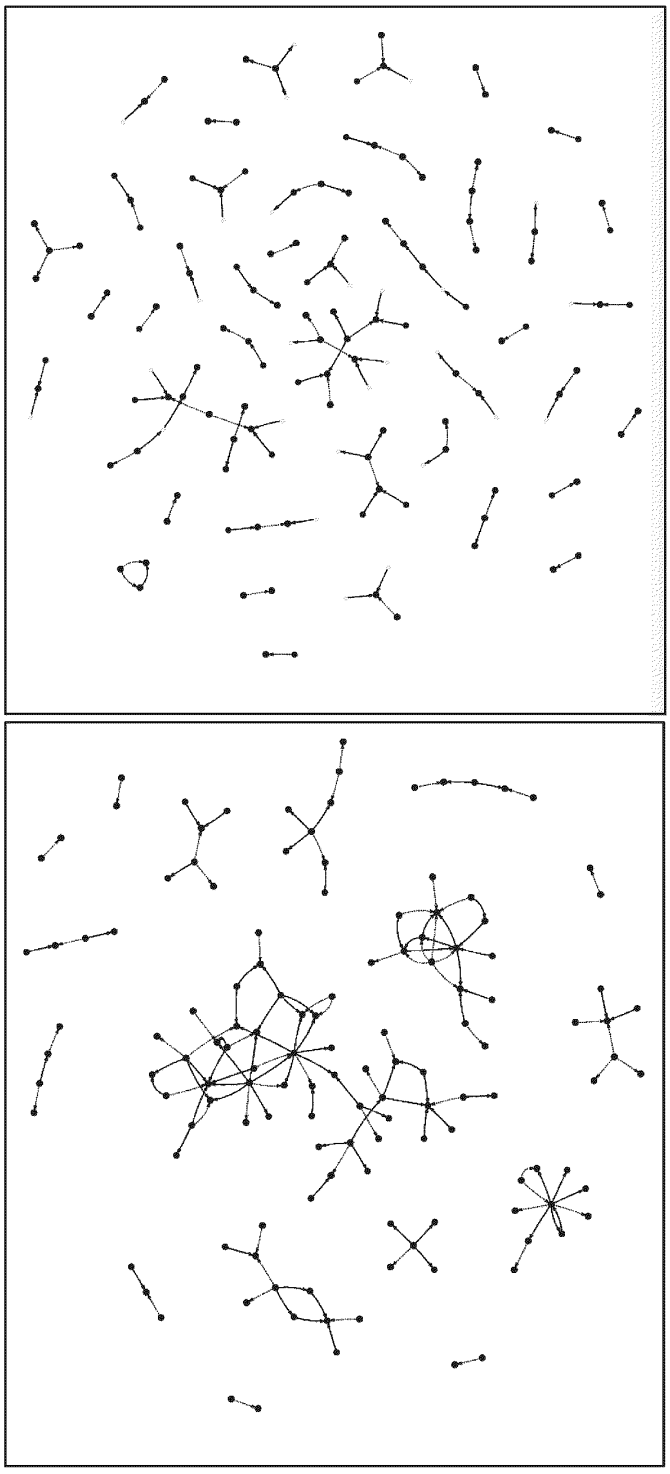


FIG. 4

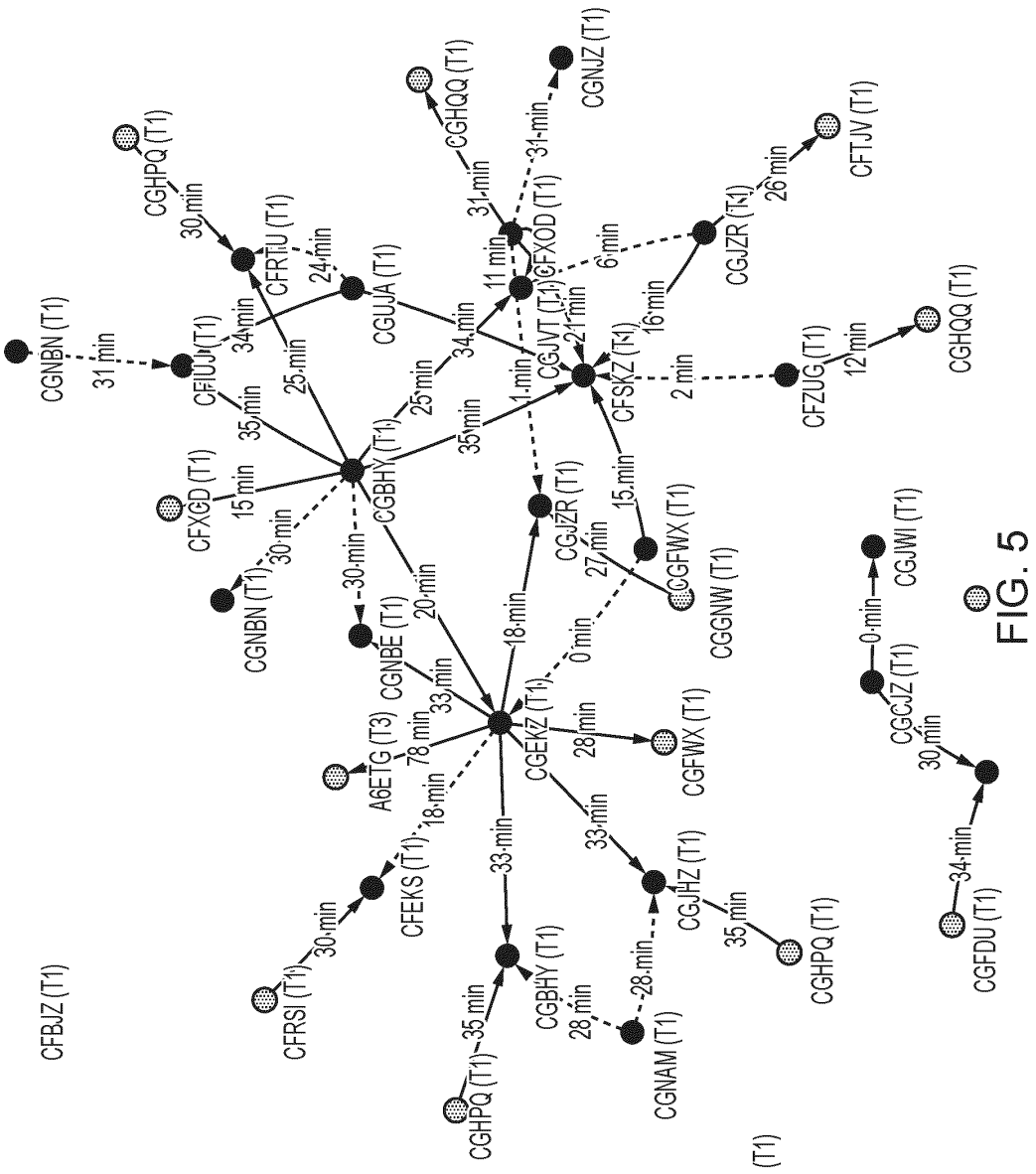

CGNBN (T1)
31 min
CFIUJ (T1)
CGHPQ (T1)
30 min
CFRTU (T1)
24 min
CGUJA (T1)
CGHQQ (T1)
31 min
CGNJZ (T1)
31 min
CFXOD (T1)
11 min
CGJZR (T1)
26 min
CFTJV (T1)
6 min
CGJVT (T1)
21 min
CFSKZ (T1)
16 min
CFZUG (T1)
12 min
CGHQQ (T1)
2 min
CFXGD (T1)
15 min
CGBHY (T1)
CGNBN (T1)
30 min
CGNBE (T1)
CGJZR (T1)
27 min
CGFWX (T1)
15 min
CGGNW (T1)
CGEKZ (T1)
A6ETG (T3)
78 min
CGFWX (T1)
28 min
CFEKS (T1)
CGJHZ (T1)
CGBHY (T1)
CFRSJ (T1)
CGHPQ (T1)
35 min
CGNAM (T1)
28 min
CGHPQ (T1)
35 min
CGJWI (T1)
0 min
CGCJZ (T1)
30 min
CGFDU (T1)
34 min
CFBJZ (T1)
(T1)

