                Relational Database Management System (RDBMS)
                  Management Information Base (MIB) using SMIv2

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.

Table of Contents

1. Introduction

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it describes managed objects used for managing
   relational database (RDBMS) implementations.

2. The SNMPv2 Network Management Framework

   The SNMPv2 Network Management Framework consists of four major
   components. They are:

       o RFC 1442 [1] which defines the SMI, the mechanisms used for
         describing and naming objects for the purpose of management.

       o STD 17, RFC 1213 [2] defines MIB-II, the core set of managed
         objects for the Internet suite of protocols.

       o RFC 1445 [3] which defines the administrative and other
         architectural aspects of the framework.

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

       o RFC 1443 [5] which describes textual conventions for the
         framework.

   The framework permits new objects to be defined for the purpose of
   experimentation and evaluation. In particular, the RDBMS-MIB can be
   seen as an extension of

       o RFC 1565 [6] which defines the MIB for monitoring network
         service applications.

2.1. Object Definitions

   Managed objects are accessed via a virtual information store, termed
   the Management Information Base or 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, 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, we
   often use a textual string, termed the descriptor, to refer to the
   object type.

3. Overview

   The RDBMS-MIB contains objects that may be used to manage relational
   database implementations. Specifically, it contains information on
   installed databases, servers, and on the relation of databases and
   servers. The terms used in this database are described below.

3.1. Terminology

     Vendors and Products
          are providers of database systems on a host. These vendors
          may have more than one database product that is manageable
          through this MIB. On a host, there may be systems from
          multiple vendors, multiple systems from a single vendor, or
          any other combination. There may be a private MIB for each
          vendor, and this may be located using the PrivateMibOID
          objects in some of the tables.

     Databases
          are collections of interrelated data organized according to a
          schema to serve one or more applications. A database is, for
          purposes of this MIB, a collection of tables whose
          organization is based on the relational model. There may be
          one or more databases available in each system on the host
          from each product. In the MIB, data about databases is
          captured in the rdbmsDbTable and the rdbmsDbInfoTable, each
          with one row per database.

     Relational Database Management System (RDBMS)
          A collection of integrated services which support database
          management and together support and control the creation, use
          and maintenance of relational databases. Servers as defined
          in this MIB provide the functions of the RDBMS.

     Servers
          are entities that provide access to databases. For this MIB,
          servers are defined to be entities that may exist
          independently of other servers. A server may or may not be a
          single process, based on its independence from other
          processes. In this MIB, information about servers is
          captured in the rdbmsSvrTable, the rdbmsSvrInfoTable, each
          with one row per server extending the applTable from the
          APPLICATION-MIB of RFC 1565. The rdbmsSvrTable and
          rdbmsSvrInfoTable are both indexed by the applIndex of that
          MIB.

     Associations
          Inbound associations are local or remote conversations,
          usually instances of the SQL CONNECT statement, as made
          visible in servers. The MIB does not currently reveal
          individual associations; there are association counters in
          the dbmsSvrInfoTable and the applTable.

     There are also relationships between servers and databases. All
     obvious relationships are possible and supported:

    o   1 database : 1 server

    o   1 database : many servers

    o   many databases : 1 server

    o   many databases : many servers

3.2. Structure and Features

    The information in this MIB module is organized into nine tables,
    twelve potentially writable objects, and two traps, as follows.

3.2.1. Tables

    o   databases installed on a host/system (rdbmsDbTable)

    o   actively opened databases (rdbmsDbInfoTable)

    o   database configuration parameters (rdbmsDbParamTable)

    o   database limited resources (rdbmsDbLimitedResourceTable)

    o   database servers installed on a system (rdbmsSrvTable)

    o   active database servers (rdbmsSrvInfoTable)

    o   configuration parameters for a server (rdbmsSrvParamTable)

    o   server limited resources (rdbmsSrvLimitedResourceTable)

    o   relation of servers and databases on a host (rdbmsRelTable)

    These entities have broad applicability among database systems, and
    are enough for many monitoring tasks. They are far from adequate for
    detailed management or performance monitoring of specific database
    products. This gap is expected to be filled with vendor and product
    specific MIBs addressing the entities that have not been codified
    here.

3.2.2. Writable objects

   The MIB requires no writable objects for conformance. There is no
   expectation that RDBMS systems may be actively managed through this
   MIB. However, the RDBMS-MIB supports the capability to modify the
   following objects if the implementor so chooses.

   o   rdbmsDbContact

   o   rdbmsDbInfoSizeAllocated

   o   rdbmsDbParamCurrValue

   o   rdbmsDbParamComment rdbmsDbLimitedResourceLimit

   o   rdbmsDbLimitedResourceDescription

   o   rdbmsSrvContact

   o   rdbmsSrvInfoMaxInboundAssociations

   o   rdbmsSrvParamCurrValue

   o   rdbmsSrvParamComment

   o   rdbmsSrvLimitedResourceLimit

   o   rdbmsSrvLimitedResourceDescription

3.2.3. Traps

   The RDBMS-MIB contains two traps:

   o   rdbmsStateChange

   o   rdbmsOutOfSpace

4. Definitions

   RDBMS-MIB DEFINITIONS ::= BEGIN

   IMPORTS
      MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
       Counter32, Gauge32, Integer32
           FROM SNMPv2-SMI
       DisplayString, DateAndTime, AutonomousType
           FROM SNMPv2-TC
       applIndex, applGroup
           FROM APPLICATION-MIB
       mib-2
           FROM RFC1213-MIB;

   rdbmsMIB MODULE-IDENTITY
       LAST-UPDATED "9406150655Z"
       ORGANIZATION "IETF RDBMSMIB Working Group"
       CONTACT-INFO
               "   David Brower

                   Postal: The ASK Group, INGRES DBMS Development
                           1080 Marina Village Parkway
                           Alameda, CA 94501
                           US

                      Tel: +1 510 748 3418
                      Fax: +1 510 748 2770

                   E-mail: daveb@ingres.com"
       DESCRIPTION
           "The MIB module to describe objects for generic relational
            databases."

       ::= { mib-2 39 }

   rdbmsObjects   OBJECT IDENTIFIER ::= { rdbmsMIB 1 }

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   rdbmsDbTable   OBJECT-TYPE
       SYNTAX   SEQUENCE OF RdbmsDbEntry
       MAX-ACCESS   not-accessible
       STATUS   current
       DESCRIPTION
           "The table of databases installed on a system."
       ::= { rdbmsObjects 1 }

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rdbmsDbEntry     OBJECT-TYPE
    SYNTAX       RdbmsDbEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An entry for a single database on the host.  Whether a
         particular database is represented by a row in rdbmsDbTable
         may be dependent on the activity level of that database,
         according to the product's implementation.  An instance of
         rdbmsRelState having the value active, other, or restricted
         implies that an entry, corresponding to that instance, will
         be present."
    INDEX  { rdbmsDbIndex }
    ::= { rdbmsDbTable 1 }

RdbmsDbEntry     ::=
    SEQUENCE {
        rdbmsDbIndex              INTEGER,
        rdbmsDbPrivateMibOID        OBJECT IDENTIFIER,
        rdbmsDbVendorName         DisplayString,
        rdbmsDbName               DisplayString,
        rdbmsDbContact            DisplayString
    }

rdbmsDbIndex        OBJECT-TYPE
    SYNTAX          INTEGER (1..2147483647)
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "A numeric index, unique among all the databases from all
         products on this host.  This value is a surrogate for the
         conceptually unique key, which is {PrivateMibOID,
         databasename}"
    ::= { rdbmsDbEntry  1 }

rdbmsDbPrivateMibOID    OBJECT-TYPE
    SYNTAX          OBJECT IDENTIFIER
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
       "The authoritative identification for the private MIB for
        this database, presumably based on the vendor, e.g., {
        enterprises 111 <optional subidentifiers>} for Oracle
        databases, {enterprises 757 <optional subidentifiers>} for
        Ingres databases, { enterprises 897 <optional
        subidentifiers>} for Sybase databases, etc.

