



Timo Sirainen

Dovecot Oy

<http://www.dovecot.org/talks/>

Talk Overview

- Quick Dovecot introduction
- Recent happenings
- Object storage
- Anti-“brute force auth botnets”
- Future plans/ideas

Dovecot?

- IMAP, POP3 mail server
- Mail delivery agent + LMTP
- Sieve mail filtering language + ManageSieve (by Stephan Bosch)
- Still expanding to many other areas: You could even use it as a base for your own (non-email) server!
 - Easy to support SSL & user authentication
 - Soon HTTP server/proxy core included

Dovecot Features

- High performance (low disk I/O usage)
- Highly configurable/flexible
- Easy migration from other servers
 - dsync + imapc [+pop3c]
- Secure design
 - Heartbleed: Default install didn't leak users' passwords
- Admin-friendly
 - All errors are logged
 - Error log should stay empty!
 - Understandable error messages
 - Automated fixing of (corruption) errors

<http://openemailsurvey.org/>

Number of IPs scanned: 4294967295 (100%)
Number of IMAP servers found: 5157107
Number of servers detected using banner text: 4464158 (86%)
Number of servers detected using command replies: 5110783 (99%)
Number of conflicting banner vs. reply detections: 5229

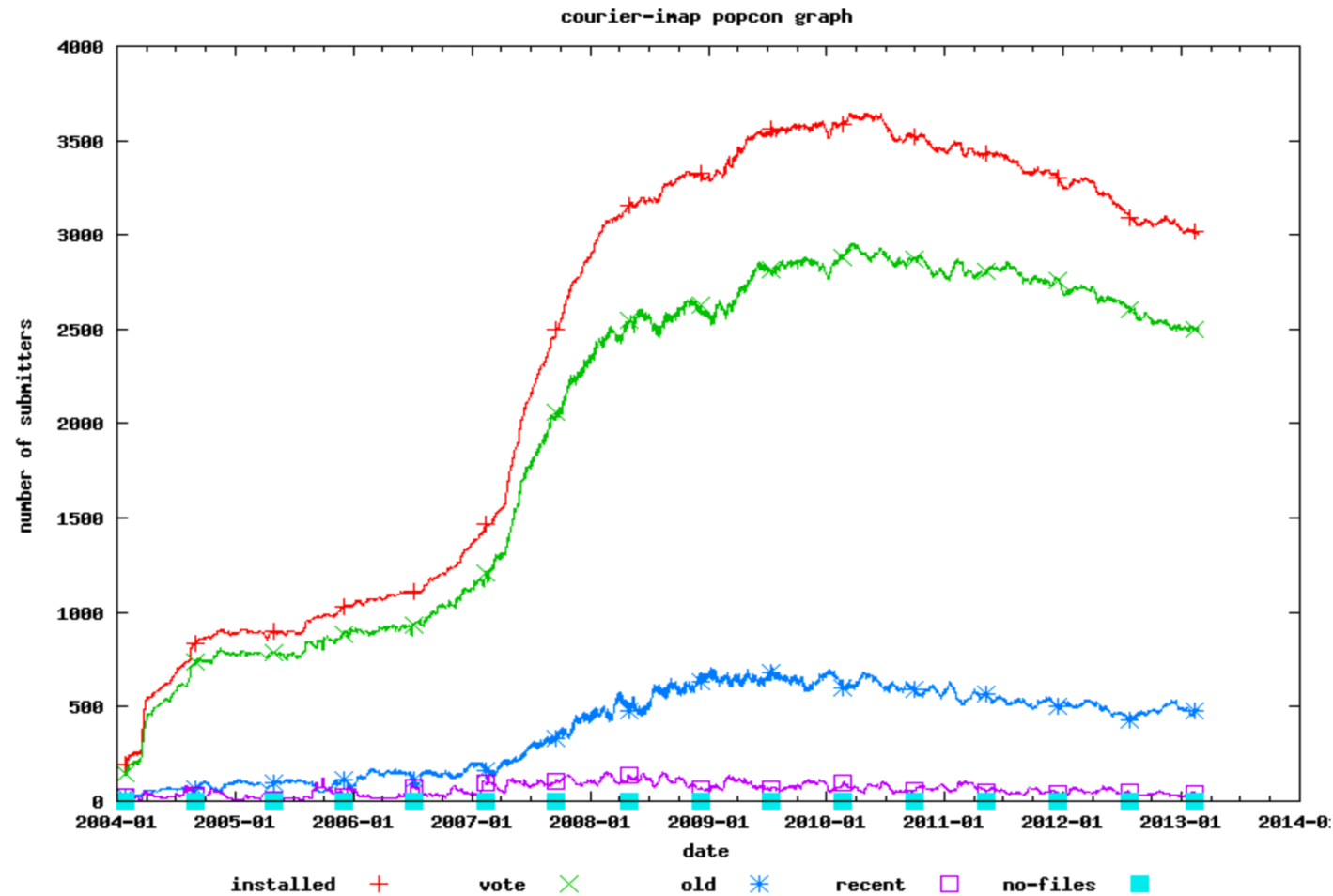
Software used by IMAP servers:

Software	Count	%	2012 points diff	2012 % diff
Dovecot	2726341	52.87	+4.50	9.30
Courier	1399784	27.14	-3.56	-11.60
Exchange	152899	2.96	-0.31	-9.36
IdeaImapServer	147900	2.87	+0.52	21.98
UW-IMAP	119522	2.32	-0.89	-27.71
NetArt	80319	1.56	+0.31	24.20
MailEnable	73914	1.43	+0.15	11.85
Cyrus	52848	1.02	-0.16	-13.12
Zimbra	41864	0.81	+0.22	37.13

(Ignore the two Polish ISPs with 200k IPs answering to IMAP..)

Debian Popularity Statistics: Courier

Popularity contest statistics for courier-imap

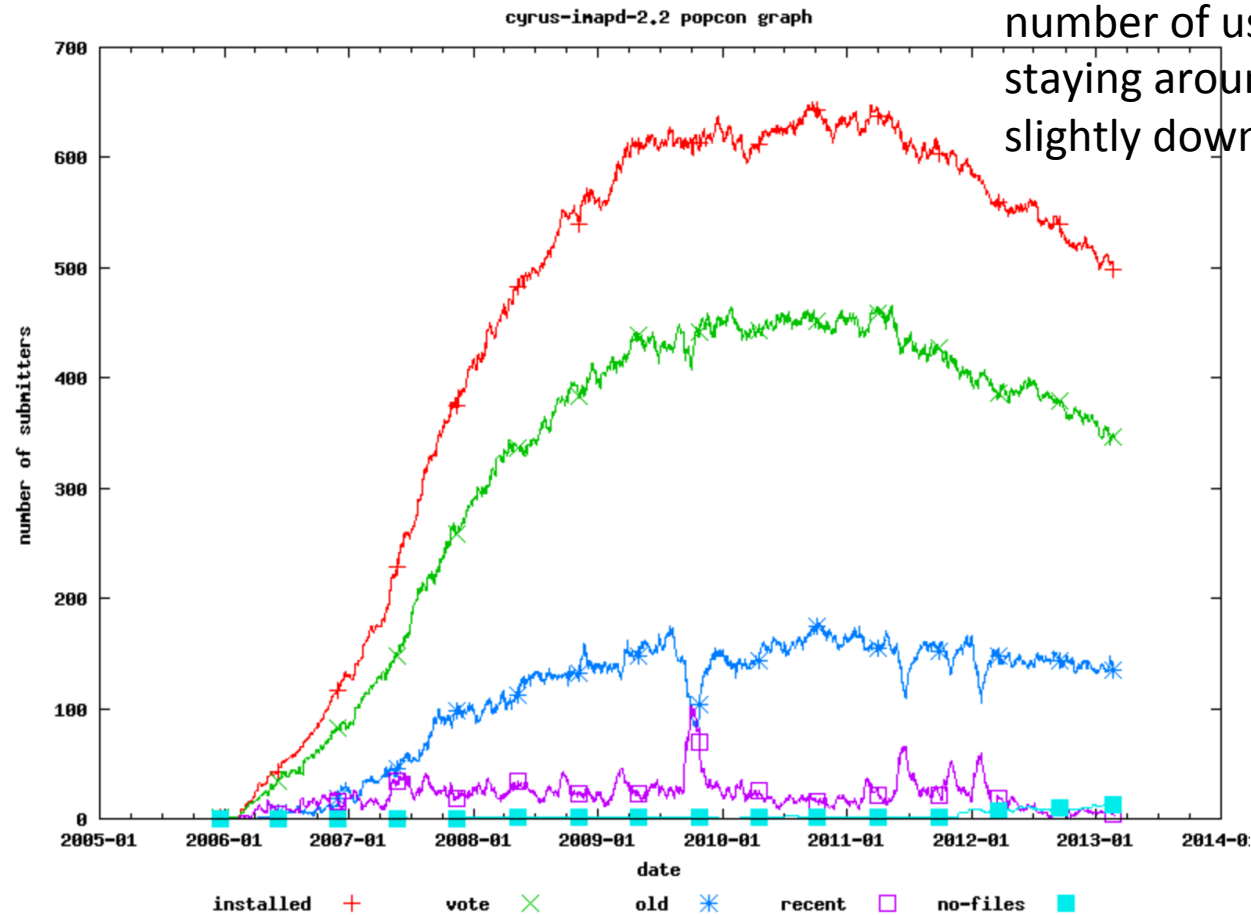


Inst: Installed Old: Installed, but not used regularly Vote: Used regularly Recent: Upgraded recently

Debian Popularity Statistics: Cyrus

Popularity contest statistics for cyrus-imapd-2.2

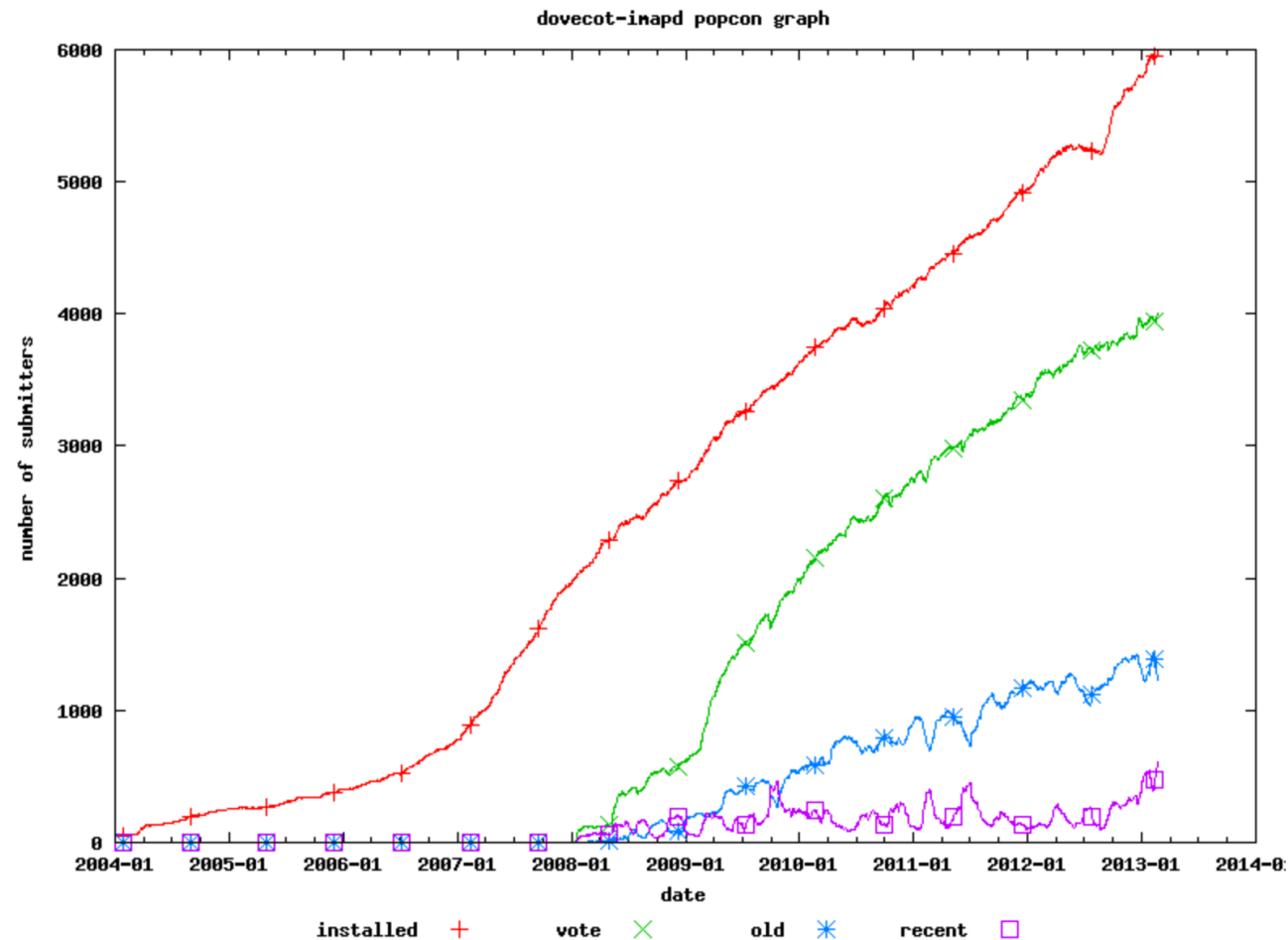
(Actually not that bad: cyrus-imapd-2.4 package has increasing number of users, still overall staying around 600 and going slightly down)



