Abstract
This paper provides the SAP Landscape Virtualization Management customer that is not familiar with EMC products (EMC Solutions Enabler and EMC SMI-S Provider) an introduction and basic understanding of our integration. SAP’s product provides SAP application virtualization and now the ability to make SAP system copies.

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Executive summary

SAP NetWeaver Landscape Virtualization Management (LVM) software is SAP’s latest product that provides application virtualization and management of SAP systems through a single user interface. This powerful management tool simplifies and optimizes provisioning, deployment, and management of SAP Systems through the use of virtualization and Infrastructure as a Service (IaaS) cloud technology resulting in:

- Reduced total cost of operations
- Enhanced flexibility and business agility

SAP LVM’s current features include:

- Framework for SAP system clone, copy, and refresh, including fully automated post-copy tasks
- Capacity management – proposal-based dialog instance scaling
- End-to-end visibility, monitoring and management of SAP and non-SAP applications in virtual infrastructures
- Overview dashboard with customization options
- Landscape visualization, from a high-level landscape view down to the infrastructure level
- Reporting options: on individual systems, and across landscapes

This following diagram shows the big picture of how SAP NetWeaver Landscape Virtualization Management software can or will have integration with various different areas. This paper will focus on the integration requirements between EMC and SAP and what is required to use the framework for SAP system clone, copy, and refresh, including the fully automated post-copy tasks. EMC Solutions Enabler will connect to the Storage Connect Attach/Detach module and EMC SMI-S Provider will connect to the Storage Connect Clone module. VMware integration occurs in the Virtualization Connect module.
EMC support for SAP Landscape Virtualization Management is a natural fit to EMC’s strategy and direction on virtualization and cloud infrastructures and Information Lifecycle Management. ILM is meant to help customers get the maximum value from their information at the lowest total cost at every point in the information lifecycle. Integrating SAP LVM into an EMC storage environment provides an ideal means to accomplish this.

**Audience**

This white paper is intended for customers that are familiar with SAP NetWeaver Landscape Virtualization Management but not familiar with EMC’s integration and product set used to support that integration.

**Introduction**

This paper will focus on the EMC and SAP integration only. It will not cover all of the available features in SAP NetWeaver Landscape Virtualization Management software. The features directly related to either integration point (EMC Solutions Enabler or EMC SMI-S Provider) will be covered. This diagram will show the configuration of the SAP NetWeaver Landscape Virtualization Management environment used in this paper.
SAP LVM programmatically manages storage for the SAP LVM graphical interface user. The application virtualization is enhanced by two components provided by SAP; the executable (sapacosprep), which stands for SAP Adaptive Computing Open Systems PREParatio, and the SAP shared library (libsapacosprep). The EMC component is invoked by the EMC shared library (libsapacosprep_emc). The SAP executable, sapacosprep, supplements SAP LVM. It is invoked on behalf of LVM GUI to control and establish the virtualization layer, by attaching and detaching distributed files systems and volume groups via the SAP and EMC shared libraries.

EMC’s shared library is provided through EMC Solutions Enabler. This software must be installed on every host in the SAP NetWeaver Landscape Virtualization Management environment. This would include any server, physical or virtual, that will have a LVM managed SAP system or instance, including potential servers to be used for clones or copies. EMC Solutions Enabler version 7.4 and higher supports all of the major UNIX and Windows platforms. Please see the support matrix section for more details of support.

**EMC SMI-S Provider**

The SAP clone, copy, and refresh process utilized EMC’s integration with SMI-S, Storage Management Interface Specification. This is a storage standard created by the SNIA, Storage Networking Industry Association.

EMC’s SMI-S Provider must be installed on a single server in the SAP NetWeaver Landscape Virtualization Management environment. An EMC best practice is to install the SMI-S provider on the same server as the SAP LVM add-on, provided this is a Linux or Windows server. If it isn’t, an additional management server will be required. It is recommended not to install on a managed server because there may be an occasion where the version of our SMI-S provider and Solutions Enabler may be different. Currently the supported version of the SMI-S provider is 4.4, which also installs Solutions Enabler 7.4.
This white paper was created for SAP customers using SAP NetWeaver Landscape Virtualization Management Software, which may not have a full understanding of the EMC Solutions Enabler and SMI-S Provider software install process. It will document the unique steps required during the installations process to enable full support of EMC’s integration with SAP.

