

SAP NetWeaver Gateway Throughput & Scalability

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Agenda

- ❑ Gateway Throughput
- ❑ Gateway Data Scalability
- ❑ Gateway Scaling Out
- ❑ Gateway High Availability

Gateway Throughput

- ❑ Gateway is stateless (no session is stored on the Gateway server).

Therefore the throughput parameter (number of calls per time period) has more value than number of users.

In Gateway, when 100 users execute 10 calls per hour, each consume the same Gateway resources as 10 users that execute 100 calls per hour each.

- ❑ To achieve better throughput, we recommend that you implement **SAP Note 1801618**.

Gateway Throughput

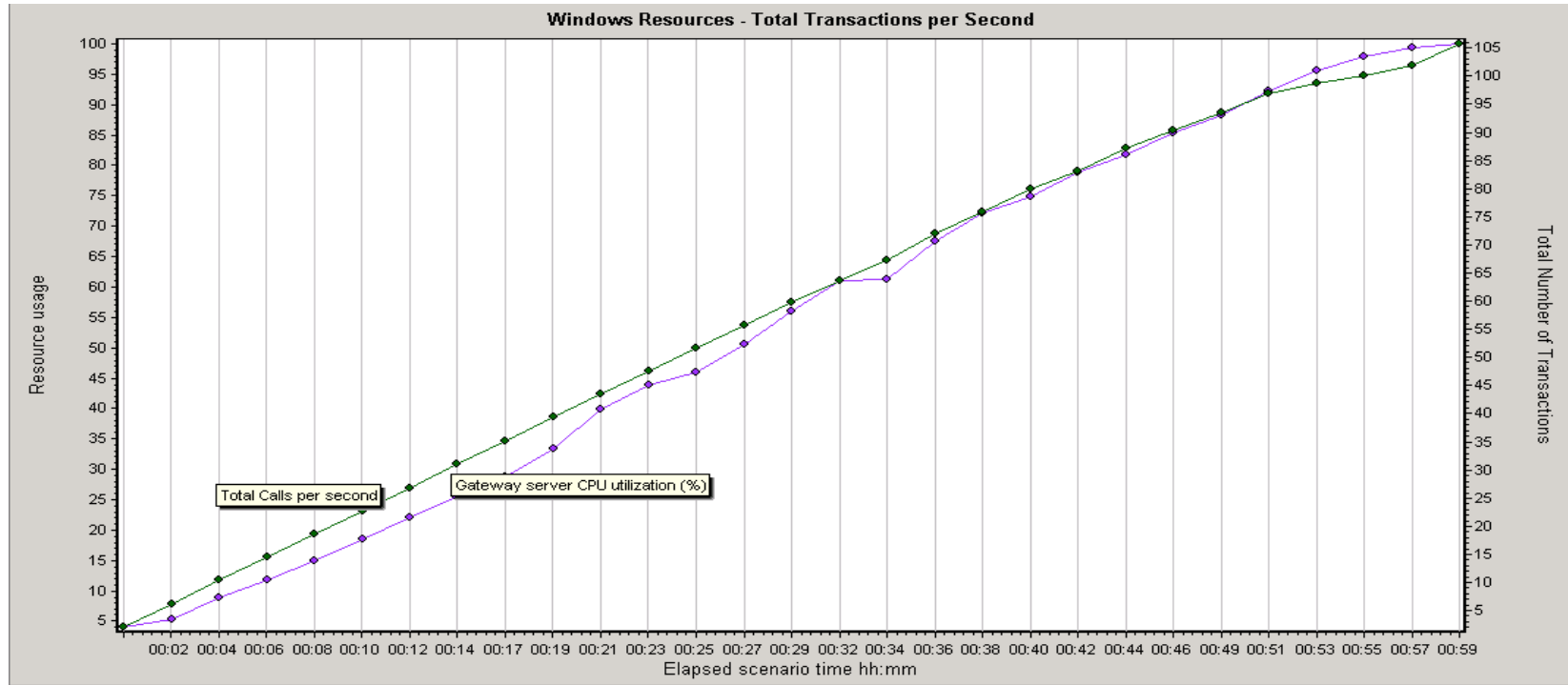
❑ **Test configuration** (executed with load runner tool):

- ❑ 600 users with 5 seconds think-time between operations.
- ❑ Ramp up 5 users every 30 seconds (1 hour ramp up).
- ❑ Every user executes the following calls sequentially:
 - ❑ Read 50 bookings in XML format, Read 100 bookings in XML format
 - ❑ Read 200 bookings in XML format, Read 50 bookings in JSON format
 - ❑ Read 100 bookings in JSON format, Read 200 bookings in JSON format
- ❑ Gateway server hardware configuration is 8 cores with 1,700 SAPS each, and 32 GB RAM.

