

# UNIVERSITY OF SOUTH FLORIDA

## Defense of a Doctoral Dissertation

Authentication and SQL-Injection Prevention Techniques in Web Applications

by

**Cagri Cetin**

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

This dissertation addresses the top two “most critical web-application security risks” by combining two high-level contributions. The first high-level contribution introduces and evaluates collaborative authentication, or coauthentication, a single-factor technique in which multiple registered devices work together to authenticate a user. Coauthentication provides security benefits similar to those of multi-factor techniques, such as mitigating theft of any one authentication secret, without some of the inconveniences of multi-factor techniques, such as having to enter passwords or biometrics. The second high-level contribution defines a class of SQL-injection attacks that are based on injecting identifiers, such as table and column names, into SQL statements. An automated analysis of GitHub shows that 15.7% of 120,412 posted Java source files contain code vulnerable to SQL-Identifier Injection Attacks (SQL-IDIAAs). This dissertation also proposes and evaluates an extended prepared-statement API to protect against SQL-IDIAAs.

### Examining Committee

Seckin Ozkul, Ph.D., Chairperson  
Jay Ligatti, Ph.D., Major Professor  
Dmitry Goldgof, Ph.D.  
Yao Liu, Ph.D.  
Sean Barbeau, Ph.D.  
Kaiqui Xiong, Ph.D.

Thursday, April 25 2019  
10:00 AM  
ENB 313

**THE PUBLIC IS INVITED**

### Publications and Patents

- 1) SQL-Identifier Injection Attacks. **Cagri Cetin**, Jay Ligatti, and Dmitry Goldgof. Proceedings of the IEEE Conference on Communications and Network Security (CNS), June, 2019
- 2) Collaborative Authentication: Protocols, Evaluations, and Applications. **Cagri Cetin**, Shamaria Engram, Jean-Baptiste Subils, Dmitry Goldgof, and Jay Ligatti. Submitted to ACM Transactions on Privacy and Security (TOPS)
- 3) Coauthentication. Jay Ligatti, **Cagri Cetin**, Shamaria Engram, Jean-Baptiste Subils, and Dmitry Goldgof. Proceedings of the ACM Symposium on Applied Computing, April, 2019
- 4) System and Methods for Authentication using Multiple Devices. Jay Ligatti, Dmitry Goldgof, **Cagri Cetin**, Jean-Baptiste Subils. US Patent 9,659,160. May 2017
- 5) Systems and Methods for Anonymous Authentication using Multiple Devices. Jay Ligatti, Dmitry Goldgof, **Cagri Cetin**, Jean-Baptiste Subils. US Patent 9,380,058. June 2016
- 6) Systems and Methods for Generating Symmetric Cryptographic Keys. Jay Ligatti, **Cagri Cetin**, Shamaria Engram, Dmitry Goldgof. US Patent Application No. 16/030,550.
- 7) Systems and Methods for Generating Symmetric Cryptographic Keys. Jay Ligatti, **Cagri Cetin**, Shamaria Engram, Dmitry Goldgof. US Patent Application No. 16/135,856.

**Robert Bishop, Ph.D.**  
*Dean, College of Engineering*

**Dwayne Smith, Ph.D.**  
*Dean, Office of Graduate Studies*

### **Disability Accommodations:**

If you require a reasonable accommodation to participate, please contact the Office of Diversity & Equal Opportunity at 813-974-4373 at least five (5) working days prior to the event.