**EMC’s library for SAP LVM description**

The SAP executable, sapacosprep, invokes the SAP and EMC shared libraries for the SAP LVM relocation process or for mounting clones or copies to the target server (resource). The EMC shared library (libsapacosprep_emc) executes the EMC module to mount and unmount file systems as well as to import and export logical volume groups. Incorporating EMC storage gives customers a broad choice of storage platforms and software to match operational business requirements, including local and remote replication, business continuance, and disaster recovery.

Technically speaking, it attaches and detaches distributed file systems and volume groups. The volume group whose logical volumes are used as mount devices for distributed file systems. EMC’s integration with SAP Landscape Virtualization Management will enable the user to automatically retrieve and select the mount points for each SAP system or instance. The SAP Host Control Agent is required to support the automatic retrieval of the mount points. Currently, EMC provides support for volume groups with 1 to many physical volumes, but only 1 logical volume per volume group. Additional support from SAP will be required to allow multiple logical volumes, but it is already being planned.

**EMC’s SMI-S Provider description**

EMC® SMI-S Provider V4.3.2 supports the SNIA Storage Management Initiative (SMI), an ANSI standard for storage management. This initiative has developed a standard management interface that has culminated in a comprehensive specification (SMI-Specification or SMI-S). The SMI-S defines the open storage management interface that enables the interoperability of multiple vendors’ storage management technologies. These technologies are used to monitor and control storage resources in multivendor or SAN topologies.

The SNIA SMI strives to ensure consistent data and eliminate inconsistencies among management tools by providing a unified interface to the many storage objects that must be managed in a storage environment. This enables application developers to focus on a single, standard interface for the development of management tools.

EMC SMI-S Provider is paired with the EMC CIM Server to provide an SMI-compliant interface for EMC Symmetrix® arrays, EMC CLARiiON® arrays, and EMC VNX family storage systems.
EMC Solutions Enabler software install process

EMC Solutions Enabler software can be downloaded from the EMC Powerlink® website (http://Powerlink.EMC.com) at the following path:

Support > Software Downloads and Licensing > Downloads S > Solutions Enabler. Contact an EMC representative if you do not have access to this website. This is the location to select the latest software to download.

The path for documentation, including the *EMC Solutions Enabler Software Installation Guide*, is Support > Technical Documentation and Advisories > Software ~ S ~ Documentation > Solutions Enabler. The installation guide will explain how to install EMC Solutions Enabler for all of the supported operating systems.

This section will only discuss unique steps required when using the EMC integration with SAP NetWeaver Landscape Virtualization Management software. During the installation process, the defaults can be taken with the exception of whether to install EMC Solutions Enabler SRM Components. The default is ‘N’ but this integration the SRM components to be installed. Please select ‘Y’ for yes to the question, “Install EMC Solutions Enabler SRM Components?”

These components are the Storage Resource Management (SRM) components and provides additional functionality used with the volume groups for EMC on all platforms. Additional information can be in the same location above on Powerlink in the *EMC Solutions Enabler Symmetrix SRM CLI Product Guide*, but in-depth
knowledge of these components is not required. All of this integration is done between SAP and EMC and is not exposed to the SAP LVM user.

After Solutions Enabler is installed, a few other actions must be taken. In order for sapacosprep to function properly, SAP Host Control Agent must be installed. The latest version is recommended. This will create the /usr/sap/hostctrl/exe directory. A symbolic link must be created in this directory to point to the EMC shared library, /opt/emc/SYMCLI/shlib/apps/SAP/libsapacosprep_emc.so. This library and directory is installed and created by the EMC Solutions Enabler install. The following command should be executed from the /usr/sap/hostctrl/exe directory:

```
ln -s /opt/emc/SYMCLI/shlib/apps/SAP/libsapacosprep_emc.so libsapacosprep_emc.so
```

The format of the command is `ln -s {target-filename} {symbolic-filename}`. After adding this link it is recommended to stop and restart the SAP Host Control Agent from the /usr/sap/hostctrl/exe directory:

```
./saphostexec -stop
./saphostexec -restart
./saphostexec -status
```

Use the **Body Text** paragraph style ....

**EMC SMI - S provider software install process**

The EMC SMI-S provider software can be downloaded from the EMC Powerlink® website (http://Powerlink.EMC.com) at the following path:

Support › Software Downloads and Licensing › Downloads S › SMI-S Provider. Contact an EMC representative if you do not have access to this website. This is the location to select the latest software to download.

