



**OTM Implementation Overview and Performance Improvement
Journey at Toyota Motor Sales**

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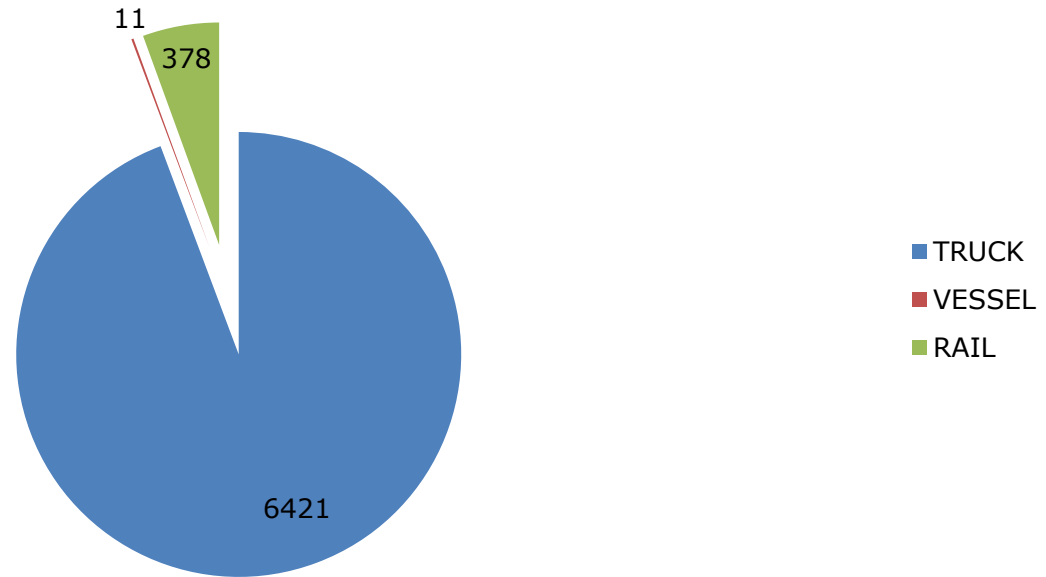
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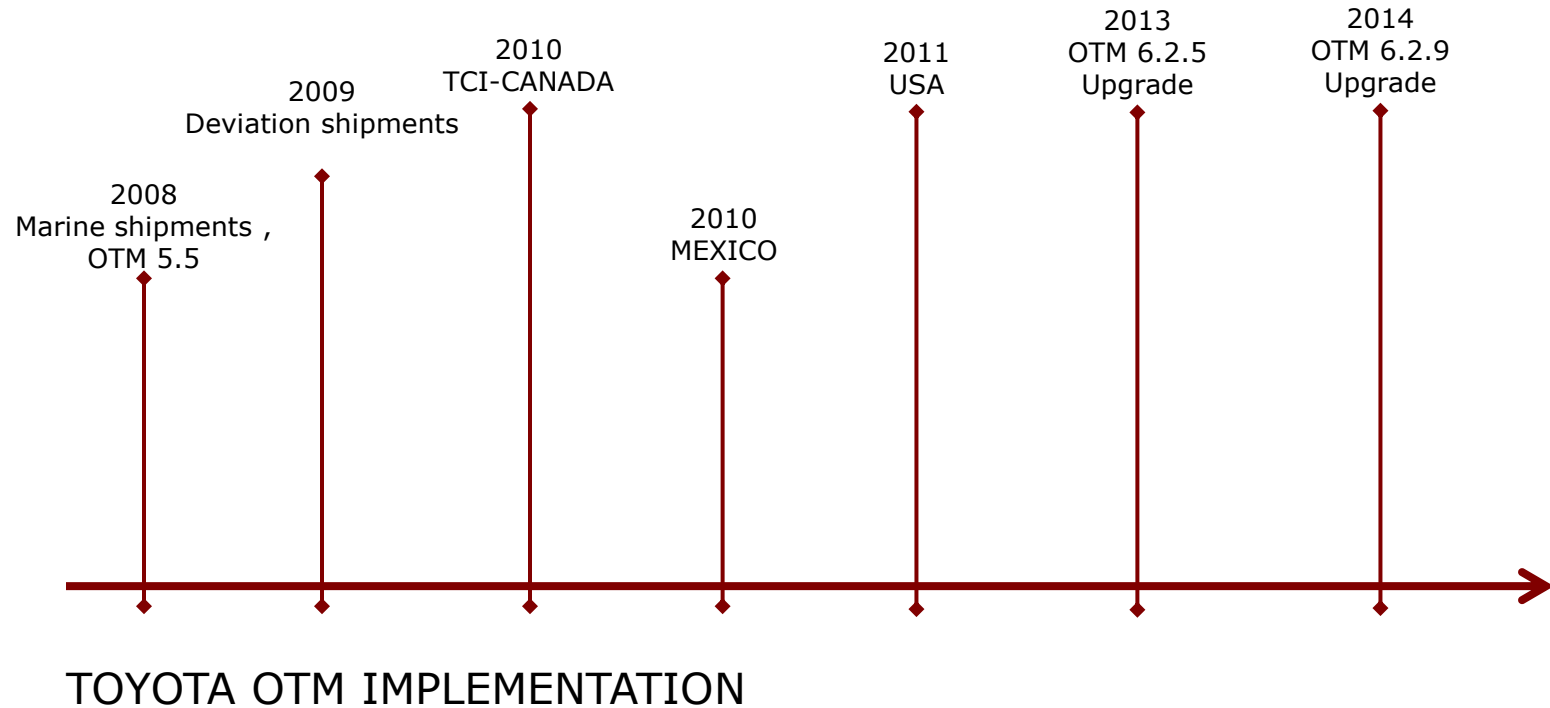


