

Project Description

A **Containerized Item Exchange Application with Full DevOps Lifecycle** is a web-based item exchange platform that allows users to post items they no longer need and either offer them for free or exchange them with other users (no selling).

The application consists of a full web system, including both **frontend and backend** components, developed as a **monolithic application**. From a DevOps perspective, the project will focus on **implementing the full DevOps lifecycle** — including containerization, continuous integration and deployment, infrastructure automation, and monitoring.

By the end of the project, the platform will demonstrate a **production-grade DevOps workflow** deployed on **AWS**, showcasing automated build, test, deployment, and monitoring processes in a scalable and reliable environment.

Objective

1. Deliver a functional monolithic item-exchange website (frontend + backend) deployed on AWS.
2. Implement a complete DevOps lifecycle: version control → CI → automated tests → image build → automated deployment → monitoring.
3. Automate infrastructure provisioning and server configuration using IaC (Terraform) + Ansible.
4. Implement centralized logging and monitoring for reliability and observability.
5. Demonstrate the workflow with an automated demo that shows code → CI/CD → AWS deployment → monitoring/alerts.

Tools & Technologies

- **Containerization:** Docker, Docker Compose
- **Image Registry:** Amazon ECR
- **CI/CD:** Jenkins
- **Cloud:** AWS (EC2, RDS/Postgres)
- **IaC:** Terraform
- **Config Management:** Ansible
- **Monitoring & Logging:** Prometheus, Grafana, ELK/EFK stack

Milestones & Deadlines

Week 1 — Containerization & Local Compose

- Dockerize the app and database, create docker-compose for local dev.

Week 2 —CI/CD Pipeline Setup

- Configure Jenkins for automated build and deployment

Week 3 —Set up AWS Environment & IaC

- Create IAM roles , Implement Infrastructure-as-Code

Week 4 — Deployment Automation

- Integrate Ansible and CI to provision & deploy to AWS (push image to ECR, run container).

Week 5 — Monitoring & Logging

- Set up logging (ELK) and monitoring dashboards (Grafana).

Week 6 — Final Testing, Documentation & Demo

- End-to-end tests, performance checks, finalize README and slides, record demo.

Key Performance Indicators (KPIs)

1. Infrastructure & Automation

- **IaC completeness:** 100% of infrastructure resources are provisioned via Terraform.
- **Ansible coverage:** >90% of server/config steps automated with Ansible playbooks.

2. Pipeline Efficiency & Performance

- **Pipeline time target:** Full CI/CD run (tests + build + push + deploy) completes in **≤ 10 minutes** for typical changes.
- **Deployment downtime:** Zero manual downtime during deployment (target: **< 1 minute** or rolling update with no user-visible downtime).

3. Deployment & Cloud Management

- **Successful automated deploys:** **≥ 95%** of CI-triggered deployments succeed without human rollback.
- **Image registry:** All production images tagged with CI build ID and present in ECR

4. Monitoring & Reliability

- **Uptime:** Service availability target **≥ 99.5%** during demo window.
- **Logging retention:** Logs retained in central store (S3/Elasticsearch) for **30 days**.

