

Lawson S3 on IBM PowerHA for i



IBM Systems & Technology Group

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1. Introduction

The IBM i™ and its predecessors, the iSeries® and AS/400®, are known for their legendary reliability. However, one computer system may no longer be sufficient in providing the level of availability required in today's demanding business environment. As companies continue to increase their reliance on computer systems as well as the mission critical data that these systems store and process, system availability is of utmost importance. Companies must prepare for both unplanned outages resulting from disasters or other unforeseen circumstances and planned outages due to regularly scheduled maintenance or other planned activities. Regardless of whether the outage is planned or unplanned, companies must be prepared to handle any outage and keep downtime to a minimum.

A high availability solution can include elements of data resiliency, device resiliency, and application resiliency and allow you to meet requirements for handling both planned and unplanned outages. This paper focuses on the use of POWERHA® for i and, more specifically, the Solution Based GUI in simplifying the implementation of a cross-site mirroring with geographic mirroring solution for Lawson S3 environments on IBM i. Even though we chose to focus on cross-site mirroring with geographic mirroring, this paper also describes other solution options that are available.

Since there are many possible high availability solutions to choose from, and likely only one is the right one for you, we strongly recommend that you work with a service provider or someone with high availability experience to plan and implement your high availability solution. This report refers numerous times to the following Redbook®, "*Implementing PowerHA for IBM i*". Redbook SG24-7405. It is recommended that you become familiar with this Redbook since it contains more details on topics discussed in this paper.

This report was written to show how to setup Lawson S3 in a PowerHA environment which utilizes an independent auxiliary storage pool or iASP. Starting with LSF 9.0.1.7, and IBM i 7.1, support has been added to allow Lawson System Foundation ("LSF") to be directly installed into an iASP. In addition, support was added to apply fixes and perform function like upgrades on installations that reside on an iASP. Older versions of LSF do not support iASPs and Lawson only supports iASPs with LSF 9.0.1.7 on i 7.1 only.

2. High Availability Overview

High Availability is a term commonly used to describe approaches involving both hardware and software technologies that are employed, often in combination, in an effort to reduce the number and duration of system outages. Outages can be one of two types:

- A planned outage that would be done for an even such as an upgrade or some sort of maintenance.
- An unplanned outage which can be the result of a hardware, power, or network failure.

By implementing a High Availability solution that meets your particular needs for both planned and unplanned outages, you can minimize or eliminate down time and ensure the system is available when you need it.

The core of any High Availability solution is maintaining either a second copy or a switchable set of objects. This can be done with:

- Logical replication
- Hardware replication

Both replication options are explained further in the below section. This paper will focus on the hardware replication side, but we also mention logical replication so you are aware of options that are available. For more details on the options described in this section, please refer to Redbook SG24-7405 "Implementing PowerHA for IBM i."

2.1 Independent Auxiliary Storage Pools

An Independent Auxiliary Storage Pool, or iASP, is an auxiliary storage pool (ASP) that can be located on internal or external storage and be brought online or taken offline independent of system data or other ASPs. An ASP is a collection of disks grouped together logically. To your system an ASP looks like a single unit of storage. Switched disk and hardware replication solutions on the IBM i utilize iASPs.

2.2 Clusters

High Availability clusters are central to many High Availability solutions. A clustered environment is a collection of multiple redundant computer systems or logical partitions configured in what is commonly referred to as a cluster. Each system or partition in a cluster is called a cluster node. These cluster nodes function as a distributed computing system that enables critical resources on the production system, such as data, devices, and environment attributes to automatically be available on one or more backup systems if the production system is not available. IBM i cluster technology provides the underpinnings and mechanisms that make switched disk and hardware replication solutions possible.

Clusters can be simple, consisting of only two nodes, or very complex with a large number of nodes. IBM i clustering provides the necessary tools to configure, monitor, and manage a clustered environment. For more information on IBM i clustering technology refer to Redbook SG24-7405, "Implementing PowerHA for IBM i".

2.3 Administrative Domain

An administrative domain provides a mechanism to maintain a consistent operational environment across the defined cluster nodes. It ensures that highly available applications and data function as expected when a failure occurs or when you manually switch over to a backup node. In a High Availability environment, you must ensure that the operational environment is identical on every system where the application can run, or where the application data resides. If you change configuration parameters or data on one system, that same change has to be replicated to all the other systems.

A cluster administrative domain provides you with the mechanisms to identify resources that need to be maintained consistently across the systems in your High Availability environment. In addition, the cluster administrative domain also monitors for changes to these specified resources and then keeps these changes synchronized across the active domain.

2.4 Switched disk

A switched disk configuration utilizes disks that can be switched between different nodes in a High Availability cluster. Switched disk can be used to create a simple and cost effective High Availability solution for planned and some unplanned outages. In a switch disk environment, only one copy of the data exists. Because there is only one copy of the data, performance is not impacted by data synchronization.

In a switched disk environment, the distance between the production and backup system is limited by the physical length of the cables used to connect the systems. The maximum distance recommended is fifteen meters. In addition to using iASPs, switched disk requires IBM i high availability cluster technology. The cluster technology is shipped with operating system option 41 “HA Switchable Resources”. An iASP must be configured as part of a High Availability cluster in order to be switchable.

2.5 Hardware replication

Cross-site mirroring is a collective term used for High Availability solutions based on hardware replication. With hardware replication a copy of the production data is mirrored to a backup system, so two or more copies of the data will exist. The three variations of cross-site mirroring supported on the IBM i include: geographic mirror, metro mirror, and global mirror.

2.5.1 Geographic mirror

Geographic mirror utilizes page level mirroring performed at the operating system level. An exact copy of the production data is maintained on a backup system by utilizing synchronous mirroring. Synchronous mirroring means that the source system waits until acknowledgement from the target system that the data has been received. Synchronous mirroring keeps the data consistent and prevents data loss.

Geographic mirror allows for production and mirrored copies to be separated geographically. This offers protection in the event of a site-wide outage. However, because of synchronous communication, longer distances may impact performance and require more communication bandwidth.

Both HA switchable resources (option 41 of the operating system) and iASPs are required for a geographic mirror solution. An external storage server is optional.

2.5.2 Metro mirror

Metro mirror is similar to geographic mirror except metro mirror utilizes disk sector level mirroring performed by an external storage server. In a metro mirror environment the mirroring is synchronous preventing data loss between the production and backup system. Production data and backup data can be located on the same external storage server or on different external storage servers separated geographically. With separate storage servers the production and backup storage servers can be located up to 300 kilometers away. However, because of synchronous communication, longer distances may impact performance and/or require more communication bandwidth.

External storage servers, HA switchable resources (option 41 of the operating system), and iASPs are required for a metro mirror solution.

2.5.3 Global mirror

Global mirror utilizes disk I/O level mirroring between external storage servers. The mirroring is asynchronous, meaning that the source system does not wait for acknowledgement from the target system that data has been received. Depending on the distance between the storage servers this means that the data on the backup system might lag the data on the production system by a few seconds. This allows the production and the backup server to be separated by virtually unlimited distances with no impact to application performance.

External storage servers, HA switchable resources (option 41 of the operating system) and iASPs are required for a global mirror solution.

2.6 Logical replication

Logical replication utilizes object based replication performed at the middleware or application level. For journaled objects, the data is replicated to a backup system by applying journal changes to the backup data. For non-journaled objects, the objects are saved and then written to the backup system.

Since logical replication is performed at the object level it is possible to be more selective with data and object replication, which may reduce network traffic. The replication process can be synchronous to prevent data lag or asynchronous allowing virtually unlimited distance between production and backup systems.

Logical replication environments can be implemented using internal storage or external storage servers. Independent ASPs are not required for logical replication solutions. Products that provide logical replication services are provided by IBM ® and independent software vendor (ISV) products. For more information about logical replication products see:

- IBM DataMirror (www.datamirror.com)
- noMax (www.maximumavailability.com)
- Trader's (www.quick-edd.com/uk/index_uk.htm)
- Vision Solutions (www.visionsolutions.com)

3. PowerHA

PowerHA for i, previously known as the High Availability Solutions Manager (HASM), is a licensed program product that provides simplified configuration and management for High Availability solutions on the IBM i operating system. Combined with High Availability switchable resources (option 41 of the operating system) and iASPs, PowerHA for i enables a complete end-to-end hardware based clustering solution for High Availability and disaster recovery. PowerHA for i allows system administrators to configure and manage their High Availability solution using one of two Web-based interfaces:

- Cluster Resource Services GUI or Task Based GUI
- High Availability Solutions Manager GUI or Solution Based GUI

3.1 PowerHA Tasked Based GUI

The Cluster Resource Services graphical interface or Task based GUI lets IBM i Administrators perform tasks with IBM i High Availability technologies, such as working with clusters, Cluster Resource Group (CRG), Device Domain, Cluster Administrative Domain to configure their High Availability solution and manage it by performing planned switchovers

Note: This paper will focus on the Solution Based GUI. The Task Based GUI is being mentioned here to make sure you are aware that there are other ways to create and maintain a high availability solution.

3.2 PowerHA Solution Based GUI (HASM)

PowerHA for i provides a solution-based approach for customers willing to implement a High Availability environment by selecting one of 4 solutions proposed:

- Switched disk between logical partitions
- Switched disk between systems
- Switched disk with geographic mirroring
- Cross-site mirroring with geographic mirroring

The graphical interface option, called “High Availability Solutions Manager” or Solution-based GUI available from IBM Systems Director for i5/OS, allows administrators to select and configure one of the pre-defined High Availability and/or Disaster Recovery solutions which are based on i5/OS® high availability technologies, such as independent disk pools and clusters. All the hardware requirements must be in place to allow the creation of the new high availability solution environment.

As soon as the solution has been set up, the IBM i Administrators will be able to manage their new High Availability environment from both GUI interfaces. The Solution-based GUI guides users through the process of selecting, configuring, and managing a High Availability solution. The user must complete each step before continuing to subsequent steps. When PowerHA for i is installed, you can access the Solution-based GUI in the IBM Systems Director Navigator for i5/OS.

4. Lawson S3 Applications in an iASP

This section lists the objects and applications that were put into the iASP. It also lists objects that remained in the system ASP or SYSBAS.

4.1 Objects migrated to the iASP

The following Lawson S3 components were moved into the independent auxiliary storage pool or iASP:

- LSF environment database
- LSF GEN database
- LSF IOS database
- LSF IFS directories
- LSF Application database
- LSF Program and Source libraries
- HTTP configuration and log files
- WebSphere® Application Server profile directories

4.2 Objects remaining in SYSBAS

The following objects remained in SYSBAS:

- Lawson objects in library QGPL

Note: The Lawson objects in QGPL include objects that must remain on SYSBAS. It also contains service programs that could have been put in a separate library and moved to an iASP, but this was not done for this exercise. As a result, all Lawson objects in QGPL needed to be duplicated on the backup system.

5. Creating the High Availability Environment and Migrating Data using HASM

The Power HA for i Solution Based GUI, also referred to as HASM, can be used to simplify the implementation of geographic mirroring in a Lawson S3 environment. Use of HASM automates many of the steps required to implement a geographic mirroring high availability solution and to migrate data for applications to an iASP. Before you begin implementing any High Availability solution, ensure accurate planning is done and that the solution you are choosing is the best option for you. In addition you may want to consult your business partner to help determine the solution that best fits your requirements.

Note: Given that we will be installing Lawson S3 after the PowerHA environment is setup as the basis for preparing this paper, we did not migrate any libraries, user profiles, or directories.

There are 5 steps when using a HASM that must be completed in order to setup a High Availability environment. Each of these steps is explained in more details in this section. There are many potential high availability solutions but only one is right for you. Even though we choose to implement Cross-Site-Mirroring with Geographic Mirroring for this paper, that does not mean that this type of implementation will be the best solution for you. Please research each of the four solutions HASM provides and then decide which is best for you.

