Host Resources MIB

Status of this Memo

This RFC 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" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

This memo defines a MIB for use with managing host systems. The term "host" is construed to mean any computer that communicates with other similar computers attached to the internet and that is directly used by one or more human beings. Although this MIB does not necessarily apply to devices whose primary function is communications services (e.g., terminal servers, routers, bridges, monitoring equipment), such relevance is not explicitly precluded. This MIB instruments attributes common to all internet hosts including, for example, both personal computers and systems that run variants of Unix.

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1. The Network Management Framework

The Internet-standard Network Management Framework consists of three components. They are:

STD 16, RFC 1155 [1] which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. STD 16, RFC 1212 [2] defines a more concise description mechanism, which is wholly consistent with the SMI.

STD 17, RFC 1213 [3] which defines MIB-II, the core set of managed objects for the Internet suite of protocols.

STD 15, RFC 1157 [4] which defines the SNMP, the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Within a given MIB module, objects are defined using STD 16, RFC 1212’s OBJECT-TYPE macro. At a minimum, each object has a name, a syntax, an access-level, and an implementation-status.

The name is an object identifier, an administratively assigned name, which specifies an object type. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the object descriptor, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1[5] language is used for this purpose. However, RFC 1155 purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The access-level of an object type defines whether it makes "protocol sense" to read and/or write the value of an instance of the object type. (This access-level is independent of any administrative authorization policy.)

The implementation-status of an object type indicates whether the object is mandatory, optional, obsolete, or deprecated.
2. Host Resources MIB

The Host Resources MIB defines a uniform set of objects useful for the management of host computers. Host computers are independent of the operating system, network services, or any software application.

The Host Resources MIB defines objects which are common across many computer system architectures.

In addition, there are objects in MIB-II [3] which also provide host management functionality. Implementation of the System and Interfaces groups is mandatory for implementors of the Host Resources MIB.

3. Definitions

HOST-RESOURCES-MIB DEFINITIONS ::= BEGIN

IMPORTS
   OBJECT-TYPE               FROM RFC-1212
   DisplayString             FROM RFC1213-MIB
   TimeTicks, Counter, Gauge FROM RFC1155-SMI;

host     OBJECT IDENTIFIER ::= { mib-2 25 }

hrSystem        OBJECT IDENTIFIER ::= { host 1 }
hrStorage       OBJECT IDENTIFIER ::= { host 2 }
hrDevice        OBJECT IDENTIFIER ::= { host 3 }
hrSWRun         OBJECT IDENTIFIER ::= { host 4 }
hrSWRunPerf     OBJECT IDENTIFIER ::= { host 5 }
hrSWInstalled   OBJECT IDENTIFIER ::= { host 6 }

-- textual conventions

-- a truth value
Boolean ::=   INTEGER { true(1), false(2) }

-- memory size, expressed in units of 1024bytes
KBytes ::=    INTEGER (0..2147483647)

-- This textual convention is intended to identify the manufacturer, model, and version of a specific hardware or software product. It is suggested that these OBJECT IDENTIFIERs are allocated such that all products from a particular manufacturer are registered under a subtree distinct to that manufacturer. In addition, all
-- versions of a product should be registered under a subtree
-- distinct to that product. With this strategy, a management
-- station may uniquely determine the manufacturer and/or model of a
-- product whose productID is unknown to the management station.
-- Objects of this type may be useful for inventory purposes or for
-- automatically detecting incompatibilities or version mismatches
-- between various hardware and software components on a system.
ProductID ::= OBJECT IDENTIFIER
-- unknownProduct will be used for any unknown ProductID
-- unknownProduct OBJECT IDENTIFIER ::= { 0 0 }

-- For example, the product ID for the ACME 4860 66MHz clock doubled
-- processor might be:
-- enterprises.acme.acmeProcessors.a4860DX2.MHz66
-- A software product might be registered as:
-- enterprises.acme.acmeOperatingSystems.acmeDOS.six(6).one(1)

DateAndTime ::= OCTET STRING (SIZE (8 | 11))
-- A date-time specification for the local time of day.
-- This data type is intended to provide a consistent
-- method of reporting date information.
--
-- field  octets  contents                  range
--        _____  ______  ________                  _____
--              1      1-2   year                      0..65536
--              2       3    month                     1..12
--              3       4    day                       1..31
--              4       5    hour                      0..23
--              5       6    minutes                   0..59
--              6       7    seconds                   0..60
--              7       8    deci-seconds              0..9
--              8       9    direction from UTC        "+" / "-
--             9      10    hours from UTC            0..11
--             10      11    minutes from UTC          0..59
--
-- Note that if only local time is known, then
timezone information (fields 8-10) is not present.

InternationalDisplayString ::= OCTET STRING
-- This data type is used to model textual information in some
-- character set. A network management station should use a local
-- algorithm to determine which character set is in use and how it
-- should be displayed. Note that this character set may be encoded
-- with more than one octet per symbol, but will most often be NVT
-- ASCII.

