Revision

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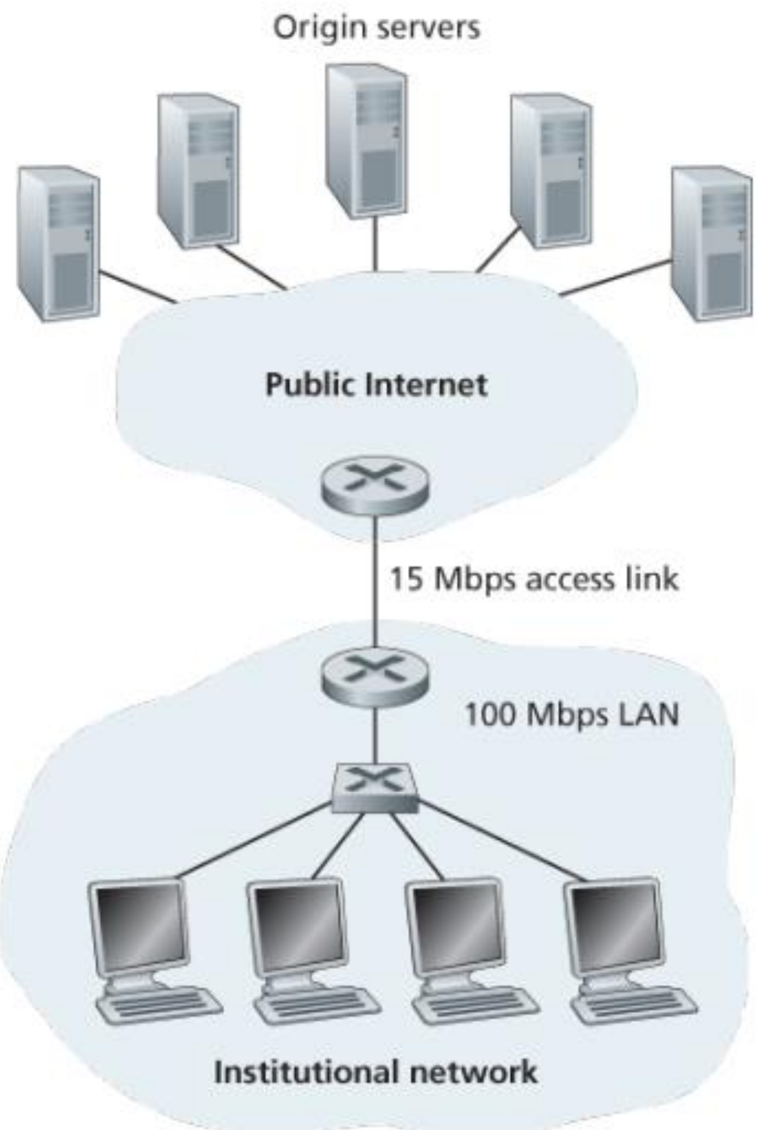
Web Caching

P9. Consider Figure 2.12 , 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 three 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 b 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.

Web Caching


Origin servers
Public Internet
15 Mbps access link
100 Mbps LAN
Institutional network

