Secure *AWS* Multi-Account Baseline

Terraform + Policy-as-Code

Portfolio
by Amina Jiyu An
@GitHub

Executive Summary

Enterprise AWS Secure Baseline (Terraform + Policy-as-Code)

"This is not theory. Every slide is a proof I built, validated, and enforced in AWS."

This portfolio demonstrates how I designed and enforced a secure AWS environment at **enterprise scale**, combining preventive, detective, and governance controls. Every component is mapped to **international and regional compliance frameworks** (ISO/IEC 27001, Saudi NCA ECC, UAE NESA IAS), proving awareness of both global standards and local regulatory requirements.

✅ Multi-account Governance	✅ Centralized Logging Encryption	✅ Compliance Mapping	✅ Threat detection & CSPM	✅ Policy-as-Code (OPA,tfsec,Checkov)
Multi-account governance with AWS Orgs &SCPs) → *ISO 27001 A.5.1, NCA GOV-02, NESA GOV-01.*	CloudTrail + S3/KMS logs → ISO 27001 A.12.4/8.15 | NCA LGM-02 | NESA MON-01	AWS Config Conformance Packs → ISO 27001 A.12.1/5.14 | NCA CC-06 | NESA AUD-02	GuardDuty + Security Hub → ISO 27001 A.12.6/8.8 | NCA D5.5 | NESA MON-05	Enforce encryption & IAM boundaries → ISO 27001 A.14.2/8.28 | NCA D3.2 | NESA DEV-01

