The First "Value of Co-Location" Study

Back in 2009 we published the first "Value of Co-Location" study. That study was based on a business process management (BPM) workload on WebSphere Process Server for z/OS (WPS). The purpose of the study was to measure the relative benefits of a "real world" workload using the cross-memory JDBC Type 2 driver as compared to the TCP-based JDBC Type 4 driver.

The topology of and components of the original study[1] can be summed up with this picture:
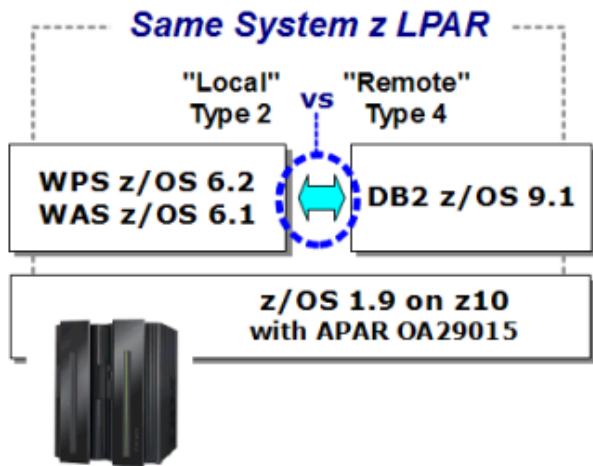
The results of the study can be summed up with this picture:
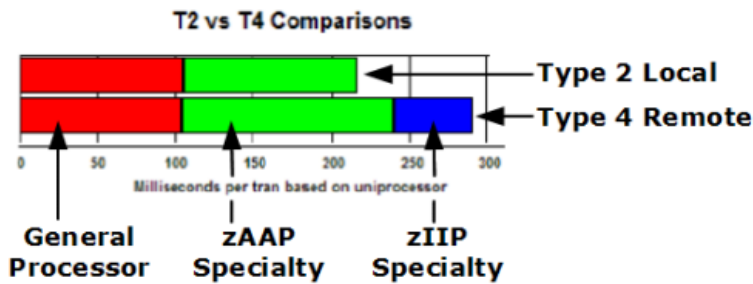
Less is better (CPU milliseconds / transaction)

This indicated the JDBC Type 2 driver required *less* overall CPU usage with approximately *the same* GP usage for the transactions run as part of the controlled test.

Overview of this Update Study

Since the time of the initial co-location study much of the technology components have been updated. The decision was made to re-run the *same study* but with *newer components:*

|	Original Test		This Update Test
Machine/Model	z10 2097-704	↑	zEnterprise z196 2817-702
Operating System	z/OS 1.9	↑	z/OS 1.11
WAS z/OS WPS z/OS	Version 6.1 31-bit Version 6.2	↑	WAS 7.0.0.11 64-bit WPS 7.0.0.2
DB2 for z/OS	Version 9.1	↑	Version 10

The JDBC drivers have been updated between DB2 V9.1 and V10. In addition to comparing JDBC Type 2 and Type 4, the update study also compared the relative benefits of these new drives. The results comparison matrix is therefore:

	JDBC Type 2	JDBC Type 4	
DB2 V9.1	**A**	**C**	In the charts that follow the results will be labeled with these letters
DB2 V10	**B**	**D**	

Results[2]

The CPU-usage results of this study are represented by the following picture:
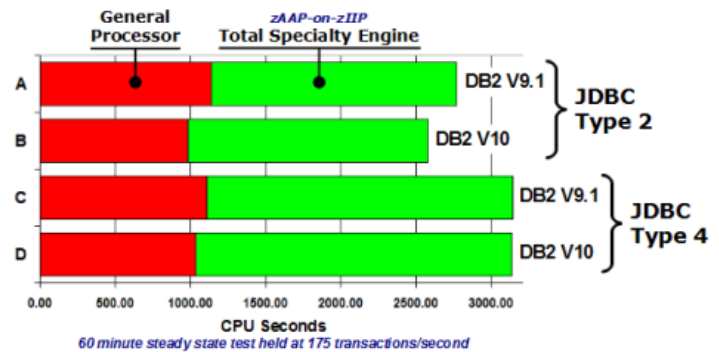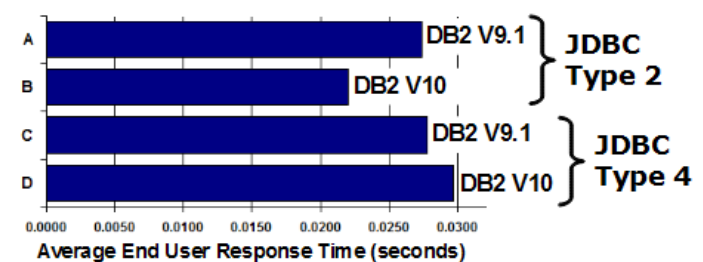

