AWS

C L O U D   C O M P U T I N G

A R C H I T E C T U R E   A S S I G N M E N T

3-Tier
Architecture Pattern

20+
AWS Services

99.99%
Target Availability

Design a 3-Tier **E-Commerce Platform** Architecture on AWS

A fully designed, scalable, secure & highly available e-commerce cloud infrastructure built on Amazon Web Services, following the AWS Well-Architected Framework.
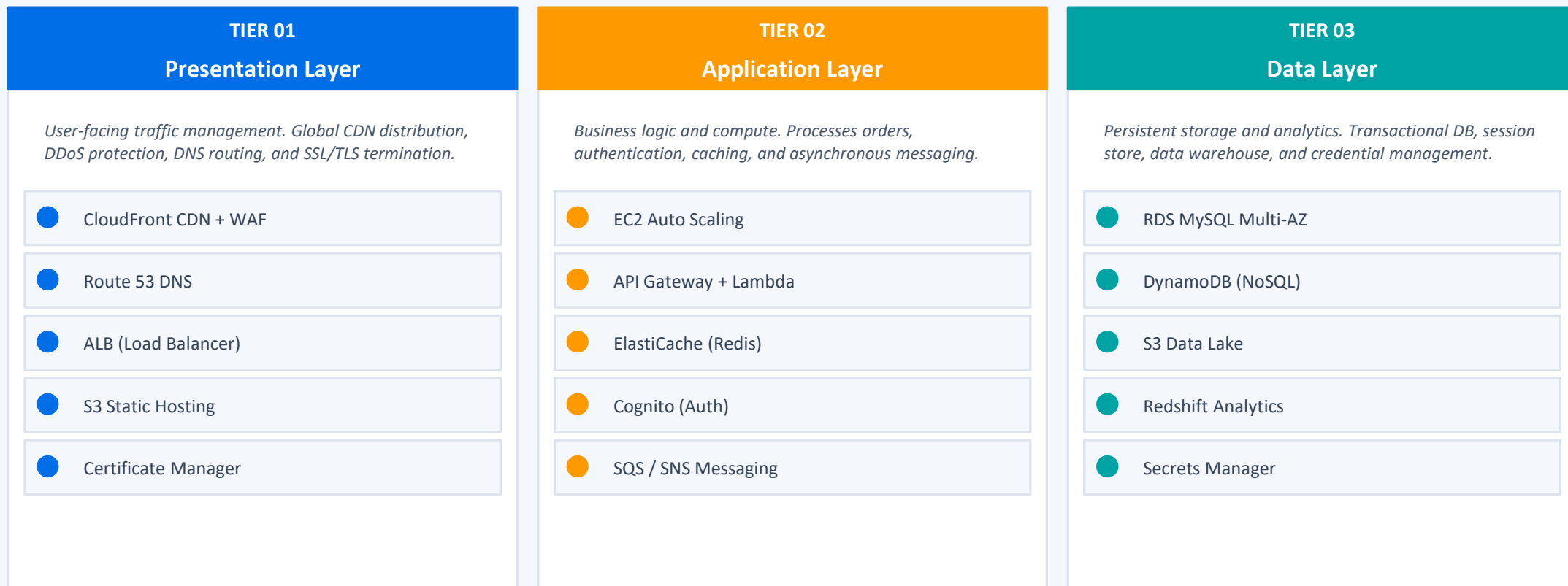
| Scalable | Secure | Highly Available |

Prepared in fulfillment of Cloud Architecture Assessment Requirements

3-Tier E-Commerce Platform Architecture on AWS

A fully designed 3-tier e-commerce platform on AWS following the Well-Architected Framework. The architecture ensures scalability via Auto Scaling and load balancing, high availability through Multi-AZ deployments (99.99% uptime), and comprehensive security with IAM, VPC isolation, WAF, and KMS encryption. Warm Standby DR provides RTO < 15 min and RPO < 1 min.

