Paper 286-2010

Birds Fly South to Migrate
A SAS® 9.2 Migration Need Not

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Abstract: *Birds fly south to migrate. South is the proper direction for bird migration but not a SAS 9.2 migration. SAS 9.2 provides tools and utilities to help with a migration from 9.1.3 to ensure a smooth flight in the proper direction. Need a bird's-eye view of the migration process to scope the effort and process? How can virtualization strategies be incorporated to greatly mitigate risk commonly associated with major application upgrades? Those birds of a feather who flock together with a need to understand options, alternatives, constraints and requirements for SAS 9.2 migration in 20 min or less can start here. We now begin our flyover, panoramic view of the migration landscape ....*

Contents

SAS 9.2 Upgrade Landscape

Promotion vs. Migration

When upgrading from SAS 9.1.3 to SAS 9.2, 3 general approaches that can be employed:

- Fresh start with SAS 9.2
- Promotion
- Migration

The first option, **fresh start** with SAS 9.2, requires a completely new installation and configuration process. This method is fairly obvious in the implications and effort required and not discussed further.

The next option, **promotion**, conceptually involves the exporting of selected content, the standard installation and configuration of SAS 9.2 with the SAS Deployment Wizard, and then the importing of previously exported SAS 9.1.3 content into the newly configured SAS 9.2 environment. Promotion can be done selectively and iteratively over time.

The last option, **migration**, uses a new feature in SAS 9.2, the SAS Migration Utility (SMU). The SMU queries and captures the state of the majority of the SAS 9.1.3 environment, creates a set of SAS package files and directories which is then used as input to the SAS 9.2 Deployment Wizard(SDW). At configuration time, SDW will configure SAS 9.2 to match the SAS 9.1.3 environment as closely as possible. A migration deployment is done once and migrates all data and configuration information in its entirety.

Requirements

Upgrading via the promotion method is more flexible than that of migration but more time consuming and generally requires more SAS administration expertise. Using promotion, deployment options such as system platform and application topology can be changed but using migration, the option to do so is not available prior to SAS 9.2 Maintenance 3. For example, if SAS 9.1.3 is deployed on Windows but you wish to deploy SAS 9.2 to Solaris, you can do so with the promotion method but cannot with migration. Similarly, if SAS 9.1.3 consists of a 3 tiered application architecture but you wish to consolidate to 1 or 2 tiers, you can do so with promotion but not with SMU. Starting with SAS 9.2 Maintenance 3(M3), the option to do either (change platform or change topology) will be supported. Note: Network port re-mapping is supported as well as changing the web application server (ie: from Apache Tomcat to Oracle WebLogic) **is** supported since SDW will perform an “out of the box” web container deployment with the migrated content. The content available for promotion includes metadata, stored processes, reports, information maps, tables, libraries, metadata folders but not OLAP cubes, schemas, portal content, users, groups, server definitions and access control templates.

Additional requirements for migration include that SAS Foundation be at 9.1.3 SP4 or later, deployment levels must remain the same, ie: Lev1 to Lev1, Lev2 to Lev2 but not Lev0 to Lev2 and certain products may require SAS Hotfixes prior to migration. While the migration from SAS 9.1.3 requires Xythos 4.0.48 or later for webdav, all migrated DAV content will be hosted under the SAS 9.2 Content Server on a different port.

For the complete list of requirements and a pre-migration checklist, visit:
Overview of Migrating Content to SAS 9.2 → High-Level SAS Migration Requirements
http://support.sas.com/documentation/cdl/en/bimig/61696/HTML/default/overvw.htm
Be sure to review the Maintenance Planning for SAS 9.2 document as well.

Migration Overview

The SAS Migration Utility, or SMU, is run on each server tier of the 9.1.3 deployment (but not client tiers) starting with the Metadata Server tier. The output of SMU is a package directory and if possible, should be placed on a centrally accessible, shared file system among all the application tiers.

The SAS Deployment Wizard (SDW) handles both the installation and configuration of the SAS 9.2 platform. On UNIX systems (Solaris 10 in this case), this is invoked by the setup.sh script located in the SAS software depot. SDW can perform either installation or configuration tasks (or both) and manages the migration process during the configuration stage if directed to do so.

Exporting SAS 9.1.3 Content

The SMU utility, smu.sh, is located in the SAS depot *utilities* subdirectory. It is not installed when SAS 9.2 is installed. If no SAS depot is readily available, a SMU version can be downloaded from:
http://www.sas.com/apps/demosdownloads/smu_PROD_sysdep.jsp?packageID=000492
Note: The version of smu.sh must match the exact version of SAS 9.2 being installed.

Smu.sh is a self-extracting archive (basically, that means its a shell script which contains binary data such that you can't readily view or edit it) that is a java based framework which houses extensions for all the SAS components that the migration process needs to handle.

