TPC Benchmark H
Full Disclosure Report

SPARC T5-4 Server
Using
Oracle Database 11g Release 2 Enterprise Edition
with Partitioning

Submitted for Review
June 7, 2013

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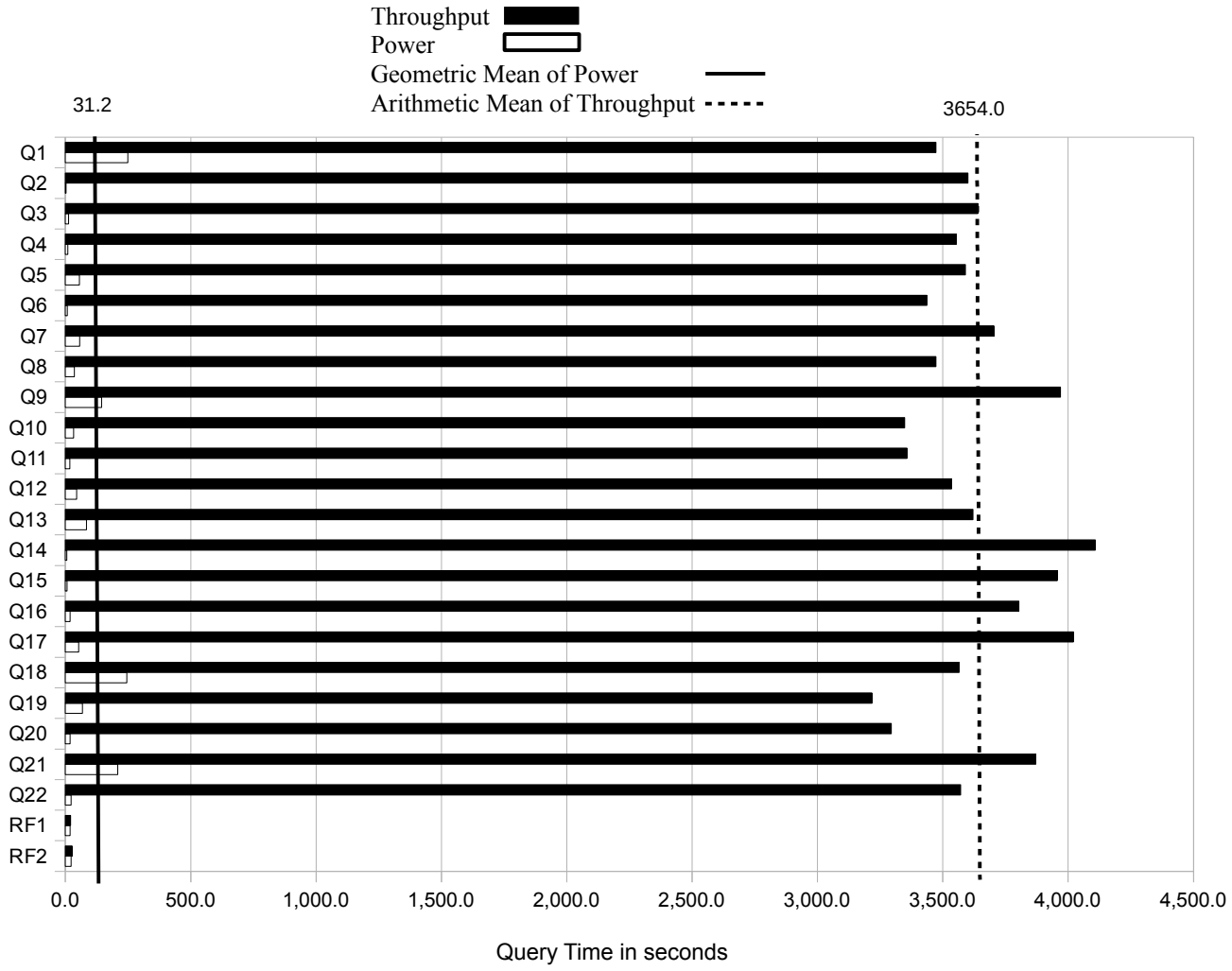
SPARC T5-4 Server

TPC-H Rev. 2.15.0
TPC-Pricing 1.7.0

Report Date:
June 7, 2013

Total System Cost	Composite Query per Hour Metric	Price / Performance
$1,610,564 USD	**409,721.8 QphH@3000GB**	**$3.94/QphH@3000GB**

Database Size	Database Manager	Operating System	Other Software	Availability Date
3000GB	Oracle Database 11g Release 2 Enterprise Edition with Partitioning	Oracle Solaris 11.1	None	September 24, 2013



Database Load Time = 2:06:04
Load Includes Backup: N
Total Data Storage / Database Size = 29.0
Memory to Database Size Percentage = 66.6

Storage Redundancy Levels:
Base Tables: Level Three
Auxiliary Data Structures: Level Three
DBMS Temporary Space: Level Zero
OS and DBMS Software: Level One

System Configuration:
Processors:
Memory:
Disks:

Total Storage:

SPARC T5-4 Server
4 SPARC T5 3.6GHz Processors, 64 cores, 512 threads
2TB
12 Sun Storage 2540 M2 w/ 12 300GB 3.5” 15K RPM SAS disks
12 Sun Storage 2540 M2 expansion arrays w/ 12 300GB 3.5” 15K RPM SAS disks
2 300GB 10K SAS Internal
87,000GB (GB = 1024*1024*1024 bytes)

ORACLE

SPARC T5-4 Server

TPC-H Rev. 2.15.0
TPC-Pricing 1.7.0

Report Date:
June 7, 2013

Description	Part Number	Source	Unit Price	Qty	Ext. Price	3 Yr. Maint.
Server Hardware						
SPARC T5-4 Server, base chassis	7104191	1	35,300	1	35,300	
2 SPARC T5 3.6GHz 16-core processors	7104194	1	33,856	2	67,712	
One 32GB DDR3-1066 registered DIMM	7104200	1	2,000	64	128,000	
300GB 2.5” 10K RPM SAS-2 HDD (factory install)	7105211	1	345	2	690	
Sun Storage 16Gb/s FC PCIe HBA, dual port, Qlogic	7101673	1	1,696	12	20,352	
Sun Storage 16Gb/s FC optics, SR, Qlogic	7101675	1	960	24	23,040	
Power Cord, 2.5M, C20 plug	SELY9P31Z	1	29	2	58	
Sun Server X3-2; base chassis	7102735	1	3,076	1	3,076	
Oracle Solaris 11.1 Pre-Install (factory install)	7100734	1	0	1	0	
US PC Peripheral Kit (Keyboard/Mouse)	X3701A-PC	1	50	1	50	
8GB DDR3-1600 DIMM (factory install)	7100730	1	152	2	304	
Sun Storage 6 Gb/s SAS HBA, Internal; 8 PORT	SG-SAS6-INT-Z	1	419	1	419	
Four 2.5” drive slots and 1 DVD-RW disk cage	7102740	1	676	1	676	
Heatsink (factory install)	7102758	1	20	1	20	
PCIe filler panel (factory install)	7102748	1	2	3	6	
Single processor I/O cover kit (factory install)	7104900	1	10	1	10	
Power Cord North America, 2.5M, 5-15P plug	333A-25-15-NEMA	1	13	2	26	
300GB 10K RPM 2.5” SAS-2 Disk	RB-SS2CF-300G10K2	1	345	1	345	
Intel® Xeon® E5-2609 4-core 2.2GHz, w/ heat-sink	7100604	1	516	1	516	
Acer S181HL Mb 18.5” LED (+ 2 spares)	2888308	2	86	3	258	
Server Hardware Subtotal					**280,858**	**0**
Storage						
StorageTek 2540 M2 array, dual FC ctrls w/ 4 8Gb/s & 2GB cache	7100183	1	12,271	12	147,252	
StorageTek 2540 M2 array; drive expansion tray	7100185	1	3,567	12	42,804	
Sun Storage 2500 M2 Performance Enhancer	7102876	1	7,500	12	90,000	
300GB 15K RPM 3.5” SAS-2 HDD w/ bracket	7100019	1	519	288	149,472	
1 AC Power Supply	7100021	1	600	48	28,800	
Power cord; Sun Rack jumper, 2M, C14 plug, C13 connector	333V-20-15-C14	1	25	48	1,200	
5M LC to LC FC cable	X9733A-Z-N	1	80	72	5,760	
Brocade 6510 Fibre Channel Swith w/ 24 16Gb/s activated	7103553	1	26,046	2	52,092	
Brocade 6510 Activation Permit for 12 8Gb/s SFPs	7103555	1	12,741	4	50,964	
Brocade 8Gb/s SFP short wave optic module	SGXSWBROSFP8GSWS-N	1	399	48	19,152	
Power cord; Sun Rack jumper, 2M, C14 plug, C13 connector	X333V-20-15-C14-N	1	25	4	100	
Rack rail kit	7103770	1	282	2	564	
Sun Rack II 42U	SR-1242E	1	2,849	2	5,698	
PDU 15kVA, Single Phase, LV	SR-15K-L630-N	1	1,200	4	4,800	
Jumper Cable Kit SunRack II – 20 C13 cables	SR-JUMPKIT-N	1	198	2	396	
Storage Subtotal					**599,054**	**0**
Server Software						
Oracle Solaris 11.1, Oracle Solaris Studio 12	7104202	1	0	1	0	
Oracle Solaris Development Tools Support	B59320	1	1,200	3		3,600
Oracle Database 11g Release 2 Enterprise Edition, Per Processor for 3 years (for 32 processors)		1	23,750	32	760,000	
Oracle Partitioning, Per Processor for 3 years (for 32 processors)		1	5,750	32	184,000	
Oracle Incident Server Support Package (for 3 years)		1	2,300	3		6,900
Server Software Subtotal					**944,000**	**10,500**
Oracle Premier Hardware Support	Q-PREM-SPRT-SYS	1	105,558	3		316,676
			Totals		**1,823,912**	**327,176**
Total Oracle Software, Hardware and Maintenance Discount		1			(540,524)	
Notes (Source):			**3 Yr. Cost**		**$1,610,564**	
1. Oracle Corp. 2. CDW			**QphH @3000GB**		**409,721.8**	
Audited by Francois Raab of InfoSizing, Inc.			**$/QphH @3000GB**		**$3.94**	

Oracle's discounts are based upon US list prices and for similar quantities and configurations. A total discount of 25.1% has been applied to all Oracle hardware, software and services based on the total value and quantities of the components of the configuration, including full payment of all components and maintenance.

Prices used in TPC Benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing section of the TPC benchmark specifications. If you find that stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

Numerical Quantities

Measurement Results:

Database Scale Factor	= 3000GB
Total Data Storage / Database Size	= 29.0
Start of database load time	= 05/31/2013 21:41:25
End of database load time	= 05/31/2013 23:47:29
Database Load Time	= 2:06:04
Query Streams for Throughput Test	= 192
TPC-H Power	= 345.762.7
TPC-H Throughput	= 485,512.1
TPC-H Composite Query-per-Hour Rating (QphH@3000GB)	= 409,721.8
Total System Price Over 3 Years	= $1,610,564
TPC-H Price/Performance Metric ($/QphH@3000GB)	= $3.94

Measurement Intervals:

Measurement Interval in Throughput Test (Ts)	= 93,961 seconds

Duration of Stream Execution:

Power Run	Seed	RF1 Start RF1 End	Query Start Query End	RF2 Start RF2 End	Duration
	531234729	6/2/13 2:11:39	6/2/13 2:11:58	6/2/13 2:35:25	0:24:08
		6/2/13 2:11:58	6/2/13 2:35:24	6/2/13 2:35:47	

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
1	531234730	6/2/13 2:35:59	21:37:51	6/3/13 2:10:02	6/3/13 2:10:21
		6/3/13 0:13:50		6/3/13 2:10:21	6/3/13 2:10:47
2	531234731	6/2/13 2:35:59	21:17:52	6/3/13 2:10:47	6/3/13 2:11:06
		6/2/13 23:53:51		6/3/13 2:11:06	6/3/13 2:11:31
3	531234732	6/2/13 2:35:59	21:36:34	6/3/13 2:11:31	6/3/13 2:11:51
		6/3/13 0:12:33		6/3/13 2:11:51	6/3/13 2:12:18
4	531234733	6/2/13 2:35:59	21:37:07	6/3/13 2:12:18	6/3/13 2:12:38
		6/3/13 0:13:06		6/3/13 2:12:38	6/3/13 2:13:03
5	531234734	6/2/13 2:35:59	21:36:38	6/3/13 2:13:04	6/3/13 2:13:23
		6/3/13 0:12:37		6/3/13 2:13:23	6/3/13 2:13:50
6	531234735	6/2/13 2:35:59	21:35:46	6/3/13 2:13:50	6/3/13 2:14:10
		6/3/13 0:11:45		6/3/13 2:14:10	6/3/13 2:14:35
7	531234736	6/2/13 2:35:59	21:42:35	6/3/13 2:14:35	6/3/13 2:14:54
		6/3/13 0:18:34		6/3/13 2:14:54	6/3/13 2:15:21
8	531234737	6/2/13 2:35:59	21:41:25	6/3/13 2:15:21	6/3/13 2:15:42
		6/3/13 0:17:24		6/3/13 2:15:42	6/3/13 2:16:08
9	531234738	6/2/13 2:35:59	21:36:31	6/3/13 2:16:08	6/3/13 2:16:30
		6/3/13 0:12:30		6/3/13 2:16:29	6/3/13 2:16:55

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
10	531234739	6/2/13 2:35:59 6/3/13 0:16:58	21:40:59	6/3/13 2:16:55 6/3/13 2:17:16	6/3/13 2:17:16 6/3/13 2:17:41
11	531234740	6/2/13 2:35:59 6/3/13 0:14:02	21:38:03	6/3/13 2:17:41 6/3/13 2:18:02	6/3/13 2:18:02 6/3/13 2:18:29
12	531234741	6/2/13 2:35:59 6/3/13 0:18:30	21:42:31	6/3/13 2:18:29 6/3/13 2:18:48	6/3/13 2:18:48 6/3/13 2:19:15
13	531234742	6/2/13 2:35:59 6/3/13 0:15:47	21:39:48	6/3/13 2:19:15 6/3/13 2:19:37	6/3/13 2:19:37 6/3/13 2:20:05
14	531234743	6/2/13 2:35:59 6/3/13 0:14:02	21:38:02	6/3/13 2:20:05 6/3/13 2:20:25	6/3/13 2:20:25 6/3/13 2:20:53
15	531234744	6/2/13 2:35:59 6/3/13 0:15:30	21:39:31	6/3/13 2:20:53 6/3/13 2:21:13	6/3/13 2:21:13 6/3/13 2:21:41
16	531234745	6/2/13 2:36:00 6/3/13 0:13:58	21:37:58	6/3/13 2:21:41 6/3/13 2:22:01	6/3/13 2:22:01 6/3/13 2:22:29
17	531234746	6/2/13 2:36:00 6/3/13 0:16:55	21:40:55	6/3/13 2:22:29 6/3/13 2:22:50	6/3/13 2:22:50 6/3/13 2:23:16
18	531234747	6/2/13 2:36:00 6/3/13 0:12:35	21:36:35	6/3/13 2:23:16 6/3/13 2:23:36	6/3/13 2:23:36 6/3/13 2:24:03
19	531234748	6/2/13 2:36:00 6/3/13 0:13:13	21:37:14	6/3/13 2:24:03 6/3/13 2:24:23	6/3/13 2:24:23 6/3/13 2:24:49
20	531234749	6/2/13 2:36:00 6/3/13 0:13:30	21:37:31	6/3/13 2:24:49 6/3/13 2:25:10	6/3/13 2:25:10 6/3/13 2:25:39
21	531234750	6/2/13 2:36:00 6/3/13 0:13:40	21:37:41	6/3/13 2:25:39 6/3/13 2:25:59	6/3/13 2:25:59 6/3/13 2:26:29
22	531234751	6/2/13 2:36:00 6/3/13 0:17:47	21:41:47	6/3/13 2:26:29 6/3/13 2:26:50	6/3/13 2:26:50 6/3/13 2:27:17
23	531234752	6/2/13 2:36:00 6/3/13 0:24:06	21:48:07	6/3/13 2:27:17 6/3/13 2:27:37	6/3/13 2:27:37 6/3/13 2:28:04
24	531234753	6/2/13 2:36:00 6/3/13 0:22:37	21:46:37	6/3/13 2:28:04 6/3/13 2:28:24	6/3/13 2:28:24 6/3/13 2:28:51
25	531234754	6/2/13 2:36:00 6/3/13 0:31:15	21:55:15	6/3/13 2:28:51 6/3/13 2:29:11	6/3/13 2:29:11 6/3/13 2:29:38
26	531234755	6/2/13 2:36:00 6/3/13 0:13:47	21:37:47	6/3/13 2:29:38 6/3/13 2:29:59	6/3/13 2:29:59 6/3/13 2:30:26
27	531234756	6/2/13 2:36:00 6/3/13 0:24:40	21:48:40	6/3/13 2:30:26 6/3/13 2:30:47	6/3/13 2:30:47 6/3/13 2:31:12
28	531234757	6/2/13 2:36:00 6/3/13 0:15:26	21:39:26	6/3/13 2:31:12 6/3/13 2:31:32	6/3/13 2:31:32 6/3/13 2:31:59
29	531234758	6/2/13 2:36:00 6/3/13 0:21:09	21:45:09	6/3/13 2:31:59 6/3/13 2:32:19	6/3/13 2:32:19 6/3/13 2:32:45
30	531234759	6/2/13 2:36:00 6/3/13 0:31:28	21:55:27	6/3/13 2:32:45 6/3/13 2:33:05	6/3/13 2:33:05 6/3/13 2:33:32
31	531234760	6/2/13 2:36:00 6/3/13 0:18:19	21:42:18	6/3/13 2:33:32 6/3/13 2:33:52	6/3/13 2:33:52 6/3/13 2:34:19
32	531234761	6/2/13 2:36:01 6/3/13 0:18:02	21:42:02	6/3/13 2:34:19 6/3/13 2:34:40	6/3/13 2:34:40 6/3/13 2:35:08
33	531234762	6/2/13 2:36:01 6/3/13 0:13:54	21:37:53	6/3/13 2:35:08 6/3/13 2:35:28	6/3/13 2:35:28 6/3/13 2:35:55

