

IS 698 CLOUD COMPUTING - PROJECT

JOB APPLICATION PORTAL

Design and Implementation of a Scalable Job Application
Tracking Platform on AWS Using Terraform,
CloudFormation, and Serverless Technology

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1. Introduction

This project focuses on designing and deploying a scalable, cloud-based web application using Amazon Web Services (AWS). The primary objective was to build an end-to-end infrastructure using modern Infrastructure-as-Code (IaC) practices and cloud-native services, while integrating automation, event-driven logging, and programmatic AWS interaction.

The system hosts a Job Application Portal that allows users to track job applications, upload resumes, and manage their job search progress. Application data is stored in an Amazon RDS MySQL database, while uploaded resumes are stored in Amazon S3. An AWS Lambda function automatically logs new file uploads to Amazon CloudWatch, demonstrating a serverless, event-driven workflow.

Infrastructure was provisioned using:

- **Terraform** for network components, including VPC, subnets, security groups, and S3 bucket.
- **CloudFormation** for compute, database, application load balancing, auto scaling, and serverless components.

The web application is hosted on Amazon EC2 instances behind an Application Load Balancer (ALB) and supports auto scaling. Additional automation was implemented using Python Boto3 scripts to demonstrate direct AWS service interaction, including S3 management, EC2 listing, and Lambda invocation.

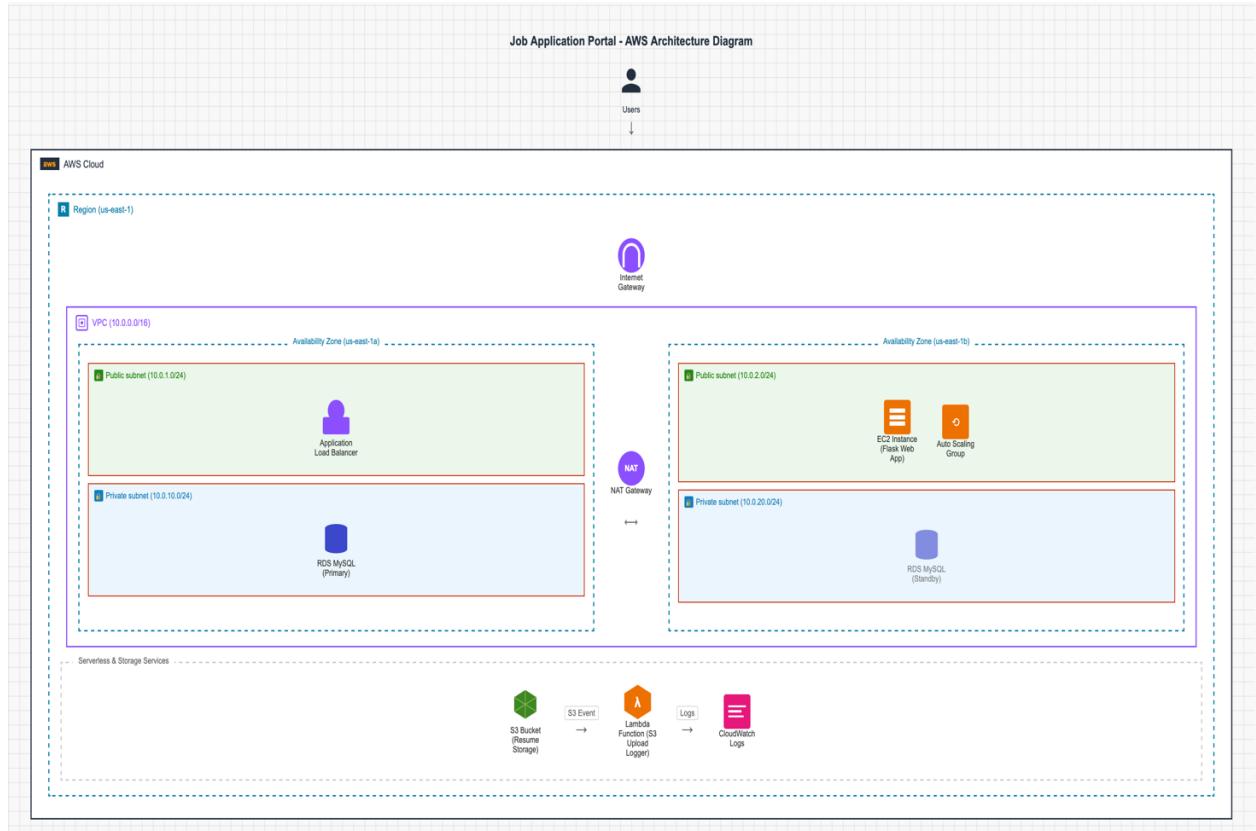
The final result is a fully functional, scalable cloud application demonstrating the combined use of:

- Infrastructure-as-code tools (Terraform and CloudFormation)
- Compute and serverless AWS services (EC2, Lambda)
- Storage and database backends (S3, RDS MySQL)
- SDK-based cloud interactions (Python Boto3)

GitHub Repository:

https://github.com/Harsh527lab/Cloud_Computing_project_architecture

2. Architecture Diagram



The architecture consists of the following components:

- **VPC (10.0.0.0/16)** with public and private subnets across two availability zones
- **Application Load Balancer** for distributing traffic to EC2 instances
- **EC2 Auto Scaling Group** running Flask web application
- **RDS MySQL** database in private subnets for data persistence
- **S3 Bucket** for resume file storage
- **Lambda Function** triggered by S3 uploads to log events to CloudWatch
- **NAT Gateway** for private subnet outbound connectivity
- **Security Groups** enforcing least-privilege access between services

3. Terraform and CloudFormation Scripts

Terraform was used exclusively to provision the fundamental networking components:

- Creation of a dedicated Virtual Private Cloud (VPC)
 - Configuration of public subnets for internet-facing services (ALB and EC2)
 - Configuration of private subnets for backend services (RDS)
 - Definition of route tables, internet gateway, NAT gateway, and subnet associations
 - Security groups for ALB, EC2, RDS, and Lambda
 - S3 bucket with versioning and encryption enabled

Terraform allowed the network to be declared in a fully reproducible manner. The resulting outputs included VPC ID, public subnet IDs, private subnet IDs, security group IDs, and S3 bucket name. These outputs were then referenced by the CloudFormation stacks to ensure consistent integration between tools.

Terraform script: The entire script has been uploaded in the GitHub repository under /terraform directory.

3.1 CloudFormation – Application & Service Layer

CloudFormation was used to deploy all primary AWS services required by the application:

- Application Load Balancer (ALB) with target groups and listeners
 - Launch Template and Auto Scaling Group for EC2 web servers
 - Amazon EC2 instances running Python Flask application
 - Amazon RDS MySQL database deployed in private subnets, with public access disabled
 - Security Groups controlling traffic: ALB → EC2 (HTTP), EC2 → RDS (MySQL 3306)

- AWS Lambda function written in Python to log S3 object upload events to CloudWatch
- IAM Roles and Policies granting controlled access between services

CloudFormation allowed the entire application stack to be created and updated using YAML templates. The project uses three separate stacks: ec2-webapp-stack.yaml, rds-stack.yaml, and lambda-stack.yaml for modular infrastructure management.

CloudFormation scripts: The entire scripts have been uploaded in the GitHub repository under /cloudformation directory.

Stacks (3)				
	Stack name	Status	Created time	Description
○	job-portal-ec2-v2	CREATE_COMPLETE	2025-12-07 03:10:03 UTC-0500	Job Portal - EC2 with Web Application
○	job-portal-lambda	CREATE_COMPLETE	2025-12-06 18:41:32 UTC-0500	Job Portal - Lambda Function Stack for S3 Upload Logging
○	job-portal-rds	CREATE_COMPLETE	2025-12-06 18:19:22 UTC-0500	Job Portal - RDS Database Stack

4. Step-by-Step Implementation Process

4.1 AWS Console Usage

The AWS Management Console was used to verify service deployments and monitor system functionality:

- **EC2 Dashboard:** Verified running instances launched by the Auto Scaling Group and confirmed health status through the Target Group associated with the ALB.
- **RDS Console:** Verified private subnet placement of the MySQL instance and confirmed that 'Publicly Accessible' was disabled.
- **S3 Console:** Uploaded test resumes through the web application and verified object creation within the designated bucket.
- **CloudWatch Logs:** Monitored real-time log entries created by the Lambda S3 upload logger.
- **Load Balancer Dashboard:** Verified listener routing and confirmed accessibility through the ALB DNS endpoint.

4.2 AWS CLI Interaction

AWS CLI commands were executed to deploy infrastructure and validate resource configuration:

