

CityMart E-Commerce Platform

Design & Deployment of a Production-Grade
3-Tier Architecture on AWS

Programme / Academy: Cloud Computing/
Cloudboosta

April 2026





Problem Statement

- Traditional retail systems lack:
 - Scalability
 - High availability
 - Secure remote access
- Need for:
 - Cloud-native digital platform
 - Reliable order processing system

Project Objectives

- Enable digital customer interaction
- Ensure high availability
- Achieve scalability & elasticity
- Enforce strong security
- Build production-ready architecture



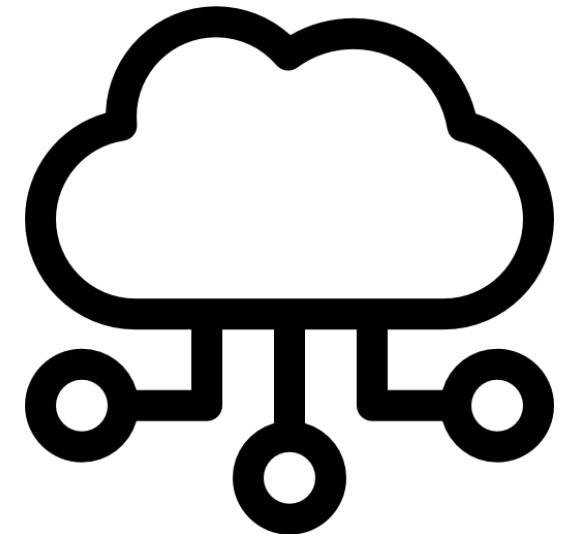
Architecture Overview

- Cloud-native 3-tier architecture on AWS
- Components:
 - CloudFront (CDN)
 - Route 53 (DNS)
 - ALB (Load balancing)
 - EC2 (Compute)
 - RDS (Database)
 - S3 (Deployment storage)



Project Deliverables Overview

- 3-Tier-Architecture diagram
 - https://drive.google.com/file/d/1F_GnG3eb7b07ykS3Btq3wRlhN2fYnnsm/view?usp=drive_link
- Video recap of executed project
 - https://drive.google.com/file/d/1LoLqI52jjzB9xUTh9M5ydf8qGbf7g3Xl/view?usp=drive_link





End-to-End Request Flow

- **User Request Path:**
- User → Route53 → CloudFront → Public ALB → Frontend EC2 → Internal ALB → Backend EC2 → RDS → Response

Three-Tier Architecture Model

- Presentation Layer (Frontend)
 - Application Layer (Backend)
 - Data Layer (Database)
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- Separation of concerns
 - Independent scaling
 - Security isolation



Presentation Tier (Frontend)

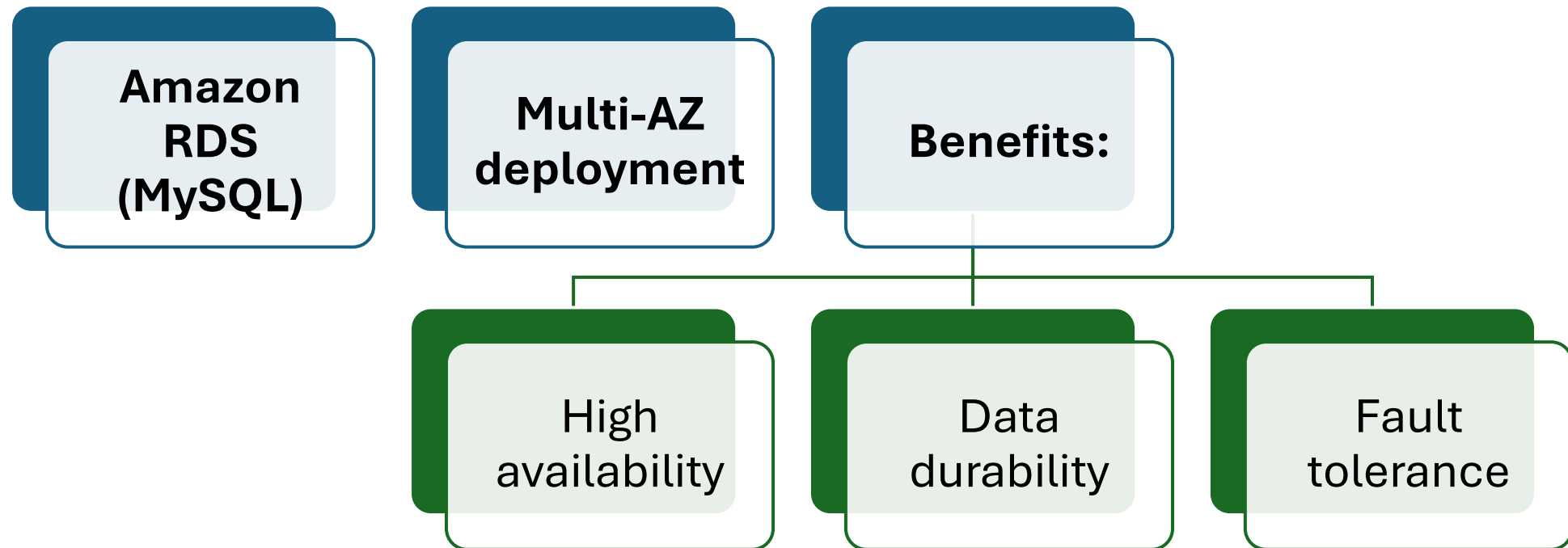
- CloudFront (global edge entry)
- Public ALB
- EC2 (Nginx servers)
- Static assets (HTML, JS, CSS)
- **Functions:**
 - Serve UI
 - Cache content
 - Route API requests



