Lab W11: Virtualization, Container and Kubernetes

Lab: 把它給我裝起來

小米是 IM.Inc 的軟體工程師，今天他被指派到一個任務，為了更新公司的 CI/CD 流程，他要把一個已經寫好的前端網站 打包成 Docker Image，請完成以下：

1. Install Docker on the server (Docker Engine).
2. Clone the repository.
3. Create a Dockerfile that defines how to build the image. Choose either `ubuntu` or `node` as the base image.
4. Build the image.
5. Run the image as a container (adjust ports as needed).
6. From your personal computer, open a browser to `http://<server-domain>:<vm-port>` to verify the site is served.

完成後請找助教 Demo 你的成果。

Lab: 欸資料怎麼會不見啦

聖家是小米的同事，她看到小米設置的網站之後，發現上面的資料竟然是寫死的。原來後端的系統也需要包裝成 Docker Image，請完成以下：

1. Create a Dockerfile that defines how to build the image. Choose either `ubuntu` or `python` as the base image.
2. Build the image.
3. Run the image as a container (adjust ports and mounted storage as needed).
4. From your personal computer, open a browser to `http://<server-domain>:<vm-port>/docs` to verify the site is served.
5. Create or modify data in the application's database and verify it remains intact after stopping and restarting the container. Ensure persistence by mounting the database storage (for example, using a Docker volume or a bind mount).

完成後請找助教 Demo 你的成果。

Lab: 團結力量大

現在，有了前端和後端，聖凱（聖家的弟弟）要負責把所有的系統架設到 Kubernetes 上面，請完成以下：

1. Install Minikube on the server.
2. Make your local Docker images available to Minikube so it can load the images you built locally.
3. Provision PersistentVolume and PersistentVolumeClaim for the backend database to ensure data persists across pod restarts.
4. Deploy the frontend and backend as Kubernetes Deployments with 2 replicas each.
5. Configure an Ingress to expose both the frontend and backend services. Modify the frontend to poll the backend for updated data every 2 seconds.
6. From your personal computer, open a browser to `http://<server-domain>:<vm-port>` to verify the site is served.

完成後請找助教 Demo 你的成果。