Management Conversation

Establishing a Common Terminology Between Manager and Agent

- Assign the same terms and labels
  - Managed Objects (MOs) and Management Information Base (MIB).

- MIB
  - MIB can be considered a conceptual data store it
  - Represents an abstraction and a view of the device being managed for management purposes
  - retrieve management information from the MIB by directing corresponding requests at the management agent for example, using a "get" operation.
  - In many cases, they can also manipulate and modify the information that is contained in the MIB—for example, using a "set," "create," or a "delete" operation.

- MIBs:
  - Information about physical aspects such as ports and line cards, as well as about logical aspects such as protocol machines, software, and features of individual communication services.
  - The pieces of management information in a MIB are commonly referred to as managed objects
  - (MOs)
  - Subject of management conversations between managers and agents. Here are some examples:
    - Retrieve statistical information about a port (that is used to connect a piece of equipment to a network)
    - Create an access control rule (that specifies for a firewall which packets to filter)
    - Configure the connection endpoint of an ATM connection
Categories of Management Information

- State information
  - Information about the current state of physical and logical resources, along with any operational data.
  - Most relevant for monitoring a network

- Physical configuration information
  - Information about how the managed device is physically configured.
  - Includes information such as the device type, physical configuration in terms of cards and available ports, serial numbers, and MAC addresses.

- Logical configuration information
  - This concerns various parameter settings and configured logical resources on the device, such as IP addresses, telephone numbers, or logical interfaces.

- Historical information
  - This includes historical snapshots of performance-related state information (such as the packet counts for each 15-minute interval over the past 24 hours).
  - Including logs of various types of events, such as a firewall log of recent remote connection attempts
The Difference Between a MIB and a Database

- Footprint
  - Regular DBMS mechanisms are heavier weight and require more processing resources than management interfaces.

- Specific management requirements
  - Management information is hierarchical in nature—a device contains cards, which contain ports, which contain interfaces, and so on.
  - These types of requirements need to be captured, and a MIB should provide built-in support for them.

- Real effects
  - MIB is not a “passive” database, but a view on an “active” real-world system.

- Characteristics of the contained data
  - Database typically contains large volumes of data that is legacy of the same structure.

Schema of MIB

- Different Meta schemes, Different Character of the Abstraction
  - Character of the model that results looks different depending on what meta scheme is used.
Matching Management Information and Metaschema
- Each metaschema has its advantages and drawbacks
- Generally, management information that management agents on network equipment provide tends to be based on relatively simple metaschemata
- State information is often modeled as tables and represented in SNMP MIBs because SNMP is the management protocol of choice for many monitoring applications.
- Logical configuration information is often managed using CLI, meaning that often it is modeled only in the form of parameters of CLI functions instead of a more explicit management information model.
- Historical information is often represented in proprietary formats, optimized for periodic retrieval in one large bulk file from a device.

Structure of Management Information

One MIB, Multiple MIB Modules

- Information are defined in a MIB module:
  - The object types themselves, the instances of which contain the actual management information—the "MIB variables"
  - Notifications, defining information that can be conveyed to managers as part of event messages (called traps in SNMP), sent unsolicitedly by the device.
  - Nodes that represent nothing specific but that are introduced for grouping purposes.
  - Example: MIB module for the (BGP) might contain a node "BGP statistics," under which object types are grouped that represent different kinds of statistics about BGP.