

EMC END-TO-END INTELLIGENT CLONING FOR SAP ENABLED BY EMC REPLICATION MANAGER AND CISCO TIDAL INTELLIGENT AUTOMATION FOR SAP A DETAILED REVIEW

EMC SOLUTIONS GROUP

Abstract

This white paper demonstrates that Cisco Tidal Intelligent Automation for SAP can successfully integrate with EMC Replication Manager to enable easy-to-administer SAP test system refreshes. Customers can use this solution to improve business continuity, increase IT productivity, provide end user self-service capabilities, and reduce the risk of business disruption.

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Executive summary

Business case

Most SAP environments require the generation of SAP system copies (from production to non-production systems) that reflect current, applicable business data. Today, this is a manual process that requires saving key system data (such as RFC, transports, and other key data) before the refresh, performing the refresh, reapplying the saved key data, and performing additional time-consuming post-processing activities.

Even though some customers have automated the storage-side processing with scripts that automate the operation of EMC replication tools, the required application-side processing continues to be time-consuming and labor-intensive.

Solution overview

The solution builds on the capabilities of Cisco Tidal Intelligent Automation for SAP (TIA), which is software that automates system refresh procedures for SAP systems including SAP Business Warehouse (BW).

In the solution, TIA performs pre-replication steps on the source and target SAP systems, launches EMC Replication Manager (RM) to perform the replication operation, and then performs post-replication steps on the source and target SAP systems.

During the replication operation, TIA takes appropriate actions depending on the status of the process.

The use of existing native TIA adapters to interface with RM through RM-supported external calls offers a complete, automated solution for both the storage and SAP application-related system copy tasks.

Key results

This white paper demonstrates that Cisco Tidal Intelligent Automation for SAP can successfully integrate with EMC Replication Manager to enable easy-to-administer SAP test system refreshes. Customers can use this solution to:

- Improve business continuity with automated, non-disruptive storage-based replication processes
- Increase IT productivity with the simplification and end user self-service capabilities provided by the integration of EMC Replication Manager and Cisco Tidal Intelligent Automation for SAP
- Reduce the risk of business disruption by eliminating error-prone manual scripting

Additional benefits

Not only does this solution automate and streamline SAP test system refreshes, it can also greatly assist in managing the application changes required by SAP data and system migrations.

Introduction

Purpose

The purpose of this paper is to show that SAP customers can improve business continuity, increase IT productivity, and reduce the risk of business disruption by automating many of the procedures involved in performing SAP test system refreshes.

Scope

The scope of this paper is limited to the scope of the solution validation (build, test, and document) activities performed by EMC engineers in an EMC lab.

What was built and tested is described and, where possible, recommendations and guidelines are provided for professionals to design an identical or similar solution for a customer.

The concepts, instructions, procedures, recommendations, and guidelines presented in this document are by no means exhaustive.

Audience

The target audience for this white paper is business executives, IT directors, and infrastructure administrators who are responsible for their company's SAP landscape.

The target audience also includes professional services groups, system integration partners, and other EMC teams tasked with deploying SAP systems in a customer environment.

A high-level understanding of SAP solutions and SAP landscapes is beneficial. Familiarity with virtualization concepts is also beneficial.

Solution design

Reference architecture

This solution has a corresponding Reference Architecture document that is available on Powerlink and EMC.com. Refer to *EMC Virtual Infrastructure for SAP Intelligent Cloning in Virtual Environments Enabled by EMC Replication Manager*.

Architecture diagram

The following diagram shows the overall physical architecture of the solution. Three physical servers, six virtual machines, Ethernet and Fibre Channel networks were used to validate the solution.

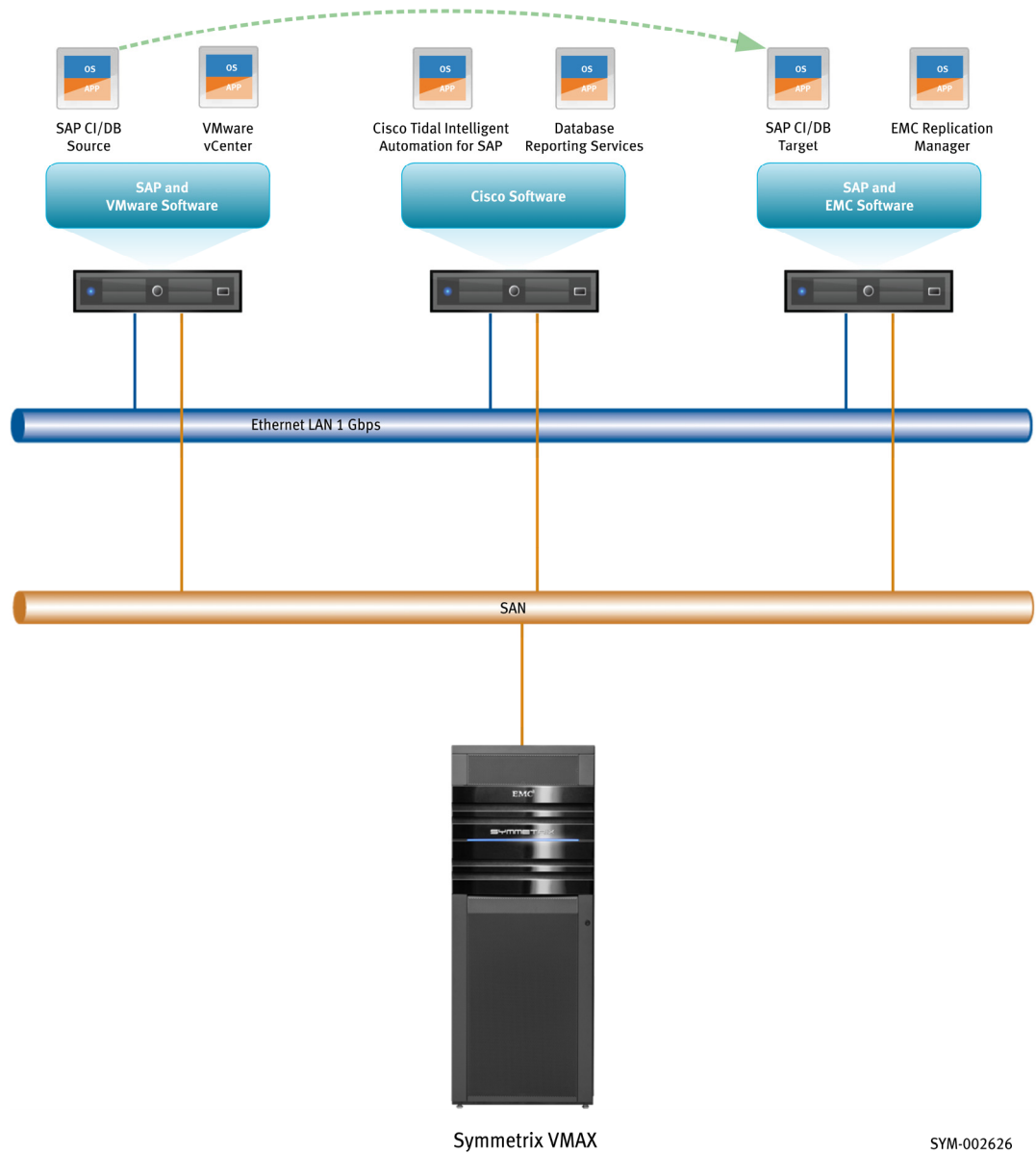


Figure 1. Architecture diagram

Validated scenario

Functional objectives

The solution demonstrates the automated replication of an SAP Oracle database through the use of EMC Replication Manager, EMC VMAX TimeFinder, and Cisco Tidal Intelligent Automation for SAP in a virtualized environment.