- Deploy CloudFormation stacks using aws cloudformation create-stack
- Confirm running EC2 instances using aws ec2 describe-instances
- Enumerate deployed Lambda functions using aws lambda list-functions
- Check RDS instance status using aws rds describe-db-instances
- View CloudWatch logs using aws logs tail

```
harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws cloudformation create-stack \
--stack-name job-portal-rds \
--template-body file://rds-stack.yaml \
--parameters \
ParameterKey=VpcId,ParameterValue=vpc-006700469aeff974e \
ParameterKey=PrivateSubnetIds,ParameterValue="subnet-09b0a343dcf5197bd\,subnet-054a10e931093ff1e" \
ParameterKey=RDSSecurityGroupId,ParameterValue=sg-0d969a6dd19d00f73 \
ParameterKey=DBPassword,ParameterValue=YourPassword123!
{
  "StackId": "arn:aws:cloudformation:us-east-1:653842454976:stack/job-portal-rds/ffad6a10-d2f9-11f0-8591-12d173d1fd29"
}
```

```
harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws cloudformation create-stack \
[ --stack-name job-portal-lambda \
--template-body file://lambda-stack.yaml \
--capabilities CAPABILITY_NAMED_IAM \
--parameters 'ParameterKey=S3BucketName,ParameterValue=job-portal-dev-files-ktbop1q2'
{
  "StackId": "arn:aws:cloudformation:us-east-1:653842454976:stack/job-portal-lambda/17fe3560-d2fd-11f0-81df-0ef7f51bf4b9"
}
[harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws s3api put-bucket-notification-configuration --bucket job-portal-dev-files-ktbop1q2 --notification-configuration "{\"LambdaFunctionConfigurations\"::[{\"LambdaFunctionArn\":\"arn:aws:lambda:us-east-1:653842454976:function:job-portal-dev-s3-upload-logger\",\"Events\":[\"s3:ObjectCreated:*\"]}]}"
```

```
harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws cloudformation create-stack \
--stack-name job-portal-ec2-v2 \
--template-body file://ec2-webapp-stack.yaml \
--capabilities CAPABILITY_NAMED_IAM \
--parameters \
ParameterKey=VpcId,ParameterValue=vpc-006700469aeff974e \
ParameterKey=PublicSubnetIds,ParameterValue="subnet-0c5ffee7e6f8f2d52\,subnet-0a1ab054c619f5572" \
ParameterKey=PrivateSubnetIds,ParameterValue="subnet-09b0a343dcf5197bd\,subnet-054a10e931093ff1e" \
ParameterKey=ALBSecurityGroupId,ParameterValue=sg-0ffb56a2781b822a4 \
ParameterKey=EC2SecurityGroupId,ParameterValue=sg-042403c61abf1754 \
ParameterKey=S3BucketName,ParameterValue=job-portal-dev-files-ktbop1q2 \
ParameterKey=DBEndpoint,ParameterValue=job-portal-dev-db.c41mscumwggo.us-east-1.rds.amazonaws.com \
ParameterKey=DBPassword,ParameterValue=YourPassword123!
{
  "StackId": "arn:aws:cloudformation:us-east-1:653842454976:stack/job-portal-ec2-v2/220894f0-d344-11f0-bb40-0e9bf0ed4d47"
}
```

```

harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws logs tail /aws/lambda/job-portal-dev-s3-upload-logger
--since 10m
2025-12-07T08:19:19.415000+00:00 2025/12/07[$LATEST]dd1b410b11524dc8804a9160c003b4c7 INIT_START Runtime Version: python
n:3.11.v187 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:621ac689144ea9bc996443b608b02d97cdd92d2c95af1da
8c74a08767be04952
2025-12-07T08:19:19.498000+00:00 2025/12/07[$LATEST]dd1b410b11524dc8804a9160c003b4c7 START RequestId: 6da2e766-2452-43
a7-accf-46fd3fef6594 Version: $LATEST
2025-12-07T08:19:19.499000+00:00 2025/12/07[$LATEST]dd1b410b11524dc8804a9160c003b4c7 [INFO] 2025-12-07T08:19:19.498
6da2e766-2452-43a7-accf-46fd3fef6594 [job-portal] S3 Upload Event Received
2025-12-07T08:19:19.499000+00:00 2025/12/07[$LATEST]dd1b410b11524dc8804a9160c003b4c7 [INFO] 2025-12-07T08:19:19.499
6da2e766-2452-43a7-accf-46fd3fef6594 Event: {
  "Records": [
    {
      "eventVersion": "2.1",
      "eventSource": "aws:s3",
      "awsRegion": "us-east-1",
      "eventTime": "2025-12-07T08:19:18.103Z",
      "eventName": "ObjectCreated:Put",
      "userIdentity": {
        "principalId": "AWS:AROAZQPAMDHAP4A7HWCW7:i-0a5b8c410d1603f07"
      },
      "requestParameters": {
        "sourceIPAddress": "35.172.234.74"
      },
      "responseElements": {
        "x-amz-request-id": "835GQECVWCS69TV4",
        "x-amz-id-2": "QV0s3q7WBCaDODnuyAziWdp9ICQ28GLq3V3/+9mn/AUUXN3JrAdv5HyUnywdqzm9ZSo8L2Ac54PU5RJmihpOdV/2CsQmLI23"
      },
      "s3": {
        "s3SchemaVersion": "1.0",
        "configurationId": "ZmY4NWm5ZmEtMWY0Ni00MWU3LThmOTETNTlhNTIyYTFiNjB1",
        "bucket": {
          "name": "job-portal-dev-files-ktbop1q2",
          "ownerIdentity": {
            "principalId": "A3QOK5CQPM3KV6"
          },
          "arn": "arn:aws:s3:::job-portal-dev-files-ktbop1q2"
        },
        "object": {
          "key": "resumes/20251207081918_Harshith_Gudapati.pdf",
          "size": 185138,
          "eTag": "355e6d8040e0e7dd1fb159b6f15d7c18",
          "versionId": "c9b4J0n0NgGI3jPQDruPRgujzmpVkc9",
          "sequencer": "00693538860F7715C6"
        }
      }
    }
  ]
}

```

```

harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws cloudformation describe-stacks --stack-name job-portal
-rds --query "Stacks[0].StackStatus"
"CREATE_COMPLETE"
harshithgudapati@Harshiths-MacBook-Air-1815 cloudformation % aws rds describe-db-instances --query "DBInstances[*].[DBI
nstanceIdentifier,DBInstanceStatus,Endpoint.Address]" --output table
-----
|                               DescribeDBInstances                               |
+-----+-----+-----+
| job-portal-dev-db | available | job-portal-dev-db.c41mscumwggo.us-east-1.rds.amazonaws.com |
+-----+-----+-----+

```

4.3 Python Boto3 Automation Scripts

Three Python scripts were developed using the Boto3 SDK to demonstrate programmatic AWS interaction:

s3_operations.py - S3 Bucket Operations

- Lists all S3 buckets in the account
- Creates a uniquely named S3 bucket
- Uploads a text file into the bucket
- Verifies upload success via console and CLI

```

[(myenv) harshithgudapati@Harshiths-MacBook-Air-1815 boto3-scripts % python3 s3_operations.py
=====
AWS S3 Operations Demo - Job Portal Project
=====

🚀 Starting S3 operations demo...
Bucket name: job-portal-dev-files-4bnck3m8
Region: us-east-1

=====
STEP 1: List Existing Buckets
=====

📦 S3 Buckets in Account:
-----
• job-portal-dev-files-ktbop1q2 (Created: 2025-12-06 22:45:14)

Total: 1 bucket(s)

=====
STEP 2: Create New Bucket
=====
✓ Bucket 'job-portal-dev-files-4bnck3m8' created successfully!
✓ Versioning enabled for bucket 'job-portal-dev-files-4bnck3m8'
✓ Tags added to bucket 'job-portal-dev-files-4bnck3m8'

=====
STEP 3: Upload Sample Files
=====
✓ Content uploaded to 's3://job-portal-dev-files-4bnck3m8/resumes/john_doe_resume.txt'
✓ Content uploaded to 's3://job-portal-dev-files-4bnck3m8/logos/company_logo.txt'

=====
STEP 4: List Uploaded Objects
=====

📄 Objects in 's3://job-portal-dev-files-4bnck3m8/':
-----
• logos/company_logo.txt (0.04 KB, Modified: 2025-12-07 08:34:00)
• resumes/john_doe_resume.txt (0.28 KB, Modified: 2025-12-07 08:34:00)

Total: 2 object(s)

=====
STEP 5: Get Bucket Information
=====

🌐 Bucket Information: job-portal-dev-files-4bnck3m8
-----
Region: us-east-1
Versioning: Enabled
Tags: {
    "Project": "job-portal",
    "Environment": "dev",
    "ManagedBy": "boto3"
}

=====
S3 Operations Demo Complete!
=====
```

ec2_operations.py - EC2 Instance Operations

- Uses Boto3's `describe_instances()` API
- Retrieves instance ID, type, availability zone, and state
- Prints details of all running EC2 instances within the region

```

(myenv) harshithgudapati@Harshiths-MacBook-Air-1B15 boto3-scripts % python3 ec2_operations.py
=====
AWS EC2 Operations Demo - Job Portal Project
=====

Starting EC2 operations demo...
Region: us-east-1
Project: job-portal

STEP 1: List All EC2 Instances
=====
All EC2 Instances:
● i-0a5bdc45c48d1689f7 - N/A (running)

STEP 2: List Running EC2 Instances
=====
Running EC2 Instances:
Instance: i-0a5bdc45c48d1689f7
Name: N/A
Type: t2.micro
State: running
Private IP: 10.0.2.198
Public IP: 38.172.234.74
AZ: us-east-1b
VPC ID: vpc-0849e9ff9746
Launched: 2025-12-07 08:10:47

Total: 1 running instance(s)

STEP 3: Retrieve EC2 Metadata
=====
EC2 metadata service not available.
(This is normal when running outside of EC2)
Mock Metadata (for demonstration):
instance-id: i-0123456789abcdef
instance-type: t2.micro
image-id: ami-0123456789abcdef0
local-ipv4: 10.0.1.100
availability-zone: us-east-1a
region: us-east-1

STEP 4: Filter Instances by Project Tag
=====
Instances with tag Project:job-portal:
No matching instances found.

STEP 5: Get Detailed Instance Information
=====
Instance Details: i-0a5bdc45c48d1689f7
{
    "instance_id": "i-0a5bdc45c48d1689f7",
    "name": null,
    "state": "running",
    "private_ip": "10.0.2.198",
    "public_ip": "38.172.234.74",
    "vpc_id": "vpc-0849e9ff9746",
    "public_dns": "ec2-35-172-234-74.compute-1.amazonaws.com",
    "ami_id": "ami-0807a840a9474674",
    "root_device_name": "/dev/sda1",
    "availability_zone": "us-east-1b",
    "tags": [
        "job-portal-dev-ec2-0g"
    ],
    "key_name": "null-1560017654de900",
    "key_fingerprint": "null-1560017654de900",
    "root_device_type": "ebs",
    "tags": [
        {
            "aws:cloudformation:stack-id": "arn:aws:cloudformation:us-east-1:653842654976:stack/job-portal-ec2-v2/228894fb-d344-11fe-bb40-9e9b08ed4d47",
            "aws:cloudformation:stack-name": "job-portal-ec2-v2-A50-tnZv7aGQ700",
            "aws:cloudformation:stack-status": "CREATE_COMPLETE"
        }
    ]
}
✓ Instance Status: i-0a5bdc45c48d1689f7
  State: running
  System Status: ok
  Instance Status: ok
  AZ: us-east-1b

EC2 Operations Demo Complete!
=====

(myenv) harshithgudapati@Harshiths-MacBook-Air-1B15 boto3-scripts %