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
34	531234763	6/2/13 2:36:01 6/3/13 0:18:45	21:42:45	6/3/13 2:35:55 6/3/13 2:36:15	6/3/13 2:36:15 6/3/13 2:36:43
35	531234764	6/2/13 2:36:01 6/3/13 0:14:23	21:38:22	6/3/13 2:36:43 6/3/13 2:37:04	6/3/13 2:37:04 6/3/13 2:37:31
36	531234765	6/2/13 2:36:01 6/3/13 0:18:29	21:42:28	6/3/13 2:37:31 6/3/13 2:37:51	6/3/13 2:37:51 6/3/13 2:38:20
37	531234766	6/2/13 2:36:01 6/3/13 0:18:38	21:42:37	6/3/13 2:38:20 6/3/13 2:38:40	6/3/13 2:38:40 6/3/13 2:39:07
38	531234767	6/2/13 2:36:01 6/3/13 0:21:10	21:45:09	6/3/13 2:39:07 6/3/13 2:39:28	6/3/13 2:39:28 6/3/13 2:39:53
39	531234768	6/2/13 2:36:01 6/3/13 0:19:52	21:43:51	6/3/13 2:39:53 6/3/13 2:40:13	6/3/13 2:40:13 6/3/13 2:40:38
40	531234769	6/2/13 2:36:01 6/3/13 0:20:42	21:44:41	6/3/13 2:40:38 6/3/13 2:40:58	6/3/13 2:40:58 6/3/13 2:41:22
41	531234770	6/2/13 2:36:01 6/3/13 0:23:18	21:47:17	6/3/13 2:41:22 6/3/13 2:41:42	6/3/13 2:41:42 6/3/13 2:42:08
42	531234771	6/2/13 2:36:01 6/3/13 0:19:58	21:43:57	6/3/13 2:42:09 6/3/13 2:42:29	6/3/13 2:42:30 6/3/13 2:42:56
43	531234772	6/2/13 2:36:01 6/3/13 0:20:46	21:44:45	6/3/13 2:42:56 6/3/13 2:43:17	6/3/13 2:43:17 6/3/13 2:43:42
44	531234773	6/2/13 2:36:01 6/3/13 0:19:34	21:43:33	6/3/13 2:43:42 6/3/13 2:44:03	6/3/13 2:44:03 6/3/13 2:44:30
45	531234774	6/2/13 2:36:01 6/3/13 0:19:30	21:43:29	6/3/13 2:44:30 6/3/13 2:44:50	6/3/13 2:44:50 6/3/13 2:45:18
46	531234775	6/2/13 2:36:01 6/3/13 0:21:14	21:45:13	6/3/13 2:45:18 6/3/13 2:45:39	6/3/13 2:45:39 6/3/13 2:46:05
47	531234776	6/2/13 2:36:01 6/3/13 0:31:36	21:55:35	6/3/13 2:46:05 6/3/13 2:46:25	6/3/13 2:46:25 6/3/13 2:46:52
48	531234777	6/2/13 2:36:01 6/3/13 0:21:55	21:45:54	6/3/13 2:46:52 6/3/13 2:47:12	6/3/13 2:47:12 6/3/13 2:47:40
49	531234778	6/2/13 2:36:02 6/3/13 0:31:05	21:55:03	6/3/13 2:47:40 6/3/13 2:48:00	6/3/13 2:48:01 6/3/13 2:48:29
50	531234779	6/2/13 2:36:02 6/3/13 0:21:54	21:45:53	6/3/13 2:48:29 6/3/13 2:48:49	6/3/13 2:48:49 6/3/13 2:49:16
51	531234780	6/2/13 2:36:02 6/3/13 0:24:11	21:48:09	6/3/13 2:49:17 6/3/13 2:49:37	6/3/13 2:49:37 6/3/13 2:50:04
52	531234781	6/2/13 2:36:02 6/3/13 0:19:54	21:43:52	6/3/13 2:50:04 6/3/13 2:50:25	6/3/13 2:50:25 6/3/13 2:50:52
53	531234782	6/2/13 2:36:02 6/3/13 0:20:23	21:44:21	6/3/13 2:50:52 6/3/13 2:51:13	6/3/13 2:51:13 6/3/13 2:51:41
54	531234783	6/2/13 2:36:02 6/3/13 0:27:05	21:51:03	6/3/13 2:51:41 6/3/13 2:52:02	6/3/13 2:52:02 6/3/13 2:52:26
55	531234784	6/2/13 2:36:02 6/3/13 0:20:02	21:44:00	6/3/13 2:52:26 6/3/13 2:52:47	6/3/13 2:52:47 6/3/13 2:53:14
56	531234785	6/2/13 2:36:02 6/3/13 0:19:38	21:43:36	6/3/13 2:53:14 6/3/13 2:53:33	6/3/13 2:53:33 6/3/13 2:54:02
57	531234786	6/2/13 2:36:02 6/3/13 0:37:47	22:01:45	6/3/13 2:54:02 6/3/13 2:54:23	6/3/13 2:54:23 6/3/13 2:54:52

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
58	531234787	6/2/13 2:36:02 6/3/13 0:23:50	21:47:49	6/3/13 2:54:52 6/3/13 2:55:12	6/3/13 2:55:12 6/3/13 2:55:39
59	531234788	6/2/13 2:36:02 6/3/13 0:20:58	21:44:56	6/3/13 2:55:39 6/3/13 2:55:59	6/3/13 2:55:59 6/3/13 2:56:24
60	531234789	6/2/13 2:36:02 6/3/13 0:23:18	21:47:16	6/3/13 2:56:24 6/3/13 2:56:45	6/3/13 2:56:45 6/3/13 2:57:12
61	531234790	6/2/13 2:36:02 6/3/13 0:30:26	21:54:24	6/3/13 2:57:12 6/3/13 2:57:32	6/3/13 2:57:32 6/3/13 2:57:59
62	531234791	6/2/13 2:36:02 6/3/13 0:20:56	21:44:54	6/3/13 2:57:59 6/3/13 2:58:20	6/3/13 2:58:20 6/3/13 2:58:45
63	531234792	6/2/13 2:36:02 6/3/13 0:20:29	21:44:26	6/3/13 2:58:46 6/3/13 2:59:05	6/3/13 2:59:05 6/3/13 2:59:31
64	531234793	6/2/13 2:36:02 6/3/13 0:46:27	22:10:25	6/3/13 2:59:31 6/3/13 2:59:52	6/3/13 2:59:52 6/3/13 3:00:18
65	531234794	6/2/13 2:36:02 6/3/13 0:32:29	21:56:26	6/3/13 3:00:18 6/3/13 3:00:38	6/3/13 3:00:38 6/3/13 3:01:04
66	531234795	6/2/13 2:36:02 6/3/13 0:41:07	22:05:05	6/3/13 3:01:04 6/3/13 3:01:24	6/3/13 3:01:24 6/3/13 3:01:49
67	531234796	6/2/13 2:36:03 6/3/13 0:28:50	21:52:47	6/3/13 3:01:50 6/3/13 3:02:11	6/3/13 3:02:11 6/3/13 3:02:39
68	531234797	6/2/13 2:36:03 6/3/13 0:30:22	21:54:19	6/3/13 3:02:39 6/3/13 3:03:00	6/3/13 3:03:00 6/3/13 3:03:25
69	531234798	6/2/13 2:36:03 6/3/13 0:31:38	21:55:35	6/3/13 3:03:25 6/3/13 3:03:46	6/3/13 3:03:46 6/3/13 3:04:12
70	531234799	6/2/13 2:36:03 6/3/13 0:35:14	21:59:11	6/3/13 3:04:12 6/3/13 3:04:34	6/3/13 3:04:34 6/3/13 3:05:01
71	531234800	6/2/13 2:36:03 6/3/13 0:47:56	22:11:54	6/3/13 3:05:01 6/3/13 3:05:22	6/3/13 3:05:22 6/3/13 3:05:47
72	531234801	6/2/13 2:36:03 6/3/13 0:24:06	21:48:03	6/3/13 3:05:47 6/3/13 3:06:08	6/3/13 3:06:08 6/3/13 3:06:35
73	531234802	6/2/13 2:36:03 6/3/13 0:27:33	21:51:30	6/3/13 3:06:35 6/3/13 3:06:56	6/3/13 3:06:56 6/3/13 3:07:23
74	531234803	6/2/13 2:36:03 6/3/13 0:31:07	21:55:04	6/3/13 3:07:23 6/3/13 3:07:43	6/3/13 3:07:43 6/3/13 3:08:08
75	531234804	6/2/13 2:36:03 6/3/13 0:41:03	22:05:00	6/3/13 3:08:08 6/3/13 3:08:30	6/3/13 3:08:30 6/3/13 3:08:56
76	531234805	6/2/13 2:36:03 6/3/13 0:23:48	21:47:45	6/3/13 3:08:56 6/3/13 3:09:16	6/3/13 3:09:16 6/3/13 3:09:44
77	531234806	6/2/13 2:36:03 6/3/13 0:34:40	21:58:37	6/3/13 3:09:44 6/3/13 3:10:04	6/3/13 3:10:04 6/3/13 3:10:32
78	531234807	6/2/13 2:36:03 6/3/13 0:47:38	22:11:35	6/3/13 3:10:32 6/3/13 3:10:51	6/3/13 3:10:51 6/3/13 3:11:20
79	531234808	6/2/13 2:36:03 6/3/13 0:40:47	22:04:44	6/3/13 3:11:20 6/3/13 3:11:38	6/3/13 3:11:38 6/3/13 3:12:05
80	531234809	6/2/13 2:36:03 6/3/13 0:30:33	21:54:30	6/3/13 3:12:05 6/3/13 3:12:25	6/3/13 3:12:25 6/3/13 3:12:51
81	531234810	6/2/13 2:36:03 6/3/13 0:27:21	21:51:18	6/3/13 3:12:51 6/3/13 3:13:11	6/3/13 3:13:11 6/3/13 3:13:36

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
82	531234811	6/2/13 2:36:03 6/3/13 0:31:11	21:55:07	6/3/13 3:13:36 6/3/13 3:13:57	6/3/13 3:13:57 6/3/13 3:14:23
83	531234812	6/2/13 2:36:03 6/3/13 0:46:07	22:10:04	6/3/13 3:14:23 6/3/13 3:14:43	6/3/13 3:14:43 6/3/13 3:15:10
84	531234813	6/2/13 2:36:04 6/3/13 0:45:19	22:09:16	6/3/13 3:15:10 6/3/13 3:15:30	6/3/13 3:15:30 6/3/13 3:15:56
85	531234814	6/2/13 2:36:04 6/3/13 0:32:31	21:56:27	6/3/13 3:15:56 6/3/13 3:16:17	6/3/13 3:16:17 6/3/13 3:16:42
86	531234815	6/2/13 2:36:04 6/3/13 0:56:26	22:20:23	6/3/13 3:16:42 6/3/13 3:17:04	6/3/13 3:17:04 6/3/13 3:17:31
87	531234816	6/2/13 2:36:04 6/3/13 0:38:36	22:02:32	6/3/13 3:17:31 6/3/13 3:17:52	6/3/13 3:17:52 6/3/13 3:18:19
88	531234817	6/2/13 2:36:04 6/3/13 0:49:56	22:13:52	6/3/13 3:18:19 6/3/13 3:18:40	6/3/13 3:18:40 6/3/13 3:19:06
89	531234818	6/2/13 2:36:04 6/3/13 0:52:59	22:16:55	6/3/13 3:19:06 6/3/13 3:19:27	6/3/13 3:19:27 6/3/13 3:19:54
90	531234819	6/2/13 2:36:04 6/3/13 0:40:46	22:04:42	6/3/13 3:19:54 6/3/13 3:20:16	6/3/13 3:20:16 6/3/13 3:20:43
91	531234820	6/2/13 2:36:04 6/3/13 0:39:34	22:03:30	6/3/13 3:20:43 6/3/13 3:21:05	6/3/13 3:21:05 6/3/13 3:21:31
92	531234821	6/2/13 2:36:04 6/3/13 0:32:35	21:56:30	6/3/13 3:21:31 6/3/13 3:21:52	6/3/13 3:21:53 6/3/13 3:22:21
93	531234822	6/2/13 2:36:05 6/3/13 0:37:46	22:01:41	6/3/13 3:22:21 6/3/13 3:22:43	6/3/13 3:22:43 6/3/13 3:23:09
94	531234823	6/2/13 2:36:05 6/3/13 0:52:39	22:16:35	6/3/13 3:23:09 6/3/13 3:23:30	6/3/13 3:23:31 6/3/13 3:23:57
95	531234824	6/2/13 2:36:05 6/3/13 0:34:34	21:58:29	6/3/13 3:23:57 6/3/13 3:24:18	6/3/13 3:24:18 6/3/13 3:24:45
96	531234825	6/2/13 2:36:05 6/3/13 0:41:07	22:05:02	6/3/13 3:24:45 6/3/13 3:25:07	6/3/13 3:25:07 6/3/13 3:25:32
97	531234826	6/2/13 2:36:05 6/3/13 0:46:07	22:10:01	6/3/13 3:25:32 6/3/13 3:25:54	6/3/13 3:25:54 6/3/13 3:26:22
98	531234827	6/2/13 2:36:06 6/3/13 1:06:04	22:29:58	6/3/13 3:26:22 6/3/13 3:26:43	6/3/13 3:26:44 6/3/13 3:27:09
99	531234828	6/2/13 2:36:06 6/3/13 0:55:46	22:19:40	6/3/13 3:27:09 6/3/13 3:27:31	6/3/13 3:27:32 6/3/13 3:27:58
100	531234829	6/2/13 2:36:06 6/3/13 0:47:10	22:11:04	6/3/13 3:27:58 6/3/13 3:28:20	6/3/13 3:28:20 6/3/13 3:28:47
101	531234830	6/2/13 2:36:06 6/3/13 0:43:15	22:07:09	6/3/13 3:28:47 6/3/13 3:29:07	6/3/13 3:29:07 6/3/13 3:29:35
102	531234831	6/2/13 2:36:06 6/3/13 0:46:23	22:10:17	6/3/13 3:29:35 6/3/13 3:29:56	6/3/13 3:29:56 6/3/13 3:30:23
103	531234832	6/2/13 2:36:07 6/3/13 1:08:46	22:32:40	6/3/13 3:30:23 6/3/13 3:30:45	6/3/13 3:30:45 6/3/13 3:31:15
104	531234833	6/2/13 2:36:07 6/3/13 0:43:13	22:07:06	6/3/13 3:31:15 6/3/13 3:31:36	6/3/13 3:31:36 6/3/13 3:32:02
105	531234834	6/2/13 2:36:08 6/3/13 1:08:46	22:32:39	6/3/13 3:32:02 6/3/13 3:32:23	6/3/13 3:32:23 6/3/13 3:32:49

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
106	531234835	6/2/13 2:36:08 6/3/13 0:53:31	22:17:23	6/3/13 3:32:49 6/3/13 3:33:11	6/3/13 3:33:11 6/3/13 3:33:38
107	531234836	6/2/13 2:36:09 6/3/13 1:04:29	22:28:21	6/3/13 3:33:38 6/3/13 3:34:00	6/3/13 3:34:00 6/3/13 3:34:26
108	531234837	6/2/13 2:36:09 6/3/13 0:48:01	22:11:52	6/3/13 3:34:26 6/3/13 3:34:49	6/3/13 3:34:49 6/3/13 3:35:14
109	531234838	6/2/13 2:36:09 6/3/13 0:52:39	22:16:30	6/3/13 3:35:14 6/3/13 3:35:35	6/3/13 3:35:35 6/3/13 3:36:03
110	531234839	6/2/13 2:36:10 6/3/13 0:49:22	22:13:13	6/3/13 3:36:03 6/3/13 3:36:24	6/3/13 3:36:24 6/3/13 3:36:51
111	531234840	6/2/13 2:36:10 6/3/13 1:07:26	22:31:16	6/3/13 3:36:51 6/3/13 3:37:12	6/3/13 3:37:12 6/3/13 3:37:39
112	531234841	6/2/13 2:36:10 6/3/13 1:18:27	22:42:17	6/3/13 3:37:39 6/3/13 3:38:01	6/3/13 3:38:01 6/3/13 3:38:27
113	531234842	6/2/13 2:36:10 6/3/13 0:50:26	22:14:16	6/3/13 3:38:27 6/3/13 3:38:48	6/3/13 3:38:48 6/3/13 3:39:15
114	531234843	6/2/13 2:36:11 6/3/13 0:55:57	22:19:46	6/3/13 3:39:15 6/3/13 3:39:37	6/3/13 3:39:38 6/3/13 3:40:04
115	531234844	6/2/13 2:36:11 6/3/13 0:46:23	22:10:13	6/3/13 3:40:04 6/3/13 3:40:26	6/3/13 3:40:26 6/3/13 3:40:52
116	531234845	6/2/13 2:36:11 6/3/13 1:06:20	22:30:09	6/3/13 3:40:52 6/3/13 3:41:13	6/3/13 3:41:13 6/3/13 3:41:40
117	531234846	6/2/13 2:36:11 6/3/13 0:53:03	22:16:52	6/3/13 3:41:40 6/3/13 3:42:01	6/3/13 3:42:01 6/3/13 3:42:28
118	531234847	6/2/13 2:36:12 6/3/13 1:15:39	22:39:27	6/3/13 3:42:28 6/3/13 3:42:50	6/3/13 3:42:50 6/3/13 3:43:16
119	531234848	6/2/13 2:36:12 6/3/13 0:57:22	22:21:11	6/3/13 3:43:16 6/3/13 3:43:38	6/3/13 3:43:38 6/3/13 3:44:06
120	531234849	6/2/13 2:36:12 6/3/13 1:15:45	22:39:33	6/3/13 3:44:06 6/3/13 3:44:26	6/3/13 3:44:26 6/3/13 3:44:53
121	531234850	6/2/13 2:36:12 6/3/13 0:52:01	22:15:49	6/3/13 3:44:53 6/3/13 3:45:16	6/3/13 3:45:16 6/3/13 3:45:42
122	531234851	6/2/13 2:36:13 6/3/13 0:55:46	22:19:34	6/3/13 3:45:42 6/3/13 3:46:03	6/3/13 3:46:03 6/3/13 3:46:30
123	531234852	6/2/13 2:36:13 6/3/13 0:51:49	22:15:36	6/3/13 3:46:30 6/3/13 3:46:51	6/3/13 3:46:51 6/3/13 3:47:18
124	531234853	6/2/13 2:36:13 6/3/13 1:05:42	22:29:29	6/3/13 3:47:18 6/3/13 3:47:39	6/3/13 3:47:39 6/3/13 3:48:05
125	531234854	6/2/13 2:36:13 6/3/13 1:16:50	22:40:37	6/3/13 3:48:05 6/3/13 3:48:27	6/3/13 3:48:27 6/3/13 3:48:52
126	531234855	6/2/13 2:36:13 6/3/13 1:18:57	22:42:44	6/3/13 3:48:52 6/3/13 3:49:14	6/3/13 3:49:14 6/3/13 3:49:42
127	531234856	6/2/13 2:36:13 6/3/13 0:59:51	22:23:38	6/3/13 3:49:43 6/3/13 3:50:04	6/3/13 3:50:04 6/3/13 3:50:31
128	531234857	6/2/13 2:36:13 6/3/13 0:58:54	22:22:41	6/3/13 3:50:31 6/3/13 3:50:53	6/3/13 3:50:53 6/3/13 3:51:19
129	531234858	6/2/13 2:36:13 6/3/13 1:08:47	22:32:34	6/3/13 3:51:19 6/3/13 3:51:40	6/3/13 3:51:41 6/3/13 3:52:07