FIG. 5

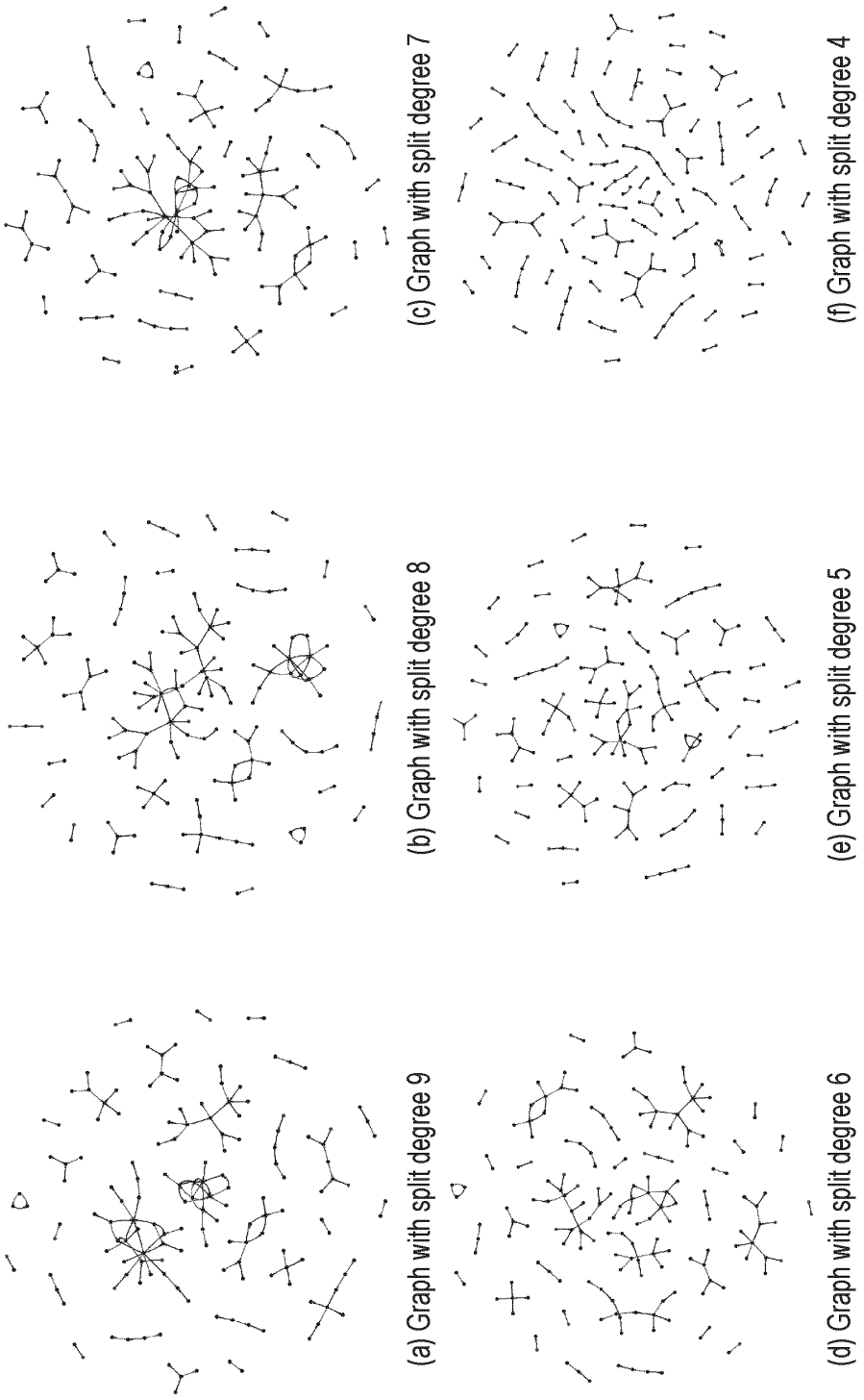
