Otto-Friedrich-University of Bamberg

Professorship for Computer Science,
Communication Services, Telecommunication
Systems and Computer Networks

Foundations of Internet Communication

Assignment 3
Domain Name System (DNS) and Load Balancing

Submitted by:
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Figure 1: authoritative DNS server for ru

2. Determine the addresses of the Internet DNS root servers

Figure 2: Address of the Internet DNS root servers

3. Run dig to display the nameservers for the domain uni-bamberg.de

Figure 3: Nameservers for domain uni-bamberg.de

2 DNS Configuration with CoreDNS

1. Followings is the screenshot of lab.conf file:

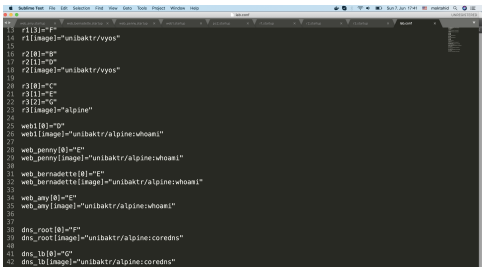

Figure 4: lab.conf file of Table 1

2. Followings are the screenshots of startup files file:

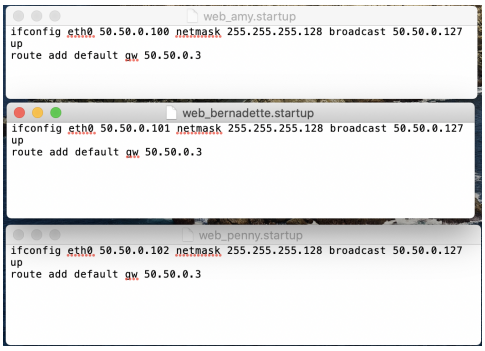

Figure 5: Startup files of web_amy, web_penny, web_bernadette

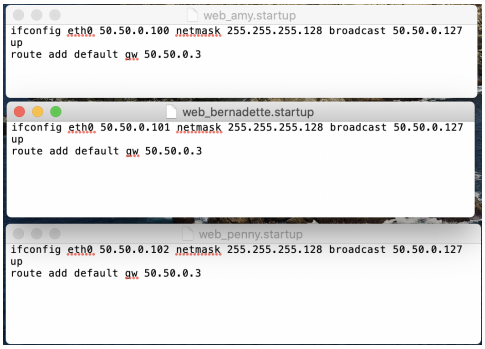

Figure 6: Startup files of web_amy, web_penny, web_bernadette

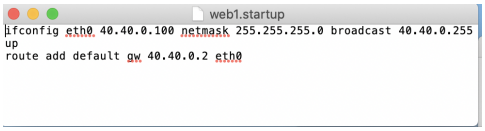

Figure 7: Startup files of web_1

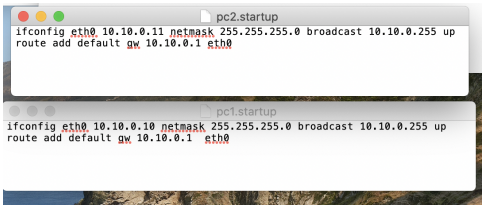

Figure 8: Startup files of pc_1 and pc_2

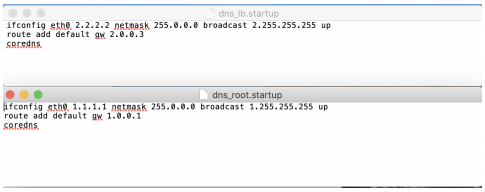

Figure 9: Startup files of dns_root, dns_lb

3. Static routes to the topology :

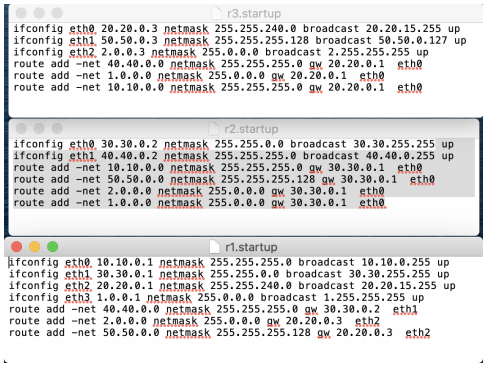