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
130	531234859	6/2/13 2:36:13 6/3/13 0:57:38	22:21:25	6/3/13 3:52:07 6/3/13 3:52:28	6/3/13 3:52:28 6/3/13 3:52:54
131	531234860	6/2/13 2:36:13 6/3/13 1:05:12	22:28:59	6/3/13 3:52:54 6/3/13 3:53:15	6/3/13 3:53:15 6/3/13 3:53:43
132	531234861	6/2/13 2:36:13 6/3/13 1:08:34	22:32:21	6/3/13 3:53:43 6/3/13 3:54:04	6/3/13 3:54:04 6/3/13 3:54:29
133	531234862	6/2/13 2:36:13 6/3/13 0:59:52	22:23:38	6/3/13 3:54:29 6/3/13 3:54:50	6/3/13 3:54:50 6/3/13 3:55:17
134	531234863	6/2/13 2:36:14 6/3/13 1:18:28	22:42:15	6/3/13 3:55:17 6/3/13 3:55:38	6/3/13 3:55:38 6/3/13 3:56:06
135	531234864	6/2/13 2:36:14 6/3/13 1:26:25	22:50:12	6/3/13 3:56:06 6/3/13 3:56:28	6/3/13 3:56:28 6/3/13 3:56:54
136	531234865	6/2/13 2:36:14 6/3/13 1:11:43	22:35:29	6/3/13 3:56:54 6/3/13 3:57:15	6/3/13 3:57:15 6/3/13 3:57:41
137	531234866	6/2/13 2:36:14 6/3/13 1:34:44	22:58:30	6/3/13 3:57:41 6/3/13 3:58:03	6/3/13 3:58:03 6/3/13 3:58:30
138	531234867	6/2/13 2:36:14 6/3/13 1:28:43	22:52:29	6/3/13 3:58:30 6/3/13 3:58:51	6/3/13 3:58:51 6/3/13 3:59:18
139	531234868	6/2/13 2:36:14 6/3/13 1:24:22	22:48:08	6/3/13 3:59:18 6/3/13 3:59:40	6/3/13 3:59:40 6/3/13 4:00:06
140	531234869	6/2/13 2:36:14 6/3/13 1:21:04	22:44:49	6/3/13 4:00:06 6/3/13 4:00:27	6/3/13 4:00:27 6/3/13 4:00:54
141	531234870	6/2/13 2:36:14 6/3/13 1:06:44	22:30:30	6/3/13 4:00:54 6/3/13 4:01:14	6/3/13 4:01:14 6/3/13 4:01:40
142	531234871	6/2/13 2:36:15 6/3/13 1:15:48	22:39:34	6/3/13 4:01:40 6/3/13 4:02:01	6/3/13 4:02:01 6/3/13 4:02:28
143	531234872	6/2/13 2:36:15 6/3/13 1:43:06	23:06:52	6/3/13 4:02:28 6/3/13 4:02:49	6/3/13 4:02:49 6/3/13 4:03:15
144	531234873	6/2/13 2:36:15 6/3/13 1:41:45	23:05:30	6/3/13 4:03:15 6/3/13 4:03:37	6/3/13 4:03:37 6/3/13 4:04:03
145	531234874	6/2/13 2:36:15 6/3/13 1:43:53	23:07:38	6/3/13 4:04:03 6/3/13 4:04:24	6/3/13 4:04:24 6/3/13 4:04:51
146	531234875	6/2/13 2:36:15 6/3/13 1:30:41	22:54:26	6/3/13 4:04:51 6/3/13 4:05:12	6/3/13 4:05:12 6/3/13 4:05:38
147	531234876	6/2/13 2:36:15 6/3/13 1:25:57	22:49:42	6/3/13 4:05:38 6/3/13 4:05:58	6/3/13 4:05:58 6/3/13 4:06:24
148	531234877	6/2/13 2:36:15 6/3/13 1:29:49	22:53:34	6/3/13 4:06:24 6/3/13 4:06:45	6/3/13 4:06:45 6/3/13 4:07:12
149	531234878	6/2/13 2:36:16 6/3/13 1:28:37	22:52:22	6/3/13 4:07:12 6/3/13 4:07:31	6/3/13 4:07:31 6/3/13 4:07:59
150	531234879	6/2/13 2:36:16 6/3/13 1:18:18	22:42:02	6/3/13 4:07:59 6/3/13 4:08:19	6/3/13 4:08:19 6/3/13 4:08:45
151	531234880	6/2/13 2:36:16 6/3/13 1:27:44	22:51:28	6/3/13 4:08:45 6/3/13 4:09:05	6/3/13 4:09:05 6/3/13 4:09:30
152	531234881	6/2/13 2:36:16 6/3/13 1:26:00	22:49:45	6/3/13 4:09:30 6/3/13 4:09:51	6/3/13 4:09:51 6/3/13 4:10:16
153	531234882	6/2/13 2:36:16 6/3/13 2:05:32	23:29:16	6/3/13 4:10:16 6/3/13 4:10:36	6/3/13 4:10:36 6/3/13 4:11:02

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
154	531234883	6/2/13 2:36:16 6/3/13 1:30:56	22:54:40	6/3/13 4:11:02 6/3/13 4:11:21	6/3/13 4:11:22 6/3/13 4:11:48
155	531234884	6/2/13 2:36:16 6/3/13 1:25:11	22:48:55	6/3/13 4:11:48 6/3/13 4:12:08	6/3/13 4:12:08 6/3/13 4:12:34
156	531234885	6/2/13 2:36:16 6/3/13 1:39:17	23:03:01	6/3/13 4:12:34 6/3/13 4:12:55	6/3/13 4:12:55 6/3/13 4:13:22
157	531234886	6/2/13 2:36:16 6/3/13 1:33:36	22:57:20	6/3/13 4:13:22 6/3/13 4:13:43	6/3/13 4:13:43 6/3/13 4:14:10
158	531234887	6/2/13 2:36:16 6/3/13 1:34:32	22:58:15	6/3/13 4:14:10 6/3/13 4:14:29	6/3/13 4:14:29 6/3/13 4:14:56
159	531234888	6/2/13 2:36:16 6/3/13 1:24:56	22:48:40	6/3/13 4:14:56 6/3/13 4:15:15	6/3/13 4:15:16 6/3/13 4:15:42
160	531234889	6/2/13 2:36:16 6/3/13 1:40:22	23:04:06	6/3/13 4:15:42 6/3/13 4:16:02	6/3/13 4:16:02 6/3/13 4:16:27
161	531234890	6/2/13 2:36:16 6/3/13 1:52:47	23:16:30	6/3/13 4:16:27 6/3/13 4:16:47	6/3/13 4:16:47 6/3/13 4:17:13
162	531234891	6/2/13 2:36:16 6/3/13 2:03:30	23:27:14	6/3/13 4:17:13 6/3/13 4:17:33	6/3/13 4:17:33 6/3/13 4:17:59
163	531234892	6/2/13 2:36:17 6/3/13 1:33:44	22:57:27	6/3/13 4:17:59 6/3/13 4:18:19	6/3/13 4:18:19 6/3/13 4:18:44
164	531234893	6/2/13 2:36:17 6/3/13 1:38:42	23:02:25	6/3/13 4:18:44 6/3/13 4:19:05	6/3/13 4:19:05 6/3/13 4:19:30
165	531234894	6/2/13 2:36:17 6/3/13 1:41:41	23:05:24	6/3/13 4:19:30 6/3/13 4:19:51	6/3/13 4:19:51 6/3/13 4:20:17
166	531234895	6/2/13 2:36:17 6/3/13 1:41:37	23:05:20	6/3/13 4:20:17 6/3/13 4:20:37	6/3/13 4:20:37 6/3/13 4:21:04
167	531234896	6/2/13 2:36:17 6/3/13 1:29:52	22:53:35	6/3/13 4:21:04 6/3/13 4:21:25	6/3/13 4:21:25 6/3/13 4:21:52
168	531234897	6/2/13 2:36:17 6/3/13 1:29:40	22:53:23	6/3/13 4:21:52 6/3/13 4:22:14	6/3/13 4:22:14 6/3/13 4:22:42
169	531234898	6/2/13 2:36:17 6/3/13 1:49:42	23:13:25	6/3/13 4:22:42 6/3/13 4:23:04	6/3/13 4:23:04 6/3/13 4:23:32
170	531234899	6/2/13 2:36:17 6/3/13 1:58:15	23:21:57	6/3/13 4:23:32 6/3/13 4:23:53	6/3/13 4:23:53 6/3/13 4:24:21
171	531234900	6/2/13 2:36:17 6/3/13 1:33:26	22:57:08	6/3/13 4:24:21 6/3/13 4:24:43	6/3/13 4:24:43 6/3/13 4:25:10
172	531234901	6/2/13 2:36:18 6/3/13 1:41:40	23:05:22	6/3/13 4:25:10 6/3/13 4:25:31	6/3/13 4:25:31 6/3/13 4:25:57
173	531234902	6/2/13 2:36:18 6/3/13 1:44:54	23:08:36	6/3/13 4:25:57 6/3/13 4:26:18	6/3/13 4:26:18 6/3/13 4:26:44
174	531234903	6/2/13 2:36:18 6/3/13 2:03:14	23:26:56	6/3/13 4:26:44 6/3/13 4:27:05	6/3/13 4:27:05 6/3/13 4:27:30
175	531234904	6/2/13 2:36:18 6/3/13 2:01:05	23:24:47	6/3/13 4:27:30 6/3/13 4:27:52	6/3/13 4:27:52 6/3/13 4:28:20
176	531234905	6/2/13 2:36:19 6/3/13 2:05:25	23:29:06	6/3/13 4:28:20 6/3/13 4:28:41	6/3/13 4:28:41 6/3/13 4:29:08
177	531234906	6/2/13 2:36:19 6/3/13 1:41:40	23:05:21	6/3/13 4:29:08 6/3/13 4:29:30	6/3/13 4:29:30 6/3/13 4:29:57

Throughput Stream	Seed	Query Start Query End	Duration	RF1 Start RF1 End	RF2 Start RF2 End
178	531234907	6/2/13 2:36:19 6/3/13 2:06:44	23:30:26	6/3/13 4:29:57 6/3/13 4:30:19	6/3/13 4:30:19 6/3/13 4:30:47
179	531234908	6/2/13 2:36:19 6/3/13 2:05:11	23:28:52	6/3/13 4:30:47 6/3/13 4:31:08	6/3/13 4:31:08 6/3/13 4:31:33
180	531234909	6/2/13 2:36:19 6/3/13 1:49:45	23:13:26	6/3/13 4:31:33 6/3/13 4:31:55	6/3/13 4:31:55 6/3/13 4:32:21
181	531234910	6/2/13 2:36:19 6/3/13 2:07:45	23:31:26	6/3/13 4:32:21 6/3/13 4:32:43	6/3/13 4:32:43 6/3/13 4:33:08
182	531234911	6/2/13 2:36:19 6/3/13 1:45:55	23:09:36	6/3/13 4:33:08 6/3/13 4:33:30	6/3/13 4:33:30 6/3/13 4:33:57
183	531234912	6/2/13 2:36:20 6/3/13 2:01:11	23:24:52	6/3/13 4:33:57 6/3/13 4:34:18	6/3/13 4:34:18 6/3/13 4:34:45
184	531234913	6/2/13 2:36:20 6/3/13 2:06:04	23:29:44	6/3/13 4:34:45 6/3/13 4:35:07	6/3/13 4:35:07 6/3/13 4:35:33
185	531234914	6/2/13 2:36:20 6/3/13 2:06:17	23:29:57	6/3/13 4:35:33 6/3/13 4:35:54	6/3/13 4:35:54 6/3/13 4:36:21
186	531234915	6/2/13 2:36:20 6/3/13 2:02:11	23:25:51	6/3/13 4:36:21 6/3/13 4:36:42	6/3/13 4:36:43 6/3/13 4:37:12
187	531234916	6/2/13 2:36:20 6/3/13 2:09:00	23:32:40	6/3/13 4:37:12 6/3/13 4:37:34	6/3/13 4:37:34 6/3/13 4:38:00
188	531234917	6/2/13 2:36:20 6/3/13 2:08:51	23:32:31	6/3/13 4:38:00 6/3/13 4:38:22	6/3/13 4:38:22 6/3/13 4:38:48
189	531234918	6/2/13 2:36:20 6/3/13 2:10:02	23:33:41	6/3/13 4:38:49 6/3/13 4:39:11	6/3/13 4:39:11 6/3/13 4:39:37
190	531234919	6/2/13 2:36:21 6/3/13 1:59:05	23:22:45	6/3/13 4:39:37 6/3/13 4:39:58	6/3/13 4:39:58 6/3/13 4:40:23
191	531234920	6/2/13 2:36:21 6/3/13 2:05:12	23:28:51	6/3/13 4:40:23 6/3/13 4:40:46	6/3/13 4:40:46 6/3/13 4:41:11
192	531234921	6/2/13 2:36:21 6/3/13 2:03:18	23:26:57	6/3/13 4:41:11 6/3/13 4:41:33	6/3/13 4:41:33 6/3/13 4:41:59

TPC-H Timing Intervals (in seconds):

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
0	249.6	2.8	12.4	10.1	55.8	7.9	56.6	35.9	144.8	33	17.9	45.1
1	2725.6	2377.8	9292.1	2597.5	4442.5	5549.8	3237.5	1783.4	2859	2568.9	3552	3800.5
2	2013	4828.2	2703.6	2456.2	3145.2	12.1	3812.5	3098.5	4682	3204.8	2720.3	3683.3
3	5553	1763.9	2733.4	6967.5	9513.9	4457.5	3130.4	380.7	3870	2716	2778.7	2906.5
4	2560.6	2739	2870.8	2273.1	265.3	4411.9	3203.5	3576.2	3810.9	2374	4290.2	5689.6
5	2840.9	2462.7	4151.4	7030.9	1793.6	4312.6	3683.5	2507.1	2729.6	2772	3575.4	3235.4
6	2977.5	2359.2	9693.8	2274.9	2224	3577.9	4684.4	3154.3	5460.9	97.7	3486.3	4019.2
7	2955.7	3500	4215.7	3231.5	2504	2774.7	1874	8827.5	3615.6	2559.1	3255.9	2645.1
8	9861.9	2694.2	3039.6	3548.4	3505.6	2489.2	3217.3	3071.5	5699.7	2549.4	2651.4	4572.7
9	1998	6819.2	3023.3	2960.7	2914.2	5646.6	2344.9	649.6	3159.1	2996.9	3505.3	2586.7
10	3729.2	4251.5	2344.3	2767.2	2629.2	611.6	5149.7	2826.9	2524.9	3057.7	2715.6	3854.7
11	2234.3	2342.5	2346.9	3462.8	4278.6	2692	2496.1	3659.2	1792.3	3613.8	4450.6	2974.8
12	1307.3	4294	2683.8	3030.6	2434.2	4292.1	9146	2484.4	3782	2588.3	3527.3	5448.8
13	4008.1	4223	4526.9	2581	2308.5	3647.1	6692.7	2713.5	2714.4	3323.2	2969.6	5250.3

