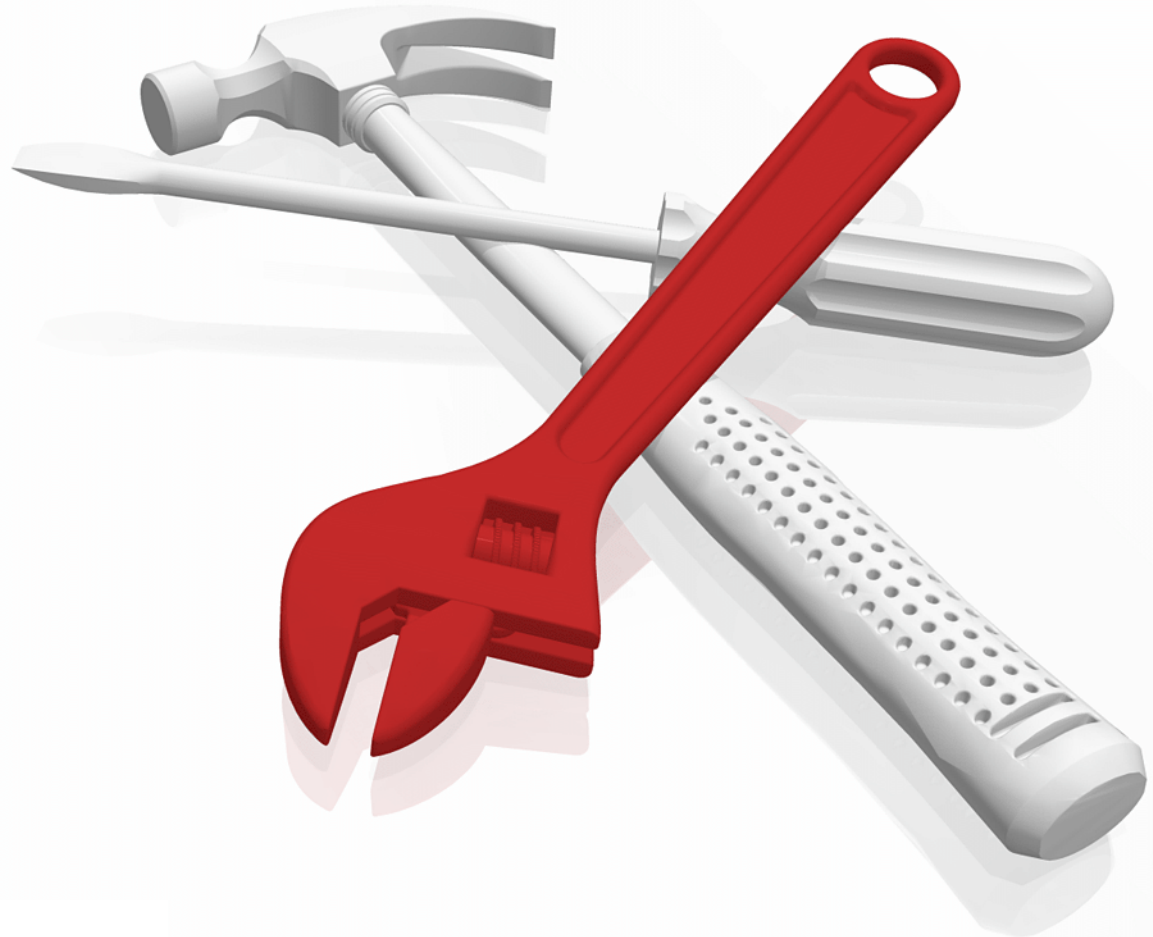


# IBM Spectrum Copy Data Management with IBM FlashSystem A9000 or A9000R and SAP HANA

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## Introduction

Data is the currency of the new economy, and organizations are increasingly tasked with finding better ways to protect, recover, access, share, and use it.

IBM Spectrum™ Copy Data Management is aimed at using existing data in a manner that is efficient, automated, scalable. It helps you manage all of those snapshot and IBM FlashCopy® images made to support DevOps, data protection, disaster recovery, and Hybrid Cloud computing environments.

This IBM® Redpaper™ publication specifically addresses IBM Spectrum Copy Data Management in combination with IBM FlashSystem® A9000 or A9000R when used for Automated Disaster Recovery of SAP HANA.

# IBM Spectrum Copy Data Management overview

IBM Spectrum Copy Data Management offers a complete automation process that makes data copies available to users when and where they need them. It avoids creating unnecessary copies or leaving unused copies on valuable storage, as shown in Figure 1.

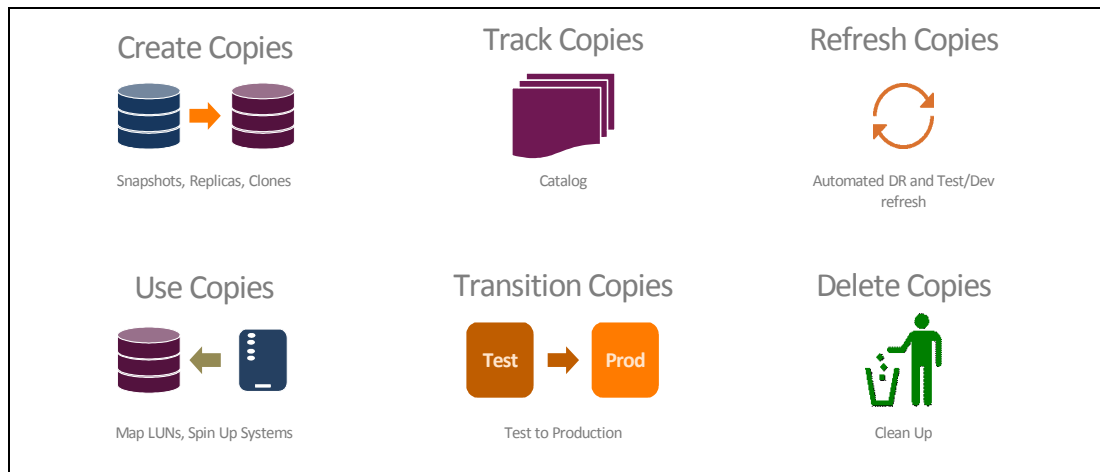


Figure 1 Complete copy automation with IBM Spectrum Copy Data Management

The solution catalogs copy data from across local, off-site, or hybrid cloud infrastructures. It identifies duplicates and compares copy requests to existing copies. This process ensures that the minimum number of copies is created to service the various business needs. Copy processes and workflow are automated to ensure consistency and reduce complexity.

IBM Spectrum Copy Data Management rapidly deploys as an agentless virtual machine for faster time to value. Data consumers can use the self-service portal to create the copies that they need, when they need them, enabling business agility.

## IBM Spectrum Copy Data Management architecture

IBM Spectrum Copy Data Management is built on a scalable and extensible platform and includes a full set of robust RESTful APIs for enterprise or managed service provider (MSP) integration. IBM Spectrum Copy Data Management is built based on a provider model. Each storage array or hypervisor that is supported is built as a provider and integrates into the application. This approach ensures that the user can drive all of the core IBM Spectrum Copy Data Management policies and services consistently across each supported platform.

### In-place copy data management

Using a provider-based model makes IBM Spectrum Copy Data Management unique among other solutions available in the market today that require either a “rip and replace” approach or that use a redundant hardware infrastructure dedicated solely to managing data copies.

IBM Spectrum Copy Data Management allows organizations to use the existing infrastructure investments while putting data copies to use. With IBM Spectrum Copy Data Management, there is no need to purchase a redundant set of “copy services” functions. The primary storage systems already contain these capabilities. IBM Spectrum Copy Data Management brings the necessary automation, orchestration, and self-service to those services to allow in-place copy data management.

## Integration with IBM products

The IBM Spectrum Copy Data Management provider model for supporting specific storage and hypervisor platforms allows for support for the following IBM products:

- ▶ Storage systems built with IBM Spectrum Virtualize™ software
- ▶ Storage systems built with IBM Spectrum Accelerate™ software
- ▶ IBM Spectrum Protect™ Snapshot (formerly IBM Tivoli® Storage FlashCopy Manager)

**Note:** For more information about the versions of IBM products that are supported by IBM Spectrum Copy Data Management, see the [IBM Spectrum Copy Data Management User's Guide](#).