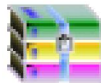
❑ **Test results:**

- ❑ Total number of calls per second (throughput) is scalable when CPU utilization of the Gateway server increases.
- ❑ CPU of the Gateway server reaches 100%, and that of the backend system reaches 25% when you complete to ramp-up the users.
- ❑ Response time is stable during the test execution.
- ❑ ~203,000 calls passed. No error calls.
- ❑ 105 calls per second were executed once CPU of the Gateway server reached 100%.

Gateway Throughput (Graph)



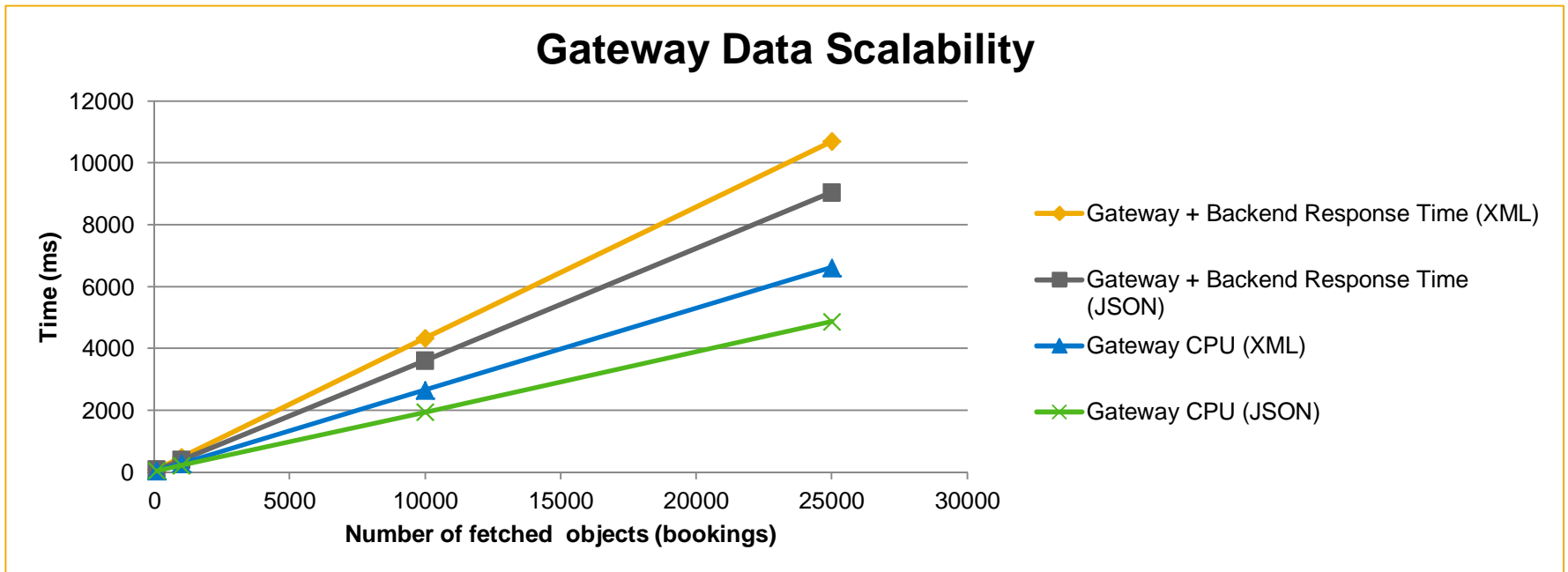
In the attached file, you can find the load runner HTML report for all the graphs.



Gateway_Throughput_LR_HTML_Report.zip

Gateway Data Scalability

- Gateway processing time is scalable when the number of objects fetched from the backend increases
- JSON format behaves slightly better than XML.



(*) Backend Response Time includes RFC call time.

