

Case Study:

Analyzing Case of High CPU Utilization

Application Status Monitoring

Active Service Graph helps monitor the status of running applications by color-coding each process according to the runtime. (Blue: Less than 1 sec, Purple: 1~3 sec, Orange: 3~8 sec, Red : More than 8 sec)

When a performance bottleneck occurs due to internal or external resource problem, received service request are not processed right away; as response time is delayed, its status turn into Purple, then Orange then finally Red color. Incoming requests are placed in queue, piling up as a result. Using Active Service Graph allows administrator to see the detailed information about the running application service such as Client IP of users, application name, Application CPU utilization, etc...

Key Message :

1. Normally, CPU Utilization rate is around 50%, but randomly it reached 100%, resulting in delay in service time and system down. Cause is difficult to discover without further analysis.
2. Random surge in CPU utilization can be often attributed to poorly designed application logic. In order to identify and resolve such application performance problem, administrator must identify which applications are using up CPU resource and analyze parameter value of those application services by performing code-level analysis in order to find the cause of performance problem.

Background

"T" Company has developed a billing system which handles online payment transaction for customers' monthly service fee. This billing system processes 200 TPS during peak hours of operation and is accessed by up to 900 concurrent users in a given day.

Normally, CPU utilization is approximately 50%, but recently the CPU utilization started climbing to 100%, followed by delay in service response time and frequent system downtime. Sudden surges in CPU utilization seem to be happening at random, and it does not correlate to amount of incoming service request.

Looking for Cause of High CPU Usage

To identify the cause of this performance problem, JENNIFER was installed and application services were monitored. When CPU Utilization increased, the delay in application service response time was observed. After careful analysis of individual application services transaction, administrator noticed that only some of applications were using up unusually high amount of CPU resource.

