Email: Postfix and Anti-SPAM

- What we will cover
  - **Email in General** – How it works (previous)
  - **The Postfix Email server**
    - We will install a simplified configuration of the Postfix email server
    - Send emails from the Internet and receive emails to our *afnog* user accounts
  - **Cover some email best practices**
  - **Setup an Email server/Mail Gateway with an Anti-SPAM and Anti-Virus solution**
    - Filter incoming emails
    - View logs via the shell and web browser of emails

Postfix Mail Server

Kevin Chege
ISOC

What is Postfix?

- **Postfix** is a free and open-source mail transfer agent (MTA) that routes and delivers electronic mail, intended as an alternative to the widely used Sendmail MTA.
- Postfix is released under the IBM Public License 1.0 which is a free software licence.
- Originally written in 1997 by Wietse Venema at the IBM Thomas J. Watson Research Center and first released in December 1998, Postfix continues as of 2014 to be actively developed by its creator and other contributors. The software is also known by its former names **VMailer** and **IBM Secure Mailer**.
- In January 2013 in a study performed by E-Soft, Inc. found that approximately 25% of the publicly reachable mail-servers on the Internet ran Postfix.

Postfix

- Works on UNIX-like systems including AIX, BSD, HP-UX, Linux, MacOS X, Solaris, and more.
- It is the default MTA for the OS X, NetBSD[3] and Ubuntu operating systems
- Used by: AOL, Apple Server, Stanford University, United States Navy, NASA, Rackspace, many ISPs
- Able to process thousands

Some Key Features

- SASL authentication Simple Auth Security Layer
- Mail forwarding or delivery
- "Virtual" domains with distinct address-namespaces
- A large number of database lookup mechanisms including Berkeley DB, CDB, OpenLDAP LMDB, Memcached, LDAP and multiple SQL database implementations
- Extended
  - Deep content inspection before or after a message is accepted into the mail queue;
  - Mail authentication with DKIM, SPF, or other protocols;
  - SMTP-level access policies such as greylisting or rate control.

Postfix on Debian

- Installed via: **$sudo apt-get install postfix**
- Directories:
  /etc/postfix
- Configuration files
  - main.cf - stores site specific Postfix configuration parameters while
  - master.cf – defines daemon processes

master.cf

- defines how a client program connects to a service, and what daemon program runs when a service is requested.
- The Postfix master daemon launches all of the other Postfix services as they are needed. The various services, and how they are run, are specified in the master.cf file.
- The SMTP service is defined in this file as well as third party apps like an SPF program or a DKIM Program

main.cf

- specifies a very small subset of all the parameters that control the operation of the Postfix mail system
- you will have to set up a minimal number of configuration parameters.
- Postfix configuration parameters resemble shell variables
  - parameter = value
  - other_parameter = $parameter
- Postfix uses database files for access control, address rewriting and other purposes

main.cf Key Settings

- myorigin = $myhostname
  - specifies the domain that appears in mail that is posted on this machine. Defaults to the value of the machine's hostname
- mydestination = $myhostname, localhost
  - specifies what domains this machine will deliver locally
  - if your machine is a mail server for its entire domain, you must list $mydomain as well in this setting
- The mydomain parameter specifies the parent domain of $myhostname. By default, it is derived from $myhostname by stripping off the first part (unless if the result would be a top-level domain)

Relaying Mail – From

- Postfix will forward mail from clients in authorized network blocks to any destination
- Authorized networks are defined with the mynetworks configuration parameter
- The default is to authorize all clients in the IP subnetworks that the local machine is attached to.
- By default, Postfix will NOT be an open relay ie it will not forward from IPs outside your network to the Internet
  - mynetworks_style = subnet
  - mynetworks = 127.0.0.0/8 168.100.189.2/32

Relaying mail - to

- By default, Postfix will forward mail from strangers (clients outside authorized networks) to authorized remote destinations only.
- Authorized remote destinations are defined with the relay_domains configuration parameter.
- The default is to authorize all domains (and subdomains) of the domains listed with the mydestination parameter.
- This means that by default, your Postfix mail server will accept mail from anyone to recipients to the local Postfix server

Outbound emails

- By default, Postfix tries to deliver mail directly to the Internet.
- Depending on your local conditions this may not be possible or desirable
- For example, your system may be behind a firewall, or it may be connected via a provider who does not allow direct mail to the Internet.
- In those cases you need to configure Postfix to deliver mail indirectly via a relay host.
  - relayhost = [mail.isp.tld]
  - Note that the [] disables MX lookups so is necessary

Reporting problems

- You should set up a postmaster alias in the aliases table that directs mail to a real person
- The postmaster address is required to exist, so that people can report mail delivery problems.
- While you're updating the aliases(5) table, be sure to direct mail for the super-user to a human person too.
  /etc/aliases:
  postmaster: afnog
  root: afnog
- After editing the aliases file, run the command *$sudo newaliases*

