SNMP Overview

Dr. G. Usha Devi
Associate Professor
School of Information Technology and Engineering
VIT University
Vellore

OSI Architecture and Model

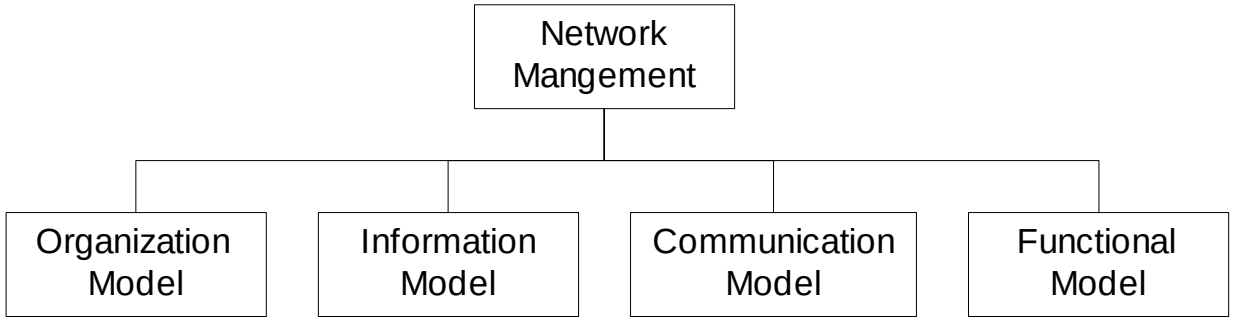

Figure 3.1 OSI Network Management Model

- **Organization**
  - Describes Network management system components
  - Functions and Infrastructure
  - Relationships
  - It defines the terms object, agent and manager

- **Information**
  - Structure of management information (SMI)
    - Syntax and semantics
  - Management information base (MIB)
    - Organization of management information

- **Communication**
  - Management application process
  - Layer management between layers and within the layers
  - Transfer syntax with bi-directional messages
  - Transfer structure (PDU)

- **Functional**
  - User oriented requirements of applications
  - Application functions
    - Configure components
    - Monitor components
    - Measure performance
    - Secure information
    - Usage accounting

Organizational Model

- **Manager**
  - manages the managed element
  - has a database
  - Sends requests to agents
  - Monitors alarms
  - Houses applications and Provides user interface
- **Agent**
  - Gathers information from objects
  - Configures parameters of objects
  - Responds to managers' requests
  - Generates alarms and sends them to managers
- **Managed object**
  - Network elements such as hosts, hubs, bridges, routers & so on
  - Managed objects – mgmt process running on it - agent
  - Unmanaged objects – does not have mgmt process
  - All objects are not managed / manageable

