X.500 Directory Monitoring MIB

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

This document defines a portion of the Management Information Base (MIB). It defines the MIB for monitoring Directory System Agents (DSA), a component of the OSI Directory. This MIB will be used in conjunction with the APPLICATION-MIB for monitoring DSAs.

Table of Contents

1.  The SNMPv2 Network Management Framework ........................ 1
2.  MIB Model for DSA Management ...................................... 2
3.  The DSA functions and operations ...................................... 2
4.  MIB design ..................................................................... 3
5.  The Directory Monitoring MIB .......................................... 3
6.  Acknowledgements .......................................................... 17
7.  References ..................................................................... 17
8.  Security Considerations .................................................. 18
9.  Authors’ Addresses ......................................................... 18

1. The SNMPv2 Network Management Framework

The major components of the SNMPv2 Network Management framework are described in the documents listed below.

- RFC 1442 [1] defines the Structure of Management Information (SMI), the mechanisms used for describing and naming objects for the purpose of management.

- STD 17, RFC 1213 [2] defines MIB-II, the core set of managed objects (MO) for the Internet suite of protocols.
RFC 1567  X.500 Directory Monitoring MIB  January 1994

1. Introduction

- RFC 1448 [4] defines the protocol used for network access to managed objects.

The framework is adaptable/extensible by defining new MIBs to suit the requirements of specific applications/protocols/situations.

Managed objects are accessed via a virtual information store, the MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, which is an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, often a textual string, termed the descriptor, is used to refer to the object type.

2. MIB Model for DSA Management

A DSA-manager may wish to monitor several aspects of the operational DSA. He/she may want to know the process related aspects—the resource utilization of the operational DSA; the network service related aspects e.g., inbound-associations, outbound-associations, operational status, and finally the information specific to the DSA application - its operations and performance.

The MIB defined in this document covers the portion which is specific to the DSA-application. The network service related part of the MIB, and the host-resources related part of the MIB, as well other parts of interest to a Manager monitoring the DSA-application, are covered in separate documents [6] [7].

3. The DSA functions and operations

The Directory System Agent [DSA], a component of the OSI-Directory [5] [9], is an application process. It provides access to the Directory Information Base [DIB] to Directory User Agents [DUA] and/or other DSA. Functionally, a User [DUA] and the Directory are bound together for a period of time at an access point to the Directory [DSA]. A DSA may use information stored in its local database or interact with (chain the request to) other DSAs to service requirements. Alternatively, a DSA may return a reference to another DSA.

The local database of a DSA consists of the part of the DIT that is mastered by the DSA, the part of the DIT for which it keeps slave copies and cached information that is gathered during the operation
of the DSA.

The specific operations carried out by the DSA are: Read, Compare, AddEntry, ModifyEntry, ModifyRDN, RemoveEntry, List, Search. There is also the special operation Abandon. In response to requests results and/or errors are returned by the DSA.

4. MIB design

The basic principle has been to keep the MIB as simple as possible. The Managed objects included in the MIB are divided into three tables - dsaOpsTable, dsaEntryTable and dsaIntTable.

- The dsaOpsTable provides summary statistics on the accesses, operations and errors.
- The dsaEntriesTable provides summary statistics on the entries held by the DSA and on cache performance.
- The dsaIntTable provides some useful information on the interaction of the monitored DSA with peer DSAs.

There are references to the Directory itself for static information pertaining to the DSA. These references are in the form of "Directory Distinguished Name" [8] of the corresponding object. It is intended that DSA management applications will use these references to obtain further related information on the objects of interest.

5. The Directory Monitoring MIB

DSA-MIB DEFINITIONS ::= BEGIN

IMPORTS
   MODULE-IDENTITY, OBJECT-TYPE,
   NOTIFICATION-TYPE
   FROM SNMPv2-SMI
   DisplayString, TimeStamp,
   TEXTUAL-CONVENTION
   FROM SNMPv2-TC
   mib-2
   FROM RFC1213-MIB

applIndex, DistinguishedName
   FROM APPLICATION-MIB;

dsaMIB MODULE-IDENTITY
LAST-UPDATED "9311250000Z"
ORGANIZATION "IETF Mail and Directory Management Working Group"
CONTACT-INFO

"        Glenn Mansfield

Postal: AIC Systems Laboratory
       6-6-3, Minami Yoshinari
       Aoba-ku, Sendai, 989-32
       JP