For more details about IBM Spectrum Copy Data Management, refer to [IT Modernization using Catalogic ECX Copy Data Management and IBM Spectrum Storage](#), SG24-8341.

## Configuring IBM Spectrum Copy Data Management

This section describes the configuration steps to manage IBM FlashSystem A9000 or A9000R with IBM Spectrum Copy Data Management.

### IBM Spectrum Copy Data Management web management portal

To access the IBM Spectrum Copy Data Management web management portal, complete these steps:

1. From a supported browser, enter the following URL:

```
https://<HOSTNAME>:8443/portal/
```

where <HOSTNAME> is the IP address of the virtual machine where the application is deployed.

2. In the login window, enter a user name and password and click **Log In**. The default user name is *admin* and the default password is *password*.

### Configure IBM FlashSystem A9000 or A9000R as a provider

To configure an IBM FlashSystem A9000 or A9000R system in IBM Spectrum Copy Data Management, first gather the following information about that system:

Site	A user-defined provider location, created in the Sites view in the Configure tab.
Name	A user-defined name for the IBM provider. This name can be the same as the host name, or it can be a meaningful name that is used within your organization to refer to the provider. Provider names must be unique.
Host address	A resolvable IP address or a resolvable path and machine name.
Username	The user name that is used to access the IBM FlashSystem A9000 or A9000R.
Password	The password associated with the user name.
Comment	Optional provider description.

Complete the following steps to configure the IBM FlashSystem A9000 or A9000R as a provider:

1. Navigate to the **Configure** tab and click the **Sites & Providers** icon in the left side navigation, as shown in Figure 2.

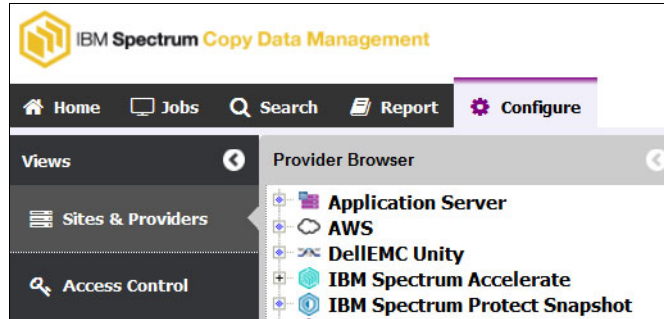


Figure 2 Sites & Providers window in the IBM Spectrum Copy Data Management portal

2. Right-click the **IBM Spectrum Accelerate** item in the Provider Browser pane, as shown in Figure 3, and click **Register**.

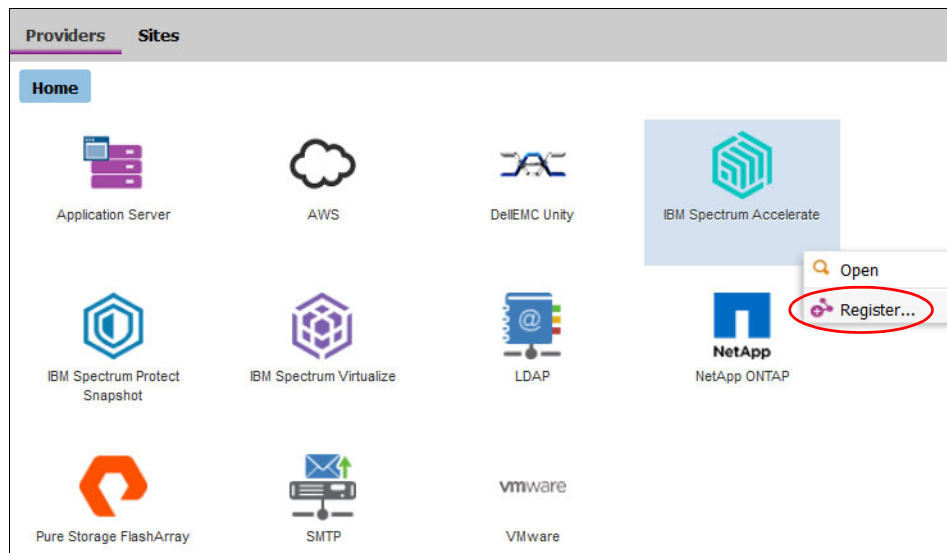


Figure 3 Register an IBM FlashSystem A9000 or A9000R

3. Enter the details about the IBM FlashSystem A9000 or A9000R, as shown in Figure 4, and click **OK** to register the system.

Name	Username	Type	
CDM A9000	itsso_cdm	System	

Figure 4 IBM FlashSystem A9000 or A9000R registration details

**Tip:** Leave the **Run inventory job after registration** check box selected. Doing so ensures that the system you are registering is added to the appropriate default storage catalog policy and IBM Spectrum Copy Data Management will then automatically catalog the resources on that system.

The IBM FlashSystem A9000 or A9000R is now registered in IBM Spectrum Copy Data Management and is available for use with SLA policies and backup or restore jobs.

## Creating an IBM FlashSystem A9000 or A9000R SLA policy

A service level agreement (SLA) policy allows storage and virtualization administrators to create customized templates for the key processes that are involved in the creation and use of backup jobs. Copy types, destinations, and parameters are configured in SLA policies, which can be used and re-used in backup jobs.

Generally, a storage administrator creates SLA policies after registering an IBM FlashSystem A9000 or A9000R in IBM Spectrum Copy Data Management and after creating accounts that will create, edit, and run backup and restore jobs through role-based access control. When configuring a backup job definition, available SLA policies display in the job creation wizard, tailored to the type of backup job being created.

With IBM Spectrum Copy Data Management, snapshots and replicas are deployed across the environment and are aligned with the SLAs established by the lines of business and the IT team. Policies can range from a simple policy that creates a single local snapshot once per day, to more a complex workflow that involves multiple local and remote data copies of every volume or virtual machine multiple times per day. Creating these policies through IBM Spectrum Copy Data Management saves administrators time, drives repeatability of best practices, and reduces sprawl of data copies that never get used. This approach drives out complexity and significantly reduces capital expenditure (CAPEX) and operational cost (OPEX).

IBM Spectrum Copy Data Management eliminates the dependency on manual procedures or scripts that are hard to maintain, often fail, and do not provide IT with any insight into their service levels.

To create an SLA Policy, log in to the IBM Spectrum Copy Data Management portal as described in “IBM Spectrum Copy Data Management web management portal” on page 3. Then, complete the following steps:

1. Go to the **Configure** tab. On the Views pane, select **SLA Policies**. The ALL SLA Policies pane opens.
2. In the All SLA Policies pane, click **New**. The new SLA Policies pane opens.
3. Select **IBM Spectrum Accelerate**, as shown in Figure 5, to create an IBM FlashSystem A9000 or A9000R SLA Policy.

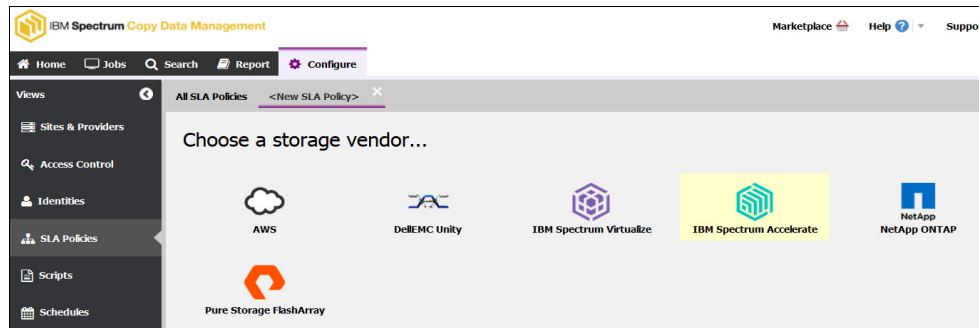


Figure 5 Choose “IBM Spectrum Accelerate” for the SLA Policy

4. The SLA Policy can contain Snapshots, VM Replication, or Replication (Async Mirroring). The example shown in Figure 6 highlights **Add Snapshot** as a subpolicy.

