



## Lesson Module Status

- Slides – draft
- Properties - done
- Flashcards – not done
- 1<sup>st</sup> minute quiz –
- Web Calendar summary –
- Web book pages –
- Commands – done
- Howtos –
- Skills pacing -
- Lab – done
- Depot (VMs) – na
- Hershey accounts made – done
- hayrocket accounts made - done

## Course history and credits

Jim Griffin



- Jim created the original version of this course
- Jim's site: <http://cabrillo.edu/~jgriffin/>

Rick Graziani



- Thanks to Rick Graziani for the use of some of his great network slides
- Rick's site: <http://cabrillo.edu/~rgraziani/>



Joe A.



Joe P.



Chuck



Kay



Joe B.



Chris H.



Edwin



Lieven



Rich



Jesus



Josh



Robert



Casady



Edgar



John



Junious

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[www.cccconfer.org](http://www.cccconfer.org)  
dial-in: 888-886-3951  
passcode: 439080



Jack



Brynden



Ryan



VMs for tonight  
**(Revert, 384MB RAM  
and Power up)**  
**Elrond**

## Quiz

Please take out a blank piece of paper, switch off your monitor, close your books, put away your notes and answer these questions:

- What firewall ports must be opened for Samba?
- If you see the IPC\$, ADMIN\$ and C\$ shares on a server is the server most likely running Linux or Windows?
- What option on the ls command will let you view the SELinux security contexts?

# email

Objectives	Agenda
<ul style="list-style-type: none"><li>• Configure POP3 and IMAP4 services to allow a remote client to access e-mail on a Linux mail server</li></ul>	<ul style="list-style-type: none"><li>• Quiz</li><li>• Questions on previous material</li><li>• Housekeeping</li><li>• Email overview</li><li>• Mail User Agent</li><li>• Email message</li><li>• Mail Transport/Submission Agents</li><li>• sendmail</li><li>• Delivery Agent</li><li>• Access Agent</li><li>• POP commands</li><li>• IMAP commands</li><li>• VM screen size</li><li>• MUA configuration</li><li>• Setting up DNS and Sendmail activity</li><li>• Lab 9</li><li>• Wrap</li></ul>

# Questions on previous material



## Questions?

- Previous lesson material
- Lab assignment

# Housekeeping





- Lab 8 due tonight
- Five posts due tonight
- Remaining point earning opportunities

Work	Points
Quizzes Q9 & Q10	6
Test T3	30
Forum F3 & F4	40
Labs L8, L9, L10	90
Final	60
Extra Credit	up to 90

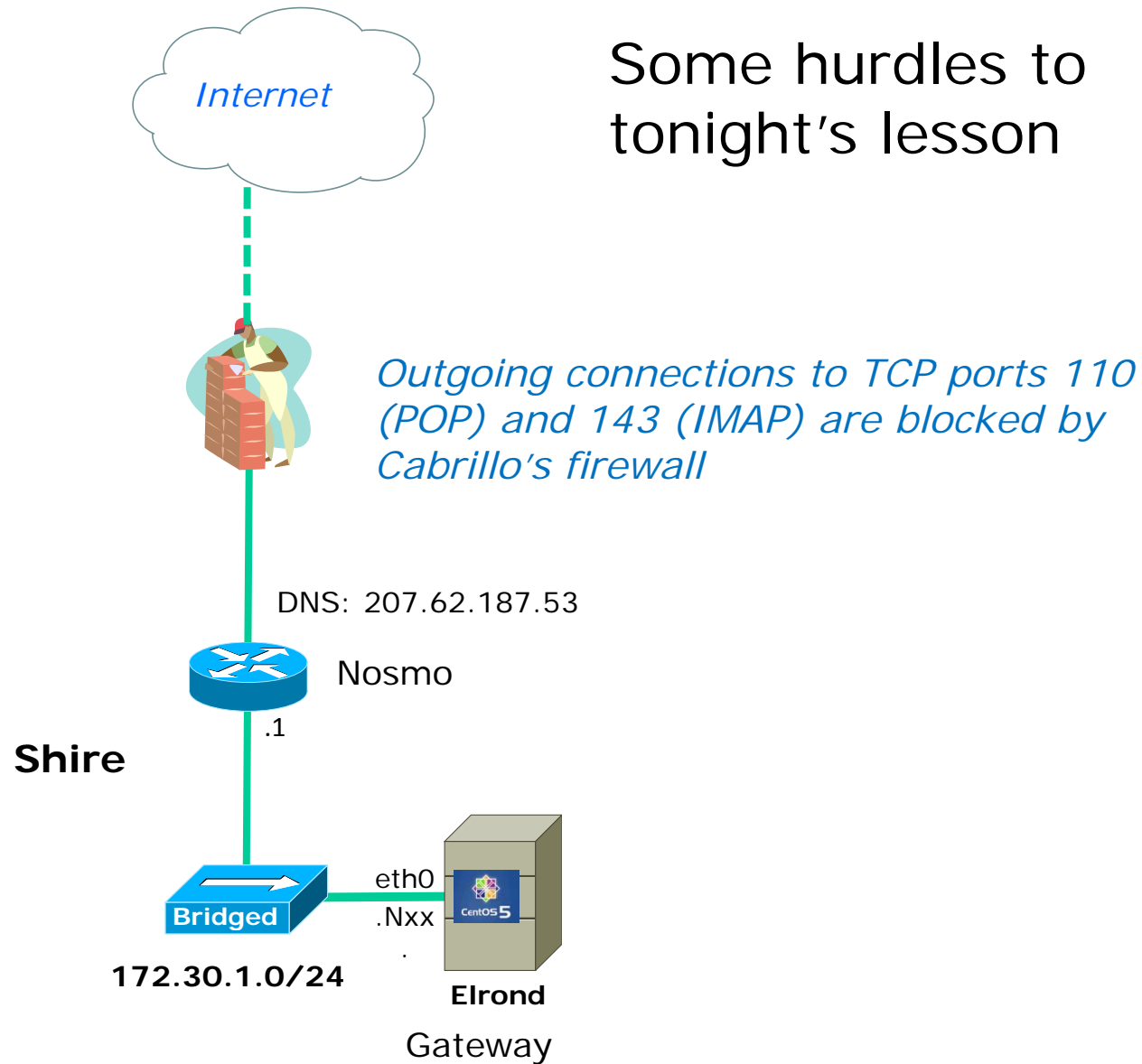
Grades Check

504 or higher	A	Pass
448 to 503	B	Pass
392 to 447	C	Pass
336 to 391	D	No pass
0 to 335	F	No pass

You can copy and paste the grades page into Excel at anytime to check your current progress

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Code	Grading	Quizzes & Tests										Forum				Labs										Final	Extra	Total	Grade			
2	Name	Choice	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q1	T1	T2	T3	F1	F2	F3	F4	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10		Credit		
3	Max Points		3	3	3	3	3	3	3	3	3	3	30	30	30	20	20	20	20	30	30	30	30	30	30	30	30	30	30	60	90	560	
4	Arwen	Grade	3	3	3	3	3	3		3			33	34		20	20			30	30	30	30	30	30					90	428		
5	Aragorn	Grade	3	3	3		3			3			30	28		8	8			30	30	28	30		30	29				12	278		
6	Balrog	P/NP		3	3	3	3	3	3	3			27	28		0	0				27	30	28	30	29					32	252		
7	Denethor	Grade	3	3	3	3	3						17	21		12	0			30	24	22		27	3	30				5	206		
8	Dwalin	Grade											18	15		20	20			30	28	26	29	27	3					3	219		
9	Elrond	Grade	3	3	3	3	3	3	3	3			22	27		20	20			29	28	30	29	27	30	27				29	342		
10	Eomer	Grade	3	3	3		3			3			32	32		8	12			30	30	28	30	29	30	30					306		
11	Frodo	Grade	3	3	3	3	3			3			34	30		20	20			30	30	30	30	30	30	30				87	419		
12	Goldberry	P/NP	3													4	0			28	30									5	70		
13	Gwaihir	Grade		3	3	3	3			3	3		32	32		20	20			30	30	30	26	29	30	30				45	372		
14	Ioreth	Grade	3	3	3	3	3	3	3	3			29	30		20	20			30	30	30	27	28	30	30				20	348		
15	Legolas	Grade		3			3			3	3		27	29		0	16				20				30	29				33	196		
16	Pippen	Grade	1	3	3	3				3	3	3		32	30		20	20			30	12	30		27	19				41	280		
17	Samwise	Grade			3								30	27		20	20			28	29	29	27	25						3	241		
18	Saruman	Grade	3	3	3	3	3	3	3	3			29	26		16	20			30	30	30	30	30	30	30				90	415		
19	Smeagol	Grade	3	3	3	3	3	3	3	3			25	30		20	20			30	30	26	30	29	30	28					322		
20	Strider	Grade	3	3	3	3	3	3	3	3			31	30		20	20			30	30	30	30	30	27	30				28	360		
21	Theoden	Grade		3	3	3	3	3	3				30	31		20	20			30	28	30	27	29	30	30				44	367		
22	Treebeard	Grade	3		3	3	3						28			20	20			30		26	30							32	198		

## Some hurdles to tonight's lesson



Some hurdles to tonight's lesson

*Your ISP may block port 25*

The screenshot shows a web browser window displaying a DreamHost knowledge base article. The article title is "Does my ISP block port 25?". The content explains that some ISPs block port 25 to prevent spamming and abuse. It provides a table of major ISPs and their SMTP server addresses. The article also notes that AOL does not block port 25 as of February 2002. It mentions that blocking port 25 can prevent users from accessing SMTP servers, leading to error messages. A note states that sometimes an ISP will only allow email to be sent through their SMTP server with a different domain. Finally, it mentions that DreamHost supports message submission protocol (RFC 2476) on port 587 as an alternative to port 25.

**Does my ISP block port 25?**

Some Internet providers have recently started blocking port 25 in an attempt to help prevent direct to MX spamming, and abuse of open proxies / relays from their dialup and broadband customers.

Some major ISPs that do this (and the address of their SMTP server) are:

ISP	SMTP server
<a href="#">People PC</a>	mail.peoplepc.com
<a href="#">Optimum Online</a>	mail.optonline.net
<a href="#">MSN</a>	smtp.email.msn.com
<a href="#">EarthLink</a>	mail.earthlink.net
<a href="#">Verio</a>	mail.verio.net
<a href="#">Comcast / ATTB!</a>	smtp.comcast.net
<a href="#">Cox</a>	smtp.west.cox.net/smtp.east.cox.net
Many others	[smtp/mail].example.com

Fortunately it seems that **AOL** does NOT do this (as of Feb 2002)!

Unfortunately a side-effect of this practice is that it prevents users from accessing our SMTP servers. If you are getting error messages when you try sending mail which state that smtp.domain.com is not responding or not found, contact your ISP, and find out if they're blocking port 25. If they are, you can probably send outgoing mail through their outgoing mail servers.

**Sometimes**, however, an **ISP** will not allow **email** to be sent through their SMTP **server** with a different domain. In other words, you may only be able to use their SMTP server if you have your reply address set to your ISP-based email address, not your custom **domain name** address that you have at DreamHost.

DreamHost does support message submission protocol, as per RFC 2476. This means that you can use port 587 for outgoing mail. If your mailer supports it, you can simply set it to send outgoing mail on this port instead of port 25.

Last updated: Sep 05, 2004.

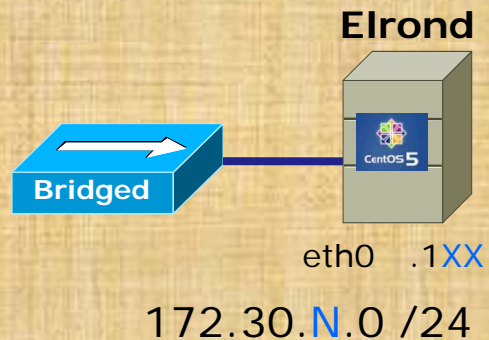
## Some hurdles to tonight's lesson

```
[root@elrond bin]# telnet mail.hayrocket.com 587
Trying 208.113.200.50...
Connected to mail.hayrocket.com (208.113.200.50).
Escape character is '^]'.
220 spaceymail-a2.g.dreamhost.com ESMTTP
ehlo elrond
250-spaceymail-a2.g.dreamhost.com
250-PIPELINING
250-SIZE 40960000
250-ETRN
250-STARTTLS
250-AUTH LOGIN PLAIN
250-AUTH=LOGIN PLAIN
250 8BITMIME
mail from: simms@hayrocket.com
250 Ok
rcpt to: simms@hayrocket.com
554 <simms@hayrocket.com>: Recipient address rejected: Access denied
quit
221 Bye
Connection closed by foreign host.
[root@elrond bin]#
```

*Your ISP may  
block sending  
messages from  
outside the ISP's  
domain*

# Warmup

## Warmup



- Update /etc/hosts:
  - change localdomain to shire
  - Add hershey 172.30.1.20
- Test:
  - ping 172.30.N.1
  - ping google.com
  - ping hershey

.1XX is based on your station number and the IP Table  
 N=1 for the classroom and N=4 for the CIS lab or CTC  
<http://simms-teach.com/docs/static-ip-addr.pdf>

```
# cat /etc/sysconfig/network-scripts/ifcfg-eth0
DEVICE=eth0
ONBOOT=yes
BOOTPROTO=static
IPADDR=172.30.N.1XX
NETMASK=255.255.255.0

# cat /etc/sysconfig/network-scripts/ifcfg-eth1
DEVICE=eth1
ONBOOT=no
BOOTPROTO=none
```

```
# cat /etc/sysconfig/network
NETWORKING=yes
NETWORKING_IPV6=no
HOSTNAME=elrond.shire
GATEWAY=172.30.N.1

# cat /etc/resolv.conf
nameserver 207.62.187.53

# hostname elrond.shire
# service network restart
```

```
[root@elrond ~]# cat /etc/hosts
::1 localhost6.localdomain6 localhost6
127.0.0.1 elrond.shire elrond localhost.shire localhost
172.30.1.20 hershey
```

# email overview



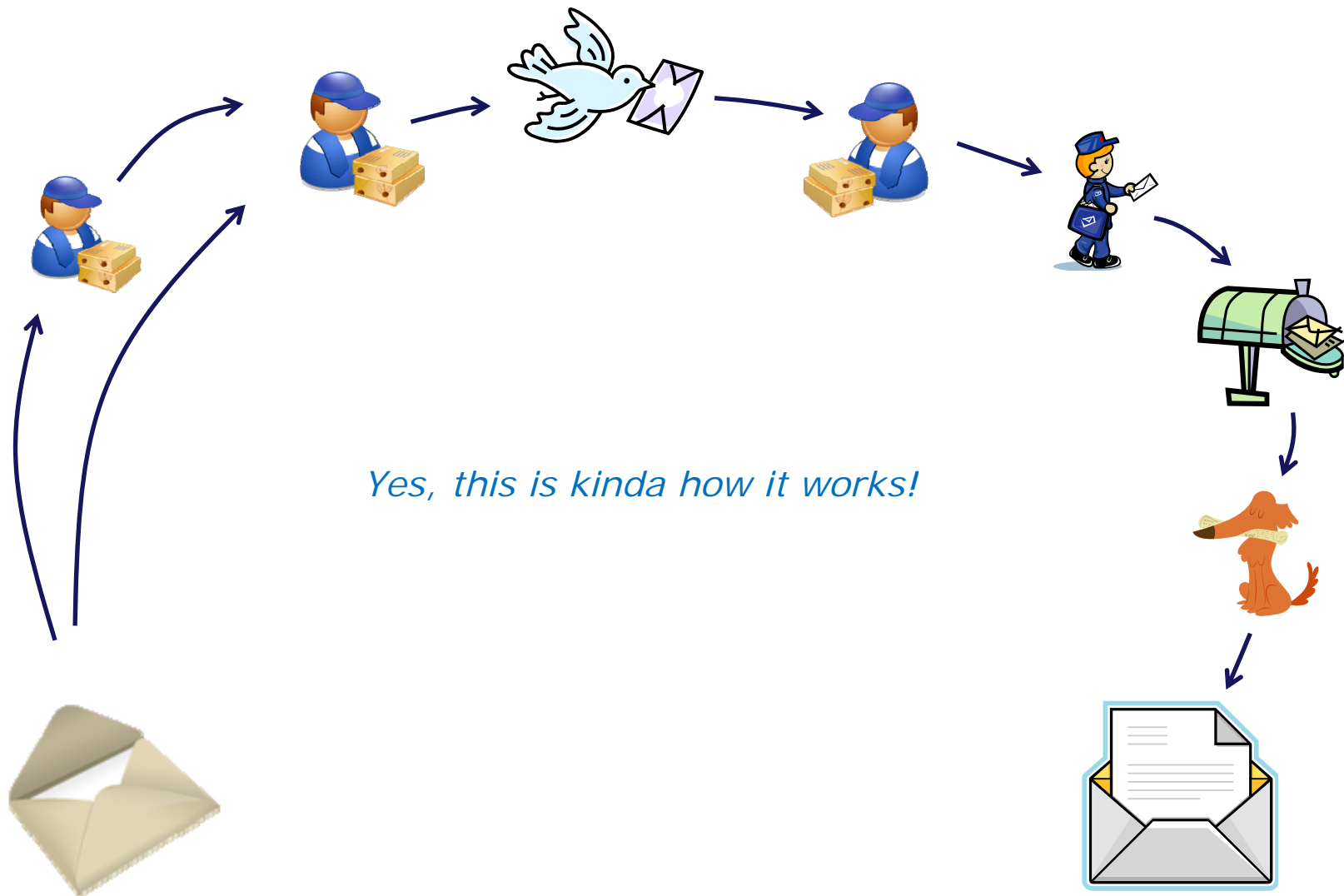
**This lecture is about configuring electronic mail, one of the most widely used internet programs in existence.**

**Electronic mail consists of many parts, from user interfaces to transfer protocols, and can be configured in numerous ways to make sending and receiving email transparent to users.**

Based on Jim Griffin's Lesson #13 on Configuring Email at:

- <http://www.cabrillo.edu/~jgriffin/CIS192/files/lesson13.html>

Overview of email

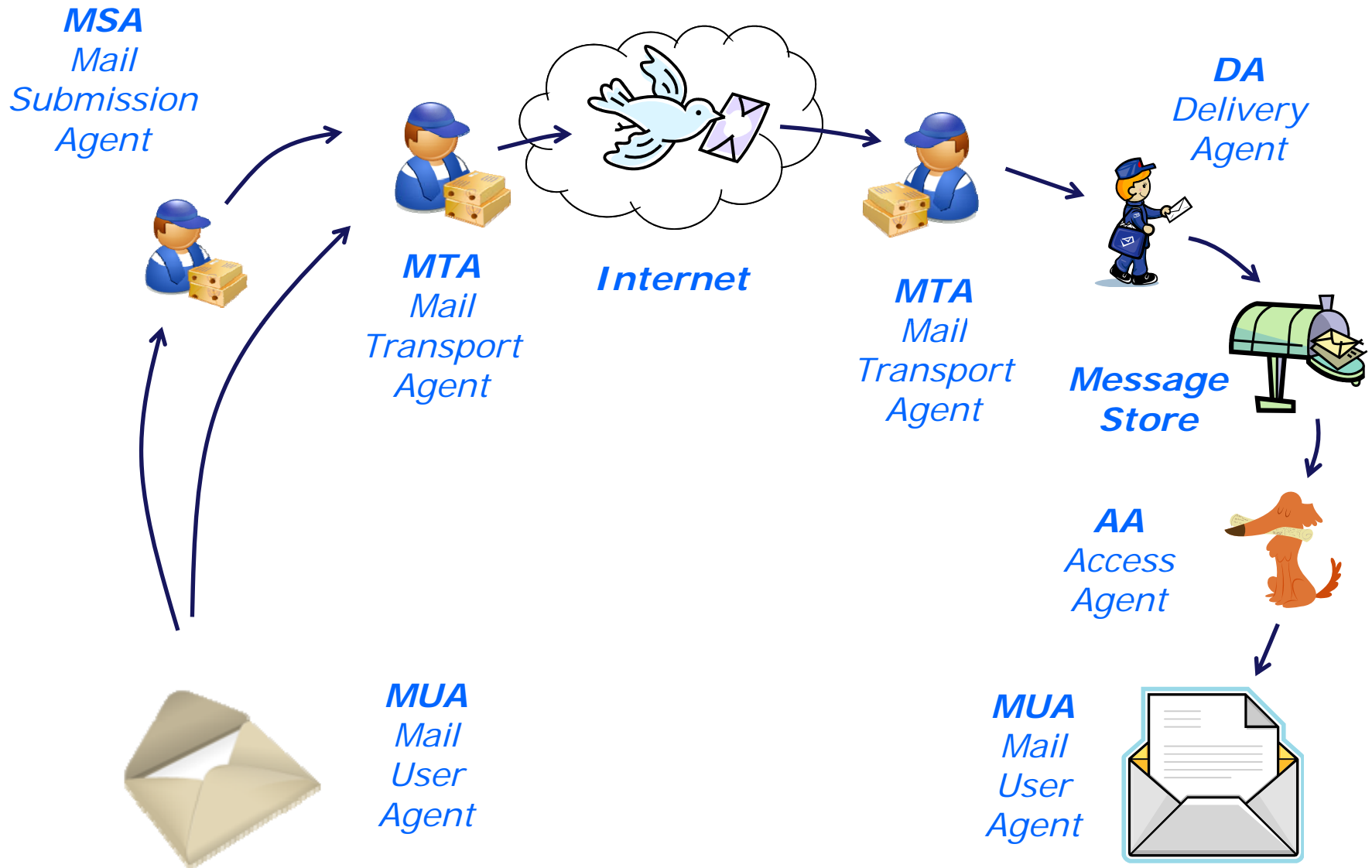


*Yes, this is kinda how it works!*

*compose and send message*

*open and read message* 18

# Overview of email

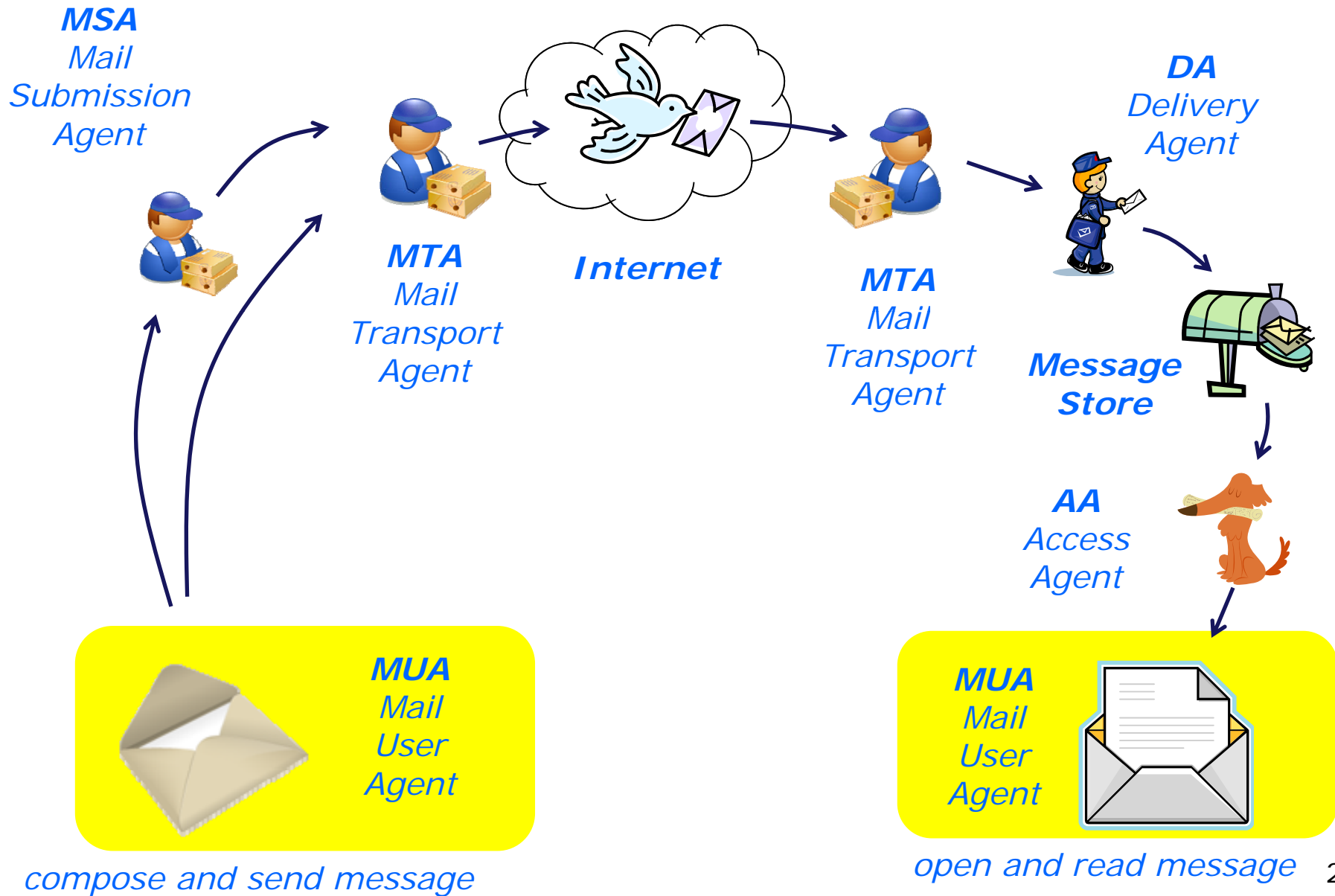


*compose and send message*

*open and read message* 19

**MUA**

Overview of email



## Mail User Agent (MUA)

### The Mail User Agent (MUA)

Clients that users use to create and read their mail messages. The more popular MUAs support the Multipurpose Internet Mail Extension (MIME) format for attaching files to messages.

