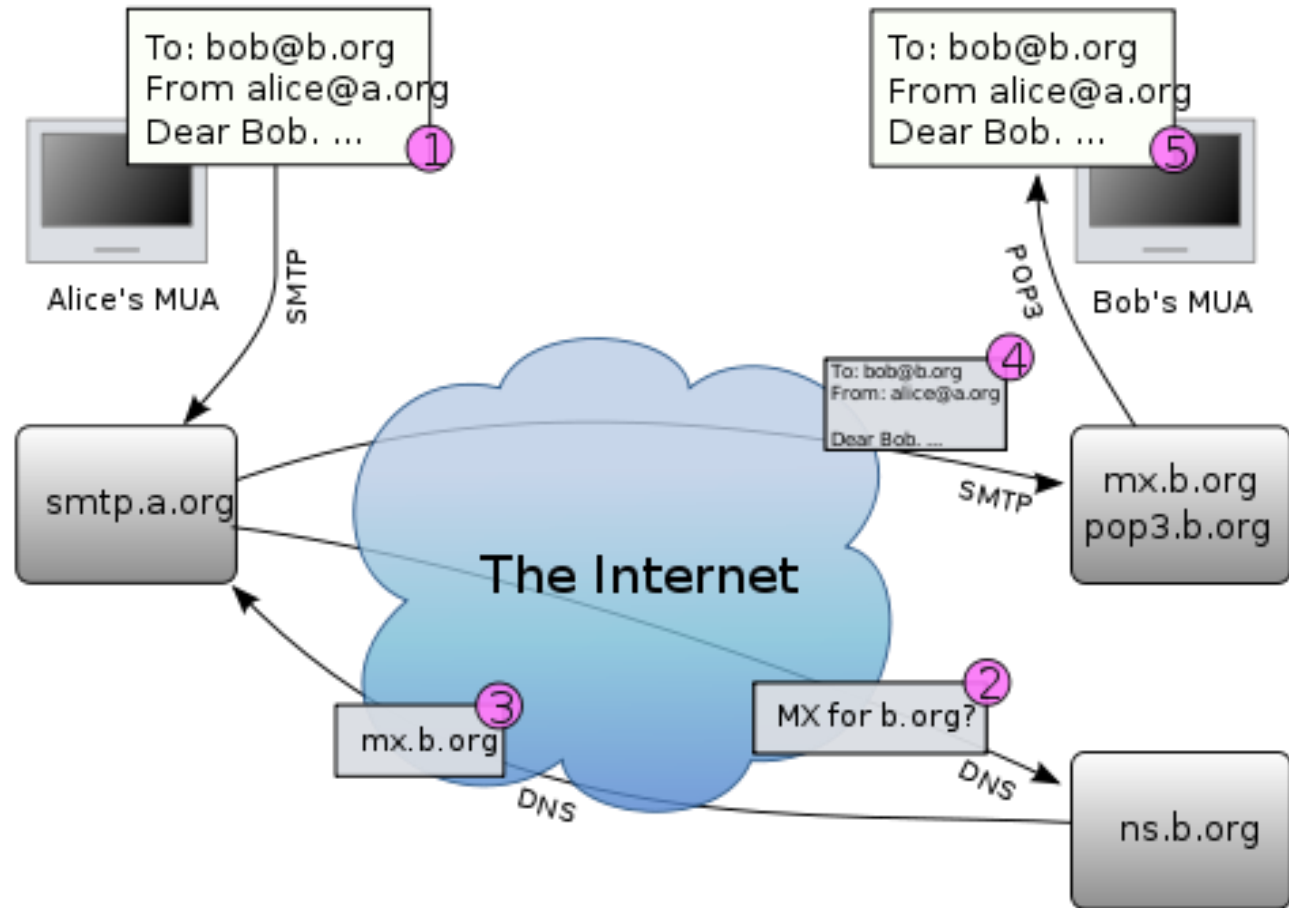


Electronic Mail (e-mail): Protocols

Kameswari Chebrolu

Architecture

- Sending mails is a PUSH operation
 - SMTP protocol
- Receiving mails is a PULL operation
 - POP3, IMAP, HTTP



