Project
AWS Infrastructure Deployment with Terraform

https://www.loom.com/share/ba0fcc6f4b1f4fdea2d1391a2cad2d67?sid=5bfcf5aa-d374-49e0-8177-6a564c5eb762

1. Project Overview

This project involved designing and deploying a scalable, secure, and containerized AWS environment using Terraform. The infrastructure included:

- Auto Scaling EC2 instances running Nginx, Docker, and Node.js.
- Private RDS databases (MySQL & PostgreSQL) with restricted access.
- HTTPS-enabled Application Load Balancer (ALB) for secure traffic routing.
- Business Intelligence (BI) tool deployment (Metabase) for live data visualization.
- Domain & SSL configuration for secure application access.

2. Infrastructure Deployment

2.1 Auto Scaling EC2 Instances

- Deployed three EC2 instances using a Launch Template with Amazon Linux 2.
- Configured user data scripts to auto-install Docker, Nginx, and Node.js.
- Implemented multi-stage Docker containers for frontend and backend applications.

2.2 Secure RDS Databases

- MySQL and PostgreSQL launched in private subnets (no public access).
- Configured security groups to allow only EC2 instances for secure communication.
- Used SSH tunneling to securely connect to databases from local machines.

2.3 Load Balancer & HTTPS Setup

- Deployed an Application Load Balancer (ALB) to distribute traffic across EC2 instances.
- Configured HTTPS (SSL/TLS) using AWS Certificate Manager (ACM).
- Set up HTTP-to-HTTPS redirection for secure connections.

2.4 BI Tool (Metabase) Deployment

- Installed Metabase via Docker on one of the EC2 instances.

3. Challenges Faced & Solutions

3.1 Unused Target Status in ALB

- Problem: The ALB showed "unused" targets even after registering EC2 instances.
- Root Cause:
    - Health check misconfiguration (incorrect path/port).
    - Security group rules blocking ALB traffic.
- Solution:
    - Updated health check settings to /api/health (Node.js) and / (React).
    - Adjusted security groups to allow ALB-to-EC2 communication.
    - Verified container logs to ensure apps were running correctly.

3.2 SSH Tunneling Issues

- Problem: Unable to connect to RDS via SSH tunnel.
- Root Cause:
    - Incorrect SSH key permissions.
    - Security group rules blocking port 22 (SSH).
- Solution:
    - Fixed permissions (chmod 400 key.pem).
    - Updated security groups to allow SSH from trusted IPs.

