

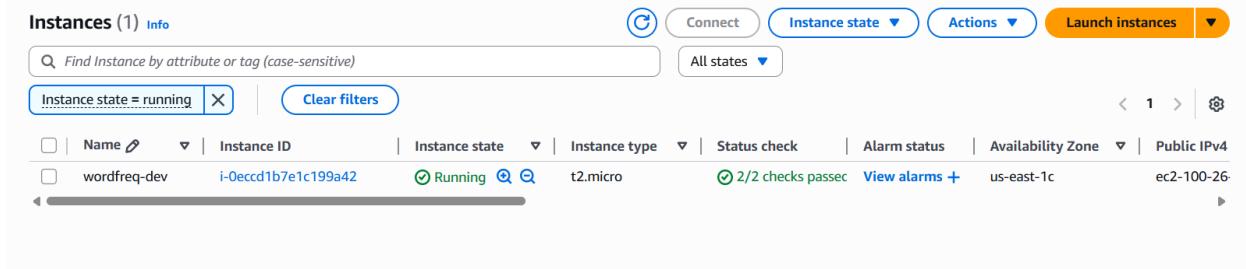
# LSDE Coursework Part 2 – Scaling the WordFreq Application

Rohan Anthony (2704500)

## Task A: Installing and Verifying the WordFreq Application

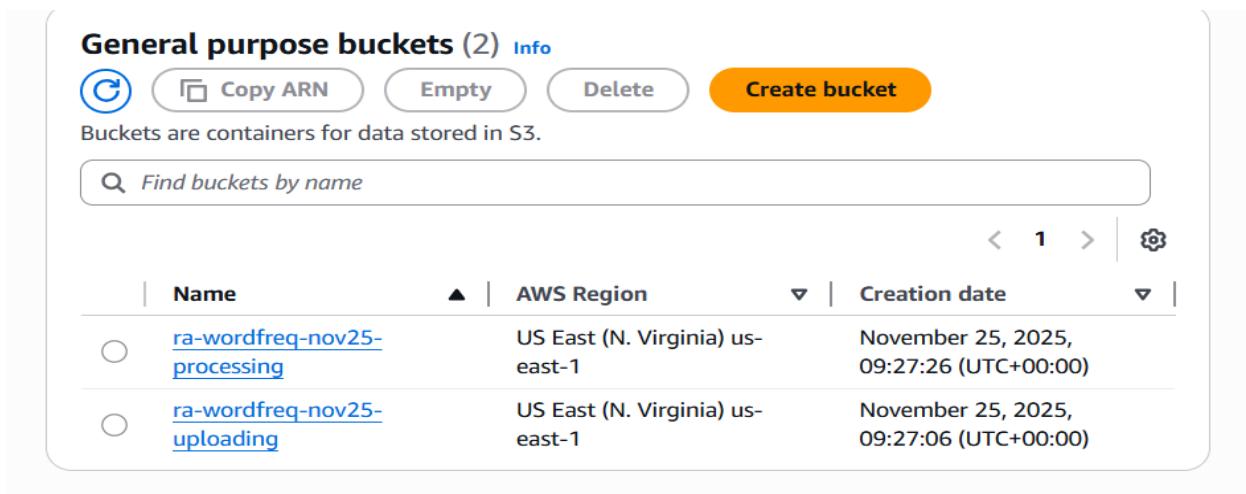
To begin the WordFreq application setup, we first accessed the AWS Learner Lab (142821) and ensured that the account had the specified \$50 credit. Task A involves deploying the required resources for the application and verifying the end-to-end flow for an uploaded text file. This includes creating the EC2 worker instance, configuring S3 buckets, setting up SQS queues, and a DynamoDB table.

The deployment consisted of an Ubuntu EC2 instance that runs the worker service, two S3 buckets used for storing uploaded and processed files, and two SQS queues used for holding jobs and the top 10 results of processed jobs. The setup script in the application also creates a DynamoDB table. Figures 2-4 show these resources created in the AWS account.