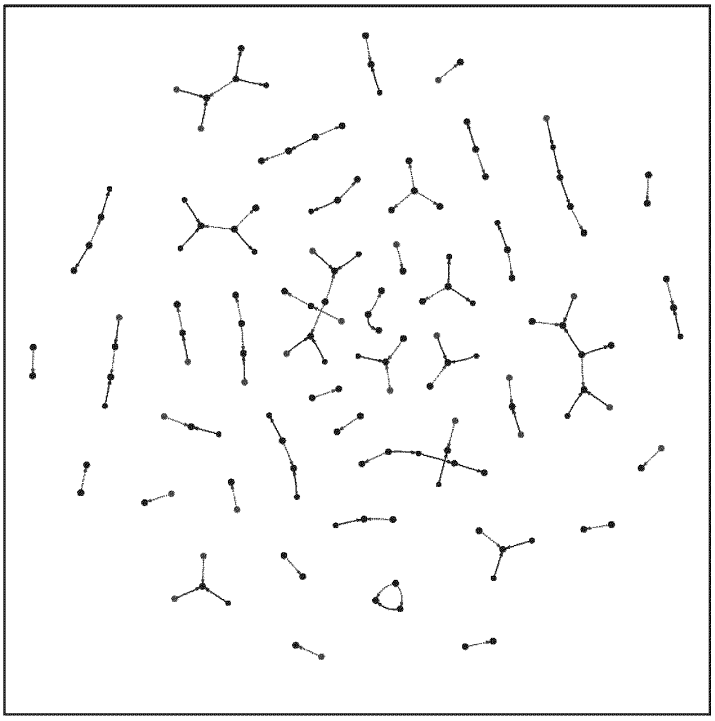
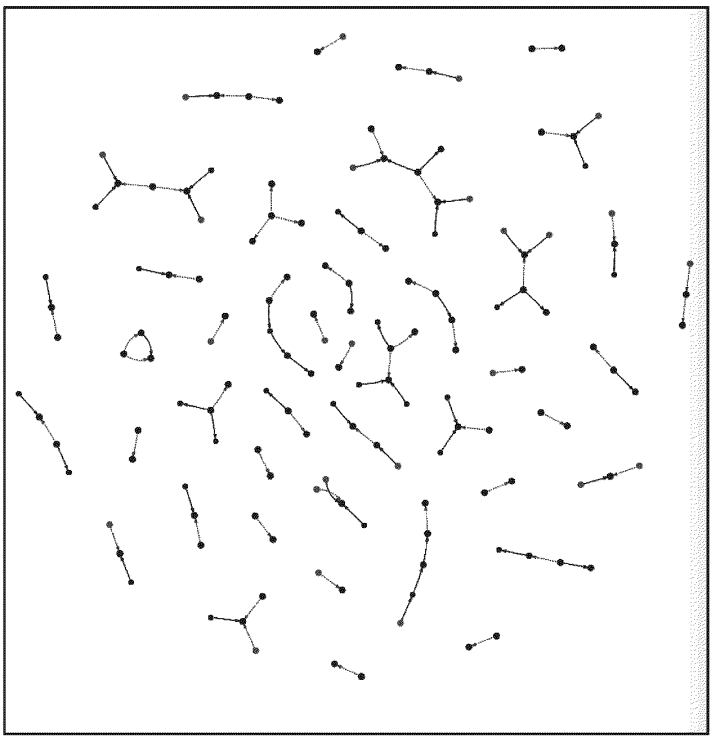

