Automated Managed System Reconfiguration
SAP Solution Manager > 7.2 SP01

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Agenda

General

Configuration Step-by-Step

Data Flow

Logs
General
Naming Conventions

- **MSC** = Managed System Configuration
  Performed by users via a guided procedure in SAP Solution Manager Configuration.

- **AMSC** = Automatic Managed System Configuration
  Performed without user interaction. Also known as *Automated Reconfiguration* and *Automated Option*.

- **SISE** = Simple Setup
  SAP Solution Manager Configuration (solman_setup). SISE is an acronym used in development objects.

- **MAI** = Technical Monitoring and Alerting Infrastructure
Goals of Automated Reconfiguration

- Adapt the SAP Solution Manager configuration to dynamic landscape changes
- Reduce the effort required for system maintenance during regular production
- Close communication gaps between Technical Landscape Operations (TLO) and Operation Control Center (OCC)

For example, TLO removes a system instance but does not inform OCC about it. An alert about the missing instance is generated automatically, prompting OCC to resolve the discrepancy.
AMSC Process Overview (Simplified)

1. SLD data supplier reports technical system changes (upgrades, addition or removal of instances, etc.) to the LMDB.

2. LMDB sends notifications about the technical system changes to so-called “notification consumers.”

3. Notification consumers execute configuration activities for the technical systems in the background, without user interaction.

Before SAP Solution Manager 7.1 SP12, MSC activity functions only provide standard interfaces for execution by users via a guided procedure. The guided procedure must be repeated whenever a technical landscape object changes.

With SAP Solution Manager 7.1 SP12, MSC activity functions provide additional interfaces for automatic background execution of configuration activities, triggered by LMDB notification.
AMSC Architecture Overview (Simplified)

Data Provider to LMDB
- SLD Content Sync
- Outside Discovery
- LMDB UI

Report dynamic landscape change

Create Delete Change Rename

LMDB Notification Framework

Internal Landscape Management Change Notification Consumer
- LAPI
- SMSY
- Dual Stack Tech Scenarios
- Product System + Diagnostic Relevant Flag

External Change Notification Consumer
- MAI-HA-Switch
- SolMan Setup
- IBase Consumer

Additional Consumer
- Monitoring and Alerting Infrastructure
- Adapt SAP Solution Manager Configuration

Relevant Components for AMSC

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Use Cases Overview

- The following changes in the managed landscape are covered
  - Instance added
  - Instance moved to different physical host
  - Instance removed
  - Product version / product instance upgraded
  - Product version / product instance added
  - Product version / product instance removed
  - JAVA server node added
  - JAVA server node removed
  - Database replication scenario takeover (only released for HANADB)
AMSC Prerequisites and Limitations

➢ The initial managed system configuration must be executed completely and successfully.

➢ To automatically update the configuration for added instances, SAP Host Agent and Diagnostics Agent must be installed on new hosts, and the managed host setup must be completed. The Agent-on-the-Fly option must be selected for the Diagnostics Agent.

➢ AMSC does not support heterogeneous installations (dialog instances on different OS).

➢ For a multi-instance ABAP system, it is strongly recommended to use an RFC logon group to create RFC destinations. Without a logon group, AMSC cannot recreate RFC destinations when an instance the RFC points to is removed.
Support Components

In case of issues with AMSC, open a customer incident with the following components:

- LMDB and LMDB notification jobs → SV-SMG-LDB
- SolMan_Setup notification consumer jobs and activities → SV-SMG-INS-CFG-MNG
- MAI notification consumer jobs and activities → SV-SMG-MON-ALR-CFG
Configuration Step-by-Step
AMSC Entry Point

Select one or multiple systems

Open the AMSC Configuration
Automated System Configuration Handling

Choose which configuration steps and activities to execute automatically. Select **Full Automatic** to execute all steps, or select individual steps and activities.

The SolMan Setup framework is the first LMDB notification consumer. You can add Technical Monitoring as an additional notification consumer.
MSC Steps Explained in Context of AMSC: Assign Product

A new version of the product system and new versions of installed product instances will be calculated automatically by LMDB. There is no configuration option in AMSC to enable or disable this step. AMSC uses the product modeling from the initial managed system configuration.