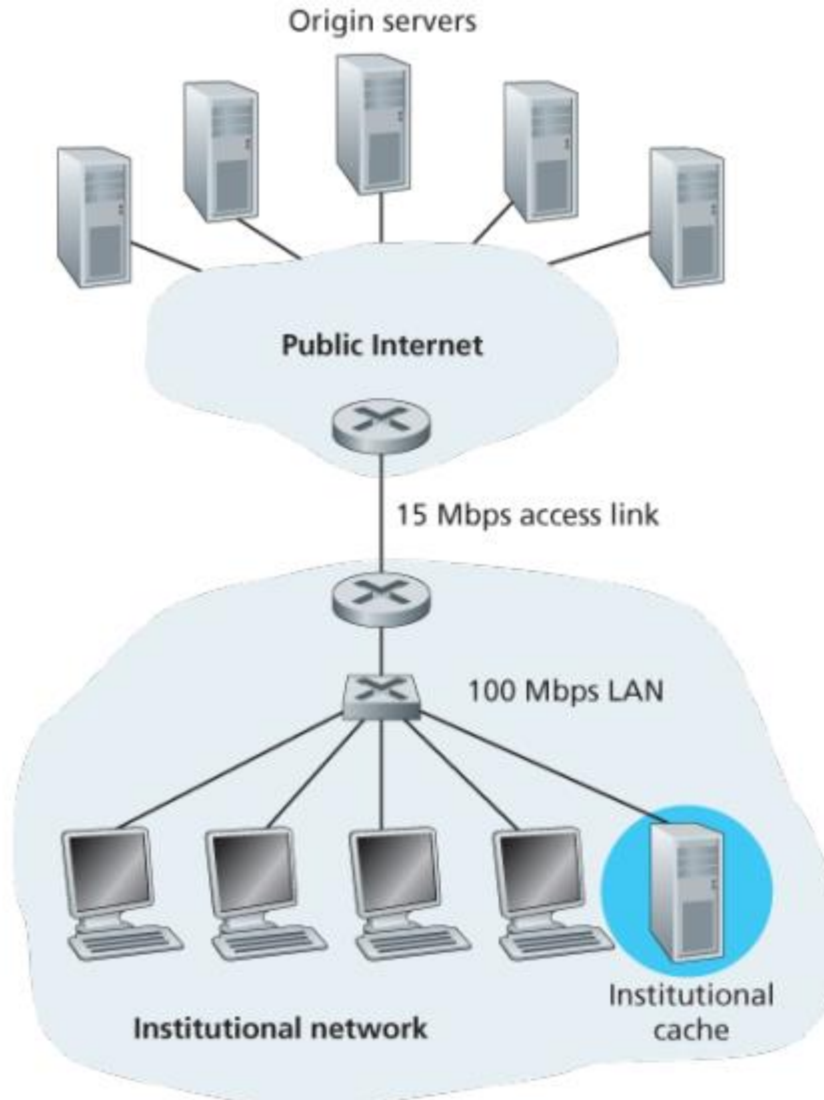
Web Caching

a) The time to transmit an object of size L over a link or rate R is L/R. The average time is the average size of the object divided by R:

Δ = (850,000 bits)/(15,000,000 bits/sec) = .0567 sec

The traffic intensity on the link is given by $\beta\Delta$=(16 requests/sec)(.0567 sec/request) = 0.907. Thus, the average access delay is (.0567 sec)/(1 - .907) ≈ .6 seconds. The total average response time is therefore .6 sec + 3 sec = 3.6 sec.

Web Caching



Origin servers
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b) The traffic intensity on the access link is reduced by 60% since the 60% of the requests are satisfied within the institutional network. Thus the average access delay is (.0567 sec)/[1 – (.4)(.907)] = .089 seconds. The response time is approximately zero if the request is satisfied by the cache (which happens with probability .6); the average response time is .089 sec + 3 sec = 3.089 sec for cache misses (which happens 40% of the time). So the average response time is (.6)(0 sec) + (.4)(3.089 sec) = 1.24 seconds. Thus the average response time is reduced from 3.6 sec to 1.24 sec.

JavaScript

- Write a function that is triggered when the user releases a key in the input field. The function transforms the character to upper case.

```
<!DOCTYPE html>
<html>
<head>
<script>
function myFunction() {
  var x = document.getElementById("fname");
  x.value = x.value.toUpperCase();
}
</script>
</head>
<body>

<p>A function is triggered when the user releases a key in the input
field. The function transforms the character to upper case.</p>
Enter your name: <input type="text" id="fname" onkeyup="myFunction()">

</body>
</html>
```

JavaScript (Cont.)

Write JavaScript code to replace the content of webpage when the button clicked.

```
<!DOCTYPE html>
<html>
<body>

<p id="demo">Click the button to replace this document with new content.
</p>

<button onclick="myFunction()">Try it</button>

<script>
function myFunction() {
  document.open("text/html","replace");
  document.write("<h2>Learning about the HTML DOM is fun!</h2>");
  document.close();
}
</script>

</body>
</html>
```

JavaScript (Cont.)

Write JavaScript to find the InnerHTML for the first anchor in HTML

```
<!DOCTYPE html>
<html>
<body>

<a name="html">HTML Tutorial</a><br>
<a name="css">CSS Tutorial</a><br>
<a name="xml">XML Tutorial</a><br>

<p>Click the button to display the innerHTML of the first anchor in the
document.</p>

<button onclick="myFunction()">Try it</button>

<p id="demo"></p>

<script>
function myFunction() {
  document.getElementById("demo").innerHTML =
  document.anchors[0].innerHTML;
}
</script>

</body>
```

JavaScript

This example changes the style of the HTML element with id="id1", when the user clicks a button:

```
<!DOCTYPE html>
<html>
<body>

<h1 id="id1">My Heading 1</h1>

<button type="button"
onclick="document.getElementById('id1').style.color = 'red'">
Click Me!</button>

</body>
</html>
```

Client-Server and Peer to Peer Model

P22. Consider distributing a file of $F=15$ Gbits to N peers. The server has an upload rate of $us=30$ Mbps, and each peer has a download rate of $di=2$ Mbps and an upload rate of u. For N=10, 100, and 1,000 and u=300 Kbps, 700 Kbps, and 2 Mbps, prepare a chart giving the minimum distribution time for each of the combinations of N and u for both client-server distribution and P2P distribution.

For calculating the minimum distribution time for client-server distribution, we use the following formula:

$$D_{cs} = max\ \{NF/u_s,\ F/d_{min}\}$$

Similarly, for calculating the minimum distribution time for P2P distribution, we use the following formula:

$$D_{P2P} = max\{F/u_s,\ F/d_{min},\ NF/(u_s + \sum_{i=1}^{N} u_i)\}$$

Where, F = 15 Gbits = 15 * 1024 Mbits

u_s = 30 Mbps

$d_{min} = d_i$ = 2 Mbps

Note, 300Kbps = 300/1024 Mbps.

Client-Server and Peer to Peer Model

Client Server

		N		
		10	**100**	**1000**
	300 Kbps	7680	51200	512000
u	**700 Kbps**	7680	51200	512000
	2 Mbps	7680	51200	512000

Peer to Peer

		N		
		10	**100**	**1000**
	300 Kbps	7680	25904	47559
u	**700 Kbps**	7680	15616	21525
	2 Mbps	7680	7680	7680