Examples:

- Netscape Messenger
- Pine (University of Washington)
- Eudora (Qualcomm)
- Outlook (Microsoft)
- Evolution (Novell)
- /bin/mail (original UNIX email program)
- Yahoo Mail
- Gmail (Google)
- SquirrelMail

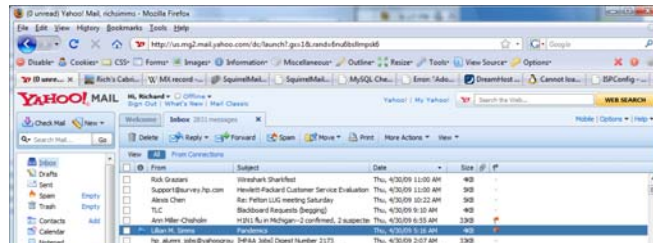
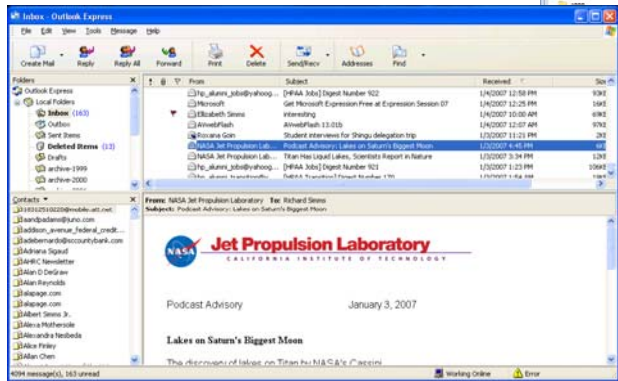
# CIS 192 - Lesson 12

## Mail User Agent (MUA)

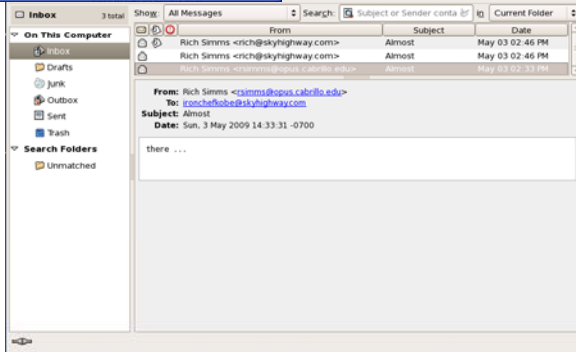
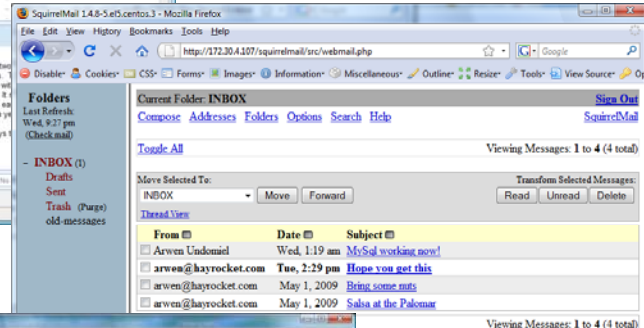
Yahoo Mail

Example MUAs

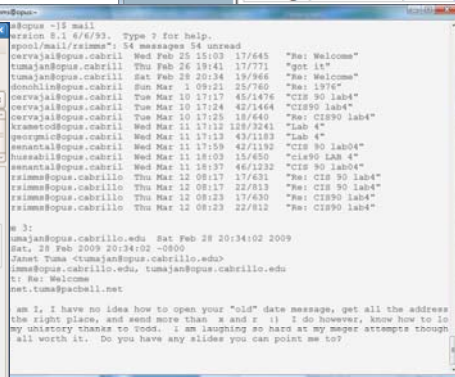
Outlook Express



SquirrelMail



Evolution



/bin/mail

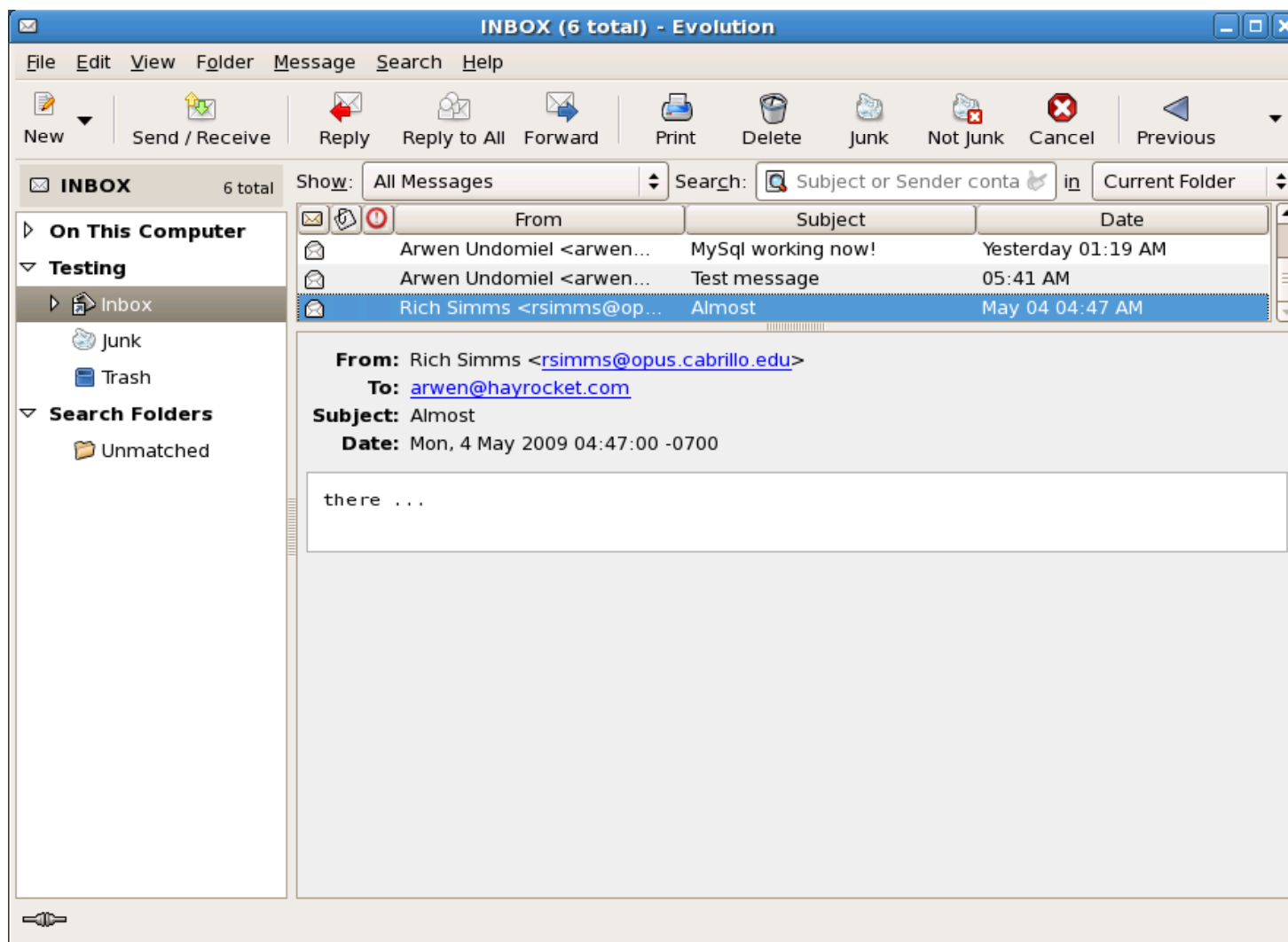
# MUA Survey

*What MUAs are you using ?*



# An email message

# email message



*Here is an example email message in the Evolution MUA intray*

email message

```
[rsimms@opus ~]$ mail arwen@hayrocket.com
Subject: Almost
there ...
.
Cc:
[rsimms@opus ~]$
```



*Sent using /bin/mail  
MUA on Opus*

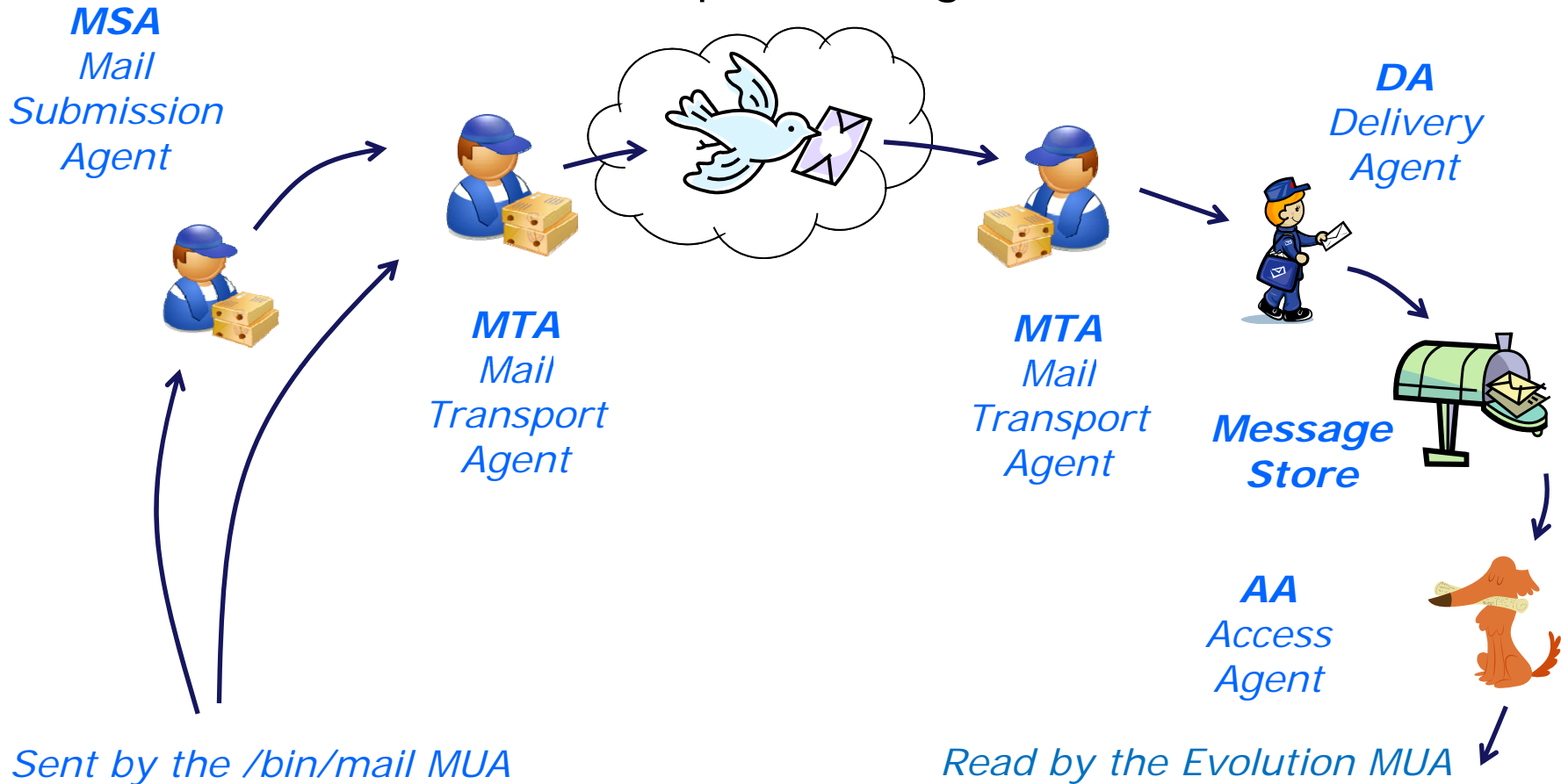


*Read using Evolution  
MUA on Arwen*

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

there ...

Example message



```
[rsimms@opus ~]$ mail arwen@hayrocket.com
Subject: Almost
there ...
.
Cc:
[rsimms@opus ~]$
```

```
From: Rich Simms <rsimms@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
Date: Mon, 4 May 2009 04:47:00 -0700

there ...
```



# email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

## Headers: property/value pairs

- defined by RFC2822
- added by MUA and MTAs

there ...

*Property*

*Value*

*Headers*

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
    TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
    requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTTP id
    5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
    (8.13.8/8.13.8) with ESMTTP id n44B10mF028559 for <arwen@hayrocket.com>;
    Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
    (8.13.8/8.13.8/Submit) id n44B10w0028558 for arwen@hayrocket.com; Mon, 4
    May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Body:*  
*Actual content of the message*

there ...

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
        TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
        requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTTP id
        5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
        (8.13.8/8.13.8) with ESMTTP id n44Bl0mF028559 for <arwen@hayrocket.com>;
        Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
        (8.13.8/8.13.8/Submit) id n44Bl0w0028558 for arwen@hayrocket.com; Mon, 4
        May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44Bl0w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

*Body* { there ...

# email message

*Notice that the MUA hides almost all of the header information for readability!*

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

there ...

Return-Path: <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
X-Original-To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Delivered-To: [x3836465@spaceymail-mx3.g.dreamhost.com](mailto:x3836465@spaceymail-mx3.g.dreamhost.com)  
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTTP id 5591018901E for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 05:23:49 -0700 (PDT)  
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu (8.13.8/8.13.8) with ESMTTP id n44B10mF028559 for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 04:47:00 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu (8.13.8/8.13.8/Submit) id n44B10w0028558 for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 04:47:00 -0700

[Date: Mon, 4 May 2009 04:47:00 -0700](#)  
[From: Rich Simms <\[rsimms@opus.cabrillo.edu\]\(mailto:rsimms@opus.cabrillo.edu\)>](#)  
[Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>](#)  
[To: \[arwen@hayrocket.com\]\(mailto:arwen@hayrocket.com\)](#)  
[Subject: Almost](#)  
[X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/](#)  
[Mime-Version: 1.0](#)

[there ...](#)

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*These headers were (most likely) added by the sender MUA*

there ...

Return-Path: <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
X-Original-To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Delivered-To: [x3836465@spaceymail-mx3.g.dreamhost.com](mailto:x3836465@spaceymail-mx3.g.dreamhost.com)  
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate requested) by [spaceymail-mx3.g.dreamhost.com](mailto:spaceymail-mx3.g.dreamhost.com) (Postfix) with ESMTP id 5591018901E for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 05:23:49 -0700 (PDT)  
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu (8.13.8/8.13.8) with ESMTP id n44B10mF028559 for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 04:47:00 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu (8.13.8/8.13.8/Submit) id n44B10w0028558 for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 04:47:00 -0700  
**Date:** Mon, 4 May 2009 04:47:00 -0700  
**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**Message-Id:** <200905041147.n44B10w0028558@opus.cabrillo.edu>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**X-Evolution-Source:** [imap://arwen%40hayrocket.com@mail.hayrocket.com/](mailto:imap://arwen%40hayrocket.com@mail.hayrocket.com/)  
**Mime-Version:** 1.0

there ...



## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Unofficial headers (not defined when mail was first specified) start with an "X-"*

there ...

Return-Path: <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**X-Original-To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com  
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTPE id 5591018901E for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 05:23:49 -0700 (PDT)  
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 04:47:00 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu (8.13.8/8.13.8/Submit) id n44B10w0028558 for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 04:47:00 -0700  
Date: Mon, 4 May 2009 04:47:00 -0700  
From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>  
To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Subject: Almost  
**X-Evolution-Source:** [imap://arwen%40hayrocket.com@mail.hayrocket.com/](mailto:imap://arwen%40hayrocket.com@mail.hayrocket.com/)  
Mime-Version: 1.0

there ...

## email message

*Each system that handles the message adds a Received header line to the message*

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

there ...

Return-Path: <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
X-Original-To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Delivered-To: [x3836465@spaceymail-mx3.g.dreamhost.com](mailto:x3836465@spaceymail-mx3.g.dreamhost.com)  
Received: from [opus.cabrillo.edu](mailto:opus.cabrillo.edu) ([opus.cabrillo.edu](mailto:opus.cabrillo.edu) [207.62.186.9]) (using TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate requested) by [spaceymail-mx3.g.dreamhost.com](mailto:spaceymail-mx3.g.dreamhost.com) (Postfix) with ESMTP id 5591018901E for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 05:23:49 -0700 (PDT)  
Received: from [opus.cabrillo.edu](mailto:opus.cabrillo.edu) ([opus](mailto:opus.cabrillo.edu) [127.0.0.1]) by [opus.cabrillo.edu](mailto:opus.cabrillo.edu) (8.13.8/8.13.8) with ESMTP id n44B10mF028559 for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 04:47:00 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by [opus.cabrillo.edu](mailto:opus.cabrillo.edu) (8.13.8/8.13.8/Submit) id n44B10w0028558 for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 04:47:00 -0700  
Date: Mon, 4 May 2009 04:47:00 -0700  
From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>  
To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Subject: Almost  
X-Evolution-Source: [imap://arwen%40hayrocket.com@mail.hayrocket.com/](mailto:imap://arwen%40hayrocket.com@mail.hayrocket.com/)  
Mime-Version: 1.0

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Each Received header line includes the name of the sender or sending system*

there ...

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
    TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
    requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTPE id
    5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
    (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <arwen@hayrocket.com>;
    Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
    (8.13.8/8.13.8/Submit) id n44B10w0028558 for arwen@hayrocket.com; Mon, 4
    May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Each Received header line includes the name of the receiving system*

there ...

Return-Path: <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
X-Original-To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Delivered-To: [x3836465@spaceymail-mx3.g.dreamhost.com](mailto:x3836465@spaceymail-mx3.g.dreamhost.com)  
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate requested) by [spaceymail-mx3.g.dreamhost.com](http://spaceymail-mx3.g.dreamhost.com) (Postfix) with ESMTPE id 5591018901E for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 05:23:49 -0700 (PDT)  
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by [opus.cabrillo.edu](http://opus.cabrillo.edu) (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 04:47:00 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by [opus.cabrillo.edu](http://opus.cabrillo.edu) (8.13.8/8.13.8/Submit) id n44B10w0028558 for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 04:47:00 -0700  
Date: Mon, 4 May 2009 04:47:00 -0700  
From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>  
To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Subject: Almost  
X-Evolution-Source: [imap://arwen%40hayrocket.com@mail.hayrocket.com/](mailto:imap://arwen%40hayrocket.com@mail.hayrocket.com/)  
Mime-Version: 1.0

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Each Received header line includes the version of sendmail (or whatever MTA is using)*

there ...

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
      TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
      requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTPE id
      5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
      (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <arwen@hayrocket.com>;
      Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
      (8.13.8/8.13.8/Submit) id n44B10w0028558 for arwen@hayrocket.com; Mon, 4
      May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Each Received header line includes the unique message ID while on the handling system.*

there ...

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
      TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
      requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTP id
      5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
      (8.13.8/8.13.8) with ESMTP id n44B10mF028559 for <arwen@hayrocket.com>;
      Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
      (8.13.8/8.13.8/Submit) id n44B10w0028558 for arwen@hayrocket.com; Mon, 4
      May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Each Received header line includes the recipient.*

there ...

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
      TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
      requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTPE id
      5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
      (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <arwen@hayrocket.com>;
      Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
      (8.13.8/8.13.8/Submit) id n44B10w0028558 for arwen@hayrocket.com; Mon, 4
      May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

there ...

## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*Each Received header line includes the date, time and offset from UTC.*

there ...

```
Return-Path: <rsimms@opus.cabrillo.edu>
X-Original-To: arwen@hayrocket.com
Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using
      TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate
      requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTPE id
      5591018901E for <arwen@hayrocket.com>; Mon, 4 May 2009 05:23:49 -0700 (PDT)
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu
      (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <arwen@hayrocket.com>;
      Mon, 4 May 2009 04:47:00 -0700
Received: (from rsimms@localhost) by opus.cabrillo.edu
      (8.13.8/8.13.8/Submit) id n44B10w0028558 for arwen@hayrocket.com; Mon, 4
      May 2009 04:47:00 -0700
Date: Mon, 4 May 2009 04:47:00 -0700
From: Rich Simms <rsimms@opus.cabrillo.edu>
Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>
To: arwen@hayrocket.com
Subject: Almost
X-Evolution-Source: imap://arwen%40hayrocket.com@mail.hayrocket.com/
Mime-Version: 1.0
```

there ...



## email message

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
**Subject:** Almost  
**Date:** Mon, 4 May 2009 04:47:00 -0700

*These headers were probably added by the delivery agent (DA)*

there ...

[Return-Path: <rsimms@opus.cabrillo.edu>](mailto:rsimms@opus.cabrillo.edu)

[X-Original-To: arwen@hayrocket.com](mailto:arwen@hayrocket.com)

[Delivered-To: x3836465@spaceymail-mx3.g.dreamhost.com](mailto:x3836465@spaceymail-mx3.g.dreamhost.com)

Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) (using TLSv1 with cipher DHE-RSA-AES256-SHA (256/256 bits)) (No client certificate requested) by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTPE id 5591018901E for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 05:23:49 -0700 (PDT)

Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu (8.13.8/8.13.8) with ESMTPE id n44B10mF028559 for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 04:47:00 -0700

Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu (8.13.8/8.13.8/Submit) id n44B10w0028558 for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 04:47:00 -0700

Date: Mon, 4 May 2009 04:47:00 -0700

From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>

Message-Id: <200905041147.n44B10w0028558@opus.cabrillo.edu>

To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)

Subject: Almost

X-Evolution-Source: [imap://arwen%40hayrocket.com@mail.hayrocket.com/](mailto:imap://arwen%40hayrocket.com@mail.hayrocket.com/)

Mime-Version: 1.0

there ...

Another  
email  
message

## Overview of email

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:33:31 -0700

there ...

### *Actual message content (the body)*

X-Spam-Checker-Version: SpamAssassin 3.2.5 (2008-06-10) on skyhighway.com  
X-Spam-Level:  
X-Spam-Status: No, score=0.0 required=1.0 tests=none autolearn=disabled  
version=3.2.5  
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) by  
skyhighway.com with ESMTTP id n43MAHLC058199 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 15:10:17 -0700 (PDT)  
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu  
(8.13.8/8.13.8) with ESMTTP id n43LXVXu025747 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 14:33:31 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu  
(8.13.8/8.13.8/Submit) id n43LXVOi025746 for [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com);  
Sun, 3 May 2009 14:33:31 -0700  
Date: Sun, 3 May 2009 14:33:31 -0700  
From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
Message-Id: <200905032133.n43LXVOi025746@opus.cabrillo.edu>  
To: [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
Subject: Almost  
X-Cruzio-Spamtrap: 2.5 (2009/02/25)  
X-CruzioSpamTrap: SpamAssassin Tagged vs 3  
X-CruzioSpamtrapClass: OK  
X-Evolution-Source: pop://[ironchefkobe%40skyhighway.com@mail.skyhighway.com](mailto:ironchefkobe%40skyhighway.com@mail.skyhighway.com)/  
Mime-Version: 1.0

there ...



## Overview of email

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
**Subject:** Almost  
**Date:** Sun, 3 May 2009

there ...

### *Route taken (the Received header lines)*

X-Spam-Checker-Version: SpamAssassin 3.2.5 (2008-06-10) on skyhighway.com

X-Spam-Level:

X-Spam-Status: No, score=0.0 required=1.0 tests=none autolearn=disabled  
version=3.2.5

Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) by  
skyhighway.com with ESMTTP id n43MAHLC058199 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 15:10:17 -0700 (PDT)

Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu  
(8.13.8/8.13.8) with ESMTTP id n43LXVXu025747 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 14:33:31 -0700

Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu  
(8.13.8/8.13.8/Submit) id n43LXVOi025746 for [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com);  
Sun, 3 May 2009 14:33:31 -0700

Date: Sun, 3 May 2009 14:33:31 -0700

From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>

Message-Id: <200905032133.n43LXVOi025746@opus.cabrillo.edu>

To: [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)

Subject: Almost

X-Cruzio-Spamtrap: 2.5 (2009/02/25)

X-CruzioSpamTrap: SpamAssassin Tagged vs 3

X-CruzioSpamtrapClass: OK

X-Evolution-Source: pop://[ironchefkobe%40skyhighway.com@mail.skyhighway.com](mailto:ironchefkobe%40skyhighway.com@mail.skyhighway.com)/

Mime-Version: 1.0

there ...



## Overview of email

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:33:31 -0700

there ...

### *Unofficial headers used for spam filtering*

X-Spam-Checker-Version: SpamAssassin 3.2.5 (2008-06-10) on skyhighway.com  
X-Spam-Level:  
X-Spam-Status: No, score=0.0 required=1.0 tests=none autolearn=disabled  
version=3.2.5  
Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) by  
skyhighway.com with ESMTTP id n43MAHLC058199 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 15:10:17 -0700 (PDT)  
Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu  
(8.13.8/8.13.8) with ESMTTP id n43LXVXu025747 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 14:33:31 -0700  
Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu  
(8.13.8/8.13.8/Submit) id n43LXVOi025746 for [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com);  
Sun, 3 May 2009 14:33:31 -0700  
Date: Sun, 3 May 2009 14:33:31 -0700  
From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
Message-Id: <200905032133.n43LXVOi025746@opus.cabrillo.edu>  
To: [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
Subject: Almost  
X-Cruzio-Spamtrap: 2.5 (2009/02/25)  
X-CruzioSpamTrap: SpamAssassin Tagged vs 3  
X-CruzioSpamtrapClass: OK  
X-Evolution-Source: pop://[ironchefkobe%40skyhighway.com@mail.skyhighway.com](mailto:ironchefkobe%40skyhighway.com@mail.skyhighway.com)/  
Mime-Version: 1.0

there ...



email  
with a  
picture

## MIME

### **MIME:**


- Basic email messages using the SMTP protocol are limited to 7-bit ASCII characters.
- To transfer 8-bit character files such as programs, images, and audio the 8-bit information must be encoded as 7-bit ASCII.
- MIME defines the content headers in the message and the set of transfer encodings.

## Overview of email

Message

**From:** Rich Simms <rich@skyhighway.com>  
**To:** Andy Simms  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:46:16 -0700  
▶ 1 attachment

there ...



**Sent by Outlook Express MUA containing message and photo**


X-Spam-Checker-Version: SpamAssassin 3.2.5 (2008-06-10) on skyhighway.com  
X-Spam-Level:  
X-Spam-Status: No, score=0.0 required=1.0 tests=HTML\_MESSAGE  
    autolearn=disabled version=3.2.5  
Received: from mail.cruzio.com (mail.cruzio.com [63.249.95.37]) by  
    skyhighway.com with ESMTP id n43Lk8nb093539 for  
    <ironchefkobe@skyhighway.com>; Sun, 3 May 2009 14:46:08 -0700 (PDT)  
Received: from shrekster (dsl-63-249-103-107.dhcp.cruzio.com  
    [63.249.103.107]) by mail.cruzio.com with SMTP id n43Lk87K000805 for  
    <ironchefkobe@skyhighway.com>; Sun, 3 May 2009 14:46:08 -0700 (PDT)  
Message-ID: <96E1021BA6E445DAB309031CDACA3428@shrekster>  
From: "Rich Simms" <rich@skyhighway.com>  
To: "Andy Simms \ (sky\)" <ironchefkobe@skyhighway.com>  
Subject: Almost  
Date: Sun, 3 May 2009 14:46:16 -0700  
MIME-Version: 1.0  
Content-Type: multipart/mixed; boundary="----  
    =\_NextPart\_000\_000A\_01C9CBFD.E97D30B0"  
X-Priority: 3  
X-MSMail-Priority: Normal  
**X-Mailer: Microsoft Outlook Express 6.00.2900.5512**  
X-MimeOLE: Produced By Microsoft MimeOLE V6.00.2900.5579  
X-Cruzio-Spamtrap: 2.5 (2009/02/25)  
X-CruzioSpamTrap: SpamAssassin Tagged vs 3  
X-CruzioSpamtrapClass: OK  
X-Evolution-Source: pop://ironchefkobe%40skyhighway.com@mail.skyhighway.com/

Photo

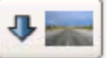




Overview of email

**From:** Rich Simms <...>  
**To:** Andy Simms <...>  
**Subject:** Almost  
**Date:** Sun, 3 May 20...

▶ 1 attachment 

there ...

  JPEG image



*Message body: both plain and HTML text (for fonts and colors)*

This is a multi-part message in MIME format.

```
-----_NextPart_000_000A_01C9CBFD.E97D30B0
Content-Type: multipart/alternative; boundary="-----
=_NextPart_001_000B_01C9CBFD.E97D30B0"

-----_NextPart_001_000B_01C9CBFD.E97D30B0
Content-Type: text/plain; charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

there ...


-----_NextPart_001_000B_01C9CBFD.E97D30B0
Content-Type: text/html; charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML><HEAD>
<META http-equiv=3DContent-Type content=3D"text/html; =
charset=3Diso-8859-1">
<META content=3D"MSHTML 6.00.6000.16809" name=3DGENERATOR>
<STYLE></STYLE>
</HEAD>
<BODY bgColor=3D#ffffff>
<DIV><FONT face=3DArial size=3D2></FONT>&nbsp;</DIV>there =
...</BODY></HTML>
```

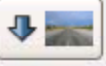

*html* {


*plain* ← there ...

## Overview of email

**From:** Rich Simms <rich@ckhighway.com>  
**To:** Andy Simms  
**Subject:** Almost  
**Date:** Sun, 3 May 2006  
**1 attachment** 

there ...

  JPEG image



### MIME content headers

This is a multi-part message in MIME format.

```
-----=_NextPart_000_000A_01C9CBFD.E97D30B0
Content-Type: multipart/alternative; boundary="-----
=_NextPart_001_000B_01C9CBFD.E97D30B0"

-----=_NextPart_001_000B_01C9CBFD.E97D30B0
Content-Type: text/plain; charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

there ...

-----=_NextPart_001_000B_01C9CBFD.E97D30B0
Content-Type: text/html; charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML><HEAD>
<META http-equiv=3DContent-Type content=3D"text/html; =
charset=3Diso-8859-1">
<META content=3D"MSHTML 6.00.6000.16809" name=3DGENERATOR>
<STYLE></STYLE>
</HEAD>
<BODY bgColor=3D#ffffff>
<DIV><FONT face=3DArial size=3D2></FONT>&nbsp;</DIV>there =
...</BODY></HTML>
```

Overview of email

**From:** Rich Simms <rich@skyhighway.com>  
**To:** Andy Simms (sky) <ironchefkobe@skyhighway.com>  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:46:16 -0700

1 attachment Save

there ...