        If no OBJECT IDENTIFIER exists for the private MIB, attempts
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        to access this object will return noSuchName (SNMPv1)
        or noSuchInstance (SNMPv2)."
     ::= { rdbmsDbEntry  2 }

  rdbmsDbVendorName    OBJECT-TYPE
     SYNTAX           DisplayString
     MAX-ACCESS       read-only
     STATUS           current
     DESCRIPTION
         "The name of the vendor whose RDBMS manages this database,
          for informational purposes."
     ::= { rdbmsDbEntry 3 }

  rdbmsDbName       OBJECT-TYPE
     SYNTAX       DisplayString
     MAX-ACCESS   read-only
     STATUS       current
     DESCRIPTION
         "The name of this database, in a product specific format.  The
          product may need to qualify the name in some way to resolve
          conflicts if it is possible for a database name to be
          duplicated on a host.  It might be necessary to construct a
          hierarchical name embedding the RDBMS instance/installation
          on the host, and/or the owner of the database.  For instance,
          '/test-installation/database-owner/database-name'."
     ::= { rdbmsDbEntry 4 }

  rdbmsDbContact   OBJECT-TYPE
     SYNTAX       DisplayString
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
         "The textual identification of the contact person for this
          managed database, together with information on how to contact
          this person.

          Note: if there is no server associated with this database, an
          agent may need to keep this in other persistent storage,
          e.g., a configuration file.

          Note that a compliant agent does not need to
          allow write access to this object."

     ::= { rdbmsDbEntry 5 }
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   rdbmsDbInfoTable     OBJECT-TYPE
       SYNTAX             SEQUENCE OF RdbmsDbInfoEntry
       MAX-ACCESS         not-accessible
       STATUS             current
       DESCRIPTION
           "The table of additional information about databases present
            on the host."
       ::= { rdbmsObjects 2 }

   rdbmsDbInfoEntry     OBJECT-TYPE
       SYNTAX             RdbmsDbInfoEntry
       MAX-ACCESS         not-accessible
       STATUS             current
       DESCRIPTION
           "Information that must be present if the database is actively
            opened.  If the database is not actively opened, then
            attempts to access corresponding instances in this table may
            result in either noSuchName (SNMPv1) or noSuchInstance
            (SNMPv2).  'Actively opened' means at least one of the
            rdbmsRelState entries for this database in the rdbmsRelTable
            is active(2)."
       INDEX  { rdbmsDbIndex }
       ::= { rdbmsDbInfoTable 1 }

   RdbmsDbInfoEntry ::=
       SEQUENCE {
           rdbmsDbInfoProductName      DisplayString,
           rdbmsDbInfoVersion          DisplayString,
           rdbmsDbInfoSizeUnits        INTEGER,
           rdbmsDbInfoSizeAllocated    INTEGER,
           rdbmsDbInfoSizeUsed         INTEGER,
           rdbmsDbInfoLastBackup       DateAndTime
       }

   rdbmsDbInfoProductName  OBJECT-TYPE
       SYNTAX             DisplayString
       MAX-ACCESS         read-only
       STATUS             current
       DESCRIPTION
           "The textual product name of the server that created or last
            restructured this database.  The format is product specific."
       ::= { rdbmsDbInfoEntry 1 }

   rdbmsDbInfoVersion  OBJECT-TYPE
       SYNTAX             DisplayString
       MAX-ACCESS         read-only
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     STATUS             current
     DESCRIPTION
         "The version number of the server that created or last
          restructured this database.  The format is product specific."
     ::= { rdbmsDbInfoEntry 2 }

 rdbmsDbInfoSizeUnits     OBJECT-TYPE
     SYNTAX               INTEGER {
                             bytes(1),
                             kbytes(2),
                             mbytes(3),
                             gbytes(4),
                             tbytes(5)
                             }
     MAX-ACCESS           read-only
     STATUS               current
     DESCRIPTION
         "Identification of the units used to measure the size of this
          database in rdbmsDbInfoSizeAllocated and rdbmsDbInfoSizeUsed.
          bytes(1) indicates individual bytes, kbytes(2) indicates
          units of kilobytes, mbytes(3) indicates units of megabytes,
          gbytes(4) indicates units of gigabytes, and tbytes(5)
          indicates units of terabytes.  All are binary multiples -- 1K
          = 1024.  If writable, changes here are reflected in the get
          values of the associated objects."

     ::= { rdbmsDbInfoEntry 3 }

 rdbmsDbInfoSizeAllocated   OBJECT-TYPE
     SYNTAX               INTEGER (1..2147483647)
     MAX-ACCESS           read-write
     STATUS               current
     DESCRIPTION
         "The estimated size of this database (in
          rdbmsDbInfoSizeUnits), which is the disk space that has been
          allocated to it and is no longer available to users on this
          host.  rdbmsDbInfoSize does not necessarily indicate the
          amount of space actually in use for database data.  Some
          databases may support extending allocated size, and others
          may not.

          Note that a compliant agent does not need to
          allow write access to this object."

 --       Note:  computing SizeAllocated may be expensive, and SNMP
 --       agents might cache the value to increase performance.

     ::= { rdbmsDbInfoEntry 4 }
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rdbmsDbInfoSizeUsed      OBJECT-TYPE
    SYNTAX               INTEGER (1..2147483647)
    MAX-ACCESS           read-only
    STATUS               current
    DESCRIPTION
        "The estimated size of this database, in rdbmsDbInfoSizeUnits,
         which is actually in use for database data."

