Systems and Internet Infrastructure Security

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Towards Practical Attestation: Challenges and Opportunities

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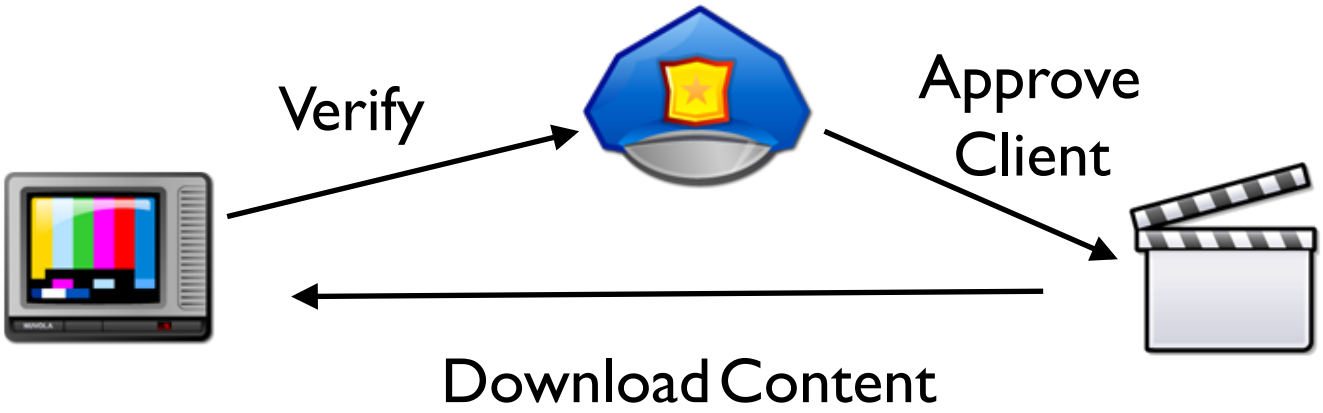
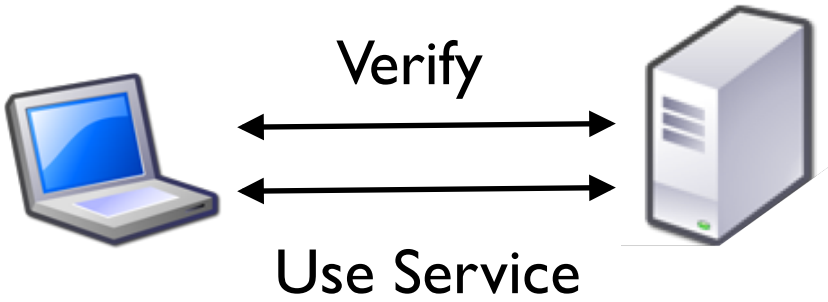
What is it good for?

- TC originally designed to monitor clients
  - Monitor special purpose systems (media players)
  - Establishing trust in the client's environment
- Required the user to participate
- Lacking a PKI to identify machines



Verifying Servers

- Servers have a greater incentive to use TC
  - Proof of the service's correctness
  - Supplement SSL Certificates
  - Large companies can manage internal PKI
- Adoption challenges
  - Performance
  - Privacy concerns
  - Don't want to be restricted by complicated processes



Defining Integrity Goals

- Must first build *secure systems* before we can verify
- *Challenge*: Extract meaningful security properties from system configurations.
- What is a *secure system* or *high integrity*?
- Establish higher level properties
  - We can guide our design from integrity models
- Support various mechanisms

Trustworthy Base

- *Challenge*: Verifying the initial state of the entire attestation framework
- Potentially large TCB to verify
  - Code and data
  - Need methods for assessing dynamic data
- Provenance of system to a trusted origin
  - Root of Trust for Installation [ACSAC '07]
- Alternative is to assess the impact of the data

Integrity Monitoring

PENNSTATE 1855

- *Challenge*: Balancing verification and enforcement of security-sensitive events
- Record events for later verification
  - Verify after the fact
  - Difficult to evaluate without context
- Enforcement can reduce verification effort
  - Must verify enforcement mechanism and policy
- VM systems are even more complicated

Performance

- *Challenge:* Eliminating performance bottlenecks
  - ~ 1 second for TPM Quote
  - Late-launch requires substantial setup time
- Must move hardware off of the critical path
  - Use derived primitives, asynchrony, etc
- Examples:
  - Spork Web Server [ACSAC '09]
  - TrustVisor [S&P '10]

Summary

- Develop high level properties to verify
- Create attestation frameworks that are complete, but also simple to verify
- Build upon the TC primitives to improve performance

Thank you

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