

**Test Outcome:**

Performance Test Cycle 3 – Institution Login, Annual Submission, Case Management Login, Query (search), Create Users and Complete ACD scripts were run to resolve issues encountered in Cycles 1 and 2, test all scripts, and verify issue resolution efforts.

**Application Background:**

This eZ-Audit initiative is designed to provide a paperless, single-point of receipt and access for financial statements and compliance audits for institutions participating in Student Financial Aid Title IV programs. The Electronic Audited Financial Statements (EAFS) & Compliance Reports application will reduce the cycle-time required to collect and process financial statements and compliance audits from more than 8,500 proprietary, non-profit, and public institutions. The application will enhance the ability of Case Teams and the Document Receipt and Control Center (DRCC) to accurately record and report status of school reporting; therefore, addressing concerns listed in a recent GAO audit. The quality of FSA service to institutions will also be improved by this application via the timely acceptance and processing of the audited financial statements and compliance reports. This initiative will focus on both FSA audits and Office of Management and Budget (OMB) Circular A-133 audits (both compliance and financial).

**Cycle Background:**

eZ-Audit Performance Test Cycle 3 was executed on March 11, 2003. The goals for this test cycle were to verify resolution of issues that occurred in Cycle 1 and Cycle 2, and test all business processes.

**Hardware and Configuration:**

The configuration for the test was one-web server and one application server architecture. The web server is SU35E6 with 4 CPUs and 2GB Memory. The application server is SU35E11 with 4 CPUs and 2 GB Memory and one clone. 512 max clients set on the web server. Servlet threads were set to 50. The number of JDBC connections to the application database was set to 15. Application JVM was to 128 MB. The configuration featured two Oracle databases, a default WAS session database and EZPRF database.

**Detailed Description:**

Significant time was spent on trouble shooting the application before Cycle 3 took place on March 11th. After Cycle 2 test, the ITA team worked closely with the application team on a resolution for the high response time in Co\_Team\_lead\_Home.jsp and lengthy JDBC connection time observed in Cycle 2. It was found that when more than 40 co-team leads signed into the application, the JSP created a unacceptable high response time.

After Cycle 2, the ITA team focused on finding the cause of the high response time issue by running different test scenarios. It was found that the co-team lead user login step took as high as 380 seconds to complete. After discussions with the application development team, it was found that the lengthy rendering of the JSP was due to the number of submissions in the work queue and the number of Resolution Specialists each submission can assign to. Thus, additional tests were conducted on varying the number of submissions and the number of assignees. The numbers were scaled back to a more realistic level, where approximately 50 submissions and 900 assignees were processed in the JSP. However, the resulting response time was still high.

The ITA performed research on WebSphere Application Server and Struts to make sure the issue was not caused by the configuration. It was found that WAS 3.5.5 might have performance issue with Struts Custom Tags. An eFix was applied to the application server but no significant improvement was observed.

Subsequently, the ITA team worked with a developer on the application team to trouble shoot the code in the Co\_Team\_Lead\_Home.jsp. Code for different components (e.g., drop down list, buttons and etc.) were commented out to isolate the problem and to verify the effects they had on the application's performance. A dramatic improvement in performance was achieved when commenting out the assignee generating loop. As a result, this led the team to think of other ways to generate the assignee list. Also during the cause finding process, it was found that Struts tag <bean:write> contributed to the performance issue as well.

Based on these findings, three steps were taken to resolve the performance issue. First, JavaScript was used instead of Java Code to generate assignee list. This step shifted some processing work to the end user. This also helped to ease the number of database connection made when logging in. Second, <JSP:getProperty> tag was used instead of Struts' <bean:write> tag. 20% reduction in response time was achieved through this step.

The 900 assignees were needed as part of the requirement. However, in only 1% of the cases a co-team lead would need to assign to people outside of his or her team. A typical team consists of 20 to 30 people, which is a dramatic difference to 900. Thus, the third step that was taken to correct this was to set up a default assignee list. The default list consisted only the members of the team. If need be, the entire list of 900 people could be iterated. Under this scheme, the JSP will only iterate through 20 to 30 people by default instead of 900. It is recommended that a check box is added to the interface that allows users to see either the whole list or just their team members.

The combination of the three steps taken allowed the application to have a quick response time (under 10 seconds) for co-team lead logins. Since the application was not accessing the database and retrieving data as frequently as before, the JDBC connection time also dropped to below 100 milliseconds.

Cycle 3 was executed on March 11th, after the resolution – described above - was put in place. Three tests were run. First, annual submission (60 users), Institution login (30 users) and create user (20 users) scripts were tested. Response times were low and stayed flat. The CPU utilizations were at 3% and 25% for su35e5 and su35e11it. Response time on co-team lead login was at 1.6 seconds max.

