optimus information

Case Study

Performance Testing with LoadRunner

Test Design

Goals of Performance Test

- To assess performance impacts on the system upgrade.
- To verify response times and stability of the system under increasing user loads.
- To identify potential performance problems and to provide recommendations to address these potential problems.
- To identify a performance baseline for comparison for the subsequent platform migration.

Performance Test Approach

Test Scenarios	Performed by % Users	Total Load of 40 Users	Total Load of 80 Users	Total Load of 120 Users	Total Load of 160 Users	Total Load of 200 Users
Review Pay Cheques	40%	15	32	48	64	80
Add Time Report	20%	8	16	24	32	40
View Cancel Time Report	10%	4	8	12	16	20
View Calendar Others	10%	4	8	12	16	20
View Calendar Team – 10 Direct Reports View Calendar Team – 28 Direct Reports View Calendar Team – 62 to 74 Direct Reports	4%	1 1 1	1 1 1	1 2 2	2 2 3	2 3 3
Approve Time	4%	1	3	5	7	8
Approve and Cancel Time	4%	1	3	5	6	8
Manage Direct Reports	4%	2	3	5	6	8
Successful Candidates	2%	1	2	2	3	4
Job Requisition Summary	2%	1	2	2	3	4

Test Design

Script Name	Transaction Name
General Transactions used by all the scripts	A3001a_Employee_Load_Login A3001b_Manager_Load_Login A3001c_Recruitment_Load_Login A3002a_Login_Employee_Self_Service_Menu A3002b_Login_Manager_Self_Service_Menu A3002c_Login_Recruitment_Menu
WHR31-Review_Pay_Cheques	A3103_Load_view_paycheque_screen A3104_Click_View_A_Different_Paycheque A3105_Load_Another_Paycheque_Period
WHR32_Add_Time_Report	A3203_Load_Time_Absence_Add A3204_Select_Earnings_Code_Type A3205_Select_From_Date A3206_Load_Add_Comment_Screen A3207_Click_Comment_OK A3208_Save_time_absence_entry
WHR33_View_Cancel_Time_Report	A3303_Load_Time_Absence_View_Cancel A3304_Load_Time_Absence_Status_History
WHR34_View_Calendar_Others	A3402_Load_Time_Absence_Calendar A3403_TA_Calendar_Query
WHR35_View_Calendar_Team_10DirectReports	A3503a_10DirectReports_Load_TA_Mgr_Cal A3504a_10DirectReports_Mgr_Calendar_Query
WHR35_View_Calendar_Team_28DirectReports	A3503b_28DirectReports_Load_TA_Mgr_Cal A3504b_28DirectReports_Mgr_Calendar_Query
WHR35_View_Calendar_Team_62to74DirectReports	A3503c_62to74DDirectReports_Load_TA_Mgr_Cal A3504c_62to74DirectReports_Mgr_Calendar_Query
WHR36_Approve_Time	A3503d_4to49DirectReports_Load_TA_Mgr_Cal A3601_Open_TA_Approvals_List A3602_Approve_TA_entry
WHR37_Approve_and_Cancel_Time	A3503_Load_TA_Calendar_Manager A3601_Open_TA_Approvals_List A3602_Approve_TA_entry A3701_Open_TA_Cancel_List A3702_Cancel_TA_entry
WHR38_Direct_Report	A3804_Load_Direct_Reports_screen A3805_Direct_Reports_Load_Time_Off_Details
WHR39_Successful_Canadidates	A3904_Load_Successful_Candidates_screen
WHR40_Job_Req_Summary	A4003_Load_Job_Req_Summary A4004_Job_Req_Item_History A4005_Job_Req_Item_Detail

Test Preparation

Test Data

- Test user IDs need to be created to have proper relationship
- Pre-Populate Employees time reports for managers to approve

LoadRunner scripting

- The AUT has a lot of dynamic HTML and AJAX components
- Use LoadRunner's AJAX Click-And-Script protocol to record scripts
- Scripts are modulized so that components are reusable.