Inst: Installed Old: Installed, but not used regularly Vote: Used regularly Recent: Upgraded recently

Debian Popularity Statistics: Dovecot

Popularity contest statistics for dovecot-imapd



Inst: Installed Old: Installed, but not used regularly Vote: Used regularly Recent: Upgraded recently

Dovecot History

- 2002: Development started by Timo
- 2006: Pigeonhole development started by Stephan Bosch
- 2007: v1.0.0 released (finally stable)
- 2010: v2.0.0 released (core is finally ok)
- 2011: Dovecot Oy company created
- 2017: World domination completed :)

World Domination: Problems & Solutions

- Small email server admins should install Dovecot
 - Dovecot must be the default IMAP server in all Linux distros, BSDs & etc.
 - Dovecot must be easy to install and use
- Large ISPs, telcos etc should install Dovecot
 - Dovecot must have a good organization for providing 24/7 support and guaranteed future development
 - Dovecot must be able to beat competition offerings in quality and price
- Companies with internal mail should use Dovecot
 - Well, every world dominance needs some resistance..

Dovecot Oy*

- Long term plan: Hire enough Dovecot developers to guarantee its future
- 2011: Consulting, development & business hours support
- 2012: 24/7 support added
 - Problem detected: Very difficult to grow company
- 2013: Partnerships & commercial plugins added
- 2014: Future is looking very good now!
 - We are hiring more Dovecot developers!
 - Customers are mainly large ISPs & telcos

* Oy = “Ltd” / “GmbH”

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Dovecot Object Storage Plugin

- Commercial, but currently free for up to 1000 user accounts
 - <http://store.dovecot.fi/> -> Dovecot enterprise repository
- Supports many HTTP-based storages
 - S3 (Amazon, Ceph & others)
 - OpenStack Swift (Rackspace Files)
 - CDMI (Scality)
 - MS Azure, Dropbox
- More storages can be added, as long as it supports features needed by Dovecot:
 - GET, PUT, DELETE, list objects (and COPY optionally)
- Might be useful with NFS also..

Object Storage

- Simple key -> value storage
- Some problems..
 - Often relatively high latency
 - Only a few simple operations
- But also some advantages!
 - Massive scalability (cheaply)
 - Transparently scalable
 - Easy and cheap multi-site clustering
 - Allows operation during split brain (in theory at least)

