PhiGARo: Automatic Phishing Detection and Incident Response Framework

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Outline

- Introduction,
- Phishing incident response,
- PhiGARo (phishing incident response tool),
- Phishing honeypots (work in progress),
- Conclusion.

Research Questions

Question I.

How can we effectively handle a phishing incident?

Question II.

Can we automate phishing incident handling?

Question III.

Can we automate phishing incident reporting?

Question IV.

How can we attract phishers to phishing sensors?

Masaryk University

- 40,000 users,
- 15,000 active IP addresses a day,
- Many faculties, subnets, and local administrators,
- 1 security department – CSIRT-MU.

- Not applying strict firewall or e-mail filtering rules,
- Emphasis on open network and academic freedom.

- >100 reported phishing incidents per year,
- Unknown number of unreported incidents.

Tools of the Trade

- Central security contact point,
- Interaction with end-users and local administrators,
- Request tracking software (RT),
- 24 network probes (NetFlow, IPFIX),
- Custom NetFlow analysis tools as an output of R&D.

Phishing incident response

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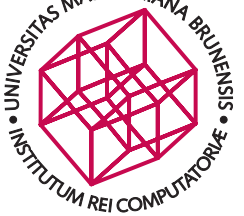
Phishing incident response

1. Incident is reported,
2. Searching for victims – checking mailserver logs and network monitoring data,
3. Interpreting the result, filtering false positives,
4. Mitigation – restricting access to phishing websites, filtering e-mails,
5. Send warning to victims,
6. Receive confirmation from victims.

Phishing incident response



- We rely on reports from users,
- Manual handling requires experienced worker,
- The process is laborious and time consuming,
- It may be too late to mitigate the attack.