Simple Mail Transfer Protocol (SMTP)

- Uses TCP to reliably transfer email messages
- Operates on port 25
- Three phases of transfer based on command (ASCII text) / response (status code and phrase)
 - Handshaking (greeting)
 - Transfer of messages (many messages can be sent on a given connection)
 - Close connection

Example

```
kameswari@asterix: ~  
kameswari@asterix:~$ telnet surya.cse.iitb.ac.in 25  
Trying 10.105.1.14...  
Connected to surya.cse.iitb.ac.in.  
Escape character is '^]'.  
220 ;; ESMTP connection timed out; no servers could be reached Sendmail 8.13.8/8.13.8/De  
bian-3; Tue, 5 Nov 2013 01:20:21 +0530; (No UCE/UBE) logging access from: [10.129.133.15  
1](FAIL)-[10.129.133.151]  
HELO PM.IN  
250 ;; connection timed out; no servers could be reached Hello [10.129.133.151], pleased  
to meet you  
MAIL FROM: <pm@india.org>  
250 2.1.0 <pm@india.org>... Sender ok  
RCPT TO: <chebrolu@cse.iitb.ac.in>  
250 2.1.5 <chebrolu@cse.iitb.ac.in>... Recipient ok  
RCPT TO: <kameswari@gmail.com>  
250 2.1.5 <kameswari@gmail.com>... Recipient ok  
DATA  
354 Enter mail, end with "." on a line by itself  
Please vote for me in the upcoming elections!  
.  
250 2.0.0 rA4JoLSH003005 Message accepted for delivery  
QUIT  
221 2.0.0 ;; connection timed out; no servers could be reached closing connection  
Connection closed by foreign host.
```

Mail Access Protocols

- Message waiting in receiver's mailbox at the receiver's mail server
- Originally, user's logged on to the mail server and execute mail reader on it
 - Mailer reader on local client provides richer set of features (offline viewing, GUI, multimedia attachments)
- Need retrieval protocols: POP3, IMAP and HTTP

Post Office Protocol – V3 (POP3)

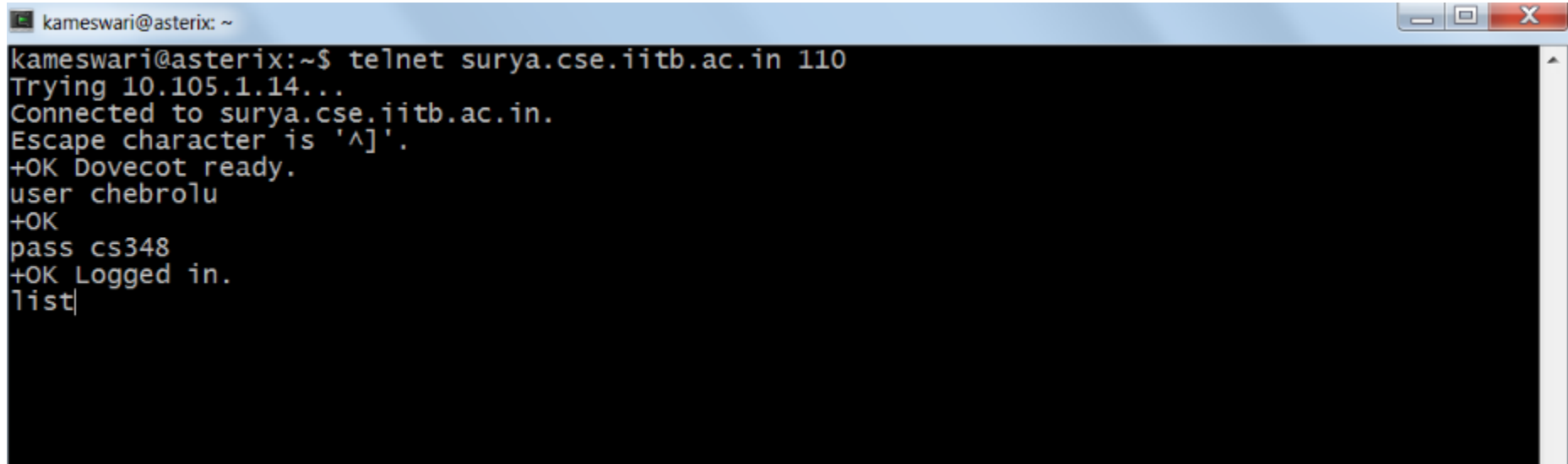
- Very simple protocol (RFC 1939), limited functionality
- Typical usage: emails retrieved, stored (at User's PC) and read offline *"delete"*
- Does not maintain state across sessions
- Uses TCP and operates on port 110