Note: Logical components are not updated automatically due to unforeseeable effects on existing projects and solutions.

The Diagnostics-Relevant flag is automatically set for the new installed product instance.
ASMC always performs the **Check Prerequisites** step. There is no configuration option in AMSC to enable or disable this step.
MSC Steps Explained in Context of AMSC: Connect Managed System

The **Maintain RFCs** step is only for ABAP systems. For ABAP systems with frequent dynamic assignment or removal of instances, it is recommended to use an RFC logon group (message server) to connect to SAP Solution Manager.

There is no configuration option in AMSC to enable or disable this step.
A Diagnostics Agent must be assigned to each landscape object in the LMDB. For a technical system, the landscape objects are instances and databases.

The Agent-on-the-Fly functionality automatically creates a dedicated Diagnostics Agent for each local hostname bound to a physical host. This ensures that a Diagnostics Agent exists for each hostname where an instance or database is running.

The **Assign Diagnostics Agent** step confirms that a certain Diagnostics Agent is assigned to a certain instance. Agent-on-the-Fly enables this confirmation to be done automatically. Prerequisite for Agent-on-the-Fly is proper configuration of all local hostnames in `/etc/hosts`. 
MSC Steps Explained in Context of AMSC: Enter System Parameters

The **Enter System Parameters** step maintains parameters for Wily EM, load balancer, the managed system itself, and the managed system database.

It is not possible to calculate values for these parameters automatically, so AMSC omits this step. There is no configuration option in AMSC to enable or disable this step.
MSC Steps Explained in Context of AMSC: Enter Landscape Parameters

The **Enter Landscape Parameters** step maintains server node paths and ICM ports for instances. AMSC calculates the paths and ICM ports for new instances based on the existing instances.

Note: AMSC only supports homogenous installations. That means all application server instances (not the DB and not the ASCS/SCS) must run on the same OS and be installed using SAP standard paths.
In the **Maintain Users** step, default users are created and roles are assigned and upgraded.

For a product version/product instance upgrade, assigned roles can be updated automatically. For example: There was an upgrade from NW70 to NW74, and new ST-PI and ST/A-PI were imported as part of that upgrade. The roles for the standard users need to be updated.

If this option is selected, AMSC will automatically update the roles.

If your security policy does not allow automatic updating of roles, deselect this option.
The **Finalize Configuration** step consists of several automatic activities that can be selected independently for automatic configuration.
AMSC always performs the **Check Configuration** step. There is no configuration option in AMSC to enable or disable this step.
The Technical Monitoring setup can be an additional consumer of the LMDB notification. A successful managed system configuration is prerequisite for setting up technical monitoring, so the additional consumer will be notified only after the managed system configuration activities have been executed.

For the added instance / server node use cases, a technical monitoring template is assigned and configured the same way as for the existing instances.

For the upgrade use case, the configured default template is used.
Data flow
AMSC Architecture Overview: Data Provider
<table>
<thead>
<tr>
<th>Change</th>
<th>SLD Data Provider changes on CIM Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition / Removal of J2EE server nodes</td>
<td>Creation / deletion of CIM object instance of type <code>SAP_J2EEEngineServerNode</code> (SAP AS Java Server Node). The SLD DS does this automatically as result of the J2EE instance configuration.</td>
</tr>
<tr>
<td>Upgrade of installed product instances</td>
<td>Modification of (multiple) CIM object instances of type <code>SAP_SoftwareComponent</code> (Software Component). The SLD DS does this automatically as result of the upgrade.</td>
</tr>
<tr>
<td>Moving an instance with a LMDB hostname of name type “logical host”</td>
<td>Deletion and new creation of the CIM association “<code>SAP_IdenticalComputerSystem</code>” (Identical Computer System) of the CIM object instance <code>SAP_ComputerSystem</code> (Computer System). Outside discovery automatically reports this directly to the LMDB.</td>
</tr>
<tr>
<td>Addition of instance</td>
<td>Creation of CIM object instance <code>SAP_ApplicationSystemInstance</code> (Application System Instance). The SLD DS does this automatically as result of the installation of an additional instance.</td>
</tr>
</tbody>
</table>
SLD DS: SLD Data Provider Changes on CIM Level

Change
Deletion of instance

SLD Data Provider changes on CIM Level

There is no SLD DS activity for the deletion of an instance. This means SLD DS cannot trigger the deletion of CIM Object Instance SAP_ApplicationSystemInstance. The problem is how to recognize/trigger the deletion of an Application Server instance on CIM Level. The next slide outlines some options for handling this issue.

