COSC2759 Assignment 2 specifications

Deadline	Sunday 17.05.2020 (**11:59 pm** AEST)
% allocated to this assignment	30
To be submitted via	Canvas
To be attempted	Individually

Please read this first

All of us have been affected by the unfortunate COVID-19 scenario and its aftermath. It is often hard to concentrate and study online; but as a student enrolled in this course, it is your responsibility to regularly attend online lecture, your respective tutorial and consultation session(s).

- Bring your questions to online discussion board, consultation sessions or email the head tutor: *Homy* (amirhomayoon.ashrafzadeh@rmit.edu.au).

- Watch the online recordings on a regular basis if you cannot attend the live sessions.

- Do NOT start the assignment at the last minute.

- Do NOT ask for last minute extensions, these are often rejected. Extensions can only be granted for personal and medical reasons, provided you can supply some evidence.

Besides, DevOps is a very important skill to have. There is a clear lack of training in this area for the graduates and as such doing well in this course will give you a competitive edge over graduates from other universities.

Finally, please do NOT give up on this semester thinking of online study as a waste of time. Global industry projects involving teams at geographically different locations often run fully online. Think of this semester as a training for future. In the fast-evolving CS&IT industry, the online medium is very popular and vastly used.

You have 4 weeks to complete this assignment. It is related to AWS.

You will need your AWS Educate accounts.

If there are any issues with your AWS Educate account, please email the head tutor at your earliest. Sending emails late or closer to deadline re account issues will only lead to adverse outcomes.

Get started!

Scenario

ACME corp. has been very excited about the progress you've made so far and have started looking at the next steps for them. So far, their application deployments have all been manual using ClickOps, which is prone to human error. They would like you to have a look at how to automate the infrastructure and application deployment.

They don't think they are ready for Kubernetes and containers yet, so they would like you to use EC2 instances to host the application.

Since you are finishing up the changes to their application continuous integration solution, they have requested that you use a different application for this. They have found an open source application written in Golang that they would like to automate the deployment of.

The application can be found here: https://github.com/servian/techtestapp

(***use the latest release, so you don't have to compile the application yourself***)

The Approach

To make this easier for ACME corp., which doesn't have extensive experience with DevOps, we will be using well known SaaS tools to help reduce the learning curve for their development team. You will follow best practice principles and make as much of your solution using code, this includes your configuration and scaffolding scripts.

Tools to use:

- Terraform
- Ansible
- AWS
- CircleCI (for HD)

ACME corp. expects **you update your Github classroom repository all the code and documentation required** to run the Continuous Integration build you are creating for them. **This includes the files that define any shell scripts, Docker files, or anything else you use.**
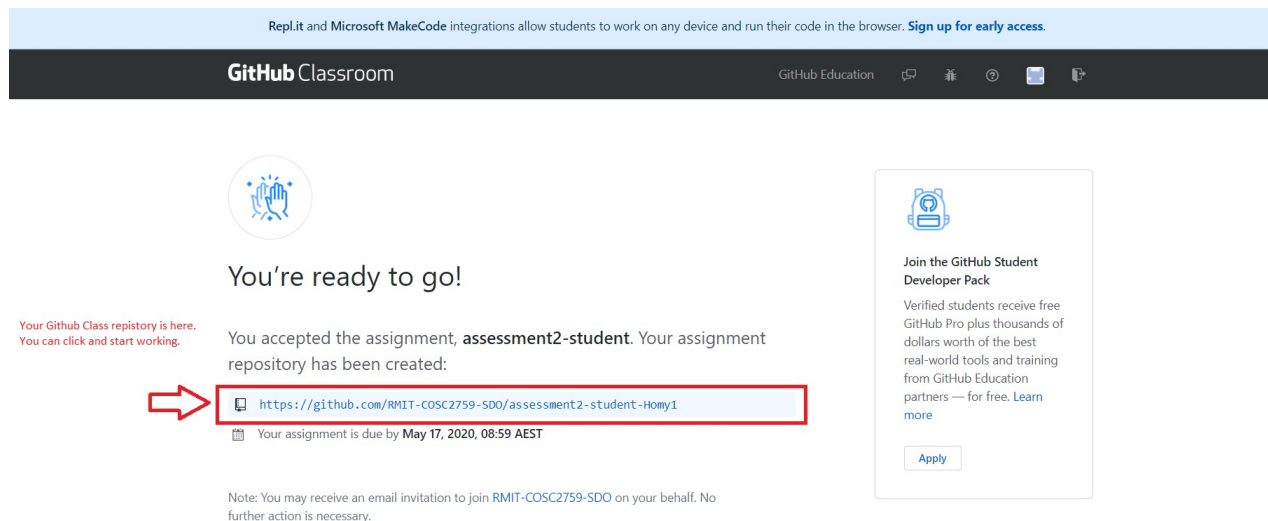
Create Github Classroom for the assignment

