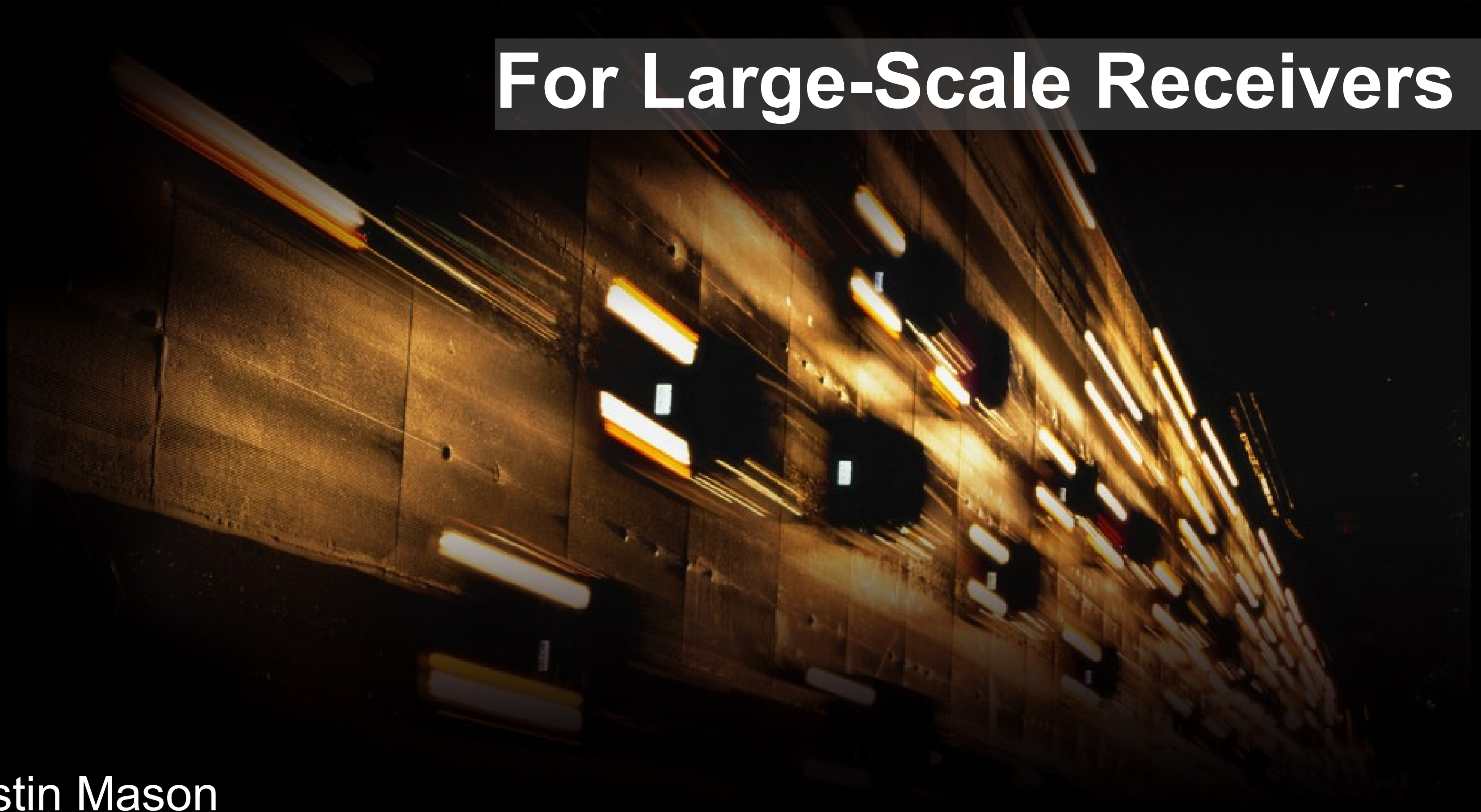
New Features in SpamAssassin 3.2.0

For Large-Scale Receivers



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Intro

- One of SpamAssassin's development team
- Wanted SA 3.2.0 to be faster
- Wrote a few of these features, kept a close eye on others
- Will do a slide or 3 on each feature

