

Announcements

- Project #5 extended until Dec. 10
- Reading: 7.3, start 7.4
- Midterm #2 last day to request re-grades Th in class
- HW#2 (due Tuesday Dec. 7)

Simple Network Management Protocol (SNMP)

- **Managed Nodes**

- things that can be configured or administered via SNMP
- includes most computers, routers, bridges, network printers

- **Management Stations**

- computers running the SNMP management software
- this is where the configuration of managed nodes is done

- **Management Information Base (MIB)**

- all possible data about all managed devices
- each device type has a defined set of data it should maintain

- **Management Protocol**

- what to send over the wire and how to authenticate it
- proxy agent: third part to speak SNMP for dumb devices
- traps: events sent to management stations from nodes

The SNMP MIB

- Divided into 10 parts
 - System: device names, manufacturer, model, serial #, etc.
 - Interfaces: network adapters
 - keeps packet, byte, broadcast, and queue size info
 - AT: deleted in SNMPv2
 - ICMP: counts of errors
 - IP: stats about the IP protocol
 - TCP: stats about current and past TCP connections
 - UDP: stats about UDP packets
 - EGP: exterior gateway protocol
 - Media Specific: Ethernet stats, ATM stats, etc.
 - SNMP: stats about SNMP itself

SNMP Protocol

- Six Message Types (plus a response)
 - Get-request: read one or more variables
 - Get-next-request: Request variable following this one
 - Get-bulk-request: Fetch a big table
 - Set-request: Updates one or more variables
 - Inform-request: management-to-manager requests
 - indicates what variables the manager is managing
 - SnmpV2-trap: agent to manager trap request

Email

- **Dominate Email is RFC821/822**

- X.400 and Lotus notes are also rans for standards

- **Basic components**

- message: the actual thing sent
- mailbox: place where email is stored (may be a file or a directory)
 - identified by a unique name
 - user@dnhost is the standard format
- transfer agent: something that sends email
 - usually speaks SMTP
 - under UNIX is a program called sendmail
- user agent
 - program for reading and generating mail
 - can be remote: use POP, IMAP, or DMSP to talk to mailbox
- alias
 - a virtual mailbox that maps to one or more real mailboxes
 - may also be a program to handle the inbound mail

Message Envelop Format

- Information associated with mail delivery
- Destination:
 - To: email address of primary recipient
 - Cc: email address of secondary recipients
 - Bcc: address for blind carbon copies
- Origination
 - From: person who created message
 - Sender: email address of actual sender
- In transit
 - Received: added by each MTA along the way
 - Return-Path: added by destination
- Misc Fields
 - Info: Date, Subject, Keyword
 - Handling: Message-id, Reply-To In-Reply-To, References

Message Body

- Under RFC822
 - raw ascii text with no semantic meaning
- MIME: Multipurpose Internet Mail Extension
 - provides an interface to send non-ascii text in mail
 - envelop not changed, so only user agents need to be modified
 - supports multiple languages
 - supports multi-media and file attachments
 - headers:
 - MIME-Version
 - Content-Description: human readable description
 - Content-Id: unique id for this part of the message
 - Content-Transfer-Encoding:
 - text: ascii, and 8bit characters
 - binary: may not get there since it is a non-conforming body
 - base64: 26 binary bits-> 4 ascii characters
 - quoted printable: only use base64 for “special” characters
 - Content-Type: what is this

Mime Types

- There is a standard set of type (these are from RFC1521)
 - text/plain
 - text/richtext: based on SGML and similar to HTML
 - image/gif
 - image/jpeg
 - audio/basic
 - video/mpeg
 - application/octet-stream: no semantic meaning
 - application/postscript: Postscript printer files
 - message/rfc822: a full email message with envelop
 - message/partial: part of a multi-message message
 - message/external-body
 - multipart/mixed
 - multipart/alternative: alternative formats for a body (text, postscript)
 - multipart/parallel: all parts must be viewed together
 - multipart/digest: collection of messages (sort of an array type)

Transferring Messages

- SMTP Agents listen on TCP port 25
- Protocol consists of a series of 4 character commands
 - HELO: exchange identity
 - MAIL FROM: indicate origin of mail
 - RCPT TO: destination for mail
 - DATA: start of mail message (envelop and body)
 - QUIT: end of mail message
- Email gateways
 - Still many other mail systems out there
 - may use other formats
 - May want only a limited number of “public” mail servers
 - provides application level firewalls
 - hides interior topology of network