**Architecture assignment**

**Objective:**  
This assignment focuses on designing the foundational architecture for your team’s application. The goal is to produce a comprehensive technical design document that outlines the cloud infrastructure, application components, database schema, network configuration, and security measures. This document will serve as the blueprint for subsequent development activities, ensuring the system meets performance, scalability, and security requirements.

This architecture document will serve as the foundation for the infrastructure and database builds, which will in turn serve as foundations and enablers for upcoming sprints.

**Assignment Requirements:**

* Cloud Service Provider:
  + Specify the cloud service provider selected – must be AWS. Justify your choice based on factors such as cost, scalability, and available services.
  + Identify the services (e.g., EC2, S3, RDS) that will be used in your architecture.
* Application Design:
  + Define the application’s programming language (Recommend JavaScript)
  + Define the run-time environment (Recommend node)
  + Define the application API (Recommend RESTful)
  + Define the application framework (e.g., Angular, React, or None)
  + Define the middleware (Recommend express)
* Operating System and Virtual Servers:
  + Select the operating system (e.g., Linux, Windows) for your virtual servers, and explain the choice.
  + Define the server configuration (e.g., instance size, CPU, memory, storage).
* Database Design:
  + Present an Entity-Relationship (ER) diagram for the application’s database, ensuring it adheres to third-normal form.
  + Specify the database management system (Recommend MySQL)
* Network Architecture and Design:
  + Illustrate the network architecture, including subnets (public and private), virtual private clouds (VPCs), and firewalls.
  + Specify the configuration of security groups, including ingress and egress rules for the application and database.
  + Specify the port configurations for the application (e.g., port 80 for HTTP or 443 for HTTPS; custom port for the application).
* Data Visualization Tool:
  + Data visualization tools such as Power BI or Tableau, offer dashboards that simplify data analysis, enabling stakeholders to make data-driven decision.
  + Select a data visualization tool standard. Justify the choice based on:
    - Functionality and features.
    - AI and data integration capabilities.
    - Team familiarity and ease of use.
    - Cost and scalability considerations.
    - Other criteria the team deems relevant.
* Testing and Quality Assurance Process: Define the testing and quality assurance processes that will be implemented during sprints to validate production code. Include the following:
  + Unit Testing: Plan for validating individual components or modules of the application.
  + Integration Testing: Approach to testing how different modules or services work together.
  + End-to-End Testing: Strategy for ensuring the entire application behaves as expected from a user perspective.
* Authentication and Authorization Process:
  + Specify whether anyone can access the system, or if the application needs to be restricted.
  + Specify roles within the application (e.g., Student, Administrator)
  + An authentication process (e.g., LDAP) and authorization process is out of scope and does not to be described. Assume the system is open to anyone when building.
* Team Responsibilities:  
  Each team member must contribute meaningfully to the project. Suggested roles include:
  + Cloud Architect: Leads the selection and configuration of cloud resources.
  + Application Developer: Designs the application’s runtime environment, APIs, and port configurations.
  + Database Architect: Develops the database schema and ensures compliance with third-normal form.
  + Network Engineer: Designs the network architecture, including firewalls and subnets.
  + QA Analyst: Develops the testing plan and tools for validating the system's functionality.
  + Project Manager: Coordinates team activities and ensures timely submission of deliverables.

**Deliverables:**

* Architecture Document: That meets the requirements described above. Use supporting diagrams (e.g., EF diagram, Network architecture) as appropriate.
* Team Contribution Summary: Provide a brief summary outlining each team member’s role and contributions. In addition, describe any challenges faced during the collaboration and how they were resolved.

**Rubric:**

* Cloud Service Provider Selection and Justification: 5 points
* Application Design: 20 points
* Database Schema and Design: 20 points
* Network Architecture and Security: 15 points
* Data visualization tool selection and justification: 10 points
* Testing and Quality Assurance: 10 points
* Authentication: 5 points
* Team Contribution Summary: 15 points