--        Note:  computing SizeUsed may be expensive, and SNMP
--        agents might cache the value to increase performance.
    ::= { rdbmsDbInfoEntry 5 }


rdbmsDbInfoLastBackup      OBJECT-TYPE
    SYNTAX                DateAndTime
    MAX-ACCESS            read-only
    STATUS                current
    DESCRIPTION
        "The date and time that the latest complete or partial backup
         of the database was taken. If a database has never been
         backed up, then attempts to access this object will
         result in either noSuchName (SNMPv1) or noSuchInstance
         (SNMPv2)."
    ::= { rdbmsDbInfoEntry 6 }


    ----------------------------------------------------------------


rdbmsDbParamTable        OBJECT-TYPE
    SYNTAX               SEQUENCE OF RdbmsDbParamEntry
    MAX-ACCESS           not-accessible
    STATUS               current
    DESCRIPTION
        "The table of configuration parameters for a database.
         Entries should be populated according to the following
         guidelines:
         (1) The value should be specified through administrative
             (human) intervention.
         (2) It should be configured on a per-database basis.
         (3) One of the following is true:
             (a) The parameter has a non-numeric value;
             (b) The current value is numeric, but it only changes due
                 to human intervention;
             (c) The current value is numeric and dynamic, but the
                 RDBMS does not track access/allocation failures
                 related to the parameter;
             (d) The current value is numeric and dynamic, the
                 RDBMS tracks changes in access/allocation failures
                 related to the parameter, but the failure has no
                 significant impact on RDBMS performance or
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                         availability.
                  (e) The current value is numeric and dynamic, the
                      RDBMS tracks changes in access/allocation failures
                      related to the parameter, the failure has
                      significant impact on RDBMS performance or
                      availability, and is shown in the
                      rdbmsDbLimitedResource table."
        ::= { rdbmsObjects 3 }

   rdbmsDbParamEntry   OBJECT-TYPE
        SYNTAX   RdbmsDbParamEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "An entry for a single configuration parameter for a database.
             Parameters with single values have a subindex value of one.
             If the parameter is naturally considered to contain a
             variable number of members of a class, e.g. members of the
             DBA user group, or files which are part of the database, then
             it must be presented as a set of rows. If, on the other
             hand, the parameter represents a set of choices from a class,
             e.g. the permissions on a file or the options chosen out of
             the set of all options allowed, AND is guaranteed to always
             fit in the 255 character length of a DisplayString, then it
             may be presented as a comma separated list with a subindex
             value of one. Zero may not be used as a subindex value.

             If the database is not actively opened, then attempts
             to access corresponding instances in this table may result in
             either noSuchName (SNMPv1) or noSuchInstance (SNMPv2).
             'Actively opened' means at least one of the
             rdbmsRelState entries for this database in the rdbmsRelTable
             is active(2)."
        INDEX { rdbmsDbIndex, rdbmsDbParamName, rdbmsDbParamSubIndex }
        ::= { rdbmsDbParamTable 1 }

   RdbmsDbParamEntry ::=
        SEQUENCE {
            rdbmsDbParamName   DisplayString,
            rdbmsDbParamSubIndex   INTEGER,
            rdbmsDbParamID   AutonomousType,
            rdbmsDbParamCurrValue   DisplayString,
            rdbmsDbParamComment   DisplayString
        }

