计算机网络 第九章作业

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Problem 1 *(P4 of Chapter 2 in [3])(5 points)*

Consider the following string of ASCII characters that were captured by Wireshark when the browser sent an HTTP GET message (i.e., this is the actual content of an HTTP GET message). The characters <cr><lf> are carriage return and line-feed characters (that is, the italized character string <cr> in the text below represents the single carriage-return character that was contained at that point in the HTTP header). Answer the following questions, indicating where in the HTTP GET message below you find the answer.

```
GET /cs453/index.html HTTP/1.1<cr><lf>Host: gai
a.cs.umass.edu<cr><lf>User-Agent: Mozilla/5.0 (
Windows;U; Windows NT 5.1; en-US; rv:1.7.2) Gec
ko/20040804 Netscape/7.2 (ax) <cr><lf>Accept:ex
t/xml, application/xml, application/xhtml+xml, text
/html;q=0.9, text/plain;q=0.8,image/png,*/*;q=0.5
<cr><lf>Accept-Language: en-us,en;q=0.5<cr><lf>Accept-
Encoding: zip,deflate<cr><lf>Accept-Charset: ISO
-8859-1,utf-8;q=0.7,*;q=0.7<cr><lf>Keep-Alive: 300<cr>
<lf>Connection:keep-alive<cr><lf><cr><lf>
```

(a) What is the URL of the document requested by the browser?

(b) What version of HTTP is the browser running?

(c) Does the browser request a non-persistent or a persistent connection?

(d) What is the IP address of the host on which the browser is running?

(e) What type of browser initiates this message? Why is the browser type needed in an HTTP request message?

Problem 2 *(P7 of Chapter 2 in [3])(5 points)*

Suppose within your Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the

IP address. Suppose the n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT_1, ..., RTT_n. Further suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT_0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much times elapses from when the client clicks on the link until the client receives the object?

Problem 3 *(P9 of Chapter 2 in [3])(10 points)*

Consider Figure 1, for which there is an institutional network connected to the Internet. Suppose that the average object size is $850,000$ bits and that the average request rate from the institution's browsers to the origin servers is 16 requests per second. Also suppose that the amount of time it takes from when the router on the Internet side of the access link forwards an HTTP request until it receives the response is 3 seconds on average (see Section 2.2.5). Model the total average response time as the sum of the average access delay (that is, the delay from Internet router to institution router) and the average Internet delay. For the average access delay, use $\Delta/(1-\Delta\beta)$, where Δ is the average time required to send an object over the access link and β is the arrival rate of objects to the access link.

(a) *Find the total average response time.*

(b) *Now suppose a cache is installed in the institutional LAN. Suppose the miss rate is 0.4. Find the total response time.*

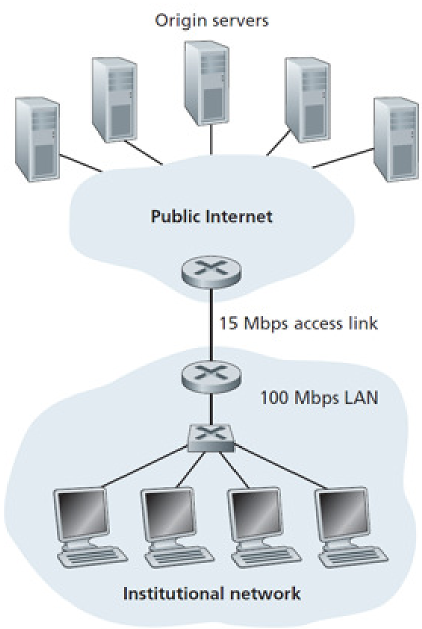

图 1: Bottleneck between an institutional network and the Internet

Problem 4 *(P23 of Chapter 2 in [3])(10 points)*

Consider distributing a file of F bits to N peers using a client-server architecture. Assume a fluid model where the server can simultaneously transmit to multiple peers, transmitting to each peer at different rates, as long as the combined rate does not exceed u_s.

a) *Suppose that* $u_s/N \leq d_{min}$. *Specify a distribution scheme that has a distribution time of* NF/u_s.
b) *Suppose that* $u_s/N \geq d_{min}$. *Specify a distribution scheme that has a distribution time of* F/d_{min}.
c) *Conclude that the minimum distribution time is in general given by* $\max\{NF/u_s, F/d_{min}\}$.

参考文献

[1] Larry L. Peterson and Bruce S. Davie. *Computer Networks: A Systems Approach (Fifth Edition)*. Morgan Kaufmann, 2012.

[2] Larry L. Peterson and Bruce S. Davie. *Computer Networks: A Systems Approach (Fourth Edition)*. Morgan Kaufmann, 2007.

[3] James F. Kurose and Keith W. Ross *Computer networking: a top-down approach (Sixth Edition)*. Addison-Wesley/Pearson, 2012.

[4] 吴功宜. 计算机网络. 清华大学出版社（第三版）, 2011.