Step by Step Approach to Port CDISC SAS® Data Integration Repositories on Cross Platforms Using %OMAPORT Macro

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ABSTRACT

Data Integration (DI) Studio provides an interface to the SAS® Metadata Server for designing and running metadata driven processes. This paper summarizes my experience in migration of a custom CDISC compliant SDTM DI Studio application from one platform to another. The examples and techniques discussed throughout this paper are based on a source environment of DI Studio 3.4 on Windows XP and a target environment of DI Studio 3.4 on HP-UX 11i. Specifically, the paper will describe the use of %OMAPORT macro and tasks to be completed on the target host (HP-UX). The target audience is members of your migration team, who know SAS® and are familiar with your overall SAS® Business Intelligence environment. Also, the migration team must work closely with the system administrator of the Windows and HP-UX 11i environments. The purpose of this paper is to assist SAS® users in the pharmaceutical, biotechnology, and medical devices industries in their efforts to migrate CDISC DI repositories from one platform to another.

INTRODUCTION:

As CDISC becomes the preferred FDA (soon to be required) format for SDTM submission, the pharmaceutical industry is becoming increasingly interested in developing robust and cost effective CDISC compliant submission processes. One of the areas of research in this direction is SAS9® Business Intelligence Platform. The platform components that are of particular interest are Metadata Server, which is the core of this architecture, and the client specifically designed for data transformation tasks – Data Integration Studio. FDA regulations under 21 CFR Part 11 have placed an increased interest by the biomedical industry on the requirements for migrating, integrating, and validating computerized systems. Porting CDISC DI Studio application from one host to another can be a challenging task. It is important to develop a plan for migrating to HP-UX 11i server. This paper will help you plan for the migration by explaining various techniques for successful migration.
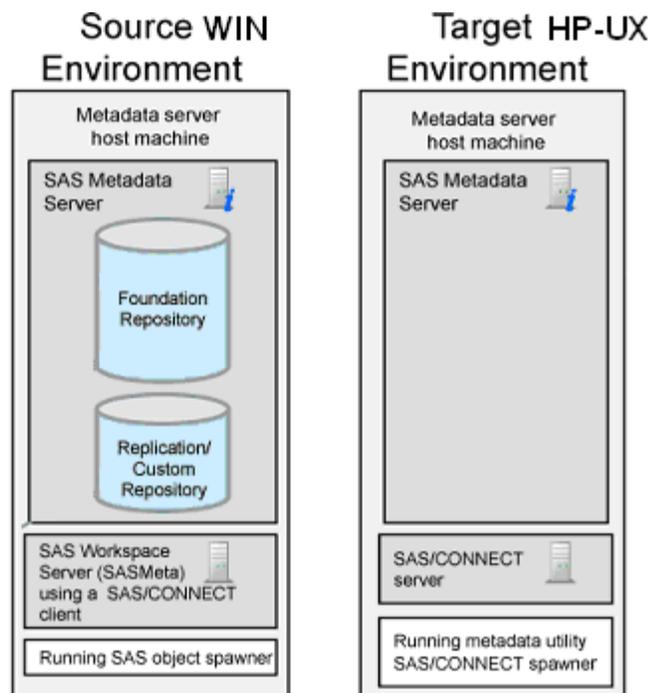

ABOUT SAS® METADATA REPOSITORIES

When designing metadata driven processes, it is extremely important to organize metadata in a straightforward way. On the Metadata Server, metadata is arranged in repositories. Repositories can be dependent upon other repositories, or can be self-contained (although not absolutely self-contained). The core repository, upon which all other repositories depend, is the Foundation repository, which stores the most general information necessary for the rest of the metadata build-up to function properly. This essential information includes physical machine name, port numbers, Workspace Server (SAS® processor) name,

security information. All other repositories are arbitrary (called custom) and are dependent of Foundation repository.

