Results of the HXOEM001 analysis

Symptoms

Users are experiencing delays when scrolling through a list of invoices from a vendor(HP). When the user clicks the scroll bar all the way down to search for an invoice the scrolling activity consistently takes 5-10 minutes to complete. The users will either sit and wait or continually click the scroll bar after every chunk of invoices is moved. The same symptoms appear when the user uses the arrow keys.

Pathology

Too many packets sent from the Oracle server and the user's network software, adapter card and TNS protocol must wait for all packets to be received before processing and updating the user's screen. Thus, resulting in the user waiting for the hourglass pointer to disappear.

Also, a delay from the SP2 Oracle server showing back to back packets with an average of 3 seconds of delay between the SP2 receiving an ACK from the workstation and sending the next frame. In several cases this accumulated ACK/PUSH delay of data adds up to over one minuet of poor performance. Many ORA-1403s were encountered from the transactions.

Etiology

The findings are consistent from Boise and SantaClara.

Many TNS executes after the SP2 sends RAW transfer data. The traces show that each invoice is returned in a separate packet with the occasional large packet from the SP2 containing all invoice numbers.

The scrolling function's typical data transfer sequence is as follows:

WS = Workstation
SP2 = Oracle Database server

WS	sends TNS packet UPI=3 Fetch Row=5
SP2	responds with a Raw transfer =6 end of row(some data in the packet)
WS	sends a UPI=3 EXECUTE (some data in the packet)
SP2	responds with a Raw transfer =6 end of row(some data in the packet
WS	sends TNS packet UPI=3 Fetch Row=5
SP2	Responds with an ORA-1403 message (no data found)

This sequence will continue for almost 2000 frames just to scroll down the screen the first time.
In these 2000 frames there may be anywhere from 9 to 15 frames with multiple invoice record information included.

Once at the bottom the scroll up function is quicker but experiences the TCP ACK/PUSH delay from the server thus making the scroll up slower than necessary.

In the TNS protocol trace it seems that the SP2 only sends one row at a time during the above sequence.

All session traces reveled a ping pong packet flow with acknowledgments sent after a packet or with pushed data.

This excessive transfer of information from the repeated sequence above causes the user to click the scroll bar many times thus resulting in the delay. One trace from Boise showed that the user had to press the scroll bar after the hourglass pointer 13 times with a delay in between the click and next packet sent to range from 2 to 36 seconds. The total time spent on clicking and waiting was 4.75 minutes.

General findings

The packet transfers and general throughput over the WAN is exceptional, interframe gaps are in the milliseconds range, not seconds. The more frames per second the better the throughput.

The SP2's instance network interface for these users is on a switched 10mbs Ethernet port. This port is used by other users/developers and based on the type of Ethernet adapter in the SP2, the possibilities of performance suffering exists.

The packet flow for all sessions shows a ping pong sequence. For every query or data packet sent to and from the SP2 there is an acknowledgment. There is no stream of packets sending data from the SP2.

The MTU sizes of the packets are small, there is the indication of fragmentation on the network but there have been several frames with a size greater than 700 bytes encountered. This means that the network is not fragmenting or reducing it's MTU sizes at any giving transport point. The SP2 is not efficiently sending large packets.

Scrolling back up the list does cause a data transfer. Why this happens is unknown for the invoice information should have been in the windows memory for easier access. It seems that every time after the initial LOV select for the scroll box, subsequent scrolls are a little faster but the scrolling still sends and receives data.

Recommendations

1. To immediately provide some relief to the users in Boise provide them a separate Frame-Relay circuit. This will reduce some of the network latency and provide better response time.

2. Move the instance these users connect to from an Ethernet node to an FDDI node.

3. Trace transaction I/O on the user's instance and user connections with Enterprise Manager and/or a third party product.

4. Tune Oracle's Ethernet/FDDI UNIX TCP/IP setting to optimize sliding window and packet sizes

5. Change application code/behavior to send multiple rows in a packet instead of just one and not to wait for all data to be received to scroll LOV.

6. Tune Network Routers for TCP transport and MTU attributes.

7. Escalate to ORACLE for TNS protocol review and optimization.