IJSE

Module	ITS 2140- Web Services
Module leader	Suhash Rodrigo
Weighting:	70% for Report and the implementation - Task 1 30% for Demonstration - Task 2
Learning Outcomes Covered in this Assignment:	LO1 - Compare the operational concepts, implementation and performance issues of cloud computing systems, and the relative merits and suitability of each for complex data−intensive applications LO2 - Critically appraise different cloud computing models, namely, infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS). LO3 - Evaluate design choices when solving real−world cloud computing problems by analyzing and contrasting different cloud computing solutions. LO4 - Integrate software components in novel ways to architect and develop cloud−based applications solutions for an enterprise. LSEPI - Security and ethics of cloud computing with public cloud solutions, Legal implications of off-premise hosted data, impact on society implications and benefits.
Handed Out:	23rd August 2024
Due Date:	Part 1: Report on Assignment: 7th August 2024 Midnight. Part 2: Presentation: 14th September 2024. Each student will get 10 min time slots.
Expected deliverables	1. Write a report to describe the designed solution. Students should include the **solution architecture diagram** and the **deployment architecture diagram** into the report. In the solution diagram the student has to highlight the request flows and the data flows. Include the **CI/CD pipeline designs diagrams** and **CI/CD process descriptions** into the same report under CI/CD process section. Highlight **security and ethics challenges** of this cloud solution. **[LO1][LO2][LO3][LSEPI]**

	2. Implement the services and create Kubernetes artifacts required to deploy the designed solution into a **Kubernetes cluster**. **[LO4]** 3. Implement a **CI/CD pipeline** to deploy the created solution. This pipeline should be able deploy the artifacts to the production environment following the Blue-Green model. **[LO4]** **4.** Create a simple test suite to automatically test the solution. Implement the test automation. **[LO4]** **5.** Create a simple RunBook with the steps to deploy the designed solution and test it. Students have to include this RunBook in the final report. **[LO4]** **Remark**: If you have any difficulties using a locally deployed Kubernetes cluster to complete the coursework, you have the freedom to use other Kubernetes providers such as AWS, GCloud, Azure with matching technologies. Your report should be no longer than **2000 words** for all answers.
Method of Submission:	Google Classroom Demonstration in the LAB
Type of Feedback and Due Date:	Written feedback and marks – within 20 working days after the conclusion of the presentations.

Coursework Description

Design and implement a container based small service solution for the Coinbase crypto exchange to manage and monitor their exchange related services.

Coinbase exchange needs to automate the service deployment and related changes using a CI/CD pipeline. They want to maintain the 100% uptime of all the services by using a Blue-Green based deployment technique.

They want to test their solution automatically after every deployment. Also they want to test the solution periodically with the same test suit.

Tasks

1. Design a container based service solution to cater the above explained requirements. This solution should be able to operate in a highly available and secure manner on the Kubernetes container orchestration system.

2. Design a continuous integration and continuous deployment (CI/CD) pipeline which can deploy the solution into development(Dev), testing(Test) and production(Prod) environments. Students have the freedom to select the flavour of the kubernetes container orchestration system. Also, use the Blue-Green deployment method in the production deployment stage.

3. Implement simple mock services to cover the use case. Create Kubernetes artifacts which are suitable to deploy the solution using the CI/CD pipeline. Use a cloud native persistent layer to persist the state of the solution. Students have the choice to run the database in the same Kubernetes cluster.

4. Create a CI/CD pipeline to deploy the created solution.

5. Create a simple test suite to test the solution automatically.

6. Document the solution, deployment steps and the operational procedures and include them in the report.

Deliverables

1. Write a report to describe the designed solution. Students should include the **solution architecture diagram** and the **deployment architecture diagram** into the report. In the solution diagram the student has to highlight the request flows and the data flows.

   Include the **CI/CD pipeline designs diagrams** and CI/CD process descriptions into the same report under CI/CD process section.

   Highlight **security and ethics challenges** of this cloud solution. **[LO1][LO2][LO3][LSEPI]**

2. Implement the services and create Kubernetes artifacts required to deploy the designed solution into a **Kubernetes cluster**. **[LO4]**

3. Implement a **CI/CD pipeline** to deploy the created solution. This pipeline should be able deploy the

artifacts to the production environment following the Blue-Green model. **[LO4]**

4. Create a simple test suite to automatically test the solution. Implement the test automation. **[LO4]**

5. Create a simple RunBook with the steps to deploy the designed solution and test it. Students have to include this part in the final report. **[LO4]**