2022학년도 제1학기 컴퓨터네트워크 과제(Ass2) 공지

과제 내용

컴퓨터네트워크 수업 교재 문제 풀이

Chapter 1 – (Page 70 – P6, Page 71 – P10, P13)

Chapter 2 – (Page170 – P9)

1. **풀이과정 필수**
2. **표지 필수 (강의명, 강의 시간, 교수님 성함, 본인 학번, 본인 성명, 소속, 제출일)**
3. **작성 방식 자유 (수기풀이 후 캡쳐 가능 또는 타이핑하여 작성 가능)**
4. **아래의 제출 파일 양식 지킬 것**

제출 파일

보고서 이름 : **과제명(Ass2)_학번_이름.pdf**

Ex.) Ass2_2020000000_홍길동.pdf

제출 방식

On-line 제출

KLAS – 강의 과제 제출

2022년 04월 13일 23:59:59까지

추가제출기간에 제출할 경우 **1일 당 10%** 감점 (최대 3일)

제출과정에서 문제가 발생할 경우, 메일로 제출 가능 (추후 증빙자료 요청 할 수 있음)

참고문헌 (교재명)

Computer Networking A TOP-DOWN APPROACH 8th edition (James F. Kurose, Keith W. Ross)

Chapter 1

Page.70

P6. This elementary problem begins to explore propagation delay and transmission delay, two central concepts in data networking. Consider two hosts, A and B, connected by a single link of rate R bps. Suppose that the two hosts are separated by m meters, and suppose the propagation speed along the link is s meters/sec. Host A is to send a packet of size L bits to Host B.

a. Express the propagation delay, d_{prop}, in terms of m and s.

b. Determine the transmission time of the packet, d_{trans}, in terms of L and R.

c. Ignoring processing and queuing delays, obtain an expression for the end-to-end delay.

d. Suppose Host A begins to transmit the packet at time $t = 0$. At time $t = d_{\text{trans}}$, where is the last bit of the packet?

e. Suppose d_{prop} is greater than d_{trans}. At time $t = d_{\text{trans}}$, where is the first bit of the packet?

f. Suppose d_{prop} is less than d_{trans}. At time $t = d_{\text{trans}}$, where is the first bit of the packet?

g. Suppose $s = 2.5 \cdot 10^8$, $L = 1500$ bytes, and $R = 10$ Mbps. Find the distance m so that d_{prop} equals d_{trans}.

Page.71

P10. Consider a packet of length L that begins at end system A and travels over three links to a destination end system. These three links are connected by two packet switches. Let d_i, s_i, and R_i denote the length, propagation speed, and the transmission rate of link i, for $i = 1, 2, 3$. The packet switch delays each packet by d_{proc}. Assuming no queuing delays, in terms of d_i, s_i, R_i, ($i = 1, 2, 3$), and L, what is the total end-to-end delay for the packet? Suppose now the packet is 1,500 bytes, the propagation speed on all three links is $2.5 \cdot 10^8$m/s, the transmission rates of all three links are 2.5 Mbps, the packet switch processing delay is 3 msec, the length of the first link is 5,000 km, the length of the second link is 4,000 km, and the length of the last link is 1,000 km. For these values, what is the end-to-end delay?

P13. (a) Suppose N packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length L and the link has transmission rate R. What is the average queuing delay for the N packets?

(b) Now suppose that N such packets arrive to the link every LN/R seconds. What is the average queuing delay of a packet?

Page. 170

P9. Consider Figure 2.12, for which there is an institutional network connected to the Internet. Suppose that the average object size is 1,000,000 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 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.