Service Manager 9.30 Web Client End-to-end Performance Test Report

Introduction

The data and information supplied in this document serve as a reference for your evaluation before implementing Service Manager (SM) web client. The performance test records the length of time of performing 22 key scenarios for SM web client with the different network latency simulations. The test results reflect the end-to-end performance of SM web client under different network latency circumstances.

Criteria

By taking some research findings and usability test results into consideration, following are the acceptable response times that we defined for the SM web pages to be presented to users with their web browsers:

- 5-second is the criteria for most of the pages for SM web client
- 10-second is the criteria for the heaviest page with cache

  Note: For SM web client, the heaviest page is the login page. When a user visits the login page the first time, the cache contents, such as javascript and css files, are loaded and kept by the web browser. Since normally these files are only loaded once, it is more reasonable that we set the criteria for the heaviest page with cache instead of without cache.

If the loading time of a web page exceeds the criteria above, the performance of the web application is likely unacceptable from an end-user's perspective.

For more information about the research supporting the criteria defined above, see APPENDIX D: RESEARCH ON RESPONSE TIMES.

Test Results

The following table summarizes the key test results:

	Network Latency*		
	125 ms	**250 ms**	**400 ms**
Most of pages	< 5 seconds	< 5 seconds	< 5 seconds
ESS login without cache	< 5 seconds	< 9 seconds	< 11 seconds
ESS login with cache	< 4 seconds	< 5 seconds	< 6 seconds
Login without cache	< 9 seconds	< 14 seconds	< 15 seconds
Login with cache	< 7 seconds	< 9 seconds	Around 10 seconds

* The network latency means the round-trip latency between the SM Web tier and the web browser.

The test results are valid for up to 2,500 concurrent users. According to our tests, the response times are quite similar between the single user scenario and the scenario with 2,500 concurrent users.

For information about the test environment and tools, see APPENDIX A: TEST ENVIRONMENT AND TOOLS. For detailed test results, see APPENDIX B: TEST RESULTS.

Conclusions

Based on the performance test results and the criteria we defined, followings are the conclusions and recommendations:

- SM web client performs well when the network latency is less than 125 ms.
- The performance of SM web client is moderate when the network latency is less than 250 ms. Running SM web client with the network latency less than 250 ms is also recommended.
- The maximum network latency with acceptable performance is 400 ms. It is not recommended to run SM web client if the network latency exceeds 400 ms.

Note: The performance test is based on the recommended configurations for SM deployment. In your implementation, the actual performance can be affected by a variety of factors, including tailoring, data volume, environments (such as network latency and different web browsers), the number of elements on a specific web page, and so on.

Appendix A: Test Environment and Tools

Hardware

All tests were conducted using the following physical assets:

Server			OS
SM - primary server	SM (9 servlets)	8cpu, 32GB RAM	Windows 2008 R2 64-bit
SM - secondary server	SM (12 servlets)	8cpu, 32GB RAM	Windows 2008 R2 64-bit
SM - secondary server	SM (11 servlets)	8cpu, 32GB RAM	Windows 2008 R2 64-bit
DB server	Oracle 11g release 2, 64-bits	8cpu, 32GB RAM	Windows 2003 R2 64-bit SP2
Tomcat server	Tomcat 5.5.28 x 10 instances, JVM - 1GB	8cpu, 32GB RAM	Windows 2003 R2 64-bit SP2
Apache httpd server	Apache httpd 2.0.53	4cpu, 4GB RAM	Windows 2003 SE 32-bit SP1
LoadRunner controller	HP LoadRunner 11with TruClient	Intel® Xeon™ CPU 3.2GHz 4.0GB RAM	Windows Server 2003 32-bit

Software

All tests were conducted with the following software set:

- Oracle 11g 11.1.0.6
- Windows Server 2008 Enterprise 64-bit
- Windows Server 2003 Enterprise 32-bit and 64-bit
- HP LoadRunner 11.0 (with TruClient)
- Apache HTTP Server 2.0.61
- Apache Tomcat Server 6.0.30
- Java 1.6 for SM 9.30 Web-tier
- VE Desktop Shunra

Network Bandwidth

In the performance tests, the maximum bandwidth for the web browser to access the SM Web tier server was limited to 4 Mbps.