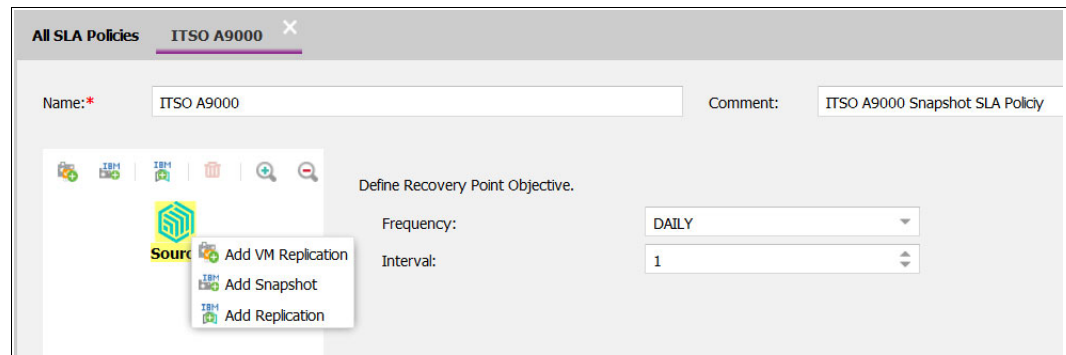


Figure 6 Choose VM Replication, Snapshot, or Replication for the SLA Policy

Enter a name and a meaningful description of the SLA Policy, as shown in Figure 7 on page 7:

- Keep Snapshots

After a certain number of snapshot instances are created for a resource, older instances are purged from the storage controller. Enter the age of the snapshot instances to purge in the *days* field or the number of instances to keep in the *snapshots* field.



– Snapshot Prefix Label

Enter an optional label to identify the snapshot. This label is added as a prefix to the snapshot name created by the job.

**Note:** Snapshot labels can contain only alphanumeric characters and underscores.

– Name

Enter an optional name to replace the default snapshot subpolicy name that is displayed in IBM Spectrum Copy Data Management. The default initial name is *Snapshot0*.

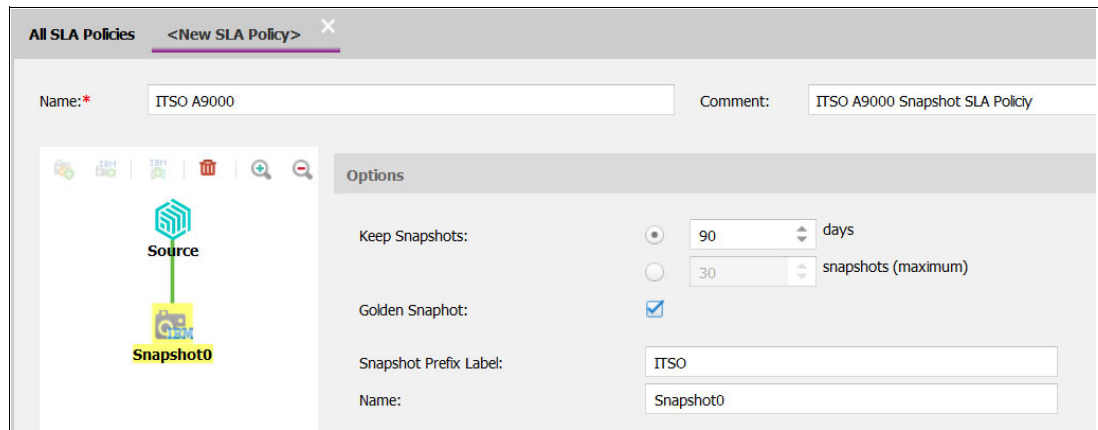


Figure 7 Specify Snapshot options

For further details about specifying subpolicies for Replication and VM copies, refer to the [IBM Spectrum Copy Data Management User's Guide](#).

For more information about the architecture and concept of IBM FlashSystem A9000 or A9000R snapshots, see *IBM Hyper-Scale Manager for IBM Spectrum Accelerate Family: IBM XIV, IBM FlashSystem A9000 and A9000R, and IBM Spectrum Accelerate, SG24-8376*.

## Configuring a Backup Job

IBM Spectrum Copy Data Management uses automated Copy Data Management workflows for replicating and intelligently reusing snapshots, vaults, and mirrors. Backup and restore jobs offer control over testing and cloning use cases, instant recovery, and full disaster recovery. Through backup jobs, you can:

- ▶ Copy data from a variety of storage providers to multiple locations.
- ▶ Support use cases for automated data protection, recovery, DevOps, DevTest, and data and database validation with data masking through the use of automated Instant Disk Restore, Instant VM Restore, volume, and file restore functions.

In the following example, a backup job is created that creates Snapshots of IBM FlashSystem A9000 or A9000R volumes, which are attached to a Windows server. The previously defined SLA Policy is used.

To configure the backup job, complete the following steps:

1. Navigate to the **Jobs** tab and right-click the **File System** icon in the left side navigation, as shown in Figure 8. Then, select the type **Backup**. The Job editor opens.

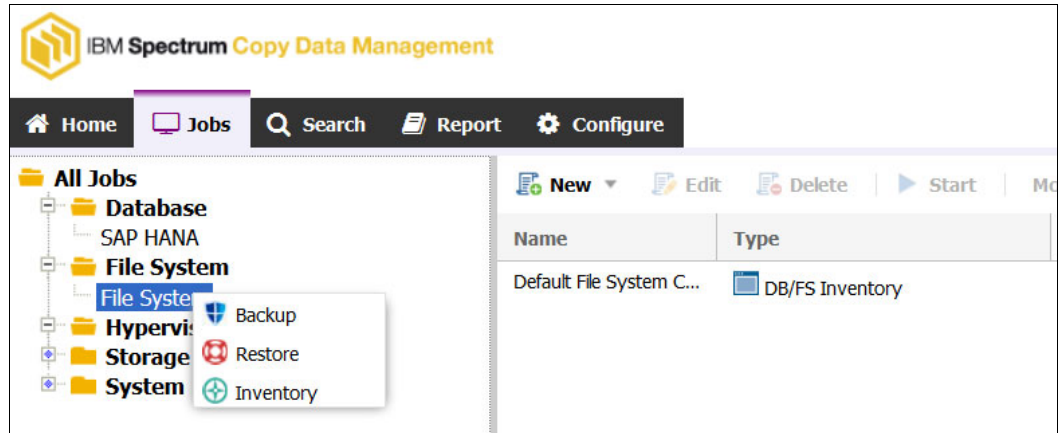


Figure 8 Create a new backup job

2. Enter a name and meaningful description. Select the Windows server and the File Systems that you want to backup, as shown in Figure 9. Select the SLA Policy that meets your backup data criteria.

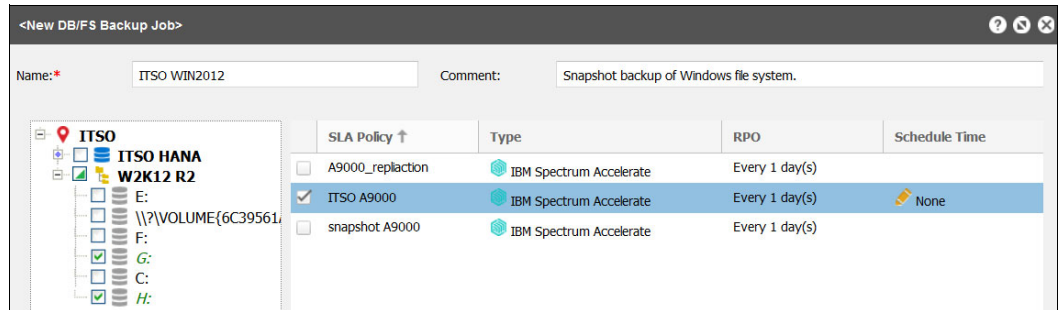
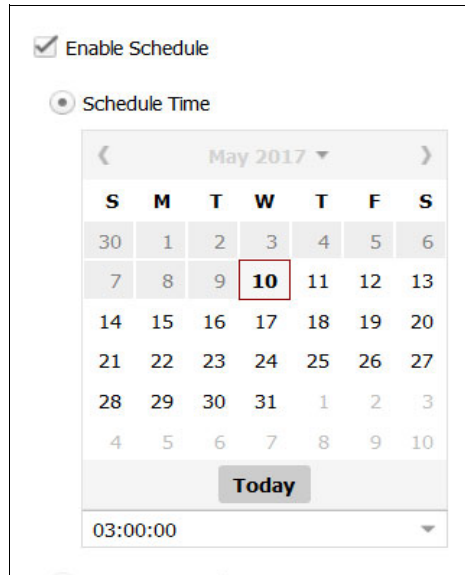


Figure 9 Specify the files systems and SLA Policy for the backup job

By clicking **None** in the **Schedule Time** column, a dialog windows opens to specify a schedule for the job, as shown in Figure 10.