Two-Tier Model

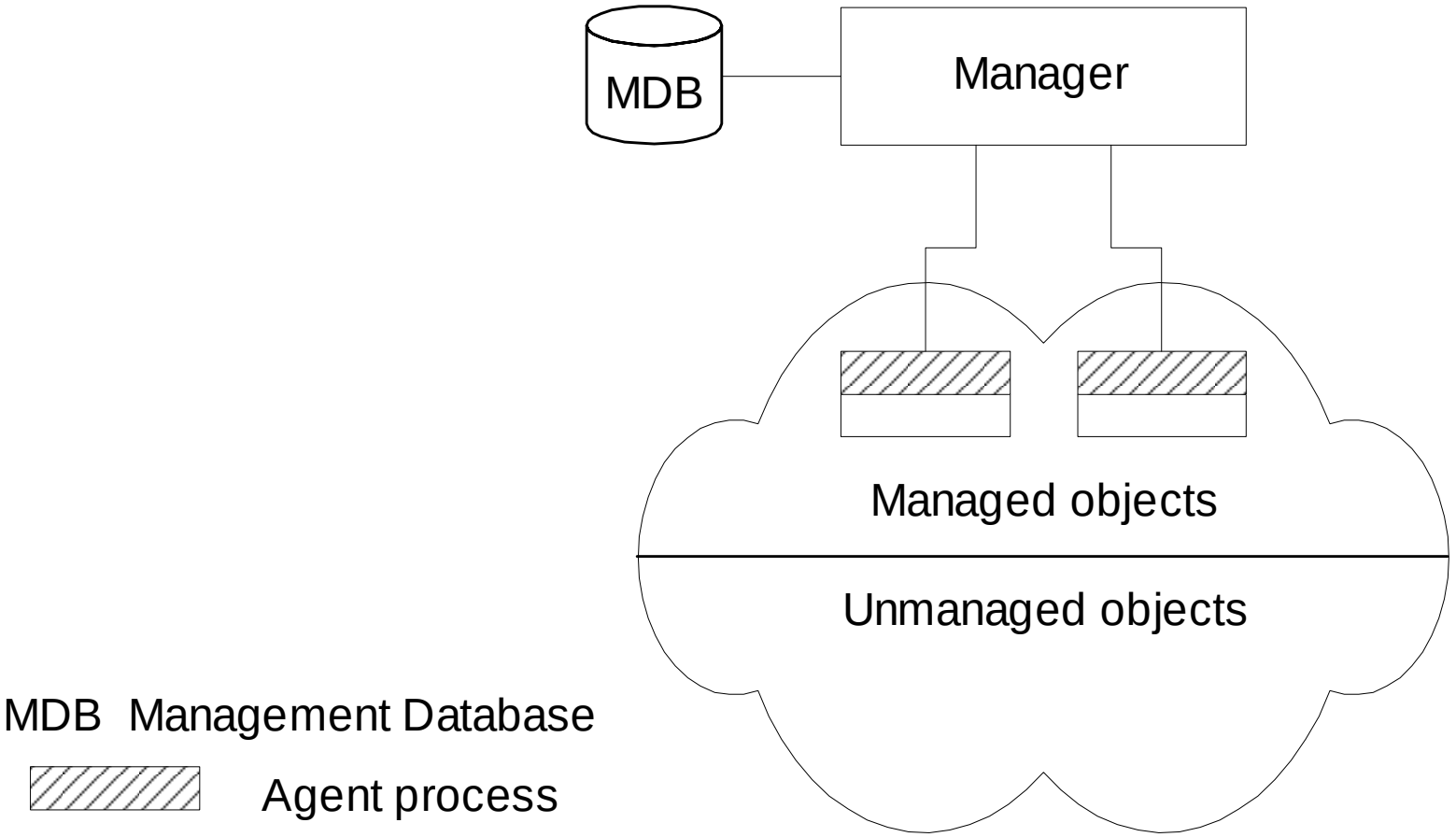

Figure 3.2 Two-Tier Network Mangement Organization Model

- Agent built into network element
  Example: Managed hub, managed router
- An agent can manage multiple elements
  Example: Switched hub, ATM switch
- MDB is a physical database
- Unmanaged objects are network elements that are not managed - both physical (unmanaged hub) and logical (passive elements)

Information Model: Analogy

- Structure and storage of information
- Figure in a book uniquely identified by
  - ISBN, Chapter, and Figure number in that hierarchical order
- ID: {ISBN, chapter, figure}
- The three elements above define the syntax
- Semantics is the meaning of the three entities according to Webster's dictionary
- The information comprises syntax and semantics about an object

Structure of Management Information (SMI)

- SMI defines for a managed object
  - Syntax
  - Semantics
  - plus additional information such as status
- Example

  sysDescr: { system 1 }
  Syntax: OCTET STRING
  Definition: "A textual description of the entity."
  Access: read-only
  Status: mandatory

Management Information Base (MIB)

- Information base contains information about objects
- Organized by grouping of related objects
- Defines relationship between objects
- It is NOT a physical database. It is a *virtual* database that is compiled into management module

