SHERPA DESIGN, INC.

Site Assessment

Electrolux

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****This document reflects half of a typical assessment.**

The remaining pages contain trade secret material**

The site assessment of Electrolux's installation of Teamcenter by Sherpa Design, Inc. was conducted {date}. The purpose of the assessment was to fact-find with the purpose of determining any road blocks or hazards that would affect an upgrade of the software. While auditing Teamcenter there were a few opportunities discovered to tweak the performance. Small changes to FMS, Pool Manager and JBoss were performed in the course of the audit. This document further describes performance enhancements that can be rolled out with the upgraded software.

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Summary

The following document discusses the results of the Site Assessment. The focus of the assessment was to identify any roadblocks or rough patches for quoting an upgrade of Teamcenter software. While conducting the assessment several areas for improvement were identified and relayed to Electrolux. Some settings were changed immediately while others are added to this document. Some advanced concepts are also added to the end based on conversations had during tag-up meetings.

Software Versions

Major Software	Current Version	Target Version
Windows Server	2003	2008 R2
Oracle[1]	10.2.0.4	11g R2
MS SQL Server[2]	n/a	2008 R2
Teamcenter Unified	2007.1.5	8.3.3
NX	6.0.2.8	7.5.3
NX I-deas	6m1, 6m2	6.1 m1
TCII	6.0.4.6	8.3.3
CMM	6.0.4	7.5.3

Several Windows components are needed to turn critical Teamcenter functions into services.

Supporting Software	Current Version	Target Version
.NET Framework[3]	n/a	?
IIS[4]	n/a	7.0
ASP.NET	n/a	2.0
Java JDK	1.6.0_12	32-bit
JBoss	4.0.5.GA	4.2.2.GA

Upgrade Phases

A pre-upgrade task (patch) may be required to immediately relieve a performance bottleneck in FMS while the upgrade project planning continues.

Phase	Short Description	Deliverable
I	Stand Up the Clone	Cloned Test environment
II	Upgrade Software	Upgraded Test environment
III	Business Testing and Reconciliation	Signed Agreement
IV	Plan Go-Live	Deployment Guide
V	Go-Live	Upgraded Production environment

Tuning Recommendations

Performance tuning is accomplished by adjusting each component of Teamcenter individually then monitoring the behavior over time before making another adjustment. Every component of Teamcenter (for Electrolux) is built on Java and offers many opportunities for improvement. Specifically, FMS, Server

[1] MS SQL Server is being considered as a replacement for Oracle.
[2] MS SQL Server 2008 R2 is being considered as a post upgrade project.
[3] Required when adding .NET Server Manager to replace J2EE Pool Manager.
[4] Required when adding .NET Web Tier to replace J2EE JBoss.

Manager, JBoss and the Rich Client can each be tuned. See the Performance Tuning section for more detail.

Pre-Upgrade (Patch)

Estimated effort: 2 weeks.

It may be necessary to apply Teamcenter 2007.1 patch 12 to the current production environment in order to relieve some performance issues in file transfers and database chattiness. We expect that performance would be greatly improved in the current production environment while we are running through the upgrade phases.

Upgrade Planning

The ultimate goal is a fully upgraded environment. The following phases help us to document and time the tasks required to reach this goal. All of the information is gathered and collected in a deployment guide which will be our measuring stick for the actual upgrade.

Phase I – Stand Up the Clone

Estimated effort: 3 weeks

This phase concentrates on creating a duplicate of current Production and providing us an environment that we can play with without adversely affecting the users.

High-Level Tasks

- Install the same software that is currently in Production.
- Clone Production.
- Morph clone into Test.
- Backup the Test environment.

Reasoning

We don't want to any adverse effects on production users.

Deliverable

A backed up test environment.

Phase II – Upgrade Software

Estimated effort: 4 weeks

This phase concentrates on the upgrade itself.

High-Level Tasks

- Populate software depot with all new versions required.
- Upgrade remote FSC's, BMIDE and Teamcenter to Tc8.3. Import custom templates.
- Patch remote FSC's, BMIDE and Teamcenter to Tc8.3.3 (available 16-Dec).

- Build OTW and create 4t rich client flavors. Deploy to web tier.
- Create client installation scripts for NX
- Create client patch scripts for NX
- Save NX custom folder contents at in NX version.
- Create and run NX refile.
- Backup the Test environment

Reasoning
Establishes the complete list of tasks along with a timing element that is critical for the writing the deployment guide.

Deliverable
A fully upgraded and backed up test environment.

Phase III – Business Testing and Reconciliation
Estimated effort: 2 week

Conduct business testing using a few super users. Use-cases are required to test functionality of the upgraded environment. Reconcile any issues.

High-Level Tasks
- Conduct business use-case testing.
- Reconcile issues.
- Roll-back the environment as required.

Reasoning
Testing data is a repetitive and time consuming process. If an issue is found that requires a major modification then the environment can be rolled back to a clean state, the modification performed, a new backup captured and testing can resume using the same use-cases and numbers as before. The data from the previous iteration is not saved.

Deliverable
Signed document from the business that the upgraded environment meets their needs.

Phase IV – Plan Go-Live
Estimated effort: 2 weeks

This phase concentrates on creating a deployment guide for go-live.

High-Level Tasks
- Document software versions and locations.
- Document tasks, times and owners.
- Document emergency contact list with phone numbers.
- Document go/no-go point.
- Document rollback plan.

Reasoning
Any software implementation with so many dependencies requires a plan.

Deliverable
Deployment guide.

