RMIT UNIVERSITY

IT Infrastructure and Security
COSC 2737
Assignment 2 - Project

Assessment Type	Individual Assignment. Submit online via Canvas→Assignments→Assignment 2. Marks awarded for meeting requirements as closely as possible. Clarifications/updates may be made via announcements/relevant discussion forums.
Due Date	Week 12, Sunday 18th October 2020, 11:59pm
Marks	30 = 30% of semester mark.

1. Overview

For this assignment you are required to create a set of 3 load balanced web servers and a load balancer to balance them as well acting as a service redirector.

This assignment is designed to be as open as possible, and you are encouraged to be creative and innovative. Marks will be awarded for interesting solutions; however, most of the marks are for the use of the techniques described below.

2. Learning Outcomes

This assessment relates to all the learning outcomes of the course which are:

- Demonstrate knowledge of higher-level aspects of data communications and network technology appropriate for the development of software applications in a networked environment and design simple computer scripts that are aware of basic aspects of networking
- Install, configure, and maintain a basic Web server;
- Analyse and determine an appropriate enterprise networking system and secure web server configuration based on stated user needs;

3. Assessment details

Individual Assignment
Produce 3 identical web servers, each on their own AWS EC2 instance. Produce a load balancer to balance their load. We will call the load balancer HostA. This server is to balance the 3 servers: HostB, HostC, and HostD, which are themselves not visible to the outside world, so all access to them is through HostA. Finally produce an extra server using any AWS technology called HostE, whose access is also restricted through HostA.

Details

1) Paths and access
   a) In addition to the load balanced hosts, HostA is to be used to access another site called HostE, but this host is not part of the load balancing.
      i) HostE can be any other web-facing AWS technology. Be creative. The only difference is that it cannot be accessed from outside – only from HostA, which will log these accesses.
   a) If the path HostA/B/path, HostA/C/path, HostA/D/path, or HostA/E/path were to be accessed explicitly, then the load balancer will display contents of HostB/path, HostC/path, HostD/path, or Hosted/path respectively.
   b) If a direct access (eg. hostA/B/path) is attempted and fails, that failure should be reported back by the load balancer which will log it.
   c) Access to HostB-E

   i) HostA can be accessed as an IP number, but the other hosts are only known to HostA, and thus only accessible via HostA.
   ii) These are internal IP numbers, so the AWS instances must remain intact throughout the marking period.
   iii) Marks are reduced if these hosts become unavailable because the IP changed due to you having to restart their instances.
2) Load Balancer.
   a) All servers are to be fully secured (https) with individual self-signed certificates
   b) AWS EC2 elastic parameters **to be disabled/fixed** for HostA where possible.
   c) If a client were to access the system via https://HostA/path then HostB/path, HostC/path, or HostD/path will be shown in Round Robin load balance sequence.
   d) All four servers to contain a file Host/id which will return the identity of the server as a text string.
   e) If any of HostB, HostC, or HostD is not answering, then the load balancer should skip it
   f) All internal content links to be relative so that the load balancer can change machine if need be.
   g) Round Robin allocation between HostB,C,D, with HostC having twice the priority of HostB and HostD.
3) Other requirements
   a) /server-info and /server-status should be implemented on HostA on port 8000, and on HostB,C,D on port 8000 as well. (accessed as /HostA/D/server-info, …)
   b) All hosts except A to contain a path hierarchy of at least 3 levels for at least 1 file.
   c) Content is up to you, except for the paths named above.
4) HostE
   a) HostE is to be an AWS-based **application** of your choice. This application is to be a complete implementation (e.g. a simple database, filer, or photo album, with expected functionality equivalent to demoing the technology)
   b) HostE can only be accessed via HostA, which will log any access that way.
5) Logging
   a) All access logging to be done by HostA with separate logs for HostB, HostC, HostD and HostE.
   b) Access log of HostA to contain load balancer decisions about the hosts B,C,D and redirection about HostE.
   c) All logs to be accessible as HostA/A/logs/A,B,C,D/ on port 8010 and requiring a user/password of "admin"/"password". There should be a Unix link for A/logs/A to point to the logs of A. The logs folder should be readable as a directory as well as its file, but it is to contain a README.html file which will be listed before the directory listing. This file, which should only apply to this directory, should contain 10 reasons why this whole dot point is such a bad idea, as well as corresponding recommendations to avoid this in future.

4. Submission

You must upload to Canvas all the materials necessary in order to reproduce the sites created.

Place them in a single ZIP file.

Include a PDF report which details how to reproduce the sites including all AWS settings needed (e.g., port / security settings). As well as config file contents

Provide a video presentation using Microsoft Teams wherein you describe your work. As a guide to content, you should present evidence in the video of all the dot points achieved. For example, show the header in a directory listing of the log's directory. This can be most easily done by creating a session and presenting screenshots either to yourself. Note that these videos should include your faces in the corner. Submit the URL of the recording as a shared link (Teams produces a shareable recording in Microsoft Streams). Be sure to enable access to myself and ABM Russel.

After the due date, you will have 5 business days to submit your assignment as a late submission. Late submissions will incur a penalty of 10% per day pro-rata (so ½ day late = 5%), rounded to down to nearest percentage. After these five days, Canvas will be closed, and you will lose ALL the assignment marks.

Assessment declaration:
When you submit work electronically, you agree to the assessment declaration:
https://www.rmit.edu.au/students/student-essentials/assessment-and-exams/assessment/assessment-declaration

5. Academic integrity and plagiarism (standard warning)

Academic integrity is about honest presentation of your academic work. It means acknowledging the work of others while developing your own insights, knowledge and ideas. You should take extreme care that you have:

- Acknowledged words, data, diagrams, models, frameworks and/or ideas of others you have quoted (i.e. directly copied), summarised, paraphrased, discussed or mentioned in your assessment through the appropriate referencing methods,

- Provided a reference list of the publication details so your reader can locate the source if necessary. This includes material taken from Internet sites.

If you do not acknowledge the sources of your material, you may be accused of plagiarism because you have passed off the work and ideas of another person without appropriate referencing, as if they were your own.

RMIT University treats plagiarism as a very serious offence constituting misconduct. Plagiarism covers a variety of inappropriate behaviours, including:

- Failure to properly document a source
- Copyright material from the internet or databases
- Collusion between students

For further information on our policies and procedures, please refer to https://www.rmit.edu.au/students/student-essentials/rights-and-responsibilities/academic-integrity

6. Approximate Marking Guidelines

The Rubric will be the definitive marking guide, please check it before final submission.

- Implementation 20/30;
- Innovation and aesthetic 3/30;
- Report 7/30;
- Video Presentation
    - In order to mitigate contract cheating, the following rules apply
    - Video must have a part where you address the camera and discuss your project. For the remainder, a head shot is sufficient.
    - Video link to be provided with appropriate permissions so that ABM Russel or myself can access, but not global access
    - You may include an MP4 as a backup, but we will follow the links when marking.
- ***Warning***
    - Total Marks reduced by 50% if video is not present or accessible.
    - Total Marks reduced by 25% if not accessible, but an MP4 was included. It is good to have backups.