For our purposes, we have the following repository structure:
1. **Foundation Repository** – as a necessary component of the metadata server – which is always present
2. **Clinical Standards Repository**, to hold external (CDISC) and internal (company specific) standards, which depends on the Foundation repository
3. **Study Repositories**, which will store all study related metadata needed for SDTM generation and depends on Clinical Standards
4. Various **Project repositories**, one per user per study, where our users could do their work.
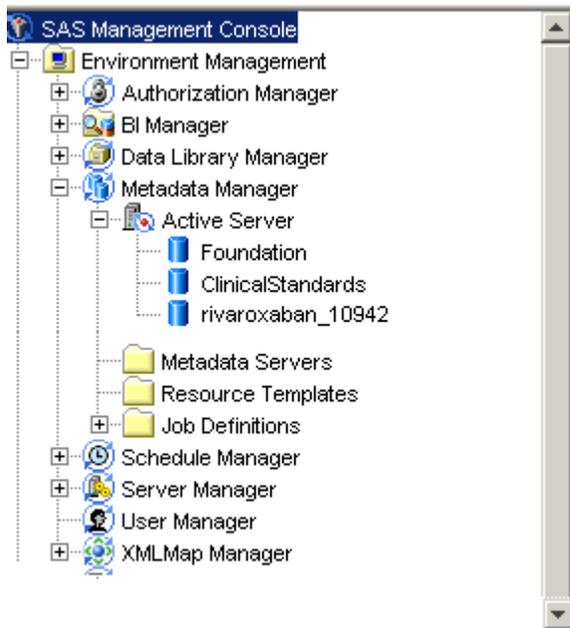
MIGRATING SAS® FILES FROM WINDOWS XP TO HP-UX 11I
Migrating large SAS® files associated with libraries defined in your repositories can pose obvious challenges in managing both time and space constraints. You can use these strategies to move source and target libraries from Windows XP to HP-UX:
- **CPORT and CIMPORT procedures**
- **XPORT engine with DATA step or PROC COPY**
- **XML engine with DATA step or PROC COPY**
- **Data Transfer Services (DTS) in SAS®/CONNECT**

PERFORMING BACKUP
Before we run OMAPORT, it is recommended to perform a Full Metadata Server Backup. %OMABAKUP must be executed on the computer that hosts the metadata server.

ABOUT THE %OMAPORT MACRO
In order to support movement of repositories across different operating system, we have to use %OMAPORT autocall macro. %OMAPORT is run within SAS® on the target machine. The target machine is the metadata server machine (HP-UX) to which you are porting the repository. The target machine must have a SAS® Metadata Server defined on it.

If you use the %OMAPORT macro to port your metadata from one host operating system to a different operating system, you might receive errors during the %OMAPORT execution. The content of the error messages will vary, but the errors will occur during the processing of the DS_DEFN or DS_VCHAR data sets.

PLANNING OF ACTIVITIES:
For successful porting of CDISC SAS® Data Integration application, you must perform the following steps:

STEP 1:
Each metadata server has one foundation repository that is created by default when the metadata server is configured. The default name of the foundation repository is Foundation. Custom repositories are useful for physically segregating metadata for storage or security purposes. Metadata in a custom repository can be associated with metadata in the foundation repository and with metadata in all other custom repositories. To support movement of Foundation and Custom repositories across different operating system, we have to copy the SAS® Foundation metadata and custom repositories from the source system (Win) to a temporary location on the target host (HP-UX Unix) using one of the supported binary transfer protocols:

- NFS or some other network convention
- binary FTP
- UPLOAD and DOWNLOAD procedures

To do a binary external file transfer with PROC UPLOAD and PROC DOWNLOAD use SAS®/CONNECT to connect from the source to the target machine and then execute the following on the source machine SAS® session:

```
filename source 'WIN source repository directory';
rsubmit;
   filename target 'UNIX temporary target repository directory';
   proc upload infile=source('*')
           outfile=target
           binary;
   run;
endrsubmit;
```

STEP 2:
The DS_DEFN and DS_VCHAR data sets contain performance information about the specific server and can be deleted during the porting process. You can recreate them by running the %OMABAKUP macro and the RUNANALYSIS=YES option (or %OMARUNAN macro) on the new server after you port your repository.

It is important we delete the ds_defn.sas7bdat and ds_vchar.sas7bdat files from the temporary location on the target host HP-UX to avoid any errors during execution of OMAPORT macro.

STEP 3:
Once step1 and step2 completed successfully, we must STOP the Target Metadata server on HP-UX. To use the sas.servers script to stop all essential servers on a HP-UX UNIX machine, follow these steps:

1- Log on as the SAS Installer user (for example, sas).
2- Go to the directory SAS-configuration-directory/Lev1/.
3- Type ./sas.servers followed by one of the following arguments:
   stop

When you stop the metadata server, any dependent servers and spawners (whether they are on the same host machine or a different machine) will stop running.

