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REG #: SP20-BCS-044
COURSE: DCCN
ASSIGNMENT # 2

Question #1

Yes, the segments sent by Host A and Host B will be directed to the same socket at Host C because both sent UDP segments to Host C through destination port number as 6789

The process at Host C knows the origins of the UDP segment as:

- Each received segment at the socket interface, the IP addresses are provided by the operating system which are used to determine the origins of the individual segments.
- The identification of the socket is done by Host C contains the values non-identical source addresses.
- Host C checks its datagram for its field that contains the four fields. which gives the data and finds out which socket is sending that data.

Question #2

a) How much data is in first segment?

Given:

First segment = 90

Second segment = 110

Solution:

Data in first segment = Second Segment - First segment
= 110 - 90
= 20

b) Suppose 1^{st} segment is lost but the second segment arrive at B..... what is the acknowledgement number?

Suppose 1^{st} segment is lost but the second segment arrives at B. The acknowledgement that Host B sent to Host A, the acknowledgement number is the sequence number of the 1^{st} segment which is 90.

Question # 3

a) Assume you have the following 2 bytes: 01011100 and 01100101. What is the 1st complement of the sum of these 2 bytes?

```
  0 1 0 1 1 1 0 0
+ 0 1 1 0 0 1 0 1
-----------------
  1 1 0 0 0 0 0 1
```

The 1's complement of the sum of these 2 bytes: 11000001 = 00111110

b) Assume you have the following 2 bytes: 11011010 and 01100101. What is the 1's complement of the sum of these 2 bytes?

```
  1 1 0 1 1 0 1 0
+ 0 1 1 0 0 1 0 1
-----------------
  0 0 1 1 1 1 1 1
```

```
  0 0 1 1 1 1 1 1
+               1
-----------------
  0 1 0 0 0 0 0 0
```

The 1's complement of the sum of these 2 bytes: 10111111

c) For the bytes in part (a), give an example where one bit is flipped in each of the 2 bytes and yet the 1s complement doesn't change.

```
  1 1 0 1 1 1 0 0
+ 1 1 1 0 0 1 0 1
-----------------
  1 1 0 0 0 0 0 1
```

= 00111110

part(c) answer is same as part(a)

Performing checksums at multiple levels throughout the network is not waste. as the flipped bits can be so easily missed, this redundancy is the best chance of catching errors.

Question # 4

minimum distribution time for Nu client-server.

Given:

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

$F = 15 \times 1024 = 15360$ Mbits

$u_s = 30$ Mbps , $d_{min} = d_i = 2$ Mbps

$u = 300$ kbps $= 300/1024 = 0.2929$ Mbps

$u = 700$ Kbps $= 700/1024 = 0.6835$ Mbps

	10	100
300 kbps	7680	51200
700 kbps	7680	51200

minimum distribution time for P2P

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

for N=10, $U_i = 300$ kbps $= \max\{\frac{15360}{30}, \frac{15360}{2}, \frac{10 \times 15360}{30 + 10 \times 0.2929}\}$

$= \max\{512, 7680, 4664.581\}$

$= \underline{7680 \text{ sec}}$

N=100

$U_i = 300$ kps $= \max\{512 , 7680 , 25906.560\}$

$= \underline{25906.560 \text{ sec}}$

N=10

$U_i = 700$ kbs $= \max\{512, 7680, 4169.94\}$

$= \underline{7680 \text{ sec}}$

N=100

$U_i = 700$ kbps $= \max\{512, 7680, 15617.69\} = \underline{15617.69}$

a) What is the EstimatedRTT after each SampleRTT?

Given:

SampleRTT = 100 ms , 110 ms   EstimatedRTT = 80 ms

$\alpha = 0.25$

$\beta = 0.125$

Solution:

$$\text{EstimatedRTT} = \alpha \times \text{SampleRTT} + (1-\alpha) \times \text{Estimated RTT}$$
$$= 0.25 \times 100 + (1-0.25) \times 80$$
$$= 25 + (0.75) \times 80$$
$$= 85 \text{ ms.}$$

$$\text{EstimatedRTT} = \alpha \times \text{Sample RTT} + (1-\alpha) \times \text{Estimated RTT}$$
$$= 0.25 \times 110 + (1-0.25) \times 80$$
$$= 27.5 + 0.75 \times 80$$
$$= 87.5 \text{ ms.}$$

b) What is the RTT Deviation after each Sample RTT?