-- The Host Resources System Group
-- Implementation of this group is mandatory for all host systems.

hrSystemUptime OBJECT-TYPE
SYNTAX TimeTicks
ACCESS read-only
STATUS mandatory
DESCRIPTION "The amount of time since this host was last initialized. Note that this is different from sysUpTime in MIB-II [3] because sysUpTime is the uptime of the network management portion of the system."
::= { hrSystem 1 }

hrSystemDate OBJECT-TYPE
SYNTAX DateAndTime
ACCESS read-write
STATUS mandatory
DESCRIPTION "The host’s notion of the local date and time of day."
::= { hrSystem 2 }

hrSystemInitialLoadDevice OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-write
STATUS mandatory
DESCRIPTION "The index of the hrDeviceEntry for the device from which this host is configured to load its initial operating system configuration."
::= { hrSystem 3 }

hrSystemInitialLoadParameters OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE (0..128))
ACCESS read-write
STATUS mandatory
DESCRIPTION "This object contains the parameters (e.g. a pathname and parameter) supplied to the load device when requesting the initial operating system configuration from that device."
::= { hrSystem 4 }
hrSystemNumUsers OBJECT-TYPE
   SYNTAX Gauge
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
      "The number of user sessions for which this host is
       storing state information. A session is a
       collection of processes requiring a single act of
       user authentication and possibly subject to
       collective job control."
   ::= { hrSystem 5 }

hrSystemProcesses OBJECT-TYPE
   SYNTAX Gauge
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
      "The number of process contexts currently loaded or
       running on this system."
   ::= { hrSystem 6 }

hrSystemMaxProcesses OBJECT-TYPE
   SYNTAX INTEGER (0..2147483647)
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
      "The maximum number of process contexts this system
       can support. If there is no fixed maximum, the
       value should be zero. On systems that have a fixed
       maximum, this object can help diagnose failures
       that occur when this maximum is reached."
   ::= { hrSystem 7 }

-- The Host Resources Storage Group
--
-- Implementation of this group is mandatory for all host systems.
--
-- Registration for some storage types, for use with hrStorageType
hrStorageTypes OBJECT IDENTIFIER ::= { hrStorage 1 }
hrStorageOther OBJECT IDENTIFIER ::= { hrStorageTypes 1 }
hrStorageRam OBJECT IDENTIFIER ::= { hrStorageTypes 2 }
-- hrStorageVirtualMemory is temporary storage of swapped
-- or paged memory
hrStorageVirtualMemory OBJECT IDENTIFIER ::= { hrStorageTypes 3 }
hrStorageFixedDisk OBJECT IDENTIFIER ::= { hrStorageTypes 4 }
hrStorageRemovableDisk OBJECT IDENTIFIER ::= { hrStorageTypes 5 }
hrStorageFloppyDisk OBJECT IDENTIFIER ::= { hrStorageTypes 6 }
hrStorageCompactDisc OBJECT IDENTIFIER ::= { hrStorageTypes 7 }
hrStorageRamDisk OBJECT IDENTIFIER ::= { hrStorageTypes 8 }

hrMemorySize OBJECT-TYPE
SYNTAX KBytes
ACCESS read-only
STATUS mandatory
DESCRIPTION "The amount of physical main memory contained by
the host."
::= { hrStorage 2 }

hrStorageTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrStorageEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION "The (conceptual) table of logical storage areas on
the host.

An entry shall be placed in the storage table for
each logical area of storage that is allocated and
has fixed resource limits. The amount of storage
represented in an entity is the amount actually
usable by the requesting entity, and excludes loss
due to formatting or file system reference
information.

These entries are associated with logical storage
areas, as might be seen by an application, rather
than physical storage entities which are typically
seen by an operating system. Storage such as tapes
and floppies without file systems on them are
typically not allocated in chunks by the operating
system to requesting applications, and therefore
shouldn’t appear in this table. Examples of valid
storage for this table include disk partitions,
file systems, ram (for some architectures this is
further segmented into regular memory, extended
memory, and so on), backing store for virtual
memory (‘swap space’).