Feature: “sa-compile”

- SpamAssassin rulesets are specified in configuration files on the server
- compiled to perl bytecode at runtime
- SpamAssassin's "body" ruleset is the slowest
  - » about 60-65% of the runtime
- would be great to speed this up

How SpamAssassin body rules work

```
foreach line (lines in rendered message) {
    if (line contains /pattern_1/) {
        got_hit("RULE1"); last;
    }
}
foreach line (lines in rendered message) {
    if (line contains /pattern_2/) {
        got_hit("RULE2"); last;
    }
    ...
}
```

This is surprisingly efficient!

- due to efficiency in perl's regular expression implementation
- and due to the fact that emails are very short in general
- especially when HTML is parsed beforehand

However, it can be improved

- in particular, matching those regular expressions in parallel would help...
- Many commercial products based on opensource SpamAssassin do this, in various ways
- It'd be nice to see it in open-source

re2c

- compiles set of (basic) regexps into C *code* which implements a parallel-matching DFA state machine
  - » compile to native code, with "cc -O2"
- Matt Sergeant contributed "**re2xs**", which converts (basic) Perl regexps into input for "**re2c**" and generates a Perl XS module

The plugin

- re2xs adapted into a new SA plugin and a user interface script for administrators:
  - Mail::SpamAssassin::Plugin::Rule2XSBody
  - sa-compile
- run "**sa-compile**" after adding new rules or updating an existing ruleset; it'll take a minute to compile the regular expressions into a parallel-matching DFA for you

Not a total replacement

- re2c regexps quite different from Perl regexps
  - » so we have to follow every potential match with a "double-check" using the full perl regexp
- Some regexps are just too complex, so we're left with a small leftover legacy set
  - » (~ 40% of the default "body" ruleset)

Real-world results

- 10% to 20% speedup on a mixed corpus of real spam and non-spam mails
- Faster if you add additional SARE rulesets (24% in my test)
- Runtime went from 51.2 seconds to 38.9 seconds
  - » (measured using SpamAssassin's "mass-check" mass scan tool)

How to use it

- Edit **/etc/mail/spamassassin/v320.pre**
- Remove the "#" from this "loadplugin" line:
  - **# Rule2XSBody - speedup by compilation of ruleset to native code**
  - **# loadplugin Mail::SpamAssassin::Plugin::Rule2XSBody**
- Run "**sa-compile**" as root
- Restart the "**spamd**" server, Amavisd-new, etc.

Feature: short-circuiting

- SpamAssassin used to run all rules before giving a spam/nonspam diagnosis
- obviously, some spam is "super-spammy"
- can be marked after running only 10% of ruleset
- ideally we should be able to "short-circuit" the scan process if the mail is already marked high enough to be spam

Harder than it seems

- checking to see if we can "short-circuit" like this can itself impose too much of a hit
  - » with 1000 rules, performing short-circuit checks after each one is slow
- nonspam mails generally hit only 1 or 2 rules
  - » we will eventually have to use all rules when scanning them, anyway

Still harder than it seems

- if we allow s/c to mark a mail as nonspam, then we open a hole that spammers can exploit to get their mails marked as nonspam if we're not careful
  - » spammers love these holes
- need to be careful about rule ordering: you can't exit early if you may be able to swing back in the opposite direction with a high-scoring rule later

The 3.2.0 approach

- allow the administrator to specify the rules *they* want to allow to short-circuit the scan
- more intuitive, since the administrator gets to decide which rules are trustworthy enough
- less "magic" happening out of sight behind the scenes

Rule priority

- rule order can be specified in configuration
- "cheap", fast, reliable rules can be set up to run first, and short-circuit if hit (such as spamtrap hits)
- followed by "less cheap" reliable rules (such as DKIM whitelists)
- followed by all the rest

