Managing NFS in Solaris[TM] Using CIM/WBEM.

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Overview

- What is CIM/WBEM?

- How does CIM/WBEM Relate to NFS?

- Solaris^{TM} NFS CIM Model

- Managing NFS in Solaris^{TM} using CIM/WBEM

- Conclusions and Other Information

What is CIM/WBEM?

- ## Web-Based Enterprise Management (WBEM)

    – Set of management and internet technologies

    – Enables heterogenous system management over the Internet

What is CIM/WBEM? (cont.)

- **WBEM cont.**
  - Set of Standards:
    - Specified by the Distributed Management Task Force (DMTF)
    - Includes:
      - Data Model
        - CIM
      - Language Specification
        - xmlCIM
      - Transport Mechanism
        - HTTP

What is CIM/WBEM? (cont.)

- Common Information Model (CIM)
  - Data Model standard specified by WBEM technologies
  - Represented in xmlCIM
  - CIM Objects defined for most system resources
  - Extensible

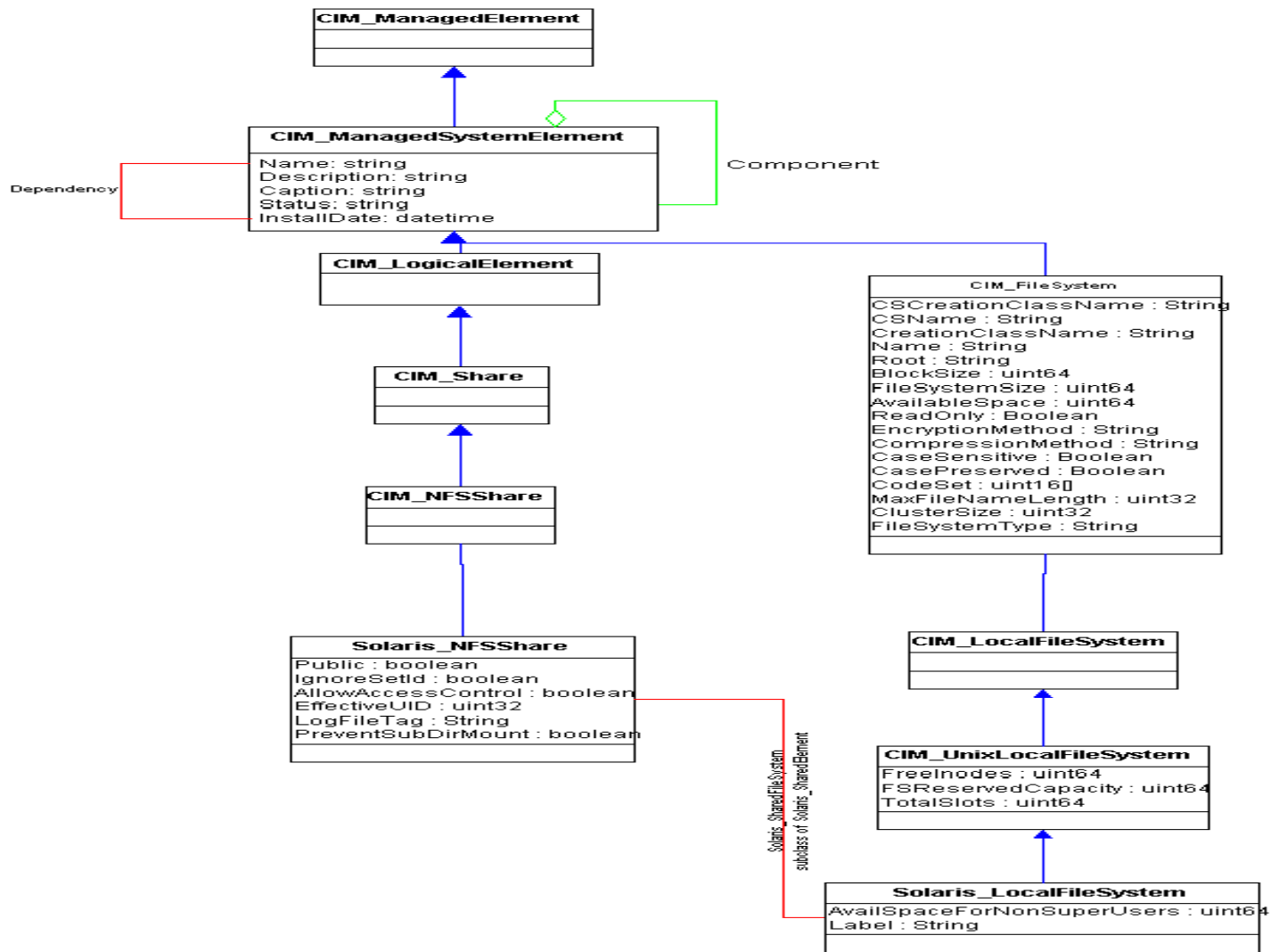# CIM/WBEM and NFS

- CIM Object model defines a set of classes for management of NFS

    – Core Classes:

        – CIM_NFS

        – CIM_Mount

        – CIM_NFSShare

        – CIM_SharedElement

- Models both the client and server resources and behaviors

Solaris™ NFS CIM Model

NFS Server Core CIM Classes

NFS INDUSTRY CONFERENCE

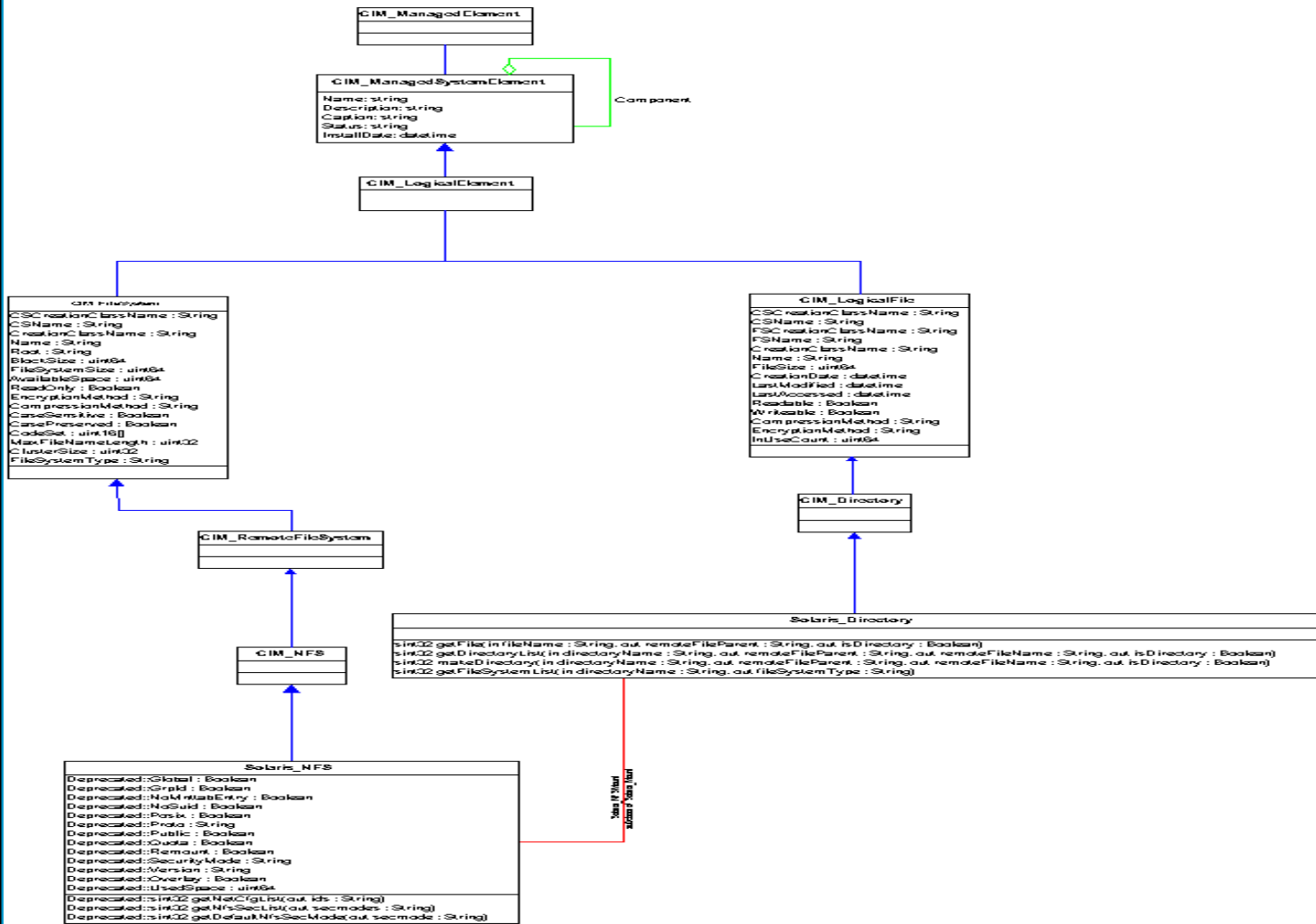*October 22-23, 2002*

CIM_ManagedElement

CIM_ManagedSystemElement
Name: string
Description: string
Caption: string
Status: string
InstallDate: datetime