Test Dataset

All the tests were based on the SM out-of-box (OOB) dataset. The OOB dataset only contains a small set of test data and 6,000 mock users.

LoadRunner TruClient

Ajax TruClient protocol was introduced to LoadRunner in version 11. This protocol is the alternative solution in the level of Ajax Click & Script protocol, for applications that work under FireFox and scripting fails in Ajax Click & Script.

Ajax Truclient advantages

- Offers robust support for different Ajax control, such as slider, calendar, or accordion.
- Works on any framework. For example, GWT, YUI, jQuery, or ZX Ajax ExtJS.
- Does not require correlations.
- Provides rich and visual UI.
- Works in the browser – developing the script interacting with the application, viewing added steps while recording, and the ability to check and improve identification.
- Insight into client behavior using multiple transactions based on different events such as network complete, DOM loaded, or document loaded.

Challenges of Ajax TruClient

The protocol only works on FireFox.

Protocol Performance

No real comparison to other protocols.
Ajax TruClient performance is application specific as the footprint is determined by the application client footprint defined by the loaded JavaScript or DOM.

Appendix B: Test Results

For the description of the transactions, see APPENDIX C: TEST SCENARIOS.

No Latency

Transaction Name	Minimum	Average	Maximum	Std Deviation
CM_Change_save	2.074	2.215	2.298	0.064
CM_Open_New_Change_Hardware_Form	2.428	2.577	2.729	0.08
ESS_Catalog_Order_Form	0.483	0.495	0.526	0.011
ESS_Catalog_Order_Submit	1.428	1.447	1.493	0.018
ESS_Login_No_Cache	2.095	2.133	2.17	0.022
ESS_Login_Cache	2.062	2.172	2.308	0.092
ESS_Logout	0.193	0.194	0.204	0.003
ESS_Submit_Problem_Request	0.687	0.7	0.702	0.008
ESS_View_Request_Help	0.567	0.571	0.58	0.004
IM_Incident_Save	2.105	2.197	2.301	0.05
IM_Incident_Search	2.148	2.265	2.364	0.074
IM_Incient_Update	1.278	1.304	1.32	0.012
IM_New_Incident_Form	1.986	2.047	2.127	0.043
OP_Login_No_Cache	6.168	6.349	6.495	0.107
OP_Login_Cache	5.541	5.676	5.864	0.088
OP_Logout	0.193	0.194	0.204	0.003
PM_Open_Problem_Form	2.202	2.296	2.393	0.052
PM_Problem_Save	1.6	1.68	1.719	0.03
SD_Interaction_Search	1.48	1.49	1.52	0.03
SD_Interaction_Update	1.997	2.525	5.55	1.068
SD_New_Interaction_Esclate	0.752	1.007	3.157	0.717
SD_new_Interaction_Esclate_Next	2.416	2.48	2.657	0.067
SD_New_Interaction_Esclate_Save	1.729	1.784	1.972	0.077
SD_View_New_Interaction_Form	1.75	2.239	4.257	0.758