Default reports

- bounce
  - Inform the postmaster of undeliverable mail. Either send the postmaster a copy of undeliverable mail that is returned to the sender, or send a transcript of the SMTP
- 2bounce
  - When Postfix is unable to return undeliverable mail to the sender,
- delay
  - Inform the postmaster of delayed mail. In this case, the postmaster receives message headers only.
- policy
  - Inform the postmaster of client requests that were rejected because of (UCE) policy restrictions. The postmaster receives a transcript of the SMTP session.
- protocol
  - Inform the postmaster of protocol errors (client or server side) or attempts by a client to execute unimplemented commands.
- resource
  - Inform the postmaster of mail not delivered due to resource problems (for example, queue file write errors)
- software
  - Inform the postmaster of mail not delivered due to software problems.

Logging

- Postfix will log all messages to ***/var/log/mail.log***
- Done using the syslogd daemon
- All transactions of messages coming in being sent out of the server will be logged
- Logs will contain details like hostnames, recipients, time and date, and whether the email was queued or dropped

Postfix Daemon process chrooted

- Postfix daemon processes can be configured (via the master.cf file) to run in a chroot jail
- The processes run at a fixed low privilege and with file system access limited to the Postfix queue directories (/var/spool/postfix).
- This provides a significant barrier against intrusion.
- The barrier is not impenetrable (chroot limits file system access only)

Interfaces and Protocol

- The inet_interfaces parameter specifies all network interface addresses that the Postfix system should listen on
  - inet_interfaces = all
- inet_protocols parameter specifies which protocols Postfix will attempt to use
  - inet_protocols = ipv4, ipv6

Starting, stopping and logs

- **Starting/Stopping**
  $sudo service postfix start
  $sudo service postfix stop

- **Checking non-default running config**
  $sudo postconf –n

- **Reloading rules**
  $sudo postfix reload

- **Checking logs**
  $sudo tail –f /var/log/mail.log

Further Postfix Reading

- Queue manipulation
  - http://www.tech-g.com/2012/07/15/inspecting-postfixs-email-queue/
- Postfix on Debian
  - https://wiki.debian.org/Postfix

Building a Mail Gateway

aka Mail Firewall or Mail Filter appliance

Email Best Practices

Kevin Chege

SPF

- SPF – Sender Policy Framework
  - SPF allows administrators to specify which hosts are allowed to send mail from a given domain by creating a specific SPF record (or TXT record) in the Domain Name System (DNS).
- *@ IN TXT "v=spf1 include:gmail.com ip4:1.2.3.4 mx -all"*
- The above will only allow mail from IP 1.2.3.4 and any server in the domain with an MX record
- If not sure use a generation tool online
  - http://www.mtgsy.net/dns/spfwizard.php

Domain Keys Identified Mail (DKIM)

- DKIM (DomainKeys Identified Mail) is an authentication mechanism to help protect both email receivers and email senders from forged and phishing email.
- It is intended to prevent forged sender addresses in emails, a technique often used in phishing and email spam.
- DKIM allows the receiver to check that an email claimed to come from a specific domain was indeed authorized by the owner of that domain which is done using cryptographic authentication.
- Verification is carried out using the signer's public key published in the DNS. A valid signature guarantees that some parts of the email (possibly including attachments) have not been modified since the signature was affixed

Reverse Records

- Have reverse records (PTR) for your mail server so that it is resolveable from the IP
- Mandatory by most servers these days
- Used to verify authenticity of the sending mail server
- The IP Address must resolve back to the mail server name
- You can have multiple reverse records
- You can have an SPF record that states that any IP that has a reverse record can send email from your domain
- *IN TXT "v=spf1 ptr:domain.co.tz ip4:1.2.3.4 mx -all"*

Use Anti Spam and Anti Virus software

- Will reduce overall spam and email received
- You can also have a mail “firewall” or gateway aka Mail Filter to stop spam before it reaches your server
- Some softwares are:
  - SpamAssassin (AntiSpam) – renowned antivirus
  - ClamAV (AntiVirus) – renowned antivirus
  - MailScanner and Amavisd (rely on the above)
- When setup try a penetration testing site to see how well your server can protect you from SPAM and Viruses

GreyListing

- Valid mail servers will have no problem if the receiving gives a soft error (4xx)
- They will attempt to send the mail again after some time
- Greylisting configured on a receiving mail server will give a soft error (4xx) to the sending server and store the IP/Hostname of the sending server in a file
- If the sending server returns again after some time (can be specified usually 5min) the email is accepted
- Used as a measure to deny mail from bots that are compromised to send mass mail. They often do not try again if the server did not accept the mail

Accept only well formatted messages

- Sender must be a valid name not an IP ie not user@192.14.5.6
- Mail server HELO name must be resolvable ie FQDN
- Server identification must resolve ie HELO/ EHLO name must be resolveable
- Email should be from a valid email address format eg: from tom@example.com and not from tom@example

