18th International Conference on Security and Cryptography (SECRYPT 2021)

Online 6 – 8 July 2021

Editors:

Sabrina De Capitani di Vimercati Pierangela Samarati

ISBN: 978-1-7138-3998-9

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2021) by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda. at the address below.

SCITEPRESS – Science and Technology Publications, Lda. Avenida de S. Francisco Xavier, Lote 7 Cv. C, 2900-616 Setúbal, Portugal

Phone: +351 265 520 185 Fax: +351 265520 186

info@scitepress.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

CONTENTS

INVITED SPEAKERS

KEVNOTE	CDEA	KEDG

REINUIE SPEAKERS	
Privacy-Preserving Analytics in the Big Data Environment Jaideep Vaidya	5
VEST: An Early Warning System for Future Cyber-Attacks V. S. Subrahmanian	7
Access Control Convergence: Challenges and Opportunities Ravi Sandhu	9
PAPERS	
FULL PAPERS	
An Upcycling Tokenization Method for Credit Card Numbers Cyrius Nugier, Diane Leblanc-Albarel, Agathe Blaise, Simon Masson, Paul Huynh and Yris Brice Wandji Piugie	15
A Unified Model to Detect Information Flow and Access Control Violations in Software Architectures Stephan Seifermann, Robert Heinrich, Dominik Werle and Ralf Reussner	26
Can a TLS Certificate Be Phishy? Kaspar Hageman, Egon Kidmose, René Rydhof Hansen and Jens Myrup Pedersen	38
Comparing Classifiers' Performance under Differential Privacy Milan Lopuhaä-Zwakenberg, Mina Alishahi, Jeroen Kivits, Jordi Klarenbeek, Gert-Jan van der Velde and Nicola Zannone	50
Hashing to Prime in Zero-Knowledge Thomas Groβ	62
BLT+L: Efficient Signatures from Timestamping and Endorsements Denis Firsov, Henri Lakk, Sven Laur and Ahto Truu	75
Scalable <i>k</i> -anonymous Microaggregation: Exploiting the Tradeoff between Computational Complexity and Information Loss Florian Thaeter and Rüdiger Reischuk	87
Statically Identifying XSS using Deep Learning Heloise Maurel, Santiago Vidal and Tamara Rezk	99
Are You There, Moriarty? Feasibility Study of Internet-based Location for Location-based Access Control Systems Muhammad I. H. Sukmana, Kai-Oliver Kohlen, Carl Gödecken, Pascal Schulze and Christoph Meinel	111
Python and Malware: Developing Stealth and Evasive Malware without Obfuscation Vasilios Koutsokostas and Constantinos Patsakis	125

