Report

Home Assignment, CCOM38

Dennis Bennhage & Hampus Lidin

May 18th, 2015

Task 1 :

a) When running the `ifconfig` command (in Mac OSX/Unix), you get all the information about the different interfaces at the host computer. Running the command in a home network, we get the following information about the `Ethernet0` (en0) interface:

```
$ ifconfig

<output omitted>

en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
     ether 20:c9:d0:7f:0f:25
     inet6 fe80::22c9:d0ff:fe7f:f25\%en0 prefixlen 64 scopeid 0x4
     inet 192.168.1.119 netmask 0xffffff00 broadcast 192.168.1.255
     nd6 options=1<PERFORMNUD>
     media: autoselect
     status: active

<output omitted>
```

The `inet` field shows information about the IPv4 configuration for that interface. The unicast IP-address is then `129.16.182.106/20` and the broadcast address for this network is `129.16.191.255/20`. However, the IP-address is within the private address space, so the router has to convert it into a globally unique IP-address using *Network Address Translation* (NAT). This address is provided to the router by the *Internet Service Provider* (ISP), and all traffic in the local network going out from the router will then use this address to communicate through the Internet.

b) The hostname can be found using the `nslookup` command on the IP-address obtained in the previous task:

```
$ nslookup 192.168.1.1

Server:   192.168.1.1
Address:  192.168.1.1#53

119.1.168.192.in-addr.arpa  name = Hampus-MBP.huawei.com.
```

The answer is given by the name server `119.1.168.192.in-addr.arpa`. The hostname that was given is `Hampus-MBP.huawei.com`.

Task 2 :

a) Answer.

b) Answer.

Task 3 :

a) Answer.

b) Answer.

Task 4 :

a) www.chalmers.se:

```
HEAD / HTTP/1.0

HTTP/1.1 401 Unauthorized
Content-Length: 16
Content-Type: text/html; charset=utf-8
Server: Microsoft-IIS/7.5
SPRequestGuid: 1b34a246-0f4b-4010-9e90-6fd42daab1e4
X-SharePointHealthScore: 0
WWW-Authenticate: NTLM
X-Powered-By: ASP.NET
MicrosoftSharePointTeamServices: 14.0.0.7102
X-MS-InvokeApp: 1; RequireReadOnly
Date: Mon, 18 May 2015 08:20:33 GMT
Connection: close
```

The type of web server www.chalmers.se is using is "Microsoft-IIS/7.5". We get the response 401 Unauthorized, which means that we do not have access to URL resources without providing user authentication (log in somewhere with a username and a password). The authentication protocol in this case, which is specified in the WWW-Authenticate field of the HTTP header, is NTLM.

```
Content-Length is the size of the content that is being sent, in octets(bytes).
Content-Type indicates what type of media is being sent.
SPRequestGuid contains diagnostic information about server problems.
X-SharePointHealthScore is a number between 0 and 10 where 0 indicates low server load and 10 in
X-Powered-By specifies which technology is used to support the web application.
MicrosoftSharePointTeamServices indicates which version of Microsoft SharePoint is installed.
X-MS-InvokeApp specifies if the application wants to use DirectInvoke, which lets a user open fo
```

RequiredReadOnly means that it opens in Read-Only mode.

```
www.tue.nl:

HEAD / HTTP/1.0

HTTP/1.1 301 Moved Permanently
Date: Mon, 18 May 2015 08:24:17 GMT
Server: Apache/2.2.22 (Ubuntu)
X-Powered-By: PHP/5.3.10-1ubuntu3.18
Location: http://www.tue.nl/
Vary: Accept-Encoding
Content-Type: text/html


Connection closed by foreign host.


www.tue.nl is using the web server type "Apache/2.2.22 (Ubuntu)".
```

301 Move Permanently means that the resource we are requesting has been redirected to a new URL. The new URL is specified in the Location field. In this case www.tue.nl is redirecting to http://www.tue.nl/. The Vary field specifies which fields of the request header to take into account when trying to find the right object in the cache.