Tel:    +81 22 279 3310
Fax:    +81 22 279 3640
E-Mail: glenn@aic.co.jp"

DESCRIPTION

" The MIB module for monitoring Directory System Agents."
::= { mib-2 29 }

dsaOpsTable OBJECT-TYPE
SYNTAX SEQUENCE OF DsaOpsEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
" The table holding information related to the
DSA operations."
::= {dsaMIB 1}

dsaOpsEntry OBJECT-TYPE
SYNTAX DsaOpsEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
" Entry containing operations related statistics
for a DSA."
INDEX { applIndex }
::= {dsaOpsTable 1}

DsaOpsEntry ::= SEQUENCE {
  -- Bindings
  dsaAnonymousBinds
    Counter32,
  dsaUnauthBinds
    Counter32,
  dsaSimpleAuthBinds
    Counter32,
  dsaStrongAuthBinds
    Counter32,
  dsaBindSecurityErrors
    Counter32,
-- In-coming operations

dsaInOps
  Counter32,
dsaReadOps
  Counter32,
dsaCompareOps
  Counter32,
dsaAddEntryOps
  Counter32,
dsaRemoveEntryOps
  Counter32,
dsaModifyEntryOps
  Counter32,
dsaModifyRDNOps
  Counter32,
dsaListOps
  Counter32,
dsaSearchOps
  Counter32,
dsaOneLevelSearchOps
  Counter32,
dsaWholeTreeSearchOps
  Counter32,

-- Out going operations

dsaReferrals
  Counter32,
dsaChainings
  Counter32,

-- Errors

dsaSecurityErrors
  Counter32,
dsaErrors
  Counter32
}

dsaAnonymousBinds OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Number of anonymous binds to this DSA from DUAs
   since application start."
 ::= {dsaOpsEntry 1}
dsaUnauthBinds OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of un-authenticated binds to this DSA since application start."
::= {dsaOpsEntry 2}

dsaSimpleAuthBinds OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of binds to this DSA that were authenticated using simple authentication procedures since application start."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988: Section 8.1.2.1.1."
::= {dsaOpsEntry 3}

dsaStrongAuthBinds OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of binds to this DSA that were authenticated using the strong authentication procedures since application start. This includes the binds that were authenticated using external authentication procedures."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988: Sections 8.1.2.1.2 & 8.1.2.1.3."
::= {dsaOpsEntry 4}

daBindSecurityErrors OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of bind operations that have been rejected by this DSA due to inappropriateAuthentication or invalidCredentials."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988: Section 12.7.2"
::= {dsaOpsEntry 5}

dsInOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  " Number of operations forwarded to this DSA
  from DUAs or other DSAs since application
  start up."
::= {dsaOpsEntry 6}

dsReadOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  " Number of read operations serviced by
  this DSA since application startup."
REFERENCE
  " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
  Section 9.1."
::= {dsaOpsEntry 7}

dsCompareOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  " Number of compare operations serviced by
  this DSA since application startup."
REFERENCE
  " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
  Section 9.2."
::= {dsaOpsEntry 8}

dsAddEntryOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  " Number of addEntry operations serviced by
  this DSA since application startup."
REFERENCE
  " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
  Section 11.1."
::= {dsaOpsEntry 9}
dsaRemoveEntryOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of removeEntry operations serviced by
this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
Section 11.2."
::= {dsaOpsEntry 10}

dsaModifyEntryOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of modifyEntry operations serviced by
this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
Section 11.3."
::= {dsaOpsEntry 11}

dsaModifyRDNOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of modifyRDN operations serviced by
this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
Section 11.4."
::= {dsaOpsEntry 12}

dsaListOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of list operations serviced by
this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
Section 10.1."
::= {dsaOpsEntry 13}
dsaSearchOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of search operations—baseObjectSearches,
oneLevelSearches and subTreeSearches, serviced
by this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 — Rec. X.511, 1988:
Section 10.2."
::= {dsaOpsEntry 14}

dsaOneLevelSearchOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of oneLevelSearch operations serviced
by this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 — Rec. X.511, 1988:
Section 10.2.2.2."
::= {dsaOpsEntry 15}

dsaWholeTreeSearchOps OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of wholeTreeSearch operations serviced
by this DSA since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 — Rec. X.511, 1988:
Section 10.2.2.2."
::= {dsaOpsEntry 16}

