

HPE Project and Portfolio Management Center

Software Version 9.40

DM Benchmark Result Document

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Hewlett Packard
Enterprise

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1 Introduction

1.1 Purpose and Scope

This document provides a benchmark that characterizes the performance of PPM version 9.40. It provides contextual data regarding the data environment within which a specific functional workload is applied representing the benchmark workload. Test results for a benchmark run within HPE PPM Performance Labs are provided for reference purposes. HPE LoadRunner version 12.50 was used to simulate the workload for the benchmark test run. Additionally the document provides instructions with respect to setup and execution the benchmark in a customized environment.

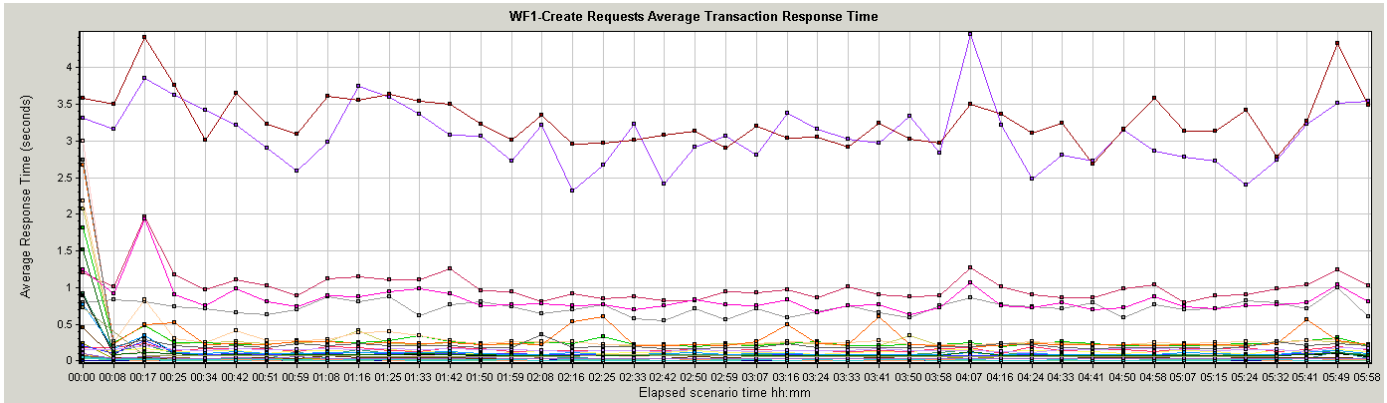
1.2 Terms and Definitions

Term	Definition
Vuser	Simulation of real user performing the actions on the product through LR scripts
Injector Host/Load Generator (LG)	The client machine from which the Vusers will run from and activate the different scripts and scenarios.
LoadRunner Controller (LC)	The LoadRunner controller is used to create and run scenarios. When running a scenario, the controller coordinates all the vusers in terms of scheduling and pacing and captures correlated resource utilization for subsequent analysis
Transaction	An end-to-end (browser-to backend-to browser) measurement of one or more user actions that has a tangible business value to the end-user. This is also termed as a "Business Process".
Transaction Throughput	Number of successful Transaction instances running through the product within a specified period of time
Transaction Response Time	The time measured by LoadRunner generator as the response time of the transaction. This is defined by LoadRunner as the time taken for all web requests belonging to the transaction, to return the responses. This is also termed as "Transaction Latency"
Think-Time	Delay provided between HTTP requests while simulating users (Vusers) through LoadRunner scripts, in order to simulate real world delays between various user actions while using the product
Concurrent users	Users that execute the same step in the same business process at the same time instance
Connected users	Uses that logged into the system, but not necessary execute any business process at this time
Active users	Connected users that execute activity at this moment, can be concurrent (but not necessarily so)

2 Benchmark Scenario Run

The following section provided results from a benchmark in PPM Performance Labs divided by WFs.

2.1 WF1-Create requests Average Transaction Response Time

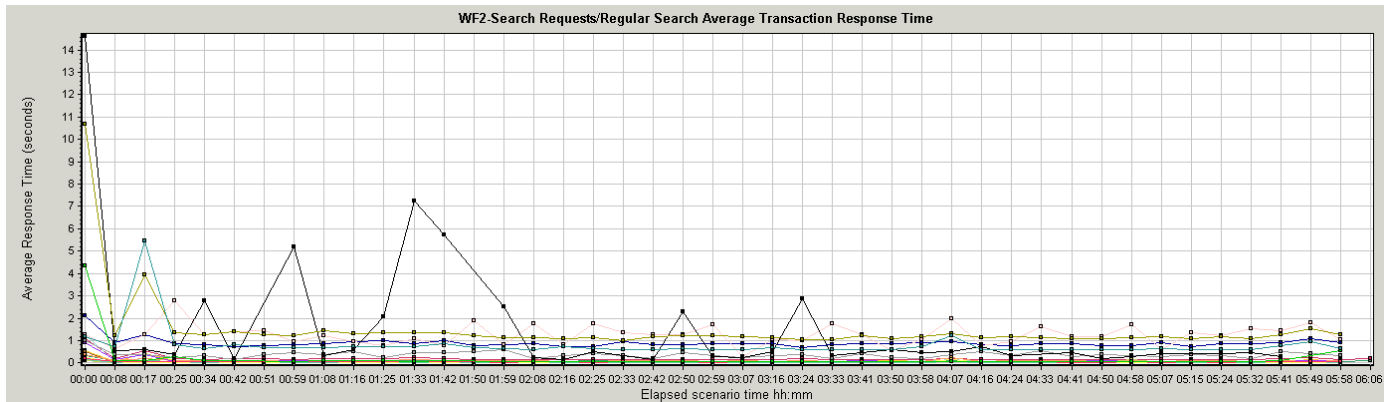


Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
	1	DMBM_01_TX_01_SelectRequest_RT_1	0.063	0.126	3.318	0.267
	1	DMBM_01_TX_02_SelectContactName_RT_1	0.661	1.009	4.107	0.345
	1	DMBM_01_TX_03_OpenScheduledStartDate_RT_1	0.006	0.012	0.538	0.035
	1	DMBM_01_TX_04_SelectScheduledStartDate_RT_1	0.005	0.008	0.245	0.012
	1	DMBM_01_TX_05_OpenScheduledFinishDate_RT_1	0.024	0.036	0.339	0.019
	1	DMBM_01_TX_06_SelectSkill_RT_1	0.021	0.038	0.770	0.044
	1	DMBM_01_TX_07_SelectDate_RT_1	0.009	0.014	0.198	0.013
	1	DMBM_01_TX_08_SubmitRequest_RT_1	0.165	0.307	4.423	0.480
	1	DMBM_02_TX_01_SelectRequest_RT_4	0.054	0.177	8.409	0.818
	1	DMBM_02_TX_02_ClickAssignToMultiVal_RT_4	2.207	3.067	4.969	0.606
	1	DMBM_02_TX_03_ClickFindAssignToMultiVal_RT_4	0.086	0.130	0.186	0.028
	1	DMBM_02_TX_04_ChooseDate_RT_4	0.009	0.015	0.054	0.007
	1	DMBM_02_TX_05_ClickTab_ShortContact_RT_4	0.096	0.159	0.409	0.042
	1	DMBM_02_TX_06_ShowAll_ShortContacts_RT_4	0.486	0.721	1.145	0.150
	1	DMBM_02_TX_07_Submit_RT_4	0.171	0.303	3.394	0.410
	1	DMBM_03_TX_01_SelectRequest_RT_5	0.055	0.112	4.922	0.281
	1	DMBM_03_TX_02_ChooseApplication_RT_5	0.021	0.042	1.844	0.098