The path for documentation, including the *EMC SMI-S Provider Release Notes*, is Support › Technical Documentation and Advisories › Software ~ S ~ Documentation › SMI-S Provider. The release notes explain how to install EMC Solutions Enabler for all of the supported operating systems.
This section will highlight the main points to keep in mind for SMI-S during the installation process. The installation process is very similar to EMC Solutions Enabler. The SMI-S installation and setup process installs the following:

EMC CIM server

EMC Solutions Enabler GA version runtime libraries

Only the “Array” provider is required for SAP NetWeaver Landscape Management software. The “VASA” provider will automatically install but you will not be required to perform any of the setup processes for this provider. The “Host” provider is not required and should NOT be installed. The installation process is will be different for Linux and Windows, please consult the release notes for specifics.

Symmetry VMAX family arrays will require six (6) additional gatekeepers for SMI-S monitoring. The VNX and CLARiiON product will require a discovery process to be able to view the arrays. These will be either an in-band or out-of-band process depending on if there are VNX or CLARiiON luns present on the SMI-S host. Both of these processes are detailed in the release notes in the Post-installation tasks section. The ECOM executable may also need to be restarted to make sure all of the arrays can be discovered. The executable file resides in /opt/emc/ECIM/ECOM/bin directory and can be restarted from this directory with the following command:

./ECOM -d

The /opt/emc/ECIM/ECOM/bin/TestSmiProvider executable will be used to log into the SMI-S provider and issue commands against the arrays. There are commands to view version information, discover the arrays, refresh the arrays, and remove any arrays. Once the initial discovery and communication is defined between the SMI-S provider and the EMC storage arrays, there will not be any manual commands that will need to be issues against SMI-S. The communication for the clone, copy, and refresh process will happen between SAP and EMC and be seamless to the SAP LVM user.
It is important to note, not to install Solutions Enabler over the SMI-S provider because it will prevent the SMI-S provider from working properly. This is why Solutions Enabler is automatically installed with the SMI-S provider.

**EMC SAP NetWeaver Landscape Virtualization Management software integration support matrix**

EMC integration with SAP NetWeaver Landscape Virtualization Management software will depend on the SAP license purchased and the features that are planned on being used. There will be a base version and standard license from SAP that will include the start, stop, relocation, and mass operations functionality. This functionality was migrated to LVM from SAP Adaptive Computing Controller and will continue to be available in SAP Adaptive Computing. There are numerous certificates of conformity that EMC will continue to support for this implementation. Along with that, EMC will support all of the following operating systems and volume managers that were previously supported by SAP Adaptive Computing.

<table>
<thead>
<tr>
<th>Open system host</th>
<th>Volume Manager</th>
<th>File System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun OS</td>
<td>VxVM</td>
<td>UFS</td>
</tr>
<tr>
<td></td>
<td>Solstice (SVM)</td>
<td>VxFS</td>
</tr>
<tr>
<td>Linux</td>
<td>Native LVM</td>
<td>EXT2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EXT3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VxFS</td>
</tr>
<tr>
<td>HPUX</td>
<td>Native LVM</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td>LDM</td>
<td>NTFS</td>
</tr>
<tr>
<td></td>
<td>VxVM</td>
<td></td>
</tr>
<tr>
<td>AIX</td>
<td>Native LVM</td>
<td>JFS</td>
</tr>
<tr>
<td></td>
<td>VxVM</td>
<td>JFS2</td>
</tr>
</tbody>
</table>

For the Enterprise license for SAP NetWeaver Landscape Virtualization Management software with the added clone, copy, refresh features, EMC currently supports following operating systems and volume groups.

<table>
<thead>
<tr>
<th>Open system host</th>
<th>Volume Manager</th>
<th>File System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux SLES 9, 10, 11</td>
<td>Native LVM</td>
<td>EXT2</td>
</tr>
</tbody>
</table>
Overview of SAP NetWeaver Landscape Virtualization Management software base functionality

SAP NetWeaver Landscape Virtualization Management software is based on four building blocks; control, which is the SAP LVM GUI, compute resources, which includes the SAP systems/instances referred to as services and physical or virtual servers referred to as resources, network, which ties the compute resource to the 4th building block, storage. The SAP systems and instances have to be installed on centralized storage with a virtual name in order to be controlled by SAP LVM.

The base functionality, start/stop/relocate/mass operations, will provide wide support across EMC storage platforms. The new features, clone/copy/refresh, will only be supported on Symmetrix VMAX family arrays running Enginuity level 73 or above, VNX family arrays running operating system 31 and above, and CLARiiON CX4 running operating system 30 and above.

