Jacob Sanford

Senior Technical Operations Manager, UNB Libraries

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PROFILE

Fifteen years in technical operations, now responsible for the frameworks, delivery pipelines, and development team behind UNB Libraries' 150+ services. Designs the library's AI architecture and helps shape its governance. Former computational physical chemistry researcher and university instructor; teaching remains central to mentoring staff and to explaining technical subjects to decision-makers.

AREAS OF EXPERTISE

Leadership	Supervising and prioritizing a developer team · Mentoring and hands-on technical training · Executive summaries and strategy documents for policy decisions
Operations	Reliability and security of 150+ services · Infrastructure growth and sustainability strategy · Requirements, feasibility, and cost estimates
AI and governance	AI architecture for an institutional library · Turning policy into technical controls through a shared LLM gateway · AI guidance and emerging technology committees
Platform	On-premises Kubernetes and containers · CI/CD and standardized developer workflow (Dockworker, 75+ projects) · Large-scale digitization and ingest workflows · Developer experience

EXPERIENCE

Senior Technical Operations Manager Jun 2017 – present

UNB Libraries, Fredericton, New Brunswick

- Designed the architecture of a shared LLM gateway and led its implementation; governance policy applies to every library application that uses an LLM, from one configuration.
- Designed Dockworker, one development workflow for every project regardless of framework. It underpins more than 75 projects.
- Designs information systems and workflows with the Manager of Library Systems and Library Administration, setting strategy for the scalability and sustainability of the Libraries' IT.
- Supervises the work of a group of developers, assigning tasks and priorities with the Manager of the Systems Group; selects the processes and tools of a common development environment, and provides or organizes training.
- Gathers requirements with stakeholders and assesses feasibility, working with the project manager; recommends technologies and provides cost estimates for development and maintenance.
- Evaluates workflows, hardware, software, and connectivity against the Libraries' evolving needs, and recommends changes that improve performance, security, and the effective use of resources.

EXPERIENCE *(contd.)*

- Mentors team members, writes executive summaries and strategy documents to inform policy decisions, leads seminars on implementation and systems thinking, and provides practical training on infrastructure and workflows.

Infrastructure and Solutions Architect Dec 2013 – Jun 2017
UNB Libraries, Fredericton, New Brunswick

- Led the 2016 move of grant-funded and one-off applications into version control and containers, orchestrated on an on-premises Kubernetes cluster that has since gone through multiple in-place upgrades and now underpins most library services.
- Set the development process for custom web applications and managed the developers who built them.
- Monitored the IT infrastructure for performance and security, and recommended to Library Administration a strategy for infrastructure growth and sustainability that remained consistent with the university's Integrated Technology Services (ITS) standards.
- Met with clients to determine project requirements and feasibility.

Web Developer and Senior Developer Feb 2010 – Nov 2013
UNB Libraries, Fredericton, New Brunswick

Doctoral Researcher and Instructor 2008 – 2010
University of New Brunswick, Department of Chemistry, Fredericton, New Brunswick

Research in computational physical chemistry with Prof. Saba M. Mattar while writing the doctoral thesis. Course instructor for CHEM 3621 Electrochemistry and Chemical Kinetics.

Founder 2004 – present
Elemental CodeWorks, Fredericton, New Brunswick

Independent consultancy building accessible, human-centred web applications and LLM-based interfaces for clients ranging from corporations and universities to community groups, including projects that support Indigenous language and culture revitalization.

EDUCATION

Ph.D., Computational physical chemistry 2010
University of New Brunswick

Thesis: *Calculation of Static and Dynamic Effects on the Magnetic Tensors of Several Benchmark Radicals*. Supervisor: Prof. Saba M. Mattar.

PROJECTS

UNB Libraries

Shared LLM gateway

Designed the architecture and led the implementation of a shared gateway API through which UNB Libraries' applications access LLMs. The gateway routes requests to local or external providers, manages permissions centrally, and enforces governance policies, so new AI policy decisions apply across every application with a single configuration change.

PROJECTS *(contd.)*

Shared service platform Since 2016

Led the 2016 move of disparate grant-funded systems and one-off builds, often patched directly on live servers, into version control and containers orchestrated on an on-premises Kubernetes cluster. The cluster has supported library services since, through multiple in-place upgrades from Kubernetes 1.9 to 1.37, and now underpins most of them.

Dockworker

Designed and maintains Dockworker, a single technical entry point and consistent workflow for developers, site builders, and operations engineers, regardless of application framework. It replaced per-project setup with the same commands for every project, so a developer can start any of the 75+ projects it underpins and ship a change without first learning its whole stack.

New Brunswick Historical Newspapers Project Since 2019

Designed the application, infrastructure, and image ingest workflows for a unified interface to UNB Libraries' current and historical newspaper collections: nearly 50,000 issues and 325,000 pages from New Brunswick and around the world, digitized from microfilm and print, OCR-indexed, and available as page images and full text. Maintained and evolved since 2019, including keeping the application available under sustained automated crawling, the subject of a 2026 presentation.

UNB Scholar Since 2015

Designed the infrastructure and workflows for UNB Libraries' institutional repository, which preserves and provides open access to nearly 11,000 works by the UNB community. Responsible for the service since 2015, including three major platform upgrades; currently leading the evaluation of DSpace 11 as its next platform.