1	DMBM_03_TX_03_ChooseRequestGroup_RT_5	0.023	0.038	1.034	0.067
1	DMBM_03_TX_04_NewReferenceAttachment_RT_5	0.062	0.095	0.955	0.069
1	DMBM_03_TX_05_ChooseDate_RT_5	0.010	0.014	0.296	0.015
1	DMBM_03_TX_06_Submit_RT_5	0.180	0.337	4.773	0.499
1	DMBM_04_TX_01_SelectRequest_RT_6	0.072	0.130	3.721	0.226
1	DMBM_04_TX_02_ClickTabOnNonExistentContactName_RT_6	0.028	0.055	4.699	0.223
1	DMBM_04_TX_03_ClickShowAll_RT_6	0.543	0.845	6.946	0.412
1	DMBM_04_TX_04_ClickFindContact_RT_6	0.097	0.151	0.674	0.042
1	DMBM_04_TX_05_Submit_RT_6	0.168	0.349	7.921	0.671
1	DMBM_05_TX_01_SelectRequest_RT_7	0.054	0.125	7.782	0.505
1	DMBM_05_TX_02_AssignToMultiSelect_RT_7	2.220	3.281	7.170	0.654
1	DMBM_05_TX_03_ChooseRequestGroup_RT_7	0.023	0.036	0.906	0.046
1	DMBM_05_TX_04_Submit_RT_7	0.133	0.283	7.311	0.658
1	OpenRequestsMenu	0.056	0.615	2.461	0.619

2.2 WF2 – Search requests, Average Transaction Response Time

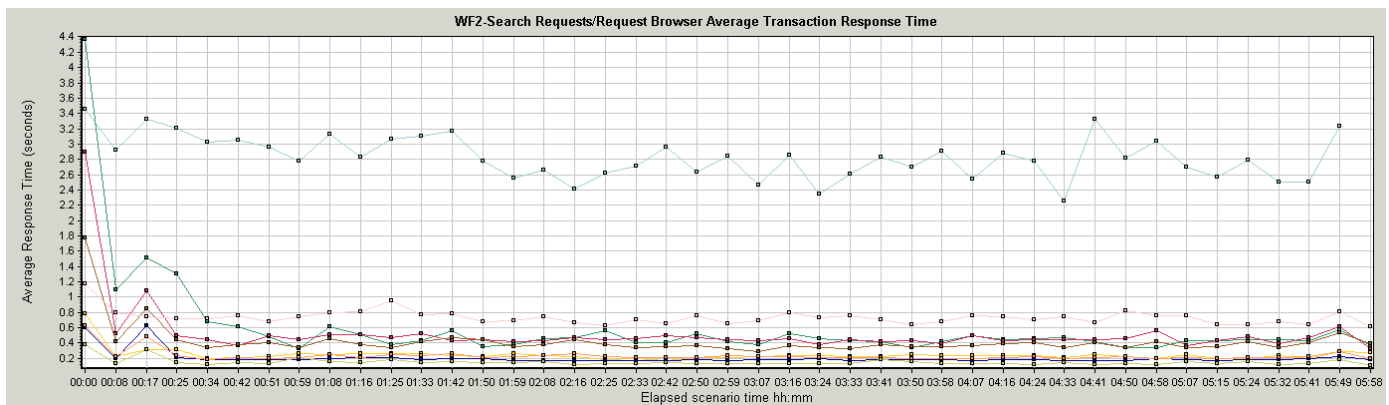
2.2.1 Regular Searches



Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
Green	1	DMBM_06_TX_01_OpenSearchMenu	0.048	0.082	2.391	0.109
Pink	1	DMBM_06_TX_02_Submit	0.112	0.207	13.227	0.427
Yellow	1	DMBM_07_TX_01_OpenSearchMenu	0.047	0.097	2.626	0.171
Blue	1	DMBM_07_TX_02_Submit	0.227	0.901	9.969	0.573
Light Blue	1	DMBM_08_TX_01_OpenSearchMenu	0.048	0.111	7.404	0.386

1	DMBM_08_TX_02_ClickTabOnReque stType	0.014	0.036	3.741	0.193
1	DMBM_08_TX_03_ClickAdvancedSea rch	0.062	0.107	2.136	0.133
1	DMBM_08_TX_04_ClickPriority	0.028	0.044	0.956	0.049
1	DMBM_08_TX_05_Submit	0.105	1.232	4.711	1.380
1	DMBM_09_TX_01_OpenSearchMenu	0.052	0.109	2.432	0.223
1	DMBM_09_TX_02_selectRT	0.013	0.029	1.211	0.089
1	DMBM_09_TX_03_selectPriority	0.025	0.045	0.571	0.049
1	DMBM_09_TX_04_ChooseWorkflow	0.029	0.048	0.730	0.049
1	DMBM_09_TX_05_ClickSearch	0.081	0.377	4.818	0.384
1	DMBM_10_TX_01_OpenSearchMenu	0.055	0.211	4.342	0.704
1	DMBM_10_TX_02_ClickSearch	0.146	1.585	14.604	2.799
1	DMBM_18_TX_01_ChoosePortlet	0.817	1.580	49.708	3.429
1	DMBM_18_TX_02_ChooseRequest	0.499	0.788	12.040	0.902

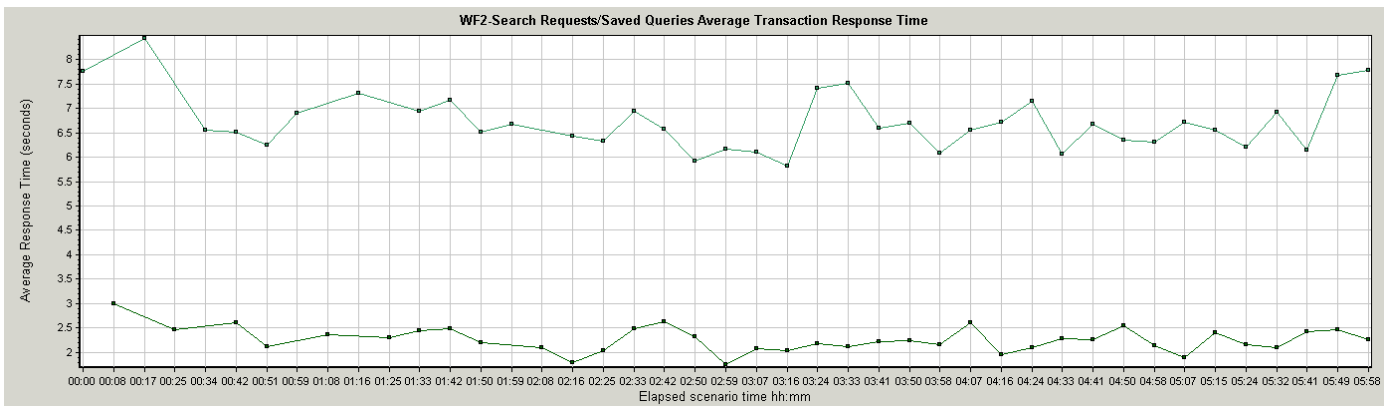
2.2.2 Request Browser



Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
	1	DMBM_21_OnlySearchRequestBr owser_TX01_Choose_Req_Brow ser	0.159	0.634	13.413	1.014
	1	DMBM_22_Request_Browser_Sa ved_Set_1_TX01_Click_Saved_S et_1	0.313	0.549	6.823	0.570
	1	DMBM_22_Request_Browser_Sa ved_Set_1_TX02_Click_Tree_Le vel_1	0.156	0.250	2.732	0.196
	1	DMBM_22_Request_Browser_Sa ved_Set_1_TX03_Click_Tree_Le vel_2	0.143	0.211	1.934	0.179
	1	DMBM_22_Request_Browser_Sa ved_Set_1_TX04_Click_Link	2.076	2.841	5.271	0.462
	1	DMBM_23_Request_Browser_Sa ved_Set_2_TX01_Push_Saved_S et_2	0.268	0.438	3.329	0.340