It's run first on the system which contains the SAS Metadata server (which must be up and running) and then on all subsequent tiers of the SAS Intelligence Platform. Although the smu.sh script is well documented, the usage is a bit unusual in that the script is actually a metascript which invokes the actual data exploration and gathering program. Thus, there are arguments which are passed to the metascript (prefaced with 2 dashes '- -') and ones that are passed to the actual worker script (StartSmu.sh) (prefaced with a single dash '-'). The usage or help invocation is shown as:

```
 $ ./smu.sh –help
   ./smu.sh --help    Print this message
   ./smu.sh --info    Print embedded info : title, default target directory, embedded
script …
   ./smu.sh --lsm     Print embedded lsm entry (or no LSM)
   ./smu.sh --list    Print the list of files in the archive
   ./smu.sh --check   Checks integrity of the archive
```

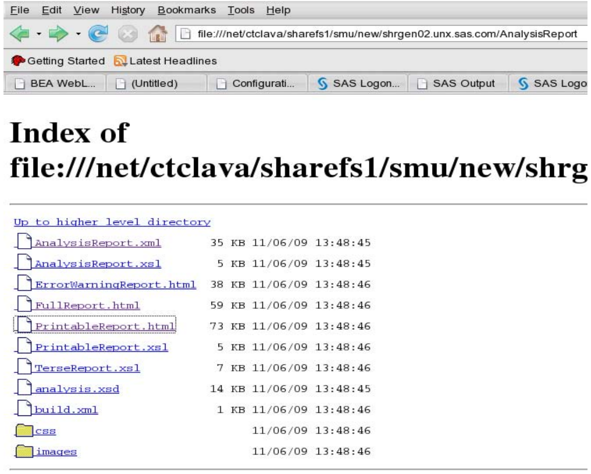
The top level smu.sh script is invoked with a command syntax similar to (or via a SMU properties file):

```
$ ./smu.sh  --target ./shrgen -- \
-outputdir /export/home/users/sasmau/shrgenoutput \  <<= NOTE: Full path required
-sasconfigdir /install/dashboard/SAS/Lev1 \
-sasexedir /install/dashboard/software/SAS_9.1 \
-metadatahost shrgen -davtier -user sas -password <password>
```

With the exception of the --target specification, all other parameters are, generally speaking, required:

--target: smu.sh argument indicator where to unpack the shell archive (requires 50+ MB of free space)
-outputdir: directory where 9.1.3 data will be exported to
-sasconfigdir: 9.1.3 configuration directory
-sasexedir: 9.1.3 SASFoundation directory
-metadatahost: SAS metadata (OMR) host; Metadata server must be running
-davtier: include WebDAV content
-user/-password: SAS OMR user/password with full administrative rights

For a full description of the smu.sh arguments see:
http://support.sas.com/documentation/cdl/en/bimig/61696/HTML/default/mig602.htm

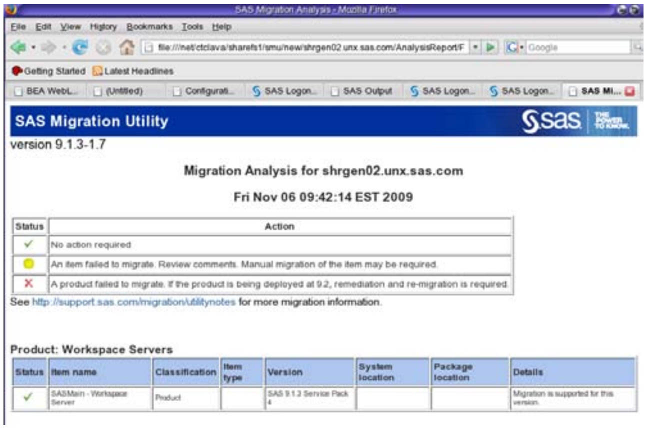

File Edit View History Bookmarks Tools Help
file:///net/ctclava/sharefs1/smu/new/shrgen02.unx.sas.com/AnalysisReport
Getting Started
Latest Headlines
BEA WebL...
(Untitled)
Configurati...
SAS Logon...
SAS Output
SAS Logo

Index of file:///net/ctclava/sharefs1/smu/new/shrg

```
Up to higher level directory
AnalysisReport.xml        35 KB 11/06/09 13:48:45
AnalysisReport.xsl         5 KB 11/06/09 13:48:45
ErrorWarningReport.html   38 KB 11/06/09 13:48:46
FullReport.html           59 KB 11/06/09 13:48:46
PrintableReport.html      73 KB 11/06/09 13:48:46
PrintableReport.xsl        5 KB 11/06/09 13:48:46
TerseReport.xsl            7 KB 11/06/09 13:48:46
analysis.xsd              14 KB 11/06/09 13:48:45
build.xml                  1 KB 11/06/09 13:48:46
css                             11/06/09 13:48:46
images                          11/06/09 13:48:46
```

SAS Migration Utiltily, smu.sh, AnalysisReport dir listing

After running smu.sh, a subdirectory, AnalysisReport, will be created in the specified output direction (-outputdir parameter) detailing the processes of exporting the SAS 9.1.3 environment and data. In the example, /net/ctclava/sharefs1/smu/new is the output directory, and the system name, shrgen, is used as the primary subdirectory which holds the majority of the migrated content. Several html files of interest include: FullReport, PrintableReport and ErrorWarningReport. FullReport.html and PrintableReport.html show the same information but in different formats. Close attention should be paid to all the warnings and error messages. The reports will detail all the process steps, location of data, whether the data or services are allowed to be migrated and the result codes from the attempted data export. Check also for the file migrate.log.


SAS Migration Analysis - Mozilla Firefox
File Edit View History Bookmarks Tools Help
file:///net/ctclava/sharefs1/smu/new/shrgen02.unx.sas.com/AnalysisReport/F
Google
Getting Started Latest Headlines
BEA WebL... (Untitled) Configurati... SAS Logon... SAS Output SAS Logon... SAS Logon... SAS MI...
sas THE POWER TO KNOW.

SAS Migration Utility

version 9.1.3-1.7

Migration Analysis for shrgen02.unx.sas.com

Fri Nov 06 09:42:14 EST 2009

Status	Action
✓	No action required
●	An item failed to migrate. Review comments. Manual migration of the item may be required.
✗	A product failed to migrate. If the product is being deployed at 9.2, remediation and re-migration is required.

See http://support.sas.com/migration/utilitynotes for more migration information.