```

lambda_operations.py - Lambda Function Operations

- Lists all Lambda functions in the account
- Manually invokes the S3 logging Lambda function using Boto3
- Sends a test JSON payload
- Verifies invocation success via terminal output and matching CloudWatch log entries

```
❯❯❯ aws lambda invoke --function job-portal-dev-v3-upload-logger --cli-binary-format raw-in-base64-out > logs.log

AWS Lambda Operations Demo - Job Portal Project

Starting Lambda operations demo...
Target Function: job-portal-dev-v3-upload-logger
Target Function: job-portal-dev-v3-upload-logger

STEP 1: List All Lambda Functions

# Lambda Functions:
Function: job-portal-dev-v3-upload-logger
Memory: 128 MB
Runtime: Python3.11
Description: Logs S3 file uploads to CloudWatch...
Last Modified: 2025-12-01T12:43:06.700Z

Total 1 Function(s)

STEP 2: Get Function Details

# Lambda Function Details: job-portal-dev-v3-upload-logger

ARN: arn:aws:lambda:us-east-1:163882426497:function:job-portal-dev-v3-upload-logger
Name: job-portal-dev-v3-upload-logger
Handler: index.lambda_handler
Role: arn:aws:iam::163882426497:role/job-portal-dev-lambda-role
Timeout: 30 seconds
Code Size: 4.4 KB
State: Active
Container Image: n/a
Lambda Layer ARN: n/a
IAM Role: arn:aws:iam::163882426497:role/job-portal-dev-lambda-role
Last Modified: 2025-12-01T12:43:06.700Z

STEP 3: Get Function Configuration

# Function Configuration: job-portal-dev-v3-upload-logger

Environment Variables:
ENVIRONMENT: dev
FUNCTION_NAME: job-portal-dev-v3-upload-logger
VPC Config: Not in VPC
Tracing: Passthrough
Layers: 0 layer(s)

STEP 4: Invoke Lambda Function (Synchronous)

# Invoking Lambda Function: job-portal-dev-v3-upload-logger

# Request type: RequestResponse
Payload:
{
    "Records": [
        {
            "eventTime": "2025-12-07T07:13:58.589Z",
            "eventName": "ObjectCreated:Put",
            "s3": {
                "bucket": {
                    "name": "job-portal-dev-files"
                },
                "object": {
                    "key": "resumes/test_resume.pdf",
                    "size": 58248
                }
            },
            "requestParameters": {
                "sourceIPAddress": "192.168.1.108"
            },
            "userIdentity": {
                "principalId": "BOT03_TEST_USER"
            }
        }
    ]
}

# Lambda Invocation Result:

Status Code: 200
Executed Version: $LATEST
Execution Duration: 20ms
Statistics:
  *Statistical Metrics*: 200
  *Logs*: <Log Output>: "{'s3': {'records': [{}]} upload event logged successfully!V, 'records_processed': 1}">

STEP 5: Get Recent Function Logs

# Recent Log Entries for job-portal-dev-v3-upload-logger
Log Stream: 2025/12/07/[$LATEST]fr2c15843792f20fe181d4659378
[2025-12-07 03:48:52,982] INIT Runtime Version: python3.11.v1.1587 Runtime Version ARN: arn:aws:lambda:us-east-1:runtime:al21a89214a5e99443b648b8f2d7cd92dcf95f1de8c7a8877e04952
[2025-12-07 03:48:52,982] START Runtime Version: 722584a-2623-4428-8456-908884ad81 Version: SLATEST
```

```

STEP 6: Get Recent Function Logs
=====
Recent Logs for: job-portal-dev-s3-upload-logger
Log Stream: 2025/12/07/[SLATEST]f6c231853e754f2bfae81b14e0559378
[2025-12-07 03:40:52.054000] [INFO] 2025-12-07 [SLATEST] Runtime Version: python:3.11.v107 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:id:621acd89144a9bc996443bd6989d297cd92dc95ef1da8c7a08767be04952
[2025-12-07 03:40:52.129000] [INFO] Start RequestId: 7223584e-2023-4420-8456-9b85884ad83 Version: SLATEST
[2025-12-07 03:40:52.129000] [INFO] 2025-12-07T08:40:52.129Z 7223584e-2023-4420-8456-9b85884ad83 [job-portal] S3 Upload Event Received
[2025-12-07 03:40:52.129000] [INFO] 2025-12-07T08:40:52.129Z 7223584e-2023-4420-8456-9b85884ad83 Event: (
'Record': [
    {
        "eventVersion": "2.1",
        "eventSource": "aws:s3",
        "awsRegion": "us-east-1",
        "eventTime": "2025-12-07T08:40:51.883Z",
        "eventName": "ObjectCreated:Put",
        "userIdentity": {
            "principalId": "AWS:ARDAOZPAMCHAP4A7HmCW7:i-9a5b8c418d1683f67"
        },
        "requestParameters": {
            "sourceIPAddress": "35.172.234.74"
        },
        "responseElements": {
            "x-amz-request-id": "44242AKFQDZTNSXCSH",
            "x-amz-id-2": "U0t1W5nqaz2w1YvD0xij+1PzYfJjtYcp/3301dvh5za881B35/sphE=0Ufnvh0g2rANJZm683pcu0bdPQRXY4XLB6kZ+01"
        },
        "s3SchemaVersion": "1.0",
        "configurationId": "2xyANMMS2zEtMWhY8N180MMULThmOTEtNTIuNTIyYTFinjB1",
        "bucket": {
            "name": "job-portal-dev-files-ktbop1q2",
            "ownerIdentity": {
                "principalId": "A3QKQSCQPMK3KV6"
            }
        },
        "arn": "arn:aws:s3:::job-portal-dev-files-ktbop1q2"
    },
    {
        "object": {
            "key": "resumes/20251207084051_ASC_Guest_services_and_operations.pdf",
            "size": 62265,
            "lastModified": "2025-12-07T08:43:22Z",
            "versionId": "774459744524ca66477c342f4cc5a",
            "sequencer": "066958350988ECB680"
        }
    }
]
}
[2025-12-07 03:40:52.129000] [INFO] 2025-12-07T08:40:52.121Z 7223584e-2023-4420-8456-9b85884ad83 S3 Upload Details: (
'timestamp': '2025-12-07T08:40:51.883Z',
'prefix': '',
'suffix': '',
'environment': 'dev',
'event_type': 'ObjectCreated:Put',
'bucket': 'job-portal-dev-files-ktbop1q2',
'object_key': 'resumes/20251207084051_ASC_Guest_services_and_operations.pdf',
'object_size_bytes': 62256,
'object_size_gb': '0.00006256 GB',
'request_id': '44242AKFQDZTNSXCSH',
'owner_agent': 'AWS:ARDAOZPAMCHAP4A7HmCW7:i-9a5b8c418d1683f67'
)
[2025-12-07 03:40:52.129000] [INFO] 2025-12-07T08:40:52.212Z 7223584e-2023-4420-8456-9b85884ad83 File Category: resume | Extension: pdf
[2025-12-07 03:40:52.129000] [END RequestId: 7223584e-2023-4420-8456-9b85884ad83]
[2025-12-07 03:40:52.129000] [REPORT RequestId: 7223584e-2023-4420-8456-9b85884ad83 Duration: 1.98 ms Billed Duration: 95 ms Memory Size: 128 MB Max Memory Used: 35 MB Init Duration: 92.58 ms
=====

Lambda Operations Demo Complete!

```

All scripts were included in the GitHub repository under the /boto3-scripts directory along with execution documentation.

5. Screenshots of the Deployment

a) Terraform

Terraform init and validate:

```
harshithgudapati@Harshiths-MacBook-Air-1815 terraform % terraform init
Initializing the backend...
Initializing modules...
[- security_groups in modules/security-groups
- vpc in modules/vpc
Initializing provider plugins...
- Finding hashicorp/aws versions matching "~> 5.0"...
- Finding latest version of hashicorp/random...
- Installing hashicorp/aws v5.100.0...
- Installed hashicorp/aws v5.100.0 (signed by HashiCorp)
- Installing hashicorp/random v3.7.2...
- Installed hashicorp/random v3.7.2 (signed by HashiCorp)
Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and prompt you to do so if necessary.
```

Terraform plan:

```

harshithgudapati@Marshiths-MacBook-Air-1815:~/Desktop$ terraform plan
Terraform used the selected providers to generate the following execution plan.
Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:

# aws_s3_bucket.app_bucket will be created
+ resource "aws_s3_bucket" "app_bucket" {
  + acceleration_status      = (known after apply)
  + acl                      = (known after apply)
  + arn                      = (known after apply)
  + bucket                   = (known after apply)
  + bucket_domain_name       = (known after apply)
  + bucket_prefix             = (known after apply)
  + bucketRegionalDomainName = (known after apply)
  + force_destroy            = false
  + hostedZoneId             = (known after apply)
  + id                       = (known after apply)
  + objectLockEnabled         = (known after apply)
  + policy                   = (known after apply)
  + region                   = (known after apply)
  + requestPayer              = (known after apply)
  + tags                     = {
    + "Name" = "job-portal-files"
  }
  + tags_all                 = {
    + "Environment" = "dev"
    + "Managedby"   = "terraform"
    + "Name"        = "job-portal-files"
    + "Project"     = "job-portal"
  }
  + websiteDomain           = (known after apply)
  + websiteEndpoint          = (known after apply)

  + cors_rule (known after apply)
  + grant (known after apply)
  + lifecycle_rule (known after apply)
  + logging (known after apply)
  + objectLockConfiguration (known after apply)
  + replicationConfiguration (known after apply)
  + serverSideEncryptionConfiguration (known after apply)
  + versioning (known after apply)
  + website (known after apply)
}

# aws_s3_bucket_server_side_encryption_configuration.app_bucket_encryption will be created
+ resource "aws_s3_bucket_server_side_encryption_configuration" "app_bucket_encryption" {
  + bucket = (known after apply)
  + id     = (known after apply)

  + rule {
    + applyServerSideEncryptionByDefault {
      + sseAlgorithm = "AES256"
      # (1 unchanged attribute hidden)
    }
  }
}

# aws_s3_bucket_versioning.app_bucket_versioning will be created
+ resource "aws_s3_bucket_versioning" "app_bucket_versioning" {
  + bucket = (known after apply)
  + id     = (known after apply)

  + versioningConfiguration {
    + mfaDelete = (known after apply)
    + status     = "Enabled"
  }
}

# random_string.suffix will be created
+ resource "random_string" "suffix" {
}

```

Plan: 22 to add, 0 to change, 0 to destroy.

Changes to Outputs:

```

+ alb_security_group_id      = (known after apply)
+ cloudformationParameters = {
  + alb_sg_id      = (known after apply)
  + ec2_sg_id      = (known after apply)
  + private_subnet_ids = (known after apply)
  + public_subnet_ids = (known after apply)
  + rds_sg_id      = (known after apply)
  + s3_bucket_name  = (known after apply)
  + vpc_id          = (known after apply)
}
+ ec2_security_group_id      = (known after apply)
+ private_subnet_ids         = [
  + (known after apply),
  + (known after apply),
]
+ public_subnet_ids          = [
  + (known after apply),
  + (known after apply),
]
+ rds_security_group_id      = (known after apply)
+ s3_bucket_arn               = (known after apply)
+ s3_bucket_name              = (known after apply)
+ vpc_id                      = (known after apply)