The screenshot shows a scheduling configuration window. At the top, there is a checked checkbox labeled "Enable Schedule". Below it, a radio button labeled "Schedule Time" is selected. The main area contains a calendar for May 2017. The days of the week are abbreviated as S, M, T, W, T, F, S. The date 10 is highlighted with a red border. Below the calendar is a "Today" button and a time selection dropdown menu currently showing "03:00:00".

Figure 10 Define a schedule

3. To create the job definition using default options, click **Create Job**. The job runs as defined by your schedule, or you can start it manually from the **Jobs** tab.

## Configuring a restore job

IBM Spectrum Copy Data Management uses Copy Data Management technology for recovering physical Windows, IBM AIX®, and Linux file systems through File System Restore jobs. Instant Disk Restore jobs mount file systems from storage copies that contain application data. When a restore job is run, the job session status is monitored, and its status can be watched in real time in the job monitor. Job sessions are run on demand or by trigger.

In the following example, a restore job is created, that mounts IBM FlashSystem A9000 or A9000R snapshots on a Windows server. By default the last backup is always used.

To configure the restore job, complete the following steps:

1. Navigate to the **Jobs** tab and right-click the **File System** icon in the left side navigation and select the type **Restore**. The Job editor opens.
2. Enter a name for your job definition and a meaningful description. Select the **Instant Disk Restore** template, as shown in Figure 11 on page 10.

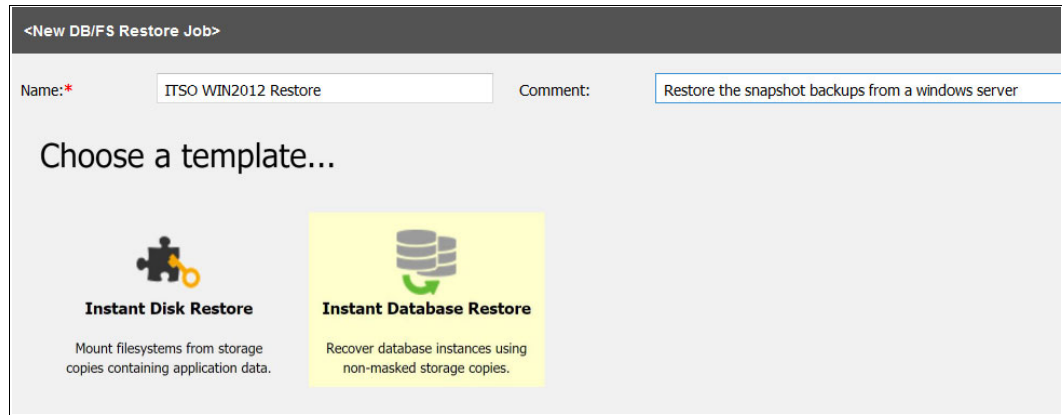


Figure 11 Template for restore job

3. Click **Source**. From the drop-down menu, click **Application Browse** to select a source site and a file system to view available recovery points, as shown in Figure 12.

Select resources, and change the order in which the resources are recovered by dragging and dropping the resources in the grid.

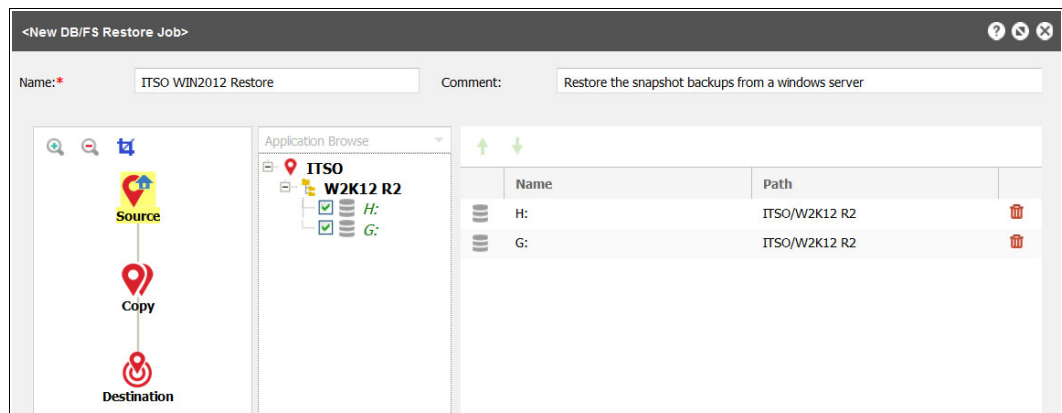


Figure 12 Select the file systems to restore

4. Click **Copy**. Sites containing copies of the selected data display. In this example, only the *ITSO* site is selected, as shown in Figure 13 on page 11.

By default the latest copy of your data is used. To choose a specific version, select a site and click **Select Version**. Click the **Version** field to view specific copies and their associated job and completion time.

If recovery from one snapshot fails, another copy from the same site is used.

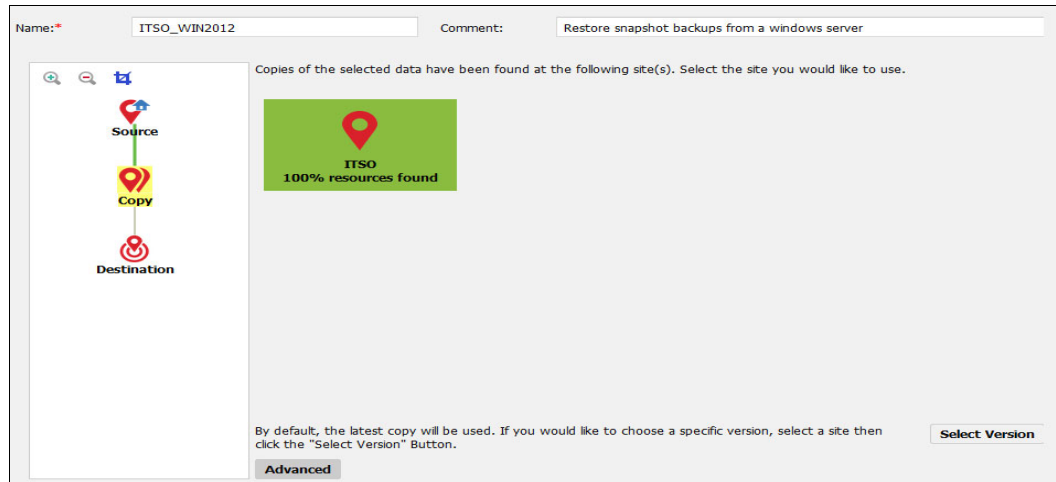


Figure 13 Select the site that contains the backup for the restore

- Click **Destination**. Select a server and an associated destination, as shown in Figure 14. Review the destination's mount point mapping settings. Optionally, click the **Enter an alternate mount point** field to create an alternate mount point, or select **Use original mount points**.