Agenda

- Gateway Throughput

- Gateway Data Scalability

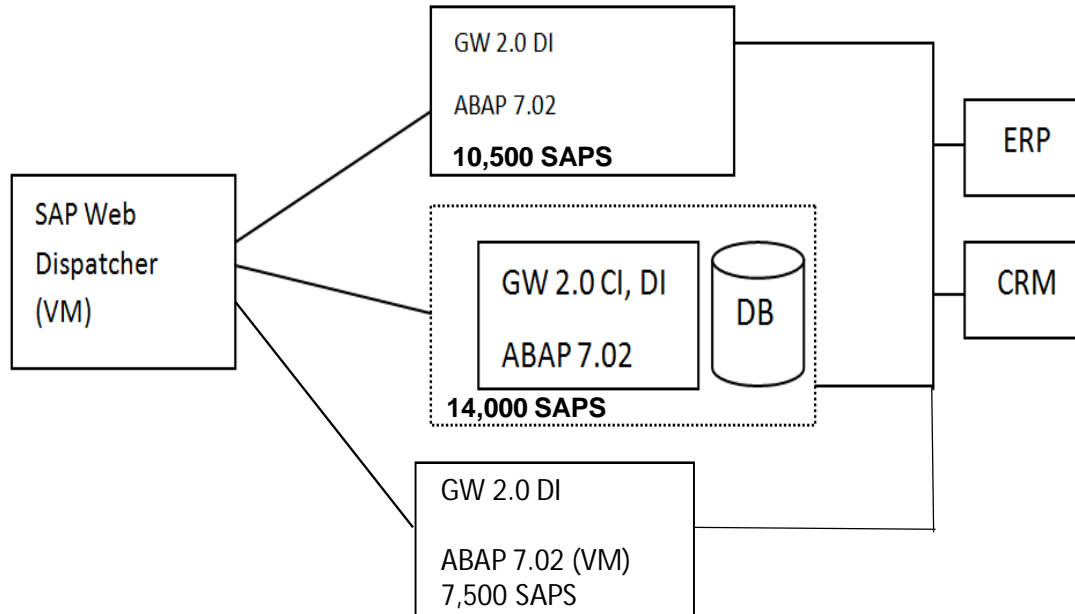
- **Gateway Scaling Out**

- Gateway Scaling Out Landscape
- Scaling Out Test Configuration
- Scaling Out Test Results

- Gateway High Availability

Gateway Scaling Out Landscape

- ❑ The landscape contains SAP Web Dispatcher, 3 SAP NetWeaver Gateway dialog instances, and 2 SAP Business Suite systems (ERP and CRM).
- ❑ First Gateway dialog instance has 14,000 SAPS, the second has 10,500 SAPS, and the third has 7,500 SAPS.
- ❑ SAP Web Dispatcher is used as a load balancer.
- ❑ SAP Web Dispatcher and one Gateway Dialog Instance are on VMware machines.



Scaling Out Test Configuration - I

Test configuration:

- ❑ Systems: SAP Web Dispatcher, 3 Gateway Dialog Instances (DIs), ERP and CRM.
- ❑ Test procedure:
 - Phase 1. Run 220 users. Only one Gateway DI with 14,000 SAPS works.
 - Two Gateway DIs manually stopped.
 - SAP Web Dispatcher sends requests to one Gateway DI only.
 - Phase 2. After 1 hour, start manually the second Gateway DI with 10,500 SAPS.
 - One Gateway DI still stopped.
 - SAP Web Dispatcher sends requests to two Gateway DIs
 - Phase 3. After 1.5 hours, run 150 additional users. The total number of users is 370.
 - One Gateway DI is still stopped.
 - Phase 4. After 1 hour, manually start the third Gateway DI with 7,500 SAPS.
 - SAP Web Dispatcher sends requests to all three Gateway DIs.
 - Phase 5. After 1 hour, run 100 additional users. The total number of users is 470.

Scaling Out Test Configuration - II

- ❑ Think-time between operations equals to 1 second.
- ❑ Every user triggers one call to query 25 flight objects from the CRM or the ERP system (randomly, 50:50) through SAP NetWeaver Gateway. The user then waits for 1 second and triggers the same call again.
- ❑ Test time period: 5.5 hours (for 5 phases).

Scaling Out Test Results – I

Test results:

- ❑ Throughput (number of calls per second) is scalable when the CPU utilization and the SAPS of Gateway Dialog Instances are increased.

The following table shows scaling out results of 5 phases:

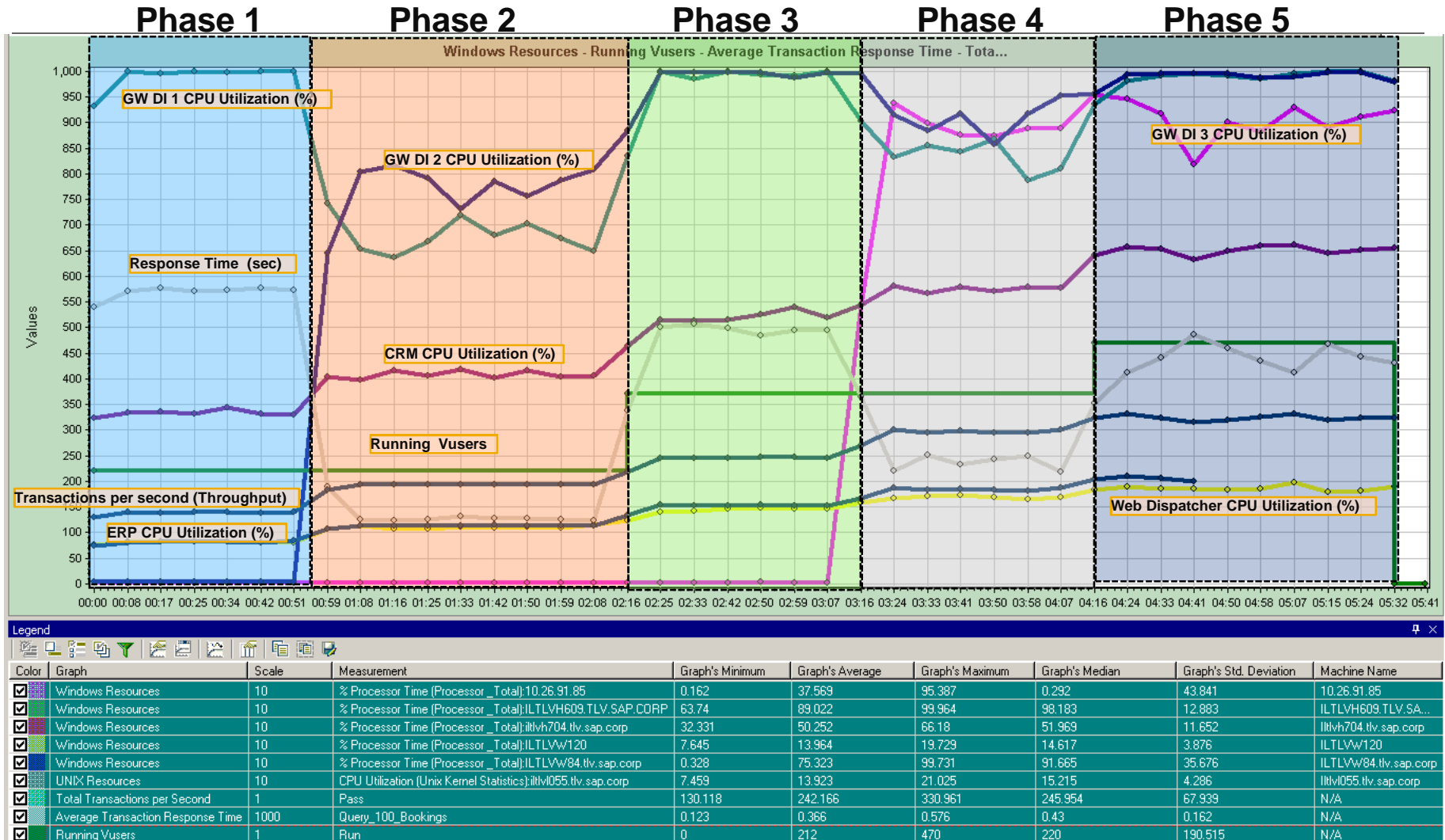
Phase #	Users #	GW DIs #	GW DIs SAPS	CPU Utilization (%)	Throughput (calls per second)	Throughput/SAPS	Response Time (Sec)
1	220	1	14K	100%	140	0.01	0.57
2	220	2	14K+10.5K=24.5K	75% each	195	0.008	0.13
3	370	2	14K+10.5K=24.5K	100%	245	0.01	0.5
4	370	3	14K+10.5K+7.5K= 32K	85% each	295	0.009	0.23
5	470	3	14K+10.5K+7.5K= 32K	100%	320	0.01	0.46

Scaling Out Test Results - II

- ❑ ~5,000,000 transactions executed in 5.5 hours without errors.
- ❑ Response time was stable during every phase. It was higher than single user response time due to CPU utilization bottleneck and this was expected.
- ❑ ERP, CRM and SAP Web Dispatcher systems behaved stable and linearly.
- ❑ With 3 SAP NetWeaver Gateway Dialog Instances, the systems produced 320 transactions per second → 1,150,000 transactions per hour!

