

# CS312 Homework #5 Answer Key

March 9, 2016

## Questions

1. Load balancers are designed to help with vertical scaling.
  - (a) True
  - (b) **False**
2. Layer 7 load balancers allow you to use both connection tracking and inspection of packets including modification of packets.
  - (a) **True**
  - (b) False
3. Linux containers do not require hypervisors
  - (a) **True**
  - (b) False

4. The RUN command can be used more than once in a Dockerfile.
  - (a) **True**
  - (b) False
5. The PID Namespace allows users to see processes from other containers
  - (a) True
  - (b) **False**
6. Paravirtualization uses cpu supported virtualization.
  - (a) True
  - (b) **False**
7. Which software load balancer primarily acts as an HTTP accelerator **and** a static cache server?
  - (a) HAProxy
  - (b) Apache
  - (c) nginx
  - (d) **Varnish**
8. Which of the following is **not true** about Linux Containers?
  - (a) Operating system level virtualization
  - (b) Provides little overhead
  - (c) **Fully emulates an operating system**
  - (d) Allows limits to resources with cgroups
9. Which service describes a virtual computing platform?
  - (a) **IaaS**
  - (b) PaaS
  - (c) SaaS
  - (d) VaaS

10. Describe the potential problems of using Round Robin DNS.
- **Depending on the implementation of the client resolver, this can be somewhat random or not.**
  - **Some resolvers always use alphabetical ordering.**
  - **DNS Caching and Time-To-Live (TTL) issues.**
  - **If the site goes down, you have to update DNS to reroute traffic which can cause problems.**

11. Which scheduling algorithm is generally preferred if the web application uses sessions?

**Source Connection**

12. Which HAProxy configuration section allows you to define a complete proxy?

**listen**

13. Name the two components of the Linux Kernel that are required to make Linux containers function.

**CGroups and Namespaces**

14. Define what a hypervisor is.

**Software, firmware or hardware that creates and runs virtual machines. Hypervisor presents the guest machine with a virtual operating platform that resembles a real machine.**

15. Provide an example of a Type 2 hypervisor.

**Answers may vary but this would include VMWare Workstation, VirtualBox and KVM somewhat falls under this category.**

16. Explain the relationship between KVM and QEMU in detail.

**KVM is a kernel module that converts the Linux Kernel into a virtual machine monitor, or a hypervisor. It interfaces with the hardware virtualization features on the host processor and**

creates a device called `/dev/kvm` which allows user space applications access to the hypervisor features. QEMU is a user-space application that is used to emulate an operating system virtually. QEMU can be configured to use KVM which enables hardware accelerated virtualization and a hypervisor. It will access the `/dev/kvm` device created by the kernel which provides an interface to the hypervisor.

17. Explain the relationship with Libvirt and KVM in detail.

Libvirt provides an API interface to various hypervisors. Applications such as Openstack interface with Libvirt which then interfaces with KVM. Libvirt is trying create a unified API for all hypervisors (of which KVM is a hypervisor). Each hypervisor has their own API interface so Libvirt creates a unified one that then translates it to each hypervisors' API.

18. What are the primary differences between Ganeti and Openstack?

- Openstack is designed to be a complete cloud platform while Ganeti is primarily a compute platform only.
- Ganeti's primary feature is fault tolerance and high availability while OpenStack's design does not take that into account by default.
- OpenStack tends to be more complicated to deploy and maintain while Ganeti is usually less complicated.
- OpenStack uses Libvirt to interface with hypervisors while Ganeti has its own built-in support for hypervisors.

19. Define in detail what a cloud or machine image is.

- A copy of an operating system including the entire state of the computer system stored in a non-volatile form such as a file.
- It may content additional metadata information about the image.
- A single file usually represents an entire filesystem.
- Usually support extra features such as Copy-on-Write and snapshotting.

20. Name three useful features that distributed systems tend to support.

- **Redundancy**
- **Fault-tolerance**
- **Horizontal Scalability Parallelization**
- **Flexibility in deploying scalable web applications for developers**