

# **Cover sheet**

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| Unit name | Enterprise and Cloud Computing | | |
| Unit code | 9281 | | |
| Semester | 1 | Year | 2025 |
| Assessment name and part | Assessment 3 – Case Study Analysis | | |

### **Checklist**

Please list all items completed for this assessment task and that are included in your Canvas submission

* Project Proposal

We declare that this assessment is solely our own work, except where due acknowledgements are made. We acknowledge that the assessor of this assessment may provide a copy of this assessment to another member of the University, and/or to a plagiarism checking service whilst assessing this assessment. We have read and understood the University Policies in respect of Student Academic Honesty.

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Date: 09/03/2025

**Scaling an E-Commerce Platform on AWS**

**1. Chosen Scenario**

A heavy traffic e-commerce company is struggling with holiday traffic. The organization requires a solution that dynamically scales resources, has high availability, and imposes rigorous security controls to ensure a seamless and secure shopping experience. The solution will be built using AWS cloud services to deliver scalable infrastructure with high performance and cost efficiency that dynamically scales up or down according to evolving needs.

**2. Problem to be Solved**

The primary problems faced by the e-commerce platform are:

* **Traffic Spikes & Load Balancing:** Random traffic spikes from sales promotions lead to server overload, affecting customer experience.
* **Downtime & Performance Issues:** Delays in loading pages and interruption of service due to inadequate infrastructure led to sales loss and customer confidence loss.
* **Security Vulnerabilities:** Cyber-attacks such as DDoS attacks, SQL injection, and data breaches are a serious threat to user data.
* **Temporary Scaling Inefficiency:** Current infrastructure cannot scale dynamically in accordance with real-time demand.
* **Data Management Issues:** The website requires a scalable, secure, and dependable database solution to handle growing volumes of user and transaction data.

With a cloud-based, auto-scaling approach, the company will enhance performance, provide high availability, and meet security, resulting in improved customer satisfaction and business resilience.

**3. Proposed AWS Services and Architecture**

**3.1. AWS Services**

The below AWS services will be utilized to address these challenges:

* **Compute & Scaling:**
* **Amazon EC2 Auto Scaling:** Automatically provisions computer resources based on demand.
* **AWS Elastic Load Balancing (ELB):** Directs incoming traffic across servers to enable high availability.
* **Storage & Database:**
* **Amazon S3:** Stores static assets such as product images, videos, and logs in an optimized way.
* **Amazon RDS (MySQL/Aurora):** Provides a managed relational database to process orders and customer information.
* **Security & Compliance:**
* **AWS WAF & Shield:** Protects against web attacks, such as DDoS and SQL injection attacks.
* **AWS IAM:** Practices role-based access control to reject unauthorized access.
* **Performance & Monitoring:**
* **Amazon CloudFront:** Provides a CDN for fast delivery of page content and graphics.
* **Amazon CloudWatch:** Monitors app performance and alerts.
* **Amazon SNS:** Gives real-time alerts to customers and administrators regarding order status and security alerts.
* **Amazon SQS:** Handles event-driven processing tasks such as confirming orders and updating stock.

**3.2. System Architecture**

* **Load Balancing & Auto Scaling:** AWS ELB loads the incoming requests over multiple EC2 instances, and Auto Scaling dynamically scales the number of instances according to demand.
* **Database & Storage Management:** Amazon RDS offers order management and inventory management transactional consistency and high availability, while Amazon S3 stores media assets in the optimal way.
* **Security & Compliance:** AWS WAF blocks security threats, IAM controls access, and AWS Shield blocks DDoS attacks.
* **Performance Optimization:** CloudFront delivers contents faster by caching static files and reduced latency for all worldwide customers.
* **Event-Driven Processing & Automation:** AWS Lambda manages real-time customer input and automates order status update.

**4. Conclusion**

Using AWS cloud infrastructure, the solution provides high availability, auto-scaling, security, and better performance to the e-commerce website. The design can handle traffic bursts well, reduce downtime, and protect customer data and, therefore, delivers a dynamic and future-proofed solution for business growth. With high scalability with strong security aspects and efficient management of databases, the e-commerce website will be in good shape to provide an improved shopping experience to customers while maintaining operational efficiency and cost savings.

**Team roles and responsibilities**

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| **Team member** | **Role** | **Responsibilities** |
| Syeda Tahrima Nuhi | Lead Solutions Architect | Design architecture, ensure scalability, and integration. |
| Maisha Mostafa | Cloud Engineer | Configure AWS infrastructure (EC2, RDS, networking). |
| Mathios Yonas | Security Specialist | Implement IAM, AWS WAF, Shield, and compliance measures. |
| Minh Nguyen | DevOps Engineer | Optimize performance, CI/CD automation, and monitoring. |
| Fardeen Bahar Ghalib Okasha | QA & Cloud Monitoring | Conduct testing, performance checks, and deployment validation. |

**Task breakdown**

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| **Task** | **Description** | **Assigned to** | **Start date** | **End date** | **Status** |
| Define Architecture | Design a scalable AWS system using CAF principles. | Syeda Tahrima Nuhi | 10th March, 2025 | 20th March, 2025 | Pending |
| AWS Setup | Deploy and configure cloud | Maisha Mostafa | 21st March, 2025 | 5th April, 2025 | Pending |
| Security Implementation | Apply security controls | Mathios Yonas | 6th April, 2025 | 15th April, 2025 | Pending |
| Performance Optimization | Enhance system efficiency | Minh Nguyen | 16th April, 2025 | 22nd April,2025 | Pending |
| Testing & Deployment | Validate and launch system | Fardeen Bahar Ghalib Okasha | 23rd April, 2025 | 27th April, 2025 | Pending |

**Communication**

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| We agree to communicate regularly to be up to date with our progress via Whatsapp, Microsoft teams, and in-person meetings. |