

Configuration Manual

MSc Research Project
Cloud Computing

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MSc Project Submission Sheet
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Configuration Manual

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1 Introduction

The practical design of a holistic cloud security framework is introduced in a setting of Amazon Web Services (AWS) in this section. It is concerned with the functionality of converting theoretical security into a real-world setting that helps to increase confidentiality, integrity, and availability of the cloud resources. The basic infrastructure including EC2, VPC, S3, etc are properly implemented and strengthened with a Zero Trust security model, multi-factor authentication, and enhanced SSH access control.

Automated threat detection processes are also incorporated with the help of tools such as Fail2ban and custom log analysis to detect and prevent harmful behavior in real-time. TLS and AWS Key Management Service are used to ensure strong encryption of data in transit and the rest. To prove the efficiency and stability of the secured AWS environment, the system is ultimately tested by the means of controlled security testing, comprising of the network scan, denial-to-service testing, and brute-force attacks.

1.1 System Configuration Setup

1.1.1 System Configuration Setup

Software Used

- AWS Lab
- Kali Linux
- WSL (Windows Subsystem for Linux)

Hardware Used

- Windows 10
- 8 GB RAM

2 Project Implementation

2.1 Environmental Setup

2.1.1 Step 1: Zero Trust Hardening



Figure 1: Installation of Google Authenticator

The success of the deployment of Google Authenticator on the server is confirmed by the installation of the packages and the available opportunities to achieve multi-factor authentication, thus increasing access controls due to the introduction of additional verification measures in accordance with the requirements of the Zero Trust model.



Figure 2: Configuring the Google Authenticator

Configuration introduces the generation of tokens, time-skewed exploitation and “brute-force” guarding. Allowing rate-limiting decrease the chances of abuse of authentication, and provide greater resistance to repeated logins and overall security of the authentication state.

```
[ec2-user@ip-172-31-77-5 ~]$ sudo nano /etc/ssh/sshd_config
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$

# -- Zero Trust Implementation----
KbdInteractiveAuthentication yes
ChallengeResponseAuthentication yes
```

Figure 3: Enabling Keyboard-interactive Authentication

The SSH is configured so that there is the keyboard-interactive authentication has been activated and challenge response authentication is also activated that the security to the user logins on top of the password authentication can be there.

```
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ sudo sshd -t || echo "ERROR"
OK
[ec2-user@ip-172-31-77-5 ~]$
```

Figure 4: Checking the configuration file

Configuration check gets validation of syntax correctness whereby modified SSH parameters are verified to work correctly. This process helps avoid the risks of misconfiguration and ensures that secure authentication policies are implemented without appropriately interrupting the access to the servers.

```
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ sudo systemctl restart sshd
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ ||
```

Figure 5: Restarting sshd configuration

The restart of the SSH daemon with new authentication options enables MFA and new security policies that are immediately enforced and the server immediately start to operate with enhanced Zero Trust.

```
[ec2-user@ip-172-31-77-5 ~]$ sudo nano /etc/pam.d/ssh
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ ||
GNU nano 8.3
##PAM-1.0
auth required pam_google_authenticator.so nullok
auth        substack      password-auth
auth        include       postlogin
account     required      pam_sepermit.so
account     required      pam_nologin.so
account     include       password-auth
password    include       password-auth
# pam_selinux.so close should be the first session rule
session     required      pam_selinux.so close
session     required      pam_loginuid.so
# pam_selinux.so open should only be followed by sessions to be executed in the user context
session     required      pam_selinux.so open env_params
session     required      pam_namespace.so
session     optional      pam_keyinit.so force revoke
session     optional      pam_motd.so
session     include       password-auth
session     include       postlogin
|
```

Figure 6: Configuring PAM File

PAM settings are modified to provide authentication control, Google refresher, session management, and secure login activities, which enforces orderly access by SSH access policy and controlled session policy.

```
[ec2-user@ip-172-31-77-5 ~]$  
[ec2-user@ip-172-31-77-5 ~]$ sudo sshd -t  
[ec2-user@ip-172-31-77-5 ~]$  
[ec2-user@ip-172-31-77-5 ~]$
```

Figure 7: Testing the PAM File

The SSH daemon setup is tested with a `sudo sshd -t` command to ensure that the rules in authentication are free of errors before implementing changes on the server to ensure one operates the server securely.