This table is intended to be a useful diagnostic
for ‘out of memory’ and ‘out of buffers’ types of
failures. In addition, it can be a useful
performance monitoring tool for tracking memory,
disk, or buffer usage."
::= { hrStorage 3 }

hrStorageEntry OBJECT-TYPE
SYNTAX HrStorageEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one logical storage area
on the host. As an example, an instance of the
hrStorageType object might be named
hrStorageType.3"
INDEX { hrStorageIndex }
::= { hrStorageTable 1 }

HrStorageEntry ::= SEQUENCE {
    hrStorageIndex               INTEGER,
    hrStorageType                OBJECT IDENTIFIER,
    hrStorageDescr               DisplayString,
    hrStorageAllocationUnits     INTEGER,
    hrStorageSize                INTEGER,
    hrStorageUsed                INTEGER,
    hrStorageAllocationFailures  Counter
}

hrStorageIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A unique value for each logical storage area
contained by the host."
::= { hrStorageEntry 1 }

hrStorageType OBJECT-TYPE
SYNTAX OBJECT IDENTIFIER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The type of storage represented by this entry."
::= { hrStorageEntry 2 }

hrStorageDescr OBJECT-TYPE
SYNTAX DisplayString
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A description of the type and instance of the
storage described by this entry."
::= { hrStorageEntry 3 }

hrStorageAllocationUnits OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The size, in bytes, of the data objects allocated from this pool. If this entry is monitoring sectors, blocks, buffers, or packets, for example, this number will commonly be greater than one. Otherwise this number will typically be one."
::= { hrStorageEntry 4 }

hrStorageSize OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The size of the storage represented by this entry, in units of hrStorageAllocationUnits."
::= { hrStorageEntry 5 }

hrStorageUsed OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The amount of the storage represented by this entry that is allocated, in units of hrStorageAllocationUnits."
::= { hrStorageEntry 6 }

hrStorageAllocationFailures OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of requests for storage represented by this entry that could not be honored due to not enough storage. It should be noted that as this object has a SYNTAX of Counter, that it does not have a defined initial value. However, it is recommended that this object be initialized to zero."
::= { hrStorageEntry 7 }
-- The Host Resources Device Group
--
-- Implementation of this group is mandatory for all host systems.
--
-- The device group is useful for identifying and diagnosing the
-- devices on a system. The hrDeviceTable contains common
-- information for any type of device. In addition, some devices
-- have device-specific tables for more detailed information. More
-- such tables may be defined in the future for other device types.

-- Registration for some device types, for use with hrDeviceType

hrDeviceTypes OBJECT IDENTIFIER ::= { hrDevice 1 }

hrDeviceOther OBJECT IDENTIFIER ::= { hrDeviceTypes 1 }
hrDeviceUnknown OBJECT IDENTIFIER ::= { hrDeviceTypes 2 }
hrDeviceProcessor OBJECT IDENTIFIER ::= { hrDeviceTypes 3 }
hrDeviceNetwork OBJECT IDENTIFIER ::= { hrDeviceTypes 4 }
hrDevicePrinter OBJECT IDENTIFIER ::= { hrDeviceTypes 5 }
hrDeviceDiskStorage OBJECT IDENTIFIER ::= { hrDeviceTypes 6 }
hrDeviceVideo OBJECT IDENTIFIER ::= { hrDeviceTypes 7 }
hrDeviceAudio OBJECT IDENTIFIER ::= { hrDeviceTypes 8 }
hrDeviceCoprocessor OBJECT IDENTIFIER ::= { hrDeviceTypes 9 }
hrDeviceKeyboard OBJECT IDENTIFIER ::= { hrDeviceTypes 10 }
hrDeviceModem OBJECT IDENTIFIER ::= { hrDeviceTypes 11 }
hrDeviceParallelPort OBJECT IDENTIFIER ::= { hrDeviceTypes 12 }
hrDevicePointing OBJECT IDENTIFIER ::= { hrDeviceTypes 13 }
hrDeviceSerialPort OBJECT IDENTIFIER ::= { hrDeviceTypes 14 }
hrDeviceTape OBJECT IDENTIFIER ::= { hrDeviceTypes 15 }
hrDeviceClock OBJECT IDENTIFIER ::= { hrDeviceTypes 16 }
hrDeviceVolatileMemory OBJECT IDENTIFIER ::= { hrDeviceTypes 17 }
hrDeviceNonVolatileMemory OBJECT IDENTIFIER ::= { hrDeviceTypes 18 }

hrDeviceTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrDeviceEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION "The (conceptual) table of devices contained by the
host."
 ::= { hrDevice 2 }

hrDeviceEntry OBJECT-TYPE
SYNTAX HrDeviceEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION "A (conceptual) entry for one device contained by
the host. As an example, an instance of the
hrDeviceType object might be named hrDeviceType.3

INDEX ( hrDeviceIndex )
::= { hrDeviceTable 1 }

HrDeviceEntry ::= SEQUENCE {
    hrDeviceIndex INTEGER,
    hrDeviceType OBJECT IDENTIFIER,
    hrDeviceDescr DisplayString,
    hrDeviceID ProductID,
    hrDeviceStatus INTEGER,
    hrDeviceErrors Counter
}

hrDeviceIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A unique value for each device contained by the
host. The value for each device must remain
constant at least from one re-initialization of the
agent to the next re-initialization."
::= { hrDeviceEntry 1 }

hrDeviceType OBJECT-TYPE
SYNTAX OBJECT IDENTIFIER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"An indication of the type of device.
If this value is 'hrDeviceProcessor { hrDeviceTypes 3 }', then an entry exists in the hrProcessorTable
which corresponds to this device.

