AWS Project Report: Word Count with PySpark & Node.js Docker Deployment

Web App URL: http://3.89.209.39/
Docker Hub Repo URL: https://hub.docker.com/r/saiharsha027/node-webserver
Github: https://github.com/saiharsha27/word-count-spark-hands-on-11

Task 1: Word Count on AWS Lightsail using PySpark

Objective

To set up Apache Spark on a Lightsail instance and run a PySpark job to perform word count on a text file stored in an S3 bucket.

1. Lightsail Setup

- Instance: Amazon Linux 2 (1 GB RAM, 1 vCPU)
- Connect using SSH

2. Install Required Software

```
sudo yum update -y
sudo yum install java-11 -y
export JAVA_HOME=$(dirname $(dirname $(readlink -f $(which java))))
sudo mount -o remount,size=2G /tmp
sudo yum install python3-pip -y
pip3 install pyspark
```

3. PySpark Word Count Script (`word_count.py`)

```
from pyspark.sql import SparkSession

AWS_ACCESS_KEY_ID = 'YOUR_ACCESS_KEY'
AWS_SECRET_ACCESS_KEY = 'YOUR_SECRET_KEY'
S3_INPUT = 's3a://your-bucket/input_file.txt'
S3_OUTPUT = 's3a://your-bucket/output_folder/'

spark = SparkSession.builder \\\\
    .appName("WordCount") \\\\
    .config("spark.jars.packages",
"org.apache.hadoop:hadoop-aws:3.3.1,com.amazonaws:aws-java-sdk-bundle:1.11.901") \\\\
    .getOrCreate()
```

```
hadoop_conf = spark.sparkContext._jsc.hadoopConfiguration()
hadoop_conf.set("fs.s3a.access.key", AWS_ACCESS_KEY_ID)
hadoop_conf.set("fs.s3a.secret.key", AWS_SECRET_ACCESS_KEY)

text_file = spark.sparkContext.textFile(S3_INPUT)
counts = text_file.flatMap(lambda line: line.split()) \\\\
            .map(lambda word: (word, 1)) \\\\
            .reduceByKey(lambda a, b: a + b)
counts.saveAsTextFile(S3_OUTPUT)
spark.stop()
```

