



## Client/Server Etudes: Vertica ODBC, JDBC, & VSQL Performance

This project examines the resources required to execute a series of SQL requests (etudes) for Vertica 7.1 JDBC, ODBC, and VSQL clients in Windows 8.1/RedHat Enterprise Linux 5.9 environments. The Setquery Benchmark (Dr. Patrick O'Neil University of Massachusetts, Boston) is investigated; NMON 15e & Vtune are used for performance data recording and analysis. 57 requests are executed against a 1,000,000 row SETQUERY database, the last request copies 1,000,000 rows from server to client.

The following graph shows the ELAPSED seconds, CPU seconds, and gigabytes of RAM for VSQL, Perl (ODBC), Java (JDBC), and DBEAVER (JDBC) setups as measured on the Windows 8.1 client machine.

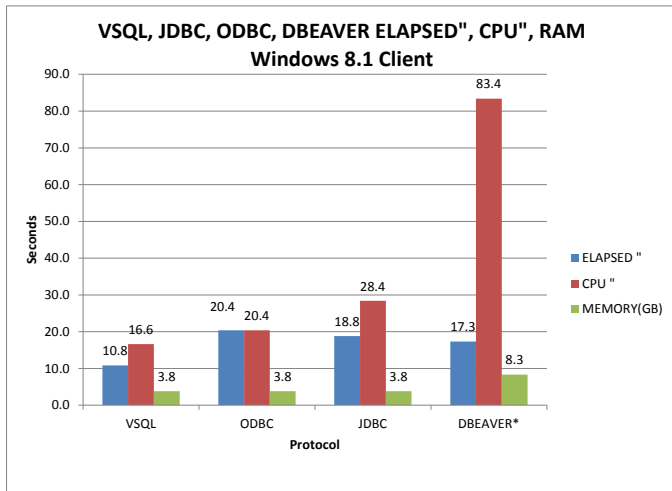


Figure 1 – Windows 8.1 Client

VTUNE Advanced Hotspots synopsis for the Windows 8.1 client machine is shown following.

JDBC	ODBC	VSQL
Elapsed Time: 128.571s	112.964s	77.601s
Instructions Retired: 546,163,200,000	579,583,200,000	389,570,400,000
CPI Rate: 0.772	0.548	0.653
CPU Frequency Ratio: 1.28	1.236	1.317
Paused Time: 0s	0s	0s
CPU Time: 137.627s	107.370s	80.723s
Spin Time: 0.127s	4.047s	22.594s
Overhead Time: 0s	0s	0s
Effective Time: 137.500s	103.323s	58.129s
Idle: 6.431s	7.814s	4.672s
Poor: 129.774s	95.508s	53.457s
Ok: 1.195s	0.001s	0s
Ideal: 0.100s	0s	0s
Over: 0s	0s	0s
Top Hotspots	Top Hotspots	Top Hotspots
Function CPU Time	Function CPU Time	Function CPU Time
[Outside any known module] 44.919s	func@0x140152c90 8.089s	RTLeaveCriticalSection 11.902s
func@0x140152c90 6.787s	func@0x18002de50 5.243s	RTEnterCriticalSection 10.661s
wxEvtHandler::ProcessEvent 2.603s	RTFreeHeap 3.964s	rputc 6.973s
func@0x140065de0 2.097s	func@0x1800b9580 2.492s	func@0x140152c90 4.576s
ExReleaseCacheAwarePushLockSharedEx 1.950s	Perl_sv_catpv_n_flags 2.361s	lock_file 2.842s
[Others] 79.271s	[Others] 85.221s	[Others] 43.769s

Figure 2 – Windows 8.1 Client VTUNE Advanced Hotspots

The following graph shows the ELAPSED seconds, CPU seconds, and gigabytes of RAM for VSQL, Perl 5.20.1 (ODBC), Java (JDBC), and Perl 5.8.8 (ODBC) setups as measured on the

RHEL 5.9/Vertica 7.1 Server. The client software is also running on the Vertica Server, so the numbers below are for the Vertica Server and Client.