   rdbmsDbParamName   OBJECT-TYPE
        SYNTAX   DisplayString (SIZE (1..64))
        MAX-ACCESS   not-accessible

```
            STATUS              current
            DESCRIPTION
                "The name of a configuration parameter for a database.  This
                 name is product-specific.  The length is limited to 64
                 characters to constrain the number of sub-identifiers needed
                 for instance identification (and to minimize network
                 traffic)."

            ::= { rdbmsDbParamEntry 1 }

      rdbmsDbParamSubIndex      OBJECT-TYPE
            SYNTAX              INTEGER (1..2147483647)
            MAX-ACCESS          not-accessible
            STATUS              current
            DESCRIPTION
                "The subindex value for this parameter.  If the parameter is
                 naturally considered to contain a variable number of members
                 of a class, e.g.  members of the DBA user group, or files
                 which are part of the database, then it must be presented as
                 a set of rows.  If, on the other hand, the parameter
                 represents a set of choices from a class, e.g. the
                 permissions on a file or the options chosen out of the set of
                 all options allowed, AND is guaranteed to always fit in the
                 255 character length of a DisplayString, then it may be
                 presented as a comma separated list with a subindex value of
                 one.  Zero may not be used as a value."
            ::= { rdbmsDbParamEntry 2 }

      rdbmsDbParamID            OBJECT-TYPE
            SYNTAX              AutonomousType
            MAX-ACCESS          read-only
            STATUS              current
            DESCRIPTION
                "The ID of the parameter which may be described in some other
                 MIB (e.g., an enterprise-specific MIB module).  If there is
                 no ID for this rdbmsDbParamName, attempts to access this
                 object will return noSuchName (SNMPv1) or noSuchInstance
                 (SNMPv2)."
            ::= { rdbmsDbParamEntry 3 }

      rdbmsDbParamCurrValue OBJECT-TYPE
            SYNTAX              DisplayString
            MAX-ACCESS          read-write
            STATUS              current
            DESCRIPTION
                "The value for a configuration parameter now in effect, the
                 actual setting for the database.  While there may multiple
                 values in the temporal domain of interest (for instance, the
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                 value to take effect at the next restart), this is the
                 current setting.

                 Note that a compliant agent does not need to
                 allow write access to this object."

             ::= { rdbmsDbParamEntry 4 }

     rdbmsDbParamComment   OBJECT-TYPE
         SYNTAX   DisplayString
         MAX-ACCESS   read-write
         STATUS   current
         DESCRIPTION
             "Annotation which describes the purpose of a configuration
              parameter or the reason for a particular parameter's
              setting.

              Note that a compliant agent does not need to
              allow write access to this object."

             ::= { rdbmsDbParamEntry 5 }

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     rdbmsDbLimitedResourceTable   OBJECT-TYPE
         SYNTAX   SEQUENCE OF RdbmsDbLimitedResourceEntry
         MAX-ACCESS   not-accessible
         STATUS   current
         DESCRIPTION
             "The table of limited resources that are kept per-database."
         ::= { rdbmsObjects 4 }

     rdbmsDbLimitedResourceEntry   OBJECT-TYPE
         SYNTAX   RdbmsDbLimitedResourceEntry
         MAX-ACCESS   not-accessible
         STATUS   current
         DESCRIPTION
             "An entry for a single limited resource kept per-database.
              A limited resource has maximum use determined by a parameter
              that might or might not be changeable at run time, or visible
              in the rdbmsDbParamTable. Examples would be the number of
              available locks, or disk space on a partition. Arrays of
              resources are supported through an integer sub index, which
              should have the value of one for single-instance names.

              Limited resources that are shared across databases, are best
              put in the rdbmsSvrLimitedResourceTable instead of this one.

             If the database is not actively opened, then attempts to
             access corresponding instances in this table may result in
             either noSuchName (SNMPv1) or noSuchInstance (SNMPv2).
             'Actively opened' means at least one of the rdbmsRelState
             entries for this database in the rdbmsRelTable is active(2)."

        INDEX { rdbmsDbIndex, rdbmsDbLimitedResourceName }
        ::= { rdbmsDbLimitedResourceTable 1 }

    RdbmsDbLimitedResourceEntry ::=
        SEQUENCE {
            rdbmsDbLimitedResourceName   DisplayString,
            rdbmsDbLimitedResourceID   AutonomousType,
            rdbmsDbLimitedResourceLimit   INTEGER,
            rdbmsDbLimitedResourceCurrent   INTEGER,
            rdbmsDbLimitedResourceHighwater   INTEGER,
            rdbmsDbLimitedResourceFailures   Counter32,
            rdbmsDbLimitedResourceDescription   DisplayString
        }

    rdbmsDbLimitedResourceName   OBJECT-TYPE
        SYNTAX   DisplayString
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "The name of the resource, for instance 'global locks' or
             'locks for the FOO database', or 'data space on /dev/rdsk/5s0
             for FOO'. The length is limited to 64 characters to constrain
             the number of sub-identifiers needed for instance
             identification (and to minimize network traffic)."
        ::= { rdbmsDbLimitedResourceEntry 1 }

    rdbmsDbLimitedResourceID OBJECT-TYPE
        SYNTAX   AutonomousType
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "The ID of the resource which may be described in some other
             MIB (e.g., an enterprise-specific MIB module). If there is
             no ID for this rdbmsDbLimitedResourceName, attempts to access
             this object will return noSuchName (SNMPv1) or noSuchInstance
             (SNMPv2)."
        ::= { rdbmsDbLimitedResourceEntry 2 }

    rdbmsDbLimitedResourceLimit   OBJECT-TYPE
        SYNTAX   INTEGER (1..2147483647)
        MAX-ACCESS   read-write
        STATUS   current

        DESCRIPTION
            "The maximum value the resource use may attain.

             Note that a compliant agent does not need to
             allow write access to this object."

        ::= { rdbmsDbLimitedResourceEntry 3 }

  rdbmsDbLimitedResourceCurrent   OBJECT-TYPE
      SYNTAX   INTEGER (1..2147483647)
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
          "The current value for the resource."
      ::= { rdbmsDbLimitedResourceEntry 4 }

  rdbmsDbLimitedResourceHighwater   OBJECT-TYPE
      SYNTAX   INTEGER (1..2147483647)
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
          "The maximum value of the resource seen since applUpTime
           was reset for the earliest server which has the database
           actively opened.

           If there are two servers with the database open, and the
           oldest one dies, the proper way to invalidate the value is by
           resetting sysUpTime."
      ::= { rdbmsDbLimitedResourceEntry 5 }

  rdbmsDbLimitedResourceFailures   OBJECT-TYPE
      SYNTAX   Counter32
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
          "The number of times the system wanted to exceed the limit of
           the resource since applUpTime was reset for the earliest
           server which has the database actively opened.

           If there are two servers with the DB open, and the
           oldest one dies, the proper way to invalidate the value is by
           resetting sysUpTime."
      ::= { rdbmsDbLimitedResourceEntry 6 }

  rdbmsDbLimitedResourceDescription   OBJECT-TYPE
      SYNTAX   DisplayString
      MAX-ACCESS   read-write
      STATUS   current

         DESCRIPTION
             "A description of the resource and the meaning of the integer
              units used for Limit, Current, and Highwater.

              Note that a compliant agent does not need to
              allow write access to this object."

         ::= { rdbmsDbLimitedResourceEntry 7 }

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    rdbmsSrvTable   OBJECT-TYPE
        SYNTAX   SEQUENCE OF RdbmsSrvEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "The table of database servers running or installed
             on a system."
        ::= { rdbmsObjects 5 }

    rdbmsSrvEntry   OBJECT-TYPE
        SYNTAX   RdbmsSrvEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "An entry for a single database server. A server is an
             independent entity that provides access to one or more
             databases. Failure of one does not affect access to
             databases through any other servers. There might be one or
             more servers providing access to a database. A server may be
             a 'process' or collection of 'processes', as interpreted by
             the product."
        INDEX { applIndex }
        ::= { rdbmsSrvTable 1 }

    RdbmsSrvEntry ::=
        SEQUENCE {
            rdbmsSrvPrivateMibOID   OBJECT IDENTIFIER,
            rdbmsSrvVendorName DisplayString,
            rdbmsSrvProductName DisplayString,
            rdbmsSrvContact   DisplayString
        }

    rdbmsSrvPrivateMibOID   OBJECT-TYPE
        SYNTAX   OBJECT IDENTIFIER
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION

            "The authoritative identification for the private MIB for this
            server, presumably based on the vendor, e.g., { enterprises
            111 <optional subidentifiers>} for Oracle servers, {
            enterprises 757 <optional subidentifiers>} for Ingres
            servers, { enterprises 897 <optional subidentifiers>} for
            Sybase servers, etc.

            If no OBJECT IDENTIFIER exists for the private MIB, attempts
            to access this object will return noSuchName (SNMPv1)
            or noSuchInstance (SNMPv2)."
        ::= { rdbmsSrvEntry 1 }

    rdbmsSrvVendorName   OBJECT-TYPE
        SYNTAX   DisplayString
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "The name of the vendor whose RDBMS manages this database,
            for informational purposes."
        ::= { rdbmsSrvEntry 2 }

    rdbmsSrvProductName   OBJECT-TYPE
        SYNTAX   DisplayString
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "The product name of this server. This is normally the
            vendor's formal name for the product, in product specific
            format."
        ::= { rdbmsSrvEntry 3 }

    rdbmsSrvContact OBJECT-TYPE
        SYNTAX   DisplayString
        MAX-ACCESS   read-write
        STATUS   current
        DESCRIPTION
            "The textual identification of the contact person for this
            managed server, together with information on how to contact
            this person.

            Note: if there is no active server associated with this
            object, an agent may need to keep this in other persistent
            storage, e.g., a configuration file.

            Note that a compliant agent does not need to
            allow write access to this object."

        ::= { rdbmsSrvEntry 4 }

```
      ----------------------------------------------------------------

   rdbmsSrvInfoTable    OBJECT-TYPE
       SYNTAX             SEQUENCE OF RdbmsSrvInfoEntry
       MAX-ACCESS         not-accessible
       STATUS             current
       DESCRIPTION
            "The table of additional information about database servers.

            Entries in this table correspond to applications in the
            APPLICATION-MIB applTable.  Some objects in that table are
            application-specific.  When they are associated with an RDBMS
            server in this table, the objects have the following
            meanings.

            applName - The name of this server, i.e., the process or
            group of processes providing access to this database.  The
            exact format will be product and host specific.

            applVersion - The version number of this server, in product
            specific format.

            applOperStatus - up(1) means operational and available for
            general use.  down(2) means the server is not available for
            use, but is known to the agent.  The other states have broad
            meaning, and may need to be supplemented by the vendor
            private MIB.  Halted(3) implies an administrative state of
            unavailability.  Congested(4) implies a resource or or
            administrative limit is prohibiting new inbound associations.
            The 'available soon' description of restarting(5) may include
            an indeterminate amount of recovery.

            applLastChange is the time the agent noticed the most recent
            change to applOperStatus.

            applInboundAssociation is the number of currently active
            local and remote conversations (usually SQL connects).

            applOutboundAssociations is not provided by this MIB.

            applAccumulatedInboundAssociations is the total number of
            local and remote conversations started since the server came
            up.

            applAccumulatedOutbound associations is not provided by this
            MIB.

