

AWS WAF – Web Application Firewall

(Note: Use this automation script for whole web and agent installation as a userdata: https://github.com/JJTechInc/ecommerce-web-app/blob/main/userdata1.sh)

AWS WAF is a web application firewall that helps protect your web applications or APIs against common web exploits and bots that may affect availability, compromise security, or consume excessive resources. AWS WAF gives you control over how traffic reaches your applications by enabling you to create security rules that control bot traffic and block common attack patterns, such as SQL injection or cross-site scripting. You can also customise rules that filter out specific traffic patterns. You can get started quickly using Managed Rules for AWS WAF, a pre-configured set of rules managed by AWS or AWS Marketplace Sellers to address issues like the OWASP Top 10 security risks and automated bots that consume excess resources, skew metrics, or can cause downtime. These rules are regularly updated as new issues emerge. AWS WAF includes a full-featured API that you can use to automate the creation, deployment, and maintenance of security rules.

AWS WAF Overview

AWS Web Application Firewall (WAF) is a security tool that helps you to protect the application against web attacks. WAF monitors and controls unusual bot traffic, blocks common attack patterns, such as **SQL Injection or Cross-site scripting**, etc. It also lets you monitor the HTTP and HTTPS requests that are forwarded to an Amazon API Gateway API, Amazon CloudFront or an Application Load Balancer.

- Amazon WAF allows you to control your content by using an IP address from where the request originates.
- Three things make Amazon WAF work Access control lists (ACL), Rules and Rule Group.
- Amazon WAF manages Web ACL capacity units (WCU) for rules, rule groups and web ACLs.
- Amazon WAF includes a full-featured API that you can use to automate the creation, deployment, and maintenance of security rules.

Common Web Attacks

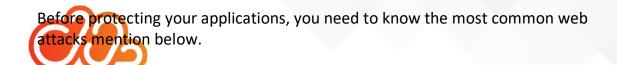












DDoS(Denial-Of-Service) attacks: This is probably the most common attack. Attackers overload an application by sending bulk requests to the web servers. Thousands of hosts infected with malware are used in this attack, which utilizes more than one unique IP address or machine. This slows down the application and significantly hurt the value of a brand.

SQL injections: SQL injection is a code injection procedure that might destroy your SQL database. Attackers can run malicious SQL queries on your web applications. **Cross-Site Scripting:** If your application is vulnerable to cross-site scripting, then the attacker can run or inject malicious scripts, generally in the form of a browser side script. These scripts can even rewrite the content of the HTML pages.

AWS WAF Features

Amazon Web Application Firewall offer lots of features to its users mentioned below.

- Protection Against Web Attacks: With minimum latency impact on incoming traffic, AWS WAF offers many rules to inspect any element of a web request. AWS WAF protects web applications against threats by filtering traffic according to the rules created.
- Establish Rules Accordingly: AWS WAF is a versatile and valuable tool for
 protecting the infrastructures of applications. And this is because it allows
 users to establish rules according to their needs and vulnerabilities that they
 wish to stop. We can consider it as a great solution to protect any web
 applications environment at the enterprise level.
- Web traffic filtering: WAF allows users to create rules to filter web traffic. It filters IP addresses, HTTP headers, HTTP body, or URI strings from a web request.
- Flexible Integration With AWS Services: AWS Web Application Firewall offers easy integration with other AWS services like Amazon EC2, CloudFront, Load balancer etc.
- **Monitor Rules:** AWS Web Application Firewall allows us to create rules and review and customize them to prevent unknown attracts.









Benefits

Agile protection against web attacks

AWS WAF rule propagation and updates take under a minute, enabling you to quickly update security across your environment when issues arise. WAF supports hundreds of rules that can inspect any part of the web request with minimal latency impact to incoming traffic. AWS WAF protects web applications from attacks by filtering traffic based on rules that you create. For example, you can filter any part of the web request, such as IP addresses, HTTP headers, HTTP body, or URI strings. This allows you to block common attack patterns, such as SQL injection or cross-site scripting.

