

Robert Underwood

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Education

Clemson University

PhD of Science in Computer Science, GPA 4.0/4.0

Clemson, SC

May 2021, expected

Clemson University

Master of Science in Computer Science, GPA 4.0/4.0

Concentration: Systems and Implementation

Clemson, SC

August 2018

Clemson University, Calhoun Honors College

Bachelor of Science in Computer Science, GPA 4.0/4.0

Honors Thesis: Automation in the Classroom

Clemson, SC

December 2016

Peer Reviewed Publications

- [1] Robert Underwood, Jason Anderson, and Amy Apon. “Measuring Network Latency Variation Impacts to High Performance Computing Application Performance”. In: *Proceedings of the 9th International Conference on Performance Engineering*. To Appear. ACM/SPEC. Berlin, Germany, Apr. 2018, pp. 1–12.

Research Experience

Clemson University

Clemson Data Intensive Computing Environments

Clemson, SC

2016-2018

- Applications and modeling of reliability and performance of error-bounded lossy compression
- Design experiments to analyze performance of high performance computing systems
- Analyzed and modeled latency variation in Ethernet and Infiniband
- Build models to improve reliability computer infrastructure.

Clemson University

Clemson PERSIST Lab

Clemson, SC

2015-2016

- Designed and developed an automated grading framework using Python, C, Raspberry Pi, and Docker.
- System used modular design, supports process isolation, and multiple test formats.

Teaching Experience

Clemson University

CPSC/ECE 3220: Operating Systems

Clemson, SC

Fall 2018

- Junior level course - 55 Students enrolled
- Served as a Graduate Instructor of Record – produced all lectures and most course materials
- 1 of 2 Graduate Teachers of Record in the School of Computing during Fall 2018
- Syllabus and course materials available: <https://robertu94.github.io/cpsc3220-f18/>

Relevant Coursework

Clemson University

Clemson, SC

CPSC 827: Language Translation

Fall 2016

- o Implemented a subset of Python from a yacc-able version of the full Python 2.7 grammar in C++, flex, and bison
- o Included: a.s.t. generator; type system; function, global, nested, and returning scope; and primitive exceptions
- o Designed and implemented using Object Oriented principals with 55 classes, over 3600 SLOC, in less than 2 months

Clemson University

Clemson, SC

CPSC 820: Parallel Architecture

Fall 2016

- o Studied hardware and software iterations that facilitate parallel and distributed computation
- o Researched and presented on the design and implementation of Linux Bridge, OpenVSwitch, DPDK, SRIOV, and MACVLAN
- o Designed and conducted experiment to quantify latency variation in RDMA using InfiniBand layers 1, 2, and 4

Clemson University

Clemson, SC

CPSC 822: Case Study in Operating Systems: Linux

Spring 2016

- o Designed and developed:
 - Graphics driver for an AMD Radeon-like device with frame buffer, fifo, and dma interfaces
 - System call to unconditionally kill a process
 - Disk scheduler for a SCSI disk controller
- o Analyzed and debugged performance issues in the Linux kernel
- o Worked with a complex system with limited documentation

Work Experience

The Boeing Company

Charleston, SC

Information Technology Intern

Summer 2016, 2017

- o Developed improvements for a web based portal system in HTML, Python, and JavaScript
- o Developed the user interface for a materials database using HTML and JavaScript
- o Designed, developed, and led development on a resource management tool using C#, HTML, and JavaScript.
- o Worked on the Network Automation, Tooling, and Standards Integration Team

Unitrends, Inc

Columbia, SC

Software Development Intern

2014-2016

- o Developed GPU offloading for AES encryption using Nvidia CUDA.
- o Designed and developed automated configuration scripts for testing environments using Ansible.
- o Designed and developed new cloud infrastructure using LVM, Linux, and Docker
- o Designed and developed a Dynamic Alert System in Python
- o Worked on the Alerts System in PHP, BASH, C, PERL
- o Worked on the internal Customer Incident Analysis web portal using Django, Postgreql, HTML, CSS, and JavaScript

Extracurricular Activities

Clemson University

Clemson School of Computing Graduate Student Organization, Secretary

Clemson, SC

2017-2018

- Keep minutes and assist with program and logistics
- Coordinate with other student organizations and School of Computing staff

Clemson University

Clemson University Cyber Security Team

Clemson, SC

2015-2018

- Competed in Collegiate Cyber Defense Competition 2015-2016
- Competed in Palmetto Cyber Defense Competition, 2015
- Primary developer for the Cyber Security reference material, 2016
- Designed and developed scripts to aid in auditing and administration of contest environments, 2016
- Lead training on:
 - Exploitable patterns in software design and how to mitigate them
 - User (strace, ltrace, lldb) and system (systemtap, dtrace) tracing tools for program analysis.