You can also STOP the metadata server using SAS® Management Console. In the SAS® Management Console Plug-ins tab, expand the Metadata Manager node, select the Active Server node and select STOP.
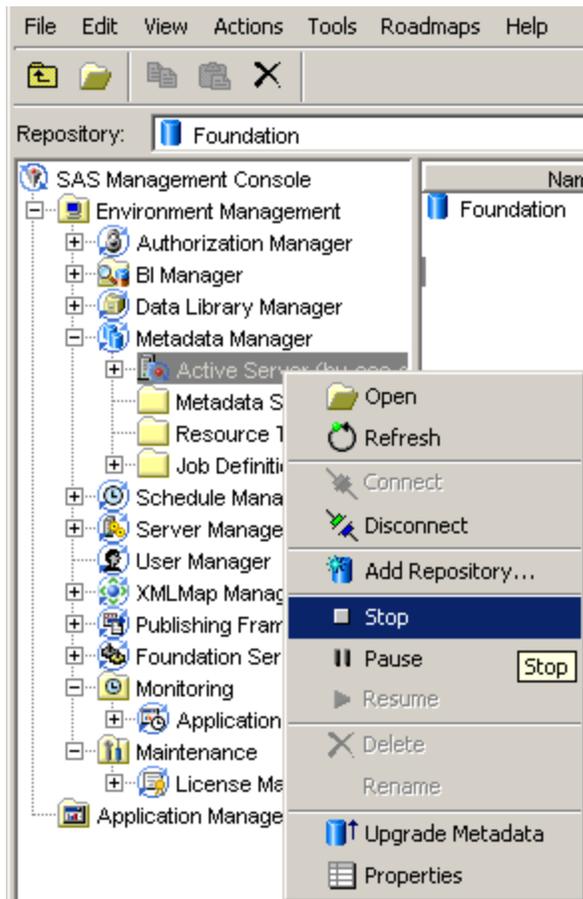
STEP 4:

Metadata repositories are managed by a repository manager, which is a library of tables that define the set of repositories that can be accessed by a SAS Metadata Server. A metadata server cannot be started without a repository manager. Each metadata server can have only one repository manager. As part of this migration, you should cleanup up the rposmgr directory on the target host using operating system command. The rposmgr directory on you target server will have the following datasets.

- assocmgr.sas7bdat
- cntainer.sas7bdat
- ds_defn.sas7bdat
- mdassoc.sas7bdat
- mrrgstry.sas7bdat
- rposctrl.sas7bdat

At this point your rposmgr directory should be empty.

STEP 5:
In this step we move the target Foundation and Custom repository datasets on HP-UX to another temporary location. Target Foundation repository and Custom repository directories should be empty at this point.

STEP 6:
Start the target metadata server and don't configure any repository yet. This will initialize the rposmgr tables. Do not connect to SAS® Management Console and define any repository yet.

STEP 7:
Stop the target Metadata server again using instructions in Step3. Run the %OMAPORT macro on the HP-UX target server and verify that it runs without errors. The **%OMAPORT** macro does not register the ported repository on the target metadata server. After the data sets conversion is complete, you must register the ported repository**.**

> Libname oldrpos "source-repository-path";
> libname newrpos "target-repository-path";
> libname newrmgr "metadata server's repository manager";
>
> %*omaport*(oldrpos,newrpos,newrmgr);

STEP 8:
Start the metadata server, log in to the server as the unrestricted user in SAS Management Console, and register the SAS® Foundation repository.

To use the sas.servers script to start all essential servers on a HP-UX UNIX machine, follow these steps:

1- Log on as the SAS Installer user (for example, sas).
2- Go to the directory SAS-configuration-directory/Lev1/.
3- Type ./sas.servers followed by one of the following arguments:
   start

When you register a metadata repository, information about the repository is added to the repository manager so that the repository can be accessed by clients.

To register a repository:

1- Log on to SAS Management Console as a user with the appropriate credentials (sasadm).
2- In the Metadata Manager, right-click the Active Server node and select Register Repository. Then follow the instructions that are provided by the wizard.

STEP 9:
Configure server definition, library objects, and user objects according to your target environment and test connection to servers etc

STEP 10:
Register the Custom repository and setup dependencies.

CONCLUSION:
Whatever the results of the validation, they should be documented as part of the change control process. All stakeholders should be informed of the outcome. Any additional changes that might be required should go back through the process in order to provide the essential documentation that would be necessary to understand what activity is taking place in the metadata repositories.

As part of your change control process, you should maintain a complete history of changes and keep a complete record that can be used for auditing and tracing. When partial or full promotion is done, the relevant information should be captured, such as the owner ID, the date, and a description of the contents. In addition, there should be documentation about how to execute the change, which would include the following information:

- The name of the target repository
- The name of the parent folder to import into
- Any reconnection information that might be required for the target repository
- Any dependency requirements that specific content must already exist in the target repository

ACKNOWLEDGEMENTS
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http://support.sas.com/documentation/cdl/en/bisag/64088/HTML/default/viewer.htm#a003259965.htm