Architecture Diagram

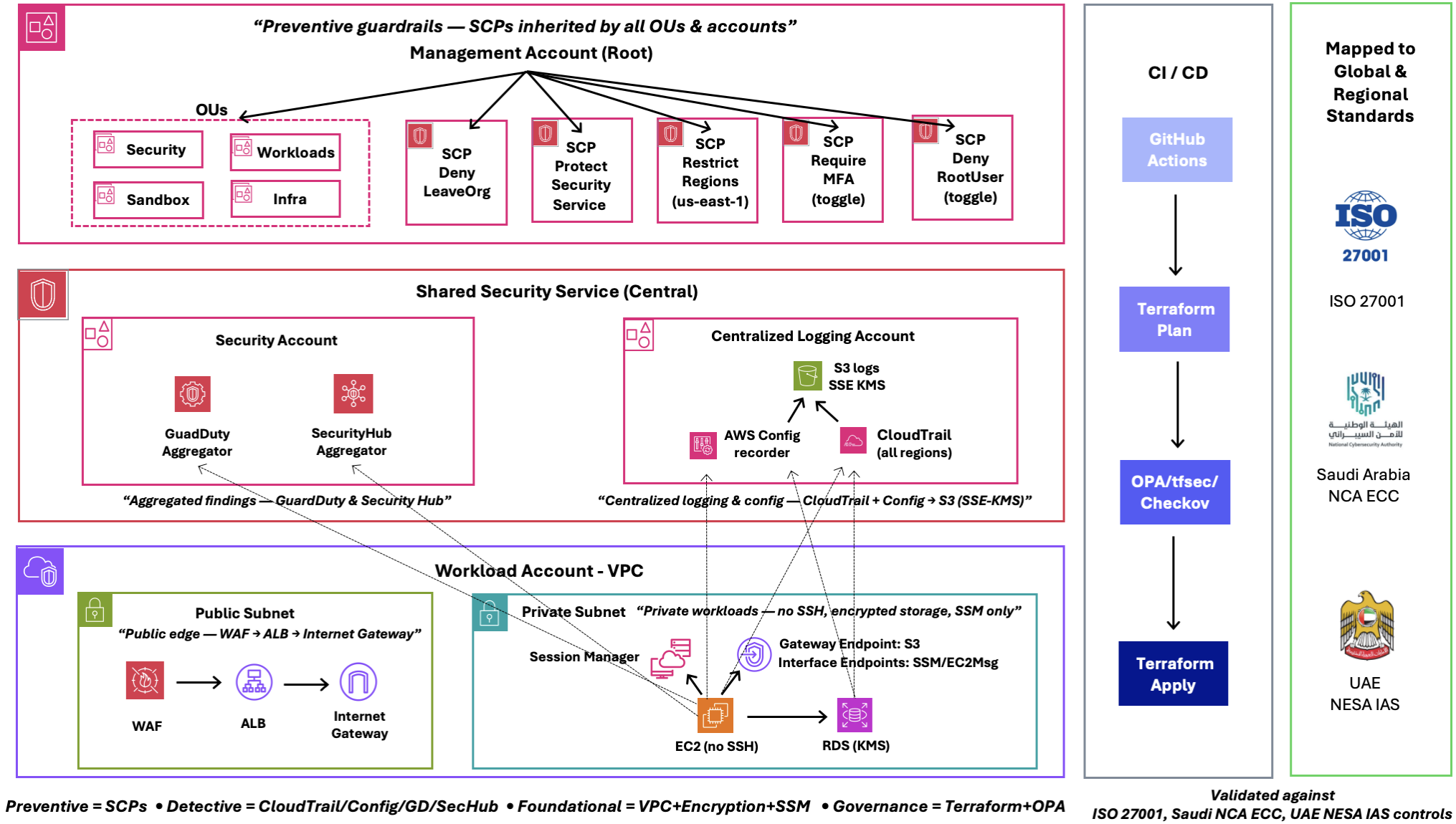


Figure 1: Secure AWS multi-account architecture with governance, logging, and workload layers

Step1: State Backend

What this proves

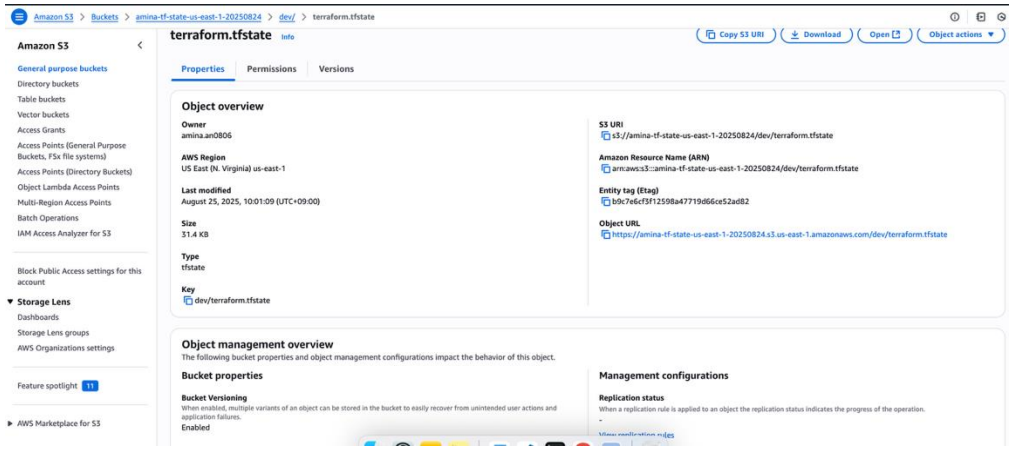
- Secure Terraform state management across accounts.
- Encryption (SSE-KMS) protects state confidentiality.
- DynamoDB locking prevents concurrent writes / corruption.