Save time with managed rules

With Managed Rules for AWS WAF, you can quickly get started and protect your web application or APIs against common threats. You can select from many rule types, such as ones that address issues like the Open Web Application Security Project (OWASP) Top 10 security risks, threats specific to Content Management Systems (CMS), or emerging Common Vulnerabilities and Exposures (CVE). Managed rules are automatically updated as new issues emerge, so that you can spend more time building applications.

Improved web traffic visibility

AWS WAF gives near real-time visibility into your web traffic, which you can use to create new rules or alerts in Amazon CloudWatch. You have granular control over how the metrics are emitted, allowing you to monitor from the rule level to the entire inbound traffic. In addition, AWS WAF offers comprehensive logging by capturing each inspected web request's full header data for use in security automation, analytics, or auditing purposes.

Ease of deployment & maintenance

AWS WAF is easy to deploy and protect applications deployed on either Amazon CloudFront as part of your CDN solution, the Application Load Balancer that fronts all your origin servers, Amazon API Gateway for your REST APIs, or AWS AppSync for your GraphQL APIs. There is no additional software to deploy, DNS configuration,













SSL/TLS certificate to manage, or need for a reverse proxy setup. With AWS Firewall Manager integration, you can centrally define and manage your rules, and reuse them across all the web applications that you need to protect.

Easily monitor, block, or rate-limit bots

With AWS WAF Bot Control, you get visibility and control over common and pervasive bot traffic to your applications. Within the AWS WAF console, you can monitor common bots, such as status monitors and search engines, and get detailed, real-time visibility into the category, identity, and other details of bot traffic. You can also block, or rate-limit, traffic from pervasive bots, such as scrapers, scanners, and crawlers. Using AWS Firewall Manager, you can deploy the Bot Control managed rule group across multiple accounts in your AWS Organization.

Security integrated with how you develop applications

Every feature in AWS WAF can be configured using either the AWS WAF API or the AWS Management Console. This allows your DevOps team to define application-specific rules that increase web security as they develop applications. This lets you put web security at multiple points in the development process chain, from the hands of the developer initially writing code, to the DevOps engineer deploying software, to the security administrators enforcing a set of rules across the organization.

How It Works

AWS Web Application Firewall protect the applications from malicious attacks. Working of WAF mentioned below.

- AWS Firewall Manage: It Manages multiple AWS Web Application Firewall Deployments
- AWS WAF: Protect deployed application from common web exploits.
- Create a Policy: Now you can build your own rules using the visual rule builder.
- **Block Filter:** Block filter protect against exploits and vulnerabilities attacks.

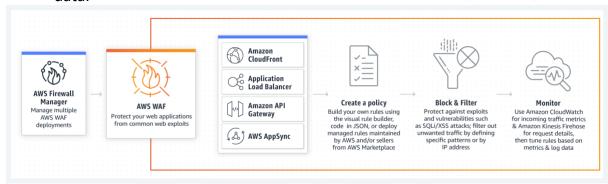








JJ•TMonifor: Use Amazon CloudWatch for incoming traffic metrics & Amazon kinesis firehose for request details, then tune rules based on metrics and log data.









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Demo: Control Web Traffic using Web Application Firewall (WAF)

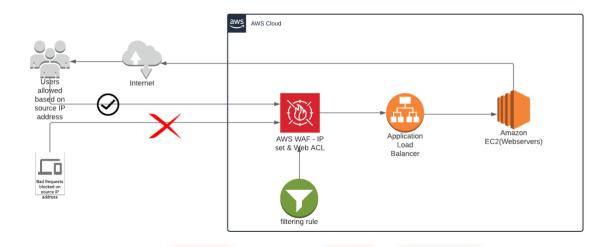
Step 1: Laurich 2 webservers in 2 different Az's

