A Runbook Guide to easily enable HANA System Replication automation failover with SUSE Linux Enterprise Server for SAP Applications
1 Introduction

This runbook describes how to access and how to show a YAST module in SUSE Linux Enterprise Server for SAP Applications 15 that automates common tasks with SAP HANA. This includes simplifying the enablement of SAP HANA System Replication, as well as configuring SUSE Linux Enterprise High Availability to monitor and initiate HANA System Replication takeover in case of a failure of the primary HANA system.

An experienced administrator will take 60 to 90 minutes to perform these tasks manually for a production SAP HANA deployment. With the automation these tasks take less than 10 minutes.

1.1 Architectural Overview

The following block diagram shows the initial configuration of the environment before starting the demonstration. Two important items to note are:

- SAP HANA System Replication is not configured.
- The SAPHanaSR resource agent and the SUSE High Availability components are not configured.
SUSE is the Open Open Source Company.

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This demonstration use SUSE Linux Enterprise Server (SLES) for SAP Applications 15 as the certified and preferred Linux operating system for SAP HANA. Included in SLES for SAP Application is the high availability technology, Pacemaker, and the SAPHanaSR resource agent that will monitor and automate the HANA System Replication failover in case of system failure.
2 Log on to the Dell EMC Lab VPN

2.1 Getting started

To access the demo system from your computer you need to use a VPN. Contact Christian Bronk (christian.bronk@dell.com) to request a user name and initial password.

When you received your user name and password, please download the How-to-Guide for accessing the VPN from https://inside.dell.com/docs/DOC-371961. In this guide you will find instructions how to setup and use the SonicWall Global VPN Client (IPSEC).

Please note: when accessing the GSCOE VPN, you cannot be accessing any other VPN!

2.2 Review and absorb the reference material

To offer a good demonstration to our customers it is important that the provider of the demo has a good understanding of:

- SAP HANA System Replication
- Simplified SAP HANA System Replication Setup including in SUSE Linux Enterprise Server for SAP Applications

which is documented in the resources and information contained within the reference material in Section 5 – References. Please review this material before offering the demonstration.
3 Easily enable HANA System Replication

SAP HANA is a critical component in a SAP deployment. If the database is unavailable then the SAP system is unavailable. SAP provides several different options to make the HANA database highly available. HANA System Replication is a common highly availability option deployed by customers because the replication technology is included in SAP HANA.

HANA System Replication addresses data protection by replicating data changes from a primary database to a secondary database. SAP HANA cannot guarantee uninterrupted access to the data if the primary database server stops responding. The impact is downtime for a company and its users of a SAP system.

To recover from a failed primary, a SAP HANA administrator will need to manually issue commands to initiate a failover to the secondary HANA system. In contrast, this solution monitors the primary database server and can automatically initiate the failover to the secondary systems if the primary stops responding. This means that the business and its users keep working.

3.1 Solution Overview

SAP HANA System Replication protects the data by replicating any changes from the primary HANA database to a secondary. The high availability technologies included in SUSE Linux Enterprise Server for SAP Applications continuously monitor and if necessary automatically initiate the failover so the secondary HANA database becomes the primary.

This solution simplifies the multi-step process of enabling HANA System Replication and configuring Pacemaker and Corosync, the two core components in the high availability technology, which monitor and automate HANA System Replication failover.

3.2 Solution Components

The following components are required before using the YAST module.

- SUSE Linux Enterprise Server for SAP Applications is installed on two servers.
- The systems have the sap-hana OS pattern installed.
- The OS on each system is registered and fully patched.
- Two NIC bonds are properly configured and working.
- Two small SAN LUNs to be used for HA fencing
- The SAP HANA database is installed per SAP recommendations on the two servers with the same System ID (SID) and Instance number.

- After using the YAST module, the additional components will be configured and enabled.
  - HANA System Replication
• Network Time Protocol
• Two Corosync rings used for HA heartbeat
• Pacemaker, the HA resource manager
• The following resources agents being managed by Pacemaker
  o SBD Fencing using the two shared SAN LUNs
  o Virtual IP address
  o SAPHanaSR

### 3.3 Dell EMC Infrastructure

The Dell EMC infrastructure for this demonstration consists of two R940 SAP HANA Appliances, with an example network configuration as suggested in diagram 2.

![Diagram 2: Example Infrastructure – For Two R940 SAP HANA Appliances](image)