For more details on HASM or any of these steps please refer to Redbook SG24-7405 "Implementing PowerHA for IBM i".

5.1 See how IBM High Availability solutions work

To start, log onto IBM Systems Director Navigator for i5/OS using a web browser connecting to port 2001 on the target system.

- <http://mysystem:2001>.

Then select the High Availability Solutions Manager Menu. See Figure 1 below.

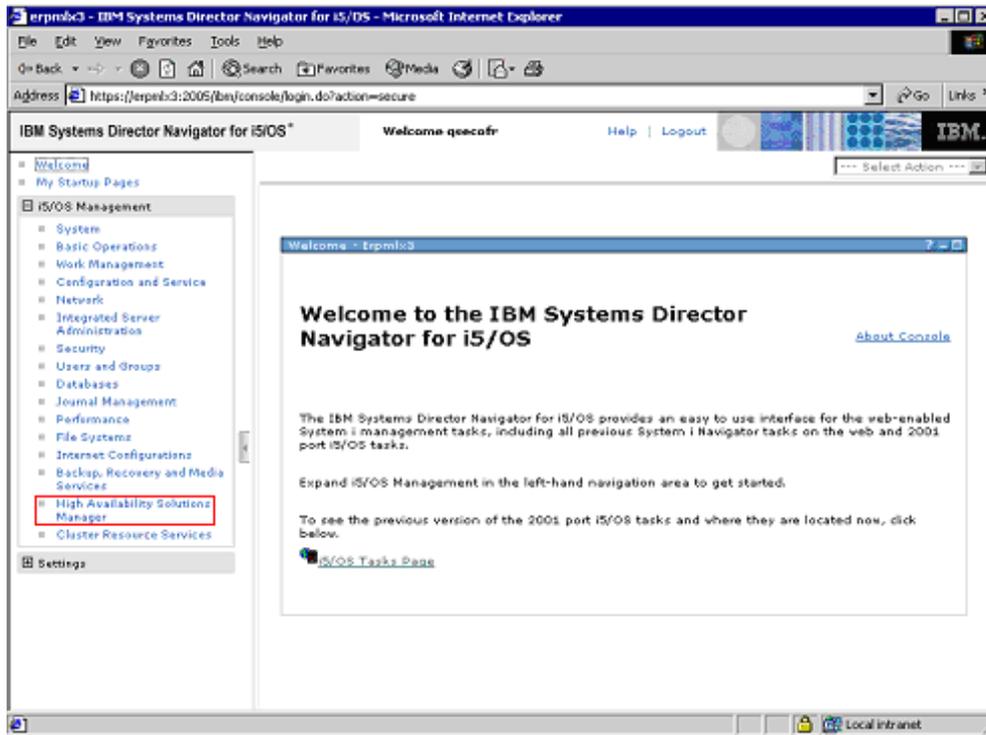


Figure 1. IBM Systems Director Navigator

The first step in HASM is to ensure that you understand how each of the potential High Availability solutions work. The solution-based GUI provides a flash demo with details on each of the potential solutions. It is highly recommended that you watch this demo. See Figure 2 below.

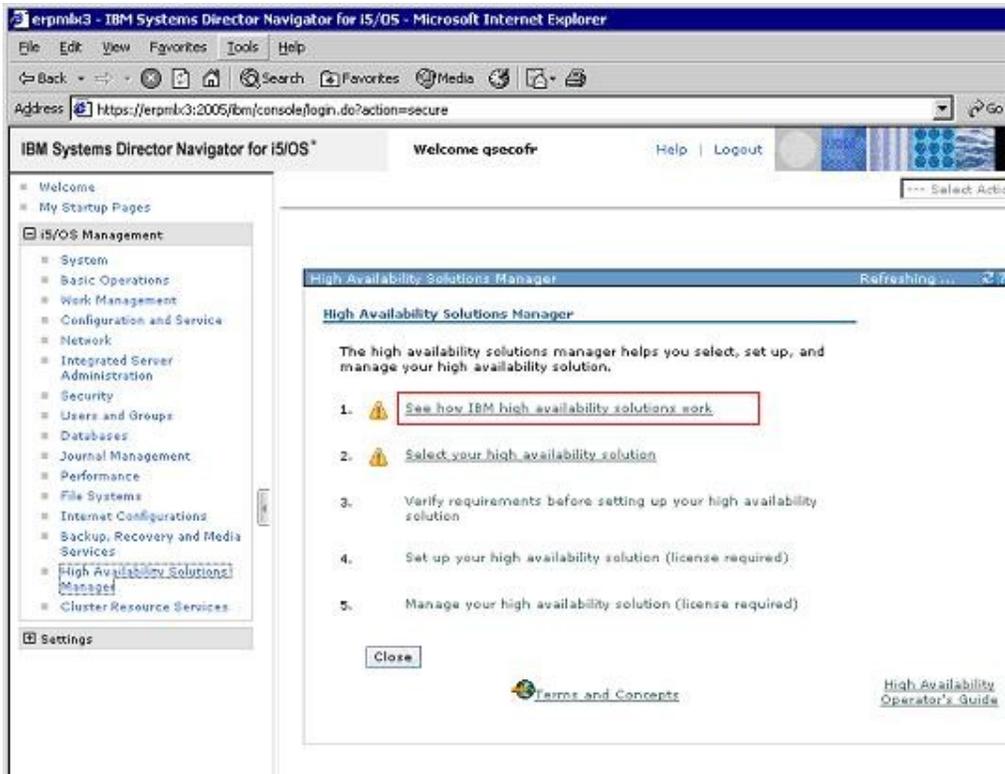


Figure 2. Solution Based GUI step1, see how IBM high availability solutions work

5.1.1 Select your high availability solution

The next step is to choose the High Availability solution you want. Again, we chose “Cross-Site-Mirroring with Geographic Mirroring” as the solution we used, but that may not be the best solution for you. See, Figure 3 and Figure 4 below.

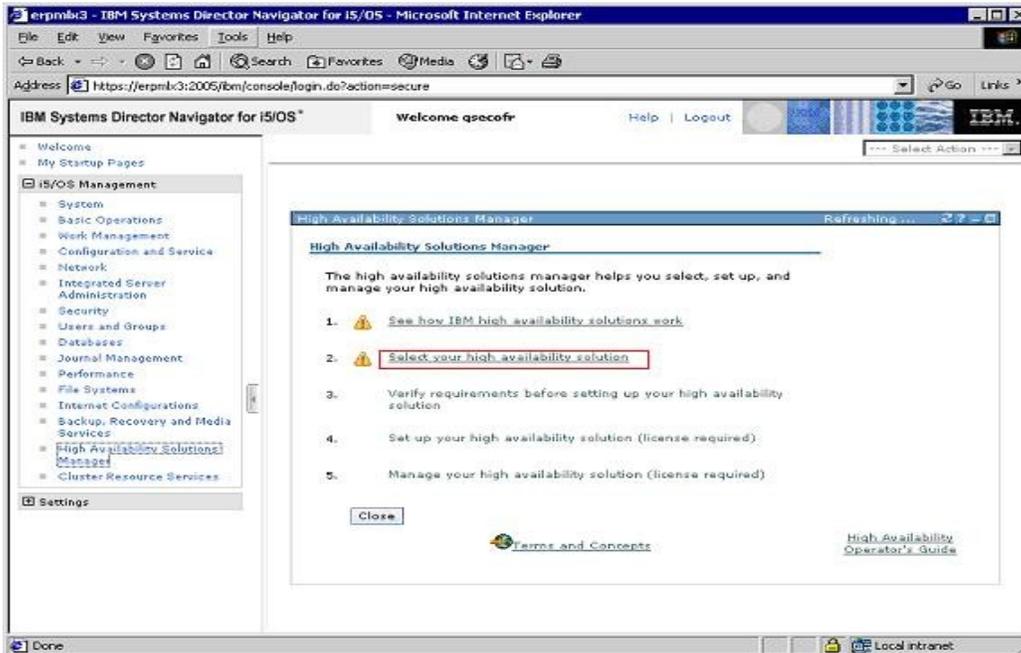


Figure 3. Solution-Based GUI. Step 2, select the appropriate High Availability solution

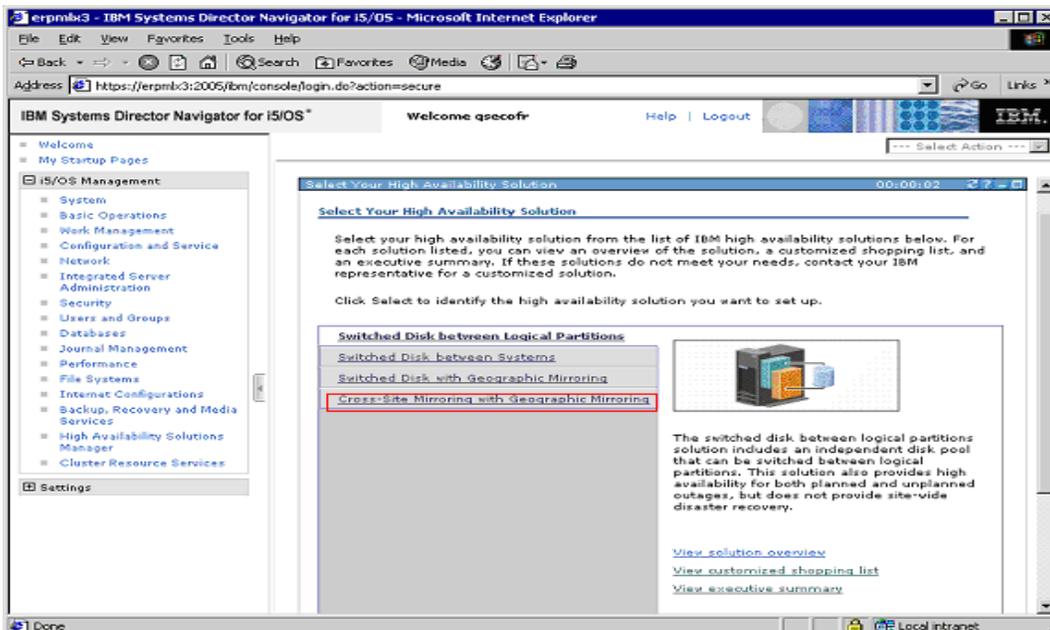


Figure 4. Select High Availability Solution

5.1.2 Verify requirements before setting up your high availability solution

The next step is to verify requirements that need to be met in order to setup the High Availability solution you selected. During this step you will also need to provide information about the backup system you use, data ports to use, and the take over IP address to use. Below are the steps to complete this process:

1. Go to step 3, Verify Requirements, see Figure 5.

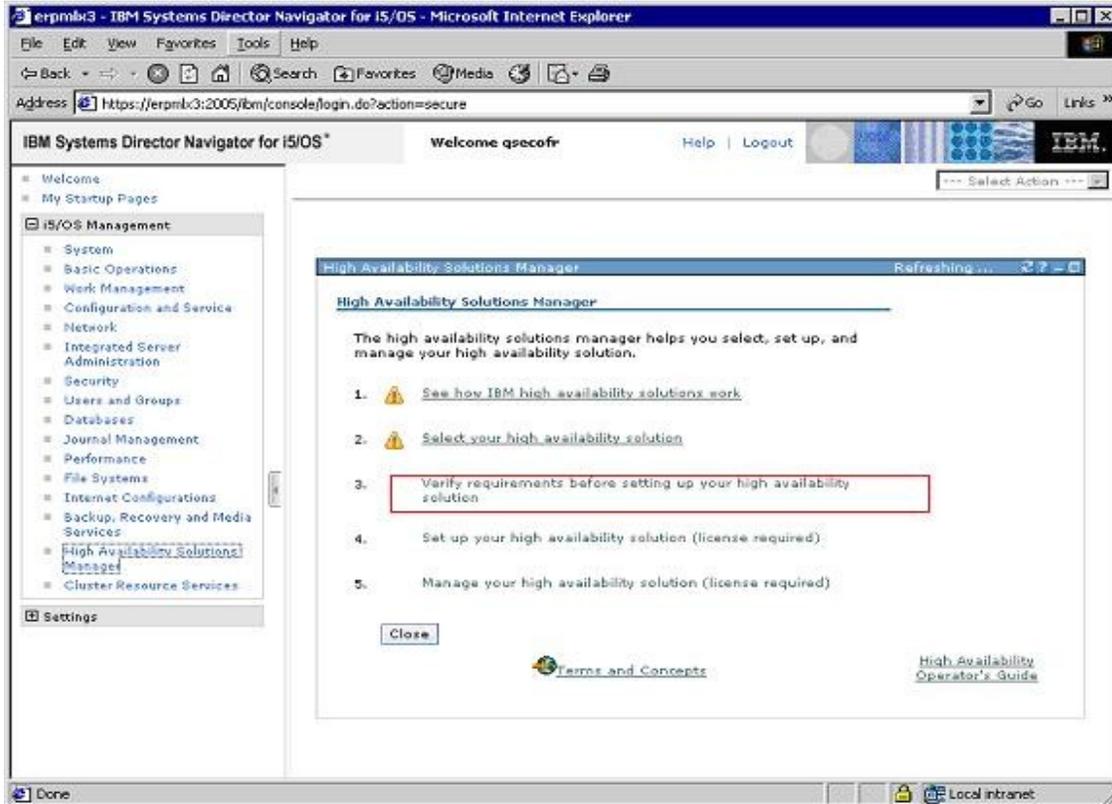


Figure 5. Solution-Based GUI. Step 3, Verify Requirements

- During the first phase of this third step, a list of requirements is generated. All requirements listed must be met before you are allowed to continue on to the fourth step and setup the High Availability solution. See Figure 6 below.

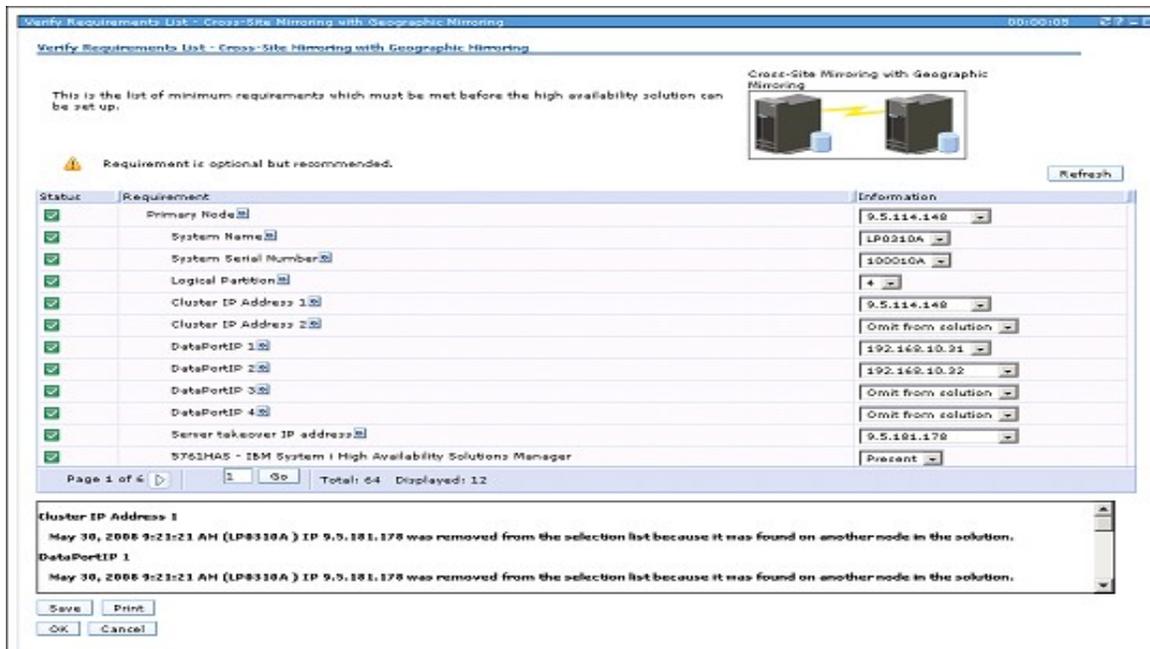


Figure 6. Verify Requirements

3. Ensure the following information is entered on the Verify Requirements screen, see Figure 7:

- Backup node name
- Enter any additional data port name.
- Enter Server Take Over IP Address.
- Any secondary ports.

Status	Requirement	Information
✓	Primary Node	9.5.114.148
✓	System Name	LP0310A
✓	System Serial Number	100010A
✓	Logical Partition	4
✓	Cluster IP Address 1	9.5.114.148
✓	Cluster IP Address 2	Omit from solution
✓	DataPortIP 1	192.168.10.31
✓	DataPortIP 2	192.168.10.32
✓	DataPortIP 3	Omit from solution
✓	DataPortIP 4	Omit from solution
✓	Server takeover IP address	9.5.181.178
✓	5761HAS - IBM System i High Availability Solutions Manager	Present

Page 1 of 5 1 Go Total: 59 Displayed: 12

Figure 7. Shopping List

5.1.3 Set up your High Availability solution

Now that all the requirements have been met, the next step is to set up the High Availability solution. This section includes the steps on how to migrate libraries, user profiles and directories to the iASP. The steps listed here show all of these items can be accomplished. However, since we will be installing Lawson S3 after the iASP, this paper will not address the issues of migrating libraries or setting up user profiles or directories.

Note: It is recommended that you do a backup of your system before starting this step. Up to this point in the process, changes have not been made to your system. Changes to the system, however, will begin with this step. Also, this step will be the longest and will likely take a significant time to complete.

1. Go to Step 4 , Set up your High Availability solution, see Figure 8

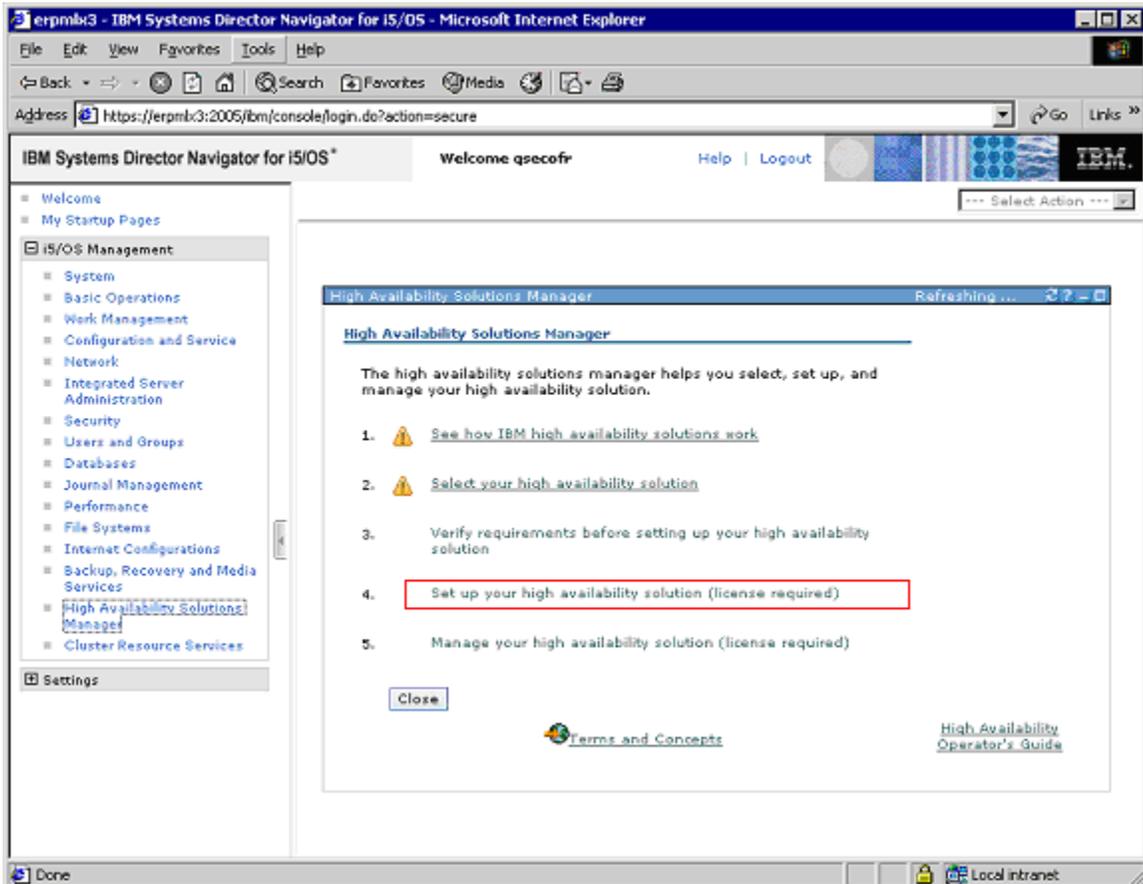


Figure 8. Solution-Based GUI. Step 4, set up your High Availability solution

- Setting up the High Availability solution consists of several sub-steps that can be completed one at a time. Follow the first 4 sub-steps as shown in Figure 9. These first four steps will create the iASPs, setup the cross-site mirroring between the two systems, and verify that a switch over can be done between the two systems.

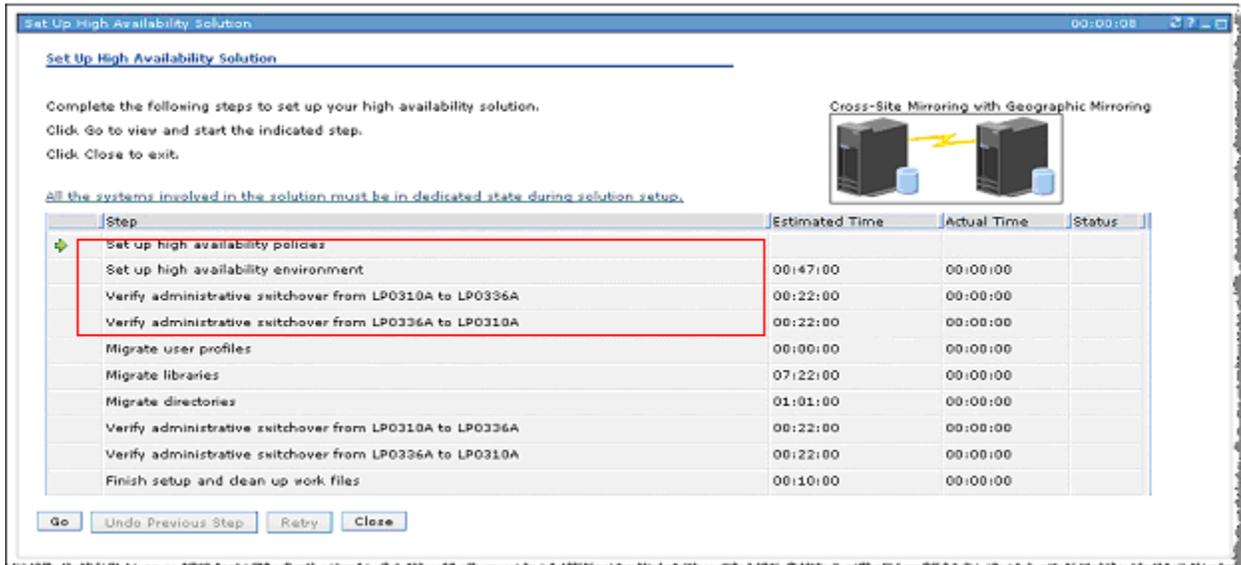


Figure 9. Steps to setup your High Availability solution

- Ensure the system value QRETVRSEC is set to 1 in order to allow user profiles to be migrated to the administrative domain. This can be done by running the command below.