Step 2: Create Application Load Balancer

Step 3 : Create IP set in WAF

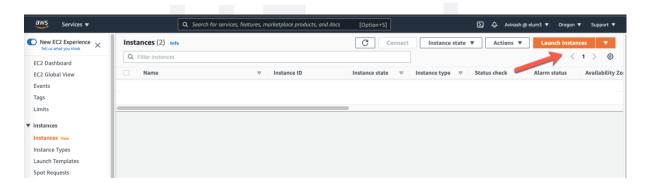
Step 4: Create Web ACL in WAF

Step 5: Test the working on WAF



Step 1: Launch 2 webservers in 2 different Az's

Navigate to AWS EC2 console



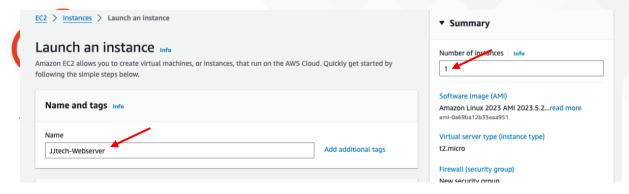


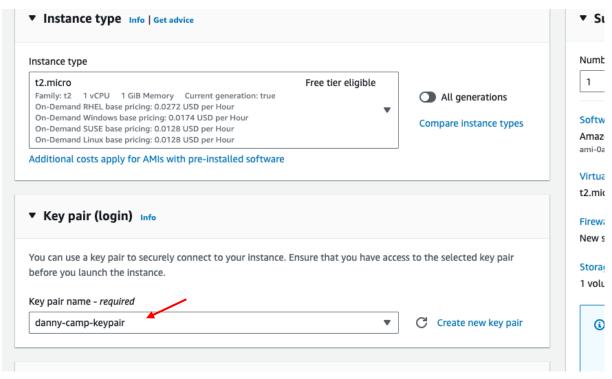


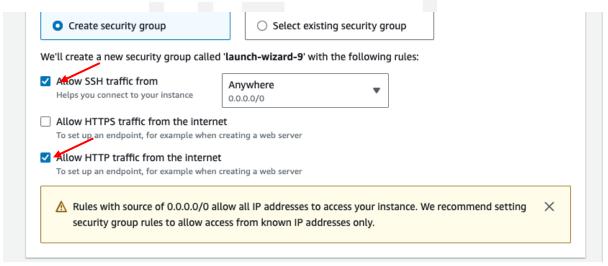












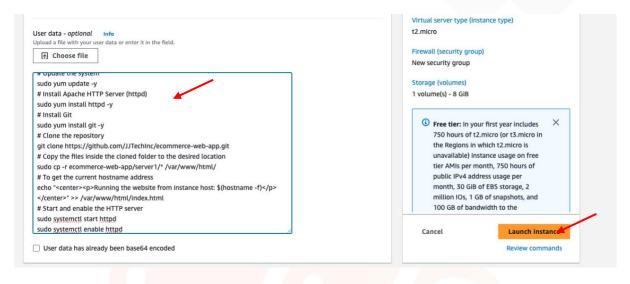












Please create the second EC2 instance with same configuration and userdata in another AZ