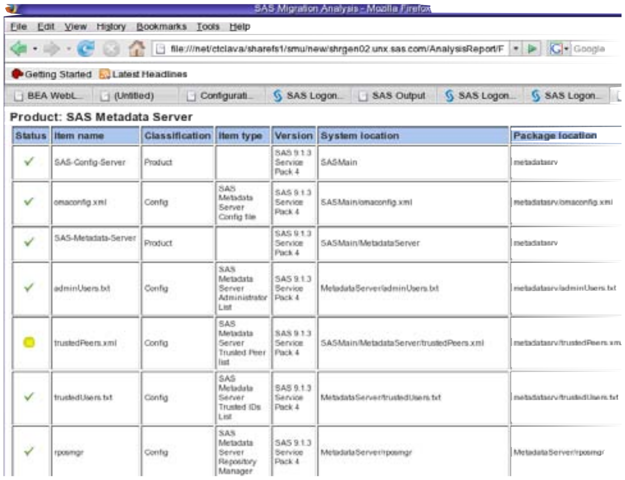
Product: Workspace Servers

Status	Item name	Classification	Item type	Version	System location	Package location	Details
✓	SASMain - Workspace Server	Product		SAS 9.1.3 Service Pack 4			Migration is supported for this version.

smu.sh, FullReport.html sample

Here we see FullReport.html where each item is coded with a green check for success, yellow circle for migration component failure, and red X for a product level migration failure. The screenshot shows that the Workspace server service was successfully exported. The report is fairly lengthy and care should be taken to examine all the warnings and errors carefully.

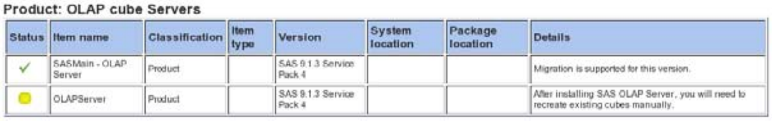
One area to be especially careful verifying is the migration of the SAS Metadata Server. Scrolling through the FullReport.html file, we find the section containing the Metadata migration. The warning is noted that trustedPeers.xml was not migrated.


SAS Migration Analysis - Mozilla Firefox
File Edit View History Bookmarks Tools Help
file:///net/ctclava/sharefs1/smu/new/shrgen02.unx.sas.com/AnalysisReport/F
Google
Getting Started Latest Headlines
BEA WebL... (Untitled) Configurati... SAS Logon... SAS Output SAS Logon... SAS Logon...

Product: SAS Metadata Server

Status	Item name	Classification	Item type	Version	System location	Package location
✓	SAS-Config-Server	Product		SAS 9.1.3 Service Pack 4	SASMain	metadatasrv
✓	omaconfig.xml	Config	SAS Metadata Server Config file	SAS 9.1.3 Service Pack 4	SASMain/omaconfig.xml	metadatasrv/omaconfig.xml
✓	SAS-Metadata-Server	Product		SAS 9.1.3 Service Pack 4	SASMain/MetadataServer	metadatasrv
✓	adminUsers.txt	Config	SAS Metadata Server Administrator List	SAS 9.1.3 Service Pack 4	MetadataServer/adminUsers.txt	metadatasrv/adminUsers.txt
●	trustedPeers.xml	Config	SAS Metadata Server Trusted Peer list	SAS 9.1.3 Service Pack 4	SASMain/MetadataServer/trustedPeers.xml	metadatasrv/trustedPeers.xm
✓	trustedUsers.txt	Config	SAS Metadata Server Trusted IDs List	SAS 9.1.3 Service Pack 4	MetadataServer/trustedUsers.txt	metadatasrv/trustedUsers.txt
✓	rposmgr	Config	SAS Metadata Server Repository Manager	SAS 9.1.3 Service Pack 4	MetadataServer/rposmgr	MetadataServer/rposmgr

smu.sh, FullReport.html, Metadata server export



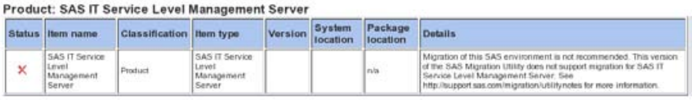
Product: OLAP cube Servers

Status	Item name	Classification	Item type	Version	System location	Package location	Details
✓	SASMain - OLAP Server	Product		SAS 9.1.3 Service Pack 4			Migration is supported for this version.
●	OLAPServer	Product		SAS 9.1.3 Service Pack 4			After installing SAS OLAP Server, you will need to recreate existing cubes manually.

smu.sh, FullReport.html, OLAP server export status

We can also see that certain components (OLAP cubes in this case) will need to be rebuilt.

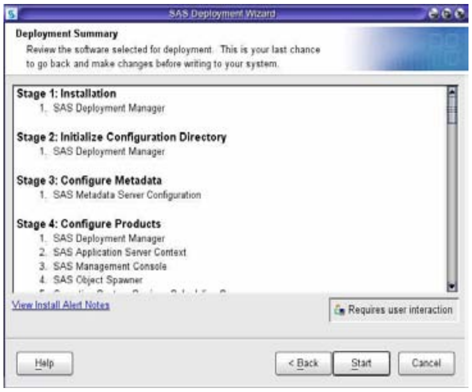
Products that do not support migration are noted, such as IT Service Level Management Server in this example.



Product: SAS IT Service Level Management Server

Status	Item name	Classification	Item type	Version	System location	Package location	Details
✗	SAS IT Service Level Management Server	Product	SAS IT Service Level Management Server			n/a	Migration of this SAS environment is not recommended. This version of the SAS Migration Utility does not support migration for SAS IT Service Level Management Server. See http://support.sas.com/migration/utilitynotes for more information.

smu.sh, FullReport.html, Migration not supported example



Deployment Summary

Review the software selected for deployment. This is your last chance to go back and make changes before writing to your system.