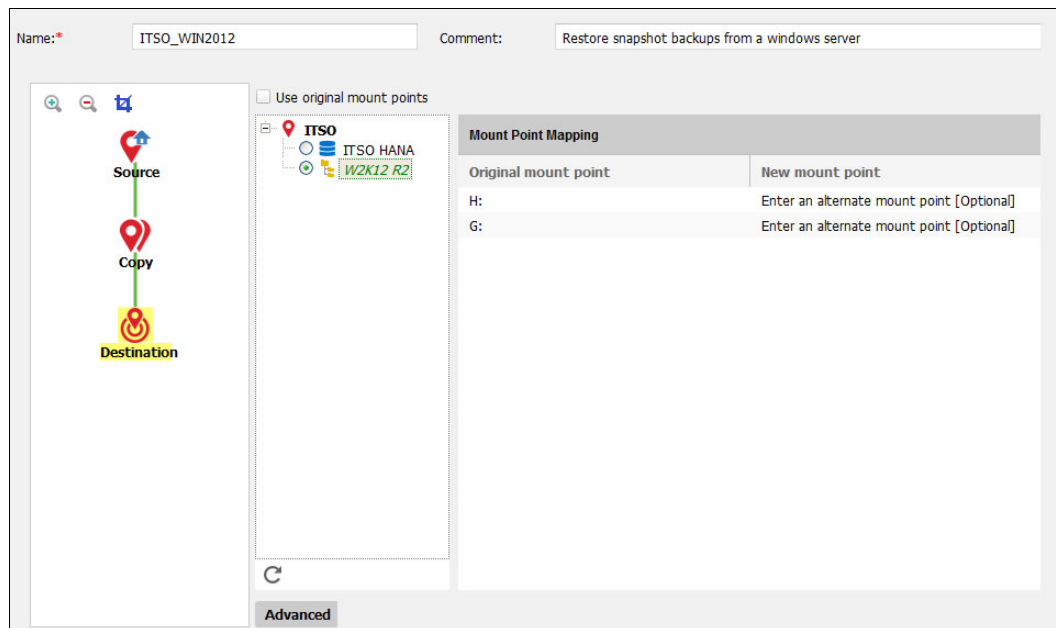


Figure 14 Select the destination for the restore

- To create the job definition using default options, click **Create Job**. You can run the job manually from the **Jobs** tab.

For further details about creating a backup or restore job, see [IBM Spectrum Copy Data Management User's Guide](#).

## Monitoring jobs

You can view the details of a job session that is currently running or one that has finished. Use the **Jobs** tab to view the status of a job session including start time, end time, and job name.

To view information about a specific job session:

1. Click the **Jobs** tab and select a job by clicking in the row containing the job name.
2. The **Activity / History** pane displays. If the job is currently running, its status displays in the **Activity** tab. To review the history of previous runs of the job, click the **History** tab, and then click the session with the date of the last run for details, as shown in Figure 15.

The screenshot shows the IBM Spectrum Copy Data Management web interface. The 'Jobs' tab is active, displaying a list of jobs. The 'File System' category is selected in the left-hand navigation pane. The main table lists jobs with columns for Name, Type, Status, Next Run, Last Run, and Last Run duration. The first job, 'ITSO WIN2012', is highlighted. Below the table, the 'History' tab is active, showing a table with columns for Start Time, End Time, Duration, Comment, and Status. The first row in the history table is circled in red, with the word 'Session' written next to it. The start time for this session is 'May 7 15:46:31 2017'.

Name	Type	Status	Next Run...	Last Runt...	Last Run ...	Last Run ...
ITSO WIN2012	DB/FS Backup	IDLE		May 7 15:4...	0h 1m 20s	COMPLE...
Default File System Catalog	DB/FS Inventory	IDLE	May 8 10:0...	May 7 10:0...	0h 0m 34s	COMPLE...
ITSO WIN2012 Restore	DB/FS Restore	IDLE				

Start Time ↓	End Time	Duration	Comment	Status
May 7 15:46:31 2017	May 7 15:47:51 2017	0h 1m 20s	SNAPSHOT(ITSO)	COMPLETED

Figure 15 Monitoring jobs

## SAP HANA automated disaster recovery use case

IBM Spectrum Copy Data Management supports multiple use cases, including online database backups, instant recovery to physical or virtual setups, and automated Dev-Test setup with database refreshes on IBM FlashSystem A9000 and A9000R. At the time of writing (April 2017), the following applications are supported:

- ▶ Microsoft SQL Server 2008 and later, on physical hosts and running on VMware VMs
- ▶ Oracle 11gR2 and 12c on physical hosts and running on VMware virtual machines
- ▶ Windows, Linux and AIX File Systems consistent protection and recovery
- ▶ InterSystems Caché and Epic Electronic Health Record (EHR) database support
- ▶ SAP HANA (1.0 SPS7 and above) instant application consistent protection and recovery

SAP HANA support is a recent addition with Version 2.2.6 of IBM Spectrum Copy Data Management. Therefore, this section focuses on SAP HANA protection and recovery use case.

The use case presented describes the registration of an SAP HANA application server and the configuration of backup and restore jobs. The backup job will create an online SAP HANA backup using the snapshots technology of IBM FlashSystem A9000 or A9000R.

The environment for this use case consists of the following components:

- ▶ IBM Spectrum Copy Data Management 2.2.6 virtual appliance on VMware ESXi 6
- ▶ SAP HANA 2 Service Pack 1 on one physical x86\_64 server
- ▶ Operating System: Red Hat Enterprise Linux Server release 7.3 (Maipo)
- ▶ IBM FlashSystem A9000 or A9000R 12.1 connected through Fibre Channel with the server
- ▶ IBM FlashSystem A9000 or A9000R volumes for SAP HANA data, log, and shared

**Note:** Before registering an SAP HANA server in IBM Spectrum Copy Data Management, ensure that it meets the requirements described in one of the following resources:

- ▶ IBM Spectrum Copy Data Management **Help** → **Setup** → **SAP HANA Requirements**
- ▶ [IBM Spectrum Copy Data Management User's Guide](#)

Example 1 shows the IBM FlashSystem A9000R volumes that are mapped to the SAP HANA server.

*Example 1 The xiv\_devlist command on the SAP HANA server*

```
# xiv_devlist
IBM storage devices
-----
Device          Size (GB) Paths Vol Name          Vol ID Storage ID Storage Type
Hyper-Scale Mobility
-----
/dev/mapper/mpatha 50.0      4/4   ITS0_HANA_DATA_001 25216 1320902  FlashSystem A9000R N/A
-----
4/4   ITS0_HANA_LOG      25220 1320902   FlashSystem A9000R N/A
-----
4/4   ITS0_HANA_SHARED  25221 1320902   FlashSystem A9000R N/A
-----
```

## Register the SAP HANA application server

To successfully register an SAP HANA application server, complete the following steps:

1. Log in to IBM Spectrum Copy Data Management and click the **Configure** tab. On the Views pane, select **Sites & Providers**, and then select the **Providers** tab.
2. In the Provider Browser pane, select **Application Server**.
3. Right-click **Application Server**, and then click **Register**. The Register Application Server dialog box opens, as shown in Figure 16. Select the **SAP HANA** server type.