Step 2: Create Application Load Balancer

Navigate to EC2 console

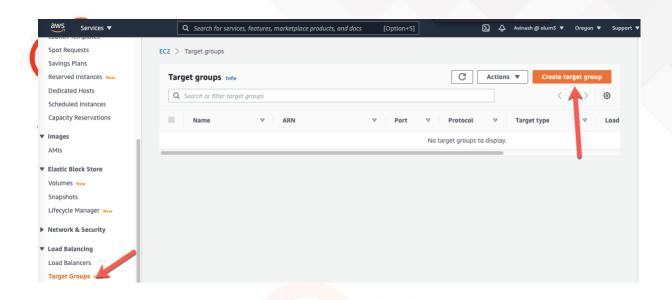
TargetGroup



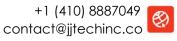




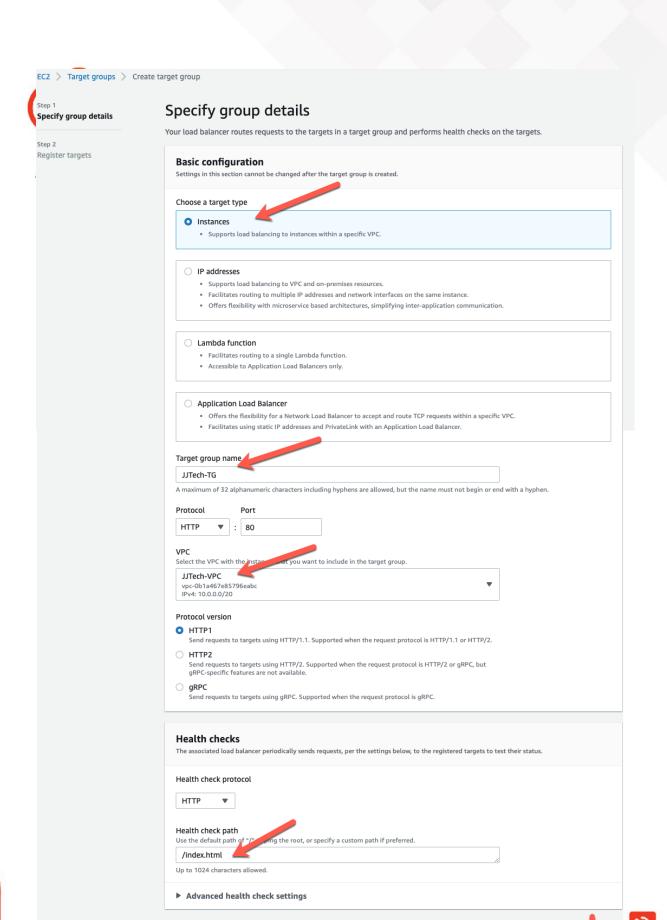










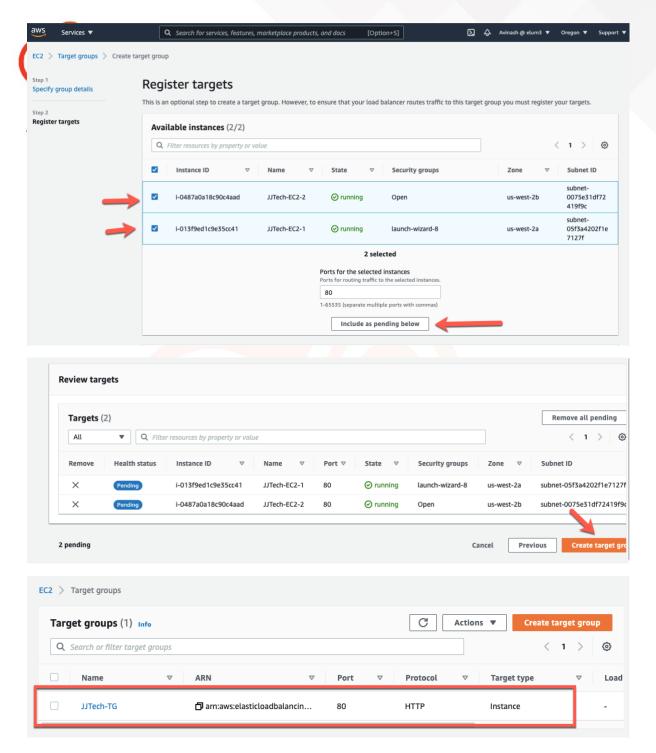