[illegible]

Figure 8: Restarting SSHD and Checking SSHD status

SSHD is restarted and its health is checked, which proves that it has been loaded successfully, is running and is bound to port 22, which is a working service of secure-shell.

```

[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ sudo nano /etc/ssh/sshd_config
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ |
# -- Zero Trust Implementation----
KbdInteractiveAuthentication yes
ChallengeResponseAuthentication yes
PermitRootLogin no
PubkeyAuthentication yes
PermitEmptyPasswords no
PasswordAuthentication yes
UsePAM yes
AllowAgentForwarding no
AllowTcpForwarding no
GatewayPorts no
X11Forwarding no
MaxAuthTries 3
LoginGraceTime 30s
ClientAliveInterval 300
ClientAliveCountMax 2
UseDNS no
PermitUserEnvironment no
# AuthenticationMethods publickey keyboard-interactive

```

Figure 9: Applying Zero Trust Settings

SSH settings are adjusted to impose requirements on stronger authentication, to refuse unsafe features, to restrict the number of sessions, and to apply the principles of Zero Trust to provide better system security and keeping the attack surface at the minimal level.

```

[ec2-user@ip-172-31-77-5 bin]$ sudo passwd ec2-user
Changing password for user ec2-user.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[ec2-user@ip-172-31-77-5 bin]$

```

Figure 10: Creating Password for EC2 User

The EC2 user is given a new password which changes authentication tokens and allows the user to log in with a password upon activation of more stringent access control and stricter security enforcement.