Stage 1: Installation
1. SAS Deployment Manager

Stage 2: Initialize Configuration Directory
1. SAS Deployment Manager

Stage 3: Configure Metadata
1. SAS Metadata Server Configuration

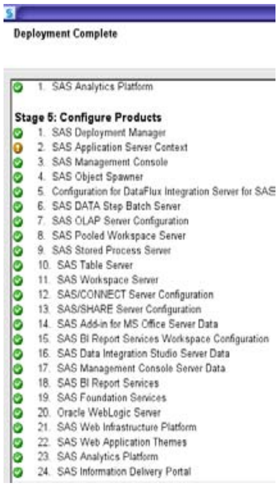
Stage 4: Configure Products
1. SAS Deployment Manager
2. SAS Application Server Context
3. SAS Management Console
4. SAS Object Spawner

SDW, Config confirmation

Importing Content to SAS 9.2

After inspection of the SMU analysis reports, the SDW script (setup.sh) can be run to perform both an installation and configuration or just a configuration. The configuration process will ask for the location of the top level SMU migration package directory if the migration option is selected. There will be several screens for input of various parameters which give the options to set the various user names, passwords, port numbers, etc. Once all the screens are processed, you will see, the actions to be taken(for either “install and configure”, or configure only). Note: For client installations and configurations, do not select the migration checkbox.

Once the installation and/or configuration is under way, each item will be checked off as progress is made towards completion as shown in the screenshot to the left.



Deployment Complete

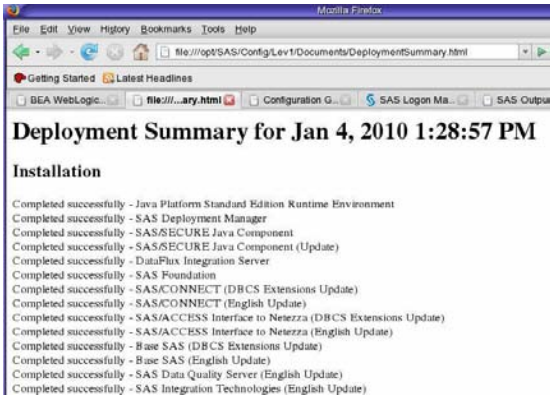
- ✓ 1. SAS Analytics Platform

Stage 5: Configure Products

- ✓ 1. SAS Deployment Manager
- ! 2. SAS Application Server Context
- ✓ 3. SAS Management Console
- ✓ 4. SAS Object Spawner
- ✓ 5. Configuration for DataFlux Integration Server for SAS
- ✓ 6. SAS DATA Step Batch Server
- ✓ 7. SAS OLAP Server Configuration
- ✓ 8. SAS Pooled Workspace Server
- ✓ 9. SAS Stored Process Server
- ✓ 10. SAS Table Server
- ✓ 11. SAS Workspace Server
- ✓ 12. SAS/CONNECT Server Configuration
- ✓ 13. SAS/SHARE Server Configuration
- ✓ 14. SAS Add-in for MS Office Server Data
- ✓ 15. SAS BI Report Services Workspace Configuration
- ✓ 16. SAS Data Integration Studio Server Data
- ✓ 17. SAS Management Console Server Data
- ✓ 18. SAS BI Report Services
- ✓ 19. SAS Foundation Services
- ✓ 20. Oracle WebLogic Server
- ✓ 21. SAS Web Infrastructure Platform
- ✓ 22. SAS Web Application Themes
- ✓ 23. SAS Analytics Platform
- ✓ 24. SAS Information Delivery Portal

SDW shows step-by-step progress status

After the configuration process has completed successfully, two files of interest will be generated. The first, DeploymentSummary.html in $SAS_CONFIG/Lev1/Documents, shown to the right, provides the status of each configuration step.



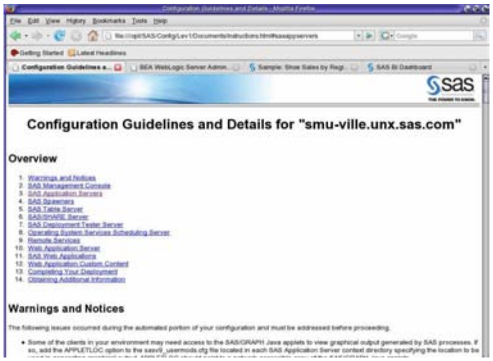
Deployment Summary for Jan 4, 2010 1:28:57 PM

Installation

Completed successfully - Java Platform Standard Edition Runtime Environment
Completed successfully - SAS Deployment Manager
Completed successfully - SAS/SECURE Java Component
Completed successfully - SAS/SECURE Java Component (Update)
Completed successfully - DataFlux Integration Server
Completed successfully - SAS Foundation
Completed successfully - SAS/CONNECT (DBCS Extensions Update)
Completed successfully - SAS/CONNECT (English Update)
Completed successfully - SAS/ACCESS Interface to Netezza (DBCS Extensions Update)
Completed successfully - SAS/ACCESS Interface to Netezza (English Update)
Completed successfully - Base SAS (DBCS Extensions Update)
Completed successfully - Base SAS (English Update)
Completed successfully - SAS Data Quality Server (English Update)
Completed successfully - SAS Integration Technologies (English Update)

Post SDW, DeploymentSummary.html - Config Status

The other file of interest, Instructions.html, is especially useful system or application administrators. This report provides details of each module configuration and if relevant, location of log files, URL for access, start up command, validation steps, port numbers, deployed or migrated web applications, etc. This extremely handy guideline should be used for the post installation and configuration validation checklist.



