C. Carlo Fazioli

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I am an applied mathematician and software engineering generalist with experience in cloud computing, AI, and DevOps. I am a lifelong learner with far-ranging interests, confident in my ability to rapidly spin up in new environments, as well as deep-dive into the gritty details. In 2021, I made it onto the Advent Of Code global leaderboard!

Current Position

2018 – Present **Software Engineer**, *Group W, Inc.*, Vienna VA.

Contributor to nearly all aspects of a 2021 MORS Barchi-prize-winning, multi-year, multimillion-dollar DARPA contract to develop an AI wargaming application deployed to a 11-node, 1,240-CPU cluster. After the award, migrated the application from the privately controlled cluster to MS Azure.

- Cloud-native Architecture:
  - Architected microservices, their interfaces, and their implementations as Kubernetes objects, including all system Deployments, Services, Jobs, PVCs, ConfigMaps, NetworkPolicies, Secrets, RoleBindings, and ServiceAccounts
  - Managed Kubernetes objects in a Helm Chart for flexible deployment to multiple pipeline environments and client systems
  - Defined all cloud infrastructure requirements using Azure ARM Templates, including Virtual Networks, subnets, DNS config, ACR, AKS, Azure RoleDefinitions and Assignments
  - Configured application reverse proxy with NGINX, and Certbot for automated Let's Encrypt SSL certificate procurement
- Agile Development:
  - Acted as unofficial Agile Team Leader for a team of 10, managing issues, branching/merging strategies, package releases, and CICD pipelines
  - Assembled a robust CICD Pipeline using GitLab Runners deployed as VMs in Azure, as well as on-prem machines, that: de/commissions Azure infrastructure as needed; assures code quality with style guides, unit tests, and integration tests; builds and tags Docker images; installs/updates the application
  - Facilitated uniform development workflows using a shared, pre-built Docker image
- Software Engineering:
  - Designed AI algorithms under senior mathematician's guidance, using reinforcement learning, feature engineering, TensorFlow neural networks, and Monte Carlo Tree Search
  - Researched data analysis techniques, and implemented a from-scratch K-medoids algorithm to cluster and classify wargame state data
  - Authored application source code in python, including a REST server with Django, database interfaces with PyMongo, and custom libraries
  - Detailed significant portions of the project in technical documentation for ingestion by fellow developers, client developers, and project leadership, in the form of wiki pages, READMEs, code comments, prose documents, and GitLab comment threads
  - Constructed an application REST API and SDK to support frontend Vue developers as well as external collaborators, with artifacts that include full technical documentation, abstract base classes and derived class examples, and Jupyter notebooks that illustrate common API use cases.
- System Administration:
  - Controlled application access using Azure Active Directory for users, Vouch Proxy for OAuth2, and security principals for pipeline actions
  - Administrated multiple MongoDB instances (each 10GB-1TB) from the mongo shell, and with PyMongo, including automated backup/restore, manual intervention when necessary, and query design

Education

2005 – 2009 **Ph.D. Mathematics**, *University of Illinois at Chicago*, Chicago IL.

2000 – 2004 **B.S. Mathematics**, *University of San Francisco*, San Francisco CA.

Previous Positions

2016 – 2018 **Econometric Modeler**, *International Monetary Fund*, Washington DC.

Collaborated with IMF economists on global economic model development; researched, designed, and implemented algorithms for use by IMF staff; pursued exploratory research into technology solutions for IMF institutional needs; addressed technical needs of individual IMF staff.

2013 – 2016 **Assistant Teaching Professor**, *Dept. of Mathematics*, Drexel University, Philadelphia, PA.

Developed course and lab materials; lectured, graded exams, monitored students' use of online resources, assigned final grades; assisted students as needed outside of class or in office hours; directed teaching assistants.

2011 – 2013 **Postdoctoral Research Associate**, *Dept. of Mathematical Sciences*, New Jersey Inst. of Tech., Newark, NJ.

Researched, designed, and coded novel algorithms for use in fluid dynamics simulations; briefed research supervisor; presented findings to collaborators and conference attendees.

Hobbies and Interests

- Solving the NYT crossword puzzle daily: My longest streak is 225 days!
- Cycling: I spent 6 weeks traveling 1,451 miles by bicycle in 2013.
- Mindfullness: frequent meditator and yoga practicioner.
- Cloud computing: professional experience with MS Azure and AWS; personal website hosted on GCP.
- Science fiction lit/TV/movies: I'm a fan of classics like Phil K. Dick, contemporaries like Neal Stephenson and Rian Hughes, and the '80s and '90s campiness of Paul Verhoeven.
- Coding competitions: I am Advent of Code supporter, proudly listed on the global leaderboard! Also enjoy participating in entry-level CTFs.
- Quantum computing: Occasional conference attendee, and collaborator of Dr. Denny Dahl (D-Wave Systems, Cold Quanta).
- Bug bountying and cybersecurity: Avid listener of Risky Biz and Darknet Diaries podcasts.
- MCU and embedded systems: Arduino and AVR chip tinerker, currently working on a sleep monitor to induce lucid dreaming.