- OTM Overview in Toyota Motor Sales USA
- Complexity and Integration volume
- Creating a new Queue in Event Queue and it's Performance improvement Benefits.
- Existing Issues and Performance bottlenecks

- 2.5 mil Annual Order's and 10 mil shipments.
- 8 Plants, 5 Vessel Ports in North America.
- 8233 Delivery Points
- 376 Active Itineraries and 1089 Active Rates and 36 Contracted carriers.
- 3 Modes (Truck , Rail , Vessel)

**Average Daily Shipments Per day
6810 Shipments Per day.
3 Modes Truck, Vessel, Rail)**





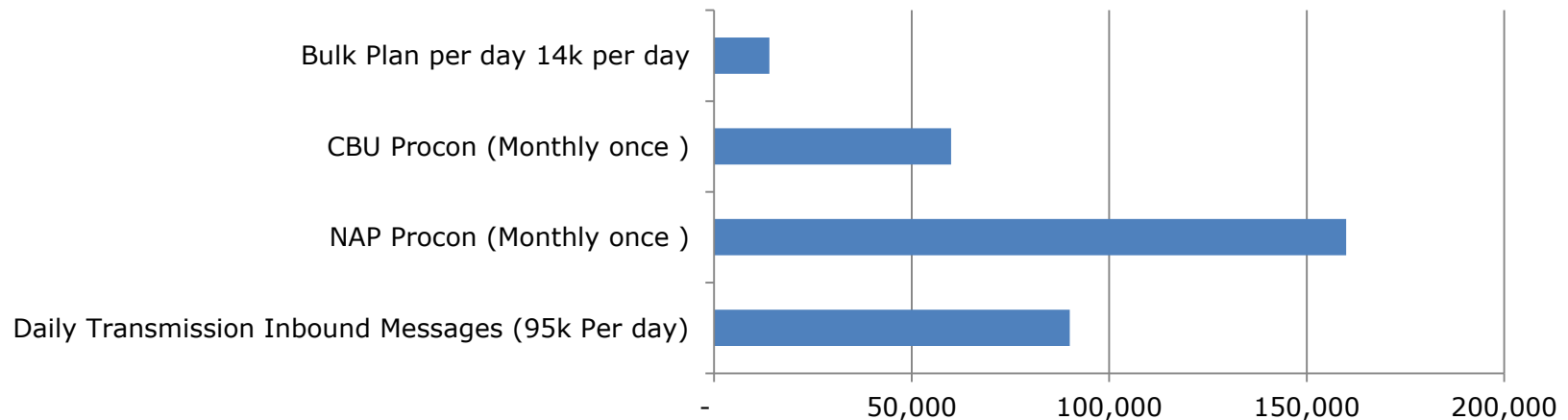
■ **Current Functionality in Use**

- Order Management
- Shipment Planning and Execution Event Management.
- Route Itinerary Management, Rate, Carrier Management
- Freight Pay (Shipment as Work , Invoices ,Vouchers)
 - » Tier based Rating for the Shipments.
 - » Payment for Car Inspections
 - » Payment for 3rd party Invoicing such as carwash, Border crossing.
- Shipment Event Management (Actual Event's) , Complete Track and Trace of the Shipment , Each order is typically planned with Truck and Rail leg shipments combination . Truck shipment is tracked with Truck Ship and Truck Arrival Events, Payments of Truck shipments are triggered during Truck Arrival Events. Rail Shipments are tracked with Rail Shipment and CLM events received for the Railcar. Payments of the Rail Car is triggered on the Rail Arrival events and CLM-Z events. CLM-P of second leg Rail car triggers the payment for first leg RAILCAR.