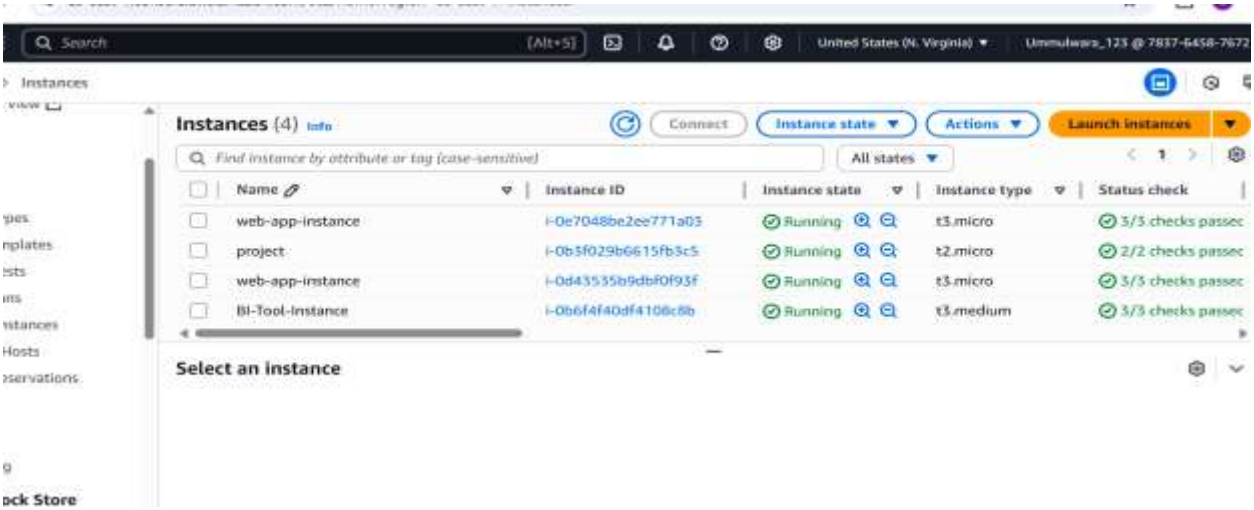
Some s.s are

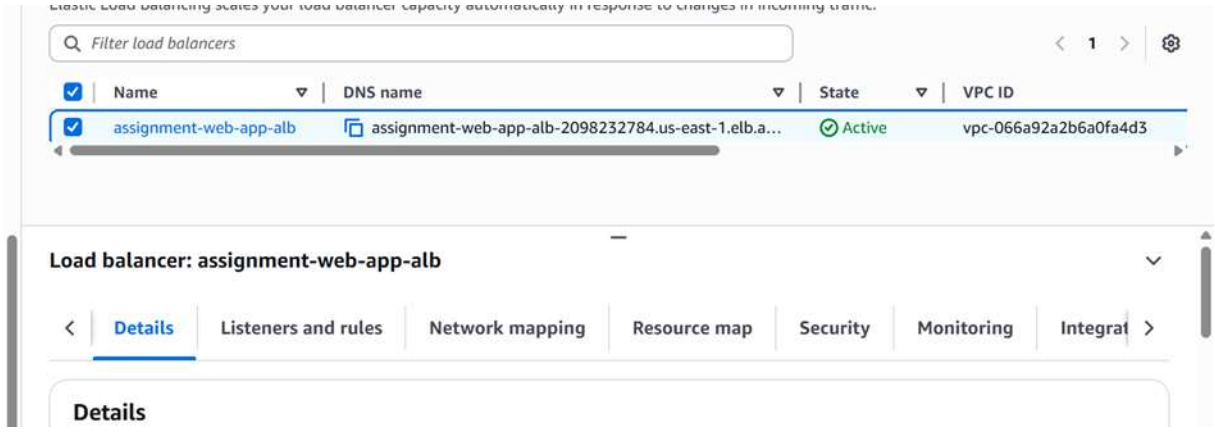
```
ummulwara@devopsvm-02:~$ HTTP/1.1 200 OK
-bash: HTTP/1.1: No such file or directory
ummulwara@devopsvm-02:~$ # Check React routes (run on your EC2 instance)
curl -v http://localhost:3000              # Root path
curl -v http://localhost:3000/any-route  # Test specific routes
* Host localhost:3000 was resolved.
* IPv6: ::1
* IPv4: 127.0.0.1
*   Trying [::1]:3000...
* Connected to localhost (::1) port 3000
> GET / HTTP/1.1
> Host: localhost:3000
> User-Agent: curl/8.5.0
> Accept: */*
>
< HTTP/1.1 200 OK
< Content-Length: 644
< Content-Disposition: inline; filename="index.html"
< Accept-Ranges: bytes
< ETag: "48755a8ded14555da66a9bd9626274a3e065698a"
```

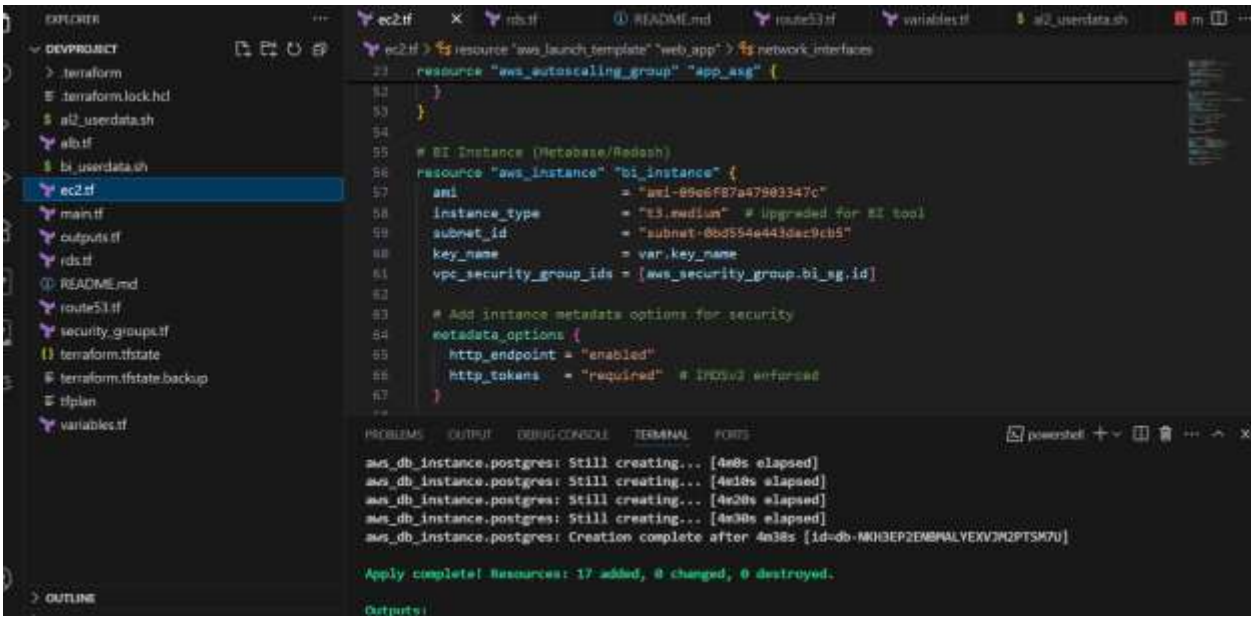
```
Warning: Permanently added '54.81.5.209' (ED25519) to the list of known hosts.
ec2-user@54.81.5.209: Permission denied (publickey,gssapi-keyex,gssapi-with-mic).
ummulwara@devopsvm-02:~$ curl http://localhost
systemctl status nginx  # or apache2/httpd,
● nginx.service - A high performance web server and a reverse proxy server
     Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
     Active: active (running) since Sun 2025-06-15 11:45:15 UTC; 2h 50min ago
       Docs: man:nginx(8)
    Process: 3996683 ExecStartPre=/usr/sbin/nginx -t -q -g daemon on; master_process on; (code=exited, status=0/SUCCESS)
    Process: 3996685 ExecStart=/usr/sbin/nginx -g daemon on; master_process on; (code=exited, status=0/SUCCESS)
   Main PID: 3996686 (nginx)
      Tasks: 5 (limit: 4613)
     Memory: 3.9M (peak: 4.5M)
        CPU: 23ms
     CGroup: /system.slice/nginx.service
             ├─3996686 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
             ├─3996687 "nginx: worker process"
             ├─3996688 "nginx: worker process"
             ├─3996689 "nginx: worker process"
             └─3996690 "nginx: worker process"
ummulwara@devopsvm-02:~$ curl -v https://ummul-project.apparelcorner.shop
* Host ummul-project.apparelcorner.shop:443 was resolved.
* IPv6: (none)
* IPv4: 52.1.10.17, 54.85.122.124
*   Trying 52.1.10.17:443
```