Shortcircuiting example

```
# local whitelists, or mails via trusted hosts
meta SC_HAM (USER_IN_WHITELIST||USER_IN_DEF_WHITELIST||ALL_TRUSTED)
priority SC_HAM              -1000
shortcircuit SC_HAM          ham
score SC_HAM                 -20

# slower, network-based whitelisting
meta SC_NET_HAM (USER_IN_DKIM_WHITELIST||USER_IN_SPF_WHITELIST)
priority SC_NET_HAM          -500
shortcircuit SC_NET_HAM      ham
score SC_NET_HAM             -20

# run Spamhaus tests early, and shortcircuit if they fire
meta SC_SPAMHAUS (RCVD_IN_XBL||RCVD_IN_SBL||RCVD_IN_PBL)
priority SC_SPAMHAUS         -400
shortcircuit SC_SPAMHAUS     spam
score SC_SPAMHAUS            20
```

Results

- On my (small, vanity-domain) server, it's resulted in an average of 20% less time spent scanning
- Mails that short-circuited as "spam" completed scans in an average of 0.2 seconds; as "ham", in an average of 0.5s
- Details at **http://wiki.apache.org/spamassassin/ShortcircuitingRuleset**

Feature: “msa_networks”

- Dynablock rules cause false positives for some ISPs with dynamic address pools
- Mails from dynamic users arrive from the pool via a trusted Mail Submission Agent, which authenticates them
- However SpamAssassin can't tell that the MSA authed the user, so a dynablock rule fires (incorrectly)

We try to recognise MSA authentication

- some MTAs record this in a “Received” header (RFC 3848, defining “Received: with ESMTPSA” etc., especially useful)
- some don't record it at all in headers :(
- hence **“msa_networks”**: specify the IP address (ranges) where your MSAs live
- SpamAssassin will assume that any message via those is from a trusted host, since your MSA authenticated the user

Feature: backscatter ruleset

- “backscatter” = bounces, in response to spam sent using a fake address at your domain
- you had nothing to do with it, but the remote MTA still sends you:
  - » "user unknown" bounces
  - » "your mail was probably spam!" bounces
  - » "your mail had a virus!" bounces
  - » challenge/response challenges
- volume can be as high as spam itself :(

Add a ruleset to detect it

- based on Tim Jackson's **“bogus-virus-warnings.cf”** ruleset
- much extended, and made a core part of SpamAssassin
- added whitelisting of “good” relays, so you can rescue bounces of messages that really were sent by your MTAs

Feature: mod_perl module

- spamd implemented as a mod_perl Apache module
- contributed as a Google Summer of Code project by Radoslaw Zielinski
- Apache includes lots of well-tested, optimized, scalable code to do all the TCP heavy-lifting, so this is more efficient than spamd

MAILCHANNELS

TRAFFIC CONTROL

Proactive Email Protection

mod_perl module, contd.

- this speed comes at a cost: simplified configuration support and no setuid mode
- in the SpamAssassin 3.2.0 release tarball in the *“spamd-apache2”* directory, if you're interested
- a little bit beta! hasn't received massive real-world deployment yet, so watch out ;)

Feature: Amazon EC2 support

- The “Elastic Compute Cloud” is a virtual server farm operated by Amazon
- incredibly easy to bring up and shut down new virtual "servers" to match demand
- a great way in theory to deal with high load caused by spam storms: start up some servers at EC2, and offload your spam filtering load to there until it dies down

Amazon EC2 support, contd.

- EC2 is billed partly on bandwidth used, so we need to reduce that
- added new features to the spamc/spamd protocol to support this:
  - » "-z": compression
  - » "--headers": return just rewritten headers
  - » "--ssl": SSL encryption
- even without EC2, this is good for cross-internet use of spamd, in general

Feature: sa-update

- tighten up the rule-development life cycle by automatically publishing new rules
  - » rules are added to our SVN repository for testing
  - » automatically tested against several fresh collections of mail
  - » if they pass, they're added to the published set in the next day's updates
- (coming; still working on this, post-release)

That's it!

- Thanks for listening!
- Slides will be blogged at **http://taint.org/tag/sa320**
- Thanks also to MailChannels
- Questions?