John D. Duncan, III

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MOTIVATION

Making things that are useful to people and that work well.

EMPLOYMENT

Quorum Analytics — Washington, DC

2022–2024	Senior Software Engineer	(50 to 70+ hours/week)
2020–2022	Software Engineer II	
2018–2020	Software Engineer	

Python, Django, SQL, PostgreSQL, JavaScript, TypeScript, React, Redux, D3, HTML, CSS, React Native, PostGIS, Elastic

Wrote and launched over a dozen flagship products for Quorum Analytics, the industry leading public affairs platform. I consistently solved the team's most complex technical challenges while delivering projects on time, in scope, and under budget.

- Instrumental in helping scale ARR from $9M to $64M+.
- Authored 5k+ commits, 1k+ code reviews, 700+ PRs, and conducted 100+ technical interviews.
- Led cross-functional projects in collection, organization, and presentation of legislative, regulatory, compliance, financial, geospatial, and user-generated datasets.

Projects			Duties	Leadership
PAC Hybrid	Technical Lead	Team of 10	Mentorship, coaching, onboarding	Wrote first design system
Quorum PAC	Technical Lead	Team of 8	Code Review (async, collaborative)	Created full-stack guild
Search UI/UX	Technical Lead	Team of 4	Interviews (technical, design)	Led apprenticeship program
Dashboards	Technical Lead	Team of 2	Tests (regression, integration, unit)	Mentored dozens of engineers
Transcripts	Frontend Lead	Team of 2	Technical Design Documents	Onboarding coach
Bulk Actions	Technical Lead	Team of 1	Product Requirements Documents	Upgraded major dependencies
International	Full-stack	Team of 2	Technical Documentation	Discovered bug in Google Chrome
Regulations	Full-stack	Team of 1	"Learning Lab" presentations	Longest tenured engineer
Search	Full-stack	Team of 2	Daily deployment, 24hr on-call shifts	Rockstar of the Quarter

Massachusetts Institute of Technology: Lincoln Laboratory (MIT LL) — Lexington, MA

Summer 2016	Research Intern	(40 hours/week)

Java, Android SDK, Google Maps SDK, JavaScript, ExtJS, HTML, CSS, SQL, Acme (Plan 9)

Wrote Local Evacuation Alert Verification (LEAV, sponsored by DHS S&T) for HURREVAC-eXtended (HVX, sponsored by FEMA) with the Humanitarian Assistance and Disaster Relief Systems (HADR) group at MIT LL on Hanscom AFB.

- Designed and built LEAV, an Android application that routes hurricane evacuees to shelters, visualizes evacuation zone status in an interactive map, and facilitates communication between Emergency Managers (EMs) and evacuees.
- Developed an interactive LEAV web module which enables Emergency Managers to update, visualize, and monitor the status of state evacuation zones in the HVX web interface.
- Reduced WFS-T request size by an order of magnitude.

TECHNICAL SKILLS

Languages	Python, JavaScript, TypeScript, Go, SQL, LaTeX	**SCM & CI/CD**	Git, Github, Jenkins, Travis
Databases	PostgreSQL, PostGIS, Elasticsearch, SQLite	**Infrastructure**	Docker, Kubernetes, Ansible
Web	Django, React, Next.js, D3, HTML5, CSS3	**Observability**	Sentry, Datadog, Grafana
Devops	AWS (EC2, RDS, S3, Lambda, DMS, Route53)	**Design**	Figma, Invision, Sketch, GIMP
	Atlassian (Jira, Confluence, Opsgenie), G Suite	**Unix**	sh, pkg-src, brew, x11, plan9port
Libraries	npm, Babel, Webpack, Gulp, Cypress, Mantine, Styled Components, Stylus, Jest, react-testing-library		

EDUCATION

Gettysburg College — Gettysburg, PA

Bachelor of Science in Computer Science (3.60, HONORS) and Philosophy (3.73, HONORS) — 2013–2017
Class of 2017 Outstanding Computer Science Student Award