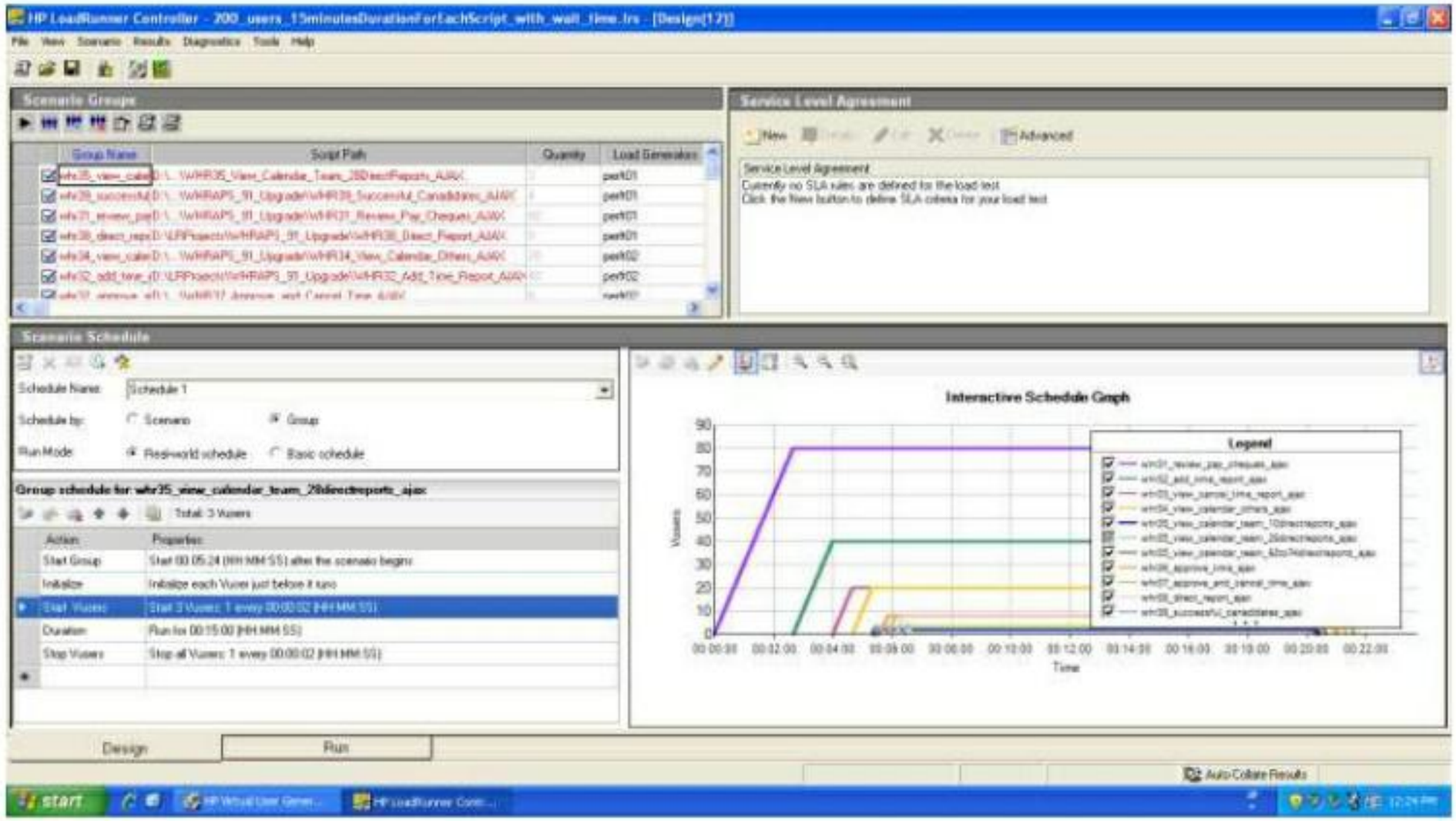
Load Generator Agents

- LoadRunner load generator agents are setup on two servers

Test Preparation

LoadRunner Controller Load Scenarios

- Load Test Scenarios ramp-up 1 user every 2 seconds and all scripts have wait time
- Stress Test Scenarios ramp-up 2 users every 1 second and all scripts have no wait time



Test Preparation

Server Monitoring and Logging

- PerfMon was setup to log measurement counters on both Windows 2008 application servers
- DB2 tasks CPU utilization and SQL transactional performance were also logged
- Mainframe Central Processors utilization was also logged

Test Environment Downtime Coordination

- The test environment was scheduled to be inaccessible by other users during performance tests

Dry-runs

- A number of low user load tests were carried out to make sure all team members get familiar with the test execution process and to make sure all test execution issues are surfaced and resolved

