Security and Privacy Foundations of Internet-Scale User-Centered Automation

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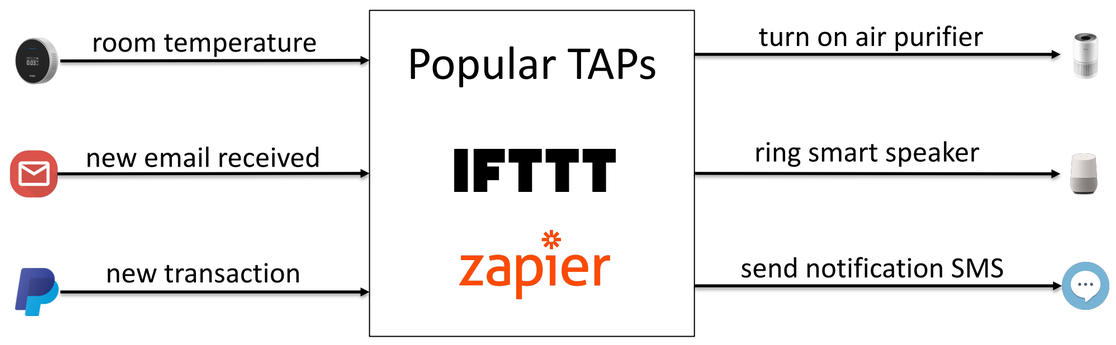
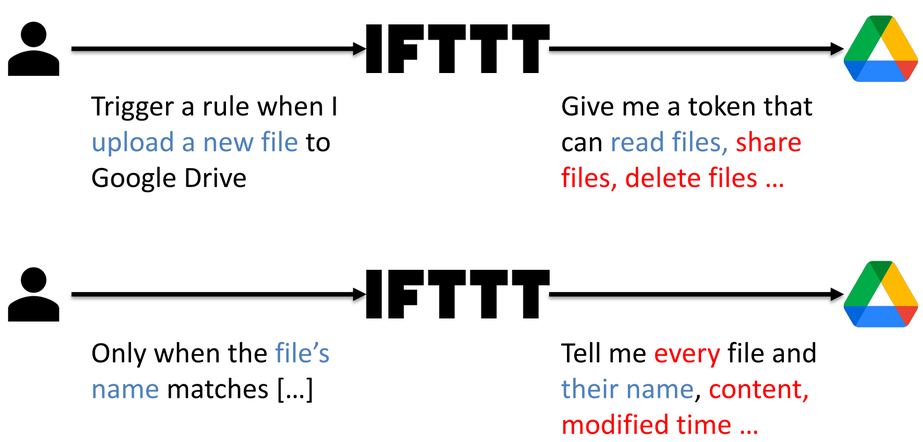
Challenge

- Trigger-action platforms (TAPs) enable automation rules between wide variety of services



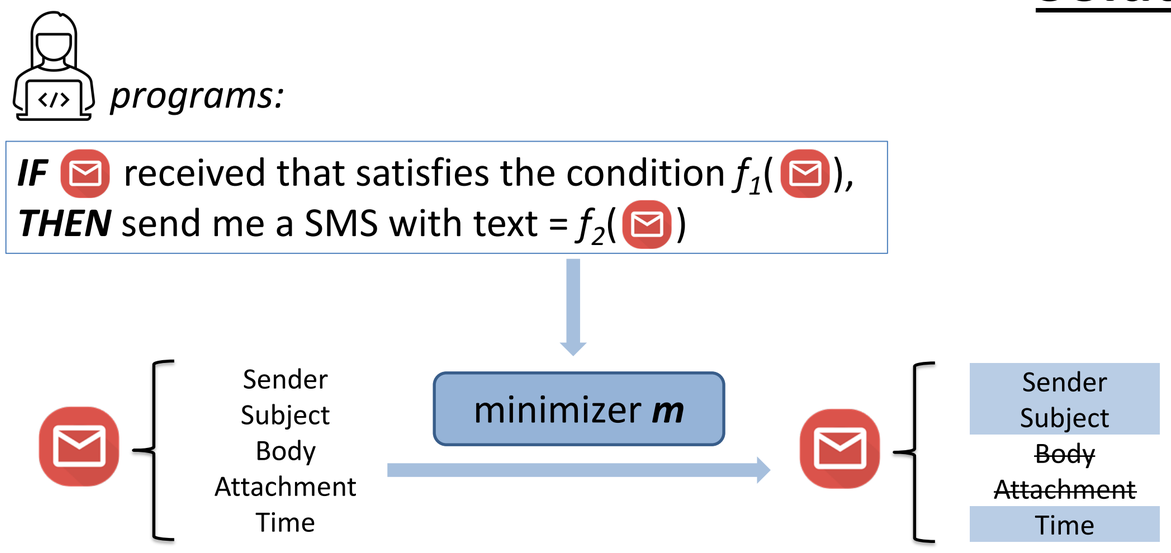
- But they are ***overprivileged*** to ensure ease of use