PERSONAL PROJECTS

In my free time, I enjoy working on creative and idiosyncratic projects. I recently scraped and analyzed the Electronic Code of Federal Regulations and extended bob—a Golang query builder—with Django features and syntax. I previously ported James Ashton's X-Face decoder from C to Golang, wrote wiki and blog platforms in Golang, found a bug in the Google Chrome URL parser, discovered a novel method to losslessly convert Susan Kare's Macintosh fonts from Classic Mac OS resource forks to macOS data forks, wrote a JavaScript weather script with retro bitmaps, created a 3x4 bitmap font, wrote a Mozilla add-on to display 'face' images embedded in email and newsgroup message headers, and won a Gentoo Linux interface design competition. My personal, professional, and open-source work is detailed in my CV: https://johnduncan.io/cv.pdf.

Computer Science	**Capstone** *Adam's Wellness Family Connection*	Advisor Dr. Rod Tosten
Philosophy	**Thesis** *Virtual Futures: Virtuality as Political Praxis*	Advisor Dr. Lisa Portmess
	Capstone *Infinite Horizons: The World to Mind Question*	Advisor Dr. Daniel DeNicola

PROFESSIONAL PROJECTS

Quorum Analytics   Washington, DC

PAC Hybrid	May–October 2024
Position	Technical lead (search, dashboards, backend, SQL)
Team	8 engineers, 2 product managers, 2 QA engineers, 2 engineering managers, 1 engineering director
Technologies	Python, Django, SQL, TypeScript, React, Mantine, K8s, PostgreSQL, MySQL, AWS DMS, Figma

Summary Designed, implemented, and launched the Quorum PAC Hybrid Federal Election Commission (FEC) reporting platform, further expanding Quorum into the $15M+ PAC software market by integrating Cision's market leading government relations PAC product into the Quorum PAC federal filing platform, which enables clients to fundraise, manage transactions, reconcile accounts, file FEC reports, and ensure compliance with evolving FEC financial regulatory enforcement requirements and reporting procedures. Wrote most backend queries, full-stack Search infrastructure, technical design document (TDD) for one-time and recurring credit card contributions, and TDD & MVP for the full-stack Dashboard integration.

- Collaborated closely with product team to write core infrastructure for backend integration with Cision's PAC infrastructure
- Reduced database query latency from 60 seconds to 20 milliseconds by optimizing Postgres partition and schema constraints, improving transaction dataset query plan performance by over 3000x and permanently fixing a 10+ year old bug. Optimization ensured adherence to contractual SLOs, maintaining product viability for clients managing hundreds of thousands to millions of transactions.
- Coached engineers to optimize a database migration by replacing sequential queries with a single constant-time operation, reducing execution time from two weeks to under five seconds and improving backfill performance by over 240,000x.
- Worked with team to design service to instantly synchronize billions of rows between the Quorum and CisionPAC databases.
- Discovered critical discrepancies in FEC-designated national party committee C-numbers listed across 50+ years of legal advisory opinions, FEC website data, and official fec-cms GitHub repository.
- Developed end-to-end search, filtering, and data visualization features for four datasets, including backend sql queries, API endpoints, and frontend UI functionality.
- Developed optimized O(1) QueryMethods to support complex summation and grouping over arbitrarily filtered PAC Transaction datasets—including Officials, Contacts, Transactions, Pac Organizations, and Elections—in search and dashboards, replacing an inflexible yearly contribution caching model, enabling efficient searches across four datasets, and improving performance and scalability.

Quorum PAC	July 2022–October 2024
Position	Technical Lead (search, dashboards, FEC submission, forms, backend, SQL)
Team	8 Engineers
Technologies	Python, Django, FastAPI, TypeScript, React, Mantine, Docker, K8s, PostgreSQL, Figma

Summary As a technical lead, I designed and implemented full-stack search and dashboard infrastructure for the Quorum PAC FEC reporting platform, a greenfield project expanding Quorum's business into the $15M+ PAC software market and helping clients remain compliant, raise funds, and report results to the FEC.