The start and stop functions are very basic starting and stopping of an SAP system or instance. You can extend these functions by adding a prepare or unprepare function.
to mount or unmount the files systems or volume groups associated with the SAP system or instance in a SAN environment. In a NAS environment the equivalent process is a bind or unbind of the mount points associated with the SAP system or instances. The *relocate* function will simply *stop* and *unprepare* the SAP system or instance on *server x* and then issue a *prepare* and *start* on *server y*.

At this point, the functionality only requires EMC Solutions Enabler and does not require the SMI-S provider. One of the benefits of using this functionality is to have a single control interface to start and stop all of your SAP systems. This provides ease of management versus have to maintain a list of all servers and SAP systems that will be used when the SAP Basis person has to log in and out of every server to issue the start or stop. The SAP LVM user will also be able to schedule start and stop operations and perform mass operations, starting or stopping more than one SAP system or instance.

This functionality is providing SAP application virtualization, by allowing the SAP system or instance to be *relocated* to different servers (same architecture) and not being tied to the hardware it was originally installed on. SAP NetWeaver Landscape Virtualization Management software also support hypervisor or server virtualization products. One example is VMware virtualization. The SAP LVM user will have the flexibility to choose between using application virtualization or hypervisor virtualization. For example, if there is scheduled hardware maintenance on a server, then the SAP LVM user may choose to use the hypervisor virtualization to move the virtual machines off of that hardware. Although, during maintenance weekend, the
SAP LVM user may choose to move certain SAP systems to more powerful servers to speed up the maintenance weekend processing.

**Initial setup, configuring the SAP system mount points, and executing base operations**

**Setup**

After SAP NetWeaver Landscape Virtualization Management software is installed as an add-on to SAP NetWeaver, there are several configuration steps required. We will not cover all of them, only point out the important steps for our EMC integration with SAP NetWeaver Landscape Virtualization Management software. There are several possible selections that you may choose to set in the setup section of SAP LVM:

There are three area of configurable parameters in the setup section; User Interface Settings, E-Mail Notification Settings, and Engine Settings.

We recommend viewing these options so you are familiar with what can be pre-configured. During our testing we had to make sure the following options were selected on Engine Settings; “Allow Multiple Services on Same Resource” and “Allow Multiple Database Services on Same Resource”. We also set the “Show Advanced Shutdown Options when Stopping Operations” for more functionality.

**Host control agent and SAP profile parameters**

It is recommended to make sure the SAP Host Control Agent is at the latest version and that it is also installed on the server running SAP LVM. It is important to apply SAP note 1550099, to add the operation.d directory with a configuration file.

The SAP profiles required additional parameters; SAPLOCALHOST, SAPLOCALHOSTFULL, icm/host_name_full.
Install EMC Solutions Enabler on all server resources that have LVM managed SAP systems or will have LVM managed SAP systems. You may have to create the required SAP users if the target servers do not already have them defined. Verify the EMC shared library has a symbolic link in /usr/sap/hostctrl/exe/libsapacosprep_emc.so for all SAN implementations.

It is highly recommended to enable multi-pathing using EMC PowerPath. Native multi-pathing is also supported.

**Special note about volume groups**

SAP LVM 1.0 and Solutions Enabler 7.4 will support volume groups for SAN configurations. The volume group must only have 1 logical volume, but can have multiple physical luns. Single lun mount points without a volume group are also supported. We recognize this as a limitation and SAP LVM 2.0 will have the ability to add multiple logical volumes to a volume group along with multiple physical luns.

**Retrieving SAP system mount points in SAP LVM**

In the configuration screen of the SAP NetWeaver Landscape Virtualization Management interface, you will define pools, services, and resources.

During the *add services* process, you will be able to define the mount points in step 3. In step 1, you will be providing the database configuration information. Step 2 is where you will select the system to be AC-Enabled. This allows for the management of the SAP System by SAP LVM. In step 3, you will be able to add your mount points. It is highly recommended that you retrieve the mount points automatically by selecting the *Retrieve Mount List* button:
The button will use the binaries and the shared libraries between SAP and EMC to automatically populate the mount list with all of the mount points that are seen on the resource or server. Highlight and remove the mount points that do not pertain to this SAP instance. Below is an example of what will be populated. As you can see each field contains detailed information about the mount point, volume group, logical volume, and physical luns. This is why it is highly recommended to use the Retrieve Mount List button, because the SAP LVM user will not know what is required in each field.