(a) Graph with split degree 9
(b) Graph with split degree 8
(c) Graph with split degree 7
(d) Graph with split degree 6
(e) Graph with split degree 5
(f) Graph with split degree 4

FIG. 6



(b) Graph without unfixable components



(a) Graph final without fixed components

FIG. 7

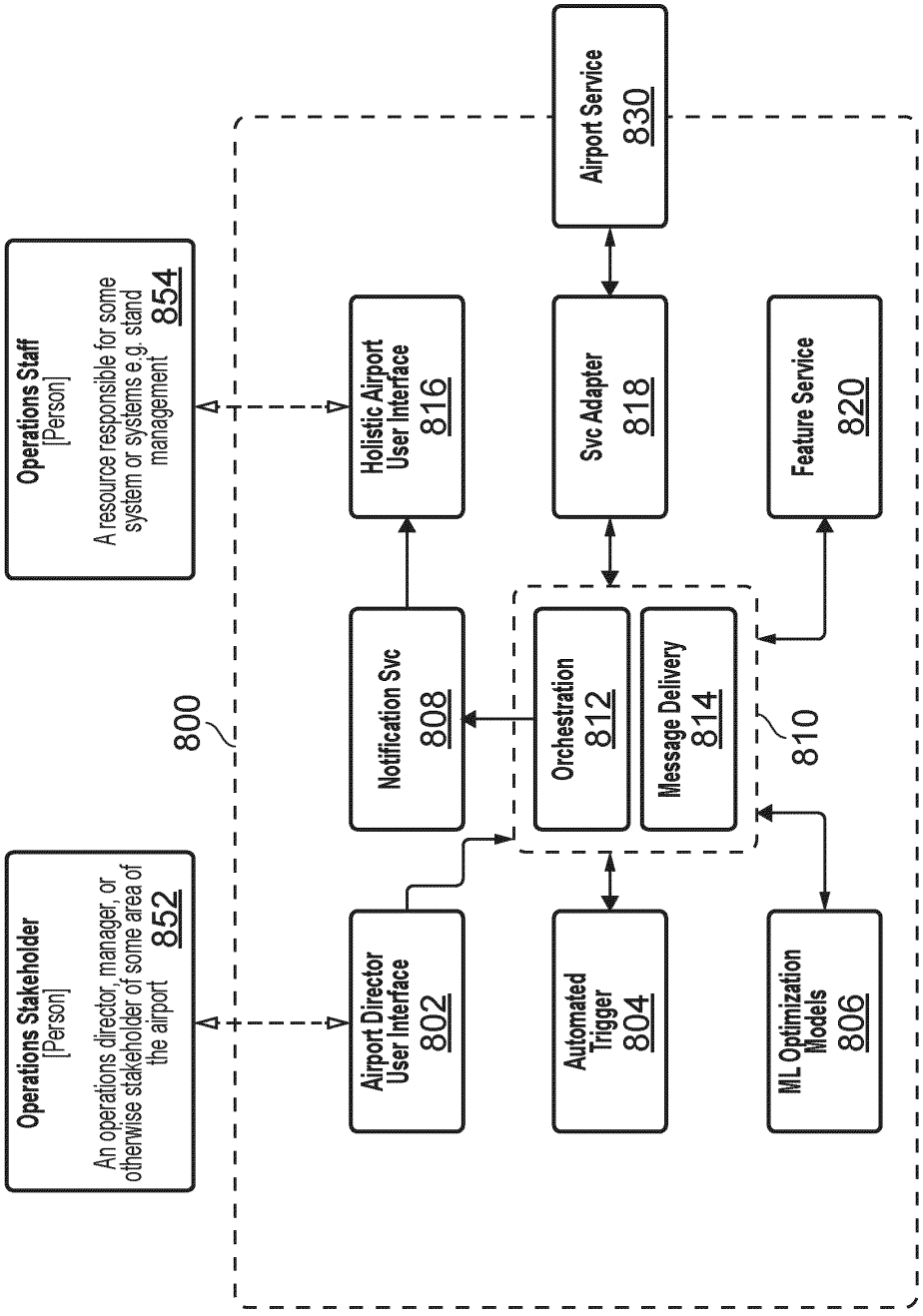

Operations Staff
[Person]
A resource responsible for some system or systems e.g. stand management
854
Operations Stakeholder
[Person]
An operations director, manager, or otherwise stakeholder of some area of the airport
852
800
Airport Director User Interface
802
Automated Trigger
804
ML Optimization Models
806
Notification Svc
808
Orchestration
812
Message Delivery
814
810
Holistic Airport User Interface
816
Svc Adapter
818
Feature Service
820
Airport Service
830