JPEG image att



encoded  
jpeg

*Message body: jpeg image encoded into 7-bit ASCII*

-----=\_NextPart\_001\_000B\_01C9CBFD.E97D30B0--

-----=\_NextPart\_000\_000A\_01C9CBFD.E97D30B0

Content-Type: image/jpeg; name="almost.jpg"

Content-Transfer-Encoding: base64

Content-Disposition: attachment; filename="almost.jpg"

```
/9j/4AAQSkZJRgABAQAAZABkaAD/7AARRHVja3kAAQAEAAAHAHgAA/+4ADkFkb2JlAGTAAAAAF/b
AIQAEAsLCwwLEAwMEBcPDQ8XGxQQEBQbHxcXFxcXHx4XGhoaGhceHiMlJyUjHi8vMzMvL0BAQEBA
QEBAQEBAQEBAQAERDw8RExEVEhIVFBEUERQaFByWFBomGhocGhomMCMehH4eIzArLicnJy4rNTUw
MDU1QEA/QEBAQEBAQEBAQEBA/8AAEQgAlgDIawEiAAIRAQMRAF/EAI0AAAIDAQEAAAAAAAAAAAAA
AAIDAAEEBQYBAQEBAQEAAAAAAAAAAAAAAAAABAgMEEAABAwIEBAUBBQcEawAAAAABABECIQMxQRIE
UWFxgZEiMhMFUqHB0UIU8LHxcpJDU2KCIxXhMzQRAQACAQIFBAIDAAAAAAAAAAAAABEQIhejFRYVID
QXGBE6EyKQQU/9oADAMBAAIRAxEAPwDTEAh0YmDSSqIiPzVV+U59163EZ0ipVe5E0d+SEyikeupq
0+kB0DYCMqEBkUxacZNwSX1Bya8sVYje5seJTXmh+mw7s48VZnA4CgSgIQDCpPFGNMRRuZCoKriW
AcIhKMMBXiUAINQ5UarkDogsyncLow5IxCMa0QHJzJQvcxAZTzkv4oCNCZMOAUFyMA0HkTiUIgSXJ
cI4xlk0RyQUPelVtI5oqgVkJZHGMEUY8a9VZryHBQLD4mnLNXiDiRzRamwoheuNFRGcYNYAdTTwqq
fsoKnjlRFaJmsjpyVCINZYDiJmUwChkMWcpYXQ4DV0wUPuZDsJlE5dgg1NgFQoiQxLdA6iYbk1E
+Ec/VTorej5oQxwVsVmmrXGqIFgzOhAKtigKJINKBESSgYqwEDA7ZIo0pilBFXigapjiwQAnBWqC
c40ir9VOiAHgrccaIhgROcj4JWquKrUOKKa8nxdTUUsSHEqXMPihZlVflGKW6sEIg/L1U1ACgQ6o
< snipped >
9gjOTcf2dRRBdsy1ScVzw7Lr/Gv+nP8AMVFFx8/6fMOni/b4c25q9642Oouq8ueKii6Rwj2YnjKU
zwYPwSp40wzUUVRI6qtjlxWW4IfrrZjJp/mABwUUVG7qPBF5m5KKKCi+TupF68OGaiiBkcNwbcCw
SNZaWXHsooqgBLcPplHyN5ZBsPFRRRB//9k=
```

-----=\_NextPart\_000\_000A\_01C9CBFD.E97D30B0--

Overview of email

From: Rich Simms <rich@skyhighway.com>  
To: Andy Simms (sky) <ironchefkobe@skyhighway.com>  
Subject: Almost  
Date: Sun, 3 May 2009 14:46:16 -0700

1 attachment

there ...



*MIME content headers for jpeg images*

-----=\_NextPart\_001\_000B\_01C9CBFD.E97D30B0--

-----=\_NextPart\_000\_000A\_01C9CBFD.E97D30B0

Content-Type: image/jpeg; name="almost.jpg"

Content-Transfer-Encoding: base64

Content-Disposition: attachment; filename="almost.jpg"

```
/9j/4AAQSkZJRgABAgAAZABkaAD/7AARRHVja3kAAQAEAAAHAHgAA/+4ADkFkb2JlAGTAAAAAF/b
AIQAEASLCwwLEAwMEBcPDQ8XGxQQEBQbHxcXFxcXHx4XGhoaGhceHiMlJyUjHi8vMzMvL0BAQEBA
QEBAQEBAQEBAQAERDw8RExEVEhIVFBEUERQaFByWFBomGhocGhomMCMehH4eIzArLicnJy4rNTUw
MDU1QEBA/QEBAQEBAQEBAQEBA/8AAEQgAlgDIawEiAAIRAQMRAF/EAI0AAAIDAQEAAAAAAAAAAAAA
AAIDAAEEBQYBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBAQEBA
UWFxgZEiMhMFUqHB0UIU8LHxcpJDU2KCIxXhMzQRAQACAQIFBAIDAAAAAAAAAAAAABEQIhEjFRYVID
QXGBE6EyKQQU/9oADAMBAAIRAxEAPwDTEAh0YmDSSqIiPzVV+U59163EZ0ipVe5E0d+SEyikeUpq
0+kB0DYCMqEBkUxacZNwSX1Bya8sVYjE5seJTXmh+mw7s48VZnA4CgSgIQDCpPFGNMRRuZCoKRiW
AcIhKMMBXiUAINQ5UarkDogsyncL0w5IxCMa0QHzJQvcxAZTzkv4oCNcZMOAUFyMA0HkTiUIgSXJ
ci4xlk0RyQUPelvtI5oqgVkhZhgMEUY8a9VZryHBQLD4mnLNXiDirzRamwoheuNFRGcYNYAdTTwqq
fsoKnj1RFaJmsjppjyVCINZYDijMuWChkMwcpYXQ4DV0wUPuZDsJlE5dgq1NgFQoiQxLdA6iYbk1E
+Ec/VTorej5oQxwVsVmmrXGqIFgzOhAKtigKJINKBESSgYqwEDA7ZIo0pilBFXigapjiwQAnBWqC
c40ir9VoIAHgrccaIhgROcj4JWquKrUOKKa8nxdTUUsSHEqxMPihz1VflGKW6sEIg/L1U1ACgQ6o
< snipped >
9gjOTcf2dRRBdsylScVzw7Lr/Gv+nP8AMVFFx8/6fMOni/b4c25q9642Oouq8ueKii6Rwj2YnjKU
zwYPwSp40wzUUVRI6qtjlxwW4IfrrZjJp/mABwUUVG7qPBF5m5KKKCi+TupF68OGaiiBkcWbcCw
SNZaWXHsooqgBLcPplHyN5ZBsPFRRRB//9k=
```

-----=\_NextPart\_000\_000A\_01C9CBFD.E97D30B0--

## Viewing message headers

**Work solo or with a partner and login to your favorite web-based email MUA:**

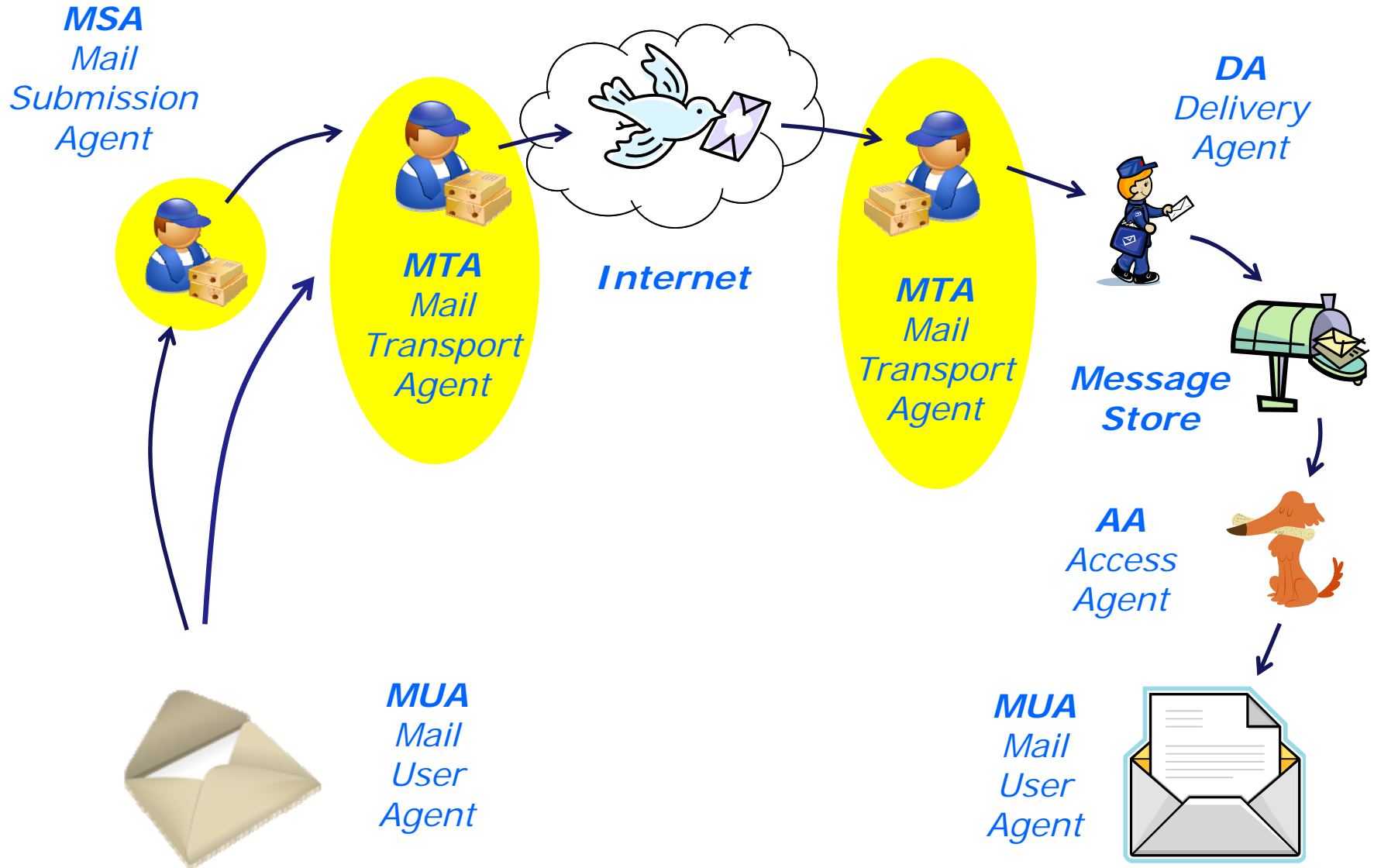
- Select a message
- View the headers
- Try and identify the route the message took across the Internet
- Identify the different MIME content types
- View the unofficial headers
- Find a message with an encoded jpeg

*For Yahoo! mail , select message, Actions > View Full Header  
For Gmail, open message, "Down Arrow" icon > Show original  
For SquirrelMail, open message, click View Full Header*

**MTA**

**MSA**

Overview of email



*compose and send message*

*open and read message* 55



## Mail Transport Agents

*MTAs are responsible for getting messages from point A to point B. They also receive incoming mail from other MTAs.*

**MTA**



### **Example implementations:**

- sendmail (most widespread usage)
- Qmail (security aware, public domain)
- Exim (highly configurable, GNU license)
- Microsoft Exchange Server (proprietary)
- Postfix (IBM public license)

*They are analogous to the Internet layer of the network stack.*

*They use destination addresses, aliases and distribution lists to route mail to one or more users.*





## Mail Transport Agents

**MTA**



### Mail Transport Agents

- Use SMTP protocol (RFC 821)
- Or Extended SMTP protocol
- Uses port 25

**MSA**



*MSAs (Mail Submission Agents) use port 587 and can offload the MTA by performing some of the pre-processing activities (finding and logging errors, verifying hostnames, fixing headers etc.)*

Overview of email

DNS MX records

Where is the mail server for skyhighway.com users?

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:33:31 -0700

there ...

DNS MX records

[rsimms@opus ~]\$ **dig mx skyhighway.com**

```

; <<>> DiG 9.3.4-P1 <<>> mx skyhighway.com
;; global options: printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 59217
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 1

;; QUESTION SECTION:
;skyhighway.com.                IN      MX

;; ANSWER SECTION:
skyhighway.com.                81181  IN      MX      10 iol-sec.cruzio.com.
skyhighway.com.                81181  IN      MX      5 mail.skyhighway.com.

;; AUTHORITY SECTION:
skyhighway.com.                81181  IN      NS      iol-sec.cruzio.com.
skyhighway.com.                81181  IN      NS      iol.cruzio.com.

;; ADDITIONAL SECTION:
mail.skyhighway.com.           81181  IN      A       63.249.82.6

```

mail.skyhighway.com has the highest priority (5)

# MTA SMTP commands

## Sending an email using SMTP

### Some SMTP commands

HELO *sendinghostname*

*Initiate SMTP conversation*

EHLO *sendinghostname*

*Initiate extended SMTP conversation*

MAIL From: *<source email address>*

*Source*

RCPT To: *<destination email address>*

*Destination*

DATA

*Message body*

QUIT

*End connection*

## Sending an email using SMTP – Cruzio SMTP server



*This has got to be the most basic of MUAs - using telnet!*

```
[root@arwen ~]# telnet mx.cruzio.com 25    SMTP uses port 25
Trying 63.249.95.37...
Connected to mx.cruzio.com (63.249.95.37).
Escape character is '^]'.
220 mail.cruzio.com ESMTP ready at Mon, 4 May 2009 10:21:49 -0700 (PDT)
ehlo arwen
250-mail.cruzio.com Hello dsl-63-249-103-107.dhcp.cruzio.com
[63.249.103.107], pleased to meet you
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-8BITMIME
250-SIZE 25000000
250-DSN
250-ETRN
250-DELIVERBY
250 HELP
mail from: rich@hayrocket.com
250 2.1.0 rich@hayrocket.com... Sender ok
rcpt to: arwen@hayrocket.com
250 2.1.5 arwen@hayrocket.com... Recipient ok
```

## Sending an email using SMTP – Cruzio SMTP server



*This has got to be the most basic of MUAs - using telnet!*

### **data**

354 Enter mail, end with "." on a line by itself

**Date: May 4, 2009**

**From: Rich**

**Reply-to: rich@hayrocket.com**

**Message-ID: one**

**Subject: Manual SMTP message**

**Hi Arwen,**

**Almost there ...**

**- Rich**

.

250 2.0.0 n44HLnNw035164 Message accepted for delivery

### **quit**

221 2.0.0 mail.cruzio.com closing connection

Connection closed by foreign host.

[root@arwen ~]#

## Sending an email using SMTP – Cruzio SMTP server



*Voila ... the message is sent and it arrives in our intray*

SquirrelMail 1.4.8-5.el5.centos.3 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://172.30.4.107/squirrelmail/src/webmail.php

Disable Cookies CSS Forms Images Information Miscellaneous Outline Resize Tools View Source Options

Current Folder: **INBOX** [Sign Out](#)

[Compose](#) [Addresses](#) [Folders](#) [Options](#) [Search](#) [Help](#) [SquirrelMail](#)

[Message List](#) [Delete](#) Previous | [Next](#) [Forward](#) [Forward as Attachment](#) [Reply](#) [Reply All](#)

**Subject:** Manual SMTP message  
**From:** Rich@mail.cruzio.com  
**Date:** Wed, December 31, 1969 9:00 am  
**To:** undisclosed-recipients;  
**Priority:** Normal  
**Options:** [View Full Header](#) | [View Printable Version](#) | [Download this as a file](#)

Hi Arwen,  
Almost there ...  
- Rich

Delete & Prev | [Delete & Next](#)

Move to: INBOX

Done

## Sending an email using SMTP – Cruzio SMTP server



### *View of the headers*

SquirrelMail 1.4.8-5.el5.centos.3 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://172.30.4.107/squirrelmail/src/webmail.php

Disable Cookies CSS Forms Images Information Miscellaneous Outliner Resizer Tools View Source Options

**Folders**  
Last Refresh: Thu, 9:01 am (Check mail)

- INBOX (3)
  - Drafts
  - Sent
  - Trash (Purge)
  - old-messages

Current Folder: INBOX [Sign Out](#)

[Compose](#) [Addresses](#) [Folders](#) [Options](#) [Search](#) [Help](#) [SquirrelMail](#)

Viewing Full Header - [View message](#)

Return-Path: <[rich@hayrocket.com](mailto:rich@hayrocket.com)>  
X-Original-To: [arwen@hayrocket.com](mailto:arwen@hayrocket.com)  
Delivered-To: [x3836465@spaceymail-mx3.g.dreamhost.com](mailto:x3836465@spaceymail-mx3.g.dreamhost.com)  
Received: from mail.cruzio.com (mail.cruzio.com [63.249.95.37])  
by spaceymail-mx3.g.dreamhost.com (Postfix) with ESMTP id EEBD4189025  
for <[arwen@hayrocket.com](mailto:arwen@hayrocket.com)>; Mon, 4 May 2009 10:25:26 -0700 (PDT)  
Received: from arwen (dsl-63-249-103-107.dhcp.cruzio.com [63.249.103.107])  
by mail.cruzio.com with ESMTP id n44HLnNw035164  
for [arwen@hayrocket.com](mailto:arwen@hayrocket.com); Mon, 4 May 2009 10:22:51 -0700 (PDT)  
Date: May 4, 2009  
From: [Rich@mail.cruzio.com](mailto:Rich@mail.cruzio.com)  
Reply-To: [rich@hayrocket.com](mailto:rich@hayrocket.com)  
Message-ID: one  
Subject: Manual SMTP message  
To: undisclosed-recipients: ;

Done



## Sending an email using SMTP – Hershey SMTP server



*This has got to be the most basic of MUAs - using telnet!*

```
[simms@hershey rsimms]$ telnet hershey 25      SMTP uses port 25
Trying 127.0.0.1...
Connected to hershey.
Escape character is '^]'.
220 hershey.localdomain ESMTP Sendmail 8.12.8/8.12.8; Wed, 5 May 2010
14:00:44 -0700
ehlo hershey
250-hershey.localdomain Hello hershey [127.0.0.1], pleased to meet you
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-8BITMIME
250-SIZE
250-DSN
250-ETRN
250-DELIVERBY
250 HELP
```

## Sending an email using SMTP – Hershey SMTP server



*This has got to be the most basic of MUAs - using telnet!*

**mail from: simms@middleearth.net**

250 2.1.0 simms@middleearth.net... Sender ok

**rcpt to: simms**

250 2.1.5 simms... Recipient ok

**data**

354 Enter mail, end with "." on a line by itself

**Date: May 5, 2010**

**From: Benji Simms**

**Reply-to: Benji Simms**

**Message-ID: one**

**Subject: Salsa**

**Don't forget ... Salsa tonight at the Palomar!**

.

250 2.0.0 o45L0i6A000767 Message accepted for delivery

**quit**

221 2.0.0 hershey.localdomain closing connection

Connection closed by foreign host.

## Sending an email using SMTP – Hershey SMTP server



*This has got to be the most basic of MUAs - using telnet!*

```
[simms@hershey simms]$ mail
Mail version 8.1 6/6/93.  Type ? for help.
"/var/spool/mail/simms": 6 messages 1 new 3 unread
  1 rsimms@hershey.local  Wed May  5 08:18  47/1388  "Motorpsycho (part1)"
  2 rsimms@hershey.local  Wed May  5 08:18  46/1375  "Motorpsycho (part2)"
U  3 rsimms@hershey.local  Wed May  5 08:18  46/1421  "Motorpsycho (part3)"
U  4 rsimms@hershey.local  Wed May  5 08:18  46/1370  "Motorpsycho (part4)"
  5 rsimms@hershey.local  Wed May  5 08:18  34/1030  "Motorpsycho (part5)"
>N 6 Benji.Simms@hershey.  Wed May  5 14:04  13/423   "Salsa"
& 6
Message 6:
From simms@middleearth.net  Wed May  5 14:04:37 2010
Date: May 5, 2010
From: Benji.Simms@hershey.localdomain
Reply-to: Benji.Simms@hershey.localdomain
Subject: Salsa

Don't forget ... Salsa tonight at the Palomar!

&
```



## Send yourself an email on Hershey

### telnet hershey 25

**ehlo** *hostname*

**mail from:** *username@middleearth.net*

**rcpt to:** *username*

**data**

**Subject: Manual SMTP message**

**This is now my favorite way  
to send emails!**

.

**quit**

andes  
armstrong  
bobisuthi  
collins  
crivello  
dahlin  
hsieh  
huberlantz  
hutmacher  
lee  
lopez  
mambulu  
ordaz  
ortega  
prager  
rivas  
ross  
saenz  
simms  
unruh

MTA  
sendmail

## Mail Transport Agent Sendmail

### Sendmail

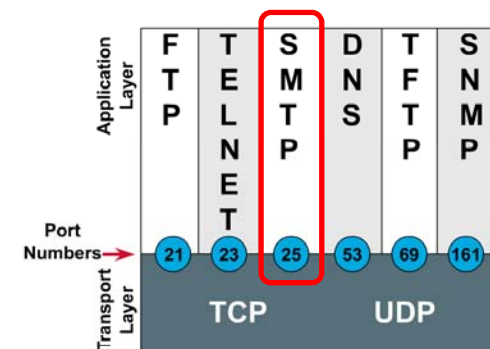
- Uses port 25 (SMTP – Simple Mail Transport Protocol)
- Mail router - controlled by /etc/mail/sendmail.cf
- Aliases - maintained in /etc/aliases
- Name resolution - using DNS records and /etc/hosts files
- User options - vacation notification and mail forwarding

```
[root@elrond ~]# cat /etc/services | grep -w 25
```

```
smtp      25/tcp    mail
smtp      25/udp    mail
```

<snipped>

Port Numbers



SMTP uses TCP port 25

## The default sendmail configuration

### Incoming mail:

- delivered locally if the destination exists
- rejected and returned to sender if the destination user does not exist
- forwarded to remote system if destined for another system (@hostname.dom)
- Mail to this system's postmaster is delivered to root.

### Outgoing mail:

- delivered directly to the system in the address
- Append the FQDN to the sender's user name

## Modifying the sendmail configuration

Must change the sendmail.cf file to do any of the following:

- To use a central mail server and you need to forward all mail to that server
- To configure your server as a central mail server
- To use other mail channels

### *Mail channels*

- *badhost* - for mail with un-resolvable destination hostname
- *baduser* - for non-existing users
- *SMTP* - for mail to be sent using SMTP
- *UUCP* - for mail to be sent using UNIX to UNIX Copy program
- *local* - for mail that is to be delivered locally



## sendmail configuration

```
[root@elrond ~]# service sendmail status  
sendmail (pid 2204) is running...
```

```
[root@elrond ~]# netstat -tln  
Active Internet connections (only servers)  
Proto Recv-Q Send-Q Local Address           Foreign Address         State  
tcp      0      0 127.0.0.1:2208          0.0.0.0:*                 LISTEN  
tcp      0      0 0.0.0.0:111            0.0.0.0:*                 LISTEN  
tcp      0      0 0.0.0.0:6000           0.0.0.0:*                 LISTEN  
tcp      0      0 127.0.0.1:631          0.0.0.0:*                 LISTEN  
tcp      0      0 127.0.0.1:25           0.0.0.0:*                 LISTEN  
tcp      0      0 127.0.0.1:2207          0.0.0.0:*                 LISTEN  
tcp      0      0 0.0.0.0:703            0.0.0.0:*                 LISTEN  
tcp      0      0 :::6000                 :::*                     LISTEN  
tcp      0      0 :::22                   :::*                     LISTEN  
[root@elrond ~]#
```

*Note: sendmail is already installed and running on the CentOS VMs*

# email aliases

## Configuring mail aliases

- expand a single name to many users
- create mailing lists
- append mail to files, possibly for archival purposes\*
- filter mail through programs or shell scripts
- after editing /etc/aliases file, you must run:
  - the **newaliases** command
  - or **service sendmail restart**

*In the text book (p. 547) they had this nice alias: **complaints: /dev/null***

## sendmail configuration - alias example

edit /etc/aliases:

```
[root@arwen html]# tail -1 /etc/aliases
```

```
student: cis192
```

```
[root@arwen html]#
```

*Add this line to the end of the file to create the alias **student** for the existing **cis192** account*

```
[root@arwen bin]# newaliases
```

```
/etc/aliases: 77 aliases, longest 10 bytes, 775 bytes total
```

```
[root@arwen html]# mail student
```

```
Subject: Quiz soon
```

```
study hard
```

```
.
```

```
Cc:
```

```
[root@arwen html]# su - cis192
```

```
[cis192@arwen ~]$ mail
```

```
Mail version 8.1 6/6/93. Type ? for help.
```

```
"/var/spool/mail/cis192": 1 message 1 new
```

```
>N 1 root@arwen.localdoma Fri May 1 01:50 16/624 "Quiz soon"
```

```
& 1
```

```
Message 1:
```

```
From root@arwen.localdomain Fri May 1 01:50:33 2009
```

```
Date: Fri, 1 May 2009 01:50:32 -0700
```

```
From: root <root@arwen.localdomain>
```

```
To: student@arwen.localdomain
```

```
Subject: Quiz soon
```

```
study hard
```

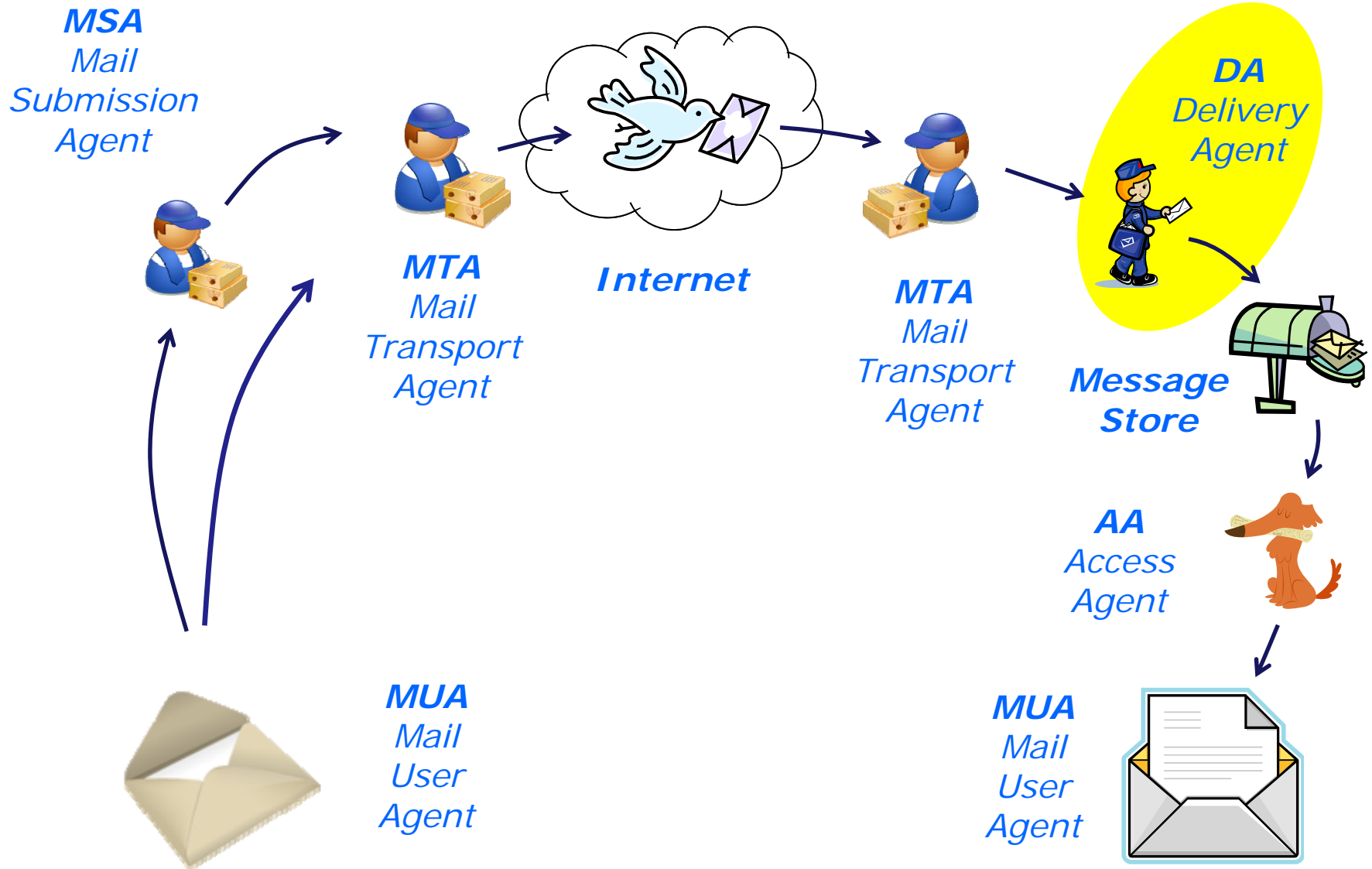
*Because of the alias, the mail sent to student goes to the cis192 user*

## Mail aliases

- Add an alias of student to cis192 in /etc/aliases on Elrond  
student: cis192
- Send an email to student with **mail student**
- Use **newaliases** or **service sendmail restart**
- **su – cis192** and read your message with **mail**

DA

Overview of email



compose and send message

open and read message 79

## Delivery Agents

*Delivery agents deliver the mail to the recipient's mailbox. Mail can be delivered to a mailbox, a distribution list and to a program.*

**DA**  
*Delivery  
Agent*



### Examples:

- fetchmail - used when fetching mail from a remote (ISP's) server
- procmail - can be configured to filter and process mail as it delivers
- smrsh - a restricted shell to replace the use of sh for delivering mail to programs

*We will use fetchmail in Lab 9 to pull mail from your ISP's mailbox and read it locally using /bin/mail.*



# Fetchmail Example



**DA**  
Delivery  
Agent

Current Folder: INBOX [Sign Out](#)

[Compose](#) [Addresses](#) [Folders](#) [Options](#) [Search](#) [Help](#) [Calendar](#)

[Toggle All](#) Viewing Messages: 1 to 11 (11 total)

Move Selected To:    Transform Selected Messages:

