Project Step 2 Assignment: Rendezvous Server Submission

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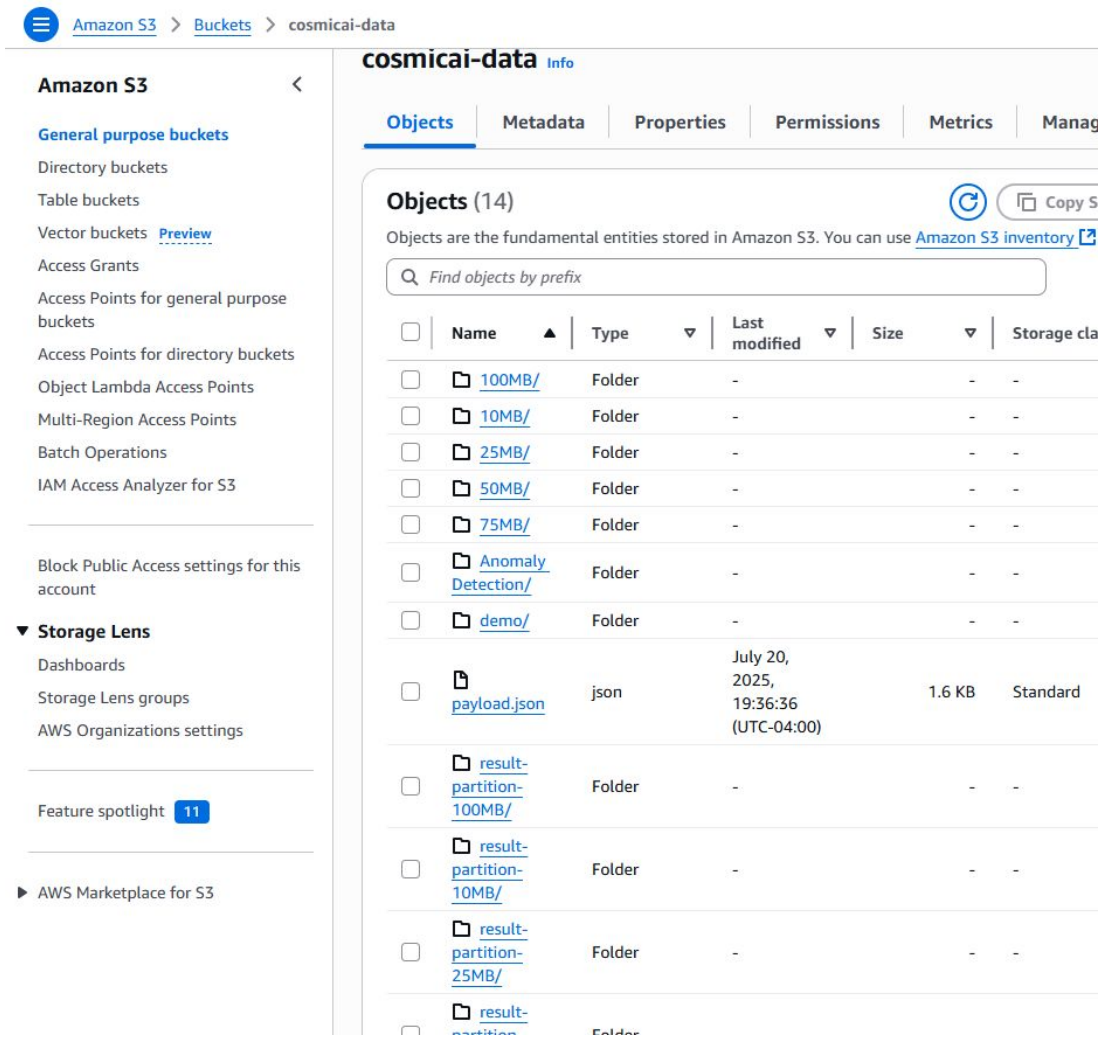
Created S3 Bucket