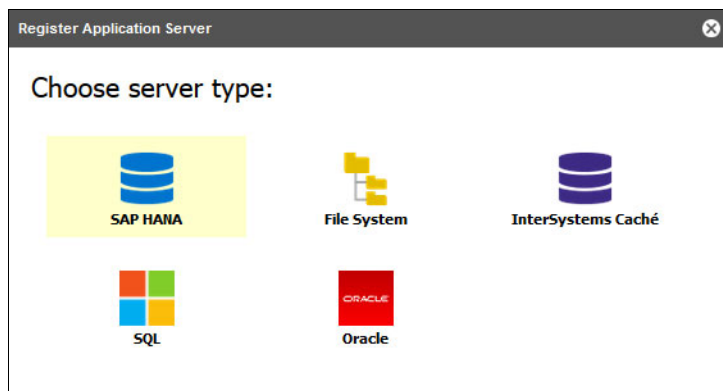


Figure 16 Choose the application server type SAP HANA

4. Complete the following fields, as shown in Figure 17 on page 14:
  - **Site:** A user-defined provider location, created in the **Sites & Providers** view
  - **Name:** A user-defined name for the SAP HANA server
  - **Host Address:** A resolvable IP address or a resolvable path and machine name

Register Application Server (SAP HANA)

Site: ITSO

Name: ITSO HANA

Host Address: xx.xx.xx.xx

Port: 30015

Run Inventory job after registration

Type:  Virtual  Physical

System Credential:

Name	Username	Type	
HANA admin	anaadm	System	<input type="button" value="Delete"/>

Database Credential(s):

Name	Username	Type	Instance	
System	SYSTEM	SAP HANA	Apply to all instances	<input type="button" value="Delete"/>

Figure 17 Register the SAP HANA application server

## Configure and run an SAP HANA backup job

The following steps describe how to create an SAP HANA backup job:

1. Click the **Jobs** tab. Expand the **Database** folder, and then select **SAP HANA**. Click the New icon, and then select **Backup**. The job editor opens.
2. Enter a name for your job definition and a meaningful description. From the list of available sites, select the SAP HANA database to backup. In this example, the database is *ANA*.
3. Select an **SLA Policy** for the IBM FlashSystem A9000 or A9000R that meets your backup criteria, as shown in Figure 18. Click **Create Job**.

<New DB/FS Backup Job>

Name: ITSO SAP HANA backup

Comment: Backup of ANA database

ITSO

ANA

SLA Policy	Type	RPO	Schedule Time
<input type="checkbox"/> A9000_replication	IBM Spectrum Accelerate	Every 1 day(s)	
<input checked="" type="checkbox"/> ITSO A9000/A9000R	IBM Spectrum Accelerate	Every 1 day(s)	None

Figure 18 Select the database and the SLA policy for the backup job

From the **Jobs** tab, you can run a job session on demand, pause or cancel a running job, or hold all future scheduled instances of a job from running until you are ready for the job to proceed.



To start the backup job, complete the following steps:

1. Click the **Jobs** tab and select the job you want to run by clicking the row with the job name.
2. Click **Start**, or right-click job name and select **Start**. A dialog box opens and asks for the SLA policy to be used, as shown in Figure 19.

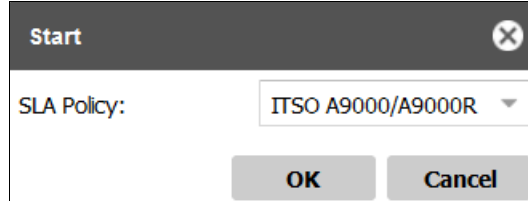


Figure 19 Select the SLA policy to start the backup job

3. In the Activity pane, click the job name to view the job session details, including the job session's start date and time, duration, description, status through a progress bar, and associated messages, as shown in Figure 20.

Start Time	Duration	Comment	Status	Message
May 9 14:35:51 2017	0h 0m 6s	SNAPSHOT(ITSO)	0%	RU Started

Figure 20 Activity pane showing the running backup job

IBM Spectrum Copy Data Management creates a snapshot backup of the SAP HANA data volume group, as shown in Example 2. This example shows the snapshots and consistency group for two subsequent SAP HANA backups. The SAP HANA logs are not included in the backup.

*Example 2 Snapshot list of two SAP HANA backups*

```
9000R>>snapshot_list vol=ITSO_HANA_DATA_001
```

Name	Size (GB)	Master Name	Consistency Group	Pool	Creator
ITSO_1019_1001_44.ITSO_HANA_DATA_001	50	ITSO_HANA_DATA_001	cec_x_1019_1001_63d19800021	ITSO_CDM	itso_cdm
ITSO_1019_1001_46.ITSO_HANA_DATA_001	50	ITSO_HANA_DATA_001	cec_x_1019_1001_63d19800021	ITSO_CDM	itso_cdm

## Configure an SAP HANA restore job

IBM Spectrum Copy Data Management handles SAP HANA Instant Disk Restore for iSCSI or Fibre Channel protocols to provide immediate mount of IBM FlashSystem A9000 or A9000R LUNs without transferring data. Snapshotted SAP HANA databases are cataloged and instantly recoverable with no physical transfer of data.

To create an SAP HANA restore job:

1. Click the **Jobs** tab. Expand the **Database** folder, and then select **SAP HANA**. Click **New**, and then select **Restore**, as shown in Figure 21.

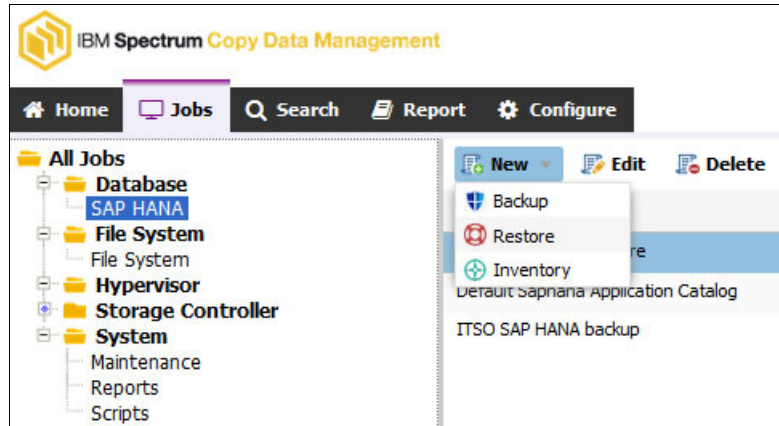


Figure 21 Create an SAP HANA restore job

2. The job editor opens. Enter a name for the job definition and a meaningful comment. Select the **Instant Disk Restore** template, as shown in Figure 22.

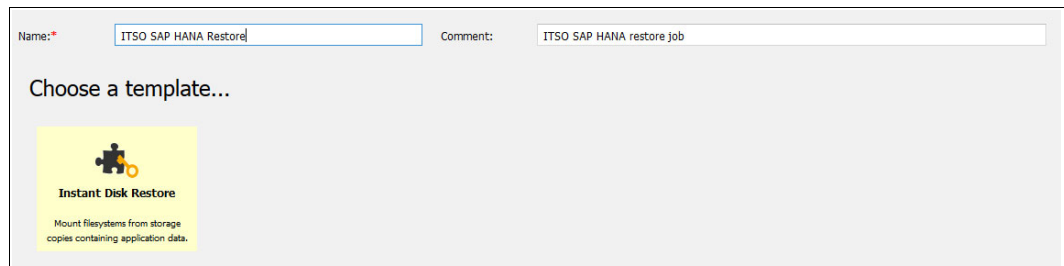


Figure 22 Choose the template for the restore job

3. Click **Source**. From the drop-down menu select **Application Browse** to select a source site and the SAP HANA server to view available database recovery points. In this example, there is a recovery point for the *ANA* database, as shown in Figure 23.

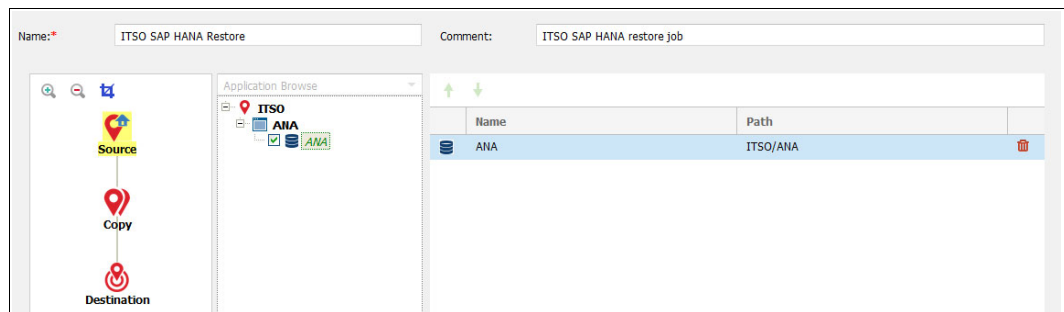


Figure 23 Select a recovery point

4. Click **Copy**. Sites containing copies of the selected data display, as shown in Figure 24 on page 17.

In this example, this is the *ITSO* site. By default, the latest copy of your data is used. To choose a specific version, select a site and click **Select Version**.