Given:

Sample RTT = 100 , 110 ms

Estimated RTT = 85ms , 87.5ms

$\alpha = 0.25$

$\beta = 0.125$

Solution:

$$\text{Deviation RTT} = \beta \times |\text{SampleRTT} - \text{EstimatedRTT}| + (1-\beta) \times \text{Deviation RTT}$$
$$= 0.125 \times |100 - 85| + (1-0.125) \times 10$$
$$= 0.125 \times |15| + 0.875 \times 10$$
$$= 1.875 + 8.75$$
$$= 10.625 \text{ ms} = 10.63 \text{ ms.}$$

$$\text{Deviation RTT} = \beta \times |\text{Sample RTT} - \text{EstimatedRTT}| + (1-\beta) \times \text{Deviation RTT}$$
$$= 0.125 \times |110 - 87.5| + (1-0.125) \times 10$$
$$= 0.125 \times |22.5| + (0.875) \times 10$$
$$= 2.8125 + 8.75$$
$$= 11.5625 \text{ ms} \approx 11.56 \text{ ms.}$$

c) What is the TCP timeout after each SampleRTT?

Given:

EstimatedRTT = 85 ms, 87.5 ms

DevRTT = 10.63 ms, 11.56 ms.

Solution:

Time Out = EstimatedRTT + 4 DevRTT

= 85 + (10.63)4

= 85 + 42.52

= 127.52 ms.

Time Out = EstimatedRTT + 4DevRTT

= 87.5 + 4 x 11.56

= 87.5 + 46.25

= 133.74 ms.

Question #6

a) What behavior is observed in A? Provide reason.

A indicates the slow-start period quickly discovers the maximum acceptable throughput that the is supported by the path.

b) what caused the decrease in window size at point B? Provide reason.

Tripple duplicate acknowledge caused the decrease in window size at point B.

c) what caused the decrease in window size at point D?

At point D, TimeOut caused the decrease in window size.

d) Describe the behavior from point E to F?

from point E to F, the behavior of slow start and it will increase until it will reach thread where it start congection control.

Question #8

a) Find the total average response time?

$\frac{L}{R}$ is the time required to transmit a packet/object of size L over a link R.

$$\text{Avg time} = \frac{\text{avg size of obj}}{R}$$

$$\text{Avg time} = \Delta = \frac{850{,}000}{15{,}000{,}000} = 0.0567 \text{ sec.}$$

Scanned with CamScanner

$\times 0.567 = \underline{0.9072}$

Avg access delay $= \dfrac{\Delta}{1-\beta\Delta} = \dfrac{0.0567}{1-0.9072} = \underline{\underline{0.6109}}$ sec

Total avg response time $= 0.6109 + 3 = \underline{\underline{3.6109 \text{ sec}}}$.

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

Traffic intensity of the access link is reduced by 60%.

Avg access delay $= \dfrac{0.0567}{1-(0.4)(0.9072)} = \underline{0.0889}$ sec

Response time ≈ 0 (if request handled by cache)

Avg response time $= 0.0889 + 3 = \underline{\underline{3.0889 \text{ sec}}}$

For cache miss,

Avg response time $= 0.6(0) + 0.4(3.0889) = 1.2356$ sec

Question #7

No. of IP	N/W	Broadcast address	IP range	Subnet Mask	Format
64	14.14.74.0	14.14.74.63	.1 — .62	255.255.255.192	/26
64	14.14.74.64	14.14.74.127	.65 — .126	255.255.255.192	/26
32	14.14.74.128	14.14.74.159	.129 — .158	225.255.255.224	/27
32	14.14.74.160	14.14.74.191	.161 — 190	225.255.255.224	/27
16	14.14.74.192	14.14.74.207	.193 — .206	255.255.255.240	/28
16	14.14.72.208	14.14.72.223	.209 — .222	255.255.255.240	/28
16	14.14.72.224	14.14.74.239	.225 — .238	255.255.255.240	/28
4	14.14.72.240	14.14.74.243	.242 — .241	215.255.255.252	/30
4	14.14.72.244	14.14.74.247	.245 — .246	255.255.255.252	/30
4	14.14.72.248	14.14.74.251	.249 — .250	255.255.255.252	/30
4	14.14.72.252	14.14.74.255	.253 — .254	225.255.255.252	/30