Solution components

The solution uses EMC, VMware, Cisco, Oracle, SAP, OS, and Microsoft technologies, including:

- EMC VMAX storage
- EMC VMAX TimeFinder
- EMC Replication Manager
- EMC PowerPath
- VMware ESX Server
- VMware vCenter
- Cisco Tidal Intelligent Automation for SAP
- Oracle Enterprise Server (Oracle 10g)
- SAP NetWeaver / SAP ECC
- Red Hat Enterprise Linux (RHEL)
- Microsoft Windows Enterprise Server 2008
- Microsoft SQL Server 2008 R2

For details, including version information, about all of the components that make up the solution, see [Hardware and software resources](#) on page 9.

Supported SAP landscapes

Validation focused on the replication of the following live (running) SAP system:

- Virtual central system ABAP stack (SAP ERP 6.0 EHP 4 Core IDES)

Other SAP Business Suite systems, such as BI, CRM, and SRM, can also benefit from the application of this solution, but such applications were not explicitly validated.

Although the solution was validated in a virtualized environment, the solution can also be utilized in a partially virtualized environment or a fully physical environment. In other words, the solution can be used to perform replication between a physical and virtual system or between two physical systems.

Hardware and software resources

Hardware

The hardware used to validate the solution is listed below.

Table 1. Hardware resources

Equipment	Quantity	Configuration
Storage array	1	EMC VMAX – Enginuity 5875 146 GB FC drives 300 GB FC drives
Fibre Channel switch	1	Cisco MDS 9509 - 64 ports
Network switch	1	Cisco 3460G - 64 ports
VMware ESX Server physical server	2	Dell R710 servers Four Intel quad-core Nehalem CPUs 96 GB RAM VMware ESX 4.1
VM running SAP ERP 6.0 EHP 4 Core IDES	2	2 vCPUs 32 GB RAM Red Hat Enterprise Linux (RHEL) 5.2 AS
VM running VMware vCenter	1	2 vCPUs 16 GB RAM Microsoft Windows Server 2008 SP2 Enterprise
VM running EMC Replication Manager	1	2 vCPUs 16 GB RAM Microsoft Windows Server 2008 SP2 Enterprise
VM running Cisco Tidal Intelligent Automation for SAP	2	2 vCPUs 32 GB RAM Microsoft Windows Server 2008 SP2 Enterprise

Software

The software used to validate the solution is listed below.

Table 2. Software resources

Software title	Version	Comment
SAP	ERP 6.0 EHP 4 Core IDES	ABAP stack only (not Java stack)
Java JDK	1.4.2.23	Installed on SAP source and target systems; required by SAP installer (SAPInst)
Oracle Database	10.2.0.4 x64 Enterprise	Installed on SAP source and target systems
Microsoft Windows Server 2008	64-bit Enterprise Edition SP2	Installed on RM and TIA systems
EMC Replication Manager Server	5.3.1	Installed on EMC Replication Manager system
EMC Replication Manager Agent	5.3.1	Installed on SAP source and target systems
EMC TimeFinder	7.2.0.0	Installed on SAP source and target systems
EMC Solutions Enabler	7.2.0.0	Installed on SAP source and target systems
VMware ESX Server Standard Edition	4.1	Installed on each physical server
VMware vCenter	4.1	Installed on a separate VM from all other solution software
Cisco Tidal Intelligent Automation for SAP (TIA)	2.1.2	Installed on a Windows Server 2008 VM
Microsoft SQL Server	2008 R2	Installed on a Windows Server 2008 VM Used for database reporting services
SAP transports	Cisco_TEO_70_SC_211_8 Cisco_TEO_70_SC_212_1 (For the most recent versions, contact a Cisco TIA representative.)	Installed on SAP source and target systems

Storage design

Supporting documents

Practices derived from the following documents form the basis of the storage design chosen for this solution.

- *SAP Installation Guide ERP 6.0 EHP 4 Linux Oracle*
- *Fibre Channel SAN Configuration Guide*
- *Using VMware vSphere with EMC Symmetrix Storage Applied Technology*
- *White Paper: EMC Symmetrix VMAX and VMware Virtual Infrastructure Applied Technology*

Design guidelines

To determine an efficient storage design, observe the following guidelines:

- Carefully consider application requirements when configuring RAID groups, filesystems, and so on. The *SAP Installation Guide*, in *Section 2.2.2 Requirements for Linux*, provides specific requirements related to disks, RAID 5, RAID 1, in addition to other design guidelines.
- Assess the sizes of the application, database, and log LUNs to be replicated.
- Place the source and the target LUNs in different RAID groups to optimize performance during replication.
- Consider using RAID 1/0 for logs and RAID 5 for data.

Disk type selection

In a virtualized or mixed SAP environment, selecting the appropriate disk type or types for your SAP source and target systems is critical. You must choose a combination of either RDM or VMFS disk formats in either physical or virtual compatibility mode.

The primary consideration when selecting disk types is whether your SAP source and target systems are both virtual or one is physical and the other one is virtual.

The decision tree is complex and beyond the scope of this document. To determine the appropriate configuration for your environment, consult the relevant EMC Replication Manager documentation.

To validate the solution, EMC engineers looked first at which file types were to reside on a given VM, and then selected an appropriate disk type to support that VM.

- Disks for VMs on which the SAP Oracle database was to reside were configured as RDM disks in physical compatibility mode.
- Disks for VMs on which operating system, swap, and SAP kernel/instance files were to reside were configured as VMFS disks.

Important: Both the source and target SAP systems were configured identically.

Source disk layout

SAP recommendations for SAP ERP 6.0 EHP 4, Red Hat Enterprise Linux 5.2, and Oracle form the basis of the source and target disk layouts used to validate the solution. In Table 3, RE2 is an SAP System Identification (SID) value, which is a unique identifier of an SAP instance.