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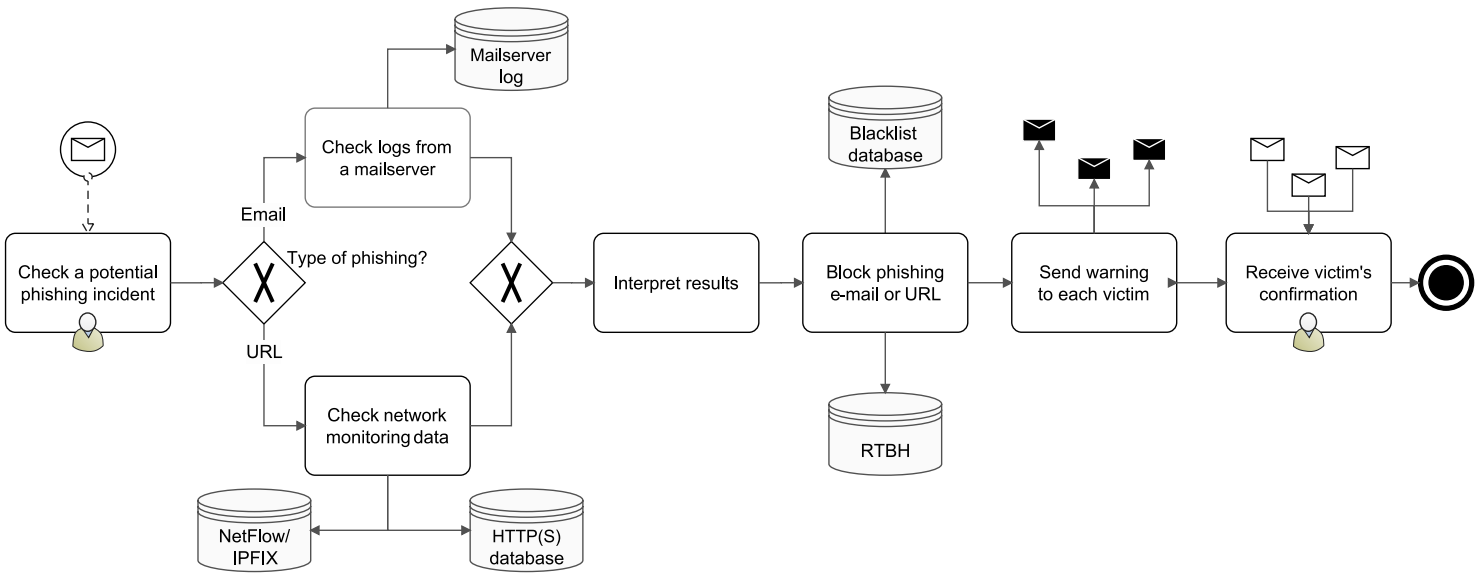
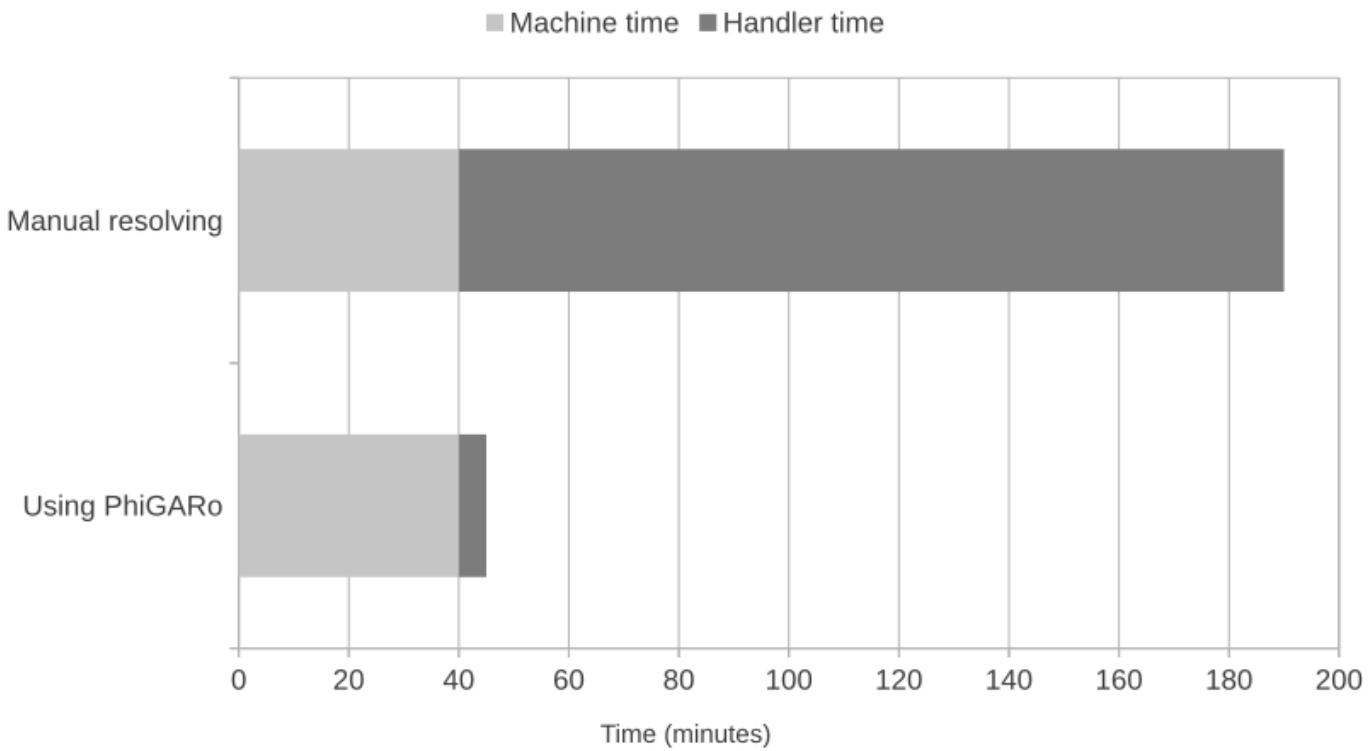
PhiGARo

- Phishing: Gather, Analyze, React, and Distribute,
- Semi-automatic phishing incident response tool,
- Modular architecture,
- Incident handler runs PhiGARo after receiving phishing report,
- PhiGARo performs the incident handling routine,
- Incident handler receives confirmation from victims.

PhiGARo


Mailserver log
Check logs from a mailserver
Email
Check a potential phishing incident
Type of phishing?
URL
Check network monitoring data
NetFlow/ IPFIX
HTTP(S) database
Blacklist database
Interpret results
Block phishing e-mail or URL
RTBH
Send warning to each victim
Receive victim's confirmation

PhiGARo


Machine time
Handler time
Manual resolving
Using PhiGARo
0
20
40
60
80
100
120
140
160
180
200
Time (minutes)

PhiGARo modules

- Request Tracker integration,
- URL expander and URL redirection uncloaking,
- Sendmail log parsing module,
- NetFlow/IPFIX module (network traffic monitoring),
- HTTP(S) module (extended flow monitoring),
- E-mail blocking API,
- RTBH API (blocking of network traffic),
- Reporting phishing hosted on Google Docs,
- Storage of phishing pages (screenshots),
- Phishing form filling simulator.

Phishing detection

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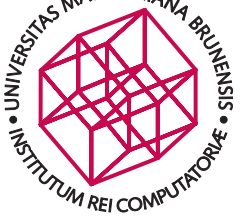
Phishing detection

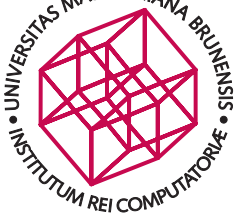


- Reliance on user reports is insufficient,
- Existing methods focus on filtering e-mail on mailservers or mailboxes,
- Keyword search, data mining, machine learning...
- Maintaining common phishing reporting tool in large networks is difficult.