125 ms Latency

Transaction Name	Minimum	Average	Maximum	Std Deviation
CM_Change_save	3.028	3.148	3.286	0.079
CM_Open_New_Change_Hardware_Form	2.857	2.887	2.923	0.017
ESS_Catalog_Order_Form	0.943	0.948	0.956	0.005
ESS_Catalog_Order_Submit	1.675	1.704	1.783	0.031
ESS_Login_No_Cache	4.444	4.529	4.769	0.088
ESS_Login_Cache	2.807	3.059	4.473	0.478
ESS_Logout	0.183	0.192	0.203	0.006
ESS_Submit_Problem_Request	0.966	0.975	0.978	0.005
ESS_View_Request_Help	0.902	0.911	0.924	0.006
IM_Incident_Save	3.867	3.101	4.221	0.099
IM_Incident_Search	2.78	2.898	3.05	0.093
IM_Incient_Update	2.021	2.088	3.05	0.093
IM_New_Incident_Form	2.182	2.242	2.297	0.029
OP_Login_No_Cache	7.162	8.468	8.721	0.442
OP_Login_Cache	6.197	6.574	7.884	0.474
OP_Logout	0.183	0.193	0.215	0.008
PM_Open_Problem_Form	2.535	2.571	2.599	0.02
PM_Problem_Save	1.568	1.605	1.697	0.034
SD_Interaction_Search	1.891	1.908	1.933	0.012
SD_Interaction_Update	2.582	2.704	3.295	0.208
SD_New_Interaction_Esclate	1.386	1.433	1.567	0.05
SD_new_Interaction_Esclate_Next	2.942	3.025	3.317	0.1
SD_New_Interaction_Esclate_Save	2.264	2.282	2.309	0.018
SD_View_New_Interaction_Form	2.015	2.156	2.299	0.08

250 ms Latency

Transaction Name	Minimum	Average	Maximum	Std Deviation
CM_Change_save	3.202	3.313	3.372	0.043
CM_Open_New_Change_Hardware_Form	4.092	4.225	4.305	0.06
ESS_Catalog_Order_Form	1.632	1.634	1.643	0.004
ESS_Catalog_Order_Submit	2.299	2.364	2.448	0.043
ESS_Login_No_Cache	8.448	8.554	8.644	0.05
ESS_Login_Cache	3.847	4.255	5.255	0.283
ESS_Logout	0.183	0.192	0.204	0.006
ESS_Submit_Problem_Request	1.544	1.549	1.558	0.004
ESS_View_Request_Help	1.481	1.488	1.504	0.007
IM_Incident_Save	3.208	3.343	3.371	0.046
IM_Incident_Search	3.631	3.753	3.942	0.087
IM_Incient_Update	3.157	3.187	3.243	0.024
IM_New_Incident_Form	3.395	3.526	3.576	0.052
OP_Login_No_Cache	13.671	13.999	14.65	0.288
OP_Login_Cache	7.959	8.32	10.202	0.633
OP_Logout	0.183	0.19	0.204	0.007
PM_Open_Problem_Form	3.899	3.959	4.017	0.031
PM_Problem_Save	2.641	2.69	2.717	0.021
SD_Interaction_Search	2.739	2.77	2.844	0.027
SD_Interaction_Update	3.531	3.586	3.779	0.087
SD_New_Interaction_Esclate	1.944	2.012	2.588	0.192
SD_new_Interaction_Esclate_Next	3.908	4.118	5.746	0.543
SD_New_Interaction_Esclate_Save	3.18	3.253	3.324	0.037
SD_View_New_Interaction_Form	3.298	3.405	3.544	0.07

400 ms Latency

Transaction Name	Minimum	Average	Maximum	Std Deviation
CM_Change_save	2.975	3.304	3.169	0.058
CM_Open_New_Change_Hardware_Form	4.198	4.282	4.489	0.081
ESS_Catalog_Order_Form	2.341	2.359	2.394	0.025
ESS_Catalog_Order_Submit	2.728	2.81	2.954	0.102
ESS_Login_No_Cache	10.42	10.647	10.835	0.172
ESS_Login_Cache	5.273	5.942	6.215	0.102
ESS_Logout	0.183	0.193	0.204	0.009
ESS_Submit_Problem_Request	2.084	2.095	2.116	0.015
ESS_View_Request_Help	2.051	2.098	2.181	0.059
IM_Incident_Save	2.965	2.998	3.051	0.023
IM_Incident_Search	4.144	4.217	4.411	0.074
IM_Incient_Update	4.399	4.49	4.573	0.071
IM_New_Incident_Form	3.468	3.501	3.544	0.026
OP_Login_No_Cache	13.732	14.833	15.274	0.15
OP_Login_Cache	8.533	10.363	11.205	0.243
OP_Logout	0.182	0.187	0.204	0.007
PM_Open_Problem_Form	4.124	4.21	4.329	0.069
PM_Problem_Save	2.084	2.117	2.223	0.046
SD_Interaction_Search	3.792	3.846	3.989	0.052
SD_Interaction_Update	4.856	5.104	5.309	0.149
SD_New_Interaction_Esclate	2.686	2.788	3.527	0.247
SD_new_Interaction_Esclate_Next	5.039	5.502	8.065	0.863
SD_New_Interaction_Esclate_Save	4.157	4.352	4.781	0.165
SD_View_New_Interaction_Form	3.599	3.782	4.99	0.407

