Introduction to SMTP

RES, Lecture 4

Olivier Liechti

heig-vd

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D'INGÉNIERIE ET DE GESTION
DU CANTON DE VAUD

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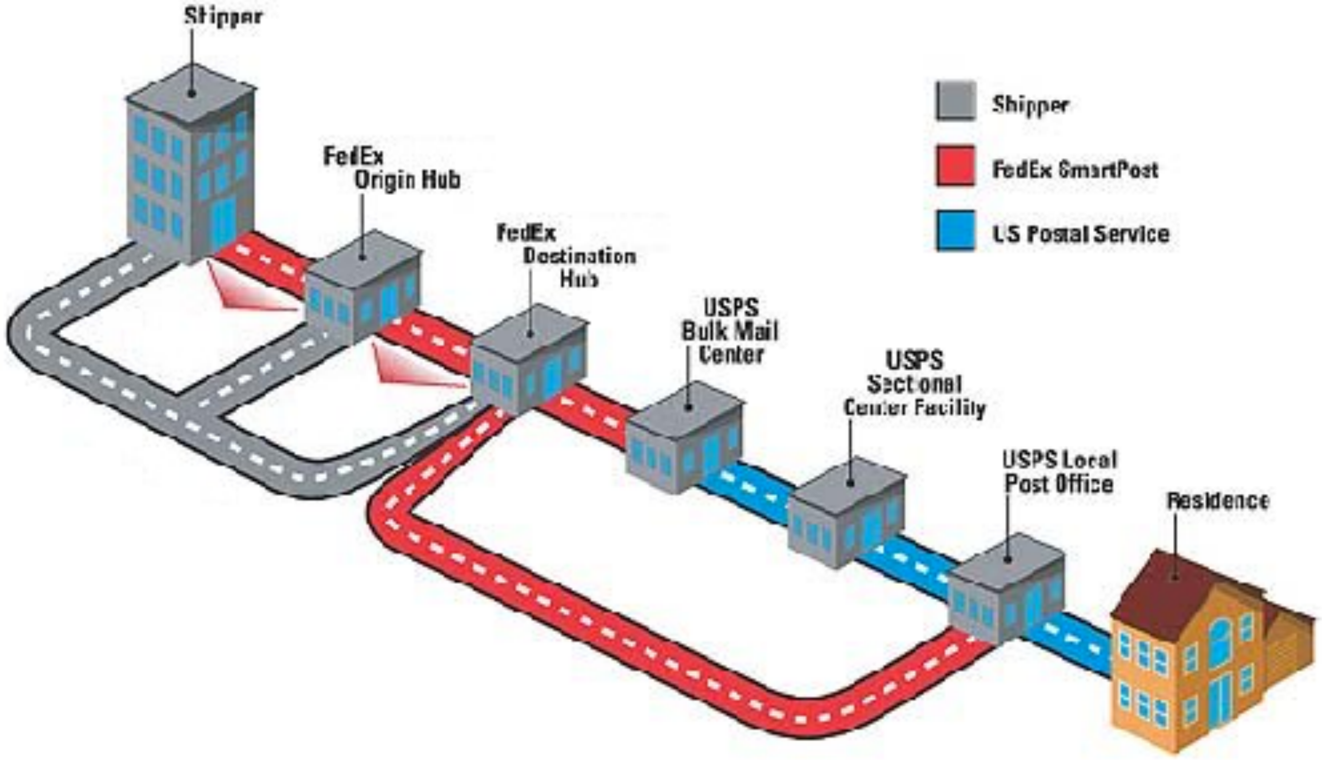

Shipper
FedEx Origin Hub
FedEx Destination Hub
USPS Bulk Mail Center
USPS Sectional Center Facility
USPS Local Post Office
Residence
Shipper
FedEx SmartPost
US Postal Service

Warning 1

The slides and the webcasts contain examples and demos with **real SMTP servers**.

The behaviour of these servers may change over time. It may also change depending on the network you are connected to (internal, ISP, other ISP).

The main reason why a server might behave differently is the fight between mail administrators and **spammers**.

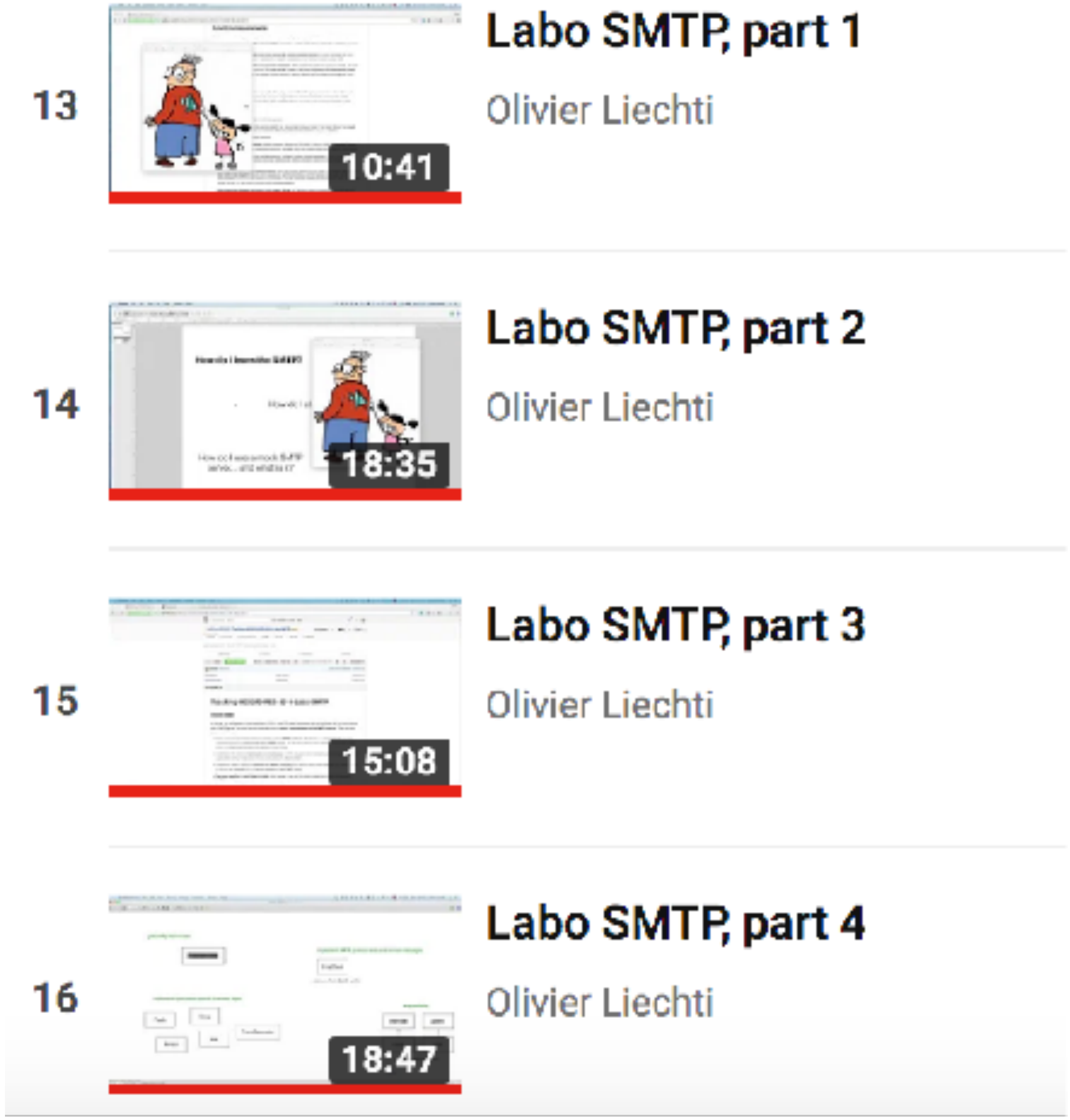
Warning 2

It is a good thing to experiment with real SMTP servers.

But remember that they are real servers and act responsibly.

Please avoid launching a **surprise denial of service attack** with your accidental infinite loop.

May changing your Facebook relationship status as an April Fool's joke not cause the end of your relationship.
someecards



13 Labo SMTP, part 1
Olivier Liechti
10:41

14 Labo SMTP, part 2
Olivier Liechti
18:35

15 Labo SMTP, part 3
Olivier Liechti
15:08

16 Labo SMTP, part 4
Olivier Liechti
18:47

- SMTP demo & hints
- SMTP protocol
- Mock server
- Implementation walk-through

Lecture	Lab A	Lab B
01.04 SMTP	01.04 Labo SMTP	04.04 Labo SMTP
08.04 Labo SMTP	08.04 Labo SMTP	11.04 Labo SMTP
15.04 Travail écrit Tout, y compris SMTP	15.04 Labo SMTP Démos "option standard"	18.04 Labo SMTP Démos "option standard"

