Super-Sticky and Declassifiable Release Policies for Flexible Information Dissemination Control

Sruthi Bandhakavi, Charles C. Zhang, and Marianne Winslett

University of Illinois at Urbana-Champaign

www.iti.uiuc.edu

Goal: Formulate a logical framework to specify and reason about release policies for aggregated data that allows:
(1) Original owner to retain control of data re-dissemination.  (2) Derivation of release policies for aggregated data
(3) Declassification and reclassification of aggregated data

Motivation
Different data has different security & privacy requirements. Aggregation changes sensitivity of data.

An Example: Release of aggregate needs consensus from all original data owners

Aggregate’s Release Policies are derived using the various release policies and axioms in the framework

Super-stickiness: original release policies are respected for aggregates, unless declassified.

Release Policies

Sticky Release Policy (SRelease): Must be satisfied before actual release of data
Aggregate Release Policy (ARelease): Original data owner’s authorization of release
Local Release Policy (LRelease): Aggregator’s authorization of release

Syntax: P signs Release (P signs Φ, X, Y)
Meaning: if X has a rule/fact Φ signed by P, and P authorizes X to release Φ to Y

Axioms

- Monotonic Declassification Axiom: Aggregated data can be released if permitted by all original data owners as well as the aggregator.

P signs SRelease (P signs Φ, X, Y) ⇐ aggregate (P signs Φ, P_i signs Φ_i, ... , P_n signs Φ_n) ∨ P signs ARelease(P signs Φ, P signs Φ_i, P_i signs Φ_i, X, Y) ∨ P_i signs Φ_i ∨ P signs LRelease(P signs Φ, X, Y)

- Monotonic Release Axiom: If the original data is already releasable, no further permission from this original owner is needed to disclose any aggregation.

P signs ARelease (H signs Φ, P signs Φ_i, X, H) ⇐ P signs SRelease( P signs Φ_i, H, X)

Future Work

- Add time constraints so that we can do time-based declassification.
- Add negation to our release policies to increase the expressiveness.
- Implement the logic.