Inbound and Outbound Transmission Volume Per Day

1. Average Inbound Transmissions Per day – 95,000
2. NAP Procon Messages – 160,000 (NAP Procon is North America Production Units, these are the Order Forecast which is received once in a Month).
3. CBU Procon Messages – 60,000 (CBU Procon is Japan Production Units these are the units received by Vessel once in a Month).
4. Average 14,000 orders Bulk Planned per day.

Inbound Transmission Messages



Problem statement

We found that agentIntegration queue is overloaded in Peak hours and the backlog use to increase continuously which is around 2000 to 3000 in peak hours.

When users tried to plan one or 2 orders manually it takes lot of time to complete.

When users send a ASN or shipment plan outbound it take more then 10-15 min to be sent out of OTM.

Average Transmission Processing time is 11 min during Peak hours.(i_transmission:update_date – i_transmission:insert_date difference can be treated as a average time calculated to deterring the average processing time of transmission with complete agent processing time)

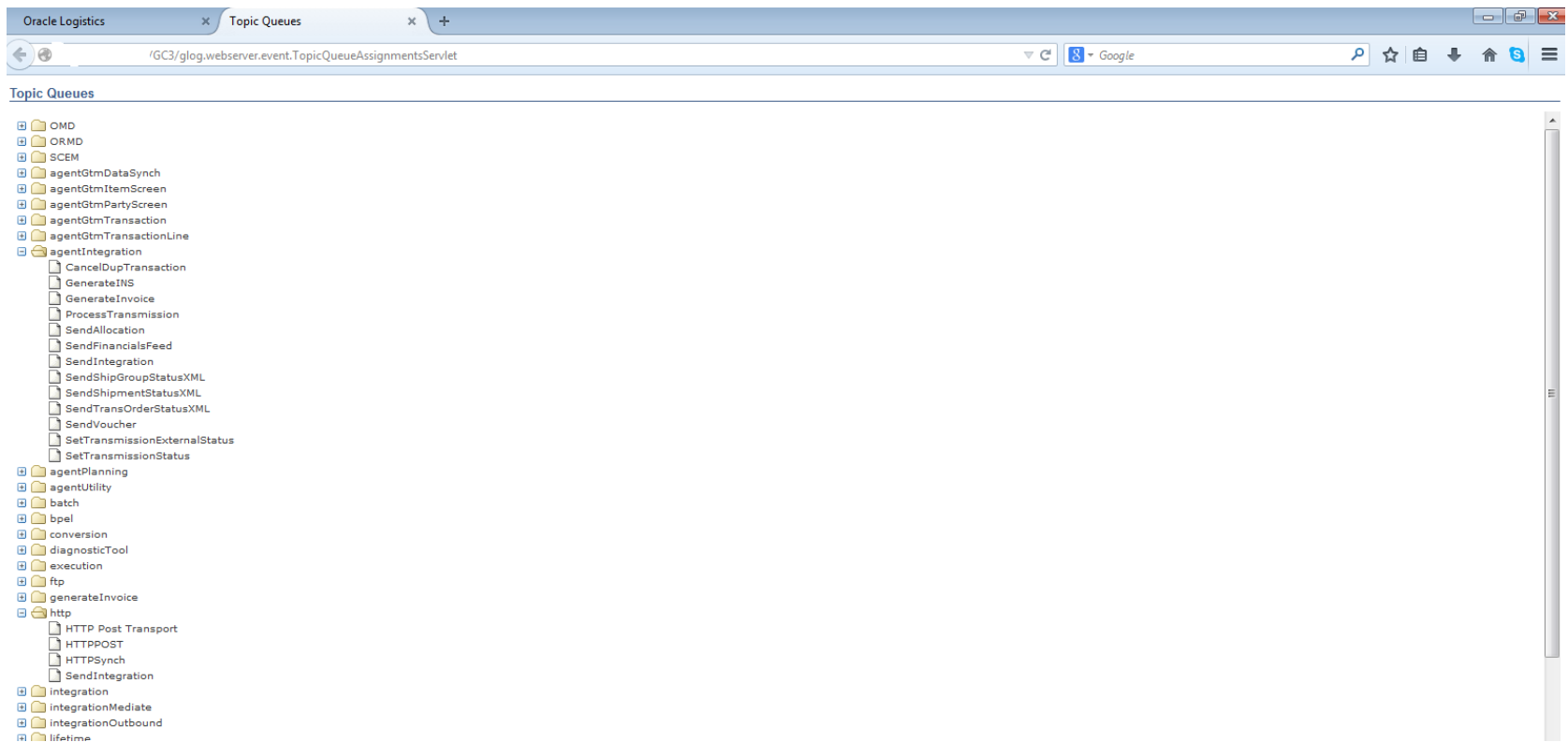
Next few slides will talk about how to create a new queue in OTM and dedicate a process to that particular queue and its Advantages of creating a new Queue.

