

An Analysis and Design of the Storage Management System Based on SMI 1.1.0

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Abstract

This paper aims to suggest a Management Model of a storage system in distributed computing environment. Based on the Common Information Model and Web Based Enterprise Management, the SMI-S is a standard to manage a storage system. This specification defines an interface for the management of a Storage Area Network that is a heterogeneous environment of management applications, storage devices and storage system from different vendors. It consists of a Profile, Subprofile and Package. A Profile defines the base set of information and capabilities that allow a Client to manage a particular storage resource. A Subprofile represents additional functionality. Analyzing of the Profile, Subprofile and the Package, it is goal to find the method that we need to manage a storage system in this paper.

Keywords: SMI, SNIA

1. Introduction

According to increase the complexity of computer, the cost and effort to manage the system are more bigger. To solve this problem, it has been studied a standard to manage a various computer resource. The CIM(Common Information Model) and WBEM(Web Based Enterprise Management) are showed as a result of research.[1][2][3] Also, the SMI-S(Storage Management Initiative-Specification) is proposed by the SNIA(Storage Networking Industry Association). [4][5][6]

This paper aims to suggest a Management Model of a storage system in distributed computing environment. Based on the Common Information Model and Web Based Enterprise Management, SMI-S is a standard to manage a storage system. This specification defines an interface for the management of a storage Area Network that is a heterogeneous environment of management applications, storage devices and storage system from different vendor. It consists of a Profiles, Subprofiles and Packages. A Profile defines the base set of information and capabilities that allows a Client to manage a particular storage resource. A

Subprofile represents additional functionality. Analyzing of the Profile, the Subprofile and the Package, it is goal to find the method that we need to manage a storage system.

2. SMI-S

The SMI-S defines an interface for the management of a Storage Area Network that is a heterogeneous environment of management applications, storage devices and storage system from different vendors. The interface uses standards based protocols and specifications(CIM/WBEM/SLP) to provide interoperability, security and extensibility.[1] It is composed of three elements so called the Profiles, the Subprofiles and the Packages.

2.1. Profiles

A Profile defines the base set of information and capabilities that allow a Client to manage a particular storage resource such as a disk array. It defines the classes that a Client will use to perform a particular management task in a SAN. The Profile defines the associations that will be used to traverse between classes. In addition to identifying the class used, a Profile defines the properties and extrinsic methods of each class that must be supported

A Profile can defines Subprofiles which represents additional capability that a vendor can choose to make available. Like Profile, it defines the classes, properties and extrinsic methods that must be implemented to support its functionality. Also, it can incorporate Packages. Likewise, a Package defines the classes, properties and extrinsic methods that must be implemented to support its functionality.

In SMI-S 1.1.0, the following groups of Profiles has been defined :

1. Storage : to manage different types of storage devices
2. Host : to manage components attached to host systems
3. Fabric : to manage the Fabric topology
4. Server : to manage the SMI Agent

Several Storage Profiles are defined for managing storage devices on a Storage Area Network. Each Profile is focused on a different aspect of storage device management.

These devices are :

- Volume Management : allows a Client to manage physical disk as logical devices called volumes.
- NAS Head : allows a Client to manage a Network Attached Storage systems.
- Self-Contained NAS System : to manage a Client a Network Attached Storage systems.
- Storage Library : allows a Client to manage a storage system that has mechanism for retrieving data from different physical forms of storage media.
- Storage Virtualizer : allows a Client to manage a storage system that dose not directly include any local storage.

2.2. Subprofiles

A Subprofile can be referenced by a Profile to allow optional inclusion of additional capability. A Subprofile defines the classes that a Client will use to perform the additional management tasks provided by the Subprofile. Also it defines associations that will be used to traverse between classes. In addition to identifying the class used, a Subprofile defines the properties and extrinsic methods of each class that must be supported. However, a significant difference exists between a Profile and a Subprofile. A Profile represents a base set of classes and capabilities that all supporting implementations must make available. In contrast, a Subprofile represents an optional set of classes and capabilities that a vender may or may not choose to implement.

A Subprofile can contain the following components :

- The standards used
- The events that a Client can monitor
- The Packages that are incorporated into the Subprofile
- Etc

In SMI-S 1.1.0, the following groups of Subprofiles has been defined :

- Common : one that can apply to many different Profiles
- Common Initiator Port : one that can apply to Profiles that manage the generic SCSI capabilities and transport-specific aspects of target storage system.
- Common Target Port : one that can apply to Profiles that manage the generic SCSI capabilities and transport-specific aspects for hosts and storage systems to discover and make connections to connected storage.
- Profile-specific : one that applies to only one particular Profile.