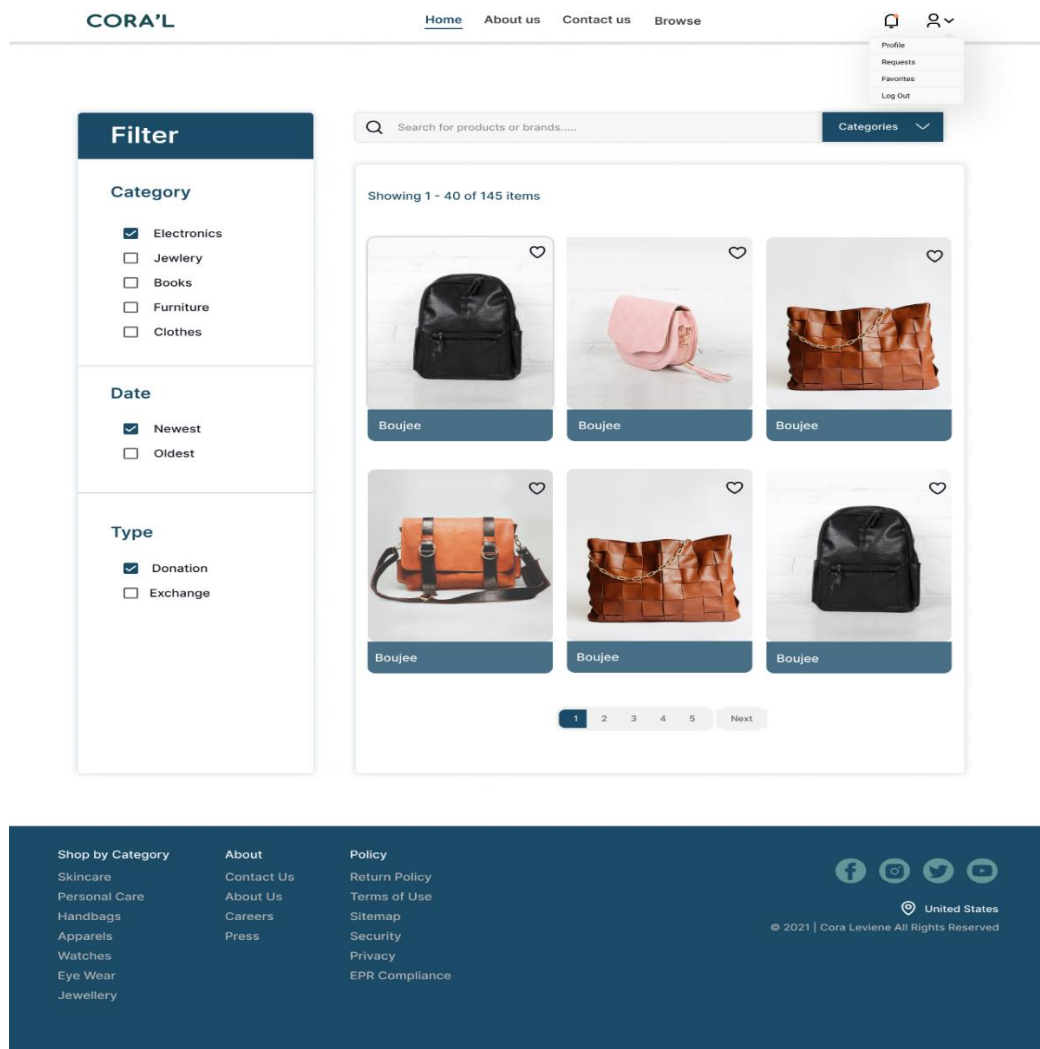
Stakeholder Analysis

This project involves several stakeholders who contribute to its success at different stages of the DevOps lifecycle.

Stakeholder	Role
Team Leader: Sama Mostafa Fazaa	CI/CD Pipeline: <ul style="list-style-type: none">- Design & implement CI/CD (Jenkins).- Automate build → test → package → deploy pipeline to AWS.
Team member 1: Ahmed Hamdy Mahmoud Elshewemy	Cloud Infrastructure: <ul style="list-style-type: none">- Create AWS account structure and IAM users/roles.- Configure VPCs, security groups and monitor AWS costs
Team member 2: Omar Said Omar	Containerization: <ul style="list-style-type: none">- Create Docker Compose file for the monolith, build images, test containers locally.- Push images to Amazon ECR.
Team member 3: Osama Mamdouh Mohamed	Infrastructure-as-Code (IaC): <ul style="list-style-type: none">- Write Terraform templates to provision required AWS resources (EC2, RDS or managed DB, S3, IAM roles).- Keep infrastructure versioned and reusable.
Team member 4: Mahmoud Gomaa Abouelfetouh	Configuration Management: <ul style="list-style-type: none">- Create Ansible playbooks to configure EC2 instances- Integrate Ansible steps into CI/CD
Team member 5: Mayar Khaled Mostafa	Monitoring & Logging: <ul style="list-style-type: none">- Implement centralized logging (ELK/EFK stack).- Set up monitoring: Prometheus + Grafana
Instructor / Supervisor: Muhammed Gamal	Evaluates and guides the project
End Users	Use the item exchange platform
Cloud Provider: AWS	Hosts and supports deployment

UI/UX Design

Home page:



Product page:

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Sara Dahman

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