

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

Amazon S3 > Buckets > cosmicai-data

cosmicai-data Info

Objects | Metadata | Properties | Permissions | Metrics | Manag

Objects (14) Copy S

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#)

Find objects by prefix

<input type="checkbox"/>	Name	Type	Last modified	Size	Storage cla
<input type="checkbox"/>	100MB/	Folder	-	-	-
<input type="checkbox"/>	10MB/	Folder	-	-	-
<input type="checkbox"/>	25MB/	Folder	-	-	-
<input type="checkbox"/>	50MB/	Folder	-	-	-
<input type="checkbox"/>	75MB/	Folder	-	-	-
<input type="checkbox"/>	Anomaly Detection/	Folder	-	-	-
<input type="checkbox"/>	demo/	Folder	-	-	-
<input type="checkbox"/>	payload.json	json	July 20, 2025, 19:36:36 (UTC-04:00)	1.6 KB	Standard
<input type="checkbox"/>	result-partition-100MB/	Folder	-	-	-
<input type="checkbox"/>	result-partition-10MB/	Folder	-	-	-
<input type="checkbox"/>	result-partition-25MB/	Folder	-	-	-
<input type="checkbox"/>	result-partition-	Folder	-	-	-

Clone repos

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

Includes scripts for model inference and tuning tasks

Amazon S3

General purpose buckets

Directory buckets

Table buckets

Vector buckets [Preview](#)

Access Grants

Access Points for general purpose buckets

Access Points for directory buckets

Object Lambda Access Points

Multi-Region Access Points

Batch Operations

IAM Access Analyzer for S3

Block Public Access settings for this account

▼ Storage Lens

Dashboards

Storage Lens groups

AWS Organizations settings

Feature spotlight **11**

► AWS Marketplace for S3

Anomaly Detection/

Objects

Properties

Objects (6)

Objects are the fundamental entities stored in Amazon S3. You

🔍 Find objects by prefix

<input type="checkbox"/>	Name ▲	Type ▼	Last modified ▼
<input type="checkbox"/>	📁 blocks/	Folder	-
<input type="checkbox"/>	📁 config/	Folder	-
<input type="checkbox"/>	📁 Fine_Tune_Model/	Folder	-
<input type="checkbox"/>	📁 Inference/	Folder	-
<input type="checkbox"/>	📄 NormalCell.py	py	November 12, 2024, 10:58:40 (UTC-05:00)
<input type="checkbox"/>	📄 Plot_Redshift.py	py	November 12, 2024, 10:58:40 (UTC-05:00)