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
14	3040.4	1158.3	2564.2	4419.5	6663	2515.2	3579.4	1848.2	9198	2925.6	2390	3009.2
15	2548.2	2736.2	2817	2753.4	2569	2368.2	3785.2	4525.2	9342.3	5212.4	3283.8	4447.6
16	1805.3	3435.8	8778.8	3629.9	4649.4	6639	2782.3	1851.9	3072.7	4252	2576.5	2689.6
17	2608.6	5309.3	1238.9	2472.5	6637.2	2755.2	3001.7	4494.8	3376.6	2272.9	4475.6	2654.9
18	4274.6	3415.2	2237.1	9171.7	4518.1	4419.4	2384.2	5553.2	1752.4	2353.5	3110.2	2564.6
19	2650.5	4398	2376.1	1276.4	3396.6	1760.2	2737.1	2345	2742.2	3643.2	3108.6	9269.7
20	3518.8	2523.8	1724	3500.7	4339.7	2754.4	2413	2782.8	2592.6	2544.9	3037.7	3787.5
21	2792.4	2648.5	2746.5	5385.8	2541.2	2672	1848.1	2645.2	2872.1	3636.1	3690.8	4663.4
22	2912.6	4636.1	2586.5	4418.6	2444.9	2632.9	2332.3	1944.1	2722.2	3150.1	5410.4	2984.2
23	3362.9	3261.7	2797.8	2604.2	2610.8	4186.2	2569.1	5242.8	6909.1	1805.2	4295.7	3613.8
24	2427	2316.4	9043.4	3384.4	2369.2	4295.3	1493.1	2872.3	3692.5	6556.8	2776.4	2656.1
25	9351.8	3891.4	2590	2774.4	3394.7	2797.7	4140.6	2512.5	2760.9	3706.9	3040.7	2808.2
26	2591.6	8838.1	1777.5	3672.7	4546.2	2356.1	2364.7	2427.7	2745.2	3525	3559.6	2668.9
27	2892.3	3579.9	2460.5	4048.5	2771.3	4943.1	3003.3	4112	3773.8	2861.6	2621.5	2452.3
28	6628.1	2592.8	2547.7	2329.5	2606.5	2641.9	3021.5	2832.1	2761.9	1792.9	2574.2	4696.2
29	5809.2	1883.1	2482.1	2528.3	3991.6	3265.7	2823.5	8800.7	7081.6	1864	3433.5	3583.4
30	3642.8	2773.9	3588.1	2778.7	4220.5	2648.6	1917.3	2517.5	2976.3	3346.7	2766.9	2025.6
31	5187.8	1878.1	4172.5	3436.7	3532.4	2683.4	3315.7	2593	8722	2608.6	4425.7	2709.9
32	2525.1	2625.6	3245.3	4101.3	2981.3	4270.9	3640.5	7016	2312.3	2340.3	1865.3	8979.5
33	2539.1	7038.2	2789.7	3313.9	5121.9	2388.1	3340.8	1853.2	2581	4354.9	4198	2360.5
34	2542.8	2607.6	4023.9	3559.4	2544.5	5110.9	4207.5	2776.2	3025.2	2332.3	7022.4	2694
35	2736.3	3707.3	2692.6	2312.3	5018.8	2869.4	2336.3	3603.5	2514.4	4291.7	2514.8	4341.7
36	3024.5	2739.4	3267.3	4033.8	3569.4	4211.3	7074.6	2757.2	2315.1	2486.7	2747.8	2743.5
37	2588.3	2685.2	2593.4	2446.3	6989	4024.9	4333.8	3674.2	5325.4	3003.7	3394.6	2762.4
38	3850.5	4214.2	3101.1	6915.7	8697.3	4956.1	3352.8	2879.5	2521	2878.5	3555.6	2653.1
39	2429.4	2606.8	2344.6	3644.3	3368.6	3605	8720.3	2691	1744.4	3245.3	2719.3	2608.6
40	3944.8	2504.1	5014.6	4332.7	2762.5	2601.1	2834.1	2494.9	4303.5	2702.2	3392.8	2683.6
41	2456.9	8664.5	3364.3	2478.2	2504.6	3562.9	2939.6	3795.7	7207.7	2672.1	2457.6	2627.7
42	2814.2	2469.2	8237	2561.1	4024.6	4951.6	3487.6	1888.1	2696.8	2556.9	3581.6	3368.2
43	2356.9	3713	2454.1	2656.3	3327.7	2540.8	2623.5	3457.7	5413.2	3607.5	2900.7	4253.7
44	4941.5	1817.3	2606.4	7008.9	8453.7	3974.8	3676.2	2622.2	3604.6	3009.2	2473.9	2869.3
45	2564.6	2557.7	2767.2	2824	2543.2	3969.4	2813.2	3655.2	3153.3	2406.4	4247.6	5158
46	2448.5	2370.1	4283.5	6928.7	1858.7	4028.4	3658.2	2687.6	2521	2834	3560.4	2983.1
47	2414	2378.3	8386.2	2823.6	2456.2	3506.4	3702.1	3739.1	5319.8	2724.4	3409.8	4422.4
48	2687.9	3241.2	4158.3	3907.7	2440.1	2879	1808.5	7927	3489.7	2396.7	3407.9	2570
49	8668.2	2735.7	3226.1	3473	3463.5	2364.3	3005.2	3697.3	5549.9	2482.7	2803	3826.2
50	1865.6	6909	3607.8	2556.9	2837.8	5151.8	2420.9	3172.6	2866.7	3050.4	3343.4	2868.2
51	3985.4	3615.4	2456.2	2559.7	2569.2	3152.6	5203.7	2829.7	2432.7	3021.4	2883.7	3724.3
52	2820	2641.5	2439.1	3342.1	4165.2	2571.8	2558.1	3399.4	1848.4	3493.5	3802.1	2638
53	3860.7	4247.7	2509.5	3018.7	2476.7	3639.1	7958.9	2750.9	3357.9	2668.1	3478.8	5211.4
54	3290.5	4174.9	4270.9	2465.1	2432.5	3459.4	6583.3	2584.3	3064.9	3912.4	3233	5172.4
55	3608.8	3373.5	2615.8	4078.2	6595.9	2537.6	3425.8	1845.4	8287	2698.8	2673.9	2897.7
56	2515.6	2614.5	3125.2	2805.1	2556.9	2745	3348.3	4261.5	8331.5	5204.1	3704.4	3798.8
57	4127.5	3234.2	7896.3	3493.4	4268.9	6420.8	2813.8	1986.5	3391.2	4210.2	2477.6	2474.4
58	2452.7	5089.3	3691.5	2640.3	6465.4	2796.7	3021.9	4323.1	3935.8	2759.8	4104.8	2558.8
59	4167.9	3355.8	2876.9	8086.5	4076.6	3668	2523.7	5285.2	1828.5	2410.4	3627.4	2655.4
60	2550.4	3721.7	2424.1	3737.8	3288.9	1908.3	2496.5	2806	3075.6	3391.6	2955.5	8223.9
61	3397	2635	1924.3	3464.8	4206.8	2835.8	2738.5	2788.7	2711.9	2416.5	2729	3524

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
62	3022.1	2518.9	2842.4	5133	2509.4	2463.7	1868.5	2493.4	2942.9	3429	3463.5	4293.7
63	2803.6	4247.2	2640.3	3696.3	2468.3	2423.1	2464	1910.2	2763.8	3789.7	5154.3	3089.2
64	3735.9	4239.4	2885.8	2718.5	2298.8	3870.5	3233	5069.8	6830.1	1984.6	3343.5	3523.2
65	1771.8	2313.1	7856.5	3102.9	2532.4	3655.9	4001.2	3210.8	3506.8	6581.7	2808.1	2879.8
66	8538.3	3652.6	2678.7	2734.2	2983.3	2860	4044.8	2380.7	3017.1	4173.3	3229.8	2917.9
67	2508.8	7878	1812.3	3495.8	4255.3	2436.3	2735.6	2675.1	2997.9	3337	3249.5	2655.9
68	2424.1	3219.1	2496.5	3647.3	2728.4	4895.1	3078.8	4291.3	4328.5	2929.4	2643.9	2715.1
69	6422	3005.2	2642.9	2325.9	2543.6	2702.7	3195.5	2699.9	2785.8	4102.1	2832.3	4445.4
70	5595.3	1891.9	2447.9	2848.1	2958	4056	2810.6	7936.1	6721	4153.1	3249.1	3620.6
71	3544.2	3314.1	3337.9	2844.5	4072.2	2746.9	4232.9	2432.8	3054.7	4215.3	2727.4	2113.9
72	4976.3	4150.4	4278.1	3238.9	3321.6	2574.8	4156.7	2580.4	7868.2	2532.6	3679.3	2596.7
73	2576.6	2630.3	2985	4182.4	3220.7	4191.7	3473	6375.1	2316.3	2616.9	1789.9	8004.6
74	2758.7	6375.5	3073.4	3148.8	4808.3	2592.9	4267.1	1832.8	2773.1	4203.5	4299.2	2354.9
75	4827.4	3124	4202.9	3503.1	2470.7	5188.6	4297.8	2700	3192.7	2340.1	6136.5	2530.4
76	2731.4	3529.5	2512.8	2440.3	4960.1	2862.5	2620.3	3290.3	2467.3	3648.3	2626.8	4336.7
77	3193.7	2656.2	3087.9	4082.7	3338.6	4171.4	6320.9	2924.5	4579.7	2600.5	3009.2	2938.2
78	2768.2	2737	2495.2	2540.3	6433.2	3363.4	4223.9	3565.4	5189.4	3184.2	4222.5	2885.3
79	4712.1	4140.3	3243.5	6460.8	7687.5	5283.7	3264.1	3024.8	3140.9	2778.2	3310.7	2485.2
80	2578.2	2773.3	4550.3	3480.8	4204.8	3352.4	7775.2	2645.5	1776.5	3052.9	2750.5	2650.7
81	4070.4	2312.7	4757.3	3669.5	2745.8	2620.1	3112	2636.8	4167.7	2806.5	4187.7	2628
82	2628.4	7755.5	3516.8	2578.6	2636.9	3341	2822	3710	6419.3	2593.1	2331.5	2761
83	2817	2303.8	7471.7	3309	4225.3	5199.6	4075.3	1960.4	2719.2	2521	3529.5	3380.3
84	2444.5	3364.5	2634.3	2769	3471.1	4597.7	2532.2	3049.9	5020.5	4144	2818.2	4381.6
85	4638.2	1775.4	2760.9	6336.9	7742.1	4061.9	4318.2	4676.4	3497	3192.9	2569.4	3006.3
86	2412.1	2271.2	2644.8	3075.9	4809.1	2943.6	2706.4	3482.4	3461.3	2290.8	3712.4	5464.2
87	2464.7	2375.9	4243.9	6092.5	1828.5	4086	3510.4	2589.9	3082.2	2784.5	3448.7	2868.7
88	2481.8	2451	7654.9	3023.4	2379.9	3360.3	3354.4	4296.3	5034.4	4829.7	3016.3	4363
89	3047.2	3050.4	3812.1	4379.8	2324	2701.7	2012.8	7374.8	3483.7	2452.4	3230.4	3604.9
90	7931.3	2816.3	3072	3469.6	3356.5	2374.8	3188.7	4178.4	5443.2	2419	3144.5	3023.2
91	1878.3	6071.6	4085.2	2497.8	2813.8	5174.5	2468.4	5369.2	2795.8	3218.2	3053.5	2807.8
92	4070.1	3222.6	2375.9	2593.2	2723.4	5367	5157.6	2891.1	2468.5	3232.7	2734.8	3527.8
93	2994.5	2733.1	2420.3	3398.2	4201.9	2627.8	2974.2	3111.2	1882.9	3483.5	3203.5	2526.2
94	6053.9	3787.7	2706.8	3543.1	2392.9	2879.6	7343.2	3090.6	3508.7	2789.4	3355.8	5371
95	3276	4195.3	4289.2	2477.7	2349.8	3351.7	5668.4	2524.5	2989.2	4208.1	3238.3	5301.6
96	4068.5	5479.3	2635.6	4226.9	5613.4	3019.9	3389.3	1986.8	7737	2777.8	2769	2939
97	2471.3	2622.2	3242.3	2810.1	2472.9	3031.4	3531.4	4291.3	7730	5146.2	4206.9	3135.6
98	6243.3	3044.4	7298.2	3419.5	4454.4	5520.6	2601.7	2121.1	3698.5	3794.9	2395.4	2543.5
99	2456.2	5235	5889.3	2833.4	5559	2767.6	3434.6	3833.4	4497	3023.5	4379.1	3715.1
100	4150.7	3268.3	3050.4	7376.5	4328.9	3137.3	2715.8	5181.8	1900.3	2310.7	4173.6	2593.7
101	3142.4	2936.5	2447.6	5931.7	3140.8	1888.9	2484.9	3090.5	3065.5	3186.4	2812.4	7656.8
102	3216.7	2728.1	2054.2	3356.5	3849.6	2829.6	2987.5	3329	2382.9	2532.9	2794.2	3556.9
103	4170.5	4283.1	2637.7	5037.9	2265.2	2843.3	2161.3	2482.5	2553.9	3280.7	3408	4382.9
104	2975	4285.9	2697.1	2998.3	2456.9	2386.6	2287.8	2054.5	2846.9	4212.1	5342.7	3510.7
105	3548.3	4335.7	2633.6	2943.9	2250.3	3795.9	4291.4	5166.4	6041.7	2092.9	3039.5	3322.1
106	1878	2306.2	7221.9	3219.4	2452.4	2999.4	6194.9	3287.7	3535.9	5618.8	2801.4	2992.8
107	7860.5	2932.5	2867.6	2702.9	3147.6	2527.7	4144.6	2334.2	4214	4367.2	3592.8	2945.6
108	2384.5	7300.7	2052.8	3469.6	4192.3	2287.8	3023.4	2757.7	3396	3188.5	3187.1	2715.8
109	2283.8	3155.2	2424.9	2924	3086.7	5070.4	3477	4348.8	4720.7	2696.4	2745.3	2819.7

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
110	5613.2	3114.7	2544.1	2284.7	2388.1	2685.8	3437.7	2727.3	2838.1	6288	3391.9	4298.7
111	5421.2	2102	2304	4210.4	2589.3	4462.7	2630.6	7369.6	5909.6	6307.7	3285.8	3413.9
112	3920.2	4731.4	3140.9	2684.3	4147.3	3004.1	6409.2	2541	3314.3	4391.9	2484.4	2136.6
113	5119.9	6311.1	4144.6	3116.6	3213	2643.4	4509.8	2512.5	7658.3	2424.3	2949.7	2874.7
114	2424.9	3718.6	3144.9	4146.4	3480.4	3815.7	3493.2	5534.2	2280	2748.9	2066.9	7561
115	3229.9	5637.4	3344.3	3154.2	5132.6	2700.9	4466.3	2029.5	2521	3891.7	4183.7	2303.8
116	6964.1	4169.1	4151.1	3349.7	2256.8	5021.9	3819.9	2824.1	3660	2320	5204.6	2409.2
117	3078.8	3496.2	2457.1	2324	4962	2648.3	2882.8	3257	2377.4	2943.6	3556.5	3955.3
118	4218.4	2836	3166.4	4057.7	3379.5	3337	5468.1	2661.8	6847.9	3029.3	3087.7	2729.2
119	2843.8	2744.7	2445.1	2396.7	5440.9	2927.5	3795.9	3559.8	5052.6	3549.8	4387.8	2853.4
120	4982.6	3583.3	3656	5415.9	7436.7	5176.3	2977.3	3010.7	4697.4	2550.9	3256.5	2305.6
121	2392.8	3494.8	6722.8	3485.2	4334.8	3226	7398.5	2466	2048.8	3144.9	2766.5	2643.3
122	4052.7	2276.6	4790.9	2997.4	2654.8	2792.1	2994.2	2407.3	3791.9	2682.4	4501	2975
123	2384.3	7314	3489.4	2394	2661.1	3201.2	2845.7	3011.5	5416.9	2744.9	2293.6	3542.6
124	2576.6	2323	7355	4182.7	4085	4769.6	4502	2110.7	2614.8	2264.3	3366.5	3296.9
125	2439.9	2636.4	2819.8	2945.3	3369.1	6870	2302.1	3317.2	5146.2	4446.8	2672.5	3918.4
126	4769.5	2069.4	4564.3	5392.1	7308.6	4037.7	4587	6946.3	3637.2	3600.5	2315.8	2938.2
127	2415.9	2309	2627.2	2982.8	6949.7	2532.1	2706.4	3045.2	3776.5	2212.7	3582.5	5228.6
128	2400.5	2283.5	3792.1	5393.3	2049.3	4035.8	3313.1	2468.6	3899.1	2683.6	3378.8	2729
129	2262.5	2448.7	7329.7	3083.8	2320	3334.6	3050.8	4485.9	4825.9	6957.6	3251.5	3810.2
130	3090.8	3422.9	3807	4461.9	2319.8	2798.5	2092.9	7377.9	3324.4	2412.1	3273.9	3815.3
131	7873.7	2621.1	3612	3029	3322.4	2257.6	3777	4511.8	5281.3	2393	4156.5	2622.3
132	2066.4	5318.7	4538.5	2281.4	2633.9	5020.4	2432.3	7059.1	2580.9	3562.7	3297	3123.2
133	4434.4	2721.4	2323.8	2822.4	3837.8	7079	5047.7	2620.5	2252.6	3564	2628.7	3482.4
134	3094.3	3015.4	2124.6	3178.7	3390.9	2827.3	4667	3755.3	2145.1	3424.4	2545.2	2356.2
135	7824.4	3377.6	2876.1	3760.6	2239.1	2510.5	7345.1	3216.1	3547.2	3053.3	3192.3	4977.7
136	3278.5	3371.8	4132.3	2242.7	2208	3181.4	4754.4	2540.9	3149.3	4628.2	3770.2	5270.8
137	5177.3	7207	2906.7	4143.5	4836.1	5258.3	3220.5	2180.1	7735.7	2573.5	2931.5	2899.5
138	2516.1	2758.4	3699.9	2826.4	2304.5	3152.1	3193	4129.6	7805.9	5075.6	4726.8	2694.4
139	7969	3268.9	7192.6	2938.7	3802.8	5014.6	2681.5	2146.2	3663.9	3576.4	2382.4	2615.9
140	2535.9	4879.4	7700.5	2941.1	4826.5	2662.5	3759.8	3423.6	4957.5	2994.8	4057.4	4940.2
141	3655.7	3340.5	2991.8	7348.8	4257.9	2545.7	2823.2	5176.2	2092.9	2170.8	4624.5	2541.7
142	4615	2496.4	2237	7738.3	3156.8	2124	2296.5	3167.2	3798.8	3628.4	2635.1	7601.6
143	3898.8	2823.3	2101.4	3320.2	3593.9	2723	2981.4	5750	2770.9	2100.1	2585.7	3333.1
144	4270.1	5672.1	2729.8	4805.8	2183.9	2810.4	2289.1	2438.1	2525.2	3544.8	3283.2	3936.8
145	3508.7	3827.3	3025.7	2577.7	2169.3	2426.9	2055.9	2286.2	2697.7	4727.8	5080.2	3651.4
146	3707.2	4908.7	2746	2928.1	2150.2	3376.3	5164.9	4902.7	5150.6	2145.1	2470	3499.1
147	2154.2	2211.1	7196.6	3732.3	2479.9	2567.4	7967.9	3746.8	3321.7	5103.1	2863.1	3021.5
148	7300.7	2525.7	3044.2	2583.3	3630.7	2821.6	4056.6	2248.9	5205.8	4986.5	3800.3	2758.8
149	2535.9	7198.5	2141.3	2941.1	3740.4	2128.1	3094.8	3077	3976.8	3704.7	3183.4	2758.8
150	2208	3195.5	2300.5	2520	3146.4	4815.8	3701.1	3772.4	5135.8	2604.7	2963.2	2931.9
151	5080	3147.6	2320.3	2188.1	2461.5	2449	3749.1	2892	2941.8	8057.3	4991.5	3889.9
152	4862.4	2133.1	2219.8	4888.5	2483.9	4822.6	2779.8	7202.9	5326.3	8067.6	3512.8	3345.5
153	4062	6742.6	3308.6	2712.6	3785.4	2953.4	8167.8	2422.9	3531.6	4847.7	2537.5	2696.8
154	4878.2	8080.7	3746.1	3123.4	3579.3	2902.5	4931.7	2261.8	7482.7	2451.7	2530.3	3161.2
155	2180.6	4882.6	3496.8	3668	3669.8	3516.6	3298.9	5012.5	2160	3053.4	2156.3	7360.8
156	5648.1	4994.4	3743.9	3589.3	4878.2	3045.5	4931.6	2202.2	2300.5	3364.3	3735.7	2334.2
157	8731.6	5197.8	3637	3338.7	2324.3	4806.2	3384.5	2854.9	3663.6	2124.4	5021.3	2497.8

