SIT226 Cloud Automation Technologies

Pass Task 4.1P

Containers and Pods

Background

This week we learned how Kubernetes does not deploy containers directly, but instead introduces the concept of a Pod which allows containers to potentially share resources. A common application of this approach is the application of the sidecar pattern, where a container can be supplemented by others to enhance or add to its functionality. In this task, we consider where sidecars should and shouldn't be used.

Get Prepared

Begin by locating articles on the web that discuss when sidecar containers should be used. Make sure you take the time to understand in what circumstances it is acceptable to use sidecars. Consider the development of a website for online shopping that has been deployed to two separate web services:

1. The first web service manages the static content for the website (content that doesn't change), e.g., HTML files, images, JavaScript libraries, etc. This service is deployed in a single Pod consisting of two containers. The first container is the web server, while the second container downloads a copy of the static content from a central master server and periodically updates that content.
2. The second web service is responsible for the dynamic content of the website (database driven content), e.g., customer data, order data, catalogue data, shipping calculations, etc. This service is deployed using two Pods, the first is the web server and the second is the database (or replica).

Complete the Task

Page Limit: 1 page of text formatted reasonably, e.g., 2cm margins, 11 or 12 point font, appropriate headings/spacing, etc.

Prepare a document according to the following requirements:

1. Reflect on the content for this week. In ½-¾ page, identify the most important lessons/topics this week relevant to your future studies/career and explain why they are the most important. Note: Do not present/explain topics, you are explaining why the things you learned are important!
2. Provide one or more screenshots for each activity, demonstrating that you have completed the lab session this week and briefly explain what is shown in each screenshot (one or two short sentences each).
3. In ¼-½ page, explain why a single Pod is appropriate for the first web service and why separate Pods would be inappropriate.
4. In ¼-½ page, explain why two Pods are appropriate for the second web service and why a single Pod would be inappropriate.

Submit Your Task

Prepare your submission using the word processor of your choice and submit a PDF to OnTrack.

Taking it Further (Optional)

This task focuses on the relationship between containers and Pods. Generally speaking, Pods should only contain a single container that performs a single task. This provides a number of advantages that we will learn about throughout the unit, but it's interesting to note at this point that the sidecar pattern effectively breaks this model. Here are some points worth considering:

- Do you really understand containers at this point? We've been working with containers for a few weeks now and will continue to do so for the rest of the trimester. If you haven't fully grasped what a container is, consider reviewing some of the content we've already covered and reading more about containers to learn what they are used for.
- In this task, we focused on the Pod concept in Kubernetes which allows containers to share resources. You should recognise that this is unusual, if not review the previous bullet point. This week we also identified another type of container that can exist in a Pod, the init container, however, their purpose and behaviour are quite different to the sidecars. Take the time to review the concepts of init containers and sidecars to ensure that you understand them well.
- An important issue that we haven't addressed for this scenario in the class or the task is replication, which we address in Week 6. It's worth taking the time to consider the idea of replicating data and how this would work in the context of static content and database driven content as described in this scenario.
- Recall that we've also examined the idea of applications developed using the microservice architecture. Consider how a microservices application would be deployed in Pods/containers. What are the different components of a typical microservices application? What Pods would be required? What init containers and sidecars might be involved in these applications? You might also like to read about service mesh architectures which are often used in the development of microservices applications. One such example is the Istio service mesh which is often used with applications managed by Kubernetes.

Citations and Referencing

When completing any work it is necessary to acknowledge the work of others that you have relied upon. For written assessment, we achieve this through the use of citations and references. Failing to correctly identify the work of others is known as plagiarism and is considered an issue of Academic Integrity.

If your submission to this task has involved the work of others, you must include citations and references where appropriate. Deakin provides a website that explains how to use citations and references, and includes explanations of various referencing styles:

https://www.deakin.edu.au/students/studying/study-support/referencing

You may select any style for your citations/references, however, you must be consistent in applying that style in this task (you can use other styles in other tasks if you wish).

Note that any bibliography/list of references is not included in page limits.