CSEE W4119 Computer Networks

Homework 2

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1. Consider a circular Distributed Hash Table (DHT) with node identifiers in the range [0; 15]. Suppose there are seven peers with identifiers 1, 3, 4, 5, 8, 12 and 14. Suppose that peer 3 learns that peer 5 has left the DHT. How does peer 3 update its successor state information? Which peer is now its first successor? Its second successor?

Answer:

Peer 3 learns that peer 5 has left the DHT, then peer 3 asks peer 4 who its immediate successor is. Peer 4 detects peer 5 departure, makes 8 as it immediate successor. After peer 4 updating its successor state information, peer 3 updates the successor state information and make peer 8 as its second successor.

Its first successor is peer 4, and second successor is peer 8.

2. Consider a reliable data transfer that only uses negative acknowledgments. Suppose the sender only sends data infrequently. Would a NAK-only protocol be preferable to a protocol that uses ACKs? Why? Now suppose the sender has a lot of data to send and the end-to-end connection experiences very few losses. In this second case, would a NAK-only protocol be preferable to a protocol that uses ACKs? Why?

Answer:

a)No. We know that with the NAK-only protocol, the receiver can detect the data loss when it receives the next data package, however, the sender only sends date infrequently, so it should takes a very long time to detect and correct the data loss. Therefore, the NAK-only protocol would not be preferable to a protocol that uses ACKs.

b)Yes. The sender has a lot of date to send(frequently) and very few losses, so that the data errors are rare and easy to be corrected. And receiver will not have to waste bandwidth to send a ACK every time it receives a packet. Therefore, NAK-only protocol is better.

3. Suppose the sender and receiver in a pipelined reliable data transfer protocol have a window of size N. Suppose the sequence number of the segment at the base of the window at the receiver is x. What is the possible range of sequence numbers in the sender's window?

Answer:

[x-N, x+N-1] (assume x+N-1<=2^k-1 and x>=N)

In selective repeat protocol, if the ACKs before x have not been received by sender, the possible range of sequence number at the base of the window at the sender is [x-N, x-1], so the possible range of sequence numbers in the sender’s window is [x-N, x+N-2].

And if the ACKs have been received by send, the range of sequence numbers is [x, x+N-1].

Therefore, the possible range of sequence numbers in the sender’s window is [x-N, x+N-1].

4. Go-back-N and Selective Repeat

Window Size = 4

Packet 1 transmission lost first time

Acknowledgment 3 transmission lost first time

Timeout = 5.5 lines below

Each RTT = 2 lines

In each line (row) one packet is transmitted. Draw what happens until the end of diagram (i.e. 11 Rows), underlining sliding window for both sender and receiver and assuming Go-back-N. Repeat for Selective repeat with identical assumptions.

Answer:

First is Go-back-N, second is Selective repeat.