Controls

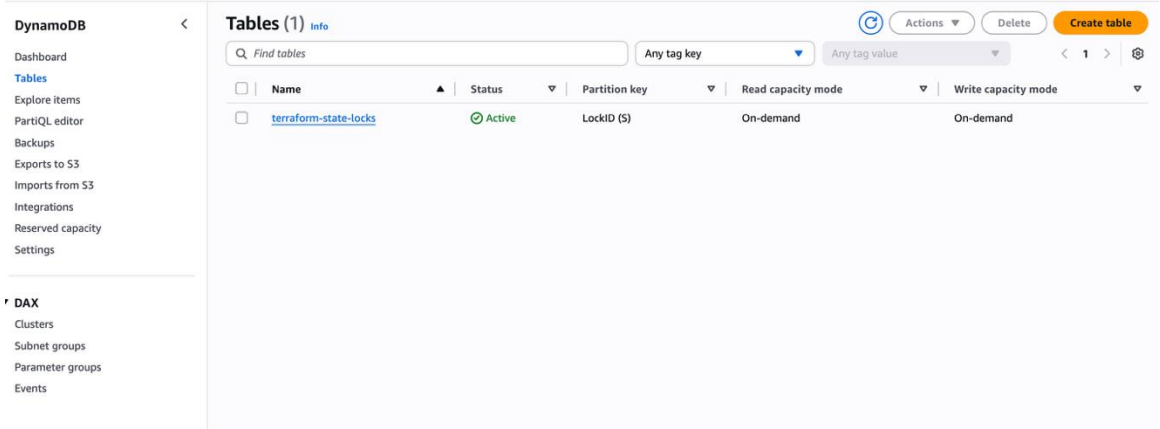
- ISO 27001: A.8.20, A.8.23, A.8.16 → 2022: 8.24, 5.23, 5.15

Proofs / Screenshots

S3 bucket (SSE-KMS enabled)



DynamoDB state locking



Note: Ensures **tamper-resistant, segregated state** → critical for enterprise IaC.

Step2: Centralized Logging

What this proves

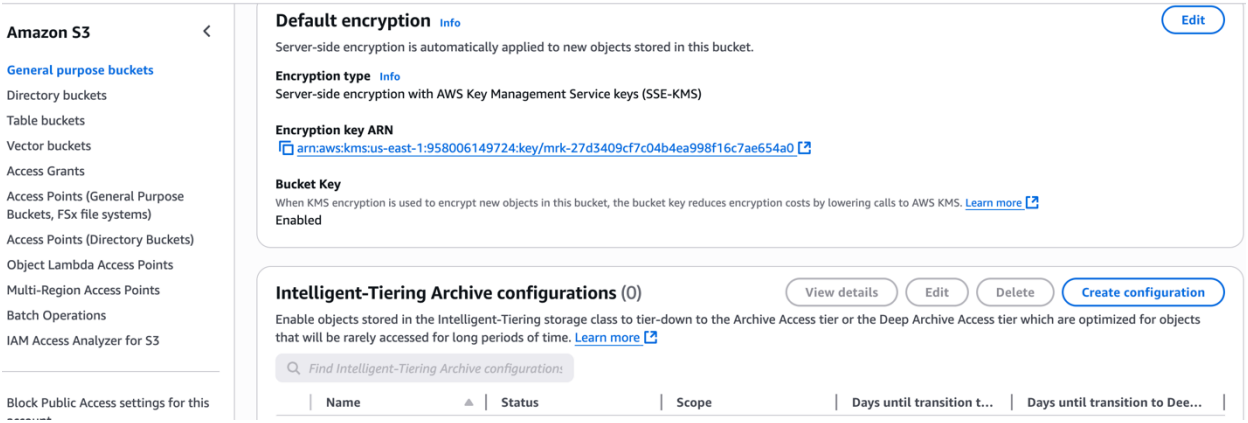
- Enterprise-wide **visibility** into all AWS activity.
- CloudTrail & AWS Config logs are **centralized, encrypted, immutable**.
- S3 bucket with **KMS CMK + versioning** → no accidental/intentional log deletion.