Scaling Out: Load Runner Results – Graph I

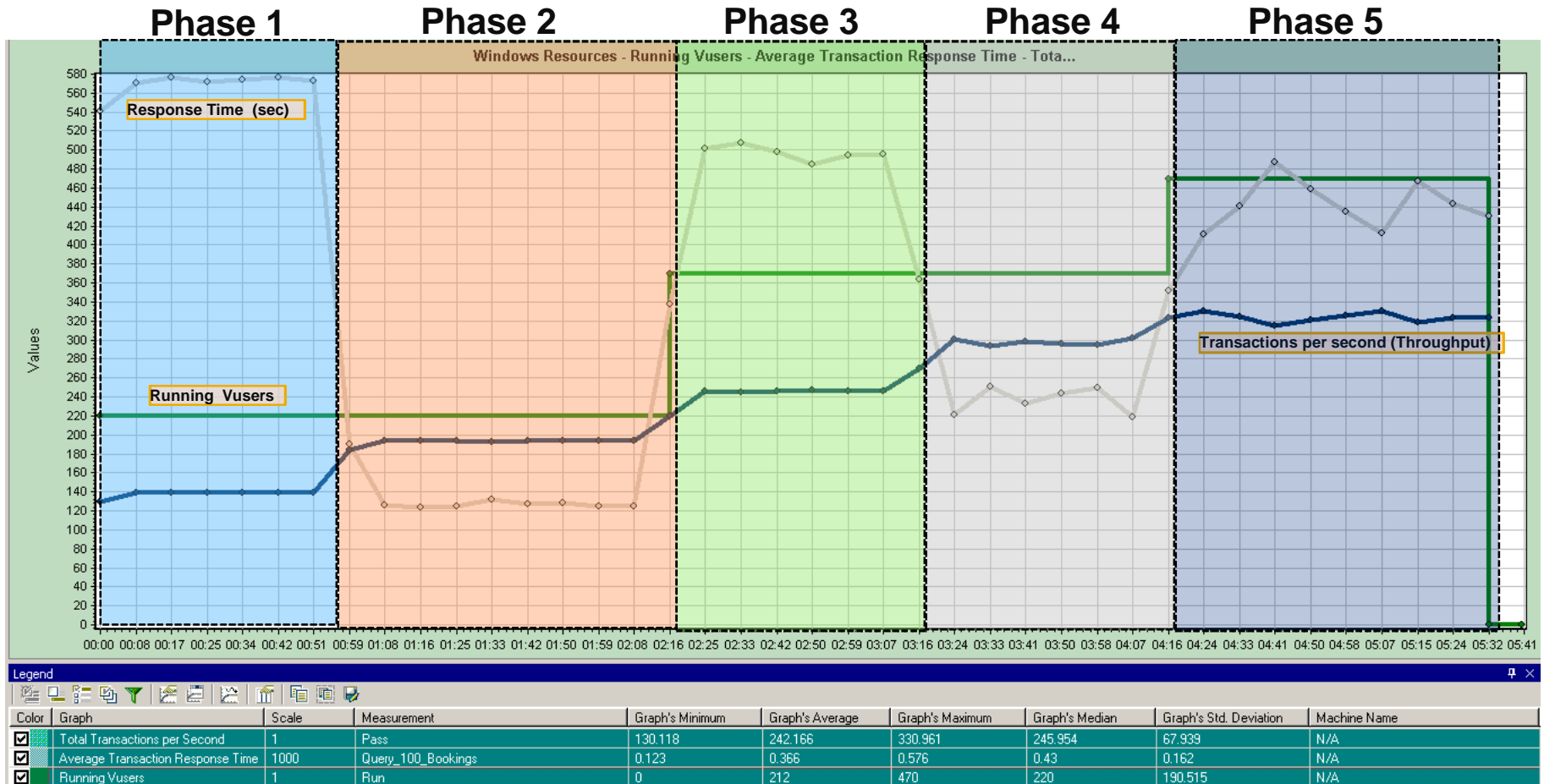
Note: The values in the table below are in a number of scales.



Merged graphs of CPU Utilization of 3 Gateway DIs, CRM, ERP, Web Dispatcher with Throughput, Response Time, and Number of Users, in 5 Phases.

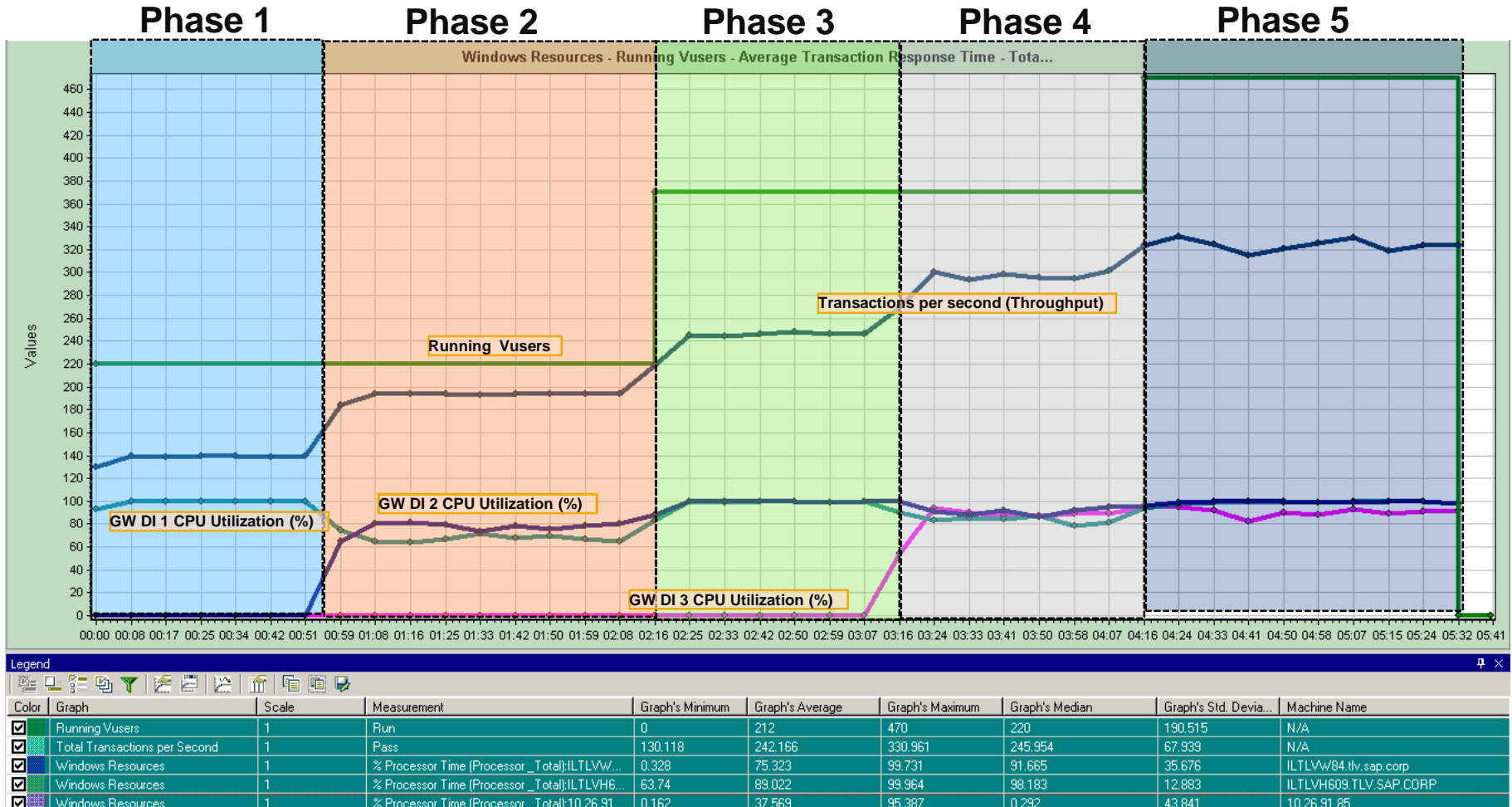
Scaling Out Load Runner Results – Graph II

