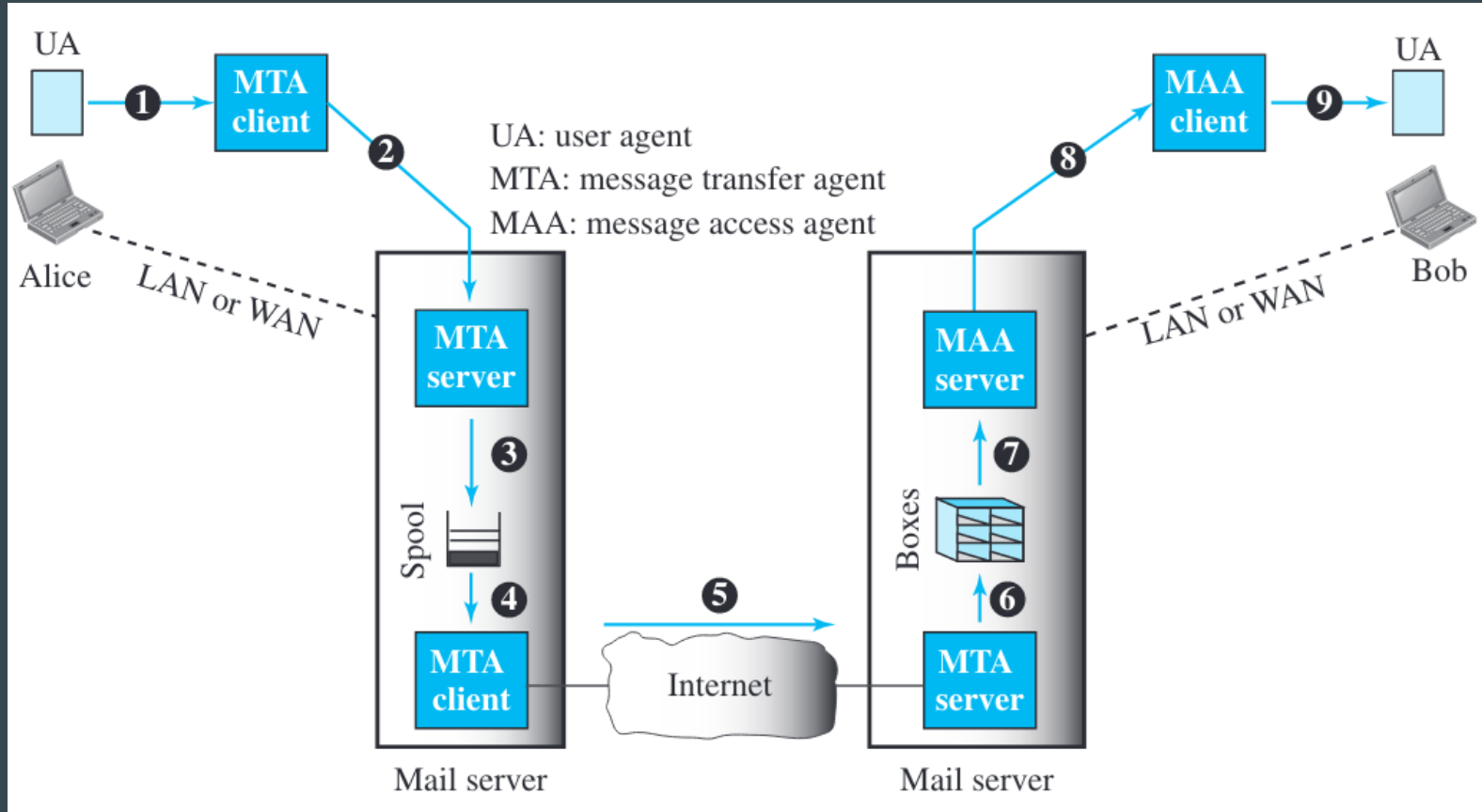


Multipurpose Internet Mail Extension (MIME) Protocol

...