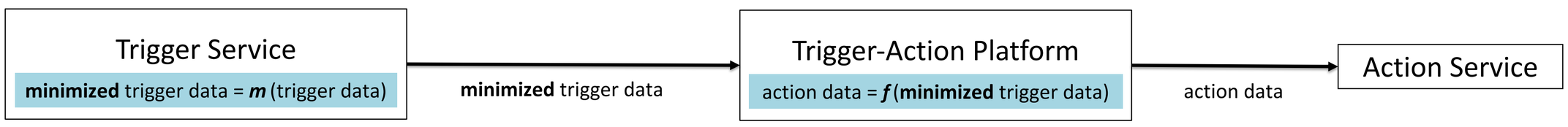
Scientific Impact

- Understand and measure the two levels of overprivileges caused by the current designs of TAP
  1. Access to redundant APIs
  2. Access to unnecessary data attributes
- Automatically ensure ***data minimization*** when executing trigger-action rules
  - *w/o* sacrificing usability or compatibility
  - *against* a compromised TAP
- Towards the design of an authorization system with ***dynamic access control***

Solution

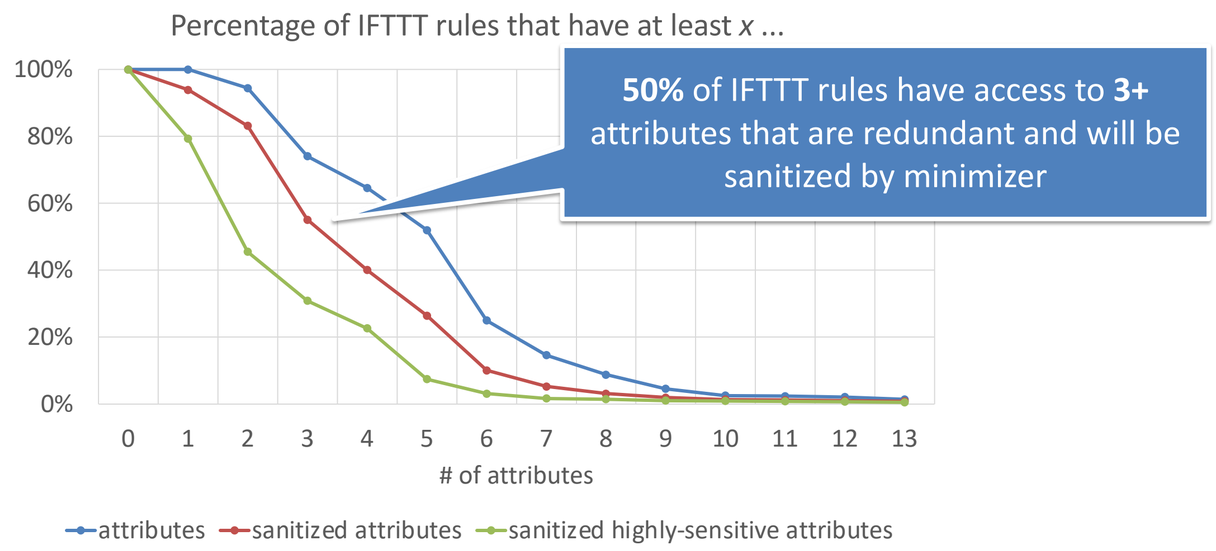


- Develop a practical data minimization model for trigger-action rules in TAPs
- Apply static and dynamic data-flow analysis to compute minimizer function for rules
- Sandbox execution environment to protect services from maliciously programmed rules



Estimated Impact

Prevent all unnecessary leakages of user data to TAPs



Other Impact

- Allow service providers to have fine-grained control of their data
  - Reports indicated that some service providers were unwilling to be integrated into TAPs due to excessive data access
- Help service providers convert their existing APIs to privacy-aware ones that adhere to the principle of data minimization required by GDPR/CPRA