



What is Manageability?

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Thanks to Rocky Craig



Introduction and Agenda

Overview

Use case

SNMP

Open-IPMI

Nagios

Manageability – Construct a definition

Exchange of information between “knowledge entities”

- Producer has information and/or abilities
- Consumer wants that info or needs actions performed
- Data represents configuration state, change, history, health, ...

Networking is assumed

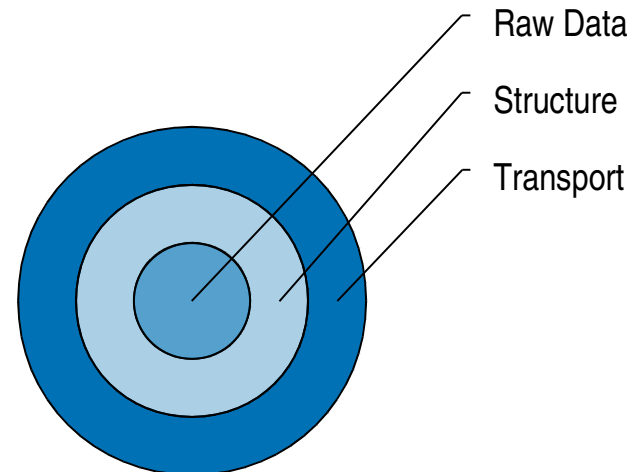
- Speed / latency / bandwidth / urgency considerations

Standards

- Reusability
- Heterogeneous environments
- Extensibility

It's all about the data

- Granularity
- Grouping
- Protocol



Manageability – A definition

Tools and protocols that enable the deployment, administration, and monitoring of several servers and other network devices from a remote console.

Tools and protocols that enable the **deployment**, administration, and monitoring of several servers and other network devices from a remote console.



Things to do before you install the OS

- Update the Firmware
- Configure ROMs / BIOS etc

Installing the OS

- Image based deployment
- From network boot with an answer file

Things to do immediately after you install the OS

- Install patches
- Configure the system
- Basically anything that needs to be done before the system is usable

Tools and protocols that enable the deployment, **administration**, and monitoring of several servers and other network devices from a remote console.



Keeping the users happy

Upgrading Firmware

Upgrading / Adding user applications

Adding storage

Disaster recovery

Basically a lot of day to day stuff the keeps a lot of us employed

Tools and protocols that enable the deployment, administration, and **monitoring** of several servers and other network devices from a remote console.

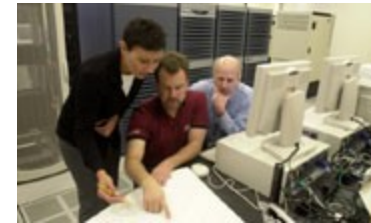


Watching everything hum along

Detect problems before they impact users (ideal!)