Electronic Mail - Overview



The Three Agents at play

User Agent

Software program to compose and read emails

Interfaces the end-user with the inner emailing agents

- MTA for sender
- MAA for receiver

Encapsulates messages into

- Envelope
- Body (Header + Message)

Eg: Gmail, Mutt

Message Transfer

Push messages from client to server

Client triggered

SMTP (Simple MTP) is the most predominant. Others - LMTP (Local MTP)

Command-Response format of communication

Message Access Agent

Pull messages from the server to client

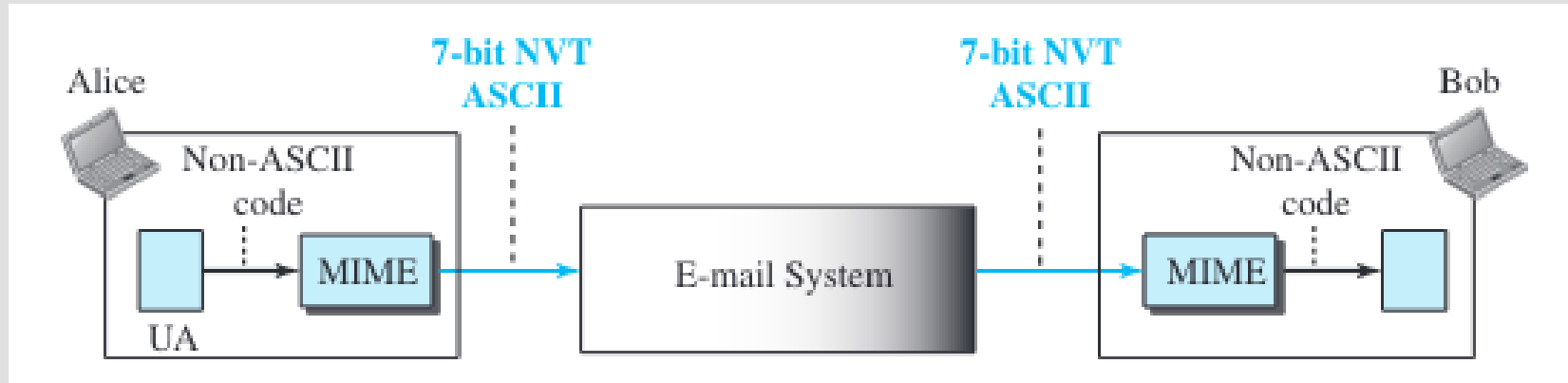
Client triggered

- POPv3 (Post Office)
- IMAPv4 (Internet Mail Access)

User's UA subscribes and fetches emails from the user's authenticated mailbox

Typical Workflow

1. Alice uses her UA to compose an email.
Now available with the first MTA client
 2. The MTA client pushes the email to **her** MTA server (mail-server)
 3. The MTA server spools the messages to be sent over the internet
 4. The second MTA client is activated based on spool status. Fetches messages from the spool
 5. Connect to the second MTA server, **push** the messages over the internet
 6. The second MTA server assorts the messages into respective mailboxes
-
9. Bob **logs-in** to his UA and loads his inbox
 8. Bob's MAA client (triggered by the UA) requests the MAA server
 7. The MAA server **pulls** Bob's emails from **his mailbox**



MIME: A Supplementary Protocol Interconverting Non-ASCII and ASCII data

The Need for MIME

The **email system** only supports NVT 7-bit ASCII characters in messages

Need support for:

- Other languages
- Multimedia content
- Non-text file formats

Solution: Use a protocol to translate any data into and out-of NVT 7-bit

Works with the User-Agent of the email system on both ends

MIME Headers

Included in the email's **header section**

Sender-MIME defines the transformation parameters and translates the message

Receiver-MIME decodes the message following the parameters

MIME-Version

Content-Type

Type of data contained in the message body

Content-Transfer-Encoding

Method used to encode the message into binary

Content-ID

A header to uniquely identify a message block

Content-Description

Additional human-readable information about the message data

The Content-Type header

Type	Subtype	Description
Text	Plain	Unformatted
	HTML	HTML format (see Appendix C)
Multipart	Mixed	Body contains ordered parts of different data types
	Parallel	Same as above, but no order
	Digest	Similar to Mixed, but the default is message/RFC822
	Alternative	Parts are different versions of the same message
Message	RFC822	Body is an encapsulated message
	Partial	Body is a fragment of a bigger message
	External-Body	Body is a reference to another message
Image	JPEG	Image is in JPEG format
	GIF	Image is in GIF format
Video	MPEG	Video is in MPEG format
Audio	Basic	Single channel encoding of voice at 8 KHz
Application	PostScript	Adobe PostScript
	Octet-stream	General binary data (eight-bit bytes)

Syntax

Content-Type: <type>/<subtype>; <parameters>

Example

Content-Type: text/plain; charset="UTF-8"

Parameter

<i>Type</i>	<i>Description</i>
7-bit	NVT ASCII characters with each line less than 1000 characters
8-bit	Non-ASCII characters with each line less than 1000 characters
Binary	Non-ASCII characters with unlimited-length lines
Base64	6-bit blocks of data encoded into 8-bit ASCII characters
Quoted-printable	Non-ASCII characters encoded as an equal sign plus an ASCII code

The Content-Transfer-Encoding header

Syntax

Content-Transfer-Encoding: <type>

Example

Content-Transfer-Encoding: base64

Two Notable Transfer-Encoding Schemes

1. Base64

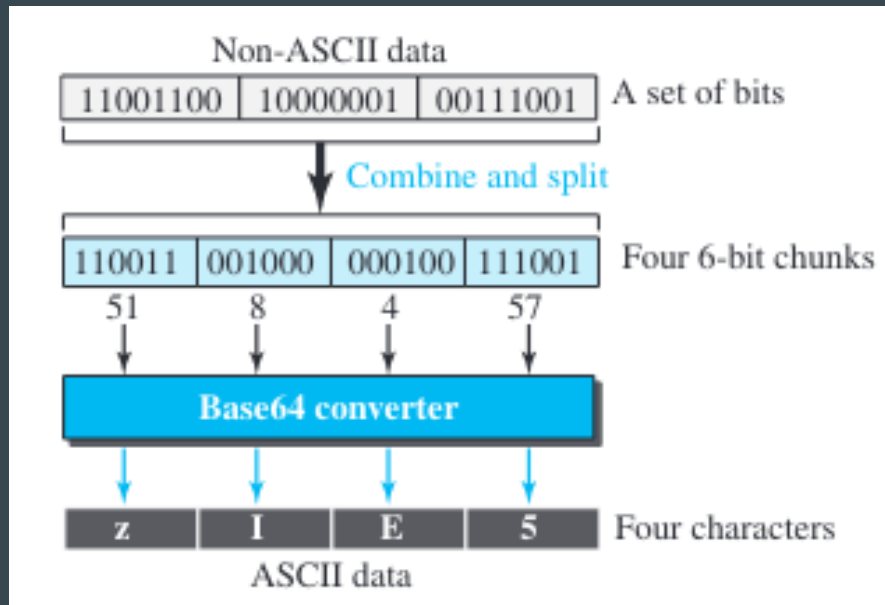
Divide the string of data bits into 6-bit chunks

2^6 possible combinations (within the ASCII range of 2^7)

Represent each chunk as an ASCII character:

- 0 - 25 \Rightarrow A - Z
- 26 - 51 \Rightarrow a - z
- 52 - 61 \Rightarrow 0 - 9
- 62 \Rightarrow +
- 63 \Rightarrow -