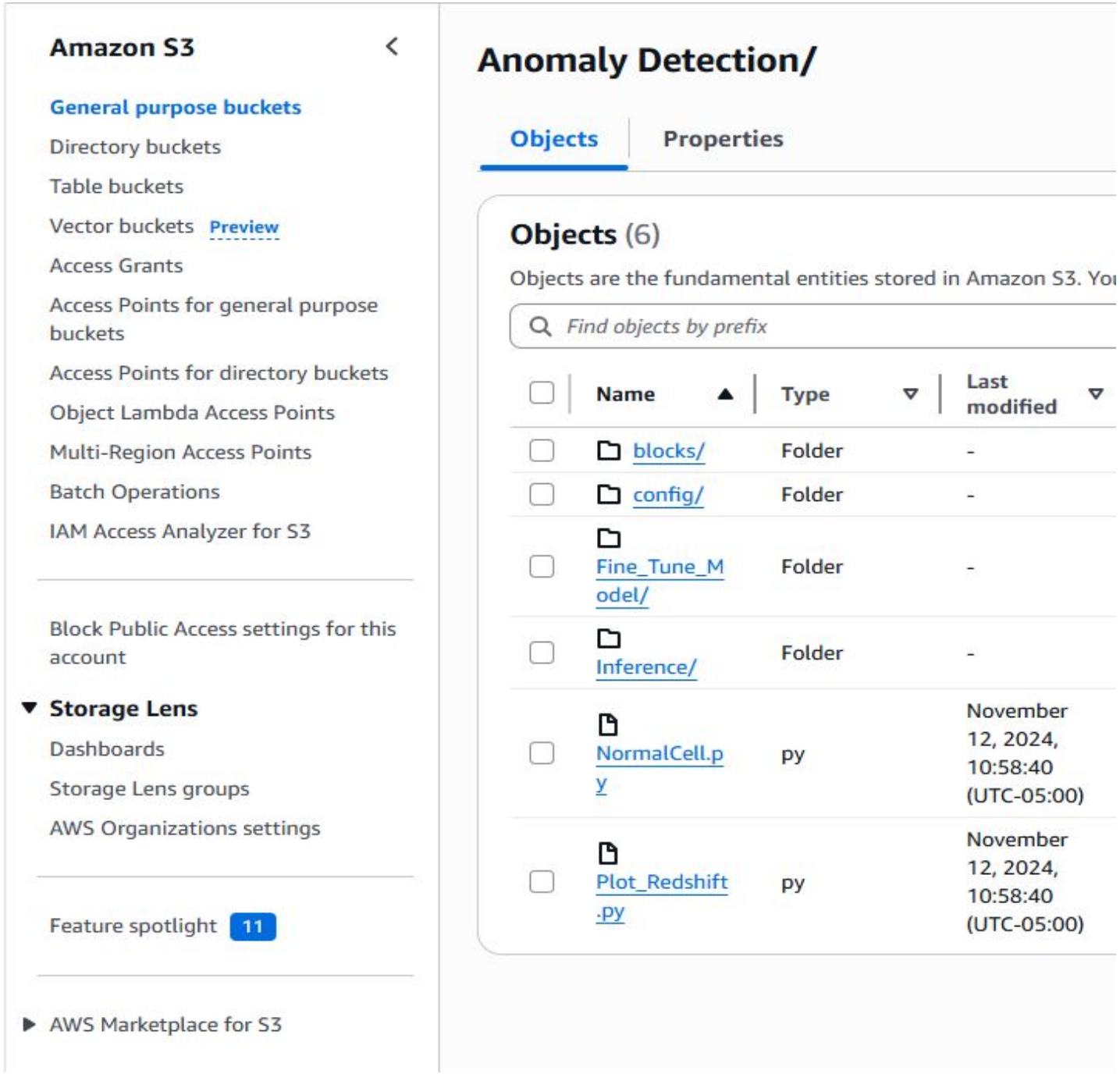
- Created to host scripts and datasets
- Bucket name: cosmica-data, used throughout the workflow
- Includes input datasets and inference scripts required for Lambda execution



Clone repos

Make sure relevant repository (e.g. Anomaly Detection) is accessible in S3 bucket