Dependency

Component

CIM_LogicalElement

CIM_Share

CIM_NFSShare

Solaris_NFSShare
Public : boolean
IgnoreSetId : boolean
AllowAccessControl : boolean
EffectiveUID : uint32
LogFileTag : String
PreventSubDirMount : boolean

Solaris_SharedFileSystem
subclass of Solaris_SharedElement

CIM_FileSystem
CSCreationClassName : String
CSName : String
CreationClassName : String
Name : String
Root : String
BlockSize : uint64
FileSystemSize : uint64
AvailableSpace : uint64
ReadOnly : Boolean
EncryptionMethod : String
CompressionMethod : String
CaseSensitive : Boolean
CasePreserved : Boolean
CodeSet : uint16[]
MaxFileNameLength : uint32
ClusterSize : uint32
FileSystemType : String

CIM_LocalFileSystem

CIM_UnixLocalFileSystem
FreeInodes : uint64
FSReservedCapacity : uint64
TotalSlots : uint64

Solaris_LocalFileSystem
AvailSpaceForNonSuperUsers : uint64
Label : String

Solaris™ NFS CIM Model

Cont.

NFS Client Core CIM Classes

Managing NFS in Solaris™ with CIM/WBEM

- Java or XML client side interface

- Must have Solaris WBEM services packages installed

    - SUNWCwbem and SUNWwsdk clusters

- Must understand NFS model and important Solaris™ NFS CIM classes (Core classes are a good start)

Managing NFS in Solaris™ with CIM/WBEM Cont.

- Java WBEM Client – See backup slides

- XML WBEM Client:

  - Steps:

    - Create XML over HTTP CIMOM Request document

    - Send request

    - Get xmlCIM output

Managing NFS in Solaris™ with CIM/WBEM Cont.

- ## XML WBEM Client cont.:

  - Sample XML request for NFS filesystems:

```xml
<?xml version="1.0" encoding="utf-8">
<CIM CIMVERSION="2.0" DTDVERSION="2.0">
<MESSAGE ID="87872" PROTOCOLVERSION="1.0">
  <SIMPLEREQ>
    <IMETHODCALL NAME="EnumerateInstances">
      <LOCALNAMESPACEPATH>
        <NAMESPACE NAME="root"/>
      </LOCALNAMESPACEPATH>
      <IPARAMVALUE NAME="ClassName">
        <CLASSNAME NAME="Solaris_NFS"/>
      </IPARAMVALUE>
      <IPARAMVALUE NAME="LocalOnly">
        <VALUE>TRUE</VALUE>
      </IPARAMVALUE>
      <IPARAMVALUE NAME="DeepInheritance">
        <VALUE>TRUE</VALUE>
      </IPARAMVALUE>
    </IMETHODCALL>
  </MESSAGE>
</CIM>
```

Managing NFS in Solaris™ with CIM/WBEM Cont.

- ## XML WBEM Client cont.:

  – Sample XML output for NFS filesystems:

```
<?xml version="1.0" ?>
 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
  <MESSAGE ID="0" PROTOCOLVERSION="1.0">
   <SIMPLERSP>
    <IMETHODRESPONSE NAME="EnumerateInstanceNames">
     <IRETURNVALUE>
      <INSTANCENAME CLASSNAME="Solaris_NFS">
       <KEYBINDING NAME="Name">
        <KEYVALUE VALUETYPE="string">
         /export
        </KEYVALUE>
       </KEYBINDING>
      </INSTANCENAME>
     </IRETURNVALUE>
    </IMETHODRESPONSE>
   </SIMPLERSP>
  </MESSAGE>
 </CIM>
```

Managing NFS in Solaris™ with CIM/WBEM Cont.

- Solaris™ GUI Interface:

  - Getting information about all Shares and NFS filesystems:

    - Use Solaris Management Console tool (/usr/sadm/bin/smc)

    - Mounts and Shares tool

Managing NFS in Solaris™ with CIM/WBEM Cont.

Managing NFS in Solaris™ with CIM/WBEM Cont.

Managing NFS in Solaris™ with CIM/WBEM Cont.