Less is better (CPU seconds for the 60 minute test duration)

The numbers underlying that chart are:

Driver	DB2 Ver.	Result	General Processor	zAAP-on-zIIP Specialty Engines
JDBC Type 2	DB2 V9.1	A	1139.76	1637.64
	DB2 V10	B	979.92	1605.60
JDBC Type 4	DB2 V9.1	C	1111.68	2038.68
	DB2 V10	D	1031.76	2110.68

The end-user response time results in chart form:

Less is better (average end user response time in seconds)

The numbers underlying the end-user response time chart:

Driver	DB2 Ver.	Result	Average End User Response Time
JDBC Type 2	DB2 V9.1	A	0.0274
	DB2 V10	B	0.0220
JDBC Type 4	DB2 V9.1	C	0.0278
	DB2 V10	D	0.0297

Comparison Analysis of Results

There are three sets of results to compare and analyze:

- JDBC Type 2 vs. Type 4
- DB2 V10 vs. DB2 V9.1
- Overall: combined benefits of Type 2 and DB2 V10

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1   Still available at `ibm.com/support/techdocs` under the WP101476 Techdoc number.

2   Results may vary; results are *not* a guarantee of performance.
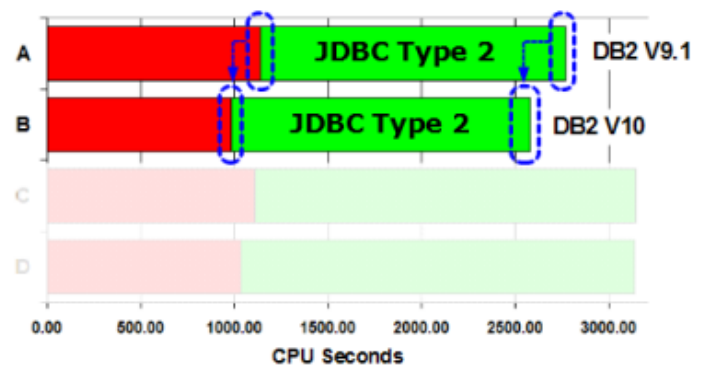
DB2 *V9.1*, JDBC T2 vs. T4
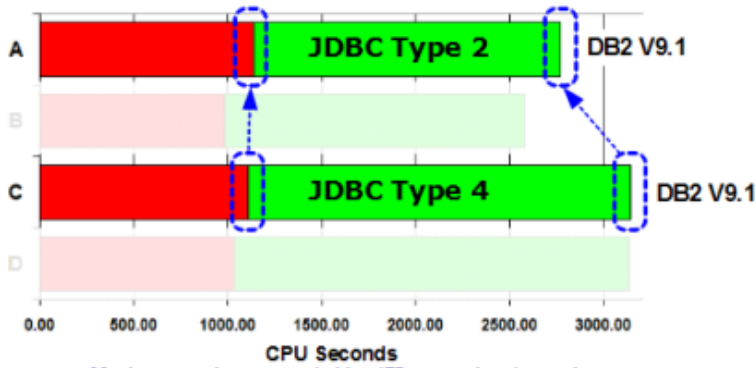
Less is better (CPU seconds for the 60 minute test duration)

The following table summarizes the comparison of CPU seconds consumed during the testing run duration:

	Type 2	Type 4	T2 Benefit	% T2 Benefit
General	1139.76	1111.68	–28.08	–2.53%
Specialty	1637.64	2038.68	401.04	19.67%
Total	2777.40	3150.36	372.96	11.84%

Using DB2 V9.1, JDBC Type 2 used a small percentage *more* GP, nearly 20% *less* total specialty engine, and nearly 12% *less* total CPU.
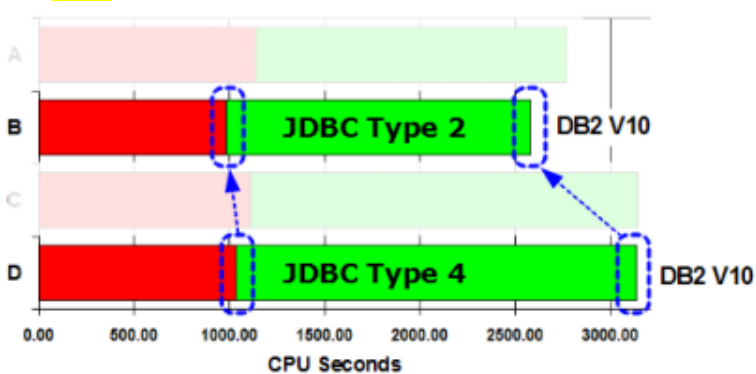
DB2 *V10*, JDBC T2 vs. T4