- CHGSYSVAL SYSVAL(QRETSVRSEC) VALUE('1').

- Follow the next three sub-steps to migrate any the user profiles, directories, and databases to the iASP, see Figure 10.

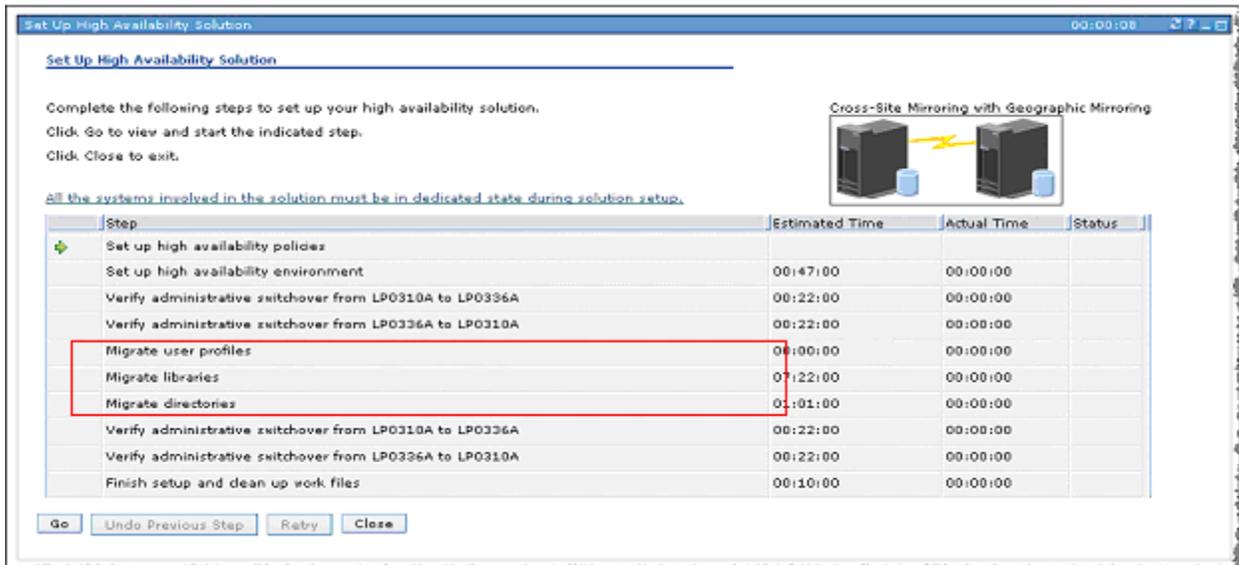


Figure 10. Migrate user profiles, libraries, and directories

- Finally, follow the last three sub-steps to verify that you can still do a switch over between both systems and then finish the setup, see Figure 11.

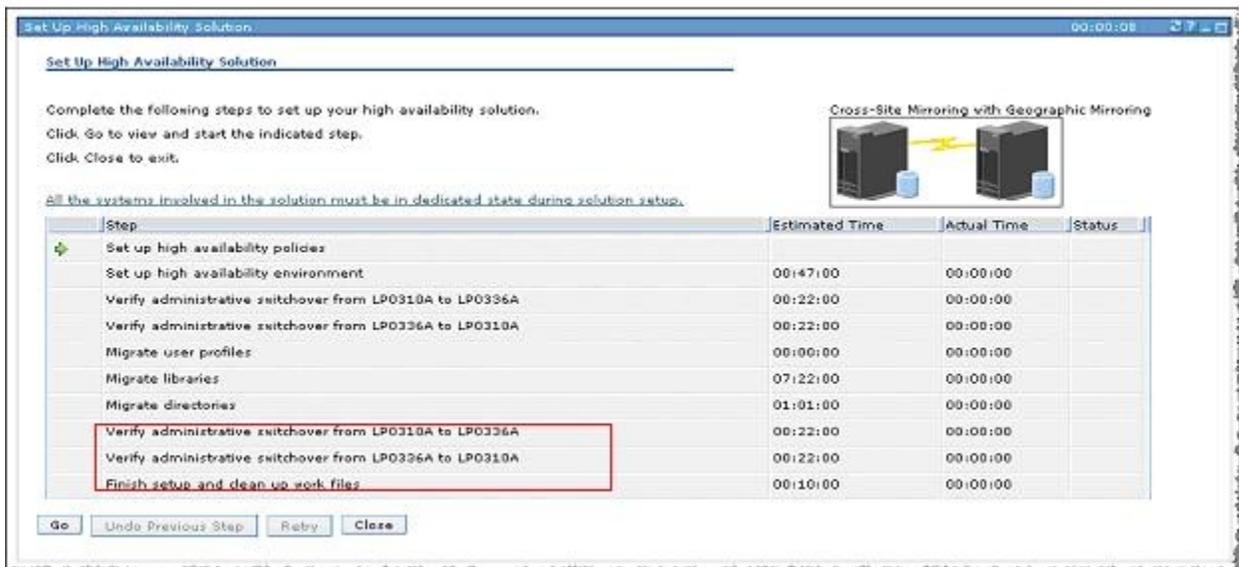


Figure 11. Verify Switchovers

5.1.4 Manage your high availability solution

HASM also provides a management function to monitor your High Availability solution. From the management page you can view the current status of your High Availability environment and perform tasks such as switch overs, shut down the High Availability environment, or resume the High Availability environment.

1. Select step 5, Manage your High Availability solution, see Figure 12.

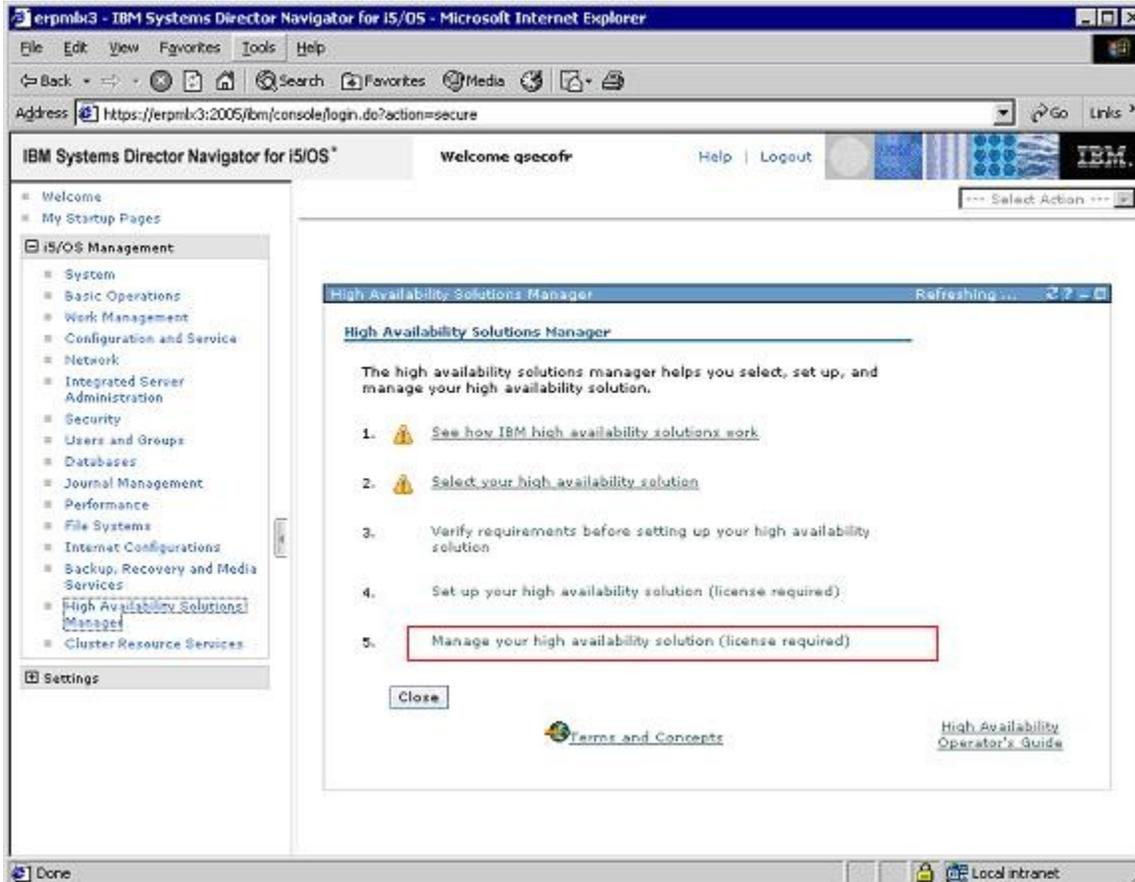


Figure 12. Solution-Based GUI. Step 5, manage your High Availability solution

2. Figure 13 shows the management page.

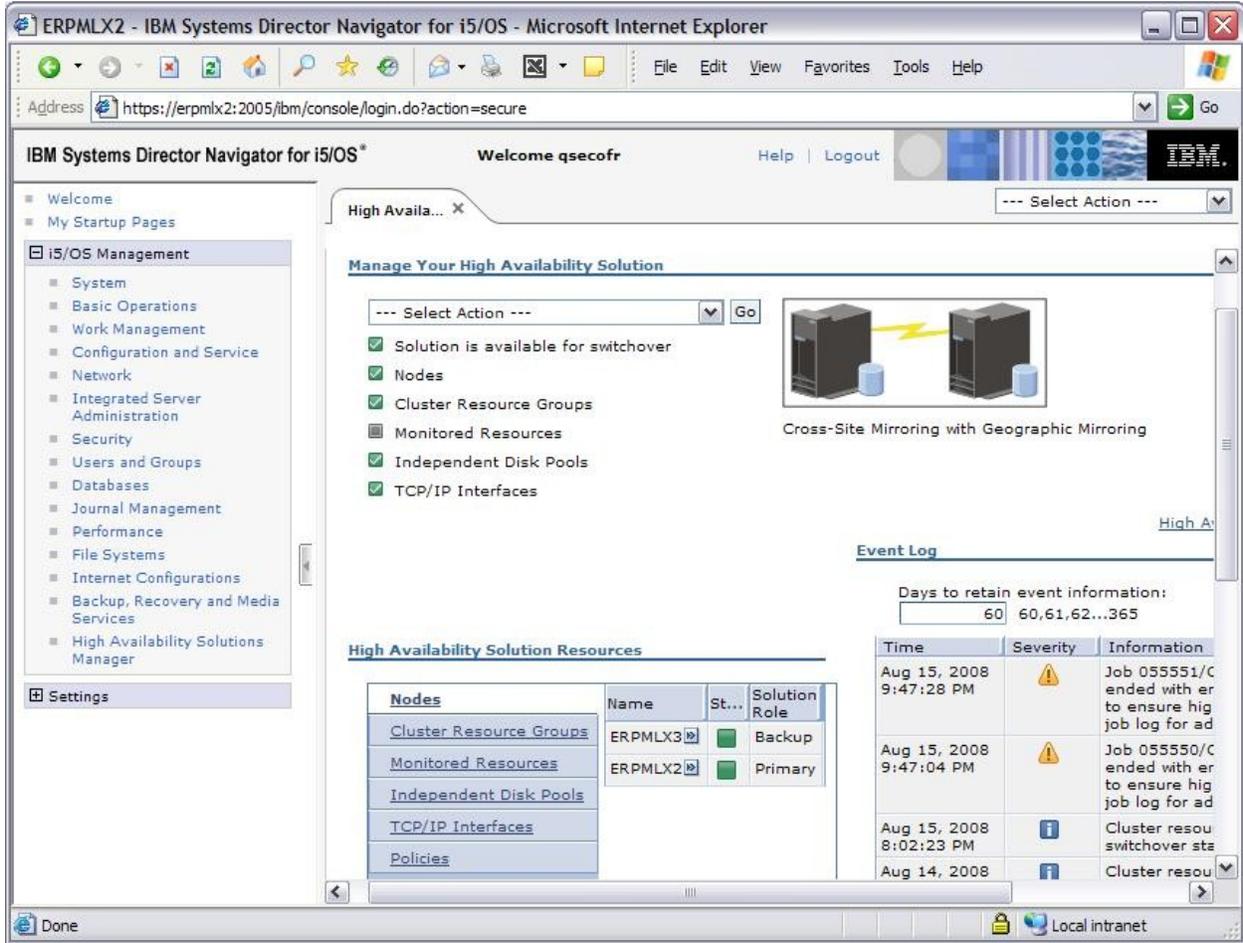


Figure 13. Using the Solution-Based GUI to manage your High Availability solution