Table 3. Source disk layout

	A	B	C	D	E	F	G
1	Mount	VG	Filesystem	Device	Prot. Type	Size (GB)	Disk
2	/oracle/RE2/oraarch	saparchvg	fslvsaparch	0089	RAID 5	64	/dev/sdq
3	/oracle/RE2/saptrace	saparchvg	fslvsaptrace	0089	RAID 5		/dev/sdq
4	/oracle/client	oraclevg	fslvoraclient	008B	RAID 5	32	/dev/sdr
5	/oracle/stage	oraclevg	fslvorastaging	008B	RAID 5		/dev/sdr
6	/oracle/RE2/102_64	oraclevg	fslv102_64	008B	RAID 5		/dev/sdr
7	/sapmnt/RE2	sapvg	fslvsapmnt	0088	RAID 5	32	/dev/sdp
8	/usr/sap/RE2	sapvg	fslvusrsap	0088	RAID 5		/dev/sdp
9	/usr/sap/trans	sapvg	fslvusrsaptrans	0088	RAID 5		/dev/sdp
10	/oracle/RE2/mirrlogA	sapmirrlogvg	fslvmirrlogA	005B	RAID 1+0	32	/dev/sdc
11	/oracle/RE2/mirrlogB	sapmirrlogvg	fslvmirrlogB	005B	RAID 1+0		/dev/sdc
12	/oracle/RE2/origlogA	saporalogvg	fslvoriglogA	005A	RAID 1+0	32	/dev/sdb
13	/oracle/RE2/origlogB	saporalogvg	fslvoriglogB	005A	RAID 1+0		/dev/sdb
14	/oracle/RE2/sapdata1	sapdata1vg	fslvsapdata1	005C	RAID 5	64	/dev/sdd
15				005D	RAID 5	64	/dev/sde
16	/oracle/RE2/sapdata2	sapdata2vg	fslvsapdata2	005E	RAID 5	64	/dev/sdf
17				005F	RAID 5	64	/dev/sdg
18	/oracle/RE2/sapdata3	sapdata3vg	fslvsapdata3	0060	RAID 5	64	/dev/sdh
19				0061	RAID 5	64	/dev/sdi
20	/oracle/RE2/sapdata4	sapdata4vg	fslvsapdata4	0062	RAID 5	64	/dev/sdj
21				0063	RAID 5	64	/dev/sdk
22	/oracle/RE2/sapdata5	sapdata5vg	fslvsapdata5	0064	RAID 5	64	/dev/sdl
23				0065	RAID 5	64	/dev/sdm
24	/oracle/RE2/sapdata6	sapdata6vg	fslvsapdata6	0066	RAID 5	64	/dev/sdn
25				0067	RAID 5	64	/dev/sdo

Target disk layout The target layout was the same as the source layout, except the mount points included .../RE9/... in the target layout.

Example:

```
/oracle/RE9/mirrlogA
/oracle/RE9/sapdata1
```

Application, OS, and filesystem design

SAP

The solution was validated with SAP ERP 6.0 EHP 4 Core IDES (International Demo and Evaluation System).

TIA requires two SAP transports to be imported to both SAP (source and target) systems. The following transports were used to validate the solution:

- Cisco_TEO_70_SC_211_8
- Cisco_TEO_70_SC_212_1

Contact a Cisco TIA representative for the latest versions.

Oracle

SAP recommends segregating the SAP Oracle database-related files from all other files in order to simplify the identification of the disks/LUNs to be replicated and to maintain consistency between the source and the target filesystems.

In the solution as validated, the Red Hat Linux paging file was placed on the same LUN as the operating system and the Oracle binaries on both SAP (source and target) systems. The SAPTEMP and SAPUNDO tablespaces were placed on different, separate LUNs on both SAP (source and target) systems.

For additional SAP Oracle database configuration guidelines, refer to Section 3.3.2 “Oracle Directories” in the document entitled *SAP Installation Guide ERP 6.0 EHP 4 Ready Linux Oracle*.

For more general information about installing and configuring SAP ERP 6.0, refer to the SAP Master Guide, Technical Infrastructure Guide, and the appropriate installation guide at <http://service.sap.com/installNW70>.

Linux

Linux was configured according to SAP-specific notes (refer to SAP documentation in the [References](#) section of this document on page 29).

Filesystem

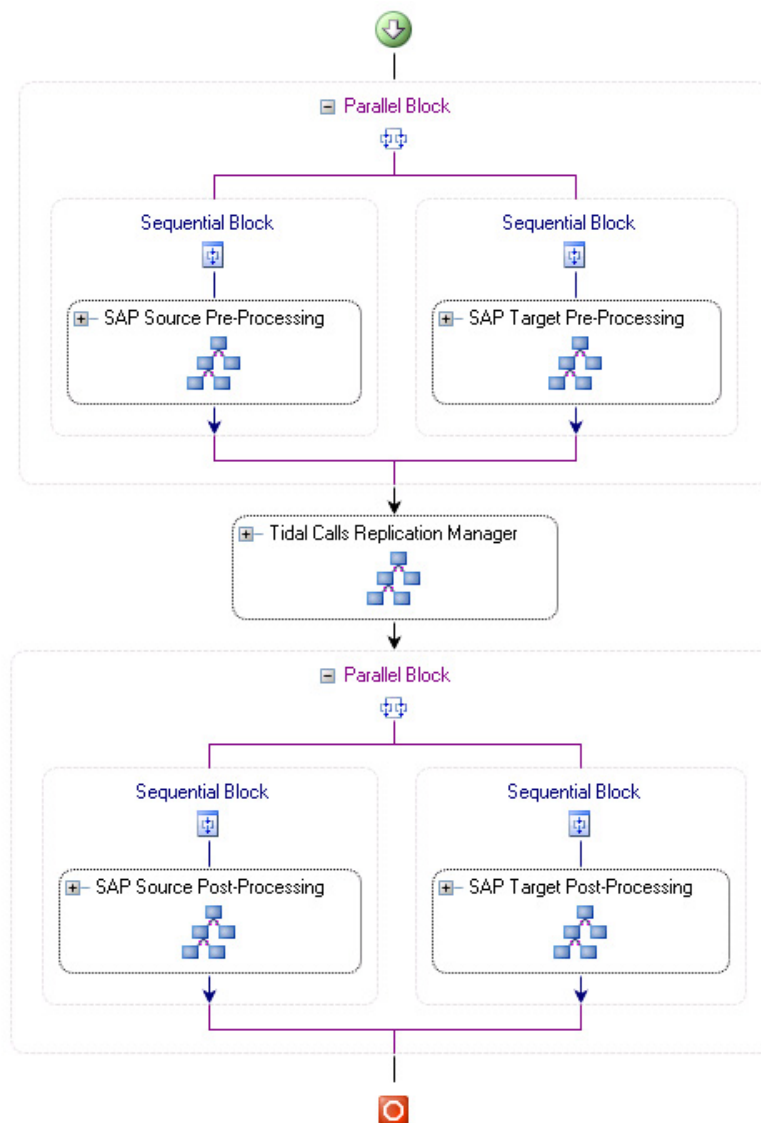
Replication Manager requires that the LUNs to be replicated use the same filesystem type on both the source and the target systems. For example, if the source LUNs use Linux EXT3, the target LUNs must also use Linux EXT3.

For a list of supported options, refer to the relevant EMC Replication Manager documentation.