If this value is 'hrDeviceNetwork { hrDeviceTypes 4 }', then an entry exists in the hrNetworkTable
which corresponds to this device.

If this value is 'hrDevicePrinter { hrDeviceTypes 5 }', then an entry exists in the hrPrinterTable
which corresponds to this device.

If this value is 'hrDeviceDiskStorage { hrDeviceTypes 6 }', then an entry exists in the
hrDiskStorageTable which corresponds to this
device."
::= { hrDeviceEntry 2 }

hrDeviceDescr OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..64))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A textual description of this device, including
the device’s manufacturer and revision, and
optionally, its serial number."
::= { hrDeviceEntry 3 }

hrDeviceID OBJECT-TYPE
SYNTAX ProductID
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The product ID for this device."
::= { hrDeviceEntry 4 }

hrDeviceStatus OBJECT-TYPE
SYNTAX  INTEGER {
    unknown(1),
    running(2),
    warning(3),
    testing(4),
    down(5)
}
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The current operational state of the device
described by this row of the table.  A value
unknown(1) indicates that the current state of the
device is unknown.  running(2) indicates that the
device is up and running and that no unusual error
conditions are known.  The warning(3) state
indicates that agent has been informed of an
unusual error condition by the operational software
(e.g., a disk device driver) but that the device is
still ‘operational’.  An example would be high
number of soft errors on a disk.  A value of
testing(4), indicates that the device is not
available for use because it is in the testing
state.  The state of down(5) is used only when the
agent has been informed that the device is not
available for any use."
::= { hrDeviceEntry 5 }
hrDeviceErrors OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of errors detected on this device. It should be noted that as this object has a SYNTAX of Counter, that it does not have a defined initial value. However, it is recommended that this object be initialized to zero."
 ::= { hrDeviceEntry 6 }

hrProcessorTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrProcessorEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of processors contained by the host.

Note that this table is potentially sparse: a (conceptual) entry exists only if the correspondent value of the hrDeviceType object is 'hrDeviceProcessor'."
 ::= { hrDevice 3 }

HrProcessorEntry OBJECT-TYPE
SYNTAX HrProcessorEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one processor contained by the host. The hrDeviceIndex in the index represents the entry in the hrDeviceTable that corresponds to the hrProcessorEntry.

As an example of how objects in this table are named, an instance of the hrProcessorFrwID object might be named hrProcessorFrwID.3"
INDEX { hrDeviceIndex }
 ::= { hrProcessorTable 1 }

HrProcessorEntry ::= SEQUENCE {
 hrProcessorFrwID            ProductID,
 hrProcessorLoad             INTEGER
 }
SYNTAX ProductID
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The product ID of the firmware associated with the processor."
 ::= { hrProcessorEntry 1 }

hrProcessorLoad OBJECT-TYPE
SYNTAX INTEGER (0..100)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The average, over the last minute, of the percentage of time that this processor was not idle."
 ::= { hrProcessorEntry 2 }

hrNetworkTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrNetworkEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of network devices contained by the host.

Note that this table is potentially sparse: a (conceptual) entry exists only if the correspondent value of the hrDeviceType object is 'hrDeviceNetwork'.”
 ::= { hrDevice 4 }

hrNetworkEntry OBJECT-TYPE
SYNTAX HrNetworkEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one network device contained by the host. The hrDeviceIndex in the index represents the entry in the hrDeviceTable that corresponds to the hrNetworkEntry.

As an example of how objects in this table are named, an instance of the hrNetworkIfIndex object might be named hrNetworkIfIndex.3"
INDEX { hrDeviceIndex }
 ::= { hrNetworkTable 1 }
HrNetworkEntry ::= SEQUENCE {
    hrNetworkIfIndex    INTEGER
}

hrNetworkIfIndex OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The value of ifIndex which corresponds to this network device."
::= { hrNetworkEntry 1 }

hrPrinterTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrPrinterEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of printers local to the host.

Note that this table is potentially sparse: a (conceptual) entry exists only if the correspondent value of the hrDeviceType object is 'hrDevicePrinter'."
::= { hrDevice 5 }

HrPrinterEntry OBJECT-TYPE
SYNTAX HrPrinterEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one printer local to the host. The hrDeviceIndex in the index represents the entry in the hrDeviceTable that corresponds to the hrPrinterEntry.