2.2 Step 2: Threat Detection

```

root@kali:~# dpkg-query -f='${Package} ${Version} ${Architecture} ${Depends} ${Recommends} ${Provides} ${Conflicts} ${Replaces} ${Breaks} ${Installed-Size} ${Size} ${MD5sum} ${Package-Filename}\n' -W fail2ban
Package: fail2ban
Version: 0.11.0-1
Architecture: amd64
Depends: python3, python3-pam, python3-regex, python3-yaml, python3-cryptography, python3-ldap3, python3-geoip, python3-ipaddress, python3-geoip2, python3-geoip3, python3-geoip4, python3-geoip5, python3-geoip6, python3-geoip7, python3-geoip8, python3-geoip9, python3-geoip10, python3-geoip11, python3-geoip12, python3-geoip13, python3-geoip14, python3-geoip15, python3-geoip16, python3-geoip17, python3-geoip18, python3-geoip19, python3-geoip20, python3-geoip21, python3-geoip22, python3-geoip23, python3-geoip24, python3-geoip25, python3-geoip26, python3-geoip27, python3-geoip28, python3-geoip29, python3-geoip30, python3-geoip31, python3-geoip32, python3-geoip33, python3-geoip34, python3-geoip35, python3-geoip36, python3-geoip37, python3-geoip38, python3-geoip39, python3-geoip40, python3-geoip41, python3-geoip42, python3-geoip43, python3-geoip44, python3-geoip45, python3-geoip46, python3-geoip47, python3-geoip48, python3-geoip49, python3-geoip50, python3-geoip51, python3-geoip52, python3-geoip53, python3-geoip54, python3-geoip55, python3-geoip56, python3-geoip57, python3-geoip58, python3-geoip59, python3-geoip60, python3-geoip61, python3-geoip62, python3-geoip63, python3-geoip64, python3-geoip65, python3-geoip66, python3-geoip67, python3-geoip68, python3-geoip69, python3-geoip70, python3-geoip71, python3-geoip72, python3-geoip73, python3-geoip74, python3-geoip75, python3-geoip76, python3-geoip77, python3-geoip78, python3-geoip79, python3-geoip80, python3-geoip81, python3-geoip82, python3-geoip83, python3-geoip84, python3-geoip85, python3-geoip86, python3-geoip87, python3-geoip88, python3-geoip89, python3-geoip90, python3-geoip91, python3-geoip92, python3-geoip93, python3-geoip94, python3-geoip95, python3-geoip96, python3-geoip97, python3-geoip98, python3-geoip99
Recommends: python3-geoip, python3-geoip2, python3-geoip3, python3-geoip4, python3-geoip5, python3-geoip6, python3-geoip7, python3-geoip8, python3-geoip9, python3-geoip10, python3-geoip11, python3-geoip12, python3-geoip13, python3-geoip14, python3-geoip15, python3-geoip16, python3-geoip17, python3-geoip18, python3-geoip19, python3-geoip20, python3-geoip21, python3-geoip22, python3-geoip23, python3-geoip24, python3-geoip25, python3-geoip26, python3-geoip27, python3-geoip28, python3-geoip29, python3-geoip30, python3-geoip31, python3-geoip32, python3-geoip33, python3-geoip34, python3-geoip35, python3-geoip36, python3-geoip37, python3-geoip38, python3-geoip39, python3-geoip40, python3-geoip41, python3-geoip42, python3-geoip43, python3-geoip44, python3-geoip45, python3-geoip46, python3-geoip47, python3-geoip48, python3-geoip49, python3-geoip50, python3-geoip51, python3-geoip52, python3-geoip53, python3-geoip54, python3-geoip55, python3-geoip56, python3-geoip57, python3-geoip58, python3-geoip59, python3-geoip60, python3-geoip61, python3-geoip62, python3-geoip63, python3-geoip64, python3-geoip65, python3-geoip66, python3-geoip67, python3-geoip68, python3-geoip69, python3-geoip70, python3-geoip71, python3-geoip72, python3-geoip73, python3-geoip74, python3-geoip75, python3-geoip76, python3-geoip77, python3-geoip78, python3-geoip79, python3-geoip80, python3-geoip81, python3-geoip82, python3-geoip83, python3-geoip84, python3-geoip85, python3-geoip86, python3-geoip87, python3-geoip88, python3-geoip89, python3-geoip90, python3-geoip91, python3-geoip92, python3-geoip93, python3-geoip94, python3-geoip95, python3-geoip96, python3-geoip97, python3-geoip98, python3-geoip99
Provides: fail2ban
Conflicts: fail2ban
Replaces: fail2ban
Breaks: fail2ban
Installed-Size: 1024
Size: 1024
MD5sum: 1024
Package-Filename: fail2ban_0.11.0-1_amd64.deb

```

Figure 11: Installation of Fail2ban (Anomaly Detection for SSH)

The information in the package installation and system logs proves that Fail2ban is deployed successfully, and the dependencies, repositories, and service components are installed correctly and strengthening the anomaly detection ability of SSH.