            applLastInboundActivity is the time the most recent local or
```

                remote conversation was attempted or disconnected.

                applLastOutboundActivity is not provided by this MIB.

                applRejectedInboundAssociations is the number of local or
                remote conversations rejected by the server for
                administrative reasons or because of resource limitations.

                applFailedOutboundAssociations is not provided by this MIB."

          ::= { rdbmsObjects 6 }

     rdbmsSrvInfoEntry   OBJECT-TYPE
         SYNTAX   RdbmsSrvInfoEntry
         MAX-ACCESS   not-accessible
         STATUS   current
         DESCRIPTION
             "Information that must be present for a single 'up' database
              server, with visibility determined by the value of the
              corresponding applOperStatus object. If an instance of
              applOperStatus is not up(1), then attempts to access
              corresponding instances in this table may result in either
              noSuchName (SNMPv1) or noSuchInstance (SNMPv2) being returned
              by the agent."
         INDEX { applIndex }
         ::= { rdbmsSrvInfoTable 1 }

     RdbmsSrvInfoEntry ::=
         SEQUENCE {
             rdbmsSrvInfoStartupTime   DateAndTime,
             rdbmsSrvInfoFinishedTransactions   Gauge32,
             rdbmsSrvInfoDiskReads   Counter32,
             rdbmsSrvInfoDiskWrites   Counter32,
             rdbmsSrvInfoLogicalReads   Counter32,
             rdbmsSrvInfoLogicalWrites   Counter32,
             rdbmsSrvInfoPageWrites   Counter32,
             rdbmsSrvInfoPageReads   Counter32,
             rdbmsSrvInfoDiskOutOfSpaces   Counter32,
             rdbmsSrvInfoHandledRequests   Counter32,
             rdbmsSrvInfoRequestRecvs   Counter32,
             rdbmsSrvInfoRequestSends   Counter32,
             rdbmsSrvInfoHighwaterInboundAssociations   Gauge32,
             rdbmsSrvInfoMaxInboundAssociations   Gauge32
         }

     rdbmsSrvInfoStartupTime OBJECT-TYPE
         SYNTAX   DateAndTime
         MAX-ACCESS   read-only

```
     STATUS                current
     DESCRIPTION
         "The date and time at which this server was last started."
     ::= { rdbmsSrvInfoEntry 1 }

  rdbmsSrvInfoFinishedTransactions  OBJECT-TYPE
     SYNTAX                Gauge32
     MAX-ACCESS            read-only
     STATUS                current
     DESCRIPTION
         "The number of transactions visible to this server that have
          been completed by either commit or abort.  Some database
          operations, such as read-only queries, may not result in the
          creation of a transaction."
     ::= { rdbmsSrvInfoEntry 2 }

  rdbmsSrvInfoDiskReads   OBJECT-TYPE
     SYNTAX                Counter32
     MAX-ACCESS            read-only
     STATUS                current
     DESCRIPTION
         "The total number of reads of database files issued to the
          operating system by this server since startup.  Numbers are
          not comparable between products.  What constitutes a
          readand how it is accounted is product-specific."
     ::= { rdbmsSrvInfoEntry 3 }

  rdbmsSrvInfoLogicalReads    OBJECT-TYPE
     SYNTAX                Counter32
     MAX-ACCESS            read-only
     STATUS                current
     DESCRIPTION
         "The total number of logical reads of database files made
          internally by this server since startup.  The values of this
          object and those of rdbmsSrvInfoDiskReads reveal the effect
          of caching on read operation. Numbers are not comparable
          between products, and may only be meaningful when aggregated
          across all servers sharing a common cache."
     ::= { rdbmsSrvInfoEntry 4 }

  rdbmsSrvInfoDiskWrites  OBJECT-TYPE
     SYNTAX                Counter32
     MAX-ACCESS            read-only
     STATUS                current
     DESCRIPTION
         "The total number of writes to database files issued to the
          operating system by this server since startup.  Numbers are
          not comparable between products."
```

```
      ::= { rdbmsSrvInfoEntry 5 }

   rdbmsSrvInfoLogicalWrites  OBJECT-TYPE
       SYNTAX                Counter32
       MAX-ACCESS            read-only
       STATUS                current
       DESCRIPTION
           "The total number of times parts of the database files have
           been marked 'dirty' and in need of writing to the disk.  This
           value and rdbmsSrvInfoDiskWrites give some indication of the
           effect of 'write-behind' strategies in reducing the number of
           disk writes compared to database operations.  Because the
           writes may be done by servers other than those marking the
           parts of the database files dirty, these values may only be
           meaningful when aggregated across all servers sharing a
           common cache.  Numbers are not comparable between products."
       ::= { rdbmsSrvInfoEntry 6 }

   rdbmsSrvInfoPageReads   OBJECT-TYPE
       SYNTAX                Counter32
       MAX-ACCESS            read-only
       STATUS                current
       DESCRIPTION
           "The total number of pages in database files read by this
           server since startup.  'Pages' are product specific units of
           disk i/o operations.  This value, along with
           rdbmsSrvInfoDiskReads, reveals the effect of any grouping
           read-ahead that may be used to enhance performance of some
           queries, such as scans."
       ::= { rdbmsSrvInfoEntry 7}

   rdbmsSrvInfoPageWrites  OBJECT-TYPE
       SYNTAX                Counter32
       MAX-ACCESS            read-only
       STATUS                current
       DESCRIPTION
           "The total number of pages in database files written by this
           server since startup.  Pages are product-specific units of
           disk I/O.  This value, with rdbmsSrvInfoDiskWrites, shows the
           effect of write strategies that collapse logical writes of
           contiguous pages into single calls to the operating system."
       ::= { rdbmsSrvInfoEntry 8 }