- Collaborated closely with product team to write core infrastructure for double ledger accounting backend
- Wrote full-stack PAC, search, and dashboard infrastructure
- Wrote highly optimized O(1) QueryMethods to support complex summation and grouping over arbitrarily filtered PAC Transaction datasets—including Officials, Contacts, Transactions, Political Committees, and Elections—in search and dashboards
- Designed a microservice which allows user to check, print, and submit their FEC report using the FEC's VenPak 8.4 software
- Implemented forms and backend infrastructure for state political committees, donations (payroll, credit card), optional charity matching, and check processing
- Wrote technical design document (TDD) for PCI-compliant recurring credit card payment integration with Cision PAC

Search UI/UX	February–September 2021
Position	Technical Lead
Team	4 engineers (2 apprentices), 1 designer, 1 engineering manager
Technologies	Python, Django, JavaScript, React, Styled Components, PostgreSQL, Invision

Summary I designed and implemented visual and functional enhancements for Quorum's search feature, the default homepage for all users. I mentored two apprentice engineers transitioning from non-engineering careers by providing constant guidance and facilitating their technical growth as a player/coach technical lead focusing on collaborative problem solving. Wrote the project technical design document (TDD), collaborated closely with product and design teams on the products requirements document (PRD), and wrote reusable design system components.

- Wrote feature to search the current dataset's filters by their internal metadata
- Wrote novel ordering system enabling users to sort 15 datasets in ascending or descending order by 27 unique database columns
- Designed and wrote global search pop-down, allowing seamless search to 37 datasets from any feature or location in Quorum

Dashboards	January–November 2020
Position	Technical Lead
Team	2 engineers, 1 designer, 1 engineering manager
Technologies	Python, Django, SQL, JavaScript, React, D3, Styled Components, Postgres, PostGIS, Invision

Summary Developed an industry-first, full-stack Dashboard feature empowering users to visualize data through an intuitive interface, enabling analysis, filtering, and grouping of key metrics and performance indicators, enabling the centralization of information for tracking progress, identifying trends, and evaluating performance benchmarks.

- Wrote entirety of frontend and backend infrastructure, including core react-grid-layout dashboard and all related components
- Designed and implemented 9 widget types (e.g., List, Calendar, Visualization, etc.) to address diverse user needs.
- Wrote 73 Django SQL query methods spanning 25 datasets for complex column, date, and sum grouping for visualizations.
- Created portable D3-based visualization components (Bar, Pie, Line, and Map) utilized in dashboards and other Quorum tools such as search visualizations and official district maps.
- Engineered a novel GraphQL-like data shaping system for efficient data storage, serialization, and caching.
- Identified and resolved critical bugs in Chromium URI parsing and react-grid-layout to enhance dashboard performance.

Transcripts	2019
Position	Frontend Lead
Team	2 engineers, 2 engineering managers, CTO/co-founder
Technologies	Python, Django, JavaScript, React, PostgreSQL, AWS S3/RDS

Summary Developed the frontend for the Committee and Presidential Transcripts feature, enabling users to read, search, download, and visualize transcripts of congressional hearings and presidential speeches within an hour of their completion.

- Implemented bidirectional synchronization between video and individual transcript statements, including auto-scrolling and highlighting of relevant transcript statements during both video playback & manual scrubbing and updating the video to relevant timestamp when a specific transcript statement is clicked
- Designed and built a committee profile overview page which included rewriting a non-performant API endpoint using a novel Django QueryMethod to support arbitrary ordering of rows by their column's related enum attributes, significantly improving performance and scalability by returning all ordered rows at once instead of 4 paginated rows.

