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Project Milestone 1: IaaS: Virtualization and Containerization

1. Answer the following questions
    a. What are docker images, container, and registry?
        i. Docker images are files used to execute code within a container
        ii. A docker container is an executable package of software
        iii. A docker registry stores and delivers information held within a container
    b. List the Docker commands used in the video with a brief description for each command and option.
        i. FROM: Choses the docker image to pull and what version of it to use
        ii. RUN: Creates a new directory for the application files
        iii. COPY: copies the application files from the host application
        iv. WORKDIR: Sets up directory for future commands
        v. CMD: Allows you to run a command you would in a terminal, like running the program
    c. At the end of the video, there are two running containers, what commands can be used to stop and delete those two containers?
        i. To stop the two containers you can use `docker stop CONTAINER_ID`
        ii. To delete a container, you can use `docker rm CONTAINER_ID`
2. Link to the video of the docker image running on my computer for v1 https://drive.google.com/file/d/1BhVnkhIRf5DoOe_i0NU-bfh2oRpNlPX-/view?usp=sharing
3. Answer the following questions
    a. What's a multi-container Docker application?
        i. A group of containers docker uses together and combines using docker-compose
    b. How are these containers communicated together?
        i. They communicate with each other via a network that they are all a part of
    c. What command can be used to stop the Docker application and delete its images?
        i. The command: `docker image rm -f IMAGE_ID` Can be used to remove a docker image and stop it in one command
    d. List the new docker commands used in the video with a brief description for each command and option

i. ADD: This command allowed me to add the java file I am using to my docker server
ii. EXPOSE: Allows you to expose a port to docker
iii. CMD: Rather than allowing me to run the command in the terminal, I start up tomcat with it

4. Link to the video of the webapp running on docker on my machine for v2 https://drive.google.com/file/d/1CvnVTX9fY2uM5dE7DgRpSpSay0_xEirg/view?usp=sharing
5. Link to the video of the Google cloud running index.html for v3 https://drive.google.com/file/d/1zi5bbllhU5fqLiBNxcm3p3lr8_4oFo-l/view?usp=sharing
6. List all used GCP shell commands and their description in your report.
    a. `docker run -d -p 8080:80 nginx:latest` This command allows docker to run on port 8080
    b. `docker cp index.html CONTAINER_ID:/usr/share/nginx/html/` This command searches for the file index.html and runs it on the server
7. Link to YML file running on google cloud https://drive.google.com/file/d/1Fq660yzeG5JsGCvM39b2dcqwqrK_k3Bm/view?usp=sharing
8. Link to video describing YML file https://drive.google.com/file/d/1BkGCS2vCS6LtPq2L8a8Io2mbhABk0jbx/view?usp=sharing
9. Answer the following questions
    a. What is Kubernetes' pod, service, node, and deployment?
        i. Pod: a group of containers with shared resources
        ii. Service: Shows all the services running under a set of pods, shows their IP addresses as well
        iii. Node: is a machine that works to run the pods
        iv. Deployment: provides updates for pods
    b. What's meant by replicas?
        i. A backup of the running pods, replicas of them
    c. What are the types of Kubernetes' services? what is the purpose of each?
        i. LoadBalancer: Exposes the service via the cloud providers load balancer
        ii. NodePort: Exposes a service via a static port on each node's IP.
        iii. ExternalName: Maps a service to a predefined externalName field by returning a value for the CNAME record.
        iv. ClusterIP: Exposes a service which is only accessible from within the cluster.