Find problems first

Let's focus on monitoring

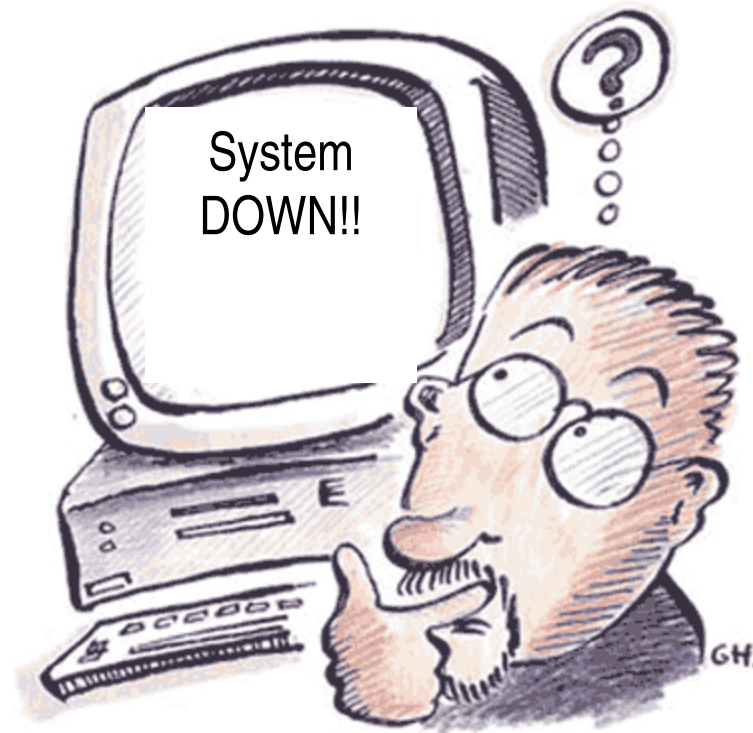


Monitoring is Kewl

With a capital “K”



Use Cases



Use Case 1

Network Error Without Manageability Tools



Root Cause of Headache: T1 link between branch office and corporate data center goes down.

3. 5 sales reps call to complain about e-mail outage
4. You spend half an hour troubleshooting
5. The sales manager rants about your e-mail server being broken.
6. Finally realize the T1 is down and resolve the problem



Use Case 2

Network Error With Manageability Tools



Root Cause of Headache : T1 link between branch office and corporate data center goes down.

3. Management console detects network outage and generates notification
4. You call the ISP and have them fix the error before the sales reps call you

Use Case 3

Dimm Fails Without Manageability Tools



Root Cause of Headache: Dimm on My-SQL server generates parity errors for a week then dies

3. Errors go undetected (who has time to read syslog on every server every day)
4. Dimm finally dies, corrupts the DB, and takes down the system
5. Remove the affected memory and try to restore the DB from the previous night backup



Use Case 4

Dimm Fails With Manageability Tools



Root Cause of Headache: Dimm on My-SQL server generates parity errors for a week then dies

3. Management console detects multiple parity errors in a Dimm and notifies you
4. That evening you schedule down time and replace the memory
5. Corruption is avoided

Use Case 5

Web Server Dies Without Manageability Tools



Root Cause of Headache: /var file system is 100% full which causes Apache to crash

3. Log files fill the /var file system
4. Apache crashes and does not even write an error message
5. You get several calls that the web site is down
6. You finally root case the problem and fix it



Use Case 6

Web Server Dies With Manageability Tools



Root Cause of Headache: /var file system is 100% full which causes Apache to crash

3. Management Console detects /var is 80% full and notifies you
4. You clean up log files etc and Apache does not crash

IPMI
Open

IPMI: Intelligent Peripheral Management Initiative

Intel specification

- Offload platform management from the CPU
- One-size-fits-all definitions of the universe
 - Entities, readings, states, events, logs, ...
 - Interface hardware, protocol, language, ...
- Plus OEM extensions
- www.intel.com/design/servers/ipmi/

Baseboard Management Controller does the work

- Inventory lists
- Configuration and state

BMC: Baseboard Management Controller

“Heart of IPMI”

SDRR: Sensor Data Record Repository

- Sensors
- FRU list
- Entity Associations
- Data as “tokens” and “properties” (OEM extensions)