Note: The values in the table below are in a number of scales.



Merged graphs of Throughput, Response Time, and Number of Users in 5 Phases.

Scaling Out Load Runner Results – Graph III

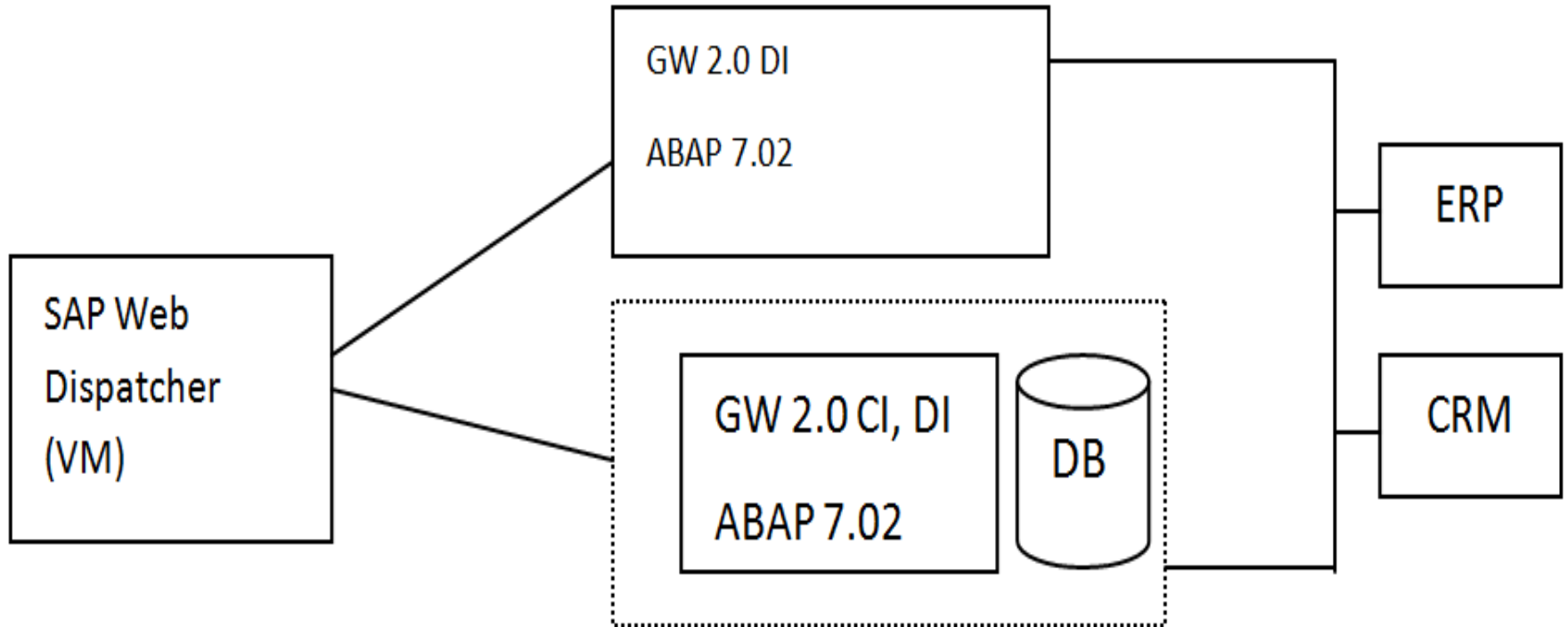


Merged graphs of CPU Utilization of 3 Gateway DIs, Throughput, and Number of Users.

Agenda

- ❑ Gateway Throughput
- ❑ Gateway Data Scalability
- ❑ Gateway Scaling Out
- ❑ **Gateway High Availability**
 - Failover test
 - Services distribution by Logon Group test

Gateway High Availability Landscape



Failover Test Configuration

- ❑ One of the Dialog instances was switched off manually after ~6 hours of the load test.