Configuration Guidelines and Details - Mozilla Firefox
File Edit View History Bookmarks Tools Help
file:///opt/SAS/Config/Lev1/Documents/Instructions.html#sasappservers
Google
Getting Started
Latest Headlines
Configuration Guidelines a...
BEA WebLogic Server Admin...
Sample: Shoe Sales by Regi...
SAS BI Dashboard
sas
THE POWER TO KNOW.

Configuration Guidelines and Details for "smu-ville.unx.sas.com"

Overview

1. Warnings and Notices
2. SAS Management Console
3. SAS Application Servers
4. SAS Spawners
5. SAS Table Server
6. SAS/SHARE Server
7. SAS Deployment Tester Server
8. Operating System Services Scheduling Server
9. Remote Services
10. Web Application Server
11. SAS Web Applications
12. Web Application Custom Content
13. Completing Your Deployment
14. Obtaining Additional Information

Warnings and Notices

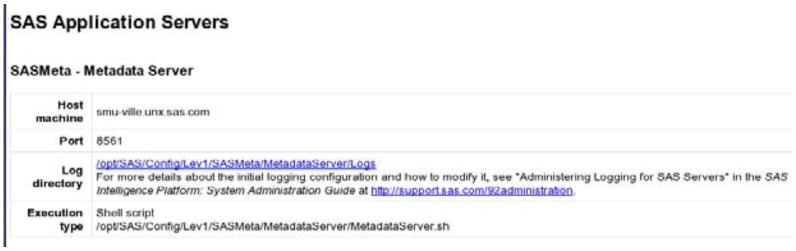
The following issues occurred during the automated portion of your configuration and must be addressed before proceeding.

- Some of the clients in your environment may need access to the SAS/GRAPH Java applets to view graphical output generated by SAS processes. If so, add the APPLETLOC option to the sasv9_usermods.cfg file located in each SAS Application Server context directory specifying the location to be

smu.sh, Instructions.html, post SDW

Some information samples from Instructions.html:

- Starting the SAS Metadata Server
- SAS Web Application access points, log location and validation sequence (ie: SAS Web Report Studio)
- Starting the Oracle WebLogic Application Server

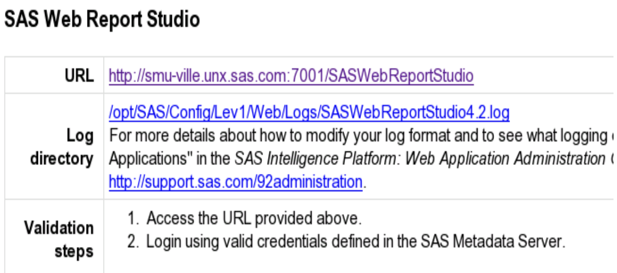


SAS Application Servers

SASMeta - Metadata Server

Host machine	smu-ville.unx.sas.com
Port	8561
Log directory	/opt/SAS/Config/Lev1/SASMeta/MetadataServer/Logs For more details about the initial logging configuration and how to modify it, see "Administering Logging for SAS Servers" in the *SAS Intelligence Platform: System Administration Guide* at http://support.sas.com/92administration.
Execution type	Shell script /opt/SAS/Config/Lev1/SASMeta/MetadataServer/MetadataServer.sh

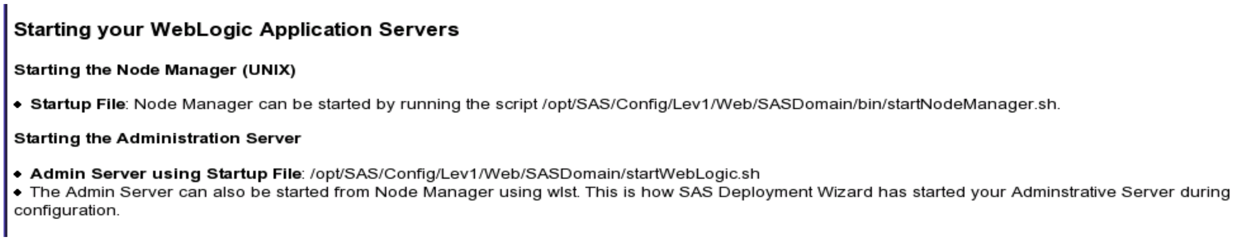
smu.sh, Instructions.html, Starting the SAS Metadata Server



SAS Web Report Studio

URL	http://smu-ville.unx.sas.com:7001/SASWebReportStudio
Log directory	/opt/SAS/Config/Lev1/Web/Logs/SASWebReportStudio4.2.log For more details about how to modify your log format and to see what logging Applications" in the *SAS Intelligence Platform: Web Application Administration* http://support.sas.com/92administration.
Validation steps	1. Access the URL provided above. 2. Login using valid credentials defined in the SAS Metadata Server.

smu.sh, Instructions.html, SAS Web Report Studio access point & validation sequence



Starting your WebLogic Application Servers

Starting the Node Manager (UNIX)

- **Startup File**: Node Manager can be started by running the script /opt/SAS/Config/Lev1/Web/SASDomain/bin/startNodeManager.sh.

Starting the Administration Server

- **Admin Server using Startup File**: /opt/SAS/Config/Lev1/Web/SASDomain/startWebLogic.sh
- The Admin Server can also be started from Node Manager using wlst. This is how SAS Deployment Wizard has started your Adminstrative Server during configuration.

Instructions.html sample showing WebReport Studio URL, log and validation steps

Be sure to check the post-migration task checklist as well.