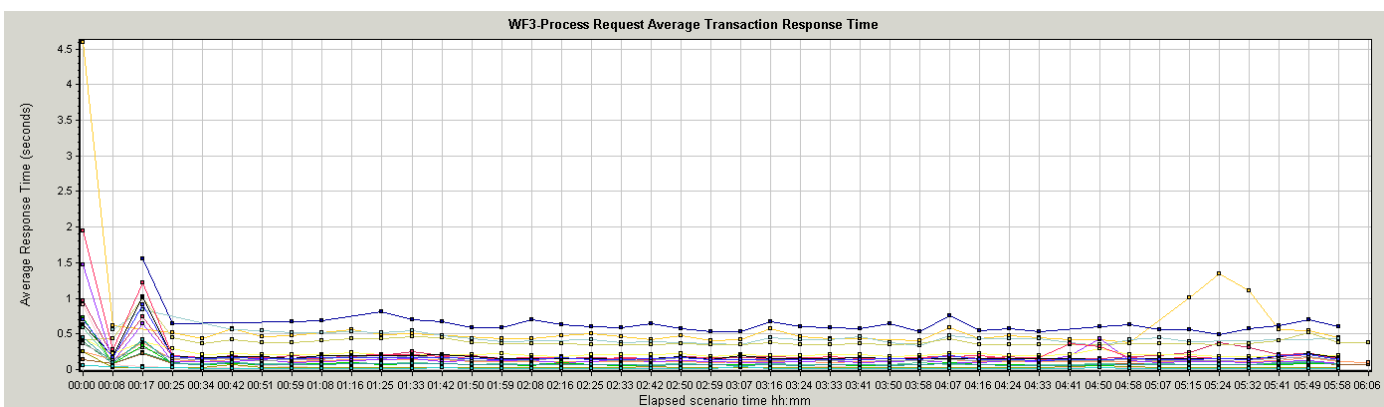
1	DMBM_23_Request_Browser_Saved_Set_2_TX02_Click_1st_Level	0.146	0.240	2.176	0.180
1	DMBM_23_Request_Browser_Saved_Set_2_TX03_Click_2nd_Level	0.098	0.155	1.226	0.107
1	DMBM_23_Request_Browser_Saved_Set_2_TX04_Click_Link	0.523	0.737	2.915	0.202

2.2.3 Run from Saved queries



Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
1	1	DMBM_24_Run_Queries_FromSaved_Query_Builder_Choose_Query_1	1.685	2.302	5.945	0.479
1	1	DMBM_24_Run_Queries_FromSaved_Query_Builder_Choose_Query_2	4.985	6.827	9.835	0.964

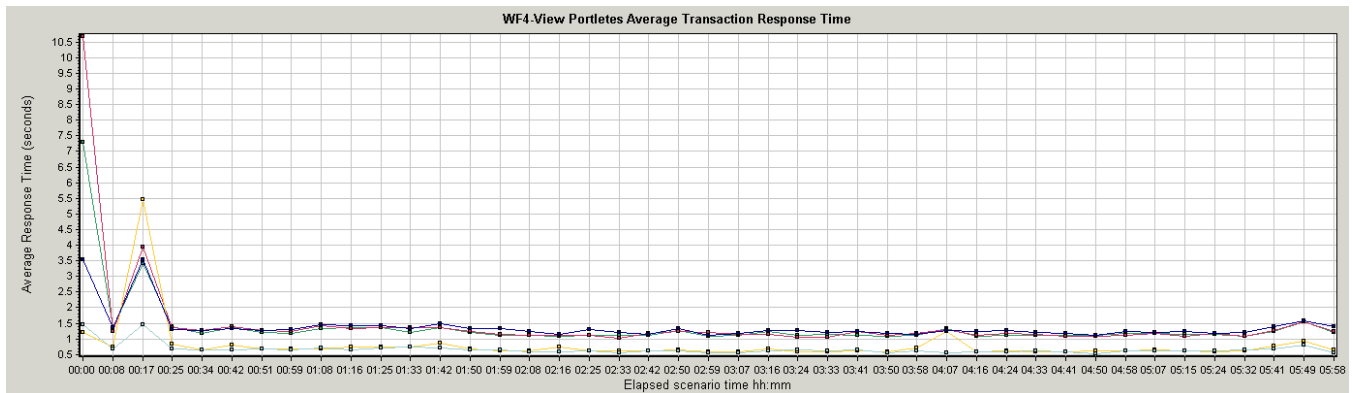
2.3 WF3 - process request Average Transaction Response Time



Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
1	1	DMBM_11_TX_01_OpenSearchMenu	0.048	0.084	4.669	0.156

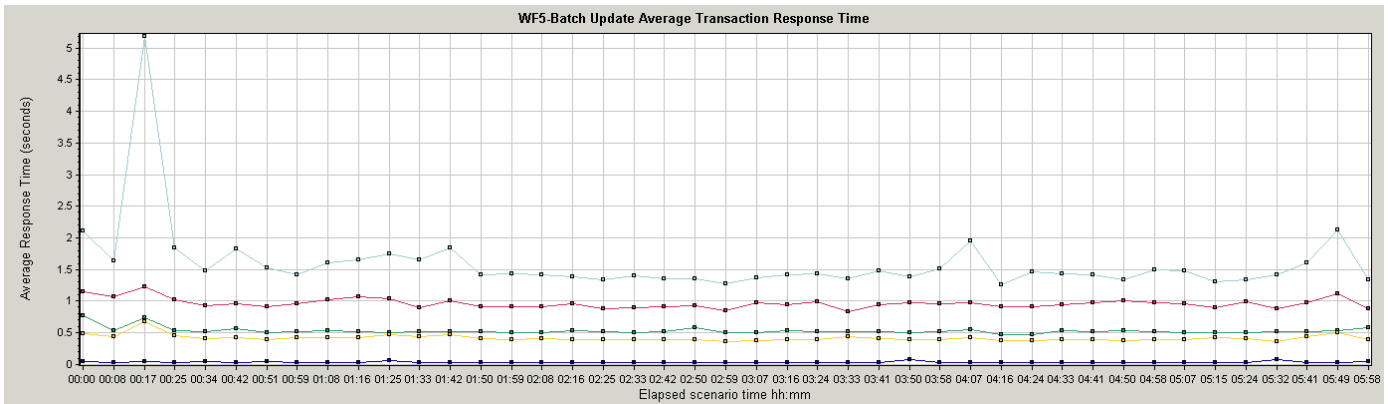
1	DMBM_11_TX_02_SearchRequestID	0.103	0.217	12.992	0.443
1	DMBM_11_TX_03_ClickAssign_RT_1	0.312	0.783	9.640	1.197
1	DMBM_11_TX_03_ClickAssign_RT_6	0.383	0.652	6.968	0.439
1	DMBM_11_TX_03_ClickAssign_RT_7	0.289	0.461	1.684	0.135
1	DMBM_12_TX_01_OpenSearchMenu	0.045	0.076	4.265	0.080
1	DMBM_12_TX_02_SearchRequestID	0.067	0.124	5.351	0.116
1	DMBM_12_TX_03_ClickAssign_RT5	0.265	0.395	5.245	0.200
1	DMBM_13_TX_01_OpenSearchMenu	0.019	0.060	9.744	0.424
1	DMBM_13_TX_02_SearchRequestID	0.069	0.186	8.958	0.561
1	DMBM_13_TX_03_ShowGraphicalView	0.143	0.224	1.306	0.105
1	DMBM_14_TX_01_OpenSearchMenu	0.054	0.105	4.226	0.212
1	DMBM_14_TX_02_SearchRequestID	0.099	0.264	10.783	0.674
1	DMBM_14_TX_03_ShowApprovalDetails	0.099	0.152	2.249	0.112
1	DMBM_15_TX_01_OpenSearchMenu	0.050	0.101	5.159	0.282
1	DMBM_15_TX_02_SearchRequestID	0.112	0.203	2.968	0.249
1	DMBM_15_TX_03_ShowTransactionalDetails	0.016	0.035	4.414	0.183
1	DMBM_16_TX_01_OpenSearchMenu	0.048	0.089	2.775	0.153
1	DMBM_16_TX_02_SearchRequestID	0.108	0.186	4.834	0.261
1	DMBM_16_TX_03_openAttachment	0.006	0.019	1.129	0.044