- After Analysis we found that agentIntegration queue handles 2 important actions which Toyota uses in the daily operation (i.e.) Generate Invoice , Send Integration .
- You can use “glog.webserver.event.TopicQueueAssignmentsServlet” queue to find mapped functions and the queues.
- 60% of the shipments in Toyota including (Rail, Vessel and 30% of truck shipments) uses Auto Generation Invoice for the payment.
- So during the peak hours when there were huge amount of shipments event’s received which involves sending Integration plus Invoice were generated and everything goes through the same agentIntegration queue, Also we noticed that generate Invoice is a little slow process which took around 5 seconds to complete one generate Invoice action.
- Since the agentIntegration Queue had only one thread and we found that it was heavy overloaded.

Creating a New Event Queue and its Performance Improvement Benefits



- Use "glog.webserver.event.TopicQueueAssignmentsServlet" queue to see mapped functions and the queues.



- Use “glog.webserver.event.EventDiagServlet” queue to view the different queues within this servlet. You have the ability to monitor system processing in variety of queues that are used to handle many of the different activities within the system.
- You can read the Average/Max processing time of each queue using eventDiagServlet .
- You can read Average Wait time/Max Wait time of each queue using eventDiagServlet.
- Throughput of each queue can be monitored using EventDiagServlet

Creating a New Event Queue and its Performance Improvement Benefits



- Snapshot of Event Queues

Oracle Logistics

/GCI/glog/webserver/event/EventDiagServlet

Queue: Process: Memory: Data: Oracle:

Max Events per Queue: 300

Active:

Since 2014-07-21 09:35:51

Queue	Backlog	Queue Size	Wait Time	Process Time	Throughput	Data	Oracle
OMD	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
ORMD	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
SCEM	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentGtmDataSynch	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentGtmItemScreen	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentGtmPartyScreen	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentGtmTransaction	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentGtmTransactionLine	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentIntegration	0	22.82 / 353.0	0.5 / 12.66	0.06 / 12.8	223035	△	△
agentPlanning	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
agentUtility	0	186.00 / 1185.0	3.37 / 80.43	0.1 / 44.54	795674	△	△
batch	0	2.23 / 6.0	466.38 / 9272.07	3496.42 / 14145.67	111	△	△
bpel	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
conversion	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
diagnosticTool	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
execution	0	1.48 / 54.0	0.01 / 10.3	0.27 / 26.32	110735	△	△
ftp	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
generateInvoice	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
http	1	1670.21 / 7717.0	255.38 / 2431.29	0.69 / 132.42	284053	△	△
integration	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
integrationMediate	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
integrationOutbound	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
lifetime	0	20.9 / 479.0	0.28 / 38.59	0.15 / 57.28	499876	△	△
lifetimePre	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△
mltestname	0	NaN / 0.0	NaN / 0.0	NaN / 0.0		0	△