The second test employed the following business processes: Create user (20 users), Complete ACD (30 users), Query (10 users) and Case Team login (20 users). Response times on the business processes were low and flat. CPU utilizations were at 6% and 40% for su35e6 and su35e11it. The response time on co-team login was at 1.09 seconds max.

All business processes were tested totaling 170 users in the third test. The test was able to run for 20 minutes before stopping and no unusual behavior in the application was observed. The test was stopped due to testing time frame limitation. At the end of the 20 minutes, CPU utilizations were at 10% and 2% for su35e6 and su35e11it. Response time on co-team login was at 1.57 seconds max. This scenario will be tested in the next cycle in its entirety.

## Institution Login, Annual Submission, Create Users

### Statistics Summary

- ⦿ **Maximum Running Vusers:** 110
- ⦿ **Total Throughput (bytes):** 545,437,827
- ⦿ **Throughput (bytes/second):** Average: 133,948
- ⦿ **Total Hits:** 170,403
- ⦿ **Hits per Second:** Average: 41.847 [View HTTP Responses Summary](#)

### Transaction Summary

- ⦿ **Transactions:** Total passed: 9,028 Total failed: 0 Total Stopped: 6

Transaction Name	Minimum	Average	Maximum	90 Percent	Pass	Fail	S
S01_1_EnterHomePage	0.344	0.402	3.813	0.431	662	0	0
S01_2_Login	1.516	1.637	5.703	1.694	661	0	0
S01_3_Logout	0.031	0.047	0.453	0.06	661	0	0
S01_InstitutionLogin	7.906	8.094	15.672	8.166	661	0	1
S03_01_EnterHomePage	0.344	0.468	3.203	0.431	60	0	0
S03_02_Login	1.641	1.73	1.984	1.775	60	0	0
S03_03_EnterAnnualSubPage	0.625	0.897	6.828	0.763	60	0	0
S03_04_EnterBalanceSheet	0.234	0.466	4.688	0.381	60	0	0
S03_05_CalculateBalanceSheet	0.25	0.356	0.563	0.421	60	0	0
S03_06_EnterStatementOfActivites	0.328	0.463	2.328	0.461	60	0	0
S03_07_CalculateStatementOfActivities	0.219	0.27	0.469	0.341	60	0	0
S03_08_EnterCashFlowStatement	0.234	0.385	1.109	0.481	60	0	0
S03_09_CalculateCashFlowStatement	0.188	0.255	0.484	0.28	60	0	0
S03_10_EnterAnnualSubPage	0.344	0.431	0.813	0.511	60	0	0

S03_11_EnterCheckListPage	0.344	0.603	4.375	0.561	60	0	0
S03_12_EnterFileUploadPage	0.313	0.55	3.422	0.541	60	0	0
S03_13_ViewHelpPage	0.359	0.489	0.797	0.592	60	0	0
S03_14_UploadFile	27.75	28.814	29.656	29.523	60	0	0
S03_15_ViewSubmitMessage	0.109	0.287	1.063	0.351	60	0	0
S03_16_Submit	1.844	2.028	2.375	2.132	60	0	0
S03_17_Logout	0.141	0.235	1.094	0.24	60	0	0
S03_AnnualSubmission	3,397.406	3,399.577	3,428.766	3,399.208	60	0	0
S11_01_EnterHomePage	0.344	0.399	0.781	0.431	334	0	0
S11_02_Login	0.375	0.514	2.172	0.592	333	0	0
S11_03_EnterManageUserPage	0.422	0.829	2.719	1.086	333	0	0
S11_04_EnterAddUserPage	0.141	0.276	3.109	0.32	333	0	0
S11_05_AddUser	1.219	3.42	17.438	6.449	333	0	0
S11_06_EnterDeletionPage	0.109	0.305	1.016	0.431	333	0	0
S11_07_CancelDeletion	0.328	0.658	2.281	0.884	333	0	0
S11_08_GoToNextPage1	0.344	0.752	2.266	1.025	332	0	0
S11_13_SelectUserToDelete	0.125	0.296	0.766	0.421	331	0	0
S11_14_DeleteUser	0.328	0.679	1.641	0.944	331	0	0
S11_15_SelectByName	0.172	0.307	0.828	0.401	330	0	0
S11_16_ReturnToFirstPage	0.438	0.831	2.234	1.086	330	0	0
S11_17_SelectByUserName	0.172	0.307	0.672	0.401	330	0	0
S11_18_UpdateEmail	0.547	0.88	2.531	1.167	329	0	0
S11_19_Logout	0.031	0.052	0.156	0.07	329	0	0
S11_CreateUser	51.125	55.56	68.984	59.804	329	0	5

## HTTP Responses Summary

HTTP Responses

Total

Per second

HTTP_200	152,643	37.486
HTTP_302	480	0.118
HTTP_304	17,280	4.244

# Case Team Login, Query (search), Create Users, and Complete ACD

## Analysis Summary

Period: 11/03/2003 11:07:23 - 11/03/2003 11:07:23

**Scenario Name:** C:\Program Files\Mercury Interactive\LoadRunner\scenario\ezAudit\0311\_S10\_S08\_S11\_S14.lrs  
**Results in session:** M:\ezAudit\0311\_s08\_s10\_s11\_s14\_trial2\0311\_s08\_s10\_s11\_s14\_trial2.lrr.  
**Duration:** 1 hour, 16 minutes and 23 seconds.