SSI Strong Authentication using a Mobile-phone based Identity Wallet Reaching a High Level of Assurance Andreas Abraham, Christopher Schinnerl and Stefan More	137
Armored Twins: Flexible Privacy Protection for Digital Twins through Conditional Proxy Re-Encryption and Multi-Party Computation Felix Hörandner and Bernd Prünster	149
Towards Integrating Security in Industrial Engineering Design Practices Panagiotis Dedousis, George Stergiopoulos, George Arampatzis and Dimitris Gritzalis	161
Balancing Quality and Efficiency in Private Clustering with Affinity Propagation Hannah Keller, Helen Möllering, Thomas Schneider and Hossein Yalame	173
Automated Symbolic Verification of Telegram's MTProto 2.0 Marino Miculan and Nicola Vitacolonna	185
Formal Proof of a Vulnerability in Z-Wave IoT Protocol Mario Lilli, Chiara Braghin and Elvinia Riccobene	198
Formal Analysis of EDHOC Key Establishment for Constrained IoT Devices Karl Norrman, Vaishnavi Sundararajan and Alessandro Bruni	210
A Framework for Security and Risk Analysis of Enrollment Procedures: Application to Fully-remote Solutions based on eDocuments <i>Marco Pernpruner, Giada Sciarretta and Silvio Ranise</i>	222
The Missing Piece of the ABAC Puzzle: A Modeling Scheme for Dynamic Analysis Marius Schlegel and Peter Amthor	234
Program Protection through Software-based Hardware Abstraction J. Todd McDonald, Ramya K. Manikyam, Sébastien Bardin, Richard Bonichon and Todd R. Andel	247
Vulnerability Metrics for Graph-based Configuration Security Ibifubara Iganibo, Massimiliano Albanese, Marc Mosko, Eric Bier and Alejandro E. Brito	259
Model Inversion for Impersonation in Behavioral Authentication Systems Md Morshedul Islam and Reihaneh Safavi-Naini	271
Trace Recovery: Inferring Fine-grained Trace of Energy Data from Aggregates Nazim Uddin Sheikh, Zhigang Lu, Hassan Jameel Asghar and Mohamed Ali Kaafar	283
Preventing Watermark Forging Attacks in a MLaaS Environment Sofiane Lounici, Mohamed Njeh, Orhan Ermis, Melek Önen and Slim Trabelsi	295
Systematic Evaluation of Probabilistic k-Anonymity for Privacy Preserving Micro-data Publishing and Analysis Navoda Senavirathne and Vicenç Torra	307
Boolean Exponent Splitting Michael Tunstall, Louiza Papachristodoulou and Kostas Papagiannopoulos	321
Proof-of-Forgery for Hash-based Signatures Evgeniy Kiktenko, Mikhail Kudinov, Andrey Bulychev and Aleksey Fedorov	333

Trusted Enforcement of Application-specific Security Policies Marius Schlegel	343
Responding to Living-Off-the-Land Tactics using Just-In-Time Memory Forensics (JIT-MF) for Android Jennifer Bellizzi, Mark Vella, Christian Colombo and Julio Hernandez-Castro	356
Cryptographic Enforcement of Access Control Policies in the Cloud: Implementation and Experimental Assessment Stefano Berlato, Roberto Carbone and Silvio Ranise	370
SHORT PAPERS	
Supporting Cyber Threat Analysis with Service-Oriented Enterprise Modeling Kees Leune and Sung Kim	385
Signer and Message Ambiguity from a Variety of Keys George Teşeleanu	395
Ransomware Detection using Markov Chain Models over File Headers Nicolas Bailluet, Hélène Le Bouder and David Lubicz	403
Proof-of-Useful-Randomness: Mitigating the Energy Waste in Blockchain Proof-of-Work Efe Ulas Akay Seyitoglu, Attila Altay Yavuz and Thang Hoang	412
A New MILP Model for Matrix Multiplications with Applications to KLEIN and PRINCE Murat Burhan İlter and Ali Aydı́n Selçuk	420
Protecting End User's Privacy When using Social Login through GDPR Compliance Carlos Villarán and Marta Beltrán	428
Efficient Joint Random Number Generation for Secure Multi-party Computation Erwin Hoogerwerf, Daphne van Tetering, Aslí Bay and Zekeriya Erkin	436
Improved Circuit Compilation for Hybrid MPC via Compiler Intermediate Representation Daniel Demmler, Stefan Katzenbeisser, Thomas Schneider, Tom Schuster and Christian Weinert	444
A Novel Security Framework for Minimization of False Information Dissemination in VANETs: Bayesian Game Formulation Basant Subba and Ayushi Singh	452
An Extension of the Avalanche Criterion in the Context of c-Differentials Pål Ellingsen, Constanza Riera, Pantelimon Stănică and Anton Tkachenko	460
A New Delegated Authentication Protocol based on PRE Anass Shai, Cyril Drocourt and Gilles Dequen	468
Mobile Family Detection through Audio Signals Classification Rosangela Casolare, Giacomo Iadarola, Fabio Martinelli, Francesco Mercaldo and Antonella Santone	479
Accurate Measurement of the Energy Consumption of Security Functions Benoît Fournier, Valérie Viet Triem Tong and Gilles Guette	487
Practically Efficient RFID Scheme with Constant-time Identification Ferucio Laurențiu Țiplea and Cristian Hristea	495