Includes scripts for model inference and tuning tasks



Edit payload

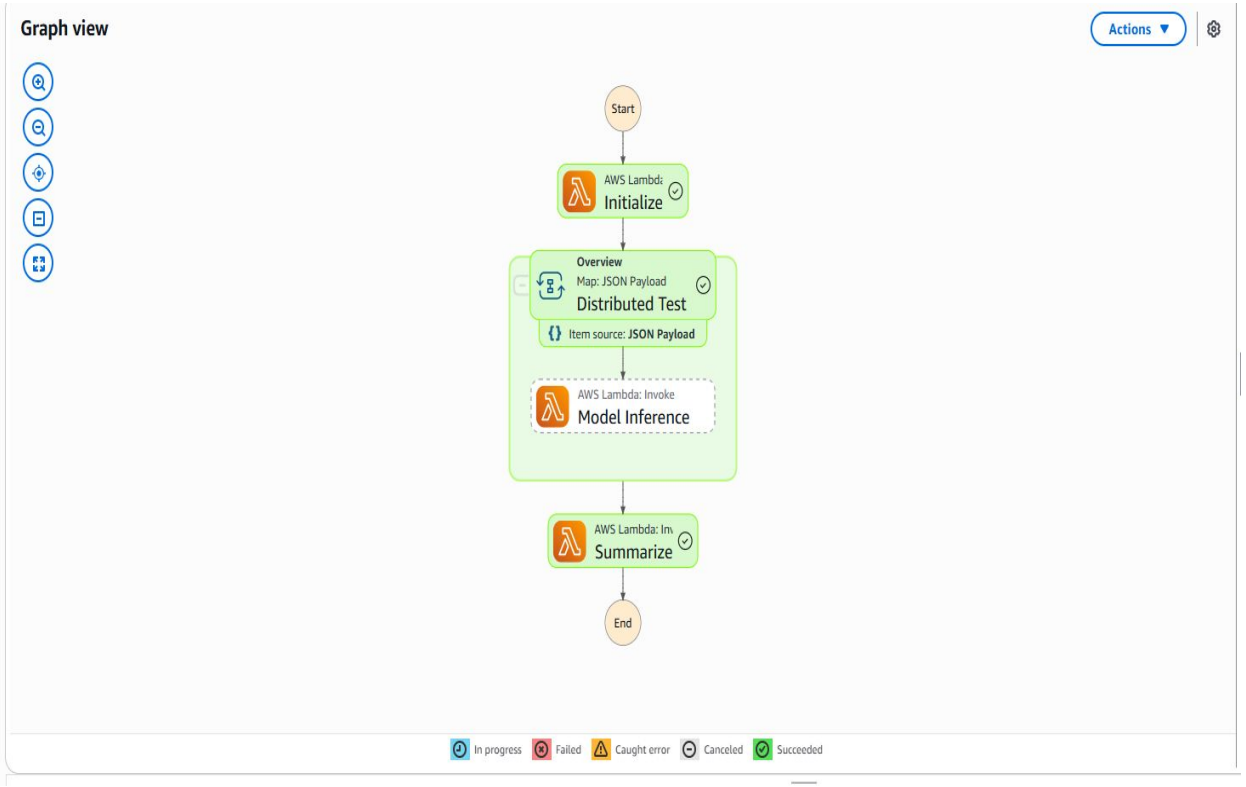
- Updating parameters (e.g. world_size, bucket) in CosmicAI state machine in the Lambda Init State

