

# **How to Get Promoted in Six Weeks or Less: A Step by Step Guide to a SAS 9.2 EBI Server Installation and Promotion**

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## **ABSTRACT**

Organizations inevitably face the struggle to cost-effectively install enterprise-wide analytical software. The successful installation and promotion of SAS 9.2 Enterprise Business Intelligence software requires the collaboration of Information Technology, SAS and the system administrators of SAS software. Whether an organization must depend on SAS consultants to perform the installation and promotion hinges on the local expertise of SAS EBI architecture. This paper will detail the preparation and execution of a multi-tiered SAS 9.2 Enterprise Business Intelligence Server installation and promotion on a Windows OS.

## **INTRODUCTION**

Western Kentucky University's Office of Institutional Research is focused on the collection and analysis of university data for executive level decision support. In March of 2009, WKU selected the SAS 9.1.3 Enterprise Business Intelligence Server to transform customary static reports and analytics into a dynamic, proactive web-based system available at the click of a mouse. With the help of a SAS consultant, Institutional Research (IR) designed a variety of OLAP cubes, Stored Processes and other business objects that saturated the basic needs of the executive level staff. Reports were created and delivered through SAS web applications (Information Delivery Portal, Web Report Studio and Stored Process Web Application). While the innovative system gave birth to a new era in IR, deficiencies in the 9.1.3 EBI Server, or moreover, the fantastic enhancements to the 9.2 EBI Server, pushed the promotion of the new system into focus.

### **9.1.3 EBI ARCHITECTURE**

IR's 9.1.3 EBI architecture consisted of two 32-bit virtual machines (ESX 4 for VMware) running Windows Server 2003, Enterprise Edition. Each VMware box had a Dual-Core Intel 2.93 GHz Xeon x3650 processor, 8 GB of memory and a 150 GB of allotted hard drive storage space. The EBI topology was made up of a Metadata Server and Mid-tier Server. Tomcat was used as the application server on the Mid-tier box. The 9.1.3 EBI system was sized to handle 70 total users and approximately 3 GB of working data volume. The average user concurrency was 2 users.

## **PREPARATION**

### **SIZING**

The first step in an installation and promotion should be ensuring the new 9.2 EBI system architecture meets the anticipated user demand for the system. This is the appropriate time for enhancements to your system architecture, if necessary. IR took advantage of this opportunity to enhance our hardware configuration. Using the recommendation provided by the SAS Enterprise Excellence Center (EEC), IR expanded the production environment into three server tiers (Metadata, Compute and Mid-tier) and added a virtual machine to host the development environment. The Metadata and Mid-tier servers continued as virtual machines, while the Compute Server is a Dell PowerEdge R710 running 64-bit Windows Server 2008 Service Pack 2.

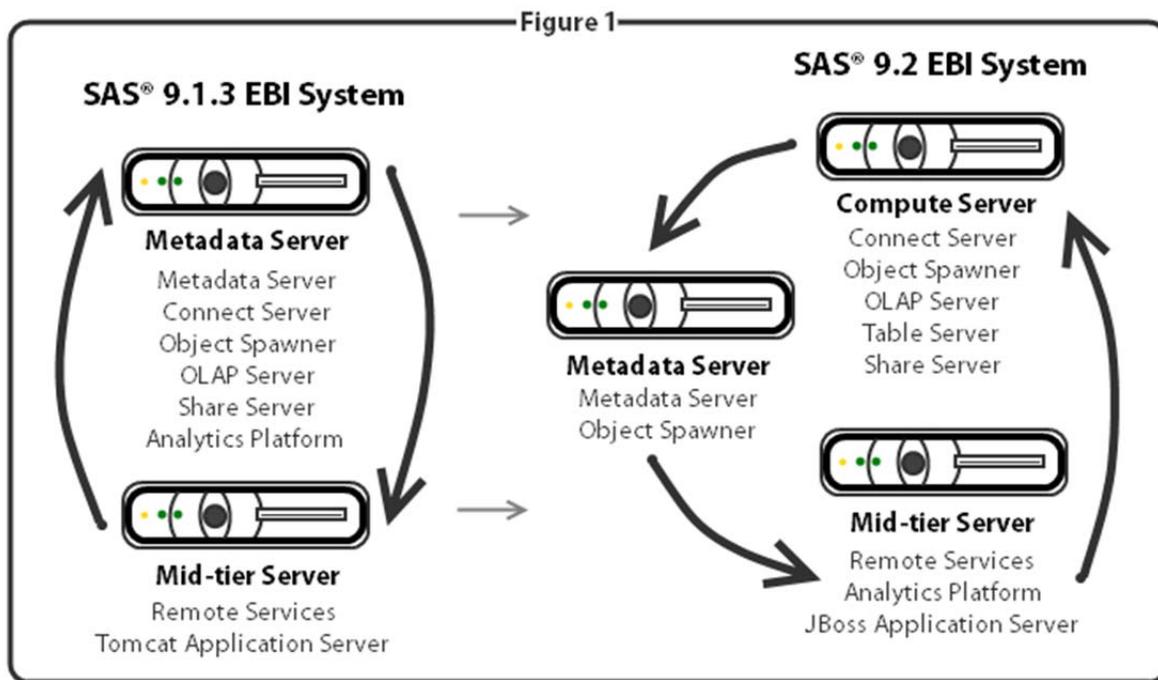
- The Metadata Server has a Dual-Core Intel 3.00 GHz Xeon x7350 processor, 8 GB of memory and a 100 GB of allotted hard drive storage space.
- The Compute Server has two Six-Core Intel 2.93 GHz Xeon x5670 processors, 48 GB of memory and a 1.5 TB, 15,000 rpm internal hard drive.