► Tags - optional









- Navigate to EC2 console

 Load balancer
- Create ALB, with above Target group

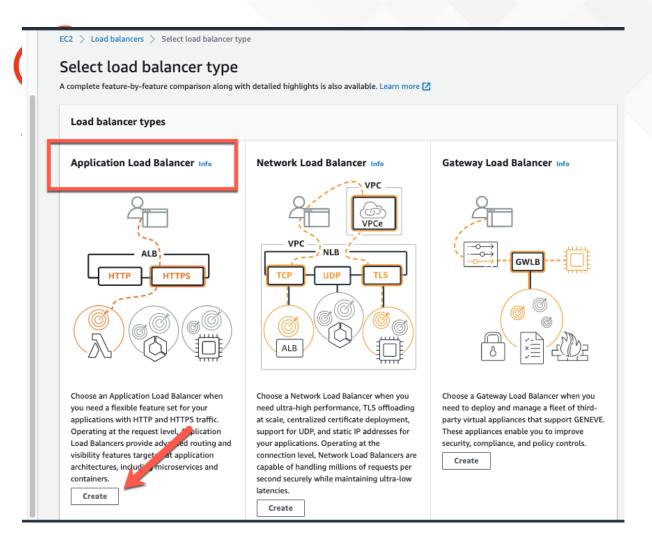






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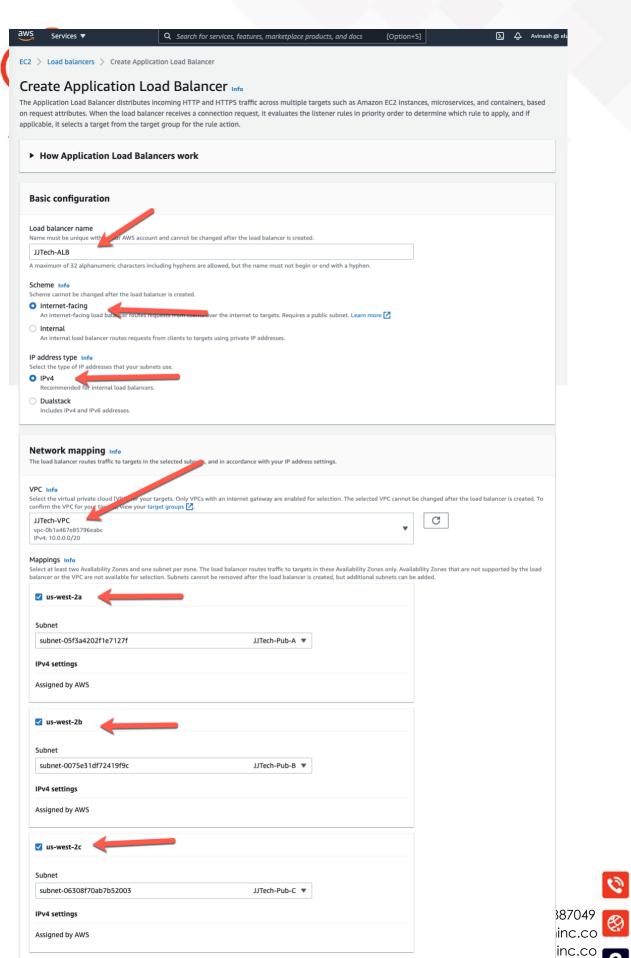