2.4 WF4 - View Portlets



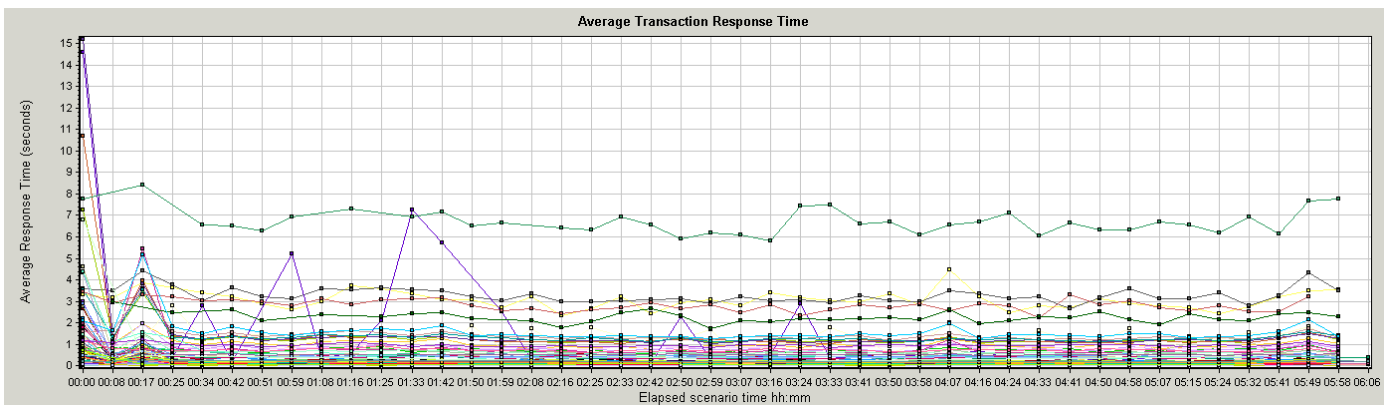
Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
Green	1	DMBM_17_TX_01_ChoosePortlet	0.814	1.432	50.032	2.582
Pink	1	DMBM_18_TX_01_ChoosePortlet	0.817	1.580	49.708	3.429
Yellow	1	DMBM_18_TX_02_ChooseRequest	0.499	0.788	12.040	0.902
Blue	1	DMBM_20_TX_01_ViewPortlet_With_Bar_And_Pie_Chart	0.897	1.405	19.068	1.032
Cyan	1	DMBM_20_TX_02_ClickOnPieChart	0.415	0.681	6.189	0.437

2.5 WF5 – Batch update



Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
Green	1	DMBM_25_PPM_BatchUpdate_TX 01_SearchRequests	0.346	0.523	2.367	0.137
Pink	1	DMBM_25_PPM_BatchUpdate_TX 02_Search75Req	0.640	0.960	3.124	0.202
Yellow	1	DMBM_25_PPM_BatchUpdate_TX 03_ClickMassUpdate	0.279	0.411	1.900	0.108
Blue	1	DMBM_25_PPM_BatchUpdate_TX 04_ClickDone	0.017	0.031	0.681	0.040
Light Blue	1	DMBM_25_PPM_BatchUpdate_TX 05_ClickContinue	0.777	1.591	16.317	1.028

2.6 Average Transaction Response Time-Total TRT's



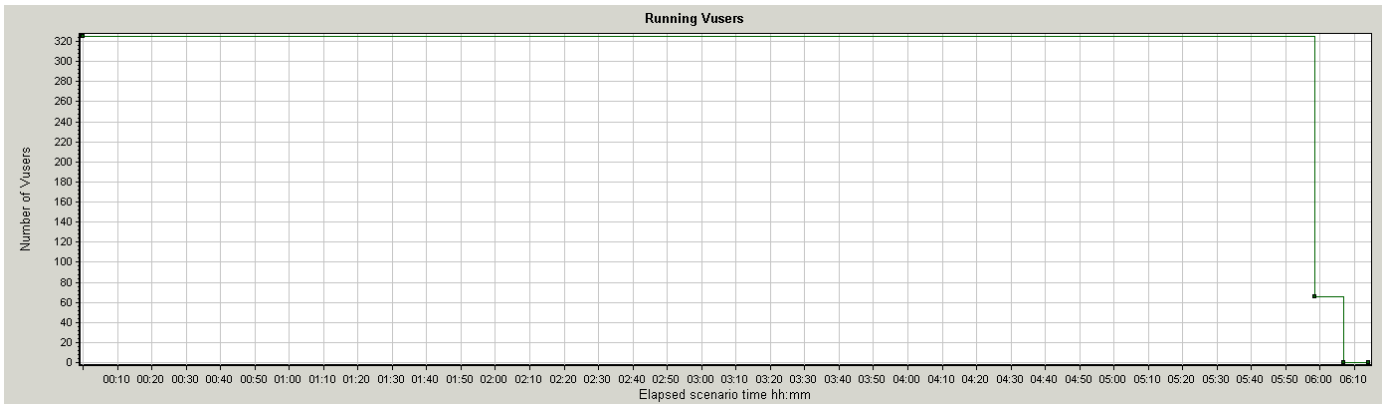
Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
Pink	1	DMBM_01_TX_01_SelectRequest_RT_1	0.063	0.126	3.318	0.267
Yellow	1	DMBM_01_TX_02_SelectContactName_RT_1	0.661	1.009	4.107	0.345
Blue	1	DMBM_01_TX_03_OpenScheduledStar tDate_RT_1	0.006	0.012	0.538	0.035