Test configuration:

- ❑ Systems: SAP Web Dispatcher, 2 Gateway Dis, and CRM system
- ❑ 1,000 users with 10 seconds think-time between operations.
- ❑ Every user triggers one call query 25 flight objects from the CRM system waits for 5 to 15 seconds and triggers the same call again.
- ❑ Test time period: 16 hours

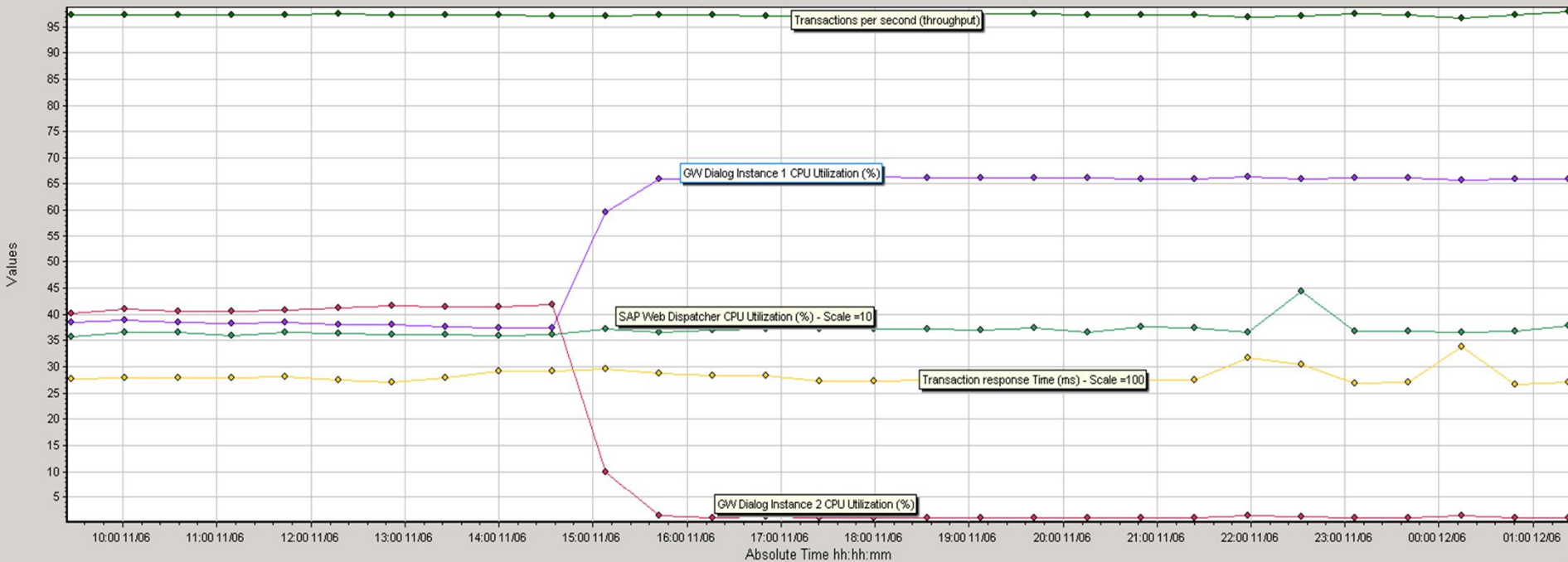
Failover Test Results

Test results:

- ❑ The response time and throughput of Gateway did not change when the second DI was stopped.
When the second Gateway DI was stopped, the SAP Web Dispatcher sent all the calls to the first Gateway DI, which continued to be stable with higher utilization.
- ❑ 5,600,000 transactions were executed without errors.
- ❑ The systems were stable during 16 hours. The response time, throughput (~100 transactions per second!) and systems behavior were very stable.

Failover Test Load Runner Results (Graph)

Windows Resources - Average Transaction Response Time - Total Transactions pe...



Legend

Color	Graph	Scale	Measurement	Graph's Mini...	Graph's Ave...	Graph's Max...	Graph's Me...	Graph's Std...	Machine Name	Monitor Type
<input checked="" type="checkbox"/>	Windows Resources	1	% Processor Time (Processor_Total):itlvh609	37.32	56.183	66.364	65.871	13.16	itlvh609	Windows Resources
<input checked="" type="checkbox"/>	Windows Resources	10	% Processor Time (Processor_Total):itlvw120.tlv.sap.corp	3.578	3.701	4.44	3.669	0.149	itlvw120.tlv.sap.corp	Windows Resources
<input checked="" type="checkbox"/>	Windows Resources	1	% Processor Time (Processor_Total):itlvw84.tlv.sap.corp	1.081	15.259	41.846	1.205	18.798	itlvw84.tlv.sap.corp	Windows Resources
<input checked="" type="checkbox"/>	Average Transaction Response Time	100	GENIL_CRM_Query_100	0.267	0.282	0.339	0.277	0.015	N/A	N/A
<input checked="" type="checkbox"/>	Total Transactions per Second	1	Pass	96.566	97.205	97.855	97.199	0.21	N/A	N/A

Services Distribution By Logon Group Test Configuration

- ❑ 2 logon groups.
Flight service belongs to logon Group 1, and the service logic calls to CRM.
Material service belongs to logon Group 2 and calls to ERP.

