Alessandro Reina

Email: alessandro.reina@gmail.com
Phone: +39 (347) 3188769

Industrial Experience

- **FireEye, Inc.** Milpitas, CA, USA
  Staff Software Engineer *May. 2013 - present*
- **Member of the organizing committee of the dCTF** Amsterdam, The Netherlands
  1-day Capture the Flag competition of the DIMVA conference *7th July 2011*
- **eMaze Networks S.p.A.** Milano, Italy
  Consultant: penetration test and reverse engineering *December 2010 - Feb 2011*
- **eMaze Networks S.p.A.** Milano, Italy
  Consultant: penetration test and reverse engineering *May 2011*

Education

- **University of California, Berkeley** Berkeley, CA
  Visiting Scholar and Research Associate *Sep. 2012 - May. 2013*
  - Advisor: Professor Dawn Song
- **Università degli Studi di Milano** Milano, IT
  Ph.D., Computer Science *Jan. 2011 - Mar. 2014*
  - Advisor: Professor Danilo Mauro Bruschi
- **Università degli Studi di Milano** Milano, IT
  M.S., Computer Science *Sep. 2007 - Apr. 2010*
  - Graduated with a final grade of 110/110 cum Laude
- **Helsinki University of Technology TKK** Helsinki, FI
  Erasmus scholarship *Jan. 2007 - Jun. 2007*
- **Università degli Studi di Milano** Milano, IT
  B.S., Computer Science *Sep. 2003 - Dec. 2006*
  - Graduated with a final grade of 110/110 cum Laude

Selected Projects

Mobile Security

- **Dynamic Analysis**
  Devised and built a system to collect information of the analyzed Android application and the system during the application execution. It provides monitoring of system calls and performs binder analysis.

  Developed a framework to easily define malicious behaviors to detect (know and unknown exploits), file system operations, linux utilities (e.g., tools executed), SMS operations, GPS operations, JNI loading, etc.

- **Instrumentation of Android Execution Environment**
  Developed a framework to provide virtual machine introspection by instrumenting the Android QEMU emulator. The QEMU instrumentation allows to perform a full transparent analysis outside the guest, without any modification to the Android system, providing OS-wide system calls tracking and arguments introspection.

  As android applications are mostly written in Java programming language, analysts may find sometime more interesting to inspect Java method invocations. To this end, Dalvik virtual machine has been instrumented and the analysis framework extended to perform analysis outside the emulator. The system also provides a feature to map system calls to the specific invoked Java method.

Binary Analysis for Security

- **KEmuFuzzer**
  KEmuFuzzer is protocol-specific fuzzer for system virtual machines. KEmuFuzzer generates floppy images to boot a virtual machine and to execute a specific test-case. The same test-case is executed also in an oracle, based on hardware-assisted virtualization. The states obtained are compared to detect defects in the virtual machine. Test-cases are generated using a special compiler that applies certain mutations before compiling.

- **EmuFuzzer**
  EmuFuzzer is a fuzzer for CPU emulators. EmuFuzzer "stresses" a CPU emulator with specially crafted test-cases, representing registers and memory configurations, to verify whether the CPU is properly emulated or not. EmuFuzzer detects improper behaviors of the emulator by running the same test-case concurrently on the emulated and on the physical CPUs and by comparing the state of the two after the execution. Differences in the state testify defects in the code of the emulator.

Forensic Analysis

- **SMMDumper**
  SMMDumper is a novel technique to perform *atomic* acquisitions of volatile memory of running systems. SMMDumper is implemented as an x86 firmware, which leverages the System Management Mode of Intel CPUs to create an *atomic*, *consistent*, *complete* and *reliable* snapshot of the state of the system that, with a minimal hardware support, is resilient to malware attacks. This technology supports both 32 and 64 bit processors.

Publications

Papers

- **Improving Mac OS X Security Through Gray Box Fuzzing Technique**
  Stefano Bianchi Mazzone, Mattia Pagnozzi, Aristide Fattori, Alessandro Reina, Andrea Lanzi, Danilo Bruschi.
  In Proceedings of the *7th European Workshop on Systems Security (EUROSEC 2014)*

- **A methodology for testing CPU emulators**
  Lorenzo Martignoni, Roberto Paleari, Alessandro Reina, Giampaolo Fresi Roglia, Danilo Bruschi.
  ACM Transactions on Software Engineering and Methodology (TOSEM 2013)

- **A System Call-Centric Analysis and Stimulation Technique to Automatically Reconstruct the Behaviors of Android Malware**
  Alessandro Reina, Ariste Fattori, Lorenzo Cavallaro.
  In Proceedings of the 6^{th} *European Workshop on Systems Security (EUROSEC 2013)*

- **When Hardware Meets Software: a Bulletproof Solution to Forensic Memory Acquisition**
  Alessandro Reina, Aristide Fattori, Fabio Pagani, Lorenzo Cavallaro, Danilo Mauro Bruschi.
  In Proceedings of the *28th Annual Computer Security Applications Conference (ACSAC 2012)*
- **A low-cost instrument for environmental particulate analysis based on optical scattering**
  Anna Morpurgo, Federico Pedersini, Alessandro Reina.
  In Proceedings of the *International Instrumentation and Measurement Technology Conference (I2MTC 2012)*

Industrial Papers

- **On the Privacy of Real-World Friend-Finder Services**
  Aristide Fattori, Alessandro Reina, Andrea Gerino, Sergio Mascetti.
  In Proceedings of the *14th International Conference on Mobile Data Management (MDM 2013)*

Academic Appointments

- **Graduate Student Instructor** Università degli Studi di Milano
  Network Security *2011 - 2012*
- **Graduate Student Instructor** Università degli Studi di Milano
  Information Security *2010 - 2012*
- **Teaching Assistant** Università degli Studi di Milano
  Algorithms and Data Structures *2010 - 2011*
- **Teaching Assistant** Università degli Studi di Milano
  Laboratory of Computer Programming *2009 - 2010*

Awards & Honors

- **Conferenceship award** Orlando, FL
  ACSAC 2012 *December 2012*
- **Ph.D. scholarship award** Università degli Studi di Milano
  XXVI Cycle *2011 - present*
- **3rd place at the International Capture the Flag** University of California, Santa Barbara
  Member of Chocolate Makers *team* *4th December 2009*
- **1st place at the International Capture the Flag** University of California, Santa Barbara
  Member of Chocolate Makers *team* *7th December 2007*