From	Date	Subject
<input type="checkbox"/> Benji Simms	10:38 am	<a href="#">test from evolution</a>
<input type="checkbox"/> simms@hayrocket.com	10:46 am	<a href="#">test from webmail</a>
<input type="checkbox"/> Rich Simms	8:37 am	<a href="#">Motorpsycho (part5)</a>
<input type="checkbox"/> Rich Simms	8:37 am	<a href="#">Motorpsycho (part4)</a>
<input type="checkbox"/> Rich Simms	8:37 am	<a href="#">Motorpsycho (part2)</a>
<input type="checkbox"/> Rich Simms	8:37 am	<a href="#">Motorpsycho (part3)</a>
<input type="checkbox"/> Rich Simms	8:37 am	<a href="#">Motorpsycho (part1)</a>
<input type="checkbox"/> Rich Simms	Tue, 10:57 pm	<a href="#">Star Wars</a>
<input type="checkbox"/> Rich Simms	Tue, 10:53 pm	<a href="#">Star Wars</a>
<input type="checkbox"/> Rich Simms	Tue, 10:53 pm	<a href="#">Star Wars</a>
<input type="checkbox"/> Rich Simms	Tue, 10:40 pm	<a href="#">101</a>

[Toggle All](#) Viewing Messages: 1 to 11 (11 total)

*Viewing received messages using SquirrelMail (a web based MUA)*

*Messages are arriving on the simms@hayrocket.com account*

# Fetchmail Example



**DA**  
Delivery  
Agent

*Hidden file in user's home directory*

```
[cis192@elrond ~]$ cat .fetchmailrc
poll mail.hayrocket.com protocol pop3
username simms@hayrocket.com
password ██████████
keep
```

*Keeps a copy of each message on the server*

*fetchmail is a delivery agent that can be used to pull down messages into the local mail store*

```
[cis192@elrond ~]$
[cis192@elrond ~]$ fetchmail
fetchmail: Server CommonName mismatch: *.mail.dreamhost.com != mail.hayrocket.com
fetchmail: Server certificate verification error: unable to get local issuer certificate
fetchmail: Server certificate verification error: certificate not trusted
fetchmail: Server certificate verification error: unable to verify the first certificate
11 messages for simms@hayrocket.com at mail.hayrocket.com (13976 octets).
reading message simms@hayrocket.com@mail.hayrocket.com:1 of 11 (992 octets) not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:2 of 11 (1027 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:3 of 11 (1028 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:4 of 11 (1028 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:5 of 11 (1676 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:6 of 11 (1739 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:7 of 11 (1694 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:8 of 11 (1690 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:9 of 11 (1338 octets). not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:10 of 11 (900 octets) not flushed
reading message simms@hayrocket.com@mail.hayrocket.com:11 of 11 (864 octets) not flushed
[cis192@elrond ~]$
```

## Fetchmail Example



**DA**  
Delivery  
Agent

```
[cis192@elrond ~]$ mail
```

```
Mail version 8.1 6/6/93. Type ? for help.
```

```
"/var/spool/mail/cis192": 11 messages 11 new
```

```
>N 1 rsimms@Opus.cabrillo Wed May 5 13:25 29/1398 "101"  
N 2 rsimms@Opus.cabrillo Wed May 5 13:25 29/1433 "Star Wars"  
N 3 rsimms@Opus.cabrillo Wed May 5 13:25 29/1434 "Star Wars"  
N 4 rsimms@Opus.cabrillo Wed May 5 13:25 29/1434 "Star Wars"  
N 5 rsimms@Opus.cabrillo Wed May 5 13:25 55/2056 "Motorpsycho (part1)"  
N 6 rsimms@Opus.cabrillo Wed May 5 13:25 55/2119 "Motorpsycho (part3)"  
N 7 rsimms@Opus.cabrillo Wed May 5 13:25 55/2074 "Motorpsycho (part2)"  
N 8 rsimms@Opus.cabrillo Wed May 5 13:25 55/2068 "Motorpsycho (part4)"  
N 9 rsimms@Opus.cabrillo Wed May 5 13:25 43/1728 "Motorpsycho (part5)"  
N 10 simms@hayrocket.com Wed May 5 13:25 29/1299 "test from webmail"  
N 11 simms@hayrocket.com Wed May 5 13:25 28/1264 "test from evolution"
```

```
& 10
```

```
Message 10:
```

```
From simms@hayrocket.com Wed May 5 13:25:17 2010  
X-Original-To: simms@hayrocket.com  
Delivered-To: x10727529@spaceymail-a4.g.dreamhost.com  
Date: Wed, 5 May 2010 10:46:27 -0700  
Subject: test from webmail  
From: simms@hayrocket.com  
To: simms@hayrocket.com  
User-Agent: SquirrelMail/1.4.20  
MIME-Version: 1.0  
Content-Type: text/plain; charset=iso-8859-1  
Content-Transfer-Encoding: 8bit
```

```
here we go
```

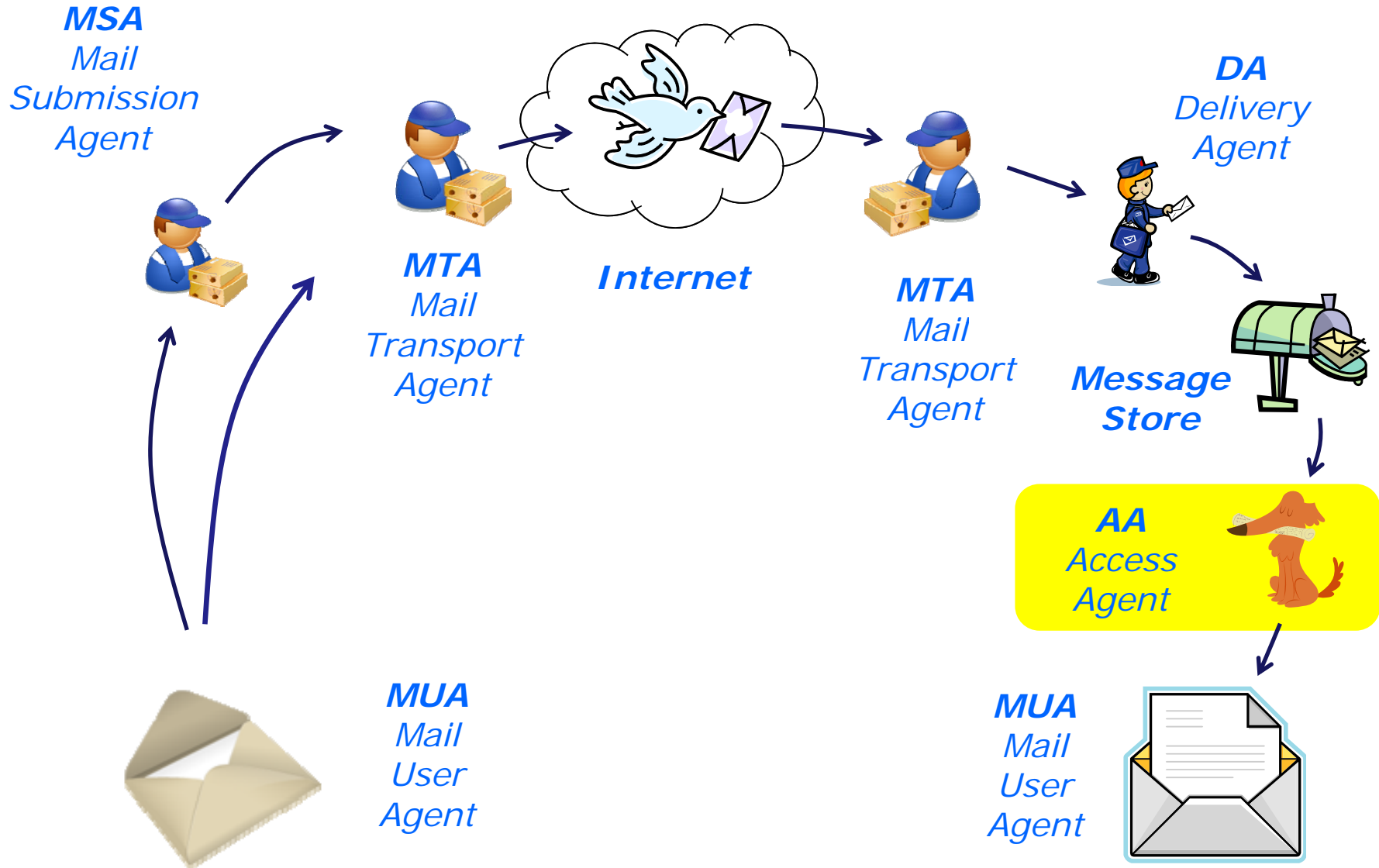
```
&
```

*The downloaded  
messages can be read  
using /bin/mail*

*You will do this in Lab 9*

**AA**

Overview of email



*compose and send message*

*open and read message* 85



## Access Agents

**AA**



### Access Agent services

- POP (port 110)
- IMAP (port 143)

*MUAs (Mail User Agents) connect to POP or IMAP services to download messages that have been delivered.*

## Access Agents

**POP and IMAP services** are provided from the mail server. Remote clients connect to these servers to download the mail that has already arrived to its destination.

### **POP (Post Office Protocol)**

- Allows only one way transfer from a central server to the client
- Must download all messages at once, and then messages are optionally deleted from the server
- Email is saved on whatever client is used to connect to the POP server

### **IMAP (Internet Message Access Protocol)**

- Allows two way transmission
- Downloads only one message at a time and you can browse headers before deciding to download attachments (nice when in foreign country hotel room)
- Email messages are stored on the server in multiple folders
- Edits made offline can be uploaded and applied to messages later on

# POP commmands



## Getting messages from a POP server

### Some POP commands

**user** *username*

*Initiate POP connection*

**pass** *password*

*Provide password*

**list** [message]

*List one or all messages*

**retr** message

*Retrieves entire message*

**dele** message

*Deletes message*

**quit**

*End connection*

## Using POP Commands

*Checking out a pop server using the telnet command*

```
[cis192@elrond ~]$ telnet mail.skyhighway.com 110
```

```
Trying 63.249.82.6...
```

```
Connected to mail.skyhighway.com (63.249.82.6).
```

```
Escape character is '^]'.  
+OK Cruzio ready.
```

```
user ironchefkobe@skyhighway.com      login
```

```
+OK
```

```
pass Secret                          password
```

```
+OK Logged in.
```

```
list
```

```
+OK 1 messages:
```

```
1 1292
```

```
.
```

```
retr
```

```
-ERR There's no message 0.
```

*list messages (only one)*

*Retrieve (no  
message number  
specified)*

## Using POP Commands

### retr 1

```
+OK 1292 octets
X-Spam-Checker-Version: SpamAssassin 3.2.5 (2008-06-10) on skyhighway.com
X-Spam-Level:
X-Spam-Status: No, score=0.0 required=1.0 tests=none autolearn=disabled
version=3.2.5
Received: from mail.cruzio.com (mail.cruzio.com [63.249.95.37])
  by skyhighway.com with ESMTTP id n3FN7Iss006071
  for <ironchefkobe@skyhighway.com>; Wed, 15 Apr 2009 16:07:18 -0700 (PDT)
Received: from cruziomail.cruzio.com (cruziomail.cruzio.com [63.249.95.24])
  by mail.cruzio.com with ESMTTP id n3FN7Ir0008189
  for <ironchefkobe@skyhighway.com>; Wed, 15 Apr 2009 16:07:18 -0700 (PDT)
Received: from 63.249.103.107
  (SquirrelMail authenticated user ironchefkobe@skyhighway.com)
  by cruziomail.cruzio.com with HTTP;
  Wed, 15 Apr 2009 16:07:18 -0700 (PDT)
Message-ID: <dd44141laf6aa6dfe85b5f9fab30c2a6.squirrel@cruziomail.cruzio.com>
Date: Wed, 15 Apr 2009 16:07:18 -0700 (PDT)
Subject: test email
From: ironchefkobe@skyhighway.com
To: ironchefkobe@skyhighway.com
User-Agent: SquirrelMail/1.4.17
MIME-Version: 1.0
Content-Type: text/plain;charset=iso-8859-15
Content-Transfer-Encoding: 8bit
X-Priority: 3 (Normal)
Importance: Normal
X-Cruzio-Spamtrap: 2.5 (2009/02/25)
X-CruzioSpamTrap: SpamAssassin Tagged vs 3
X-CruzioSpamtrapClass: OK
```

test email

.

### quit

```
+OK Logging out.
Connection closed by foreign host.
```

*Retrieve message*

*Quit session*



Read email you sent yourself previously

**telnet hershey 110**

**user** *username*

**pass** 

**list**

**retr 1**

**quit**

andes  
armstrong  
bobisuthi  
collins  
crivello  
dahlin  
hsieh  
huberlantz  
hutmacher  
lee  
lopez  
mambulu  
ordaz  
ortega  
prager  
rivas  
ross  
saenz  
simms  
unruh

# IMAP commands

## Getting messages from an IMAP server

### Some example IMAP commands

*tag login* **username password**

*Initiate IMAP session*

*tag list* **"Mail" "\*"**

*Shows folders in Mail folder*

*tag list* **"" "\*"**

*Shows all folders*

*tag select* **INBOX**

*Selects folder (read-write)*

*tag examine* **INBOX**

*Selects folder (read)*

*tag status* **INBOX (messages)**

*Shows basic information*

*tag fetch* **num FULL**

*Shows message headers*

*tag fetch* **num body[text]**

*Shows message text content*

*tag logout*

*End session*

# IMAP

## example 1

## Using IMAP Commands - Example 1

### *Checking out a IMAP server with the telnet command*

```
[root@arwen ~]# telnet mail.hayrocket.com 143
Trying 208.113.200.50...
Connected to mail.hayrocket.com (208.113.200.50).
Escape character is '^]'.
* OK [CAPABILITY IMAP4rev1 UIDPLUS CHILDREN NAMESPACE
THREAD=ORDEREDSUBJECT THREAD=REFERENCES SORT QUOTA IDLE STARTTLS]
Courier-IMAP ready. Copyright 1998-2005 Double Precision, Inc. See
COPYING for distribution information.
a001 login arwen@hayrocket.com Secret
a001 OK LOGIN Ok.
a002 list "Mail" "*"
a002 OK LIST completed
a003 SELECT INBOX
* FLAGS (\Draft \Answered \Flagged \Deleted \Seen \Recent)
* OK [PERMANENTFLAGS (\* \Draft \Answered \Flagged \Deleted \Seen)]
Limited
* 2 EXISTS
* 0 RECENT
* OK [UIDVALIDITY 1241196931] Ok
* OK [MYRIGHTS "acdilrsw"] ACL
a003 OK [READ-WRITE] Ok
```



## Using IMAP Commands - Example 1

### *Checking out a IMAP server with the telnet command*

#### **a004 FETCH 1 full**

```
* 1 FETCH (FLAGS () INTERNALDATE "01-May-2009 09:57:02 -0700"
RFC822.SIZE 1171 ENVELOPE ("Fri, 1 May 2009 09:57:02 -0700 (PDT)" "Salsa
at the Palomar" ((NIL NIL "arwen" "hayrocket.com")) ((NIL NIL "arwen"
"hayrocket.com")) ((NIL NIL "arwen" "hayrocket.com")) ((NIL NIL "arwen"
"hayrocket.com")) NIL NIL NIL
"<5d005d3ae56798364bdc396b730538ea.squirrel@webmail.hayrocket.com>")
BODY ("text" "plain" ("charset" "iso-8859-1") NIL NIL "8bit" 71 6))
a004 OK FETCH completed.
```

#### **a005 FETCH 1 body[text]**

```
* 1 FETCH (BODY[TEXT] {71})
```

Hi Arwen,

Interested in going Salsa dancing tonight?

- Elrond

)

```
* 1 FETCH (FLAGS (\Seen))
```

```
a005 OK FETCH completed.
```

### *Same message in SquirrelMail*

<p><b>Subject:</b> Salsa at the Palomar <b>From:</b> arwen@hayrocket.com <b>Date:</b> Fri, May 1, 2009 9:57 am <b>To:</b> arwen@hayrocket.com <b>Priority:</b> Normal <b>Options:</b> <a href="#">View Full Header</a>   <a href="#">View Printable Version</a>   <a href="#">Download this as a file</a></p>
<p>Hi Arwen,  Interested in going Salsa dancing tonight?  - Elrond</p>

## Using IMAP Commands - Example 1

### *Checking out a IMAP server with the telnet command*

#### **a006 list "" ""**

```
* LIST (\HasNoChildren) "." "INBOX.Drafts"  
* LIST (\HasNoChildren) "." "INBOX.Trash"  
* LIST (\HasNoChildren) "." "INBOX.Sent"  
* LIST (\Marked \HasChildren) "." "INBOX"  
a006 OK LIST completed
```

#### **a007 status INBOX (messages)**

```
* STATUS "INBOX" (MESSAGES 2)  
a007 OK STATUS Completed.
```

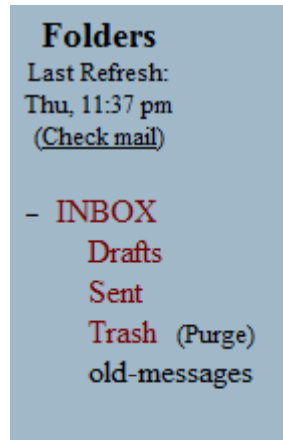
#### **a008 examine INBOX**

```
* FLAGS (\Draft \Answered \Flagged \Deleted \Seen \Recent)  
* OK [PERMANENTFLAGS ()] No permanent flags permitted  
* 2 EXISTS  
* 0 RECENT  
* OK [UIDVALIDITY 1241196931] Ok  
* OK [MYRIGHTS "acdilrsw"] ACL  
a008 OK [READ-ONLY] Ok
```

#### **a009 logout**

```
* BYE Courier-IMAP server shutting down  
a009 OK LOGOUT completed  
Connection closed by foreign host.
```

### *Folder view using SquirrelMail*



# IMAP

## example 2



## Using IMAP Commands - Example 2

*This has got to be the most basic of MUAs - using telnet!*

```
[root@arwen ~]# telnet mail.hayrocket.com 143
Trying 208.113.200.50...
Connected to mail.hayrocket.com (208.113.200.50).
Escape character is '^]'.
* OK [CAPABILITY IMAP4rev1 UIDPLUS CHILDREN NAMESPACE THREAD=ORDEREDSUBJECT
THREAD=REFERENCES SORT QUOTA IDLE STARTTLS] Courier-IMAP ready. Copyright
1998-2005 Double Precision, Inc. See COPYING for distribution information.
a001 login arwen@hayrocket.com Secret
a001 OK LOGIN Ok.
a002 SELECT INBOX
* FLAGS (\Draft \Answered \Flagged \Deleted \Seen \Recent)
* OK [PERMANENTFLAGS (\* \Draft \Answered \Flagged \Deleted \Seen)] Limited
* 6 EXISTS
* 0 RECENT
* OK [UIDVALIDITY 1241196931] Ok
* OK [MYRIGHTS "acdilrsw"] ACL
a002 OK [READ-WRITE] Ok
```

*Connecting to a IMAP server (an Access Agent) to get mail*



## Using IMAP Commands - Example 2

*Note that each IMAP command label is incremented*

### a003 FETCH 6 full

```
* 6 FETCH (FLAGS () INTERNALDATE "04-May-2009 05:23:49 -0700" RFC822.SIZE
975 ENVELOPE ("Mon, 4 May 2009 04:47:00 -0700" "Almost" (("Rich Simms" NIL
"rsimms" "opus.cabrillo.edu")) (("Rich Simms" NIL "rsimms"
"opus.cabrillo.edu")) ("Rich Simms" NIL "rsimms" "opus.cabrillo.edu"))
((NIL NIL "arwen" "hayrocket.com")) NIL NIL NIL
"<200905041147.n44B10w0028558@opus.cabrillo.edu>") BODY ("text" "plain" NIL
NIL NIL "8bit" 11 1))
a003 OK FETCH completed.
```

### a004 FETCH 6 body[text]

```
* 6 FETCH (BODY[TEXT] {11}
there ...
)
* 6 FETCH (FLAGS (\Seen))
a004 OK FETCH completed.
```

### a005 logout

```
* BYE Courier-IMAP server shutting down
a005 OK LOGOUT completed
Connection closed by foreign host.
[root@arwen ~]#
```

### *Same message in Evolution*



## Read email you sent yourself previously

```
telnet hershey 143
```

```
a001 login username 
```

```
a002 list "" "*"
```

```
a003 select INBOX
```

```
a004 fetch 1 full
```

```
a005 fetch 1 body[text]
```

```
a006 logout
```

```
andes  
armstrong  
bobisuthi  
collins  
crivello  
dahlin  
hsieh  
huberlantz  
hutmacher  
lee  
lopez  
mambulu  
ordaz  
ortega  
prager  
rivas  
ross  
saenz  
simms  
unruh
```

# VM Screen Resolution VMware

## VM Screen Resolution

### Steps to increase screen resolution on VMware VM:

1. In run level 3 (text mode)
2. Edit **/etc/X11/xorg.conf** and add these lines to the end:  
Section "Monitor"  
    Identifier "vmware"  
EndSection
3. Run **vmware-config-tools.pl**  
**no** to vmhgfs module  
**no** to vmxnet module  
**yes** to change guest X resolution  
**3** for 1024x768
4. **service network restart**
5. **startx** or **init 5**

*The Evolution configuration windows are too big when using the 800x600 screen size*



## VM Screen Resolution

```
[root@arwen ~]# vmware-config-tools.pl
```

Stopping VMware Tools services in the virtual machine:

Guest operating system daemon: [ OK ]

Trying to find a suitable vmhgfs module for your running kernel.

None of the pre-built vmhgfs modules for VMware Tools is suitable for your running kernel. Do you want this program to try to build the vmhgfs module for your system (you need to have a C compiler installed on your system)? [no] **no**

The filesystem driver (vmhgfs module) is used only for the shared folder feature. The rest of the software provided by VMware Tools is designed to work independently of this feature.

If you wish to have the shared folders feature, you can install the driver by running `vmware-config-tools.pl` again after making sure that `gcc`, `binutils`, `make` and the kernel sources for your running kernel are installed on your machine. These packages are available on your distribution's installation CD.

[ Press Enter key to continue ]

## VM Screen Resolution

```
pcnet32                35269  0
Unloading pcnet32 module
```

Trying to find a suitable vmxnet module for your running kernel.

None of the pre-built vmxnet modules for VMware Tools is suitable for your running kernel. Do you want this program to try to build the vmxnet module for your system (you need to have a C compiler installed on your system)? [no] **no**

The fast network device driver (vmxnet module) is used only for our fast networking interface. The rest of the software provided by VMware Tools is designed to work independently of this feature.

If you wish to have the fast network driver enabled, you can install the driver

by running vmware-config-tools.pl again after making sure that gcc, binutils, make and the kernel sources for your running kernel are installed on your machine. These packages are available on your distribution's installation CD.

[ Press Enter key to continue ]

## VM Screen Resolution

Detected X.org version 7.1.

Do you want to change your guest X resolution? (yes/no) [no] yes

Please choose one of the following display sizes (1 - 13):

- [1] "640x480"
- [2] "800x600"
- [3] "1024x768"
- [4] "1152x864"
- [5] "1280x800"
- [6] "1152x900"
- [7] "1280x1024"
- [8] "1376x1032"
- [9] "1400x1050"
- [10] "1680x1050"
- [11] "1600x1200"
- [12] "1920x1200"
- [13] "2364x1773"

Please enter a number between 1 and 13:

[3] 3

## VM Screen Resolution

Starting VMware Tools services in the virtual machine:

```
Switching to guest configuration:      [ OK ]  
DMA setup:                             [ OK ]  
Guest operating system daemon:        [ OK ]
```

The configuration of VMware Tools 1.0.8 build-126538 for Linux for this running kernel completed successfully.

You must restart your X session before any mouse or graphics changes take effect.

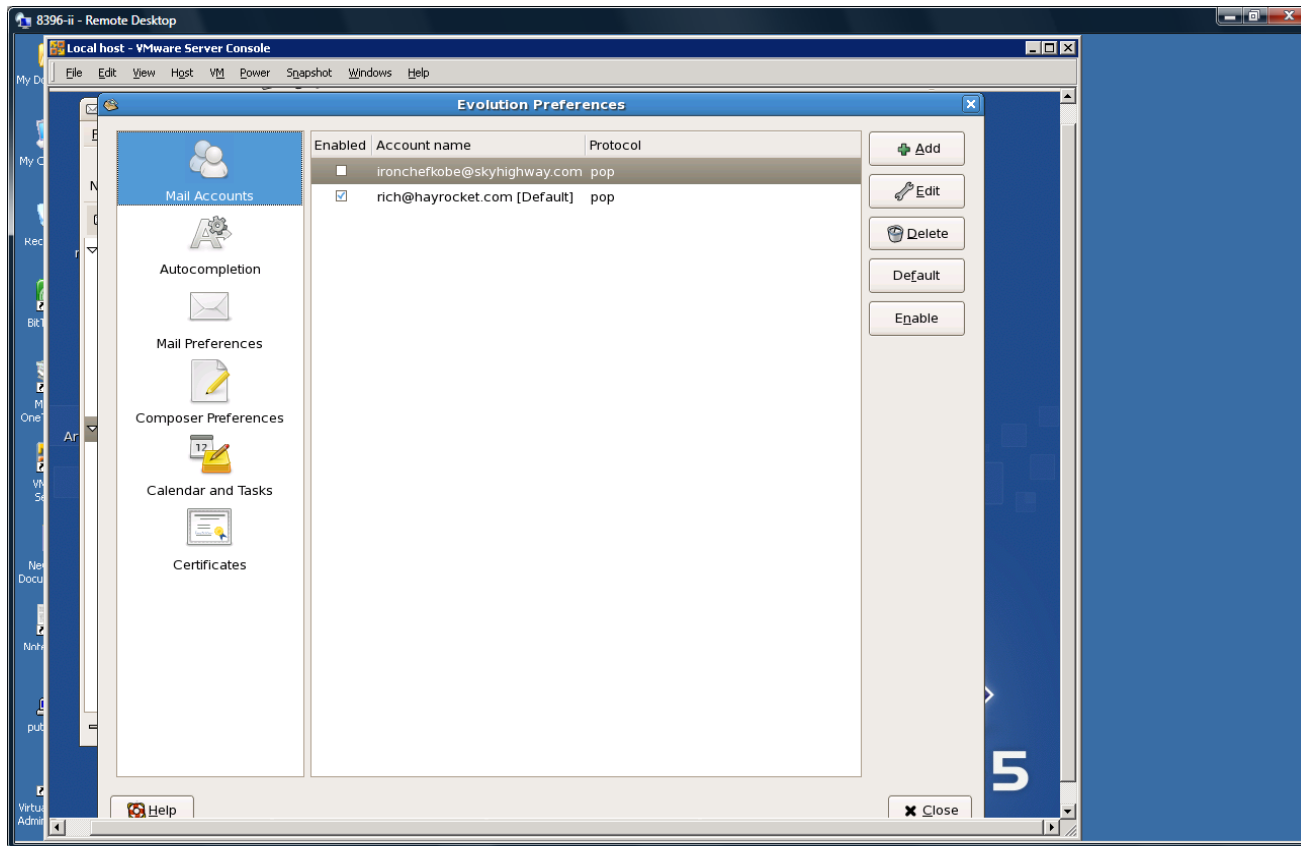
You can now run VMware Tools by invoking the following command:  
"/usr/bin/vmware-toolbox" during an X session.