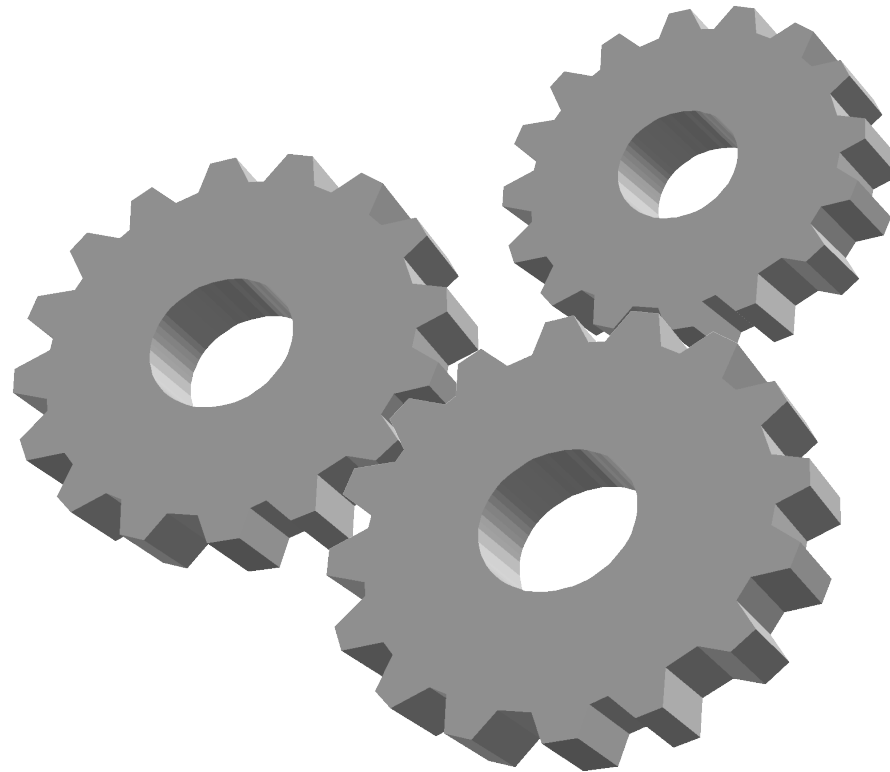
Open IPMI



Open IPMI Driver

- <http://openipmi.sourceforge.net>
- Originally from MontaVista
- Accepted in kernel 2.6.x/2.4.22