Controls

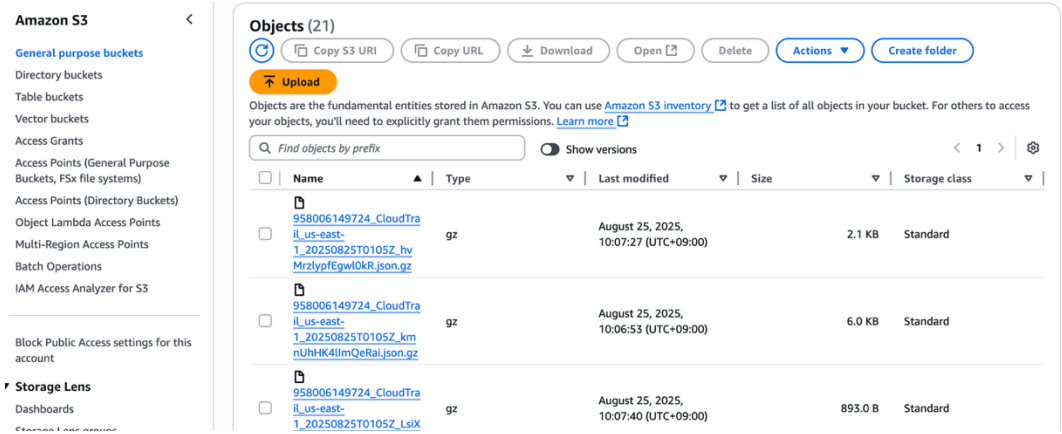
- ISO 27001: A.12.4 → 2022: 8.15
- Saudi NCA: D1 Logging & CC-06 Compliance
- UAE NESA: MON-01

Proofs / Screenshots

Log bucket encryption (SSE-KMS)



CloudTrail Logs in S3



Note: Logging is the foundation for monitoring & audit evidence.

Step3: AWS Config & Conformance Packs

What this proves

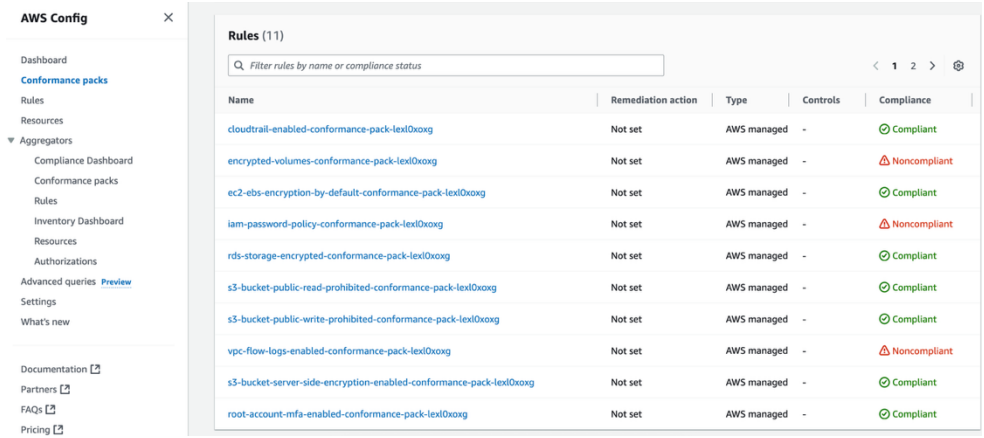
- **Detects misconfigurations** → flags non-compliance in near real-time.
- Conformance Pack with 11 security baseline rules (passwords, MFA, encryption, logs)

Controls

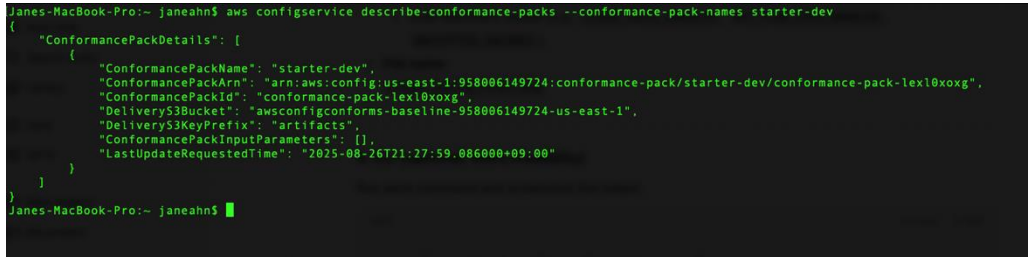
- ISO 27001: A.12.1, A.18.2.2 → 2022: 5.14, 5.36
- Saudi NCA ECC: OAM-06 (config mgmt.)
- UAE NESA IAS: Secure baseline, data protection, audit & accountability

