MAXIMILIAN ZINKUS PHD, CISSP

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Profile

Security and applied cryptography researcher, cybersecurity architect, software and security engineer

- Advanced the state of the art in static analysis and secure cryptographic protocols in my doctoral degree
- Created the most rigorous analysis of mobile data protection to date, garnering features in WIRED and Forbes
- Planned and led cybersecurity initiatives across embedded, cloud, and self-hosted platforms in biotechnology
- Designed and implemented bespoke cryptographic systems and software security features in production software
- Secured high-value platforms and Fortune 100 companies through blue-team and red-team efforts, including product security, secure software engineering, and penetration testing

Education

Doctor of Philosophy (PhD), Computer Science, Johns Hopkins University 2018 – 2024
Advised by Dr. Matthew D. Green
Dissertation: *Data Confidentiality For All: New Methods in Attack and Defense*

Master of Science in Engineering, Computer Science, Johns Hopkins University (GPA 3.96) 2018 — 2020

Bachelor of Science, Computer Science, California Polytechnic State University SLO (Maj. GPA 3.71) 2014 — 2018

Technical Skills

Cybersecurity	Threat modeling, secure design, vulnerability research & management, SecDevOps
Software Engineering	Full-stack development, Unix, embedded, database, network, & systems programming
Cryptography	Cryptography engineering, cryptographic vulnerability research, auditing, & code review

Work Experience

Technical Staff, Security Engineering Anchorage Digital (Remote) Mar 2024 - Present

- Leading security initiatives in collaboration with engineers across the company
- Analyzing and building regulations- and standards-compliant security infrastructure
- Developing security monitoring & automations and performing incident response
- Maintaining and enhancing security across mobile, web, cloud, and on-prem platforms
- Applying cryptography engineering to securely enable new features in digital asset custody, authentication, and other client-driven needs

Lead Information Security Engineer Medical Biotechnology Company (NDA) Oct 2021 - Oct 2023

- Led the cybersecurity mission by advising senior management and collaborating with software engineers to design, implement, deploy, and maintain software across embedded, iOS, cloud, and internal platforms
- Streamlined FDA pre-market submission through secure software engineering, software supply chain security via bespoke PKI, secure SDLC, SBOM automation, and rigorous documentation
- Improved security posture in all 23 core NIST cybersecurity categories through threat modeling, project planning, secure software engineering, and system hardening
- Implemented bespoke authenticated encryption for sensitive data flows across the software ecosystem

Cryptography Engineering Consultant Paxos Trust Company (Remote) Nov 2021 - May 2022

- Improved security for high-assurance systems, safeguarding billions of USD in digital assets through rigorous design review, research, and implementation support
- Researched candidate hardware security modules (HSMs) to minimize costs while maintaining security standards
- Collaboratively implemented cryptocurrency wallet generation software with security best-practices

Product Security Engineer Coinbase (San Francisco, CA) Internship: Summer 2017

- Streamlined secure user management by developing internal tools and automated tests
- Improved HackerOne bug bounty response time by 990% (~10x) through automation and manual review
- Enhanced code quality across the platform by developing internal static and dynamic testing systems

Product Security Engineer Apple (Cupertino, CA) Internship: Summer 2016

- Prevented vulnerabilities by automating security regression testing across all Apple OS platforms
- Improved security posture by discovering and triaging security issues, and coordinating response
- Collaborated with software engineers to build security and privacy by design into new and existing features

Application Penetration Tester Bishop Fox (San Francisco, CA) Internship: Summer 2015

- Discovered vulnerabilities and recommended remediations through penetration testing for Fortune 100 clients
- Led reporting for multiple engagements, enabling developer teams to remediate issues prioritized by severity
- Enhanced penetration testing capabilities by developing and improving internal software tools

Penetration Testing Trainee Leviathan Security Group (Seattle, WA) Internship: Summer 2013

- Developed internal software tools for penetration testing demos and developer education
- Assisted on client penetration tests, software and firmware analysis, and reporting

Selected Publications *first or co-first author

*McFIL: Model Counting Functionality-Inherent Leakage *Usenix Security 2023*

A novel framework for vulnerability detection and exploitation in software employing modern cryptography such as MPC, ZK, and FHE

*Automating the Development of Chosen Ciphertext Attacks *Usenix Security 2020*

Automated vulnerability detection and exploitation for encryption systems, achieved through a novel static analysis engine

*SoK: Cryptographic Confidentiality of Data on Mobile Devices *Privacy Enhancing Technologies Symposium 2022*

>100-page Systematization of Knowledge rigorously analyzing mobile OS exploits, data protection systems, and the use of cryptography on modern mobile devices

One-Time Programs from Commodity Hardware *IACR Theory of Cryptography Conference 2022*

Practical realization of One-Time Programs and formal security proofs; OTPs are powerful cryptographic tools applicable to authentication and program encryption

Teaching, Mentoring, and other Leadership and Experiences

(ISC)² CISSP: Certified Information Systems Security Professional 2024

Teaching Experience

- Developed and delivered a novel graduate-level course “Blockchains and Cryptocurrencies” at JHU to teach blockchain technology fundamentals and cryptography background 2019
- Updated material and lectured for “Security and Privacy in Computing” at JHU for both technical- and business-track cybersecurity students 2019 & 2020
- Supported course development, teaching, and administration for undergraduate courses during my own undergraduate degree
  - Web and Network Security, Privacy Engineering 2017
  - Cryptography Engineering 2016

President of the White Hat Ethical Hacking & Cybersecurity Club at Cal Poly SLO 2017 - 2018

- Organized and led co-curricular cybersecurity education through weekly 1-hr technical talks
- Significantly expanded club membership peaking over 100 students
- Facilitated corporate events and sponsorship, connecting students with prestigious internships
- Led participation and educated in Capture-the-Flag ethical hacking competitions

Contributor to open-source projects including Qubes (security-focused OS based on Xen), the Z3 SAT solver and other solvers, and macpine (a lightweight VM manager for macOS, built on QEMU)

Hobbies: Tennis, chess, and elaborate coffee-making methods