Towards a Usable, Practical, and Provably Secure Browser Infrastructure

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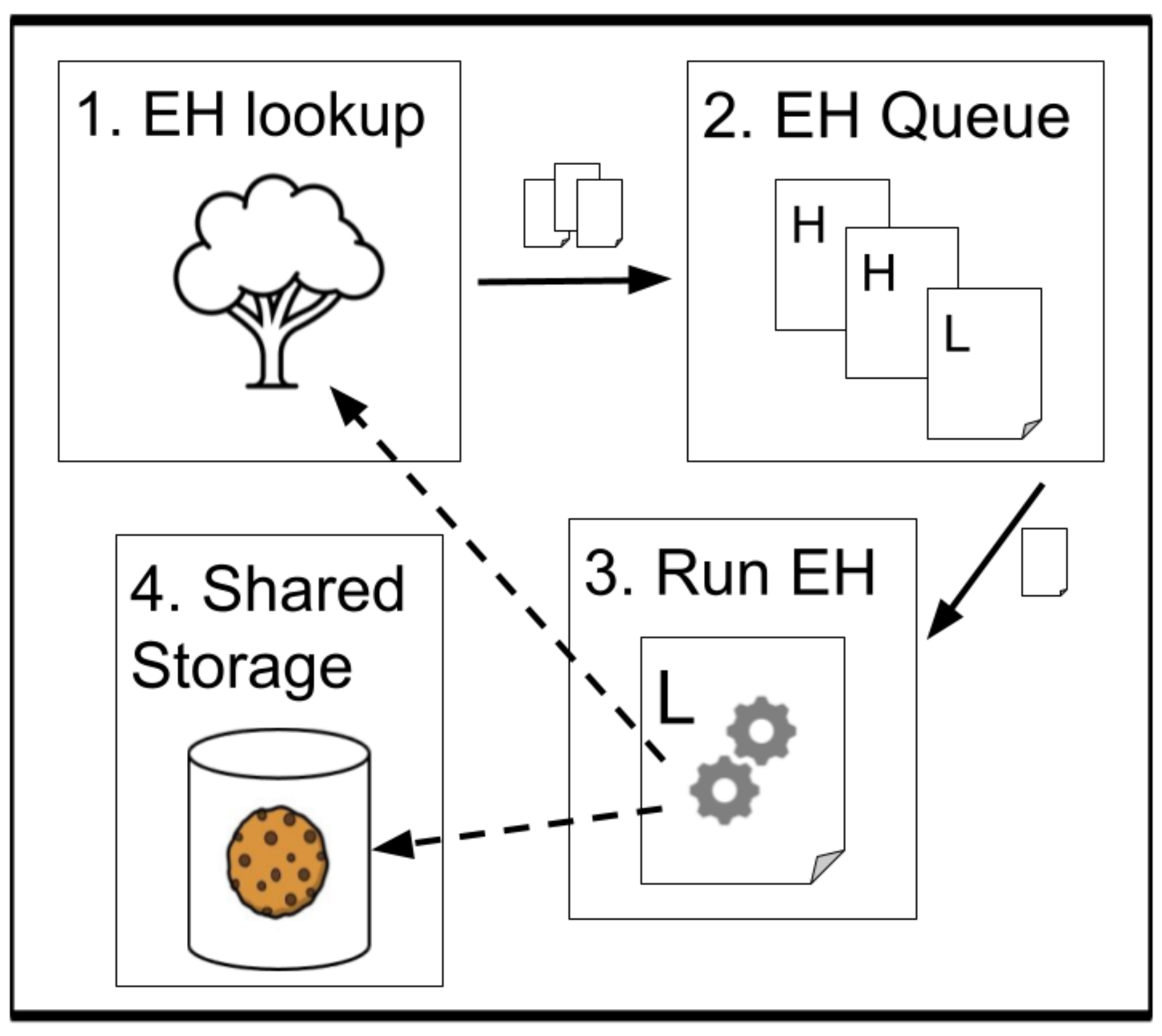
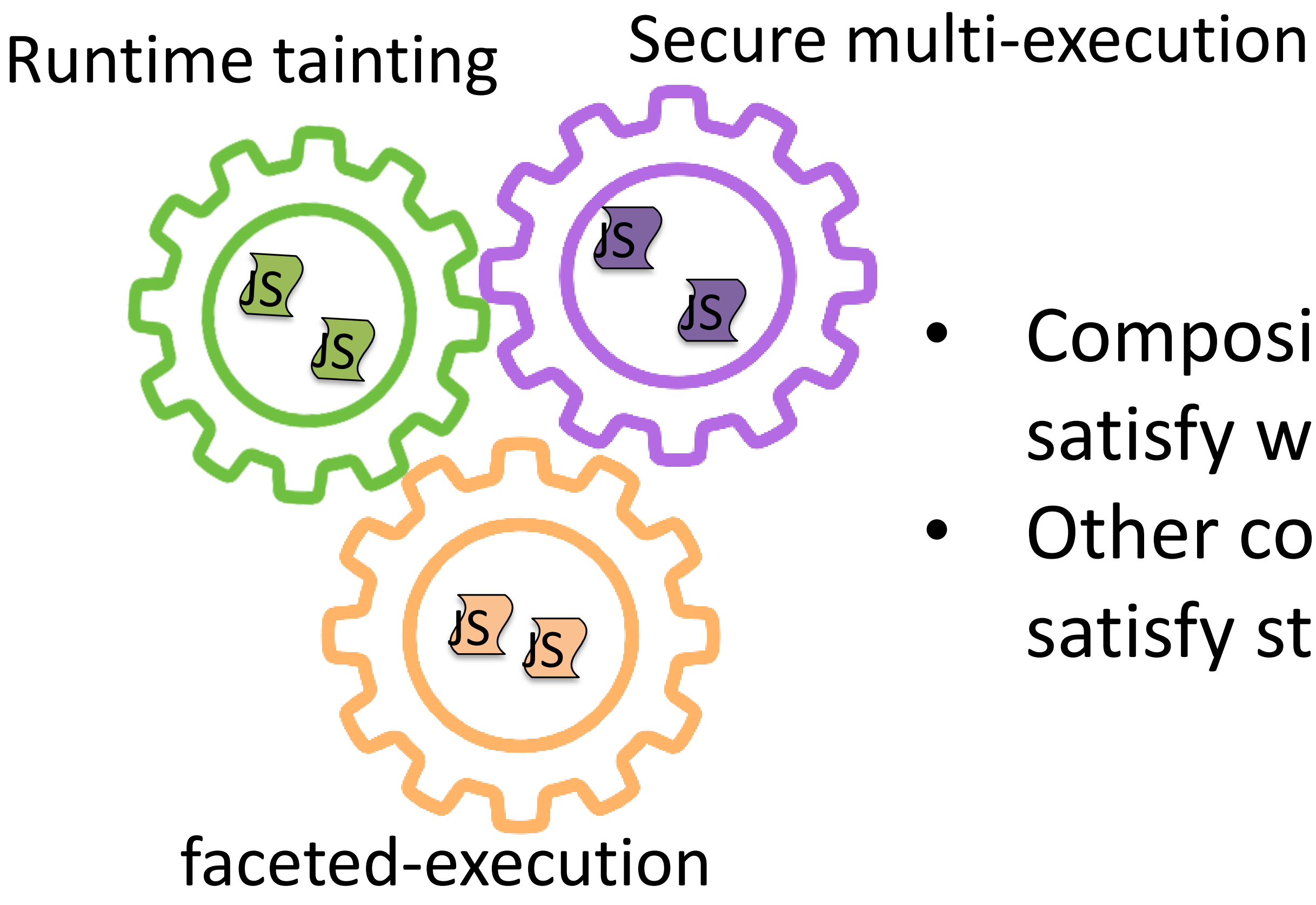
https://www.nsf.gov/awardsearch/showAward?AWD_ID=1704542





- Compositions involve tainting satisfy weak-secrecy
- Other compositions satisfy strong secrecy

Challenges

- Web applications are susceptible to XSS attacks, but few existing tools effectively help programmers or users to detect them
- Proposed security mechanisms for preventing web applications from leaking users' private information are one-size fit all and can't be easily used in practice

Scientific impacts

- The compositional framework could provide insight into how best to combine different IFC mechanisms to achieve desired efficiency and strength of security guarantees
- Results from this project can show where IFC succeeds and fails in ensuring the security and privacy of web applications

Solutions

- Improve browser infrastructure (Chromium) with taint tracking to help identify bugs and enforce security properties in web applications
- Develop compositional framework to combine existing information flow control (IFC) mechanisms to enforce IFC policies on web applications

Broader impacts

Web-based attacks are becoming more and more common; results from this project have the potential to help not only web developers but all also web users

Research results have been integrated into the curriculum of CMU course 18636/14828 Browser Security

Our taint-tracking Chromium has been used as the basis for several undergraduate research projects