6. Installing Lawson S3 into the iASP

This section outlines the steps that were done to install all required applications into the iASP and any additional configuration steps that were needed to be able to run the applications on an iASP. Applications that are included in this section are:

- Lawson System Foundation (“LSF”)
- LSF environment, GEN, and LOGAN databases
- LSF Applications
- Lawson Portal and WebSphere Application Server profile directories
- HTTP configuration and log files

6.1 LDAP

Prior to installing Lawson S3 it is recommended that you either (i) migrate an existing LDAP instance to the iASP or (ii) create a new instance on the iASP. The link below contains the steps to do this.

<http://publib.boulder.ibm.com/infocenter/iseres/v7r1m0/index.jsp?topic=/rzahy/rzahyiasp-rf.htm>

6.2 Installing WebSphere Application Server into a iASP

WebSphere® can be installed into an iASP as long as the steps below are followed. The recommended way to install WebSphere into an iASP is to (i) do the install on both the primary and backup system, (ii) leave the product dir on SYSBASE, and (iii) put the profile dir on the iASP. This section shows the steps necessary to complete this process.

Note: While the same set of steps below apply to both WebSphere 6.1 and WebSphere 7.0, some commands may only show one version of WebSphere, but either version of WebSphere can be used

6.2.1 Restrictions for running WebSphere under an iASP

To share the same UserData directory on an iASP, the following restrictions apply:

- I. The same prerequisite and optional software for WebSphere Application Server must be installed on both the primary and secondary systems.
- II. The names of the installation libraries for the WebSphere Application Server installations must be the same on both systems (i.e. WAS61A, WAS61B... etc).
- III. Maintenance of the WebSphere Application Server installations sharing the UserData directory must be completed in such a manner that both systems are kept at the same fix level.
- IV. The product default Java Virtual Machine (JVM) value must be the same for both primary and secondary installations. This should not be an issue if the primary and secondary systems have the same IBM Developer Kit for Java product options installed.

The most practical way to achieve the second restriction is to ensure that the installation of WebSphere Application Server 6.1 is the first step completed on each system. After installing, look in the <app_server_root>/properties/product.properties file to find the name of the installation library.

To determine the JVM that the WebSphere Application Server product installation is enabled for use, view the contents of file app_server_root/properties/product.properties:

- If was.use.j9=false, then the installation is enabled to use the "classic" JVM.
- If was.use.j9=true, then :
 - If was.j9.version=32bit, then the installation is enabled to use the "std32" JVM.
 - If was.j9.version=64bit, then the installation is enabled to use the "std64" JVM.

Use the enablejvm command to change the product default JVM.

6.2.2 Installing WebSphere on the primary system

The steps below show how to perform the install on the primary system. After performing these steps, you will have the product dir (ProdData) dir on SYSBAS and the profile dir (UserData) on the iASP.

- 1.) CD to the WAS dir on the WebSphere installation image
 - cd /QOPT/WEBSHERE/WAS
- 2.) Make a copy of the default response file into the dir of your choosing
 - cp /QOPT/WEBSHERE/WAS/responsefile.nd.txt /WAS61ND
- 3.) Edit the following option in the response file you created in Step 2
 - -OPT silentInstallLicenseAcceptance="true"
 - -OPT installLocation="/QIBM/ProdData/WebSphere/AppServer/V61/ND"
 - -OPT defaultProfileLocation="/MyIASP/QIBM/UserData/WebSphere/AppServer/V61/ND"
 - -OPT PROF_enableAdminSecurity="false"
 - -OPT PROF_omitAction=samplesInstallAndConfig
- 4.) Install WebSphere using the modified response file from Step 3
 - INSTALL -options /was61nd/responsefile.nd.txt

6.2.3 Installing WebSphere on the backup system

The steps below show how to perform the install on the backup system. After performing these steps you will have the product dir (ProdData) on SYSBAS and the profile dir (UserData) on the iASP.

- 1.) Ensure the iASP is available on the backup system.
- 2.) CD to the WAS dir on the WebSphere installation image
 - o `cd /QOPT/WEBSHERE/WAS`
- 3.) Make a copy of the default response file into the dir of your choosing
 - o `cp /QOPT/WEBSHERE/WAS/responsefile.nd.txt /WAS61ND`
- 4.) Edit the following option in the response file you created in Step 2
 - o `-OPT silentInstallLicenseAcceptance="true"`
 - o `-OPT installLocation="/QIBM/ProdData/WebSphere/AppServer/V61/ND"`
 - o `-OPT defaultProfileLocation="/MyIASP/QIBM/UserData/WebSphere/AppServer/V61/ND"`
 - o **`-OPT allowOverrideProfileLocation="true"`**
 - o **`-OPT profileType="none"`**
 - o `-OPT PROF_enableAdminSecurity="false"`
 - o `-OPT PROF_omitAction=samplesInstallAndConfig`
- 5.) Install WebSphere using the modified response file from Step 3
 - o `INSTALL -options /was61nd/responsefile.nd.txt`

Note: The two option identified in bold text above prevent the default profile from being created a second time. Remember that the default profile already exists on the iASP and was created when the install was done on the primary system.

6.2.4 Adding iASP group to WebSphere's job description

WebSphere will not be able to see libraries and databases on the iASP unless the job description that WebSphere 6.1 runs under is changed to set the iASP group. That can be done using

- `CHGJOB JOB(QWAS7/QWASJOB) INLSPGRP({MYIASP})`

Note: This must be done on both Primary and Backup systems.

6.2.5 Changing Host Name in WebSphere

When WebSphere is installed, the default system name is set to the host name used throughout the configuration files. Use of the host name is not always the name we want WebSphere to use. In a High Availability environment like we created here, we want WebSphere to use the Takeover IP Address. By switching WebSphere to use the TakeOverIP Address, we can then run WebSphere on either the backup or primary system and avoid any IP or naming issues when a switch over occurs. To change the WebSphere host name, follow the instructions listed in the Info Center link below.

http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/topic/com.ibm.websphere.base.iseries.doc/info/series/ae/tagt_hostname.html

Note: Since the profile directory resides on the iASP changing the host name only needs to be done once.

6.2.6 Recommended clean up after a switch over

When a switch over is completed, it is recommended that the WebSphere OSGi cache is cleaned up. This step could be added to an auto start or auto stop program and occur automatically when a switch over is done. Chapter 7 provides more details on creating auto start or auto stop programs.

To cleanup the OSGi cache, complete the following:

1. Ensure the server is not running.
2. `cd /MYIASP/WebSphere_profile_dir/profiles/ProfileName/bin.`
3. Run: `osgiCfgInit.`

6.3 Installing Lawson System Foundation

To properly install the Lawson System Foundation into an iASP, you will need to follow the instructions provided in the Lawson Core Technology Installation Guide™ together with the following exceptions which are iASP-specific changes:

1. Make sure the databases are created on the iASP
 - CREATE COLLECTION {GEN DB} IN ASP {my iASP}
 - CREATE COLLECTION {IOS DB} IN ASP {my iASP}
2. Follow instructions in the Lawson Core Technology Installation to launch the Java Installer.
3. On the Configure Core screen, ensure “Is this to be installed in an independent auxiliary storage pool” is set to **yes** and that the path for the directories is on that resides on the iASP. See Figure 14 below.

The screenshot shows the 'Lawson Installer' window with the 'Configuring Core' screen. The window has a title bar with standard Windows controls and the Lawson logo. The main area contains the following configuration options:

- The LID port number: 7900
- The LAWIPC value for this Environment Instance: e
- Is this to be installed in an Independent Auxiliary Storage Pool: Yes No
- The root directory of the IASP device: /MYIASP (with a 'Browse...' button)
- The base directory for the Lawson install: /MYIASP/law9 (with a 'Browse...' button)
- The directory for GENDIR: /MYIASP/law9/gen (with a 'Browse...' button)
- The directory for LAWDIR: /MYIASP/law9/law (with a 'Browse...' button)
- The directory for LADBDIR: /MYIASP/law9/db (with a 'Browse...' button)
- The directory for LAW_JAVA_HOME: /QOpenSys/QIBM/ProdData/JavaVM/jdk60/64bit (with a 'Browse...' button)
- Choose the file security level: Basic (dropdown menu)

At the bottom of the window, there are four buttons: 'Help...', 'Previous', 'Next', and 'Cancel'.

Figure 14. Configure Core Screen

Figure 15.

4. On the Configure General Network Screen, ensure the name used is the TakeOverIP Address that will be shared between the primary and backup system. See Figure 15 below.

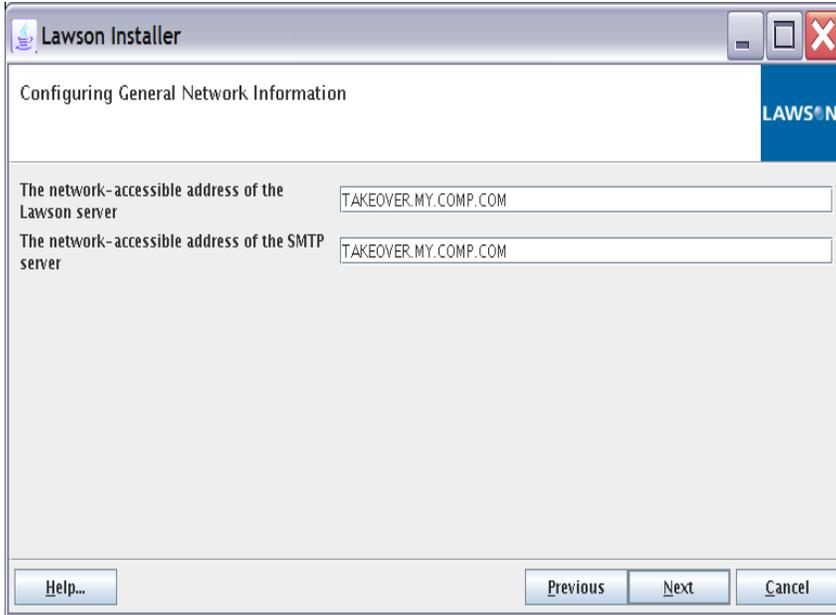


Figure 16. Configure General Network Screen

5. On the Configure General Network Screen, ensure the name used is the TakeOverIP Address that will be shared between the primary and backup system. See Figure 16 below.