Refresh Reset Show Events Show Threads Show Listeners Mediator Object Locks Open Processes Threads

▪ **Solution**

- The majority of the Events in this agentIntegration queue are Send Integration Events. Also From the Event Diagnostics data, it can be seen that the longest Event is Generate Invoice and it's a slow process.
- Generate Invoice is taking significantly longer to process and blocking the Send Integration Events. This can be resolved by dedicating a queue to the Generate Invoice Event.
- How about creating a separate queue for generate Invoice process alone and keep the agentIntegration queue do rest of the function's.
- New queue "generate Invoice" is created and 2 threads are added to this queue.
- Increase the agentIntegration queue thread count from 1 to 4.

- How to create a new queue and dedicated a particular function to that queue.

Add these below entries in `glog.properties` file under "# Custom Thread Properties - Beginning"

```
glog.workflow.topicGroup=generateInvoice,2
glog.workflow.topic.group.glog.server.agent.business.shipment.GenerateInvoice=generateInvoice
```

Add the below entries to increase the number of threads in agentIntegration queue

```
!remove glog.workflow.topicGroup= agentIntegration,1
glog.workflow.topicGroup= agentIntegration,4
```

Creating a New Event Queue and its Performance Improvement Benefits



- Snapshot of new Queue generateInvoice

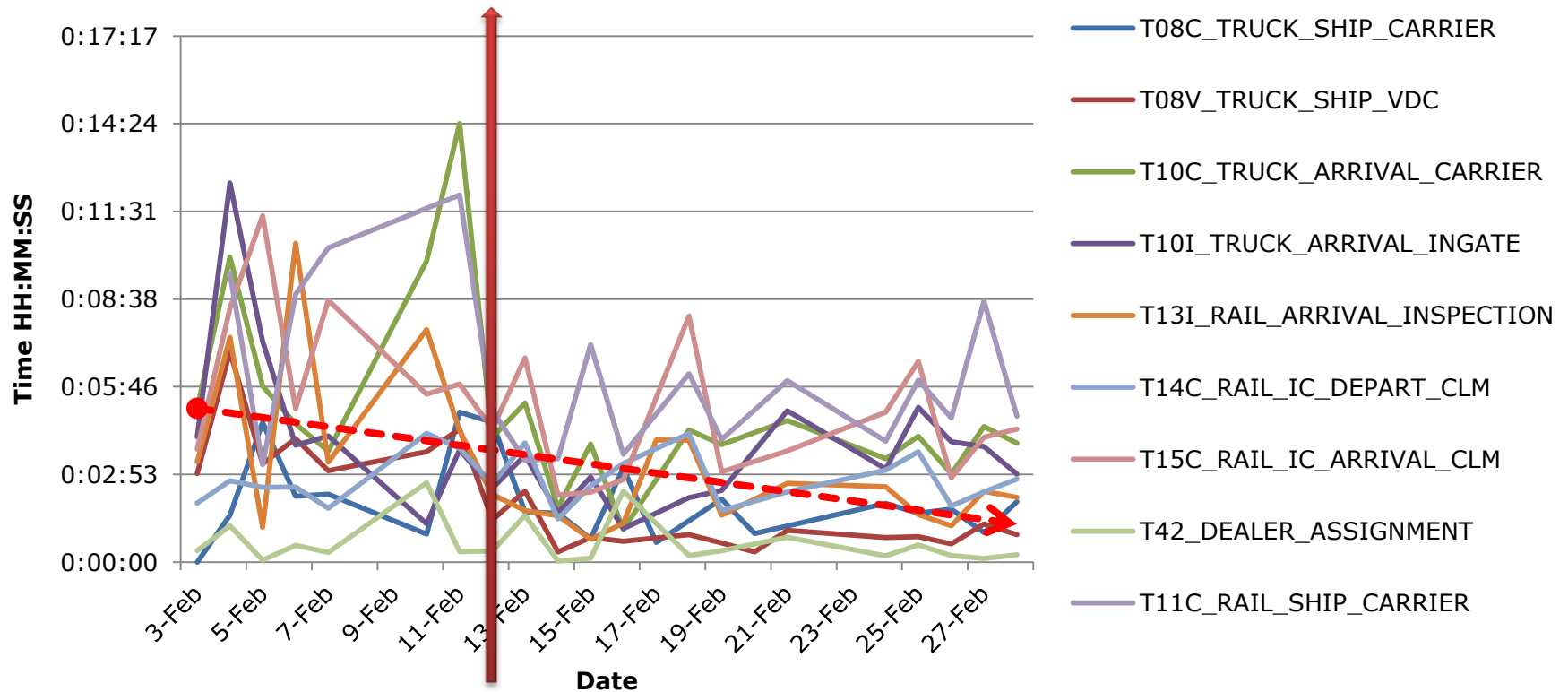
agentGtmPartyScreen	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
agentGtmTransaction	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
agentGtmTransactionLine	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
agentIntegration	0 1.0 / 17.0	0.0 / 1.29	0.02 / 5.08	255986		
DEFAULT	0 1.0 / 17.0	0.0 / 1.29	0.02 / 5.08	255986	Δ	Δ
agentMessaging	0 1.08 / 75.0	0.01 / 17.95	1.06 / 145.62	257041		
DEFAULT	0 1.08 / 75.0	0.01 / 17.95	1.06 / 145.62	257041	Δ	Δ
agentUtility	1 159.4 / 2623.0	1.43 / 1535.77	0.04 / 317.64	8881179		
DEFAULT	1 159.4 / 2623.0	1.43 / 1535.77	0.04 / 317.64	8881179	Δ	Δ