Proofs / Screenshots

Config Rules Evaluations



CLI Conformance Pack



```
Janes-MacBook-Pro:~ janeahn$ aws configservice describe-conformance-packs --conformance-pack-names starter-dev
{
    "ConformancePackDetails": [
        {
            "ConformancePackName": "starter-dev",
            "ConformancePackArn": "arn:aws:config:us-east-1:958006149724:conformance-pack/starter-dev/conformance-pack-lexl0xoxg",
            "ConformancePackId": "conformance-pack-lexl0xoxg",
            "DeliveryS3Bucket": "awsconfigconforms-baseline-958006149724-us-east-1",
            "DeliveryS3KeyPrefix": "artifacts",
            "ConformancePackInputParameters": [],
            "LastUpdateRequestedTime": "2025-08-26T21:27:59.086000+09:00"
        }
    ]
}
Janes-MacBook-Pro:~ janeahn$
```

Note: Provides ongoing evidence for audits. Moves from reactive audits → proactive continuous compliance

Step4: Security Hub & GuardDuty

What this proves

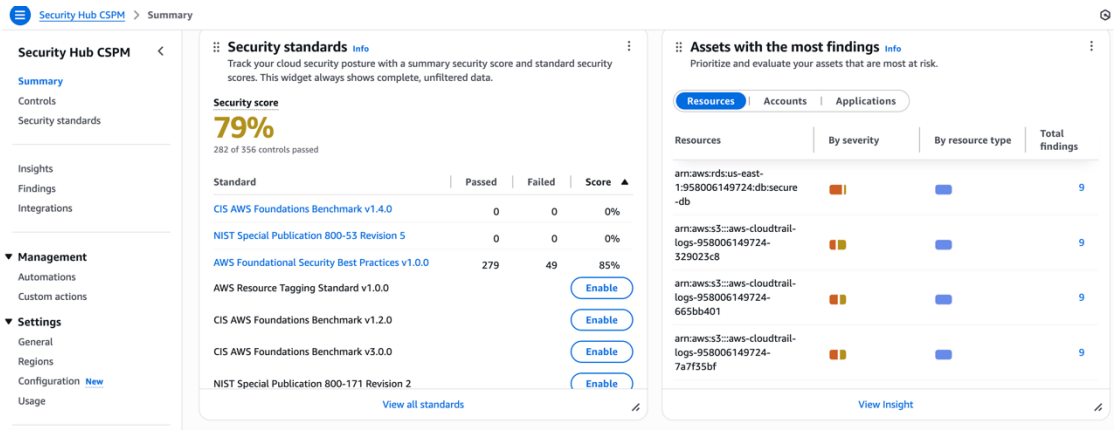
- Unified **threat detection + compliance aggregation.**
- Security Hub consolidates findings (CIS, PCI DSS).
- GuardDuty detects **anomalous network and account behavior.**

Controls

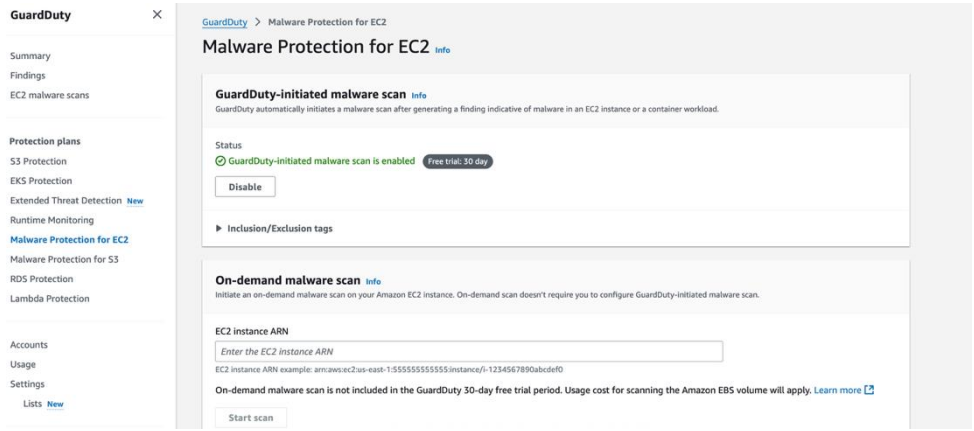
- ISO 27001: A.12.6, A.16.1 → 2022: 8.8, 5.25
- Saudi NCA: D5.5 Threat Detection

