

Thomas Coe

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Education

Georgia Institute of Technology — Atlanta, GA August '20 – Present
Master of Science in Cybersecurity

- 4.0 GPA
- Information Security track

Georgia Institute of Technology — Atlanta, GA August '13 – May '17
Bachelor of Science in Computer Science

- 4.0 GPA - Faculty Honors
- Information Internetworks and Systems & Architecture threads

James L. Mann High School — Greenville, SC August '09 – May '13
Technology Magnet Program

- 3.93 GPA
 - Highest Academic Honors, top 5% of class
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Experience

Union Pacific Railroad — Omaha, NE May '14 – Present
Systems Engineer – Network Design May '22 – Present

- Continue to support the network architecture of public cloud deployments across the organization
- Develop cloud firewall architecture

Associate Systems Engineer – Network Design April '21 – May '22

- Increased the raw packets-per-second (pps) throughput capabilities of Union Pacific's custom network firewall by greater than a factor of 10 through rewriting the packet processing engine to leverage the Data Plane Development Kit (DPDK) and interface with NIC hardware directly from Linux userspace
- Updated the firewall's multi-threaded architecture to allow for a more even distribution of work between threads and add the ability for future single-node growth via scaling out across additional CPU cores
- Wrote Wireshark plugin to parse the custom syncing protocol used to maintain session state across all nodes in a firewall cluster
- Automated configuration of a datacenter BGP overlay supporting on-premise Kubernetes deployments
- Designed and implemented a hybrid cloud network architecture to securely connect Union Pacific's on-premise datacenters to deployments across various public cloud providers

Senior Project Engineer – Network Design April '20 – April '21

- Drove rapid IT infrastructure changes to support Union Pacific's office-based workforce transitioning to WFH due to the COVID-19 pandemic. Re-balanced internet traffic across DIA circuits and firewall nodes to allow for surges in traffic from the immediate transition to remote work as longer-term capacity increases were implemented throughout 2020. Implemented a NAT solution to allow a video conferencing platform to be used remotely over the company VPN. Validated operations of DDoS mitigation tools.
- Worked in depth on Union Pacific's custom Linux-based network firewall. Completed network architecture changes to remove performance bottlenecks at the firewall's routing layer. Worked with other firewall engineers to implement low-level code changes to system calls in the firewall engine itself to achieve a 55+% per-thread performance increase. Executed changes across 9 scheduled outage windows without major disruptions to users or applications.

- Completed R&D on the network layer for an on-premise Kubernetes implementation, helping complete tests of various CNIs with different levels of integration to the existing datacenter fabric. Worked with other network engineers to establish a plan for effectively deploying BGP across a large datacenter fabric for better network integration with Kubernetes.
- Worked on a cross-functional team to implement a POC cloud infrastructure environment. Made decisions on how to implement cloud networking and how to connect on-premise datacenters to various public cloud environments.

Project Engineer – Network Design

April '19 – April '20

- Automated DNS zonefile creation from data in IPAM database, saving hours of work a week across multiple departments and delivering DNS name changes more quickly and accurately
- Worked with train dispatchers to develop process for installing virtual routers on thousands of servers where the installation briefly impacts PTC operations and had the potential of stopping trains
- Tested Union Pacific's internally-developed Linux-based network firewall, pushing packet throughput to the limit. Identified performance limits and beginning to investigate high-performance Linux packet processing technologies to boost firewall performance
- Supported and guided interns, helping them create an Angular + Java web application to provide network looking glass functionality to other teams for increased troubleshooting visibility

Associate Project Engineer – Network Design

April '18 – April '19

- Designed and implemented virtualized network of backoffice routers to support routing connections to over 10,000 remote field virtual routers running on track wayside servers
- Developed automation and procedures to support network of 10,000 remote virtual routers. Automated documentation in IPAM system, generation of router config, and configuration of backoffice routers
- Provided 3rd tier support escalation through an on-call rotation. Supported issues such as routing loops caused by vendor bugs, power issues affecting core routers, DDoS attack mitigation, and diagnosing multicast issues in a multi-vendor environment

Junior Project Engineer – Network Design

June '17 – April '18

- Developed OSPF Area 0 costing plan incorporating new datacenter and replacement of WAN circuits
- Created and executed plan for network routing changes moving mainframe operations to new datacenter
- Worked with telecom carriers and field technicians to replace TDM WAN circuits with high bandwidth Ethernet circuits, including installation and provisioning of new routers in collocated facilities
- Built and executed outage plan for migrating OSPF border router functionality and external fiber connections to a new set of core routers at UPRR's central train dispatching center with no downtime
- Troubleshoot vendor bugs uncovered implementing a unique VXLAN-based network in new datacenter

Intern – Network Design

May '14 – June '17

- Developed a Linux daemon in C to de-duplicate Netflow flows received from multiple routers and generate a single stream of Netflow data to encompass all traffic reported by 50+ routers
- Developed a highly configurable software UDP packet repeater/forwarder to facilitate analysis of Netflow data by multiple collectors and the de-duplication daemon
- Performed OSPF cost analysis & design for a multi-area architecture consisting of thousands of routers
- Engineered and executed planned outage procedures for router software and hardware replacement, including working with remote technicians to complete physical installs and cutovers
- Created Perl scripts to automate common tasks and assist engineers with tasks that can't be automated

BikeStreet USA — Taylors, SC
Sales and Inventory Management

March '13 – August '13

- Transferred inventory between shop locations, placed orders for inventory restocking
- Sales specializing in road bicycles

Gusto Cycles, LLC — Taylors, SC
Computer Systems and Marketing

October '11 – March '13

- Launched a new website, managed shop's online presence on Facebook, Twitter, Foursquare
 - Restructured and simplified their computer network and point of sale system
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Skills

- **Programming:** C, Perl, Java, Python
 - **Networking:** Cisco IOS-XE/NX-OS, Arista EOS, OSPF, BGP, VXLAN, PIM-SM, GRE, Netflow
 - **Software:** Oracle SQL, tcpdump/Wireshark, Vi, Bash, Git, L^AT_EX, Quagga, Linux KVM, nfsen/nfdump
 - **Cloud:**
 - **Azure:** VNet, ExpressRoute, Private Link, Azure Firewall, User-Defined Routes
 - **AWS:** VPC, Direct Connect, Transit Gateway, PrivateLink
 - Snowflake
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Activities

Georgia Tech Cycling Wreck Team

August '13 – August '14

- Recreational cycling club

Finish Strong Endurance Cycling Team

January '13 – December '13

- Taught basic riding skills and rules of the road to beginners looking to get involved in road cycling