

# Chapter 8 – Network Management

# Why network management?

- To deal with the administration of large, complex, multiple users, multiple applications and multiple vendors networks!

# What is network management?

- Ability to monitor and change the state of network elements (routers, switches, (web) servers, printers, power supplies, modems, databases) and the network itself (traffic)
- Getters (e.g., data rate) and setters (e.g., interface shutdown)
- Data model of managed information
- Aims at scalability (large number of network elements), automation (alarms) and uniformity (across vendors)

# Solutions (not exhaustive)

1. Manual : (remote) login
2. Web client and server
3. Simple Network Management Protocol (SNMP v1, 2 and 3)
4. Software Defined Network (SDN)

# Simple Network Management Protocol (SNMP)

# Key concepts

1. Manager
2. Agent
3. Management information base
4. Network management protocol

# Enabling the SNMP Agent

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## SNMP Agent

SNMP Agent:  Enable

SysContact:

SysName:

SysLocation:

Get Community:

Get Source:

Set Community:

Set Source:

# Manager - Command-line interface

```
snmpwalk -c public -v 1 192.168.0.254
```

```
iso.3.6.1.2.1.1.1.0 = STRING: "Linux CPE510 2.6.31 #1 PREEMPT Mon  
Dec 14 13:06:33 CST 2015 mips"
```

```
iso.3.6.1.2.1.1.2.0 = OID: iso.3.6.1.4.1.8072.3.2.10
```

```
iso.3.6.1.2.1.1.3.0 = Timeticks: (66857) 0:11:08.57
```

```
iso.3.6.1.2.1.1.4.0 = STRING: "Michel"
```

```
iso.3.6.1.2.1.1.5.0 = STRING: "MyCPE510"
```

```
iso.3.6.1.2.1.1.6.0 = STRING: "Ottawa"
```

```
iso.3.6.1.2.1.1.8.0 = Timeticks: (10) 0:00:00.1
```

```
...
```



# Manager - MIB Browser

The screenshot shows the iReasoning MIB Browser interface. The top menu bar includes File, Edit, Operations, Tools, Bookmarks, and Help. Below the menu, there are fields for Address (192.168.0.254), Advanced..., OID (.1.3.6.1.2.1.1.8.0), and Operations (Get Next), along with a Go button.

The left pane displays the MIB Tree under the path iso.org.dod.internet.mgmt.mib-2. The tree includes a system folder containing sysDescr, sysObjectID, sysUpTime, sysContact, sysName, sysLocation, and sysServices. Below this is an interfaces folder containing at, ip, icmp, tcp, udp, and egp, followed by transmission, snmp, and host folders.

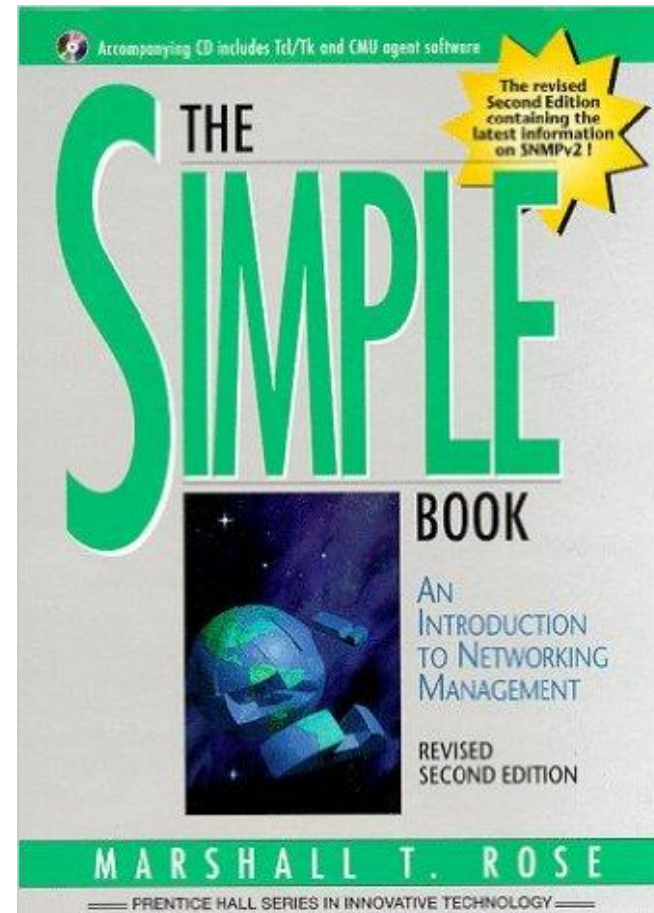
The right pane shows a Result Table with the following data:

Name/OID	Value	Type	IP:Port
sysObjectID.0	.1.3.6.1.4.1.8072.3.2.10	OID	192.168.0.2...
sysUpTime.0	26 minutes 4 seconds (1564...	TimeTicks	192.168.0.2...
sysContact.0	Michel	OctetString	192.168.0.2...
sysName.0	MyCPE510	OctetString	192.168.0.2...
sysLocation.0	Ottawa	OctetString	192.168.0.2...
.1.3.6.1.2.1.1.8.0	100 milliseconds (10)	TimeTicks	192.168.0.2...
.1.3.6.1.2.1.1.8.0	100 milliseconds (10)	TimeTicks	192.168.0.2...