Object Storage

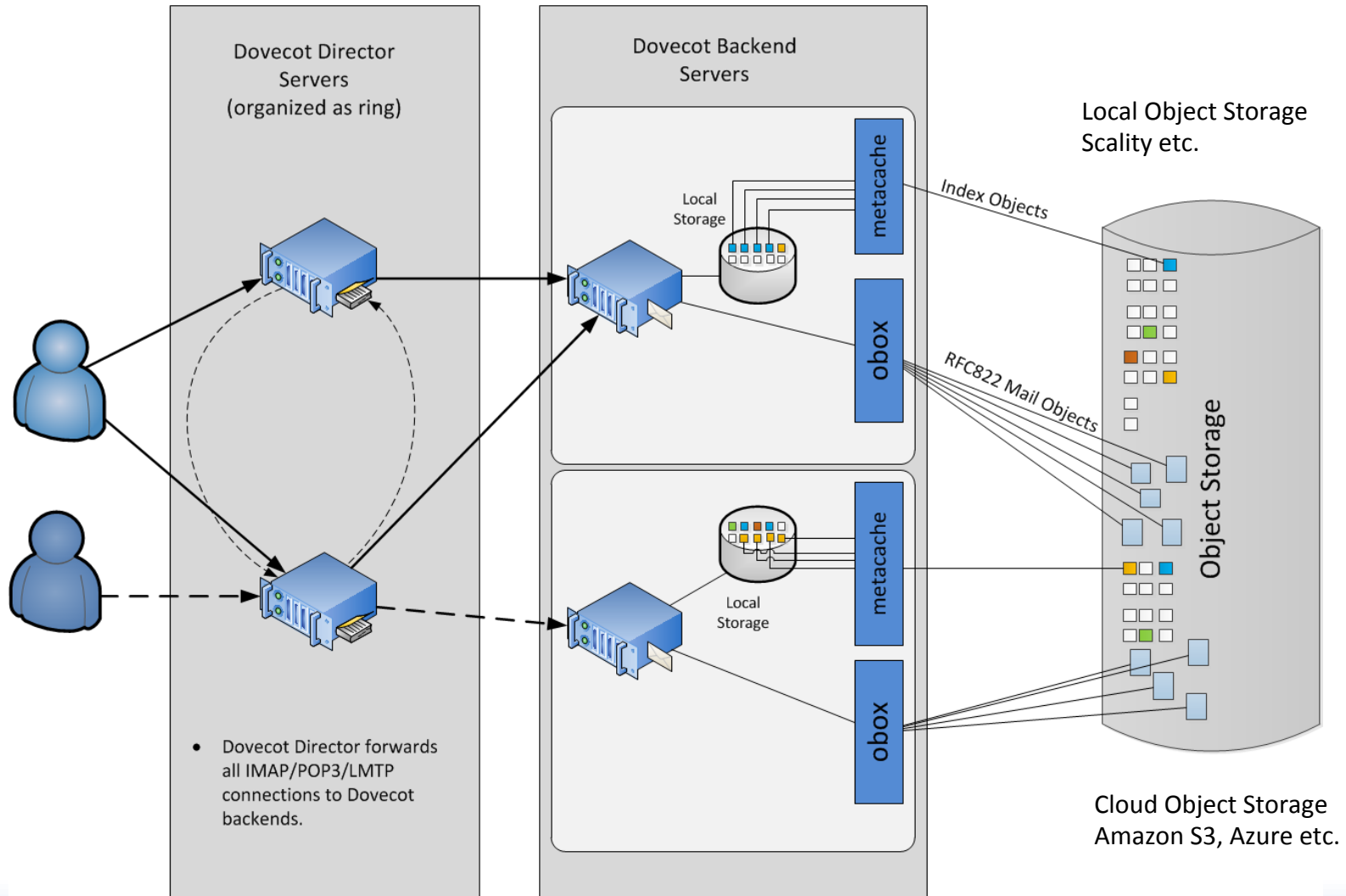
- HTTP-based storage API offers some interesting possibilities..
 - With Dovecot HTTP proxy..
- Storage I/O priorities during high load
- Redirect different users to different storages
- Implement mbox “alternative storage” with HTTP proxy (lookup primary? -> fallback secondary)
- Any other kind of routing/fallback/failure/etc rules you can think of..

Dovecot Object Storage Plugin

- Dovecot's idea:
 - Treat object storage as slow high-latency storage
 - Don't create many tiny objects
 - Reuse existing Dovecot index files
 - Cache data to local filesystem
 - Send multiple requests in parallel to minimize latency waits

Object Storage

(high level)



Object Storage: Object Names

- All objects under folder GUID directory:
 - **user@example.com/mailboxes/
e5dcbb1a0e326851fc7700000a3ea4c7/**
- Mail GUID objects:
 - **21282f3321e361519b7600000a3ea4c7**
- Index bundles:
 - self bundle: bundle.<timestamp>.<self guid>."
 - base bundle ("bundle.<timestamp>.<base guid>")
 - diff bundle ("bundle.<timestamp>.<base guid>-<diff guid>")

Object Storage: Metacache

- Index bundles are downloaded to local FS (cache)
 - Unpacked to regular Dovecot indexes
 - Indexes accessed/modified locally in “normal way”
- Changes uploaded back to object storage
 - in background (e.g. every 5 mins)
 - Also uploaded back immediately when user’s all sessions are closed
- Server dies -> metacache is lost
 - Flag changes within last 5 mins are lost
 - But no saved emails are lost (the next server adds missing objects to index)
 - Plan: Send changes immediately to other servers and replay the changes -> no changes lost

Object Storage: Georeplication

- Assign users primarily to one site
- Fallback to other site(s) where storage is replicated to
 - Dovecot proxies' user database need to be updated for this manually or by script.
- Dovecot allows split brain operation by merging changes later (no data loss)
 - If object storage is local, assumes it can handle this (I'm not sure if any can yet).

