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CSE 530

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Homework 3

Please answer the following questions.

1. What is the difference between routing and forwarding?

    a. Routing finds the suitable paths for a packet to travel between hosts, by reading routing tables in the routers. While forwarding makes the packet travel those paths from the source to the destination determined by the routing.

2. Three types of switching fabrics are discussed. List and briefly describe each type. Which, if any, can send multiple packets across the fabric in parallel?

    a. Switching via Memory

        i. Switching of inputs and outputs ports are controlled by the router CPU.

        ii. Packets arrive from input ports by fetching the interrupt signal in the CPU

        iii. The routing processor extracts the destination address from the header, uses the forwarding table to find the appropriate output port. Then copies the packet to the output buffer.

    b. Switching via a Bus

        i. The packets are directly transferred from input to output over a shared bus without the routing processor.

        ii. The bus is shared bus, so only can packet can only be delivered by the limited speed determined by the bus bandwidth

    c. Switching via Interconnection Network

        i. Overcame the bus bandwidth limitations

        ii. The cross bar, banyan networks, and other interconnections is able to connect processors into a multiprocessor.

        iii. This is able to send multiple packets across the fabric in parallel.

3. Describe how packet loss can occur at input ports. Describe how packet loss at input ports can be eliminated (without using infinite buffers).

    a If the rate of the packet arrival exceeds the switching fabric rate, then the packet is queued at the input ports. If the rate continues to be exceeded, the queue will get larger and eventually overflow causing packet loss. Packet loss can be eliminated if the switching fabric speed is at least N times faster than input line speed, assuming N is the number of input ports.

4. Describe how packet loss can occur at output ports. Can this loss be prevented by increasing the switch fabric speed?

    a Packet loss can occur when the queue at the output ports grows larger. The slow speed can cause this. When the queue becomes larger than the buffer space this creates packet loss. This loss cannot be prevented by increasing the speeds because the packets still will only travel one at a time.

5. Suppose there are three routers between a source host and a destination host. Ignoring fragmentation, an IP datagram sent from the source host to the destination host will travel over how many interfaces? How many forwarding tables will be indexed to move the datagram from the source to the destination?

    a An IP datagram sent from a source to destination will travel through 8 different interfaces. While 3 forwarding tables will be used to move the datagram to the destination.

6. Suppose an application generates chunks of 40 bytes of data every 20 msec, and each chunk gets encapsulated in a TCP segment and then an IP datagram. What percentage of each datagram will be overhead, and what percentage will be application data?

    a TCP and IP are 20 bytes each. Added to the 40 bytes creates a total of 80 bytes. The over-head is 40 of the total 80. This is a 50% overhead.