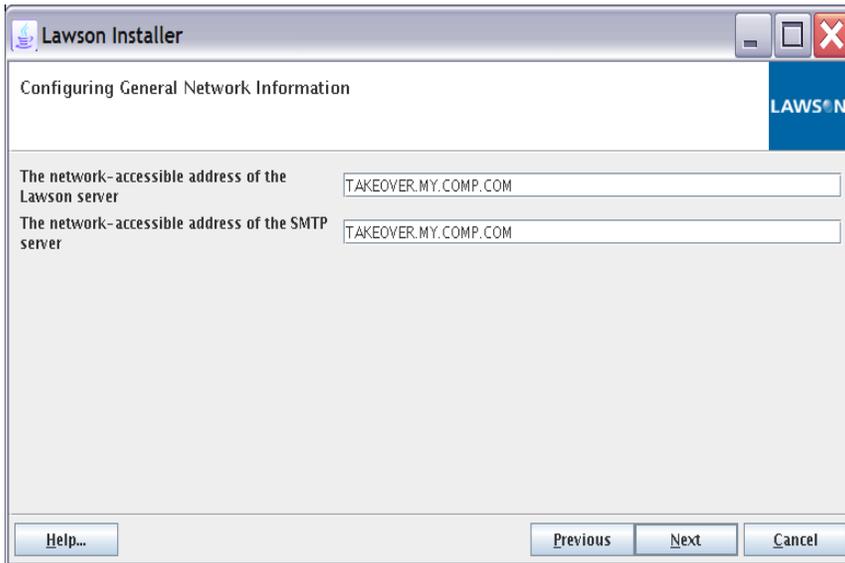


Figure 17. Configure General Network Screen

Figure 18.

6. On the Configure Web Server Information Screen, ensure the name used is the TakeOverIP Address that will be shared between the primary and backup system. See Figure 17 below.

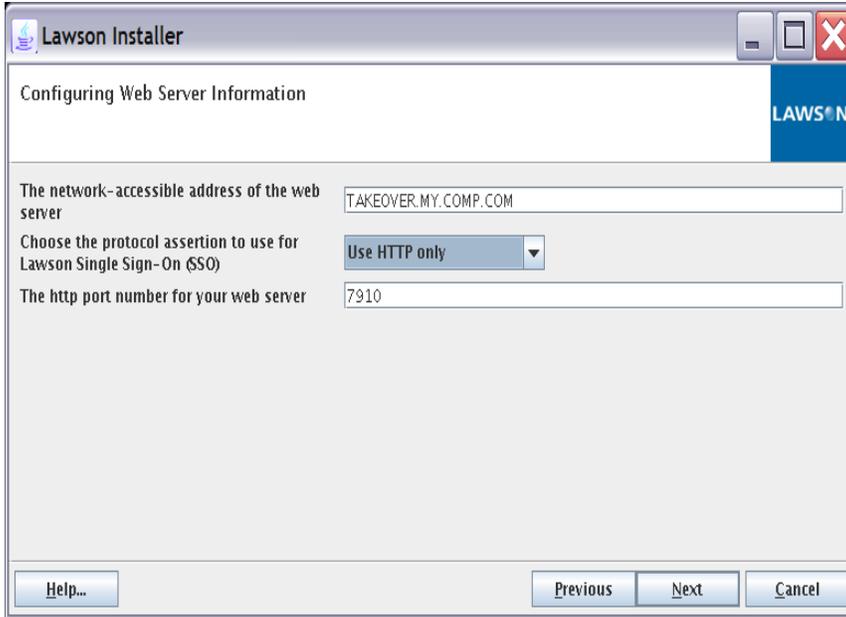


Figure 19. Configure Web Server Information Screen

7. On the Configure Resource Management screen, ensure the LDAP name used is the TakeOverIP Address that will be shared between the primary and backup system. See Figure 18 below.

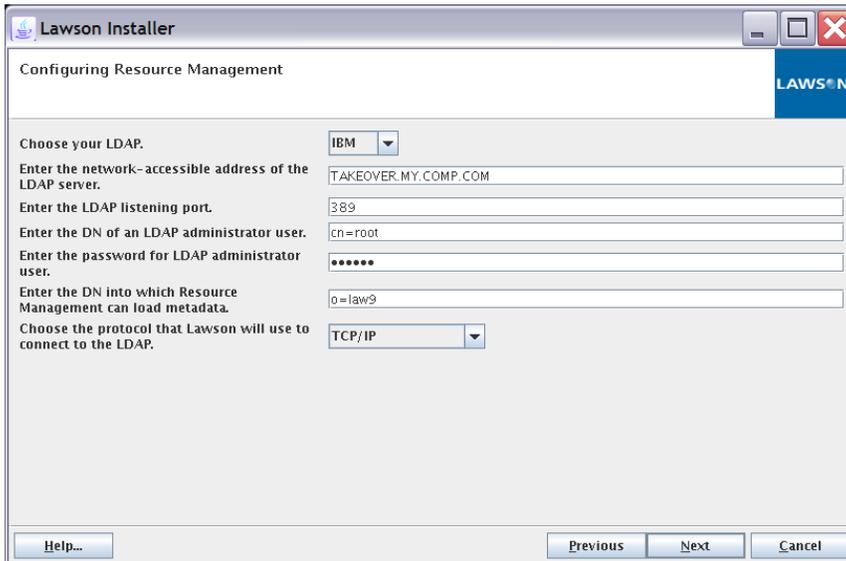


Figure 20. Configure Resource Management Screen

8. On the Configure Resource Management screen and LOGAN databases screens, ensure “The local alias for the DB2 database” is set to the iASP name. See Figure 19 below.

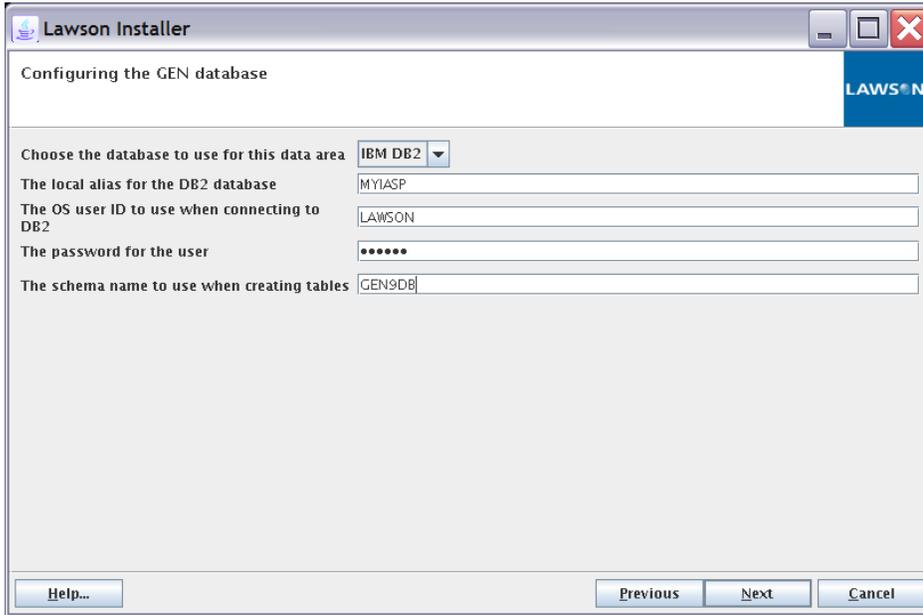


Figure 21. Configure the GEN database Screen

9. On the IOS Configuration screen, ensure path is set to a directory that resides on the iASP. See Figure 20 below.

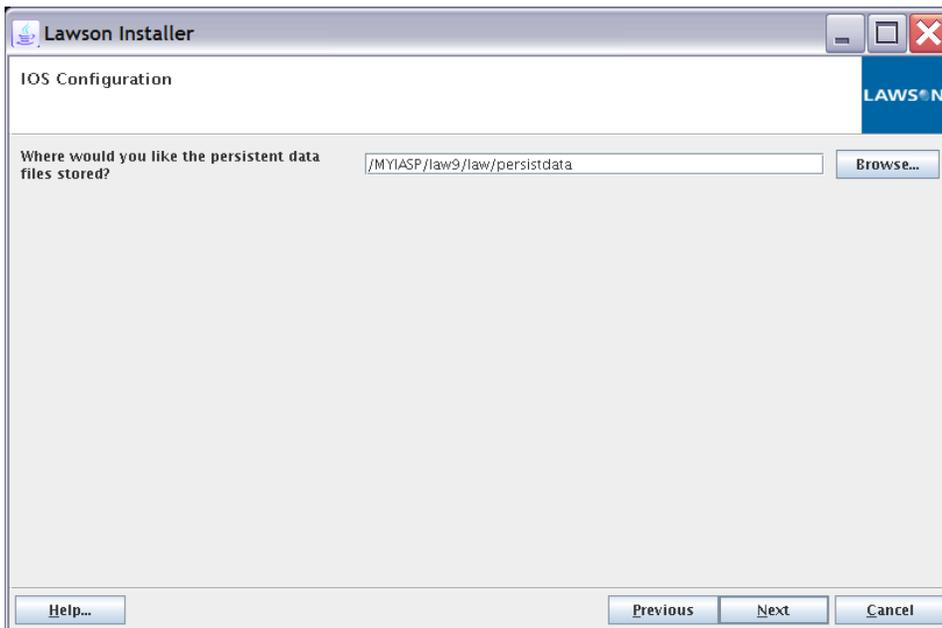


Figure 22. IOS Configuration Screen

10. Change the LAWENV job description to include the iASP as the initial ASP group.
 - CHGJOB JOB(QGPL/LSFPROD1) INLSPGRP({MYiASP})
11. Change the Lawson user profile so it uses the LAWENV job description. This allows jobs running under this profile to see objects that reside on the iASP.
 - CHGUSRPRF USRPRF(LAWSON) JOB(QGPL/LSFPROD1)
12. Change the WebSphere job description to add the iASP as the initial ASP group.
 - CHGJOB JOB(QWAS7/QWASJOB) INLSPGRP({MYiASP})

6.3.1 Optional: Migrate Tax software databases to the iASP

Optionally, the tax software database can be migrated to the iASP as well. After the database is installed it can be saved then restored to the iASP.

- SAVLIB LIB(TAX) DEV(*SAVF) SAVF(MYLIB/TAXSAVF)
- RSTLIB SAVLIB(TAX) DEV(*SAVF) SAVF(MYLIB/TAXSAVF) RSTASPDEV(MYI-ASP).

6.3.2 Ensure Lawson objects in library QGPL are migrated to the backup system.

The QGPL library contains the Lawson job descriptions and subsystem descriptions which are objects that cannot reside on an iASP. It also contains the Lawson programs that could have been moved to the iASP but were not moved to this location as part of this process and as a result all Lawson objects in QGPL will need to be duplicated on the backup system. Below are the steps to complete this process.

On the Primary system:

1. Create a library to store the Lawson QGPL objects.
 - CRTLIB LIB(LAWENVSAV)
2. Run the Lawson MOVENV command to copy the Lawson QGPL objects to the new library.
 - MOVENV FROMLIB(QGPL) TOLIB(LAWENVSAV)
3. Save the objects in the new library.
 - CRTSAVF FILE(QGPL/LAWENVSAV)
 - SAVOBJ OBJ(*ALL) LIB(LAWENVSAV) DEV(*SAVF) SAVF(QGPL/LAWENVSAV)
4. Copy the items below over to the backup system.
 - LAWENVSAV save file
 - The /etc/lawson.env file from primary and place it in the /etc directory on the backup system

On the Backup system:

1. Perform a switch over and ensure iASP is available on the backup system.
2. Restore the save file that was copied over.
 - o CRTLIB LIB(LAWENVSAV)
 - o RSTOBJ OBJ(*ALL) SAVLIB(LAWENVSAV) DEV(*SAVF) SAVF(QGPL/LAWENVSAV) RSTLIB (QGPL)
3. Copy the Lawson objects from LAWENVSAV to QGPL.
 - o ADDLIBE LAWENVSAV
 - o MOVENV FROMLIB(LAWENVSAV) TOLIB(QGPL)
4. Run the Lawson SETUPCLS command to setup the Lawson environment on backup system.
 - o Make sure subsystem name is the same as the primary. See Figure 21 below.