Proofs / Screenshots

Security Hub Summary



GuardDuty Detector ON



Note: Provides central view of risk posture across all accounts

Step5: Policy-as-Code (OPA, tfsec, Checkov)

What this proves

- **Automated governance** before provisioning.
- Prevents deployment of insecure resources (unencrypted S3, missing MFA, etc.).
- CI/CD gate → code must pass tfsec, Checkov, OPA rules **before apply.**

Controls

- ISO 27001: A.14.2, A.12.1.2, A.18.2.3 → 2022: 8.28, 5.14, 5.35
- CIS AWS Foundations: enforced via Hub CIS subscription

Proofs / Screenshots

❌ OPA eval fail (GuardDuty missing)

```
Janes-MacBook-Pro:tf-aws-secure-baseline janeahn$ cat > plan-no-guardduty.json <<'EOF'
> {
>   "resource_changes": []
> }
> EOF
Janes-MacBook-Pro:tf-aws-secure-baseline janeahn$ opa eval -d policies-as-code/opa -i plan-no-guardduty.json 'data.terraform.security.m
tty
[
  "GuardDuty is not being enabled in this plan (missing aws_guardduty_detector).",
```

✅ OPA eval pass (all checks)

```
Janes-MacBook-Pro:tf-aws-secure-baseline janeahn$ opa eval -d policies-as-code/opa -i plan-pass.json 'data.terraform.security.result' -f pretty
{
  "count": 0,
  "messages": [],
  "passed": true
}
Janes-MacBook-Pro:tf-aws-secure-baseline janeahn$
```

✅ OPA unit tests pass

```
Janes-MacBook-Pro:tf-aws-secure-baseline janeahn$ opa test  policies-as-code/opa -v
policies-as-code/opa/policies_test.rego:
data.terraform.security.test_guardduty_missing_detector_denies: PASS (2.876834ms)
data.terraform.security.test_iam_group_missing_boundary_denies: PASS (3.512292ms)
data.terraform.security.test_guardduty_disabled_denies: PASS (3.549917ms)
data.terraform.security.test_securityhub_both_missing_denies: PASS (3.554584ms)
data.terraform.security.test_securityhub_account_only_denies_subscription: PASS (3.612166ms)
data.terraform.security.test_iam_role_missing_boundary_denies: PASS (3.591125ms)
data.terraform.security.test_iam_user_missing_boundary_denies: PASS (3.576917ms)
data.terraform.security.test_s3_requires_sse_denies: PASS (626.75µs)
data.terraform.security.test_s3_with_sse_allows: PASS (4.415333ms)
data.terraform.security.test_guardduty_enabled_allows: PASS (1.988041ms)
--------------------------------------------------------------------------------
PASS: 10/10
```

Note: Shifts compliance left → security embedded in development pipeline.