The Storage Subprofile can reference the following storage specific Subprofiles as optional enhancements :

- File System Manipulation
- File Export Manipulation
- Block Service Resource Ownership
- Block Server Performance
- Copy Services
- Disk Driver Lite
- Disk Sparing
- Extent Composition
- Masking and Mapping
- Limited Access Ports

2.3. Packages

A Package can be referenced by Profile. It defines a set of CIM classes and the associations that will used to traverse between classes. In addition to defining the classes used, a Package defines the properties and extrinsic methods to be used. However, there exists a significant difference between a Subprofile and a Package. A Subprofile represents additional functionality that a vender can optionally choose to implement as a part of their Profile implementation. In contrast, when a Package is referenced by a Profile, all of the CIM

elements in the Package are considered to be part of the Profile and hence, must be implemented

A Package contains the following components as a Profile which are :

- The standards used
- The events that a Client can monitor
- The Subprofiles that can optionally be implemented

The Package defines the following four catalogues : — Health : allows a Client to retrieve information about the status of the device managed by the referencing Profile. — Physical Package : allows a Client to retrieve information about the physical characteristics of the device managed by the referencing Profile. — Software : allows a Client to retrieve information about the software and firmware installed on the device or element managed by the referencing Profile. — Block Services : allows a Client to manage storage pools and logical disks by the referencing storage Profile

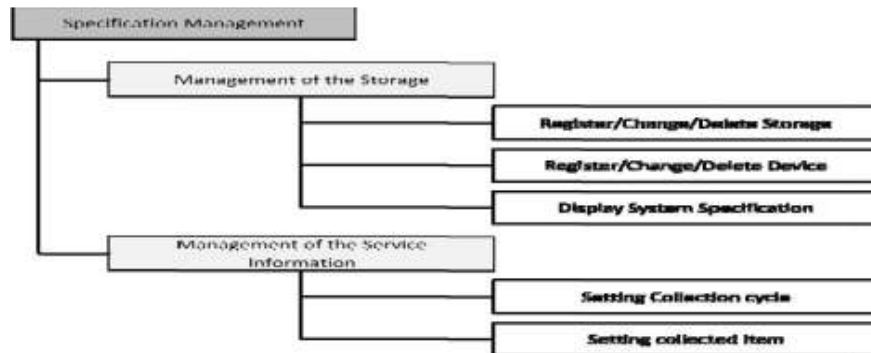
(b)

3. Proposed SRM(Storage Resource Management)System

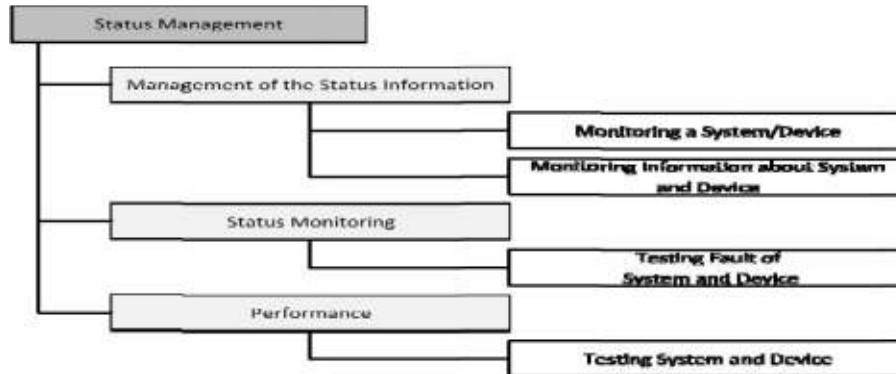
At this stage of implementation, A SRM System is defined as a set of functionality to manage a storage resource. The figure 1,2 is showed functionality of the SRM system to manage devices that are composed. The Menu of the Management System is composed of a Specification, a Status, a Fault, a Statistics, a Report Management.