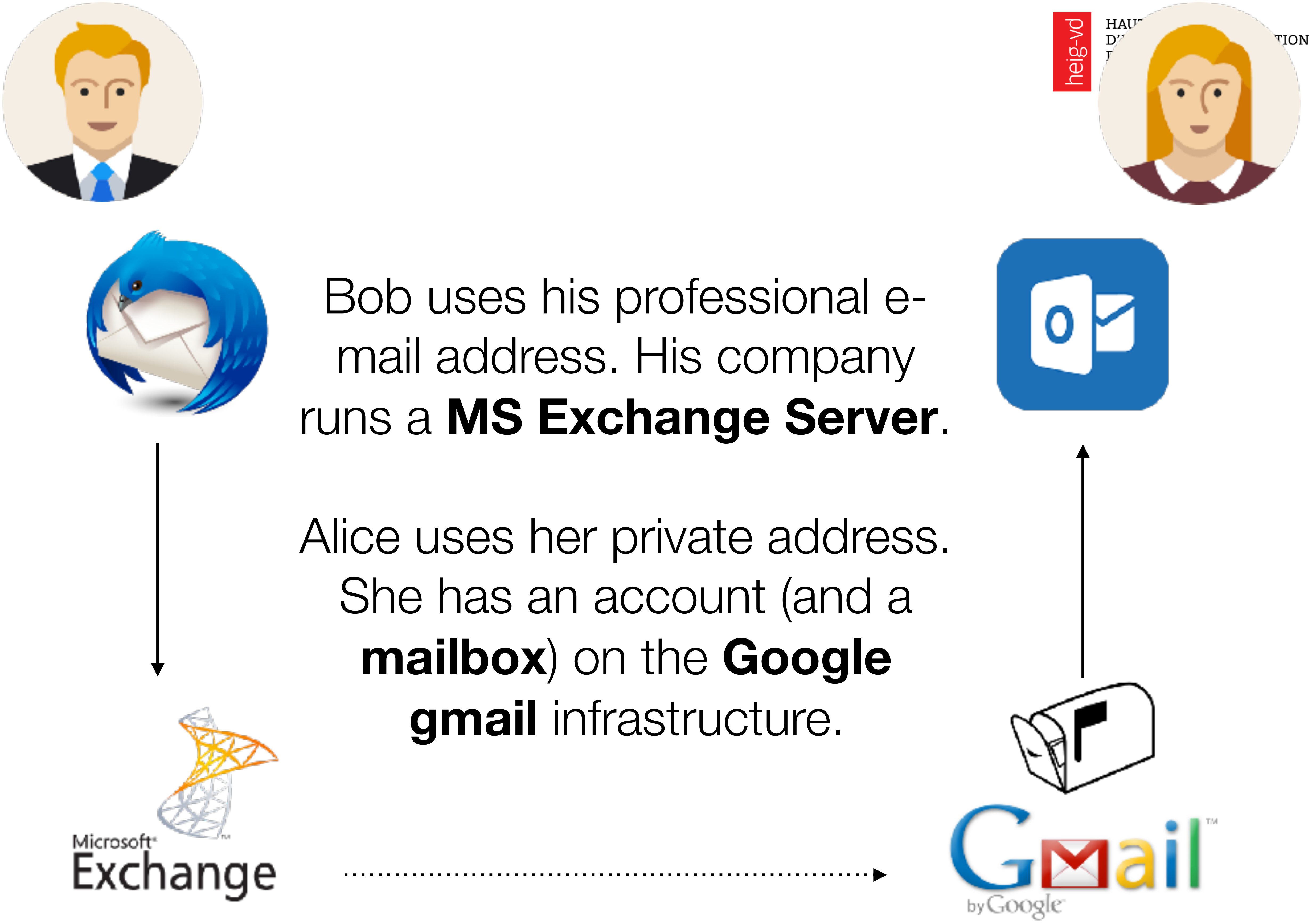
Démo (**5 minutes MAX**)	
Le labo est terminé et la démo est faite au plus tard la semaine du 15 avril.	1 pt
Le groupe arrive à démarrer un serveur mock dans un container Docker et à expliquer à quoi il sert. Le groupe a aussi configuré le service mailtrap.io	1 pt
Le groupe montre comment configurer la campagne de "pranks" et lance son programme dans un environnement de test (mock mock, mailtrap ou autre). Le groupe explique les résultats.	2 pt
Le groupe montre son repo GitHub. En regardant les commits, on voit que tout le monde a participé et qu'il n'y a pas seulement un gros commit à la fin.	1 pt
Une documentation de qualité et conforme aux exigences est fournie dans le repo GitHub.	2 pt

What happens when Bob wants to **send an e-mail** to Alice?

Bob uses **Thunderbird** to write his mail.

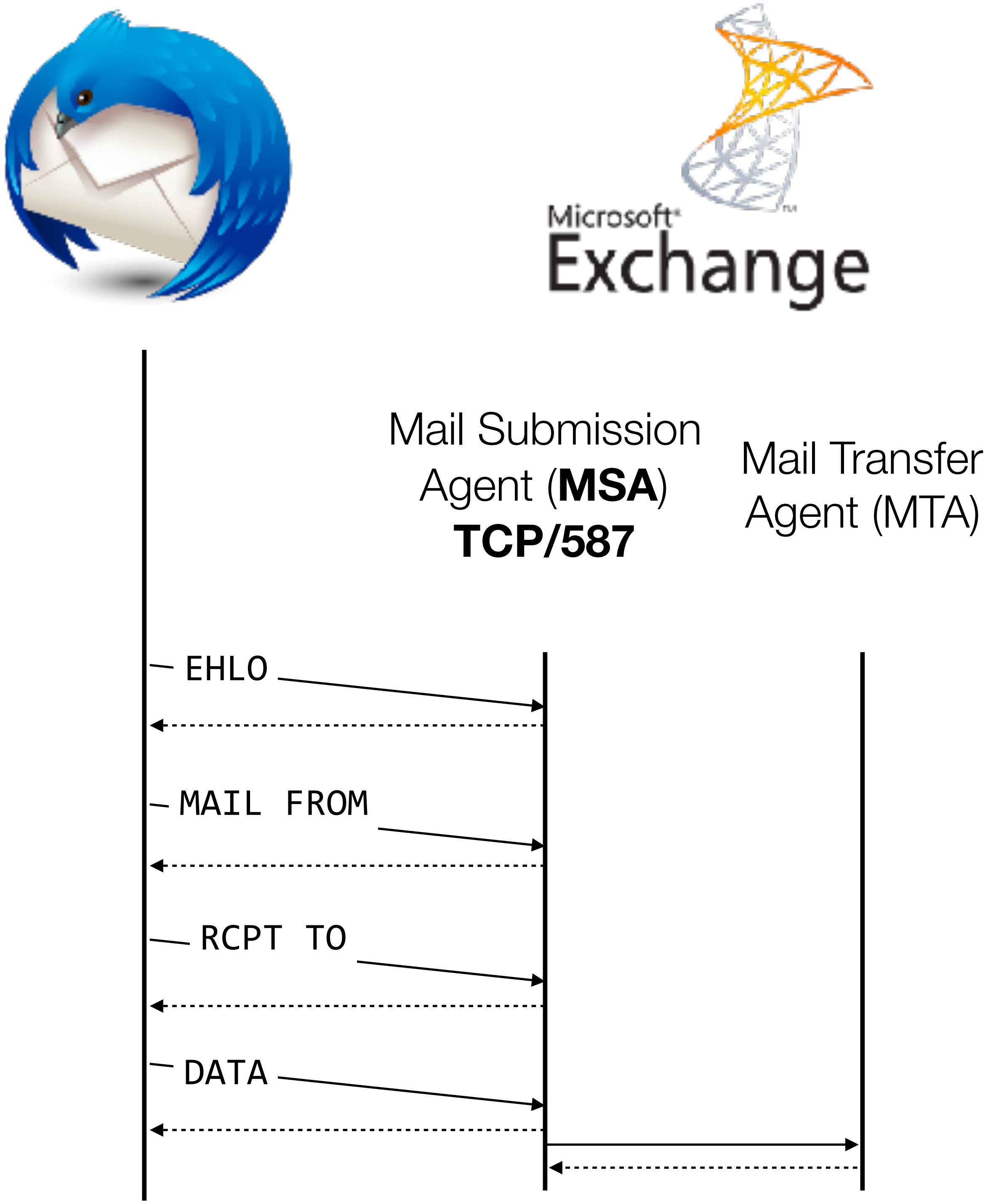
Alice uses **MS Outlook** to check and read her mails.

In the technical specs (RFCs), these programs are called **Mail User Agents (MUA)**



Bob uses his professional e-mail address. His company runs a **MS Exchange Server**.

Alice uses her private address. She has an account (and a **mailbox**) on the **Google gmail** infrastructure.

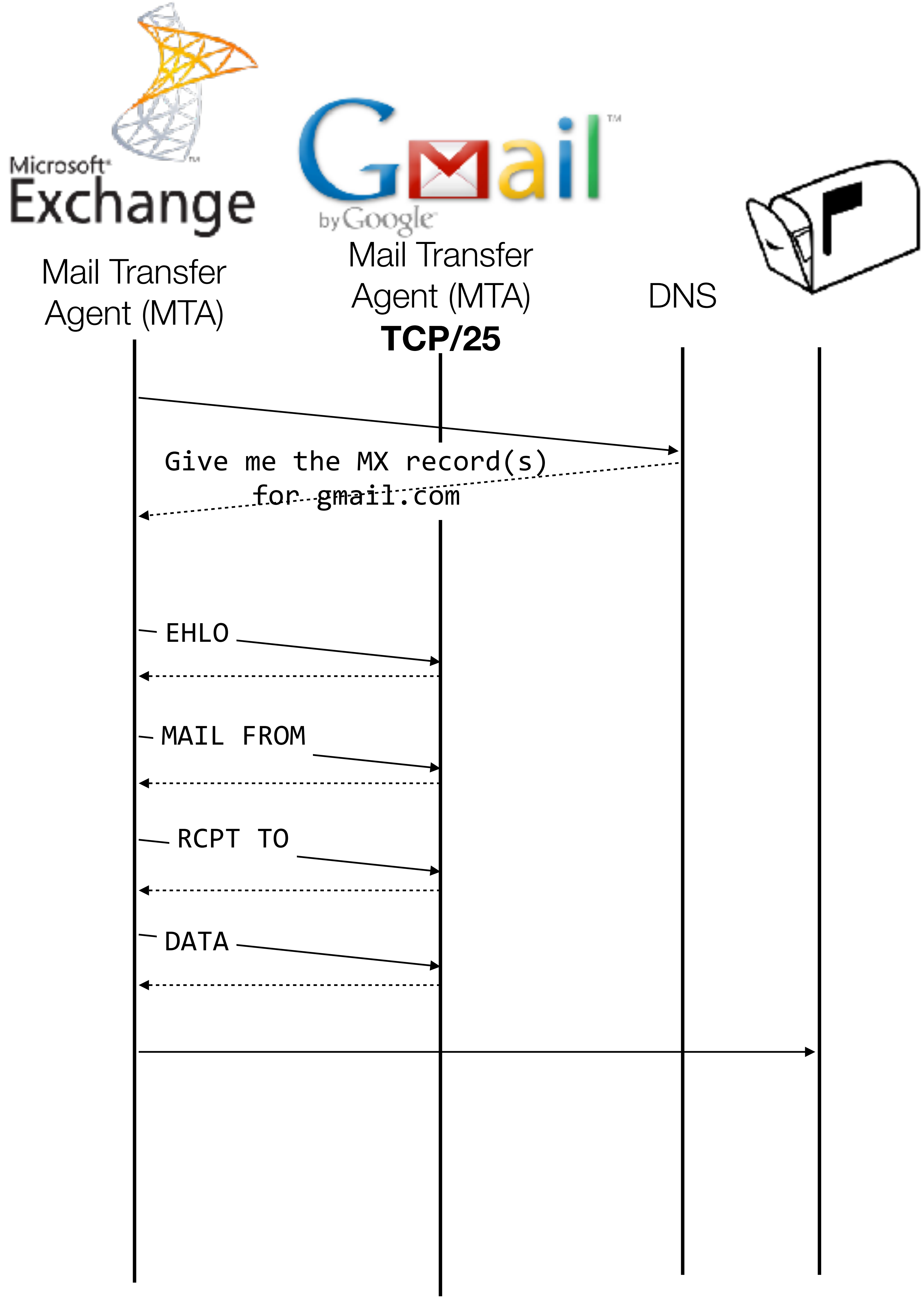

Microsoft Exchange
Mail Submission Agent (**MSA**) **TCP/587**
Mail Transfer Agent (MTA)
EHLO
MAIL FROM
RCPT TO
DATA

Bob writes a message to "**alice.res@gmail.com**". He pushes on the "Send" button.