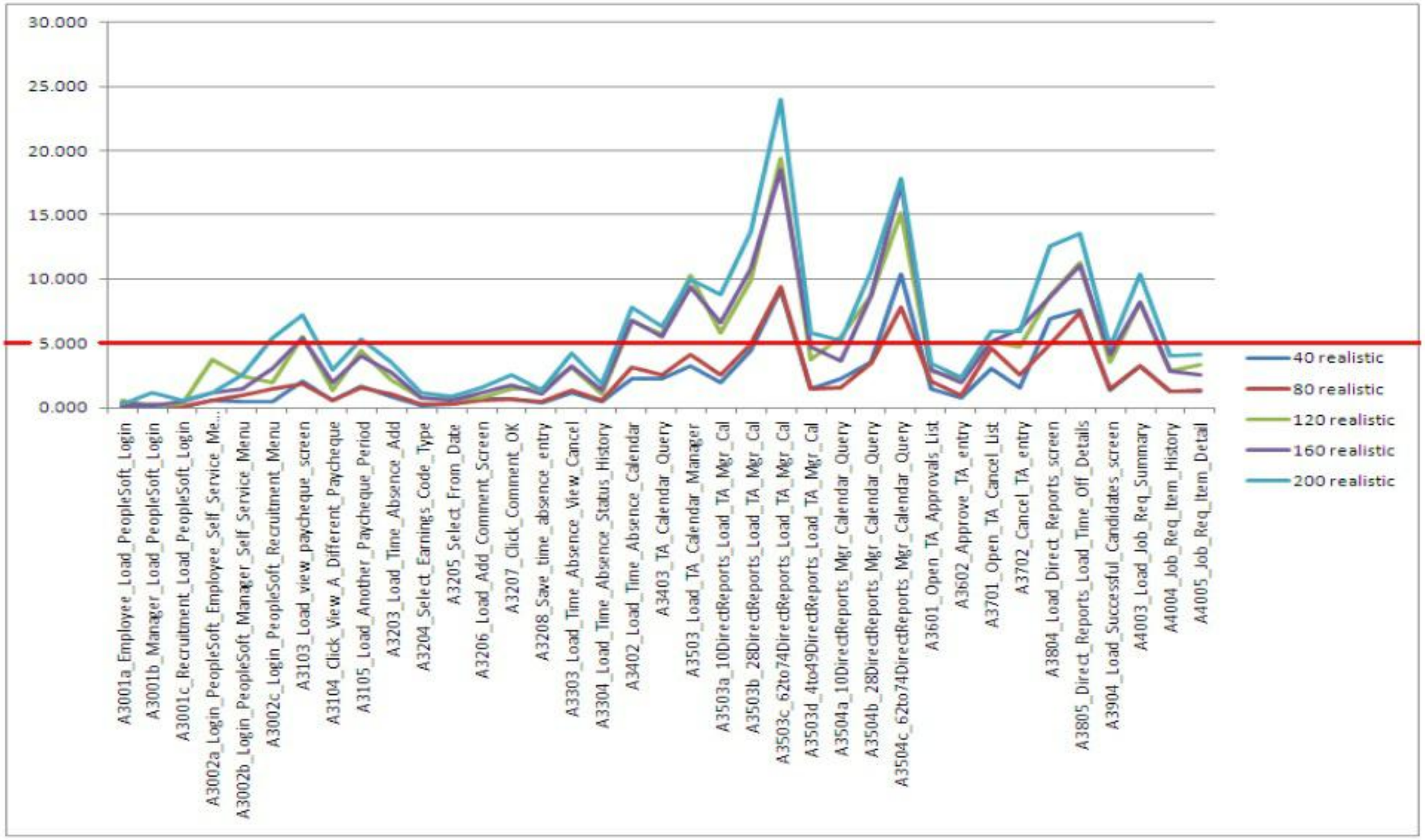
Test Execution

- All team members are invited to MS Communicator before test execution starts. All activities and observations during test execution are logged in Communicator conversations in a chronological order
- Run script to populate data before load scenario execution
- Always allow at least 5 minutes of quiet time before and after each load scenario execution

Test Execution

- After each load scenario execution, a database tables clean-up SQL script will be run to remove data added by the LoadRunner scripts
- A database table re-org is needed after each load scenario execution
- WebLogic needs to be restarted after each load scenario execution