	1	DMBM_01_TX_04_SelectScheduledStartDate_RT_1	0.005	0.008	0.245	0.012
	1	DMBM_01_TX_05_OpenScheduledFinishDate_RT_1	0.024	0.036	0.339	0.019
	1	DMBM_01_TX_06_SelectSkill_RT_1	0.021	0.038	0.770	0.044
	1	DMBM_01_TX_07_SelectDate_RT_1	0.009	0.014	0.198	0.013
	1	DMBM_01_TX_08_SubmitRequest_RT_1	0.165	0.307	4.423	0.480
	1	DMBM_02_TX_01_SelectRequest_RT_4	0.054	0.177	8.409	0.818
	1	DMBM_02_TX_02_ClickAssignToMultiVal_RT_4	2.207	3.067	4.969	0.606
	1	DMBM_02_TX_03_ClickFind_AssignToMultiVal_RT_4	0.086	0.130	0.186	0.028
	1	DMBM_02_TX_04_ChooseDate_RT_4	0.009	0.015	0.054	0.007
	1	DMBM_02_TX_05_ClickTab_ShortContact_RT_4	0.096	0.159	0.409	0.042
	1	DMBM_02_TX_06_ShowAll_ShortContacts_RT_4	0.486	0.721	1.145	0.150
	1	DMBM_02_TX_07_Submit_RT_4	0.171	0.303	3.394	0.410
	1	DMBM_03_TX_01_SelectRequest_RT_5	0.055	0.112	4.922	0.281
	1	DMBM_03_TX_02_ChooseApplication_RT_5	0.021	0.042	1.844	0.098
	1	DMBM_03_TX_03_ChooseRequestGroup_RT_5	0.023	0.038	1.034	0.067
	1	DMBM_03_TX_04_NewReferenceAttachment_RT_5	0.062	0.095	0.955	0.069
	1	DMBM_03_TX_05_ChooseDate_RT_5	0.010	0.014	0.296	0.015
	1	DMBM_03_TX_06_Submit_RT_5	0.180	0.337	4.773	0.499
	1	DMBM_04_TX_01_SelectRequest_RT_6	0.072	0.130	3.721	0.226
	1	DMBM_04_TX_02_ClickTabOnNonExistentContactName_RT_6	0.028	0.055	4.699	0.223
	1	DMBM_04_TX_03_ClickShowAll_RT_6	0.543	0.845	6.946	0.412
	1	DMBM_04_TX_04_ClickFindContact_RT_6	0.097	0.151	0.674	0.042
	1	DMBM_04_TX_05_Submit_RT_6	0.168	0.349	7.921	0.671
	1	DMBM_05_TX_01_SelectRequest_RT_7	0.054	0.125	7.782	0.505
	1	DMBM_05_TX_02_AssignToMultiSelect_RT_7	2.220	3.281	7.170	0.654
	1	DMBM_05_TX_03_ChooseRequestGroup_RT_7	0.023	0.036	0.906	0.046
	1	DMBM_05_TX_04_Submit_RT_7	0.133	0.283	7.311	0.658
	1	DMBM_06_TX_01_OpenSearchMenu	0.048	0.082	2.391	0.109
	1	DMBM_06_TX_02_Submit	0.112	0.207	13.227	0.427
	1	DMBM_07_TX_01_OpenSearchMenu	0.047	0.097	2.626	0.171
	1	DMBM_07_TX_02_Submit	0.227	0.901	9.969	0.573

1	DMBM_08_TX_01_OpenSearchMenu	0.048	0.111	7.404	0.386
1	DMBM_08_TX_02_ClickTabOnRequest Type	0.014	0.036	3.741	0.193
1	DMBM_08_TX_03_ClickAdvancedSearch	0.062	0.107	2.136	0.133
1	DMBM_08_TX_04_ClickPriority	0.028	0.044	0.956	0.049
1	DMBM_08_TX_05_Submit	0.105	1.232	4.711	1.380
1	DMBM_09_TX_01_OpenSearchMenu	0.052	0.109	2.432	0.223
1	DMBM_09_TX_02_selectRT	0.013	0.029	1.211	0.089
1	DMBM_09_TX_03_selectPriority	0.025	0.045	0.571	0.049
1	DMBM_09_TX_04_ChooseWorkflow	0.029	0.048	0.730	0.049
1	DMBM_09_TX_05_ClickSearch	0.081	0.377	4.818	0.384
1	DMBM_10_TX_01_OpenSearchMenu	0.055	0.211	4.342	0.704
1	DMBM_10_TX_02_ClickSearch	0.146	1.585	14.604	2.799
1	DMBM_11_TX_01_OpenSearchMenu	0.048	0.084	4.669	0.156
1	DMBM_11_TX_02_SearchRequestID	0.103	0.217	12.992	0.443
1	DMBM_11_TX_03_ClickAssign_RT_1	0.312	0.783	9.640	1.197
1	DMBM_11_TX_03_ClickAssign_RT_6	0.383	0.652	6.968	0.439
1	DMBM_11_TX_03_ClickAssign_RT_7	0.289	0.461	1.684	0.135
1	DMBM_12_TX_01_OpenSearchMenu	0.045	0.076	4.265	0.080
1	DMBM_12_TX_02_SearchRequestID	0.067	0.124	5.351	0.116
1	DMBM_12_TX_03_ClickAssign_RT5	0.265	0.395	5.245	0.200
1	DMBM_13_TX_01_OpenSearchMenu	0.019	0.060	9.744	0.424
1	DMBM_13_TX_02_SearchRequestID	0.069	0.186	8.958	0.561
1	DMBM_13_TX_03_ShowGraphicalView	0.143	0.224	1.306	0.105
1	DMBM_14_TX_01_OpenSearchMenu	0.054	0.105	4.226	0.212
1	DMBM_14_TX_02_SearchRequestID	0.099	0.264	10.783	0.674
1	DMBM_14_TX_03_ShowApprovalDetails	0.099	0.152	2.249	0.112
1	DMBM_15_TX_01_OpenSearchMenu	0.050	0.101	5.159	0.282
1	DMBM_15_TX_02_SearchRequestID	0.112	0.203	2.968	0.249
1	DMBM_15_TX_03_ShowTransactional Details	0.016	0.035	4.414	0.183
1	DMBM_16_TX_01_OpenSearchMenu	0.048	0.089	2.775	0.153
1	DMBM_16_TX_02_SearchRequestID	0.108	0.186	4.834	0.261
1	DMBM_16_TX_03_openAttachment	0.006	0.019	1.129	0.044
1	DMBM_17_TX_01_ChoosePortlet	0.814	1.432	50.032	2.582
1	DMBM_18_TX_01_ChoosePortlet	0.817	1.580	49.708	3.429
1	DMBM_18_TX_02_ChooseRequest	0.499	0.788	12.040	0.902
1	DMBM_19_TX_01_ChoosePortlet	0.816	1.763	50.045	4.185
1	DMBM_19_TX_02_EditPortlet	0.088	0.135	1.542	0.101
1	DMBM_19_TX_03_ChangeRequestList Filter	0.931	1.423	7.728	0.500
1	DMBM_20_TX_01_ViewPortlet_With_Bar_And_Pie_Chart	0.897	1.405	19.068	1.032
1	DMBM_20_TX_02_ClickOnPieChart	0.415	0.681	6.189	0.437