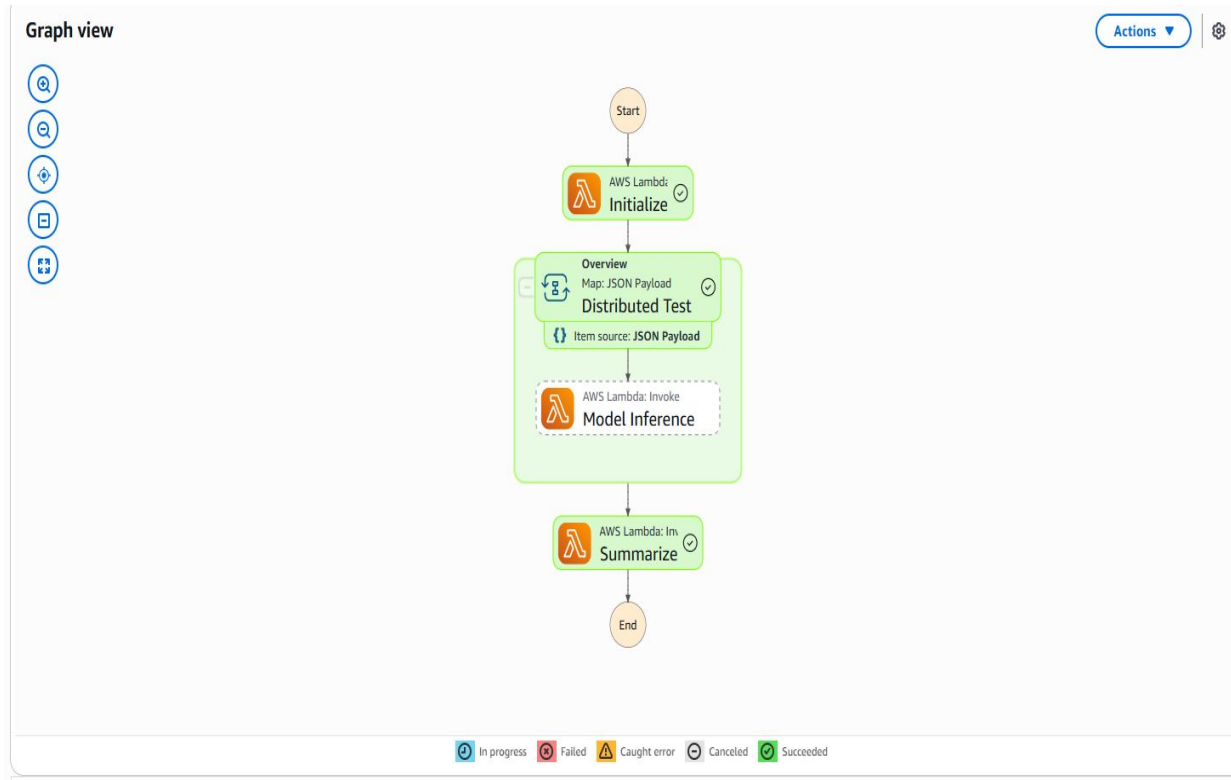
Edit payload

- 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

The screenshot displays the AWS CloudWatch console interface. The left sidebar contains navigation options: CloudWatch, Log groups, and a breadcrumb path to the specific log group: /aws/lambda/cosmic-init. The main panel shows the 'Log events' section for the log group 2025/07/20/[\$LATEST]ee381f7674284f6c9636... The interface includes a search bar, filters for time range (1m, 1h) and timezone (UTC), and a 'Display' button. The log events are listed in a table with columns for Timestamp and Message. The logs show a sequence of events: receiving event, successful connection, a warning, an error (KeyError: 'bucket' Traceback), and a report. The bottom of the console indicates 'No newer events at this moment' and provides a 'Back to top' button.

CloudWatch > Log groups > /aws/lambda/cosmic-init > 2025/07/20/[\$LATEST]ee381f7674284f6c9636...

CloudWatch <

Favorites and recents ▶

Dashboards

▶ AI Operations [New](#)

▶ Alarms [0](#) [0](#) [0](#) [0](#)

▼ Logs

[Log groups](#)

Log Anomalies

Live Tail

Logs Insights

Contributor Insights

▶ Metrics

▶ Application Signals (APM) [New](#)

GenAI Observability [Preview](#)

▶ Network Monitoring

▶ Insights

Settings

Telemetry config [New](#)

Getting Started

What's new

Log events [Refresh](#) [Actions](#) [Start tailing](#) [Create metric filter](#)

You can use the filter bar below to search for and match terms, phrases, or values in your log events. [Learn more about filter patterns](#)

Q Filter events - press enter to search

1m 1h [Clear](#) UTC timezone [Display](#)

▶	Timestamp	Message
▶	2025-07-20T20:58:41.419Z	receiving event: {'rendezvous_endpoint': 'rendezvous.uva-d...
▶	2025-07-20T20:58:41.421Z	renzdezvous connection successful!
▶	2025-07-20T20:58:41.421Z	[WARNING] 2025-07-20T20:58:41.421Z 17e56f70-d5a0-4aee-b5fe...
▶	2025-07-20T20:58:41.421Z	[ERROR] KeyError: 'bucket' Traceback (most recent call las...
▶	2025-07-20T20:58:41.431Z	END RequestId: 17e56f70-d5a0-4aee-b5fe-b99a97cc359b
▶	2025-07-20T20:58:41.431Z	REPORT RequestId: 17e56f70-d5a0-4aee-b5fe-b99a97cc359b Dur...
▶	2025-07-20T20:58:42.170Z	START RequestId: bee0c8ea-a66a-4d8a-9c26-efb0f7071218 Vers...
▶	2025-07-20T20:58:42.171Z	receiving event: {'rendezvous_endpoint': 'rendezvous.uva-d...
▶	2025-07-20T20:58:42.172Z	renzdezvous connection successful!
▶	2025-07-20T20:58:42.172Z	[WARNING] 2025-07-20T20:58:42.172Z bee0c8ea-a66a-4d8a-9c26...
▶	2025-07-20T20:58:42.172Z	[ERROR] KeyError: 'bucket' Traceback (most recent call las...
▶	2025-07-20T20:58:42.190Z	END RequestId: bee0c8ea-a66a-4d8a-9c26-efb0f7071218
▶	2025-07-20T20:58:42.190Z	REPORT RequestId: bee0c8ea-a66a-4d8a-9c26-efb0f7071218 Dur...
▶	2025-07-20T20:59:33.593Z	START RequestId: 9a6b6c42-e703-4cb7-ac97-91a78db059b9 Vers...
▶	2025-07-20T20:59:33.594Z	receiving event: {'rendezvous_endpoint': 'rendezvous.uva-d...
▶	2025-07-20T20:59:33.610Z	renzdezvous connection successful!
▶	2025-07-20T20:59:33.610Z	[WARNING] 2025-07-20T20:59:33.610Z 9a6b6c42-e703-4cb7-ac97...
▶	2025-07-20T20:59:33.611Z	[ERROR] KeyError: 'bucket' Traceback (most recent call las...
▶	2025-07-20T20:59:33.631Z	END RequestId: 9a6b6c42-e703-4cb7-ac97-91a78db059b9
▶	2025-07-20T20:59:33.631Z	REPORT RequestId: 9a6b6c42-e703-4cb7-ac97-91a78db059b9 Dur...

