CSC138-01 HW2

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1. a. datalink layer b. Network layer c. Transport layer

2. To identify the applications, namely processes, IP address and port number need to be specified.

Therefore, in this situation, where two browsers from one computer active at the same time, the server could distinguish two browser applications by different port numbers.

3. a. client upload rate, u doesn't affect to the client-server distribution time.

$$\frac{NF}{u_s} = \frac{100 \times 20\,\text{Gbits}}{30\,\text{Mbps}} = \frac{100 \times 20 \times 10^9\,\text{bits}}{30 \times 10^6\,\text{bits/sec}} = \frac{2}{3} \times 10^5\,\text{sec}$$

$$\frac{F}{d_{min}} = \frac{20\,\text{Gbits}}{2\,\text{Mbps}} = 10^4\,\text{sec}$$

$$\therefore \max\{NF/u_s, F/d_{min}\} = \frac{2}{3} \times 10^5\,\text{sec}$$

Therefore, the minimum distribution time is $\frac{2}{3} \times 10^5$ sec whether u is 300Kbps or 700Kbps.

b. $\frac{F}{u_s} = \frac{20\,\text{Gbits}}{30\,\text{Mbps}} = \frac{2}{3} \times 10^3\,\text{sec}$

$\frac{F}{d_{min}} = \frac{20\,\text{Gbits}}{2\,\text{Mbps}} = 10^4\,\text{sec}$

i) $u = 300\,\text{Kbps}$

$$\frac{NF}{u_s + \Sigma u_i} = \frac{100 \times 20\,\text{Gbits}}{30\,\text{Mbps} + 300\,\text{Kbps} \times 100} = \frac{200\,\text{Gbits}}{6\,\text{Mbps}} = \frac{10^5}{3}\,\text{sec}$$

$$\therefore \max\left\{\frac{F}{u_s}, \frac{F}{d_{min}}, \frac{NF}{u_s + \Sigma u_i}\right\} = \frac{10^5}{3}\,\text{sec}$$

ii) $u = 700\,\text{Kbps}$

$$\frac{NF}{u_s + \Sigma u_i} = \frac{100 \times 20\,\text{Gbits}}{30\,\text{Mbps} + 700\,\text{Kbps} \times 100} = \frac{200\,\text{Gbits}}{10\,\text{Mbps}} = 2 \times 10^4\,\text{sec}$$

$$\therefore \max\left\{\frac{F}{u_s}, \frac{F}{d_{min}}, \frac{NF}{u_s + \Sigma u_i}\right\} = 2 \times 10^4\,\text{sec}$$

Therefore, when u is 300Kbps, the minimum distribution time is $\frac{10^5}{3}$ sec and when u is 700Kbps, the minimum distribution time is 2×10^4 sec.

4. $1518 \geq L + 20 + 20 + 18 \quad \therefore 1460 \geq L \cdots$ @

$$\frac{L\,\text{bytes}}{L\,\text{bytes} + 20\,\text{bytes} + 20\,\text{bytes} + 18\,\text{bytes}} = 95\%$$

$$\frac{L}{L + 58} = \frac{95}{100}$$

$$100L = 95L + 95 \times 58 \qquad 5L = 95 \times 58$$

$$\therefore L = \frac{95 \times 58}{5} = 1102 \quad \text{(satisfying condition @, so no problem)}$$