   rdbmsSrvInfoDiskOutOfSpaces OBJECT-TYPE
       SYNTAX                  Counter32
       MAX-ACCESS              read-only
       STATUS                  current
       DESCRIPTION
```

                "The total number of times the server has been unable to
                 obtain disk space that it wanted, since server startup. This
                 would be inspected by an agent on receipt of an
                 rdbmsOutOfSpace trap."
            ::= { rdbmsSrvInfoEntry 9 }

      rdbmsSrvInfoHandledRequests   OBJECT-TYPE
            SYNTAX   Counter32
            MAX-ACCESS   read-only
            STATUS   current
            DESCRIPTION
                "The total number of requests made to the server on inbound
                 associations. The meaning of 'requests' is product specific,
                 and is not comparable between products.

                 This is intended to encapsulate high level semantic
                 operations between clients and servers, or between peers.
                 For instance, one request might correspond to a 'select' or
                 an 'insert' statement. It is not intended to capture disk
                 i/o described in rdbmsSrvInfoDiskReads and
                 rdbmsSrvInfoDiskWrites."
            ::= { rdbmsSrvInfoEntry 10 }

      rdbmsSrvInfoRequestRecvs   OBJECT-TYPE
            SYNTAX   Counter32
            MAX-ACCESS   read-only
            STATUS   current
            DESCRIPTION
                "The number of receive operations made processing any requests
                 on inbound associations. The meaning of operations is product
                 specific, and is not comparable between products.

                 This is intended to capture lower-level i/o operations than
                 shown by HandledRequests, between clients and servers, or
                 between peers. For instance, it might roughly correspond to
                 the amount of data given with an 'insert' statement. It is
                 not intended to capture disk i/o described in
                 rdbmsSrvInfoDiskReads and rdbmsSrvInfoDiskWrites."
            ::= { rdbmsSrvInfoEntry 11 }

      rdbmsSrvInfoRequestSends   OBJECT-TYPE
            SYNTAX   Counter32
            MAX-ACCESS   read-only
            STATUS   current
            DESCRIPTION
                "The number of send operations made processing requests
                 handled on inbound associations. The meaning of operations
                 is product specific, and is not comparable between products.

          This is intended to capture lower-level i/o operations than
          shown by HandledRequests, between between clients and
          servers, or between peers. It might roughly correspond to
          the number of rows returned by a 'select' statement. It is
          not intended to capture disk i/o described in DiskReads."
     ::= { rdbmsSrvInfoEntry 12 }

  rdbmsSrvInfoHighwaterInboundAssociations OBJECT-TYPE
     SYNTAX   Gauge32
     MAX-ACCESS   read-only
     STATUS   current
     DESCRIPTION
         "The greatest number of inbound associations that have been
          simultaneously open to this server since startup."
     ::= { rdbmsSrvInfoEntry 13 }

  rdbmsSrvInfoMaxInboundAssociations OBJECT-TYPE
     SYNTAX   Gauge32
     MAX-ACCESS   read-write
     STATUS   current
     DESCRIPTION
         "The greatest number of inbound associations that can be
          simultaneously open with this server. If there is no limit,
          then the value should be zero.

          Note that a compliant agent does not need to
          allow write access to this object."

     ::= { rdbmsSrvInfoEntry 14 }

     ----

  rdbmsSrvParamTable   OBJECT-TYPE
     SYNTAX   SEQUENCE OF RdbmsSrvParamEntry
     MAX-ACCESS   not-accessible
     STATUS   current
     DESCRIPTION
         "The table of configuration parameters for a server. Entries
          should be populated according to the following guidelines:
          (1) The value should be specified through administrative
              (human) intervention.
          (2) It should be configured on a per-server or a more global
              basis, with duplicate entries for each server sharing
              use of the parameter.
          (3) One of the following is true:
              (a) The parameter has a non-numeric value;
              (b) The current value is numeric, but it only changes due
                  to human intervention;

              (c) The current value is numeric and dynamic, but the
                  RDBMS does not track access/allocation failures
                  related to the parameter;
              (d) The current value is numeric and dynamic, the
                  RDBMS tracks changes in access/allocation failures
                  related to the parameter, but the failure has no
                  significant impact on RDBMS performance or
                  availability.
              (e) The current value is numeric and dynamic, the
                  RDBMS tracks changes in access/allocation failures
                  related to the parameter, the failure has
                  significant impact on RDBMS performance or
                  availability, and is shown in the
                  rdbmsSrvLimitedResource table."
          ::= { rdbmsObjects 7 }

  rdbmsSrvParamEntry   OBJECT-TYPE
       SYNTAX   RdbmsSrvParamEntry
       MAX-ACCESS   not-accessible
       STATUS   current
       DESCRIPTION
            "An entry for a single configuration parameter for a server.
            Parameters with single values have a subindex value of one.
            If the parameter is naturally considered to contain a
            variable number of members of a class, e.g. members of the
            DBA user group, or tracepoints active in the server, then it
            must be presented as a set of rows. If, on the other hand,
            the parameter represents a set of choices from a class,
            e.g. the permissions on a file or the options chosen out of
            the set of all options allowed, AND is guaranteed to always
            fit in the 255 character length of a DisplayString, then it
            may be presented as a comma separated list with a subindex
            value of one. Zero may not be used as a subindex value.

            Entries for a server must be present if the value of the
            corresponding applOperStatus object is up(1). If an instance
            of applOperStatus is not up(1), then attempts to access
            corresponding instances in this table may result in either
            noSuchName (SNMPv1) or noSuchInstance (SNMPv2) being returned
            by the agent."
       INDEX { applIndex, rdbmsSrvParamName, rdbmsSrvParamSubIndex }
       ::= { rdbmsSrvParamTable 1 }

  RdbmsSrvParamEntry ::=
       SEQUENCE {
            rdbmsSrvParamName   DisplayString,
            rdbmsSrvParamSubIndex   INTEGER,
            rdbmsSrvParamID   AutonomousType,

```
                rdbmsSrvParamCurrValue        DisplayString,
                rdbmsSrvParamComment          DisplayString
        }

  rdbmsSrvParamName          OBJECT-TYPE
      SYNTAX               DisplayString (SIZE (1..64))
      MAX-ACCESS           not-accessible
      STATUS               current
      DESCRIPTION
          "The name of a configuration parameter for a server.  This
           name is product-specific. The length is limited to 64
           characters to constrain the number of sub-identifiers needed
           for instance identification (and to minimize network
           traffic)."
      ::= { rdbmsSrvParamEntry 1 }

  rdbmsSrvParamSubIndex      OBJECT-TYPE
      SYNTAX               INTEGER (1..2147483647)
      MAX-ACCESS           not-accessible
      STATUS               current
      DESCRIPTION
          "The subindex value for this parameter.  If the parameter is
           naturally considered to contain a variable number of members
           of a class, e.g.  members of the DBA user group, or files
           which are part of the database, then it must be presented as
           a set of rows.  If, on the other hand, the parameter
           represents a set of choices from a class, e.g. the
           permissions on a file or the options chosen out of the set of
           all options allowed, AND is guaranteed to always fit in the
           255 character length of a DisplayString, then it may be
           presented as a comma separated list with a subindex value of
           one.  Zero may not be used as a value."
      ::= { rdbmsSrvParamEntry 2 }

  rdbmsSrvParamID            OBJECT-TYPE
      SYNTAX               AutonomousType
      MAX-ACCESS           read-only
      STATUS               current
      DESCRIPTION
          "The ID of the parameter which may be described in some
           other MIB.  If there is no ID for this rdbmsSrvParamName,
           attempts to access this object will return noSuchName
           (SNMPv1) or noSuchInstance (SNMPv2)."
      ::= { rdbmsSrvParamEntry 3 }

  rdbmsSrvParamCurrValue  OBJECT-TYPE
      SYNTAX               DisplayString
      MAX-ACCESS           read-write
```

```
        STATUS                current
        DESCRIPTION
            "The value for a configuration parameter now in effect, the
             actual setting for the server.  While there may multiple
             values in the temporal domain of interest (for instance, the
             value to take effect at the next restart), this is the
             current setting.

             Note that a compliant agent does not need to
             allow write access to this object."