As an example of how objects in this table are named, an instance of the hrPrinterStatus object might be named hrPrinterStatus.3"
INDEX { hrDeviceIndex }
::= { hrPrinterTable 1 }

HrPrinterEntry ::= SEQUENCE {
    hrPrinterStatus             INTEGER,
    hrPrinterDetectedErrorState OCTET STRING
}
hrPrinterStatus OBJECT-TYPE
SYNTAX INTEGER {
    other(1),
    unknown(2),
    idle(3),
    printing(4),
    warmup(5)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The current status of this printer device. When in the idle(1), printing(2), or warmup(3) state, the corresponding hrDeviceStatus should be running(2) or warning(3). When in the unknown state, the corresponding hrDeviceStatus should be unknown(1)."
::= { hrPrinterEntry 1 }

hrPrinterDetectedErrorState OBJECT-TYPE
SYNTAX OCTET STRING
ACCESS read-only
STATUS mandatory
DESCRIPTION
"This object represents any error conditions detected by the printer. The error conditions are encoded as bits in an octet string, with the following definitions:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Bit #</th>
<th>hrDeviceStatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>lowPaper</td>
<td>0</td>
<td>warning(3)</td>
</tr>
<tr>
<td>noPaper</td>
<td>1</td>
<td>down(5)</td>
</tr>
<tr>
<td>lowToner</td>
<td>2</td>
<td>warning(3)</td>
</tr>
<tr>
<td>noToner</td>
<td>3</td>
<td>down(5)</td>
</tr>
<tr>
<td>doorOpen</td>
<td>4</td>
<td>down(5)</td>
</tr>
<tr>
<td>jammed</td>
<td>5</td>
<td>down(5)</td>
</tr>
<tr>
<td>offline</td>
<td>6</td>
<td>down(5)</td>
</tr>
<tr>
<td>serviceRequested</td>
<td>7</td>
<td>warning(3)</td>
</tr>
</tbody>
</table>

If multiple conditions are currently detected and the hrDeviceStatus would not otherwise be unknown(1) or testing(4), the hrDeviceStatus shall correspond to the worst state of those indicated, where down(5) is worse than warning(3) which is worse than running(2).

Bits are numbered starting with the most
significant bit of the first byte being bit 0, the
least significant bit of the first byte being bit
7, the most significant bit of the second byte
being bit 8, and so on. A one bit encodes that
the condition was detected, while a zero bit
encodes that the condition was not detected.

This object is useful for alerting an operator to
specific warning or error conditions that may
occur, especially those requiring human
intervention.

::= { hrPrinterEntry 2 }

hrDiskStorageTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrDiskStorageEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of long-term storage
devices contained by the host. In particular, disk
devices accessed remotely over a network are not
included here.

Note that this table is potentially sparse: a
(conceptual) entry exists only if the correspondent
value of the hrDeviceType object is
'hrDeviceDiskStorage'."

::= { hrDevice 6 }

hrDiskStorageEntry OBJECT-TYPE
SYNTAX HrDiskStorageEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one long-term storage
device contained by the host. The hrDeviceIndex in
the index represents the entry in the hrDeviceTable
that corresponds to the hrDiskStorageEntry. As an
example, an instance of the hrDiskStorageCapacity
object might be named hrDiskStorageCapacity.3"
hrDiskStorageAccess OBJECT-TYPE
SYNTAX INTEGER {
    readWrite(1),
    readOnly(2)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"An indication if this long-term storage device is readable and writable or only readable. This should reflect the media type, any write-protect mechanism, and any device configuration that affects the entire device."
::= { hrDiskStorageEntry 1 }

hrDiskStorageMedia OBJECT-TYPE
SYNTAX INTEGER {
    other(1),
    unknown(2),
    hardDisk(3),
    floppyDisk(4),
    opticalDiskROM(5),
    opticalDiskWORM(6), -- Write Once Read Many
    opticalDiskRW(7),
    ramDisk(8)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"An indication of the type of media used in this long-term storage device."
::= { hrDiskStorageEntry 2 }

hrDiskStorageRemovele OBJECT-TYPE
SYNTAX Boolean
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Denotes whether or not the disk media may be removed from the drive."
::= { hrDiskStorageEntry 3 }

hrDiskStorageCapacity OBJECT-TYPE
SYNTAX KBytes
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The total size for this long-term storage device."
::= { hrDiskStorageEntry 4 }

hrPartitionTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrPartitionEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of partitions for long-term storage devices contained by the host. In particular, partitions accessed remotely over a network are not included here."
::= { hrDevice 7 }

hrPartitionEntry OBJECT-TYPE
SYNTAX HrPartitionEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one partition. The hrDeviceIndex in the index represents the entry in the hrDeviceTable that corresponds to the hrPartitionEntry.