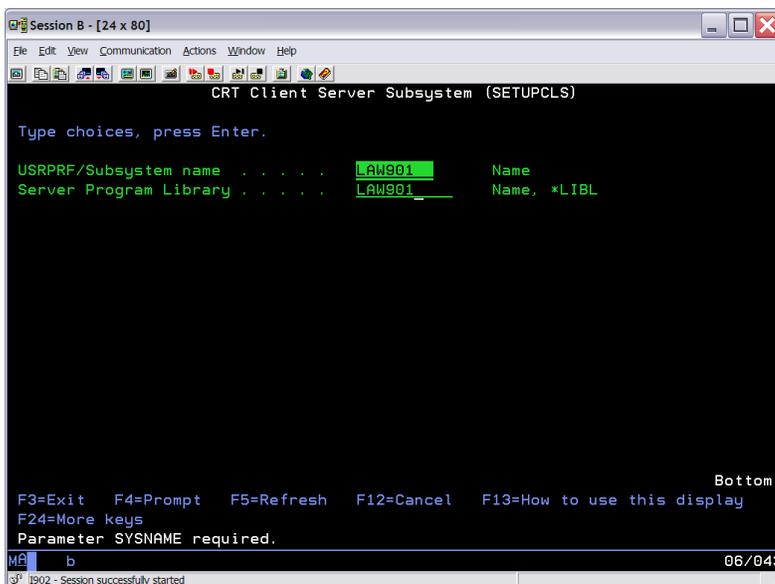


Figure 23. SETUPCLS Screen

- o Make sure jobd has the same lib list as primary. See Figure 22 below.

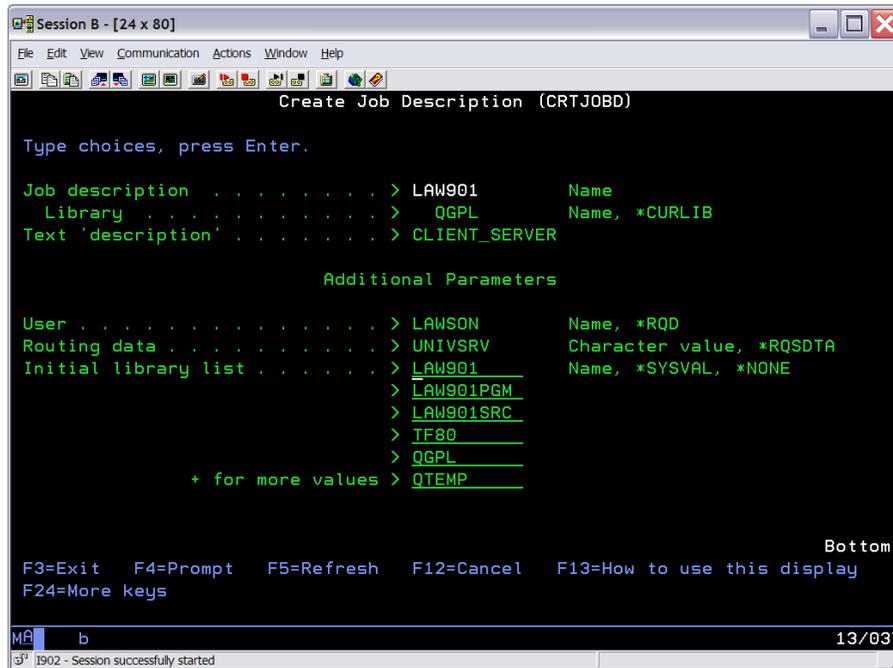


Figure 24. Create Job Description Screen

- o Make sure SRVTBLE has same port # as primary. See Figure 23 below.

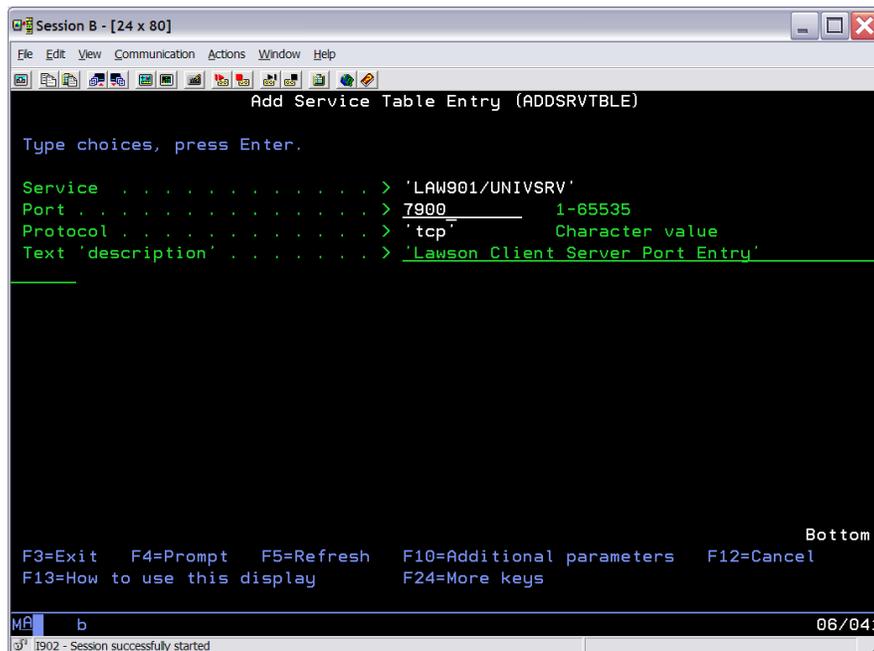


Figure 25. Add Service Table Entry Screen

6.3.3 Additional changes needed on the backup system

The additional steps that need to be completed in order to finalize the setup on the backup system for LSF are provided below:

1. Change the Lawson job description to add the iASP as the initial ASP group.
 - CHGJOB JOB(QGPL/LSFPROD1) INLSPGRP({MYiASP})
2. Change the Lawson user profile so it uses the LAWENV job description. This allows jobs running under this profile to see objects that reside on the iASP.
 - CHGUSRPRF USRPRF(LSFPROD1WS) JOB(QGPL/LSFPROD1)
Note: PowerHA will create profile when you switch to backup system. If PowerHA is not being used, you will need to manually create a user profile.
3. Change the profile WebSphere runs under so it WebSphere has the correct group and supplemental group.
 - CHGUSRPRF USRPRF(LSF901WS) GRPPRF(QEJBSVR) SUPGRPPRF(LAWSON)
4. Change the WebSphere job description to add the iASP as the initial ASP group.
 - CHGJOB JOB(QWAS7/QWASJOB) INLSPGRP({MYiASP})
5. Grant the WebSphere user profile access to WebSphere.
 - /qibm/proddata/websphere/appserver/v7/nd/bin/enbprfwas -profile LSF901WS
6. Ensure Bouncy Castle is setup correctly on backup system.

6.4 HTTP Server

The HTTP Server configuration and logs files can also be put on the iASP. This will enable the same HTTP Server configuration to be used when a switch over occurs on the backup system. Steps below show how to set up this configuration.

1. Create an HTTP Server on the primary system by following the steps outlined in the Lawson Core Technology Installation guide. Only one additional change needs to be completed:
 - a. For the path to the configuration file, instead of the default setting of /www/myserver, the configuration files needs to point to the iASP, i.e. /myiasp/www/myserver
2. Create a duplicate HTTP server on the backup server and use the same configuration files:
 - a. Make sure the iASP is allocated to the backup system.
 - b. Create an HTTP Server with the same name and but make sure you point to the configuration files that were created in the previous step on the iASP, i.e. /myiasp/www/myserver.
 - c. When prompted, select "Use this existing file without change for this new server configuration".

6.5 Installing Lawson Portal

Follow the instructions in the Lawson Core Technology Installation to install Lawson Portal. Since the WebSphere profile directory already resides on the iASP, there are no additional steps needed for Lawson Portal to run on the iASP.

6.6 Installing Lawson Applications

Follow the instructions in the Enterprise Applications Installation Guide to install the Lawson Applications. The only changes needed to install these applications onto the iASP is to ensure the Lawson Program and Source libraries are created on the iASP as shown below.

- CRTLIB LIB(LAW9PGM) ASPDEV(MYIASP)
- CRTLIB LIB(LAW9SRC) ASPDEV(MYIASP)

7. Creating and Registering Auto Start and Auto Stop Programs

To further automate the switchover and/or failover process, exit programs can be utilized. Exit programs can be used to automatically stop and start the Lawson S3 applications during a switchover and automatically start the Lawson S3 applications during a failover. Exit programs can also be used to keep objects which have not been migrated to the iASP or included as part of the administrative domain, synchronized between the production and backup systems.

Two exit programs will need to be used, one for the shutdown and one for the startup. To use an exit program, the name and location of the exit program must be entered in the designated data area in library QUSRHASM. The name of the data areas are QSHUTDOWN and QSTARTAPP. In order for the programs to be called on a switch over, they need to be registered in a specific data area.

- For the Startup program:
 - CHGDTAARA DTAARA(QUSRHASM/QSTARTAPP) VALUE('STARTUPS3 PAUL ')
- For the Shutdown program:
 - CHGDTAARA DTAARA(QUSRHASM/QSHUTDOWN) VALUE('SHUTDWNS3 PAUL ')

The programs can reside in any library you choose and can be any name of your choosing. However, if the name of the library and/or program is less than 10 characters, then the names must be padded with spaces as shown in the above example. Also, the library and program names cannot exceed 10 characters in length.

The exit programs are called with the user profile QPGMR. During the processing of the exit programs, the user profile is switched to LAWSON, so it is necessary to grant QPGMR the necessary authority to LAWSON in order to execute the exit programs successfully. Run the command below to grant the necessary authority.

- GRTOBJAUT OBJ(LAWSON) OBJTYPE(*USRPRF) USER(QPGMR) AUT(*USE)

The exit programs need to exist on both the production and backup host and all of the commands to configure the exit programs need to be run on both hosts. See Appendix A.1 and A.2 for sample exit programs we used.

Note: HASM does not support parameter passing for exit programs. If parameter passing is required, you can register your exit program via the Cluster Resource Group, or CRG, instead of HASM. The drawback to using the CRG is that you lose the ability to utilize automated planned switch overs that the HASM management web page gives you. Instead, any planned switch over would have to be manually completed. For more details on using exit program via the CRG, please refer to Redbook SG24-7405, "Implementing PowerHA for IBM i".

8. Testing of Cross-Site Mirroring with Lawson S3

Several tests were run using the Lawson S3 General Ledger Batch benchmark. See Appendix A.3 for a description of the benchmark used. The tests were completed to validate that the S3 environment was working on both the primary and backup system.

8.1 Validation of Lawson S3 environment

The chart below shows results achieved on both the primary and backup systems. Both systems were identical in terms of hardware and software and as a result, the outcomes should be equivalent (as shown in Figure 24). The key here is the validation of the S3 applications on our High Availability solution. Not only is the Lawson S3 application fully functional on the primary system, when it is switched over to the backup system, all applications continue to run without any issues.

GENERAL LEDGER PROCESS	PROGRAM	ELAPSED TIME (HH:MM:SS)	
		Primary	Backup
Interface Journal Entries	GL165	00:11:04	00:11:31
Journal Posting	GL190	00:01:31	00:01:28
Period Closing (Single job)	GL199	00:00:05	00:00:05
Average CPU Utilization		28 %	27 %

Figure 26. Verification of S3 in a High Availability Environment

Note: Times reported are the total time required to complete all job groups for each GL process. Additionally, only 1 concurrent job was used for the tests above.