```

Terraform apply:

```
[harshithgudapati@Harshiths-MacBook-Air-1815 terraform % terraform apply

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the
following symbols:
+ create

Terraform will perform the following actions:

# aws_s3_bucket.app_bucket will be created
+ resource "aws_s3_bucket" "app_bucket" {
    + acceleration_status      = (known after apply)
    + acl                      = (known after apply)
    + arn                      = (known after apply)
    + bucket                   = (known after apply)
    + bucket_domain_name       = (known after apply)
    + bucket_prefix             = (known after apply)
    + bucketRegionalDomainName = (known after apply)
    + force_destroy            = false
    + hostedZoneId             = (known after apply)
    + id                       = (known after apply)
    + objectLockEnabled         = (known after apply)
    + policy                   = (known after apply)
    + region                   = (known after apply)
    + requestPayer              = (known after apply)
    + tags                     = {
        + "Name" = "job-portal-files"
    }
    + tags_all                 = {
        + "Environment" = "dev"
        + "ManagedBy"   = "terraform"
        + "Name"        = "job-portal-files"
        + "Project"     = "job-portal"
    }
    + websiteDomain           = (known after apply)
    + websiteEndpoint          = (known after apply)

    + cors_rule (known after apply)
    + grant (known after apply)
    + lifecycle_rule (known after apply)
    + logging (known after apply)
    + objectLockConfiguration (known after apply)
    + replicationConfiguration (known after apply)
    + serverSideEncryptionConfiguration (known after apply)
    + versioning (known after apply)
    + website (known after apply)
}

# aws_s3_bucket_server_side_encryption_configuration.app_bucket_encryption will be created
+ resource "aws_s3_bucket_server_side_encryption_configuration" "app_bucket_encryption" {
    + bucket = (known after apply)
    + id     = (known after apply)

    + rule {
        + applyServerSideEncryptionByDefault {
            + sseAlgorithm = "AES256"
            # (1 unchanged attribute hidden)
        }
    }
}

# aws_s3_bucket_versioning.app_bucket_versioning will be created
+ resource "aws_s3_bucket_versioning" "app_bucket_versioning" {
    + bucket = (known after apply)
    + id     = (known after apply)

    + versioningConfiguration {
        + mfaDelete = (known after apply)
        + status    = "Enabled"
    }
}

# random_string.suffix will be created
+ resource "random_string" "suffix" {
    + id      = (known after apply)
    + length  = 8
    + lower   = true
    + minLower = 0
}
```

```

Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

random_string.suffix: Creating...
random_string.suffix: Creation complete after 0s [id=ktbop1q2]
module.vpc.aws_vpc.main: Creating...
aws_s3_bucket.app_bucket: Creating...
aws_s3_bucket.app_bucket: Creation complete after 1s [id=job-portal-dev-files-ktbop1q2]
aws_s3_bucket_versioning.app_bucket_versioning: Creating...
aws_s3_bucket_server_side_encryption_configuration.app_bucket_encryption: Creating...
aws_s3_bucket_server_side_encryption_configuration.app_bucket_encryption: Creation complete after 0s [id=job-portal-dev-files-ktbop1q2]
aws_s3_bucket_versioning.app_bucket_versioning: Creation complete after 2s [id=job-portal-dev-files-ktbop1q2]
module.vpc.aws_vpc.main: Still creating... [00m10s elapsed]
module.vpc.aws_vpc.main: Creation complete after 12s [id=vpc-006700469aeff974e]
module.vpc.aws_subnet.public[0]: Creating...
module.vpc.aws_subnet.private[0]: Creating...
module.vpc.aws_subnet.public[1]: Creating...
module.vpc.aws_internet_gateway.main: Creating...
module.vpc.aws_subnet.private[1]: Creating...
module.security_groups.aws_security_group.lambda: Creating...
module.security_groups.aws_security_group.alb: Creating...
module.vpc.aws_internet_gateway.main: Creation complete after 0s [id=igw-0299b9cf89bc101fd]
module.vpc.aws_eip.nat: Creating...
module.vpc.aws_route_table.public: Creating...
module.vpc.aws_subnet.private[1]: Creation complete after 1s [id=subnet-054a10e931093ff1e]
module.vpc.aws_subnet.private[0]: Creation complete after 1s [id=subnet-09b0a343dcf5197bd]
module.vpc.aws_eip.nat: Creation complete after 1s [id=eipalloc-0a38ad6583bd36835]
module.vpc.aws_route_table.public: Creation complete after 2s [id=rtb-074bc911afdf62e864]
module.security_groups.aws_security_group.lambda: Creation complete after 2s [id=sg-047a0d5f3459200cc]
module.security_groups.aws_security_group.alb: Creation complete after 3s [id=sg-0ffb56a2781b822a4]
module.security_groups.aws_security_group.ec2: Creating...
module.security_groups.aws_security_group.ec2: Creation complete after 3s [id=sg-042403c6e1abf1754]
module.security_groups.aws_security_group.rds: Creating...
module.security_groups.aws_security_group.rds: Creation complete after 3s [id=sg-0d969a6dd19d00f73]
module.vpc.aws_subnet.public[1]: Still creating... [00m10s elapsed]
module.vpc.aws_subnet.public[0]: Still creating... [00m10s elapsed]
module.vpc.aws_subnet.public[0]: Creation complete after 11s [id=subnet-0c5ffee7e6f8f2d52]
module.vpc.aws_nat_gateway.main: Creating...
module.vpc.aws_subnet.public[1]: Creation complete after 11s [id=subnet-0a1ab054c619f5572]
module.vpc.aws_route_table_association.public[1]: Creating...
module.vpc.aws_route_table_association.public[0]: Creating...
module.vpc.aws_route_table_association.public[1]: Creation complete after 1s [id=rtbassoc-04a7029a7f681a52e]
module.vpc.aws_route_table_association.public[0]: Creation complete after 1s [id=rtbassoc-06b6f9f46783aae72]
module.vpc.aws_nat_gateway.main: Still creating... [00m10s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [00m20s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [00m30s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [00m40s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [00m50s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [01m00s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [01m10s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [01m20s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [01m30s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [01m40s elapsed]
module.vpc.aws_nat_gateway.main: Still creating... [01m50s elapsed]
module.vpc.aws_nat_gateway.main: Creation complete after 1m54s [id=nat-00cd8320585d4e3b3]
module.vpc.aws_route_table.private: Creating...
module.vpc.aws_route_table.private: Creation complete after 1s [id=rtb-0efe052c67aef1c04]
module.vpc.aws_route_table_association.private[1]: Creating...
module.vpc.aws_route_table_association.private[0]: Creating...
module.vpc.aws_route_table_association.private[0]: Creation complete after 1s [id=rtbassoc-0aec687ff29cfbc9a]
module.vpc.aws_route_table_association.private[1]: Creation complete after 1s [id=rtbassoc-08e0b7f2d38b3e277]

Apply complete! Resources: 22 added, 0 changed, 0 destroyed.

Outputs:

alb_security_group_id = "sg-0ffb56a2781b822a4"
cloudformation_parameters = {
  "alb_sg_id" = "sg-0ffb56a2781b822a4"
  "ec2_sg_id" = "sg-042403c6e1abf1754"
  "private_subnet_ids" = "subnet-09b0a343dcf5197bd, subnet-054a10e931093ff1e"
  "public_subnet_ids" = "subnet-0c5ffee7e6f8f2d52, subnet-0a1ab054c619f5572"
  "rds_sg_id" = "sg-0d969a6dd19d00f73"
  "s3_bucket_name" = "job-portal-dev-files-ktbop1q2"
  "vpc_id" = "vpc-006700469aeff974e"
}
ec2_security_group_id = "sg-042403c6e1abf1754"
private_subnet_ids = [

```

b) VPC

vpc-006700469aef974e / job-portal-dev-vpc

Actions ▾

Details Info		Block Public Access		DNS hostnames	
VPC ID vpc-006700469aef974e	State Available	Off	DHCP option set dopt-0527e91e312baec75	Main route table rtb-03e36fe09872d3469	
DNS resolution Enabled	Tenancy default	IPv4 CIDR 10.0.0.0/16	IPv6 pool -	Owner ID 653842454976	
Main network ACL acl-018c572a86552fd0	Default VPC No	Network Address Usage metrics Disabled	Route 53 Resolver DNS Firewall rule groups -		
IPv6 CIDR (Network border group) -	Encryption control mode -				

[Resource map](#) | [CIDRs](#) | [Flow logs](#) | [Tags](#) | [Integrations](#)

Resource map [Info](#)

```

graph LR
    VPC[job-portal-dev-vpc] --- Subnets[Subnets (4)]
    Subnets --- usEast1a[us-east-1a]
    Subnets --- usEast1b[us-east-1b]
    usEast1a --- subnet1a1[job-portal-dev-public-subnet-1]
    usEast1a --- subnet1a2[job-portal-dev-private-subnet-1]
    usEast1b --- subnet1b1[job-portal-dev-public-subnet-2]
    usEast1b --- subnet1b2[job-portal-dev-private-subnet-2]
    RouteTables[Route tables (3)] --- rtb1[rtb-03e36fe09872d3469]
    RouteTables --- rtb2[job-portal-dev-public-rt]
    RouteTables --- rtb3[job-portal-dev-private-rt]
    NetworkConnections[Network Connections] --- igw[job-portal-dev-igw]
    NetworkConnections --- natgw[job-portal-dev-nat-gw]
    subnet1a1 --- rtb1
    subnet1a2 --- rtb1
    subnet1b1 --- rtb2
    subnet1b2 --- rtb2
    rtb1 --- igw
    rtb2 --- natgw
    rtb3 --- natgw
  
```

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c) Subnets

Subnets (10) [Info](#)

Last updated less than a minute ago [Actions ▾](#) [Create subnet](#)

<input type="checkbox"/>	Name	Subnet ID	State	VPC	Block Public...	IPv4 CIDR	IPv6 CIDR
<input type="checkbox"/>	-	subnet-08a609c9cb2adc1ff	Available	vpc-080b4bb70c2cfe663	Off	172.31.32.0/20	-
<input type="checkbox"/>	-	subnet-0d9a061339d2d1f05	Available	vpc-080b4bb70c2cfe663	Off	172.31.80.0/20	-
<input type="checkbox"/>	-	subnet-0a6ed8972f1f75a5a	Available	vpc-080b4bb70c2cfe663	Off	172.31.48.0/20	-
<input type="checkbox"/>	-	subnet-0931459e64b108450	Available	vpc-080b4bb70c2cfe663	Off	172.31.64.0/20	-
<input type="checkbox"/>	job-portal-dev-private-subnet-1	subnet-09b0a343dcf5197bd	Available	vpc-006700469aef974e job-p...	Off	10.0.10.0/24	-
<input type="checkbox"/>	job-portal-dev-public-subnet-2	subnet-0a1ab054c619f5572	Available	vpc-006700469aef974e job-p...	Off	10.0.2.0/24	-
<input type="checkbox"/>	job-portal-dev-public-subnet-1	subnet-0c5ffee7e6f8f2d52	Available	vpc-006700469aef974e job-p...	Off	10.0.1.0/24	-
<input type="checkbox"/>	-	subnet-0ce8168dfba84028	Available	vpc-080b4bb70c2cfe663	Off	172.31.0.0/20	-
<input type="checkbox"/>	-	subnet-036022c172bcf2265	Available	vpc-080b4bb70c2cfe663	Off	172.31.16.0/20	-
<input type="checkbox"/>	job-portal-dev-private-subnet-2	subnet-054a10e931093ff1e	Available	vpc-006700469aef974e job-p...	Off	10.0.20.0/24	-

d) Gateway

igw-0299b9cf89bc101fd / job-portal-dev-igw

Details [Info](#)

Internet gateway ID igw-0299b9cf89bc101fd	State Attached	VPC ID vpc-006700469aeff974e job-portal-dev-vpc	Owner 653842454976
--	--	--	---------------------------------------

Tags (4)

Search tags	
Key	Value
Environment	dev
ManagedBy	terraform
Name	job-portal-dev-igw
Project	job-portal

[Manage tags](#)

[Actions ▾](#)

nat-00cd8320585d4e3b3 / job-portal-dev-nat-gw

Details

NAT gateway ID nat-00cd8320585d4e3b3	Connectivity type Public	State Available	State message Info -
NAT gateway ARN arn:aws:ec2:us-east-1:653842454976:natgateway/nat-00cd8320585d4e3b3	Primary public IPv4 address 35.153.97.152	Primary private IPv4 address 10.0.1.235	Primary network interface ID eni-0a543b35d319c1d6a
VPC vpc-006700469aeff974e job-portal-dev-vpc	Subnet subnet-0c5fee7e6f8f2d52 job-portal-dev-public-subnet-1	Created Saturday, December 6, 2025 at 17:45:36 EST	Deleted -

[Secondary IPv4 addresses](#) [Monitoring](#) [Tags](#)

Secondary IPv4 addresses

Search				
Private IPv4 address	Allocation ID	Association ID	Public IPv4 address	Network interface ID
Secondary IPv4 addresses are not available for this nat gateway.				

