CSCI 5902 Term Project – Fall 2023

Architecting Applications on AWS

Objective:

The objective of this project is to test your understanding of cloud architecting concepts and technologies by having you host an application on Amazon Web Services (AWS). You will be required to choose from various AWS service categories, justify your choices, and demonstrate your understanding of the AWS Well-Architected Framework principles.

Scope:

1. You **DO NOT** need to develop an application or write Infrastructure as Code (IaC) for this assignment. However, if you wish to do so, you may, but no extra points will be awarded for these actions.
2. You are expected to use an existing open-source application code, written in a language of your choice. The chosen repository should have a minimum of 100 commits and at least 50 stars, indicating that it is a stable and well-received project. You may use Github search tool (https://seart-ghs.si.usi.ch/) or similar tools for other repositories to select an application.
   If you have questions about choosing the applications, please contact our TA, Harmit Narula.
3. Applications can be picked on a first come first served basis, if one student has picked the app the same app cannot be picked by another student. Please ensure that you enter both the name and the link of your application codebase into the spreadsheet located in our Teams channel. This step is crucial to prevent multiple students from working on the same application.
4. You will utilize the AWS Academy Learner Lab, specifically created for this course, to implement your architecture. You have been allocated $100 of AWS Academy credit (i.e. the AWS Academy Learner Lab) for this project, which you should manage judiciously in terms of service usage. If you opt to employ your personal AWS account, that's perfectly acceptable; however, I urge you to exercise utmost caution with regard to your incurred costs. Please note that AWS Academy Learner Lab have a lot of restrictions on their services. You will have to understand the restrictions before architecting your application. You can find the doc “AWS Academy Learner Lab – Services”on Brightspace to learn the supported services.

Tasks:

1. Select the open-source application. Explain why you choose this application.
2. Design the cloud architecture to host the application on AWS. Your cloud architecture should use a minimum of 5 categories from the following AWS service categories:
   - Compute
   - Storage
   - Database
   - Networking & Content Delivery
   - Developer Tools
   - Management & Governance
   - Security
   - Identity & Compliance

- Machine Learning
- Analytics
- End User Computing
- Media Services
- IoT

When designing the architecture for the chosen application, it is imperative to adhere to the principles and best practices of a minimum of **four** pillars within the AWS Well-Architected Framework.

3. Implement the architecture on AWS.

Deliverables:

1. Report:
   A detailed report outlining the choices you made and justifying them. Justify your choice of services. Explain why the chosen service was the best fit for your application, considering factors like cost, performance, security, and scalability.
   This report should also explain how your architecture adheres architecting principles and best practices. Inclusion of an architecture diagram (or multiple diagrams) is expected in this report. The report must present the hosted application's public URL or other accessible evidence of the running application on AWS.
2. Video:
   A video where you explain your architecture. Ensure that you walk through your architecture diagram and explain the reasons behind your chosen architecture and how it adheres to the AWS Well-Architected Framework.
   It is mandatory to showcase your student ID and maintain your camera visibility throughout the video. Additionally, the video duration should not exceed 15 minutes. Comprehensive guidelines regarding this can be found in the Evaluation section for more details.

Evaluation:

The total marks of the term project is 30. Your project will be evaluated based on the following criteria:

1. Hosting of the application on AWS (**5 marks**).
   a. Application runs without any problem on the implemented architecture. (5 marks)
   b. Application has partial problems running on the implemented architecture. (1-4 marks)
   c. Application doesn’t run. (0 marks)
2. Justification of the chosen AWS services (**10 marks**).
   a. Provide accurate and lucid explanations of the utilized services. Ensure that the chosen services fulfill the requirements outlined in the Tasks section and align with the AWS service categories. (10 marks)
   b. The explanations of the services may lack clarity or contain partial inaccuracies, yet they remain comprehensible. And/or the explanations of the services do not adhere to the requirements of the AWS service categories as elucidated in the Tasks section. (1-9 marks)
   c. The explanations provided for the services are neither accurate nor clear, and they do not align with the stipulated service categories' requirements. (0 marks)

3. Implementation of the AWS Well-Architected Framework principles and best practices (**10 marks**).
    a. Demonstrate accurate application of the AWS Well-Architected Framework by incorporating principles and best practices from a minimum of **four** pillars into the architectural design. The execution of the architecture on AWS aligns with the established design. (10 marks)
    b. Partially demonstrate the application of the AWS Well-Architected Framework principles and best practices into the architectural design. And/or the execution of the architecture on AWS partially align with the established design. (1-9 marks)
    c. No application of the AWS Well-Architected Framework principles and best practices into the architectural design. The execution of the architecture on AWS mismatches the established design. (0 marks)
4. Video (**5 marks**).
   Note: The presenter is required to prominently present their student ID card in front of the camera at the video's outset and maintain the camera in an active state throughout the entire video duration. Failure to comply with this will result in a score of **ZERO**.
    a. The video must not exceed 15 minutes in length. For each minute of overtime, a deduction of one mark will be applied, progressively reducing the score to zero.
    b. The video explanation seamlessly corresponds with the content of the report. (5 marks)
    c. The video explanation partially correlates with the content of the report. (1-4 marks)
    d. The video explanation is unrelated to the report. In such instances, the instructor will contact you to reassess your project as a whole. (0 marks)

Please note, this assignment is intended to test your cloud architecting skills, so focus on the architecture, not the application's functionality or the codebase.

Submission:
All submissions should be made on the Brightspace by the due date.

FAQ:

1. How long should be the report?

There isn't a required length of the report. But if you provide an explanation of your architecture and service choice selections, your report cannot be just two pages. The length of your report will be reasonable if you try your best to provide a clear explanation.

2. Can I submit my assignment multiple times?

Yes, you can. If you have submitted your assignment, but later found that you need to change it, you can just upload a new file. The marker will only be looking at the most recent one as the official submission.

3. Will I lose points if I do not include architecture diagram or video explanation?

Architecture diagram and video explanations are expected deliverables of this assignment and you will lose points if you do not submit these deliverables.

4. Can I rearchitect monolith application into microservices?

This is an architectural decision which you will make as an architect, you are free to explore various architecture choices at hand and choose the best fit based on application, complexity, knowledge at hand, available credits, timelines for delivery.