9. Additional Considerations

There are several other factors to consider when choosing a High Availability solution for your organization. This section covers two key factors.

9.1 Overhead of mirroring

There are overhead costs when you have and maintain a mirrored copy of the iASP. These overhead costs can vary depending on your configuration. The overhead costs apply to both the primary and backup system and is typically in the form of CPU usage. These overhead costs needs to be taken into account when planning your High Availability solution.

9.2 Switch over times

There is a certain amount of time needed to complete a switch over. The amount of time required can vary quite a bit based on the type of High Availability solution you choose as well as several other factors. Times may vary based on size and type of system as well as the number of database objects you have in the iASP. The size of the db objects should not have a significant impact on the switch over times. Also, the size and number of non-database objects, such as IFS objects, should not have a significant impact on the switch over times. The key point concerning switch over times is that switching over is not an instantaneous event. Switch over time is another factor that needs to be accounted for when planning your High Availability solution.

10. Summary

High Availability in a Lawson S3 environment can be a crucial component in today's demanding business environment. By utilizing the PowerHA for i High Availability Solution Manager, it is possible to greatly reduce the complexity of implementing and managing a geographic mirroring High Availability solution. When properly migrated and configured in a geographic mirror environment, you will be able to set up your Lawson S3 application to easily switch back and forth between production and backup systems. By creating and registering startup and shutdown exit programs, you can also set up your Lawson S3 application to be automatically restarted on the backup system after a planned switchover or failover. Also, by utilizing a TakeOverIP Address, the host the Lawson S3 applications are running on will be transparent to the user.

Running your Lawson S3 applications in a geographic mirror environment provides the data resiliency and the flexibility to quickly recover from both planned and unplanned outages. As a result, the combination of geographic mirroring with PowerHA for i High Availability Solution Manager allows you to easily implement and manage a High Availability environment that achieves your availability goals.

Note: Starting with LSF 9.0.1.7 and IBM i 7.1, support has been added to allow LSF to be directly installed into an iASP. In addition, support was added to apply fixes and perform function (like upgrades) on installations that reside on an iASP. Older versions of LSF do not support iASPs and Lawson only provides support for iASPs with LSF 9.0.1.7 running on i 7.1 only.

11. References

International Business Machines Corporation. *Implementing PowerHA for IBM i*. Redbook SG24-7405. First edition, 2008.

International Business Machines Corporation. WebSphere Application Server, Version 6,1 Information Center. <http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/topic/com.ibm.websphere.-base.iseries.doc/info/series/ae/tagt_hostname.html >

Appendix

A.1 Startup exit program

Below is the code example for the startup exit program. This program is made up of two components including a CL program and a Qshell script. Each is listed below.

Passing parameters into an exit program is not supported by the High Availability Solution Manager, and as a result, the Lawson S3 environment name, HTTP Server name, and other hard coded values will need to be changed. After making the necessary modifications, compile the exit program and place it in a library of your choosing. Regardless of the library used to store the exit programs, make sure that the user profile QPGMR has at least *USE authority to that library. QPGMR is the user profile used by the High Availability Solution Manager to call the exit program.

Note: This program is given as an example only to help you create a startup exit program. This may not be an optimal solution for all environments.

A.1.1 CL Startup exit program

```
 /
*****//
* PROGRAM: STARTUPS3
*/ /* PURPOSE: Start Lawson S3 jobs
*/ /* Note: Program submits a batch jobs which runs a .qsh script
*/ /* Batch Job name is: S3START
*/ /* Check S3START JOB LOG FOR ADDITIONAL ERRORS
*/
/*****//
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```

```

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/* Licensed Material - Property of IBM */
/* */
/*****
DCL      VAR(&ADMINID) TYPE(*CHAR) LEN(10)
DCL      VAR(&CURUSER) TYPE(*CHAR) LEN(10)
DCL      VAR(&ADMHANDLE) TYPE(*CHAR) LEN(12)
DCL      VAR(&CURHANDLE) TYPE(*CHAR) LEN(12)
MONMSG   MSGID(CPF2103)
MONMSG   MSGID(CPF0000) EXEC(GOTO CMDLBL(ERROR))

/* REMEMBER CURRENT USER PROFILE: */
RTVJOBA  CURUSER(&CURUSER)
CALL     PGM(QSYS/QSYGETPH) +
        PARM(&CURUSER '*NOPWDCHK' &CURHANDLE)

/* SWITCH TO LAWSON S3 USER PROFILE LAWSON: */
CHGVAR   VAR(&ADMINID) VALUE('LAWSON')
CALL     PGM(QSYS/QSYGETPH) +
        PARM(&ADMINID '*NOPWDCHK' &ADMHANDLE)
CALL     PGM(QSYS/QWTSETP) PARM(&ADMHANDLE)

/* Setup Environmnet */
SETASPGRP ASPGRP(MYIASP)
CALL     PGM(LAWENV) PARM(LAW901 '')

/* START LAWSON S3 JOBS */
QSH CMD('/etc/S3/StartupS3.qsh')

/* SWITCH BACK TO ORIGINAL USER PROFILE: */
CALL     PGM(QSYS/QWTSETP) PARM(&CURHANDLE)
GOTO     CMDLBL(END)

ERROR:
SNDFGMSG MSGID(CPF0001) MSGF(QCPFMSG) MSGDTA('LAWSON +
        S3 STARTUP FAILED') MSGTYPE(*ESCAPE)

END:
SETASPGRP ASPGRP(*NONE)
ENDPGM

```

A.1.2 Qshell startup script

```
#####  
# Program: StartupS3.qsh #  
# #  
# Purpose: Starts up LSF jobs, Lawson Portal, and the HTTP Server instance #  
#####  
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# US Government Users Restricted Rights - #  
# Use, duplication or disclosure restricted #  
# by GSA ADP Schedule Contract with IBM Corp. #  
# Licensed Material - Property of IBM #  
# #  
#####  
#  
# Create log file  
if [ -e /etc/S3/startup.log ]  
then  
    rm /etc/S3/startup.log  
fi  
  
touch -C 819 /etc/S3/startup.log
```

```
# Start LSF jobs
    echo "Starting S3 environment" | tee -a /etc/S3/startup.log
    startlaw 2>&1 | tee -a /etc/S3/shutdown.log
# Wait for S3 to start
    sleep 30

# Start Lawson Portal
    echo "Starting Lawson Portal instance LAWWAS901" | tee -a /etc/S3/startup.log
    /qibm/proddata/websphere/appserver/v7/nd/bin/startserver -profileName LAWWAS901 2>&1 | tee -a /etc/S3/startup.log

# Start HTTP Server Instance
    echo "Starting HTTP Server: LAW901" >> /etc/S3/startup.log
    system "STRTCPSVR *HTTP HTTPSVR(LAW901)" 2>&1 | tee -a /etc/S3/startup.log
```

A.2 Shutdown exit program

Below is the code example for the shutdown exit program. This program is made up of two components including a CL program and a Qshell script. Each is listed below.

Passing parameters into an exit program are not supported by the High Availability Solution Manager, and as a result, the Lawson S3 environment name, HTTP Server name and other hard coded values will need to be changed. After making the necessary modifications, compile the exit program and place it in a library of your choosing. Regardless of the library used to store the exit programs, make sure that the user profile QPGMR has at least *USE authority to that library. QPGMR is the user profile used by the High Availability Solution Manager to call the exit program.

Note: This program is given as an example only to help you create a shutdown exit program. This may not be an optimal solution for all environments.

A.2.1 CL Shutdown exit program

```
/
*****//
* PROGRAM: SHUTDOWN3
*/ /* PURPOSE: Shutdown Lawson S3 jobs
*/ /* Note: Program submits a batch jobs which runs a .qsh script
*/ /* Batch Job name is: S3START
*/ /* Check S3STOP JOB LOG FOR ADDITIONAL ERRORS
*/
/*****//
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```

```

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/* */
/*****/
DCL      VAR(&ADMINID) TYPE(*CHAR) LEN(10)
DCL      VAR(&CURUSER) TYPE(*CHAR) LEN(10)
DCL      VAR(&ADMHANDLE) TYPE(*CHAR) LEN(12)
DCL      VAR(&CURHANDLE) TYPE(*CHAR) LEN(12)

MONMSG   MSGID(CPF2103)
MONMSG   MSGID(CPF0000) EXEC(GOTO CMDLBL(ERROR))

/* REMEMBER CURRENT USER PROFILE: */
RTVJOBA  CURUSER(&CURUSER)
CALL     PGM(QSYS/QSYGETPH) +
        PARM(&CURUSER '*NOPWDCHK' &CURHANDLE)

/* SWITCH TO LAWSON S3 USER PROFILE LAWSON: */
CHGVAR   VAR(&ADMINID) VALUE('LAWSON')
CALL     PGM(QSYS/QSYGETPH) +
        PARM(&ADMINID '*NOPWDCHK' &ADMHANDLE)
CALL     PGM(QSYS/QWTSETP) PARM(&ADMHANDLE)

/* Setup environment */
SETASPGRP ASPGRP(MYIASP)
CALL     PGM(LAWENV) PARM(LAW901 '')

/* SHUTDOWN LAWSON S3 JOBS */
QSH CMD('/etc/S3/ShutdownS3.qsh')

/* SWITCH BACK TO ORIGINAL USER PROFILE: */
CALL     PGM(QSYS/QWTSETP) PARM(&CURHANDLE)
GOTO     CMDLBL(END)

ERROR:
SNDPGMSG MSGID(CPF0001) MSGF(QCPFMSG) MSGDTA('LAWSON +
        S3 SHUTDOWN FAILED') MSGTYPE(*ESCAPE)

END:
SETASPGRP ASPGRP(*NONE)
ENDPGM

```

A.2.2 Qshell Shutdown script

```
#####  
# Program: ShutdownS3.qsh #  
# #  
# Purpose: Shuts down LSF jobs, Lawson Portal, and the HTTP Server instance #  
#####  
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#####  
#  
# Create log file  
if [ -e /etc/S3/shutdown.log ]  
then  
    rm /etc/S3/shutdown.log  
fi  
  
touch -C 819 /etc/S3/shutdown.log  
  
# Stop LSF jobs  
    echo "Stopping S3 environment" | tee -a /etc/S3/shutdown.log
```

```
stoplaw 2>&1 | tee -a /etc/S3/shutdown.log
# Wait for S3 to stop
sleep 30

# Stop Lawson Portal
echo "Stopping Lawson Portal instance LAWWAS901" | tee -a /etc/S3/shut-
down.log
/qibm/proddata/websphere/appserver/v7/nd/bin/stopserver -profileName
LAWWAS901 2>&1 | tee -a /etc/S3/shutdown.log

# Stop HTTP Server Instance
echo "Stopping HTTP Server: LAW901" | tee -a /etc/S3/shutdown.log
system "ENDTCPSVR *HTTP HTTPSVR(LAW901)" 2>&1 | tee -a /etc/S3/shutdown.-
log
```

A.3 Lawson GL Batch Benchmark

For this batch test, the Lawson benchmark kit was used to create data for and to facilitate the testing of the following Lawson General Ledger (GL) closing processes:

GL165, GL190 and GL199..

The database was created with an extra large volume size of 256,000 journal entries together with a default of 6 months of general ledger history. For GL165, 64 distinct run groups, or jobs, were created each with 4,000 journal entries. For GL190, there were 4 distinct run groups. For GL199, there was only one run group.

To execute the test, the benchmark kit submits all run groups for each of the GL tests (GL165, GL190 and GL199). Results are calculated as the total time it takes to complete all of the run groups for each GL process.

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