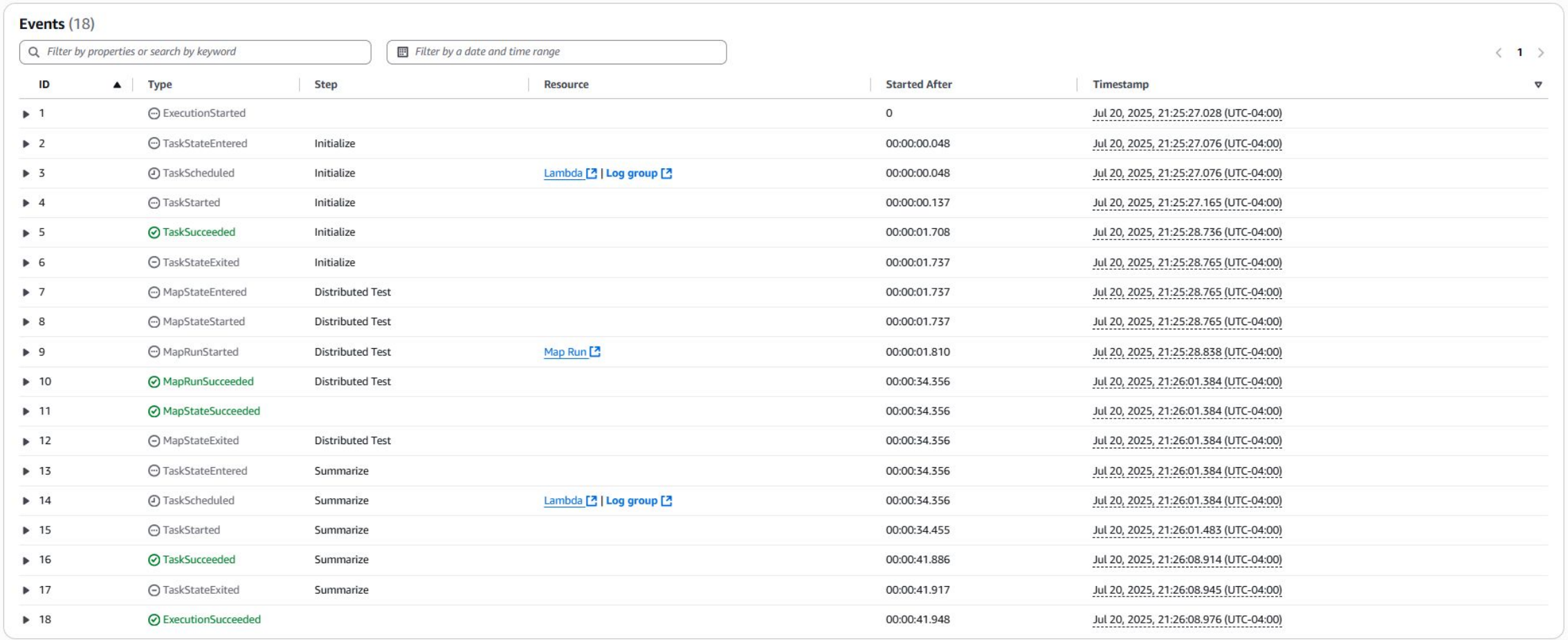

```
{
  "bucket": "cosmicai-data",
  "file_limit": "11",
  "batch_size": 512,
  "object_type": "folder",
  "S3_object_name": "Anomaly Detection",
  "script": "/tmp/Anomaly Detection/Inference/inference.py",
  "result_path": "result-partition-100MB/1GB/1",
  "data_bucket": "cosmicai-data",
  "data_prefix": "100MB"
}
```

Execute Step Function

•Monitor workflow in AWS Step Functions, ensuring tasks transition through all states

•Workflow executed successfully with payload flowing through all Lambda states





Events (18)