Integration of TIA and RM

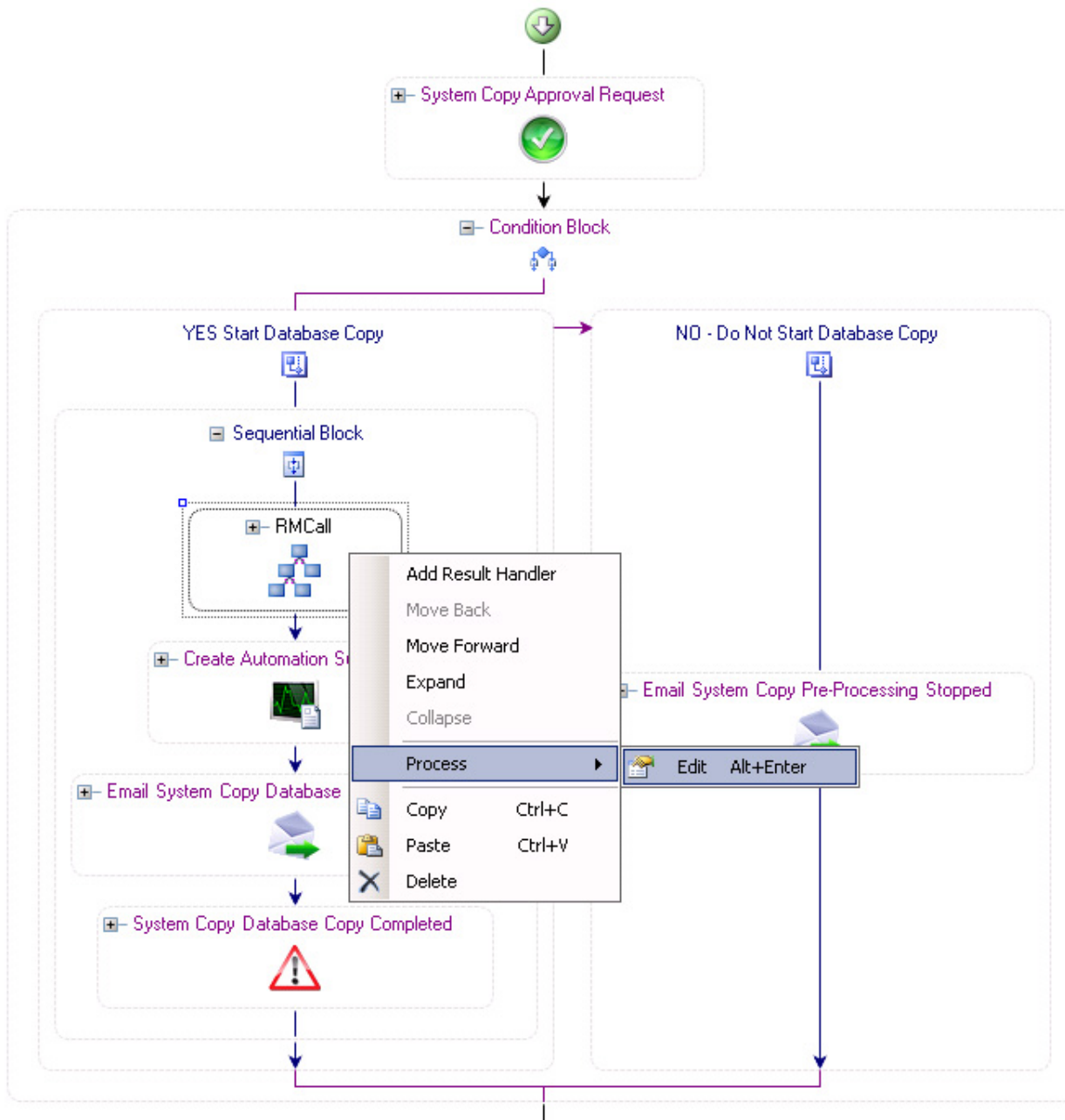
Process overview

The following flowchart shows the process that Cisco Tidal Intelligent Automation for SAP, integrated with EMC Replication Manager, uses to perform an SAP system refresh. The steps include pre-processing on the source and target SAP systems, cloning of the database by EMC Replication Manager, and performing post-processing on the SAP source and target systems. The entire process, and individual phases, can be configured based on customer requirements.



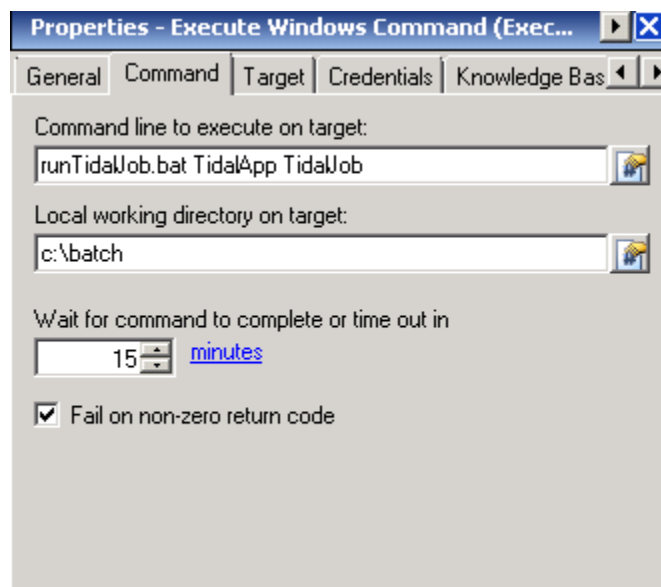
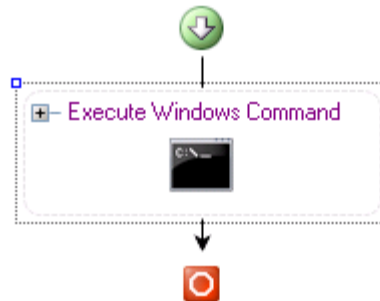
Database cloning phase

Replication Manager clones, recovers, renames and starts the SAP database. The following workflow diagram focuses on the phase in which Cisco Tidal Intelligent Automation for SAP calls Replication Manager to perform these steps.



Integration on Windows platforms

The following workflow diagram and screen shot correspond to the calling of EMC Replication Manager by Cisco Tidal Intelligent Automation for SAP on Windows servers.

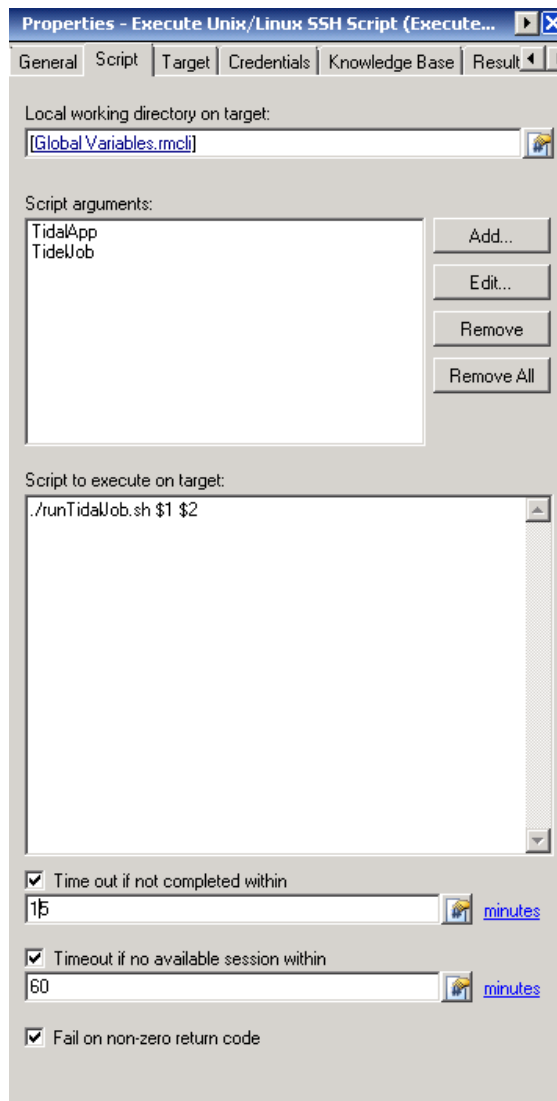
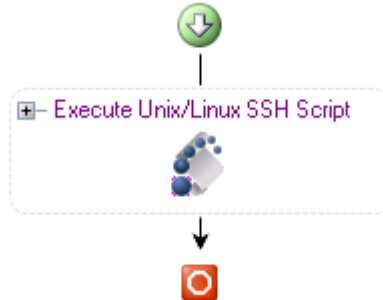