Questions, concerns,



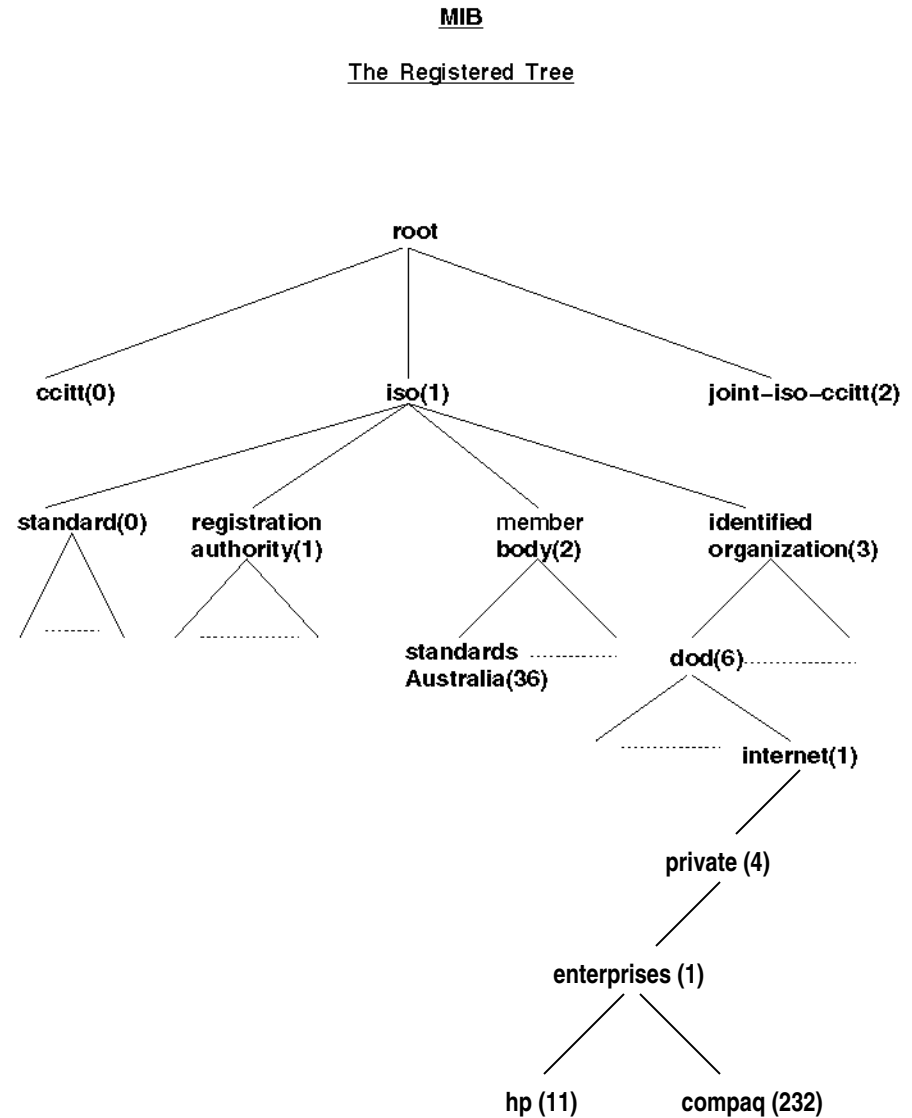
Simple *Network Management Protocol*

Structure of Management Info (SMI)

- Blueprint for managed data
- Tree hierarchy
- Branches assigned by IANA

Management Info Base (MIB)

- “Contract” for managed data
 - What manager may request
 - What agent ought to provide
- Defines actual data items
 - Type, status, accessibility
 - Scalars
 - “Grouping”: table row
 - Abstract Syntax Notation One (ASN.1)



SNMP Stack

<http://net-snmp.sourceforge.net>

Evolved over the years

cmu-snmp

ucd-snmp

net-snmp

Working with SNMP Variables

Command line tools

- snmpget
- snmpset
- snmpwalk

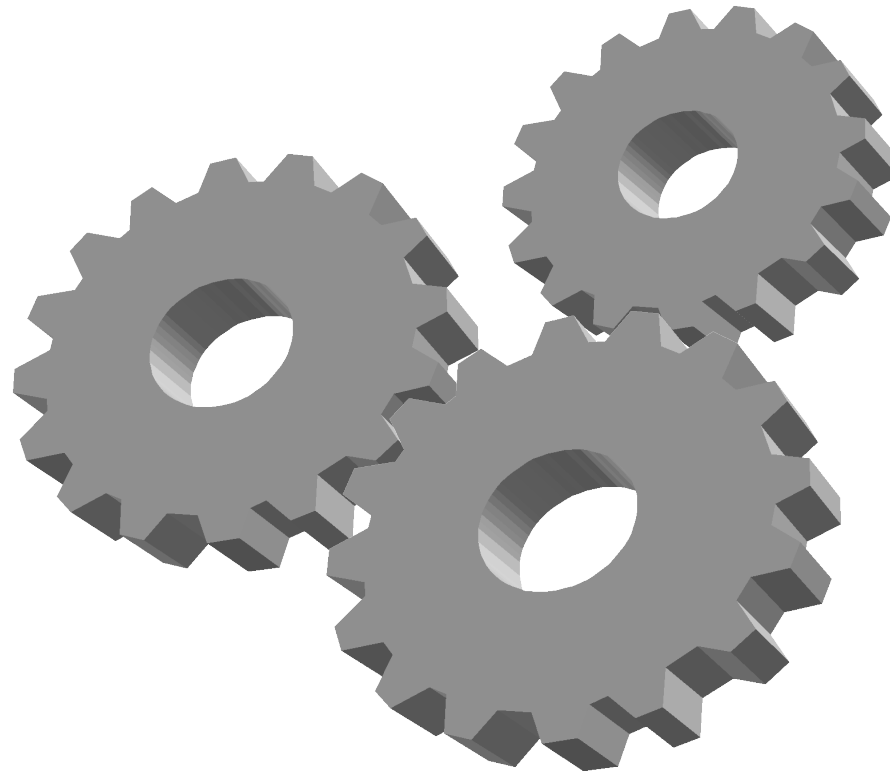
Generic Network Managers

- Nagios, OpenView, Tivoli, CA Unicenter,
 - Have MIB, will travel
- Don't know logical relationship/structure between OIDs
 - SNMP/ASN.1 limitation