Post Office Protocol – V3 (POP3)

- Three Phases:
 - Authorization: Authentication of user via username /passwd
 - Transaction: retrieve messages, mark deletions, obtain mail statistics
 - Update: After quit, server deletes marked emails
- Disadvantage: Poor support for remote multi-machine access



Example



```
kameswari@asterix: ~  
kameswari@asterix:~$ telnet surya.cse.iitb.ac.in 110  
Trying 10.105.1.14...  
Connected to surya.cse.iitb.ac.in.  
Escape character is '^]'.  
+OK Dovecot ready.  
user chebrolu  
+OK  
pass cs348  
+OK Logged in.  
list
```


2444 49872
2445 7065
2446 8930
2447 13619
2448 9440
2449 7335
2450 7585
2451 447
2452 7365
2453 750736

.
retr 2451

+OK 447 octets

Return-Path: <pm@india.org>

Received: from PM.IN ([10.129.133.151])

by ;; connection timed out; no servers could be reached (8.13.8/8.13.8/Debian-3) with S
MTP id rA67Ycqo029559;

Wed, 6 Nov 2013 13:07:57 +0530

Date: Wed, 6 Nov 2013 13:04:38 +0530

From: pm@india.org

Message-Id: <201311060737.rA67Ycqo029559@;; connection timed out; no servers could be reached>

To: undisclosed-recipients;;

Please vote for me in the upcoming election!

.
dele 2450

+OK Marked to be deleted.

quit

+OK Logging out, messages deleted.

Connection closed by foreign host.

kameswari@asterix:~\$

IMAP (RFC 3501)

- Provides more complete and complex remote mailbox access
POP3 - retrieve mails
IMAP - mails ^{manage} on mail server
- Emails organized in multiple folders (mailboxes) on server
- IMAP keeps user state across sessions
 - E.g. Names of folders and mappings between message IDs and folder name
- IMAP servers listen on port 143; IMAP over SSL (IMAPS) assigned port 993

IMAP Features

- IMAP clients stay connected, results in faster response time
- Permits multiple email clients (same user but different readers) to simultaneously connect to the mailbox
- Permits partial fetch (e.g. text, no attachments)

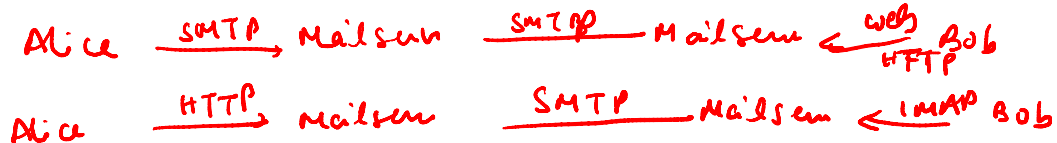
↳ low BW

IMAP Features

- Keeps track of message status (read, replied to, marked for deletion etc)
- Permits server-side searches (e.g. search for messages with subject line “networks”)

Web Access

- Hotmail introduced web-based access in mid 1990s
- Service also provided by Google, Yahoo etc
- User agent is a web-browser and interacts with mailserver via HTTP (as opposed to using SMTP or POP3/IMAP)
 - Mail servers still use SMTP to talk with each other



Summary

- Email is a very widely used application
- Needs two protocols: mail transfer (SMTP) and mail access (POP3, IMAP)
- SMTP: ASCII based involving three phases
- IMAP/Web Access provide more features than POP3