Note: If the RM job exceeds the time out value you specify, RM continues to attempt to process the job but TIA marks the job as Failed. Even if the job completes successfully following the time out period, the job is still marked as Failed by TIA and TIA aborts the workflow. Therefore, it is recommended to set the time out value to a value greater than the number of minutes you expect the RM job to complete.

An alternative to using a hard time out value is to have Cisco customize the workflow to monitor the RM job progress and status using the RM job stdout stream.

Integration on UNIX or Linux platforms

What follows is a workflow diagram and screen shot that correspond to the calling of EMC Replication Manager by Cisco Tidal Intelligent Automation for SAP on UNIX or Linux servers. The screen shot shows the variables that can be passed by TIA to the calling script or command. These variables can be modified, depending on the appset and job that need to be invoked by RM.



Note: If the RM job exceeds the “Time out if not completed within” value you specify, RM continues to attempt to process the job but TIA marks the job as Failed. Even if the job completes successfully following the time out period, the job is still marked as Failed by TIA and TIA aborts the workflow. Therefore, it is recommended to set the time out value to a value greater than the number of minutes you expect the RM job to complete.

An alternative to using a hard time out value is to have Cisco customize the workflow to monitor the RM job progress and status using the RM job stdout stream.

RM call scripts

Scripts that call EMC Replication Manager are provided on the TIA server as part of the integrated solution. Both a Windows script and a UNIX/Linux script are provided.

The appset name is passed as the first variable \$1, and the jobname is passed as the second variable \$2.

Windows script

The provided Windows script is shown below.

```
C:\> type runTidalJob.bat
C:\PROGRAM~2\emc\rm\gui\rmcli.bat host=ServerHost port=65432
cmd="login user=Administrator epassword=<encrypted password>; run-
job appset=%1 name=%2;exit 0;"
```

Note: On Windows 2008 and higher, it is recommended to create a user that has privileges to call scripts from the Cisco Tidal Intelligent Automation for SAP Server to the Windows server that contains and executes the script. TIA can call a Windows script through either a command or a script. When calling through a script, keep in mind that TIA can execute only VBScript (.vbs) files directly. When calling through a Windows command, TIA can execute Batch (.bat) files in addition to VBScript files.

During validation, user account controls (UAC) and the Windows firewall were disabled to permit the execution of a script or command in Windows environments. If security policies prohibit this, Windows authentication with appropriate roles and privileges must be configured.

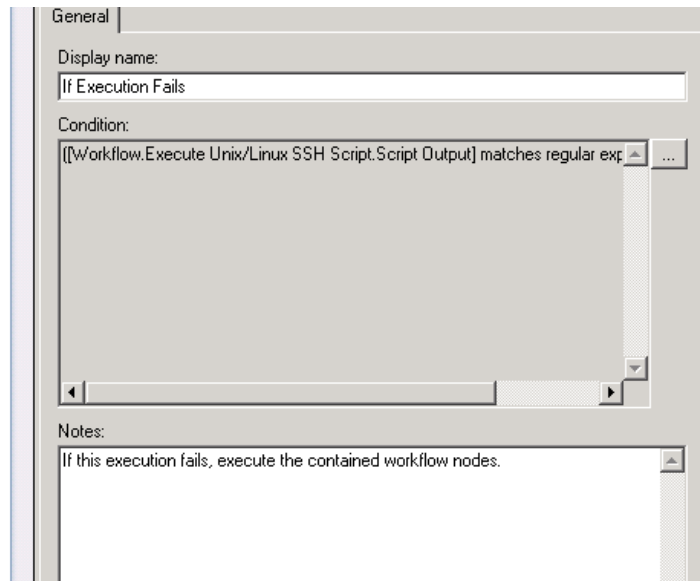
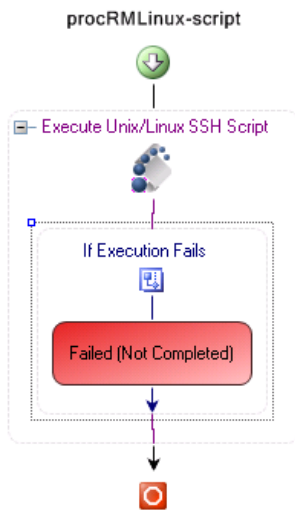
UNIX/Linux script

The provided UNIX/Linux script is shown below.