Click the **Version** field to view specific copies and their associated job and completion time.

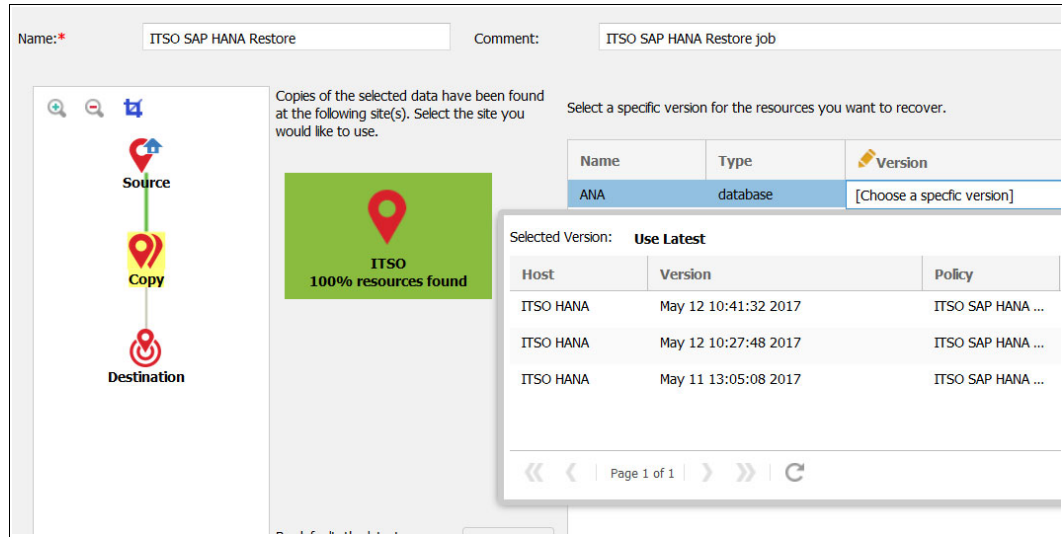


Figure 24 Select the site and version, that contains a copy of the database

5. Edit the options of the SAP HANA restore job, as shown in Figure 25. Click **Advanced** and set the Application option **Rename Mount points** to *Do not rename*. Set the StorageOptions **Make Permanent** to *Enabled* and **Protocol Priority** to *Fibre Channel*.

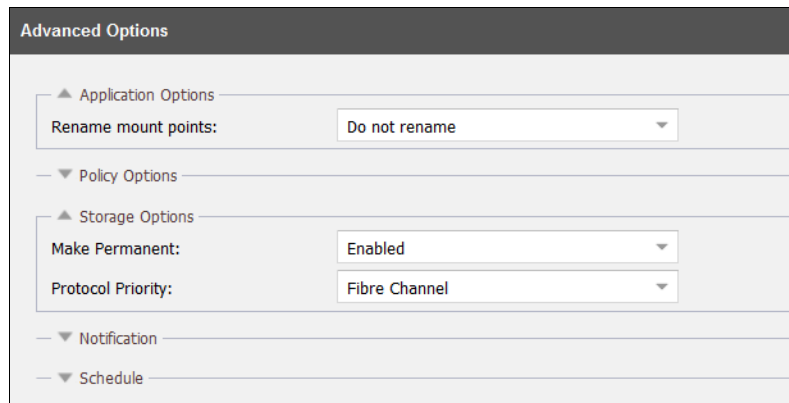


Figure 25 Set the Advanced Options for the restore job

6. Click **Destination**. Select a destination site and an associated database. In this example, the SAP HANA database *ANA* is selected, as shown in Figure 26 on page 18. Review the destination's database name mapping settings.

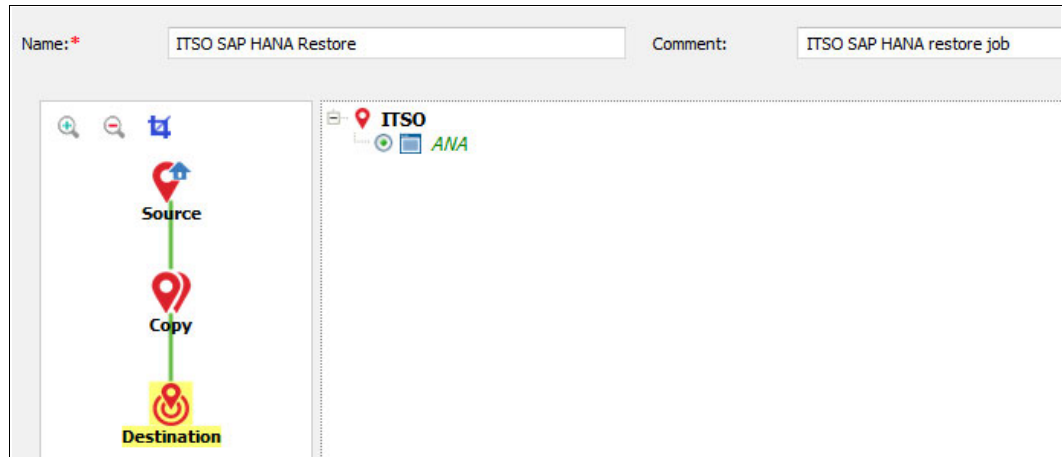


Figure 26 Specify the destination for the restore job

- To create the restore job, click **Create Job**. You can run the job manually from the **Jobs** tab.

## Complete an SAP HANA database restore

Before starting the restore job, you need to shut down SAP HANA.

The following options were used for the restore job:

- ▶ The restore job storage option **Make Permanent**: *Enabled*  
With this option enabled, the restore job performs a full volume copy of the SAP HANA snapshot backup to a new volume on the IBM FlashSystem A9000 or A9000R.
- ▶ The restore job application option **Rename Mount Points**: *Do not rename*  
Select this option if you do not want to rename mount points during recovery. IBM Spectrum Copy Data Management will mount using the same path or name as used for mounting the source.

**Important:** Before starting a restore job, shut down the database and unmount the SAP HANA data file system.

The following steps describe how to complete an SAP HANA restore with IBM Spectrum Copy Data Management:

1. Click the **Jobs** tab. Expand the **Database** folder. Then select the SAP HANA restore job and click **Start**, as shown in Figure 27.