        ::= { rdbmsSrvParamEntry 4 }

  rdbmsSrvParamComment    OBJECT-TYPE
        SYNTAX                DisplayString
        MAX-ACCESS            read-write
        STATUS                current
        DESCRIPTION
            "Annotation which describes the purpose of a configuration
             parameter or the reason for a particular parameter's
             setting.

             Note that a compliant agent does not need to
             allow write access to this object."

        ::= { rdbmsSrvParamEntry 5 }

    ------------------------------------------------------------------

  rdbmsSrvLimitedResourceTable        OBJECT-TYPE
        SYNTAX         SEQUENCE OF RdbmsSrvLimitedResourceEntry
        MAX-ACCESS     not-accessible
        STATUS         current
        DESCRIPTION
            "The table of limited resources relevant to a server."
        ::= { rdbmsObjects 8 }

  rdbmsSrvLimitedResourceEntry    OBJECT-TYPE
        SYNTAX       RdbmsSrvLimitedResourceEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "An entry for a single limited resource kept by the server.
             A limited resource has maximum use determined by a parameter
             that might or might not changeable at run time, or visible in
             the rbmsSrvParamTable.  Examples would be the number of
             available locks, or number of concurrent executions allowed
             in a server.  Arrays of resources are supported through an
```

```
             integer subindex, which should have the value of one for
             single-instance names.

             Limited resources that are shared across servers or databases
             are best duplicated in this table across
             all servers accessing the resource."
        INDEX { applIndex, rdbmsSrvLimitedResourceName }
        ::= { rdbmsSrvLimitedResourceTable 1 }

   RdbmsSrvLimitedResourceEntry ::=
        SEQUENCE {
             rdbmsSrvLimitedResourceName          DisplayString,
             rdbmsSrvLimitedResourceID            AutonomousType,
             rdbmsSrvLimitedResourceLimit         INTEGER,
             rdbmsSrvLimitedResourceCurrent       INTEGER,
             rdbmsSrvLimitedResourceHighwater     INTEGER,
             rdbmsSrvLimitedResourceFailures      Counter32,
             rdbmsSrvLimitedResourceDescription   DisplayString
        }

   rdbmsSrvLimitedResourceName          OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      not-accessible
        STATUS          current
        DESCRIPTION
            "The name of the resource, for instance 'threads' or
             'semaphores', or 'buffer pages'"
        ::= { rdbmsSrvLimitedResourceEntry  1 }

   rdbmsSrvLimitedResourceID OBJECT-TYPE
        SYNTAX             AutonomousType
        MAX-ACCESS         read-only
        STATUS             current
        DESCRIPTION
            "The ID of the resource which may be described in some other
             MIB.  If there is no ID for this rdbmsSrvLimitedResourceName,
             attempts to access this object will return noSuchName
             (SNMPv1) or noSuchInstance (SNMPv2)."
        ::= { rdbmsSrvLimitedResourceEntry 2 }

   rdbmsSrvLimitedResourceLimit         OBJECT-TYPE
        SYNTAX          INTEGER (1..2147483647)
        MAX-ACCESS      read-write
        STATUS          current
```

         DESCRIPTION
             "The maximum value the resource use may attain.

              Note that a compliant agent does not need to
              allow write access to this object."

         ::= { rdbmsSrvLimitedResourceEntry 3 }

  rdbmsSrvLimitedResourceCurrent   OBJECT-TYPE
      SYNTAX   INTEGER (1..2147483647)
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
          "The current value for the resource."
      ::= { rdbmsSrvLimitedResourceEntry 4 }

  rdbmsSrvLimitedResourceHighwater   OBJECT-TYPE
      SYNTAX   INTEGER (1..2147483647)
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
          "The maximum value of the resource seen since applUpTime
           was reset."
      ::= { rdbmsSrvLimitedResourceEntry 5 }

  rdbmsSrvLimitedResourceFailures   OBJECT-TYPE
      SYNTAX   Counter32
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
          "The number of times the system wanted to exceed the limit of
           the resource since applUpTime was reset."
      ::= { rdbmsSrvLimitedResourceEntry 6 }

  rdbmsSrvLimitedResourceDescription   OBJECT-TYPE
      SYNTAX   DisplayString
      MAX-ACCESS   read-write
      STATUS   current
      DESCRIPTION
          "A description of the resource and the meaning of the integer
           units used for Limit, Current, and Highwater.

           Note that a compliant agent does not need to
           allow write access to this object."

      ::= { rdbmsSrvLimitedResourceEntry 7 }

```
        ----------------------------------------------------------------

     rdbmsRelTable     OBJECT-TYPE
         SYNTAX         SEQUENCE OF RdbmsRelEntry
         MAX-ACCESS     not-accessible
         STATUS         current
         DESCRIPTION
             "A table relating databases and servers present on a host."
         ::= { rdbmsObjects 9 }

     rdbmsRelEntry     OBJECT-TYPE
         SYNTAX         RdbmsRelEntry
         MAX-ACCESS     not-accessible
         STATUS         current
         DESCRIPTION
             "An entry relating a single database server to a single
              database to which it may provide access.  The table is
              indexed first by the index of rdbmsDbTable, and then
              rdbmsSrvTable, so that all servers capable of providing
              access to a given database may be found by SNMP traversal
              operations (get-next and get-bulk).  The makeup of this table
              depends on the product's architecture, e.g. if it is one
              server - many databases, then each server will appear n
              times, where n is the number of databases it may access, and
              each database will appear once.  If the architecture is one
              database - many servers, then each server will appear once
              and each database will appear n times, where n is the number
              of servers that may be accessing it."
         INDEX  { rdbmsDbIndex, applIndex }
         ::= { rdbmsRelTable 1 }

     RdbmsRelEntry ::=
         SEQUENCE {
             rdbmsRelState            INTEGER,
             rdbmsRelActiveTime       DateAndTime
         }

     rdbmsRelState     OBJECT-TYPE
         SYNTAX         INTEGER{
                     other(1),
                     active(2),
                     available(3),
                     restricted(4),
                     unavailable(5)
                     }
         MAX-ACCESS     read-only
         STATUS         current
         DESCRIPTION
```

           "The state of this server's access to this database.
            Active(2) means the server is actively using the database.
            Available(3) means the server could use the database if
            necessary. Restricted(4) means the database is in some
            administratively determined state of less-than-complete
            availability. Unavailable(5) means the database is not
            available through this server. Other(1) means the
            database/server is in some other condition, possibly
            described in the vendor private MIB."

        ::= { rdbmsRelEntry 1 }

   rdbmsRelActiveTime OBJECT-TYPE
       SYNTAX   DateAndTime
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
           "The time the database was made active by the server. If an
            instance of rdbmsRelState is not active(1), then attempts to
            access the corresponding instance of this object may result
            in either noSuchName (SNMPv1) or noSuchInstance (SNMPv2)
            being returned by the agent."
       ::= { rdbmsRelEntry 2 }

   -- Well known resources for which limits, high water marks,
   -- access or allocation failures, and current levels of use
   -- are possibly available in either the rdbmsDbLimitedResources
   -- or the rdbmsSrvLimitedResources tables.

   rdbmsWellKnownLimitedResources OBJECT IDENTIFIER
           ::= { rdbmsObjects 10 }

   rdbmsLogSpace   OBJECT-IDENTITY
                    STATUS current
                    DESCRIPTION
                    "Storage allocated for redo and undo logs."
           ::= { rdbmsWellKnownLimitedResources 1}

   ----

   rdbmsTraps   OBJECT IDENTIFIER ::= { rdbmsMIB 2 }

   rdbmsStateChange   NOTIFICATION-TYPE
       OBJECTS   { rdbmsRelState }
       STATUS   current
       DESCRIPTION