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
158	3146.4	3142.6	2507.7	2066	4820.4	2687.2	2929.9	3181.7	2462.3	2524	5251.2	3645.1
159	3619.2	2756.7	3552.3	3584.4	3313.6	3512.8	5056.3	2587.4	8537.9	3053.3	3227.2	2819.7
160	3025.7	2853.7	2453.7	2107.5	4952.7	2441.3	3617.7	3352	5117.7	3612.7	4933.3	2583.5
161	5520.9	3506.6	3531.6	4979.5	7078.8	4694.4	3446.4	3258	6254	2539.9	3233.5	2481.2
162	2185.3	6674.8	8486.7	3181	4890.5	3250.5	7170.4	2529	2423.6	3496.8	2547.6	3005.3
163	3649.5	2109.6	4858	2501.2	2708.8	2983.2	3203.9	2191.3	3713.5	2591.1	4861.9	3068.3
164	2507.7	7076.1	3388.4	2223.9	2851.1	3213.3	2733.8	2472.9	5341.2	2929.9	2076.5	5497.1
165	2699	2078.5	7000.3	5664.2	3588.7	4808.1	4984	2199.9	2553.9	2220.2	3373.4	3505.6
166	2419.9	2330.2	2881.7	3057.7	3283	8554.8	2181	3510.9	5112.6	4848.2	2739.5	3561.5
167	4855.9	2080.6	5001.2	4956.5	7022.3	3662.5	4949.9	8637	3285.3	3671.4	2241.7	2743
168	2503.7	2200	2749.1	3158.1	8754.8	2367.6	2594.9	3368.3	3448.6	2097.6	3568	4649.2
169	2200.2	2105.8	3520.8	4953.2	2143.5	3624.1	3362.4	2571.8	6137.6	2627.9	3353.9	2660.4
170	2097.3	2449.3	6975.7	3091.4	2132	3308.3	2555	4948.7	4813.4	8738.3	3550.3	3615.9
171	3095.3	3322.3	3347.5	4837.9	2075.9	2556.8	2201.3	7051.7	3609.6	2419.9	3549.6	5209.2
172	7557.8	2551.7	3847.7	3240.5	3189	2042.7	3317.2	5295.1	4894	2328.8	5667.6	2327.7
173	2110.7	4850.4	5307.4	2224.2	2629.7	4657.5	2507.7	8857	2789.8	3530.2	3458.3	3102.6
174	5481.9	2240.7	1810.8	2793.8	6699.7	8875.6	4574	2851.5	2513.5	3847.7	2473.6	3398.6
175	3178.8	3039.5	2085.8	3279.5	3466.6	2802.6	6585.9	3514.4	2584.3	3265.7	2466.2	2320.6
176	9608.1	2743.6	2764.1	4294	2369.5	2272.8	7034.7	3607.1	3884.2	3009.1	2745.5	4865.1
177	3176.1	3314.5	3642.2	2183.6	2067.9	3428	4414.7	2505	3571.6	5099.8	3742.6	4922.9
178	5582.3	8977.9	2942	3553.3	4536.8	6658.2	3309.1	2612.1	7405.6	2368.3	3145.1	2927.1
179	2331.6	2802.8	3847.7	2776.3	2172.2	3456	3241.1	3644.9	7517.5	4649.7	5316	2539
180	9738.8	3109.5	7019.1	3428.2	3621.8	4299.5	2649.7	2328.5	3878.2	3183.7	2198.3	2373.2
181	2260	4545.9	9477.6	3085.4	4376	2730.3	3825.2	3227.6	5646.8	3587.3	3678.3	6908.5
182	3556.4	3360.7	3201.6	7022	3644.8	2310.2	2794.8	4685.3	2461.6	2050.3	5227	2518.2
183	6657.2	2312	1884.6	9518.1	3096.6	2361.3	2423.2	3481.2	4110.4	3139.2	2596.2	7285.3
184	3735.7	2721.5	2554	3192.4	2703.5	2751.2	3583.7	6774.9	2583	2396.3	2563.6	3033
185	4654.4	6740.6	2660.8	4548.6	2348.4	2734.2	2600.6	2354.9	2695.7	3300.3	3265.5	3886.7
186	3804.3	3651.5	3085.4	2304.1	2339.3	2262.6	1792.2	2594.3	2790.5	5283.9	4658.7	4145
187	4763.7	5626.3	2585.5	2659.8	1884.6	2525.7	6790.1	4486.1	4678.4	2608.6	2260.8	3212.1
188	3024.2	1801.8	7060.7	3345.4	2588	2312.9	9742.1	4204.6	3686.4	4262.6	2568.6	2752.9
189	7535.9	2282.4	2897.5	2668	3615.3	2597.9	3532.5	1832.7	6972.3	5259.6	4517.2	2810.2
190	2304	6993.9	2521	3309.1	3618.9	1796	3602.9	3109.5	4114.3	3187.3	3118.7	2806.4
191	1808.2	3099	2452.1	2299.4	3547.6	4424.6	4150.5	3684.2	5763.7	2540	3120.9	2868.3
192	4448.8	3536	2460.1	1792.2	2240	2387.9	4219.1	2917.1	2722.9	9751.3	6701.5	3698.7
Min.	249.6	2.8	12.4	10.1	55.8	7.9	56.6	35.9	144.8	33	17.9	45.1
Avg.	3742.5	3600.8	3639.8	3554.1	3590.1	3436.2	3703.8	3472.8	3969.6	3347.5	3357.5	3535.4
Max.	9861.9	8977.9	9693.8	9518.1	9513.9	8875.6	9742.1	8857	9342.3	9751.3	7022.4	9269.7

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
0	84.3	6.1	7.1	18.5	53.1	245	68.6	19.3	208.8	23.3	19.4	22.4
1	4351	2599.9	2799.6	3686.2	2354.7	7034	2515.4	4466.5	524.2	2752.7	19.6	25.5
2	2262.9	7527.1	2999.8	5432.4	6463.8	2320	4209.6	2880.4	2753	3463.4	19	25.4
3	3006.2	3575.5	4279.3	2400.1	3632.9	4414.4	2415.2	2395.9	2599.7	2303.1	19.8	26.5
4	2260.2	7074.6	3457.4	2849.8	3193.9	1764.4	4449.4	2762.7	9499.8	2449.6	19.9	25.9
5	2977.9	2276.9	9240.6	3099.1	2530.4	4411.6	5689.5	2356.3	574.5	3546.1	19.4	26.9
6	4312.6	2322.9	7050.6	2091	2965	3201.5	3222.9	2523.1	2686.9	3359.2	19.9	25.1
7	2428.9	2571.8	2766.5	2635.9	4346.7	1152.2	3209.3	6932.2	4888.8	5263.9	19.4	26.4

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
8	2616.3	2799.9	6591	2475.7	4587.2	2702.5	591.1	4308.7	2683.4	1828	21.3	25.9
9	9417.5	2384.2	4036	2774.7	3567.5	2277.1	3544.8	4502.9	4407.4	2274.1	21.3	25.3
10	3169.2	4214.8	9225.3	1834	4552.3	7017	2482.6	2695.7	3620.4	2785	20.8	25.3
11	2859.5	9221.7	633.7	5599.2	4555.9	7002.5	2900.2	3043.6	2692.6	3030.1	20.7	27
12	2632.6	2766.3	2641.3	6633.3	4684.7	3520.3	2774.3	2496.9	1743.7	3238.7	19.3	27.4
13	2807.9	1848.1	2782.3	3278.2	9020.4	2759.8	2650.6	2377.7	1176.8	4327.2	21.3	28.3
14	4279.3	2760.9	4439.9	2287.9	3726.7	3592.5	2492.1	5599.6	2805.3	2587.2	20.1	27.9
15	2404.3	3442.3	4347.1	1205.8	6787.9	2573.7	3151	1772.8	3521.2	2376.1	19.5	28.2
16	2763.6	5151.9	2324.9	3343.1	2360.9	2713.2	2496.8	3567.9	2537.5	4455	20.3	28.1
17	1900.4	2333.8	4405.1	9164.3	3531.7	3669.3	2708.8	2809	3519.1	2715.7	20.6	25.8
18	6593.9	1255.9	3169.2	2736.7	3706.7	2260.2	2831.7	3026	3499.4	2961.5	20.3	26.3
19	2556.8	4592.3	3144.5	5446.6	3683.8	2260.2	3056.8	2481.9	4291.3	6615.9	20.6	26.1
20	4496.8	6572.3	9152.9	1320.2	2818.1	5507.9	4561.2	2408.5	2404.3	3088.4	20.8	28.7
21	2352	9141.5	3429.9	4402.7	3146.4	2360.5	4596.2	1354.4	6549.6	2385.2	19.7	30.7
22	6556	9166.2	2632.2	1367.2	2698.3	3644.6	4396.7	2771.8	3417.2	3281.8	20.7	26.7
23	2572.7	4451.1	9160	3701.1	2581.6	1355.8	2541.1	2897.9	3440.2	2525.9	20.1	26.8
24	3394.3	4659	2578.7	2557.3	2563.3	5229.2	2995.5	2581.2	3619.4	4336.2	19.9	27.1
25	6725.9	5080.6	2431.2	3542.2	1975	2040.3	2966.6	2629	3460.4	4293.7	19.9	27.3
26	1709	4408.9	3021.7	2656.6	2753	2572.9	4483.4	5189.9	3333.5	6664.8	20.5	27.3
27	3173.3	1729.6	4303.5	2512.5	8935.5	1808.9	2680.2	2880.2	7293.5	3682.6	20.5	25.6
28	3505.4	3371.3	4243.1	3712.8	1922.4	3320.4	2516.5	4384.9	5159.8	8804.2	19.8	27
29	2424.1	2698.2	2454.2	4240.6	3446.9	4159.7	2766.9	2840.6	2672.1	3059.1	20.1	25.3
30	5052.1	3483.6	3147.3	2322.3	8839.7	4291.7	2741.2	2666.5	4141.6	7038.6	20	27.1
31	1904.6	2702.5	2696.8	2406.7	2456.2	4343.2	2845.3	3684.9	7129.9	2702.4	19.9	27.2
32	3223.3	2857.9	1902	5276.8	4341.1	2693.8	2898.6	2804.5	2675.6	3545	21.5	27.9
33	2587.7	4295.5	1920.8	8785.8	3593.3	2925.5	2757	2647.7	3696.3	2784.3	20.2	26.5
34	8525.6	4236.1	2788.4	2508.2	2751.8	3604.3	2829.5	1882.9	3369.2	3221.6	20.4	27.2
35	3221.3	1939.6	2758.3	3383	8865	1836.3	2836.5	4134.2	2926.5	7062.5	21.1	27.5
36	3380.7	1871.6	2626.4	2569.6	8617.5	4279.7	2748.3	2368.1	5055.5	3659.9	20.2	28
37	2270.5	8537.4	3173.3	1846.4	2449.6	2792.2	3675.4	2657.1	2760.7	4173.2	20.8	26.8
38	2638	4079.9	2479.9	4083.6	2469.3	2830	2014.6	2321.8	2429.2	3387.8	20.5	25.2
39	2500	6965.9	3986.9	3024.1	2712.5	2706	4404.6	4318	5059.3	2826.2	20.3	24.5
40	2529.4	3608.7	8502.7	2643.8	7044.7	1770.3	2777.7	3200.7	3007	3625.4	20.7	23.6
41	3429	2367.2	1854.9	4240.9	3911.1	5089	2869.6	4116.8	2688.3	3138.5	20.4	26
42	4162.8	2443.6	3134.7	3436.8	2860.6	6948.2	2730.2	4303.6	2907.6	2671.7	21	26.7
43	2423.2	6957.7	2741.7	4179	8608.1	1908.3	3610.1	2911.9	2510.7	3129.5	20.7	25.4
44	2690.4	3152.4	4303.5	2695.8	3701.4	4063.6	2660.3	2423.9	2630.7	2832.9	21.1	26.3
45	2600.5	7012	3497.6	3071.3	3616.9	1828.5	4120.5	2645.5	8528.6	2628	20.5	27.4
46	3033	2815.6	8043.8	3707.3	2622.2	3895.7	5080.2	2619	3120.4	3213.7	21.7	26
47	4166.9	2658.6	6977.9	1940.5	2868.5	3088.7	3004.5	2575	2979.8	3392.3	19.5	26.8
48	2576.6	2479.9	2826.2	2695.6	3783.3	3358.9	3178.6	6875.6	4528.8	5136.3	20.6	27.9
49	2660.9	2991.3	6464.6	2574	4178	2858	3131.9	4220.7	2626.3	1902.4	20.1	28.2
50	8035	2456.1	4163.4	2557.2	3590	2844.1	3525	4192.6	3823.6	2514.9	20.5	27.2
51	3333.7	4295.5	8034.4	1899.6	4140.9	6909.6	2777.7	2443.7	3476.4	2743.6	20.8	26.9
52	2765	8033.7	3169.9	5193.4	4207.8	6896.9	2933.4	3724.9	2440.7	3147.5	20.7	27.5
53	2456.9	2838.2	2557.6	6515.8	4349.7	3241	2860.7	2460.5	1848	3953.9	20.9	27.7
54	2804.9	1816.1	2797.8	3114.3	8120.8	2572.1	2751.6	2634.6	3656.6	3750.9	20.6	24.4
55	4283.5	2448.5	3837.4	2845.9	3305.8	3562.9	2605.2	5134.1	3033.2	2545	20.7	26.7

