Mail Servers

System Administration Decal
Lecture #6
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April 9, 2008

Last time...

- Linux kernel and its modules
- Who works on the kernel
- How to build the kernel using 'menuconfig'
- No homework, because my hard disk died with my almost complete lab and I just said 'screw it.'
- Did you all do project proposals?

Today

- How do email servers send and receive mail?
- How can you interact with mail from the command line?
- How many ways can you receive your mail after the mail server stores it on disk?
- How do you know what server to contact when you want to deliver mail to "gmail.com"?
- Note: All final projects have to include a functional mail setup.

Terminology

- Mail transfer agents (MTAs) actually **send** and **receive** mail by talking to each other with SMTP.
- Mail servers using protocols such as IMAP and POP3 allow you to **read** messages over the network.
- As you can see, these two are orthogonal

SMTP

- "Simple Message Transfer Protocol": protocol for server-to-server mail delivery connections
- It's been around since the late 1970s and has since been heavily extended - basic behavior is still the same

SMTP

- Sending a message involves telling the receiving mail server...
  - what your domain name is (e.g. example.com)
  - who you are sending the message to
  - the contents of your message

MX Records

- But how do you know what server to talk to in the first place to deliver the message?
- This is where DNS comes into play
- When you look up a domain's IP address, you use DNS to find the "A" record for the domain
- When you want to send mail to a domain, you use DNS to find the "MX" (Mail eXchange) record for the domain

IMAP and POP3

- "Internet Mail Access Protocol" and "Post Office Protocol"
- IMAP lets you browse and organize your mail **server-side**
- POP3 is simpler and just spits out the messages for you, and you read them **client-side**

The Life of an E-mail

- Albert opens Thunderbird to send a message to Betty
- The message is redacted and sent off.
- Albert's client opens a connection to his ISP's mail server, `smtp.awesome.com`...

SMTP: Albert to ISP

```
220 smtp.awesome.com Welcome
HELO alberts-box
250 Why hello there
MAIL FROM:<albert@awesome.com>
250 OK
RCPT TO:<betty@brilliant.com>
250 OK
DATA
354 Terminate data with '.'
From: albert@awesome.com
Subject: Dinner

Hey, let's do dinner tonight.
-Albert
.
250 OK queued as FFDC3387
QUIT
221 See ya
```

Server greeting
Client greeting
Acknowledgement
Sender command

Recipient command

Start of message
Acknowledgement of start
Message body + headers

Acknowledgement of end

Quit message

Finding the MX record

- smtp.awesome.com now has Albert's message, and needs to figure out how to relay mail to brilliant.com
- brilliant.com DNS records:

```
brilliant.com IN A 1.2.3.4
brilliant.com IN MX 10 smtp.brilliant.com
```

- Now smtp.awesome.com has to look up smtp.brilliant.com's A record to connect

```
smtp.brilliant.com IN A 1.2.3.5
```

SMTP: ISP to Betty ISP

```
220 brilliant.com Bienvenue
HELO smtp.awesome.com
250 Bonjour
MAIL FROM:<albert@awesome.com>
250 Oui
RCPT TO:<betty@brilliant.com>
250 Oui
DATA
354 Termine le message avec '.'
From: albert@awesome.com
Received: from 1.2.3.4 by
smtp.awesome.com
Subject: Dinner

Hey, let's do dinner tonight.
-Albert
.
250 OK message no. C2D344F1
QUIT
221 a tout a l'heure
```

Server greeting
Client greeting
Acknowledgement
Sender command

Recipient command

Start of message
Acknowledgement of start

Extra header denoting the 'relay path'

Acknowledgement of end

Quit message

The Life of an E-mail

- Now the message is safely stored on brilliant.com's mail servers.
- Betty gets home from work and opens Apple Mail, which uses IMAP to access her inbox.
- She reads the message!

Reading Mail, Unix Style

- Of course, there's a rich history of text-based mail clients from before GUIs existed
- Pine is the most well-known one and is famously known to be a piece of shit.
- Mutt is the most popular text-based email client these days, highly customizable.
- All use /usr/sbin/sendmail to interact with mail server