Migration Mistakes and Mishaps

The migration feature set is very powerful and fully automated but it's easy to make mistakes along the way. Some common mistakes are described here:

1. **Don't install SAS software as root**. On Unix systems, some applications require installation as the root user while other applications take pains to prevent it. The SAS 9.2 installation process will not prevent installation as root however the SAS Quickstart Guide strongly suggests that an alternate user be used:
http://support.sas.com/documentation/installcenter/en/ikqsgbasicesd/62123/PDF/default/quickstart.pdf
Out of a curiosity as to what would happen, our initial installation was done as root. There were indeed resulting failures but they were interesting and unintuitive. The installation actually seemed to have initially succeeded and initial validation tests were started per the deployment report. While most of the server validation tests worked from within the SAS Management Console (SMC), the Pooled Workspace server test was failing with the error message posted to both SMC and the Solaris logging facility, syslog:
```
[11/9/09 1:40 PM] INFO: Starting simple validation for Pooled Workspace
server (level 1) – ping
[11/9/09 1:40 PM] INFO: Ping successful!
[11/9/09 1:40 PM] INFO: Starting extended validation for Pooled
Workspace server (level 1) - Making a connection
[11/9/09 1:40 PM] SEVERE: Launch Failed. Cannot execute program
/opt/SAS/Config/Lev1/SASMain/PooledWorkspaceServer/PooledWorkspaceServer.sh",
error = 53 (Anode table overflow).
[11/9/09 1:40 PM] SEVERE: The specified executable module either cannot be
located or it is not a valid executable.
```

   A lookup to /usr/include/sys/errno.h showed that error 53 was ENOANO but a quick search showed that this errno was generally unused. Fortunately, the SAS module, elssrv, also sent errors to syslog; this time providing a clue to the source of the acutal problem:
```
Nov  9 13:40:04 smu-ville elssrv[3701]: [ID 278861 user.error] TKELS -
CLIENT( 3701): EXEC FAILED 13
```
   where error 13 in /usr/include/sys/errno.h matches to Permission denied. No pun intended but the root of the problem is well, that of root permissions. Certain directories were owned by root as the installation user with no or limited permissions to other users. When SAS services were started by the non root “sas” user, fatal errors occurred because the “sas” user required legitimate access to those directories. In summary, the error, ENOANO, or anode table overflow is not only misleading but erroneous (SAS bug filed). In an attempt to rectify this situation by doing a simply recursive change of ownership without having to do a full software re-install, we ran into the next pitfall.

2. **Leftover root installation breadcrumbs.** After the “not a best practice” installation as root, we wanted to leave the SAS software installation in place and simply rectify the ownerships so that

we could re-attempt the configuration without having to do the re-installation. A global user and group id change to the proper installation id/group was performed on the installation directory. Three binaries (sasauth, sasperm, elssrv) require setuid root permission set and this was done in legitimate fashion with the sassetup script normally invoked as part of the SAS Foundation install. The $SAS_CONFIG[*] directory (/opt/SAS/Config in our case) was moved aside for a fresh configuration attempt. Running the installation as the proper user (*prdsas2* in our case), the SDW would not allow a reconfiguration. Using the same installation directory (/opt/SAS), the only options allowed were installation and depot management (no reconfiguration). If "install" was selected, an error message was presented indicating that the previous installation had been done as *root* even though all the files in the directory were now owned by *prdsas2*. It turns out that the install user is stored in $SASHOME/deploymntreg/registry.xml with the directive:

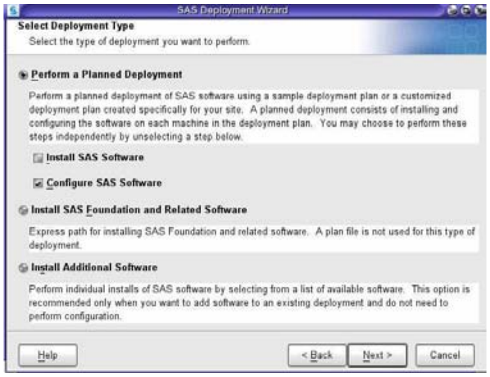
```
<Value data="root"  name="install_user"/>
```

After making a backup copy of the file, and modifying *root* to *prdsas2*, we were then able to do a reconfiguration only. Note, registry files be ***should not*** be manually modified under normal conditions. As a side note, SDW stores information in $HOME/.SASAppData, most of which is specific to the state of actions last taken such as Metadata profile connection information, results of SDW validation testing, SAS Management Console state information, etc.

3. **smu version mismatch**. When the migration information is extracted from the SAS 9.1.3 deployment, the version of smu.sh must match the version of SDW to be used for the SAS 9.2 installation and configuration. Smu.sh is located in $SAS_DEPOT/utilities/smu subdirectory. The migration package will not be valid if there is a version mismatch between smu.sh and the SDW (setup.sh) script located in the top level $SAS_DEPOT directory.

4. **Web Container must be installed with 64 bit JVM support**. Although SAS 9.2 on Solaris is a full 64-bit application, it uses a Java Runtime Environment (JRE) in 32-bit mode via a proxy ($SASROOT/utilities/bin/jproxy). However, SAS 9.2 on UNIX requires that the web container (Oracle WebLogic in our case) use a 64-bit JVM. Since the WebLogic installation will default to a 32-bit JVM, the SDW deployment of the web container content will fail in that installation scenario. A quick way to determine (on Solaris+SPARC) if the installation has 64-bit support, is to look for the directory, $WL_HOME/server/native/solaris/sparc64 (ie: WL_HOME = /opt/bea/wlserver_10.0). If the subdirectory, *sparc*, exists instead of *sparc64*, then WebLogic needs to be re-installed with 64-bit support (java -jar -d64 server.jar). Once the 64-bit installation has completed, follow the WebLogic documentation to verify whether modifications to $WL_HOME/common/bin/commEnv.sh are necessary. Refer to third party support docs for more information.