- The Mid-tier Server has two Dual-Core Intel 3.00 GHz Xeon x7350 processors, 16 GB of memory and a 200GB of allotted hard drive storage space. JBoss is used as the application server on the Mid-tier Server.

IR's new system architecture could handle 450 total users and approximately 10 GB of working data volume. The average user concurrency on the 9.2 system was anticipated to be 6 users.

### MIGRATION OR PROMOTION?

Once your organization ensures the 9.2 EBI architecture will support the anticipated number of users and data volume, you should determine whether a migration or promotion most appropriately fits the architecture of your current and future BI system. A migration is most appropriate when organizations want to preserve all the content from the original system including metadata, permissions, cubes and Stored Processes. Using the SAS Migration Utility to create a migration package, almost all 9.1.3 EBI content is migrated during the installation of the 9.2 software. Unfortunately, a migration is constrained by topology changes and operating system changes (please note that a migration package supports the move from a 32-bit Windows operating system to a 64-bit Windows operating system). A promotion can also transfer 9.1.3 content, but a promotion moves the content in pieces. Promotions are not constrained by topology changes or operating systems changes. **Figure 1** shows the enhancement in WKU's system architecture, along with the Windows services running on each server.



With an addition to the EBI topology, IR chose to promote (rather than migrate) the 9.1.3 content from the original two-tiered environment to the new three-tiered environment. The 9.1.3 EBI system would continue to serve as the production environment until the 9.2 production system was complete.

### PRE-INSTALLATION/MIGRATION CHECKLIST

Completing the pre-installation/migration checklist ensures both the 9.1.3 and 9.2 systems are ready for the migration (or promotion in IR's case). This checklist also brings light to overlooked tasks, such as backing up the 9.1.3 system and port configuration on each of the 9.2 tiers. IR heavily relied on WKU's Information Technology department to configure the new servers to exist on the same subnet, behind the university firewall. This configuration allowed SAS web applications to communicate via multicasting.

IR faced a small obstacle well into the installation and promotion of the 9.2 servers that could have been prevented with a completed pre-installation checklist. As a starting point, IR and IT decided to configure

the 9.2 ports the same as the 9.1.3 configuration. Even though this approach accounted for most of the required ports, additional ports, such as the ports associated with Enterprise Miner 6.1, were left closed. This small mishap was overlooked during validation because IR tested Enterprise Miner 6.1 on the server, which was already behind the university firewall. As a result, end users received an error message saying, "RMI registry could not be found". This problem was circumvented after IT opened the additional EM ports, which, by default, are 6411, 6421, 6471 and 6481.

## **DEFINE USER ACCOUNTS**

SAS defines two types of user accounts that are associated with a SAS deployment: Internal and External. Internal users are defined as users only known internally to SAS and include the SAS Administrator and SAS Trusted User. Internal accounts are created during the execution of the installation. External users are defined in the server operating system or through a network directory. A list of the internal and external users and their respective permission requirements can be found in the SAS 9.2 Intelligence Platform Installation and Configuration Guide.