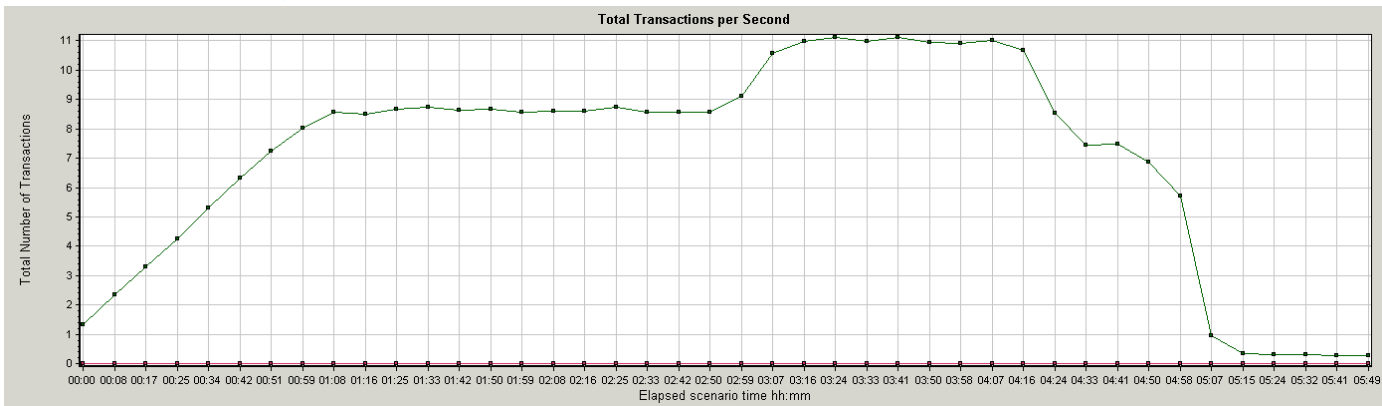
1	DMBM_21_OnlySearchRequestBrowser_TX01_Choose_Req_Browser	0.159	0.634	13.413	1.014
1	DMBM_22_Request_Browser_Saved_Set_1_TX01_Click_Saved_Set_1	0.313	0.549	6.823	0.570
1	DMBM_22_Request_Browser_Saved_Set_1_TX02_Click_Tree_Level_1	0.156	0.250	2.732	0.196
1	DMBM_22_Request_Browser_Saved_Set_1_TX03_Click_Tree_Level_2	0.143	0.211	1.934	0.179
1	DMBM_22_Request_Browser_Saved_Set_1_TX04_Click_Link	2.076	2.841	5.271	0.462
1	DMBM_23_Request_Browser_Saved_Set_2_TX01_Push_Saved_Set_2	0.268	0.438	3.329	0.340
1	DMBM_23_Request_Browser_Saved_Set_2_TX02_Click_1st_Level	0.146	0.240	2.176	0.180
1	DMBM_23_Request_Browser_Saved_Set_2_TX03_Click_2nd_Level	0.098	0.155	1.226	0.107
1	DMBM_23_Request_Browser_Saved_Set_2_TX04_Click_Link	0.523	0.737	2.915	0.202
1	DMBM_24_Run_Queries_FromSaved_Query_Builder_Choose_Query_1	1.685	2.302	5.945	0.479
1	DMBM_24_Run_Queries_FromSaved_Query_Builder_Choose_Query_2	4.985	6.827	9.835	0.964
1	DMBM_25_PPM_BatchUpdate_TX01_SearchRequests	0.346	0.523	2.367	0.137
1	DMBM_25_PPM_BatchUpdate_TX02_Search75Req	0.640	0.960	3.124	0.202
1	DMBM_25_PPM_BatchUpdate_TX03_ClickMassUpdate	0.279	0.411	1.900	0.108
1	DMBM_25_PPM_BatchUpdate_TX04_ClickDone	0.017	0.031	0.681	0.040
1	DMBM_25_PPM_BatchUpdate_TX05_ClickContinue	0.777	1.591	16.317	1.028
1	Login	0.204	6.691	22.230	5.496
1	Logout	0.147	0.211	1.023	0.097
1	OpenRequestsMenu	0.056	0.615	2.461	0.619

2.7 Total Running Vusers



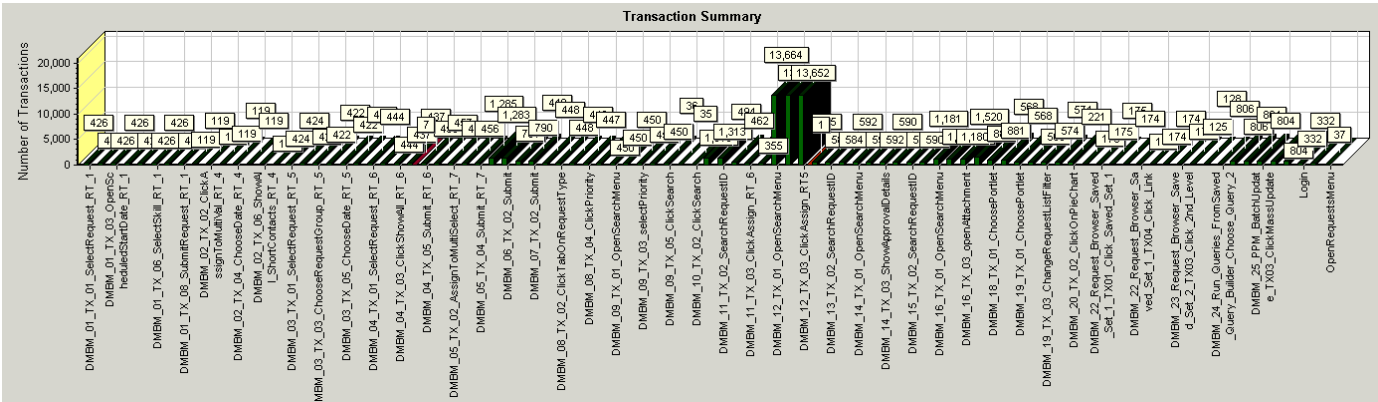
Color	Scale	Measurement	Graph Minimum	Graph Average	Graph Maximum	Graph Median	Graph Std. Deviation
	1	Run	0.000	97.750	325.000	66.000	133.941

2.8 Total Transaction per Second



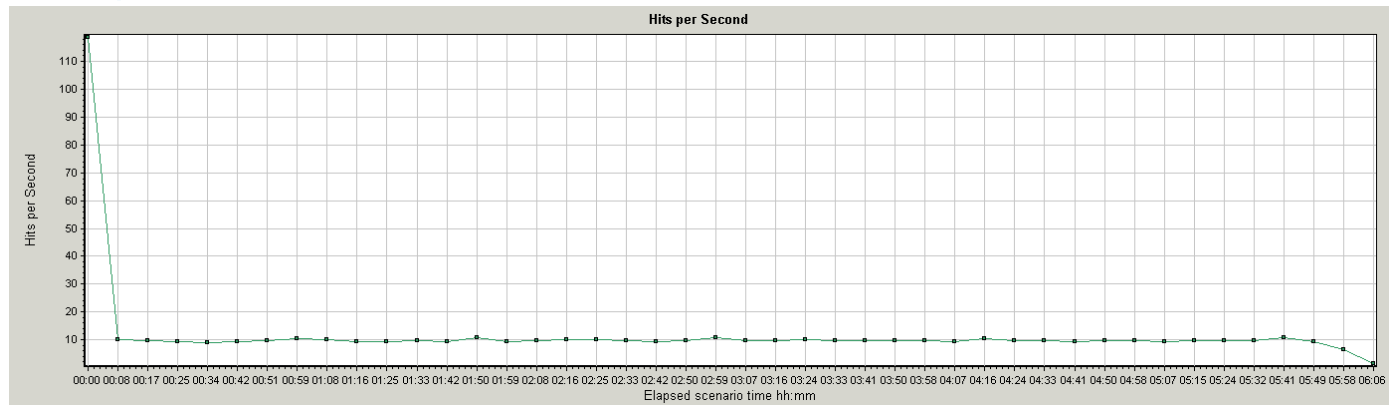
Color	Scale	Measurement	Graph Minimum	Average	Graph Maximum	Graph Median	Graph Std. Deviation
	1	Fail	0.000	0.000	0.002	0.000	0.001
	1	Pass	0.972	3.832	4.584	3.889	0.459
	1	Stop	0.000	0.000	0.002	0.000	0.000