5. **The SAS Deployment Wizard (SDW) : Used for Configuration and/or Installation**. As mentioned earlier, the SDW can be used for both installation and configuration or just configuration. Deployment of the migrated content will occur in this configuration phase. The item of note is that the initial screens require that the selection *install* software be chosen even if the desired task is configuration only. The screen shown will be presented where the choice to



Select Deployment Type

Select the type of deployment you want to perform.

● Perform a Planned Deployment

Perform a planned deployment of SAS software using a sample deployment plan or a customized deployment plan created specifically for your site. A planned deployment consists of installing and configuring the software on each machine in the deployment plan. You may choose to perform these steps independently by unselecting a step below.

□ Install SAS Software

☑ Configure SAS Software

○ Install SAS Foundation and Related Software

Express path for installing SAS Foundation and related software. A plan file is not used for this type of deployment.

○ Install Additional Software

Perform individual installs of SAS software by selecting from a list of available software. This option is recommended only when you want to add software to an existing deployment and do not need to perform configuration.

SDW (setup.sh), no install, configuration only

[*] With the exception of $SASROOT, SAS variables (ie: $SAS_CONFIG) do not have any context to SAS and are used as generic reference points

install software can be de-selected.

6. **Web Application Server configuration and SAS plan file mismatch yields no joy.** In SAS 9.2 Maintenance 2, the migration process requires a “Like for Like” migration. The OS platform and architecture must remain the same, although changing the web application server (ie: from Apache Tomcat to Oracle WebLogic) is allowed and supported. Due to a simple oversight, my SAS plan file specified the JBoss web application server instead of the intended Oracle WebLogic server. The correct procedure would have been to re-generate the SAS plan file but, at the time, I didn't think this was necessary since the SDW configuration process allows you to de-select the configuration of the web container. Additionally, knowing that the web application server is deployed out-of-the-box via standard interfaces, there was a false assumption that the erroneous plan file was irrelevant for a configuration only. Interested in trying the back door fix (as mentioned before, this is **not** recommended and should **not** be done under normal conditions), I was able to perform a successful configuration + migration without having a correct plan. The installation process creates a file, $SASHOME/deploymntreg/registry.xml. It was a simple edit to change the application server specification from:

```
      <Key name="jboss">
          <Key name="default">
            <Value data="492926" name="order"/>
            <Value data="JBoss Application Server" name="displayname"/>
            <Value data="/opt/JBOSS/jbossesb-server-4.2GA" name="location"/>
          </Key>
        </Key>
to:
      <Key name="weblogic">
          <Key name="default">
            <Value data="492926" name="order"/>
            <Value data="Oracle WebLogic Server" name="displayname"/>
            <Value data="/opt/bea/wlserver_10.0" name="location"/>
          </Key>
        </Key>
```

Once this was modified, a subsequent SDW configuration+migration attempt completed successfully.

7. **Configuration Re-do, what to save** .... I did a “re-do”, several actually, on migration attempts for purposes of writing this paper, sometimes because of mistakes documented above, but other times wondering, “What if....”. Each time, we would remove our $SAS_CONFIG directory since SDW would not allow you to overwrite this directory. Thus, this directory was removed (and eventually simply renamed) but, in hindsight, I wished that I had backed up several files. The first was the script to start and stop the SAS Servers. Recall that a number of the SAS servers might be running and need to be stopped before SDW can be run. The script, $SASHOME/Config/Lev1/SASMain/**sas.servers** is used to start and stop the SAS servers. Forgetting to stop the SAS servers before removing this directory would require a manual shutdown of all the SAS application services. Remember to stop all the SAS services and/or make a copy of this script prior to running SDW or removing the configuration directory. The second thing that I wished I had saved was the **$SAS_CONFIG/Lev1/Documents** directory, specifically, the previous DeploymentSummary and Instructions reports. In subsequent deployment attempts, I wished I had saved these files for a comparison of what worked and what didn't.

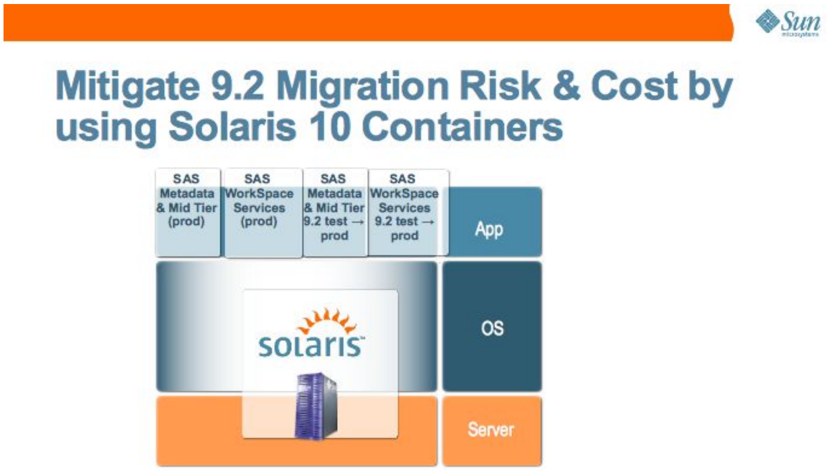
Barring mistakes like these, the auto-migration via the SDW configuration phase should well be on its way towards a successful migration.

