CS312 Homework #6

March 5, 2015

Instructions

Please submit all answers as a single text file via T.E.A.C.H using the naming format `$onidusername-hw6.txt`. This homework is due at 4pm on Thursday, Mar 12th.

Questions

1. (1pt) Define in detail what a load balancer is and what problem it's trying to solve. Give at least two examples of where using a load balancer might be useful, and describe why.
2. (1pt) Describe pros and cons of each type of load balancer.
3. (1pt) Describe what Round-Robin DNS is and when it might be useful to use it.
4. (1pt) Say you're serving a web application that needs to keep track of its sessions for users. Now you have this application distributed across 100 machines. What scheduling algorithm would you choose with HAProxy for this application? What other information might you need to make a better decision?
5. (1pt) Describe what persistence is in the context of load balancers. Why is it important? What are some issues with using persistence?
6. (5pts) Create a new OpenStack VM. We will be setting HAProxy to serve a site that uses 8 different application servers that are simulated

with a simple python one-liner. Here are the details about each application server:

- We have two blog applications running on ports 8000 and 8001 that will show ”Blog Page”.
- We have one admin application running on port 8002 that will show ”Admin Page”.
- We have five www applications running on ports 8003, 8004, 8005, 8006 and 8007 that will show ”WWW Page”.

Complete the following tasks:

(a) Install and setup HAProxy. Setup the `global` and `defaults` sections like we did in class. For now don't add any frontends or backends. Also make sure you setup logging with `rsyslog`.

(b) Setup the HAProxy admin port so we can see stats.

(c) Download this script (`http://cs312.osuosl.org/_static/hw/haproxy.sh`) and run it. This will setup a few simple HTTP servers using python to simulate a cluster of applications. Make sure you see several log files in `/tmp/hw6/logs` so you can see the output of the HTTP servers.

(d) Create a frontend on port 80.

(e) Create three backends called `blog`, `admin` and `www` that connect to the ports mentioned above for each app (assume you're using `localhost` as the hostname).

(f) For the www backend, give the apps running on port 8006 and 8007 a weight of 100, while the others have a weight of 50.

(g) Setup acls for `/blog` that point to the blog app, and `/admin` that point to the admin app.

(h) Set the www backend as the default backend.

(i) Now try accessing the site. Do `/blog` and `/admin` show the correct content? Does the main page work properly? Access each URL several times to ensure the weighting is working properly.

Create a gzip tarball that contains the `haproxy.cfg` file and all of the log files in `/tmp/hw/logs`, the CSV file that is created on the HAProxy admin page and `/var/log/haproxy.log`.

7. (1pt) Define a hypervisor. If you had to classify KVM, would you classify it as a type 1 or type 2 hypervisor? Explain your reasoning in detail.
8. (1pt) Can you use KVM to virtualize a machine running a different processor architecture than the host? Explain your reasoning in detail.
9. (1pt) Explain the relationship between KVM and QEMU in detail.
10. (1pt) Name three primary differences between KVM and Xen.
11. (2pts) Do some more research online regarding the differences between KVM and Xen. Based on what you have researched, which hypervisor would you choose if you were creating a virtualization server? Explain your reasoning in a paragraph and provide links to the sources you found online. In addition, what would be a good reason to choose neither and go with something proprietary such as VMWare?
12. (1pt) How does Libvirt relate to KVM and OpenStack? What problem is it trying to solve?
13. (3pts) For the following list of Openstack services, briefly explain what each does and why it is useful. Research two more not on this list, and give their codename, an explanation of what the service does, and an explanation of why the service is useful.

    - cinder
    - glance
    - keystone
    - neutron
    - nova
    - swift