Conclusions

- **What's Cool:**

  – Provides standard API for management of NFS resources

  – Allows heterogeneous systems to be managed via the same API

  – Client side development is fast

    – Java or XML

    – Standard API with documented SDK

Conclusions Cont.

- More of What's Cool:

  – Streamlines NAS management in Solaris

  – Can use XML Client side in scripts

  – XML output is MUCH easier to parse than CLI output

  – xmlCIM is a standard and will not change

  – xmlCIM over HTTP makes it easy to develop NAS management application

Conclusions Cont.

- Current Limitations:
  - Runs on a per host basis
    - Must correlate multiple host data
  - Overhead of CIMOM
    - Java based
      - Limits use
      - No boot time use
      - Single user mode
  - Complexity of CIM model

Conclusions Cont.

- ## Futures:

    - ### Continuing to support this technology

    - ### More 'Service Level' NFS and NAS management

    - ### Continuing to drive for consistency across our management offerings

Other Information

- Other Information:
    - Solaris^{TM} WBEM Documents located at:
        - Solaris WBEM Services Admin. Guide

        http://docs.sun.com/db/doc/806-6827
        - Solaris WBEM SDK Developer's Guide

        http://docs.sun.com/db/doc/806-6828
    - Cimworkshop
        - /usr/sadm/bin/cimworkshop
    - CIM/WBEM Information
        - www.dmtf.org
        - www.snia.org

Other Information Cont.

- ## Other Information:

  – XML Information and Specification

  - www.w3c.org

  – Open source WBEM Client applications:

  - http://www.openpegasus.org/manual/PegasusCIMClients.html

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Managing NFS in Solaris™ Using CIM/WBEM.

Backup Slides

Solaris™ NFS CIM Model

Full Solaris™ NFS CIM Model

Solaris^{TM} NFS CIM Model

Solaris^{TM} NFS Statistical CIM Model

Managing NFS in Solaris™ with CIM/WBEM

- ## Java Client :

  - Must create CIMClient connection

    - CIMClient cc = new CIMClient(host);

    - Client connection maintained through call. Can be used for new call but no state information maintained

  - Create CIMObjectPath

    - Object path is handle to type of cim object you want to reference

Managing NFS in Solaris™ with CIM/WBEM Cont.

- Java Client cont.:

  – Create CIMObjectPath cont.

    – CIMObjectPath cop = new CIMObjectPath("Solaris_NFS");

    – Enumeration e = cc.enumerateInstances(cop);

    – Will get all instances of NFS filesystems on a client

Managing NFS in Solaris™ with CIM/WBEM Cont.

```
Instance of Solaris_NFS {
        AttributeCaching, Value: 1
        AttributeCachingForDirectoriesMax, Value: 60
        AttributeCachingForDirectoriesMin, Value: 30
        AttributeCachingForRegularFilesMax, Value: 60
        AttributeCachingForRegularFilesMin, Value: 3
        AvailableSpace, Value: 151191350272
        BlockSize, Value: 8192
        CasePreserved, Value: 1
        CaseSensitive, Value: 1
        ClusterSize, Value: 512
        CompressionMethod, Value: Unknown
        [KEY]  CSCreationClassName, Value: Solaris_ComputerSystem
        [KEY]  CSName, Value: cutiger
        [KEY]  CreationClassName, Value: Solaris_NFS
        EncryptionMethod, Value: Unknown
        FileSystemSize, Value: 215027578880
        FileSystemType, Value: nfs
        Global, Value: 0
        GrpId, Value: 0
        HardMount, Value: 1
        InstallDate, Value: 1030121269
        Interrupt, Value: 1
        MaxFileNameLength, Value: -1
        [KEY]  Name, Value: resource:=pogo:/export devid:=3c40f9c
        NoMnttabEntry, Value: 0oop
        NoSuid, Value: 0
        Posix, Value: 0
        Proto, Value: tcp
        Public, Value: 0
        Quota, Value: 0
        ReadBufferSize, Value: 32768
        ReadOnly, Value: 1
        RetransmissionAttempts, Value: 5
        RetransmissionTimeout, Value: 600
        Root, Value: /export/slice6
        SecurityMode, Value: sys
        ServerCommunicationPort, Value: 2049
        UsedSpace, Value: 63836228608
        Version, Value: 3
        WriteBufferSize, Value: 32768
};
```

Managing NFS in Solaris™ with CIM/WBEM Cont.

Managing NFS in Solaris™ with CIM/WBEM Cont.