Dedicated viewer

- Groups things appropriately
- Displays groupings in a useful manner

Questions, concerns,



SNMP Review

Born	1988 (v1 RFC)
Acceptance	Universal
Life Expectancy	Past Chad's retirement
Data Granularity	Scalar (integer or octet sequence)
Data Grouping	Table row
Data Hierarchy	Not really
Data Declaration/Language	SMI / ASN.1 (collection of "Object Identifiers")
Data "Contract"	MIB
Operations	GET, SET, GETNEXT, TRAP (v1)
Security	Very weak (v1)
Network	PDU encoded with BER over UDP
Managed node	snmpd + agents
Difficulty to extend?	Low to moderate

WBEM: Pronounced “WEB-M”

Web-Based Enterprise Management (WBEM) is a platform and resource-independent standard that defines both a model (description) and protocol (interface) for monitoring and controlling diverse resources from diverse platforms.

www.dmtf.org

Distributed Management Task Force Board Members:

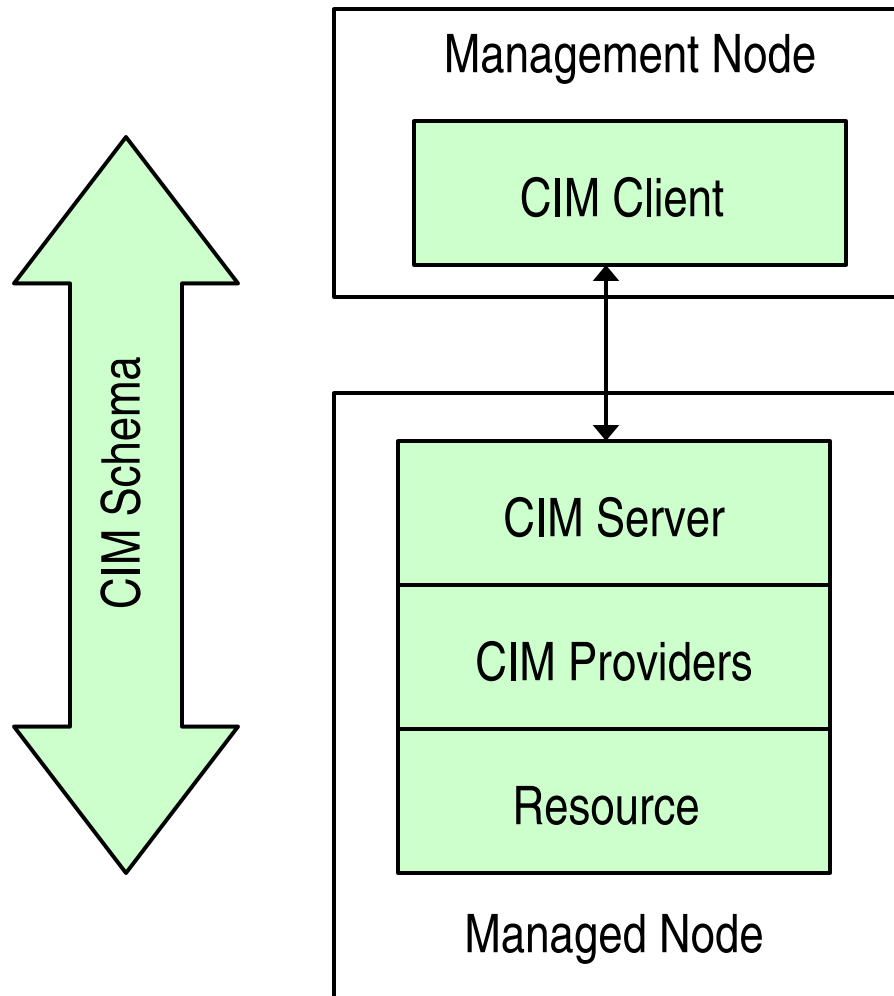
- 3Com, Cisco, Dell, HP, IBM/Tivoli, Intel, Microsoft, NEC, Novell, Oracle, Sun, Symantec, VERITAS