Please accept [this invitation](#), (you must login with your Github account).
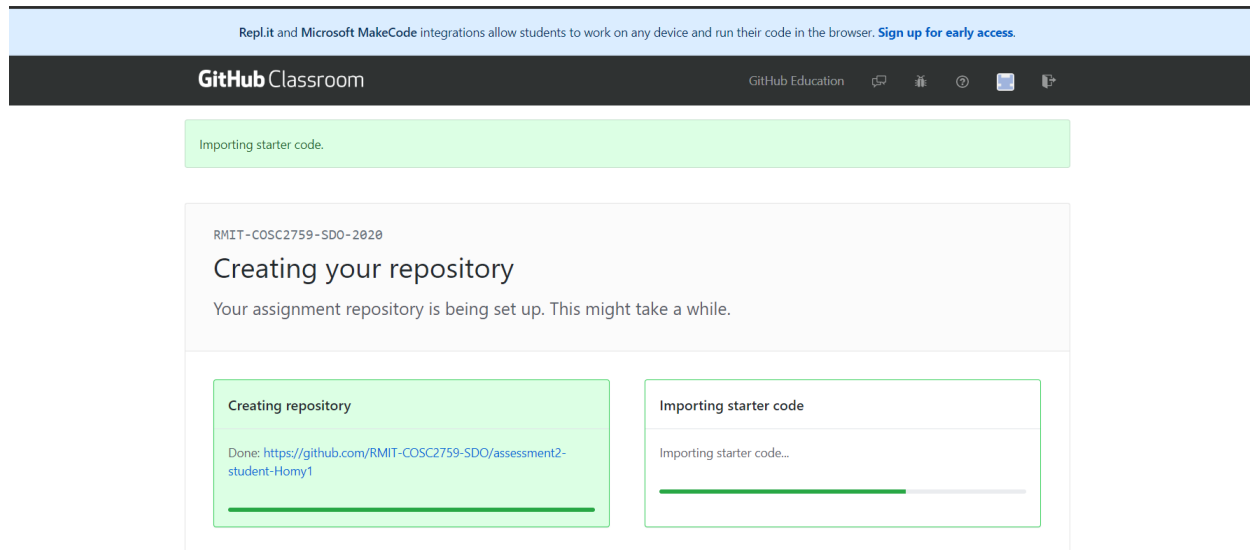
You will see above picture after you accept the invitation, wait until the process is done.

Then you must be able to see the below page. You can see your repository for you on SDO Github classroom. Please click on that and then

you must be able to see your Github repository as below:

Please be advised that you are only allowed to use this repository for the assignment. Your scaffold with a folder structure and some support files is available in your Github repository.

Please use your AWS Educate account to test the solution as you build it.

Tasks

Pass part:

A. (20 marks) Document the solution in the Readme.md file

    Please document the solution including all the steps of your work so it can be deployed by someone with no prior knowledge of the approach. This means a step by step guide to deploying the application including screen shots. You can document as you do.