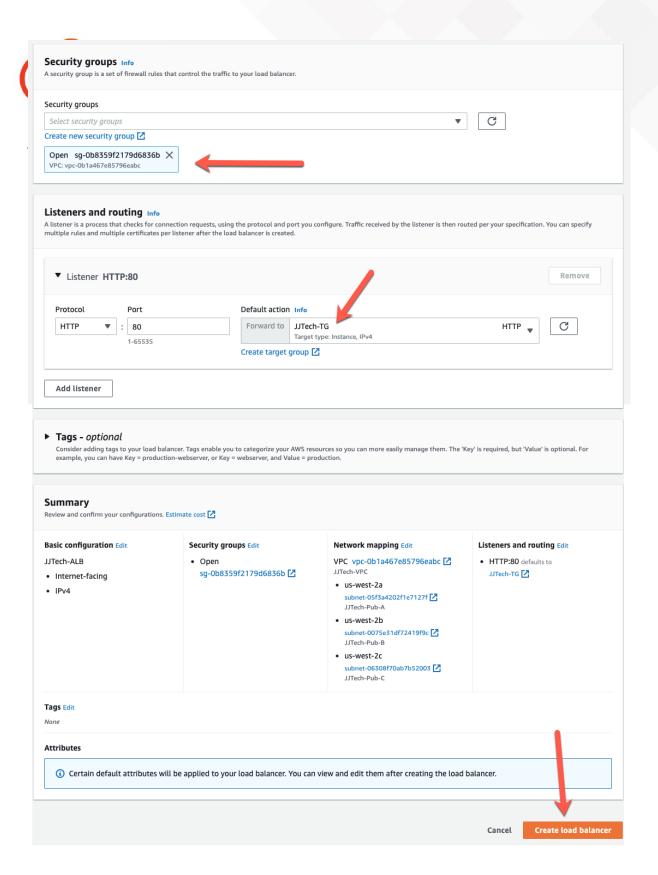








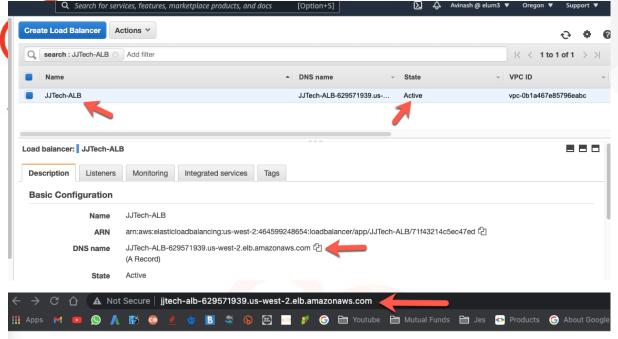












Hello AZ1

- Refresh the browser traffic will be loaded to another EC2 Instance
- Now, you are able to access the app from load balancer
- Let's restrict the access through WAF

Step 3: Create IP set in WAF

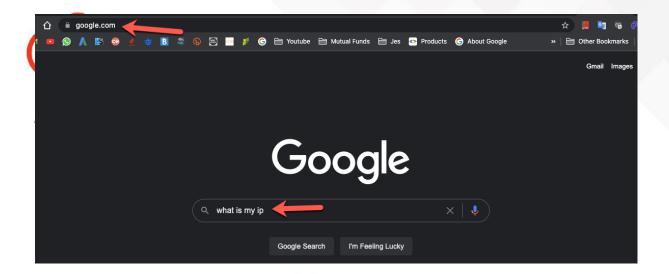
 Before we setup IP set, let's get your ip by typing "what is my ip" in Google search