A Comparison of GKE Protocols based on SIDH Hiroki Okada, Shinsaku Kiyomoto and Carlos Cid	507
Multi-Party Private Set Intersection Protocols for Practical Applications Asli Bay, Zeki Erkin, Mina Alishahi and Jelle Vos	515
Using Program Analysis to Identify the Use of Vulnerable Functions Rasmus Hagberg, Martin Hell and Christoph Reichenbach	523
Compact Variable-base ECC Scalar Multiplication using Euclidean Addition Chains Fabien Herbaut, Nicolas Méloni and Pascal Véron	531
Secure Computation by Secret Sharing using Input Encrypted with Random Number Keiichi Iwamura and Ahmad Akmal Aminuddin Mohd Kamal	540
A Scalable Bitcoin-based Public Key Certificate Management System Chloe Tartan, Craig Wright, Michaella Pettit and Wei Zhang	548
Cloud Key Management using Trusted Execution Environment Jaouhara Bouamama, Mustapha Hedabou and Mohammed Erradi	560
An Improved Live Anomaly Detection System (I-LADS) based on Deep Learning Algorithms Gustavo Gonzalez-Granadillo, Alejandro G. Bedoya and Rodrigo Diaz	568
$Inferring\ Flow\ Table\ State\ through\ Active\ Fingerprinting\ in\ SDN\ Environments:\ A\ Practical\ Approach\ Marcin\ Gregorczyk\ and\ Wojciech\ Mazurczyk$	576
SecSDN: A Novel Architecture for a Secure SDN Parjanya Vyas and R. K. Shyamasundar	587
Storage Friendly Provably Secure Multivariate Identity-Based Signature from Isomorphism of Polynomials Problem Ratna Dutta, Sumit Kumar Debnath and Chinmoy Biswas	595
Formal Security Verification of the Station-to-Station based Cell-attachment Procedure of LDACS Nils Mäurer, Christoph Gentsch, Thomas Gräupl and Corinna Schmitt	603
Side Channel Counter-measures based on Randomized AMNS Modular Multiplication Christophe Negre	611
Selective Owner-side Encryption in Digital Data Markets: Strategies for Key Derivation Sara Foresti and Giovanni Livraga	620
Posters	
Security Issues of Electronic and Mobile Banking Wojciech Wodo, Damian Stygar and Przemysław Błaśkiewicz	631
Enforcing Cardinality Constraint in Temporal RBAC Sohail Rajdev and Barsha Mitra	639
Dynamic Access Control Framework for Enterprise Content Management Systems Nadia Hocine and Ismail Bokhari	647
AVX-512-based Parallelization of Block Sieving and Bucket Sieving for the General Number Field Sieve Method Pritam Pallab and Abhijit Das	653