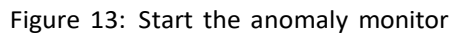
```

root@kali:~# dpkg-query -f='${Package} ${Version} ${Architecture} ${Depends} ${Recommends} ${Provides} ${Conflicts} ${Replaces} ${Breaks} ${Installed-Size} ${Size} ${MD5sum} ${Package-Filename}\n' -W fail2ban
Package: fail2ban
Version: 0.11.0-1
Architecture: amd64
Depends: python3, python3-pam, python3-regex, python3-yaml, python3-cryptography, python3-ldap3, python3-geoip, python3-ipaddress, python3-geoip2, python3-geoip3, python3-geoip4, python3-geoip5, python3-geoip6, python3-geoip7, python3-geoip8, python3-geoip9, python3-geoip10, python3-geoip11, python3-geoip12, python3-geoip13, python3-geoip14, python3-geoip15, python3-geoip16, python3-geoip17, python3-geoip18, python3-geoip19, python3-geoip20, python3-geoip21, python3-geoip22, python3-geoip23, python3-geoip24, python3-geoip25, python3-geoip26, python3-geoip27, python3-geoip28, python3-geoip29, python3-geoip30, python3-geoip31, python3-geoip32, python3-geoip33, python3-geoip34, python3-geoip35, python3-geoip36, python3-geoip37, python3-geoip38, python3-geoip39, python3-geoip40, python3-geoip41, python3-geoip42, python3-geoip43, python3-geoip44, python3-geoip45, python3-geoip46, python3-geoip47, python3-geoip48, python3-geoip49, python3-geoip50, python3-geoip51, python3-geoip52, python3-geoip53, python3-geoip54, python3-geoip55, python3-geoip56, python3-geoip57, python3-geoip58, python3-geoip59, python3-geoip60, python3-geoip61, python3-geoip62, python3-geoip63, python3-geoip64, python3-geoip65, python3-geoip66, python3-geoip67, python3-geoip68, python3-geoip69, python3-geoip70, python3-geoip71, python3-geoip72, python3-geoip73, python3-geoip74, python3-geoip75, python3-geoip76, python3-geoip77, python3-geoip78, python3-geoip79, python3-geoip80, python3-geoip81, python3-geoip82, python3-geoip83, python3-geoip84, python3-geoip85, python3-geoip86, python3-geoip87, python3-geoip88, python3-geoip89, python3-geoip90, python3-geoip91, python3-geoip92, python3-geoip93, python3-geoip94, python3-geoip95, python3-geoip96, python3-geoip97, python3-geoip98, python3-geoip99
Recommends: python3-geoip, python3-geoip2, python3-geoip3, python3-geoip4, python3-geoip5, python3-geoip6, python3-geoip7, python3-geoip8, python3-geoip9, python3-geoip10, python3-geoip11, python3-geoip12, python3-geoip13, python3-geoip14, python3-geoip15, python3-geoip16, python3-geoip17, python3-geoip18, python3-geoip19, python3-geoip20, python3-geoip21, python3-geoip22, python3-geoip23, python3-geoip24, python3-geoip25, python3-geoip26, python3-geoip27, python3-geoip28, python3-geoip29, python3-geoip30, python3-geoip31, python3-geoip32, python3-geoip33, python3-geoip34, python3-geoip35, python3-geoip36, python3-geoip37, python3-geoip38, python3-geoip39, python3-geoip40, python3-geoip41, python3-geoip42, python3-geoip43, python3-geoip44, python3-geoip45, python3-geoip46, python3-geoip47, python3-geoip48, python3-geoip49, python3-geoip50, python3-geoip51, python3-geoip52, python3-geoip53, python3-geoip54, python3-geoip55, python3-geoip56, python3-geoip57, python3-geoip58, python3-geoip59, python3-geoip60, python3-geoip61, python3-geoip62, python3-geoip63, python3-geoip64, python3-geoip65, python3-geoip66, python3-geoip67, python3-geoip68, python3-geoip69, python3-geoip70, python3-geoip71, python3-geoip72, python3-geoip73, python3-geoip74, python3-geoip75, python3-geoip76, python3-geoip77, python3-geoip78, python3-geoip79, python3-geoip80, python3-geoip81, python3-geoip82, python3-geoip83, python3-geoip84, python3-geoip85, python3-geoip86, python3-geoip87, python3-geoip88, python3-geoip89, python3-geoip90, python3-geoip91, python3-geoip92, python3-geoip93, python3-geoip94, python3-geoip95, python3-geoip96, python3-geoip97, python3-geoip98, python3-geoip99
Provides: fail2ban
Conflicts: fail2ban
Replaces: fail2ban
Breaks: fail2ban
Installed-Size: 1024
Size: 1024
MD5sum: 1024
Package-Filename: fail2ban_0.11.0-1_amd64.deb