Enjoy,

--the VMware team

```
[root@arwen ~]# service network restart
```

```
Shutting down loopback interface:      [ OK ]  
Bringing up loopback interface:        [ OK ]  
Bringing up interface eth0:            [ OK ]
```



*Now you can see the entire dialog box*

## VM Screen Size

### **vmware-config-tools.pl**

**no** to vmhgfs module

**no** to vmxnet module

**yes** to change guest X resolution

**3** for 1024x768

**service network restart**

# VM Screen Resolution VirtualBox

## VM Screen Resolution

*For VirtualBox, edit /etc/X11/xorg.conf and add the Modes line shown below. Then use **startx** or **init 5** command for graphics mode.*

```
Section "Screen"
  SubSection "Display"
    Depth      24
    Modes      "1024x768"
  EndSubSection
  Device       "Device[0]"
  Identifier   "Screen[0]"
  Monitor      "Monitor[0]"
EndSection
```



# MUA Configuration

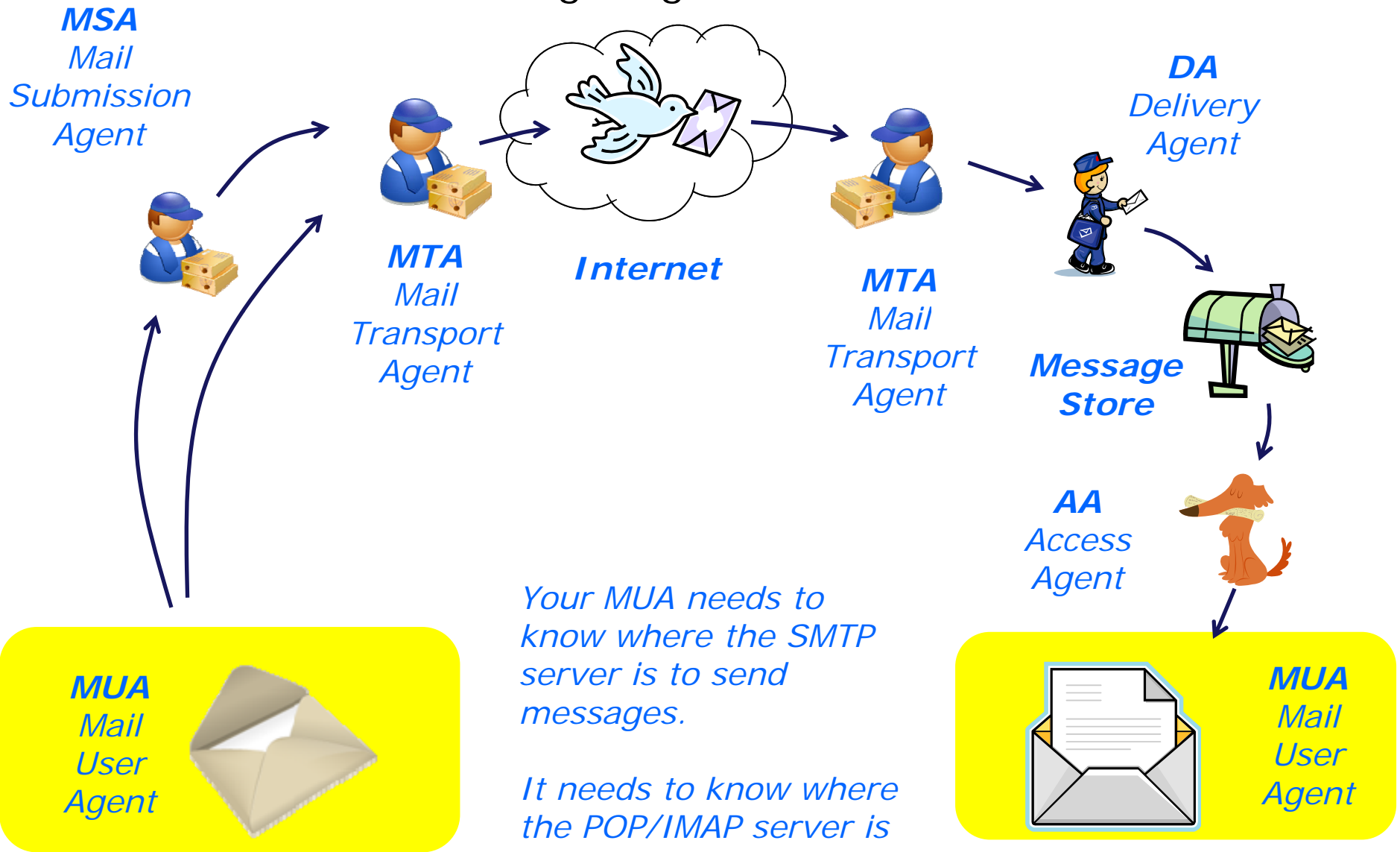
## Configuring the MUA

You will need the following information from your ISP to configure your MUA:

- username and password
- SMTP server hostname
- POP or IMAP server hostname

*There may also be special ports or security settings you may have to configure*

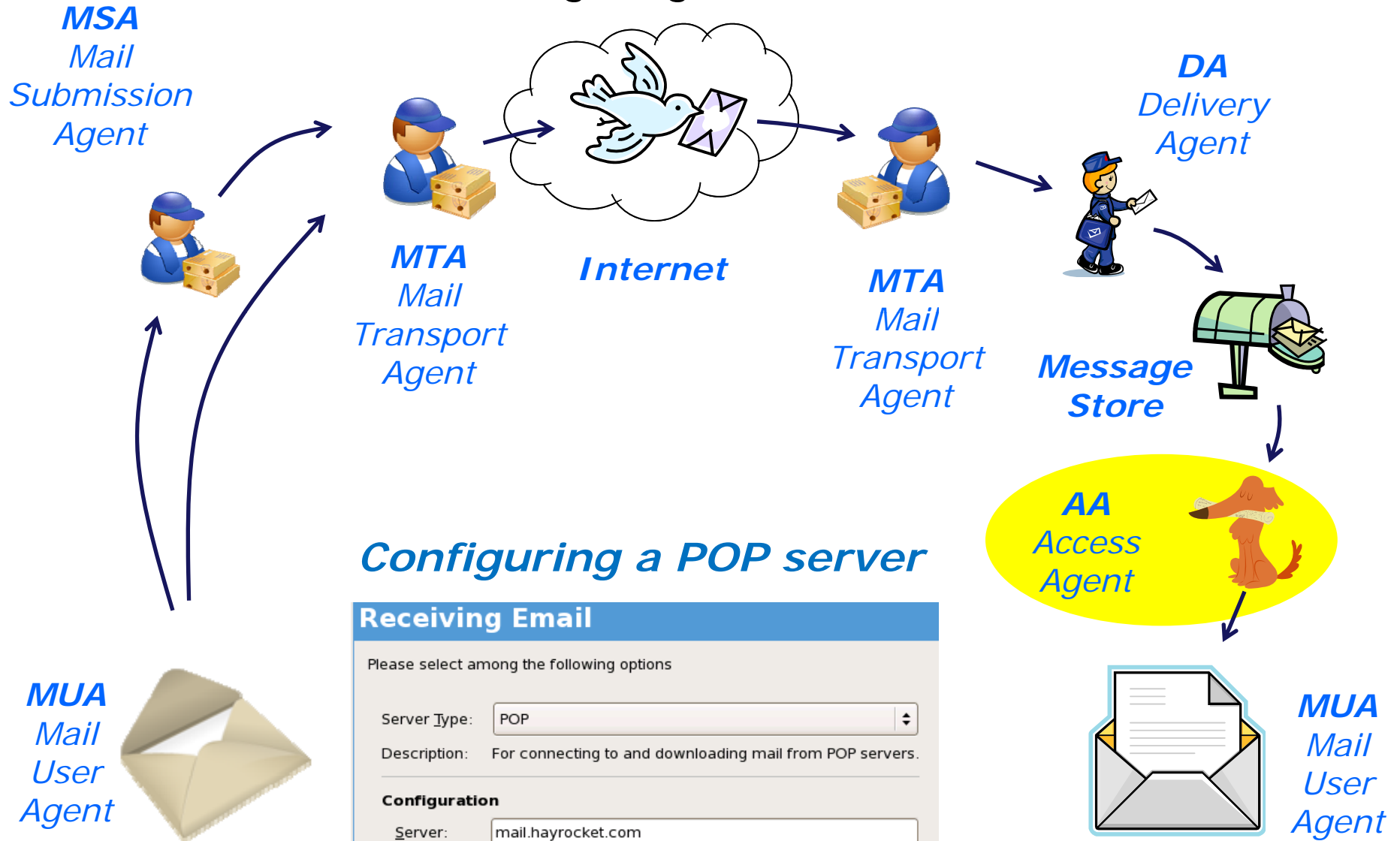
# Configuring the MUA



*Your MUA needs to know where the SMTP server is to send messages.*

*It needs to know where the POP/IMAP server is to receive messages.*

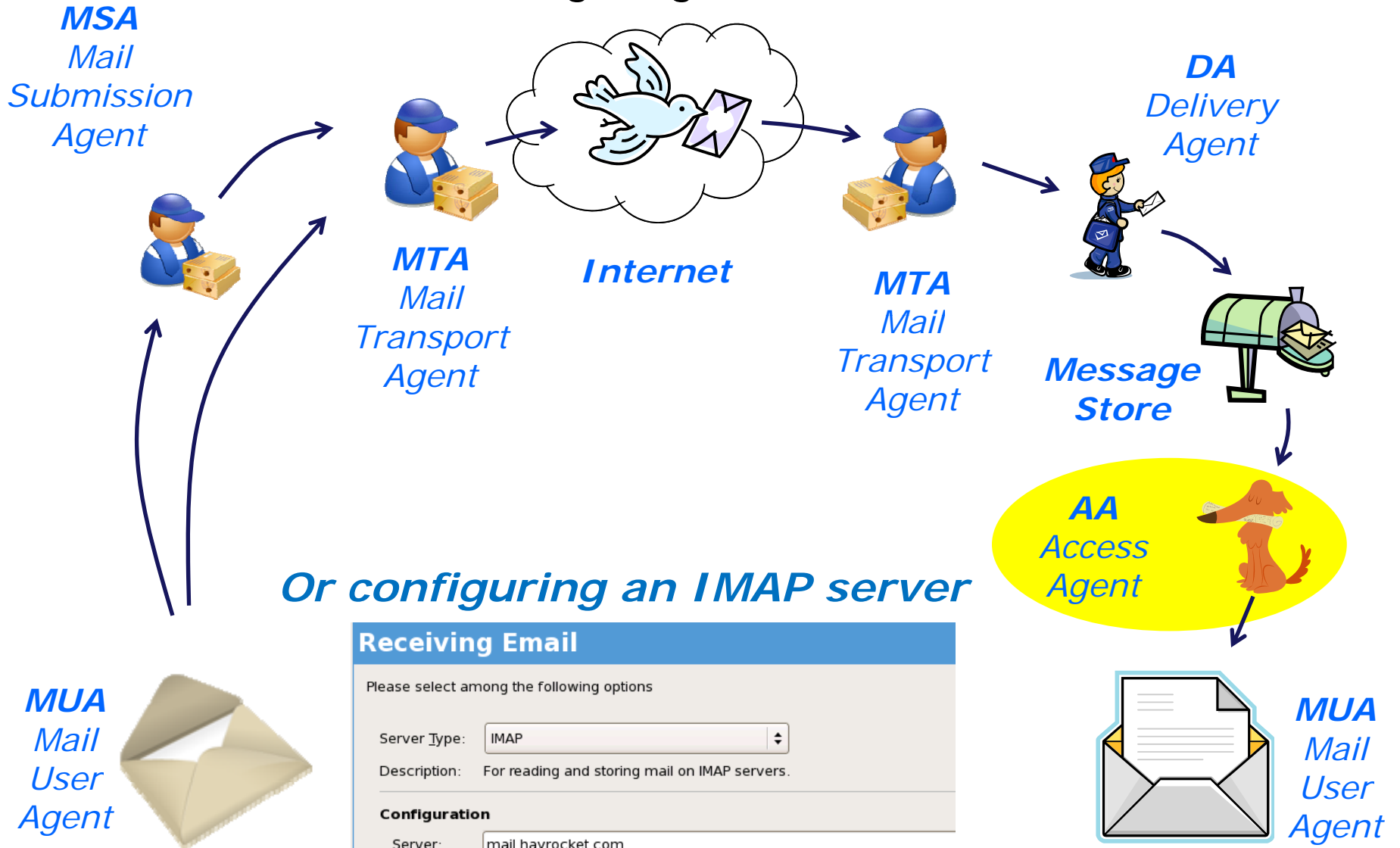
# Configuring the MUA



## Configuring a POP server

Receiving Email	
Please select among the following options	
Server Type:	POP
Description:	For connecting to and downloading mail from POP servers.
<b>Configuration</b>	
Server:	mail.hayrocket.com
Username:	rich@hayrocket.com

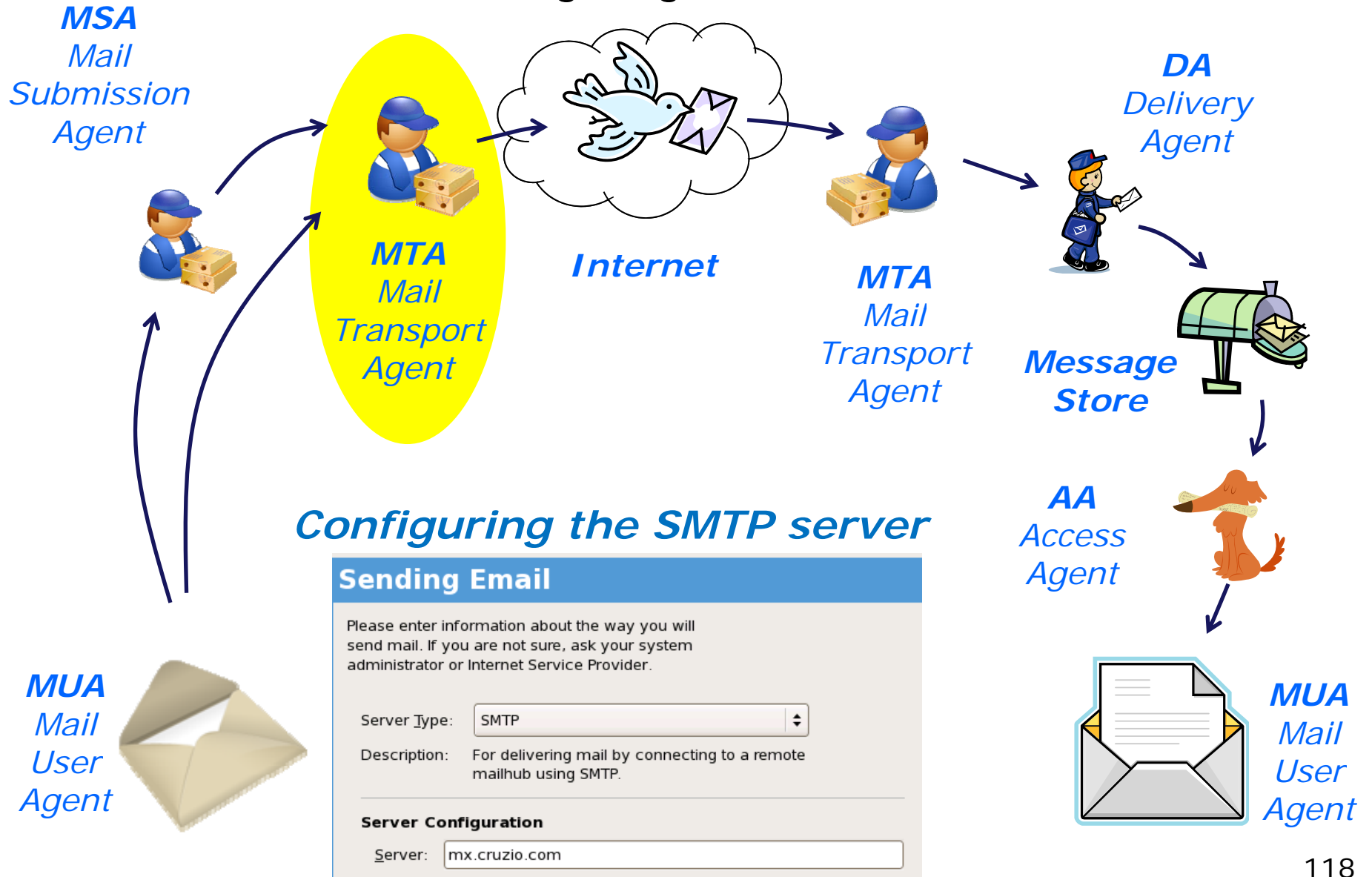
# Configuring the MUA



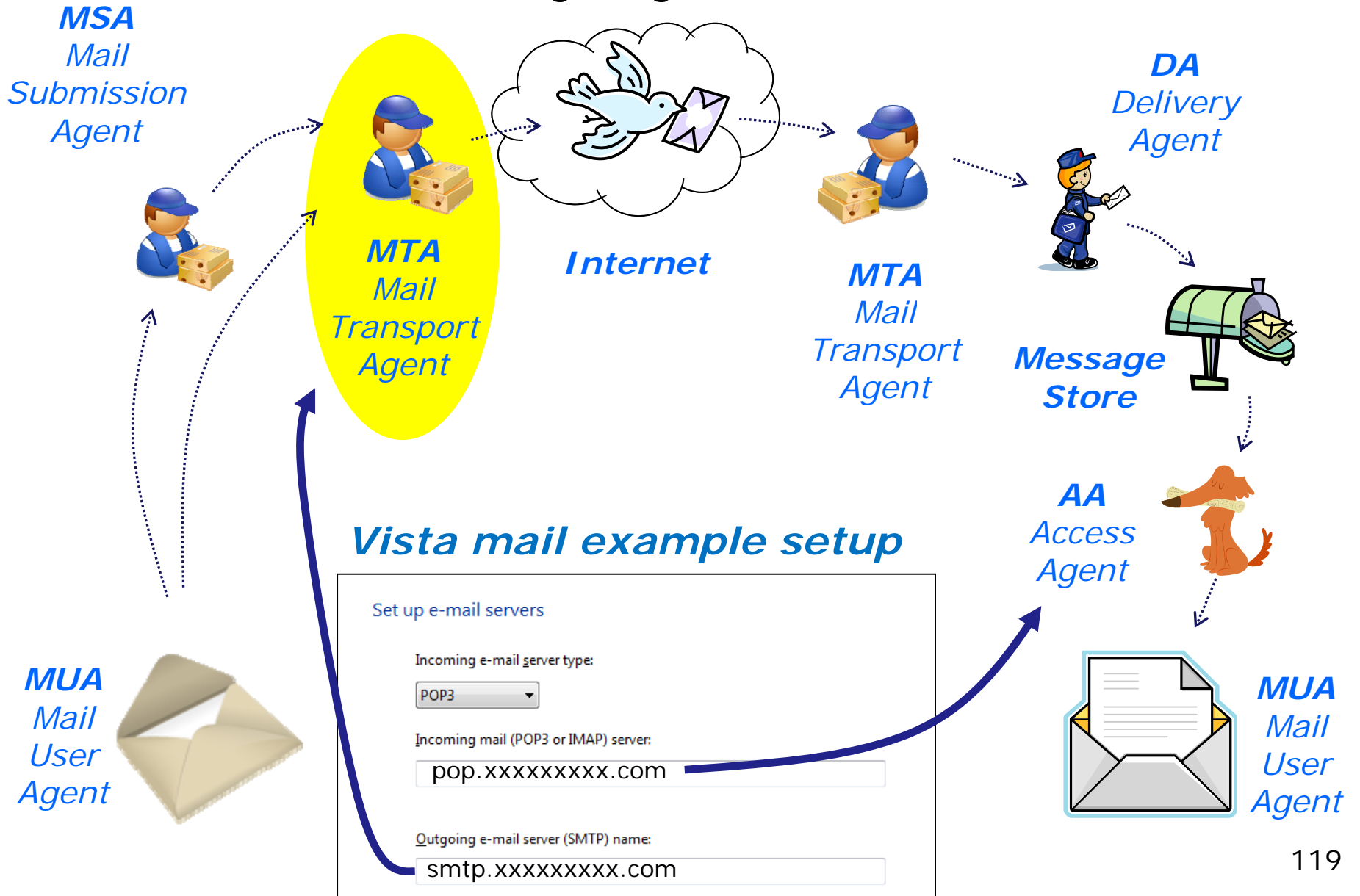
*Or configuring an IMAP server*

Receiving Email	
Please select among the following options	
Server Type:	IMAP
Description:	For reading and storing mail on IMAP servers.
<b>Configuration</b>	
Server:	mail.hayrocket.com
Username:	arwen@hayrocket.com

# Configuring the MUA

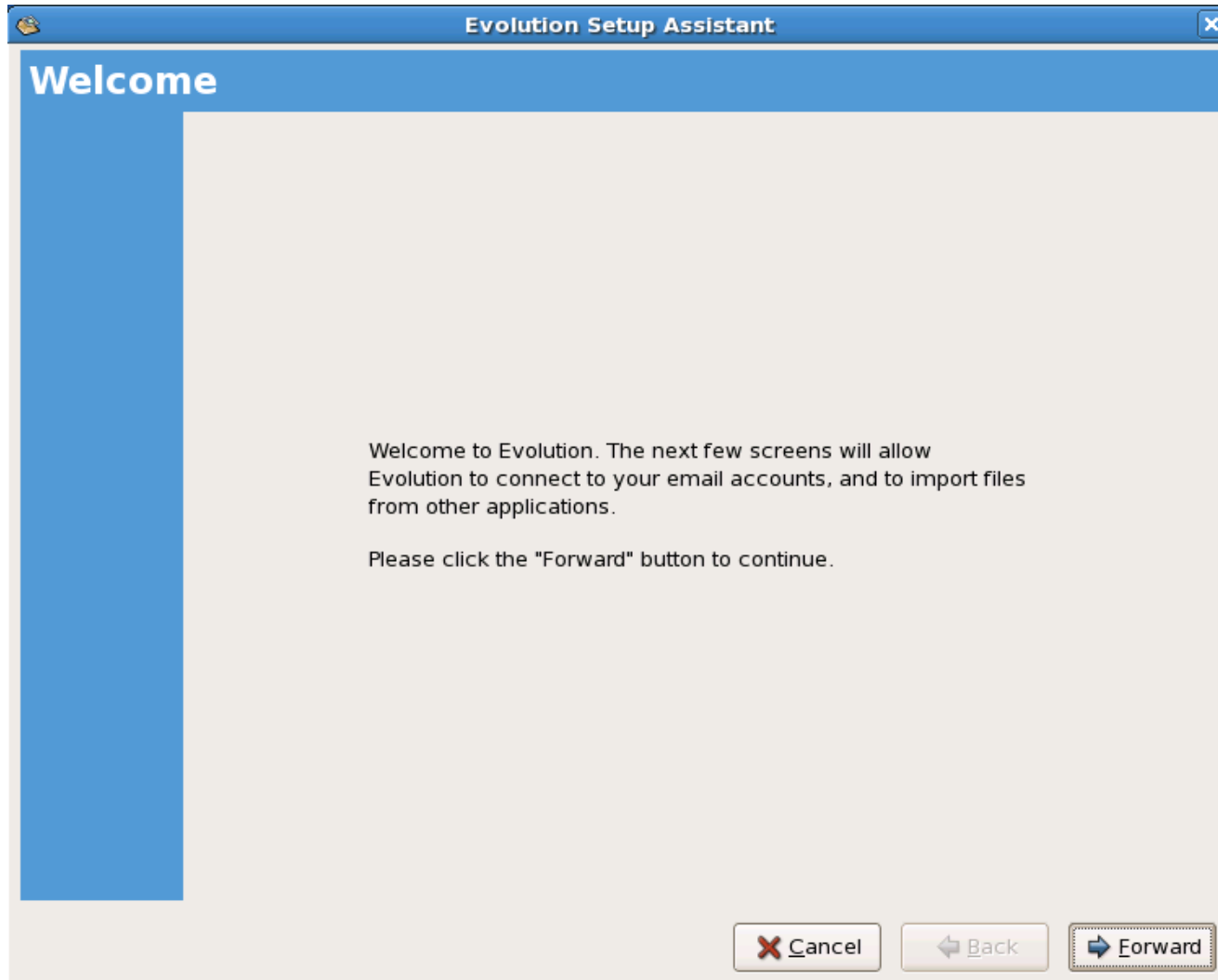


# Configuring the MUA

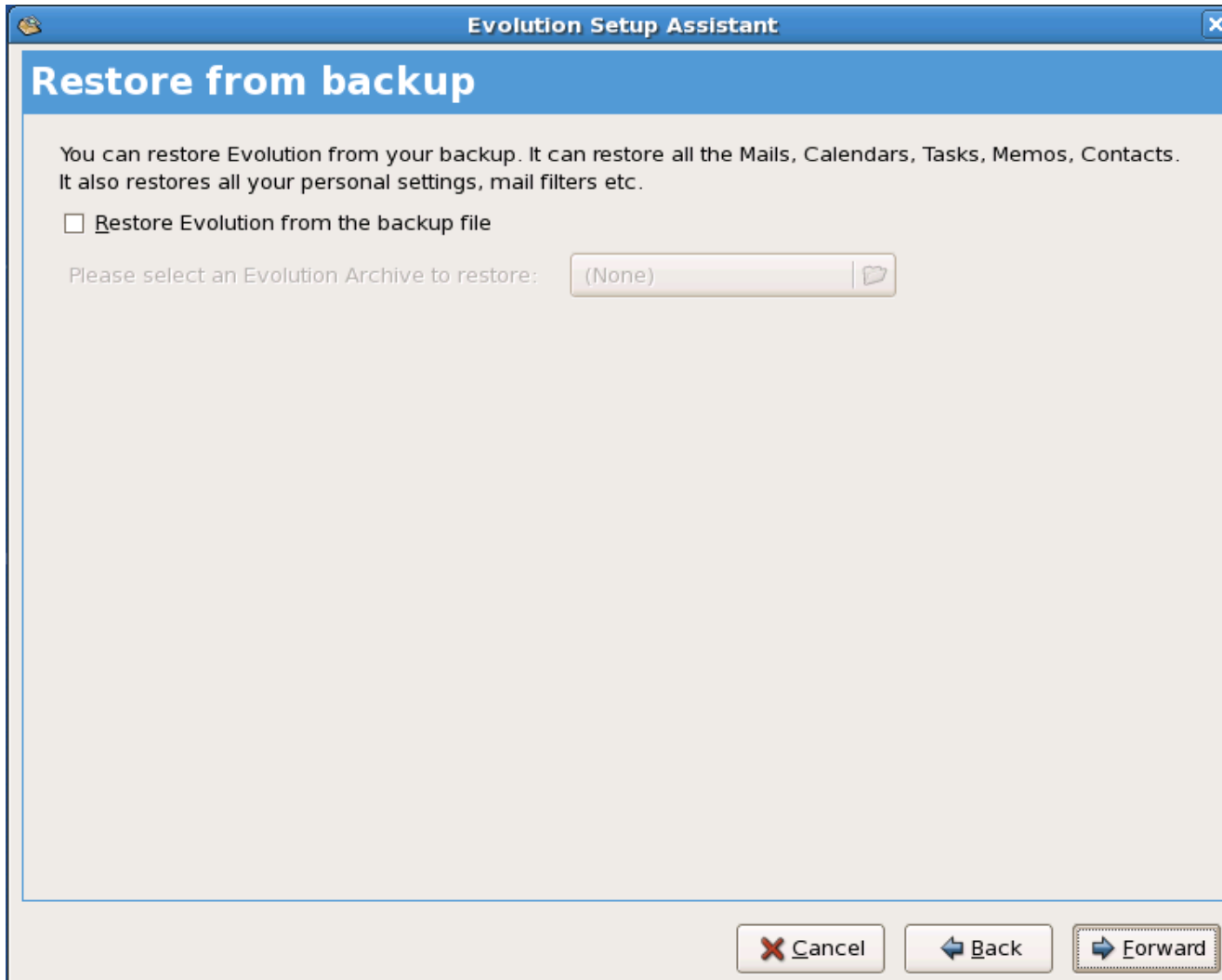


# MUA Configuration IMAP





*Most MUAs  
use a wizard  
for first time  
configuration*



*Most MUAs  
allow  
configurations  
to be  
exported and  
imported*

The screenshot shows a window titled "Evolution Setup Assistant" with a close button (X) in the top right corner. The window has a blue header bar with the word "Identity" in white. Below the header, there is a paragraph of instructions: "Please enter your name and email address below. The 'optional' fields below do not need to be filled in, unless you wish to include this information in email you send." The form is divided into two sections: "Required Information" and "Optional Information". Under "Required Information", there are two text input fields: "Full Name:" containing "Arwen Undomiel" and "Email Address:" containing "arwen@hayrocket.com". Under "Optional Information", there is a checked checkbox labeled "Make this my default account", followed by two empty text input fields for "Reply-To:" and "Organization:". At the bottom of the window, there are three buttons: "Cancel" with a red X icon, "Back" with a left-pointing arrow, and "Forward" with a right-pointing arrow.

*This is used  
to identify  
you on  
messages you  
send*

The screenshot shows the 'Evolution Setup Assistant' window with the 'Receiving Email' tab selected. The window title is 'Evolution Setup Assistant'. The main heading is 'Receiving Email'. Below the heading, it says 'Please select among the following options'. The 'Server Type' is set to 'IMAP' in a dropdown menu. The 'Description' is 'For reading and storing mail on IMAP servers.'. There are three sections: 'Configuration' with 'Server:' set to 'mail.hayrocket.com' and 'Username:' set to 'arwen@hayrocket.com'; 'Security' with 'Use Secure Connection:' set to 'No encryption'; and 'Authentication Type' with 'Password' selected in a dropdown, a 'Check for Supported Types' button, and an unchecked 'Remember password' checkbox. At the bottom, there are three buttons: 'Cancel', 'Back', and 'Forward'.

*To read mail  
you must  
specify either a  
POP or IMAP  
server.*

*The username  
is used for  
authentication*

The screenshot shows the 'Evolution Setup Assistant' window with the 'Receiving Options' tab selected. The window has a blue title bar with the text 'Evolution Setup Assistant' and a close button. The main content area is divided into several sections:

- Checking for New Mail**
  - Automatically check for new mail every 10 minutes
  - Check for new messages in all folders
- Connection to Server**
  - Use custom command to connect to server
  - Command:
- Folders**
  - Show only subscribed folders
  - Override server-supplied folder namespace
  - Namespace:
- Options**
  - Apply filters to new messages in INBOX on this server
  - Check new messages for junk contents
  - Only check for junk messages in the INBOX folder
  - Automatically synchronize remote mail locally

At the bottom of the window, there are three buttons: 'Cancel' (with a red X icon), 'Back' (with a left arrow icon), and 'Forward' (with a right arrow icon).