Figure 10: Static routes to the topology

4. Setup a DNS server on node dns_root :

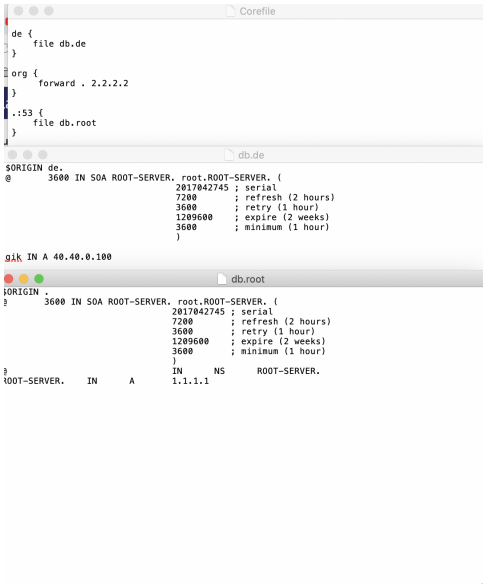

Figure 11: Screenshot of dns setup

5. Add a nameserver And curl gik.de :

Figure 12: Screenshot of resolv.conf and curl gik.de

6. Use dig to determine the authoritative server for the root domain :

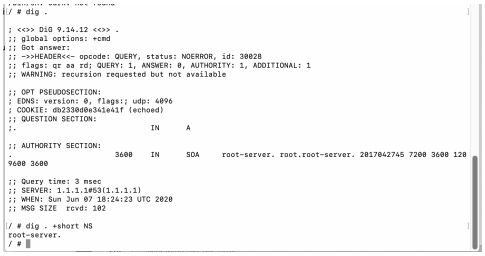

Figure 13: Screenshot of authoritative server

7. On node dns lb setup a DNS servers :

Figure 14: Screenshot of dns_lb setup

8. Modify dns_root to forward the name resolution of org to dns_lb :

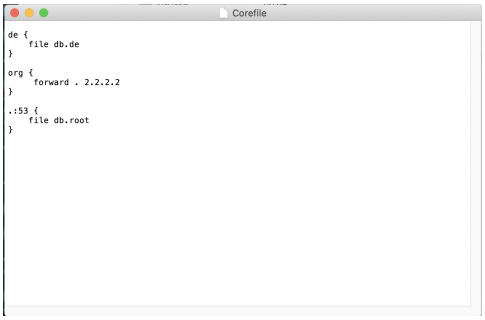

Figure 15: Screenshot of modified dns_root setup

9. Configure CoreDNS on dns_lb to load balance the entry gik.org :

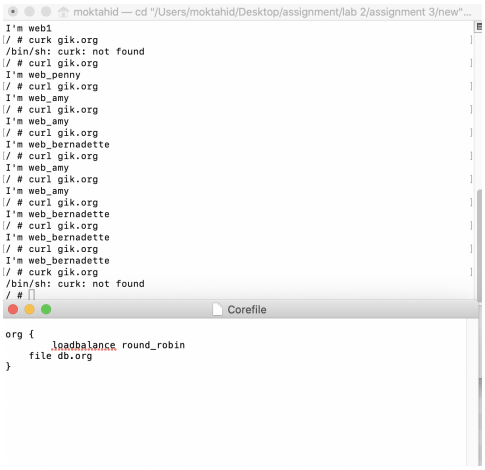

Figure 16: Screenshot of configured core dns and load balancing

Pitfalls of DNS load balancing:

Although easy to implement, round-robin DNS has a number of drawbacks, such as those arising from record caching in the DNS hierarchy itself, as well as client-side address caching and reuse, the combination of which can be difficult to manage. Round-robin DNS should not solely be relied upon for service availability. If a service at one of the addresses in the list fails, the DNS will continue to hand out that address and clients will still attempt to reach the inoperable service.