Security

- Run secure pages from the mail server and secure SMTP to clients
  - Secure Webmail – port 443
  - Secure SMTP – port 465/587
- Force clients to use secure IMAP or Secure POP
  - Secure POP – port 995
  - Secure IMAP – port 993
- Require authentication on your mail server before a mail enters the queue from a sending client aka SMTP AUTH
- Lock down your box and block all unnecessary ports

Use Blacklist databases

- Use DNSBL – DNS Based Blackhole Lists or RBL (Real Time Blackhole lists) to deny mail from well known spamming machines
- Some well known good ones are
  - SORBS – http://sorbs.net
  - SPAMHAUS – http://spamhaus.org
  - SPAMCOP – http://spamcop.net
  - MANITU – http://manitu.net

Require strong Passwords

- Advise users to use strong passwords or passphrases for their email
- Alphanumeric passwords are better than normal passwords ie combine letters with numbers
- Passphrases are even better, more difficult to break

Backup and Redundancy

- Have multiple MX records so that your server is not the only one able to receive mail for you
- Backup your mail, use tools like Rsync to copy mail to another server as often as you can
- Ensure your DNS records (MX, NS etc) are correct and test them when you complete you setup
- Use online tests like
  - http://intodns.net

The question of Ethics

- As an email administrator, its easy to view other people's email at any time with admin rights
- Emails are intended by the sender for the recipient(s) and many senders are oblivious to the fact that their email can be intercepted along the way
  - Hence the need for encryption ☺
- As an email administrator, you should be be professional and maintain ethics and etiquette ☺

References

- Wikipedia
- http://www.linuxmagic.com/best_practices
- Further reading:
  - DMARC: https://dmarc.org/
    - https://en.wikipedia.org/wiki/DMARC
  - SpamAssassin - http://spamassassin.apache.org/
  - ClamAV - https://www.clamav.net/
  - AmavisD - https://www.ijs.si/software/amavisd/