Agile Deployment Strategies

Virtualization Made Simple with Solaris 10 Containers

Consolidating Dev / Test / Prod environments

SMU sounds easy? It is relatively straightforward but unrelated logistical challenges can sometimes present hurdles. Lacking the budget for new hardware and wishing to avoid the administrative burden needed to support a new SAS 9.2 environment in addition to current production SAS 9.1.3 environments, many organizations may delay migration.



Mitigate 9.2 Migration Risk & Cost by using Solaris 10 Containers

SAS Metadata & Mid Tier (prod)
SAS WorkSpace Services (prod)
SAS Metadata & Mid Tier 9.2 test → prod
SAS WorkSpace Services 9.2 test → prod
App
solaris
OS
Server

Supporting parallel SAS 9.1.3 and SAS 9.2 deployments

Containers allow for secure, logically separated instances of Solaris to run on the same system. They are very simple to create and maintain and enable the ability to host both a SAS 9.1.3 and SAS 9.2 installation on the same hardware platform. Because each container has its own namespace, you can even use identical network port numbers in the SAS 9.2 and SAS 9.1.3 deployments as long as each is deployed in a separate container. For example, a single system with multiple containers could easily host both a SAS 9.1.3 and SAS 9.2 Metadata server with both using the same default port number (8561) or host SAS Spawners running on port 8581. Although network port re-mapping is supported in a migration, it does take additional effort to ensure that the new port numbers are correctly utilized.

Consolidating a multi-tiered SAS 9.1.3 deployment to a single tier is currently not supported by SMU M2. If the SAS Intelligence Platform is deployed on Solaris 10, the use of Containers can create very agile deployment environments; migrating a three tier application architecture to three containers on a single host would facilitate and enable a server consolidation effort while maintaining the current M2 requirement that the SAS architecture remain the same. Additionally, Solaris 10 containers can easily be migrated to different systems if determined that increased compute resources are required.

SAS 9.2 promotion from dev/test to production made easy

SAS 9.2 Maintenance 3(M3) brings a new feature to the SAS DeploymentManager (and corresponding command line utility, HostPortTool) which allows changing the deployment platform host name. Combining this feature with Solaris 10 clones enables IT/SAS administrators to deploy a SAS 9.2 migration and ***trivially*** create a production environment while retaining the test environment.

Assuming sufficient (but not necessarily additional) server and storage computing resources, imagine the following scenario. A SAS 9.1.3 environment is running on a Solaris SPARC system named ***Molly*** where the SMU utility was run to create a migration package set. Regardless of the number of server tiers- one, two, or three, the concept is the same). SAS 9.2 M3 SDW is run on a new Solaris 10 container named ***Dolly1*** and the content from ***Molly*** imported into the deployment**.** The new SAS 9.2

environment on ***Dolly1*** is tested, fully validated and give a green light go-ahead to promote to production. ***Dolly1***, the Solaris 10 container, can be easily cloned to create ***Dolly2;*** the application storage easily copied and uniquely surfaced with the same pathname directory structure. On ***Dolly2***, the SAS DeploymentManager is used to change the SAS application view of the hostname from ***Dolly1*** to ***Dolly2***. The new SAS 9.2 *test* environment can then be surfaced from ***Dolly1*** and the new 9.2 *production* environment can be surfaced via ***Dolly2***. Combining the use of containers with ZFS as described below is an even more powerful combination that creates tremendously flexible and agile deployment environments. IT/SAS application administrators can be heroes of the day by solving problems in a way that ***reduces cost, mitigates risk, and significantly shortens the time to solution***.

Additional resources for SAS deployments using Solaris 10 Containers:

- Deploying SAS in a Virtualized Sun Environment
- Deploying SAS 9 on Solaris 10: Containing Cost, Consolidation, & Capacity Challenges with Virtual Simplicity - A SAS R&D Case Study

Zip-a-dee-doo-dah, zip-a-dee-ay, my, oh my, ZFS clones are the way

Faster than you can say “Zip-a-dee-doo-dah”, a ZFS file system snapshot (clone) can be created. These ZFS clones (not to be confused with Solaris clones) can flexibly support filesystem rollbacks and/or promotion (not to be confused with SAS application promotion) with a simple command. When using SAS promotion, ZFS snapshots can easily be incorporated into enterprise application and data backup strategies. Create a ZFS snapshot prior to a SAS promotion or update after a migration. If the changes don't work, it's a simple command to revert back to the previous version.

More info on using ZFS snapshots and using ZFS for SAS 9 backup and recovery strategies:

- Working with ZFS Snapshots and Clones
- Backup and Disaster Recovery: When Disaster Strikes, What Will You Do?
- Best Practices for Deploying the SAS Business Analytics Framework on Sun Storage 7000 Systems
- Zebra, Zamboni, Zen and the Art of ZFS

Summary

The SAS Migration Utility (SMU) can be used to facilitate a SAS 9.1.3 to SAS 9.2 migration deployment. The utility, smu.sh, located in the SAS 9.2 software depot utilities subdirectory is run from the SAS 9.1.3 environment to create SAS packages. These packages can then be used as input to the SAS Deployment Wizard (SDW) during the SAS 9.2 installation and/or configuration phase. Once the SMU script has been run in the SAS 9.1.3 environment, check the AnalysisReport subdirectory in for helpful reports on the data export process. After the configuration process in SAS 9.2 with SDW, check the Documents subdirectory under the SAS Configuration directory for additional status and post-configuration next steps. Solaris 10 Containers and ZFS can be utilized to create agile and flexible deployment environments with tremendous simplicity and reduced cost. Using the techniques described in this paper can help ensure that only birds go south during a migration.

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