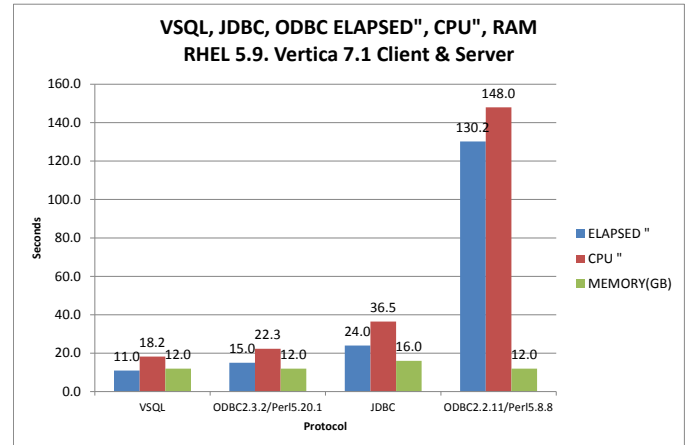


Figure 3 – RHEL 5.9 Client\Server

VTUNE Advanced Hotspots synopsis for the RHEL 5.9/Vertica 7.1/Client&Server machine is shown following.

JDBC	PERL 5.8.8	PERL 5.20.1	VSQL
Elapsed Time: 142.503s	651.951s	88.642s	66.915s
CPU Time: 182.499s	743.513s	111.565s	91.048s
Instructions Retired: 570,071,200,000	3,122,332,200,000	597,111,400,000	457,422,400,000
CPI Rate: 1.076	0.806	0.628	0.667
CPU Frequency Ratio: 0.991	0.998	0.99	0.988
Paused Time: 0s	0s	0s	0s
Overhead Time: 0s	0s	0s	0s
Spin Time: 1.279s	52.296s	2.139s	0.883s
Top Hotspots	Top Hotspots	Top Hotspots	Top Hotspots
Function CPU Time	Function CPU Time	Function CPU Time	Function CPU Time
[Outside any known module] 45.592s	_int_malloc 29.284s	_IO_vfprintf 4.772s	putc 7.593s
func@0xffffffff013c79 10.663s	pthread_mutex_unlock 26.172s	func@0x177449 3.362s	wcwidth 5.292s
put_page 4.905s	_pthread_mutex_lock 22.216s	printup_toString 3.358s	_IO_vfprintf 4.750s
_IO_vfprintf 4.854s	kmem_cache_free 21.005s	Perl_sv_catpv_n_flags 3.028s	printup_toString 3.351s
func@0xffffffff801a6704 4.843s	func@0xffffffff80007632 19.116s	Perl_sv_setsv_flags 2.733s	getAnotherTuple 3.274s
[Others] 111.642s	[Others] 625.741s	[Others] 94.314s	[Others] 66.879s
CPU Usage Histogram			
Simultaneously Utilized Logic	Elapsed Time	Elapsed Time	Elapsed Time
0	30.74968653	0	20.40983637
1	82.31551956	1	52.3467298
2	25.10862559	2	50.23017492
3	3.680888457	3	3.49682272
4	0.531500235	4	0.349672276
5	0.074959355	5	0.057297442
6	0.024055139	6	0.002826665
7	0.013369987	7	0
8	0.004435528	8	0

Figure 4 – RHEL 5.9 Client\Server VTUNE Advanced Hotspots

Vertica is housed on an ASUS CM6870 (i7-3770@3.39GHZ, Geekbench 3296/12896) with 32GB of RAM, 8 logical processors, and 9TB of sata/esata/ext3 disk. The Windows client machine is an ASUS gaming laptop G750JM (i7-4700HQ@2.40GHZ, Geekbench 3163/11,813) with 32GB of RAM, 8 logical processors, a 1TB internal disk and a 2TB external USB drive. They are connected to the network via a Netgear GS116E gigabit switch.

Detailed PERFMON and NMON results, java and perl coding examples, and the perl/odbc upgrade process can be found in the first draft of the full study.

<http://davidjyoung.com/cm/csetudes.pdf>