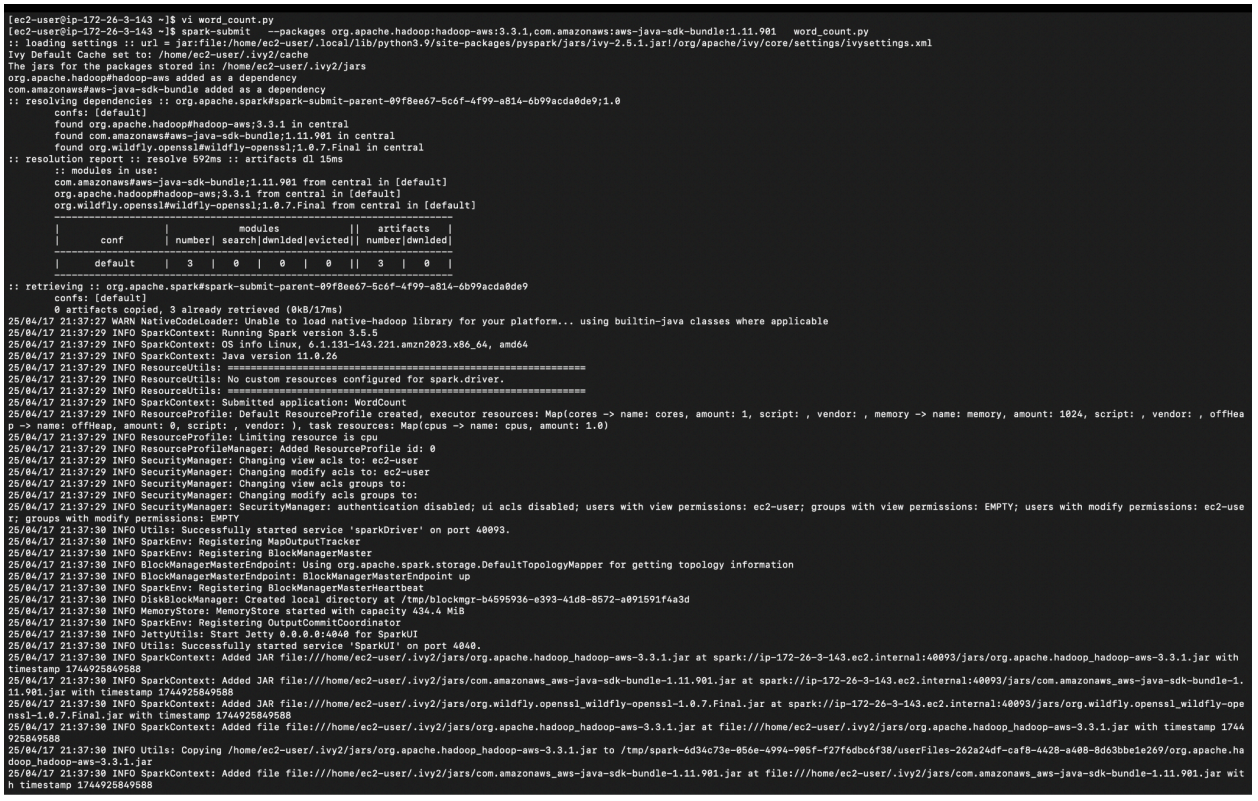
4. Run Spark Job

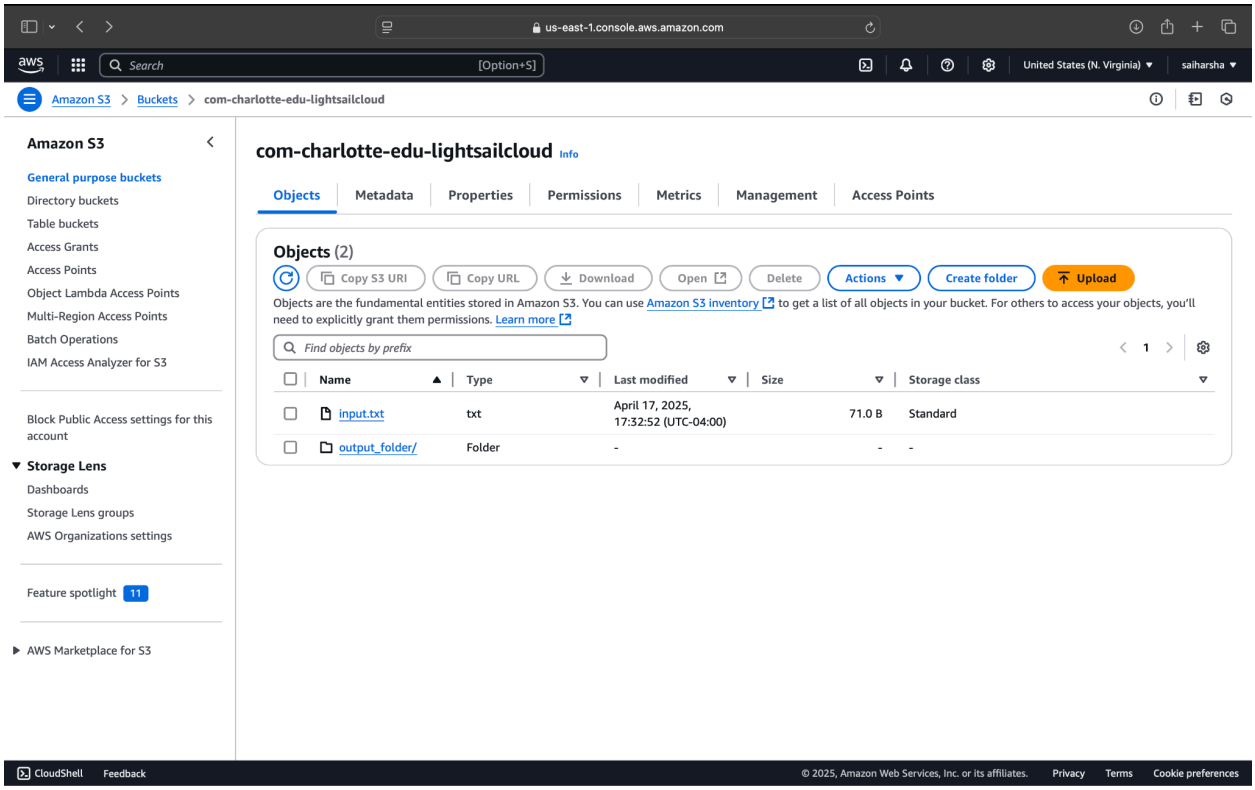
spark-submit word_count.py

5. Verification

- Output saved to S3 bucket.
- Spark UI accessible at port 4040.