Appendix C: Test Scenarios

Transaction	Description
CM_Change_save	In Change Management module, select Save & Exit to save a record.
CM_Open_New_Change_Hardware_Form	In Change Management module, open a new form to fill in a new record.
ESS_Login_No_Cache	Log in to ESS the first time without any cache previously saved by the browser. *http://<ServerIP>/sm930/ess.do*
ESS_Login_Cache	Log in to ESS with cached files.
ESS_Catalog_Order_Form	From ESS, select Submit to fill a form.
ESS_Catalog_Order_Submit	From ESS, select Submit to send a catalog order.
ESS_Logout	Log out from ESS.
ESS_Submit_Problem_Request	From ESS, select Submit to send a problem request.
ESS_View_Request_Help	From ESS, select Request Help to open a new request form.
IM_Incident_Save	In Incident Management module, save a new incident record.
IM_Incident_Search	In Incident Management module, search for an incident record.
IM_Incient_Update	In Incident Management module, update an existing incident record.
IM_New_Incident_Form	In Incident Management module, open a form to enter a new incident.
OP_Login_No_Cache	Log in to SM web client the first time without any cache previously saved by the browser. *http://<ServerIP>/sm930/index.do*
OP_Login_Cache	Log in to SM web client with cached files.
OP_Logout	Log out from SM.
PM_Open_Problem_Form	In Problem Management module, open a form to create a new record.
PM_Problem_Save	In Problem Management module, select Save & Exit to save a problem record.
SD_Interaction_Search	In Service Desk module, perform a search for interaction.
SD_Interaction_Update	In Service Desk module, update an interaction record.
SD_New_Interaction_Esclate	In Service Desk module, select Escalate to escalate an interaction record.
SD_new_Interaction_Esclate_Next	In Service Desk module, select Next to the next page when escalating an interaction record.
SD_New_Interaction_Esclate_Save	In Service Desk module, select Save & Exit to save the escalation.
SD_View_New_Interaction_Form	In Service Desk module, select Register New Interaction to open a new interaction record.

Appendix D: Research on Response Times

Following are some research findings regarding response time:

- 10 seconds is the limit for users to keep their attention on the current task with a web-based application. If anything longer than 10 seconds, it is likely that user will leave the UI and do something else. The guideline have been the same for more than 40 years and unlikely to change.

  – Miller, R. B. (1968). *Response time in man-computer conversational transactions.* Proc. AFIPS Fall Joint Computer Conference Vol. 33, 267-277.

  – Card, S. K., Robertson, G. G., and Mackinlay, J. D. (1991). *The information visualizer: An information workspace.* Proc. ACM CHI'91 Conf. (New Orleans, LA, 28 April-2 May), 181-188.

  – Jakob Nielsen. *Response Times: The 3 Important Limits.* http://www.useit.com/papers/responsetime.html

- 8-second rule: Zona Research indicated that on average, the web users will wait about eight seconds for a web page to be downloaded and displayed.

  – Zona Research, "The Need for Speed II," Zona Market Bulletin, No. 5, April 2001, Zona Research, USA.

- With faster internet connections and lower tolerance levels among online shoppers, four seconds might now be the maximum length of time the average online shopper will wait for e-commerce websites.

  http://econsultancy.com/us/blog/500-eight-second-rule-for-e-commerce-websites-now-halved

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