## **CREATE A SAS 9.2 SOFTWARE DEPOT**

A SAS Software Depot is a centralized compilation of installation files used by the SAS Deployment Wizard during the installation process. The Software Depot should be downloaded to a network drive visible to all servers in your SAS topology. If your organization has downloaded SAS 9.2 EBI Maintenance 2 and is planning on downloading Maintenance 3, be sure to download Maintenance 3 directly into the Maintenance 2 SAS Software Depot. This will prevent redundant files from being downloaded.

## **INSTALL THIRD-PARTY SOFTWARE**

A variety of third-party products are required for the SAS 9.2 EBI installation including JUnit, Platform Suite for SAS, JDK, JRE, OpenSSL, and JBoss. The installation of these third-party products is straightforward. Essentially, these products are placed on the local hard drive of each SAS server and the SAS Deployment Wizard utilizes these products during the installation. The installers role, as it concerns with third-party products, is to direct the SAS Deployment Wizard to the location of each product.

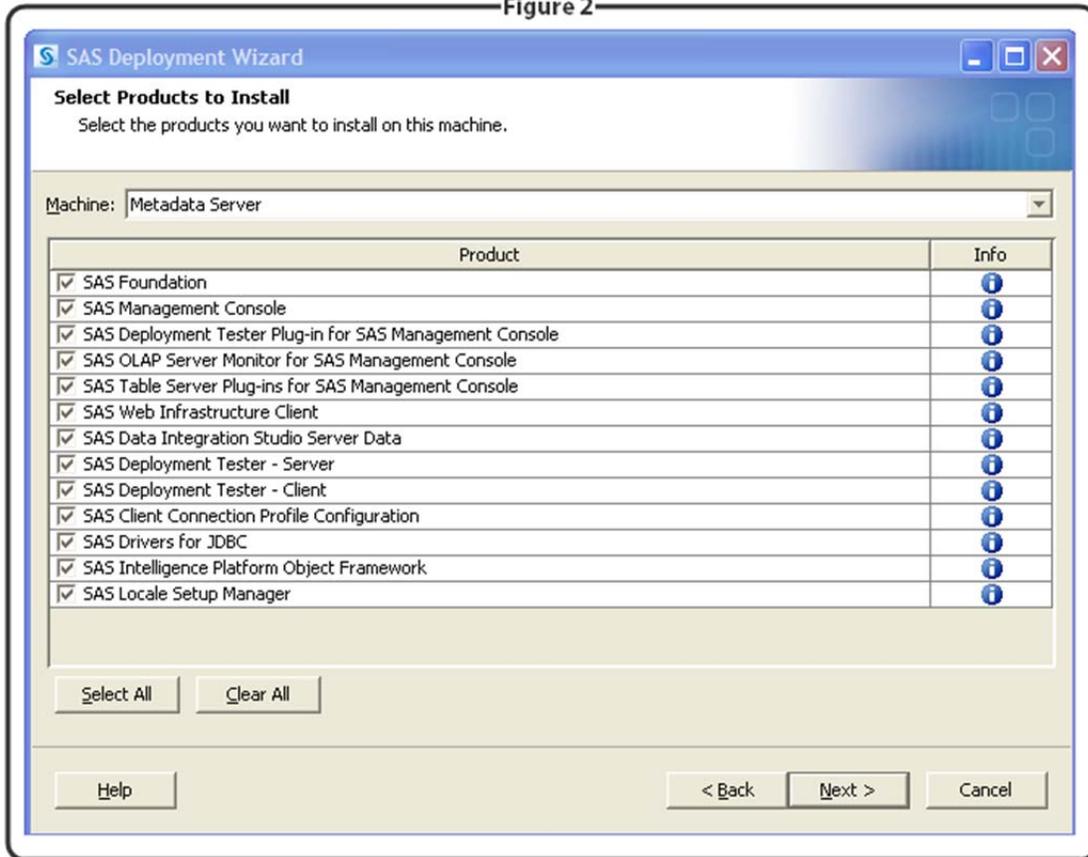
With the preparation completed, the execution of the installation and promotion comes to the forefront. Because the execution of the installation and promotion heavily relies on the groundwork set during the preparation, do not overlook any of the preparation items. Before beginning the SAS 9.2 EBI Server installation, it is also important to backup the 9.1.3 system.