The Exchange Server is made of **2 logical components:** the **MSA** and the **MTA**.

Bob's MUA asks Bob's MSA to deliver the mail. It uses the **SMTP** protocol for that purpose and (should) use TCP port 587.

After enforcing **usage policies**, the MSA delegates the work to the MTA. We don't know how.


Microsoft Exchange
Mail Transfer Agent (MTA)
Gmail by Google
Mail Transfer Agent (MTA)
TCP/25
DNS
Give me the MX record(s) for gmail.com
EHLO
MAIL FROM
RCPT TO
DATA

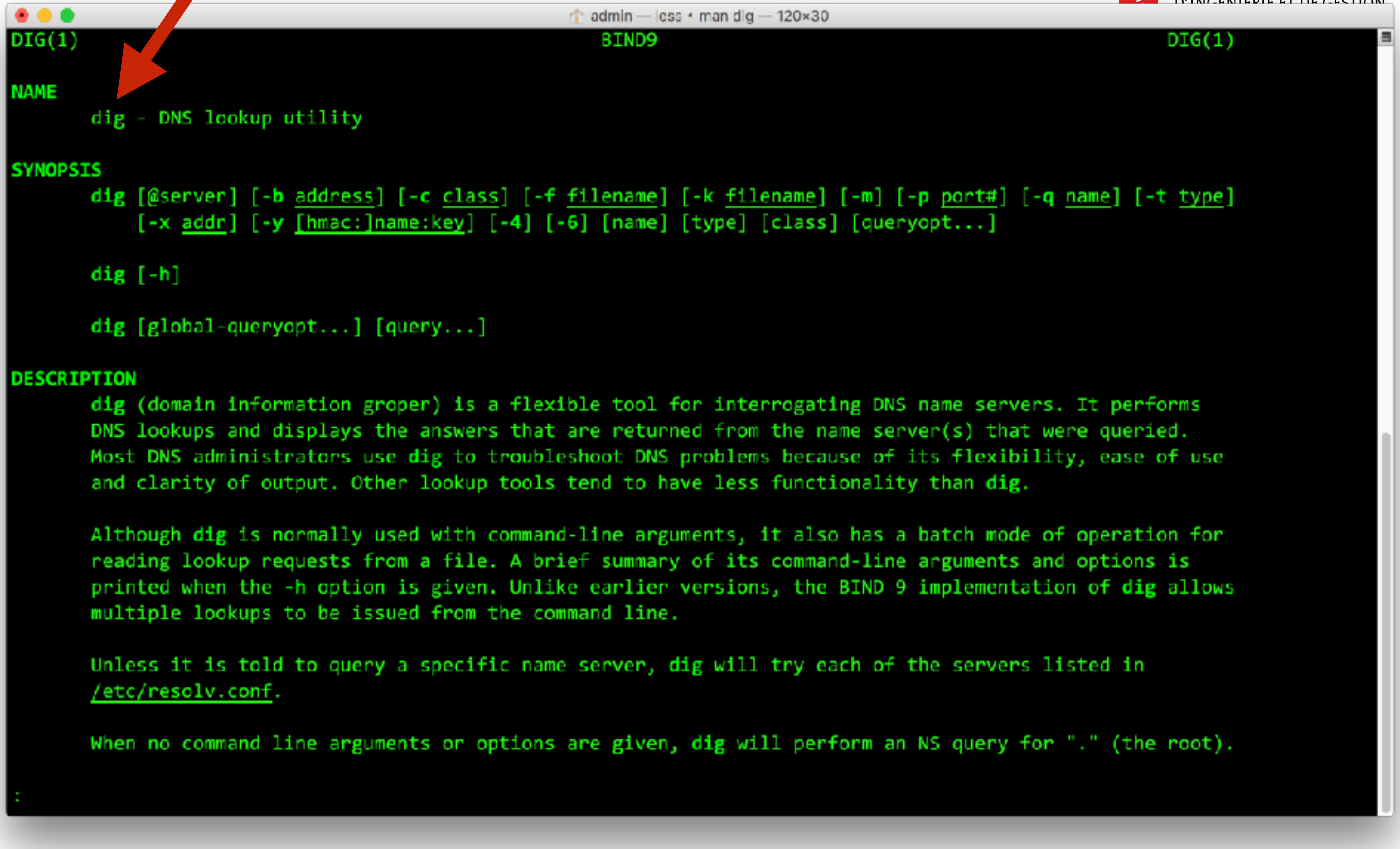
Bob's MTA initially does not know where to forward the mail...

It issues a **DNS** query to get a list of **MX records** for Alice's domain (gmail.com).

When Bob's MTA knows the IP address of Alice's MTA, it uses the **SMTP** protocol once more to forward the message. TCP **port 25** is used in this case.

When Alice's MTA receives the mail, it stores it in Alice's **mailbox** (for later retrieval).

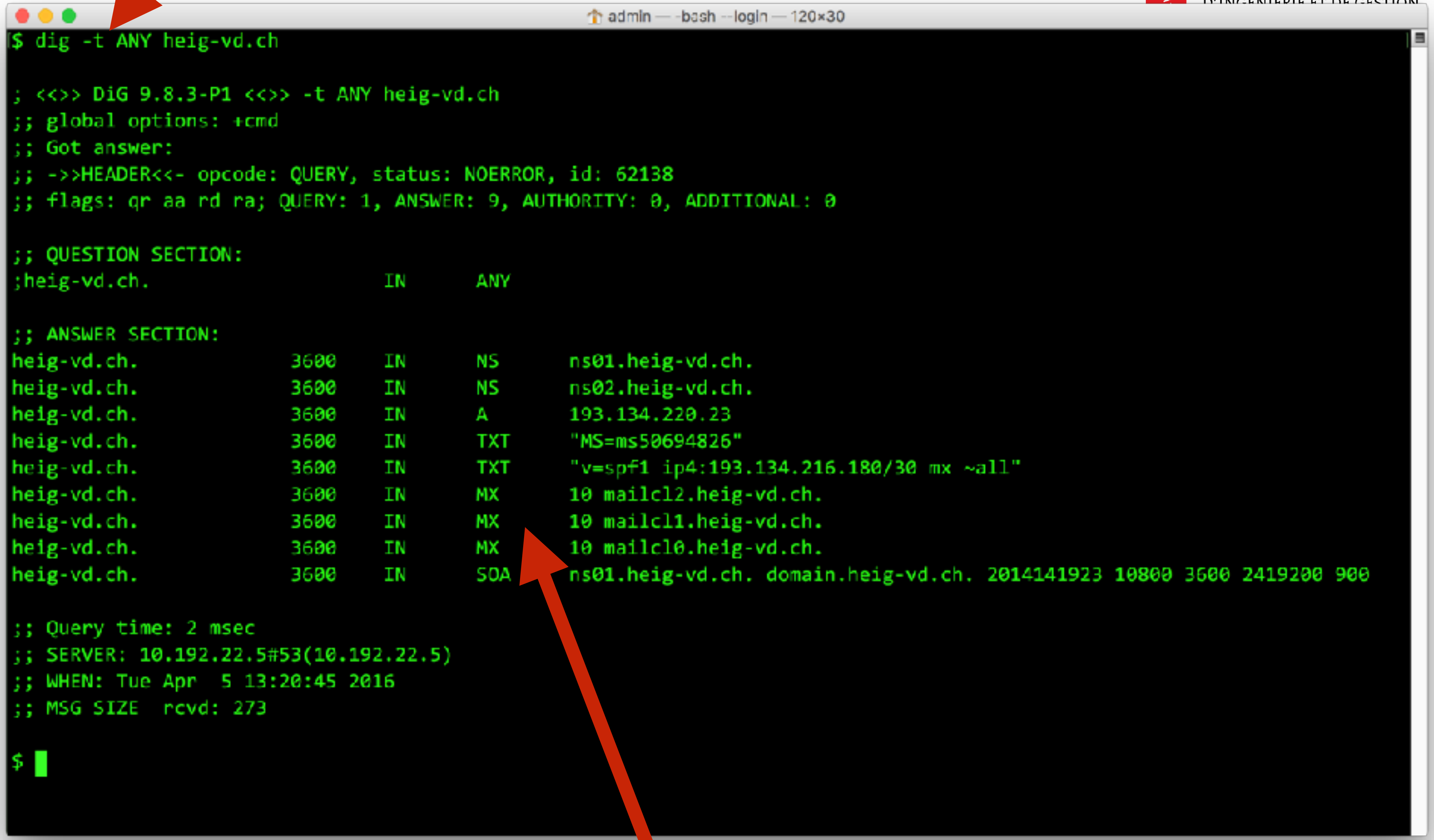
dig



```
DIG(1)                                        BIND9                                        DIG(1)

NAME
       dig - DNS lookup utility

SYNOPSIS
       dig [@server] [-b address] [-c class] [-f filename] [-k filename] [-m] [-p port#] [-q name] [-t type]
           [-x addr] [-y [hmac:]name:key] [-4] [-6] [name] [type] [class] [queryopt...]

       dig [-h]

       dig [global-queryopt...] [query...]

DESCRIPTION
       dig (domain information groper) is a flexible tool for interrogating DNS name servers. It performs
       DNS lookups and displays the answers that are returned from the name server(s) that were queried.
       Most DNS administrators use dig to troubleshoot DNS problems because of its flexibility, ease of use
       and clarity of output. Other lookup tools tend to have less functionality than dig.

       Although dig is normally used with command-line arguments, it also has a batch mode of operation for
       reading lookup requests from a file. A brief summary of its command-line arguments and options is
       printed when the -h option is given. Unlike earlier versions, the BIND 9 implementation of dig allows
       multiple lookups to be issued from the command line.

       Unless it is told to query a specific name server, dig will try each of the servers listed in
       /etc/resolv.conf.

       When no command line arguments or options are given, dig will perform an NS query for "." (the root).

:
```