```
            "An rdbmsStateChange trap signifies that one of the database
             server/databases managed by this agent has changed its
             rdbmsRelState in a way that makes it less accessible for use.
             For these purposes, both active(2) and available(3) are
             considered fully accessible.  The state sent with the trap is
             the new, less accessible state."
        ::= { rdbmsTraps 1 }

   rdbmsOutOfSpace NOTIFICATION-TYPE
        OBJECTS      { rdbmsSrvInfoDiskOutOfSpaces }
        STATUS       current
        DESCRIPTION
            "An rdbmsOutOfSpace trap signifies that one of the database
             servers managed by this agent has been unable to allocate
             space for one of the databases managed by this agent.  Care
             should be taken to avoid flooding the network with these
             traps."
        ::= { rdbmsTraps 2 }


    -----------------------------------------------------------------

    -- compliance information

    rdbmsConformance     OBJECT IDENTIFIER ::= { rdbmsMIB 3 }
    rdbmsCompliances     OBJECT IDENTIFIER ::= { rdbmsConformance 1 }
    rdbmsGroups          OBJECT IDENTIFIER ::= { rdbmsConformance 2 }

    -- compliance statements

    rdbmsCompliance      MODULE-COMPLIANCE
        STATUS           current
        DESCRIPTION
            "The compliance statement for SNMP entities which
             implement the RDBMS MIB"
        MODULE HOST-RESOURCES-MIB
           MANDATORY-GROUPS     { hrSystem }
        MODULE APPLICATION-MIB
           MANDATORY-GROUPS { applGroup }
        MODULE RDBMS-MIB
           MANDATORY-GROUPS { rdbmsGroup }

        GROUP  rdbmsGroup
            DESCRIPTION
                "The rdbmsGroup is mandatory, but no write access
                 to objects is required for compliance."
            OBJECT       rdbmsDbContact
            MIN-ACCESS   read-only
            DESCRIPTION
```

```
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsDbParamCurrValue
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsDbParamComment
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsDbLimitedResourceLimit
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsDbLimitedResourceDescription
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsSrvContact
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsSrvInfoMaxInboundAssociations
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsSrvParamCurrValue
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsSrvParamComment
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsSrvLimitedResourceLimit
         MIN-ACCESS  read-only
         DESCRIPTION
              "A compliant system need not allow write-access to this
              object."
         OBJECT      rdbmsSrvLimitedResourceDescription
```

```
        MIN-ACCESS  read-only
        DESCRIPTION
            "A compliant system need not allow write-access to this
            object."

    ::= { rdbmsCompliances 1 }

 -- units of conformance

    -- rdbmsStateChange and rdbmsOutOfSpace traps are omitted
    -- intentionally.  They are not required or part of any
    -- conformance group.

 rdbmsGroup    OBJECT-GROUP
     OBJECTS  {
                 rdbmsDbPrivateMibOID, rdbmsDbVendorName,
                 rdbmsDbName, rdbmsDbContact,

                 rdbmsDbInfoProductName, rdbmsDbInfoVersion,
                 rdbmsDbInfoSizeUnits, rdbmsDbInfoSizeAllocated,
                 rdbmsDbInfoSizeUsed, rdbmsDbInfoLastBackup,

                 rdbmsDbParamCurrValue, rdbmsDbParamComment,

                 rdbmsDbLimitedResourceLimit,
                 rdbmsDbLimitedResourceCurrent,
                 rdbmsDbLimitedResourceHighwater,
                 rdbmsDbLimitedResourceFailures,
                 rdbmsDbLimitedResourceDescription,

                 rdbmsSrvPrivateMibOID, rdbmsSrvVendorName,
                 rdbmsSrvProductName, rdbmsSrvContact,

                 rdbmsSrvInfoStartupTime,
                 rdbmsSrvInfoFinishedTransactions,
                 rdbmsSrvInfoDiskReads, rdbmsSrvInfoDiskWrites,
                 rdbmsSrvInfoLogicalReads, rdbmsSrvInfoLogicalWrites,
                 rdbmsSrvInfoPageReads, rdbmsSrvInfoPageWrites,
                 rdbmsSrvInfoHandledRequests,
                 rdbmsSrvInfoRequestRecvs, rdbmsSrvInfoRequestSends,
                 rdbmsSrvInfoHighwaterInboundAssociations,
                 rdbmsSrvInfoMaxInboundAssociations,

                 rdbmsSrvParamCurrValue, rdbmsSrvParamComment,

                 rdbmsSrvLimitedResourceLimit,
                 rdbmsSrvLimitedResourceCurrent,
                 rdbmsSrvLimitedResourceHighwater,
```

```
                    rdbmsSrvLimitedResourceFailures,
                    rdbmsSrvLimitedResourceDescription,

                    rdbmsRelState, rdbmsRelActiveTime }
        STATUS    current
        DESCRIPTION
            "A collection of objects providing basic instrumentation of an
             RDBMS entity."
        ::= { rdbmsGroups 1 }


    ----------------------------------------------------------------


    END
```

5. Acknowledgements

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6. References

   [1] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure
       of Management Information for version 2 of the Simple Network
       Management Protocol (SNMPv2)", RFC 1442, SNMP Research, Inc.,
       Hughes LAN Systems, Dover Beach Consulting, Inc., Carnegie Mellon
       University, April 1993.

   [2] McCloghrie, K., and M. Rose, "Management Information Base for
       Network Management of TCP/IP-based internets - MIB-II", STD 17,
       RFC 1213, Hughes LAN Systems, Performance Systems International,
       March 1991.

   [3] Galvin, J., and K. McCloghrie, "Administrative Model for version
       2 of the Simple Network Management Protocol (SNMPv2)", RFC 1445,
       Trusted Information Systems, Hughes LAN Systems, April 1993.

   [4] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol
       Operations for version 2 of the Simple Network Management
       Protocol (SNMPv2)", RFC 1448, SNMP Research, Inc., Hughes LAN
       Systems, Dover Beach Consulting, Inc., Carnegie Mellon
       University, April 1993.

   [5] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual
       Conventions for version 2 of the Simple Network Management
       Protocol (SNMPv2)", RFC 1443, SNMP Research, Inc., Hughes LAN
       Systems, Dover Beach Consulting, Inc., Carnegie Mellon
       University, April 1993.

   [6] Kille, S., WG Chair, and N. Freed, Editor, "The Network Services
       Monitoring MIB", RFC 1565, ISODE Consortium, Innosoft, January
       1994.

7. Security Considerations

    Security issues are not discussed in this memo.

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