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
56	2600.5	3368.8	4167.5	3436.7	6515.3	2609.1	2828.7	1818.6	3393.2	2466.8	19.9	28.7
57	2623.7	5065.7	2363.2	3997.1	2835.2	2807.8	2791.8	3264	2972.9	3788.7	21.2	28.4
58	1808.5	2440.7	3711.5	8111.3	3487.7	3433	2596.8	2593.7	3528.6	2916.4	20.4	26.4
59	6462.4	3711.3	2838.5	2561	3384.2	2657.8	2550.5	3129.3	3564.6	2873.8	20.7	24.8
60	2356.9	4216.1	3828.1	5165.9	3554.5	2656.3	2954.6	2465.2	4203.5	6455.1	20.2	27.4
61	4168.6	6458.1	8030.4	3787.5	3166.8	5223	3813.5	2504.5	2658	3681.5	20.5	26.5
62	2679.4	7979.6	3347.9	4219	3815.3	2431.9	3864.6	3838.1	6454.3	2683.3	20.9	25.6
63	6504.5	7955.9	2766.2	3875.7	2707.7	3356.8	4260.1	2622.3	3334.3	3432.7	19.3	25.7
64	2715.2	4130.8	7966.6	3519.1	2586.2	3862.7	2539.3	2750.8	2987.7	3033.4	21.4	25.5
65	3240.9	4245.4	2589.4	2800.7	2627.9	4804.6	2811.6	2971.3	4424.2	4249.4	20.2	25.9
66	6335.5	4814.6	2536.7	3383.9	1949.3	3878.6	3174.4	2517.8	3473	4230.4	20.7	25
67	4112.5	3621.3	2839.9	2699.9	2874.5	2469.3	4455	5034.5	4143.8	6479.2	21.6	28.3
68	3325	4023.1	4203.5	2402	7954.6	1904.5	2890.7	2780.7	6442.2	3535.2	20.3	25.5
69	3340.5	3038.2	4167.7	3526.6	1865.3	4188.5	2728.7	3700.7	4760.2	7915.8	20.7	25.9
70	2427.7	2734.2	2453.2	4144.2	3355.9	4082.9	2707.2	3028.7	2748.9	3180.8	21.7	27.2
71	4808	3471.5	3068.2	2324.1	8085.2	3651.9	2645.6	2716	4103.8	6402.6	20.9	24.5
72	1812.5	2778.9	2886.3	2755.8	2448.5	4155.2	3152.9	3517.4	6425	2597	21	27.5
73	4112.3	2806.1	4179.5	5057.6	3799.2	3019.1	2889.3	2626.1	2571	3267.9	20.9	26.7
74	2557.2	3655.5	4178.2	7901.5	3323.8	2770.4	2777.4	2900.1	3528.6	2822.6	20.5	25
75	7864.6	3187.5	3019.6	2686.7	2810.1	3451.4	2993.7	1862.7	4071.6	3038.5	21.7	26.2
76	3321	4204.6	2754.5	4130.6	7993.2	1812.3	2575.4	4144.6	3072.5	6430.2	20.1	27.7
77	4176.7	1773	2528.6	2528.6	7859.2	3655.9	2952.5	2411.7	4796.2	3531.4	20.1	27.7
78	4449.3	7749.1	2985.2	1922.6	2444.8	3034.2	3354.8	3299.6	2889.8	4157.4	19.4	28.1
79	2700.1	4132.9	2607.9	3022.3	2455.2	2821.6	2079.1	4511.1	2379.9	3242.1	18.9	26.1
80	2312.3	6418.5	4048.4	3203.1	2648.9	3021.8	4268.2	3685.5	4804.2	2867.7	20.4	26.4
81	4554.1	3482.3	7764.5	2589	6455.4	1775.8	2759.5	3005.5	3196.9	3380.4	19.4	25.5
82	3037.1	4572.8	1777.5	4217.1	4270.3	4722.6	2913.2	4096.3	2993.3	3213.4	20.7	25.7
83	3887.9	2372.5	3346.2	3442.9	3079.2	6240.4	2880.4	3218.3	5067.3	2756.6	20.5	26.4
84	2311.8	6337.5	3035.6	4115.5	7844.1	1900.3	3506.7	2802.9	3421.7	3252.1	20.6	25.2
85	2775	2985.6	4175.5	2675.8	3408	3707.9	2716.2	2374.9	2530.3	3062.8	21.1	25.6
86	2857.6	5947.1	3370.9	3573.3	4334.2	2092.9	4342.9	3747.2	8073.9	2808.5	22	26.4
87	3205.5	3023.4	7365.7	4189.1	2645.2	3189.6	5196.4	2725.5	5351.7	3084.5	21.2	27
88	4098.8	2746.1	6304.3	1952.9	2915	3193.5	2861.2	2659.8	3541.5	3513	21	25.6
89	2380.3	2643.4	2841.8	2817.9	2998.5	5466.8	3632.6	6005.3	4656.3	5298.3	21.2	27.1
90	2769.2	3031.8	5620.3	2484.1	4339.3	2817.6	5292.9	4153.8	2617.9	1938.1	21.9	26.9
91	7372.7	2615.7	4151.8	3075.8	3568	3019.4	3594.9	4132.1	3207.9	2437.3	21.8	26.6
92	3011	4243.9	7373.7	1841.7	4188.2	6069.9	2820.8	2558.1	3449	3069.6	21	28
93	2718.2	7358.2	5387.1	5226	4230.1	6068.8	2952	4108.6	2468.4	3226.9	22.2	26.6
94	2420.4	2769.5	3528.9	5640.2	4367	3139.6	2831.3	2329	2011.8	4334.2	21.1	26.1
95	2689.3	1936.3	2782.2	3158.1	7450.9	2659.6	2956.3	2726.1	5855.4	3025.3	21.5	27.2
96	4211.9	2456.7	3181	3059.3	3123.7	3474.7	2539.7	5216.6	3212.5	2383.4	21.6	24.5
97	2729.1	3292.4	4151.8	5527.8	5697.8	3504.3	2840	1929.3	3028.8	2408.2	22.3	28.1
98	2743.2	5232.4	2233.3	4439.2	3084.4	2613.3	3035.8	3217.9	4312.6	2950.3	21.5	25.6
99	2009	2320.6	2929.1	7397.2	3571.3	3188.5	2570.8	2726.6	3314.3	2729.5	22.3	26.8
100	5560.5	5908.2	2722.2	3333.8	3244.9	2748.3	2638.4	3267.7	3360.5	2891.6	21.8	26.5
101	2448.6	4276.1	4352.8	5286.6	3472.1	2765.2	2969.3	2628.8	4103.8	5541.3	20.6	27.6
102	4332.7	5540.1	7324.8	5980.1	3391.2	5152	3303.8	2347.9	2697.1	4129.3	20.9	27
103	2975.1	7291.6	3347.8	3378.7	4608.6	2204	2819.1	6030.7	6045.4	2951.7	21.6	30.6

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
104	5632.1	7276.4	2774.2	6067.6	3142.7	3336.2	4173.8	2722.7	3275.5	3169.8	20.4	26.2
105	2842.5	4152.1	7268.3	3465.3	2498.8	6054.7	2553.8	2651.5	3154.5	3055.7	20.7	26.4
106	3259.2	4246.1	2519.4	3575.8	2747.7	5281.1	2811.9	3028.7	4272.2	3991.9	21.9	27.4
107	5445	5253.6	2343.2	3117.6	2123.8	6069.8	3179.5	2452.7	3485.4	3792.8	21.9	25.5
108	6299.8	2924.2	2725.5	3321.6	2951.2	2421	4024.1	5268.6	4409.8	5610.5	22.9	25.1
109	3144.9	6212.2	3815.7	2430	7290.8	2053	3553.4	2889	5535.3	3512.6	20.6	27.9
110	3171.8	3145.1	3754.1	3485.6	2077.3	4351	2889.6	2959.9	5233.2	7313	21.3	27.2
111	2216.1	2794.7	2438.8	3637.8	3521.2	4076.1	2906.8	3018.8	2845.6	3613.6	20.7	27.2
112	5113.3	2939.4	3660	2226.6	7583.3	2951.6	2438.7	2859.3	3576.4	5482.8	21.6	26.4
113	2005.1	2845.5	2685.1	3052.5	2368.3	3781	3514.7	3470	5408.3	3447.3	21.1	26.6
114	4425.5	2726.2	6334.5	5172.3	3016.2	3023.6	2970.5	2771.2	2382.2	3149	22.6	26.4
115	2415.6	2899.5	6328.6	7407.2	3168.3	2778.2	2787	3105.7	3441.4	2885.9	21.8	26
116	7551.5	2707.2	3087	2885.6	2809.3	3314.9	2678.3	2095.8	4437.8	3291.3	21.7	26.5
117	3144.9	6427.9	2768.8	4456.6	7606.4	2008.8	2760.3	4121.1	3473.3	5504.8	21.4	26.5
118	4500.3	2065.1	2424.3	2355.7	7336.4	2999.6	4616.2	2216.6	4789.6	3444.4	22.4	25.7
119	6634.5	7356.9	3144.9	2053.7	2344	3087	3272.5	3795.1	2597.9	4186.1	21.7	27.9
120	2952.1	4099	2843.5	2573.1	2486	2641.5	2248.4	6685	2216	3779.2	19.9	27.8
121	2236	5384	4127	3488.8	2812	3086.6	3927.4	2936.2	5133.4	2893.1	22.6	25.8
122	6849.9	3415.8	7272.5	2433.4	5528.8	2053.7	3711.5	3214.5	3596.2	3381.3	21.6	26.8
123	3144.9	6744.4	2051.2	3780.1	4455.4	5021	2889	4181.4	3019	3550.7	20.9	26.6
124	3804.3	2435.7	3571.8	3377.5	3085.8	5110.9	3037.5	3028.8	7197.2	2872.6	20.7	26.5
125	2208	5377.9	3089.6	4088.9	7363.3	2121.3	3473.8	2674.6	4727.5	3628.6	21.5	24.9
126	2541.7	3262.4	3620.4	2872.2	3341	2995.6	3158.7	2268.8	2423.6	3113.3	21.9	28.9
127	2857.6	4970.3	3318.9	3653.2	4601.2	2088.9	4238.4	3925.3	7746.9	2848.4	21.9	26.7
128	3533.8	3086.8	7299.8	4435.2	2773.6	2857.8	5092.9	2878.9	6953.7	3221.8	21.9	25.9
129	4036.8	2840.1	5363.5	2057.6	2716.9	3625.7	2842.4	2739.8	4373	3397	21.5	26.4
130	2242	2743.4	2601.9	2881.6	2650.1	6961.6	3696	5348.4	4079.9	5083.1	21	26
131	3029.3	2933.5	4629.3	2291.6	4206.7	2613.9	7188	3623.1	2820.9	2144.8	20.9	27.9
132	7282.8	2843.3	3748.3	4274.7	3462.6	3090.6	3454.6	4104.2	2619.5	2345.7	21.5	24.8
133	3255	3748.3	7293.8	2095.6	4052.8	5281.8	3025.9	2448	3433.4	3169.1	21.1	26.8
134	2472.8	7268.4	7105.4	5053.9	4169.9	5284.6	2779.3	4798.8	2531.9	3745.3	21.3	27.9
135	2519.9	2778	4913.4	5138.6	3788	3168.4	2614.3	2254.5	2131	4985.8	21.2	26.6
136	2446.4	2153.3	2669.5	3668.5	7396.2	2823.2	4419.3	3001	7666.1	2556.7	20.5	26.4
137	3516.6	2184.4	2486.7	3195.9	3630.1	3305.1	2282.4	4864.9	3667.4	2506.7	21.9	26.8
138	3001.3	3270.3	3352.3	7262.4	4783.3	5147.3	2643.2	2182.5	3580.9	2242.8	21	27.4
139	2851.3	5125.4	2190.1	4680.3	3102.9	2438	3061.8	3709.8	5090.6	2585	21.2	26.6
140	2137.5	2130.1	2573.3	7394.1	3121.3	3776.8	2447.1	2852.2	3252.7	2525.1	21.1	26.2
141	4652.3	7716.6	2610.7	4202.7	3408.4	2939.9	2405.7	3608.3	3251.4	2664.4	20.2	25.8
142	2440.1	3703.9	4997	4884	3086.3	2945.3	2735.1	2851.5	3352.3	5083	20.9	27.1
143	4124.8	4696.3	7298	7787.2	3777.6	5133.1	2624.8	2183.8	3006.9	4597.5	21.1	26.2
144	3098.4	7285	3231.6	3185	5007.8	2084	2640.1	7829.2	5213.4	3066.1	21.5	26.7
145	4997	7290.5	2583.5	7867.3	5796.7	3325	3704.1	2894.9	3269	3495.8	21.1	26.2
146	2853	3709.9	7303.9	3241.6	2350.7	7831.9	2665.8	2628.9	3498.4	3233.1	21	26.3
147	3254.6	3728.5	2226	4887.4	2876.3	5074.3	2650.5	2991.4	4731.6	3395.4	20	25.6
148	4784.6	4871.2	2296.1	3286.3	2229.4	7835.8	3181.8	2536.5	3077.2	3352.3	21.7	26.1
149	8085.6	2490.5	2583.9	5041.7	2909.7	2320.8	3475.2	4907.3	4973.1	5073.1	19.6	27.7
150	3592.9	7989.8	3364.3	2464	7269.3	2121.3	4729.9	2677.6	5033.9	3183.8	20.2	25.5
151	3155.6	3618.9	3352.3	3132	2219.7	4951.7	3127.5	2532.6	4878.2	7151.6	20.4	25.3

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
152	2099.9	2519.3	2495.9	3493.6	3352	3645.1	2961.1	3244.3	3053.4	3674.7	20.6	24.8
153	4806.2	2935.2	4067.6	1803.3	7417.4	2492.1	2554.4	2786.6	2937	4987.3	19.7	26.6
154	2087.5	2742	2604.1	3193.7	2208.3	3451.5	3865.9	3204.6	4929.4	5063.7	19.3	26.7
155	4948.3	2523.1	8104.7	4926.7	2597.8	3200.4	2891.9	2805.5	2492.7	3187.4	19.6	26.1
156	2449	2515.8	8130.2	7262.6	3235.3	2587.3	2911.4	3194.3	3141	2786.6	20.7	27.6
157	6932.6	2495.9	3202.5	3074.4	2715.2	3228.4	2823.8	2183.2	4844.8	3557.5	20.5	26.8
158	3616.9	8150.5	2732.3	4933.7	7374.7	2121.3	2944.6	3749.2	3742.3	4965.6	19.6	26.8
159	4847.7	2098.1	2495.9	2222.4	7170	2492.1	4916.6	2180.9	4806.2	3269.2	19.2	26.4
160	8387.3	7140.5	3540.8	2258.7	2260.8	3102.1	3248.3	5593.7	2734.7	3727.4	19.8	25
161	3027.6	3733.8	2798.6	2334.9	2346.4	2689.6	2520.6	8449.1	1897.7	3467.4	20.4	26.2
162	2156.2	4958.4	3648.9	3778.7	3158.8	3220.7	3524.7	2513.7	4862.4	2769.8	19.4	25.8
163	8487	3230.4	7076.7	2506.2	5051.9	2080.1	5231.4	3555.5	3663.6	3324.1	20.3	24.8
164	3408.8	8508.5	2120.8	3559.9	5098.2	4683.8	2787.2	3606.7	3189.7	3669.6	20.6	25.5
165	3494.8	2422.5	3689	3324.3	3238.1	4801.9	3163.6	2458.1	8970.2	2885.6	20.7	25.9
166	2072.1	4938.2	3173.9	3675.7	7151	2205.1	3413.5	2608.5	5671.3	3730.2	20.4	26.5
167	2612.9	3480.4	3484.9	2904.5	3423.4	2440.5	3084.4	2207.3	2503.7	3166.3	21.7	26.8
168	2981.9	4587	3193.4	3651.9	5206.8	2081.2	3778.4	5100	7450.7	2911.8	21.5	27.9
169	3670.6	3105.9	6952.8	4874.4	2901	2442.9	5003.4	3072.8	8734.5	3585.4	22	28.3
170	3610.9	3045.6	4995.8	2155.4	2838.8	3670.6	2728.3	2945.8	6562.2	3288.6	21.2	27.7
171	2184.4	2934.7	2710	3060.2	2557.2	8742.2	3727.6	4976.7	3586	4872.2	21.9	26.5
172	3045.5	3455.9	4406.2	2224.4	3656.4	2733.8	8959.6	3181.9	2846.4	2352.4	21	26.2
173	7070.6	2796	3496.8	5845.1	3365.5	3261.5	3449	3636.4	2278.9	2090.5	21.1	26.2
174	3297.7	3168.9	6942.2	2421.8	3681	4945.4	3238.3	2289.6	3241.1	3628.8	20.5	25.7
175	2525.8	6917.3	8900.9	4833.1	3703.5	4948.9	2852.4	4978.5	2303.2	3733.8	21.8	27.4
176	2404.3	2733.4	6764	4364.5	3668.6	3108.3	2546.8	1788.6	2592.5	5377.7	21.7	26.7
177	2557.9	2209.1	2733.8	3151.6	7066.7	2846.6	5671.3	3062.2	9444.4	2308.5	21.4	27.1
178	3312.7	2184.2	2235	3583.3	3202.7	3266.1	2231.4	4574.3	3743.7	2274.6	22.2	27.8
179	3065.5	3105.7	3168.8	9034.7	4477	6894.7	2669.1	2386.4	3320.5	2115.2	21.4	24.4
180	2774.6	4551.8	2069.5	5428.9	3404.8	2583.1	3198.2	3269.3	6144.5	2352.8	22	26.5
181	2556.8	1760.7	2176.7	7076.5	3407.7	3188.6	2549.4	2951.8	3171.1	2498	21.6	25.1
182	4408.4	9495.5	2543.7	5843.5	3408.9	3035.3	2269.8	3652.7	3192.6	2692.6	21.6	26.8
183	2320.2	3568.2	5447.2	4573.3	3546	3109.4	2824.6	2776.8	2933.6	4327.1	21.5	26.4
184	3642.5	4382.8	6983.7	9569.6	4274.5	4633.5	2443.1	1835	2942.6	5284.3	22	26.7
185	3481.5	6958.4	3046.9	2614.1	5583.8	1764.3	2286.9	9613.2	4361.9	3095.8	20.9	26.8
186	4327.1	6961.3	2472.1	9648.9	6650.7	2940.8	3044.7	2837.5	3185.9	3570.9	21.5	29.6
187	2734	3476.2	6976.2	2980.4	2416.2	9616	2598.9	2760	3530.8	3589.6	21.4	26.6
188	3093.9	3631.4	2395.8	6461	2906.7	4550	2794	3316.9	5427.8	2823.6	21.7	26.6
189	4546.3	4406.8	2319.5	3176.5	2674.9	9651.7	3793.2	2417.6	2737.4	2576	22.1	26.3
190	9655.6	2270.5	2451.9	6484.7	2829.6	2356	3162.8	4616.7	5441.8	4413.4	20.9	24.9
191	3556.5	9680.7	2840.8	2308.2	7071.6	2425	6808.3	2815.2	4276.3	2990.4	22.7	25.1
192	2962.5	3544.3	2779	2987.5	2601.1	5643.9	3201.6	2311	4410.2	7100.9	22.3	26.2
Min.	84.3	6.1	7.1	18.5	53.1	245	68.6	19.3	208.8	23.3	18.9	22.4
Avg.	3620.5	4108.3	3956.9	3803.5	4020.4	3564.9	3217.3	3295	3870.7	3571.4	20.9	26.5
Max.	9655.6	9680.7	9240.6	9648.9	9020.4	9651.7	8959.6	9613.2	9499.8	8804.2	22.9	30.7

INFO SIZING

TPC TRANSACTION PROCESSING PERFORMANCE COUNCIL CERTIFIED AUDITOR

Benchmark Sponsor: Brad Carlile
Dir. Strategic Applications Engineering (SAE)
Oracle
3295 NW 211th Terrace
Hillsboro OR 97124

June 5, 2013

I verified the TPC Benchmark™ H performance of the following configuration:

Platform: **SPARC T5-4 Server**

Database Manager: **Oracle Database 11g Release 2 Enterprise Edition with Partitioning**

Operating System: **Oracle Solaris 11.1**

The results were:

CPU (Speed)	Memory	Disks	**QphH@3000GB**
SPARC T5-4 Server			
4 x SPARC T5 (3.60GHz)	2TB	288 x 300GB 15Krpm 2 x 300GB 10Krpm (internal)	**409,721.8**

In my opinion, this performance result was produced in compliance with the TPC's requirements for the benchmark. The following verification items were given special attention:

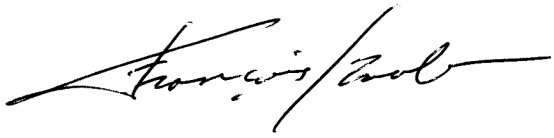
- The database records were defined with the proper layout and size
- The database population was generated using DBGEN
- The database was properly scaled to 3,000GB and populated accordingly
- The compliance of the database auxiliary data structures was verified
- The database load time was correctly measured and reported
- The required ACID properties were verified and met

- The query input variables were generated by QGEN (see note below)
- The query text was produced using minor modifications and one query variant
- The execution of the queries against the SF1 database produced compliant answers
- A compliant implementation specific layer was used to drive the tests
- The throughput tests involved 192 query streams
- The ratio between the longest and the shortest query was such that no query timings were adjusted
- The execution times for queries and refresh functions were correctly measured and reported
- The repeatability of the measured results was verified
- The system pricing was verified for major components and maintenance
- The major pages from the FDR were verified for accuracy

Additional Audit Notes:

During the course of this audit two bugs were identified in QGen v2.15.0. The bugs cause QGen to generate query substitution parameters outside the specified ranges for query 4 and query 22. Per Clause 2.1.4.5 the test sponsor modified QGen and these modifications were reviewed as part of this audit. The details of these modifications were included in section 2.2 of the Full Disclosure Report.