As an example of how objects in this table are named, an instance of the hrPartitionSize object might be named hrPartitionSize.3.1"
INDEX { hrDeviceIndex, hrPartitionIndex }
::= { hrPartitionTable 1 }

HrPartitionEntry ::= SEQUENCE {
  hrPartitionIndex                INTEGER,  
  hrPartitionLabel                InternationalDisplayString,  
  hrPartitionID                   OCTET STRING,  
  hrPartitionSize                 KBytes,  
  hrPartitionFSIndex              INTEGER  
}

hrPartitionIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A unique value for each partition on this long-term storage device. The value for each long-term storage device must remain constant at least from one re-initialization of the agent to the next re-
initialization.
 ::= { hrPartitionEntry 1 }

hrPartitionLabel OBJECT-TYPE
   SYNTAX InternationalDisplayString (SIZE (0..128))
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
     "A textual description of this partition."
   ::= { hrPartitionEntry 2 }

hrPartitionID OBJECT-TYPE
   SYNTAX OCTET STRING
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
     "A descriptor which uniquely represents this partition to the responsible operating system. On some systems, this might take on a binary representation."
   ::= { hrPartitionEntry 3 }

hrPartitionSize OBJECT-TYPE
   SYNTAX KBytes
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
     "The size of this partition."
   ::= { hrPartitionEntry 4 }

hrPartitionFSIndex OBJECT-TYPE
   SYNTAX INTEGER (0..2147483647)
   ACCESS read-only
   STATUS mandatory
   DESCRIPTION
     "The index of the file system mounted on this partition. If no file system is mounted on this partition, then this value shall be zero. Note that multiple partitions may point to one file system, denoting that that file system resides on those partitions. Multiple file systems may not reside on one partition."
   ::= { hrPartitionEntry 5 }

-- The File System Table
hrFSTable OBJECT-TYPE
   SYNTAX SEQUENCE OF HrFSEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of file systems local to this host or remotely mounted from a file server. File systems that are in only one user’s environment on a multi-user system will not be included in this table."
::= { hrDevice 8 }

hrFSEntry OBJECT-TYPE
SYNTAX HrFSEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one file system local to this host or remotely mounted from a file server. File systems that are in only one user’s environment on a multi-user system will not be included in this table.

As an example of how objects in this table are named, an instance of the hrFSMountPoint object might be named hrFSMountPoint.3"
INDEX { hrFSIndex }
::= { hrFSTable 1 }

-- Registration for some popular File System types,
-- for use with hrFSType.

hrFSTypes OBJECT IDENTIFIER ::= { hrDevice 9 }

hrFSOther OBJECT IDENTIFIER ::= { hrFSTypes 1 }
hrFSUnknown OBJECT IDENTIFIER ::= { hrFSTypes 2 }
hrFSBerkeleyFFS OBJECT IDENTIFIER ::= { hrFSTypes 3 }
hrFSSys5FS OBJECT IDENTIFIER ::= { hrFSTypes 4 }

-- DOS
hrFSFat OBJECT IDENTIFIER ::= { hrFSTypes 5 }

-- OS/2 High Performance File System
hrFSHPFS OBJECT IDENTIFIER ::= { hrFSTypes 6 }

-- Macintosh Hierarchical File System
hrFSHFS OBJECT IDENTIFIER ::= { hrFSTypes 7 }

-- Macintosh File System
hrFSMFS OBJECT IDENTIFIER ::= { hrFSTypes 8 }

-- Windows NT
hrFSNTFS OBJECT IDENTIFIER ::= { hrFSTypes 9 }
hrFSVNode OBJECT IDENTIFIER ::= { hrFSTypes 10 }
hrFSJournaled OBJECT IDENTIFIER ::= { hrFSTypes 11 }
  -- CD File systems
hrFSiso9660 OBJECT IDENTIFIER ::= { hrFSTypes 12 }
hrFSRockRidge OBJECT IDENTIFIER ::= { hrFSTypes 13 }
hrFSNFS OBJECT IDENTIFIER ::= { hrFSTypes 14 }
hrFSNetware OBJECT IDENTIFIER ::= { hrFSTypes 15 }
  -- Andrew File System
hrFSAFS OBJECT IDENTIFIER ::= { hrFSTypes 16 }
  -- OSF DCE Distributed File System
hrFSDFS OBJECT IDENTIFIER ::= { hrFSTypes 17 }
hrFSAppleshare OBJECT IDENTIFIER ::= { hrFSTypes 18 }
hrFSRFS OBJECT IDENTIFIER ::= { hrFSTypes 19 }
  -- Data General
hrFSDGCFS OBJECT IDENTIFIER ::= { hrFSTypes 20 }
  -- SVR4 Boot File System
hrFSBFS OBJECT IDENTIFIER ::= { hrFSTypes 21 }

hrFSEntry ::= SEQUENCE {
  hrFSIndex INTEGER,
  hrFSMountPoint InternationalDisplayString,
  hrFSRemoteMountPoint InternationalDisplayString,
  hrFSType OBJECT IDENTIFIER,
  hrFSAccess INTEGER,
  hrFSBootable Boolean,
  hrFSStorageIndex INTEGER,
  hrFSLastFullBackupDate DateAndTime,
  hrFSLastPartialBackupDate DateAndTime
}

hrFSIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION "A unique value for each file system local to this
host. The value for each file system must remain
constant at least from one re-initialization of
the agent to the next re-initialization."
 ::= { hrFSEntry 1 }

