Project Report: Deploying a Secure & Scalable Web Server on AWS EC2

Project Overview

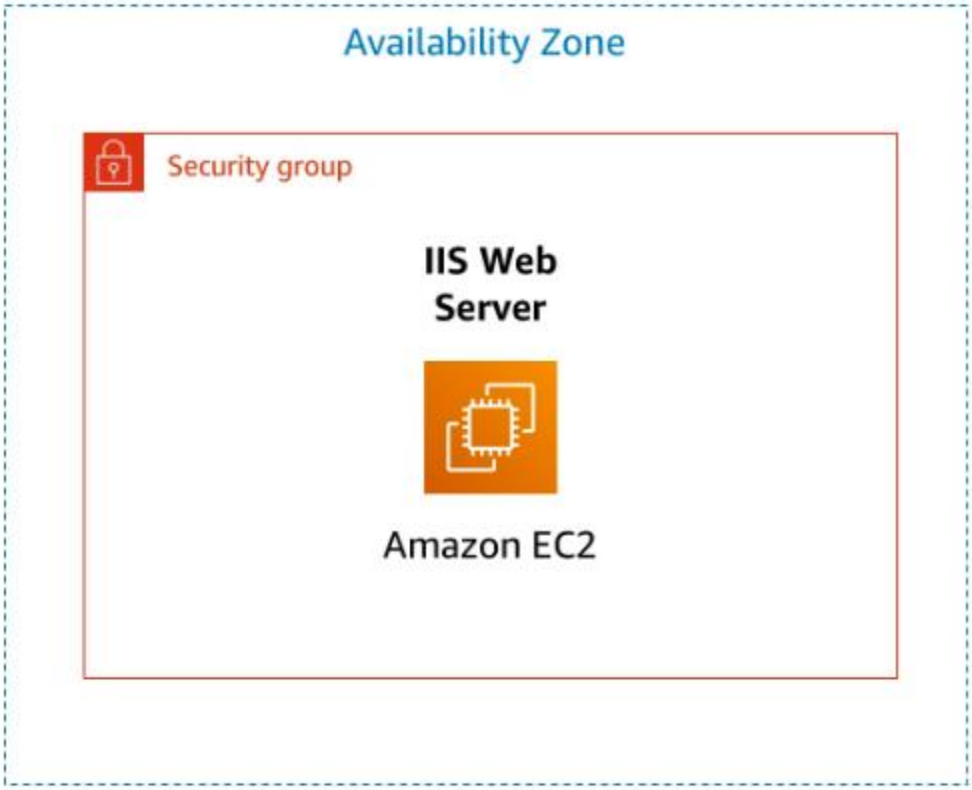
This project demonstrates the deployment of a secure, scalable, and highly available web server using **Amazon EC2**.

The solution integrates **automated provisioning, monitoring, and scaling mechanisms** while following **AWS best practices** for security, reliability, and cost optimization.

The implementation covers:

- Scalable compute resources using **EC2**
- Secure access management with **Security Groups & Termination Protection**
- Automated configuration via **User Data scripting**
- Resilient architecture supported by **monitoring and resizing strategies**

Architecture Diagram



Key Features

1. Automated Deployment

- EC2 instance launched with **Amazon Linux 2 AMI**.
- Apache web server automatically provisioned using **User Data script**:

```
#!/bin/bash

yum -y install httpd

systemctl enable httpd

systemctl start httpd

echo '<html><h1>Hello From Your Web Server!</h1></html>' > /var/www/html/index.html
```

- Website instantly accessible through **Public IP**.

---

2. Security & Reliability

- Configured **Security Group** to allow inbound HTTP traffic (port 80).
- Enabled **Termination Protection** to prevent accidental deletion.
- Restricted unnecessary access — **no SSH allowed** (Principle of Least Privilege).

---

3. Monitoring & Observability

- EC2 **status checks** for instance and system health.
- **Amazon CloudWatch** used to collect metrics on CPU, disk I/O, and network traffic.
- Enhanced **troubleshooting and capacity planning** capabilities.

---

4. Scalability & Flexibility

- **Vertical scaling**: Instance upgraded from t2.micro → t2.small.
- **Storage scaling**: Amazon EBS volume expanded from **8 GiB → 10 GiB**.
- Resizing executed **online, without downtime**.

---

5. Lifecycle Management

- **Termination Protection** tested to ensure safeguards worked as intended.
- All AWS resources decommissioned post-project to **optimize costs**.

Outcomes & Benefits

- Delivered a **secure, production-ready web server** using AWS.
- Practiced **infrastructure scaling and monitoring** in a real-world scenario.
- Applied **AWS Well-Architected Framework** principles: security, reliability, and cost-efficiency.
- Gained **hands-on experience** in automation, observability, and lifecycle management.

Skills & Tools Used

- **AWS EC2** – Compute provisioning
- **Amazon EBS** – Persistent storage management
- **Security Groups** – Firewall and network configuration
- **Amazon CloudWatch** – Monitoring & observability
- **Linux (Amazon Linux 2)** – Server OS
- **Apache (httpd)** – Web server hosting
- **Shell scripting (User Data)** – Automation