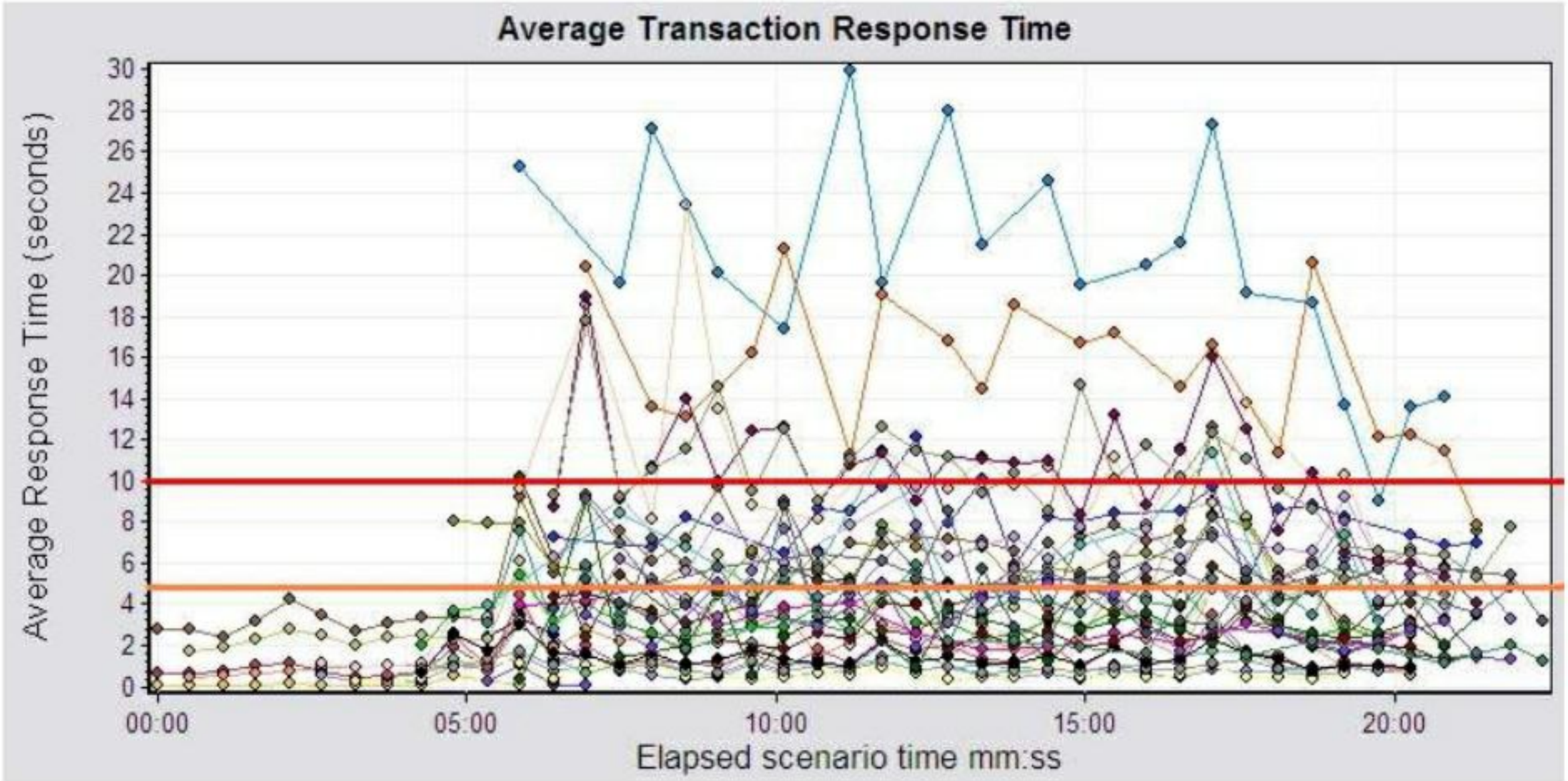
Test Results



Test Results

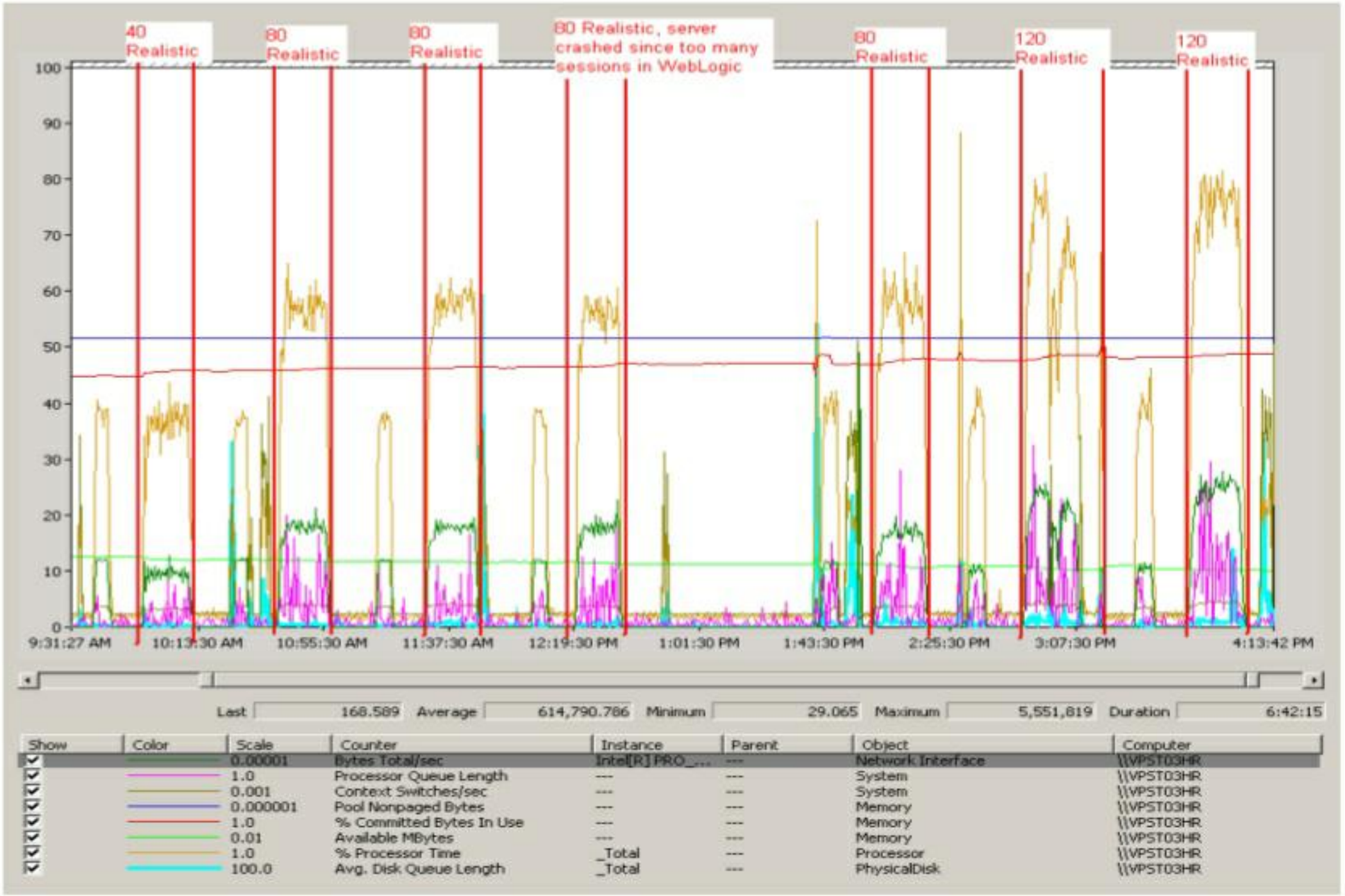
- Under realistic user loads of 40 and 80 concurrent users, Many functions performed within 3 seconds, with certain known intense functions taking slightly longer but still under 8 seconds range.
- Under a heavier load of 120, 160, and 200 concurrent users, Many functions performed within 5 seconds, with certain intense functions taking slightly longer but still under 10 seconds range.
- These transactions are considered the more intense functions and are having higher response time:
  - View paycheque
  - Load Time/Absence Calendar (both employees and managers)
  - Query Time/Absence Calendar (both employees and managers)
  - Managers open Time/Absence Cancel List
  - Managers load Manage Direct Reports page
  - Managers load Direct Reports Time Off Detail page
  - Recruitment – Job Requisition Summary