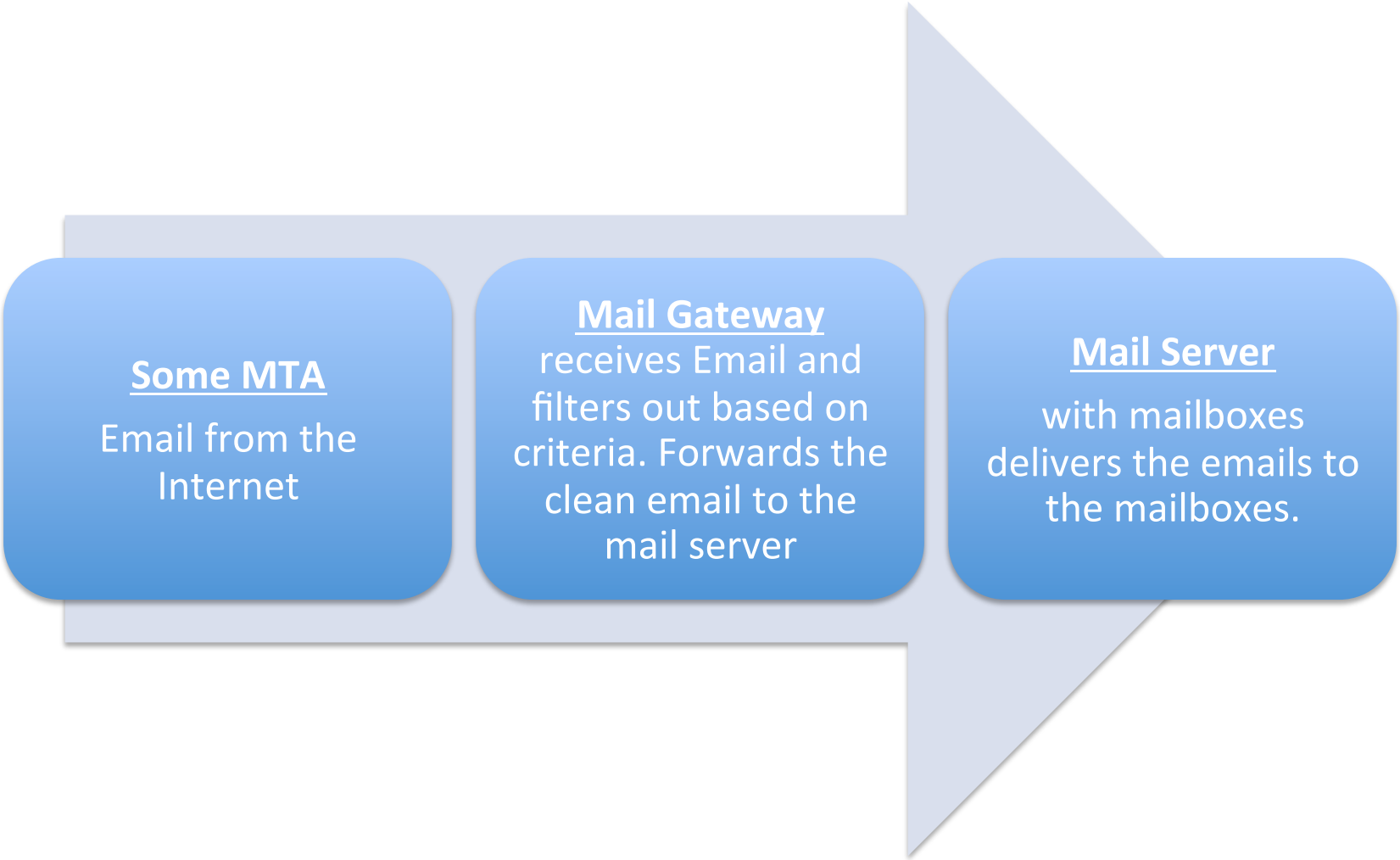
Email Gateways

Kevin Chege

What is a Mail Gateway?

- A software/service/appliance that is able to receive and filter emails before they reach the email boxes
- Typically, a mail gateway will not contain mail box accounts and will only receive emails, filter them based on configured parameters, and then forward them to the mail server that contains the mailboxes
- The purpose is to remove dangerous or harmful content (like spam and viruses) on email before they reach user boxes
- A mail filter can process incoming emails and or outgoing emails

How it flows


Some MTA
Email from the Internet
Mail Gateway
receives Email and filters out based on criteria. Forwards the clean email to the mail server
Mail Server
with mailboxes delivers the emails to the mailboxes.

Advantages

- Remove harmful email before it reaches mail boxes
- Remove the work of filtering email from the server that is handling email boxes
- Highly configurable and can block emails based on a number of criteria including content that is in the body of the email
- If hosted outside the network, can reduce load on the network connection/link (also known as far side scrubbing)

Disadvantage

- Mistakes in configuration may mean mail is not delivered. They are highly customisable with hundreds of options and parameters which you must be careful with
- Increase the number of email servers to be managed

Common tools used in Mail Gateways

- *Spamassassin* – No. 1 Open Source anti-spam platform giving system administrators a filter to classify email and block spam (unsolicited bulk email)
- *ClamAV* – Virus scanning software. Can be used for email scanning and web scanning
- *Amavisd* – interface between the MTA and the above tools. A common mail filtering installation with *Amavis* consists of an MTA, ClamAV and Spamassassin
- *MailScanner* - open source email security system design for Linux-based email gateways

Mail Gateway Appliances

These are solutions that can be installed on servers and provide Mail Gateway services

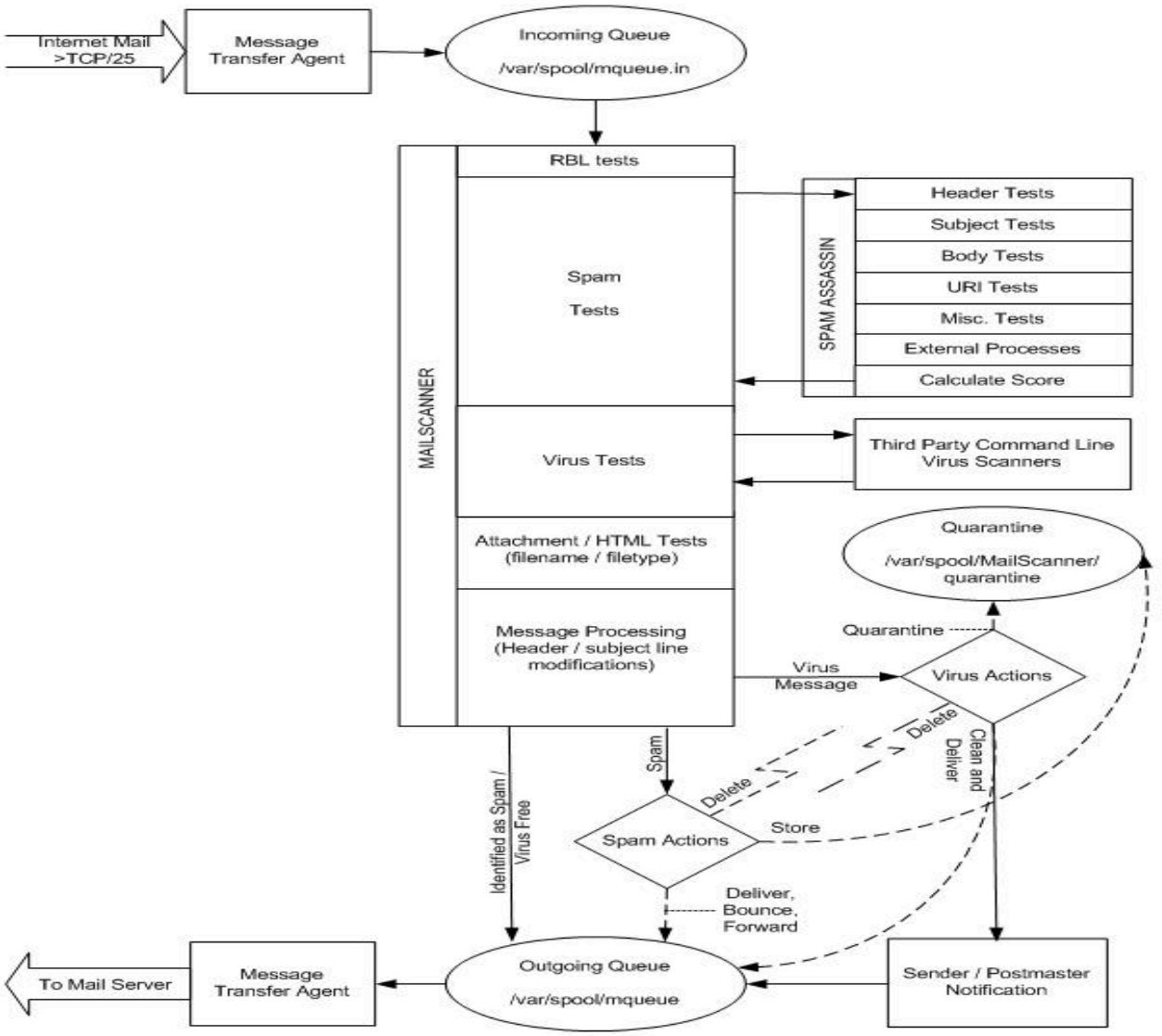
- Software:
  - Anti Spam SMTP Proxy - http://en.wikipedia.org/wiki/Anti-Spam_SMTP_Proxy
  - Mail Border - http://www.mailborder.com/
  - ScrolloutF1 - http://www.scrolloutf1.com/
  - Xeams - http://www.xeams.com/
- Hardware (Blackbox):
  - Barracuda - https://www.barracuda.com/products/emailsecuritygateway