hrFSMountPoint OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE(0..128))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The path name of the root of this file system."
::= { hrFSEntry 2 }

hrFSRemoteMountPoint OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE(0..128))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A description of the name and/or address of the
server that this file system is mounted from.
This may also include parameters such as the mount
point on the remote file system. If this is not a
remote file system, this string should have a
length of zero."
::= { hrFSEntry 3 }

hrFSType OBJECT-TYPE
SYNTAX OBJECT IDENTIFIER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The value of this object identifies the type of
this file system."
::= { hrFSEntry 4 }

hrFSAccess OBJECT-TYPE
SYNTAX INTEGER {
   readWrite(1),
   readOnly(2)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"An indication if this file system is logically
configured by the operating system to be readable
and writable or only readable. This does not
represent any local access-control policy, except
one that is applied to the file system as a whole."
::= { hrFSEntry 5 }

hrFSBootable OBJECT-TYPE
SYNTAX Boolean
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A flag indicating whether this file system is
bootable."
::= { hrFSEntry 6 }

hrFSStorageIndex OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The index of the hrStorageEntry that represents information about this file system. If there is no such information available, then this value shall be zero. The relevant storage entry will be useful in tracking the percent usage of this file system and diagnosing errors that may occur when it runs out of space."

::= { hrFSEntry 7 }

hrFSLastFullBackupDate OBJECT-TYPE
SYNTAX DateAndTime
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The last date at which this complete file system was copied to another storage device for backup. This information is useful for ensuring that backups are being performed regularly.

If this information is not known, then this variable shall have the value corresponding to January 1, year 0000, 00:00:00.0, which is encoded as (hex)'00 00 01 01 00 00 00 00'."

::= { hrFSEntry 8 }

hrFSLastPartialBackupDate OBJECT-TYPE
SYNTAX DateAndTime
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The last date at which a portion of this file system was copied to another storage device for backup. This information is useful for ensuring that backups are being performed regularly.

If this information is not known, then this variable shall have the value corresponding to January 1, year 0000, 00:00:00.0, which is encoded as (hex)'00 00 01 01 00 00 00 00'."
-- The Host Resources Running Software Group
-- Implementation of this group is optional.
-- The hrSWRunTable contains an entry for each distinct piece of
-- software that is running or loaded into physical or virtual
-- memory in preparation for running. This includes the host’s
-- operating system, device drivers, and applications.

hrSWOSIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The value of the hrSWRunIndex for the
hrSWRunEntry that represents the primary operating
system running on this host. This object is
useful for quickly and uniquely identifying that
primary operating system."
::= { hrSWRun 1 }

hrSWRunTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrSWRunEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of software running on the
host."
::= { hrSWRun 2 }

hrSWRunEntry OBJECT-TYPE
SYNTAX HrSWRunEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for one piece of software
running on the host. Note that because the installed
software table only contains information for
software stored locally on this host, not every
piece of running software will be found in the
installed software table. This is true of software
that was loaded and run from a non-local source,
such as a network-mounted file system.

As an example of how objects in this table are
named, an instance of the hrSWRunName object might
be named hrSWRunName.1287"
INDEX { hrSWRunIndex }
::= { hrSWRunTable 1 }

HrSWRunEntry ::= SEQUENCE {
  hrSWRunIndex INTEGER,
  hrSWRunName InternationalDisplayString,
  hrSWRunID ProductID,
  hrSWRunPath InternationalDisplayString,
  hrSWRunParameters InternationalDisplayString,
  hrSWRunType INTEGER,
  hrSWRunStatus INTEGER
}

hrSWRunIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A unique value for each piece of software running on the host. Wherever possible, this should be the system’s native, unique identification number."
::= { hrSWRunEntry 1 }

hrSWRunName OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE (0..64))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A textual description of this running piece of software, including the manufacturer, revision, and the name by which it is commonly known. If this software was installed locally, this should be the same string as used in the corresponding hrSWInstalledName."
::= { hrSWRunEntry 2 }

hrSWRunID OBJECT-TYPE
SYNTAX ProductID
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The product ID of this running piece of software."
::= { hrSWRunEntry 3 }

hrSWRunPath OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE(0..128))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A description of the location on long-term storage (e.g. a disk drive) from which this software was loaded."
::= { hrSWRunEntry 4 }

hrSWRunParameters OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE(0..128))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A description of the parameters supplied to this software when it was initially loaded."
::= { hrSWRunEntry 5 }

hrSWRunType OBJECT-TYPE
SYNTAX INTEGER {
  unknown(1),
  operatingSystem(2),
  deviceDriver(3),
  application(4)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The type of this software."
::= { hrSWRunEntry 6 }

hrSWRunStatus OBJECT-TYPE
SYNTAX INTEGER {
  running(1),
  runnable(2), -- waiting for resource (CPU, memory, IO)
  notRunnable(3), -- loaded but waiting for event
  invalid(4) -- not loaded
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The status of this running piece of software. Setting this value to invalid(4) shall cause this software to stop running and to be unloaded."
::= { hrSWRunEntry 7 }