FIG. 8

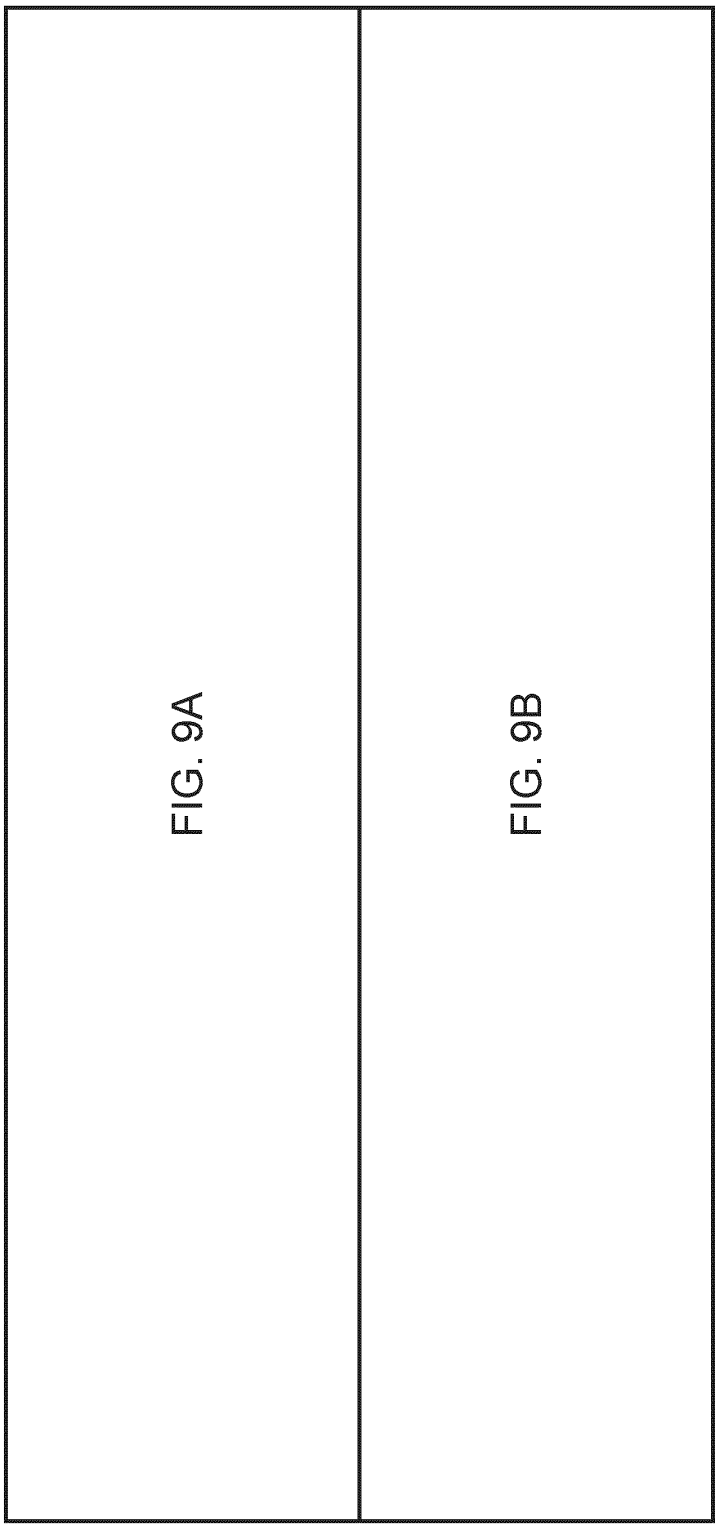


FIG. 9

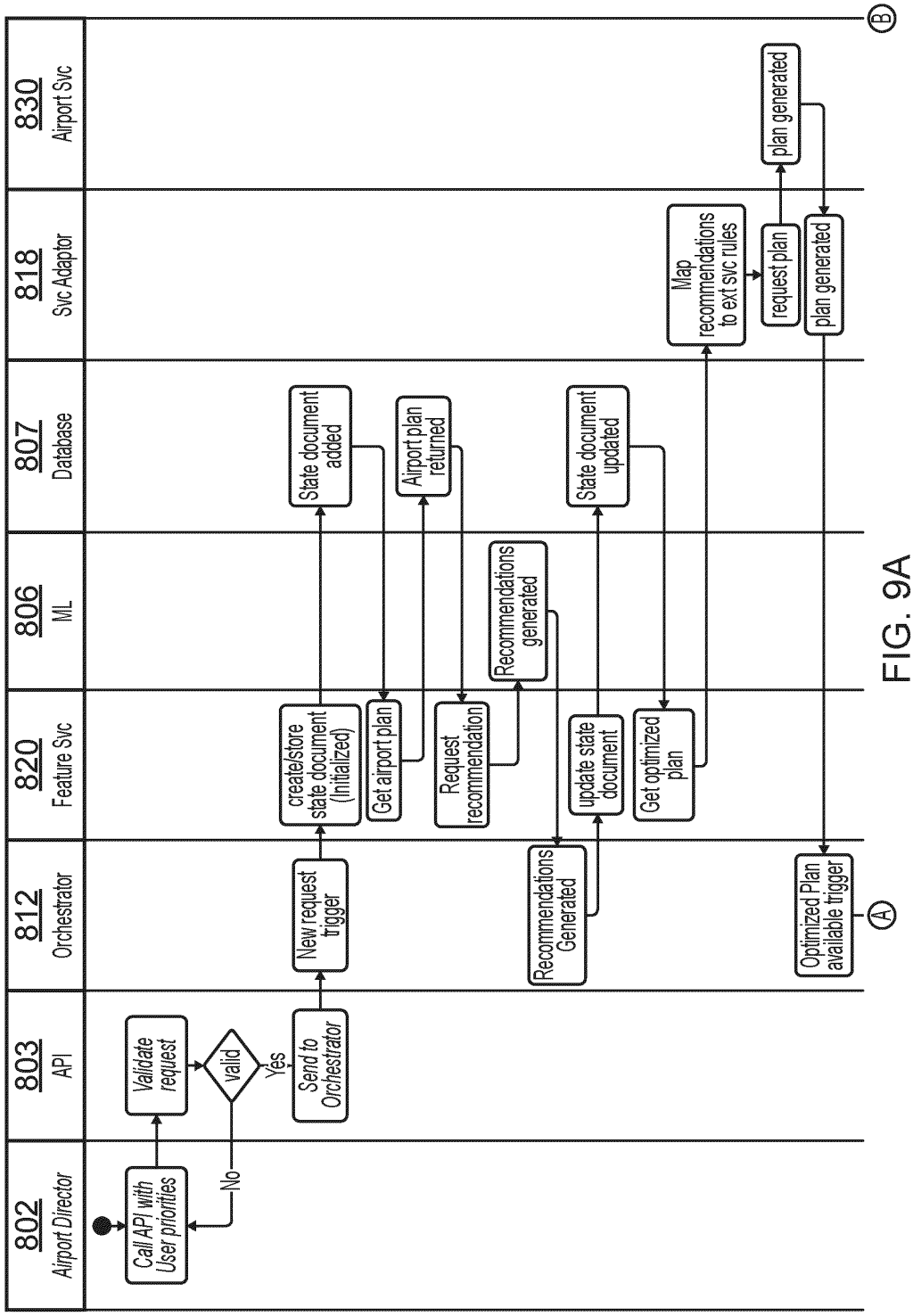

802 Airport Director
803 API
812 Orchestrator
820 Feature Svc
806 ML
807 Database
818 Svc Adaptor
830 Airport Svc
Call API with User priorities
Validate request
valid
No
Yes
Send to Orchestrator
New request trigger
create/store state document (Initialized)
State document added
Get airport plan
Airport plan returned
Request recommendation
Recommendations generated
Recommendations Generated
update state document
State document updated
Get optimized plan
Map recommendations to ext svc rules
request plan
plan generated
plan generated
Optimized Plan available trigger
A
B