Redundant scheme with a possible 25% overhead



Two Notable Transfer-Encoding Schemes

2. Quoted-Printable

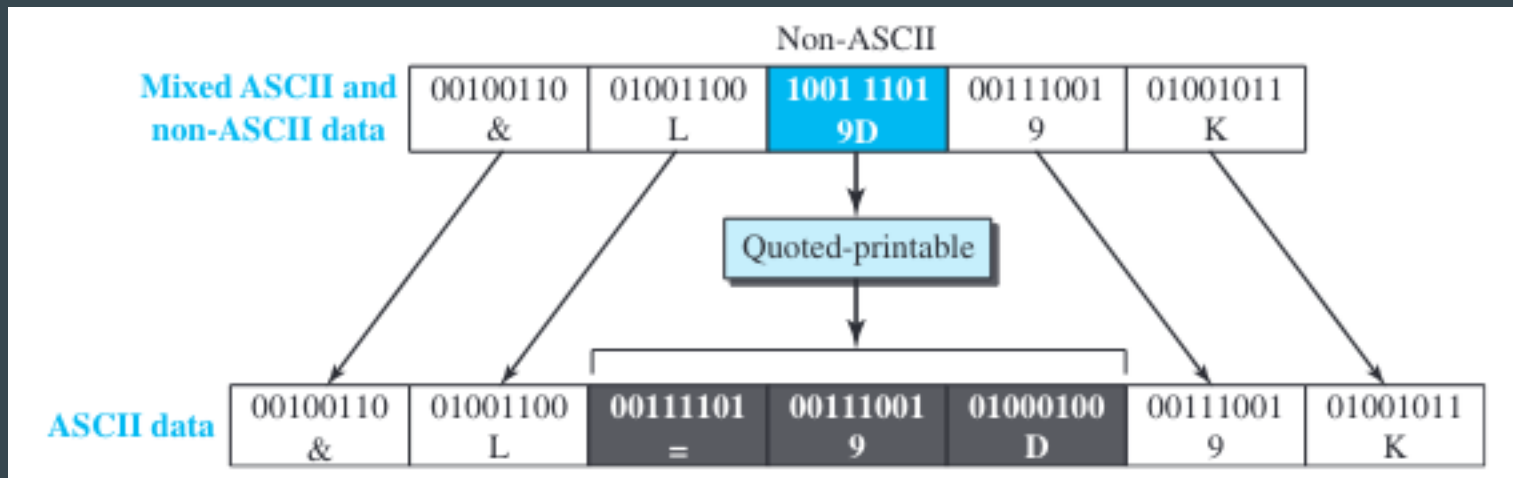
Divide the string of data bits into 8-bit chunks

If ASCII character (MSB = 0),

- Send a single ASCII character (same)

If non-ASCII character (MSB = 1),

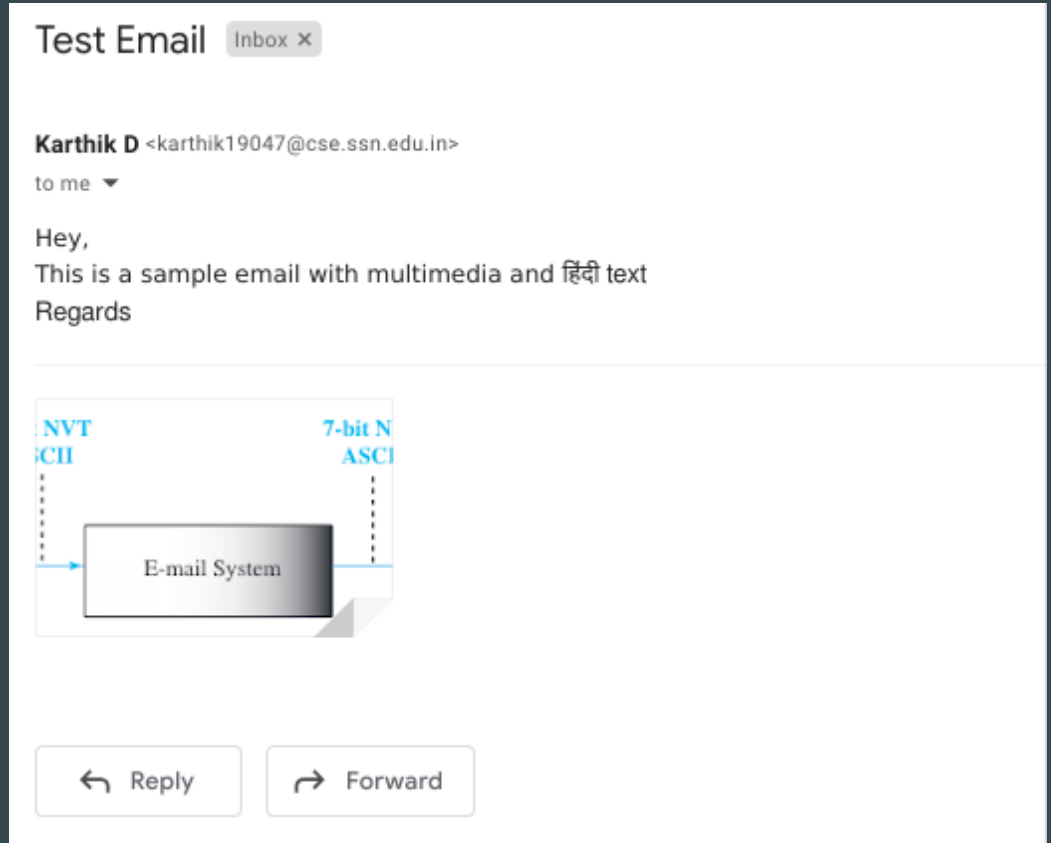
- Get HEX representation of chunk, say XY
- Construct 3 new chunks — '=', X and Y
- Send =XY in place of the non-ASCII character