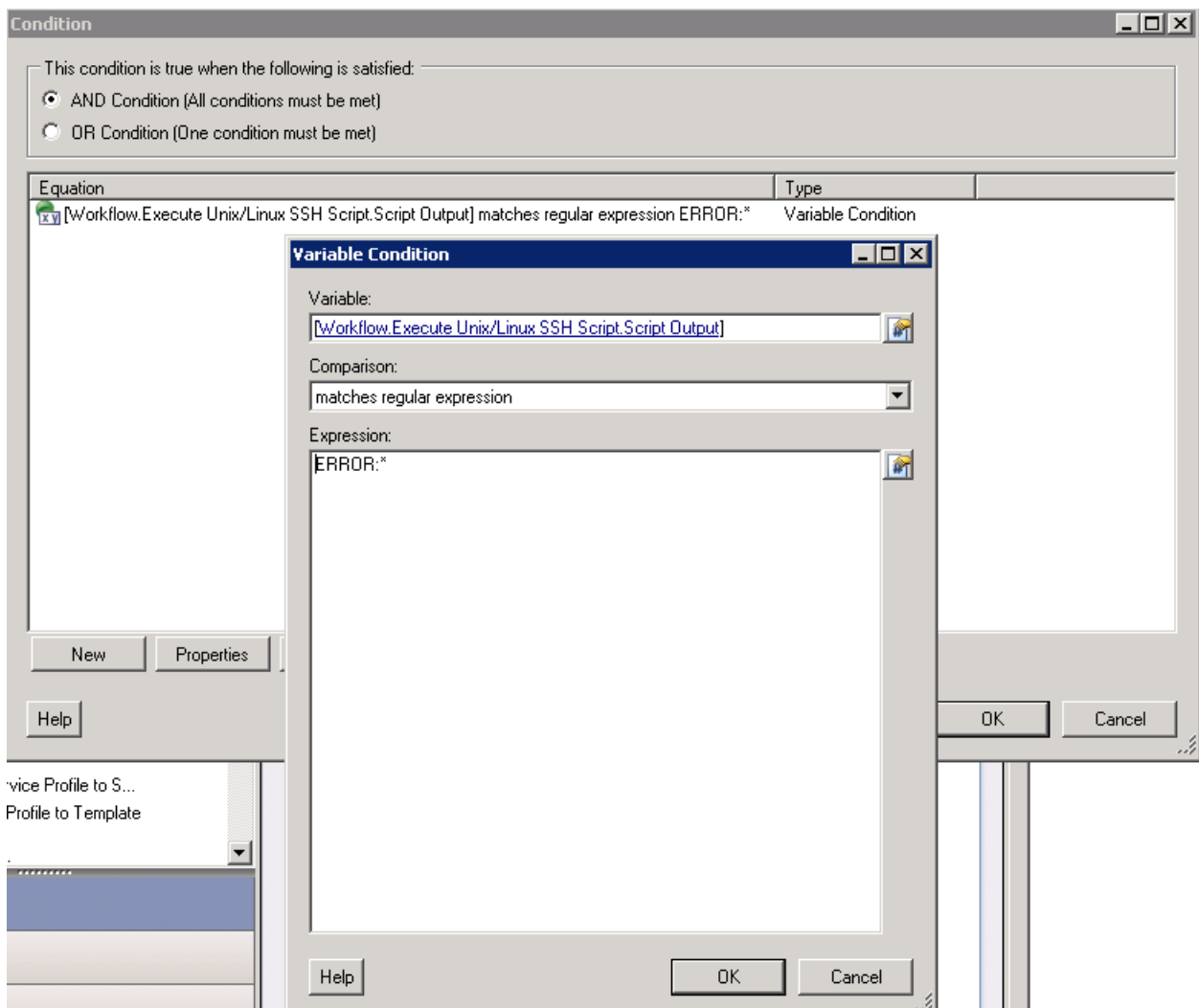
```
# cat runTidalJob.sh
/opt/emc/rm/gui/rmcli << EOF
connect host=XXX.XXX.XXX.XXX port=65432
login user=Administrator epassword=<encrypted password>
run-job appset=$1 name=$2
EOF
```

Error handling

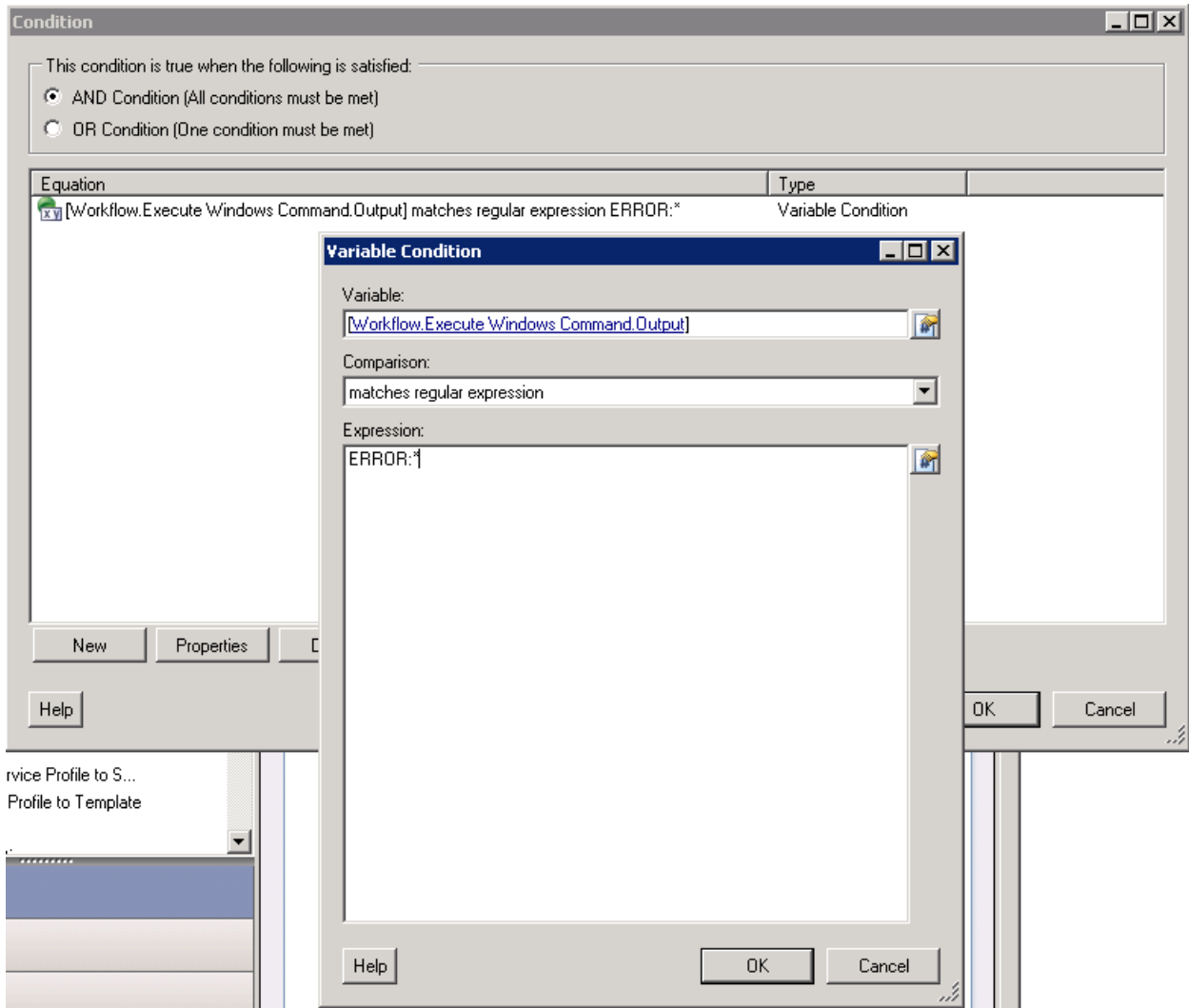
RM generates a job processing log, which can be monitored by the stdout stream of the RM job log. The log captures any warnings or errors that occur during the processing of an RM job. TIA can be configured to read the stdout stream to detect RM job warnings or errors as illustrated by the following workflow and screen shots.



The following screen shot shows the TIA configuration interface for detecting RM job errors on a UNIX/Linux platform.