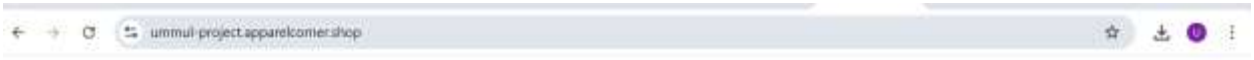
```
 => exporting to image
 => => exporting layers
 => => writing image sha256:...
 => => naming to docker.io/library/nodeapp

 1 warning found (use docker --debug to expand):
 - JSONArgsRecommended: JSON arguments recommended for CMD to prevent unintended behavior related to OS signals (line 6)
docker: Error response from daemon: Conflict. The container name "/nodeapp-container" is already in use by container "d827260d6867e64c30f1b507eb5035e1f2306aad30b658a255dd2e0b02ebb9df". You have to remove (or rename) that container to be able to reuse that name.

Run 'docker run --help' for more information
ummulwara@devopsvm-02:~/nodejs-iba$ docker ps -a | grep nodeapp
d827260d6867   96533ebae235   "docker-entrypoint.s…"   4 minutes ago   Up 4 minutes   0.0.0.0:4000->5000/tcp, [::]:4000->5000/tcp   nodeapp-container
ummulwara@devopsvm-02:~/nodejs-iba$ docker stop nodeapp-container
docker rm nodeapp-container
nodeapp-container
nodeapp-container
ummulwara@devopsvm-02:~/nodejs-iba$ nano Dockerfile
ummulwara@devopsvm-02:~/nodejs-iba$ docker build -t nodeapp .
2025/06/15 20:03:19 in: []string{}
2025/06/15 20:03:19 Parsed entitlements: []
[+] Building 7.0s (9/9) FINISHED                                          docker:default
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 124B
 => [internal] load metadata for docker.io/library/node:latest
 => [internal] load .dockerignore
 => => transferring context: 2B
```

```
* IPv4: 127.0.0.1
*   Trying [::1]:4000...
* Connected to localhost (::1) port 4000
> GET /api/health HTTP/1.1
> Host: localhost:4000
> User-Agent: curl/8.5.0
> Accept: */*
>
< HTTP/1.1 200 OK
< X-Powered-By: Express
< Content-Type: application/json; charset=utf-8
< Content-Length: 77
< ETag: W/"4d-PR+LCYh97sx2FpMBSyHdqg9d1EQ"
< Date: Sun, 15 Jun 2025 20:28:58 GMT
< Connection: keep-alive
< Keep-Alive: timeout=5
<
* Connection #0 to host localhost left intact
{"status":"healthy","timestamp":"2025-06-15T20:28:58.949Z","version":"1.0.0"}ummulwara@devopsvm-02:~/nodejs-iba$ sudo netstat -tulnp
sudo netstat -tulnp | grep 4000
[sudo] password for ummulwara:
tcp        0      0 0.0.0.0:4000            0.0.0.0:*               LISTEN      2386812/docker-prox
tcp6       0      0 :::4000                 :::*                    LISTEN      2386820/docker-prox
ummulwara@devopsvm-02:~/nodejs-iba$ chmod 400 ~/Downloads/my-keypair.pem  # Make the key read-only
chmod: cannot access '/home/ummulwara/Downloads/my-keypair.pem': No such file or directory
ummulwara@devopsvm-02:~/nodejs-iba$ ssh -i "path/to/your-key.pem" username@public-ip-or-dns
Warning: Identity file path/to/your-key.pem not accessible: No such file or directory.
ssh: Could not resolve hostname public-ip-or-dns: Temporary failure in name resolution
ummulwara@devopsvm-02:~/nodejs-iba$ java -jar metabase.jar
Error: Unable to access jarfile metabase.jar
```









503 Service Temporarily Unavailable