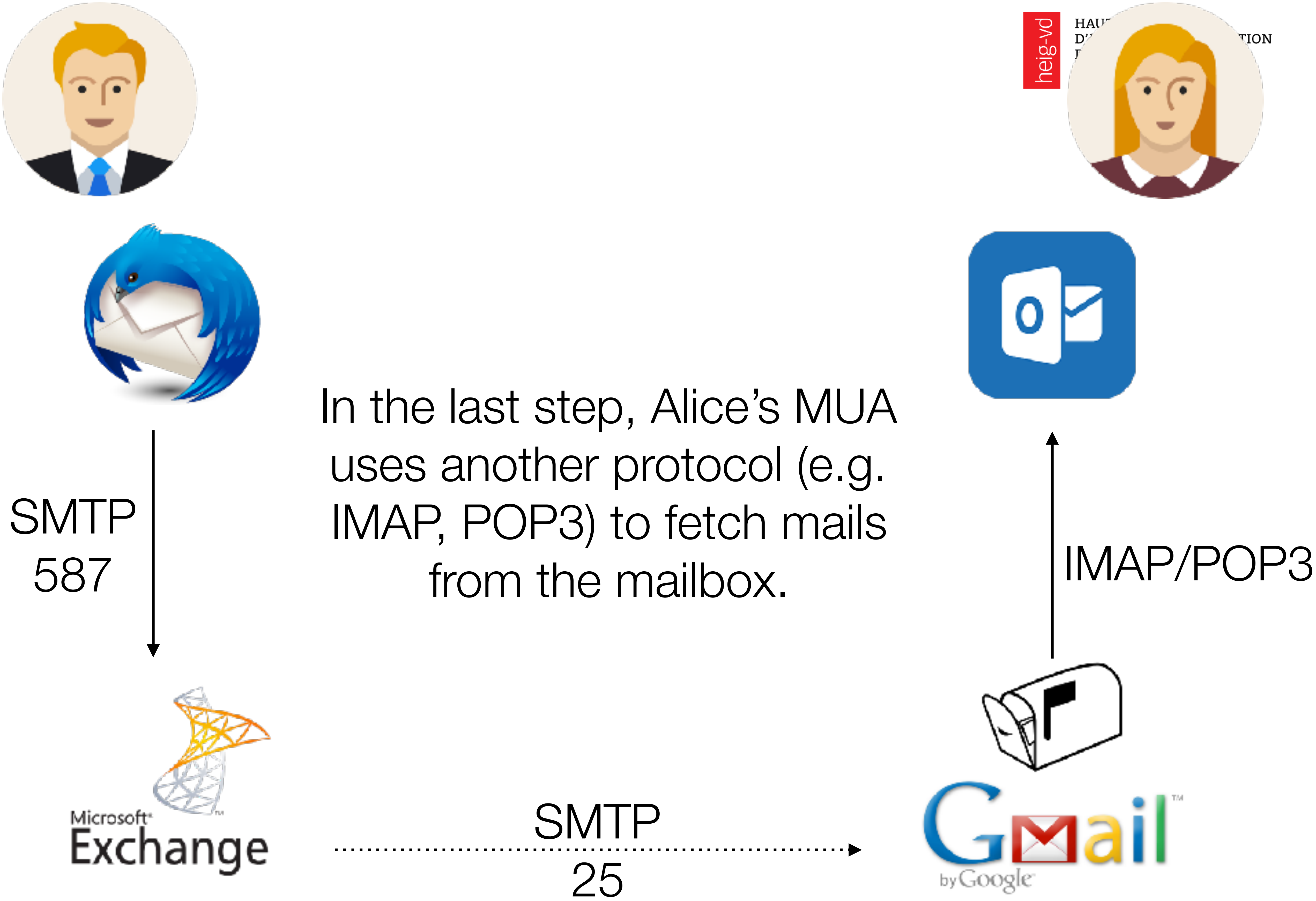
`nslookup` is another command for querying DNS

dig -t ANY heig-vd.ch



```
$ dig -t ANY heig-vd.ch

; <<>> DiG 9.8.3-P1 <<>> -t ANY heig-vd.ch
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 62138
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 9, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;heig-vd.ch.                    IN      ANY

;; ANSWER SECTION:
heig-vd.ch.             3600    IN      NS      ns01.heig-vd.ch.
heig-vd.ch.             3600    IN      NS      ns02.heig-vd.ch.
heig-vd.ch.             3600    IN      A       193.134.220.23
heig-vd.ch.             3600    IN      TXT     "MS=ms50694826"
heig-vd.ch.             3600    IN      TXT     "v=spf1 ip4:193.134.216.180/30 mx ~all"
heig-vd.ch.             3600    IN      MX      10 mailcl2.heig-vd.ch.
heig-vd.ch.             3600    IN      MX      10 mailcl1.heig-vd.ch.
heig-vd.ch.             3600    IN      MX      10 mailcl0.heig-vd.ch.
heig-vd.ch.             3600    IN      SOA     ns01.heig-vd.ch. domain.heig-vd.ch. 2014141923 10800 3600 2419200 900

;; Query time: 2 msec
;; SERVER: 10.192.22.5#53(10.192.22.5)
;; WHEN: Tue Apr  5 13:20:45 2016
;; MSG SIZE  rcvd: 273

$ 
```

`MX records` point to the SMTP servers for the domain



In the last step, Alice's MUA uses another protocol (e.g. IMAP, POP3) to fetch mails from the mailbox.

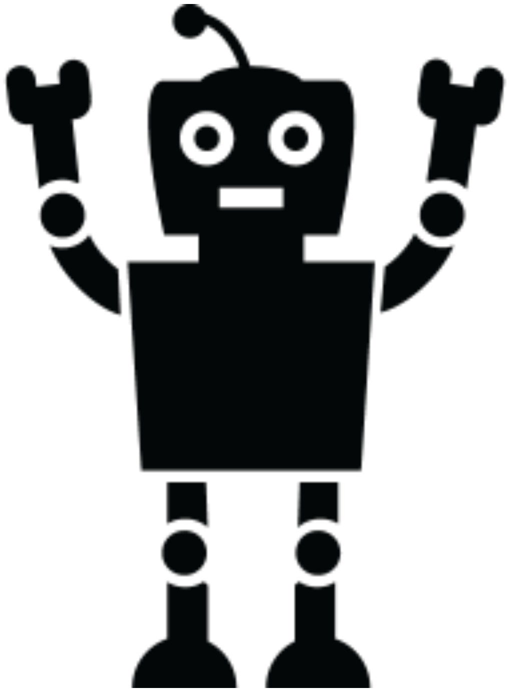
SMTP
587

SMTP
25

IMAP/POP3

Let's be human Exchange Servers (and play the role of Bob's MTA).

But instead of forwarding the mail to gmail, let's forward the mail via the **HEIG-VD's SMTP** server.

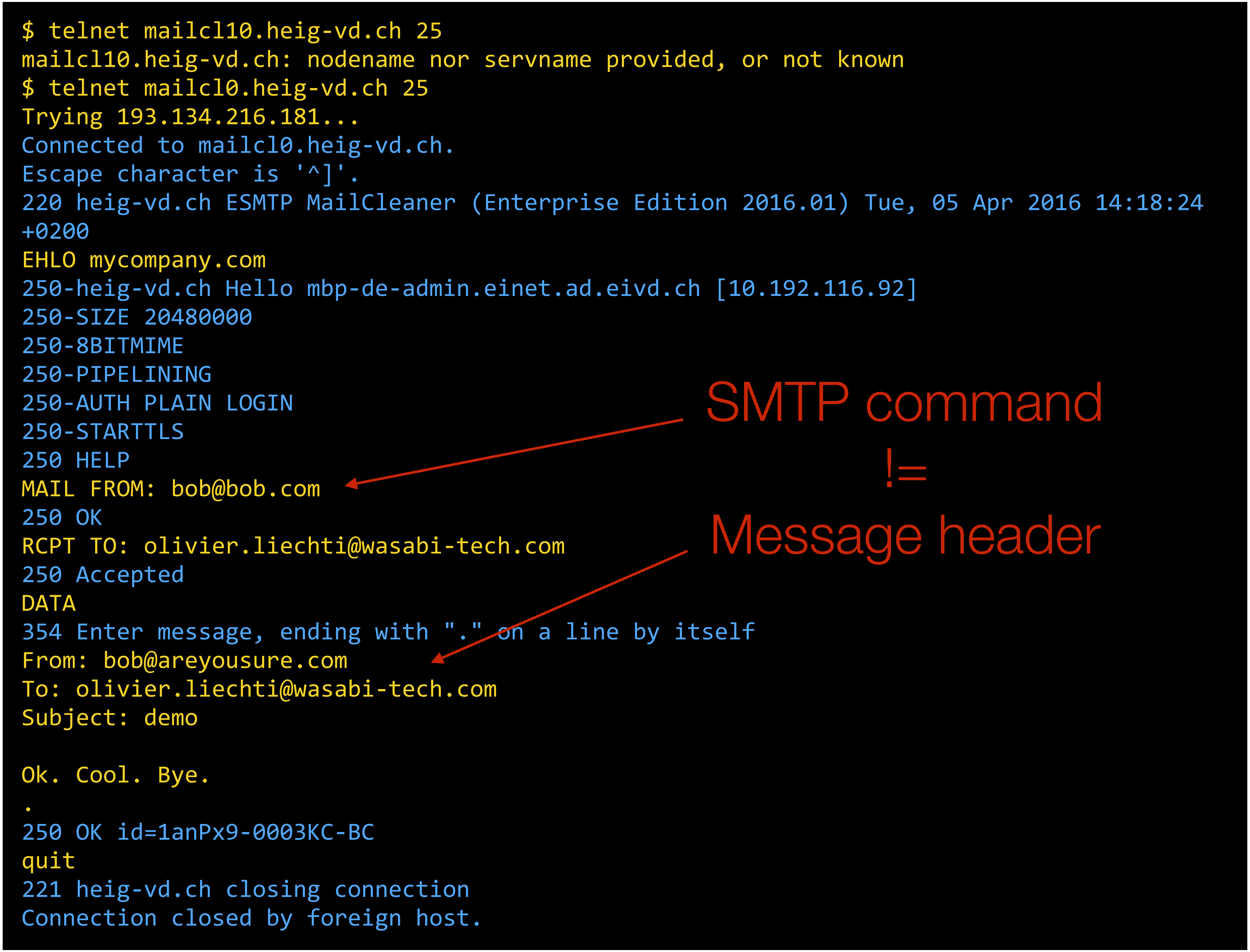


```
dig -t MX heig-vd.ch

heig-vd.ch. 600 IN MX 10 mail01.heig-vd.ch.
```