Filter by properties or search by keyword

Filter by a date and time range

1

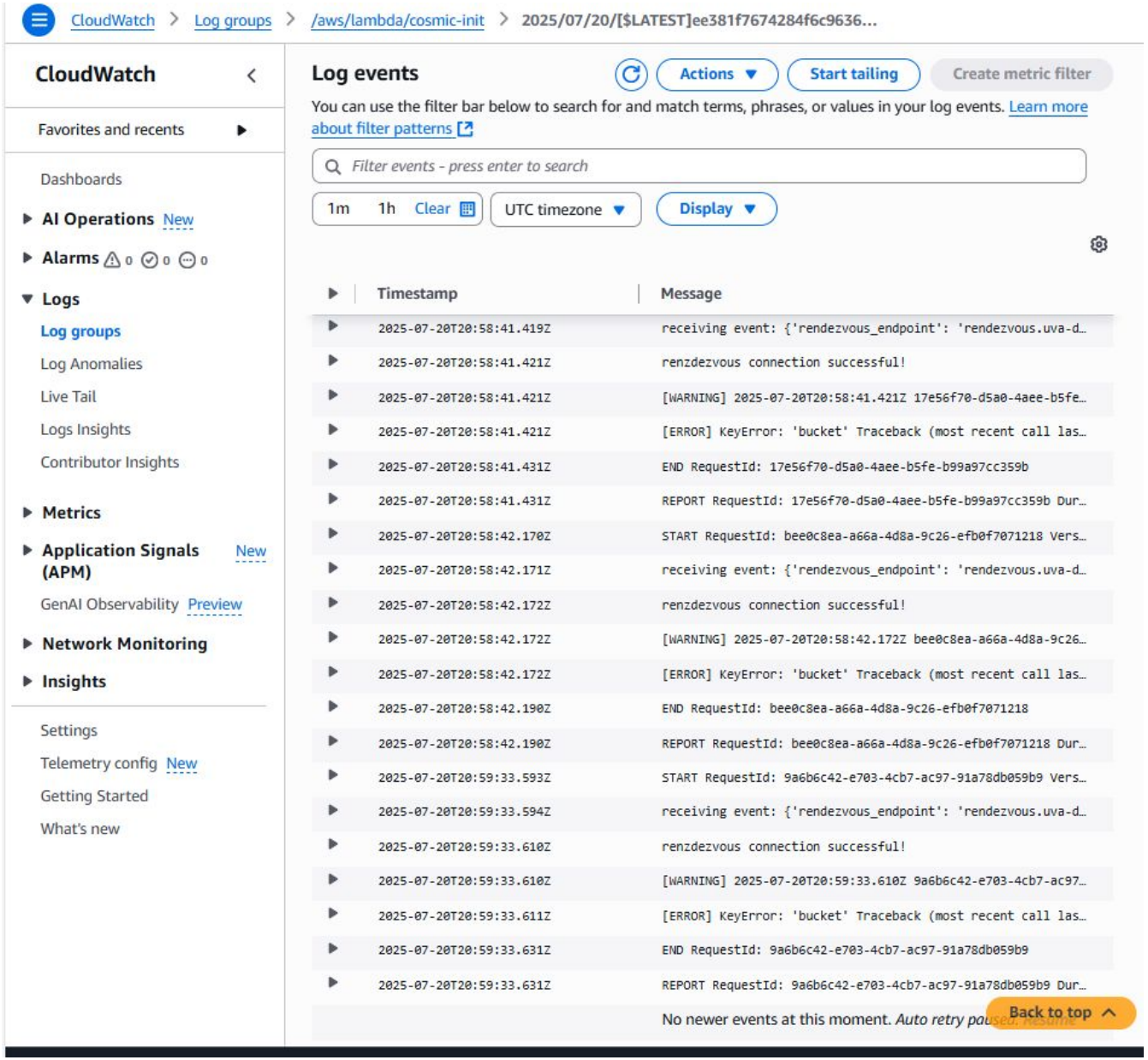
ID	Type	Step	Resource	Started After	Timestamp
1	ExecutionStarted			0	Jul 20, 2025, 21:25:27.028 (UTC-04:00)
2	TaskStateEntered	Initialize		00:00:00.048	Jul 20, 2025, 21:25:27.076 (UTC-04:00)
3	TaskScheduled	Initialize	Lambda | Log group	00:00:00.048	Jul 20, 2025, 21:25:27.076 (UTC-04:00)
4	TaskStarted	Initialize		00:00:00.137	Jul 20, 2025, 21:25:27.165 (UTC-04:00)
5	TaskSucceeded	Initialize		00:00:01.708	Jul 20, 2025, 21:25:28.736 (UTC-04:00)
6	TaskStateExited	Initialize		00:00:01.737	Jul 20, 2025, 21:25:28.765 (UTC-04:00)
7	MapStateEntered	Distributed Test		00:00:01.737	Jul 20, 2025, 21:25:28.765 (UTC-04:00)
8	MapStateStarted	Distributed Test		00:00:01.737	Jul 20, 2025, 21:25:28.765 (UTC-04:00)
9	MapRunStarted	Distributed Test	Map Run	00:00:01.810	Jul 20, 2025, 21:25:28.838 (UTC-04:00)
10	MapRunSucceeded	Distributed Test		00:00:34.356	Jul 20, 2025, 21:26:01.384 (UTC-04:00)
11	MapStateSucceeded			00:00:34.356	Jul 20, 2025, 21:26:01.384 (UTC-04:00)
12	MapStateExited	Distributed Test		00:00:34.356	Jul 20, 2025, 21:26:01.384 (UTC-04:00)
13	TaskStateEntered	Summarize		00:00:34.356	Jul 20, 2025, 21:26:01.384 (UTC-04:00)
14	TaskScheduled	Summarize	Lambda | Log group	00:00:34.356	Jul 20, 2025, 21:26:01.384 (UTC-04:00)
15	TaskStarted	Summarize		00:00:34.455	Jul 20, 2025, 21:26:01.483 (UTC-04:00)
16	TaskSucceeded	Summarize		00:00:41.886	Jul 20, 2025, 21:26:08.914 (UTC-04:00)
17	TaskStateExited	Summarize		00:00:41.917	Jul 20, 2025, 21:26:08.945 (UTC-04:00)
18	ExecutionSucceeded			00:00:41.948	Jul 20, 2025, 21:26:08.976 (UTC-04:00)