b) www.chalmers.se:

```
HEAD / HTTP/1.1
```

```
  HTTP/1.1 400 Bad Request
  Content-Length: 334
  Content-Type: text/html; charset=us-ascii
  Server: Microsoft-HTTPAPI/2.0
  Date: Mon, 18 May 2015 09:15:38 GMT
  Connection: close

  www.tue.nl:

  HEAD / HTTP/1.1

  HTTP/1.1 400 Bad Request
  Date: Mon, 18 May 2015 09:16:38 GMT
  Server: Apache/2.2.22 (Ubuntu)
  Vary: Accept-Encoding
  Connection: close
  Content-Type: text/html; charset=iso-8859-1



www.chalmers.se:

  HEAD / HTTP/1.1
  Host: www.chalmers.se

  HTTP/1.1 302 Redirect
  Content-Length: 164
  Content-Type: text/html; charset=UTF-8
  Location: http://www.chalmers.se/Pages/default.aspx
  Server: Microsoft-IIS/7.5
  SPRequestGuid: f25d9db4-5345-4c46-b7fc-292c52258273
  X-SharePointHealthScore: 0
  X-Powered-By: ASP.NET
  MicrosoftSharePointTeamServices: 14.0.0.7102
  X-MS-InvokeApp: 1; RequireReadOnly
  Date: Mon, 18 May 2015 09:27:28 GMT

  www.tue.nl:

  HEAD / HTTP/1.1
  Host: www.tue.nl

  HTTP/1.1 200 OK
  Date: Mon, 18 May 2015 09:28:56 GMT
  Server: Apache/2.2.22 (Ubuntu)
  X-Powered-By: PHP/5.3.10-1ubuntu3.18
  Set-Cookie: fe_typo_user=e4577ddec4a01568b6eefae39b0dcf4b; path=/
  Expires: Mon, 18 May 2015 10:21:29 GMT
  Cache-Control: max-age=3144
  Vary: Accept-Encoding
  Content-Type: text/html; charset=utf-8

  Connection closed by foreign host.
```

In an HTTP 1.1 request you have to specify the name of the host of the resource you are requesting. You can also specify a port number, but we did not do that since it defaults to 80 if you do not specify one. If we do not include a host name in the request, the server responds with 400 Bad Request, as we saw in 4b.

Say for example that we are hosting several different websites on a single machine. They all share an IP address. To be able to send the request to the correct website, we need to specify a host name. This is what the host header field is used for; differentiating between multiple hosts on the same IP.

Task 5 :

a) Answer.

b) Answer.

Task 6 :

a) The `nslookup` command can be used to find information about the DNS servers of a domain. We will use `utoronto.ca` (University of Toronto) for this task. Here are the results of our `nslookup` for `utoronto.ca`:

```
> nslookup -type=mx utoronto.ca

Server:  res1.chalmers.se
Address:  129.16.1.53

Non-authoritative answer:
utoronto.ca     MX preference = 10, mail exchanger = k.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = d.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = b.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = c.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = g.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = a.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = l.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = e.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = f.mx.utoronto.ca
utoronto.ca     MX preference = 10, mail exchanger = j.mx.utoronto.ca

utoronto.ca     nameserver = bay.cs.utoronto.ca
utoronto.ca     nameserver = ns2.utoronto.ca
utoronto.ca     nameserver = ns1.utoronto.ca
utoronto.ca     nameserver = ns7.utoronto.ca
bay.cs.utoronto.ca      internet address = 128.100.1.1
ns1.utoronto.ca internet address = 128.100.100.129
ns2.utoronto.ca internet address = 128.100.72.168
ns7.utoronto.ca internet address = 162.243.71.42
```

To find the mail servers we set the type parameter to `MX` (Mail eXchange). We find that there are 10 mail servers for `utoronto.ca`, with all of them having equal priority (preference = 10). All of them having equal priority means that we do not care which of the mail servers we use first.

We also find the DNS servers and their respective IP addresses.

b) We use `www.google.com` for this task.

```
> nslookup www.google.com

Server:   res1.chalmers.se
Address:    129.16.1.53

Non-authoritative answer:
Name:     www.google.com
Addresses:  2a00:1450:4010:c02::68
            74.125.205.106
            74.125.205.103
            74.125.205.105
            74.125.205.99
            74.125.205.147
            74.125.205.104
```

We can see that www.google.com has 6 different IP addresses. Multiple IP addresses can be used to balance load between web servers. There can be several copies of the same web site, each having its own IP address but all using the same DNS servers. The first user who sends a request is sent to the first IP address, the second person to the second IP address and so on. This reduces the amount of requests to each web server and provides redundancy in case a web server should go down.s

Multiple IP addresses can also be used to have different IP addresses for different services.

Task 7 :

a) Answer.

b) Answer.