~~telnet mailcl0.heig-vd.ch 25~~

```
openssl s_client -starttls smtp -crlf -connect
mail01.heig-vd.ch:25 (or use 465)
```

```
EHLO mycompany.com
```

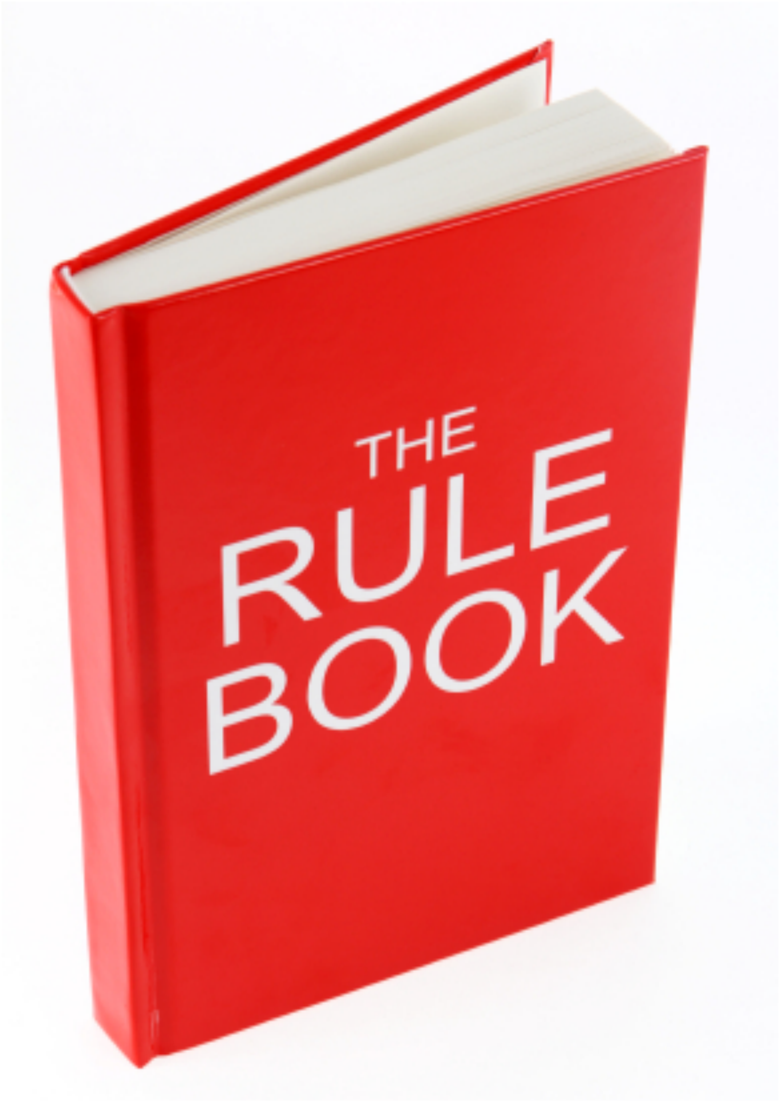


```
$ telnet mailcl10.heig-vd.ch 25
mailcl10.heig-vd.ch: nodename nor servname provided, or not known
$ telnet mailcl0.heig-vd.ch 25
Trying 193.134.216.181...
Connected to mailcl0.heig-vd.ch.
Escape character is '^]'.
220 heig-vd.ch ESMTP MailCleaner (Enterprise Edition 2016.01) Tue, 05 Apr 2016 14:18:24
+0200
EHLO mycompany.com
250-heig-vd.ch Hello mbp-de-admin.einet.ad.eivd.ch [10.192.116.92]
250-SIZE 20480000
250-8BITMIME
250-PIPELINING
250-AUTH PLAIN LOGIN
250-STARTTLS
250 HELP
MAIL FROM: bob@bob.com
250 OK
RCPT TO: olivier.liechti@wasabi-tech.com
250 Accepted
DATA
354 Enter message, ending with "." on a line by itself
From: bob@areyousure.com
To: olivier.liechti@wasabi-tech.com
Subject: demo

Ok. Cool. Bye.
.
250 OK id=1anPx9-0003KC-BC
quit
221 heig-vd.ch closing connection
Connection closed by foreign host.
```