Execute Step Function

Monitor workflow in AWS Step Functions, ensuring tasks transition through all states

Review Logs and Results

- Access CloudWatch logs to analyze execution time and memory usage
- Examined log entries for task duration and memory allocation across Lambda invocations
- Logs confirmed successful request handling and no errors during inference



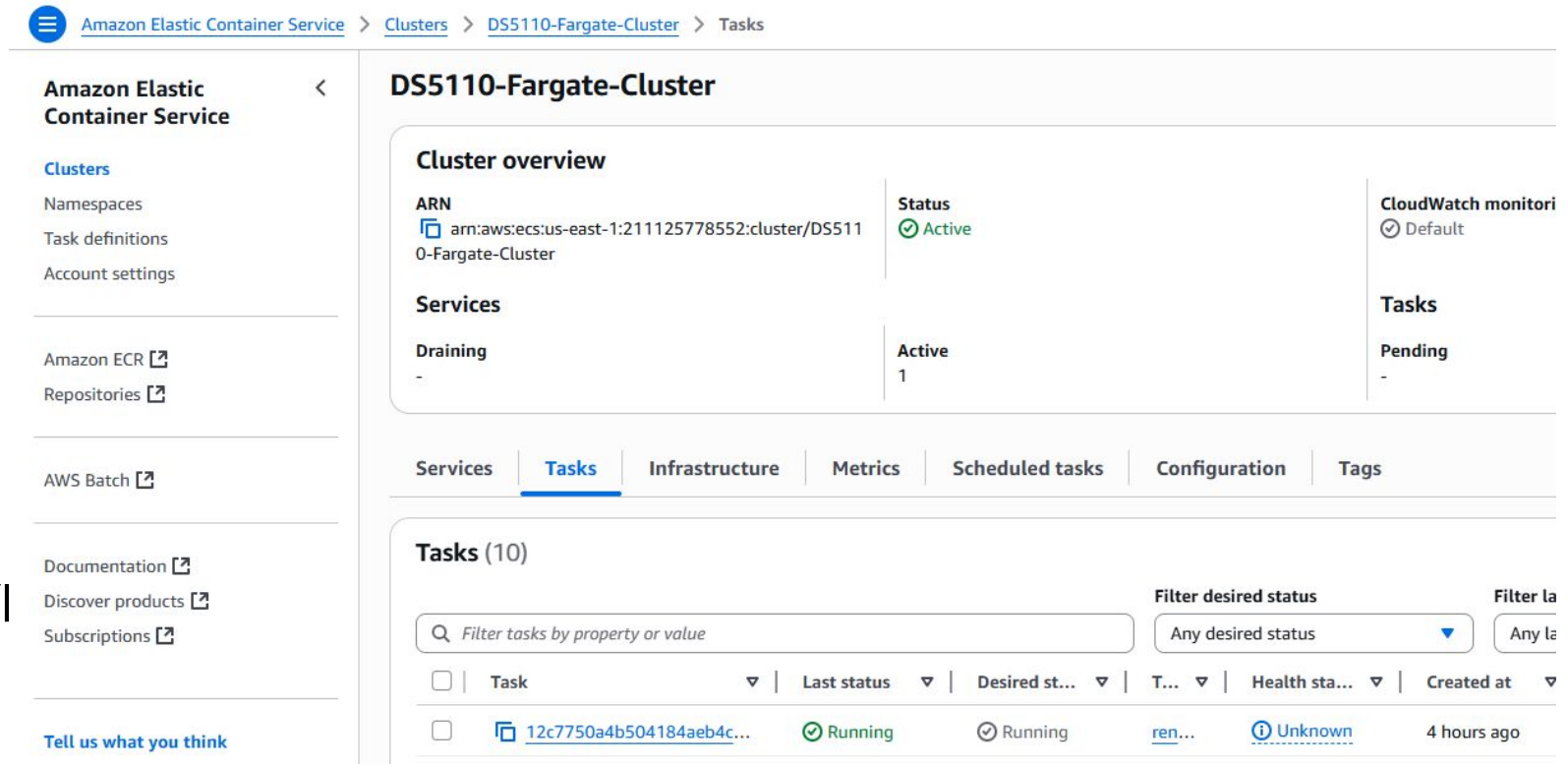
Performance measurement: Create a Table to show the performance in "memory, duration and cost" of Step Function. Measure the execution time by varying the world size.