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Model</td>
<td>Dell EMC PowerEdge R940</td>
</tr>
<tr>
<td>CPU</td>
<td>Up to either:</td>
</tr>
<tr>
<td></td>
<td>• 4 x Intel Xeon Platinum 8280/M/L 2.7GHz, 28C/56T, 10.4GT/s 3UPI, 38M cache</td>
</tr>
<tr>
<td></td>
<td>• 4 x Intel Xeon Platinum 8276/M/L 2.3GHz, 28C/56T, 10.4GT/s 3UPI, 38M cache</td>
</tr>
<tr>
<td></td>
<td>• 4 x Intel Xeon Platinum 8180/M/L 2.5GHz, 28C/56T, 10.4GT/s 3UPI, 38M cache</td>
</tr>
<tr>
<td></td>
<td>• 4 x Intel Xeon Platinum 8176/M/L 2.1GHz, 28C/56T, 10.4GT/s 3UPI, 38M cache</td>
</tr>
<tr>
<td>Memory</td>
<td>Up to 48 x DDR4 RDIMM/LRDIMM</td>
</tr>
<tr>
<td>Backplane1</td>
<td>24-drive backplane</td>
</tr>
<tr>
<td></td>
<td>Support for SSD/SAS disks: Up to 24 x SAS HDD/SSD with 24-drive backplane</td>
</tr>
<tr>
<td>RAID Controller</td>
<td>PERC H740P RAID controller, 8 GB NV cache, adapter</td>
</tr>
<tr>
<td>Embedded Network</td>
<td>One of the following:</td>
</tr>
<tr>
<td>Interface Card (NIC)</td>
<td>• Intel X710 Dual Port 10GbE SFP+ &amp; i350 Dual Port 1 GbE, rNDC</td>
</tr>
<tr>
<td>Additional Network Interface Cards</td>
<td>Intel X550 Dual Port 10GbE Base-T &amp; i350 Dual Port 1 GbE BASE-T, rNDC</td>
</tr>
</tbody>
</table>
| 1GbE cards | Intel Ethernet i350 Dual Port 1GbE BASE-T Adapter  
| 1GbE BASE-T, rNDC |
| Intel Ethernet i350 Quad Port 1GbE BASE-T Adapter  
| Intel X520 Dual Port 10GbE SFP+ Adapter  
| Intel X520 Dual Port 10GbE Base-T Adapter  
| Intel X710 Quad Port 10GbE SFP+ Adapter  
| Intel X710 Quad Port 10GbE Base-T Adapter  
| 25GbE cards (Cascade Lake only)  
| Intel XXV710 Dual Port 10/25GbE SFP28 Adapter  
| Mellanox ConnectX-4 LX Dual Port 10/25 GbE SFP28 Adapter  
| Qlogic FastLinQ 41262 Dual Port 10/25GbE SFP28 Adapter  
| 40GbE cards (Cascade Lake only)  
| Intel XL710 Dual Port 40GbE QSFP+ Adapter  
| Mellanox ConnectX-3 Pro Dual Port 40 GbE QSFP+ Adapter |
| Power | Up to 2 AC or DC power supplies with 1+1 redundancy:  
| AC (Platinum): 1100W, 1600W, 2000W  
| DC: 1100W |
| PCIe slots | PCIe Gen3:  
| Base 7 slots (3 x 8 + 4 x 16)  
| Max 13 slots (3 x 8 + 10 x 16) for 4x CPUs |
# How to run the demo – step-by-step

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 0    | To reset the demo, the following must be run as root on slhana1.  

```
# reset-demo.sh
```
| 1    | On slhana1 or slhana2 as root:  

```
# yast
```
| 2    | Using the arrow keys, select **High Availability | HA Setup for SAP Products** and press Enter |

6. Use tab key to select and change fields to match the screenshot below then use Alt-N to select Next.

7. Use Alt-N to select Next on the NTP Configuration screen.

8. Use tab key to select and change fields to match the screenshot below then use Alt-N to select Next.

9. Use Alt-N to select Next on the Watchdog Setup screen.

10. Use tab key to select and change fields to match the screenshot below then use Alt-N to select Next.
11 Use the arrow keys on the High-Availability Configuration Overview screen to review the chosen options. When ready, Use Alt-I to select **Install**

12 The installation and configuration will take several minutes. You will see screens similar to ones below.
13 Use the arrow keys on the High-Availability Setup Summary screen to review results. Point out the last line which should say **Overall status: GREEN. There were no errors.** When finished reviewing, Use Alt-F to select **Finish.**

14 Use Alt-Q to quit YAST.

15 On slhana1 or slhana2 as root:

```
# crm_mon -1
```

You may see something similar as the example below which is the state of the HA cluster and the resource agents.

```
Note: If you see the **Failed Actions** warning, enter the following command and repeat this step. This warning is due to a monitor timing issue and is not a problem with the cluster or HANA.

```
# crm resource cleanup rsc_SAPHana_SH1_HDB00
```

Point out that the HANA primary node listed in Masters. The virtual IP address, rsc_ip_SH1_HDB00, should be on the same node at the HANA primary.
On both slhana1 or slhana2 as root:

```
# su – sh1adm
sh1adm@slhana1:/usr/sap/SH1/HDB00> hdbnsutil -sr_state
```

You may see something similar as the examples below.

Point out which HANA system is the primary and which is the secondary.
5 References

- SAP HANA System Replication
- Configuring SAP HANA System Replication
- Simplified SAP HANA System Replication Setup
- Simplifying the SAP HANA System Replication setup and automated failover configuration video
6 Appendix – A

[Add appendices as appropriate / required. This could be FAQs, troubleshooting hints, further pictures, settings for the demo.... ]
7 Feedback

If you have any suggestions or if something has not been explained in an understandable way, please give us some feedback.

Please send us an email to GSCoE@dell.com with the subject: VPN Document.

Thank you very much.