Management Data Base / Information Base

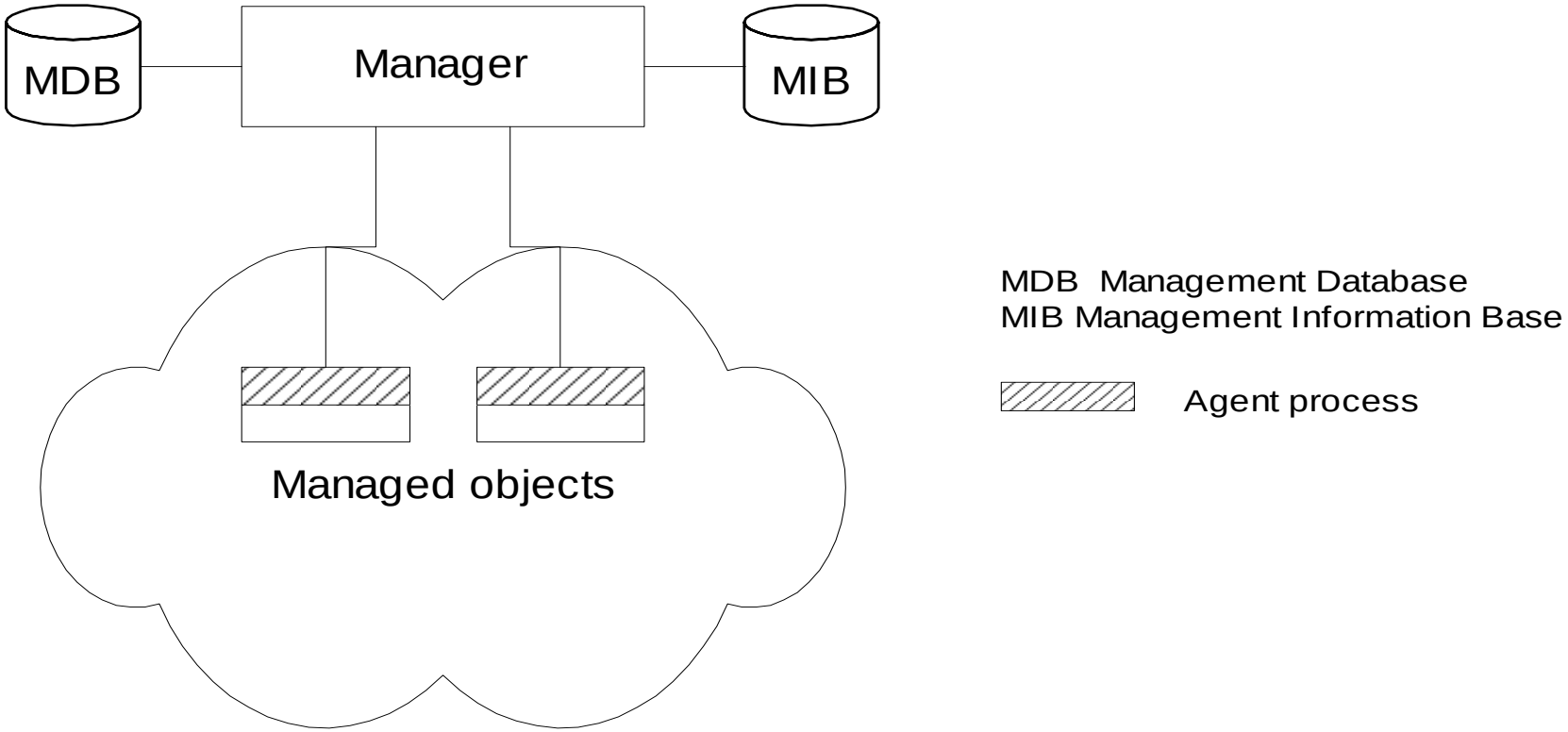

Figure 3.6 Network Configuration with Data and Information Base

- Distinction between MDB and MIB
  - MDB physical database; e.g.. Oracle, Sybase
  - MIB virtual database; schema compiled into management software
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Communication Model