2.9 Transaction Summary



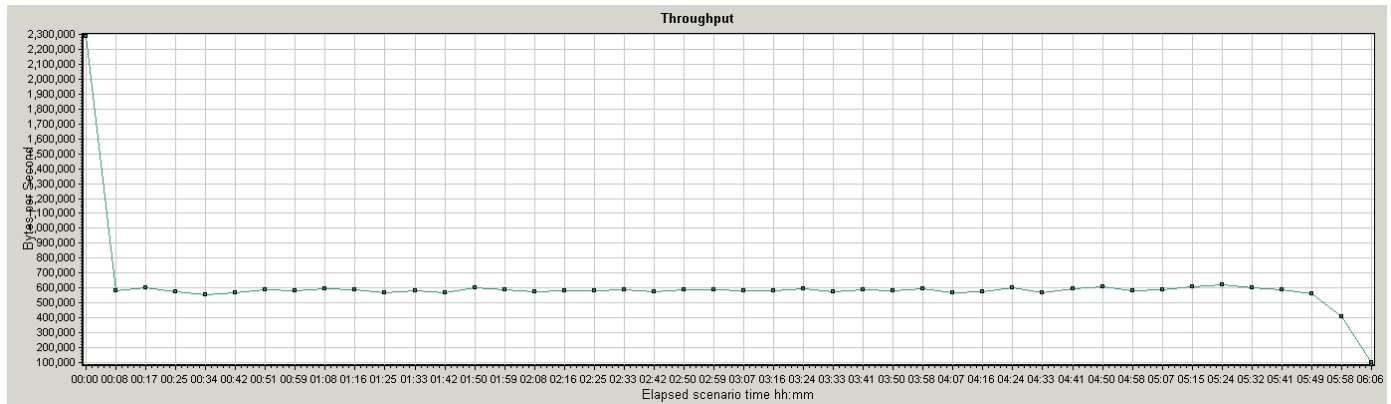
Color	Scale	Measurement
Green	1	Pass
Pink	1	Fail
Orange	1	Stop

2.10 Hits per Second



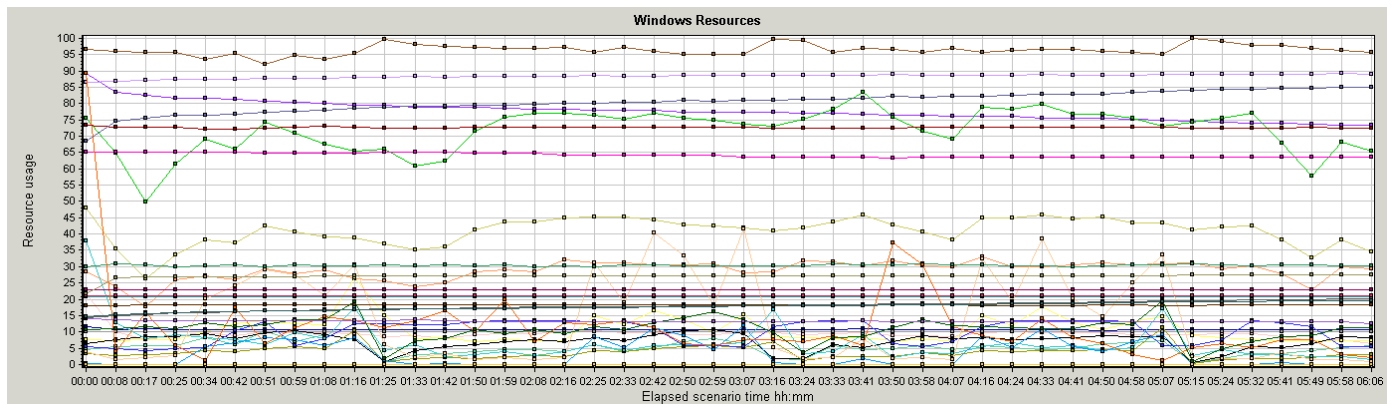
Color	Scale	Measurement	Graph Minimum	Average	Graph Maximum	Graph Median	Graph Std. Deviation
Green	1	Hits	1.494	12.030	118.588	9.721	16.313

2.11 Network Throughput



Color	Scale	Measurement	Graph Minimum	Average	Graph Maximum	Graph Median	Graph Std. Deviation
	1	Throughput	98,496.960	609,494.225	2,288,416.918	583,034.189	267,790.723

2.12 PPM Application Servers CPU Usage



Color	Scale	Measurement	Minimum	Average	Maximum	Std. Deviation
	1	% Disk Time (PhysicalDisk_Total):16.186.76.172	0.000	5.123	170.334	7.367
	1	% Idle Time (PhysicalDisk_Total):16.186.76.172	5.000	96.376	101.702	4.982
	100	% Interrupt Time (Processor_Total):16.186.76.172	0.000	0.288	1.107	0.154
	10	% Privileged Time (Processor)	0.390	4.091	12.174	1.215

		_Total):16.186.76.1 72				
	1	% Processor Time (Processor _Total):16.186.76.1 72	1.172	9.529	99.870	5.407
	0.01	Available MBytes (Memory):16.186.76 .172	7,324.000	7,772.242	9,664.000	304.624
	0.001	Avg. Disk Bytes/Transfer (PhysicalDisk _Total):16.186.76.1 72	0.000	10,603.684	108,339.200	10,216.253
	100	Avg. Disk Queue Length (PhysicalDisk _Total):16.186.76.1 72	0.000	0.051	1.703	0.074
	0.001	Bytes Total/sec (Server):16.186.76.1 72	10,044.920	10,698.487	156,058.729	1,685.398
	1E- 07	Cache Bytes (Memory):16.186.76 .172	720,388,096.00 0	726,223,387.46 6	753,225,728.00 0	2,486,741.09 0
	1E- 09	Committed Bytes (Memory):16.186.76 .172	9,737,195,520. 000	10,117,769,781. 769	10,248,208,384. 000	58,126,882.2 33
	0.01	Context Switches/sec (System):16.186.76. 172	1,846.755	7,180.865	46,326.525	1,772.102
	0.1	Disk Transfers/sec (PhysicalDisk _Total):16.186.76.1 72	0.000	70.994	1,283.509	57.451
	0.01	File Data Operations/sec (System):16.186.76. 172	4.318	370.393	42,032.328	1,340.541
	0.001	Free Megabytes (LogicalDisk _Total):16.186.76.1 72	20,824.000	20,843.633	20,870.000	11.931
	0.001	Interrupts/sec (Processor _Total):16.186.76.1 72	972.380	9,957.936	15,282.443	3,953.618
	0.01	Page Faults/sec (Memory):16.186.76 .172	1.667	680.182	76,310.137	2,714.417