#32	count : 009	ARRIVAL	ELAPSED	CPU 87.1%	THREAD	STATUS	URL	[Dump Now]
203.210.34.44	14:45:03	393.262	0.0	#####	/D:244aJRSNKT /billing/IEBL_UNPMT_LIST.E.jsp?Title=미납자리스트&ID.SD.NM=630810.RO.NM=244H30810.CORP.NM=244H30810			
61.106.210.82	14:50:12	83.595	0.0	#####	/D:244aJRSNKT /sis/work/common/PUBLSH_VVIEW.L.jsp?ID.PUBLSH=1006327037/0230T05C948T0.PUBLSH=1006327037/0230T05C948T0			
124.80.16.151	14:50:33	63.134	7.0	#####	/D:244aJRSNKT /sis/customer/IESM_PG_RETURN.jsp?cd_pay_method=20810.BANK=12810.SD=3500810.RO=3500810.Account=711020235			
218.209.31.125	14:51:05	30.907	69.9	#####	/D:244aJRSNKT /sis/work/1st/IESM_WORK.L.jsp?NO.SYS=ADMINHND.MENU=0102000081sSearch=Y&Index=1481&Index=N810.SD=330			
218.37.25.210	14:51:30	6.001	0.0	#####	/D:244aJRSNKT /sis/work/common/CONNECT_VVIEW.P.jsp [4 sql, 2 fetched] [call IFSERVER.EquipIF(? , ? , ? , ?)] ;1 DROP			
211.116.70.68	14:51:30	5.537	3.7	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
121.127.65.7	14:51:32	4.003	0.0	#####	/D:244aJRSNKT /sis/work/c/public/ResultSet.java.sql.PreparedStatement.executeQuery(QueryOf)EquipIF(? , ? , ? , ?)] ;1 DROP			
124.28.137.3	14:51:33	3.207	4.6	#####	/D:244aJRSNKT /report/smsReport30C.L.jsp [1 sql, 1 fetched] [select /*+ ORDERED USE_NL(A,B,C,D,E) INDEX(0 IEMA_DEPT_ID			
61.252.209.254	14:51:35	0.771	1.8	#####	/D:244aJRSNKT /sis/customerRcv.Transfer.L.jsp [1 sql] [SELECT /*+ ORDERED USE_NL(A,B,C,D,E) INDEX(0 IEMA_DEPT_ID			
#32	count : 029	ARRIVAL	ELAPSED	CPU 89.1%	THREAD	STATUS	URL	[Dump Now]
203.210.34.44	14:45:03	414.373	0.0	#####	/D:244aJRSNKT /billing/IEBL_UNPMT_LIST.E.jsp?Title=미납자리스트&ID.SD.NM=630810.RO.NM=244H30810.CORP.NM=244H30810			
211.116.70.68	14:51:30	26.548	26.9	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
211.247.125.25214	14:51:42	14.483	14.6	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=2&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
211.116.103.42	14:51:46	10.905	11.0	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=2&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
124.28.68.163	14:51:49	8.325	0.0	#####	/D:244aJRSNKT /sis/work/common/PUBLSH_VVIEW.L.jsp?ID.PUBLSH=1008751932/0230T05C948T0.PUBLSH=1008751932/0230T05C948T0			
124.80.16.70	14:51:52	4.934	0.0	#####	/D:244aJRSNKT /RDServer/rdagent.jsp [1 sql] [SELECT * FROM (
125.208.82.43	14:52:37	6.667	1.9	#####	/D:244aJRSNKT /sis/customer/IESM_PG_RETURN.jsp?cd_pay_method=20810.BANK=11810.SD=3500810.RO=3500810.Account=118121135			
218.209.31.20	14:52:39	4.069	25.3	#####	/D:244aJRSNKT /sis/work/1st/IESM_WORK.L.jsp?NO.SYS=ADMINHND.MENU=0102000081sSearch=Y&Index=981&Index=N810.SD=330			
61.103.100.7	14:52:41	2.248	0.0	#####	/D:244aJRSNKT /sis/customer/IESM_PG_RETURN.jsp?cd_pay_method=20810.BANK=11810.SD=3500810.RO=3500810.Account=71021255			
210.210.216.13714	14:52:42	1.009	2.5	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
222.251.129.23914	14:52:42	0.865	2.2	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
122.254.251.17614	14:52:42	0.863	7.7	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
125.208.82.68	14:52:42	0.816	6.5	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
203.210.34.38	14:52:42	0.810	6.5	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
#32	count : 017	ARRIVAL	ELAPSED	CPU 81.2%	THREAD	STATUS	URL	[Dump Now]
203.210.34.44	14:45:03	455.692	0.0	#####	/D:244aJRSNKT /billing/IEBL_UNPMT_LIST.E.jsp?Title=미납자리스트&ID.SD.NM=630810.RO.NM=244H30810.CORP.NM=244H30810			
211.221.138.23714	14:52:22	26.513	8.1	#####	/D:244aJRSNKT /sis/customer/IESM_PG_RETURN.jsp?cd_pay_method=20810.BANK=12810.SD=3500810.RO=3500810.Account=235103520			
124.28.137.3	14:52:26	22.289	0.0	#####	/D:244aJRSNKT /sis/receipt/stor/IESM_STOP_PROC.jsp?ID.RCV=1008726082 [2 sql, 2 fetched] [call PKG_WORK.PROCESS_WORK			
125.208.82.43	14:52:37	11.649	3.0	#####	/D:244aJRSNKT /sis/customer/IESM_PG_RETURN.jsp?cd_pay_method=20810.BANK=11810.SD=3500810.RO=3500810.Account=118121135			
211.116.70.68	14:52:44	4.265	11.8	#####	/D:244aJRSNKT /sis/customerSearchNB.L.jsp?node=5&searchType=NNDONHYNBIndex=181&Index=N810.SD=80C.CUST_STAT=8SEARCH			
124.28.137.3	14:52:44	4.254	81.5	#####	/D:244aJRSNKT /report/smsReport30C.L.jsp [1 sql, 81 fetched] [SELECT /*+ ORDERED USE_NL(A,B,C) */			
125.208.82.68	14:52:46	1.792	6.5	#####	/D:244aJRSNKT /sis/IESM_PG_RETURN.jsp?ID.CUST=045534722 [1 sql] [SELECT /*+ ORDERED USE_NL(A,B,C) */			

After further analysis, the cause of high CPU utilization was determined unnecessarily many loop commands in application code which used up CPU resource.

Addendum

JENNIFER Review Downloads:

<http://www.jennifersoft.com/docs/apm-jennifer-installation-file-download.html>

JENNIFER Introduction Downloads:

<http://www.jennifersoft.com/docs/apm-jennifer-documents.html>