```

Figure 12: Enable monitoring of suspicious SSH activity

Configuration entries can turn SSH protection on with set ports, filters, log paths, and ban rules to be reflected, and block repeated and failed authentication attempts to mitigate them with automatic blocking.



```
[ec2-user@ip-172-31-77-5 bin]$ sudo nano threat-detect.sh
[ec2-user@ip-172-31-77-5 bin]$ sudo chmod +x threat-detect.sh
[ec2-user@ip-172-31-77-5 bin]$ ls
threat-detect.sh
[ec2-user@ip-172-31-77-5 bin]$
```

Figure 14: Adding Local Log Analyzer

2.3 Step 3: Encryption

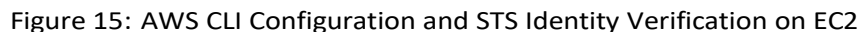
[illegible]

Figure 16: Listing the existing KMS keys

The `aws kms list-keys` retrieve a list of available KMS keys and its `KeyId` and

ARNs, ensuring the presence of several customer managed keys. Applicable in auditing encryption resources and ensuring that there is availability of keys to be operated on later.

[illegible]

Figure 17: Verifying Prerequisites

The command `aws sts get-caller-identity` shows identity of callers, IAM roles, configuration and EC2 instances metadata. Authenticates using AWS credentials, region configuration and environment preparedness with key management or encryption operation.

```
[ec2-user@ip-172-31-77-5 ~]$
[ec2-user@ip-172-31-77-5 ~]$ cat > key_policy.json << 'EOF'
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Allow root",
      "Effect": "Allow",
      "Principal": { "AWS": "arn:aws:iam::004220161871:root" },
      "Action": "kms:*",
      "Resource": "*"
    },
    {
      "Sid": "Allow role to use key",
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::004220161871:role/voclabs"
      },
      "Action": [
        "kms:Encrypt",
        "kms:Decrypt",
        "kms:GenerateDataKey",
        "kms:GenerateDataKeyWithoutPlaintext"
      ],
      "Resource": "*"
    }
  ]
}
EOF
[ec2-user@ip-172-31-77-5 ~]$
```

Figure 18: Creating a KMS Key

The cat > key policy.json << 'EOF' command displays development of a critical policy that allows authorization to root and that of a particular IAM role. Provides protection to the access control operations of encryption, decryption and key generation of data.

```

ec2-user@ip-172-31-77-5 ~]$
ec2-user@ip-172-31-77-5 ~]$ aws kms create-key --policy file://key_policy.json
{
  "KeyMetadata": {
    "KeyId": "a1b2c3d4-e5f6-g7h8-i9j0-k1l2m3n4o5p6",
    "KeyArn": "arn:aws:kms:us-east-1:123456789012:key/a1b2c3d4-e5f6-g7h8-i9j0-k1l2m3n4o5p6",
    "CreationDate": "2016-11-17T11:30:33.000Z",
    "Enabled": true,
    "DeletionDate": null,
    "KeyUsage": "ENCRYPT_DECRYPT",
    "KeyState": "Enabled",
    "Origin": "AWS_KMS",
    "KeyManager": "CUSTOMER",
    "OutcomeAtCreation": "SYMMETRIC_DEFAULT",
    "KeySpec": "SYMMETRIC_DEFAULT",
    "EncryptionAlgorithms": [
      "SYMMETRIC_DEFAULT"
    ],
    "MultiRegion": false,
    "CrossRegionReplicaId": "a1b2c3d4-e5f6-g7h8-i9j0-k1l2m3n4o5p6"
  }
}
ec2-user@ip-172-31-77-5 ~]$