Round-robin DNS may not be the best choice for load balancing on its own, since it merely alternates the order of the address records each time a name server is queried. Because it does not take transaction time, server load, and network congestion into consideration, it works best for services with a large number of uniformly distributed connections to servers of equivalent capacity. Otherwise, it just does load distribution.[6]

10. dig gik.org :

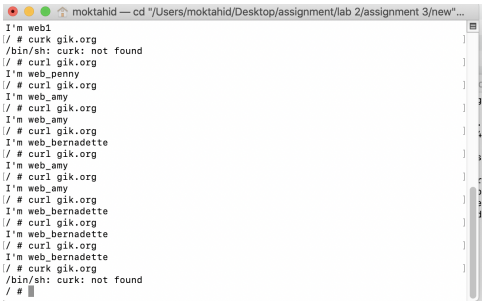

Figure 17: Screenshot of dig on gik.org

3 Load Balancing with Traefik

1. Followings are the screenshot of new startup files:

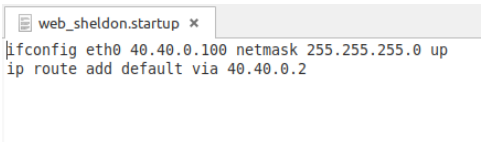

Figure 18: websheldon.startup file

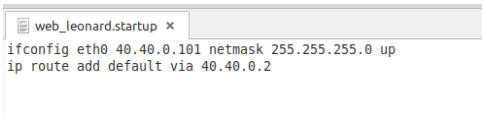

Figure 19: webleonard.startup file

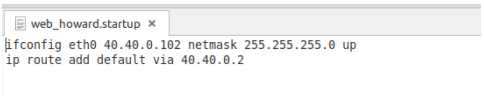

Figure 20: webhoward.startup file

2. Startup file for `traefik_lb` file:

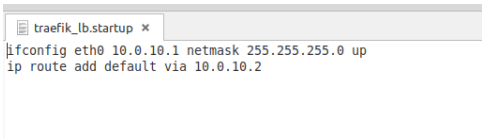

Figure 21: trafiklbStartup.startup file

listen on port 80 using a file provider:

Figure 22: 80 Listen Port

Using a file provider forwards requests on gik.de to the new webservers:

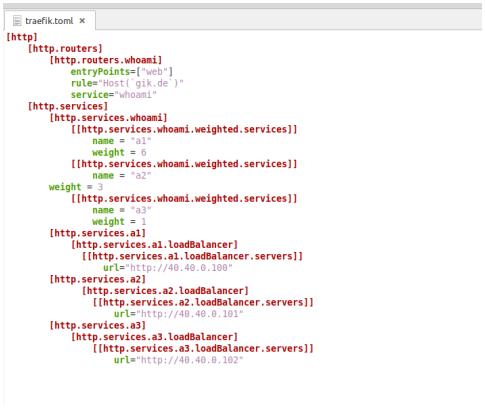

Figure 23: File Provider for new webserver

3. Adjust A record of gik de from dns root to point traefik lb

Figure 24: update dns root A record

4. confirm configuration with dig

Figure 25: dig confirmation

5. Update static route topology
   Next we updated our router to suport load balancer traefik for example:

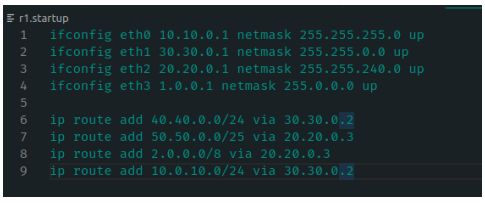

Figure 26: Update router r1 to adjust traefik

6. Test the load balancing behavior and add a weighted round robin procedure to forward 60 percent, 30 percent and 10 percent request to web sheldon, web leonard and web howard respectively.

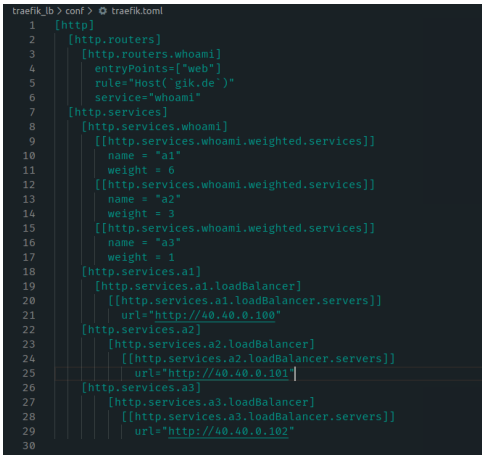

Figure 27: Weighted round robin load balancer configuration

Figure 28: Test result of load balancer

literature/bib