TIER 01	TIER 02	TIER 03
Presentation Layer	**Application Layer**	**Data Layer**
User-facing traffic management. Global CDN distribution, DDoS protection, DNS routing, and SSL/TLS termination.	*Business logic and compute. Processes orders, authentication, caching, and asynchronous messaging.*	*Persistent storage and analytics. Transactional DB, session store, data warehouse, and credential management.*
● CloudFront CDN + WAF	● EC2 Auto Scaling	● RDS MySQL Multi-AZ
● Route 53 DNS	● API Gateway + Lambda	● DynamoDB (NoSQL)
● ALB (Load Balancer)	● ElastiCache (Redis)	● S3 Data Lake
● S3 Static Hosting	● Cognito (Auth)	● Redshift Analytics
● Certificate Manager	● SQS / SNS Messaging	● Secrets Manager

AWS Architecture Diagram

Users / Internet

CloudFront + WAF

Route 53 DNS

S3 Static Hosting

Amazon VPC (Multi-AZ: ap-southeast-2a + 2b)

Public Subnets

ALB	API GW + Lambda
EC2 ASG	ElastiCache
NAT GW	Cognito

Private Subnets — Data Layer

RDS MySQL Multi-AZ	DynamoDB	Cert Mgr
Redshift	S3 Data Lake	
Secrets Mgr	OpenSearch	

| IAM | CloudWatch | GuardDuty | CloudTrail | KMS | Config |

Key Features:
- Multi-AZ for 99.99% availability
- Auto Scaling: 2-20 instances
- Warm Standby DR (RTO<15min, RPO<1min)
- Security: IAM + KMS + WAF + GuardDuty
- Cost optimised: Tiering

Security, Scalability, High Availability & Disaster Recovery

Security Architecture

- IAM least-privilege roles — no root keys
- VPC: public/private/data subnet isolation
- Security Groups (stateful) + NACLs (stateless)
- KMS encryption: RDS, S3, DynamoDB, Secrets
- WAF + Shield: DDoS + OWASP Top 10 protection
- GuardDuty + Security Hub: threat detection
- CloudTrail: immutable audit log (90 days)
- Compliance: PCI-DSS, GDPR, SOC 2 Type II

Scalability Strategies

- EC2 Auto Scaling: CPU>70% scale out, CPU<30% scale in
- Target: 2 min instances, 4 desired, 20 max
- ElastiCache Redis: 90% cache-hit offloads RDS
- RDS Read Replicas: analytics queries off primary
- CloudFront CDN: 95%+ cache-hit for static assets
- SQS queue buffering: absorbs 50k orders/min spikes
- Lambda auto-scales: 0 to thousands concurrent
- Scheduled scaling: pre-warm before peak events

High Availability Design

- Multi-AZ: all services across AZ-a and AZ-b
- RDS Multi-AZ: sync replication, 60-120s failover
- ALB health checks: /health every 10s, auto-remove
- Route 53 DNS failover: 60s to secondary region
- DynamoDB Global Tables: active-active replication
- ElastiCache cluster mode: automatic failover <60s
- Target SLA: 99.99% availability, MTTD<2min
- Zero-downtime deployments: Blue/Green via CodeDeploy

Disaster Recovery & Cost

- Warm Standby DR in ap-southeast-4
- RTO: <15 minutes | RPO: <1 minute
- Cross-region replication: RDS snapshots + S3 CRR
- AWS Backup: daily (7d) + weekly (90d) retention
- Reserved Instances: 40% savings on baseline capacity
- Spot Instances: 90% savings on batch workloads
- S3 Intelligent-Tiering: auto-move to cheaper tiers
- Cost monitoring: Budgets + Cost Explorer + alerts

✓ **Complete 3-tier separation | ✓ 20+ AWS services | ✓ Well-Architected Framework compliant | ✓ Production-ready enterprise architecture**