•Performance was evaluated by varying world size and input partition. Larger world sizes improved throughput but increased memory consumption. Trade-offs between cost and performance were observed.

Partition	World Size	Requests	Duration (s)	Memory	Cost ($)
25MB	517	517	6.55	2.8GB	0.16
50MB	259	259	11.8	4.0GB	0.20
75MB	173	173	17.6	5.9GB	0.30
100MB	130	130	25.0	7.0GB	0.38

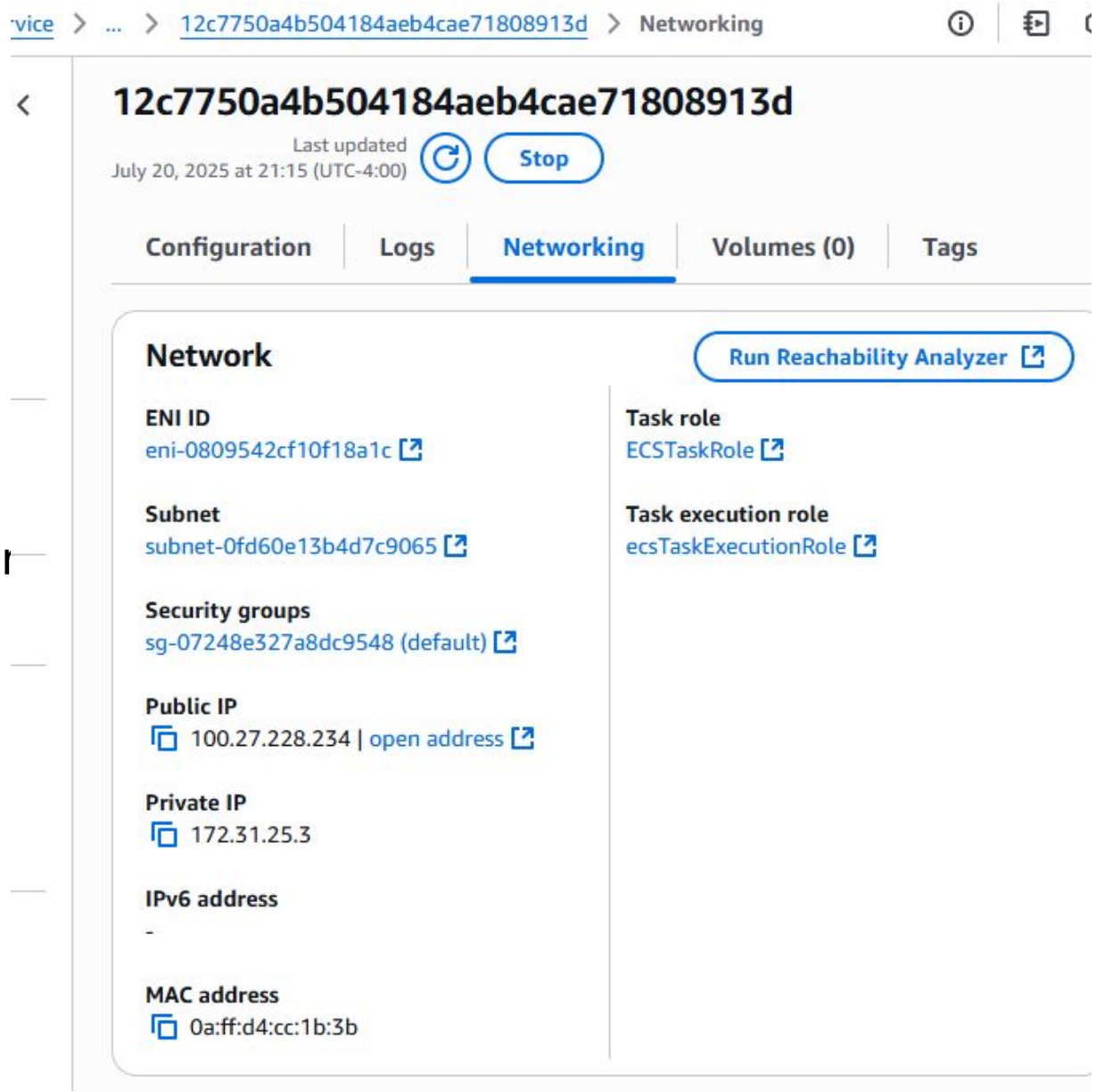
Screenshots of ECS task deployment

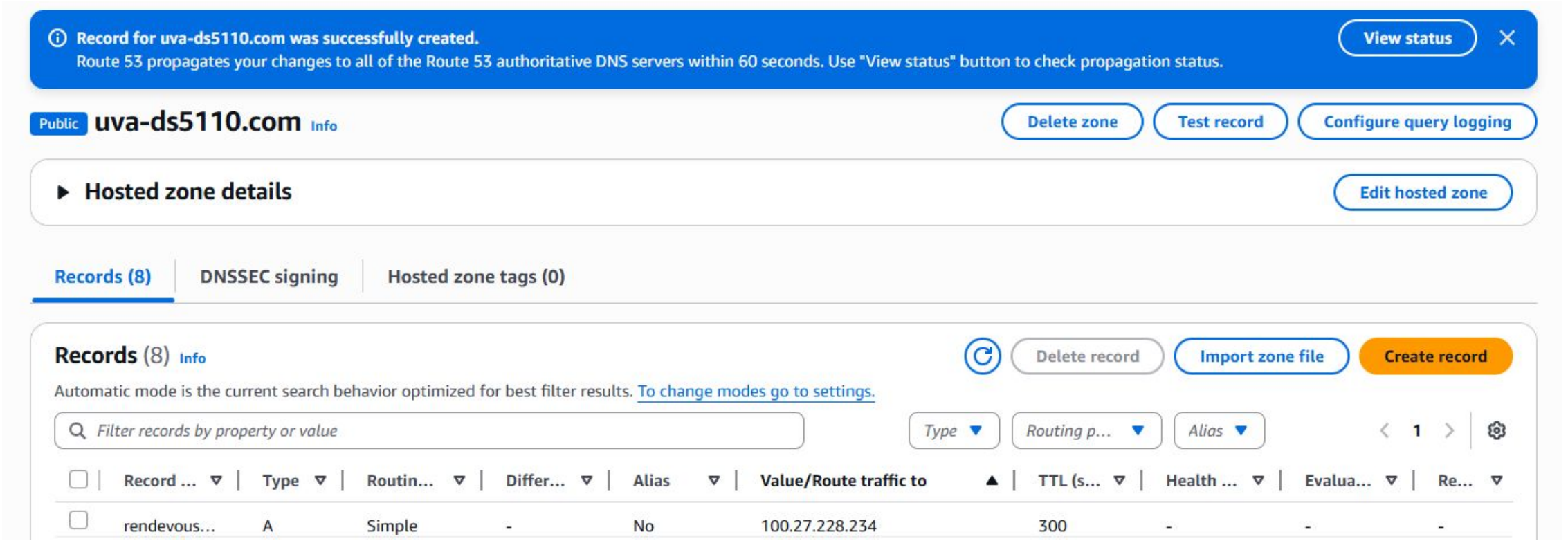
- Deployed rendezvous-tcpunch task to DS5110-Fargate-Cluster
- Task status is 'Running', confirming successful launch on Fargate
- ECS cluster uses FARGATE launch ty and open-access networking



Documentation of Fargate configuration

- • Task configured with open-access security group and public subnet
- • Public IP 100.27.228.234 assigned for external access
- • Roles and networking verified under Fargate launch type





Evidence of successful DNS record update

- DNS A-record created for rendezvous.uva-ds5110.com
- Record routes to ECS task public IP: 100.27.228.234
- DNS propagated successfully and verified in testing

Results of connection test between Lambda functions

- Lambda function successfully connected to Rendezvous server via DNS
- Logs confirm endpoint received and socket connection established
- Confirms server availability and socket handshake readiness

Brief explanation of implementation and any challenges faced

- The Rendezvous server was successfully deployed using AWS ECS with Fargate and exposed through a public IP. A DNS record was created in Route 53 to route rendezvous.uva-ds5110.com to the task's public IP. Lambda functions were configured to use the FMI library to establish socket communication via this endpoint. The system was validated through CloudWatch logs, showing successful rendezvous and data coordination. Challenges included an initial DNS propagation delay and a networking misconfiguration, which were resolved by ensuring the open-access security group was applied and allowing time for DNS to update.