Database replication scenario failover

After a DB takeover CIM Object Instances need to be updated. The SAP_IdenticalDatabaseSystem Association Instance pointing to the former Primary will be deleted, and a new one pointing to the new Primary will be created. The old SAP_DatabaseReplicationDependency Association Instance will be also deleted and a new SAP_DatabaseReplicationDependency Association Instance will be created with switched Antecent, Dependent.
**SLD DS: Alternatives for Deletion of Instances**

- For technical instances of an AS ABAP or AS Java, you can define a lifetime in the System Landscape Directory (SLD). This automatically adds and deletes the instances. For more information, see SAP Note 1694072.

- You can manually delete technical instances in the SLD, as described in SAP Note 1160192. If technical instances become active (again), they are automatically added.

- In the LMDB, you can manually set the Enabled State field of the technical instance to Disabled. Note that as soon as you manually define the Enabled State field in the LMDB, the information is no longer updated by SLD synchronization. (For more information, see SAP Note 1984076.) So if the technical instance is to be enabled again, later, you must manually select the application server or the Java instance and set the field to Enabled.

  Possible values for Enabled State:
  - Unknown: default
  - Enabled: System is released for non-administration users, nominal condition is an operable system
  - Disabled: System is in a planned, inoperable state with unknown end date
  - Passive: System is running as a backup, only administration users can log in
AMSC Architecture Overview: SLD Sync

Data Provider to LMDB
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LMDB Notification Framework

Internal Landscape Management Change Notification Consumer
- LAPI
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Additional Consumer
- Monitoring and Alerting Infrastructure

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LMDB: Sync from SLD

- All changes from the SLD DS in the SLD are synced into the LMDB by job SAP_LMDB_LDB_00000000X/XXXXXXX.

- By default, the job runs under user SOLMAN_BTC.

- The job log does not show specific changes, only the amount of changes and the correctness of the run.

- Pending syncs (if any) can be seen in the status details under SolMan_Setup → System Preparation → Setup LMDB → Advanced or in the LMDB (All Details) report at Status for SLD -> LMDB Content Synchronization.
AMSC Architecture Overview: LMDB Notification

Data Provider to LMDB

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LMDB Notification Framework

- LMDB

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Monitoring and Alerting Infrastructure

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The LMDB notifications are sent as part of job SAP_LMDB_NOTIFY_LDB_XXXXXXXXXXX.

By default, the job runs under user SOLMAN_BTC.

The different consumers are listed in the job log. The following consumers are important for AMSC:

- **CL_LAPI_NOTIFICATION_CONSUMER**
  Update the landscape API cache about changes in the systems. Because Solman_Setup and MAI are accessing the LMDB through the landscape API, it is important that the LAPI cache is up to date before activities are triggered.

- **CL_LMDB_HOST_SWITCH_CONSUMER**
  Directly notify the MAI about a switch of hostname of name type “logical host” to a different host of hostname type “physical” or “virtual”. The MAI collects instance-specific metrics in the context of the logical name and OS-specific metrics in the context of the physical/virtual host. This relationship in MAI is a parent-child relationship, which needs to be recreated in case of a host switch.

- **CL_LMDB_IPI_UPDATE_CONSUMER**
  LMDB-internal consumer doing the automatic upgrade of installed product systems and the automatic assignment of a new diagnostic-relevant flag in the case of an upgrade.

- **CL_LMDB_SISE_AUTOMAT_CONSUMER** → Main consumer of AMSC, see next slide.
Main consumer of AMSC. With this notification, the LMDB notifies the SAP Solution Manager Configuration about added or removed instances and java nodes, and upgrades.