Bulk Actions	2019
Position	Technical Lead
Team	1 engineer, 1 engineering manager, CTO/co-founder
Technologies	Python, Django, SQL, JavaScript, React, PostgreSQL

Summary Designed and implemented a full-stack Bulk Action feature enabling users to select, update, or delete up to 1 million rows at once across 17 datasets and 13 action types. Researched and wrote optimized batch creates/updates using Django ORM and raw SQL, culminating in over a dozen highly optimized $O(1)$ SQL QueryMethods for scalable performance. Delivered 13 extensively tested bulk actions, supporting high-efficiency client data processing and mutation with no reported bugs since launch in 2018. Enhanced user productivity by enabling seamless, large-scale updates in a single operation.

International	2018
Position	Full-stack
Team	2 engineers, 1 engineering manager, CTO/co-founder
Technologies	Python, Django, SQL, JavaScript, React, PostgreSQL

Summary Scaled Quorum product to new continents and dozens of new countries by writing the frontend for the international search feature, allowing clients to gather intelligence, identify trends, and communicate with key international stakeholders. Modified most search datasets to support filtering and visualization of new international data.

Regulations	2018
Position	Full-stack
Team	6 engineers, 1 engineering manager, CTO/co-founder
Technologies	Python, Django, SQL, JavaScript, React, PostgreSQL

Summary Wrote the frontend search and profile for the regulations feature, which gives clients access to comprehensive state and federal regulatory data and tracking tools. My work included dozens of filters and QueryMethods, support for alerts, lists, and downloads, and ability to set stance, priorities, and issues. I rewrote the existing Bill timeline to support Regulations and other arbitrary datasets in the future.

Search	2018
Position	Full-stack
Team	2 engineers, 1 engineering manager, CTO/co-founder
Technologies	Python, Django, SQL, JavaScript, React, HTML, PostgreSQL, PostGIS

Summary Wrote and expanded functionality for search feature, the default homepage for all Quorum clients. Wrote full-stack infrastructure for 30+ datasets with interactive informational cards, hundreds of new filters, a dozen new visualizations supported accross all datasets, and csv downloads. Worked on shared infrastructure powering search on the desktop React and mobile React Native applications. Due to a unique constraint, I wrote a library which converts raw HTML into React Elements by recursively processing DOM nodes and converting them into React elements.

PERSONAL PROJECTS

eCFR Analyzer | February 10th, 2025
Technologies | Next.js (bun), TypeScript, Python (uv), Django, PostgreSQL, SQL, Railway, Vercel
Summary Wrote an Electronic Code of Federal Regulations analyzer which scrapes the full eCFR, matches agencies with their title subset(s), computes and visualizes agency word counts, displays full title texts, and diffs full title texts from 2010–2025.

bob-sql | 2025
Technologies | Golang, PostgreSQL, SQLite, SQL
Summary Extended the bob query builder to support Django ORM syntax and features

3x4 Font | November 2017
Technologies | bitfontmaker2, FontForge
Summary Designed a bitmap font in the smallest size—3x4 uppercase and 3x3 lowercase—which remains legible when read.

wiki | April 2017
Technologies | Golang, SQLite, JavaScript, HTML, CSS, SQL
Summary Wrote a simple Golang wiki platform—whose design and functionality are based on Ward Cunningham's original 1995 WikiWikiWeb C2 wiki—in order to teach myself the basics of Golang. In July 2017, I ported James Ashton's uncompface X-Face decoder from C to Golang and wrote a picons parser for the wiki comment system.

blog | March 2017
Technologies | Golang, SQLite, JavaScript, HTML, CSS, SQL
Summary Wrote a simple Golang blog platform—whose design and functionality are based on Noah Grey's original Greymatter open-source blogging CMS, originally written in November 2000 and inspiring MovableType, LiveJournal, and WordPress—in order to teach myself the basics of Golang.

Weather Maps | September 2016
Technologies | HTML, CSS, Internet Archive, GIMP
Summary Researched, mapped, and archived the entirety of AccuWeather and Weather Underground's live updating weather map bitmaps through web scraping and the Internet Archive near the end of my internship at MIT LL.