*Various options are available depending on whether you chose a POP or IMAP server*

The screenshot shows the 'Evolution Setup Assistant' window with the 'Sending Email' tab selected. The window title is 'Evolution Setup Assistant'. The main heading is 'Sending Email'. Below the heading, there is a paragraph: 'Please enter information about the way you will send mail. If you are not sure, ask your system administrator or Internet Service Provider.' The 'Server Type' is set to 'SMTP'. The 'Description' is 'For delivering mail by connecting to a remote mailhub using SMTP.' Under 'Server Configuration', the 'Server' field contains 'mx.cruzio.com' and the checkbox 'Server requires authentication' is unchecked. Under 'Security', 'Use Secure Connection' is set to 'No encryption'. Under 'Authentication', the 'Type' is 'PLAIN' and the 'Check for Supported Types' checkbox is checked. The 'Username' field contains 'arwen@hayrocket.com' and the 'Remember password' checkbox is unchecked. At the bottom, there are three buttons: 'Cancel', 'Back', and 'Forward'.

*Note: to use a different port than 25 append :nnn to the server name.*

*For example, to specify port 587 use mx.cruzio.com:587*

*Note, some ISPs (like Cruzio) will block sending messages using a non-ISP SMTP server.*

Evolution Setup Assistant

### Account Management

Please enter a descriptive name for this account in the space below.  
This name will be used for display purposes only.

**Account Information**

Type the name by which you would like to refer to this account.  
For example: "Work" or "Personal"

Name:

*If you have multiple accounts you can use a label to identify them*

Evolution Setup Assistant

### Timezone

Use the left mouse button to zoom in on an area of the map and select a time zone.  
Use the right mouse button to zoom out.

#### Time Zones



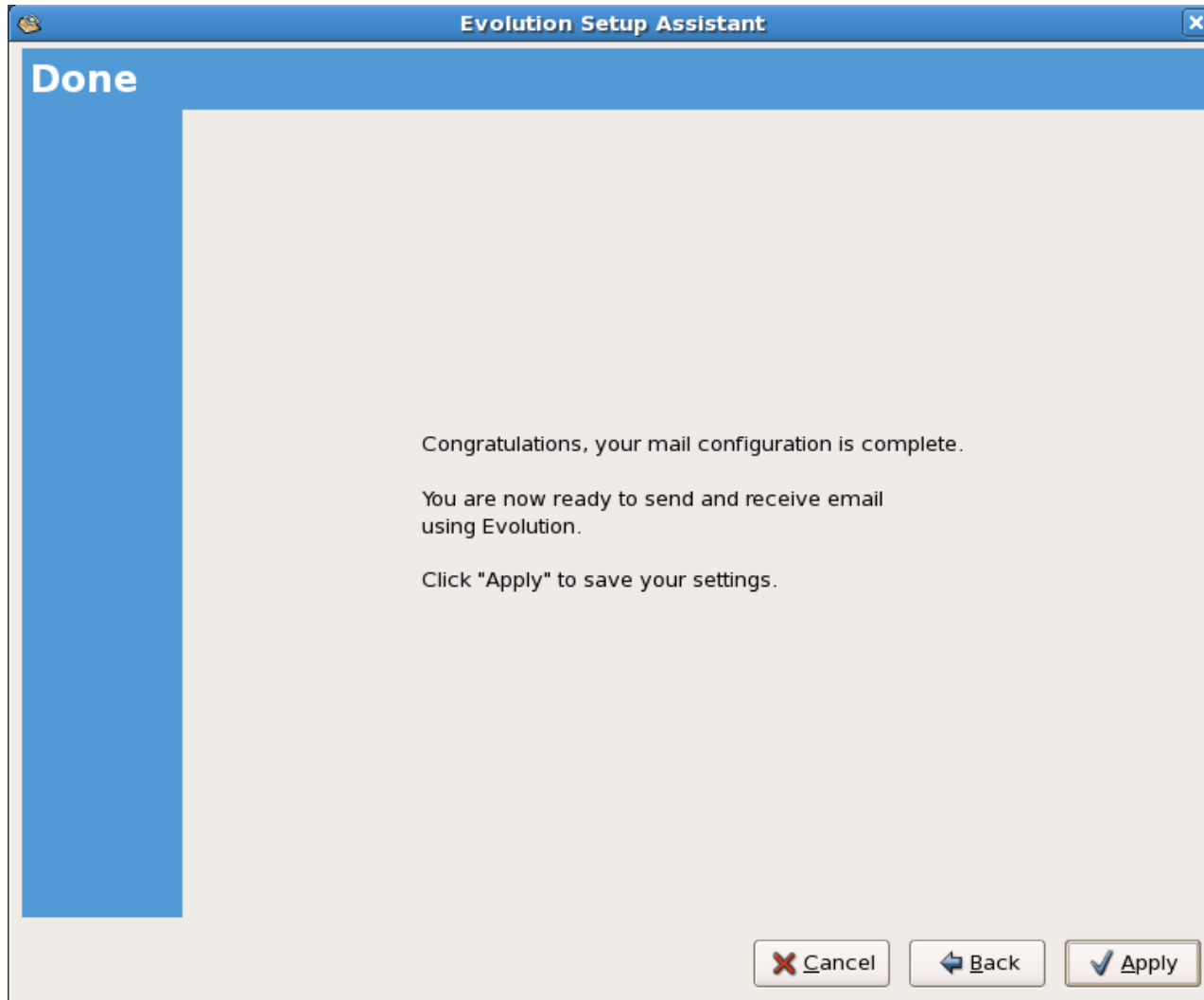
The map displays the world with various time zones marked by small diamond icons. The map is zoomed in on the North American continent, showing the United States and parts of Canada and Mexico. The map has a scroll bar on the right and navigation arrows at the bottom.

#### Selection

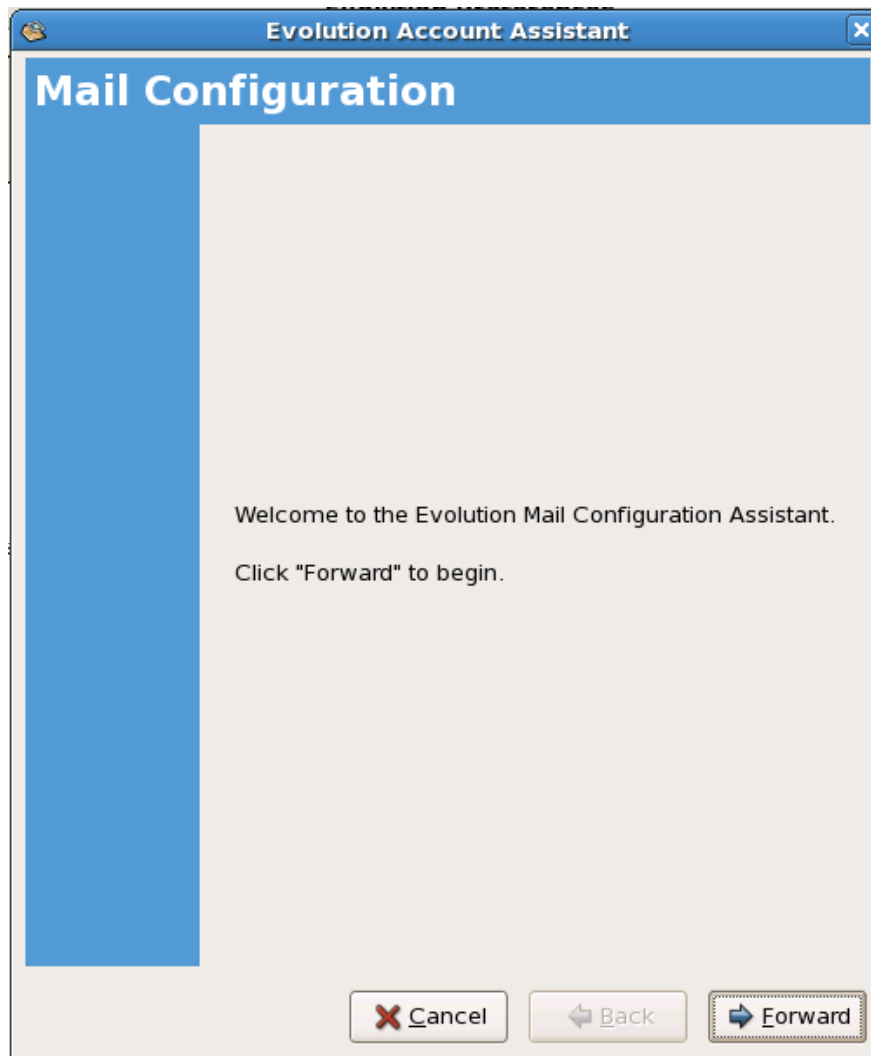
UTC

Cancel Back Forward





# MUA configuration POP



*Most MUAs use a wizard for configuration*

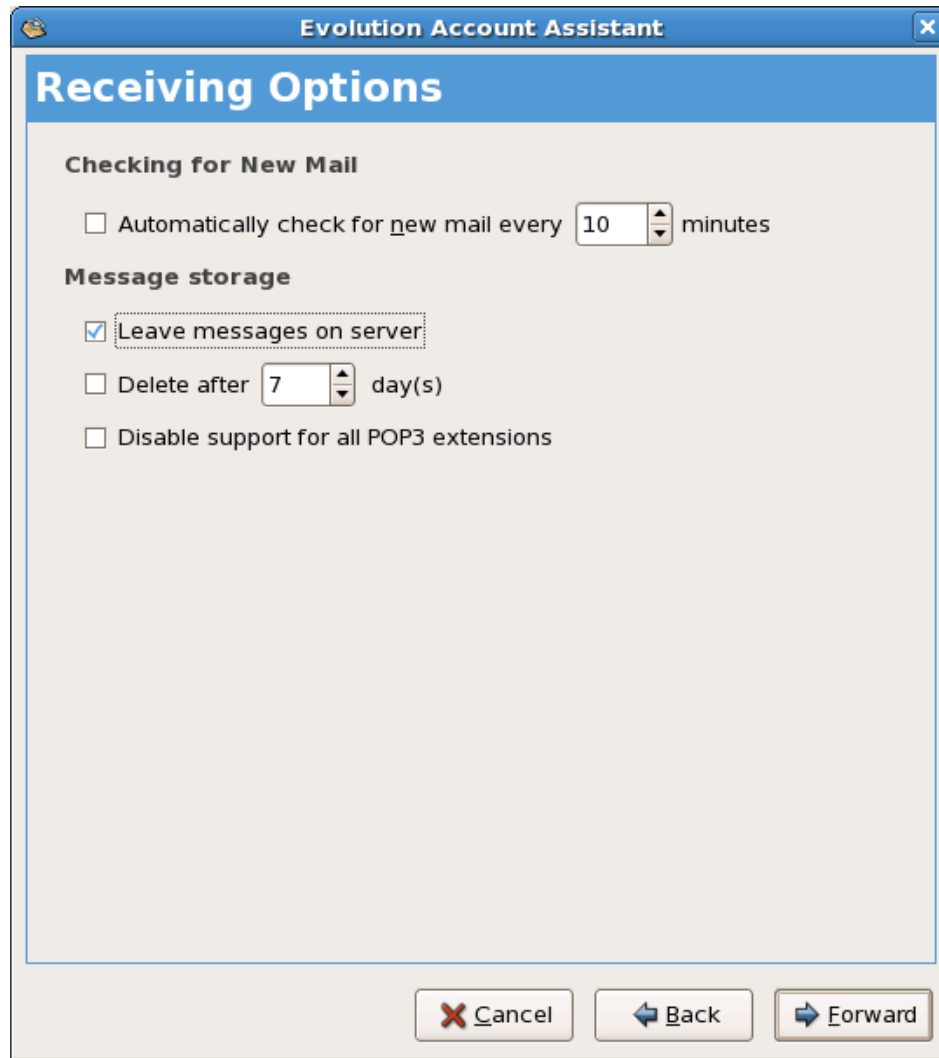
The screenshot shows a window titled "Evolution Account Assistant" with a close button in the top right corner. The window has a blue header bar with the word "Identity" in white. Below the header, there is a paragraph of text: "Please enter your name and email address below. The 'optional' fields below do not need to be filled in, unless you wish to include this information in email you send." The form is divided into two sections: "Required Information" and "Optional Information". Under "Required Information", there are two text input fields: "Full Name:" with the value "Rich Simms" and "Email Address:" with the value "rich@hayrocket.com". Under "Optional Information", there is a checkbox labeled "Make this my default account" which is currently unchecked. Below the checkbox are two more text input fields: "Reply-To:" and "Organization:", both of which are empty. At the bottom of the window, there are three buttons: "Cancel" with a red X icon, "Back" with a left-pointing arrow icon, and "Forward" with a right-pointing arrow icon.

*This is used  
to identify  
you on  
messages you  
send*

The screenshot shows the 'Evolution Account Assistant' window with the 'Receiving Email' tab selected. The window title is 'Evolution Account Assistant'. The main heading is 'Receiving Email'. Below the heading, it says 'Please select among the following options'. The 'Server Type' is set to 'POP'. The description is 'For connecting to and downloading mail from POP servers.' Under the 'Configuration' section, the 'Server' is 'mail.hayrocket.com' and the 'Username' is 'rich@hayrocket.com'. Under the 'Security' section, 'Use Secure Connection' is set to 'No encryption'. Under the 'Authentication Type' section, 'Password' is selected, and 'Check for Supported Types' is checked. The 'Remember password' checkbox is also checked. At the bottom, there are three buttons: 'Cancel', 'Back', and 'Forward'.

*To read mail  
you must  
specify either a  
POP or IMAP  
server.*

*The username  
is used for  
authentication*



*Various options are available depending on whether you chose a POP or IMAP server*

The screenshot shows the 'Evolution Account Assistant' dialog box with the 'Sending Email' tab selected. The window title is 'Evolution Account Assistant'. The main heading is 'Sending Email'. Below the heading is a paragraph: 'Please enter information about the way you will send mail. If you are not sure, ask your system administrator or Internet Service Provider.' The 'Server Type' dropdown is set to 'SMTP'. The 'Description' text reads: 'For delivering mail by connecting to a remote mailhub using SMTP.' The 'Server Configuration' section has a 'Server' text box containing 'mx.cruzio.com' and a checked checkbox for 'Server requires authentication'. The 'Security' section has a 'Use Secure Connection' dropdown set to 'No encryption'. The 'Authentication' section has a 'Type' dropdown set to 'PLAIN', a 'Check for Supported Types' button, a 'Username' text box, and an unchecked checkbox for 'Remember password'. At the bottom are three buttons: 'Cancel', 'Back', and 'Forward'.

*Note: to use a different port than 25 append :nnn to the server name.*

*For example, to specify port 587 use mx.cruzio.com:587*

*Note, some ISPs (like Cruzio) will block sending messages using a non-ISP SMTP server.*



Evolution Account Assistant

### Account Management

Please enter a descriptive name for this account in the space below.  
This name will be used for display purposes only.

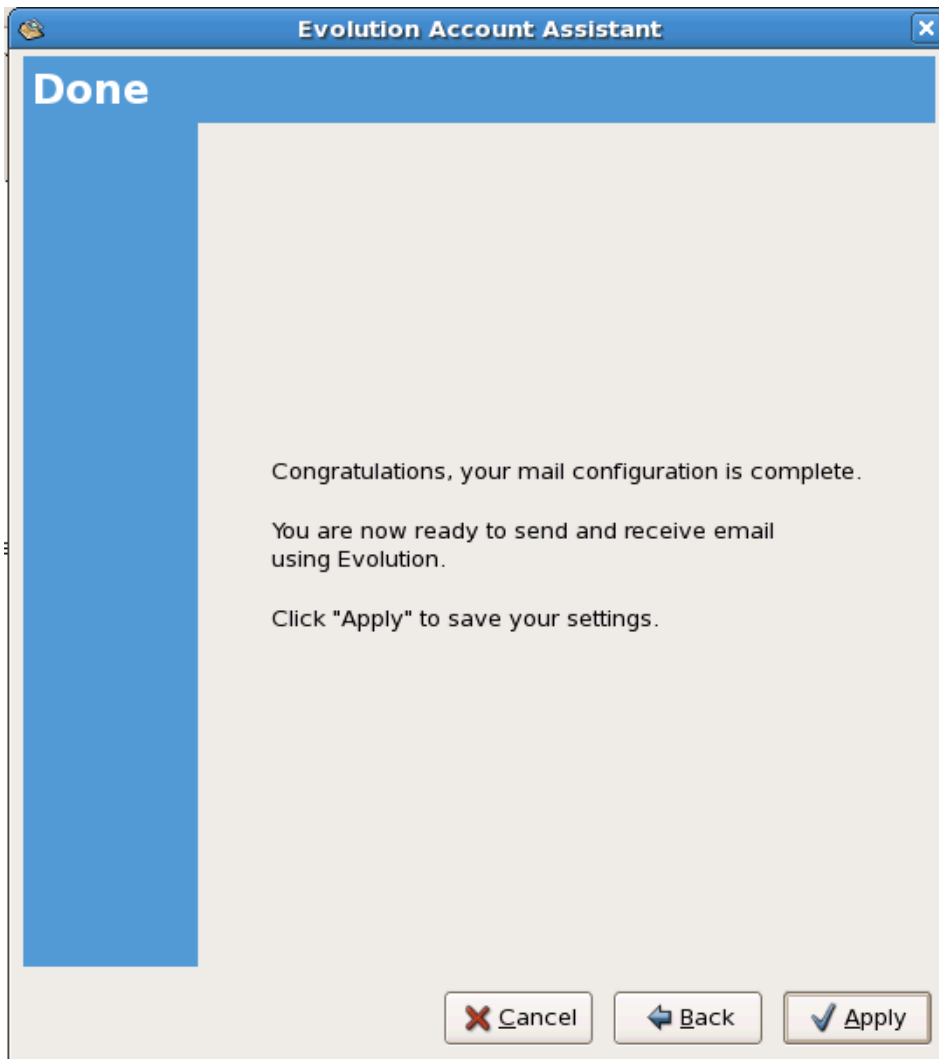
**Account Information**

Type the name by which you would like to refer to this account.  
For example: "Work" or "Personal"

Name:

*If you have multiple accounts you can use a label to identify them*





# MUA Views

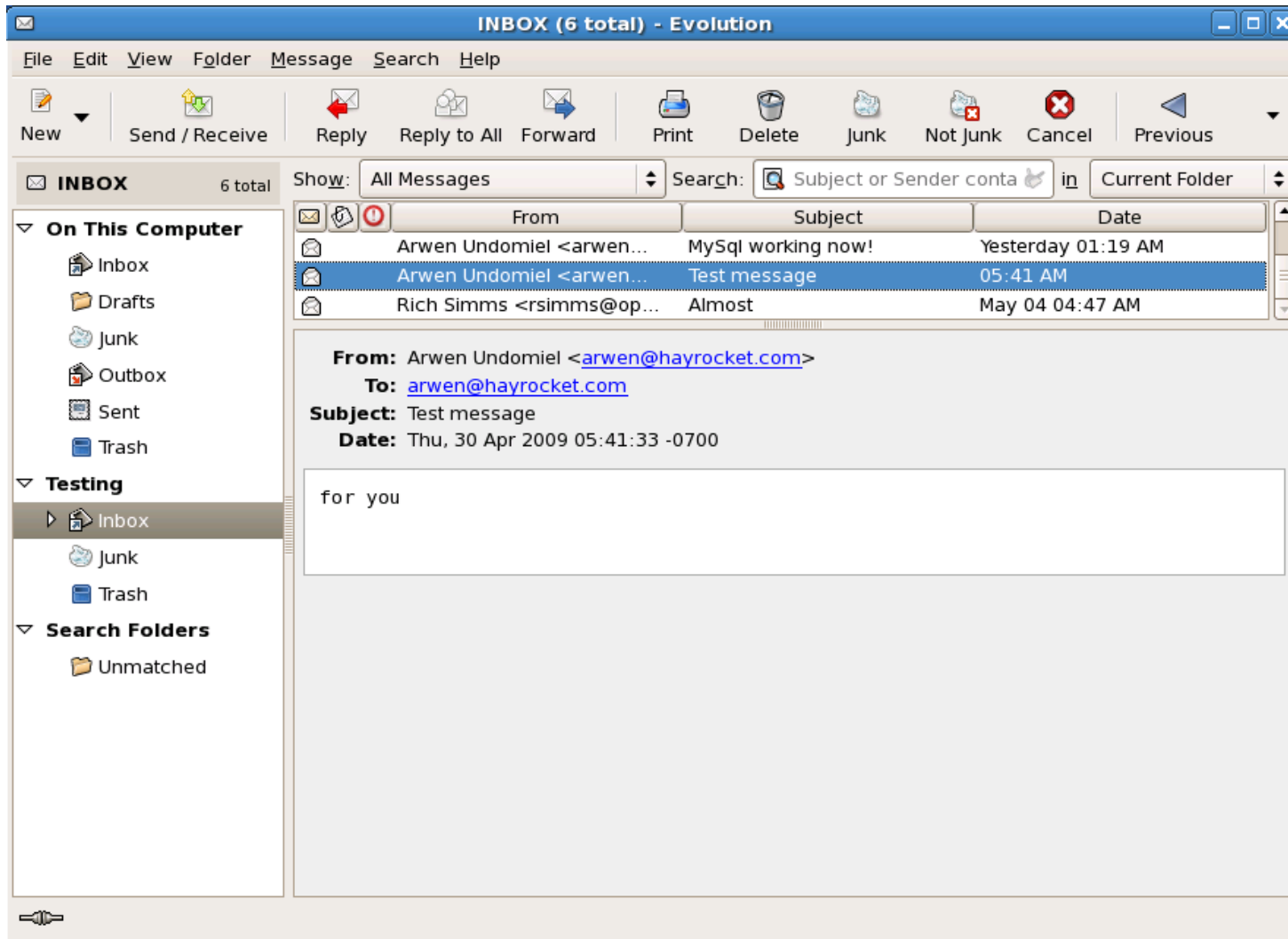
# CIS 192 - Lesson 12

## MUA Configuration

*You should now be able to read your mail depending on your ISP access policies*

*Account  
using  
POP*

*Account  
using  
IMAP*



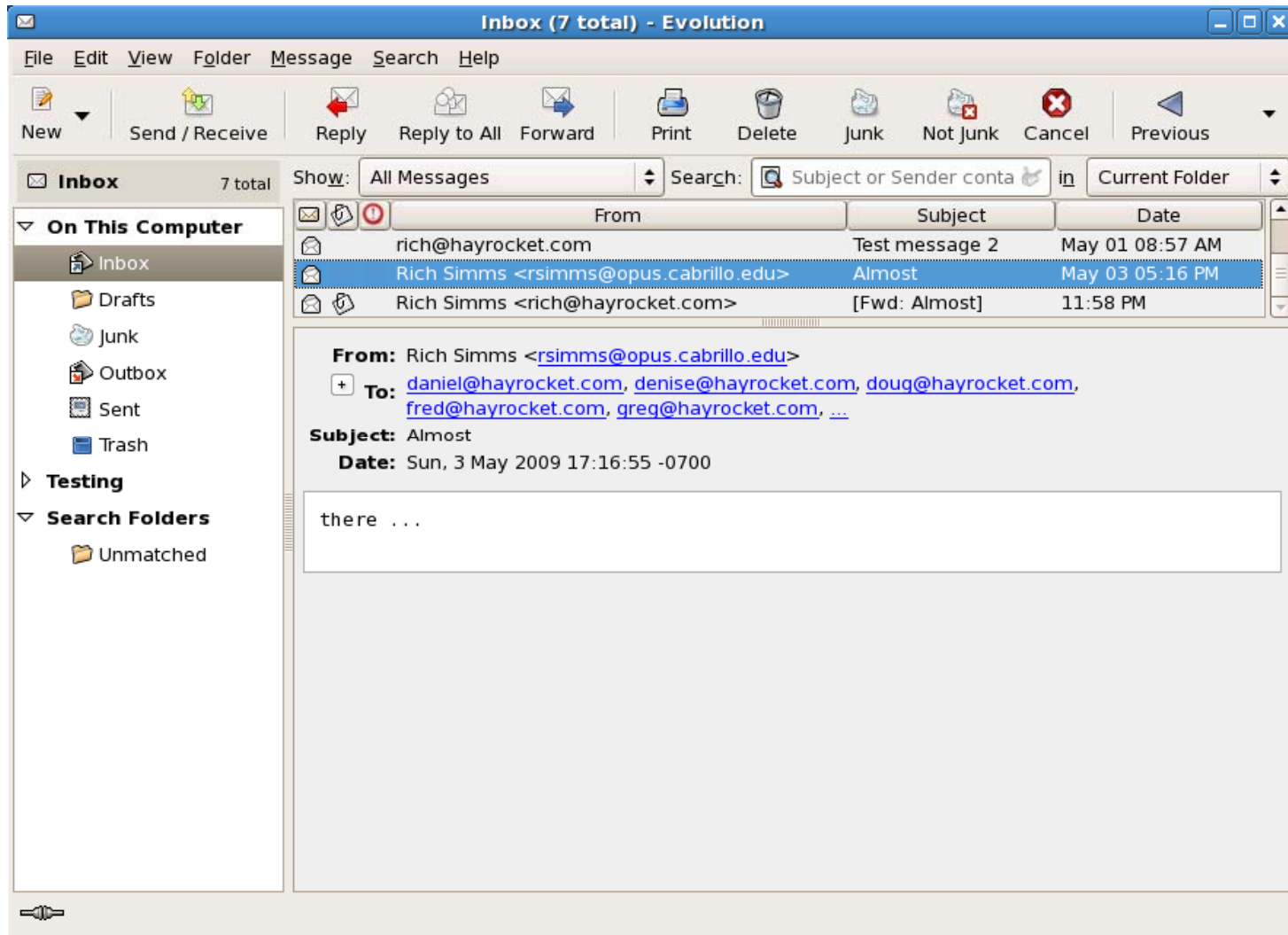
# CIS 192 - Lesson 12

## MUA Configuration

*You should now be able to read your mail depending on your ISP access policies*

*Account  
using  
POP*

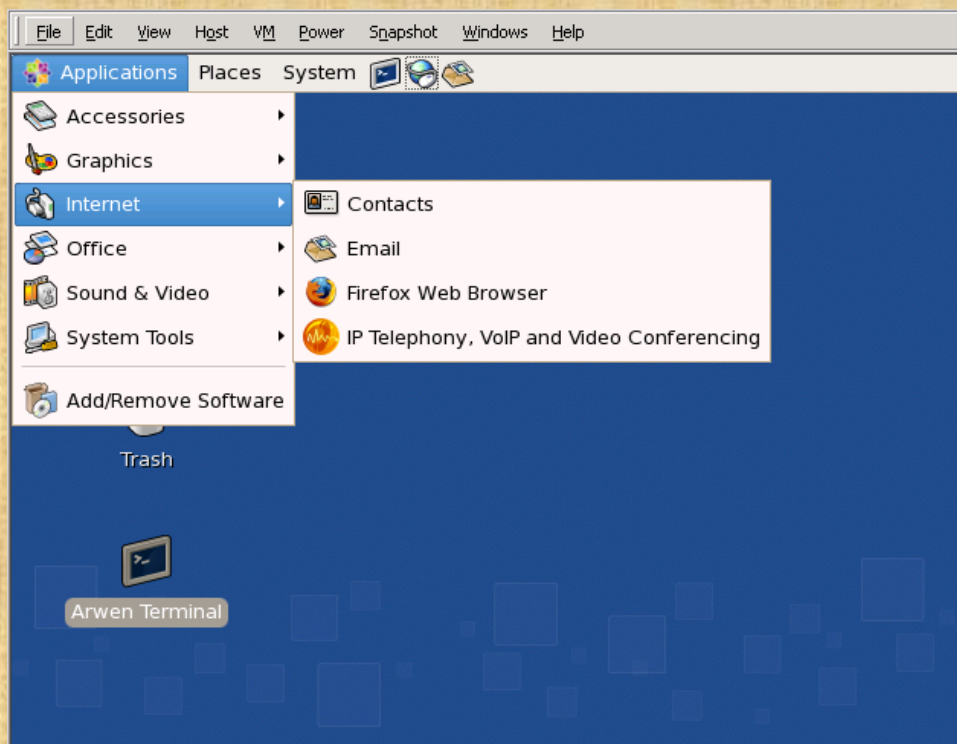
*Account  
using  
IMAP*



## MUA Configuration

*Try and set up the MUA on Arwen to read and send mail using your ISP's mail servers.*

