Unique method to backup, restore storage configuration

Dhishankar Sengupta
Krishanu Dhar

NetApp
Acknowledgement

<table>
<thead>
<tr>
<th>Publication number</th>
<th>US20130036212 A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication type</td>
<td>Application</td>
</tr>
<tr>
<td>Application number</td>
<td>US 13/195,980</td>
</tr>
<tr>
<td>Publication date</td>
<td>Feb 7, 2013</td>
</tr>
<tr>
<td>Filing date</td>
<td>Aug 2, 2011</td>
</tr>
<tr>
<td>Priority date</td>
<td>Aug 2, 2011</td>
</tr>
<tr>
<td>Inventors</td>
<td>Mahmoud K. Jibbe, Dhishankar Sengupta, Krishanu Dhar</td>
</tr>
<tr>
<td>Original Assignee</td>
<td>Jibbe Mahmoud K, Dhishankar Sengupta, Krishanu Dhar</td>
</tr>
<tr>
<td>Patent Citations</td>
<td>(3)</td>
</tr>
<tr>
<td>Classifications</td>
<td>(8)</td>
</tr>
<tr>
<td>Legal Events</td>
<td>(1)</td>
</tr>
<tr>
<td>External Links:</td>
<td>USPTO, USPTO Assignment, Espacenet</td>
</tr>
</tbody>
</table>
Abstract

All disaster recovery solutions communicate with APIs from different vendors to retrieve information and perform management operations. It is very important the solution is interoperable with the vendor APIs.

The method proposed overcomes issues arising from dependency on vendor APIs. It is a software stack to back-up the configuration on devices in a SAN/NAS environment. Upon failure of a site or a device in a site, the solution replicates the same configuration that existed on the previous site/device to the new site/device.
1. HW failure in a SAN/NAS environment
   ➢ Manually replicate logical configuration on the new component

2. Migration from one environment to another
   ➢ Requires a Storage Specialist
   ➢ Manually deploy the configuration
     ➢ Setting up Host, Network, Storage
     ➢ Re-provision LUNs
     ➢ Migrate Data

Automatically deploy the existing logical configuration on the new component(s) via a “Standard” based appliance.
Leveraging SMI-S

SMI-S Instrumentation

- Array SMI Provider
- Switch SMI Provider
- HBA SMI Provider

Disk Arrays
FC Switches
HBAs

CIM/WBEM (XML over HTTP)

Storage Management Applications
Workflow

Discover  Backup  Restore
Software Stack

- This module performs SLP based discovery of advertised CIM services.
- This module is built on SMI-S 1.5 standards to issue CIM-XML commands.
- This module operates on the XML requests, responses to extract the data and store in a relational database.
- **Relational Db:** This is a standard relational database to store values retrieved from devices.
Discover

Start

Query subnet for CIM Services

Connect to the Service URL

Query service for supported profiles

Step 2

Service Type: CIM Service
Service Access Points: Protocols and Ports
Service Attributes: Namespaces, Credentials

Service URLs could be IPv6, IPv4 or FQDN

Registered profiles and sub-profiles are retrieved from the providers.
Backup

CIM Client performs a series of enumerations & associations on the service URLs to retrieve the instances of the classes.

Responses retrieved is stripped by the CIM-XML analyzer to obtain the raw data (value of the class properties).

The data retrieved is stored in a standard relational database.
Restore

Step 3

Discover new devices

CIM Client

CIM-XML Analyzer

Is IP address, Device Type same?

NO

Store data in DB

YES

Is new, old config data same?

NO

Build CIM command

Restore on Device

YES

Take no action

Discover new devices

Compare and store device info in DB

Build CIM command and restore on device
Query device to retrieve properties and compare with the existing data in DB.

Mismatch results in re-initiation of restoration. Successful comparison results in committing the data to DB and restore completes.
Novel Features

- Easy migration of configuration data
- Vendor agnostic solution
- Maintenance of code is easy
- Solution can be extended to migrate “data” via snapshots
Pre-requisites

- The devices in the network should have its SMI provider configured to advertise its CIM service.

- The new component must be interoperable in the environment.

- Zones should be created with aliases that follow a common nomenclature.
  
  For example:
  Host1HBA1Port0, Host1HBA1Port1
  zone1, zone2
  zoneset1, zoneset2
Thank You

For queries email:

- Dhishankar.Sengupta@netapp.com
- Krishanu.Dhar@netapp.com