[Edit secondary IPv4 address associations](#)

[Actions ▾](#)

e) Route Tables

rtb-074bc911afd62e864 / job-portal-dev-public-rt

Details Info

Route table ID rtb-074bc911afd62e864	Main <input checked="" type="checkbox"/> No	Explicit subnet associations 2 subnets	Edge associations -
VPC vpc-006700469aef974e job-portal-dev-vpc	Owner ID 653842454976		

Routes Subnet associations Edge associations Route propagation Tags

Routes (2)

Destination	Target	Status	Propagated	Route Origin
0.0.0.0/0	igw-0299b9cf89bc101fd	<input checked="" type="checkbox"/> Active	No	Create Route
10.0.0.0/16	local	<input checked="" type="checkbox"/> Active	No	Create Route Table

Both ▾ [Edit routes](#) < 1 > ⚙

rtb-0efe052c67aef1c04 / job-portal-dev-private-rt

Details Info

Route table ID rtb-0efe052c67aef1c04	Main <input checked="" type="checkbox"/> No	Explicit subnet associations 2 subnets	Edge associations -
VPC vpc-006700469aef974e job-portal-dev-vpc	Owner ID 653842454976		

Routes Subnet associations Edge associations Route propagation Tags

Routes (2)

Destination	Target	Status	Propagated	Route Origin
0.0.0.0/0	nat-00cd8320585d4e3b3	<input checked="" type="checkbox"/> Active	No	Create Route
10.0.0.0/16	local	<input checked="" type="checkbox"/> Active	No	Create Route Table

Both ▾ [Edit routes](#) < 1 > ⚙

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f) CloudFormation Stacks

Stacks (3)				
Stack name	Status	Created time	Description	
job-portal-ec2-v2	CREATE_COMPLETE	2025-12-07 03:10:03 UTC-0500	Job Portal - EC2 with Web Application	Delete Update stack Stack actions Create stack
job-portal-lambda	CREATE_COMPLETE	2025-12-06 18:41:32 UTC-0500	Job Portal - Lambda Function Stack for S3 Upload Logging	Delete Update stack Stack actions Create stack
job-portal-rds	CREATE_COMPLETE	2025-12-06 18:19:22 UTC-0500	Job Portal - RDS Database Stack	Delete Update stack Stack actions Create stack

Stacks (3)				
Events				
Resources				
Outputs				
Parameters				
Template				
Change sets				
Git sync				
Events (26)				
View root cause Table view Timeline view				
Operation ID	Timestamp	Logical ID	Status	Detailed status
4cd41d17-51f6-4af1-b9d3-9e844a1c2d22	2025-12-07 03:12:46 UTC-0500	job-portal-ec2-v2.t	CREATE_COMPLETE	-
4cd41d17-51f6-4af1-b9d3-9e844a1c2d22	2025-12-07 03:12:45 UTC-0500	Listener.t	CREATE_COMPLETE	-
4cd41d17-51f6-4af1-b9d3-9e844a1c2d22	2025-12-07 03:12:44 UTC-0500	Listener.t	CREATE_IN_PROGRESS	-
4cd41d17-51f6-4af1-b9d3-9e844a1c2d22	2025-12-07 03:12:42 UTC-0500	Listener	CREATE_IN_PROGRESS	-
4cd41d17-51f6-4af1-b9d3-9e844a1c2d22	2025-12-07 03:12:42 UTC-0500	ALB.t	CREATE_COMPLETE	-

Stacks (3)				
2025-12-06 18:42:03 UTC-0500				
Events				
Resources				
Outputs				
Parameters				
Template				
Change sets				
Git sync				
Events (15)				
View root cause Table view Timeline view				
Operation ID	Timestamp	Logical ID	Status	Detailed status
d01db8ab-48e2-45b2-9a05-9ac8cf971c17	2025-12-06 18:42:07 UTC-0500	job-portal-lambda.t	CREATE_COMPLETE	-
d01db8ab-48e2-45b2-9a05-9ac8cf971c17	2025-12-06 18:42:05 UTC-0500	LambdaS3Permission	CREATE_COMPLETE	-
d01db8ab-48e2-45b2-9a05-9ac8cf971c17	2025-12-06 18:42:04 UTC-0500	LambdaS3Permission	CREATE_IN_PROGRESS	-
d01db8ab-48e2-45b2-9a05-9ac8cf971c17	2025-12-06 18:42:03 UTC-0500	LambdaS3Permission	CREATE_IN_PROGRESS	-
d01db8ab-48e2-45b2-9a05-9ac8cf971c17	2025-12-06 18:42:03 UTC-0500	S3UploadLoggerFunction.t	CREATE_COMPLETE	-
d01db8ab-48e2-45b2-9a05-9ac8cf971c17	2025-12-06 18:41:55 UTC-0500	S3UploadLoggerFunction.t	CREATE_IN_PROGRESS	-

Events (8)

Operation ID	Timestamp	Logical ID	Status	Detailed status
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:24:39 UTC-0500	job-portal-rds	CREATE_COMPLETE	-
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:24:37 UTC-0500	DBinstance	CREATE_COMPLETE	-
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:19:30 UTC-0500	DBinstance	CREATE_IN_PROGRESS	-
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:19:29 UTC-0500	DBinstance	CREATE_IN_PROGRESS	-
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:19:28	-	-	-
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:19:28	-	-	-
8fd26262-461c-43ef-b426-84049279a337	2025-12-06 18:19:28	-	-	-

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g) EC2 Instances

Instance summary for i-0a5b8c410d1603f07

Updated less than a minute ago

Instance ID i-0a5b8c410d1603f07	Public IPv4 address 35.172.234.74 open address	Private IPv4 addresses 10.0.2.198
IPv6 address -	Instance state Running	Public DNS ec2-35-172-234-74.compute-1.amazonaws.com open address
Hostname type IP name: ip-10-0-2-198.ec2.internal	Private IP DNS name (IPv4 only) ip-10-0-2-198.ec2.internal	Elastic IP addresses -
Answer private resource DNS name -	Instance type t3.micro	AWS Compute Optimizer finding Opt-in to AWS Compute Optimizer for recommendations. Learn more
Auto-assigned IP address 35.172.234.74 [Public IP]	VPC ID vpc-006700469aeff974e (job-portal-dev-vpc)	Auto Scaling Group name job-portal-ec2-v2-ASG-tnZ7H7aQD7OG
IAM Role job-portal-dev-role	Subnet ID subnet-0a1ab054c619f5572 (job-portal-dev-public-subnet-2)	Managed false
IMDSv2 Optional EC2 recommends setting IMDSv2 to required Learn more	Instance ARN arn:aws:ec2:us-east-1:653842454976:instance/i-0a5b8c410d1603f07	
Operator -		

Details **Status and alarms** **Monitoring** **Security** **Networking** **Storage** **Tags**

Instance details

AMI ID ami-0156001f0548e90b1	Monitoring disabled	Platform details Linux/UNIX
AMI name amzn2-ami-hvm-2.0.20251121.0-x86_64-gp2	Allowed image -	Termination protection Disabled

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h) S3 Bucket

job-portal-dev-files-ktbop1q2 info

Objects | Metadata | Properties | Permissions | Metrics | Management | Access Points

Objects (1)

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](#)

Find objects by prefix Show versions

Name	Type	Last modified	Size	Storage class
resumes/	Folder	-	-	-

Objects (2)

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](#)

Find objects by prefix Show versions

Name	Type	Last modified	Size	Storage class
20251207081918_Harshith_Gudapati.pdf	pdf	December 7, 2025, 03:19:19 (UTC-05:00)	180.8 KB	Standard
20251207084051_ASC_Guest_services_and_operations.pdf	pdf	December 7, 2025, 03:40:52 (UTC-05:00)	60.8 KB	Standard

i) Application Load Balancer

job-portal-dev-alb

Details

Load balancer type Application	Status Active	VPC vpc-006700469aef974e	Load balancer IP address type IPv4
Scheme Internet-facing	Hosted zone Z355XDOTRQ7X7K	Availability Zones subnet-0a1ab054c619f5572 us-east-1a (use1-az1) subnet-0c5fee7e6f8f2d52 us-east-1a (use1-az6)	Date created December 7, 2025, 03:10 (UTC-05:00)
Load balancer ARN arn:aws:elasticloadbalancing:us-east-1:653842454976:loadbalancer/app/job-portal-dev-alb/36ffd9cc109b24ae		DNS name Info job-portal-dev-alb-420915092.us-east-1.elb.amazonaws.com (A Record)	

Listeners and rules **Network mapping** **Resource map** **Security** **Monitoring** **Integrations** **Attributes** **Capacity** **Tags**

Listeners and rules (1) Info

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Protocol:Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS
HTTP:80	+ Forward to target group job-portal-dev-tg : 1 (100%)	1 rule	ARN	Not applicable	Not applicable	Not applicable

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job-portal-dev-tg

Details

Target type Instance	Protocol : Port HTTP: 80	Protocol version HTTP1	VPC vpc-006700469aef974e
IP address type IPv4	Load balancer job-portal-dev-alb		
1 Total targets	1 Healthy	0 Unhealthy	0 Unused
	0 Anomalous		0 Initial
			0 Draining

► Distribution of targets by Availability Zone (AZ)
Select values in this table to see corresponding filters applied to the Registered targets table below.

Targets **Monitoring** **Health checks** **Attributes** **Tags**

Registered targets (1) Info

Anomaly mitigation: Not applicable

Instance ID	Name	Port	Zone	Health status	Health status details	Admini...	Overri...	Launch...
i-0a5b8c410d1603f07		80	us-east-1b (us...)	Healthy	-	No override.	No overri...	December...