```

Figure 19: Creating a CMK

Provision on-demand KMS key, which is managed by the customer, and the metadata is shown, with KeyId, ARN, type and status. Certifies that it successfully provides a symmetric encryption key which uses in secure data operations.

```

ec2-user@ip-172-31-77-5 ~]$
ec2-user@ip-172-31-77-5 ~]$ aws kms generate-data-key \
--key-id $KEY_ID \
--key-spec AES_256 \
> data_key.json
ec2-user@ip-172-31-77-5 ~]$
ec2-user@ip-172-31-77-5 ~]$ ||

```

Figure 20: Generate a Data Key

Creates a data key based on KMS key and AES-256 specification. Generates encrypted key material and plaintext material needed to remain consistent with application-level encryption processes that are secure.

```

ec2-user@ip-172-31-77-5 ~]$ echo "secret message hello" > secret.txt
ec2-user@ip-172-31-77-5 ~]$ aws kms encrypt \
--key-id $KEY_ID \
--plaintext fileb://secret.txt \
--output text \
--query CiphertextBlob | base64 --decode > secret.enc
ec2-user@ip-172-31-77-5 ~]$ aws kms decrypt \
--ciphertext-blob fileb://secret.enc \
--query Plaintext \
--output text | base64 --decode
secret message hello
ec2-user@ip-172-31-77-5 ~]$ ||

```

Figure 21: Testing the KMS Encryption and Decryption

KMS encryption is effective and ensures the confidential message is secure thereby illustrating a smooth encryption and decryption process with AWS Key Management Service.

2.4 Step 4: Testing

```
root@kali:~/kali# nmap -v 3.210.181.77
Starting Nmap 7.92 ( https://nmap.org ) at 2025-11-26 02:22:19T
Nmap scan report for ec2-3-210-181-77.compute-1.amazonaws.com (3.210.181.77)
Host is up (0.002s latency).
Not shown: 486 filtered top ports (no-response), 3 filtered top ports (admin-prohibited)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh      OpenSSH 8.7 (protocol 2.0)
53/tcp    open  domain   ISC BIND 9.18.30

Service detection performed. Please report any incorrect results at https://nmap.org/submit/.
Nmap done: 1 IP address (1 host up) scanned in 24.06 seconds
```

Figure 28: Nmap scan using Public IP of AWS

A Nmap scan has been done using the public IP of the AWS EC2 Instance. The scan shows that of one of AWS EC2 Instance ports 22 and 53 are open, which means that the AWS server has an SSH port and a DNS port open, indicating that its attack surface is potentially well-lockdown.

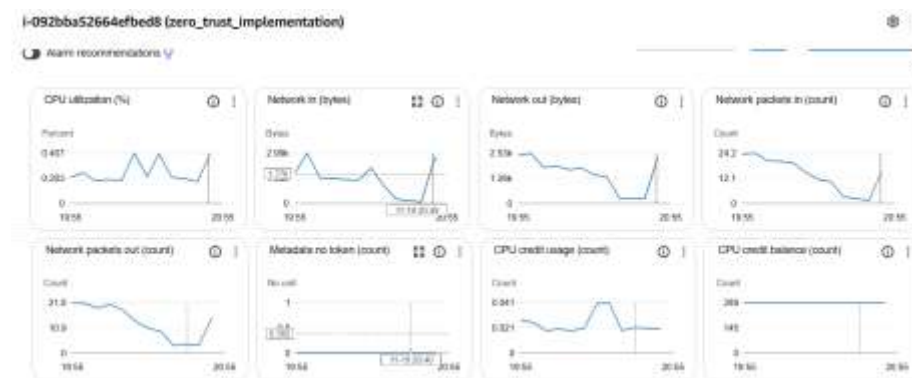


Figure 29: Monitoring EC2 Instance during Nmap scan

EC2 indicators reveal that in the measured period, CPU usage and credit balance are in a good condition and did not show any effects of the nmap scan on the performance.

```
root@kali:~/kali# sudo hping3 -S -flood -p 22 3.210.181.77
HPING 3.210.181.77 (eth0 3.210.181.77): S set, 40 headers + 0 data bytes
hping in flood mode, no replies will be shown
^C
--- 3.210.181.77 hping statistic ---
361269 packets transmitted, 0 packets received, 100% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms
```