## **EXECUTION**

### **INSTALLATION**

IR began the installation on the Metadata Server by launching the setup executable file in the SAS 9.2 Software Depot. Please note that during a multi-tiered installation, you should follow the server installation order listed in the SAS Intelligence Platform 9.1.3 to 9.2 Migration Guide. IR chose to perform a planned deployment and had the deployment wizard install and configure SAS software during the interactive installation process. Next, IR selected the "EBI EDI EG, four machine, JBoss" standard deployment plan. The four machines included in this setup are the Metadata Server, Compute Server, Mid-tier Server and Clients. **Figure 2** displays the next step in the interactive installation process. The machine entitled "Metadata Server" was selected since we began the installation on this server.

Figure 2



The subsequent screen required IR to point the installation wizard to a valid SAS Installation Data File (SID) which should come in the software depot. Before continuing on with the installation, IR was asked to select the configuration prompting level of the interactive installation. The three prompting levels are express, typical and custom, ranging from minimal prompts to all installation prompts, respectively. Under the tutelage of a SAS consultant, IR chose the typical prompting level. The remaining prompts asked for items such as the configuration directory, administrative passwords and e-mail server information. IR followed the Metadata Server installation with the Compute Server, then the Mid-tier Server and finally the Clients.

### SECURE SOCKET LAYER (SSL)

A vital web technology used on the Mid-tier Server is one-way SSL. SSL is an encryption protocol that provides security between the server and client. Deploying one-way SSL with JBoss can be problematic for first time installers. IR followed these basic instructions:

- Create a keystore using the keytool included with OpenSSL.
- Generate a CSR file (ir.web.com.csr) using your newly created keystore.
- Submit your CSR file to the certificate authority of your choice, IR chose Thawte.
- After receiving your organizations certificate (ir.web.com.cer), make a backup copy of your certificate.
- Download and install the root certificate of your certificate authority into your keystore (TrustedRoot.cer). (Please note that this is different from your organizations certificate)
- Install your organizations primary certificate (ir.web.com.cer) into your keystore.
- Add the keystore into your JBoss SASServer1 configuration directory.
- Add the SSL connector information into server.xml in your JBoss Server directory and restart JBoss.

Once the SSL certificate has been correctly installed in JBoss , several changes must be made to the SAS infrastructure to incorporate these changes. By default, SAS is installed using the HyperText

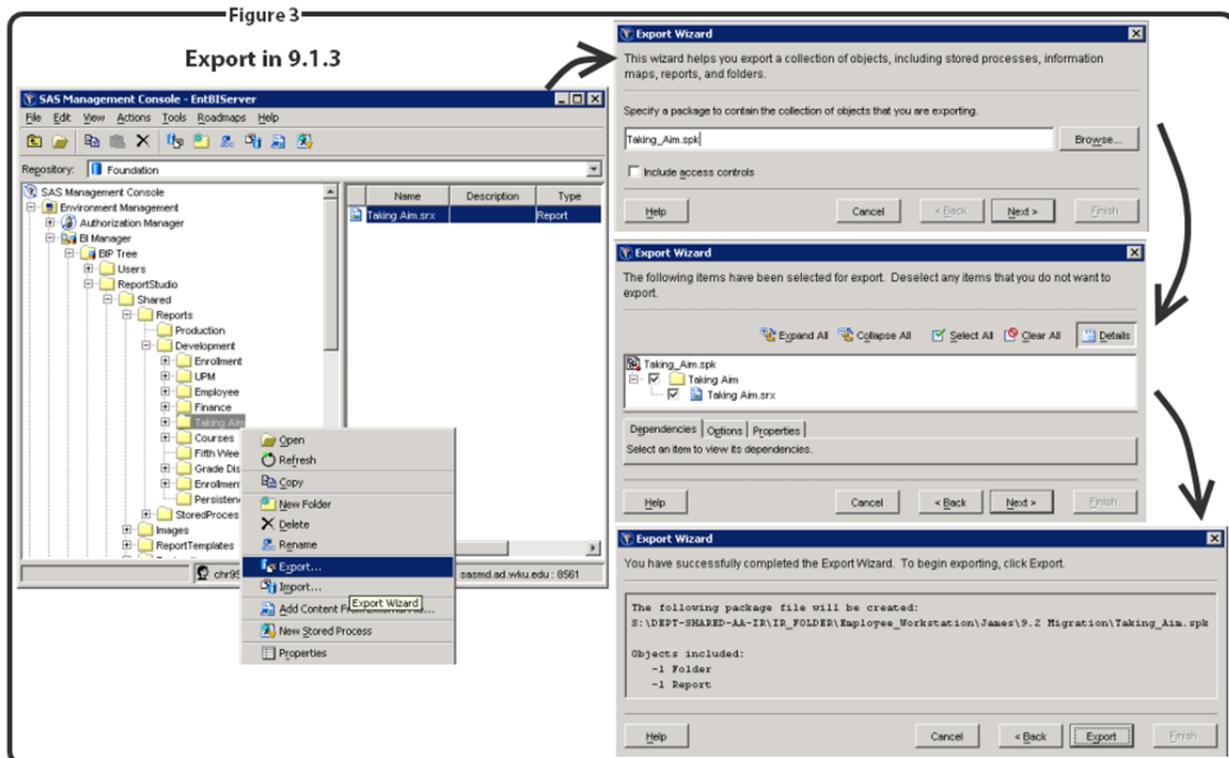
Transfer Protocol (HTTP) on port 8080. Therefore, the SAS infrastructure, including the web applications, points to 8080 “out-of-the-box”. To change the SAS installation to use SSL over port 443, the Configuration Manager, SAS Content Server, Foundation Services Manger, Content Mapping and JBoss JVM parameters must be altered to reflect the SSL protocol and port.