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j) Auto Scaling Group

job-portal-ec2-v2-ASG-tnZ7H7aQD7OG

job-portal-ec2-v2-ASG-tnZ7H7aQD7OG Capacity overview

[Edit](#)

Desired capacity 1	Scaling limits (Min - Max) 1 - 3	Desired capacity type Units (number of instances)	Status -
-----------------------	-------------------------------------	--	-------------

Date created
Sun Dec 07 2025 03:10:35 GMT-0500 (Eastern Standard Time)

Details Integrations Automatic scaling Instance management Instance refresh Activity Monitoring Tags - moved

Launch template

Launch template lt-0d6394d5d715f5718 LT_6gb9FpwnC1r9	AMI ID ami-0156001f0548e90b1	Instance type t3.micro	Owner arn:aws:iam::653842454976:user/ProgrammaticUser
Version 1	Security groups -	Security group IDs sg-042403c5e1abf1754	Create time Sun Dec 07 2025 03:10:29 GMT-0500 (Eastern Standard Time)
Description -	Storage (volumes) -	Key pair name -	Request Spot Instances No

[View details in the launch template console](#)

Network

Availability Zones use1-az1 (us-east-1b) use1-az6 (us-east-1a)	Subnet ID subnet-0a1ab054c619f5572	Availability Zone distribution Balanced best effort
--	---	--

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k) Security Groups

Security Groups (9) Info					
Find security groups by attribute or tag				Actions Export security groups to CSV Create security group	
Name	Security group ID	Security group name	VPC ID	Description	
-	sg-05924b1acc15fcc0e	launch-wizard-3	vpc-080b4bb70c2fce663	launch-wizard-3 created 2025-10-11T0...	
-	sg-00852e4850dd62b32	default	vpc-006700469aeff974e	default VPC security group	
job-portal-dev-alb-sg	sg-0fb56a2781b822a4	job-portal-dev-alb-sg	vpc-006700469aeff974e	Security group for Application Load Bal...	
-	sg-076739a6bbb0248b7	default	vpc-080b4bb70c2fce663	default VPC security group	
job-portal-dev-lamb...	sg-047a0d5f3459200cc	job-portal-dev-lambda-sg	vpc-006700469aeff974e	Security group for Lambda functions	
job-portal-dev-rds-sg	sg-0d969a6dd19d00f73	job-portal-dev-rds-sg	vpc-006700469aeff974e	Security group for RDS database	
-	sg-049afc335e9aec004	launch-wizard-1	vpc-080b4bb70c2fce663	launch-wizard-1 created 2025-09-21T2...	
job-portal-dev-ec2-sg	sg-0424036e1abf1754	job-portal-dev-ec2-sg	vpc-006700469aeff974e	Security group for EC2 web servers	
-	sg-02a4f4401f22a9a80	launch-wizard-2	vpc-080b4bb70c2fce663	launch-wizard-2 created 2025-09-21T2...	

I) RDS Database

job-portal-dev-db

[Actions](#) [Modify](#)

Summary		Status		Role		Engine		Recommendations	
DB identifier	job-portal-dev-db	Available		Instance		MySQL Community			
CPU	3.01%			Class	db.t3.micro			Region & AZ	us-east-1b
Connectivity & security Monitoring Logs & events Configuration Zero-ETL integrations Maintenance & backups Data migrations Tags									

Connectivity & security

Endpoint & port	Networking	Security
Endpoint job-portal-dev-db.c41mscumwgo.us-east-1.rds.amazonaws.com	Availability Zone us-east-1b VPC job-portal-dev-vpc (vpc-006700469aeff974e) Subnet group job-portal-dev-db-subnet-group Subnets subnet-054a10e931093ff1e subnet-09b0a343dcf5197bd Network type IPv4	VPC security groups job-portal-dev-rds-sg (sg-0d969a6dd19d00f73) Active Publicly accessible No Certificate authority Info rds-ca-rsa2048-g1 Certificate authority date May 25, 2061, 19:34 (UTC-04:00) DB instance certificate expiration date December 06, 2026, 18:22 (UTC-05:00)

Connected compute resources (0) [Info](#)

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m) Lambda Function

job-portal-dev-s3-upload-logger

This function belongs to an application. [Click here to manage it.](#)

[Throttle](#) [Copy ARN](#) [Actions](#)

[Function overview](#) [Info](#)

[Diagram](#) [Template](#)

Description
Logs S3 file uploads to CloudWatch

Last modified
18 hours ago

Function ARN
arn:aws:lambda:us-east-1:653842454976:function:job-portal-dev-s3-upload-logger

Application
job-portal-lambda

Function URL [Info](#)

n) CloudWatch Logs

</aws/lambda/job-portal-dev-s3-upload-logger>

Actions ▾ View in Logs Insights Start tailing Search log group

▼ Log group details

Log class Info	Metric filters 0	Data protection
Standard	Subscription filters 0	Sensitive data count -
ARN arn:aws:logs:us-east-1:653842454976:log-group:/aws/lambda/job-portal-dev-s3-upload-logger:*	Contributor Insights rules -	Custom field indexes Configure
Creation time 18 hours ago	KMS key ID -	Transformer Configure
Retention 2 weeks	Deletion protection <input checked="" type="radio"/> Off	Anomaly detection Configure
Stored bytes -		

Log streams Tags Anomaly detection Metric filters Subscription filters Contributor Insights Data protection Field indexes Transformer

Log streams (2)

By default, we only load the most recent log streams.

Filter log streams or try prefix search Exact match Show expired [Info](#)

Log stream	Last event time
2025/12/07/[\$LATEST]6fc23185a3754f26bfae818140559370	2025-12-07 08:43:50 (UTC)
2025/12/07/[\$LATEST]dd1b410b11524dc8804a9160c003b4c7	2025-12-07 08:19:19 (UTC)

Actions ▾ Start tailing Create metric filter

Log events

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](#)

Filter events - press enter to search Clear 1m 30m 1h 12h Custom UTC timezone Display

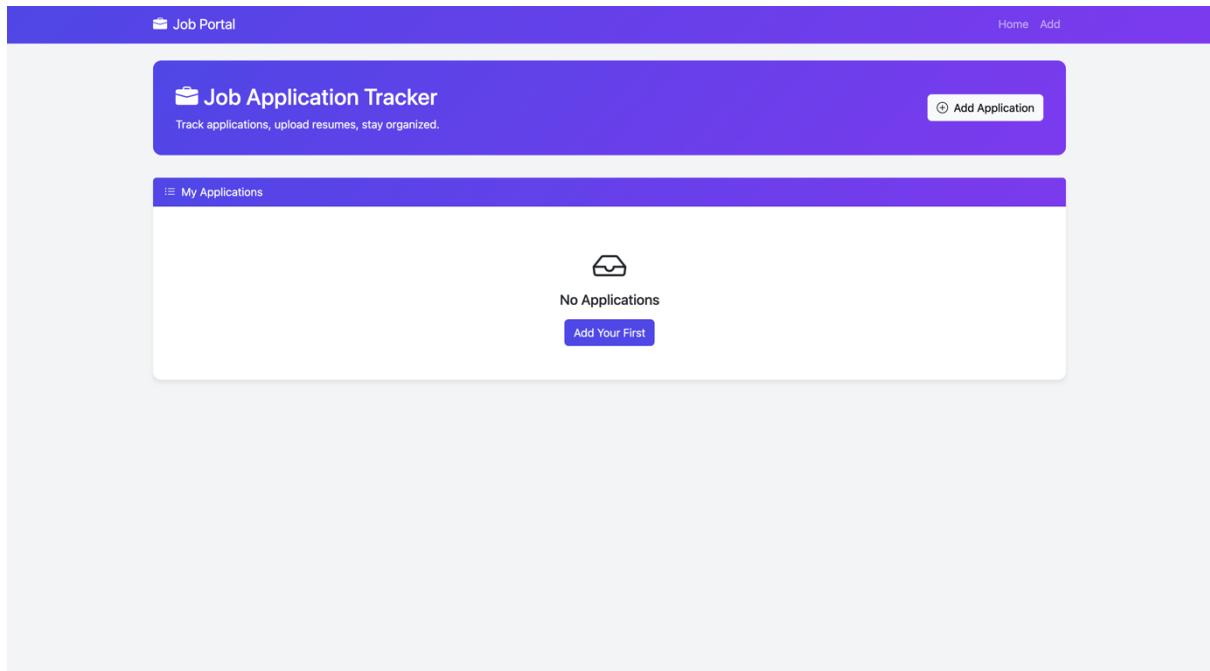
Timestamp	Message
No older events at this moment. Retry	
▶ 2025-12-07T08:40:52.024Z	INIT START Runtime Version: python:3.11.v107 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:621ac689144ed9bc996443b608b02d97cd92d2c95af1d...
▶ 2025-12-07T08:40:52.120Z	START RequestId: 7223584e-2023-4420-8456-9b05884a4d83 Version: \$LATEST
▶ 2025-12-07T08:40:52.120Z	[INFO] 2025-12-07T08:40:52.120Z 7223584e-2023-4420-8456-9b05884a4d83 [job-portal] S3 Upload Event Received
▶ 2025-12-07T08:40:52.120Z	[INFO] 2025-12-07T08:40:52.120Z 7223584e-2023-4420-8456-9b05884a4d83 Event: { "Records": [{ "eventVersion": "2.1", "eventSource": "aws:s3", "awsRegion": "us-east-1", "s3": { "bucket": "job-portal-dev", "objectKey": "resume.pdf", "size": 128000, "eTag": "d4e434a0fcd99bf93ebb55428df62be", "sequencer": "0057be" } }] }
▶ 2025-12-07T08:40:52.121Z	[INFO] 2025-12-07T08:40:52.121Z 7223584e-2023-4420-8456-9b05884a4d83 S3 Upload Details: { "timestamp": "2025-12-07T08:40:51.083Z", "project": "job-portal", "file": "resume.pdf", "size": 128000, "version": "1", "region": "us-east-1", "bucket": "job-portal-dev", "key": "resume.pdf", "sequencer": "0057be" }
▶ 2025-12-07T08:40:52.121Z	[INFO] 2025-12-07T08:40:52.121Z 7223584e-2023-4420-8456-9b05884a4d83 File Category: resume Extension: pdf
▶ 2025-12-07T08:40:52.122Z	END RequestId: 7223584e-2023-4420-8456-9b05884a4d83
▶ 2025-12-07T08:40:52.122Z	REPORT RequestId: 7223584e-2023-4420-8456-9b05884a4d83 Duration: 1.98 ms Billed Duration: 95 ms Memory Size: 128 MB Max Memory Used: 35 MB Init Duration: 0 ms
▶ 2025-12-07T08:43:50.729Z	START RequestId: e5d96cf1-1363-4f0b-bbda-be5b6d0a57be Version: \$LATEST
▶ 2025-12-07T08:43:50.729Z	[INFO] 2025-12-07T08:43:50.729Z e5d96cf1-1363-4f0b-bbda-be5b6d0a57be [job-portal] S3 Upload Event Received
▶ 2025-12-07T08:43:50.729Z	[INFO] 2025-12-07T08:43:50.729Z e5d96cf1-1363-4f0b-bbda-be5b6d0a57be Event: { "Records": [{ "eventTime": "2025-12-07T03:43:50.589121", "eventName": "ObjectCreated:Put", "awsRegion": "us-east-1", "s3": { "bucket": "job-portal-dev", "objectKey": "resume.pdf", "size": 128000, "eTag": "d4e434a0fcd99bf93ebb55428df62be", "sequencer": "0057be" } }] }
▶ 2025-12-07T08:43:50.729Z	[INFO] 2025-12-07T08:43:50.729Z e5d96cf1-1363-4f0b-bbda-be5b6d0a57be S3 Upload Details: { "timestamp": "2025-12-07T03:43:50.589121", "project": "job-portal", "file": "resume.pdf", "size": 128000, "version": "1", "region": "us-east-1", "bucket": "job-portal-dev", "key": "resume.pdf", "sequencer": "0057be" }
▶ 2025-12-07T08:43:50.729Z	[INFO] 2025-12-07T08:43:50.729Z e5d96cf1-1363-4f0b-bbda-be5b6d0a57be File Category: resume Extension: pdf
▶ 2025-12-07T08:43:50.749Z	END RequestId: e5d96cf1-1363-4f0b-bbda-be5b6d0a57be
▶ 2025-12-07T08:43:50.749Z	REPORT RequestId: e5d96cf1-1363-4f0b-bbda-be5b6d0a57be Duration: 19.52 ms Billed Duration: 20 ms Memory Size: 128 MB Max Memory Used: 35 MB
No newer events at this moment. Auto retry paused. Resume	

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o) Testing the Website

Home Page with Job Applications:



Add Application Form:

This screenshot displays the "Add Application" form. It has a purple header bar with "Job Portal" on the left and "Add Application" on the right. The main form area is white and contains several input fields: "Company *" with a text input field; "Role *" with a text input field; "Status" with a dropdown menu set to "Applied" and a date input field; "Resume" with a file upload section showing "Choose File" and "No file chosen"; and "Notes" with a text area. At the bottom are "Cancel" and "Submit" buttons.