MailScanner

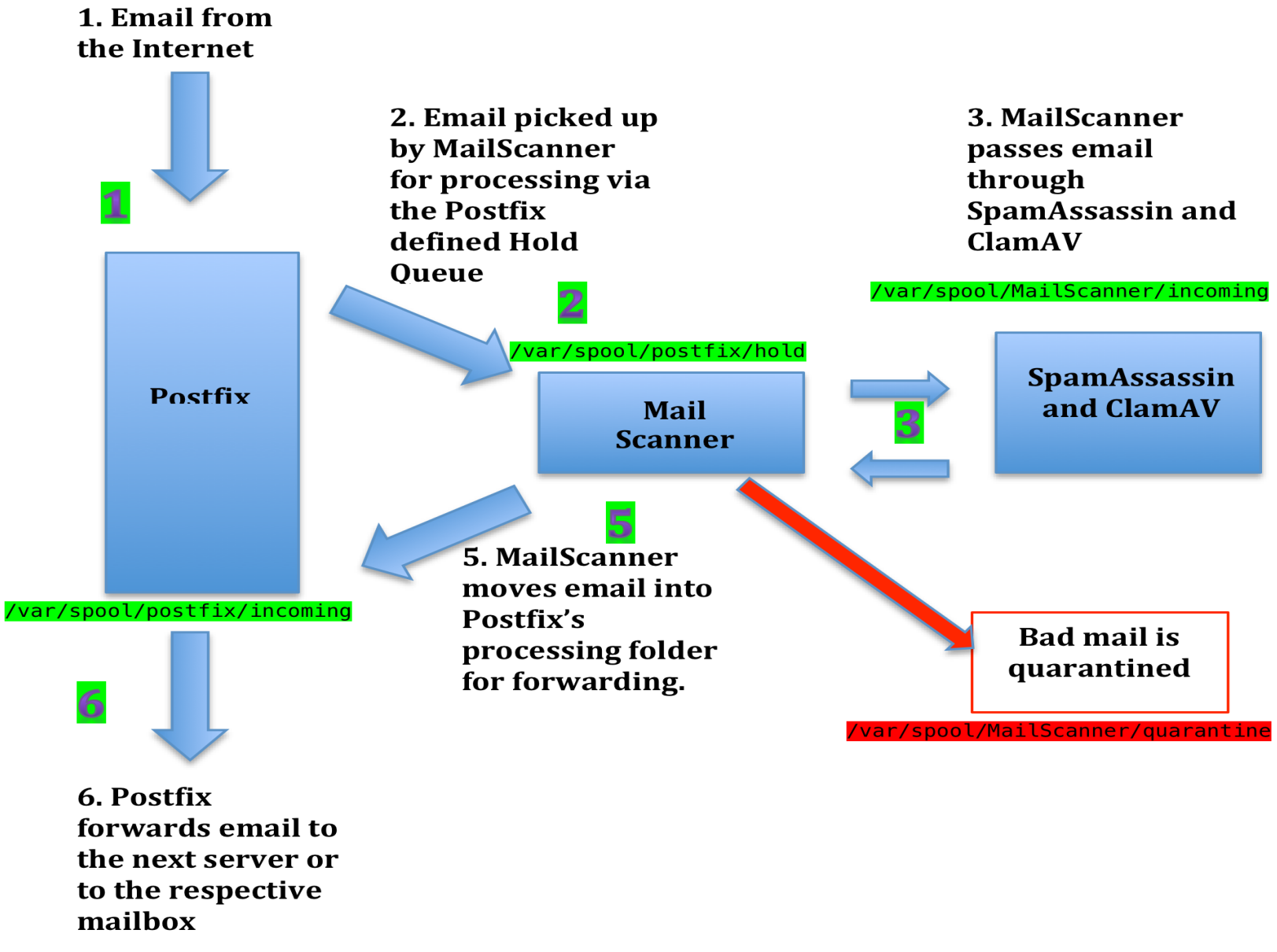
- MailScanner is a highly respected open source email security system design for Linux-based email gateways.
  - It is used at over 30,000 sites around the world
  - Has fast become the standard email solution at many ISP sites for virus protection and spam filtering.
- MailScanner scans email for viruses, spam, phishing, malware, and other attacks against security vulnerabilities and plays a major part in the security of a network.
- MailScanner supports a wide range of MTAs and virus scanners to include the popular open source Clam AV. Spam detection is accomplished via Spamassassin, which is by far the most popular and standardized spam detection engine.
- Written and Founded by: Julian Field

