Traditional applications

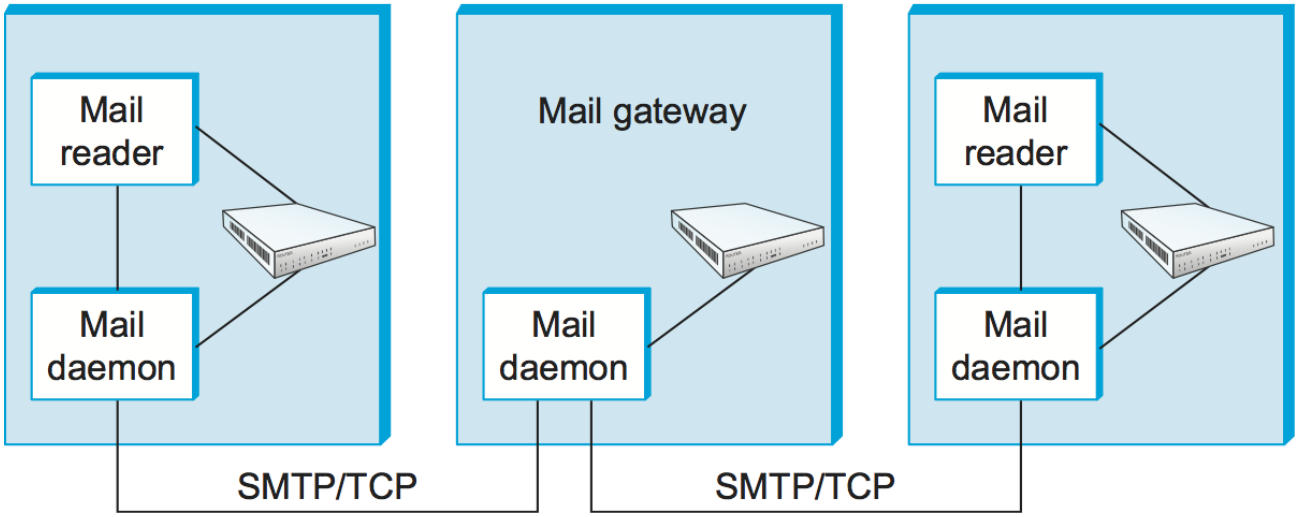
- Simple Mail Transfer Protocol (SMTP) is used to exchange electronic mail.
- HyperText Transport Protocol (HTTP) is used to communicate between web browsers and web servers.
- Many application layer protocols, including HTTP and SMTP, have a companion protocol that specifies the format of the data that can be exchanged.
- This is one reason WHY these protocols are relatively simple: Much of the complexity is managed in this companion standard.
- For example, SMTP is a protocol for exchanging electronic mail messages, but RFC 822 and Multipurpose Internet Mail Extensions (MIME) define the format of email messages. Similarly, HTTP is a protocol for fetching Web pages, but HyperText Markup Language (HTML) is a companion specification that defines the basic form of those pages.
- Finally, since the application protocols described in this section follow the same request/reply communication pattern, you might expect that they would be built on top of a Remote Procedure Call (RPC) transport protocol.
- This is not the case, however, as they are instead implemented on top of TCP. In effect, each protocol reinvents a simple RPC-like mechanism on top of a reliable transport protocol (TCP).
- We say "simple" because each protocol is not designed to support arbitrary remote procedure calls of the sort discussed in an earlier chapter, but is instead designed to send and respond to a specific set of request messages.
- Interestingly, the approach taken by HTTP has proven quite powerful, which has led to it being adopted widely by the *Web Services* architecture, with general RPC mechanisms built *on top of HTTP* rather than the other way around. More on this topic at the end of this section.

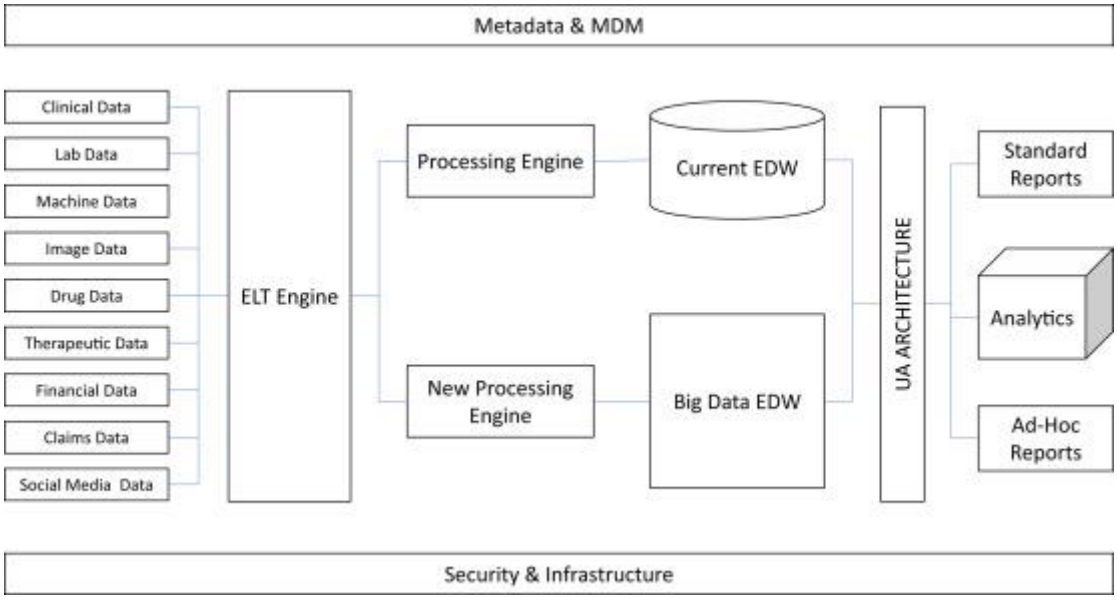
Electronic Mail (SMTP, MIME, IMAP)

As noted above, it is important (1) to distinguish the user interface (i.e., your mail reader) from the underlying message transfer protocols (such as SMTP or IMAP), and (2) to distinguish between this transfer protocol and a companion standard (RFC 822 and MIME) that defines the format of the messages being exchanged. We start by looking at the message format.

Message Format

RFC 822 defines messages to have two parts: a *header* and a *body*. Both parts are represented in ASCII text. Originally, the body was assumed to be simple text. This is still the case, although RFC 822 has been augmented by MIME to allow the message body to carry all sorts of data. This data is still represented as ASCII text, but because it may be an encoded version of, say, a JPEG image, it's not necessarily readable by human users. More on MIME in a moment.


Mail reader
Mail daemon
Mail gateway
Mail daemon
Mail reader
Mail daemon
SMTP/TCP
SMTP/TCP


Metadata & MDM
Clinical Data
Lab Data
Machine Data
Image Data
Drug Data
Therapeutic Data
Financial Data
Claims Data
Social Media Data
ELT Engine
Processing Engine
New Processing Engine
Current EDW
Big Data EDW
UA ARCHITECTURE
Standard Reports
Analytics
Ad-Hoc Reports
Security & Infrastructure