Test configuration:

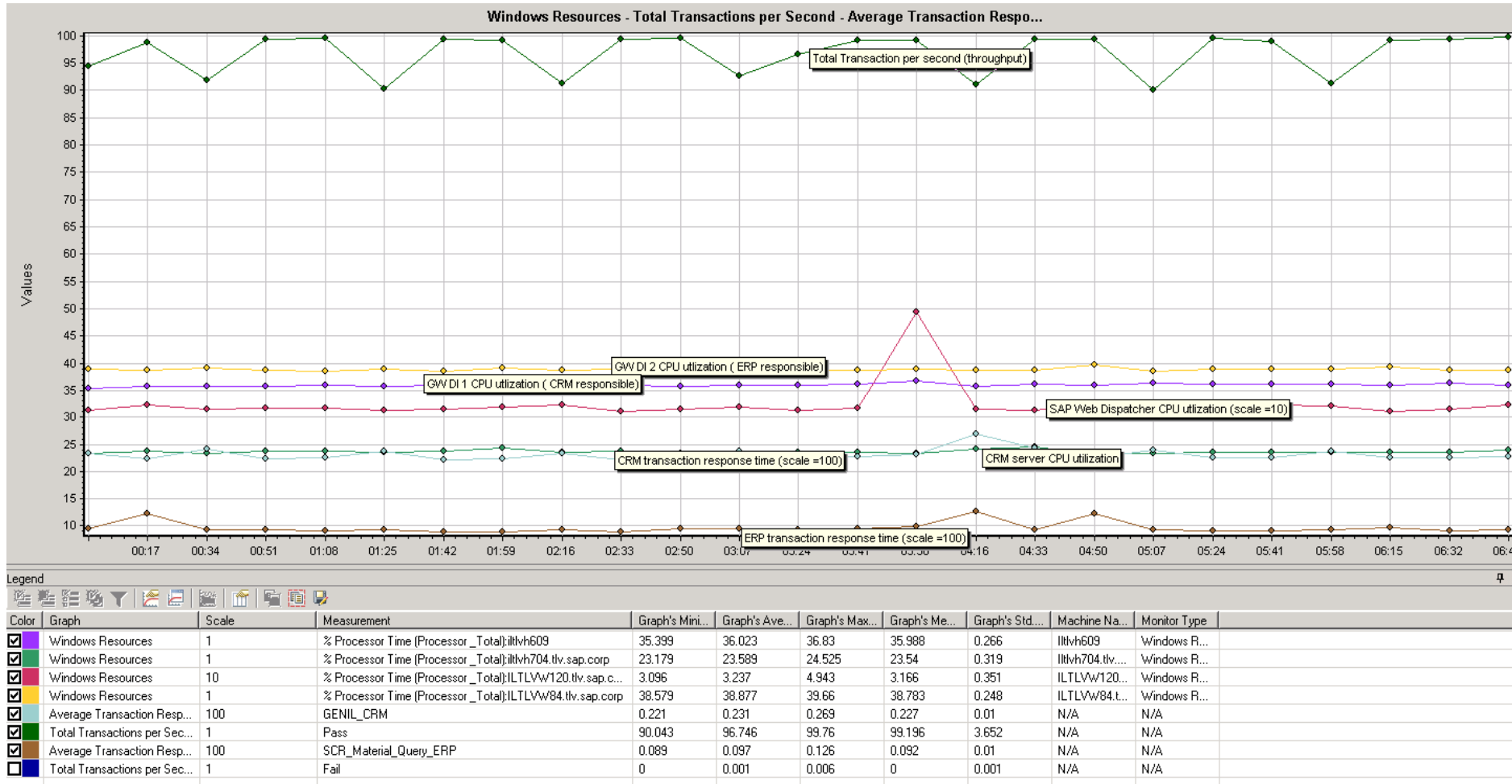
- ❑ Systems: SAP Web Dispatcher, 2 Gateway DIs, ERP and CRM system.
- ❑ 1,000 users with 10 seconds think-time between operations.
- ❑ Every user triggers randomly (50:50), one query call for flight objects from the CRM system, or Material query from ERP system.
Each user then waits for 5 to 15 seconds, and triggers the call randomly again.
- ❑ Test time period: 7 hours

Services Distribution By Logon Group Test Results

Test results:

- ❑ SAP Web Dispatcher distributed the work load to relevant GW DI according to configurations.
- ❑ ~2,400,000 transactions passed and 19 failed.
- ❑ The systems were stable during 16 hours. The response time, throughput (~100 transactions per second!) and systems behavior were very stable.

Services Distribution Test Load Runner Results (Graph)



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