dsaReferrals OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of referrals returned by this DSA in response
to requests for operations since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 — Rec. X.511, 1988:
Section 12.6."
::= {dsaOpsEntry 17}
dsaChaining OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of operations forwarded by this DSA
to other DSAs since application startup."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.518, 1988:
Section 14."
::= {dsaOpsEntry 18}

dsaSecurityErrors OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of operations forwarded to this DSA
which did not meet the security requirements."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
Section 12.7."
::= {dsaOpsEntry 19}

dsaErrors OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of operations that could not be serviced
due to errors other than security errors, and
referrals.
A partially serviced operation will not be counted
as an error.
The errors include NameErrors, UpdateErrors, Attribute
errors and ServiceErrors."
REFERENCE
"CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
Sections 12.4, 12.5, 12.8 & 12.9."
::= {dsaOpsEntry 20}

-- Entry statistics/Cache performance
dsaEntriesTable OBJECT-TYPE
SYNTAX SEQUENCE OF DsaEntriesEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The table holding information related to the"
entry statistics and cache performance of the DSAs."
 ::= {dsaMIB 2}

dsaEntriesEntry OBJECT-TYPE
SYNTAX DsaEntriesEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
" Entry containing statistics pertaining to entries
held by a DSA."
INDEX { applIndex }
 ::= {dsaEntriesTable 1}

DsaEntriesEntry ::= SEQUENCE {
  dsaMasterEntries
  Gauge32,
  dsaCopyEntries
  Gauge32,
  dsaCacheEntries
  Gauge32,
  dsaCacheHits
  Counter32,
  dsaSlaveHits
  Counter32
}

dsaMasterEntries OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" Number of entries mastered in the DSA."
 ::= {dsaEntriesEntry 1}

dsaCopyEntries OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" Number of entries for which systematic (slave)
copies are maintained in the DSA."
 ::= {dsaEntriesEntry 2}

dsaCacheEntries OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of entries cached (non-systematic copies) in
the DSA. This will include the entries that are
cached partially. The negative cache is not counted."
::= {dsaEntriesEntry 3}

dsaCacheHits OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"Number of operations that were serviced from
the locally held cache since application startup."
::= {dsaEntriesEntry 4}

dsaSlaveHits   OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"Number of operations that were serviced from
the locally held object replications [shadow
entries] since application startup."
::= {dsaEntriesEntry 5}

-- The dsaIntTable contains statistical data on the peer DSAs
-- with which the monitored DSAs [attempt to] interact. This
-- table will provide a useful insight into the effect of
-- neighbours on the DSA performance.
-- The table keeps track of the last "N" DSAs with which the
-- monitored DSAs has interacted [attempted to interact],
-- where "N" is a locally-defined constant.

dsaIntTable OBJECT-TYPE
SYNTAX   SEQUENCE OF DsaIntEntry
MAX-ACCESS not-accessible
STATUS   current
DESCRIPTION
"Each row of this table contains some details
related to the history of the interaction
of the monitored DSAs with their respective
peer DSAs."
::= { dsaMIB 3 }

dsaIntEntry OBJECT-TYPE
SYNTAX   DsaIntEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Entry containing interaction details of a DSA
with a peer DSA."
INDEX { applIndex, dsaIntIndex }
::= { dsaIntTable 1 }

DsaIntEntry ::= SEQUENCE {
  dsaIntIndex INTEGER,
  dsaName DistinguishedName,
  dsaTimeOfCreation TimeStamp,
  dsaTimeOfLastAttempt TimeStamp,
  dsaTimeOfLastSuccess TimeStamp,
  dsaFailuresSinceLastSuccess Counter32,
  dsaFailures Counter32,
  dsaSuccesses Counter32
}

dsaIntIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Together with applIndex it forms the unique key to
identify the conceptual row which contains useful info
on the (attempted) interaction between the DSA (referred
to by applIndex) and a peer DSA."
::= { dsaIntEntry 1 }

dsaName OBJECT-TYPE
SYNTAX DistinguishedName
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Distinguished Name of the peer DSA to which this
entry pertains."
::= { dsaIntEntry 2 }

dsaTimeOfCreation OBJECT-TYPE
SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value of sysUpTime when this row was created. If the entry was created before the network management subsystem was initialized, this object will contain a value of zero."
::= {dsaIntEntry 3}