FIG. 9A

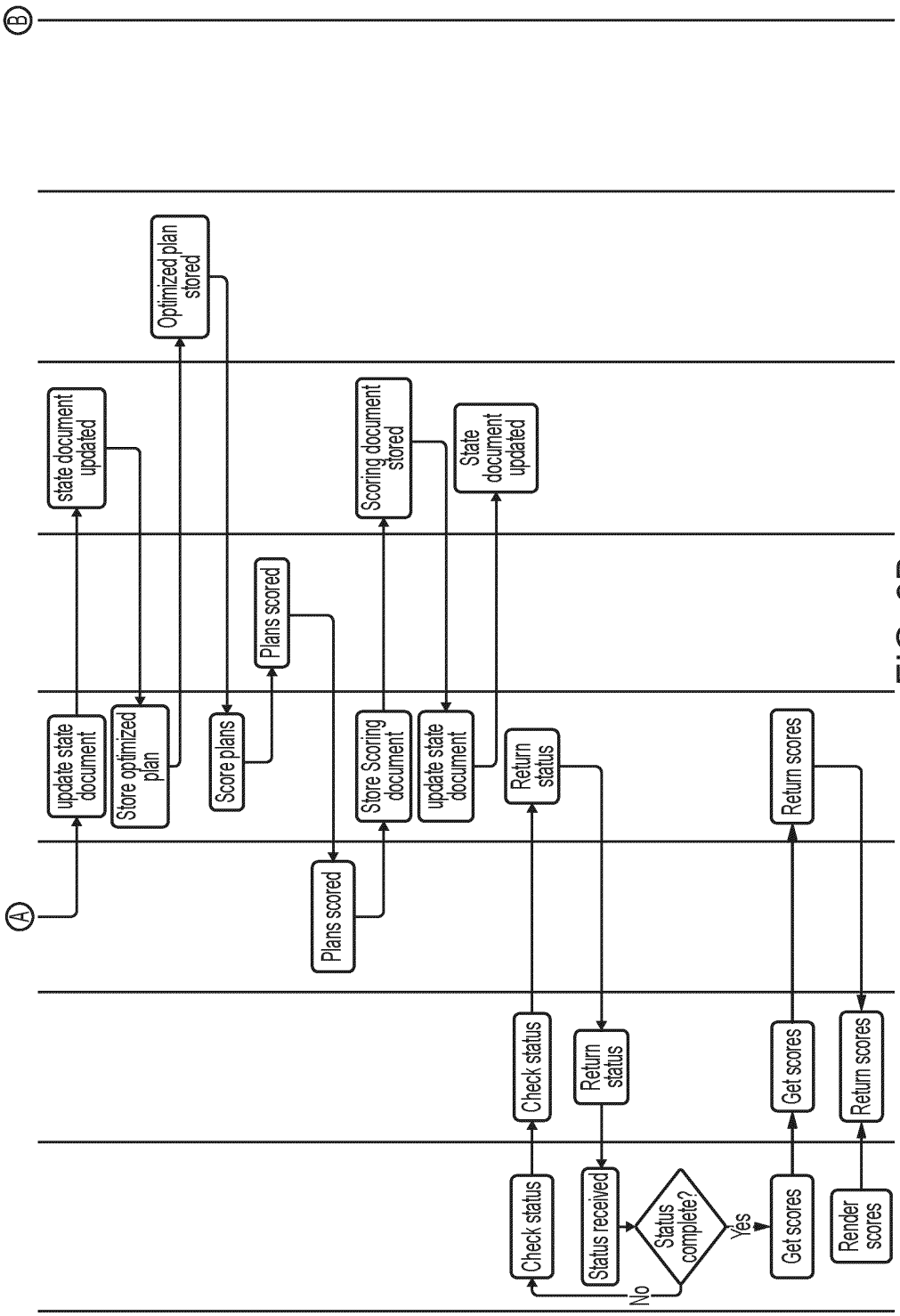

B
A
Optimized plan stored
state document updated
Scoring document stored
State document updated
Plans scored
update state document
Store optimized plan
Score plans
Store Scoring document
update state document
Return status
Return scores
Plans scored
Check status
Return status
Get scores
Return scores
Check status
Status received
Status complete?
Yes
No
Get scores
Render scores

FIG. 9B