Clemson University

Clemson Association for Computing Machinery Vice President

Clemson, SC

2014-2016

- Planned and help found the Clemson Association for Computing Machinery Technology Seminar, Fall 2016
- Prepared and presented 4 seminars per semester on Git, Linux, Vim, Firewalls, Unix tools, and other topics, 2014-2016
- Coordinated with President to set up professional development and social events, 2014-2016
- Assisted with semester planning and manage Clemson Association for Computing Machinery calendar, 2014-2016
- Prepared and presented to School of Computing faculty on automation in the classroom, April 2016.

Clemson University

Clemson Association for Computing Machinery Programming Team

Clemson, SC

2013-2016

- Competed in competitions to design efficient algorithms to solve problems
- Team placed 1st at the Mercer Spring Programming Competition in 2014 and 2015
- Team placed 3rd at Association for Computing Machinery Southeast Regional Competition 2015
- Invited to participate in the National Invitational Programming Competition 2015, 2016
- Primary developer for the Clemson Hackpack algorithms reference
- Student apprentice judge at Mercer Programming Competition February 2016.

Presentations

Systemd tools

Overview of useful, but lesser know `systemd` features
CU Cyber

Clemson, SC

November 2017

C++ Templates: Staring into the Abyss

Advanced talk on C++11-17 templates and uses
Clemson ACM Technology Seminar, Guest talk

Clemson, SC

April 2017

Dockerize all the Things!

Introduction to container technology and uses
Clemson ACM Technology Seminar, Guest talk

Clemson, SC
February 2017

Exploitable III: Reverse Engineering

Overview of binary analysis, user and kernel level tracers, and debuggers
CU Cyber and Clemson ACM Crossover Seminar

Clemson, SC
September 2016

Automation in the Classroom

Motivation and demonstration of classroom automation
School of Computing Seminar, Spring 2016 Seminar Series

Clemson, SC
April 2016

Python: A Parser Tongue Primer

Introduction to idiomatic Python programming
Clemson ACM Seminar

Clemson, SC
April 2016

Exploitable II: Application Design

Overview of writing secure software
CU Cyber and Clemson ACM Crossover Seminar

Clemson, SC
March 2016

Provisioning At the Speed of Thought

Evaluation and Uses of Ansible, Salt and Puppet
Clemson ACM Technology Seminar

Clemson, SC
October 2016

Writing Semantic Code

Using refactoring and design patterns for better code
Clemson ACM Technology Seminar

Clemson, SC
August 2016

Think Different

Introduction to approaching computer science projects
Clemson ACM Various Venues, Also titled "Perfecting Your Projects"

Clemson, SC
February 2016, et al

Linux is Scary

Introduction to Linux for new computer science students
Clemson ACM Seminar

Clemson, SC
February 2016, et al

Thou Shall Not Pass

Introduction to open source firewalls
Clemson ACM Seminar

Clemson, SC
February 2016

Exploitable: Ethical Hacking

Introduction to ethical software penetration testing
CU Cyber and Clemson ACM Crossover Seminar

Clemson, SC
October 2015

Git Well Soon

Introduction to the Git distributed version control system
Clemson ACM Various Venues, Also titled "Git Thee to a Version Control System"

Clemson, SC
September 2015, et al

Intermediate Vim

Advanced seminar on using the Vim text editor
Clemson ACM Seminar

Clemson, SC
February 2015

N Unix Tools in $O(N)$ Minutes

Overview of scripting tools for POSIX platforms
Clemson ACM Seminar

Clemson, SC
March 2015

Computer Skills

Advanced: Bash, Bourne Shell, C, C++, Docker, Linux Kernel and Userspace, Python, Vim

Intermediate: Ansible, Git, Hadoop, JAVA, JavaScript, L^AT_EX, SaltStack, Systemd, SQL

Basic: ARM assembly, C#, FreeBSD, MPI, PHP, Perl, Puppet, SNMP, SVN, Apache Spark

Professional Affiliations

Association for Computing Machinery: Student Member 2014-2018

Professional Service

Reviewer: ICPE 2017, ICCCN 2017, PBAS 2017, SC17, IEEE CLOUD 2018, IEEE TSE 2018, IPDPS 2018

Honors

- Eagle Scout 2010
- Order of the Arrow, Vigil Honor 2013
- President's List at Clemson University 2013-2016
- Outstanding Sophomore in Computer Science at Clemson University 2015
- Palmetto Fellows Recipient 2013-2016
- McAlister Scholarship 2015-2016
- Benefitfocus Scholarship 2015-2016
- Faculty Scholarship Award, Clemson University 2016
- National Science Foundation Graduate Research Fellowship Honorable Mention 2017
- Graduate Fellowship, National Research Traineeship: Resilient Infrastructure Systems