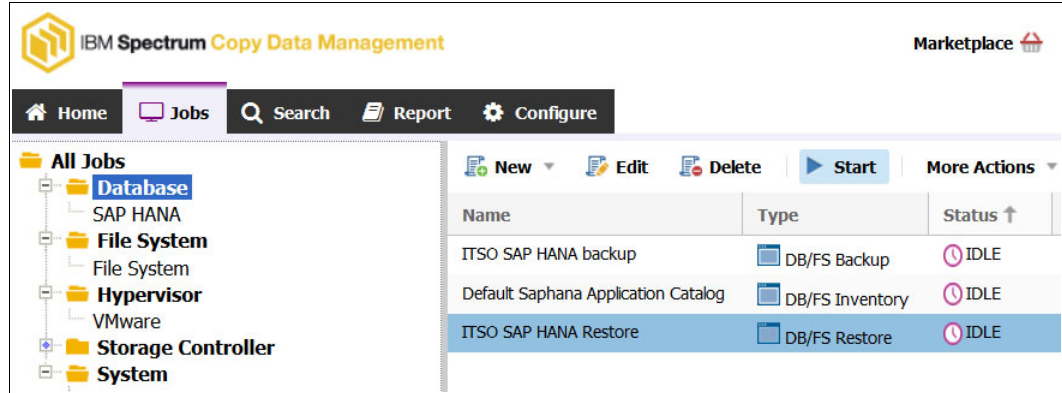


Figure 27 Start the SAP HANA restore job

2. Select the session link in the *Start Time* column to monitor the progress of the restore job, as shown in Figure 28.



Figure 28 Click the session link to follow the progress of the restore job

3. View the active and completed tasks of the SAP HANA restore job, as shown in Figure 29.

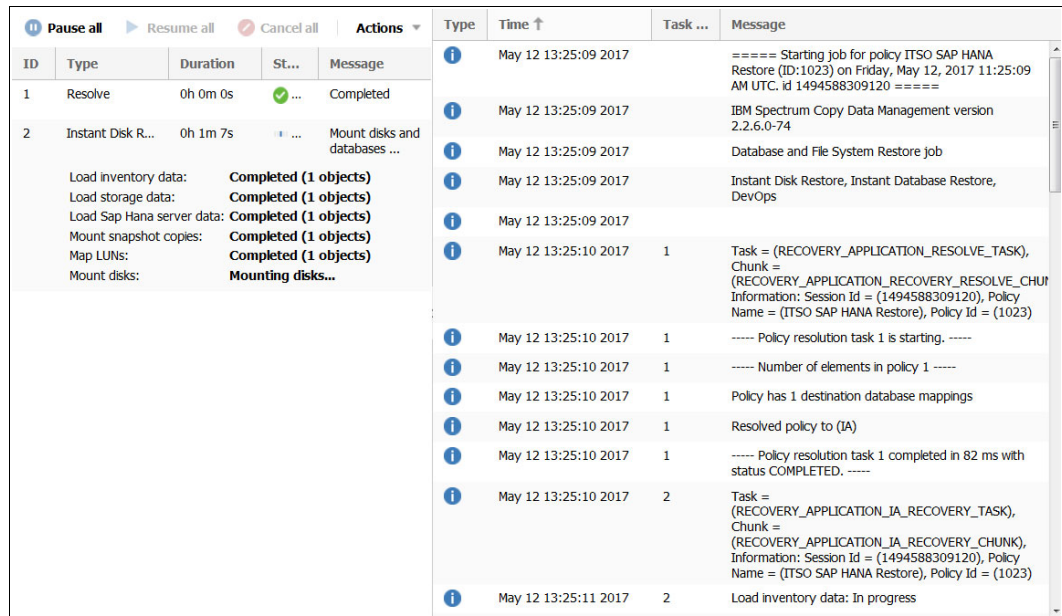


Figure 29 Task progress of the restore job

4. After the SAP HANA restore operation has completed, check that the data volume group is mounted at the application server by using the `df -h` command, as shown in Example 3.

*Example 3 The data has been restored to a new volume*

---

```
# df -h
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/rhel-root      50G   29G   22G  57% /
devtmpfs                  63G    0   63G   0% /dev
tmpfs                     63G   84K   63G   1% /dev/shm
tmpfs                     63G  9.8M   63G   1% /run
tmpfs                     63G    0   63G   0% /sys/fs/cgroup
/dev/mapper/vganashared-lvanashared 28G   14G   15G  48% /hana/shared
/dev/mapper/vganalog-lvanalog    56G  2.3G   54G   5% /hana/log/ANA
/dev/mapper/rhel-home        225G   38M  225G   1% /home
/dev/sda2                  1014M  168M  847M  17% /boot
/dev/sda1                  200M   9.5M  191M   5% /boot/efi
tmpfs                      13G    0   13G   0% /run/user/0
/dev/mapper/vganadata_Ree-lvanadata 47G   3.4G   44G   8% /hana/data/ANA
```

---

The mapped IBM FlashSystem A9000 or A9000R volumes can be listed with the `xiv_devlist` command, as shown in Example 4.

*Example 4 A new LUN for the data volume group was mapped to the SAP HANA server*

---

```
# xiv_devlist
IBM storage devices
-----Device                Size (GB) Paths Vol Name
Vol ID Storage ID Storage Type Hyper-Scale Mobility
-----/dev/mapper/mpatha 50.0 4/4 ITSO_HANA_DATA_001
25216 1320902 FlashSystem A9000R N/A
-----/dev/mapper/mpathe 60.0 4/4 ITSO_HANA_LOG
25220 1320902 FlashSystem A9000R N/A
-----/dev/mapper/mpathf 30.0 4/4 ITSO_HANA_SHARED
25221 1320902 FlashSystem A9000R N/A
-----/dev/mapper/mpathn 50.0 4/4
ECX_1023_1494588309120 13516 1320902 FlashSystem A9000R N/A
```

---

After the IBM Spectrum Copy Data Management SAP HANA restore job completes, you must finalize the restore using SAP HANA Studio.

Here is a short description of the main steps for the SAP HANA recovery:

1. In SAP HANA Studio, select **Backup and Recovery**, and then select **Recover System**.
2. In the SAP HANA Studio **Select a Backup** window, select the backup marked with a green availability icon, as shown in Figure 30 on page 21.

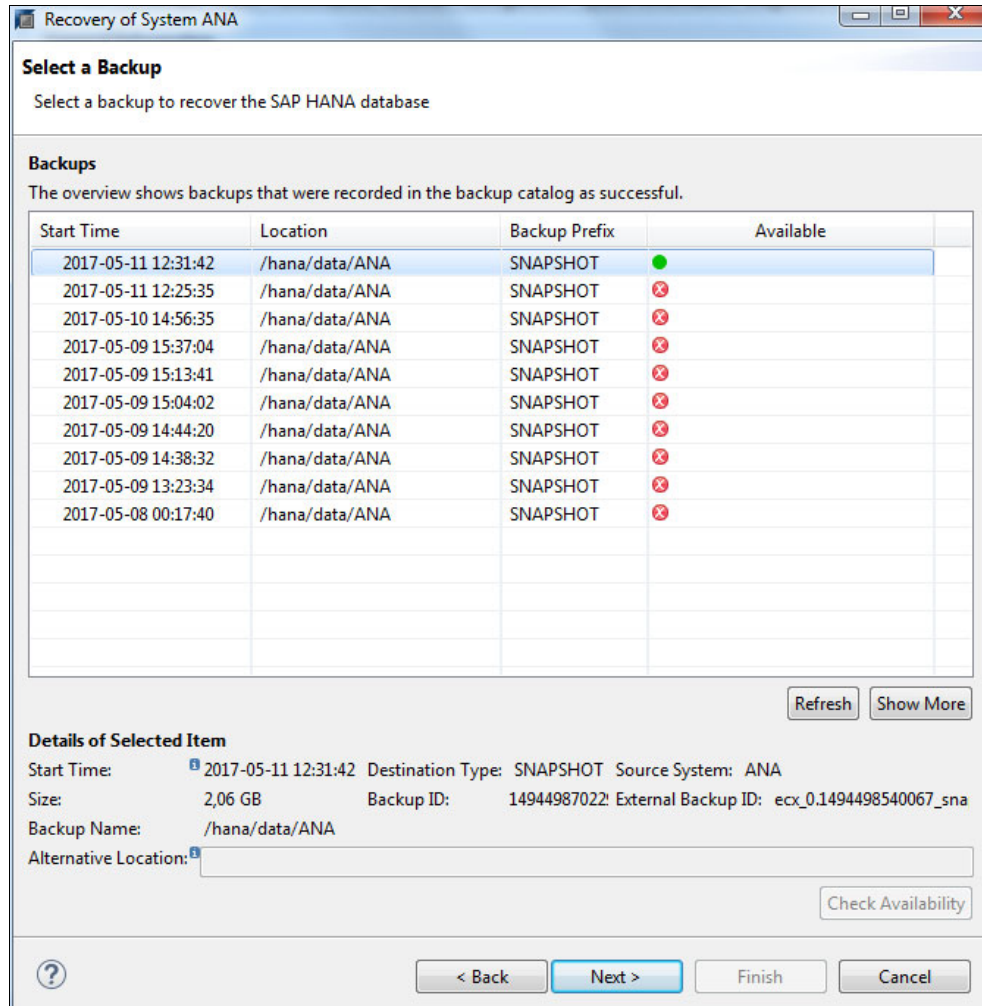


Figure 30 Select the IBM Spectrum Copy Data Management backup to recover SAP HANA

3. Finalize the database recovery with SAP HANA Studio.

For details about the SAP HANA recovery, read the SAP HANA Administration Guide, which is available at the [SAP Help Portal](#).

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