**Issuing operation functions for SAP systems and instances**

Once the mount points are configured for all SAP systems and instances, then you have the freedom to start, stop, prepare, unprepare, and relocate the SAP systems and instances, including mass operations. This will be done in the Operations section of SAP LVM.

The SAP LVM interface shows the available SAP systems and instances on the top half of the screen and you can select your options on the lower half of the screen. The above example shows a mass relocate for the SE1 SAP system from saperpsrc server to saplin249 server.
Once the execute button is selected the services are locked and the process begins. You can switch to the Monitoring section of the SAP LVM Interface. This section will display all of the automated step and the progression through the steps.

Overview of SAP NetWeaver Landscape Virtualization Management software extended functionality, including clone, copy, and refresh

Clone

SAP has extended the functionality of Landscape Virtualization Management software to include clone, copy, and refresh. SAP system cloning will create a copy of the SAP system in a fenced LAN configuration. This is done so the SAP system id can remain the same. The integration with EMC will include the ability to make the copy of the SAP system using either full volume Clones or on pointer based Snaps within the array. EMC clones are like devices that will use the same storage space as the source SAP system. EMC Snaps are pointer based copies that require the space for changed data. In typical environments this could be as little as 30% of the source SAP system.
It depends how frequently the SAP system data is updated and changed. EMC has tools that can help determine how much space is actually needed for Snaps.

Once a clone is initiated, the SAP LVM interface will use EMC’s SMI-S provider integration to either create new devices or use existing devices for the clone or snap. Either a clone or a snap will be created and activated. SAP LVM will then create a fenced LAN environment on the target server. The clones or snaps of the cloned SAP system will be mounted or prepared on the target server. Finally the newly cloned SAP system will be started.

Copy

SAP system copy will perform many of the same step as clone, except instead of creating a fenced LAN environment so the SAP system id can remain the same, SAP LVM will rename the SAP system and invoke SAP’s Post Copy Automation, PCA. The PCA procedure will automate and perform all of the numerous post copy steps that so many SAP customers are very familiar with. EMC’s integration is still providing the ability to create new devices or use existing devices in order to create either an EMC clone or Snap for the copied SAP system.
Once a copy is initiated, the SAP LVM interface will use EMC’s SMI-S provider integration to either create new devices or use existing devices for the clone or snap. Either a clone or a snap will be created and activated. SAP LVM will then rename the SAP system id and perform the post-copy automation. The clones or snaps of the copied SAP system will be mounted or prepared on the target server. Finally the newly copied SAP system will be started.

Advanced configuration to take advantage of extended functions including clone, copy, and refresh

Setup

In order to enabled clone, copy, or refresh you must first set a system profile parameter and enable the SAP system for clone and/or copy in the configuration screen. The SAP system profile, `service/EnableRemoteDeployment = true`, should be looked at to see if you require this in your environment. Also a unique identifier, `system/UUID=` will be required to be set but can also be set from the SAP LVM interface.

The `Configuration` section, `Services` tab in the SAP LVM interface will need to have cloning or copying selected in order to access those screens. The UUID parameter mentioned above can also be added to the default profile on this screen. The copy option will also require RFC connections to be defined.
SMI-S Configuration

SMI-S is already installed on the server and has visibility to the EMC Storage arrays. There is also an *Infrastructure* tab in the *Configuration* section of the SAP LVM interface that must be completed. You will add the SMI-S credentials in the *Storage Manager* area in the *Infrastructure* tab.

After you select the *Add* button, lists of supported Storage Managers are listed. You will select the one pertaining to EMC. There are two in the list for EMC; one for NAS.
implementations and one for SAN implementations. These may be combined in the future. The interface for NAS environments is listed as *EMC Corp* for the vendor field and *ESI for SAP-LVM (VNX-File)* for the product field. The SMI-S interface for SAN environments is listed and *EMC* for the vendor field and *Symmetrix / Clariion* as the product field. Our NAS implementation currently covers VNX family and Celerra product lines. The SAN implementation covers the Symmetrix VMAX family, the VNX family, and the CX4 product line. This section will focus on the SAN implementation and how to define the SMI-S interface.

On the next screen you will enter the information related to the SMI-S Provider installed either on the LVM server or another server in your SAP LVM environment. If you updated any of the SMI-S defaults, please enter your new parameters created for SMI-S. The *Label* field can be named anything you desire. In our example we named it emcsmis. Another appropriate label would be EMC_SAN. The next two fields, *User Name* and *Password* are the defaults provided in SMI-S and are listed in the SMI-S Release Notes. If you chose to change these, please use your new information. The final field, *URL*, is IP address of the server that you installed the SMI-S Provider on following by a colon “:” and the port number for SMI-S, 5988 is the default port provided with the SMI-S Provider.