Respectfully Yours,



François Raab
President

Table of Contents

TPC Benchmark H Overview

The TPC BenchmarkTM H (TPC-H) is a Decision Support benchmark. It is a suite of business-oriented ad-hoc queries and concurrent modifications. The queries and the data populating the database have been chosen to have broad industry-wide relevance while maintaining a sufficient degree of ease of implementation. This benchmark illustrates Decision Support systems that:

- Examine large volumes of data
- Execute queries with a high degree of complexity
- Give answers to critical business questions

TPC-H evaluates the performance of various Decision Support systems by the execution of sets of queries against a standard database under controlled conditions. The TPC-H queries:

- Give answers to real-world business questions
- Simulate generated ad-hoc queries
- Are far more complex than most OLTP transactions
- Include a rich breadth of operators and selectivity constraints
- Generate intensive activity on the part of the database server component of the system under test
- Are executed against a database complying to specific population and scaling requirements
- Are implemented with constraints derived from staying closely synchronized with an on-line production database

0 General Items

0.1 Benchmark Sponsor

A statement identifying the benchmark sponsor(s) and other participating companies must be provided.

Oracle Corporation is the sponsor of this TPC-H benchmark.

0.2 Parameter Settings

Settings must be provided for all customer-tunable parameters and options that have been changed from the defaults found in actual products, including but not limited to:

- *Database Tuning Options*
- *Optimizer/Query execution options*
- *Query processing tool/language configuration parameters*
- *Recovery/commit options*
- *Consistency/locking options*
- *Operating system and configuration parameters*
- *Configuration parameters and options for any other software component incorporated into the pricing structure*
- *Compiler optimization options*

The Supporting Files Archive contains the system and Oracle parameters used in this benchmark.

0.3 Configuration Diagram

Provide diagrams of both the measured and priced configurations, accompanied by a description of the differences.

Measured Configuration:

SPARC T5-4 Server, configured with:

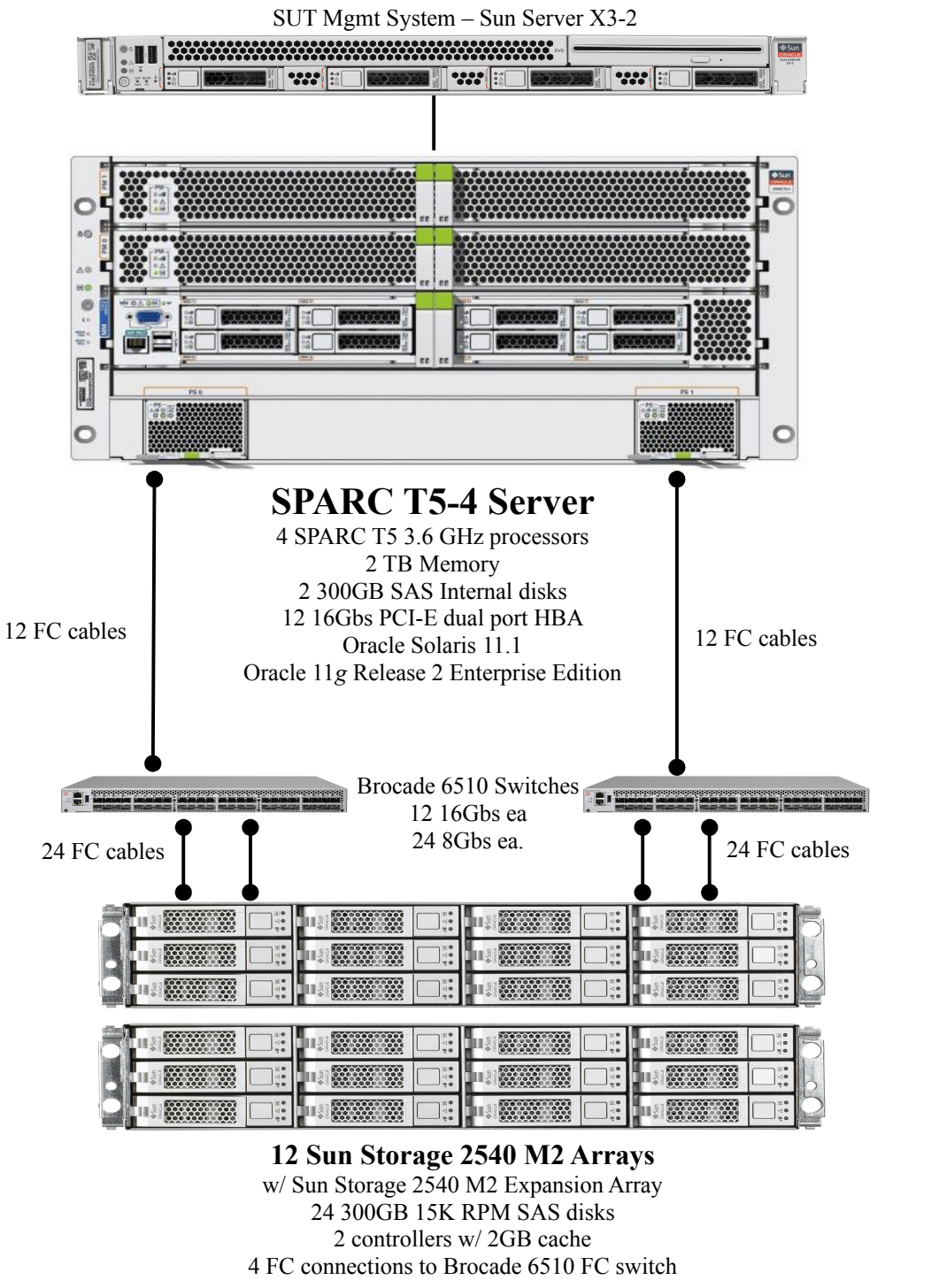
- 4 SPARC T5 3.6GHz processors
- 2 TB memory
- 1 Ethernet controller
- 2 300GB internal SAS disk drives
- 12 16Gb/s dual port FC-AL controllers
- 12 Sun Storage 2540 M2 Arrays, each containing 12 300GB 15K RPM SAS disks
- 12 Sun Storage 2540 M2 expansion arrays, each containing 12 300GB 15K RPM SAS disks

Priced Configuration:

Same components as the Measured Configuration with the addition of

- Sun Server X3-2 as the SUT management system.

System Under Test



1 Clause 1 - Logical Database Design

1.1 Database Definition Statements

Listings must be provided for all table definition statements and all other statements used to set up the test and qualification databases. All listings must be reported in the supporting files archive.

The Supporting Files Archive contains the programs and scripts that create and analyze the tables and indexes for the TPC-H database.

1.2 Physical Organization

The physical organization of tables and indices within the test and qualification databases must be disclosed. If the column ordering of any table is different from that specified in Clause 1.4, it must be noted. The physical organization of tables must be reported in the supporting files archive.

No record clustering or index clustering was used. Column ordering was changed for some tables. Refer to the table create statements in the Supporting Files Archive for further details.

1.3 Horizontal Partitioning

Horizontal partitioning of tables and rows in the test and qualification databases (see Clause 1.5.4) must be disclosed. Scripts to perform horizontal partitioning must be reported in the supporting files archive.

Horizontal partitioning was used for all tables except NATION and REGION. Refer to the table/index create statements in the Supporting Files Archive for more details.

1.4 Replication

Any replication of physical objects must be disclosed and must conform to the requirements of Clause 1.5.7. Scripts to perform any replication must be reported in the supporting files archive.

No replication was used.

1.5 Tunable Parameters

Script or text for all hardware and software tunable parameters must be reported in the supporting files archive.

All hardware and software parameters changed from their defaults are reported in the Supporting Files Archive.

2 Clause 2 - Queries and Refresh Functions

2.1 Query Language

The query language used to implement the queries must be identified.

SQL was the query language used to implement all queries.

2.2 QGen Version Verification

*The version number, release number, modification number, and patch level of **QGen** must be disclosed. Any modifications to the **QGen** (see Clause 2.1.4) source code (see Appendix D) must be reported in the supporting files archive.*

QGen from TPC-H Rev. 2.15.0 was used for this publication. Modifications were made to QGen to correct bugs in the generation of parameter substitutions for Query 4 and Query 22 per Clause 2.1.4.4 of the Specification.

The bug for Query 4 used an incorrect range of index values for the range of possible dates. The range being generated by QGen was from 1993-02-01 to 1997-11-01. Clause 2.4.4.3 requires the range to be between 1993-01-01 and 1997-10-01. The correction was to modify line 176 of varsub.c to change the indexed range from:

tmp_date = UnifInt((DSS_HUGE)1,(DSS_HUGE)58,qnum);

to:

tmp_date = UnifInt((DSS_HUGE)0,(DSS_HUGE)57,qnum);

Incidentally, these are the exact same changes applied to Query 15 on line 240 of varsub.c. Query 15 has the identical substitution requirements for DATE.

The bug for Query 22 used the wrong indexed values for the generation of country codes for Clause 2.4.22.3. This clause requires the generation of 7 unique country codes per the description in Clause 4.2.2.9, which is an index to the array of N_NAMEs defined in clause 4.2.3. The range of country codes to be generated for Clause 4.2.2.9 is from [10..34] by taking the range of indexes for N_NAME [0..24] and then adding a constant of 10. The problem with Query 22 substitution is created when line 76 of varsub.c defines the ccode array as:

long ccode[25] = {10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34};

To which a constant value of 10 is added to on line 300:

sprintf(param[i+1], "%ld", 10 + ccode[i]);

This generated a range of values for country code to be used by Query 22 in the range of [20..44], not the [10..34] as required by the specification. The corrective action applied for Query 22 was to subtract 10 from each value of the ccode array instantiation on line 76, thus making the array:

long ccode[25] = {0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24};

No changes were made to line 300 of varsub.c and now the values generated for Query 22 are in the range [10..34], matching the defined ranges noted above.

These modifications were verified by the Auditor, and are included in the Supporting Files Archive in Clause2 per the requirements of Clause 2.1.4.5. The subdirectory QGen_Modifications contains a full set of query parameters for each stream for both the original QGen and the corrected QGen, a diff file containing the changes made to varsub.c and a copy of the modified code for varsub.c. Also in this directory is a series of CSV files with counts of the query parameter distributions by query and by query parameter. This information was used to demonstrate to the auditor the necessary corrections were applied without any changes to the other queries, or the required distribution of parameters.

2.3 Query Text and Output Data from Qualification Database

The executable query text used for query validation must be disclosed along with the corresponding output data generated during the execution of the query text against the qualification database. If minor modifications (see Clause 2.2.3) have been applied to any functional query definitions or approved variants in order to obtain executable query text, these modifications must be disclosed and justified. The justification for a particular minor query modification can apply collectively to all queries for which it has been used. The output data for the power and throughput tests must be made available electronically upon request.

Clause8 of the Supporting Files Archive contains the executable query text. The zip files containing the run1 and run2 results had to be split into multiple files no larger than 3GB each using the -s option for zip. This generates filenames like run[1|2]result.z01, run[1|2]result.zip.

2.4 Query Substitution Parameters and Seeds Used

The query substitution parameters used for all performance tests must be disclosed in tabular format, along with the seeds used to generate these parameters.

The Supporting Files Archive contains the seed and query substitution parameters.

2.5 Query Isolation Level

The isolation level used to run the queries must be disclosed. If the isolation level does not map closely to the levels defined in Clause 3.4, additional descriptive detail must be provided.

The queries and transactions were run with isolation Level 3 (repeatable read).

2.6 Source Code of Refresh Functions

The details of how the refresh functions were implemented must be disclosed (including source code of any non-commercial program used).

The refresh functions are in Clause8/RF_source in the Supporting Files Archive.

3 Clause 3 - Database System Properties Related Items

3.1 ACID Properties

The results of the ACID tests must be disclosed along with a description of how the ACID requirements were met. All code (including queries, stored procedures etc.) used to test the ACID requirements and their entire output must be reported in the supporting files archive.

Tests conducted to demonstrate compliance for each of the ACID requirements is detailed in the following section. Source code for the ACID test is included in the Supporting Files Archive.

3.2 Atomicity

The system under test must guarantee that transactions are atomic; the system will either perform all individual operations on the data, or will assure that no partially-completed operations leave any effects on the data.

3.2.1 Completed Transaction

Perform the ACID Transaction for a randomly selected set of input data and verify that the appropriate rows have been changed in the ORDERS, LINEITEM, and HISTORY tables

1. The total price from the ORDERS table and the extended price from the LINEITEM table were retrieved for a randomly selected order key.
2. The ACID Transaction was performed using the order key from step 1.
3. The ACID Transaction committed.
4. The total price from the ORDERS table and the extended price from the LINEITEM table were retrieved for the same order key. It was verified that the appropriate rows had been changed.

3.2.2 Aborted Transaction

Perform the ACID Transaction for a randomly selected set of input data, substituting a ROLLBACK of the transaction for the COMMIT of the transaction. Verify that the appropriate rows have not been changed in the ORDERS, LINEITEM, and HISTORY tables.

1. The total price from the ORDERS table and the extended price from the LINEITEM table were retrieved for a randomly selected order key.
2. The ACID Transaction was performed using the order key from step 1. The transaction was stopped prior to the commit.
3. The ACID Transaction was ROLLED BACK.
4. The total price from the ORDERS table and the extended price from the LINEITEM table were retrieved for the same order key. It was verified that the appropriate rows had not been changed.

3.3 Consistency

Consistency is the property of the application that requires any execution of transactions to take the database from one consistent state to another.

3.3.1 Consistency Test

Verify that ORDERS and LINEITEM tables are initially consistent, submit the prescribed number of ACID Transactions with randomly selected input parameters, and re-verify the consistency of the ORDERS and LINEITEM.

1. The consistency of the ORDERS and LINEITEM tables was verified based on a sample of order keys.
2. 100 ACID Transactions were submitted by each of 193 execution streams.
3. The consistency of the ORDERS and LINEITEM tables was re-verified.

3.4 Isolation

Operations of concurrent transactions must yield results which are indistinguishable from the results which would be obtained by forcing each transaction to be serially executed to completion in the proper order.

3.4.1 Read-Write Conflict with Commit

Demonstrate isolation for the read-write conflict of a read-write transaction and a read-only transaction when the read-write transaction is committed.

1. An ACID Transaction was started for a randomly selected O_KEY, L_KEY, and DELTA. The ACID Transaction was suspended prior to COMMIT.
2. An ACID Query was started for the same O_KEY used in step 1. The ACID Query did not see the uncommitted changes made by the ACID Transaction.
3. The ACID Query completed.
4. The ACID Transaction was resumed and COMMITTED.

3.4.2 Read-Write Conflict with Rollback

Demonstrate isolation for the read-write conflict of a read-write transaction and a read-only transaction when the read-write transaction is rolled back.

1. An ACID Transaction was started for a randomly selected O_KEY, L_KEY, and DELTA. The ACID Transaction was suspended prior to ROLLBACK.
2. An ACID Query was started for the same O_KEY used in step 1. The ACID Query did not see the uncommitted changes made by the ACID Transaction.
3. The ACID Query completed.
4. The ACID Transaction was resumed and ROLLED BACK.

3.4.3 Write-Write Conflict with Commit

Demonstrate isolation for the write-write conflict of two update transactions when the first transaction is committed.

1. An ACID Transaction, T1, was started for a randomly selected O_KEY, L_KEY, and DELTA. T1 was suspended prior to COMMIT.
2. Another ACID Transaction, T2, was started using the same O_KEY and L_KEY and a randomly selected DELTA.
3. T2 waited.
4. T1 was allowed to COMMIT and T2 completed.
5. It was verified that T2.L_EXTENDEDPRICE = T1.L_EXTENDEDPRICE + (DELTA1*(T1.L_EXTENDEDPRICE/T1.L_QUANTITY))

3.4.4 Write-Write Conflict with Rollback

Demonstrate isolation for the write-write conflict of two update transactions when the first transaction is rolled back.

1. An ACID Transaction, T1, was started for a randomly selected O_KEY, L_KEY, and DELTA. T1 was suspended prior to ROLLBACK.
2. Another ACID Transaction, T2, was started using the same O_KEY and L_KEY and a randomly selected DELTA.
3. T2 waited.
4. T1 was allowed to ROLLBACK and T2 completed.
5. It was verified that T2.L_EXTENDEDPRICE = T1.L_EXTENDEDPRICE.

3.4.5 Concurrent Progress of Read and Write Transactions

Demonstrate the ability of read and write transactions affecting different database tables to make progress concurrently.