The entry in the LMDB notification job log contains detailed information about the kind of notification and the change log ID.

It is important to know that the CL_LMDB_SISE_AUTOMAT_CONSUM notification is only sent after the CL_LAPI_NOTIFICATION_CONSUMER has confirmed that the LAPI cache was updated successfully.
SISE_NOTIFICATION_JOB

- The LMDB notification of CL_LMDB_SISE_AUTOMAT_CONSUM triggers the execution of SISE_NOTIFICATION_JOB.

- Within the SISE_NOTIFICATION_JOB, the MSC configuration activities are executed automatically as defined for the notified use case and as allowed in the AMSC configuration. The different activities are returned in the job log together with the change log ID of the LMDB.

- The default user for this Job is SM_AMSC. Note that SISE_NOTIFICATION_JOB checks if this user is created correctly as part of SAP Solution Manager Configuration → Basic Configuration → Specify User & Connectivity Data → Maintain Users.
AMSC Architecture Overview: LMDB Notification

Data Provider to LMDB

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LMDB Notification Framework

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Additional Consumer

Monitoring and Alerting Infrastructure
Additional Consumer MAI

- MAI is the only possible additional consumer of the LMDB notification.
- After all of the configuration activities in CL_LMDB_SISE_AUTOMAT_CONSUM have been executed, CL_LMDB_SISE_AUTOMAT_CONSUM notifies the MAI consumer.
- Notification of the MAI consumer is logged in the table ACLSCHANGEEVENTS, with the change log ID and notification type.

![Data Browser: Table ACLSCHANGEEVENTS Select Entries](image)
Additional Consumer MAI

- The changes for MAI are executed with job BACKGROUND_AUTOCONFIG.
- The default user for this job is SM_AMSC.
- If new technical monitoring templates have to be assigned to landscape objects as part of this AMSC activity, MAI uses the templates as defined as “default” in the template maintenance.

Job log overview for job:  BACKGROUND_AUTOCONFIG / 09141500

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.04.2014</td>
<td>09:14:15</td>
<td>Job started</td>
</tr>
<tr>
<td>16.04.2014</td>
<td>09:14:15</td>
<td>Step 001 started (program ACR_APPLY_AND_ACTIVATE_MEAS, variant 60000000000004, user ID SM_AMSC)</td>
</tr>
<tr>
<td>16.04.2014</td>
<td>09:14:15</td>
<td>Starting reconfiguration for entry points SNN-ABAP</td>
</tr>
<tr>
<td>16.04.2014</td>
<td>09:15:15</td>
<td>Job finished</td>
</tr>
</tbody>
</table>
Logs
Log Types

- Job logs of the three important AMSC jobs
- MSC and technical monitoring setup activity logging
- AMSC configuration UI logs
Job Logs

To trace the AMSC dataflow for troubleshooting or testing purposes, see the job logs of the following jobs:

- SAP_LMDB_NOTIFY_LDB_X*XXX
- SISE_NOTIFICATION_JOB
- BACKGROUND_AUTOCONFIG

The execution of SAP_LMDB_NOTIFY_LDB_X* triggers the SISE_NOTIFICATION_JOB, and when the activities within are executed correctly, this triggers the execution of BACKGROUND_AUTOCONFIG.

The job logs are helpful for determining which system the execution was triggered for.

The LMDB change log ID is written in the job logs (in the table ACLSCHANGEEVENTS for MAI). It can be used for backward analysis, to locate the causal event in the LMDB.
MSC and Monitoring Setup activity logging

The Managed System Configuration and Technical Monitoring setup activity logging are well known. With automatic configuration, the activities are written exactly the same way as when executed by user interaction. The difference is that in the AMSC case, they are written for the user SM_AMSC, which executes the notification consumer job in the background.
AMSC UI Logs

There are two logs within the AMSC UI:

- **Configuration Log**: Logging the saved configuration

- **Operation Log**: Central log destination for configuration activities executed by AMSC. Convenience for administrators to check all logs for a system at a central place.
Thank you.