## PROMOTION

Promoting the 9.1.3 content into the 9.2 system is done one “piece” at a time. Metadata associated with libraries, tables, information maps, stored processes, data explorations, jobs, reports, mining results, directories, external files and transformations can all be promoted using a SAS package file, similar to a package used in a migration. OLAP cubes, schemas and Information Delivery Portal content cannot be promoted with these package files, but they can be promoted using alternative methods.

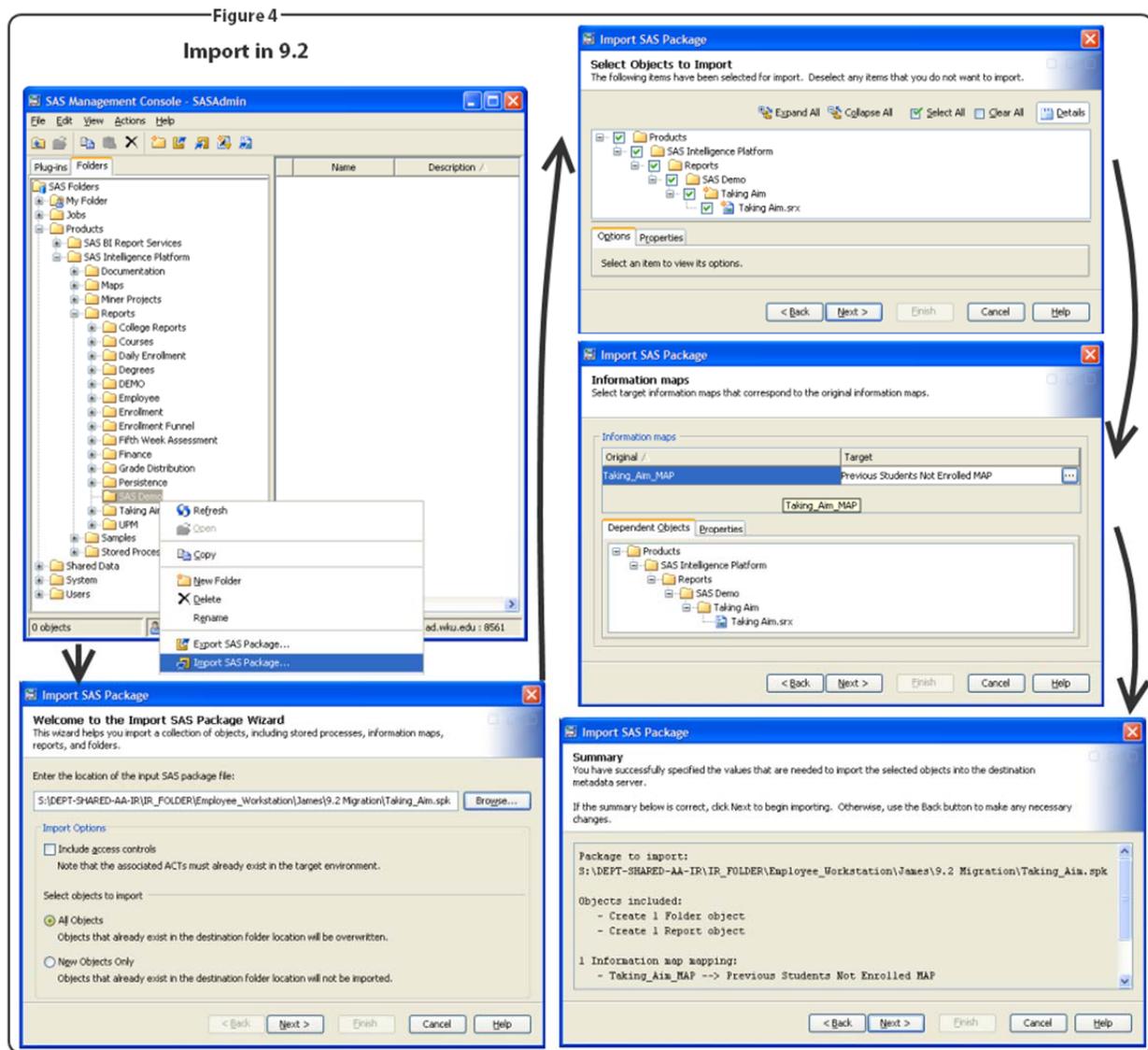
IR began the promotion process by creating separate promotion packages on the 9.1.3 system that included libraries and tables, Information Maps, directories and reports, Stored Processes and finally, jobs. Even though OLAP cubes cannot be promoted using packages, they can be promoted manually using Proc OLAP code in SAS Foundation. IR used OLAP Cube Studio 9.1 to individually export the Proc OLAP code of each cube. In the Proc OLAP code, IR updated the destination of the physical cube, the Metadata Server credentials and the OLAP schema in the SAS code to match the 9.2 specifications.

