

ArmoredSoftware: Trust in the cloud

Annual Demonstration

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Introduction and Project Goals

- Big Picture

- Implementation

Prototype demonstration and discussion

- Refine big picture to current demo

- Protocol Execution

- Appraisal

- Measurement

- Communication

- Demonstration

Short term goals and milestones

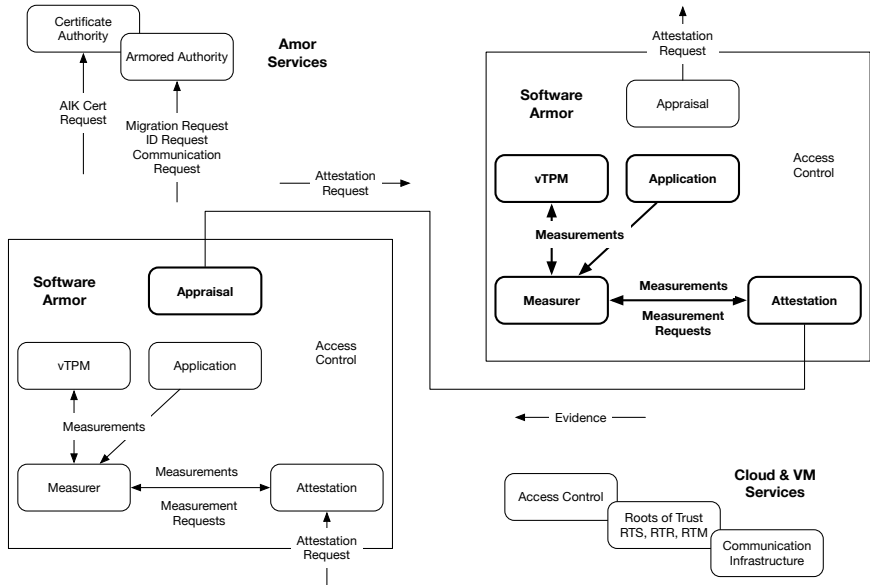
Questions and guidance

Trust in the Cloud

Provide new capabilities that help establish and maintain trustworthy cloud-based application deployment

- ▶ Establish trust among cloud components
 - ▶ trust among cohorts of processes
 - ▶ trust among processes and environment
- ▶ Promote informed decision making
 - ▶ data confidentiality can be confirmed
 - ▶ execution and data integrity can be confirmed
- ▶ Autonomous run-time response and reconfiguration
 - ▶ responds to attack, failure, reconfiguration, and repair
 - ▶ response varies based on measurement
- ▶ Lightweight integration with existing cloud
 - ▶ targeting TXT, Xen, Linux, and OpenStack infrastructure
 - ▶ user-space measurement and attestation

High-Level Architecture



- ▶ Standard delivery platform
 - ▶ Xen+XSM VM infrastructure
 - ▶ OpenStack cloud infrastructure
 - ▶ Fedora, HotSpot JVM, GHC
- ▶ Standard communication mechanisms
 - ▶ JSON structures for all exchanged data
 - ▶ *vchan* for on-platform communication
 - ▶ TCP/IP for off-platform communication
- ▶ Trusted Computing Group standards compliant
 - ▶ Trusted Platform Module (TPM) 1.2
 - ▶ TCG vTPM in principle
- ▶ Executable protocol representation
 - ▶ protocol fragments as first-class structures
 - ▶ strand space [2] formal semantics

Demonstration Protocol

What We Are Demonstrating

3-4 Slides on Attestation Protocol Execution

1-2 Slides on Appraisal

3-4 Slides on Measurement

2-3 Slides on Communication Mechanisms

Step Through Demonstration

Goals and Milestones for 2015

- ▶ Push to the cloud
- ▶ Establish roots of trust and trust argument
- ▶ Executable protocol representation and protocol semantics
- ▶ Operational, integrated vTPM prototype
- ▶ Name Server / Certificate Authority prototype
- ▶ More capable measurement
- ▶ Downloadable demonstration

Questions and Guidance

- ▶ What problems are interesting?
- ▶ What problem would be a nice attention grabber?
- ▶ What should we be watching and integrating with?

- [1] G. Coker, J. Guttman, P. Loscocco, A. Herzog, J. Millen, B. O'Hanlon, J. Ramsdell, A. Segall, J. Sheehy, and B. Sniffen. Principles of remote attestation. *International Journal of Information Security*, 10(2):63–81, June 2011.
- [2] F. J. T. Fábrega, J. C. Herzog, and J. D. Guttman. Strand spaces: Proving security protocols correct. *Journal of computer security*, 7(2):191–230, 1999.
- [3] V. Haldar, D. Chandra, and M. Franz. Semantic remote attestation – a virtual machine directed approach to trusted computing. In *Proceedings of the Third Virtual Machine Research and Technology Symposium*, San Jose, CA, May 2004.