Less is better (CPU seconds for the 60 minute test duration)

The following table summarizes the comparison of CPU seconds consumed during the testing run duration:

	Type 2	Type 4	T2 Benefit	% T2 Benefit
General	979.92	1031.76	51.84	5.02%
Specialty	1605.60	2110.68	505.08	23.93%
Total	2585.52	3142.44	556.92	17.72%

Using DB2 V10, JDBC Type 2 used 5% *less* GP, nearly 24% *less* total specialty engine, and nearly 18% *less* total CPU.
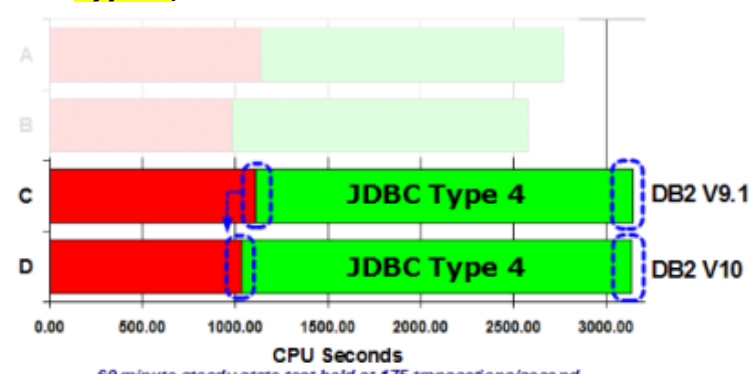
JDBC *Type 2*, DB2 V9.1 vs. DB2 V10

Less is better (CPU seconds for the 60 minute test duration)

The following table summarizes the comparison of CPU seconds consumed during the testing run duration:

	DB2 V10	DB2 V9.1	V10 Benefit	% V10 Benefit
General	979.92	1139.76	159.84	14.02%
Specialty	1605.60	1637.64	32.04	1.96%
Total	2585.52	2777.4	191.88	6.91%

Using JDBC Type 2, DB2 Version 10 used 14% *less* GP, about 2% *less* specialty and nearly 7% *less* overall CPU compared to DB2 V9.1.

JDBC *Type 4*, DB2 V9.1 vs. DB2 V10

Less is better (CPU seconds for the 60 minute test duration)

The following table summarizes the comparison of CPU seconds consumed during the testing run duration:

	DB2 V10	DB2 V9.1	V10 Benefit	% V10 Benefit
General	1031.76	1111.68	79.92	7.19%
Specialty	2110.68	2038.68	–72.00	–3.53%
Total	3142.44	3150.36	7.92	0.25%

Using JDBC Type 4, DB2 Version 10 used 7% *less* GP, over 3% *more* specialty and just a bit *less* overall CPU compared to DB2 V9.1.
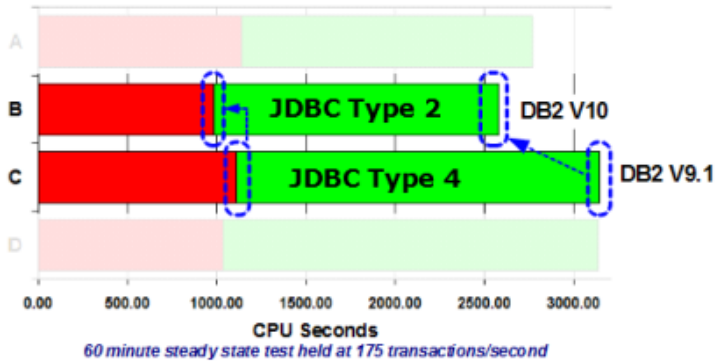
Overall Comparison

There comparison here is with both variables changing -- the JDBC type and the DB2 version:

Less is better *(CPU seconds for the 60 minute test duration)*

The following table summarizes the comparison of CPU seconds consumed during the testing run duration:

	Type 2 DB2 V10	Type 4 DB2 V9.1	T2/V10 Benefit	% T2/V10 Benefit
General	979.92	1111.68	131.76	11.85%
Specialty	1605.60	2038.68	433.08	21.24%
Total	2585.52	3150.36	564.84	17.93%

Double-digit *less* GP, speciality and total CPU when the comparing T2 v T4 and DB2 V10 v DB2 V9.1

Overall Summary

This document has summarized the effect of two areas of benefit:

1. The CPU benefits associated with JDBC Type 2 which uses cross-memory technology. This eliminates the CPU associated with the TCP stack and DB2 DDF.

2. The benefits associated with DB2 z/OS V10 as compared to DB2 z/OS V9.1.

Co-location with Type 2 is the best use of your capacity. It also provides operational benefits and reduced complexity, which were outlined in the original WP101476 white paper.

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