WBEM Data Description

The Common Information Model (CIM) is the DMTF WBEM standard for describing data. It includes:

- The definition of a formal language for describing data, the “CIM Specification”
- A description of the resources to be managed, the “CIM Schema”
 - It’s a big list 😊
- CIM uses a hierarchical, object-oriented architecture for modeling managed resources
- A CIM Schema contains a formal description of
 - Data and its attributes
 - Actions on data

Common Information Model



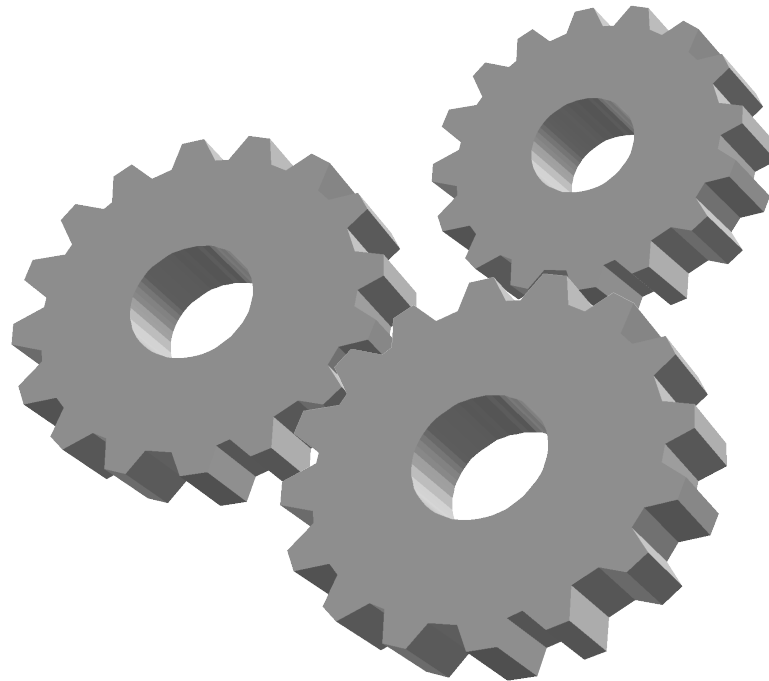
WBEM Compared With SNMP

WBEM

SNMP

	WBEM	SNMP
Born	2001 (Open Pegasus)	1988 (RFC 1157 implemented)
Acceptance	“Gaining”	Universal
Lifetime	Survived its birth	Past Chad’s retirement
Data Granularity	Object	Scalar
Data Grouping	Associations and aggregations	Table row
Data Hierarchy	Object inheritance	Not really
Data Decl/Lan	CIM (schema) / MOF	SMI / ASN.1
Data Contract	MOF File	MIB
Operations	GetClass, EnumerateClasses, EnumerateClassNames, GetInstance, GetProperty, SetProperty, CreateClass, ModifyClass, CreateInstance, Associators, ExecQuery....	GET, SET, GETNEXT, TRAP (v1)
Security	Strong via SSL/https	Very weak (v1)
Network	XML over TCP	PDU over UDP
Managed node	cimserver (CIMOM) + providers	snmpd + agents
Difficult to extend?	Moderate++	Low to moderate

Questions, concerns,



For More information

Email: RandyL@hp.com

The slides will be posted some where. Watch the delegate SPAM list for a link.

Thanks





Miscellaneous Buzzwords

Mgr/Mgmt – Manager / Management

GUI – Graphical User Interface

CLI – Command Line Interface

TUI – Textual User Interface

OSS – Open Source Software

OSD – Open Source Distribution (“distro”)

- RedHat - AS (Advanced Server) and EL (Enterprise Linux)
- SuSE – SLES (SuSE Linux Enterprise Server)
- Debian – Telco

RFC – Request For Comments

- Specifications for Internet standards
- Submission tends to imply running implementation
- www.ietf.org