

# UNIVERSITY OF SOUTH FLORIDA

## Defense of a Doctoral Dissertation

PoCo: A Language for Specifying Obligation-Based Policy Compositions  
by

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For the Ph.D. degree in Computer Science and Engineering

Security-policy composition is a classic problem in software security, due to conflicts that arise when security policies have competing requirements. To date, policy composition does not have a complete solution.

One specific case is that there was not a satisfactory solution for composing atomic-obligation policies while maintaining their atomicity. An atomic obligation requires that either all or none of the included actions are executed, and the atomicity can be extended to include the permit/deny decision that is associated with this obligation. For many practical policies, obligation atomicity is necessary for correctness, and executing only the parts of such an obligation can lead to an undesirable result.

Aiming to bridge this gap, this dissertation presents PoCo, a policy specification language and enforcement system for the principled composition of atomic-obligation policies. PoCo enables policies to interact meaningfully with the obligations of other policies, thus preventing the unexpected and insecure behaviors that can arise due to partially executed obligations or obligations that execute actions in violation of other policies. Controlling obligations in this way prevents unexpected behaviors and security breaches due to partially executed obligations or obligations that execute actions in violation of other policies. As far as we are aware, PoCo is the first system to provide support for atomic obligations, including conflict resolution and allowing policies to react to obligations.

### Examining Committee

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### Publications

- 1) D. Ferguson, **Y. Albright**, D. Lomsak, T. Hanks, K. Orr, and J. Ligatti. "PoCo: A Language for Specifying Obligation-Based Policy Compositions". In Proceeding of International Conference on Software and Computer Applications. ACM.
- 2) **Y. Albright**, D. Ferguson, D. Lomsak, T. Hanks, K. Orr, and J. Ligatti. "Composition of Atomic-Obligation Security Policies". Submitted to ACM Transactions on Privacy and Security in Feb. 2020

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