Review “Policy-Sealed-Data”

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*Paper Name：*

Santos, N., Rodrigues, R., Gummadi, K. P., & Saroiu, S. (2012, August). Policy-Sealed Data: A New Abstraction for Building Trusted Cloud Services. In *USENIX security symposium* (pp. 175-188).

**Contribution:**

1. Policy-sealed data abstraction. Data is handled only by nodes satisfying customer-chosen policy. (e.g. Handle data only by nodes running CloudVisor; Handle data only by nodes located in the EU)

2. Use attribute-based encryption (CP-ABE) to implement abstraction efficiently: (1) Binds policies and node attributes to node configurations; (2) Ciphertext-Policy Attribute-Based Encryption [Bethencourt07]

**Motivation:**

TPMs Alone Are Ill-Suited for the Cloud: (1) Stifle VM and data migration across cloud nodes, TPMs root-of-trust not transferable from one node to another; (2) Cloud providers hesitant to reveal low-level cloud details, TPMs abstractions can reveal node’s identity and details of the

node’s entire software stack; (3) Commodity TPMs can hinder the cloud’s ability to scale, TPMs’ poor performance may introduce bottlenecks.

**Related works:**

Newer hypervisors can offer protection from SW admins: e.g., nested virtualization:

CloudVisor [SOSP’11], Credo[MSR-TR]. Trusted computing can attest cloud node runs “correct” hypervisor, Trusted Platform Module (TPM).

**Methodology:**

The client seals the data, encrypt and bind data to policy. The server decrypt data if node meets policy.

**Results:**

Monitor can attest a large number of nodes, Max throughput: 630 attestation-verifications/sec

(E.g., 10K node cluster attests in ~15 seconds)

Monitor can serve many attestation requests from customers

* Max throughput: 4800 attestation-requests/sec
* Increases throughput of standard TPM attestation
* Batches multiple attestation requests into single TPM call
* Speedup orders of magnitude over standard TPM attestation

**Take away:**

1. Excalibur overcomes TPM’s limitations in the cloud
2. Policy-sealed data: new trusted computing primitive
   1. Flexible sealed storage
   2. Reduce overexposure
3. CP-ABE makes Excalibur scale
   1. Masks low performance of TPMs
4. Evaluation indicates that the system is practicals