Job Portal

Add Application

Company * Nvidia

Role * software developer intern

Status Applied Date 12/07/2025

Resume Choose File New Resume Stored in AWS S3

Notes Referral from employee

Cancel Submit

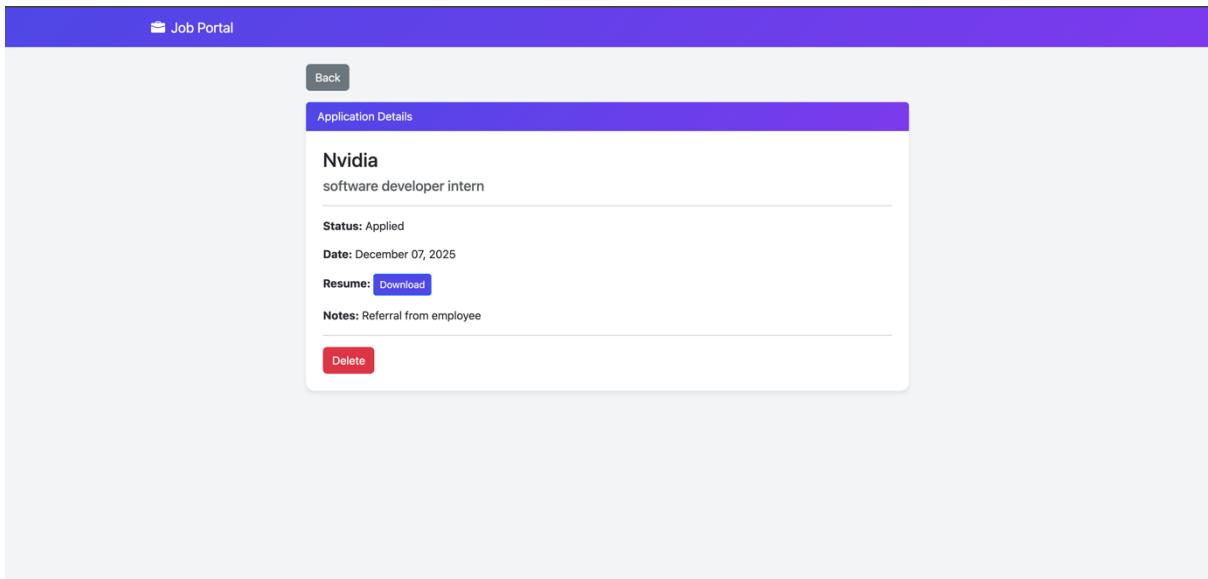
View Application Details:

Added!

Job Application Tracker
Track applications, upload resumes, stay organized.

Add Application

My Applications						
Company	Role	Status	Date	Resume	Actions	
Nvidia	software developer intern	Applied	Dec 07	✓		



S3 bucket verification:

The screenshot shows the Amazon S3 console. On the left, a sidebar menu for "Amazon S3" is visible, with sections for Buckets, Access management and security, and Storage management and insights. The main area shows a bucket named "resumes/" containing one object: "20251207173554_New_Resume.pdf". The object is a PDF file, last modified on December 7, 2025, at 12:35:55 UTC-05:00, with a size of 150.7 KB and a storage class of Standard. The interface includes standard S3 actions like Copy S3 URI, Copy URL, Download, Open, Delete, Actions, Create folder, and Upload.

CloudWatch logs verification:

Log events		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				
Filter events - press enter to search		Clear	1m	30m
Timestamp	Message	Custom	UTC timezone	Display
	No older events at this moment. Retry			
▶ 2025-12-07T17:35:55.961Z	INIT_START Runtime Version: python:3.11.v107 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:621oc689144ea9b:996443b608b02d97cd92d2c95af1d...			
▶ 2025-12-07T17:35:56.045Z	START RequestId: d22f7eef-f9ff-4b98-b604-bb250789e13f Version: \$LATEST			
▶ 2025-12-07T17:35:56.045Z	[INFO] 2025-12-07T17:35:56.045Z d22f7eef-f9ff-4b98-b604-bb250789e13f [job-portal] S3 Upload Event Received			
▶ 2025-12-07T17:35:56.045Z	[INFO] 2025-12-07T17:35:56.045Z d22f7eef-f9ff-4b98-b604-bb250789e13f Event: { "Records": [{ "eventVersion": "2.1", "eventSource": "aws:s3", "awsRegion": "us-east-1", "s3": { "bucket": "job-portal", "objectKey": "resume.pdf", "size": 128, "eTag": "d22f7eef-f9ff-4b98-b604-bb250789e13f", "sequencer": "4b98-b604-bb250789e13f" } }] }			
▶ 2025-12-07T17:35:56.045Z	[INFO] 2025-12-07T17:35:56.045Z d22f7eef-f9ff-4b98-b604-bb250789e13f S3 Upload Details: { "timestamp": "2025-12-07T17:35:54.880Z", "project": "job-portal", "fileCategory": "resume", "fileExtension": "pdf" }			
▶ 2025-12-07T17:35:56.045Z	[INFO] 2025-12-07T17:35:56.045Z d22f7eef-f9ff-4b98-b604-bb250789e13f File Category: resume Extension: pdf			
▶ 2025-12-07T17:35:56.047Z	END RequestId: d22f7eef-f9ff-4b98-b604-bb250789e13f			
▶ 2025-12-07T17:35:56.047Z	REPORT RequestId: d22f7eef-f9ff-4b98-b604-bb250789e13f Duration: 1.83 ms Billed Duration: 82 ms Memory Size: 128 MB Max Memory Used: 35 MB Init Du...			
	No newer events at this moment. Auto retry paused. Resume			

p) Python Boto3 Scripts

S3 Operations Script Output:

```
[(myenv) harshithgudapati@Harshiths-MacBook-Air-1815 boto3-scripts % python3 s3_operations.py]
=====
AWS S3 Operations Demo - Job Portal Project
=====

🚀 Starting S3 operations demo...
Bucket name: job-portal-dev-files-4bnck3m8
Region: us-east-1

=====
STEP 1: List Existing Buckets
=====

📦 S3 Buckets in Account:
-----
• job-portal-dev-files-ktbop1q2 (Created: 2025-12-06 22:45:14)

Total: 1 bucket(s)

=====
STEP 2: Create New Bucket
=====
✅ Bucket 'job-portal-dev-files-4bnck3m8' created successfully!
✅ Versioning enabled for bucket 'job-portal-dev-files-4bnck3m8'
✅ Tags added to bucket 'job-portal-dev-files-4bnck3m8'

=====
STEP 3: Upload Sample Files
=====
✅ Content uploaded to 's3://job-portal-dev-files-4bnck3m8/resumes/john_doe_resume.txt'
✅ Content uploaded to 's3://job-portal-dev-files-4bnck3m8/logos/company_logo.txt'

=====
STEP 4: List Uploaded Objects
=====

📄 Objects in 's3://job-portal-dev-files-4bnck3m8/':
-----
• logos/company_logo.txt (0.04 KB, Modified: 2025-12-07 08:34:00)
• resumes/john_doe_resume.txt (0.28 KB, Modified: 2025-12-07 08:34:00)

Total: 2 object(s)

=====
STEP 5: Get Bucket Information
=====

🌐 Bucket Information: job-portal-dev-files-4bnck3m8
-----
Region: us-east-1
Versioning: Enabled
Tags: {
    "Project": "job-portal",
    "Environment": "dev",
    "ManagedBy": "boto3"
}

=====
S3 Operations Demo Complete!
```

EC2 Operations Script Output:

```
(myenv) harshithgudipati@Harshitha-MacBook-Air-1815 bot03-scripts % python3 ec2_operations.py
=====
AWS EC2 Operations Demo - Job Portal Project

✖ Starting EC2 operations demo...
Region: us-east-1
Project: job-portal
=====
STEP 1: List All EC2 Instances
=====
All EC2 Instances:
● i-0ab08c418d1683f07 - N/A (running)
=====
STEP 2: List Running EC2 Instances
=====
Running EC2 Instances:
Instance: i-0ab08c418d1683f07
Name: dev-ec2
Type: t3.micro
State: running
Private IP: 16.0.2.198
Public IP: 35.172.234.74
Architecture: x86_64
VPC: vpc-06e7084d9aef974e
Launched: 2025-12-07 00:10:47

Total: 1 running instance(s)

=====
STEP 3: Retrieve EC2 Metadata
=====
TC: 2 updates service is available
(This is normal when running outside of EC2)
Mock Metadata (for demonstration):
=====
Instance-id: i-0ab08c418d1683f07
instance-type: t3.micro
ami-id: ami-0123456789abcdef
location: us-east-1
availability-zone: us-east-1a
region: us-east-1
=====
STEP 4: Filter Instances by Project Tag
=====
Instances with tag Project=job-portal:
No matching instance found.

=====
STEP 5: Get Detailed Instance Information
=====
Instance Details: i-0ab08c418d1683f07
=====
{
    "instance_id": "i-0ab08c418d1683f07",
    "instance_type": "t3.micro",
    "name": "dev-ec2",
    "launch_time": "2025-12-07T08:16:47+00:00",
    "private_ip": "16.0.2.198",
    "public_ip": "35.172.234.74",
    "private_dns": "ip-16-0-2-198.ec2.internal",
    "public_dns": "ec2-35-172-234-74.compute.amazonaws.com",
    "ami_id": "vpc-06e7084d9aef974e",
    "subnet_id": "subnet-01ab8c450cd59f572",
    "vpc_id": "vpc-06e7084d9aef974e",
    "availability_zone": "us-east-1a",
    "security_groups": [
        "job-portal-dev-ec2-sg"
    ],
    "ami_id": "ami-0150001f6d48e90b1",
    "image_id": "ami-0150001f6d48e90b1",
    "architecture": "x86_64",
    "root_device_type": "ebs",
    "tags": [
        {
            "aws:cloudformation:logical-id": "JobPortalEc2",
            "aws:cloudformation:stack-id": "arn:aws:cloudformation:us-east-1:653842454976:stack/job-portal-ec2-v2/228894f0-d44-11f8-bb4b-8e9bf8eddd47",
            "aws:cloudformation:logical-id": "JobPortalEc2",
            "aws:cloudformation:stack-id": "arn:aws:cloudformation:us-east-1:653842454976:stack/job-portal-ec2-v2-ASG-1nZTh7aQD700",
            "aws:cloudformation:logical-id": "JobPortalEc2"
        }
    ]
}
Instance Status: i-0ab08c418d1683f07
=====
State: running
System Status: ok
Instance Status: ok
AZ: us-east-1b
=====
EC2 Operations Demo Complete
=====
(myenv) harshithgudipati@Harshitha-MacBook-Air-1815 bot03-scripts %
```