Honeypots

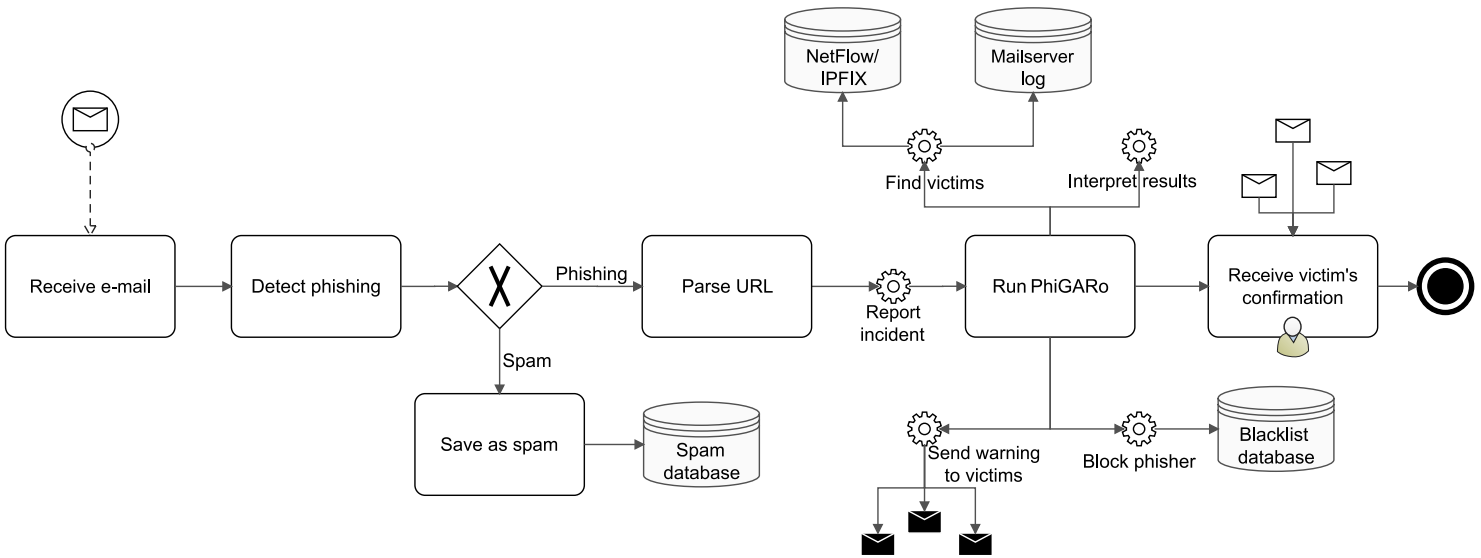
- System resources whose value lies in illicit use,
- Honeypots are generally free of false positives,
- Spamtrap – honeypot e-mail address or mailserver deployed to collect spam,
- Honeytoken – e-mail address, account name…

Honeypots



- Mailserver honeypot is deployed in the network,
- Phishing detection method is set up at the honeypot,
- Incoming e-mails are checked if they contain phishing,
- Recognized phishing is reported to PhiGARo,
- PhiGARo automatically starts handling the incident.

Phishing detection



Attracting attackers

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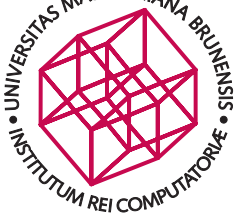
Attracting attackers

- Honeytokens are placed to be accessible by web crawlers, e-mail harvester…
- Responding to earlier phishing from honeytoken e-mail addresses,
- Using PhiGARo to respond automatically (extension of form filling simulator),
- Black market poisoning (advanced).

Attracting attackers

- Concept of *Virtual organization*,
- Custom domain, honeytokens, web content, etc. assigned to honeypots,
- Increasing trustworthiness of a honeypots and honeytokens,
- Adversary checks the domain, visits website, and is persuaded that the honeytokens are valid.

Conclusion



- **Manual phishing incident handling is laborious.**
- **The process of incident handling is automated by the phishing incident response tool PhiGARo.**
- **PhiGARo is publicly available as a modular tool at:** `http://www.muni.cz/ics/services/csirt/tools/phigaro?lang=en`
- **We propose using honeypots to overcome reliance on user reports.**
- **A concept of *Virtual organization* was discussed to attract phishers to honeypots.**

Thank you for your attention.

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