Test Results



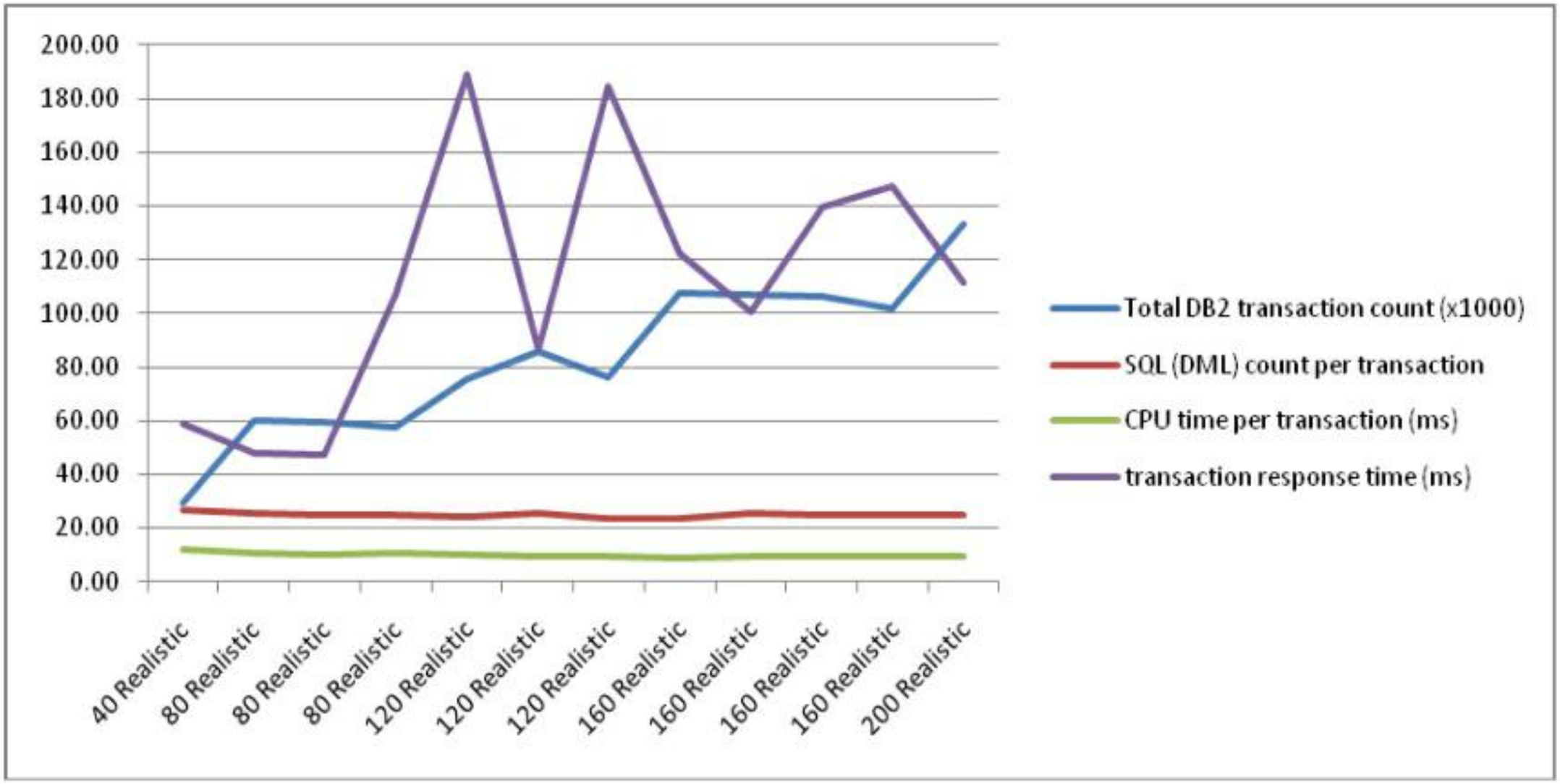
The LoadRunner response time graph from 200 users test shows that majority of transactions are under 5 seconds, with some transactions between 5 – 10 seconds. Only the known intense transactions are over 10 seconds

Test Results



This is a PerfMon graph showing one app server's various performance counters during the 40, 80, and 120 users tests

Test Results



This graph shows that the DB2 transaction response time is not in direct proportion to the user load. The possible reason is that DB2 is a shared environment with resources utilized by other applications during our tests. The DB2 transaction response time has direct impact to our performance test response time.

Conclusion

- Projection has been made that the system can handle approximately 320 concurrent users in a real production environment while response times be within 10 seconds for the frequently used non-intense transactions.

- In our estimation, the system can comfortably accommodate 160 concurrent users and still maintain acceptable response times of 5 seconds or less for most functions.

- The intense transactions will always have higher response time due to the volume of data being retrieved and displayed.

- Thank you
- Q&A

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