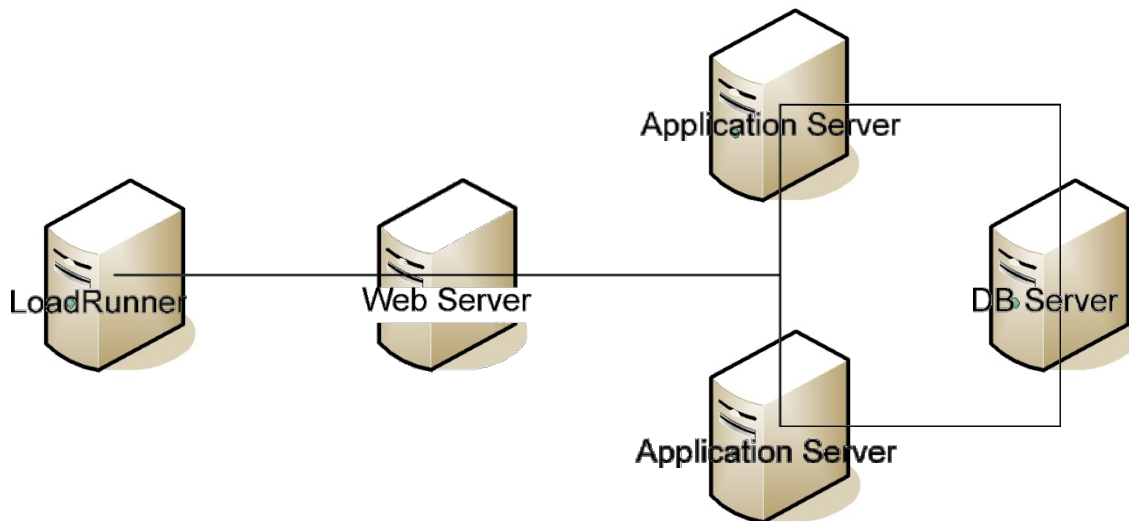
10	Page Reads/sec (Memory):16.186.76 .172	0.000	1.337	38.656	2.297
0.1	Pages/sec (Memory):16.186.76 .172	0.000	33.972	2,134.096	67.342
1E-07	Pool Nonpaged Bytes (Memory):16.186.76 .172	181,235,712.000	181,866,252.158	182,108,160.000	113,506.486
1E-05	Pool Nonpaged Bytes (Server):16.186.76.1 72	2,918,969.000	3,040,127.085	3,116,889.000	36,177.459
1E-07	Pool Paged Bytes (Memory):16.186.76 .172	634,056,704.000	641,239,041.370	652,423,168.000	6,566,652.712
0.0001	Pool Paged Bytes (Server):16.186.76.1 72	210,097.000	210,098.366	211,848.000	40.934
1	Pool Paged Failures (Server):16.186.76.1 72	0.000	0.000	0.000	0.000
1E-08	Private Bytes (Process _Total):16.186.76.1 72	8,447,963,136.000	8,835,150,581.828	8,970,280,960.000	62,621,922.235
100	Processor Queue Length (System):16.186.76. 172	0.000	0.118	23.000	0.683
1	Split IO/Sec (PhysicalDisk _Total):16.186.76.1 72	0.000	10.799	1,106.393	22.774
1E-07	System Cache Resident Bytes (Memory):16.186.76 .172	720,388,096.000	726,223,661.446	753,225,728.000	2,486,557.124
0.01	Threads (Objects):16.186.76. 172	1,216.000	1,329.900	1,569.000	29.499
1E-08	Working Set - Private (Process java#1):16.186.76.1 72	1,265,111,040.000	1,794,485,511.432	2,027,712,512.000	140,366,720.734
0.0001	Working Set - Private (Process java#2):16.186.76.1 72	229,376.000	229,376.000	229,376.000	0.000
1E-08	Working Set - Private (Process	1,791,000,576.000	2,709,137,905.822	2,815,488,000.000	86,336,855.131

		java#3):16.186.76.172				
1E-08		Working Set - Private (Process java):16.186.76.172	1,240,018,944.000	1,776,245,047.515	1,996,546,048.000	124,795,624.614
1E-08		Working Set (Process _Total):16.186.76.172	6,082,260,992.000	8,053,010,160.212	8,536,252,416.000	325,106,874.931

APPENDIX A – Benchmark Environment

Benchmark Test Environment

The environment created for the benchmarking effort is illustrated in the figure below.



- **Web Server.** Microsoft IIS server which balances the load between across the PPMC nodes handling user requests on the application server hosts. The Web server communicates with the HPE PPMC application container using the AJP13 protocol. The web server host has the following characteristics:
 - Linux version 2.6.18-231.el5
 - 1 Intel(R) Xeon(R) CPU L5640 @ 2.27GHz
 - 800 MB of RAM
 - Red Hat Enterprise Linux Server release 5.6 Beta (Tikanga)
- **Application Servers.** The environment consists of 2 clustered Application Server machines with PPM nodes, designated "Application Server 1" and "Application Server 2". Each server has a PPMC node for handling incoming user requests. One of the servers has an additional node for handling background services. The application servers have the following characteristics:
 - 8 Core 2.27 GHZ Intel Xeon(R) L5640
 - 16 GB of RAM
 - Microsoft Windows 2008 R2 Enterprise Service Pack 1
- **Database Server.** The database runs on a dedicated host machine and communicates with both PPMC application servers using the JDBC protocol. The database server has the following characteristics:
 - 40 Intel(R) Xeon(R) CPU E7-4820 v3 @ 1.90GHz
 - 256 GB of RAM
 - Linux version 3.10.0-327.10.1.el7.x86_64
 - Oracle version 12.1.0.2.0
 - Gigabit Ethernet adapter
- **Client Browser** settings are consistent with the default settings of Microsoft Internet Explorer 11.0, and the simulation assumes that the browser:
 - Has caching turned on
 - Supports GZIP encoding, where the application server compresses HTTP replies and thereby reduces network bandwidth utilization.

Hardware Configuration Table

Purpose	CPU	Memory	Software	OS
Web Server / Load Balancer	1 x 2.27 Ghz	8GB	Apache 2.2	Red Hat Linux version 5.6 Beta (Tikanga)
App Server #1	8 x 2.27 Ghz	16GB	PPM 9.40	Windows 2008 R2 SE
App Server #2	8 x 2.27 Ghz	16GB	PPM 9.40	Windows 2008 R2 SE
DB Server	40 x 1.90 Ghz	256GB	Oracle 12.1.0.2.0	RH Linux version 7.2 (Maipo)

LoadRunner Run Time Detail Settings

Tool	LoadRunner Controller
Logging	Enable logging; Send message only when error occurs
Additional Attributes	N/A
Miscellaneous	Generate snapshot on error Run Vuser as thread
Speed Simulation	Use maximum bandwidth
Browser Emulation	User Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET CLR 1.1.4322; .NET CLR 2.0.50727 Simulate browser cache; cache URLs requiring content (HTMLs) Download non-HTML resources Simulate a new user on each iteration Clear cache on each iteration
Internet Protocol Preferences	Hits per second and HTTP codes Response bytes per second File and line in automatic transaction names Non-critical resource errors as warnings Save snapshot resources locally
Internet Protocol Content Check	Enable content check during replay