Once all of this information is entered, select the *Test Configuration* button to check if the SMI-S Provider is communicating properly with SAP LVM. If it is you will receive a *Connection successful EMC SMI-S Provider* message at the bottom of the screen.
You can select the *Next* button to select which storage arrays have SAP systems installed or the arrays that have servers or resources that you will be accessing.
The final screen will show you an overview of everything you selected and you will be able to save the configuration.

Issuing clone and copy operations for SAP systems and instances

Once SMI-S is configured properly and the proper profile parameters are specified you can begin to issue clones or copies of the SAP systems. This document will focus on the highlights of the clone steps focusing on the storage integration from EMC. These steps will apply to both clone and copy. We will not focus on the additional steps in the copy procedure because it is related to SAP functionality only and out of the scope of this document.

The Provisioning section of the SAP LVM interface is where you will initiate the copy, clone, and refresh procedures. The SAP LVM screen will list the available systems to clone on the left hand side of the screen. You will also have more options if you select additional options in the Configuration section. For example, our screen only shows Clone System and Manage System Snapshots because we did not select the copy option yet or set up the RFC connections. Highlight the SAP system you would like to clone and select the Clone System button to initiate the steps for cloning.
This process will take you through six (6) steps to populate the information for a clone. The first step will select the pool for the clone and name the clone process as well as provide a description of the clone. The second step will allow the SAP LVM user to define the resources or servers. The source server is already populated but the target server should be selected from the available server resources defined in the Configuration section. The third step will define the virtual host names and network information of the cloned SAP system.
Step four is where the storage information is populated. At the top of the screen you have the ability to select the consistency options; **No special actions to ensure consistency**, **Database Consistency (Online Clone)**, and **Stop & Restart the SAP System (Offline Clone)**.

The lower section will list the source information on the left and the target information on the right. The target information is populated with the same **Storage System array id** as the source and the same **Storage Pool** as the source. A special note for Meta Volumes, it is required to leave the **Storage Pool** blank. If this field is left blank, EMC’s SMI-S Provider will select the appropriate storage pool.

The **Operation** field will default to **Create New Volume**, but you can change it to **Clone to an Existing Volume**. If you do, you will be required to select an available volume from the pop-up box associated with the **Volume** field. If you left the **Operation** field as **Create New Volume**, then you will leave the **Volume** field blank. **Create New Volume** will direct SMI-S to create a completely new device in the **Storage Pool** provided.

The **Volume Name** field is a “friendly name” of the LUN or volume. The source will list Volume followed by the LUN Symmetrix (or VNX/CX4) address. The target **Volume Name** field will be populated with the same appended with a number, such as “1” or “2”, to make it unique. It is recommended to provide a more intuitive friendly volume name. When the line is highlighted the mount data is listed at the bottom of the screen for that LUN. In this example, the source Volume 8E is `/usr/sap/SE1`. A great friendly name to enter in the **Volume Name** field would be `vol_usr_sap_SE1` versus the Volume 0008E1 listed.
Finally the last column is where you select either full volume clone or pointer-based snap from EMC. If it is checked you will receive a full volume clone, otherwise you will receive a pointer-based snap.

Special note: It would be a good idea to involve the storage management personnel when setting up the clone processes to let them know in advance that extra storage will be consumed.

The fifth step is associated with the fenced LAN isolation. The sixth step is a summary of all the steps and where you select the Start System Cloning button.

Immediately SAP LVM will bring up the Monitoring section of the interface. This will list all of the steps required to create the SAP System clone.

The same process will occur for copy, except with additional steps for the post-copy automation steps and renaming of the SAP system. The EMC integration is very similar as what is listed above.

## Conclusion

EMC’s integration with SAP NetWeaver Landscape Virtualization Management software includes the use of a storage library for SAN configurations. This storage library provides the ability to automatically detect and retrieve the SAP system mount points, mount and unmount file systems and volume groups. This process is used during any Prepare or Unprepare phase. This could be while Relocating SAP systems or making Clones or Copies of those SAP systems.
The actual clone or snap process from EMC that is taken during a SAP *Clone or Copy* process is the result of EMC’s SMI-S Provider integration. This functionality will create new volumes or use existing volumes for the replication process.

EMC will continue to grow and enhance the integration we have with SAP NetWeaver Landscape Virtualization Management Software.