dsaTimeOfLastAttempt OBJECT-TYPE
SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value of sysUpTime when the last attempt was made to contact this DSA. If the last attempt was made before the network management subsystem was initialized, this object will contain a value of zero."
::= {dsaIntEntry 4}

dsaTimeOfLastSuccess OBJECT-TYPE
SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value of sysUpTime when the last attempt made to contact this DSA was successful. If there have been no successful attempts this entry will have a value of zero. If the last successful attempt was made before the network management subsystem was initialized, this object will contain a value of zero."
::= {dsaIntEntry 5}

dsaFailuresSinceLastSuccess OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of failures since the last time an attempt to contact this DSA was successful. If there has been no successful attempts, this counter will contain the number of failures since this entry was created."
::= {dsaIntEntry 6}

dsaFailures OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Cumulative failures since the creation of this entry."
::= {dsaIntEntry 7}

dsaSuccesses OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Cumulative successes since the creation of this entry."
::= {dsaIntEntry 8}

-- Conformance information

dsaConformance OBJECT IDENTIFIER ::= { dsaMIB 4 }
dsaGroups OBJECT IDENTIFIER ::= { dsaConformance 1 }
dsaCompliances OBJECT IDENTIFIER ::= { dsaConformance 2 }

-- Compliance statements

dsaOpsCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
  "The compliance statement for SNMPv2 entities which implement the DSA-MIB for monitoring DSA operations."

  MODULE -- this module
  MANDATORY-GROUPS { dsaOpsGroup }

  ::= { dsaCompliances 1 }

dsaEntryCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
  "The compliance statement for SNMPv2 entities which implement the DSA-MIB for monitoring DSA operations, entry statistics and cache performance."

  MODULE -- this module
  MANDATORY-GROUPS { dsaOpsGroup, dsaEntryGroup }
::= { dsaCompliances 2 }

dsaIntCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement for SNMPv2 entities which implement the DSA-MIB for monitoring DSA operations and the interaction of the DSA with peer DSA.

MODULE -- this module
MANDATORY-GROUPS { dsaOpsGroup, dsaIntGroup }

::= { dsaCompliances 3 }

-- Units of conformance

dsaOpsGroup OBJECT-GROUP
OBJECTS {
  dsaAnonymousBinds, dsaUnauthBinds, dsaSimpleAuthBinds,
  dsaStrongAuthBinds, dsaBindSecurityErrors, dsaInOps,
  dsaReadOps, dsaCompareOps, dsaAddEntryOps,
  dsaRemoveEntryOps, dsaModifyEntryOps, dsaModifyRDNOps,
  dsaListOps, dsaSearchOps, dsaOneLevelSearchOps,
  dsaWholeTreeSearchOps, dsaReferrals, dsaChainings,
  dsaSecurityErrors, dsaErrors
}
STATUS current
DESCRIPTION "A collection of objects for monitoring the DSA operations."
::= { dsaGroups 1 }

dsaEntryGroup OBJECT-GROUP
OBJECTS { dsaMasterEntries, dsaCopyEntries, dsaCacheEntries,
  dsaCacheHits, dsaSlaveHits }
STATUS current
DESCRIPTION "A collection of objects for monitoring the DSA entry statistics and cache performance."
::= { dsaGroups 2 }

dsaIntGroup OBJECT-GROUP
OBJECTS {
  dsaName, dsaTimeOfCreation, dsaTimeOfLastAttempt,
  dsaTimeOfLastSuccess, dsaFailuresSinceLastSuccess, dsaFailures,
  dsaSuccesses
}
STATUS current
DESCRIPTION

"A collection of objects for monitoring the DSA’s interaction with peer DSAs."

::= { dsaGroups 3 }

END

6. Acknowledgements

This draft is the product of discussions and deliberations carried out in the following working groups:

ietf-madman-wg  ietf-madman@innosoft.com
wide-isode-wg   isode-wg@wide.ad.jp
wide-netman-wg  netman-wg@wide.ad.jp

7. References


Security Considerations

Security issues are not discussed in this memo.

Authors' Addresses

Glenn Mansfield
AIC Systems Laboratories
6-6-3 Minami Yoshinari
Aoba-ku, Sendai 989-32
Japan

Phone: +81-22-279-3310
EMail: glenn@aic.co.jp

Steve E. Kille
ISODE Consortium
The Dome, The Square
Richmond TW9 1DT
UK

Phone: +44-81-332-9091
EMail: S.Kille@isode.com