Lambda Operations Script Output:

```
(myenv) harshithgudipati@Harshitha-MacBook-Air-1815 bot03-scripts % python3 lambda_operations.py
=====
AWS Lambda Operations Demo - Job Portal Project

✖ Starting Lambda operations demo...
Region: us-east-1
Target Function: job-portal-dev-v3-upload-logger
=====
STEP 1: List All Lambda Functions
=====
Lambda Functions:
Function: job-portal-dev-v3-upload-logger
Runtime: python3.11
Role: arn:aws:lambda:us-east-1:16595245496:function:job-portal-dev-v3-updated-logger
Timeout: 30 seconds
Last Update: 2025-12-07T08:16:47Z (11 days ago)
Last Modified: 2025-12-07T08:16:47Z (11 days ago)
Total: 1 Function(s)

=====
STEP 2: Get Function Details
=====
Lambda Function Details: job-portal-dev-v3-upload-logger
ARN: arn:aws:lambda:us-east-1:16595245496:function:job-portal-dev-v3-updated-logger
Runtime: python3.11
Memory: 128 MB
Handler: lambda.lambda_handler
Version: $LATEST
Code Size: 1.27 KB
State: Active
Architecture: x86_64
IAM ARN: arn:aws:iam::16595245496:lambda:job-portal-dev-lambda-role
Last Modified: 2025-12-07T08:16:47Z (11 days ago)
=====
STEP 3: Get Function Configuration
=====
Function Configuration: job-portal-dev-v3-updated-logger
=====
Environment Variables:
PROJECT_NAME: Job-Portal
VPC Config: Not in VPC
Tracing: Off
Layers: 0 layers
=====
STEP 4: Invoke Lambda Function (Synchronous)
=====
Invoking Lambda Function: job-portal-dev-v3-upload-logger
=====
Invocation Type: RequestResponse
Payload Version: 1
{
    "eventTime": "2025-12-07T08:16:47.589Z",
    "eventName": "ObjectCreated:Put",
    "s3": {
        "bucket": "job-portal-dev-File",
        "object": "job-portal-test_resume.pdf",
        "size": 128000
    },
    "eventVersion": 1,
    "sourceIPAddress": "192.168.1.100",
    "userIdentity": {
        "principalId": "MOJO_TEST_USER"
    }
}
Lambda Invocation Result:
Status Code: 200
Selected Version: $LATEST
Records: 1
Status Code: 200
Body: {"message": "File upload event logged successfully", "records_processed": 1}
=====
STEP 5: Get Recent Function Logs
=====
Recent Log for: job-portal-dev-v3-upload-logger
Log Stream: 2025/12/07/SLATEST/4cf338da374720afae81646059379
[2025-12-07 08:16:47.524400] INIT START Runtime Version: python3.11
[2025-12-07 08:16:47.524400] INIT RequestID: 7023be8a-903-419-84d-0e0588446493 Version: SLATEST
[2025-12-07 08:16:47.524400] INIT Version: 1.0.0
```

```

=====
STEP 5: Get Recent Function Logs
=====

Recent Logs for: job-portal-dev-43-upload-logger
Log Stream: 2025/12/07/[$LATEST]/fc23185a3754f26bfae81814059378
=====
[2025-12-07 03:46:52.024000] INIT START Runtime Version: python3.11.v107           Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:621ac689144ea9bc996443b608b0d97cd92d2c95af1da8c74a08767be04952
[2025-12-07 03:46:52.120000] START RequestId: 7223584e-2023-4420-8456-9b05884a4d83 Version: $LATEST
[2025-12-07 03:46:52.120000] [INFO] 2025-12-07T08:48:52.120Z 7223584e-2023-4420-8456-9b05884a4d83 [job-portal] S3 Upload Event Received
[2025-12-07 03:46:52.120000] [INFO] 2025-12-07T08:48:52.120Z 7223584e-2023-4420-8456-9b05884a4d83 Event: {
"Records": [
{
"eventVersion": "2.1",
"eventSource": "aws:s3",
"awsRegion": "us-east-1",
"eventTime": "1970-01-01T00:00:00Z",
"eventName": "ObjectCreated:Put",
"userIdentity": {
"principalId": "AWS:ARDAZOPAMDHAPUA7HWCW7:i-0a5b8c418d1683f07"
},
"requestParameters": {
"sourceIPAddress": "35.172.234.74"
},
"responseElements": {
"x-amz-request-id": "4A12A4E52D07ECSH",
"x-amz-millisinceepoch": "1697084215921",
"bucket": "job-portal-dev-files-ktbop1q2",
"ownerIdentity": {
"principalId": "A3QKQSCPM3KVW"
},
"arn": "arn:aws:s3:::job-portal-dev-files-ktbop1q2"
},
"object": {
"key": "resume/20251207084851/ASC_Guest_services_and_operations.pdf",
"size": 62256,
"eTag": "e5a0a44a324c466077e3042f66ee8a",
"versionId": "0dt48sq1kR0DjIw_wav1R708t3Qhd2",
"sequence": "0069353D9308EC658B"
}
}
],
"timestamp": "2025-12-07T08:48:52.121Z",
"type": "S3Event",
"environment": "Dev",
"event_type": "ObjectCreated:Put",
"bucket": "job-portal-dev-files-ktbop1q2",
"object_key": "resume/20251207084851/ASC_Guest_services_and_operations.pdf",
"object_size_bytes": 62256,
"object_eTag": "e5a0a44a324c466077e3042f66ee8a",
"source_ip": "35.172.234.74",
"user_agent": "AWS:ARDAZOPAMDHAPUA7HWCW7:i-0a5b8c418d1683f07"
}
[2025-12-07 03:46:52.121000] [INFO] 2025-12-07T08:48:52.121Z 7223584e-2023-4420-8456-9b05884a4d83 S3 Upload Details: {
"FileCategory": "resume | Extension: pdf"
[2025-12-07 03:46:52.122000] END RequestId: 7223584e-2023-4420-8456-9b05884a4d83 File Duration: 95 ms Memory Size: 128 MB Max Memory Used: 35 MB Init Duration: 92.00 ms
[2025-12-07 03:46:52.122000] REPORT RequestId: 7223584e-2023-4420-8456-9b05884a4d83 Duration: 1.98 ms Billed Duration: 95 ms Memory Size: 128 MB Init Duration: 92.00 ms
=====

Lambda Operations Demo Complete!

```

6. Challenges Encountered and Solutions Applied

Throughout the development and deployment of the Job Application Portal, several technical challenges were encountered. Each issue was resolved through troubleshooting, configuration updates, and adjustments to the infrastructure design.

6.1 CloudFormation UserData Size Limit

Challenge:

The initial EC2 CloudFormation template embedded the entire Flask application code in the UserData section, exceeding the 16KB limit and causing the LaunchTemplate to fail.

Solution:

Refactored the UserData script to use compact, minified code. Removed unnecessary comments and whitespace. This reduced the template size to under the 16KB limit while maintaining full functionality.

6.2 RDS Connection Issues

Challenge:

Initially, the EC2 instances were unable to connect to the RDS MySQL database, resulting in application errors when trying to save job applications.

Solution:

Verified security group rules to ensure EC2 security group was allowed inbound access on port 3306 to RDS. Confirmed the correct RDS endpoint was passed to the CloudFormation stack parameters. Updated the EC2 stack to properly reference the RDS endpoint.

6.3 S3 to Lambda Event Trigger Configuration

Challenge:

The Lambda function was not being triggered when files were uploaded to S3, despite the function being deployed correctly.

Solution:

Configured S3 bucket notification using AWS CLI with the correct Lambda function ARN. Ensured the Lambda function had the proper resource-based policy to allow S3 to invoke it.

6.4 IAM Permission Errors for S3 Uploads

Challenge:

Resume uploads from the web application failed initially due to insufficient IAM permissions assigned to the EC2 instance role.

Solution:

Updated the EC2 IAM role in the CloudFormation template to explicitly allow s3:PutObject, s3:GetObject, and s3:DeleteObject actions on the S3 bucket and its objects.

6.5 Terraform and CloudFormation Integration

Challenge:

Coordinating outputs from Terraform with inputs required by CloudFormation stacks required careful management to ensure resource IDs were correctly passed between the two tools.

Solution:

Created comprehensive Terraform outputs that included all resource IDs needed by CloudFormation. Documented the exact parameter mapping for CloudFormation stack deployment commands.

7. Future Improvement Recommendations

While the current platform meets all functional and architectural objectives, several enhancements could further improve scalability, resiliency, security, and automation.

- **Enhanced Auto Scaling:** Implement target-tracking scaling policies based on CPU, memory, or request count metrics. Load testing could be introduced to validate scaling thresholds and optimize cost efficiency.
- **RDS High Availability:** Enable Multi-AZ deployments for RDS to provide built-in automatic failover and higher database availability for production environments.
- **Network Hardening:** Move EC2 instances to private subnets behind the ALB and use NAT Gateway for controlled outbound internet access. This would further reduce the application attack surface.
- **Security Enhancements:** Add AWS Web Application Firewall (WAF) to protect the ALB from application-layer attacks. Introduce automated vulnerability scanning and stricter IAM policy audits.
- **Content Delivery Optimization:** Deploy Amazon CloudFront CDN in front of the ALB to cache static content, improve performance for global users, and reduce backend latency.
- **CI/CD Pipeline:** Implement AWS CodePipeline or GitHub Actions for automated testing and deployment of infrastructure and application changes.
- **Application Features:** Add user authentication using Amazon Cognito, email notifications using Amazon SES, and application status analytics dashboard.
- **Backup and Disaster Recovery:** Implement automated backups using AWS Backup for RDS and S3 resources, coupled with periodic recovery testing.

8. Conclusion

This project successfully demonstrates the design and implementation of a scalable, cloud-native Job Application Portal using AWS services and Infrastructure-as-Code practices. The application provides a functional platform for tracking job applications with resume upload capabilities, while showcasing the integration of multiple AWS services.

Key accomplishments include:

- Successful deployment of a multi-tier architecture using both Terraform and CloudFormation
- Implementation of auto-scaling EC2 instances behind an Application Load Balancer
- Integration of RDS MySQL for persistent data storage
- Implementation of S3 for file storage with Lambda-based event logging
- Demonstration of three AWS interaction methods: Console, CLI, and Boto3 SDK

The project reinforced important cloud computing concepts including infrastructure automation, security best practices, serverless computing, and the value of modular, reproducible infrastructure design.