Instances (1) <a href="#">Info</a>									
<a href="#">Connect</a> <a href="#">Instance state ▾</a> <a href="#">Actions ▾</a> <a href="#">Launch instances ▾</a>									
<input type="text"/> <a href="#">Find Instance by attribute or tag (case-sensitive)</a> <a href="#">All states ▾</a>									
Instance state = <a href="#">running</a> <a href="#">X</a> <a href="#">Clear filters</a>									
□	Name <a href="#">D</a>	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4	
<input type="checkbox"/>	wordfreq-dev	i-0ecd1b7e1c199a42	<a href="#">Running</a> <a href="#">Q</a> <a href="#">Q</a>	t2.micro	<a href="#">2/2 checks passed</a> <a href="#">View alarms +</a>	us-east-1c	ec2-100-26		

Figure 2: EC2 Instance



General purpose buckets (2) <a href="#">Info</a>			
<a href="#">C</a> <a href="#">Copy ARN</a> <a href="#">Empty</a> <a href="#">Delete</a> <a href="#">Create bucket</a>			
Buckets are containers for data stored in S3.			
<input type="text"/> <a href="#">Find buckets by name</a>			
□	Name	AWS Region	Creation date
<input type="checkbox"/>	<a href="#">ra-wordfreq-nov25-processing</a>	US East (N. Virginia) us-east-1	November 25, 2025, 09:27:26 (UTC+00:00)
<input type="checkbox"/>	<a href="#">ra-wordfreq-nov25-uploading</a>	US East (N. Virginia) us-east-1	November 25, 2025, 09:27:06 (UTC+00:00)

Figure 3: S3 Buckets

Queues (2)		 Edit	Delete	Send and receive messages	Actions ▾	 Create queue	
		 Search queues by prefix					
	Name	Type	Created	Messages available	Messages in flight	Encryption	Content-based deduplication
	<a href="#">wordfreq-jobs</a>	Standard	2025-11-25T09:39+00:00	0	0	Amazon SQS key (SSE-SQS)	-
	<a href="#">wordfreq-results</a>	Standard	2025-11-25T09:40+00:00	1	0	Amazon SQS key (SSE-SQS)	-

Figure 4: SQS Queues

The application operates through an event-driven workflow across these services. When a text file is uploaded to the processing S3 bucket, the bucket's configured S3 event notification automatically sends a message to the jobs SQS queue containing the file location. The worker service running on EC2 continuously polls this queue for new messages. Upon receiving a new message, the worker service retrieves the S3 file and processes it to compute the top 10 most frequent words in the file. After processing the worker publishes the result to the results queue and stores the output in the DynamoDB wordfreq table.

To verify the installation, we uploaded a text file to the processing S3 bucket. This triggered an S3 event and pushed a new message in the jobs queue. The EC2 worker detected the job, processed the file, and successfully wrote the output to the DynamoDB table. This confirms the end-to-end working of the application. Figures 5-6 show the EC2 worker logs and the new record in the DynamoDB table.

```
ubuntu@ip-172-31-19-156:~/lsde-wordfreq-app$ ./run_worker.sh
Job Result Collector starting.
Job Message queue starting
Worker 0 starting; CTRL+C to quit
Processing message 9044745a-fd02-4de3-b118-8cb8a3c6a609
Worker 0 received job 9044745a-fd02-4de3-b118-8cb8a3c6a609
Received job result 9044745a-fd02-4de3-b118-8cb8a3c6a609
Successfully processed job 9044745a-fd02-4de3-b118-8cb8a3c6a609
Deleted message, 9044745a-fd02-4de3-b118-8cb8a3c6a609
```

Figure 5: EC2 Worker

**Table: wordfreq - Items returned (1)**

Scan started on November 25, 2025, 10:17:10

C Actions ▾ Create item

< 1 > | ⚙

	Filename (String)	Words
<input type="checkbox"/>	<a href="#">ra-wordfreq-nov25-pr...</a>	{ "movie": { "N": "1115" }, "would": { "N": "430" }, "book": { "N": "281" }, "there": { "N": "270" }, "the": { "N": "260" }, "and": { "N": "250" }, "of": { "N": "240" }, "a": { "N": "230" }, "in": { "N": "220" }, "it": { "N": "210" } }

Figure 6: DynamoDB Table