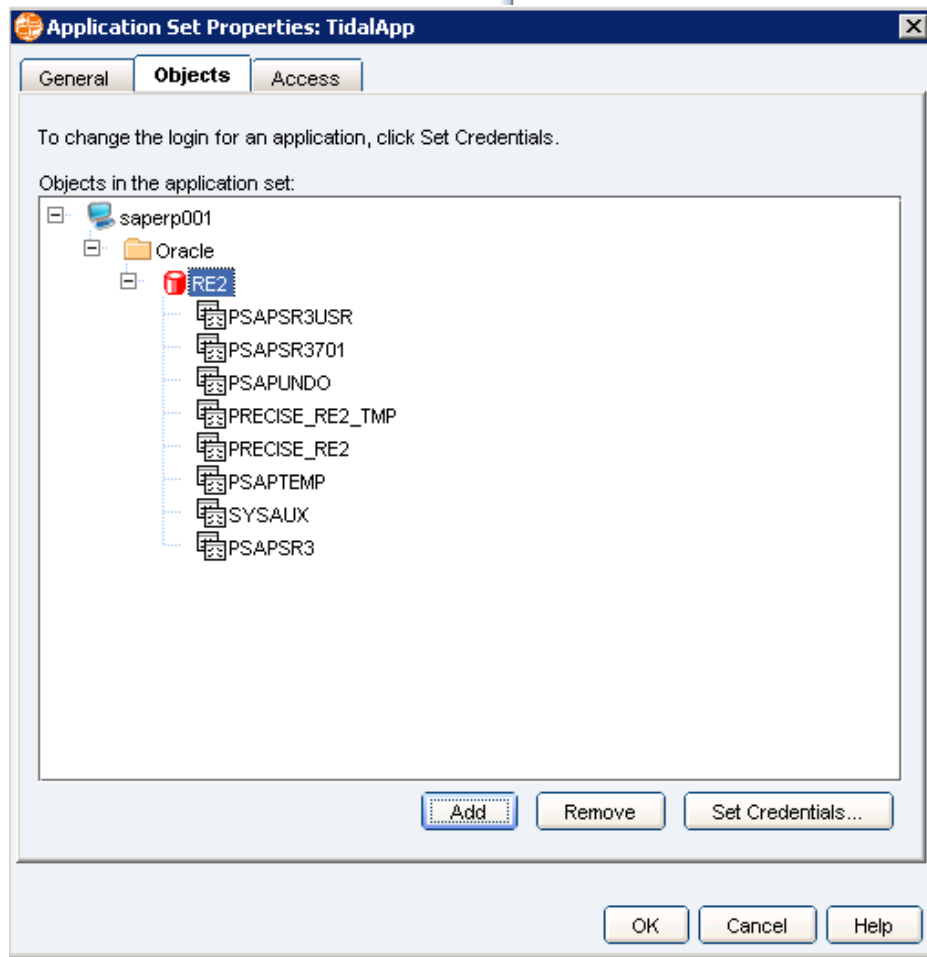
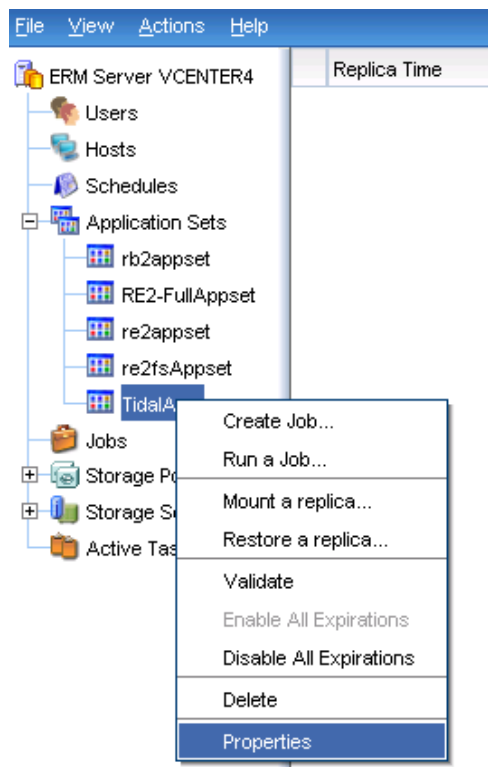
The following screen shot shows the TIA configuration interface for detecting RM job errors on a Windows platform.



Important: TIA must watch for strings that begin with “ERROR:” in order to recognize the failure of an RM job.

RM configuration

The screen shots that follow show the high level configuration of the RM appset and job required to create a copy of the source database. In this example, the source SAP SID is RE2, and the target SAP SID is RE9.



The selected mount options for the target system are shown in the screen shots below.

Name	Application Set	Host	Mount Host	Latest Status	Last RunTime	Technology	Description
rb2Job	rb2appset	saplw003		Successful	Dec 21, 2010 1:55:38 PM	TimeFinder Clone	
RE2-FullThickToThinJob	RE2-FullAppset	saperp001		Successful	Dec 2, 2010 11:41:22 PM	TimeFinder Clone	
re2fsJob	re2fsAppset	saperp001		Successful	Sep 28, 2010 1:31:06 PM	TimeFinder Clone	
RE2ThickCloneJob	re2fsAppset	saperp001		Successful	Dec 2, 2010 9:33:55 AM	TimeFinder Clone	
RE2ThickToThinJob	re2fsAppset	saperp001		Successful	Nov 1, 2010 2:07:27 PM	TimeFinder Clone	
RE2Thin-AfterPhase3	re2fsAppset	saperp001		Successful	Dec 21, 2010 4:52:01 PM	TimeFinder Clone	Job to clone from
TidalJob	TidalApp	saperp001	saperp009	Successful	Apr 27, 2011 11:28:20 AM	TimeFinder Clone	

Select mount options:

- Mount the replica
 - Mount host: saperp009
 - Path options for data residing on file systems
 - Original path
 - Alternate path: /mnt/RM_Mounts/Administrator_TidalApp_TidalJob
 - Alternate paths using path mapping
 - Oracle: RE2 (saperp001)
 - Do not perform database operations
 - Generate scripts for manual recovery
 - Recover and Open Read/Write
 - Mount as Real Application Cluster
 - Setting and Options
 - Start instance as OS user: use userID of Oracle binaries
 - ORACLE_HOME: /oracle/RE9/102_64
 - Database name: RE9
 - SID name: RE9
 - Fail mount if SID exists: No
 - Set 'SYS' password: *****
 - [Customize Initialization Parameters](#)
 - Other Mount Options

OK Cancel Help

RM callout scripts and pfile customization

EMC Replication Manager supports callout scripts to automate phases of the database cloning process. Details are available in the *EMC Replication Manager Administration Guide*.

The following scripts can be used with this solution, in the sequence given.

Callout script 550

This script is called immediately before the database is recovered. The script renames the control files to match the name of the target system SAP SID (RE9).

```
# cat IR_CALLOUT_TidalApp_TidalJob_550
mv /oracle/RE9/origlogA/cntrl/cntrlRE2.dbf
   /oracle/RE9/origlogA/cntrl/cntrlRE9.dbf
mv /oracle/RE9/origlogB/cntrl/cntrlRE2.dbf
   /oracle/RE9/origlogB/cntrl/cntrlRE9.dbf
mv /oracle/RE9/sapdata1/cntrl/cntrlRE2.dbf
   /oracle/RE9/sapdata1/cntrl/cntrlRE9.dbf
```

pfile customization

Since callout script 550 renames the control files to match the target SAP SID, the pfile of the target SAP database must be modified before the database is recovered and opened. To do this, place a new pfile in a subdirectory that has the same name as the target SAP database. Create the subdirectory in the Replication Manager client bin directory. This can be done on either UNIX/Linux or Windows. The following example applies to UNIX/Linux.

```
[root@saperp009 bin]# cd RE9
[root@saperp009 RE9]# cat initRE9.ora
control_files='/oracle/RE9/origlogA/cntrl/cntrlRE9.dbf','/oracle/R
E9/origlogB/cntrl/cntrlRE9.dbf','/oracle/RE9/sapdata1/cntrl/cntrlR
E9.dbf'
[root@saperp009 RE9]#
```

Callout script 600

This script is called after the database is recovered and opened.