Involving Humans in the Cryptographic Loop: Introduction and Threat Analysis of EEVEHAC Julius Hekkala, Sara Nikula, Outi-Marja Latvala and Kimmo Halunen	659
Empirical Security and Privacy Analysis of Mobile Symptom Checking Apps on Google Play I. Wayan Budi Sentana, Muhammad Ikram, Mohamed Ali Kaafar and Shlomo Berkovsky	665
BlockJack: Towards Improved Prevention of IP Prefix Hijacking Attacks in Inter-domain Routing via Blockchain I. Wayan Budi Sentana, Muhammad Ikram and Mohamed Ali Kaafar	674
Private Set Intersection: Past, Present and Future <i>Ionita Andreea</i>	680
MMU-based Access Control for Libraries Marinos Tsantekidis and Vassilis Prevelakis	686
Exposure Resilient Public-key Encryption with Keyword Search against Keyword Guessing Attack Kaito Uemura and Satoshi Obana	692
PUF based Lightweight Authentication and Key Exchange Protocol for IoT Sourav Roy, Dipnarayan Das, Anindan Mondal, Mahabub Hasan Mahalat, Suchismita Roy and Bibhash Sen	698
On Chameleon Pseudonymisation and Attribute Compartmentation-as-a-Service Anne V. D. M. Kayem, Nikolai J. Podlesny, Christoph Meinel and Anja Lehmann	704
Property Inference Attacks on Convolutional Neural Networks: Influence and Implications of Target Model's Complexity Mathias Parisot, Balázs Pejó and Dayana Spagnuelo	715
RMCCS: RSSI-based Message Consistency Checking Scheme for V2V Communications Mujahid Muhammad, Paul Kearney, Adel Aneiba, Junaid Arshad and Andreas Kunz	722
A New Method of Testing Machine Learning Models of Detection for Targeted DDoS Attacks Mateusz Kozlowski and Bogdan Ksiezopolski	728
Comparing Support Vector Machine and Neural Network Classifiers of CVE Vulnerabilities Grzegorz J. Blinowski, Paweł Piotrowski and Michał Wiśniewski	734
Privacy Aura for Transparent Authentication on Multiple Smart Devices Takoua Guiga, Jean-Jacques Schwartzmann and Christophe Rosenberger	741
Classifying Biometric Systems Users among the Doddington Zoo: Application to Keystroke Dynamics Denis Migdal, Ilaria Magotti and Christophe Rosenberger	747
Fair Mutual Authentication Jacek Cichoń, Krzysztof Majcher and Mirosław Kutyłowski	754
Towards CRYSTALS-Kyber VHDL Implementation Sara Ricci, Petr Jedlicka, Peter Cibik, Petr Dzurenda, Lukas Malina and Jan Hajny	760
Fast Cramer-Shoup Cryptosystem Pascal Lafourcade, Léo Robert and Demba Sow	766
RICAV: RIsk based Context-Aware Security Solution for the Intra-Electric Vehicle Network Yosra Fraiji, Lamia ben Azzouz, Wassim Trojet, Ghaleb Hoblos and Leila Azouz Saidane	772

Verify It Yourself: A Note on Activation Functions' Influence on Fast DeepFake Detection Piotr Kawa and Piotr Syga	779
GRANEF: Utilization of a Graph Database for Network Forensics Milan Cermak and Denisa Sramkova	785
Anonymous Attribute-based Credentials in Collaborative Indoor Positioning Systems Raúl Casanova-Marqués, Pavel Pascacio, Jan Hajny and Joaquín Torres-Sospedra	791
HIJaX: Human Intent JavaScript XSS Generator Yaw Frempong, Yates Snyder, Erfan Al-Hossami, Meera Sridhar and Samira Shaikh	798
User Identification from Time Series of Fitness Data Thomas Marchioro, Andrei Kazlouski and Evangelos Markatos	806
Privacy Preserving Scalable Authentication Protocol with Partially Trusted Third Party for Distributed Internet-of-Things Hiral S. Trivedi and Sankita J. Patel	812
C2RBAC: An Extended Capability-Role-Based Access Control with Context Awareness for Dynamic Environments Mitsuhiro Mabuchi and Koji Hasebe	819
Can Data Subject Perception of Privacy Risks Be Useful in a Data Protection Impact Assessment? Salimeh Dashti, Anderson Santana de Oliveria, Caelin Kaplan, Manuel Dalcastagnè and Silvio Ranise	827
Goal and Threat Modelling for Driving Automotive Cybersecurity Risk Analysis Conforming to ISO/SAE 21434 Christophe Ponsard, Valery Ramon and Jean-Christophe Deprez	833
Collateral-Free Trustworthiness-based Personal Lending on a Decentralized Application (DApp) Wisnu Uriawan, Omar Hasan, Youakim Badr and Lionel Brunie	839
Investing Data with Untrusted Parties using HE Mark Dockendorf, Ram Dantu, Kirill Morozov and Sanjukta Bhowmick	845
Machine Learning Classification of Obfuscation using Image Visualization Colby B. Parker, J. Todd McDonald and Dimitrios Damopoulos	854
AUTHOR INDEX	861