Peskotomuhkati-Wolastoqey Language Portal

Designed the infrastructure and workflows for a dictionary of the Peskotomuhkati-Wolastoqey (Passamaquoddy-Maliseet) language with audio recordings, example phrases, and video, including a speaker audio recording interface, media delivery, and search for a non-English orthography. Developed in partnership with two speaker communities in Canada and the United States.

Personal interest

docker-rtmp-multistream

Streams live video to YouTube, Twitch, and other platforms at the same time.

route-53-dyndns

Dynamic DNS through the Amazon Route 53 API: keeps an A record pointed at a changing IP address.

docker-mariadb-snapshot

Scheduled MariaDB and MySQL database snapshots, with automated rotation and retention.

scavnet

A tool for telling stories: simulates radio transmissions of audio vignettes, spinning out stories over variable timelines.

SERVICE

Emerging Technologies Team, UNB Libraries. Founding member. 2024 – present
AI Guidance and Implementation Committee, UNB Libraries. Founding member. 2024 – present
Review Committee for the Director of Scholarly Technologies, UNB Libraries. Member. 2019

TEACHING

Instructor 2008
University of New Brunswick, Department of Chemistry
CHEM 3621 Electrochemistry and Chemical Kinetics

Co-instructor 2007
University of New Brunswick, Department of Chemistry
CHEM 3621 Electrochemistry and Chemical Kinetics

Teaching Assistant 2004 – 2008
University of New Brunswick, Department of Chemistry
Laboratory courses, during doctoral studies.

- *General chemistry*: CHEM 1006/1017 General Chemistry Laboratory I/II
- *Analytical chemistry*: CHEM 2136/3137 Analytical Chemistry Laboratory I/II
- *Physical chemistry*: CHEM 3637 Physical Chemistry Laboratory I
- *Chemical engineering*: CHEM 2897 Organic Chemistry Laboratory for Chemical Engineers

JOURNAL PUBLICATIONS

Mattar, S. M., & **Sanford, J.** (2009). Effects of restricted rotations and dynamic averaging on the calculated isotropic hyperfine coupling constants of the *bis*-dimethyl and *bis*-di(trifluoromethyl) nitroxide radicals. *The Journal of Physical Chemistry A*, *113*(42), 11435–11442. https://doi.org/10.1021/jp9076646

Mattar, S. M., & **Sanford, J.** (2008). Role of the geometry, restricted rotations and solvents on the computed 2,2′-diphenyl-1-picrylhydrazyl hyperfine tensors. *The Journal of Physical Chemistry A*, *112*(45), 11349–11354. https://doi.org/10.1021/jp806919k

Mattar, S. M., & **Sanford, J.** (2006). Effects of restricted rotations and solvents on the calculated 2,2′-diphenyl-1-picrylhydrazyl *g* tensors. *Chemical Physics Letters*, *425*(1–3), 148–153. https://doi.org/10.1016/j.cplett.2006.04.110

Mattar, S. M., **Sanford, J.**, & Goodfellow, A. D. (2006). *g* tensor computation of the thiopheno-1,3,2-dithiazolyl radical by the coupled-perturbed Kohn–Sham hybrid density functional method. *Chemical Physics Letters*, *418*(1–3), 30–35. https://doi.org/10.1016/j.cplett.2005.10.095

PRESENTATIONS

Keeping the Web Open Under Automated Load	Oct 2026
State of AI Development Tools: Working Deliberately in 2026	Jul 2026
State of AI Development Tools: Update and Practical Workflows in 2025	Apr 2025
Using Retrieval-Augmented Generation (RAG) to Improve Library Interfaces	Jan 2024
Case Study: Practical Applications of Generative AI in Academic Libraries	Sep 2023
Generative AI and Developer Productivity: Capabilities, Integration, and Risks	Jul 2023
The Million Image Mountain: Challenges Faced Post-Capture in Bulk Digitization	Jun 2018
Declaring Bankruptcy on Technical Debt. With Brian Cassidy	Oct 2016

CONFERENCES ATTENDED

QCon San Francisco. Volunteer Staff.	2023, 2024
axe-con (online)	2023, 2024
DrupalCon	2013–2020
Atlantic Provinces Library Association (APLA) conference. Presenter.	2018
Access, library technology conference. Presenter.	2016

VOLUNTEERING

Civilian Volunteer 2025 – present
3059 Royal Canadian Army Cadet Corps

Volunteer Staff and Workshop Facilitator 2023 – 2024
QCon San Francisco

Volunteer conference staff in 2023 and 2024. Each year, facilitated and assisted with full-day, hands-on workshops:

- *Asynchronous Architecture Patterns To Scale ML and Other High Latency Workloads on Kubernetes*. Jérôme Petazzoni. Full day, 22 November 2024.
- *Generative AI Engineering: Composable Building Blocks, Architectural Blueprints, and Enterprise-Grade Readiness*. Daniel Whitenack. Full day, 21 November 2024.
- *Building and Productionizing LLM-Powered Applications*. Adam Breindel and Kamil Kaczmarek. Full day, 6 October 2023.
- *AI Engineering: Building Generative AI Apps That Overcome Enterprise Barriers and Create Real Value*. Daniel Whitenack. Full day, 5 October 2023.