# Using the GoldenGate 12.2 Integrated Heartbeat Table for Performance Monitoring and Tuning

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In the past few months I have found the GoldenGate 12.2 heartbeat table to be extremely valuable for performance monitoring and tuning. Using the lag feature of GoldenGate only shows the latest lag available and is at a resolution of 1 second. This doesn't provide enough resolution or accuracy for performance monitoring. In addition, unless you are constantly running a lag report, it is difficult to get a history of what is going on.

Therefore, I have found that using the integrated heartbeat table provides a great way to monitor GoldenGate. The integrated heartbeat table not only allows you to see how long it takes for a synthetic transaction to propagate through the system, but it maintains a history as well. This history is available for query and provides valuable information.

Here is an example of a heartbeat history taken from a system that is replicating in different states.
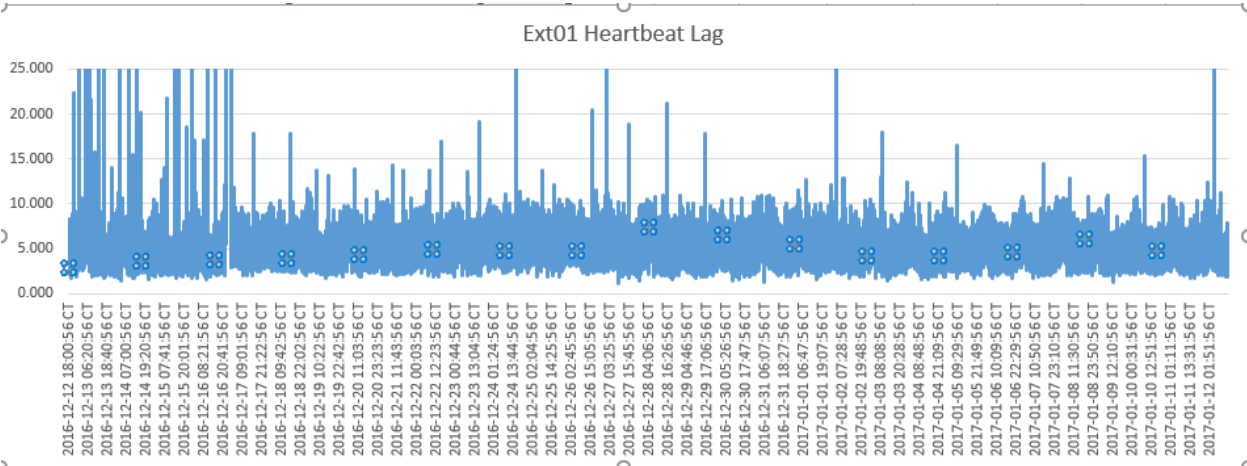
You can see how easy it is to tell the general performance of the system. In order to further break down the heartbeat you can use a query such as this, in order to see the extract, pump and replicat lags. Note that I output both the native date (UTC) and a conversion to Central Time.

```
Lag_details.sql
set pagesize 200 linesize 200

col Path format a30
col incoming_heartbeat_ts format a26
```

```
col Total format 999,999.999
col Extract format 999,999.999
col Pump format 999,999.999
col Pump_Rd format 999,999.999
col Pump_Wt format 999,999.999
col Replicat format 999,999.999

ALTER SESSION SET NLS_DATE_FORMAT='YYYY-MM-DD HH24:MI:SS';
ALTER SESSION SET NLS_TIMESTAMP_FORMAT='YYYY-MM-DD HH24:MI:SS.FF';
-- ALTER SESSION SET NLS_TIMESTAMP_FORMAT='YYYY-MM-DD HH24:MI:SS';
ALTER SESSION SET NLS_TIMESTAMP_TZ_FORMAT='YYYY-MM-DD HH24:MI:SS TZD';

SELECT incoming_extract || '->' || incoming_routing_path || '->' ||
incoming_replicat Path
, CAST(FROM_TZ(CAST(incoming_heartbeat_ts AS TIMESTAMP), 'UTC') AT TIME ZONE
'America/Chicago' AS Date) || ' CT' as incoming_heartbeat_ts
, incoming_heartbeat_ts as incoming_heartbeat_ts
,  extract (day from (heartbeat_received_ts - incoming_heartbeat_ts))*24*60*60+
extract (hour from (heartbeat_received_ts - incoming_heartbeat_ts))*60*60+
extract (minute from (heartbeat_received_ts - incoming_heartbeat_ts))*60+
extract (second from (heartbeat_received_ts - incoming_heartbeat_ts)) Total
,  extract (day from (incoming_extract_ts - incoming_heartbeat_ts))*24*60*60+
extract (hour from (incoming_extract_ts - incoming_heartbeat_ts))*60*60+
extract (minute from (incoming_extract_ts - incoming_heartbeat_ts))*60+
extract (second from (incoming_extract_ts - incoming_heartbeat_ts)) Extract
,  extract (day from (incoming_routing_ts - incoming_extract_ts))*24*60*60+
extract (hour from (incoming_replicat_ts - incoming_extract_ts))*60*60+
extract (minute from (incoming_replicat_ts - incoming_extract_ts))*60+
extract (second from (incoming_replicat_ts - incoming_extract_ts)) Pump
,  extract (day from (incoming_routing_ts - incoming_extract_ts))*24*60*60+
extract (hour from (incoming_routing_ts - incoming_extract_ts))*60*60+
extract (minute from (incoming_routing_ts - incoming_extract_ts))*60+
extract (second from (incoming_routing_ts - incoming_extract_ts)) Pump_Rd
,  extract (day from (incoming_replicat_ts - incoming_routing_ts))*24*60*60+
extract (hour from (incoming_replicat_ts - incoming_routing_ts))*60*60+
extract (minute from (incoming_replicat_ts - incoming_routing_ts))*60+
extract (second from (incoming_replicat_ts - incoming_routing_ts)) Pump_Wt
,  extract (day from (heartbeat_received_ts - incoming_replicat_ts))*24*60*60+
extract (hour from (heartbeat_received_ts - incoming_replicat_ts))*60*60+
extract (minute from (heartbeat_received_ts - incoming_replicat_ts))*60+
extract (second from (heartbeat_received_ts - incoming_replicat_ts)) Replicat
from ggadmin.gg_heartbeat_history order by Path, heartbeat_received_ts asc;
```

This provides detailed information about the extract lag, pump lag and replicat lag. Furthermore you can run analysis using your own SQL statements to get averages, min, max, etc..

The integrated heartbeat table is one of the best features of GoldenGate 12.2 and provides valuable information that can be used for performance analysis.