Note: In the script, replace *<password>* with a valid system password.

```
# cat IR_CALLOUT_TidalApp_TidalJob_600
#!/bin/ksh

su - orare9 -c "/oracle/RE9/sapclone.sh"

echo "Finished sapclone.sh"
more /oracle/RE9/sapclone.sh
#!/bin/ksh
. .profile

sqlplus rmuser/tidal60 <<ENDOFSQL
@/oracle/RE9/sapclone.sql
exit
ENDOFSQL
[root@saperp009 bin]# cat /oracle/RE9/sapclone.sql

drop table "OPS$RE2ADM".SAPUSER;
```

```

create user "OPS$RE9ADM" default tablespace SYSTEM temporary
tablespace PSAPTEMP identified externally;

grant connect, resource to "OPS$RE9ADM";

create table "OPS$RE9ADM".SAPUSER (userid varchar2(256), passwd
varchar2(256));
Insert into "OPS$RE9ADM".SAPUSER values ('SAPSR3', '<password>');

drop synonym "OPS$SAPSERVICERE2".SAPUSER;

CREATE USER "OPS$SAPSERVICERE9" PROFILE "DEFAULT"
IDENTIFIED EXTERNALLY DEFAULT TABLESPACE "SYSTEM"
TEMPORARY TABLESPACE PSAPTEMP
ACCOUNT UNLOCK;
GRANT UNLIMITED TABLESPACE TO "OPS$SAPSERVICERE9";
GRANT "CONNECT" TO "OPS$SAPSERVICERE9";
GRANT "RESOURCE" TO "OPS$SAPSERVICERE9";
GRANT "SAPDBA" TO "OPS$SAPSERVICERE9";

create synonym "OPS$SAPSERVICERE9".SAPUSER for
"OPS$RE9ADM".SAPUSER;
grant select, update on "OPS$RE9ADM".SAPUSER to
"OPS$SAPSERVICERE9";
alter user "SAPSR3" account unlock;
alter user "SAPSR3" identified by <password>;
commit work;

```

Replication design and configuration

Introduction	For cloning and repurposing, Replication Manager uses Consistent Split Technology with the Online Advanced Recovery Mode option to create online replicas.
Mount considerations	<p>During initial configuration, the replica LUNs must be presented to the target system as RDM disks in physical compatibility mode so that Replication Manager can mount the replica LUNs and execute post-processing steps at the VM guest OS level.</p> <p>After initial configuration, Replication Manager can perform the mounts automatically as part of the configured replication jobs.</p>
Replication considerations	<p>Assign LUNs so that there is a one to one relationship between storage pool and replication job for ease of management.</p> <p>Important: Before replication, align all disks at 64K to optimize system performance.</p>
Oracle mount and recover configuration	<p>The Oracle Administrator user must exist on both the source and target systems.</p> <p>It is recommended that the user and group IDs match on the source and target systems. Replication Manager changes the uid and gid of the replicated files on the target system to match those on the source. If subsequent manual steps are performed after the RM job completes, such as the manual application of archive logs, it might be necessary to change the uid and gid on the target system so that that the IDs once again match those on the source system.</p> <p>For more information, refer to the section “Oracle Procedures” in Appendix C of the <i>EMC Replication Manager Version 5.3 Product Guide</i>.</p>
Oracle replication configuration	<p>Configure the Oracle environment:</p> <ol style="list-style-type: none">1. Adjust the Oracle pfile configuration on both source and target as appropriate. Consult a DBA if necessary.2. Start Oracle on both source and target systems.3. If it is not already running, start the RM client on both source and target systems.
SAP target system storage preparation	<p>To prepare the storage of the target SAP system, do the following:</p> <ol style="list-style-type: none">1. Shut down SAP on the target system.2. Shut down the target Oracle database.3. Unmount the SAPdata and SAP redologs filesystems on the target system. <p>Note: The LUNs used by the target SAP system are the same as the replica LUNs.</p>
Create a storage pool	In the context of this solution, a storage pool is a group of target system LUNs that store replicas of source system LUNs. To create a storage pool for this purpose, refer to the appropriate EMC Replication Manager documentation.

Create an application set

Application sets are source-level objects that are replicated by an EMC Replication Manager job. These may contain databases, filesystems, NFS shares, or a combination of these. To create an application set, follow the instructions in the section “Understanding Oracle application sets and jobs” in Appendix C of the *EMC Replication Manager Version 5.3.1 Product Guide*.

Create a Replication Manager job

To set up a Replication Manager job:

1. Select an application set to replicate.
2. Specify a job name, select the Replication Source as Primary Storage, select an appropriate replication option, set Limit Replica Count to 1, and click Advanced.
3. Select Use Consistent Split, By Database, and Copy Online with Advanced Recovery.
4. Assign the storage pool created earlier.
5. Choose the Mount tab, select Alternate Paths, and select Recover the Database.

References

For detailed information about SAP post-processing tasks, refer to Chapter 6 in *System Copy Guide for SAP Systems Based on SAP NetWeaver 7.0 Including Enhancement Package 1 ABAP*.

Validation

Automated SAP system refresh

EMC engineers performed the following steps to validate the solution's automated SAP replication functionality.

1. Ensure Source and Target SAP systems are running.
2. Log on to TIA as Administrator.
3. Start the refresh job. TIA calls RM, which performs the configured replication job.
4. Monitor the process to ensure successful completion.

Note: The refresh job was run multiple times on both Windows and UNIX/Linux platforms. During some of the runs, failure conditions were injected to validate appropriate error handling. TIA detected RM success events and fail or hang events. For fail or hang events, TIA stopped further processing to prevent the need for cleanup efforts.

Conclusion

Summary

The integration of EMC Replication Manager with Cisco Tidal Intelligent Automation for SAP provides a complete, end-to-end solution for administering SAP test system refreshes.

Customers can use this solution to improve business continuity, increase IT productivity, and reduce the risk of business disruption.

Findings

In the solution, TIA performs pre-replication steps on the source and target SAP systems, launches EMC Replication Manager (RM) to perform the replication operation, and then performs post-replication steps on the source and target SAP systems. During replication, TIA takes appropriate actions depending on the status of the process.

Not only does this solution automate and streamline SAP test system refreshes, it can also greatly assist in managing the application changes required by SAP data and system migrations.

References

EMC Replication Manager

EMC Replication Manager 5.3.1 Administrator's Guide
EMC Replication Manager 5.3.1 Product Guide
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