CAREER: Tools and Techniques for Preserving Integrity on the Web

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Project timeline: 2020 – 2025

Award #1941617

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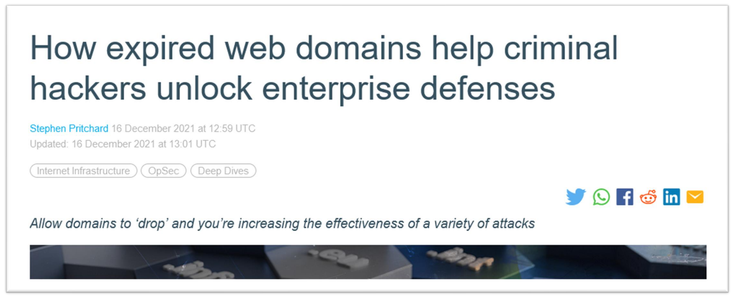
Challenge

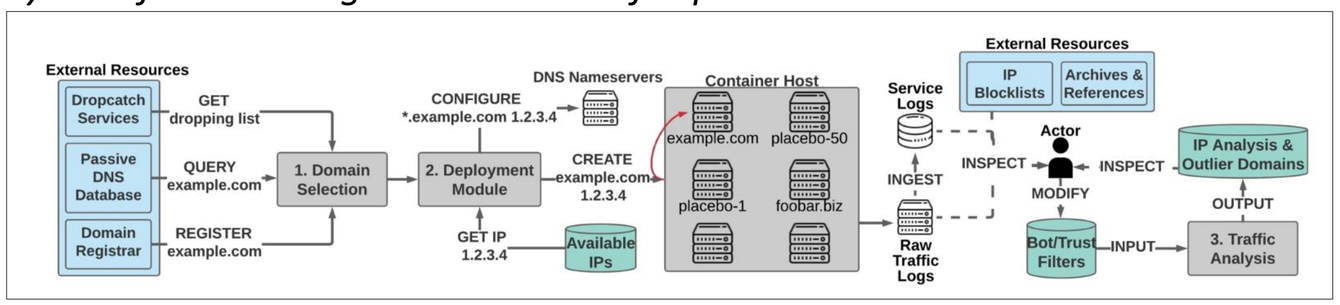
- Users and systems are constantly compromised by many seemingly unrelated attacks
  - Expired domain names (Supply chain attacks)
  - Malvertising
  - Blackhat SEO / Cloaking
  - DNS hijacking
- Prior work has proposed different countermeasures for each attack



Scientific Impact

- Identify "stateless linking" as a core problem underpinning many different vulnerabilities on the web
  - No guarantees that the resource that was linked to yesterday is the same as the one accessed today
- The aforementioned problems could be partially/fully mitigated if we could guarantee **integrity** of web content
- Implications beyond traditional computer security

System for assessing residual trust of expired domain names. IEEE S&P 2022



Our approach

- Integrity measurements across the web
  - JavaScript, domain names, articles
- Differentiate between inherent web dynamicity vs. abuse
- Site-agnostic link discovery/link management systems
- Policy frameworks for capturing implicit and explicit expectations by developers

No integrity on social-media links. NDSS 2021

Popular news outlets change titles of published articles. WWW 2022

Broader Impacts

- Increase the security of all websites and user trust of the web platform
- Battle misinformation
- Educational opportunities for underrepresented groups through SBU's WISE program