INTERNET MANAGEMENT
WHERE WE ARE AND WHERE WE GO

PRESENTATION
AT THE HIGH SPEED NETWORKING 2000 WORKSHOP
BALATONFÜRED, HUNGARY
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AIKO PRAS
UNIVERSITY OF TWENTE
THE NETHERLANDS

pras@ctit.utwente.nl
http://wwwwhome.ctit.utwente.nl/~pras
SNMP HISTORY

SGMP

SNMP

SNMP security

SMP

SNMPv2 (parties)

implementation experience

SNMPv2 (community)

SNMPv3

CMOT

HEMS/HEMP

DISTRIBUTED MANAGEMENT

THREE APPROACHES ARE BEING DEFINED

MIB BASED
- EXPRESSION MIB
- EVENT MIB
- NOTIFICATION LOG MIB

SCRIPT BASED
- SCRIPT MIB
- SCHEDULE MIB

REMOTE OPERATIONS BASED
- REMOTE OPERATIONS MIB
EXPRESSION AND EVENT MIB

TOP LEVEL MANAGER

INTERMEDIATE LEVEL MANAGER

AGENT
EXPRESSION AND EVENT MIB: CHARACTERISTICS

• STANDARD MIB APPROACH

• RESEMBLES THE OLD SNMPv2 M2M MIB

EXPRESSION MIB:
• INPUT ARE (WILDCARDED) VARIABLES OF A (LOCAL) MIB
• OPERATES ON ABSOLUTE AS WELL AS DELTA VALUES
  • RICH SET OF EXPRESSIONS
• THE OUTPUT IS STORED IN THE VALUE TABLE
• THIS TABLE MAY SERVE AS INPUT FOR OTHER EXPRESSIONS

EVENT MIB:
• INPUT ARE VARIABLES OF A (REMOTE) MIB
• TRIGGERS ON CHANGES, OR TRESHOLD CROSSING
• GENERATES A NOTIFICATION OR SET OPERATION
SCRIPT MIB

TOP LEVEL MANAGER

INTERMEDIATE LEVEL MANAGER

RUNTIME ENVIRONMENT

SNMP

HTTP

SCRIPT MIB

SCRIPT REPOSITORY

AGENTS

A A A A A A
SCRIPT MIB: CHARACTERISTICS

- FUNCTIONALITY CAN BE DEFINED AT RUN-TIME

- POWERFUL AUTONOMOUS ACTIONS

- MAY BE EASIER TO OPERATE FOR THE TOP-LEVEL MANAGER

- PROTECTION MECHANISMS NECESSARY

- DIFFERENT SCRIPT LANGUAGES
REMOTE OPERATIONS MIB

PING MIB
• TO PERFORM PING FROM A REMOTE HOST

TRACEROUTE MIB
• TO PERFORM TRACEROUTE FROM A REMOTE HOST

NAME LOOKUP MIB
• TO PERFORM NAME LOOKUP FROM A REMOTE HOST
EXTENSIBLE AGENTS

SUB AGENT

MIB

API

SUB AGENT

MIB

API

SUB AGENT

MIB

API

MASTER AGENT

- PROTOCOL OPERATIONS
- ENCODING

TRANSPORT
HISTORY

SMUX (1991: RFC 1227)
SNMP MULTIPLEXING PROTOCOL

DISTRIBUTED PROTOCOL INTERFACE

RESEARCH PROTOTYPES
FOR EXAMPLE: UNIVERSITY OF TWENTE - UT-SNMPv2

COMMERCIAL PRODUCTS
FOR EXAMPLE: SNMP RESEARCH - EMANATE
(ENHANCED MANAGEMENT AGENT THROUGH EXTENSIONS)

POLICY BASED MANAGEMENT

- BANDWIDTH BROKER
  - LDAP?
  - COPS? / SNMP?

- PDP
  - POLICY DECISION POINT
  - LDAP?
  - COPS? / SNMP?

- PEP
  - ROUTER

- POLICY REPOSITORY
COPS VERSUS SNMP

COPS:
• SPECIAL CASE OF CONFIGURATION MANAGEMENT
• HIGHER LEVEL OBJECTS THAN USUAL WITH SNMP
  • POLICY INFORMATION BASE (PIB)
• SINGLE OPERATION TO ADD OR DELETE TABLE ROWS
• RELIABLE COMMUNICATION BETWEEN PDP AND PEP (BECAUSE OF TCP)
  • EACH PEP IS CONNECTED TO SINGLE PDP

SNMP:
• INTEGRATED APPROACH TO MANAGEMENT
• POLICIES CAN BE DEFINED WITHIN MIBs
• EACH PEP MAY BE CONNECTED TO MULTIPLE PDPs
EFFICIENT TRANSFER OF BULK MANAGEMENT DATA

- SNMP OVER TCP
- COMPRESSION
- GET-SUBTREE OPERATOR

SMI NEXT GENERATION

- INDEPENDENT FROM OTHER EXTERNAL STANDARDS
- BASED ON AUGMENTED BNF
  - MORE DATA TYPES
  - EASIER TO PARSE

ACTIVE MANAGEMENT

- ALLOW MANAGEMENT FUNCTIONS WITHIN MIBs
  - CAN BE INTEGRATED WITH SMIv2
  - CAN BE USED OVER SNMP OR COPS
  - POWERFUL NEW IDEA!
FURTHER INFO: WWW SERVERS

- IETF
  http://www.ietf.org/

- IRTF
  http://www.irtf.org/

- The SimpleWeb
  http://www.simpleweb.org/

- The Simple Times
  http://www.simple-times.org/