UNIVERSITY OF SOUTH FLORIDA

Defense of a Doctoral Dissertation

Authentication and SQL-Injection Prevention Techniques in Web Applications

by

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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-IDIAs). This dissertation also proposes and evaluates an extended prepared-statement API to protect against SQL-IDIAs.

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