

David Hacker

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Education

- **University of California San Diego** **La Jolla**
○ *Major: Computer Science, Minor: Mathematics, 3.94* *2017–2021*

Work Experience

Positions Held.....

- **University of California San Diego** **La Jolla**
○ *CSE Department Tutor* *April 2018–July 2018, September 2018–Present*
 - Helped teach CSE 20, Discrete Mathematics, under Professor Daniele Micciancio
 - Currently teaching CSE 21, Mathematics for Algorithms & Systems Analysis, under Professor Quang Bach
 - Held office hours on a weekly basis and provided tutoring to students who required additional help
 - Graded students' homework assignments, midterms and final exams
- **Medspace** **La Jolla**
○ *Software Engineering Intern* *February 2018–September 2018*
 - Wrote a command line tool in C# to import 166 million rows of CSV data into a Neo4j graph database
 - Created an ASP.NET Core backend & RESTful API to interface with the database
 - Implemented an k-dimensional tree in the backend to speed up geospatial queries by a factor of several hundred
 - Managed nearly \$20,000 worth of server resources, used to store data and host the backend
 - Designed another backend using the Java Spring framework to supply customers with medical analytics
 - Integrated an Auth0 authentication system into the Spring backend to protect user data

Notable Projects.....

- **RLWE Cryptography:** *C++, Number Theoretic Library*
 - Implemented several prominent post-quantum cryptosystems related to the ring learning with errors (RLWE) problem
 - Designed a fast version of the Fan-Vercauterean cryptosystem, allowing for computations on encrypted data
 - Additionally integrated Peikert-style key exchange & Ring-TESLA digital signature algorithms
- **Shamir's Secret Sharing Scheme:** *C, GNU Multiple Precision Arithmetic*
 - Extended Shamir's (k, n) secret-sharing scheme so that it could be used on any message, regardless of its length
 - Showed how sensitive information can be split across multiple devices under a guaranteed 512-bit security level
 - Integrated an easy-to-use command-line interface into the program, supporting any POSIX-compliant shell
- **Dual_EC_DRBG Backdoor:** *Rust, Rust Arithmetic in Multiple Precision*
 - Demonstrated how a Shumlow-Ferguson attack could be used to break a dual elliptic curve random number generator
 - Heavily optimized the attack by writing custom implementations for NIST P-256, P-385, and P-521 elliptic curves
 - Can determine a generator's internal state in less than 30 seconds using only an i7-8650U processor
- **Alexa YouTube Skill:** *NodeJS, FFmpeg, AWS Lambda, Heroku*
 - Created a skill that lets Amazon Alexa devices play audio from YouTube videos as a hobbyist project
 - Downloaded over 3000 times and has over 100 stars on GitHub
 - Reviewed by the German tech channel Venix, which has over 10,000 subscribers

Technical Skills

- **Languages:** C, C++, C#, Rust, Java, Python, JavaScript, Solidity, ARM Assembly
- **Frameworks:** MEAN stack, Flask, Spring, ASP.NET Core, Materialize, React Native
- **Databases:** MongoDB, Neo4j, Redis, Firebase, MySQL