SMTP command

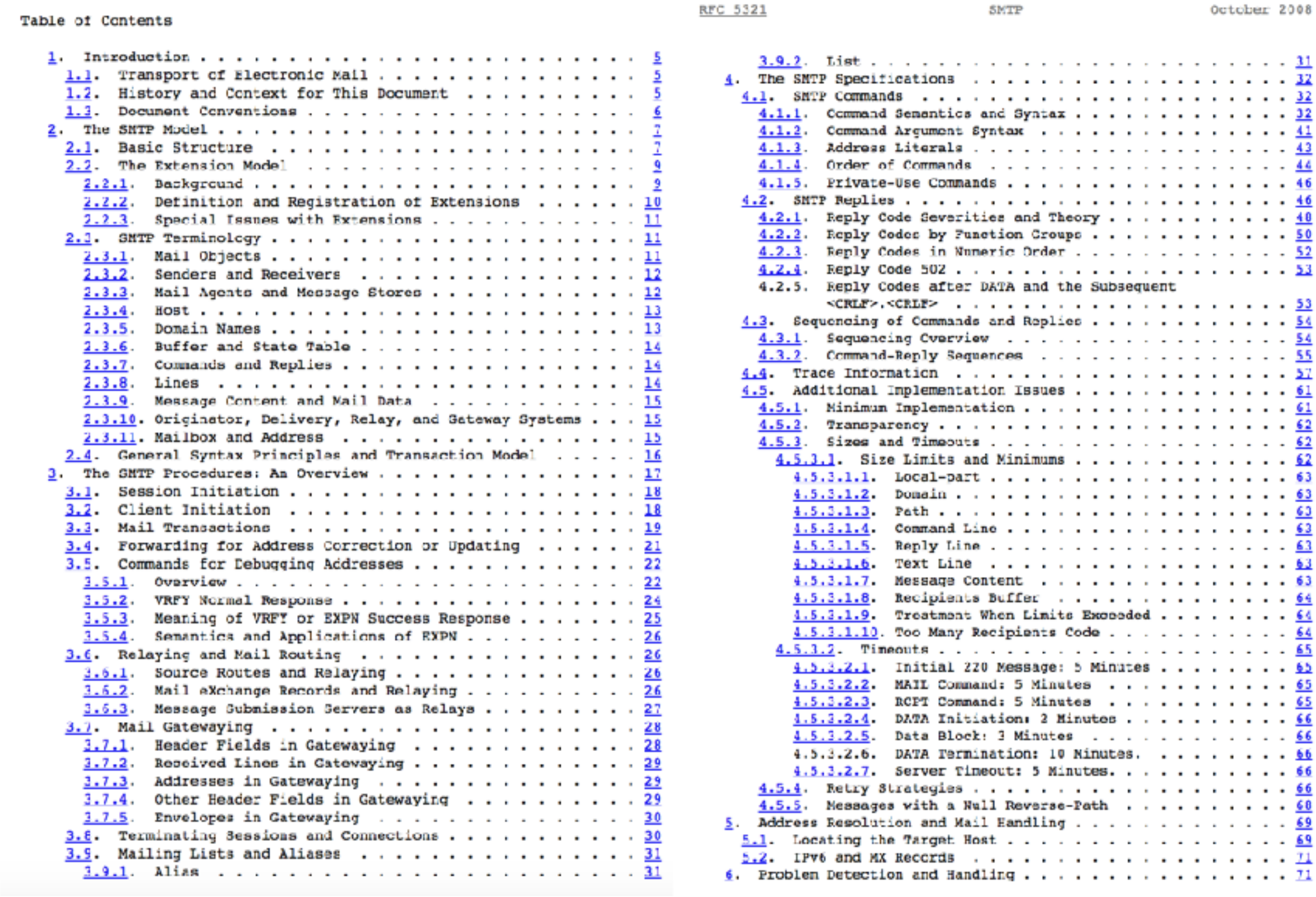
!=

Message header



The Specs

https://tools.ietf.org/html/rfc5321



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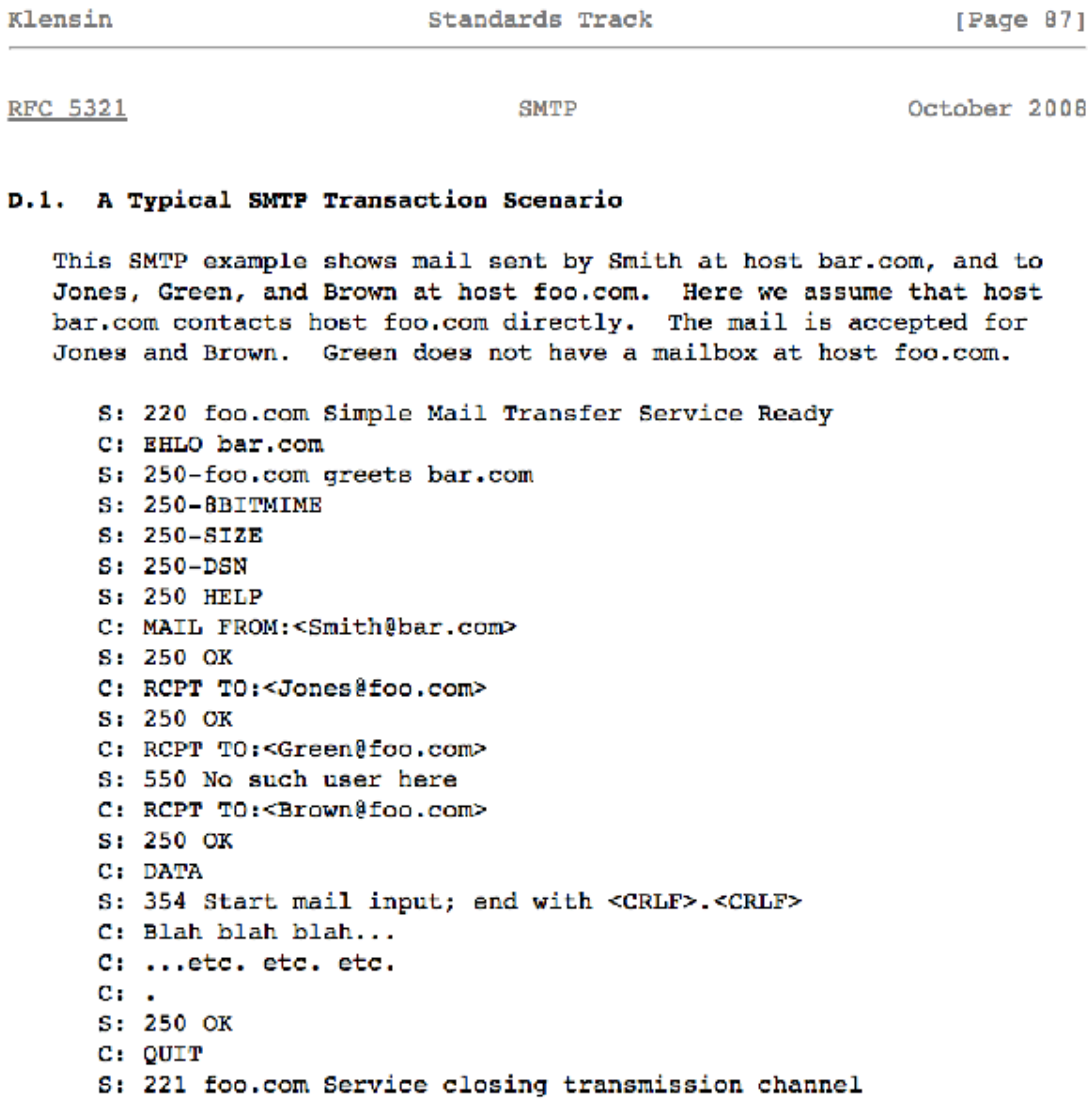
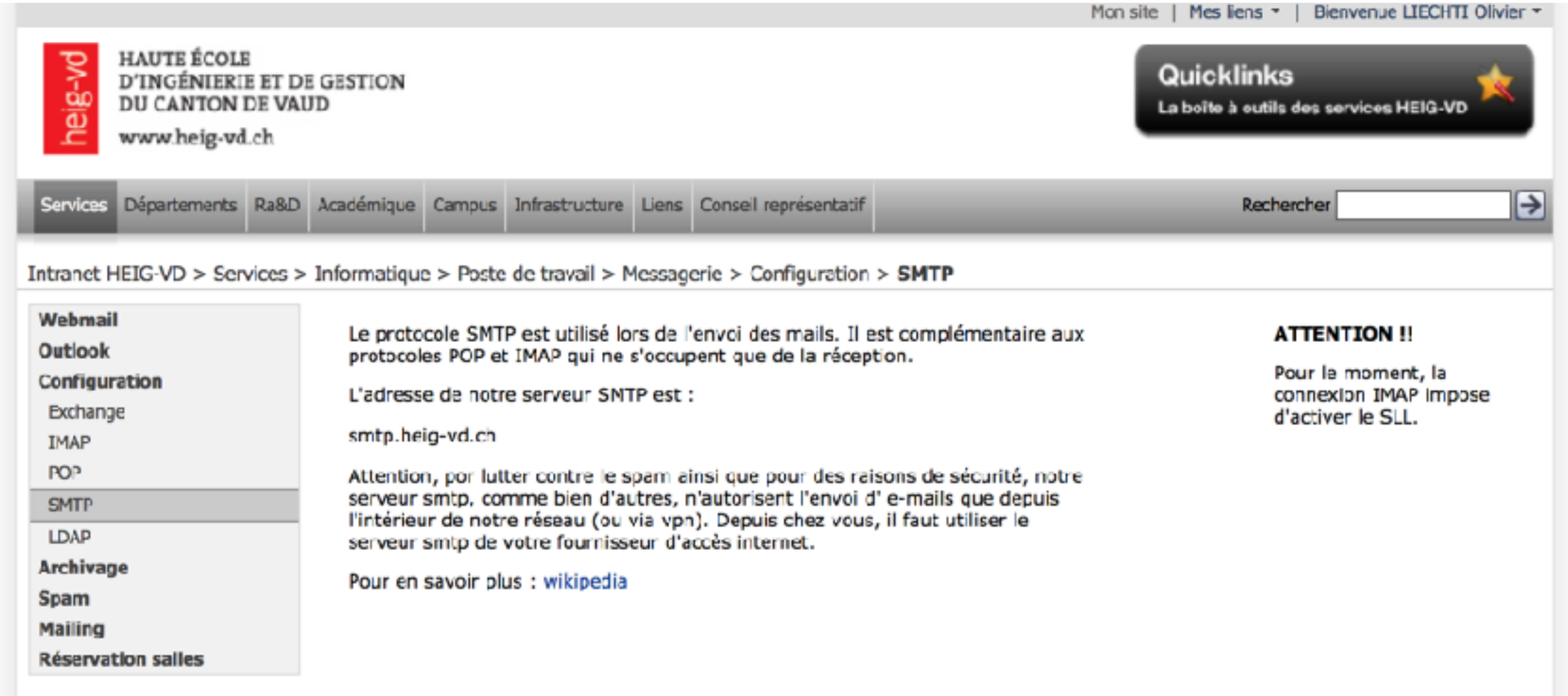
RFC 5321   SMTP   October 2008

https://tools.ietf.org/html/rfc5321



```
Klensin                  Standards Track                 [Page 87]

RFC 5321                      SMTP                    October 2008

D.1.  A Typical SMTP Transaction Scenario

   This SMTP example shows mail sent by Smith at host bar.com, and to
   Jones, Green, and Brown at host foo.com.  Here we assume that host
   bar.com contacts host foo.com directly.  The mail is accepted for
   Jones and Brown.  Green does not have a mailbox at host foo.com.

      S: 220 foo.com Simple Mail Transfer Service Ready
      C: EHLO bar.com
      S: 250-foo.com greets bar.com
      S: 250-8BITMIME
      S: 250-SIZE
      S: 250-DSN
      S: 250 HELP
      C: MAIL FROM:<Smith@bar.com>
      S: 250 OK
      C: RCPT TO:<Jones@foo.com>
      S: 250 OK
      C: RCPT TO:<Green@foo.com>
      S: 550 No such user here
      C: RCPT TO:<Brown@foo.com>
      S: 250 OK
      C: DATA
      S: 354 Start mail input; end with <CRLF>.<CRLF>
      C: Blah blah blah...
      C: ...etc. etc. etc.
      C: .
      S: 250 OK
      C: QUIT
      S: 221 foo.com Service closing transmission channel
```

SMTP Servers for experiments



Intranet HEIG-VD > Services > Informatique > Poste de travail > Messagerie > Configuration > **SMTP**

Le protocole SMTP est utilisé lors de l'envoi des mails. Il est complémentaire aux protocoles POP et IMAP qui ne s'occupent que de la réception.

L'adresse de notre serveur SMTP est :