No newer events at this moment. [Auto retry paused](#) [Resume](#) [Back to top](#)

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 type and open-access networking

Amazon Elastic Container Service

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Amazon Elastic Container Service > Clusters > DS5110-Fargate-Cluster > Tasks

DS5110-Fargate-Cluster

Cluster overview

ARN

arn:aws:ecs:us-east-1:211125778552:cluster/DS5110-Fargate-Cluster

Status

Active

CloudWatch monitoring

Default

Services

Draining

Active

1

Tasks

Pending

-

Services

Tasks

Infrastructure

Metrics

Scheduled tasks

Configuration

Tags

Tasks (10)

Filter tasks by property or value

Filter desired status

Any desired status

Filter last status

Any last status


<input type="checkbox"/>	Task	Last status	Desired status	Task name	Health status	Created at
<input type="checkbox"/>	12c7750a4b504184aeb4c...	Running	Running	ren...	Unknown	4 hours ago

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




vice > ... > 12c7750a4b504184aeb4cae71808913d > Networking

< 12c7750a4b504184aeb4cae71808913d

Last updated July 20, 2025 at 21:15 (UTC-4:00)  [Stop](#)

Configuration | Logs | **Networking** | Volumes (0) | Tags

Network [Run Reachability Analyzer](#)

ENI ID eni-0809542cf10f18a1c	Task role ECSTaskRole
Subnet subnet-0fd60e13b4d7c9065	Task execution role ecsTaskExecutionRole
Security groups sg-07248e327a8dc9548 (default)	
Public IP  100.27.228.234 open address	
Private IP  172.31.25.3	
IPv6 address -	
MAC address  0a:ff:d4:cc:1b:3b	

Record for uva-ds5110.com was successfully created.

Route 53 propagates your changes to all of the Route 53 authoritative DNS servers within 60 seconds. Use "View status" button to check propagation status.

View status



Public uva-ds5110.com Info

Delete zone

Test record

Configure query logging

Hosted zone details

Edit hosted zone

Records (8)

DNSSEC signing

Hosted zone tags (0)

Records (8) Info



Delete record

Import zone file

Create record

Automatic mode is the current search behavior optimized for best filter results. [To change modes go to settings.](#)

Filter records by property or value

Type

Routing p...

Alias

< 1 > ⚙

<input type="checkbox"/>	Record ... ▾	Type ▾	Routin... ▾	Differ... ▾	Alias ▾	Value/Route traffic to ▲	TTL (s... ▾	Health ... ▾	Evalua... ▾	Re... ▾
<input type="checkbox"/>	rendevous...	A	Simple	-	No	100.27.228.234	300	-	-	-

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

▶	2025-07-20T20:53:44.639Z	START RequestId: cb4a47c1-39a8-4859-b777-f815b3121494 Vers...
▶	2025-07-20T20:53:44.640Z	receiving event: {'rendezvous_endpoint': 'rendezvous.uva-d...
▶	2025-07-20T20:53:44.649Z	renzdezvous connection successful!

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.