-- The Host Resources Running Software Performance Group
-- Implementation of this group is optional.
--
-- The hrSWRunPerfTable contains an entry corresponding to
-- each entry in the hrSWRunTable.
hrSWRunPerfTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrSWRunPerfEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of running software
performance metrics."
 ::= { hrSWRunPerf 1 }

hrSWRunPerfEntry OBJECT-TYPE
SYNTAX HrSWRunPerfEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry containing software
performance metrics. As an example, an instance
of the hrSWRunPerfCPU object might be named
hrSWRunPerfCPU.1287"
INDEX  { hrSWRunIndex }  -- This table augments information in
-- the hrSWRunTable.
 ::= { hrSWRunPerfTable 1 }

HrSWRunPerfEntry ::= SEQUENCE {
   hrSWRunPerfCPU          INTEGER,
   hrSWRunPerfMem          KBytes
}

hrSWRunPerfCPU OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of centi-seconds of the total system’s
CPU resources consumed by this process. Note that
on a multi-processor system, this value may
increment by more than one centi-second in one
centi-second of real (wall clock) time."
 ::= { hrSWRunPerfEntry 1 }

hrSWRunPerfMem OBJECT-TYPE
SYNTAX KBytes
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The total amount of real system memory allocated
to this process."
 ::= { hrSWRunPerfEntry 2 }
-- The Host Resources Installed Software Group
--
-- Implementation of this group is optional.
--
-- The hrSWInstalledTable contains an entry for each piece
-- of software installed in long-term storage (e.g. a disk
-- drive) locally on this host. Note that this does not
-- include software loadable remotely from a network
-- server.
--
-- This table is useful for identifying and inventorying
-- software on a host and for diagnosing incompatibility
-- and version mismatch problems between various pieces
-- of hardware and software.

hrSWInstalledLastChange OBJECT-TYPE
SYNTAX TimeTicks
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The value of sysUpTime when an entry in the
hrSWInstalledTable was last added, renamed, or
deleted. Because this table is likely to contain
many entries, polling of this object allows a
management station to determine when re-downloading
of the table might be useful."
::= { hrSWInstalled 1 }

hrSWInstalledLastUpdateTime OBJECT-TYPE
SYNTAX TimeTicks
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The value of sysUpTime when the hrSWInstalledTable
was last completely updated. Because caching of
this data will be a popular implementation
strategy, retrieval of this object allows a
management station to obtain a guarantee that no
data in this table is older than the indicated
time."
::= { hrSWInstalled 2 }

hrSWInstalledTable OBJECT-TYPE
SYNTAX SEQUENCE OF HrSWInstalledEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The (conceptual) table of software installed on
this host.

::= { hrSWInstalled 3 }

hrSWInstalledEntry OBJECT-TYPE
SYNTAX HrSWInstalledEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A (conceptual) entry for a piece of software installed on this host.

As an example of how objects in this table are named, an instance of the hrSWInstalledName object might be named hrSWInstalledName.96"
INDEX { hrSWInstalledIndex }
::= { hrSWInstalledTable 1 }

HrSWInstalledEntry ::= SEQUENCE {
  hrSWInstalledIndex       INTEGER,
  hrSWInstalledName        InternationalDisplayString,
  hrSWInstalledID          ProductID,
  hrSWInstalledType        INTEGER,
  hrSWInstalledDate        DateAndTime
}

hrSWInstalledIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A unique value for each piece of software installed on the host. This value shall be in the range from 1 to the number of pieces of software installed on the host."
::= { hrSWInstalledEntry 1 }

hrSWInstalledName OBJECT-TYPE
SYNTAX InternationalDisplayString (SIZE (0..64))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A textual description of this installed piece of software, including the manufacturer, revision, the name by which it is commonly known, and optionally, its serial number."
::= { hrSWInstalledEntry 2 }

hrSWInstalledID OBJECT-TYPE
SYNTAX ProductID
ACCESS read-only
STATUS mandatory
DESCRIPTION "The product ID of this installed piece of software."
::= { hrSWInstalledEntry 3 }

hrSWInstalledType OBJECT-TYPE
SYNTAX INTEGER {
  unknown(1),
  operatingSystem(2),
  deviceDriver(3),
  application(4)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION "The type of this software."
::= { hrSWInstalledEntry 4 }

hrSWInstalledDate OBJECT-TYPE
SYNTAX DateAndTime
ACCESS read-only
STATUS mandatory
DESCRIPTION "The last-modification date of this application as it would appear in a directory listing."
::= { hrSWInstalledEntry 5 }

END

5. References


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7. Security Considerations

Security issues are not discussed in this memo.
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