An Example

The body contains:

- Some ASCII text
- Some Non-ASCII **Hindi** text
- An image attachment in .png



MIME-Version: 1.0
Date: Wed, 27 Oct 2021 14:09:59 +0530
Message-ID: <CAD6WHK3lyAdM_C=2WoEB5VD2QSn5rpW3saHC0+EUgKcQBddkkw@mail.gmail.com>
Subject: Test Email
From: Karthik D <karthik19047@cse.ssn.edu.in>
To: Karthik D <karthik19047@cse.ssn.edu.in>
Content-Type: multipart/mixed; boundary="0000000000001a7e9f05cf4fcb0f"

--0000000000001a7e9f05cf4fcb0f
Content-Type: multipart/alternative; boundary="0000000000001a7e9f05cf4fcb0d"

--0000000000001a7e9f05cf4fcb0d
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: base64

SGV5LA0KVGhpcyBpcyBhIHh0bXBsZSB1bWVpYCB3aXR0IG11bHRpbWVkaWYyW5kIOCKueCkv+Ck
guCkpuClgCB0ZXh0DQpSZWdhcmRzDQo=

--0000000000001a7e9f05cf4fcb0d
Content-Type: text/html; charset="UTF-8"
Content-Transfer-Encoding: quoted-printable

<div dir=3D"ltr"><div class=3D"gmail_default" style=3D"font-family:trebuche=
t ms,sans-serif;font-size:small"><div class=3D"gmail_default" style=3D"font=
-family:trebuchet ms,sans-serif;font-size:small">Hey,</div><div class=3D"gm=
ail_default" style=3D"font-family:trebuchet ms,sans-serif;font-size:small">=
This is a sample email with multimedia and =E0=A4=B9=E0=
=A4=BF=E0=A4=82=E0=A4=A6=E0=A5=80 text</div><div class=3D"gmail defa=
ult" style=3D"font-family:trebuchet ms,sans-serif;font-size:small"><span la=
ng=3D"hi">Regards</div></div>

--0000000000001a7e9f05cf4fcb0d--
--0000000000001a7e9f05cf4fcb0f
Content-Type: image/png; name="P1.2.png"
Content-Disposition: attachment; filename="P1.2.png"
Content-Transfer-Encoding: base64
X-Attachment-Id: f_kv957wow0
Content-ID: <f_kv957wow0>

--0000000000001a7e9f05cf4fcb0f--

An Example

Whole Message
multipart/mixed type

Two sections of the body
Parts of the multipart portion

1. multipart/alternative
2. image/png

Two sections of the
alternative portion

1. text/plain
2. text/html

Thank You