*You may not be able to connect to you ISP's mail servers if you are not connecting from one of your ISP's network addresses. In that case try using SMTP port 587 instead of port 25 which may work.*



*This won't work in 2501 as the Cabrillo firewall blocks outgoing packets to ports 110 and 143*

# Sendmail Configuration

## Installing and Configuring Sendmail (Red Hat Family)

### Sendmail

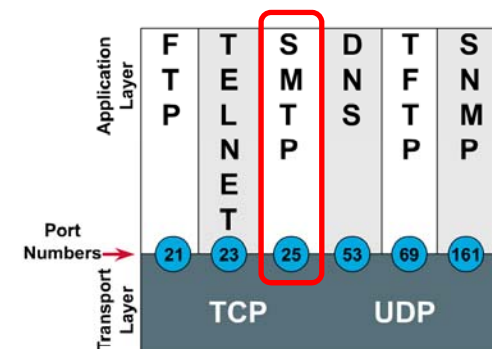
- Uses port 25 (SMTP – Simple Mail Transport Protocol)
- Mail router - controlled by /etc/mail/sendmail.cf
- Aliases - maintained in /etc/aliases
- Name resolution - using DNS records and /etc/hosts files
- User options - vacation notification and mail forwarding

```
[root@elrond ~]# cat /etc/services | grep -w 25
```

```
smtp      25/tcp    mail
smtp      25/udp    mail
```

```
<snipped>
```

Port Numbers



SMTP uses TCP port 25

## Service Applications

### Steps to installing services

1. Install software package using **yum**, **rpm** or build from source code
2. Customize service's configuration file
3. Modify the firewall to allow access to the service
4. Customize SELinux context settings to allow use
5. Start the service
6. Configure service to automatically start when system boots
7. Monitor and verify service is running
8. Troubleshoot as necessary
9. Monitor log files as appropriate
10. Configure additional security



## Installing Sendmail

### Step 1 *Install software*

```
[root@elrond ~]# rpm -qa | grep sendmail  
sendmail-cf-8.13.8-2.e15  
sendmail-8.13.8-2.e15  
[root@elrond ~]#
```

*sendmail-cf is used to build  
the configuration files*

*sendmail is the SMTP service and is  
already installed on Red Hat and  
CentOS systems*



## Installing Sendmail Configuration Files

### Step 1 *Installing configuration files and tools*

```
[root@elrond packages]# ls send*  
sendmail-cf-8.13.8-2.el5.i386.rpm
```

```
[root@elrond packages]# rpm -ihv sendmail-cf-*  
Preparing... ##### [100%]  
 1:sendmail-cf ##### [100%]
```

## sendmail configuration

*Could also use:*

**yum install sendmail-cf**

```
[root@arwen ~]# rpm -qa | grep sendmail  
sendmail-8.13.8-2.el5
```

```
[root@arwen ~]# yum install sendmail-cf  
Loading "fastestmirror" plugin  
Loading mirror speeds from cached hostfile  
* base: mirror.hmc.edu  
* updates: centos.eecs.wsu.edu  
* addons: mirrors.xmission.com  
* extras: mirrors.cat.pdx.edu  
Setting up Install Process  
Parsing package install arguments  
Resolving Dependencies  
--> Running transaction check  
---> Package sendmail-cf.i386 0:8.13.8-2.el5 set to be updated  
--> Finished Dependency Resolution  
  
Dependencies Resolved
```

# sendmail configuration

```
=====
Package                Arch          Version      Repository   Size
=====
Installing:
sendmail-cf            i386         8.13.8-2.el5 base          311 k
=====
```

Transaction Summary

```
=====
Install      1 Package(s)
Update      0 Package(s)
Remove      0 Package(s)
=====
```

Total download size: 311 k

Is this ok [y/N]: y

Downloading Packages:

```
(1/1): sendmail-cf-8.13.8 100% |=====| 311 kB    00:01
```

Running rpm\_check\_debug

Running Transaction Test

Finished Transaction Test

Transaction Test Succeeded

Running Transaction

```
Installing: sendmail-cf ##### [1/1]
```

Installed: sendmail-cf.i386 0:8.13.8-2.el5

Complete!

```
[root@arwen ~]#
```

```
[root@arwen mail]# make -C /etc/mail
```

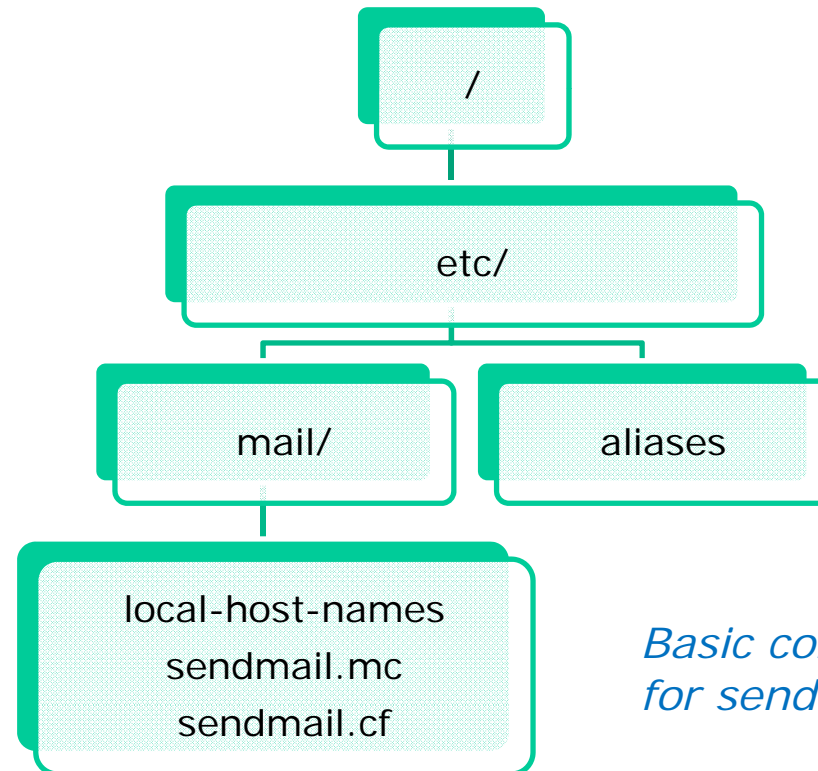
```
make: Entering directory `/etc/mail'
```

```
make: Leaving directory `/etc/mail'
```

```
[root@arwen mail]#
```

# sendmail

**Step 2** *Customize the configuration files*



*Basic configuration file  
for sendmail*

## The default sendmail configuration

### Incoming mail:

- delivered locally if the destination exists
- rejected and returned to sender if the destination user does not exist
- forwarded to remote system if destined for another system (@hostname.dom)
- Mail to this system's postmaster is delivered to root.

### Outgoing mail:

- delivered directly to the system in the address
- Append the FQDN to the sender's user name

## Modifying the sendmail configuration

Must change the sendmail.cf file to do any of the following:

- To use a central mail server and you need to forward all mail to that server
- To configure your server as a central mail server
- To use other mail channels

### *Mail channels*

- *badhost* - for mail with un-resolvable destination hostname
- *baduser* - for non-existing users
- *SMTP* - for mail to be sent using SMTP
- *UUCP* - for mail to be sent using UNIX to UNIX Copy program
- *local* - for mail that is to be delivered locally

## Sendmail configuration tools

- by hand
- install-sendmail  
<http://cork.linux.ie/projects/install-sendmail>
- m4 macros

*The you need to restart sendmail or send it a -1 (SIGHUP) signal with the kill command.*



## User-configurable mail options

- forwarding mail with `.forward`
- handling extended absences with vacation

## sendmail configuration

*By hand using /etc/mail/sendmail.cf*

```
#####  
#####  
#####  
#####  
##### SENDMAIL CONFIGURATION FILE  
#####  
##### built by mockbuild@builder5.centos.org on Wed Mar 14 20:00:26 EDT 2007  
##### in /builddir/build/BUILD/sendmail-8.13.8/cf/cf  
##### using ../ as configuration include directory  
#####  
#####  
##### DO NOT EDIT THIS FILE! Only edit the source .mc file.  
#####  
#####  
#####
```

*Hmmm, it seems to be not recommended to hand edit this file!*

## sendmail configuration

*By hand using /etc/mail/sendmail.cf*

```
[root@arwen mail]# tail -20 sendmail.cf
#
SHdrToL
R$+                $: $>AddDomain $1          add local domain if needed
R$* < @ *LOCAL* > $*    $: $1 < @ $j . > $2

#
# Common code to add local domain name (only if always-add-domain)
#
SAddDomain
R$* < @ $* > $*        $@ $1 < @ $2 > $3      already fully qualified

R$+                $@ $1 < @ *LOCAL* >      add local qualification

Mlocal,            P=/usr/bin/procmail, F=lsDFMAw5:/|@qSPfhn9, S=EnvFromL/HdrFromL,
R=EnvToL/HdrToL,
                  T=DNS/RFC822/X-Unix,
                  A=procmail -t -Y -a $h -d $u
Mprog,            P=/usr/sbin/smrsh, F=lsDFMoqeu9, S=EnvFromL/HdrFromL, R=EnvToL/HdrToL,
D=$z://,
                  T=X-Unix/X-Unix/X-Unix,
                  A=smrsh -c $u

[root@arwen mail]#
```

*Its not binary but I wouldn't  
want to edit this by hand!*

The screenshot shows a web browser window with the address bar displaying `http://ocaoimh.ie/install-sendmail`. The page title is "Holy Shmoly!" with the subtitle "Look what I found today!". The navigation menu includes "Home", "About", "WordPress", "Links", and "Random". The main content area features a section titled "Install Sendmail" with a large advertisement for WPMUDEV. Below the ad, the text reads: "Install Sendmail was a script that I worked on several years ago that made it very easy to configure Sendmail. Unfortunately, the original download site is in somewhat of a bad state and it's no longer possible to download Install Sendmail from there. Here's a new download link:" followed by a blue link: [install-sendmail-6.0.tar.gz](#). A red-bordered box highlights the following text: "This will probably be the last version of the script. Sendmail has moved on so it might not even work any more, and I recommend using [Postfix](#) which is much easier to use." The footer contains copyright information: "©2006-2010 Holy Shmoly! · Powered by WordPress 2.9.2." and a note: "Holy Shmoly! is Digg proof thanks to caching by WP Super Cache".

*Using the install-sendmail tool*

*Notice the part about how it might not work any more !!*

`http://ocaoimh.ie/install-sendmail`

## sendmail configuration

### Using M4 macros

```
[root@arwen mail]# head -25 sendmail.mc
divert(-1)dnl
dnl #
dnl # This is the sendmail macro config file for m4. If you make changes to
dnl # /etc/mail/sendmail.mc, you will need to regenerate the
dnl # /etc/mail/sendmail.cf file by confirming that the sendmail-cf package is
dnl # installed and then performing a
dnl #
dnl # make -C /etc/mail
dnl #
include(`/usr/share/sendmail-cf/m4/cf.m4')dnl
VERSIONID(`setup for linux')dnl
OSTYPE(`linux')dnl
dnl #
dnl # Do not advertize sendmail version.
dnl #
dnl define(`confSMTP_LOGIN_MSG', ` $j Sendmail; $b')dnl
dnl #
dnl # default logging level is 9, you might want to set it higher to
dnl # debug the configuration
dnl #
dnl define(`confLOG_LEVEL', `9')dnl
dnl #
dnl # Uncomment and edit the following line if your outgoing mail needs to
dnl # be sent out through an external mail server:
dnl #
[root@arwen mail]#
```

## sendmail configuration

*Make changes to /etc/mail/sendmail.mc then:*

```
[root@arwen mail]# make -C /etc/mail  
make: Entering directory `/etc/mail'  
make: Leaving directory `/etc/mail'  
[root@arwen mail]#
```

*or use*

***m4 sendmail.mc > sendmail.cf***

```
[root@arwen mail]# service sendmail restart  
Shutting down sm-client:  
Shutting down sendmail:  
Starting sendmail:  
Starting sm-client:  
[root@arwen mail]#
```

```
[ OK ]  
[ OK ]  
[ OK ]  
[ OK ]
```

## Sendmail and the Firewall

### **Step 3** *Modify the firewall*

### **Firewall ports used by sendmail**

TCP 25 *SMTP port*

```
iptables -I RH-Firewall-1-INPUT 9 -p tcp -m state --state NEW -m tcp --dport 25 -j ACCEPT
```

## Sendmail and the Firewall

```
[root@elrond ~]# iptables -nL
Chain INPUT (policy ACCEPT)
target     prot opt source                destination
RH-Firewall-1-INPUT  all  --  0.0.0.0/0             0.0.0.0/0

Chain FORWARD (policy ACCEPT)
target     prot opt source                destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source                destination

Chain RH-Firewall-1-INPUT (1 references)
target     prot opt source                destination
ACCEPT    all  --  0.0.0.0/0             0.0.0.0/0
ACCEPT    icmp --  0.0.0.0/0             0.0.0.0/0             icmp type 255
ACCEPT    esp  --  0.0.0.0/0             0.0.0.0/0
ACCEPT    ah   --  0.0.0.0/0             0.0.0.0/0
ACCEPT    udp  --  0.0.0.0/0             224.0.0.251           udp dpt:5353
ACCEPT    udp  --  0.0.0.0/0             0.0.0.0/0             udp dpt:631
ACCEPT    tcp  --  0.0.0.0/0             0.0.0.0/0             tcp dpt:631
ACCEPT    all  --  0.0.0.0/0             0.0.0.0/0             state RELATED,ESTABLISHED
ACCEPT    udp  --  0.0.0.0/0             0.0.0.0/0             state NEW udp dpt:53
ACCEPT    tcp  --  0.0.0.0/0             0.0.0.0/0             state NEW tcp dpt:53
ACCEPT    tcp  --  0.0.0.0/0             0.0.0.0/0             state NEW tcp dpt:25
ACCEPT    tcp  --  0.0.0.0/0             0.0.0.0/0             state NEW tcp dpt:22
REJECT    all  --  0.0.0.0/0             0.0.0.0/0             reject-with icmp-host-prohibited
[root@elrond ~]#
```

*SMTP port is  
open on this  
system*



## Sendmail and SELinux

### Step 4 *SELinux configuration*

Set permissive mode

```
[root@legolas ~]# setenforce permissive  
[root@legolas ~]# getenforce  
Permissive
```

Set enforcing mode

```
[root@legolas ~]# setenforce enforcing  
[root@legolas ~]# getenforce  
Enforcing
```

Show SELinux status

```
[root@legolas ~]# sestatus  
SELinux status:                enabled  
SELinuxfs mount:              /selinux  
Current mode:                  enforcing  
Mode from config file:         enforcing  
Policy version:                21  
Policy from config file:       targeted
```

*No changes are needed for this lesson's activity*

*Keep SELinux in enforcing mode*

## Sendmail

### Step 5 *Start the service*

```
[root@elrond ~]# service sendmail start  
Shutting down sm-client: [ OK ]  
Shutting down sendmail: [ OK ]  
Starting sendmail: [ OK ]  
Starting sm-client: [ OK ]
```

### Step 6 *Start the service automatically during system startup*

```
[root@elrond var]# chkconfig sendmail on  
[root@elrond var]#
```

*Note, sendmail is already configured to startup on Red Hat and CentOS systems*

## Sendmail

**Step 7** *Monitor and verify service is running*

```
[root@elrond ~]# service sendmail status  
sendmail (pid 14720) is running...  
[root@elrond ~]#
```

## Sendmail

### Step 7 *Monitor and verify service is running*

```
[root@elrond var]# netstat -tln
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 127.0.0.1:2208          0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:876           0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:111           0.0.0.0:*               LISTEN
tcp      0      0 10.10.5.1:53           0.0.0.0:*               LISTEN
tcp      0      0 172.30.1.130:53        0.0.0.0:*               LISTEN
tcp      0      0 127.0.0.1:53           0.0.0.0:*               LISTEN
tcp      0      0 127.0.0.1:631         0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:25            0.0.0.0:*               LISTEN
tcp      0      0 127.0.0.1:953         0.0.0.0:*               LISTEN
tcp      0      0 127.0.0.1:2207        0.0.0.0:*               LISTEN
tcp      0      0 :::22                 :::*                    LISTEN
[root@elrond0 ~]#
```

*Port 25 is used for SMTP (Simple Mail Transport Protocol)*



## Sendmail

### Step 8 *Troubleshoot*

```
[root@elrond bin]#
```

Problem:

Fix:

## Sendmail

### Step 9 Monitor log files

```
[root@elrond ~]# tail /var/log/maillog
[root@elrond0 ~]# tail /var/log/maillog
May  4 17:19:33 arwen sendmail[14715]: /etc/aliases: 76 aliases, longest 10 bytes, 765 bytes total
May  4 17:19:33 arwen sendmail[14720]: starting daemon (8.13.8): SMTP+queueing@01:00:00
May  4 17:19:33 arwen sm-msp-queue[14729]: starting daemon (8.13.8): queueing@01:00:00
May  4 17:21:14 arwen sendmail[14736]: o450LE1M014736: from=<root@elrond1.galaxy1.universe>, size=618,
class=0, nrcpts=1, msgid=<201005050021.o450LDkf010712@elrond1.galaxy1.universe>, proto=ESMTP, daemon=MTA,
relay=elrond1.galaxy1.universe.1.30.172.in-addr.arpa [172.30.1.126] (may be forged)
May  4 17:21:14 arwen sendmail[14737]: o450LE1M014736: to=<root@elrond5.galaxy5.universe>, delay=00:00:00,
xdelay=00:00:00, mailer=local, pri=30890, dsn=2.0.0, stat=Sent
May  4 17:21:39 arwen sendmail[14740]: o450LcPp014740: from=root, size=104, class=0, nrcpts=2,
msgid=<201005050021.o450LcPp014740@elrond5.galaxy5.universe>, relay=root@localhost
May  4 17:21:39 arwen sendmail[14741]: o450Ldtc014741: from=<root@elrond5.galaxy5.universe>, size=386,
class=0, nrcpts=2, msgid=<201005050021.o450LcPp014740@elrond5.galaxy5.universe>, proto=ESMTP, daemon=MTA,
relay=elrond5.galaxy5.universe [127.0.0.1]
May  4 17:21:39 arwen sendmail[14740]: o450LcPp014740:
to=root@elrond5.galaxy5.universe,root@elrond1.galaxy1.universe, ctladdr=root (0/0), delay=00:00:01,
xdelay=00:00:00, mailer=relay, pri=60104, relay=[127.0.0.1] [127.0.0.1], dsn=2.0.0, stat=Sent
(o450Ldtc014741 Message accepted for delivery)
May  4 17:21:39 arwen sendmail[14742]: o450Ldtc014741: to=<root@elrond5.galaxy5.universe>,
ctladdr=<root@elrond5.galaxy5.universe> (0/0), delay=00:00:00, xdelay=00:00:00, mailer=local, pri=60598,
dsn=2.0.0, stat=Sent
May  4 17:21:39 arwen sendmail[14742]: o450Ldtc014741: to=<root@elrond1.galaxy1.universe>,
ctladdr=<root@elrond5.galaxy5.universe> (0/0), delay=00:00:00, xdelay=00:00:00, mailer=esmtpl, pri=60598,
relay=elrond1.galaxy1.universe. [172.30.1.126], dsn=2.0.0, stat=Sent (o450LdlG010718 Message accepted for
delivery)
[root@elrond0 ~]#
```

## Sendmail

### Step 9 Monitor log files

```
[root@elrond ~]# mailstats
Statistics from Sun Apr  4 03:18:22 2010
 M  msgsfr  bytes_from  msgsto  bytes_to  msgsrej  msgsdis  msgsqur  Mailer
 4   2      2K          3      3K        0        0        0  esmtp
 9   8     12K          8     12K        0        0        0  local
=====
 T   10     14K         11     15K        0        0        0
 C   10          3          0
[root@elrond ~]#
```

The **mailstats** command displays mail statistics kept in `/var/log/mail/statistics`



## Sendmail

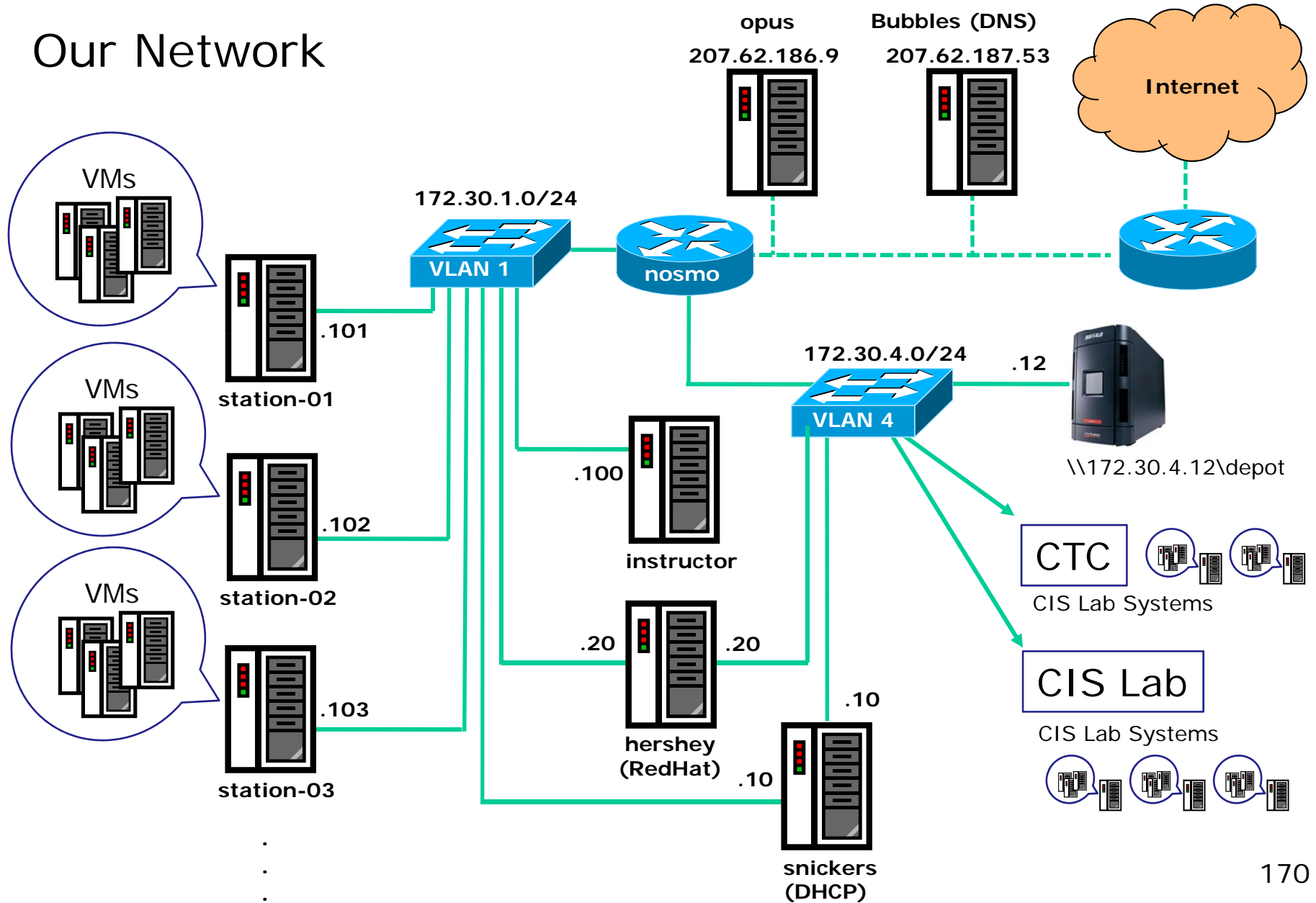
### **Step 10** *Additional security*

*See section 18.12 in the textbook*

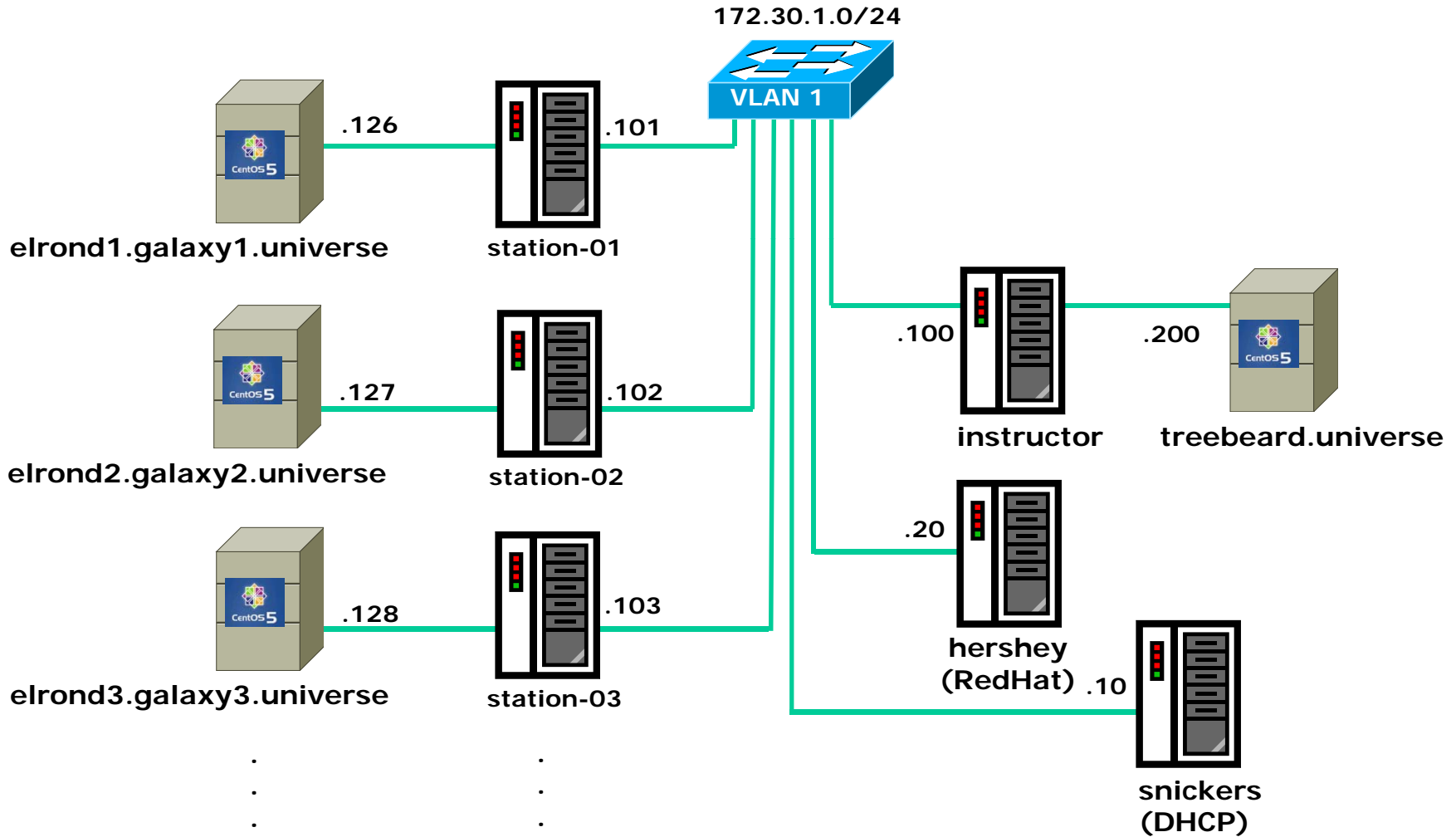


Do we dare

# Our Network



# Tonight's experiment



universe. domain

Treebeard

eth0  
.200



172.30.1.0 /24



Elrond1

galaxy1.universe. domain

eth0  
.126



eth1  
.1

10.10.1.0 /24



eth0  
.105



Legolas1

Elrond2

galaxy2.universe. domain

eth0  
.127



eth1  
.1

10.10.2.0 /24



eth0  
.105



Legolas2

•  
•  
•

# Central DNS Server

## sendmail configuration

```
[root@treebeard ~]# cat /etc/named.conf
```

```
options {
    directory "/var/named";
    /*
     * If there is a firewall between you and nameservers you want
     * to talk to, you might need to uncomment the query-source
     * directive below. Previous versions of BIND always asked
     * questions using port 53, but BIND 8.1 uses an unprivileged
     * port by default.
     */
    // query-source address * port 53;
};

//
// a caching only nameserver config
//
controls {
    inet 127.0.0.1 allow { localhost; } keys { rndckey; };
};
```

```
zone "." IN {
    type master;
    file "db.rootservers";
};
```

```
zone "localhost" IN {
    type master;
    file "localhost.zone";
    allow-update { none; };
};
```

```
zone "0.0.127.in-addr.arpa" IN {
    type master;
    file "named.local";
    allow-update { none; };
};
```

```
zone "universe" IN {
    type master;
    file "db.universe";
    allow-update { none; };
};
```

```
zone "1.30.172.in-addr.arpa" IN {
    type master;
    file "db.1.30.172";
    allow-update { none; };
};
```

```
// A key file needs to be referenced for use by rndc
include "/etc/rndc.key";
```