Below the MIB Tree, a detailed view for sysServices is shown:

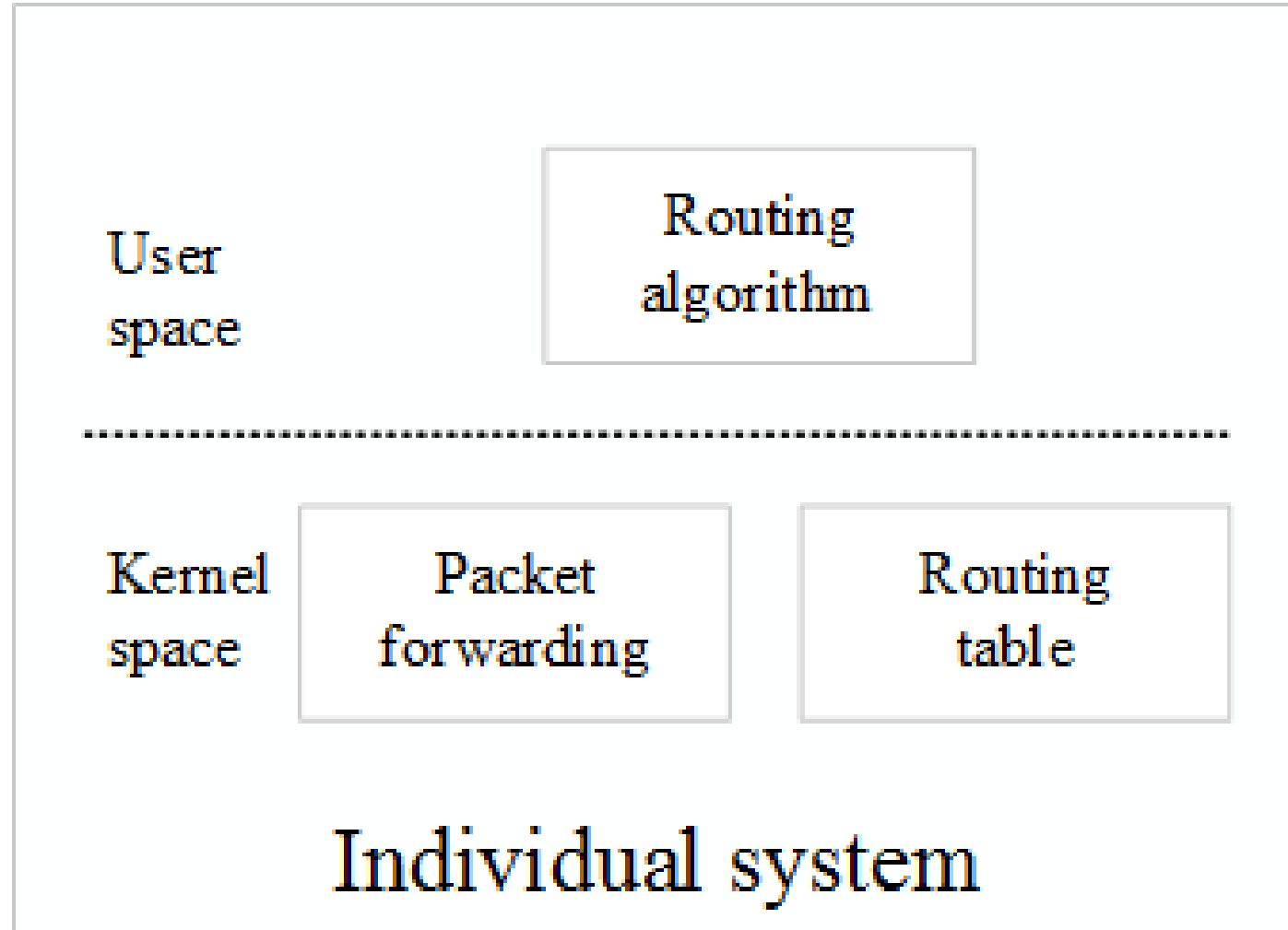
Name	sysServices
OID	.1.3.6.1.2.1.1.7
MIB	RFC1213-MIB
Syntax	INTEGER (0..127)
Access	read-only
Status	mandatory
DefVal	

The status bar at the bottom of the window displays the OID .1.3.6.1.2.1.1.8.0.



Software Defined Network (SDN)

# Traditional network architecture



# SDN architecture