Phase V – Go-Live
Estimated effort: weekend and following week for support.

This is the actual go-live itself and should include some level of NX training/mentoring and Teamcenter post go-live support.

High-Level Tasks
- Realize the deployment guide.
- Provide post go-live Teamcenter support.
- Provide on-site NX mentoring.

Reasoning
On-site resources are limited and need to be augmented for a short period of time.

Deliverable
An upgraded Production environment.

Performance Tuning
Behind every component of Teamcenter lies java. Each component offers unique opportunities to tune performance. The major components of Teamcenter are FMS, Server Manager (a.k.a. Pool Manager) and the web server.

File Management Services (FMS)
There are two main components to FMS: the File Server Cache (FSC) and the File Client Cache (FCC). They reside on the server and client respectively. Both offer opportunities for performance tuning.

FMS Master
The FMS Master contains many global settings for FSC and FCC.

Transient Volume

File Server Cache

File Client Cache

The read and write cache has already been adjusted for use with NX. A further review of the cache details using the TC utility "fccstat" is required from time to time to verify that the cache is still sized appropriately.

Load Balancing and Redundancy

Multiple FSC services are already installed on each of the FSC servers for load balancing and redundancy.

Server Manager

This component of Teamcenter manages the pool of tcserver processes for 4t rich client and web client connections. Sessions are maintained in a tree cache that is shared with the web tier. Server Manager itself is managed through an administrative web site called the "JMX Console":

http://azstccapp01:8182/

	Old Value	New Value
Max Servers in Sub-Pool	120	120
Min Warm Servers	1	20
Server Target	0700 5, 0900 3, 1700 2	0000 21

Load Balancing and Redundancy

Several pool managers can be installed on the same machine to help separate duties. For instance, one pool manager could be dedicated to 4t rich clients and another dedicated to web client connections.

Server managers can also be installed on separate machine and clustered together by sharing the tree cache. This architecture has some load balancing ability as well as redundancy if one of the servers goes offline or a server manager crashes.

JBoss (J2EE)

JBoss uses a built in version of Tomcat as the web server.

Startup Switches

The next version of JBoss introduces some more switches that must be added to the desktop shortcut:

%JBOSS_HOME%\bin\run_tc_prod.bat -c tc_prod -b 0.0.0.0 -Djboss.service.binding.set=tc_prod

Java Heap

The java heap settings Xms (minimum) and Xmx (maximum) have already been set correctly by Electrolux.

Garbage Collection

Original:

set JAVA_OPTS=%JAVA_OPTS% -Xms128m -Xmx512m

Logging

The WEB_ROOT\tc_prod\earapp_root\lib\log4j.xml file should be copied to JBOSS_HOME\server\tc_prod\conf\jboss-log4j.xml (overwrite). The path ${jboss.server.log.dir}/ should be added to each "File" entry. Copy WEB_ROOT\tc_prod\earapp_root\lib\log.properties to JBOSS_HOME\server\tc_prod\conf. Edit LogVolumeLocation=<path_where_the_logs_should_go> and LogConfigLocation=jboss-log4j.xml.

By adding these two files I believe we can redirect the logging from JBOSS_HOME\bin\logs to a logging directory of our choice.

Client

The rich client is an Eclipse project built on java.

Startup

The same kinds of GC switches can be used for the startup of Teamcenter as were used in JBoss. An example of settings I've made at other customer sites:

```
@VM_FLAG@
@VM_PATH@
@VM_BOOTCLASSPATH@
-vmargs
-Xms512m
-Xmx1024m
-XX:AggressiveHeap
-XX:AggressiveOpts
-XX:+UseParallelOldGC
-XX:ParallelGCThreads=2
-XX:ThreadPriorityPolicy=1
-Xverify:none
-XX:MaxPermSize=128m
-Duser.language=en_US
-Dsun.rmi.dgc.client.gcInterval=3600000
-Dsun.rmi.dgc.server.gcInterval=3600000
-XX:CMSinitiatingOccupancyFraction=50
-XX:PermSize=64m
-Xnoclassgc
-XX:MaxTenuringThreshold=0
-XX:+UseAdaptiveSizePolicy
-verbose:gc
-Xloggc:C:\temp\ugs\verbose-gc.log
```


Note: Xms and Xmx should be the same size instead of what is shown above.

Java Heap

The java heap settings Xms (minimum) and Xmx (maximum) are not set to the same size and need to match. It is recommended that

Cache Cleanup

Caches are high-speed memory buffers storing previously accessed data and having it readily available for future use. Teamcenter has 2 caches: FCC and RAC. When a user opens a dataset, the named reference is uploaded to the cache and opened from there. If the user opens the same dataset a few days later, providing the dataset hasn't been changed by another user, it is loaded from the cache much more quickly instead of having to download it directly from the server, saving the user a lot of time.

A good practice is to create a TC Cleanup script and make it available to the users off the Start->Teamcenter menu. Electrolux has created a cleanup script already but it removes too much and the users lose their settings. I have a script that can be used in place of Electroluxs but will have to be modified for Electrolux specific locations.

END OF PREVIEW VERSION OF THIS SAMPLE ASSESSMENT. THE REST OF THE ASSESSMENT CONTINUES FOR ANOTHER 8 PAGES, 16 TOTAL FOR THIS PARTICULAR SAMPLE. MANY OF THE CUSTOM SCRIPTS AND ADVANCED OPTIONS SETTING HAVE BEEN OMITTED FOR CONFIDENTIALITY REASONS.