1. An ACID Transaction, T1, was started for a randomly selected O_KEY, L_KEY, and DELTA. T1 was suspended prior to COMMIT.
2. Another Transaction, T2, was started which did the following:
   For random values of PS_PARTKEY and PS_SUPPKEY, all columns of the PARTSUPP table for which PS_PARTKEY and PS_SUPPKEY are equal, are returned.
3. T2 completed.
4. T1 was allowed to COMMIT.
5. It was verified that appropriate rows in ORDERS, LINEITEM and HISTORY tables were changed.

3.4.6 Read-Only Query Conflict with Update Transaction

Demonstrate that the continuous submission of arbitrary (read-only) queries against one or more tables of the database does not indefinitely delay update transactions affecting those tables from making progress.

1. A Transaction, T1, executing Q1 against the qualification database, was started using a randomly selected DELTA.

2. An ACID Transaction T2, was started for a randomly selected O_KEY, L_KEY and DELTA.
3. T2 completed and appropriate rows in the ORDERS, LINEITEM and HISTORY tables had been changed.
4. Transaction T1 completed executing Q1.

3.5 Durability

The SUT must guarantee durability: the ability to preserve the effects of committed transactions and insure database consistency after recovery from any one of the failures listed in Clause 3.5.3.

3.5.1 Failure of a Durable Medium

Guarantee the database and committed updates are preserved across a permanent irrecoverable failure of any single durable medium containing TPC-H database tables or recovery log tables.

The disks containing the TPC-H tables, indexes and log files are mirrored across the 2540 M2 arrays using Solaris Volume Manager (SVM). Each disk contains table, index and log files, therefore a failure of one device fails database tables and indexes, and log files.

The following steps were performed to induce a failure of a single disk in an array.

1. The ORDERS and LINEITEM tables were verified to be consistent.
2. 193 streams of the ACID transaction were started.
3. After more than 100 transactions from each stream completed, one of the disks in an array was removed inducing the failure of the disk.
4. Because mirroring was used across the arrays the transactions continued without any interruption.
5. A sample from the durability success file was matched against the contents for the HISTORY table and it was verified that no committed transactions had been lost.
6. The ORDERS and LINEITEM tables were verified to be consistent.

3.5.2 Failure of Write-Back Cache on a Controller

The following steps were performed to induce a failure of a single controller and write-back cache in an array containing transaction data.

1. The ORDERS and LINEITEM tables were verified to be consistent.
2. 193 streams of the ACID transaction were started.
3. After more than 100 transactions from each stream complete, one of the fibre cables between the SPARC T5-4 Server HBA and one of the 2540 M2 arrays was disconnected inducing the controller failure. Because the Brocade 6510 Fibre Channel switch is configured with a zone between each HBA port and one of the 2540 M2 controllers, the controller and all of the associated devices with it are failed.
4. Because mirroring was used across the arrays using SVM, the transactions continued without interruption.
5. A sample from the durability success file was matched against the contents for the HISTORY table and it was verified that no committed transactions had been lost.
6. The ORDERS and LINEITEM tables were verified to be consistent.

3.5.3 System Crash / Memory Failure / Loss of External Power

System Crash: Guarantee the database and committed updates are preserved across an instantaneous interruption (system crash/system hang) in processing which requires the system to reboot to recover.

Memory Failure: Guarantee the database and committed updates are preserved across failure of all or part of memory (loss of contents).

Loss of External Power: Guarantee the database and committed updates are preserved during the loss of all external power for an indefinite time period

Each of these requirements were satisfied in a single test. The following steps were performed.

1. The ORDERS and LINEITEM tables are verified to be consistent.
2. 193 streams of the ACID transactions are started
3. After more than 100 transactions from each stream has completed, the power breakers to the host are

turned off thus halting processing immediately and indefinitely.

4. Power was restored to the host, the system was started, along with the database.
5. A sample from the durability success file was matched against the contents for the HISTORY table and it was verified that no committed transactions had been lost.
6. The ORDERS and LINEITEM tables were verified to be consistent.

4 Clause 4 - Scaling and Database Population

4.1 Ending Cardinality of Tables

The cardinality (i.e., the number of rows) of each table of the test database, as it existed at the completion of the database load (see clause 4.2.5) must be disclosed.

Table	Rows
Lineitem	18,000,048,306
Orders	4,500,000,000
Partsupp	2,400,000,000
Part	600,000,000
Customer	450,000,000
Supplier	30,000,000
Nation	25
Region	5

4.2 Distribution of Tables and Logs Across Media

The distribution of tables and logs across all media must be explicitly described.

The TPC-H tables, indexes, logs and temporary tables are distributed across the Sun Storage 2540 M2 Arrays. Each 2540 M2 array has 24 300GB disks. Each disk from the arrays are formatted to have three slices, s1, s3 and s4. Solaris Volume Manager is used for mirroring of the tables and indexes across s4 and for striping of temp table across s3. Solaris Volume Manager is used for mirroring of the log files across s1. Please see the scripts to generate the metadevices in the Supporting Files Archive in Clause2/DB_creation_scripts.

4.3 Database partition/replication mapping

The mapping of database partitions/replications must be explicitly described.

The database was not replicated.

Horizontal partitioning was used for base tables LINEITEM, ORDERS, PARTSUPP, PART, SUPPLIER and CUSTOMER. The details for this partitioning can be understood by examining the syntax of the table and index definition statements in Supporting Files Archive.

4.4 Data redundancy mechanisms

Implementations may use data redundancy mechanism(s). The type of data redundancy mechanisms(s) and any configuration parameters, i.e., RAID level must be disclosed for each device.

Items	Storage Redundancy Levels
Base Tables	Level Three
Auxiliary Data Structures	Level Three
DBMS Temporary Space	Level Zero
OS and DBMS Software	Level One
Oracle Redo Logs	Level Three

4.5 Modifications to the DBGEN

*The version number, release number, modification number, and patch level of **DBGen** must be disclosed. Any modifications to the **DBGen** (see Clause 4.2.1) source code (see Appendix D) must be reported in the supporting files archive.*

DBGen from TPC-H Rev. 2.15.0 was used for this result.

4.6 Database Load Time

The database load time for the test database (see clause 4.3) must be disclosed.

The database load time was 2:06:04.

4.7 Data Storage Ratio

The data storage ratio must be disclosed. It is computed as the ratio between the total amount of priced disk space, and the chosen test database size as defined in Clause 4.1.3.

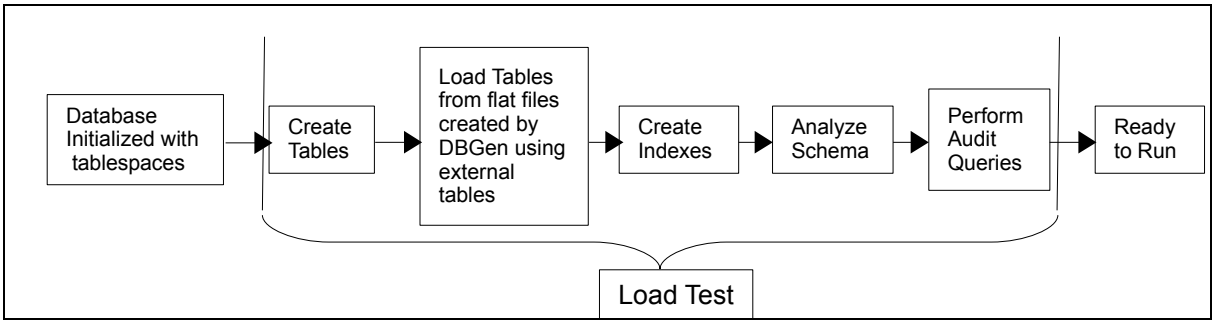
The data storage ratio is computed from the following information:

Disk Type	# Of Disks	Space Per Disk*	Sub-Total Disk Space**
2540 M2 External	288	300GB	86,400 GB
Internal SAS	2	300GB	600 GB
		Total Space	**87,000**
		Data Storage Ratio	**29.0**

** Disk manufacturer definition of one GB is 10^9 bytes*
***In this calculation one GB is defined as 2^30 bytes*

4.8 Database Load Mechanism Details and Illustration

The details of the database load must be reported in the supporting files archive . Disclosure of the load procedure includes all steps, scripts, input and configuration files required to completely reproduce the test and qualification databases. A block diagram illustrating the overall process must be disclosed.



The database was loaded using data stored on flat files that are all on the tested and priced configurations. Oracle created external tables using the files that were created by the DBGEN program.

4.9 Qualification Database Configuration

Any differences between the configuration of the qualification database and the test database must be disclosed.

The qualification database used the same scripts to create and load the data with adjustments for the size difference between the test database and the qualification database.

4.10 Memory Ratio

The memory to database size ratio must be disclosed.

The memory to database size ratio is 66.6.

5 Clause 5 - Performance Metrics and Execution Rules

5.1 System Activity Between Load and Performance Tests

*Any system activity on the SUT that takes place between the conclusion of the load test and the beginning of the performance test must be fully reported in the **supporting files archive** including listings of scripts, command logs and system activity .*

There was no system activity on the SUT between the conclusion of the load and the beginning of the performance test.

5.2 Steps in the Power Test

*The details of the steps followed to implement the power test (.e.g., system boot, database restart, etc.) must be reported in the **supporting files archive**.*

The following steps were used to implement the power test:

1. RF1 Refresh Transaction
2. Stream 00 Execution
3. RF2 Refresh Transaction

5.3 Timing Intervals for Each Query and Refresh Functions

*The timing intervals (see Clause 5.3.7) for each query and for both refresh functions must be reported for the power test. The output for each query and for both refresh functions must be reported in the **supporting files archive**.*

The timing intervals for each query and for both refresh functions are contained in the Numerical Quantities section of the Executive Summary, located at the beginning of this document.

5.4 Number of Streams for the Throughput Test

The number of query streams used for the throughput test must be disclosed.

192 query streams were used for the throughput test.

5.5 Start and End Date/Times for Each Query Stream

*The start time and finish time for each query stream for the throughput test must be disclosed. The output for each query stream for the throughput test must be reported in the **supporting files archive**..*

The throughput test start time and finish time for each stream are contained in the Numerical Quantities section of the Executive Summary, located at the beginning of this document.

5.6 Total Elapsed Time of the Measurement Interval

The total elapsed time of the measurement interval (see Clause 5.3.6) must be reported for the throughput test.

The total elapsed time of the throughput test is contained in the Numerical Quantities section of Executive Summary, located at the beginning of this document.

5.7 Refresh Function Start Date/Time and Finish Date/Time

The start time and, finish time for each refresh function in the refresh stream for the throughput test must be disclosed. The output of each refresh function in the refresh stream for the throughput test must be reported

*in the **supporting files archive**. .*

The start and finish times for each refresh function in the refresh stream are contained in the Numerical Quantities section of the Executive Summary, located at the beginning of this document.

5.8 Performance Metrics

The computed performance metric, related numerical quantities and price performance metric must be reported.

The performance metrics, and the numbers on which they are based, are contained in the Numerical Quantities section of the Executive Summary, located at the beginning of this document.

5.9 The Performance Metric and Numerical Quantities from Both Runs

The performance metric and numerical quantities from both runs must be disclosed.

Performance results from the first two executions of the TPC-H benchmark:

Run ID	QppH@3000GB	QthH@3000GB	QphH@3000GB
Run 1	363,811.6	495,322.5	424,504.5
Run 2	345.762.7	485,512.1	409,721.8

5.10 System Activity Between Performance Tests

Any activity on the SUT that takes place between the conclusion of Run1 and the beginning of Run2 must be fully disclosed including system activity, listings of scripts or command logs along with any system reboots or database restarts.

There was no activity on the SUT between Run1 and Run 2.

5.11 Query Output validation

The output of the Query Output Validation Test must reported in the supporting files archive.

The Supporting Files Archive contains the documentation.

6 Clause 6 - SUT and Driver Implementation

6.1 Driver

A detailed textual description of how the driver performs its functions, how its various components interact and any product functionalities or environmental settings on which it relies and all related source code, scripts and configuration files must be reported in the supporting files archive. The information provided should be sufficient for an independent reconstruction of the driver .

The Power Test and Throughput Test are performed by executing a shell script called runTPCHpt. QGEN is first called with a stream id of 0 to generate the queries for the Power Test. Then script runTPCHpus is executed asynchronously to control the refresh functions RF1 and RF2. The script then continues to the query portion of the Power Test (qexecpl.c ISL), which waits until RF1 is completed. After the query portion of the power run has finished the refresh function RF2 is executed by the same refresh stream that previously executed refresh function RF1.

Following the Power Test, QGEN is again executed with the subsequent stream ids and seeds to generate new queries for each stream. Then qexecpl.c is called asynchronously to execute each streams concurrently. Then runTPCHus is executed to control the throughput test refresh function's pairs of RF1 and RF2.

Both wall-clock and high-resolution times are collected for all measurement intervals.

6.2 Implementation-Specific Layer

If an implementation specific layer is used, then a detailed description of how it performs its functions, how its var-ious components interact and any product functionalities or environmental setting on which it relies must be disclosed. All related source code, scripts and configuration files must be reported in the supporting files archive. The information provided should be sufficient for an independent reconstruction of the implementation specific layer .

Query execution text generated by QGEN is picked up by the ISL program which submits the query to the SUT.

The ISL program (qexecpl.c) utilizes the Oracle Call Interface (OCI) to communicate with the Oracle database on the SUT. EQTs directly generated by QGEN are read and submitted to the SUT via the ISL program (qexecpl.c) as dynamic SQL statements. The ISL program then fetches the query execution output and reports it to the user. Timings are taken at intervals specified in Section 5.3.7 of the TPC-H benchmark specification.

6.3 Profile-Directed Optimization

If profile-directed optimization as described in Clause 5.2.9 is used, such use must be disclosed. In particular, the procedure and any scripts used to perform the optimization must be reported in the supporting files archive .

Profile-directed optimization was not used.

7 Clause 7 - Pricing

7.1 Hardware and Software Used

A detailed list of hardware and software used in the Priced Configuration must be reported. The listing for each separately Orderable item must have vendor Part Number, description, and applicable release/revision level, price source, unit price, quantity, extended price, applicable Discounted price and 3-year maintenance price. If package-pricing is used, the vendor Part Number of the package and a description uniquely identifying each of the Components of the package must be disclosed to a sufficient level of detail to meet the requirements of 1.4.1.1.

The Executive Summary contains a list of the priced hardware and software, including maintenance for 3-years, and any applicable discounts.

7.2 Total Three-Year Price

The total 3-year price of the Priced Configuration must be reported, including: hardware, software, and maintenance charges. The justification of any Discounts applied must be disclosed in the price sheet. Sufficient detail of what items are being discounted and by how much they are being discounted must be provided so that the Discount amount used in the computation of the total system cost can be independently reproduced.

The Executive Summary contains the details for the total 3-year pricing of the configuration. Oracle's discounts are based upon US list prices and for similar quantities and configurations. A discount of 25.1% has been applied to all Oracle hardware, software and services based on the total value and quantities of the components of the configuration, including full payment of all components and maintenance.

For assistance with any of these prices or their applicability to any customer's requirements please contact:

MaryBeth Pierantoni mary.beth.pierantoni@oracle.com

7.3 Availability Date

The committed Availability Date of Components used in the price calculations must be reported. The Availability Date must be reported on the first page of the Executive Summary and with a precision of one day. When the priced system includes products with different availability dates, the reported Availability Date for the priced system must be a date at which all Components are committed to be Generally Available. Each Component used in the Priced Configuration is considered to be Available on the Availability Date unless an earlier date is specified.

All components of the Priced Configuration are available now, except for the following:

Component	*Component Part Number*	*Availability Date*
Sun Storage 16Gb/s FC PCI-E HBA, Qlogic	7101673	September 24, 2013
Sun Storage 16Gb/s FC optics, SR, Qlogic	7101675	September 24, 2013

7.4 Benchmark Performance Metric

A statement of the benchmark performance metric, as well as the respective calculations for 3-year pricing, price/performance, and the availability date must be included.

Performance Metric	*Price/Performance Metric*	*Total 3-year Cost*	*Availability Date*
409,721.8 QphH@3000GB	$3.94/QphH@3000GB	$1,610,564 USD	September 24, 2013

8 Supporting Files Index Table

An index for all files included in the supporting files archive as required by Clause 8.3.2 through 8.3.8 must be provided in the report.

Clause	Description	Archive File	Pathname
Clause 1	OS and DB parameter settings	benchmark_scripts.zip	SupportingFiles/Clause1/OS_DB_parameters
Clause 2	DB creation scripts	benchmark_scripts.zip	SupportingFiles/Clause2/DB_creation_scripts
Clause 3	ACID scripts	benchmark_scripts.zip	SupportingFiles/Clause3/ACID_scripts
	ACID output	benchmark_scripts.zip	SupportingFiles/Clause3/ACID_result
Clause 4	DB Load scripts	benchmark_scripts.zip	SupportingFiles/Clause4/DB_load_scripts
	Qualification output	benchmark_scripts.zip	SupportingFiles/Clause4/QUAL_output
Clause 5	Query output results	run1result.z01 run1result.zip run2result.z01 run2result.zip	
Clause 6	Implementation Specific layer source code	benchmark_scripts.zip	SupportingFiles/Clause6/Implementation_code
Clause 7	3rd Party Price quotes	benchmark_scripts.zip	SupportingFiles/Clause7/CDW_Acer_monitor.pdf
Clause 8	Query substitution parameters	benchmark_scripts.zip	SupportingFiles/Claues8/QueryParms
	RF function source	benchmark_scripts.zip	SupportingFiles/Clause8/RF_source

9 Auditor's Information and Attestation Letter

The auditor's agency name, address, phone number, and Attestation letter with a brief audit summary report indicating compliance must be included in the full disclosure report. A statement should be included specifying who to contact in order to obtain further information regarding the audit process.

The auditor's attestation letter is included at the front of this report, just after the Executive Summary.