# Alexander Scheel

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GitHub – cipherboy
Pagure – cipherboy
Fedora Project – cipherboy
Mozilla – Alexander Scheel
LinkedIn

## [Overview]

- Interests in algorithm, protocol, and application development.
- Algorithmic specialties include cryptography, boolean satisfiability, and graph theory.
- Research interests include logical cryptanalysis of hash functions.

## [Experience]

### Canonical – Ubuntu Security Engineer – Certifications & Compliance  **March 2021 – *present***

- Delivering FIPS and CIS compliance tooling to Ubuntu Advantage customers.

### Red Hat – Software Engineer & Team Lead – Red Hat Certificate System  **September 2018 – April 2021**

- Primary maintainer of JSS a NSS wrapper for Java
- Major projects include developing *javax.net.ssl* support, extending Java Cryptography Architecture (JCA) compatibility, and low-level algorithm enablement.
- Development team lead; frequent cross-team and cross-organization contributions.
- Contributor to many open source ecosystems including Dogtag PKI, FreeIPA, NSS, OpenSCAP, MIT Kerberos, fapolicyd, rpminspect, and FreeRADIUS.
- Fedora and RHEL maintainer contributing to efforts such as the Stewardship and Java Maintenance SIGs.

### Red Hat – Intern – OpenSCAP  **June 2018 – August 2018**

- Simplified SME contribution experience to the Compliance as Code project.
- 95 accepted pull requests to Compliance as Code and 25 accepted pull requests to OpenSCAP and SCAP Workbench.

### Red Hat – Intern – Identity Management  **June 2017 – August 2017**

- Focused on enabling Channel Bindings in MIT Kerberos.
- Over 20 accepted pull requests across MIT Kerberos, gssproxy, ding-libs, python-gssapi, and libverto.
- Contributed to improving Kerberos interactions with SSH and NFS (Red Hat Bugzillas #1199363, #1477231, and #1463665).

### ISEAGE – Lab Staff  **October 2016 – May 2018**

**ISEAGE** is a security research lab at ISU which runs five Cyber Defense Competitions each year under the direction of Dr. Doug Jacobson.

- Developed scenario VM images, exploitable backdoors, and competition anomalies for use in an isolated environment.
- Competition roles include Competition Director, Red Team (volunteer hackers) Lead and Green Team (usability testing) Lead.
- Multiple responsibilities including lab leadership, sponsorship activities, and infrastructure development.

## [Projects]

### Open-Source Contributor  **2010–*always***

- Contributes to several open source projects including CryptoMiniSat, Gitea, Let's Encrypt Boulder, cryptofuzz, and Apache Tomcat.
- Publishes over 75 open-source projects including cmsh, p, sharg, SSSa libraries, and many others.
- Former Ubuntu Forums contributor with over 600 posts.

**Collisions in Hash Functions** **2017 – 2018**

- Research under Dr. Eric W. Davis (Rozier) and Dr. Clifford Bergman.
- Modeling collisions in hash functions as 3-CNF-SAT problems.
- Deriving metrics of utilities of collisions to evaluate impact of a collision.
- Analyzing breadth of collision malleability.
- Improving bounds for second preimage attacks.
- Contributing to open access and open source research.
- "Measuring Hash Trustworthiness via Collision Utility Metrics: Logical Cryptanalysis of MD4"
  A. Scheel and E. Rozier (unpublished)

**Cryptopals** **2016–*present***
Cryptographic challenges which attacking insecure assumptions. Completed 54 out of 56 problems in Go.

**crypto-collection** **2016–2017**
Various cryptographic algorithms with cross-architecture implementations in C.

**COMS 309 – EduTLS** **2016**
TLS 1.2 library implemented in C++ as part of an API-based web framework.

## [Education]

**Iowa State University (2015 – 2018) @ 3.75 GPA**

- Honors College Project: Collisions in Hash Functions (see above)
- Degrees: Computer Science and Mathematics
- Honors: ΦBK Junior Inductee, Spring 2017
- Honors: *magna cum laude* & Honors Program

## [Awards]

**ACM ICPC – North Central North America region**

- Fall 2017: 1st in site, 4th place overall

**ΦBK Junior Inductee, Spring 2017**

**ISEAGE Cyber Defense Competitions**

- ISU CDC: 5th place – Fall 2016
- ISU CDC: 4th place – Spring 2016
- National CDC: 1st place – 2016
- ISU CDC: 2nd place – Fall 2015

## [Buzzwords]

**Programming Languages:**
C, Java, Python, Go, C++, Bash, Ansible, rpmspec, SQL, HTML5, CSS3, JSX, React, JavaScript, PHP
**Operating Systems:** Fedora, RHEL, CentOS, Ubuntu, Debian, occasionally Gentoo
**Orchestration:** Podman, Docker, KVM, libvirt, AWS, GCE, DigitalOcean, RHEV
**Project Management:** Git, GitHub, Pagure, Gitea
**Protocols and Encodings:** TLS, Kerberos, ASN.1, XML, JSON, YAML
**Editors:** Atom, Brackets, Gedit, Vi, Emacs, Nano, Eclipse, Word, Google Drive
**Daemons:** Apache httpd, Apache Tomcat, MySQL, MariaDB, PostgreSQL, SSH, Nginx, FreeRADIUS, Kerberos

**References available upon request**