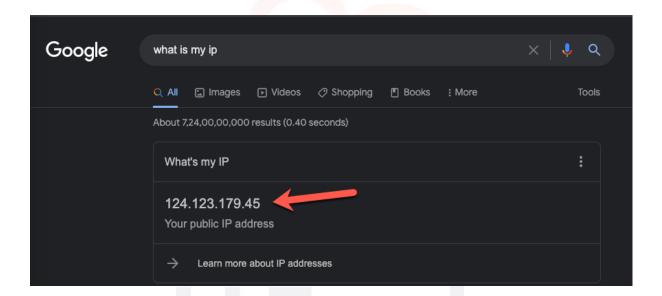












Navigate to WAF AWS Console and create an IP set

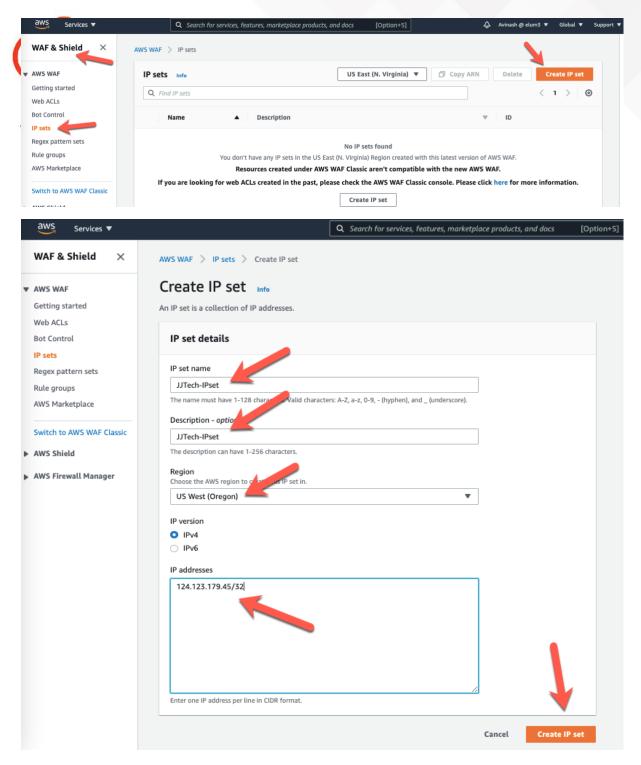












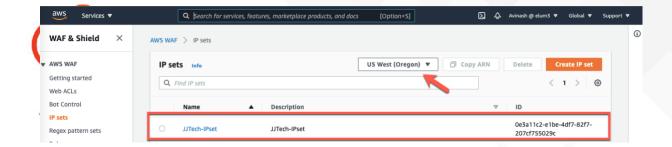
• Add the IP address you got from "what is my ip" with /32