### Statistics Summary

-  **Maximum Running Vusers:** 80
-  **Total Throughput (bytes):** 1,694,945,557
-  **Throughput (bytes/second):** Average: 369,833
-  **Total Hits:** 261,350
-  **Hits per Second:** Average: 57.026 [View HTTP Responses Summary](#)

### Transaction Summary

 **Transactions:** Total passed: 14,940 Total failed: 20 Total Stopped: 12

Transaction Name	Minimum	Average	Maximum	90 Percent	Pass	Fail	Sto
S08_01_EnterHomePage	0.344	0.425	8.344	0.451	1,470	0	0
S08_02_Login	1.094	2.756	21.219	4.31	1,470	0	0
S08_03_Logout	0.031	0.082	7.703	0.09	1,470	0	0
S08_CaseTeamLogin	7.547	9.271	27.797	10.882	1,470	0	0
S10_01_EnterHomePage	0.141	0.268	9.578	0.24	227	0	0
S10_02_Login	1.125	2.681	19.844	4.216	224	0	0
S10_03_EnterSearchPage	0.141	0.327	2.859	0.431	224	0	0
S10_04_Search	0.359	0.662	15	0.702	224	0	0
S10_05_Logout	0.031	0.067	0.5	0.09	224	0	0

S10_Query	13.984	16.031	33.203	17.609	224	0	3
S11_01_EnterHomePage	0.344	0.407	0.891	0.451	391	0	1
S11_02_Login	0.469	0.747	10.375	0.793	390	0	0
S11_03_EnterManageUserPage	0.797	2.208	28.156	3.262	390	0	0
S11_04_EnterAddUserPage	0.156	0.379	7.234	0.511	388	0	0
S11_05_AddUser	1.781	5.23	29.422	9.1	388	0	0
S11_06_EnterDeletionPage	0.281	0.717	2.281	1.076	387	0	0
S11_07_CancelDeletion	0.609	1.613	4.578	2.624	387	0	0
S11_08_GoToNextPage1	0.688	1.68	7.813	2.603	387	0	0
S11_13_SelectUserToDelete	0.297	0.747	6.75	1.167	386	0	0
S11_14_DeleteUser	0.625	1.664	7.469	2.654	386	0	0
S11_15_SelectByName	0.203	0.494	10.656	0.592	386	0	0
S11_16_ReturnToFirstPage	0.797	2.121	27.719	3.014	386	0	0
S11_17_SelectByUserName	0.203	0.42	1.859	0.572	386	0	0
S11_18_UpdateEmail	0.844	2.317	38.844	3.469	385	0	0
S11_19_Logout	0.031	0.085	7.313	0.09	384	0	0
S11_CreateUser	54.875	65.903	103.859	73.061	384	0	8
S14_01_EnterHomePage	0.344	0.412	1.078	0.451	113	0	0
S14_02_Login	1.234	2.821	20.984	4.32	113	0	0
S14_03_AssignTeam	0.906	2.4	7.719	4.008	113	0	0
S14_04_LogOff	0.031	0.073	0.438	0.1	113	0	0
S14_05_LogBackIn	0.031	0.055	0.609	0.06	113	0	0
S14_06_MyQueue	0.25	0.772	2.344	1.42	113	0	0
S14_07_SubmissionSummary	2.234	4.044	8.359	5.59	113	0	0
S14_08_ACDBlank	0.25	0.554	8.5	0.622	113	0	0
S14_09_SaveACD	0.297	0.563	1.516	0.712	103	10	0
S14_10_AddEntry1	0.297	0.448	1.797	0.622	103	0	0
S14_11_AddEntry2	0.297	0.45	1.344	0.572	103	0	0

S14_12_ACDForm	0.297	0.556	1.141	0.763	103	0	0
S14_13_LogOut	0.031	0.081	0.266	0.17	103	0	0
S14_ACDOverall	24.109	28.093	52.891	30.864	103	10	0

## HTTP Responses Summary

HTTP Responses	Total	Per second
HTTP_200	259,442	56.61
HTTP_304	1,898	0.414
HTTP_500	10	0.002