*Treebeard is the authoritative name sever for the . and **universe** domains*

*It also is the authoritative server for the **172.30.1.x reverse lookup zone***

*None of the VMs tonight will have Internet access*

# sendmail configuration

```
[root@treebeard named]# cat /var/named/db.rootserver
$TTL 3D
.           IN SOA treebeard.universe. root.treebeard.universe. (
2010050200      ; serial number
8H             ; refresh rate
2H            ; retry
4W            ; expire
1D)           ; minimum

;; ANSWER SECTION:
.           IN      NS      treebeard.universe.
universe.  IN      NS      treebeard.universe.

;; ADDITIONAL SECTION:
treebeard  IN      A       172.30.1.200

[root@treebeard named]#
```

*Treebeard is the authoritative name sever for the . and **universe** domains*

## sendmail configuration

```
[root@treebeard named]# cat /var/named/db.universe
$TTL 3D
; Universe Zone Definition
@      IN SOA treebeard.universe. root.treebeard.universe. (
                                2010050200      ; serial number
                                8H                ; refresh rate
                                2H                ; retry
                                4W                ; expire
                                1D)               ; minimum

IN NS  treebeard.universe.
```

```
galaxy1.universe.      IN NS  elrond1.galaxy1.universe.
galaxy2.universe.      IN NS  elrond2.galaxy2.universe.
galaxy3.universe.      IN NS  elrond3.galaxy3.universe.
galaxy4.universe.      IN NS  elrond4.galaxy4.universe.
galaxy5.universe.      IN NS  elrond5.galaxy5.universe.
galaxy6.universe.      IN NS  elrond6.galaxy6.universe.
galaxy7.universe.      IN NS  elrond7.galaxy7.universe.
galaxy8.universe.      IN NS  elrond8.galaxy8.universe.
galaxy9.universe.      IN NS  elrond9.galaxy9.universe.
galaxy10.universe.     IN NS  elrond10.galaxy10.universe.
galaxy11.universe.     IN NS  elrond11.galaxy11.universe.
galaxy12.universe.     IN NS  elrond12.galaxy12.universe.
galaxy13.universe.     IN NS  elrond13.galaxy13.universe.
galaxy14.universe.     IN NS  elrond14.galaxy14.universe.
galaxy15.universe.     IN NS  elrond15.galaxy15.universe.
galaxy16.universe.     IN NS  elrond16.galaxy16.universe.
galaxy17.universe.     IN NS  elrond17.galaxy17.universe.
galaxy18.universe.     IN NS  elrond18.galaxy18.universe.
galaxy19.universe.     IN NS  elrond19.galaxy19.universe.
galaxy20.universe.     IN NS  elrond20.galaxy20.universe.
galaxy21.universe.     IN NS  elrond21.galaxy21.universe.
galaxy22.universe.     IN NS  elrond22.galaxy22.universe.

galaxy23.universe.     IN NS  elrond23.galaxy23.universe.
galaxy24.universe.     IN NS  elrond24.galaxy24.universe.

treebeard.universe.    IN A   172.30.1.200
elrond0.galaxy0.universe. IN A   172.30.1.125
elrond1.galaxy1.universe. IN A   172.30.1.126
elrond2.galaxy2.universe. IN A   172.30.1.127
elrond3.galaxy3.universe. IN A   172.30.1.128
elrond4.galaxy4.universe. IN A   172.30.1.129
elrond5.galaxy5.universe. IN A   172.30.1.130
elrond6.galaxy6.universe. IN A   172.30.1.131
elrond7.galaxy7.universe. IN A   172.30.1.132
elrond8.galaxy8.universe. IN A   172.30.1.133
elrond9.galaxy9.universe. IN A   172.30.1.134
elrond10.galaxy10.universe. IN A   172.30.1.135
elrond11.galaxy11.universe. IN A   172.30.1.136
elrond12.galaxy12.universe. IN A   172.30.1.137
elrond13.galaxy13.universe. IN A   172.30.1.138
elrond14.galaxy14.universe. IN A   172.30.1.139
elrond15.galaxy15.universe. IN A   172.30.1.140
elrond16.galaxy16.universe. IN A   172.30.1.141
elrond17.galaxy17.universe. IN A   172.30.1.142
elrond18.galaxy18.universe. IN A   172.30.1.143
elrond19.galaxy19.universe. IN A   172.30.1.144
elrond20.galaxy20.universe. IN A   172.30.1.145
elrond21.galaxy21.universe. IN A   172.30.1.146
elrond22.galaxy22.universe. IN A   172.30.1.147

elrond23.galaxy23.universe. IN A   172.30.1.148
elrond24.galaxy24.universe. IN A   172.30.1.149
```

*Treebeard will refer queries to the appropriate authoritative galaxyXX name servers*

```
[root@treebeard named]#
```



# sendmail configuration

```
[root@treebeard named]# cat /var/named/db.1.30.172
$TTL 3D
; Reverse lookup zone
@      IN SOA treebeard.universe. root.treebeard.universe. (
                                2010050200      ; serial number
                                8H                ; refresh rate
                                2H                ; retry
                                4W                ; expire
                                1D)               ; minimum

@      IN NS  treebeard.universe.

200    IN PTR treebeard.universe
125    IN PTR elrond0.galaxy0.universe
126    IN PTR elrond1.galaxy1.universe
127    IN PTR elrond2.galaxy2.universe
128    IN PTR elrond3.galaxy3.universe
129    IN PTR elrond4.galaxy4.universe
130    IN PTR elrond5.galaxy5.universe
131    IN PTR elrond6.galaxy6.universe
132    IN PTR elrond7.galaxy7.universe
133    IN PTR elrond8.galaxy8.universe
134    IN PTR elrond9.galaxy9.universe
135    IN PTR elrond10.galaxy10.universe
136    IN PTR elrond11.galaxy11.universe
137    IN PTR elrond12.galaxy12.universe
138    IN PTR elrond13.galaxy13.universe
139    IN PTR elrond14.galaxy14.universe
140    IN PTR elrond15.galaxy15.universe
141    IN PTR elrond16.galaxy16.universe
142    IN PTR elrond17.galaxy17.universe
143    IN PTR elrond18.galaxy18.universe
144    IN PTR elrond19.galaxy19.universe
145    IN PTR elrond20.galaxy20.universe
146    IN PTR elrond21.galaxy21.universe
147    IN PTR elrond22.galaxy22.universe
148    IN PTR elrond23.galaxy23.universe
149    IN PTR elrond24.galaxy24.universe
[root@treebeard named]#
```

*Treebeard is authoritative for the reverse lookup zone for the 172.30.1.x network*

# Local DNS Server

## sendmail configuration

```
[root@elrond1 ~]# cat /etc/named.conf
options {
    directory "/var/named";
    /*
     * If there is a firewall between you and nameservers you want
     * to talk to, you might need to uncomment the query-source
     * directive below. Previous versions of BIND always asked
     * questions using port 53, but BIND 8.1 uses an unprivileged
     * port by default.
     */
    // query-source address * port 53;
};

//
// a caching only nameserver config
//
controls {
    inet 127.0.0.1 allow { localhost; } keys { rndckey; };
};

zone "." IN {
    type hint;
    file "myuniverse.ca";
};

zone "localhost" IN {
    type master;
    file "localhost.zone";
    allow-update { none; };
};

zone "0.0.127.in-addr.arpa" IN {
    type master;
    file "named.local";
    allow-update { none; };
};
```

```
zone "galaxy1.universe" IN {
    type master;
    file "db.galaxy1";
    allow-update { none; };
};
```

*Each elrondxx is authoritative for its own  
galaxyXX.universe domain*

```
// A key file needs to be referenced for use by rndc
include "/etc/rndc.key";
```

```
[root@elrond1 ~]#
```

## sendmail configuration

```
[root@elrond1 ~]# cat /var/named/myuniverse.ca
```

```
.                518400  IN      NS      treebeard.universe.  
treebeard.universe. 3600000 IN      A      172.30.1.200
```

```
[root@elrond1 ~]#
```

*Each elrondxx name server thinks  
Treebeard is the root server*

## sendmail configuration

```
[root@elrond1 ~]# cat /var/named/db.galaxy1
$TTL 3D
; Galaxy1.universe Zone Definition
@      IN SOA elrond1.galaxy1.universe. root.elrond1.galaxy1.universe. (
                                2010050200      ; serial number
                                8H              ; refresh rate
                                2H              ; retry
                                4W              ; expire
                                1D)             ; minimum

@      IN NS  elrond1.galaxy1.universe.
@      IN MX  10 elrond1.galaxy1.universe.

elrond1.galaxy1.universe.      IN A    172.30.1.126
elrond                        IN A    10.10.1.1
legolas                        IN A    10.10.1.105

[root@elrond1 ~]#
```

*The Elrond1 name server has the A records for the galaxy1 domain*

## sendmail configuration

```
[root@elrond24 ~]# cat /var/named/db.galaxy24
$TTL 3D
; Galaxy24.universe Zone Definition
@      IN SOA elrond24.galaxy24.universe. root.elrond24.galaxy24.universe. (
                                2010050200      ; serial number
                                8H              ; refresh rate
                                2H              ; retry
                                4W              ; expire
                                1D)             ; minimum

@      IN NS  elrond24.galaxy24.universe.
@      IN MX  10 elrond24.galaxy24.universe.

elrond24.galaxy24.universe.      IN A    172.30.1.149
elrond                          IN A    10.10.24.1
legolas                          IN A    10.10.24.105

[root@elrond24 ~]#
```

*The Elrond24 name server has the A records for the galaxy24 domain and so forth ...*

## sendmail steps for tonight

- Setup DNS services on all student systems
  - Treebeard is root server and manages universe domain
  - Each elrondXX manages its own galaxyXX domain
- install sendmail-cf
  - **rpm -ihv sendmail-cf-8.13.8-2.el5.i386.rpm**
- edit /etc/mail/sendmail.mc
  - `define(`confSMTP_LOGIN_MSG', ` $j server ready at $b')dnl`
  - `DAEMON_OPTIONS(`Port=smtp, Name=MTA')dnl`
- **cp sendmail.mc sendmail.mc.bak**
- **m4 sendmail.mc > sendmail.cf**
- Configure the /etc/mail/local-host-names file
  - localhost
  - elrond1.galaxy1.universe
  - localhost.galaxy1.universe
- **service sendmail restart**

### Activity – Download Elrond scripts

1. Cable Elrond's eth0 to the Shire network and connect with: **dhclient eth0**
2. Pull down download script with:  
**scp logname@opus.cabrillo.edu:/home/cis192/scripts/down\* .**
3. Set execute permission with **chmod 700 download-scripts-packages**
4. Run script with: **./download-scripts-packages** (Enter y for all ?'s)
5. Release IP address with: **dhclient -r**
6. Verify files:

```
[root@elrond ~]# ls /root/bin
common-functions          init-network-centos      set-hostname-centos
common-functions-centos  restart-network-centos  set-interface-centos
do-act12A-elrond         set-dns-centos           set-route-centos
do-lab3-elrond           set-forwarding-centos   show-network-centos
do-lab7-elrond          set-gateway-centos      update-scripts-elrond
[root@elrond ~]#
```

```
[root@elrond ~]# ls /root/packages/{bind*,caching*,sendmail*}
/root/packages/bind-9.3.6-4.P1.el5_4.2.i386.rpm
/root/packages/bind-libs-9.3.6-4.P1.el5_4.2.i386.rpm
/root/packages/bind-utils-9.3.6-4.P1.el5_4.2.i386.rpm
/root/packages/caching-nameserver-9.3.6-4.P1.el5_4.2.i386.rpm
/root/packages/sendmail-cf-8.13.8-2.el5.i386.rpm
[root@elrond ~]#
```



# Customize script do-act12A-elrond

```
#!/bin/bash
#
# Rich Simms
# CIS 192 Spring 2010
#
# Do on Activity 12A on Elrond
#
# Modify the following lines for static IP your workstation
# using http://simms-teach.com/docs/static-ip-addr.pdf
```

*Uncomment and set to your station number (no leading 0's)*

```
station=X
static1=172.30.1.1XX
treebeard=172.30.1.200
```

*Uncomment a set to your unique static IP address from*

*Uncomment and leave as 172.30.1.200*

<http://simms-teach.com/docs/static-ip-addr.pdf>

Station	Station IP	Work 1	Work 2	Work 3	End
0	172.30.1.100	172.30.1.100	172.30.1.100	172.30.1.100	172.30.1.100
1	172.30.1.101	172.30.1.101	172.30.1.101	172.30.1.101	172.30.1.101
2	172.30.1.102	172.30.1.102	172.30.1.102	172.30.1.102	172.30.1.102
3	172.30.1.103	172.30.1.103	172.30.1.103	172.30.1.103	172.30.1.103
4	172.30.1.104	172.30.1.104	172.30.1.104	172.30.1.104	172.30.1.104
5	172.30.1.105	172.30.1.105	172.30.1.105	172.30.1.105	172.30.1.105
6	172.30.1.106	172.30.1.106	172.30.1.106	172.30.1.106	172.30.1.106
7	172.30.1.107	172.30.1.107	172.30.1.107	172.30.1.107	172.30.1.107
8	172.30.1.108	172.30.1.108	172.30.1.108	172.30.1.108	172.30.1.108
9	172.30.1.109	172.30.1.109	172.30.1.109	172.30.1.109	172.30.1.109
10	172.30.1.110	172.30.1.110	172.30.1.110	172.30.1.110	172.30.1.110
11	172.30.1.111	172.30.1.111	172.30.1.111	172.30.1.111	172.30.1.111
12	172.30.1.112	172.30.1.112	172.30.1.112	172.30.1.112	172.30.1.112
13	172.30.1.113	172.30.1.113	172.30.1.113	172.30.1.113	172.30.1.113
14	172.30.1.114	172.30.1.114	172.30.1.114	172.30.1.114	172.30.1.114
15	172.30.1.115	172.30.1.115	172.30.1.115	172.30.1.115	172.30.1.115
16	172.30.1.116	172.30.1.116	172.30.1.116	172.30.1.116	172.30.1.116
17	172.30.1.117	172.30.1.117	172.30.1.117	172.30.1.117	172.30.1.117
18	172.30.1.118	172.30.1.118	172.30.1.118	172.30.1.118	172.30.1.118
19	172.30.1.119	172.30.1.119	172.30.1.119	172.30.1.119	172.30.1.119
20	172.30.1.120	172.30.1.120	172.30.1.120	172.30.1.120	172.30.1.120
21	172.30.1.121	172.30.1.121	172.30.1.121	172.30.1.121	172.30.1.121
22	172.30.1.122	172.30.1.122	172.30.1.122	172.30.1.122	172.30.1.122
23	172.30.1.123	172.30.1.123	172.30.1.123	172.30.1.123	172.30.1.123
24	172.30.1.124	172.30.1.124	172.30.1.124	172.30.1.124	172.30.1.124

## sendmail configuration

```
[root@elrond6 ~]# host treebeard.universe  
treebeard.universe has address 172.30.1.200
```

```
[root@elrond6 ~]# host elrond1.galaxy1.universe  
elrond1.galaxy1.universe has address 172.30.1.126
```

```
[root@elrond6 ~]# host elrond6.galaxy6.universe  
elrond6.galaxy6.universe has address 172.30.1.131
```

```
[root@elrond6 ~]# host 172.30.1.126  
126.1.30.172.in-addr.arpa domain name pointer  
  elrond1.galaxy1.universe.1.30.172.in-addr.arpa.
```

```
[root@elrond6 ~]# host 172.30.1.131  
131.1.30.172.in-addr.arpa domain name pointer  
  elrond6.galaxy6.universe.1.30.172.in-addr.arpa.  
[root@elrond6 ~]#
```

*On Edwin's Elrond6 (on station-06) we check out the  
DNS configuration in the classroom*

## sendmail configuration

```
[root@elrond6 ~]# ping -c1 treebeard.universe
PING treebeard.universe (172.30.1.200) 56(84) bytes of data.
64 bytes from treebeard.universe.1.30.172.in-addr.arpa (172.30.1.200):
icmp_seq=1 ttl=64 time=6.05 ms

--- treebeard.universe ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 6.055/6.055/6.055/0.000 ms

[root@elrond6 ~]# ping -c1 elrond1.galaxy1.universe
PING elrond1.galaxy1.universe (172.30.1.126) 56(84) bytes of data.
64 bytes from elrond1.galaxy1.universe.1.30.172.in-addr.arpa (172.30.1.126):
icmp_seq=1 ttl=64 time=13.1 ms

--- elrond1.galaxy1.universe ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 13.123/13.123/13.123/0.000 ms
[root@elrond6 ~]#
```

*On Edwin's Elrond6 (on station-06) we check out the network configuration in the classroom*

## sendmail configuration

```
[root@elrond6 ~]# host elrond1.galaxy1.universe  
elrond1.galaxy1.universe has address 172.30.1.126
```

```
[root@elrond6 ~]# mail root@elrond1.galaxy1.universe  
Subject: Test Message #1025  
How goes it?  
- root  
.  
Cc:  
[root@elrond6 ~]
```

*On Edwin's Elrond6 (on station-06) we send a message to root on Casady's Elrond1 (on station-01)*

## sendmail configuration

```
[root@elrond6 ~]# ssh elrond1.galaxy1.universe
root@elrond1.galaxy1.universe's password:
Last login: Wed May  5 23:42:43 2010
```

```
[root@elrond1 ~]# mail
Mail version 8.1 6/6/93.  Type ? for help.
"/var/spool/mail/root": 5 messages 5 new
>N  1 logwatch@elrond.loca  Wed Dec 30 01:03 122/3781  "Logwatch for elrond.1"
  N  2 logwatch@elrond.loca  Wed Dec 30 04:02 130/3962  "Logwatch for elrond.1"
  N  3 logwatch@elrond.loca  Wed Dec 30 04:57 122/3781  "Logwatch for elrond.1"
  N  4 logwatch@elrond.loca  Sat Jan  2 22:40  43/1572  "Logwatch for elrond.1"
  N  5 root@elrond6.galaxy6  Thu May  6 00:09  20/991   "Test Message #1025"
& 5
Message 5:
From root@elrond6.galaxy6.universe  Thu May  6 00:09:38 2010
Date: Thu, 6 May 2010 00:15:07 -0700
From: root <root@elrond6.galaxy6.universe>
To: root@elrond1.galaxy1.universe
Subject: Test Message #1025
```

How goes it?

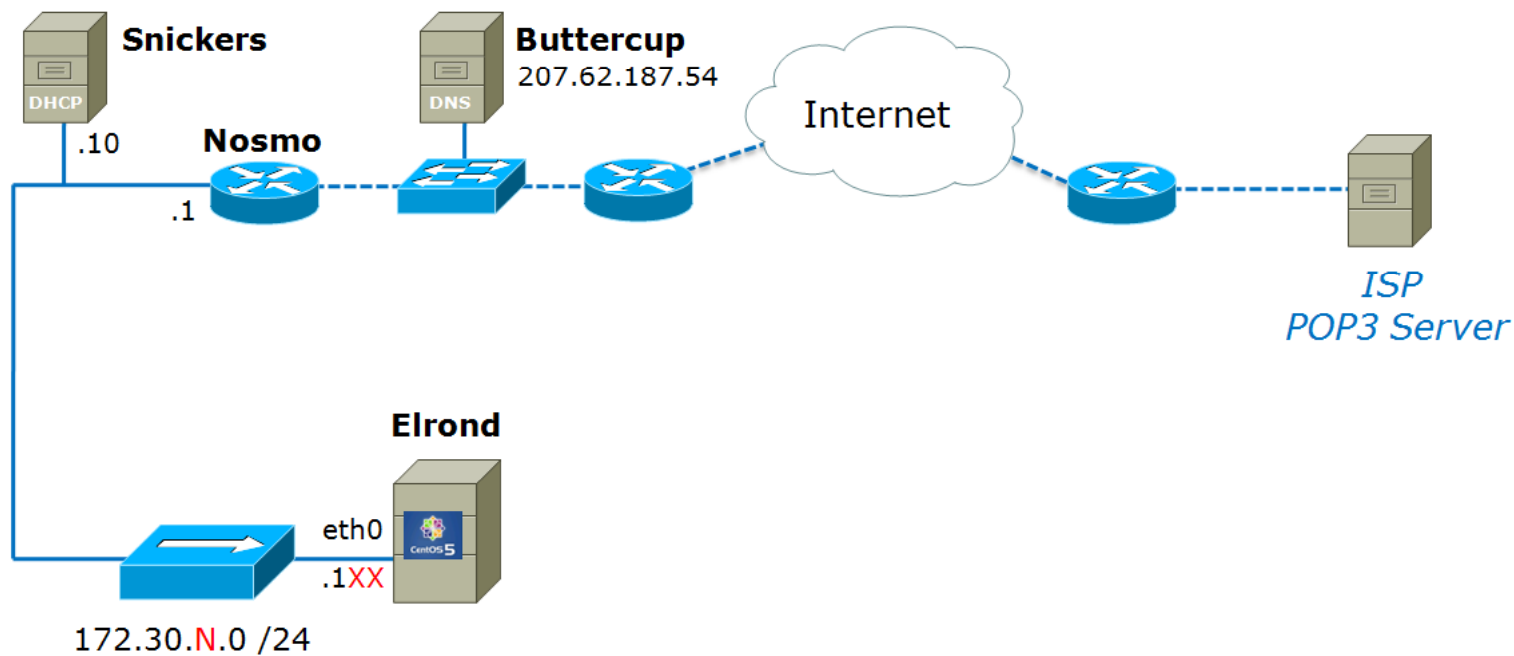
- root

*On Casady's Elrond1 (on station-01) the message is received and read*

&

# Lab 9

## Lab 9



- *Talk to a POP server directly with Telnet*
- *Configure a MUA*
- *Use fetchmail to pull messages from a mail server to your Linux mailbox*

# Wrap



# References

## **Jim Griffin**

- <http://www.cabrillo.edu/~jgriffin/CIS192/files/lesson13.html>

## **MIME**

- <http://en.wikipedia.org/wiki/MIME>

## **SMTP**

- <http://www.the-welters.com/professional/smtp.html>

## **Delivery Agents**

- <http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/index.html>
- <http://fetchmail.berlios.de/fetchmail-FAQ.html#G1>
- <http://publib.boulder.ibm.com/infocenter/systems/index.jsp?topic=/com.ibm.aix.cmds/doc/aixcmds5/smrsh.htm>

## **sendmail configuration**

- <http://www.surveymain.com/how-to-configure-sendmail-on-centos-5-215.html/>
- <http://www.solarum.com/library/configuring-sendmail-on-linux/printpage/>

**IMAP commands:**

```
telnet hershey 143
a001 login username password
a002 list "" "*"
a003 select INBOX
a004 fetch 1 full
a005 fetch 1 body[text]
a006 logout
```

**POP commands:**

```
telnet hershey 110
user yourname
pass yourpassword
list
retr 1
quit
telnet hershey 25
```

**SMTP commands:**

```
ehlo arwen
mail from: yourname@middleearth.net
rcpt to: yourname
data
Date: May 5, 2009
From: yourname
Reply-to: yourname
Message-ID: one
Subject: Manual SMTP message
Hi yourname,
Almost there ...
- yourname
.
quit
```

## Next Class

Assignment: Check Calendar Page

<http://simms-teach.com/cis192calendar.php>

Lab 9

Quiz questions for next class:

- What port is used by an IMAP server?
- Is sendmail a (DA) Delivery Agent or a (MTA) Mail Transport Agent?
- What record types are used in DNS to route email over the Internet?

# Backup

Classroom Static IP addresses for VM's

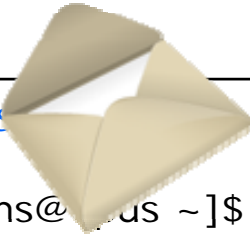
Station	IP	Static 1
Instructor	172.30.1.100	172.30.1.125
Station-01	172.30.1.101	172.30.1.126
Station-02	172.30.1.102	172.30.1.127
Station-03	172.30.1.103	172.30.1.128
Station-04	172.30.1.104	172.30.1.129
Station-05	172.30.1.105	172.30.1.130
Station-06	172.30.1.106	172.30.1.131
Station-07	172.30.1.107	172.30.1.132
Station-08	172.30.1.108	172.30.1.133
Station-09	172.30.1.109	172.30.1.134
Station-10	172.30.1.110	172.30.1.135
Station-11	172.30.1.111	172.30.1.136
Station-12	172.30.1.112	172.30.1.137

Station	IP	Static 1
Station-13	172.30.1.113	172.30.1.138
Station-14	172.30.1.114	172.30.1.139
Station-15	172.30.1.115	172.30.1.140
Station-16	172.30.1.116	172.30.1.141
Station-17	172.30.1.117	172.30.1.142
Station-18	172.30.1.118	172.30.1.143
Station-19	172.30.1.119	172.30.1.144
Station-20	172.30.1.120	172.30.1.145
Station-21	172.30.1.121	172.30.1.146
Station-22	172.30.1.122	172.30.1.147
Station-23	172.30.1.123	172.30.1.148
Station-24	172.30.1.124	172.30.1.149



*Note the static IP address for your station to use in the next class exercise*

## Overview of email



*A message created by the MUA /bin/mail*

```
[rsimms@opus ~]$ mail ironchefkobe@skyhighway.com
Subject: Almost
there ...
.
Cc:
[rsimms@opus ~]
```



**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:33:31 -0700

there ...

*A sample message read by the Evolution MUA*

## Overview of email

**From:** Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>  
**To:** [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)  
**Subject:** Almost  
**Date:** Sun, 3 May 2009 14:33:31 -0700

there ...

### *Route the message took*

X-Spam-Checker-Version: SpamAssassin 3.2.5 (2008-06-10) on skyhighway.com

X-Spam-Level:

X-Spam-Status: No, score=0.0 required=1.0 tests=none autolearn=disabled  
version=3.2.5

Received: from opus.cabrillo.edu (opus.cabrillo.edu [207.62.186.9]) by  
skyhighway.com with ESMTTP id n43MAHLC058199 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 15:10:17 -0700 (PDT)

Received: from opus.cabrillo.edu (opus [127.0.0.1]) by opus.cabrillo.edu  
(8.13.8/8.13.8) with ESMTTP id n43LXVXu025747 for  
<[ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)>; Sun, 3 May 2009 14:33:31 -0700

Received: (from [rsimms@localhost](mailto:rsimms@localhost)) by opus.cabrillo.edu  
(8.13.8/8.13.8/Submit) id n43LXVOi025746 for [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com);  
Sun, 3 May 2009 14:33:31 -0700

Date: Sun, 3 May 2009 14:33:31 -0700

From: Rich Simms <[rsimms@opus.cabrillo.edu](mailto:rsimms@opus.cabrillo.edu)>

Message-Id: <200905032133.n43LXVOi025746@opus.cabrillo.edu>

To: [ironchefkobe@skyhighway.com](mailto:ironchefkobe@skyhighway.com)

Subject: Almost

X-Cruzio-Spamtrap: 2.5 (2009/02/25)

X-CruzioSpamTrap: SpamAssassin Tagged vs 3

X-CruzioSpamtrapClass: OK

X-Evolution-Source: pop://[ironchefkobe%40skyhighway.com@mail.skyhighway.com](mailto:ironchefkobe%40skyhighway.com@mail.skyhighway.com)/

Mime-Version: 1.0

there ...



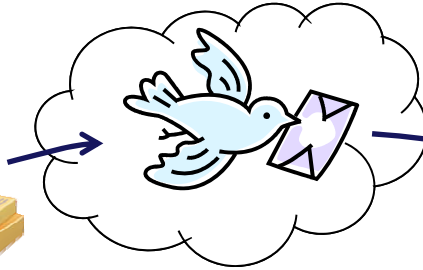
**MSA**  
Mail Submission Agent  
SMTP server  
(Port 587)



**MTA**  
Mail Transport Agent  
SMTP server  
(Port 25)



**Internet**



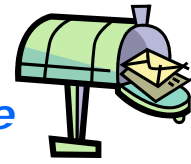
**MTA**  
Mail Transport Agent



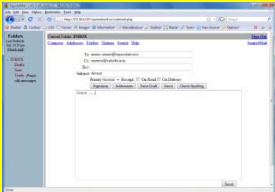
**DA**  
Delivery Agent



**Message Store**

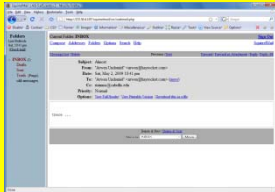


**AA**  
Access Agent  
IMAP server  
(Port 143)



**MUA**  
Mail User Agent  
SquirrelMail

*compose and send message*



**MUA**  
Mail User Agent  
SquirrelMail

*open and read message*