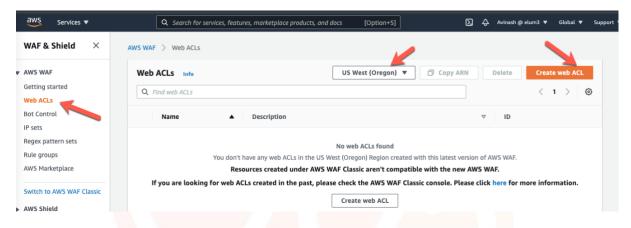


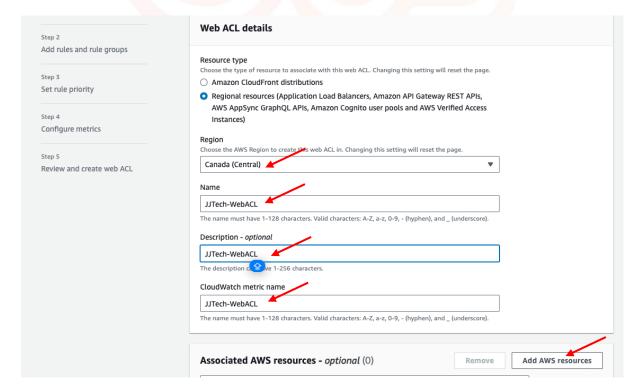






Navigate to AWS WAF Web ACI's console



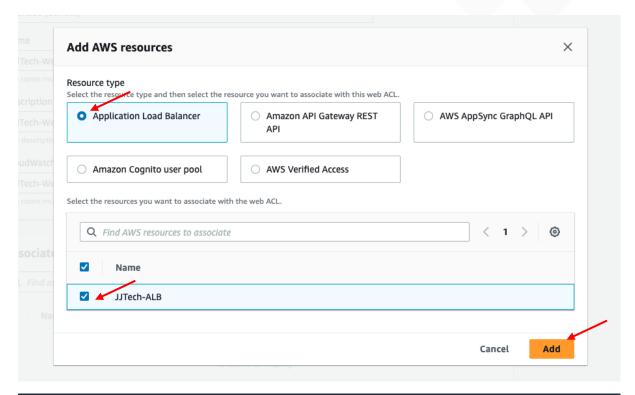


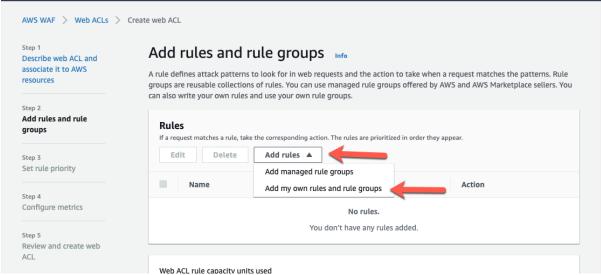












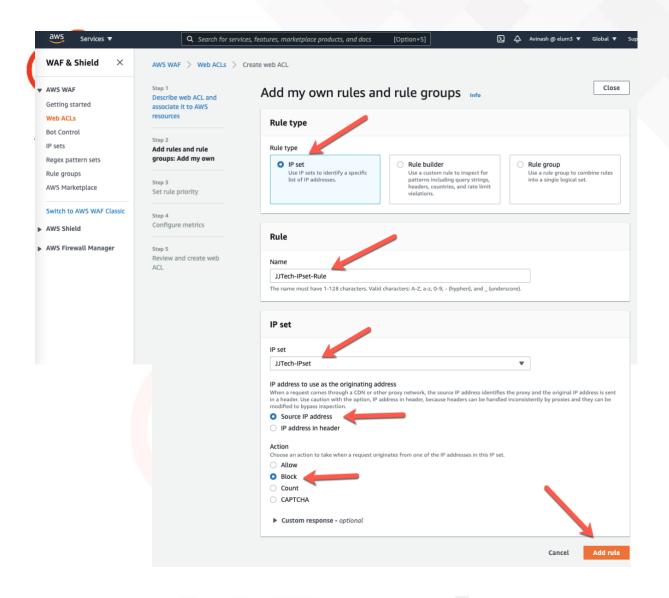
In this test we are going to block our own IP and allowing remaining all Ips

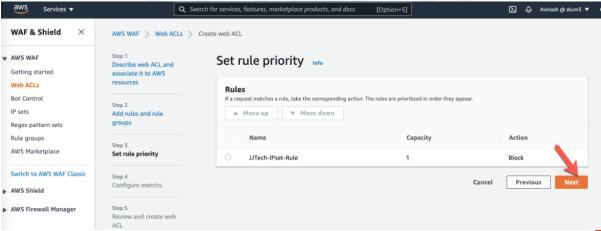








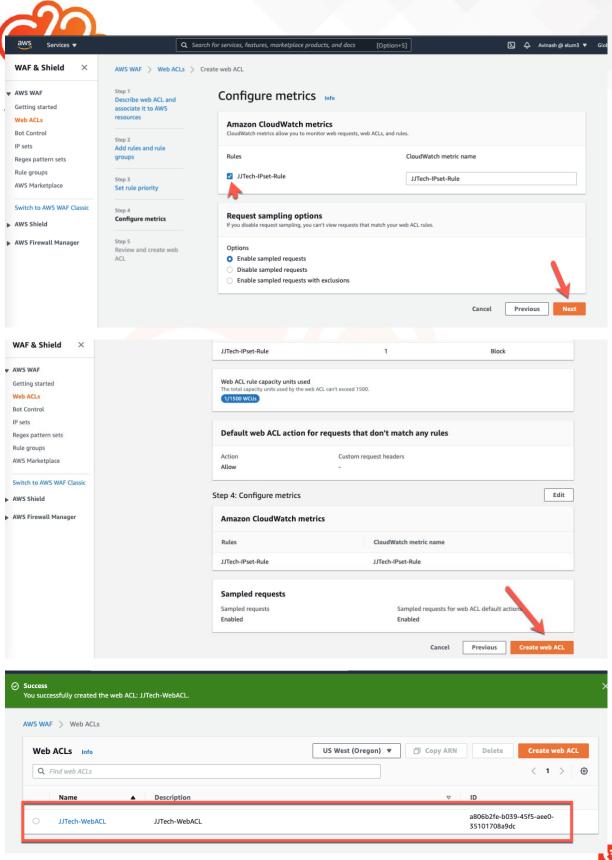








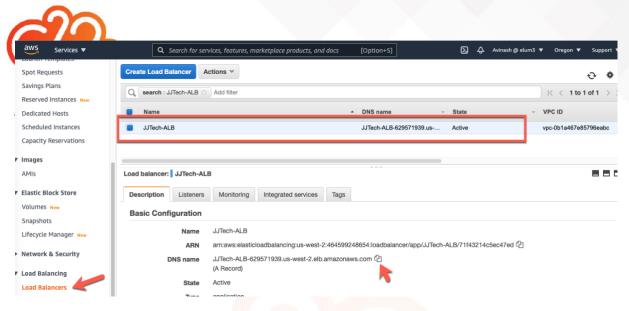












- Since we blocked our own IP, we cannot access the app from ALB DNS
- Copy the DNS and search in google



- It's not working
- Our test is successful
- This is how we can block any Ips or/and allow any IPs