smtp.heig-vd.ch

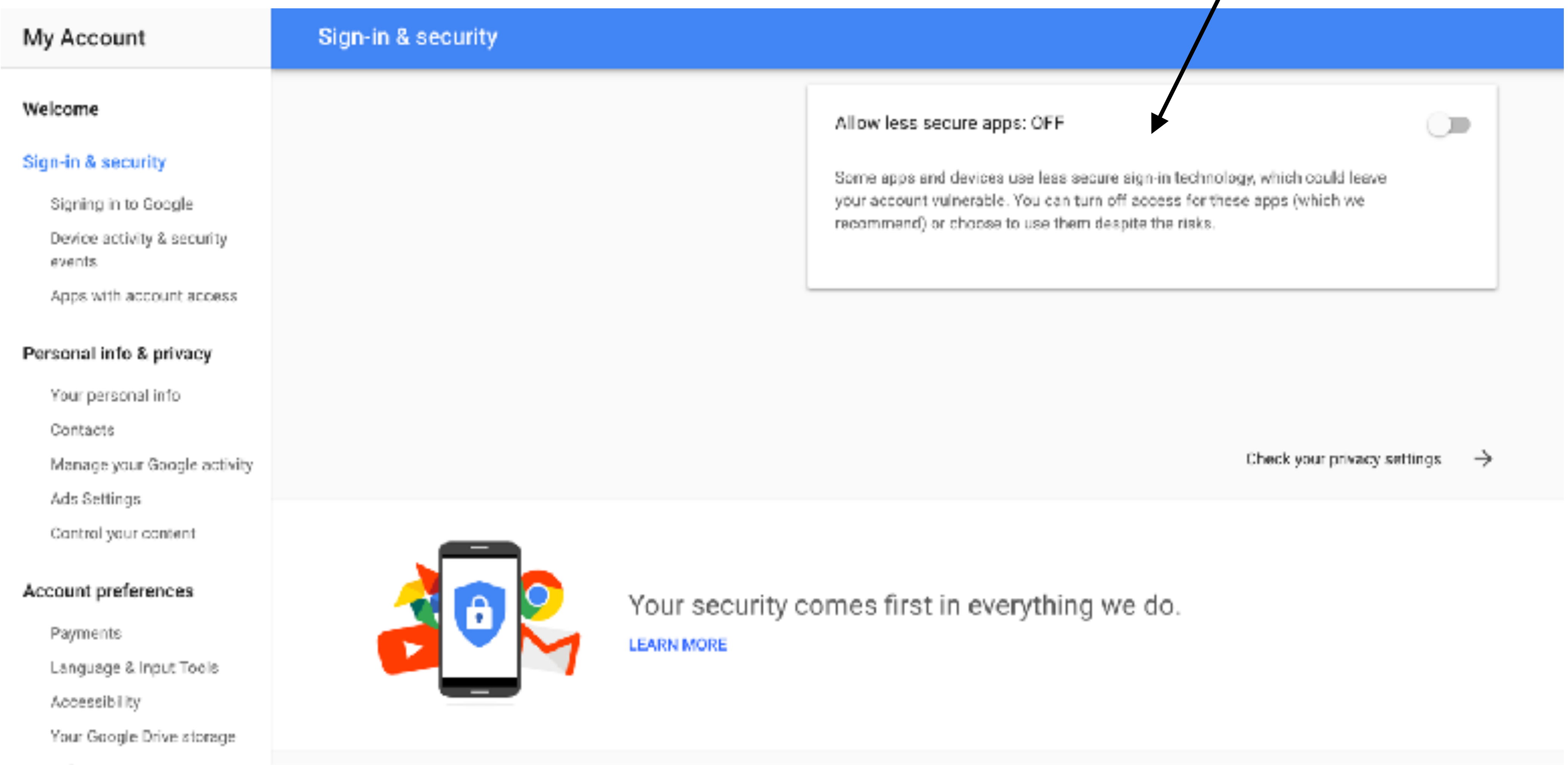
Attention, por lutter contre le spam ainsi que pour des raisons de sécurité, notre serveur smtp, comme bien d'autres, n'autorisent l'envoi d' e-mails que depuis l'intérieur de notre réseau (ou via vpn). Depuis chez vous, il faut utiliser le serveur smtp de votre fournisseur d'accès internet.

Pour en savoir plus : wikipedia

ATTENTION !!

Pour le moment, la connexion IMAP impose d'activer le SLL.

With this default setup, you will not be able to login with your user id / password.



My Account

Sign-in & security

Welcome

Sign-in & security

Signing in to Google

Device activity & security events

Apps with account access

Personal info & privacy

Your personal info

Contacts

Manage your Google activity

Ads Settings

Control your content

Account preferences

Payments

Language & Input Tools

Accessibility

Your Google Drive storage

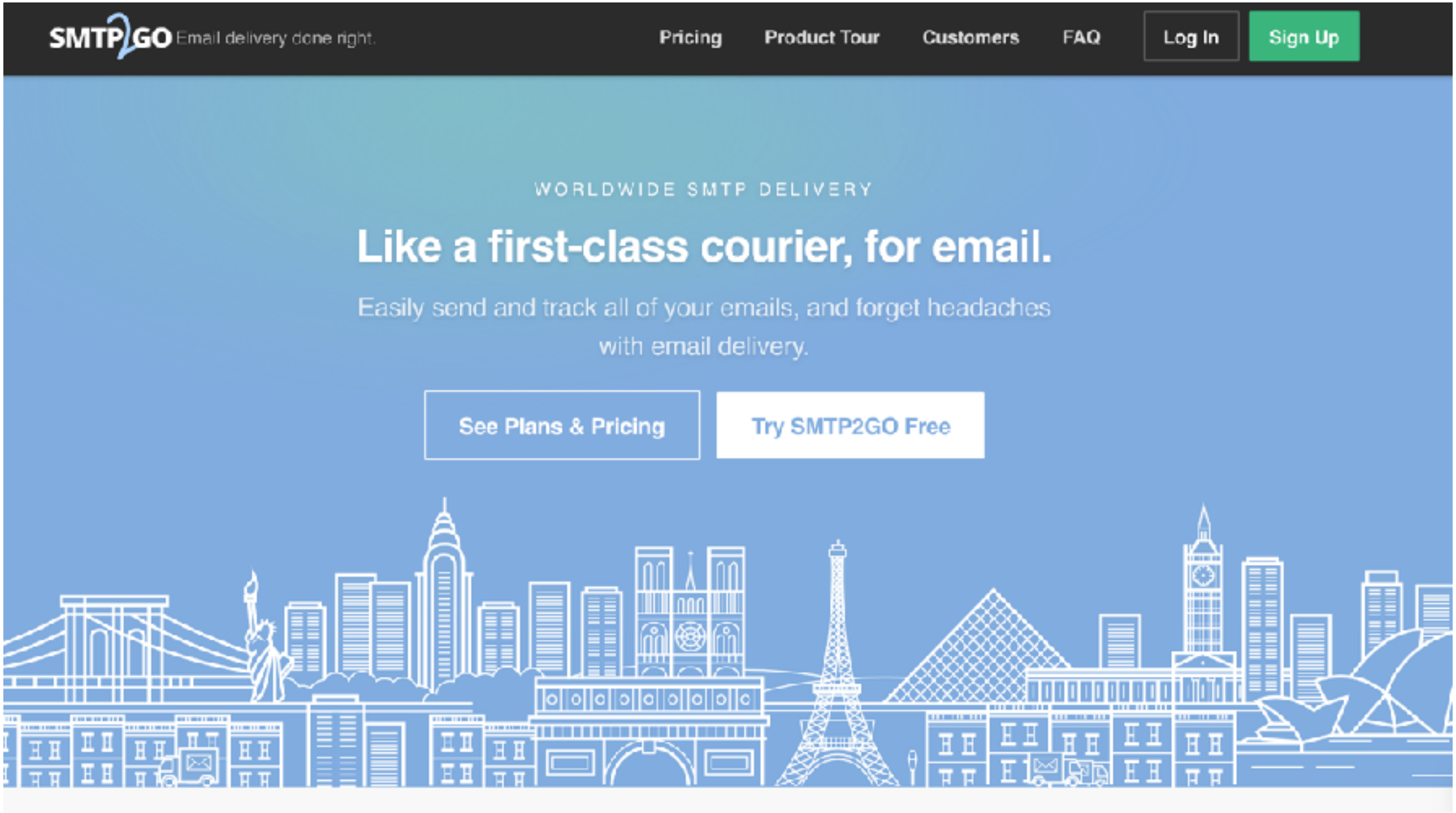
Allow less secure apps: OFF

Some apps and devices use less secure sign-in technology, which could leave your account vulnerable. You can turn off access for these apps (which we recommend) or choose to use them despite the risks.

Check your privacy settings →

Your security comes first in everything we do.

LEARN MORE

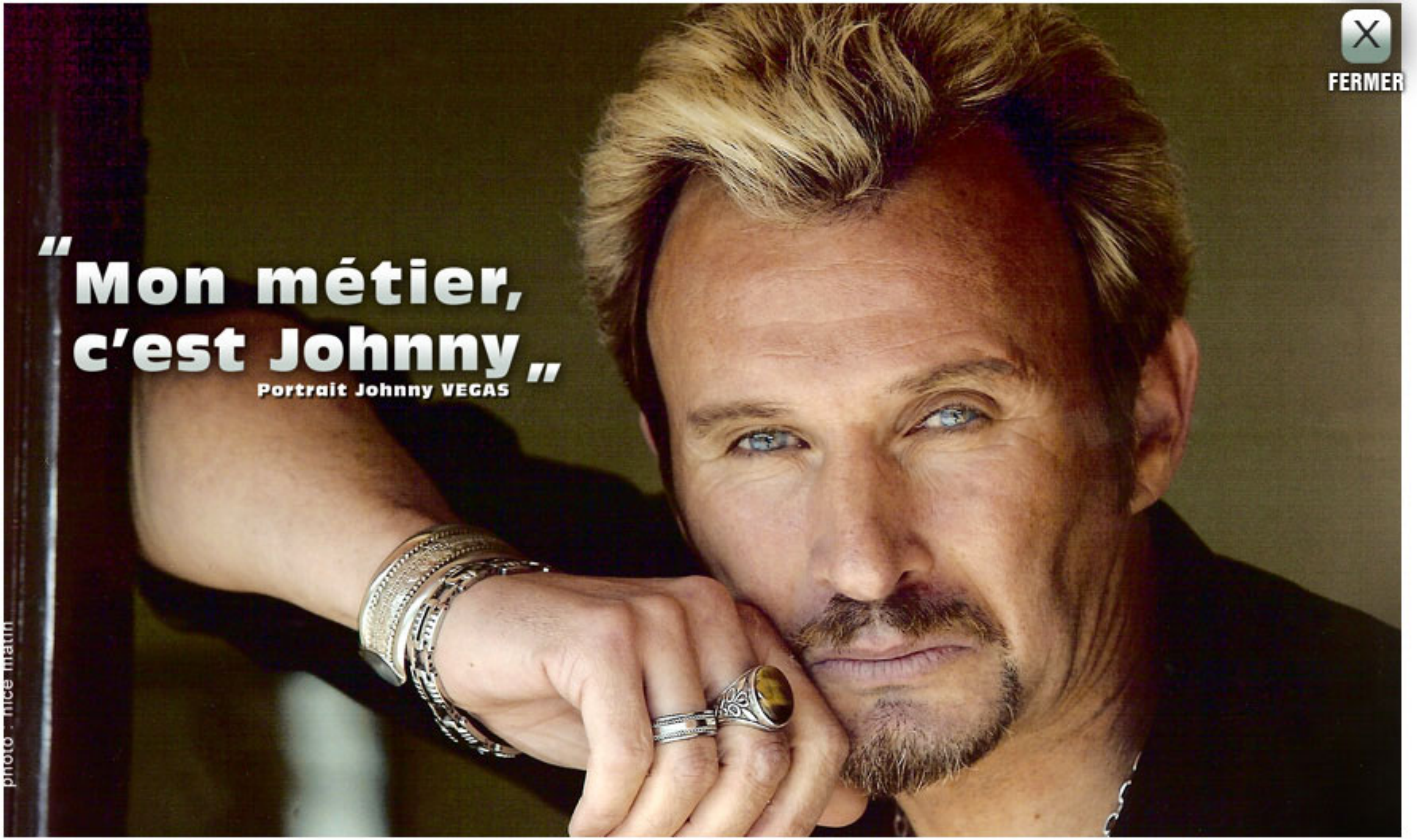


Email delivery done right.