Application Tier (Backend)

- Internal ALB
- EC2 (Apache + PHP APIs)
- **Responsibilities:**
 - Business logic
 - API processing
 - Database interaction
 - Fully private (no internet access)

Data Tier





Supporting Services

- CloudFront → Caching & latency reduction
- Route 53 → Domain routing
- ACM → TLS/HTTPS
- S3 → Application deployment

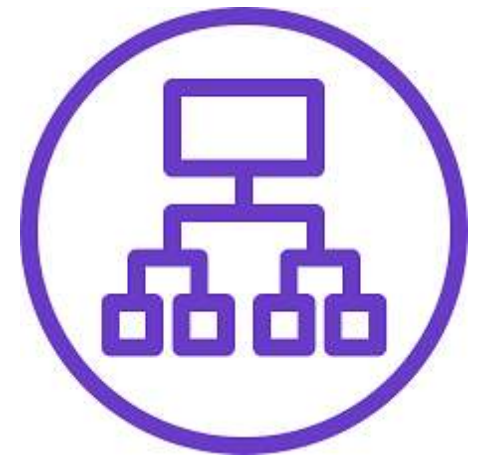
Deployment Model

- Code stored in S3
- EC2 pulls code at launch
- User data scripts automate setup
- Managed via SSM
 - Consistent deployments
 - No manual configuration



Performance Optimisation

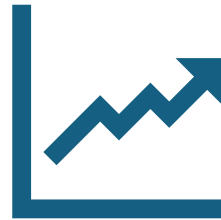
- CloudFront edge caching
- ALB traffic distribution
- Stateless architecture
 - Low latency
 - High throughput



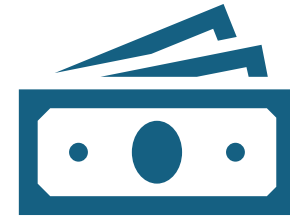
Cost Optimisation



Pay-as-you-go model



Auto scaling reduces
idle resources



Managed services
reduce ops cost

AWS Well-Architected Alignment



Security →
Layered controls



Reliability →
Multi-AZ



Performance →
CDN + ALB



Cost → Elastic
resources



Operations →
Automation

Key Engineering Achievements



Fully segmented
architecture



Secure traffic
flow



Scalable
infrastructure



Automated
deployment

Conclusion



Production-grade cloud
architecture achieved



Highly scalable, secure,
and fault tolerant



Ready for real-world
deployment

Functional Flow (Frontend → Backend)

citymart.samuelonyejekwe.com

- User browses products (Frontend – Nginx)
- Adds items to cart (client-side state)
- Submits order via API request (/api/order.php)
- Backend processes order (Apache + PHP)
- Data stored in MySQL (RDS)

Products



Premium Rice 5kg

\$12.99

Add



Cooking Oil 1L

\$4.50

Add



Laundry Detergent

\$8.75

Add



Bath Soap (Pack of 4)

\$3.20

Add

Checkout

Review your cart and submit an order request for pickup.

Cart

Premium Rice 5kg

Qty: 1

Remove

Laundry Detergent

Qty: 2

Remove

Total: \$30.49

Customer details

Name

e.g., Samuel

Email

e.g., samuel@citymart.samuelonyejekwe.com

Phone

e.g., +357...

Pickup notes (optional)

e.g., pickup at 5pm

Submit Order Request

Order request submitted

Thanks! We will confirm your pickup details shortly.

Order Reference

551212

[Continue Shopping](#)

[Home](#)

If you did not receive a reference, please try again.

Key Features of CityMart UI

- Simple and intuitive user interface
- End-to-end order workflow (browse → checkout → confirm)
- Dynamic interaction with backend APIs
- Lightweight and fast-loading frontend
- Designed for scalability in cloud deployment



Thank You