MailScanner Process Overview

September 25, 2003



A bit simpler…



MailScanner as an Appliance

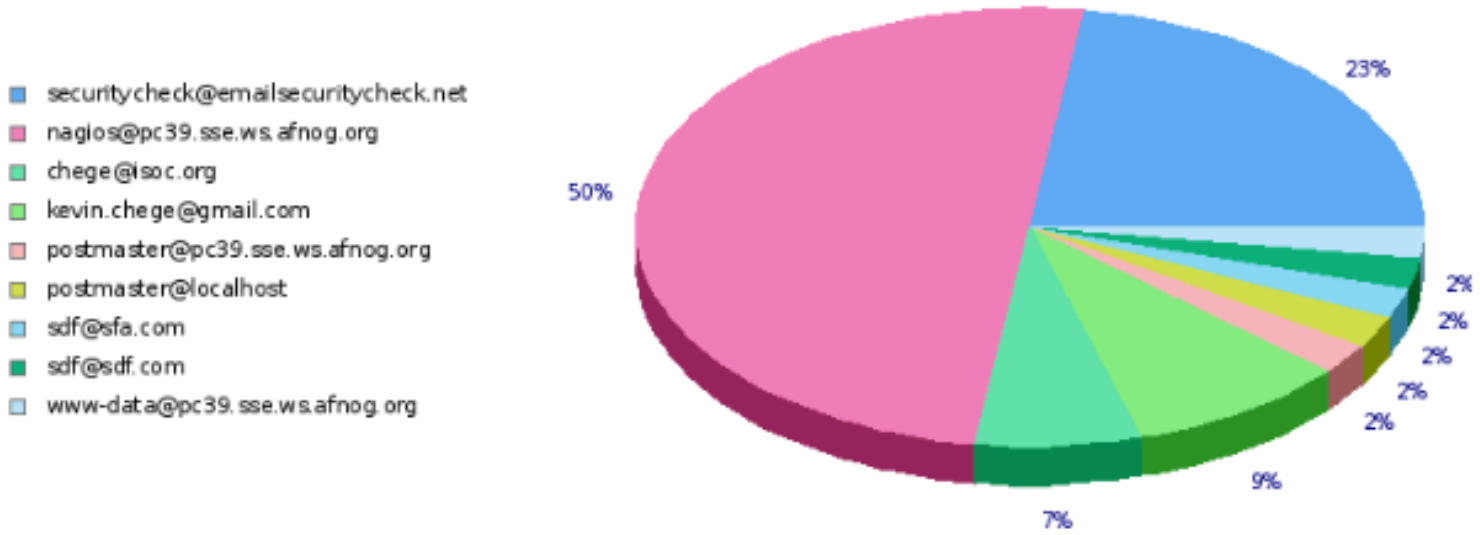
- MailScanner can be combined with a frontend to become a Mail Gateway appliance
- Two frontends are available:
  - Baruwa – http://baruwa.org
  - Mailwatch - http://mailwatch.org/
- When properly managed and configured with Postfix or Exim as the MTA, one can build a powerful mail gateway

