



Cairo University
Faculty of Computers and Information

Student Name:



Course: Selected Labs in SW Engineering

Duration: 1 hour

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Student ID:

Question 1 (50 points)

1. Which two of the following use cases are best suited for containers?
(Choose two.)
 - A. A software provider needs to distribute software that can be reused by other companies in a fast and error-free way.
 - B. A company is deploying applications on a physical host and would like to improve its performance by using containers.
 - C. Developers at a company need a disposable environment that mimics the production environment so that they can quickly test the code they develop.
 - D. A financial company is implementing a CPU-intensive risk analysis tool on their own containers to minimize the number of processors needed.

2. A company is migrating their PHP and Python applications running on the same host to a new architecture. Due to internal policies, both are using a set of custom made shared libraries from the OS, but the latest update applied to them as a result of a Python development team request broke the PHP application. Which two architectures would provide the best support for both applications? (Choose two.)
 - A. Deploy each application to different VMs and apply the custom made shared libraries
 - B. Deploy each application to different containers and apply the custom made shared libraries individually to each container.
 - C. Deploy each application to different VMs and apply the custom made shared libraries to all VM hosts.
 - D. Deploy each application to different containers and apply the custom made shared libraries to all containers.

3. Which three of the following Linux features are used for running containers? (Choose three.)
 - A. Namespaces
 - B. Integrity Management
 - C. Security-Enhanced Linux
 - D. Control Groups

4. Which of the following best describes a container image?

- A. A virtual machine image from which a container will be created.
- B. A container blueprint from which a container will be created.**
- C. A runtime environment where an application will run.
- D. The container's index file used by a registry

5. Which three of the following components are common across container architecture implementations? (Choose three.)

- A. Container runtime**
- B. Container permissions
- C. Container images**
- D. Container registries**

6. What is a container in relation to the Linux kernel?

- A. A virtual machine.
- B. An isolated process with regulated resource access.**
- C. A set of file-system layers exposed by UnionFS.
- D. An external service providing container images.

7. Which three of the following statements are correct regarding container limitations? (Choose three.)

- A. Containers are easily orchestrated in large numbers.
- B. Lack of automation increases response time to problems.**
- C. Containers do not manage application failure inside them.**
- D. Containers are not load-balanced.**
- E. Containers are heavily isolated packaged applications.

8. Which two of the following statements are correct regarding Kubernetes? (Choose two.)

- A. Kubernetes is a container.
- B. Kubernetes can only use Docker containers.
- C. Kubernetes is a container orchestration system.**
- D. Kubernetes simplifies management, deployment, and scaling of containerized applications.**
- E. Applications managed in a Kubernetes cluster are harder to maintain.

9. Which three of the following statements are true regarding Red Hat OpenShift v4? (Choose three.)

- A. OpenShift provides additional features to Kubernetes infrastructure.
- B. Kubernetes and OpenShift are mutually exclusive.
- C. OpenShift hosts use Red Hat Enterprise Linux as the base operating system.
- D. OpenShift simplifies development incorporating a Source-to-Image technology and CI/CD pipelines.
- E. OpenShift simplifies routing and load balancing.

10. Which two options are examples of software applications that might run in a container? (Choose two.)

- A. A database-driven Python application accessing services such as a MySQL database, a file transfer protocol (FTP) server, and a web server on a single physical host.
- B. A Java Enterprise Edition application, with an Oracle database, and a message broker running on a single VM.
- C. An I/O monitoring tool responsible for analyzing the traffic and block data transfer.
- D. A memory dump application tool capable of taking snapshots from all the memory CPU caches for debugging purposes.

Question 2 (50 points)

Please use the virtual machine installed inside the PC in front of you to answer the following Questions:

- 1- Open Oracle Virtualbox
- 2- Start virtual machine with name **microservices_vm**
- 3- Login password is **student**

1. Use podman to list the available images.

```
Sudo podman images
```

2. Use podman to run an apache container version xx with the name apache_<ID> replace <ID> with your ID.

```
sudo podman run -d --name apache_20120080 docker.io/library/httpd
OR
sudo podman run -d --name apache_20120080 ad17c88403e2
```

3. Print the ip address of the started container.

```
sudo podman inspect -l -f '{{.NetworkSettings.IPAdress}}' OR  
sudo podman inspect -f '{{.NetworkSettings.IPAdress}}' apache_20120080  
OR sudo podman inspect apache_20120080
```

4. Restart the container named apache_<ID> and Forward host port 8080 to container port 80.

```
Sudo podman stop apache_20120080  
Sudo podman rm apache_20120080  
Sudo podman run -d -p 8080:80 --name apache_20120080  
docker.io/library/httpd
```

5. Navigate to web_app directory installed inside home directory

```
Cd web_app
```

6. Open index.html file for edit and replace __MY_ID__ with your ID

```
Open using GUI or Vim
```

7. Change permission for web_app directory to be accessible from inside apache_<ID> container

```
sudo semanage fcontext -s -t container_file_t  
'/home/student/web_app(/.*)?'  
sudo restorecon -R /home/student/web_app
```

8. Restart the container with mounting the web_app folder in the home directory to the apache_<ID> container directory /usr/local/apache2/htdocs/

```
Sudo podman run --name apache_20120080_2 -d -v  
/home/student/web_app:/usr/local/apache2/htdocs -p 8080:80  
ad17c88403e2
```

9. Print status of the apache_<ID> container

```
sudo podman ps --format="{{.ID}} {{.Names}} {{.Status}}"
```

10. How to verify the container is running and web_app has been mounted correctly to apache_<ID> container

```
Sudo Curl http://172.0.0.1:8080
```

11. Export the apache_<ID> container into a tar file the name <ID>_myapache

```
Sudo podman export -o 20120080_myapache apache_20120080_2
```