



- Laboratory Assistantship                      2006 – 2008                      Emory University  
Supervisor: Sebastien Siva, ssiva@emory.edu  
Maintaining student computing lab facilities during school and evening hours.

Duties include: aiding students with technical questions regarding lab hardware and software environments; aiding students with general programming issues related to homework assignments; maintaining lab facilities, and ensuring a peaceful and secure work environment.

- Private Tutor                                      2004 – 2006                      Longwood University  
Supervisor: Rebecca Sturgill, sturgillrk@longwood.edu  
Aiding students with mathematics through one-on-one instruction.

Duties include: meeting with students by appointment to review current homework and course topics; preparing practice materials for students; reviewing course material with faculty to prepare for student interaction.

## **Technical Experience**

- Technical Internship                              Fall 2011                      Intel Corp.  
Supervisor: Gerolf Hoflehner, gerolf.f.hoflehner@intel.com  
Developing an automated testing framework for performance analysis on architectural simulators

Duties include: designing and implementing an extensible framework to automate data collection from multiple simulators, simultaneously; designing and implementing interface for simulation over remote procedure call through CORBA; collecting execution traces and performance data for code regions based on those traces, and comparing the results from multiple simulators.

- Technical Internship                              Summer 2009                      Intel Corp.  
Supervisor: Priti Srivastav, priti.shrivastav@intel.com  
Developing and analyzing binary translation solutions for upcoming products.

Duties include: designing test interface for benchmarking proprietary hardware; analyzing hardware and software performance under various workloads with multiple cache configurations; meeting with product designers to discuss future directions utilizing binary translation software.

- Resident Technical Associate                      2004 – 2006                      Longwood University  
Supervisor: Kim Redford, redfordkc@longwood.edu  
Assisting students with technical issues on personal computers.

Duties include: providing in-house and remote technical software support to students; diagnosing hardware problems on student laptops, and referring to repair center as needed; educating students about preventive maintenance and security; regular meetings with other RTAs for training and troubleshooting.

## Research

Interests: My primary research interest is Operating Systems, specifically Wide-Area Distributed Computing (Grids). My secondary interest is pedagogy, particularly in early exposure of students to computing/logical concepts. I have previously worked on Dynamic Binary Translation, primarily with the Pin system from Intel and the CMS system by Transmeta.

- Workflow and Job Management on the Grid  
2011 – Present

Advisor: Dr. Andrew Grimshaw, grimshaw@virginia.edu

While Condor can provide a good system for smaller scale High-Throughput Computing, there are times when a user may outgrow his local Condor pool and need to extend his resources to include a computing Grid. We wish to ease the transition for these users by providing a mechanism to recognize job submissions for Condor and dynamically transform them into standards-compliant JSDL with minimal or no changes required. We also perform a study of the usage patterns on production Condor systems to categorize the way people use Condor to derive the requirements for our translator. Finally, we design a workflow manager based on DAGMan which manages dependencies between multiple jobs as they are submitted to Grid resources.

- Secure Programming for E-Commerce  
2010 – 2011

Advisor: Dr. Alfred Weaver, weaver@virginia.edu

In many teaching environments, security is treated as an afterthought: the students learn functionality with little or no regard for the security of the product, with the expectation that security will be learned later. We adopt a new method, in which the student is taught new technologies useful for E-Commerce, and how to utilize those technologies while emphasizing security as a primary design principle.

- Dynamic Code Cache Management to Improve Dynamic Binary Instrumentation Performance  
2008 – 2009

Advisor: Dr. Kim Hazelwood, hazelwood@virginia.edu

Previous work uncovered an anomaly in the performance of some benchmark programs wherein a program's performance while instrumented will improve when the size of the virtual code cache is limited. We seek to take advantage of this behavior using adaptive techniques to monitor the code cache and flush out old data when it becomes cumbersome.

- Effects of Dynamic Binary Instrumentation on Hardware Branch Prediction  
2008

Advisor: Dr. Kim Hazelwood, hazelwood@virginia.edu

Dynamic Binary Instrumentation (DBI) tools often utilize a virtual code cache in their execution, in which traces of a program are extracted and recompiled, often with some instrumentation code or optimizations. This behavior is quite different from the standard execution environment that CPUs are generally designed for, which can cause a substantial impact on the performance of hardware components like the branch predictor. This project studied this impact in detail for two such DBIs, Pin and DynamoRIO.

- HOCA: Operating System Design on x86  
2007 – 2008  
Advisor: Dr. Ken Mandelberg, km@mathcs.emory.edu

A graduate-level computer science curriculum often includes a course in Operating System design, in which a student will implement a small Operating System over the course of a semester in order to learn about the more intricate details of OS design. As technology advances, so too must the design of these academic Operating Systems to reflect those advancements. In this project, we studied the current technology available for such an update, and began the transition from a Motorola 68000 simulator to an x86 virtual machine.

- EDIT: Extensible Data Identification Toolkit  
2007 – 2008  
Advisor: Dr. James Lu, jlu@mathcs.emory.edu

In the medical community, there is a vast amount of unstructured data available in the reports that physicians must maintain throughout day to day activities. This data goes largely unutilized by the research community for two primary reasons: 1) the format of the data is nonstandard between institutions, and 2) the data is scattered across the globe in medical records vaults where no one but local personnel can access them. EDIT is designed to overcome these two hurdles by providing a simple interface for researchers to automatically convert data to a searchable, semi-structured format, and then share this data in a secure but accessible manner to the rest of the research community.

- Computer Science Applications for Medicine  
2005  
Advisor: Dr. Alfred Weaver, weaver@virginia.edu

The rapid worldwide deployment of the Internet and Web is the enabler of a new generation of e-healthcare applications, but the provision of a security architecture that can ensure the privacy and security of sensitive healthcare data is still an open question. This project made use of web services and biometric (fingerprint, iris scan, signature recognition) and digital (etoken, RFID, PIN generators) approaches to security.

- An Automatic Graphics API for Introductory Computer Science Classrooms  
2005  
Advisor: Dr. Jeffery Peden, pedenh@longwood.edu

Computer Science educators are constantly looking for new ways to utilize technology in the pursuit of helping students to learn the concepts needed for success. Even simple ideas can be difficult for students to comprehend without some form of visual aide. To solve this problem, we designed and implemented a simple programming API whereby visualizations can be added to an educators programming examples to display control graphs, memory contents, and data structures as the program executes.