Last-Minute Paper Submissions, Forgotten Passwords and Greylisting – an Interesting Dilemma, and How to Solve It

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Scenario
Scenario: How it is supposed to be

Author

Request Reminder

Reminder

Login

Submission System
Scenario: How it is with Greylisting

Author → Author's Mail Server → Request Reminder → Submission System

- Reminder
  - Temporary Failure
    - Reminder
      - Temporary Failure
        - Reminder
          - Login
Scenario: What you see

Author —-> Request Reminder ————> Submission System

Deadline

Login ————> Reminder
Problem Statement

- Greylisting introduces delays into reminder mail delivery
- Details are hidden from the user
- Is it sensible to repeat the password reminder request (i.e. should you restart the process)?
- And if so, when?
- Criterion for applicability of restart: High variability (SCV)
- Optimal timeout: Computed using algorithm from [vMW04, vMW06]
Case-Study: Large Educational Institution
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- Parse X-Greylist header of received mails for greylisting delays
- After removal of outliers: 3692 samples (mails from the period 24 October 2007-11 June 2009)
- Minimum 720s (12 min), maximum 90131s (~25 h)
- Mean 3784.3 s (~1 h), median 1353 s (~22 min)
- SCV 6.6
- Optimal timeout: 2592 s (43 min)
Models for Analysis

• Model M1:
  - Single random variable for all observed mail servers
  - Restart may be handled by different server

• Model M2:
  - One random variable X for each mail server
  - Restart is handled by the same server

• Model M3:
  - Cluster servers by behaviour
  - Weighted choice for initial attempt, restart handled by server from same cluster
M2: Split Data by Sender

- 1151 individual senders (by sender address)
- only 4 sent more than 100 messages

Sender 1149
- 120 Samples
- Mean: 2:12h
- SCV: 3.1
- Timeout: 3:07h

Sender 1150
- 253 Samples
- Mean: 56min
- SCV: 8.9
- Timeout: 43min
M3: Split Data by Clustering

- Cluster senders by mean greylisting delay
- Base probability of choosing a cluster on cluster size

Cluster 3
- 90 Samples
- $\alpha = 0.024$
- Mean: 4:54h
- SCV: 1.4
- Timeout: 34 min

Cluster 4
- 2820 Samples
- $\alpha = 0.896$
- Mean: 29min
- SCV: 3.9
- Timeout: 1:26h
Results and Observations

- M1: Restart seems applicable (SCV = 6.6)
- M2 and M3: Restart applicable with some senders
- Optimal timeouts vary between models and depending on senders
- M2 and M3 may be more appropriate for the scenario, but suffer from data scarcity
Future Work

• Study correlation of samples: Difficult, because spammers might be the only ones to send mail in this manner

• Obtain more data for analysis using models M2 and M3

Any volunteers?

• Try to test the approach in practice

• Apply the concepts for restart in SOA systems, where on-line algorithms also suffer from data scarcity
Fin.