Alternative: Dsync Replication

- Not really meant for >1M user installations
 - Although already used by 2M user installation
- Per-user replication destination
 - Ability to replicate only some users
- Multi-master supported, 2-way merging of changes
 - But not really recommended for normal use:
 - Conflicting IMAP UIDs may cause mail redownloads
 - How do you merge e.g. 2 changed Sieve scripts?..
 - Some bugs left

Object storage: Questions?

- Next up: Anti-botnet..

Anti-Botnet Plugin

- Problem: Botnets with way too many IPs are brute-forcing user/pass combinations for IMAP/POP3/SMTP/SSH/..., and succeeding in it. Then sending spam with the user accounts.
- Plan: Block such botnets
- The plugin's two main goals:
 - Block brute force botnet login attempts based on DNSBL by Spamhaus
 - Send info back to Spamhaus about failed logins (UDP), so they can improve the botnet list (optional)

Anti-Botnet Plugin

- Problem: IP is really sending botnet traffic. But IP has a paying customer with legitimate users (NAT for school, company, etc). Now what?
- Maybe default behavior something like:
 - Track valid IP->username login combinations
 - If user recently logged in from same IP, send warning email and allow login
 - If IP/domain has admin, maybe email the admin instead
 - After n days disallow all logins from IP
 - But still whitelist usernames who have recently logged in from the IP successfully

Anti-Botnet: Questions, thoughts, ideas?

- Next up: Dovecot Future..

Future: lib-http, lib-dns

- Dovecot HTTP server
 - Easy to create HTTP services
- Dovecot HTTP proxy
 - Plugins to intercept the HTTP traffic
 - Redirect, reprioritize, modify, ..
- Dovecot DNS client library
 - Asynchronous
 - DNSSEC support

Future: doveadm REST API

- Doveadm can already be accessed via TCP protocol
 - Although not all commands yet
- Expose the same commands also via REST API
 - Ability to choose output format? JSON, XML, tab-separated, ..

Future: HTTP-based IMAP5?

- Bron Gondwana from Opera/Cyrus already implemented HTTP/JSON <http://jmap.io/>
- Why?
 - Everybody talks HTTP nowadays, nobody wants to talk anything else..
 - Works better behind firewalls
 - Mails / attachments could be downloaded directly from HTTP storage / CDN, bypassing mail server
 - Although security could be an issue..
 - Less stateful protocol might be easier to implement for clients and servers
 - Although not so much for Dovecot

Future: Session State Saving

- IDLEing imap processes stay forever and waste memory doing nothing ->
- Save state and move connections to a few imap-idle process(es)
- If IMAP client stops IDLE or underlying mailbox changes, start a new imap process and restore state
- This could also be used for
 - Moving connection to another backend server
 - Throttling if server is overloaded

Future: Full Text Search Improvements

- New lib-fts to search text
 - Does all language-specific and independent translations (normalization, stemming, stop words, ..)
 - Language detection
 - Can be used even without FTS indexing
- New IMAP extensions?
 - Search only from specific attachment types
 - *, image/*, application/pdf, ..etc..
 - Autodetection based on filename extension / content?
 - Show which attachment matched the query
 - Index MIME parts separately
- Another commercial plugin: fts-dovecot backend
 - Optimized for disk space, ~30% of Lucene/Solr index sizes
 - Ability to store indexes in object storage

Future: Random New Stuff

- IMAP METADATA
 - Mostly done, some bugs left
- IMAP ANNOTATE-EXPERIMENT
 - Per-mail key=value pairs
 - Performance might get tricky
- CalDAV / CardDAV
 - Can't fall behind Cyrus!
- Admin UI, with much prettiness

Final Questions?



Picture by Cyril Thomas, GFDL,
http://en.wikipedia.org/wiki/File:Dovecote_St_Andrews.jpg