batch	0 1.4 / 3.0	0.0 / 0.0	100.43 / 561.9	20		
DEFAULT	0 1.4 / 3.0	0.0 / 0.0	100.43 / 561.9	20	Δ	Δ
bpel	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
conversion	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
diagnosticTool	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
execution	0 1.07 / 60.0	0.0 / 10.6	0.5 / 301.01	179649		
DEFAULT	0 1.07 / 60.0	0.0 / 10.6	0.5 / 301.01	179649	Δ	Δ
ftp	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0		
DEFAULT	0 NaN / 0.0	NaN / 0.0	NaN / 0.0	0	Δ	Δ
generateInvoice	0 23.83 / 451.0	15.25 / 1150.34	1.28 / 20.4	67133		
DEFAULT	0 23.83 / 451.0	15.25 / 1150.34	1.28 / 20.4	67133	Δ	Δ
http	0 15.83 / 621.0	0.81 / 91.02	0.23 / 39.17	558935		
DEFAULT	0 15.83 / 621.0	0.81 / 91.02	0.23 / 39.17	558935	Δ	Δ
integration	0 1.0 / 1.0	0.0 / 0.0	0.37 / 0.51	4		
DEFAULT	0 1.0 / 1.0	0.0 / 0.0	0.37 / 0.51	4	Δ	Δ

Creating a New Event Queue and its Performance Improvement Benefits



- New Queue change was implemented on 12-Feb.
- Below metric portrays the processing time difference for the entire February month.
- Average processing time diff went down from 11min to 2 min.

Message Avg Processing Time Analysis



Benefits

1. High Throughput in agentIntegration queue.
2. Improved the overall processing and throughput of the transmission processing.
3. No backlog , processing time improved by 40% in the peak hours.
4. User never experienced slowness since the slow process was separated and dedicated to a separate queue.
5. Before creating a new Queue , Think of factors like what are all the problems you have in transmission processing, will creating a new queue help you in improving the processing or not ? Create a queue if it helps your system rightfully.

Other Major Performance Issue

1. Purge Performance:

- 1. Backlog: 5M orders**
- 2. Current purge speed: 75K orders per week.**
- 3. Current inbound: 250K orders per month.**
- 4. Current DB Environment: Linux box**
- 5. Future DB Environment: ExaData box**

Questions



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Thank You