Figure 30: Performing DoS attack on AWS Server

SYN flood DoS attack on port 22 result in 100 percent loss of packets by the attacker to prove the resilience of server or the presence of network filters.

```

top - 09:00:01 up 101d, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 388 total, 1 running, 387 sleeping, 0 stopped, 0 zombie
Mem: 0.0 total, 0.0 free, 0.0 used, 0.0 mem, 0.0 free, 0.0 used, 0.0 free
Mem: 0.0 total, 0.0 free, 0.0 used, 0.0 mem, 0.0 free, 0.0 used, 0.0 free
Mem: 0.0 total, 0.0 free, 0.0 used, 0.0 mem, 0.0 free, 0.0 used, 0.0 free

```

PID	PPID	CPU	MEM	COMMAND
1	0	0.0	0.0	systemd
2	0	0.0	0.0	systemd
3	0	0.0	0.0	systemd
4	0	0.0	0.0	systemd
5	0	0.0	0.0	systemd
6	0	0.0	0.0	systemd
7	0	0.0	0.0	systemd
8	0	0.0	0.0	systemd
9	0	0.0	0.0	systemd
10	0	0.0	0.0	systemd
11	0	0.0	0.0	systemd
12	0	0.0	0.0	systemd
13	0	0.0	0.0	systemd
14	0	0.0	0.0	systemd
15	0	0.0	0.0	systemd
16	0	0.0	0.0	systemd
17	0	0.0	0.0	systemd
18	0	0.0	0.0	systemd
19	0	0.0	0.0	systemd
20	0	0.0	0.0	systemd
21	0	0.0	0.0	systemd
22	0	0.0	0.0	systemd
23	0	0.0	0.0	systemd
24	0	0.0	0.0	systemd

Figure 31: Monitoring the system during DoS Attack

System monitoring in case of “DoS attack” indicate normal process load and minimal resources utilization, as evidence of the stability of the server in the state of stress.

```

(root@INBOOKY1PLUS)-[/home/kali]
# hydra -L users.txt -P passwords.txt ssh://3.210.181.77 -t 4 -V
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in military or
secret service organizations, or for illegal purposes (this is non-binding, these ** ig
nore laws and ethics anyway).

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2025-11-20 02:32:30
[DATA] max 4 tasks per 1 server, overall 4 tasks, 336 login tries (l:16/p:21), -84 tries
per task
[DATA] attacking ssh://3.210.181.77:22/
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "password" - 1 of 336 [child 0] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "Password123" - 2 of 336 [child 1] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "123456" - 3 of 336 [child 2] (0/0)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "12345678" - 4 of 336 [child 3] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "12345" - 5 of 336 [child 1] (0/0)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "admin" - 6 of 336 [child 3] (0/0)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "admin123" - 7 of 336 [child 2] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "root" - 8 of 336 [child 0] (0/0)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "root123" - 9 of 336 [child 1] (0/0)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome" - 10 of 336 [child 3] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome123" - 11 of 336 [child 2] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome123" - 11 of 336 [child 2] (0/0)
)
[ATTEMPT] target 3.210.181.77 - login "admin" - pass "qwerty" - 12 of 336 [child 0] (0/0)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "root123" - 12 of 336 [child 1] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome" - 12 of 336 [child 3] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome123" - 12 of 336 [child 2] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "qwerty" - 12 of 336 [child 0] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "root123" - 12 of 336 [child 1] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome" - 12 of 336 [child 3] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "welcome123" - 12 of 336 [child 2] (0/0)
)
[RE-ATTEMPT] target 3.210.181.77 - login "admin" - pass "qwerty" - 12 of 336 [child 0] (0/0)
)
[ERROR] all children were disabled due too many connection errors
0 of 1 target completed, 0 valid password found
[INFO] Writing restore file because 2 server scans could not be completed
[ERROR] 1 target was disabled because of too many errors
[ERROR] 1 targets did not complete
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2025-11-20 02:32:50

(root@INBOOKY1PLUS)-[/home/kali]
#