Step6: Organizations & SCPs

What this proves

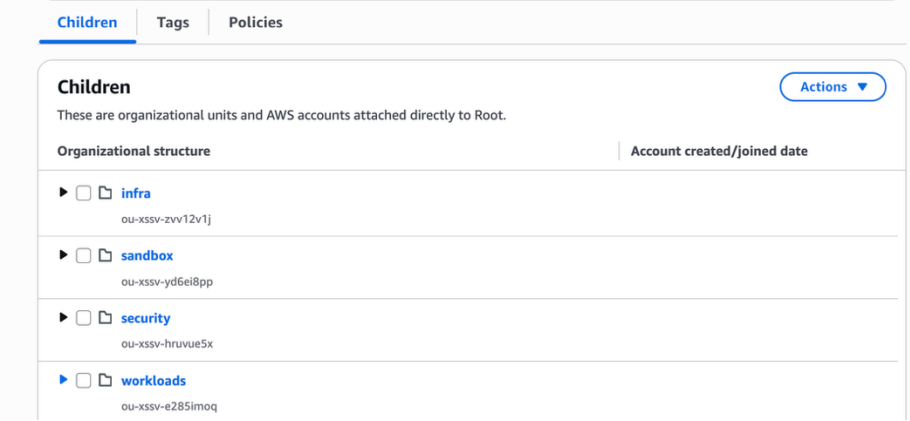
- **Preventive guardrails** enforced Org-wide.
- **SCPs restrict dangerous actions**: Deny leaving Org , Protect CloudTrail/Config/SecHub/GD ,Restrict regions (only us-east-1), Require MFA for IAM writes, Deny root user access (toggle)

Controls

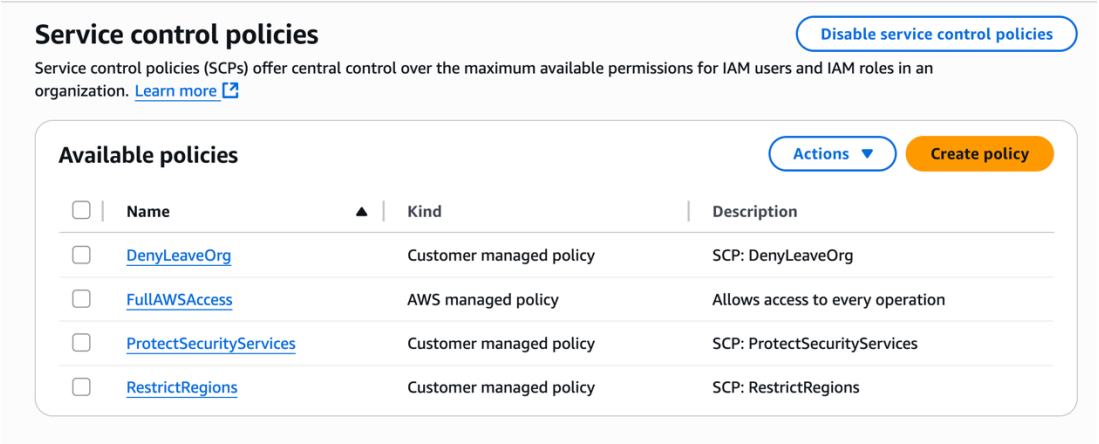
- ISO 27001: A.5.1.1, A.9.2.3, A.9.2.1 → 2022: 5.1, 5.18, 5.17
- Saudi NCA: GOV-02
- UAE NESA: GOV-01

Proofs / Screenshots

Org OUs (security, infra, workloads, sandbox)



Root with SCPs Attached



Note: These guardrails prevent violations at source — stronger than detective controls.

Compliance Mapping

Mapping of AWS security controls → ISO/IEC 27001, Saudi NCA ECC, and UAE NESA IAS frameworks, demonstrating awareness of both global standards and regional compliance mandates.