MessageFaces | March 2016
Technologies | JavaScript, XUL, XPCOM, JSM, HTML, CSS
Summary Wrote a Thunderbird/SeaMonkey add-on to display 'face'—Face, X-Face, picon, gravatar, and address book—images from email and newsgroup message headers. Based on Jens Bannmann's MessageFaces and spiritual successor to Rob Pike and Dave Presotto's vismon, Chris Liebman's xfaces, Rich Burridge's faces, Steve Kinzler's picons, and NeXTMail.

Classic Macintosh Fonts | March 2016
Technologies | FontForge, ResForge, Rezilla, Mini vMac, SheepShaver, Font/DA Mover, Classic Mac OS
Summary Discovered a novel method to losslessly convert all of Susan Kare's original Macintosh fonts from their Classic Mac OS resource forks to macOS (OS X) data forks. Received positive feedback from both Susan Kare and Chris Espinosa.

Platinum | January 2016
Technologies | ThemeEngine, GIMP, cartool, Asset Catalog Tinkerer, acextract, iOS Asset Extractor, Crunch
Summary Ported the Classic Mac OS platinum theme to Mac OS X 10.6, 10.10, and 10.11.

Orthodox | Winter 2015
Technologies | GIMP, Mozilla, archive.org
Summary Ported Netscape's xpfe theme and old addon manager to SeaMonkey (formerly Mozilla Suite) on macOS.

Playing Cards | Fall 2015
Technologies | GIMP, Windows 3.0, archive.org
Summary Created a Skat and Doppelkopf playing card set based on Susan Kare's Windows 3.0 Solitaire playing cards from 1988 and the International Skat Server (ISS) skat icons.

Poker Squares | March 2015
Technologies | Java, Android SDK, Android Studio, Eclipse, GIMP
Summary Designed and wrote an Android application to play Poker Squares—using an expectimax Native Abstract Reinforcement Learning (NARL) opponent AI player created by my academic advisor Dr. Todd W. Neller—as side project for the Gettysburg club chapter of the Association for Computing Machinery (ACM). Published to the Google Play Store.

Red Light Race | March 2015
Technologies | Java, Android SDK, Eclipse
Summary Designed and wrote an Android application to play Red Light Race—using an Artificial Neural Network (ANN) opponent AI player created by my academic advisor Dr. Todd W. Neller and Marcin Malec ('13)—for my freshman year cs112 course at Gettysburg College.

OPEN SOURCE

Apple
- `rdar://FB17090691`: 75hz external display flickering on webpage due to GPU Dithering (youtube)
- `rdar://FB9064707`: "Enabling USB Audio and MIDI for iOS" developer page 404s
- `rdar://FB5394602`: Reproducible kernel panic: "program_swap: Async Swap request landing on unsupported platform. Force panic" when using Sublime Text with Vertical Sync disabled in Quartz Debug (youtube)
- `rdar://FB11515875`: System Preferences icon placeholders do not match final rendered icons using non-retina external 1920×1080 monitor
- `rdar://FB8901170`: Terminal.app Preferences ⇒ Text ⇒ Antialias Text option not working on Big Sur
- `rdar://FB9064720`: Settings ⇒ Keyboards ⇒ Add New Keyboard bug
- `rdar://FB13695716`: Catastrophic CPU usage during Night Shift transition period 46127636
- `rdar://FB13693393`: Finder Preferences "Sidebar" menu renders off-screen at 1280x800 on 13-inch Macbook Pro

Chrome
- `Bug 40764064`: Chromium ⇒ Blink ⇒ Network: data: URLs do not strip newlines when parsed

CNAV
- Discovered two bugs in the Gettysburg Campus Navigation Portal (CNAV) electronic record keeping system. The first bug allowed any user to delete any other user account from a CNAV 'group' (mailing list). The second bug leaked all internal account images to the web. Received a cash award.