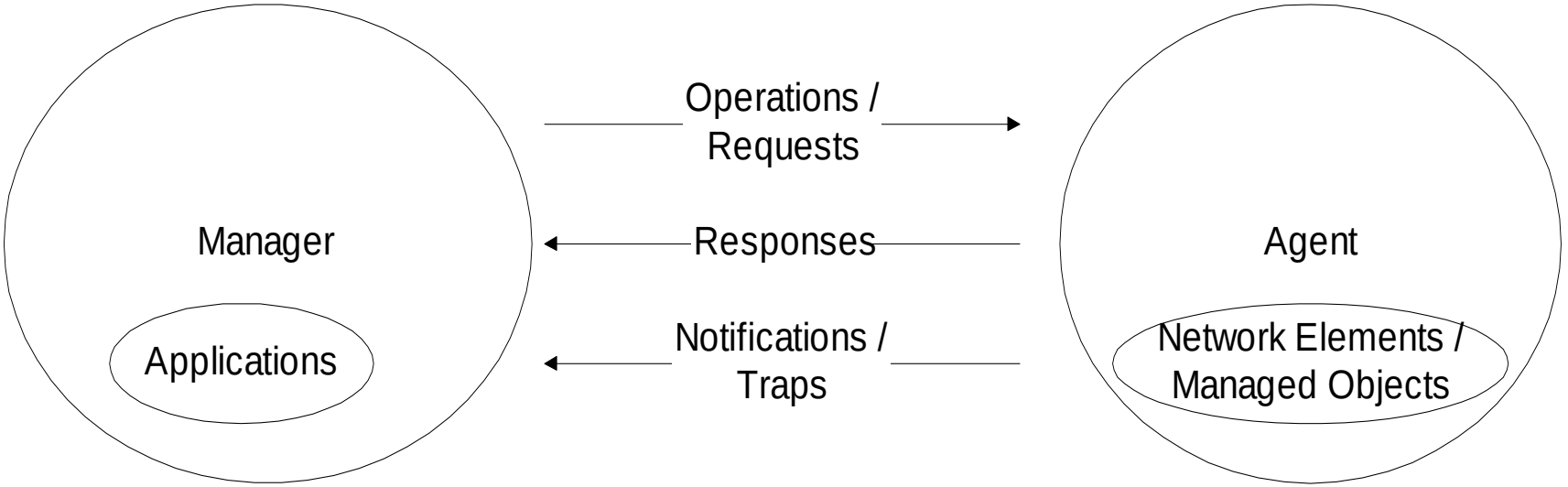
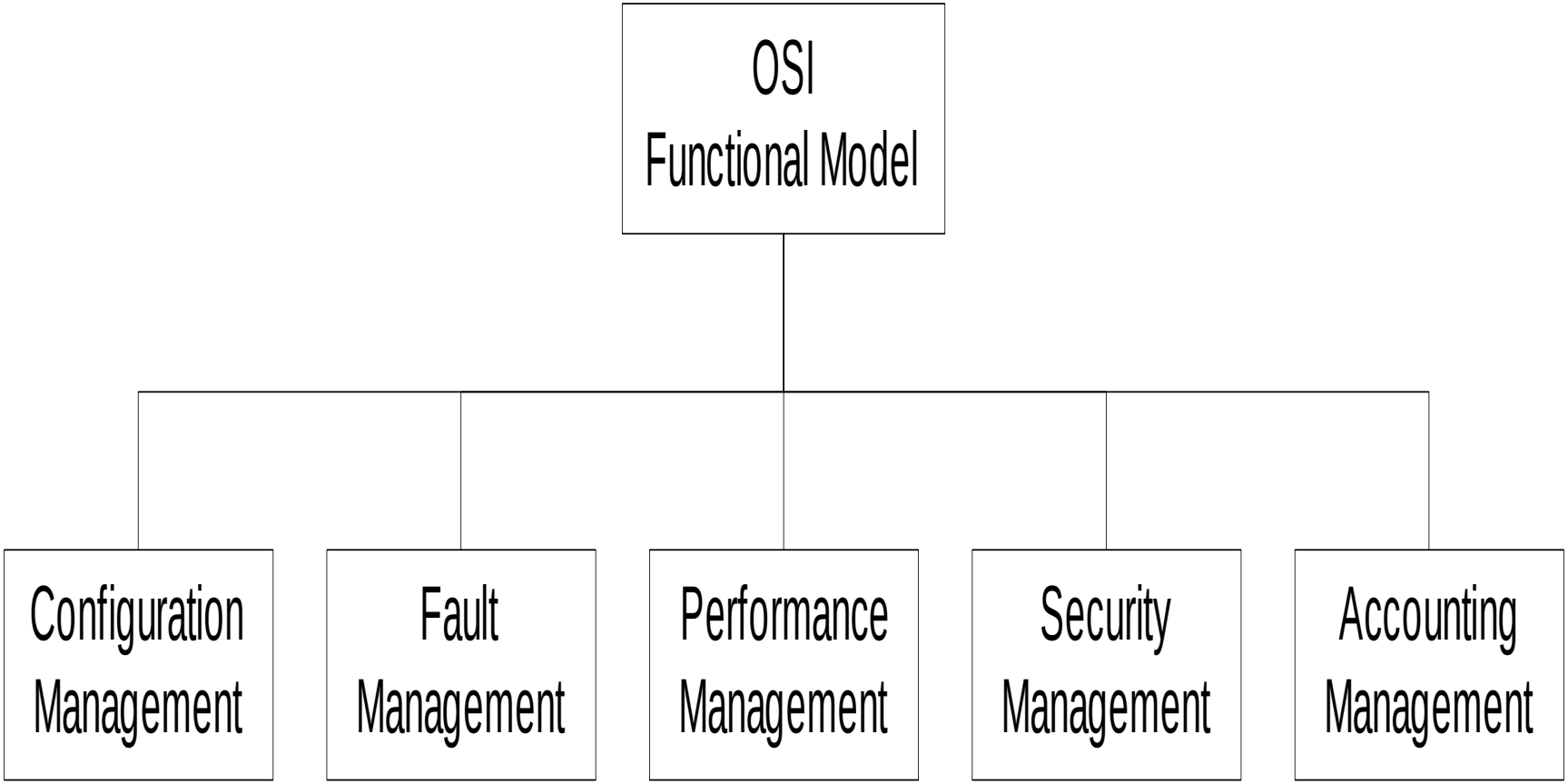


Figure 3.11 Management Message Communication Model

Abstract Syntax Notation One

- ASN.1 is more than a syntax; it's a language
- Addresses both syntax and semantics
- Two types of syntax
  - Abstract syntax: set of rules that specify data type and structure for information storage
  - Transfer syntax: set of rules for communicating information between systems

Functional Model



- Configuration management
  - set and change network configuration and component parameters
  - Set up alarm thresholds
- Fault management
  - Detection and isolation of failures in network
  - Trouble ticket administration
- Performance management
  - Monitor performance of network
- Security management
  - Authentication
  - Authorization
  - Encryption
- Accounting management
  - Functional accounting of network usage

Reference

- Network Management – Principles and Practice by Mani Subramanian