The following five catalogues are implemented in the Manu :

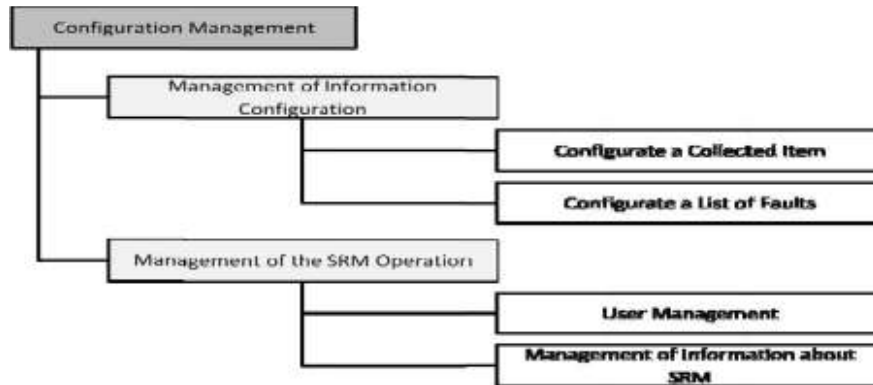
- Specification(Setting) Management Storage Specification Management Service nformation Management
- Status Management Status Information Management Status Monitoring Performance Measurement
- Fault Management Management of the Fault Information Fault Processing
- Configuration Management Information Configuration Management SRM Operation Management
- Report Management Retrieval Management Statistics Management



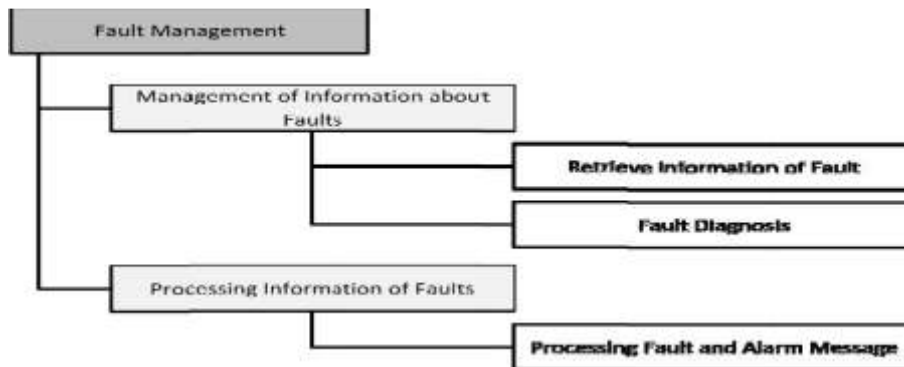
(a) Functionality of the SSRM system(SSpecification))



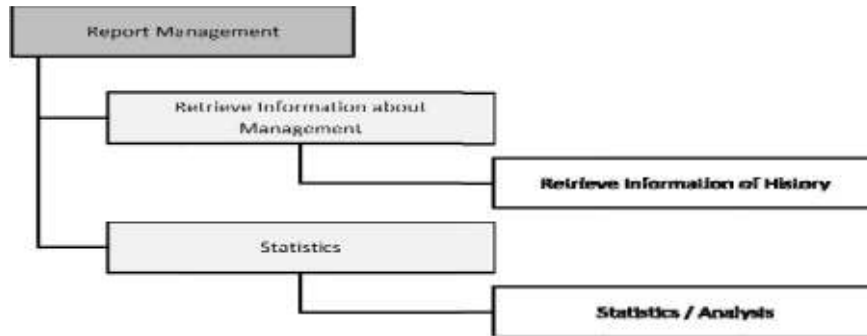
(b) Functionality of the SSRM system(SStatus)



(c) Functionality of the SSRM system(CConfiguration)



(d) Functionality of the SSRM system(FFault)



(e) Functionality of the SSRM system(RRreport)

Fig. 1. Functionality of the SRM system



< Status Information >



< Performance Information >



< e-Mail >

Fig. 2. Screen of SRM

First, the Specification Management allows a Client to control a devices and a system. Second, the Configuration Management allows a Client to manage a Storage, a Service and a Storage Organization. The Status Management allows a Client to retrieve information about a system status and a device status. Finally, the Fault Management allows a Client to be notified when the event and error is happened

4. Conclusion

This paper aims to suggest a Management Model of a storage system in distributed computing environment. Based on the Common Information Model and Web Based Enterprise Management, the SMI-S is a standard to manage a storage system. This specificction defines an interface for the management of a storage Area Network that is a heterogeneous environment of management applications, storage devices and storage system from different vender. Like implemented SRM system, we design the functionality that a Client can control a device on a SAN.

5. References

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