```

Figure 32: Performing Brute-Force Attack on AWS Server

A brute force attack with Hydra tries the SSH service with a list of usernames and passwords that have been found to be common and tries to verify the strength of the credential. The attack has been failed and hence it is proved that the AWS sever is blocking unauthorized password attempts.



Figure 33: Monitoring and Detecting Failed Logging Attempts

The monitoring tools are proactively alerting and recording when a login fails, and this fact is important to determine possible brute force attacks.

```

[ec2-user@ip-172-31-77-5 /]$ sudo cat /etc/shadow
root:*LOCK*:14600::::::
bin:*:19387:0:99999:7:::
daemon:*:19387:0:99999:7:::
adm:*:19387:0:99999:7:::
lp:*:19387:0:99999:7:::
sync:*:19387:0:99999:7:::
shutdown:*:19387:0:99999:7:::
halt:*:19387:0:99999:7:::
mail:*:19387:0:99999:7:::
operator:*:19387:0:99999:7:::
games:*:19387:0:99999:7:::
ftp:*:19387:0:99999:7:::
nobody:*:19387:0:99999:7:::
dbus:!!:20400::::::
systemd-network:!:20400::::::
systemd-oom:!:20400::::::
systemd-resolve:!:20400::::::
sshd:!!:20400::::::
rpc:!!:20400:0:99999:7:::
libstoragemgmt:!:20400::::::
systemd-coredump:!:20400::::::
systemd-timesync:!:20400::::::
chrony:!!:20400::::::
ec2-instance-connect:!!:20400::::::

[ec2-user@ip-172-31-77-5 /]$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/usr/sbin/nologin
daemon:x:2:2:daemon:/usr/sbin:/usr/sbin/nologin
adm:x:3:3:adm:/var/adm:/usr/sbin/nologin
lp:x:4:4:lp:/var/spool/lp:/usr/sbin/nologin
sync:x:5:5:sync:/usr/sbin/nologin
shutdown:x:6:6:shutdown:/usr/sbin/nologin
halt:x:7:7:halt:/usr/sbin/nologin
mail:x:8:8:mail:/usr/sbin/nologin
operator:x:9:9:operator:/usr/sbin/nologin
games:x:10:10:games:/usr/sbin/nologin
ftp:x:11:11:ftp:/usr/sbin/nologin
nobody:x:12:12:nobody:/nonexistent:/usr/sbin/nologin
dbus:x:13:13:dbus:/usr/sbin/nologin
systemd-network:x:14:14:systemd-network:/usr/sbin/nologin
systemd-oom:x:15:15:systemd-oom:/usr/sbin/nologin
systemd-resolve:x:16:16:systemd-resolve:/usr/sbin/nologin
sshd:x:17:17:sshd:/usr/sbin/nologin
rpc:x:18:18:rpc:/usr/sbin/nologin
libstoragemgmt:x:19:19:libstoragemgmt:/usr/sbin/nologin
systemd-coredump:x:20:20:systemd-coredump:/usr/sbin/nologin
systemd-timesync:x:21:21:systemd-timesync:/usr/sbin/nologin
chrony:x:22:22:chrony:/usr/sbin/nologin
ec2-instance-connect:x:23:23:ec2-instance-connect:/usr/sbin/nologin
ec2-user:x:1000:1000:ec2-user:/home/ec2-user:/bin/bash

```

Figure 34: Password Encryption Test on AWS Server

The system processes and encryption tests have been recorded in the logs of the system, which gives evidence of continued security configuration and monitoring processes on the server.

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