NETWORK MANAGEMENT

MANAGEMENT INFORMATION

Elkaf Rahmawan Pramudya,M.Kom

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❑ 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," a "create," or a "delete" operation.**

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❑ Management Conversation

- **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**

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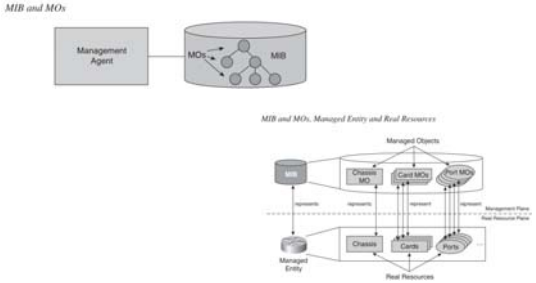
- Management Conversation



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- 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.

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- Categories of Management Information
  - 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

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❑ 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 largely of the same structure.

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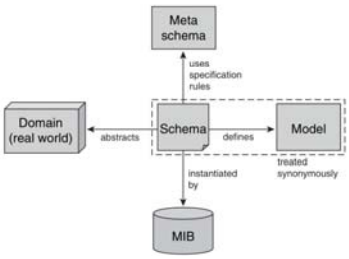
❑ Schema of MIB

Schema, Metaschema, Model, Domain, and MIB



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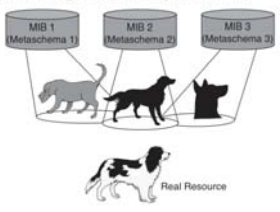
❑ Schema of MIB

Different Metaschemas, Different Characters of the Abstraction



Character of the model that results looks different depending on what metaschema is used.

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❑ 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.

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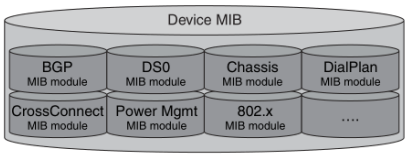
❑ Structure of Management Information

One MIB, Multiple MIB Modules



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❑ Structure of Management Information

❑ 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.