Step	Implementation Example	ISO/IEC 27001 (2013→2022)	CIS AWS Foundations	Saudi NCA ECC	UAE NESA / IAS
1 — State Backend	S3 backend SSE-KMS, DynamoDB lock	A.8.20 → 8.24 (crypto), A.8.16 → 5.15 (access control)	2.2 log encryption, 2.1.1 public access blocked	—	—
2 — Centralized Logging	CloudTrail, CloudWatch, KMS	A.12.4 → 8.15 (logging), A.8.20 → 8.24	2.1 all regions, 2.2 validation, 2.3 CMKs	D1/D2 logging & monitoring	Logging & monitoring
3 — Config & Conformance	Config rules, Conformance packs	A.12.1 → 5.14, A.18.2.2 → 5.36, A.12.7 → 5.35	2.5 Config enabled, 2.6 all resources	CC-06 compliance checks	Compliance & audit governance
4 — Security Hub & GuardDuty	Threat detection, incident dashboard	A.12.4 → 8.15, A.12.6 → 8.8, A.16.1 → 5.25	3.1 GuardDuty, 3.2 Security Hub	D5.5 threat detection, CC-06	Threat & vulnerability management, security monitoring
5 — OPA Policy-as-Code	Terraform plan eval, CI/CD enforcement	A.12.6 → 8.8, A.12.4 → 8.15, A.18.2.2 → 5.36, A.9.2.3 → 5.18	1.1 MFA, 2.x log checks, 3.x GuardDuty/SecHub	D3.2 secure by design, D5.3 IAM	Secure development lifecycle, automated compliance
6 — Organizations & SCPs	DenyLeaveOrg, Protect Security Services, RestrictRegions	A.5.1.1 → 5.1, A.12.4 → 8.15, A.9.1.2 → 5.12, A.9.2.3 → 5.18	1.1 MFA, 1.5 IAM, 1.6 Root disabled, 2.1 CloudTrail	D5.2 IAM, D5.5 GuardDuty, D1/D2 logging, CC-06	Governance, access control, continuous monitoring

CI/CD Enforcement with Policy-as-Code

What this proves

- GitHub Actions pipeline runs **security checks automatically**.
- Every pull request triggers **tfsec, Checkov, OPA** before merge.
- Pipeline ensures **"no code is applied without passing security gates."**

Controls

- ISO 27001: **A.14.2 Secure coding, A.12.1.2 Change management, A.18.2.3 Technical compliance review** → 2022: **8.28, 5.14, 5.35**
- NCA: **DEV-01 Secure Dev, CC-06 Compliance checks**
- NESA: **DEV-01, AUD-02**

Proofs / Screenshots

GitHub Actions YAML workflow

```yaml
name: terraform-security-checks

on:
  pull_request:
    paths:
      - "**/*.tf"
      - "policies-as-code/**"
      - ".github/workflows/plan.yml"
  workflow_dispatch:

jobs:
  security_checks:
    runs-on: ubuntu-latest
    env:
      # Default guess; we'll auto-correct this below if the folder doesn't exist
      WORK_DIR: envs/dev
      OPA_DIR: policies-as-code/opa
```

CI Badge Green

terraform-security-checks passing

Enterprise AWS Secure Baseline (Terraform + PaC)

This project demonstrates **how to design and enforce a secure AWS environment at enterprise scale.** It includes:

- Multi-account setup with AWS Organizations & Service Control Policies
- Centralized logging (CloudTrail, CloudWatch, S3 + KMS)
- AWS Config Conformance Packs for compliance monitoring
- Security Hub & GuardDuty as Cloud Security Posture Management (CSPM) tools
- Policy-as-Code (OPA/Rego) to enforce encryption, IAM boundaries, and security service activation

Compliance Mapping: **ISO/IEC 27001 Annex A (2013 & 2022), Saudi NCA ECC, UAE NESA IAS**

ISO/IEC 27001 Annex A — Control Mapping (2013 → 2022)

Key takeaway: IaC merges are blocked unless security & compliance tests pass → demonstrates real DevSecOps maturity and ability to operationalize cloud security pipelines.

Conclusion

“Every slide is a proof I built, validated, and enforced in AWS.”

- ✓ **Compliance → ISO 27001, NCA ECC, NESA IAS**
- ✓ **Security → SCPs, Logging, GuardDuty, Security Hub**
- ✓ **DevSecOps → Policy-as-Code in CI/CD pipelines**

Amina Jiyu An

Cloud Security & Compliance Engineer/Architect