MailScanner has hundreds of Knobs

- https://www.mailscanner.info/MailScanner.conf.index.html
- The defaults mostly work but for a production environment, please read the manual!
- We will install with basic features of
  - Process email and check for SPAM and viruses
  - Log all emails to MySQL (SPAM and Not SPAM)
  - Store all emails in the quarantine

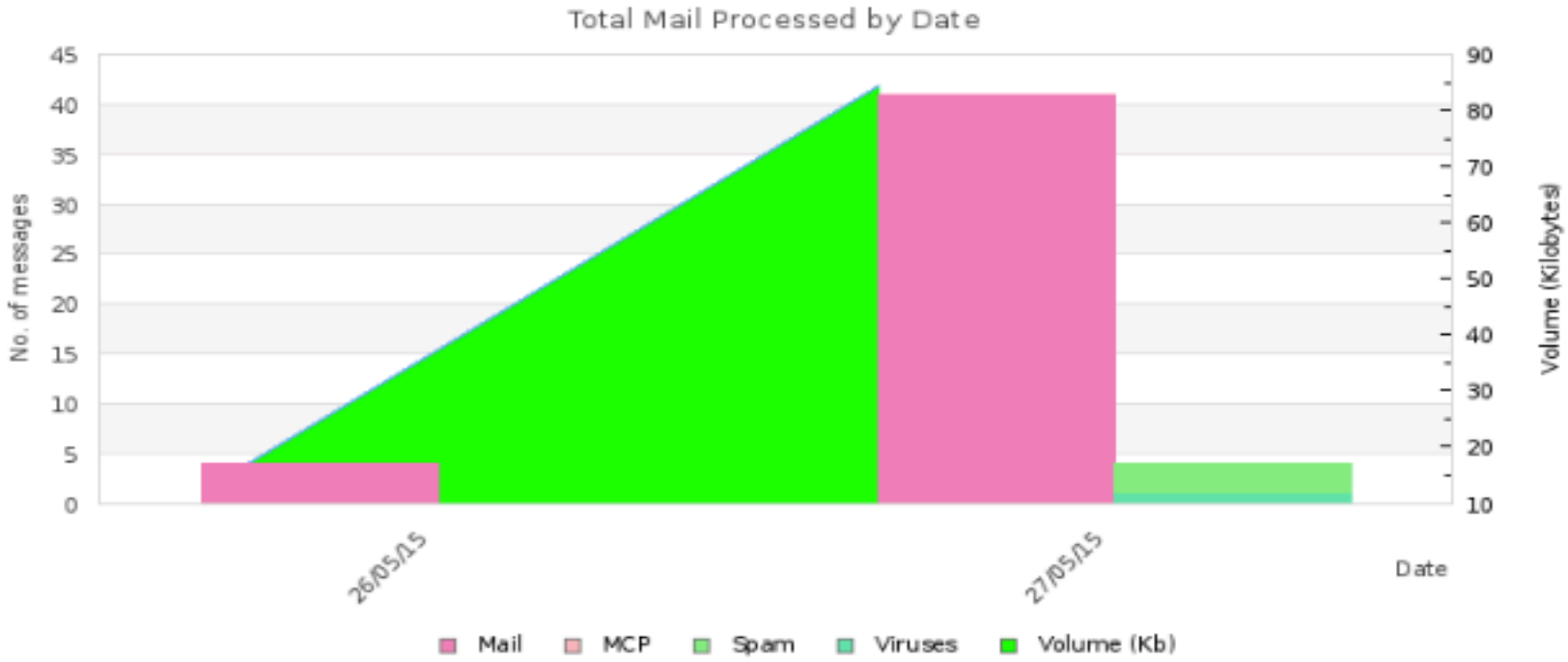
MailScanner www.mailscanner.info

Top 10 Senders by Volume



E-Mail Address	Count	Size
securitycheck@emailsecuritycheck.net	10	45.9Kb
nagios@pc39.sse.ws.afnog.org	22	17.5Kb
chege@isoc.org	3	13.2Kb
kevin.chege@gmail.com	4	9.6Kb
postmaster@pc39.sse.ws.afnog.org	1	3.2Kb
postmaster@localhost	1	2.7Kb
sdf@sfa.com	1	1.2Kb
sdf@sdf.com	1	833b
www-data@pc39.sse.ws.afnog.org	1	794b

MailScanner
www.mailscanner.info



Date	Mail	Virus	%	Spam	%	MCP	%	Volume		Unknown Users	Can't Resolve	RBL
26/05/15	4	0	0.0	0	0.0	0	0.0	12Kb		0	0	0
27/05/15	41	1	2.4	3	7.3	0	0.0	84.2Kb		0	0	0
Totals	**45**	**1**	**2.2**	**3**	**6.7**	**0**	**0.0**	**96.2Kb**		**0**	**0**	**0**