IR continued the promotion process on the 9.2 EBI Server where promotion packages were systematically imported. Because of dependencies on metadata objects, IR promoted the metadata objects in the following order: libraries and tables, OLAP Cubes, Information Maps, directories and reports, Stored Processes and jobs. **Figure 3** shows the process IR followed to create a promotion package composed of a directory and report in 9.1.3.



Once the promotion package is created in 9.1.3, the administrator can import the promotion package in the 9.2 system. As you see from **Figure 3** above, IR chose not to include access controls in the promotion package. IR decided early in the planning process to re-configure their Access Control Templates in 9.2.

Below, **Figure 4** demonstrates the process of importing the 9.1.3 promotion package in the 9.2 system. Because of metadata dependencies on this report, the Import SAS Package Wizard asks for the Information Map that corresponds to this particular report.



## VALIDATION

The last step in an installation and promotion is validating the 9.2 environment. The system administrator should validate the SAS servers and client programs. Validating the 9.2 environment will help administrators discover errors that may have been overlooked during the installation or promotion. For the full list of validation steps for your 9.2 EBI environment, refer to SAS Intelligence Platform: 9.1.3 to 9.2 Migration Guide.

IR exposed an error during the validation stage. IR's test Stored Process received an error saying, "User does not have appropriate authorization level for library". The user that instantiated the Stored Process had read/write authorization to the library, therefore SAS Technical Support believed the error occurred because of the SAS Spawmed Servers account, typically named sassrv. The SAS Spawmed Servers account is set up as an external account on the Compute Server, where the Stored Process Server resides. However, IR's data exists on a network drive, not locally on the Compute Server. Because Stored Processes run under the SAS Spawmed Servers account, that account must also have access to

the libraries on the network drive. To get around this problem, IR and IT setup a new user in LDAP/Active Directory that would possess the rights necessary to read and write to the university network drive and start the Stored Process Server.

## CONCLUSION

The Office of Institutional Research was able to successfully install the SAS 9.2 EBI Server in a multi-tiered environment. IR was then able to promote metadata from the 9.1.3 system to the new 9.2 system. The success of the installation and promotion can be attributed to careful planning, a wonderful IT department, SAS Technical Support and a knowledgeable SAS consultant.

## REFERENCES

SAS Institute Inc. 2009. *SAS Intelligence Platform: 9.1.3 to 9.2 Migration Guide*, First Edition. Cary, NC: SAS Institute Inc.

SAS Institute Inc. 2009. *SAS 9.2 Intelligence Platform: Installation and Configuration Guide*, NC: SAS Institute Inc.

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