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CSE 30264
Homework #9

Chapter 6:

44) Because the UDP applications are not controlled by the TCP congestion control, they will not limit the amount of data sent over the network. The UDP application would happily send more and more data and TCP applications would not be able to send much at all. The TCP performance would be lowered because the UDP applications would be taking up most of the bandwidth.

The current state of the network can be identified by the percentage of successful received packets. If there is a large percentage, then the source can send more because the packets are arriving correctly. If there is a low percentage, then the source should back off because the packets are getting lost. The source uses the percentage to change how many packets to send.

47)

a) Here, the bucket depth needs to be 9 so that you can store all of the extra data and send at an average rate of 2 packets per second.

b) The bucket depth needs to be 4.

Chapter 7:

1)

The XDR on the wire representation would be something like this, with integers and pointers taking 4 bytes and chars taking 1 byte each:

[7][R][I][C][H][A][R][D][4376][&date(0)][3][80000][85000][90000][2]

7)

a) [int][4][101]
b) [int][4][10120]
c) [1][7][16909060]

18) I made a complex text file, with many different characters, and used gzip and obtained a compression ratio of 280:1. I made another file with only 2 characters: spaces and occasionally a '1' character. When I used gzip on the file with only 2 types of characters I obtained a compression ratio of 384:1, which is incredibly efficient. With tar, I couldn't even come close to matching these ratios.

19) A file contains *a, b, c,* and *d.* Nominally, each letter takes 2 bits.

a) Encoding for each letter as a bit string:

a (50%): 0
b (30%): 10
c (10%): 110
d (10%): 111

In this case, the 10 letter string 'abaabadabc' (which assumes a is 50%, b is 30%, c is 10%, and d is 10%, and has a size of 20 bits) would be encoded as:

01000100111010110

b) This 17 bits, and has a compression ratio of 20/17.

c) With the same encoding for each letter, assuming that they have the following percentages:

a: 40%
b: 40%
c: 15%
d: 5%

If you had a 20 letter (40 bit) string with these percentages, such as 'aaabbbabdcaabbaccabb', then the encoding would be:

00010101000101111100010100110110001010

This is 36 bits. The compression ratio for this case would be 40/36, which is slightly worse than the previous situation. I used the same encoding method because a+b have the same percentage (80%) and d+c have the same percentage (20%). If d or c had a much larger percentage, I would assign one of them to have the encoding of one bit, and would assign a to have a different encoding.