Page generated in 0.485303 seconds

Folder: 27/05/2015							
#	Date/Time (A/D)	From (A/D)	To (A/D)	Subject (A/D)	Size (A/D)	SA Score (A/D)	Status
[#]	27/05/15 17:32:28	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc1/Web servers is CRITICAL **	840b	1.25	Clean
[#]	27/05/15 17:30:27	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc3/Web servers is CRITICAL **	841b	1.25	Clean
[#]	27/05/15 17:29:39	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc1/HTTPS servers is CRITICAL **	813b	1.25	Clean
[#]	27/05/15 17:26:56	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc3/HTTPS servers is CRITICAL **	813b	1.25	Clean
[#]	27/05/15 16:37:08	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc5/HTTPS servers is CRITICAL **	813b	1.25	Clean
[#]	27/05/15 15:54:49	nagios@pc39.sse.ws.afnog.org	root@localhost	** RECOVERY Service Alert: localhost/DNS is OK **	818b	1.25	Clean
[#]	27/05/15 15:39:59	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: localhost/DNS is CRITICAL **	809b	1.25	Clean
[#]	27/05/15 15:39:33	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc5/DNS is CRITICAL **	803b	1.25	Clean
[#]	27/05/15 15:39:13	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc4/DNS is CRITICAL **	803b	1.25	Clean
[#]	27/05/15 15:38:24	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc2/DNS is CRITICAL **	803b	1.25	Clean
[#]	27/05/15 15:36:48	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc39/DNS is CRITICAL **	803b	1.25	Clean
[#]	27/05/15 15:28:28	nagios@pc39.sse.ws.afnog.org	root@localhost	** RECOVERY Service Alert: pc39/DNS is OK **	812b	1.25	Clean
[#]	27/05/15 15:26:47	nagios@pc39.sse.ws.afnog.org	root@localhost	** RECOVERY Service Alert: pc1/DNS is OK **	818b	1.25	Clean
[#]	27/05/15 15:25:56	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc2/DNS is UNKNOWN **	810b	1.25	Clean
[#]	27/05/15 15:21:49	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc1/DNS is CRITICAL **	808b	1.25	Clean
[#]	27/05/15 14:12:55	nagios@pc39.sse.ws.afnog.org	root@localhost	** PROBLEM Service Alert: pc3/DNS is CRITICAL **	809b	1.25	Clean
[#]	27/05/15 13:52:18		securitycheck@emailsecuritycheck.net	Warning: E-mail viruses detected	1.3Kb	2.20	Clean
[#]	27/05/15 13:52:18	postmaster@pc39.sse.ws.afnog.org	postmaster	Bad Filename Detected : Virus Detected	3.2Kb	0.00	Clean
[#]	27/05/15 13:51:55	securitycheck@emailsecuritycheck.net	root@pc39.sse.ws.afnog.org	Test mail 3/7 (ID=XeTBjsyfJ8KxCbAjuo9D4w==)	1.8Kb	998.87	Spam
[#]	27/05/15 13:51:55	securitycheck@emailsecuritycheck.net	root@pc39.sse.ws.afnog.org	Test mail 1/7 (ID=XeTBjsyfJ8KxCbAjuo9D4w==)	2.1Kb	-1.14	Bad Content
[#]	27/05/15 13:51:55	securitycheck@emailsecuritycheck.net	root@pc39.sse.ws.afnog.org	Test mail 2/7 (ID=XeTBjsyfJ8KxCbAjuo9D4w==)	2.2Kb	-1.14	Virus Bad Content
[#]	27/05/15 13:51:52	securitycheck@emailsecuritycheck.net	root@pc39.sse.ws.afnog.org	Test mail 5/7 (ID=XeTBjsyfJ8KxCbAjuo9D4w==)	2.1Kb	-1.14	Clean
[#]	27/05/15 13:51:47	securitycheck@emailsecuritycheck.net	root@pc39.sse.ws.afnog.org	Test mail 4/7 (ID=XeTBjsyfJ8KxCbAjuo9D4w==)	2.1Kb	-1.14	Clean
[#]	27/05/15 13:50:56	securitycheck@emailsecuritycheck.net	root@pc39.sse.ws.afnog.org	Email Security Check: Please confirm your registration	8.4Kb	-2.30	Clean
[#]	27/05/15 13:49:59	kevin.chege@gmail.com	root@pc39.sse.ws.afnog.org	sdf	2.4Kb	-0.82	W/L

Let us build our Mail Gateway

- We will now setup a mail gateway
- Configuring a mail filter is not easy. You must be aware of what you are enabling or disabling. Preconfigured files will be provided due to time limitation
- Setting the correct DNS entries is key
- You will filter email for your neighbor and he will filter your email
- At the end, you should have a fairly strong and working mail filter

References

- https://www.mailscanner.info
- https://en.wikipedia.org/wiki/DomainKeys_Identified_Mail
- http://postfix.org
- https://www.safaribooksonline.com/library/view/postfix-the-definitive/0596002122/ch04s05.html