Firefox
- `Bug 1708064`: Core ⇒ DOM: Core & HTML: Automatic Semicolon Insertion in <iframe> src with multi-line <script> working in Chrome but not Firefox/Safari

MacFUSE
- `https://github.com/macfuse/macfuse/issues/858`: Monterey - System extension

OpenVPN
- `https://github.com/OpenVPN/openvpn3/issues/310`: macOS needs admin/sudo for ovpncli and cannot run ovpncliagent with ovpnagent from /Applications/OpenVPN Connect.app due to OVPNAGENT_NAME_STRING discrepancy

react-datepicker
- `https://github.com/Hacker0x01/react-datepicker/issues/2930`: Current day highlighted across all months

react-grid-layout
- `https://github.com/react-grid-layout/react-grid-layout/pull/892`: fix: dynamic isDraggable and isResizable remount

Sublime Text
- `https://github.com/sublimehq/sublime_text/issues/6341`: Reproducible kernel panic/restart: "program_swap: Async Swap request landing on unsupported platform. Force panic"
- `https://github.com/sublimehq/sublime_text/issues/5294`: macOS Monterey [v12.2.1 (21D62)] experiencing frequent lags and mouse loading while using

Summernote
- `https://github.com/summernote/summernote/issues/702`: New line adds p tag, ability to change it?

Svelte
- `https://github.com/sveltejs/svelte/issues/6582`: namespaceURI of math tag is wrong

XQuartz
- macOS Big Sur 11.0.1 XQuartz.app 2.7.11 vsync bug (youtube)

LEADERSHIP

The Cairo Board of Directors Washington, DC

2024–today	Vice President
2023–today	Secretary

Co-led a board transformation for The Cairo (1894), a DC building with a $1M+ annual budget. Developed financial management plan by auditing finances, optimizing expenditures, streamlining staff structure, enhancing vendor accountability, and developing a proactive capital improvement strategy—all while maintaining fee increases below 5%.

Partnered with a horticulturist from Harvard's Dumbarton Oaks Gardens and a landscape architect from Oehme, van Sweden & Associates to design and install an heirloom perennial pollinator garden.

The Cairo is listed on the DC Inventory of Historic Sites (1990) and the National Register of Historic Places (1994).

Eisenhower Institute Gettysburg, PA

2016–2017	Undergraduate Fellow

Served as an Eisenhower Institute Undergraduate Fellow (EIUF), a selective program designed to cultivate political leadership skills and empower a select group of eight Gettysburg College seniors the chance to expand their knowledge and understanding of society's most challenging public policy issues. Our research focus was refugee and asylee policy and advised by Dr. Shirley Anne Warshaw, Harold G. Evans Chair of Eisenhower Leadership Studies. Featured on the Gettysburg College homepage.

- Researched and wrote the 'New Technologies' section for our State Department Diplomacy Lab White Paper on Health Care Records in Mixed-Migration settings and presented findings to the *Office of Economic Security, International Health and Biodefense Population, Refugees, and Migration* at the State Department.
- Traveled to the United Nations in New York, conducted in person meetings with experts in Europe, visited resettled Syrian refugees in Pennsylvania, and hosted dinners with experts at Gettysburg.
- Co-organized and moderated two panels on current issues in public policy, national security, civics, and refugee rights.
- Presented research to the Eisenhower Institute National Advisory Council (EINAC), whose members include Susan Eisenhower (granddaughter of President Dwight D. Eisenhower), Gettysburg College President Janet Morgan Riggs, 9/11 Commission member Fred Fielding, and other distinguished alumni and donors.

GOVERNANCE

Gettysburg Association for Computing Machinery (ACM) chapter

2016–2017	Vice President
2015–2016	Secretary
2015–2017	Student Senate Representative

Gettysburg College Independents

2016–2017	Treasurer

Organized and moderated three political debates between the College Democrats and College Republicans.

Gettysburg College Political Philosophy Collective

2016–2017	Co-leader
2016–2017	Student Senate Representative

Organized debates, held events & rallies, distributed zines, and participated in campus political activism projects.