Screenshots Captured




us-east-1.console.aws.amazon.com
Search
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United States (N. Virginia)
saiharsha
Amazon S3 > Buckets > com-charlotte-edu-lightsailcloud
Amazon S3
General purpose buckets
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Access Points
Object Lambda Access Points
Multi-Region Access Points
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Objects
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Objects (2)
Copy S3 URI
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Actions
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Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more
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Name
Type
Last modified
Size
Storage class
input.txt
txt
April 17, 2025, 17:32:52 (UTC-04:00)
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Standard
output_folder/
Folder
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CloudShell
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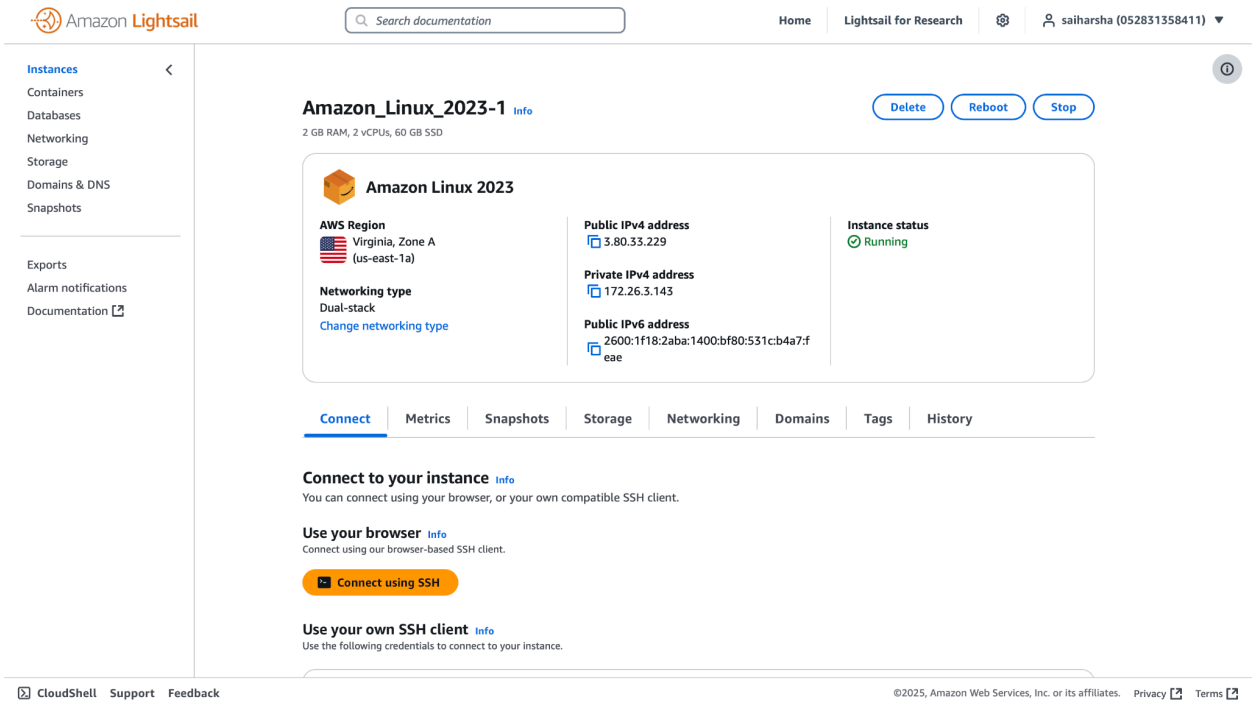
Amazon Lightsail
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saiharsha (052831358411)
Instances
Containers
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Networking
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Exports
Alarm notifications
Documentation
Amazon_Linux_2023-1 Info
2 GB RAM, 2 vCPUs, 60 GB SSD
Delete
Reboot
Stop
Amazon Linux 2023
AWS Region
Virginia, Zone A (us-east-1a)
Networking type
Dual-stack
Change networking type
Public IPv4 address
3.80.33.229
Private IPv4 address
172.26.3.143
Public IPv6 address
2600:1f18:2aba:1400:bf80:531c:b4a7:feae
Instance status
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History
Connect to your instance Info
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Task 2: Node.js Web Server with Docker Deployment

Objective

Create a Docker container for a Node.js app, test it locally, push it to Docker Hub, and deploy it on AWS Lightsail.

1. Node.js App Setup

```
mkdir node-webserver && cd node-webserver
npm init -y
npm install express
```

server.js:

```
const express = require('express');
const app = express();
const port = 3000;

app.get('/', (req, res) => {
  res.send('Hello, World! Running in Docker.');
});

app.listen(port, '0.0.0.0', () => {
  console.log(`Server running at <http://localhost>:${port}`);
});
```

2. Dockerize Application

Dockerfile:

```
FROM node:14
WORKDIR /app
COPY package*.json ./
RUN npm install
COPY . .
EXPOSE 3000
CMD ["node", "server.js"]
```

3. Build and Push Docker Image

docker buildx create --use
docker buildx build --platform linux/amd64 -t saiharsha027/node-webserver:latest --push .

4. Deploy on Lightsail

- Instance: Amazon Linux 2
- Installed Docker:

sudo yum install docker -y
sudo service docker start
sudo usermod -aG docker ec2-user

- Run container:

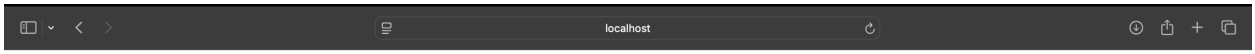
docker pull saiharsha027/node-webserver:latest
docker run -d -p 80:3000 saiharsha027/node-webserver:latest

- Ensure Lightsail firewall allows HTTP (port 80)

5. Verification

- Access via: `http://3.89.209.39/`
- Page should show: **Hello, World! Running in Docker.**

Screenshots Captured



Hello, World! Running in Docker.