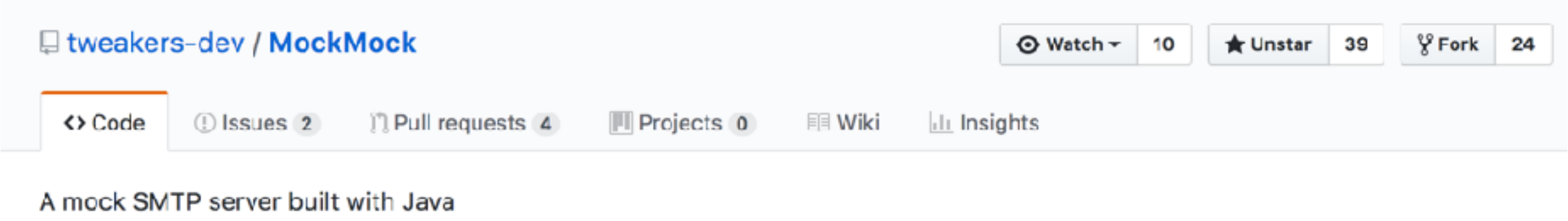
WORLDWIDE SMTP DELIVERY

Like a first-class courier, for email.

Easily send and track all of your emails, and forget headaches with email delivery.

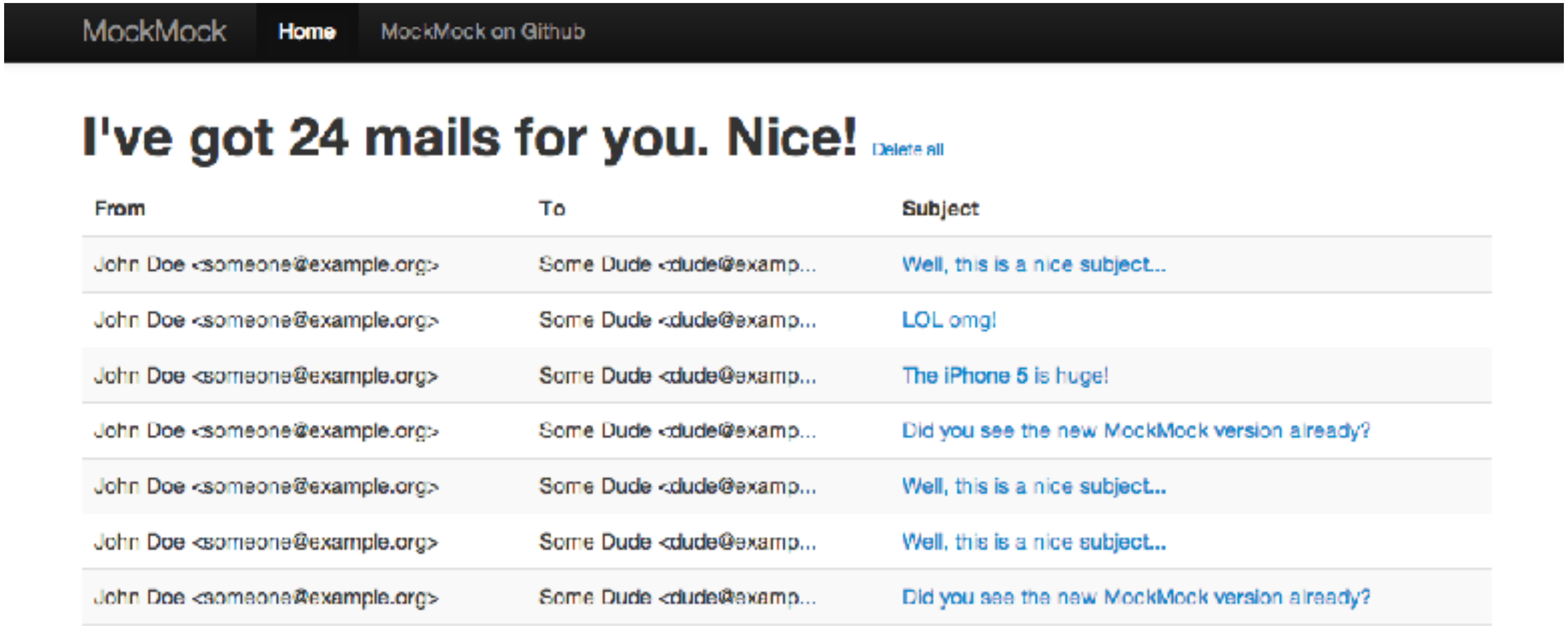


Mock Servers



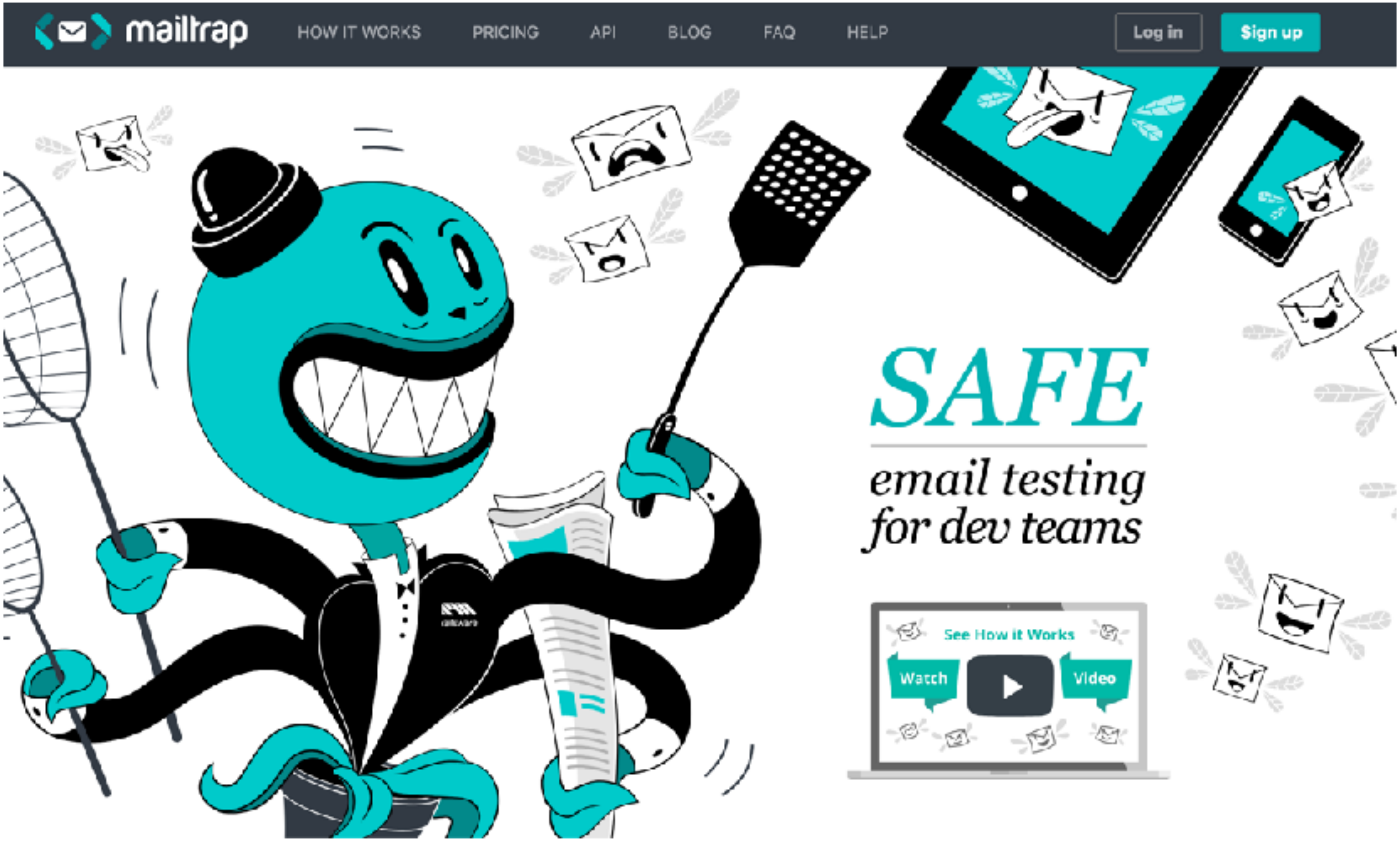
tweakers-dev / MockMock

A mock SMTP server built with Java



I've got 24 mails for you. Nice!

From	To	Subject
John Doe <someone@example.org>	Some Dude <dude@examp...	Well, this is a nice subject...
John Doe <someone@example.org>	Some Dude <dude@examp...	LOL omg!
John Doe <someone@example.org>	Some Dude <dude@examp...	The iPhone 5 is huge!
John Doe <someone@example.org>	Some Dude <dude@examp...	Did you see the new MockMock version already?
John Doe <someone@example.org>	Some Dude <dude@examp...	Well, this is a nice subject...
John Doe <someone@example.org>	Some Dude <dude@examp...	Well, this is a nice subject...
John Doe <someone@example.org>	Some Dude <dude@examp...	Did you see the new MockMock version already?


mailtrap
HOW IT WORKS
PRICING
API
BLOG
FAQ
HELP
Log in
Sign up
SAFE
email testing
for dev teams
See How it Works
Watch
Video