    Please consider:
    o   Analysis of the problem (5 marks)
    o   Explain and justify the solution (10 marks)
    o   Writing quality, layout, and accuracy (5 marks)

B. (10 marks) Create a VPC using Terraform ready to host the application in

    Create a VPC in terraform with 3 layers across 3 availability zones (9 subnets). Public, Private, and Data.

C. (10 marks) Create 3 layer application infrastructure using Terraform

    There should be:
    - a Load balancer deployed in the Public layer
    - an EC2 instance deployed in the Private layer (use the latest Amazon Linux image)
    - a Database deployed in the Data Layer

    There should be security groups defined to limit access to what is required.

D. (20 marks) Automate deployment of the application to the deployed ec2 instance. Set up an ansible playbook that deploys and configures the application on the ec2 instance.

    It should:
    - Automatically generate the inventory file (hint: `terraform output`)
    - Download the application and copy it to the local drive
    - Configure the application with the correct database endpoint and credentials. These should be automatically be fed in, rather than manually entered (hint: `terraform output`)
    - Set the application up as a service using SystemD so it will automatically start if the server is rebooted.

Credit part:

E. (10 marks) Automate database deployment to the database instance

Use a script to deploy the database, any tables, and seed any data to the database on aws. This should be automatic and not require any human input.

Distinction part:

F. (10 marks) Remote backend

By default Terraform uses a local backend, please change this by setting up a remote backend using S3 and DynamoDB.

High Distinction part (you need to self-research these ones):

If you can finish all the above tasks, then you can start working on HD tasks.

No help or consultation will be provided for these tasks. You are welcome to ask general questions regarding the tasks, but this is a strictly self-research section

G. (20 marks) Deploy the application automatically using CircleCI

Make sure that secrets are handled safely, e.g. not checked/copied into source control.

Assessment criteria

You will be assessed on:

- Your ability to automate the deployment of the AWS infrastructure using Terraform.
- Your ability to deploy the application and configure it automatically using Ansible
- Your ability to document and explain the solution so the scripts provided can be executed by someone with no prior context
- How well you analyse the problem and justify your solution for each task
- Does the provided Zip file contain everything required for ACME corp to be able to use the deployment you have designed?
- Do you use the branching and commit changes often?

PLAGIARISM:

All assignments will be checked with plagiarism-detection software; any student found to have plagiarised would be subject to disciplinary action. Plagiarism includes:

- CONTRACT CHEATING: paying someone to do your work
- CONTRACT CHEATING: getting someone else to write the test or attend demo
- submitting work that is not your own or submitting text that is not your own
- copying work from/of previous/current semester students
- allowing others to copy your work via email, printouts, social media etc.
- posting assignment questions (in full or partial) on external technical forums
- sending or passing your work to your friends
- posting assignment questions on technical forums to get them solved

A disciplinary action can lead to

- a meeting with the disciplinary committee
- a score of zero for the assignment
- a permanent record of copying in your personal university records and/or
- expulsion from the university, in some severe cases

All plagiarism will be penalised. There are no exceptions and no excuses. You have been warned. For more details please read RMIT's page on Academic Integrity at

https://www.rmit.edu.au/students/student-essentials/assessment-and-exams/academic-integrity

Submission Procedure

Each submission must include a README.txt file containing your full name, Student ID and any other relevant information (if you are working in a group, then please mention the details of your partner).

ACME corp. expects **you push all the code and documentation required** to run the Continuous Integration build you are creating for **them into your Github classroom repository**. **This includes the files that define any shell scripts, Docker files, or anything else you use.**

***Please submit ONLY the URL of your GitHub Classroom repository into Canvas*, your repository must have a format like below:**

https://github.com/RMIT-COSC2759-SDO/assessment2-student-<your github username>

Late submissions and Extension-related information

A penalty of 10% per day of the total marks for each assignment will apply for each day a submission is late, including both weekdays and the weekend. After 5 days, you will receive zero marks for that assignment.

Email your head tutor, Homy: (amirhomayoon.ashrafzadeh@rmit.edu.au) for extension related queries.