Lab5: Hosting a web service using Kubernetes cloud orchestration

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# Objectives

* Understand the concept of container and the reason for cloud orchestration
* Get familiar with the Kubernetes and how to use the Kubernetes orchestration tool.
* Experience with hosting a popular cloud service using Kubernetes
* Use Kubernetes to deploy your WordPress server with a trivial loadbalancer
* Understand that you can manage Kubernetes services on Google Cloud Platform (Google Kubernetes Engine)

# Experiments Tasks

## Basics

1. Go through the Kubernetes introduction to get the general idea of Kubernetes

<https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/>

## Install Tools

1. Install Docker:

<https://docs.docker.com/engine/install/ubuntu/>

1. Install kubectl:

<https://kubernetes.io/docs/tasks/tools/install-kubectl/>

1. Install Minikube:

<https://kubernetes.io/docs/tasks/tools/install-minikube/>

1. Install Helm:

<https://github.com/helm/helm>

## Host a Wordpress server on Kubernetes Cluster

* 1. Make sure the installation is complete
  2. Run a single-node Kubernetes cluster locally
  3. Deploy your WordPress server using helm  
     <https://hub.helm.sh/charts/bitnami/wordpress>
  4. Use kubectl commands to interact with Kubernetes cluster
  5. Verify your deployment of wordpress both on your browser and terminal
  6. Monitor the status of your Kubernetes cluster

1. **Reports**
   1. **General**

1. (a) What is a container from an operating systems perspective?   
 (b) Why are cgroups important to containers?

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2. In Docker what does the ENTRYPOINT command allow you to do?

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3. (a) In Kubernetes, what is a pod and why is it useful?   
(b) What is a label and why is it useful?

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1. (a) In Kubernetes, what is a service and why is it useful?  
   (b) What is a ReplicaSet and why is it useful?

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1. What is the difference between a pod and a node?

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**3.2 Verify your installation**

1. Screenshots of running docker successfully

sudo docker run hello-world

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1. Screenshots showing that you can start minikube successfully

minikube start --driver=docker

minikube status

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1. Screenshots of verifying kubectl configuration

kubectl cluster-info

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**3.3 Deploy your WordPress**

1. Explain the commands

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| (a)  kubectl get pods: kubectl get services:  (b) kubectl describe deployment: kubectl logs <pod-name>: |

1. Screenshots of your terminals showing that your pod is up (Hint: use a command in 9a)

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1. Screenshots of your terminals showing your running service along with the external IP address that can be used to access your pod. (Hint: use commands in 9a)

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1. (a)Screenshots of your browser running your wordpress. What is your wordpress URL?   
   (b)Screenshots of login to your wordpress as admin

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1. What happens after you manually delete a pod using the following command?

kubectl delete pods *<your-pod-name>*

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1. Screenshots of your Kubernetes Dashboard. What is the health status of your workloads?

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1. Challenges you’ve encountered while doing this experiment and explain how you manage to solve them. If you do not experience any problem, simply say no problem.

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