Steve Sampson

Electrical and Computer Engineer

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PROFILE

Software engineer with industry experience in all stages of the software development life cycle (SDLC). From requirements gathering and design to development, testing, and delivery, I have played an integral role in all stages of the process. My specialty is in developing applications for low-power, resource constrained environments which has helped me learn to write better code, always considering performance and reliability.

I have excellent communication skills, honed over ten years working in sales and management. Today, as a developer, these skills help me to articulate complex ideas clearly to team members and project stakeholders. Along with my 'can do' attitude and hunger to be the best I can be, my unique combination of technical and soft skills has always helped me find success early on in any new role.

TECHNICAL SKILLS

Programming Languages

- Rust
- Modern C++ (17 and 20)
- Java
- C
- JavaScript (ES6 and TypeScript)
- Python

Operating Systems

- Debian (Ubuntu)
- Manjaro (Arch Linux)
- CentOS
- RHEL
- Mac OS X
- Microsoft Windows

IDEs and Dev Tools

- IntelliJ (GoLand, CLion)
- VS Code
- Atmel Studio
- Eclipse
- Conan & Artifactory
- SonarQube
- K9S

Other Tools / Keywords

- Protocol Buffers
- AWS and Azure Cloud
- MQTT and Kafka
- Docker
- Kubernetes (and Helm)
- Bash (zsh)

Engineering Experience

Sampson Technologies Inc.

Owner and Software Engineer

Halifax, NS. July 2021 – Present

- Provide consulting services creating and maintaining scalable, fault-tolerant distributed systems for a securities exchange launching a new bank:
  - Created a balance syncing service capable of processing over 1,000 transaction per second to keep client balances synchronized between the exchange trading platform and the bank.
  - Implemented payment engine for handling various payment types.
  - Integrated with Signet network to facilitate 24/7 real-time processing of payments to settle funds between company entities (required to accurately reflect liabilities to clients).
  - Solved various idempotency issues making guarantees that operations that affect client balances can never be performed more than once.
  - Define database schemas for persisting data in accordance with regulatory requirements in a way to maintain client security.
  - Create deployment strategies to ensure services can scale automatically during periods of increased load and tear down compute resources automatically during periods of low activity.
  - Attend many security training sessions as a “Security Champion” for the company and review infrastructure and code for any vulnerabilities, taking appropriate action to remedy issues when found.

Byos Inc.

Director of Engineering

Halifax, NS. April 2020 – July 2021

- Redesigned Microgateway device software from the ground up in C++ using a micro-service architecture to facilitate rapid development and continuous delivery:
  - Implemented solution in modern C++ (starting with C++-17 and later moving to C++-20).
  - Developed many in-house libraries to interact with the OS in order to control everything from Netfilter firewall rules to WPA Supplicant to VPN connections programmatically (achieved completion of all services with zero system calls).
  - Developed all software with appropriate unit test coverage and benchmarks for critical algorithms allowing us to quickly identify areas for improvement and develop new features with confidence.
  - The new software was able to lower hardware footprint by over 10x, allowing us to target lower power (and lower cost) hardware, increasing profit on hardware by over 300%.

- Completely redesigned Byos' cloud infrastructure from the ground up as project lead on a $1M NRC funded project to reduce hardware footprint, expand feature set and enable integrations:
  - Defined service boundaries, database schemas, APIs, and protocol buffer messages.
  - Implemented solution around an event-driven architecture (EDA) using MQTT as the protocol of choice (EMQX broker in a Kubernetes cluster).
  - Designed PoC event-driven micro-service implementations in Golang, Rust, and C++ to provide to development teams as examples.
  - Designed system using a multi-tenant approach, dramatically reducing infrastructure costs by eliminating the need to have a unique deployment per customer.
  - Identified areas where performance improvements could be made if necessary (e.g: using an in-memory cache for read heavy operations or increasing the number of pods in a replica set).

- Introduced DevOps to the company, owning the department entirely for one year before hiring our first dedicated DevOps engineer in May of 2021:
  - Created and version controlled dockerized build agents to connect to our VCS and build on specific triggers.
  - Created development and release pipelines for all services and libraries including a cross-compilation stage for all target architectures (x86_64, armv7hf, aarch64).
  - Created virtualized environments for all supported architectures and ran unit tests and benchmarks on all of them using a combination of Docker, chroot, QEMU and binfmt.

- Owned the complete device runtime environment including U-Boot, Kernel (5.4.3) and Userland (Debian 10 – Stretch):
  - Forked repos for each of the above-mentioned components to our own private cloud and performed suitable modifications to the source code, increasing security, reducing size, and improving performance of all components.
  - Created utility scripts to automate the builds of each.
  - Monitored upstream for patches, paying close attention to security vulnerabilities) and patched our forks as Necessary.
  - Created automated development and release pipelines (with artifact storage) for each.

• Guided the company through several iterations of Gen: 1 hardware, from failing prototype to successful mass Production:

  • Performed detailed schematic review and hardware troubleshooting to identify root cause of hardware Issues.
  • Designed wire-mods to prove the problem (and the solution) prior to running more prototypes.
  • Engaged companies in design services to modify our existing design and run a small batch to validate.
  • Evaluated several contract manufacturers, settling on one based in California and successfully built over a thousand Gen: 1 devices.

• Led the Gen: 2 hardware redesign cutting size and power consumption in half while reducing cost by a factor of three:

  • Evaluated various hardware platforms including SoMs, SBCs, and microprocessors, porting Byos' software to each and analyzing the viability of each option.
  • Settled on a platform and secured a delivery pipeline with the manufacturer.
  • Created detailed Scope of Work and Feature Requirement documents for two carrier boards, satisfying two unique use-cases.
  • Managed external contractors to execute on design providing guidance where necessary.
  • Completed Gen: 2 hardware design and prototyping for under $50,000 (20% of the cost of the Gen: 1 platform).

MetOcean Telematics

Systems Engineer

Halifax, NS. April 2018 – July 2020

• Designed and implemented core functionality for the Iridium branded Edge Pro (an intelligent telematics platform) as part of a two-year, multi-million dollar ODM engagement between MetOcean and Iridium:

  • Developed device firmware in C ensuring basic operation with all peripherals (I2C sensors, QSPI flash, PSRAM, GNSS positioning module, SBD satellite modem, configurable I/Os, and more) with over 95% Embunit test coverage.
  • Ported required functionality from libc to bare metal in order to support several third-party libraries.
  • Developed the platform's Java kernel in coordination with contract engineers from MicroEJ France, tying it in with our underlying implementation of FreeRTOS • Implemented dynamic unloading / loading of JARs facilitating installation as part of a signed update package that could be delivered over the air via SBD messaging or by USB.
  • Designed the Java <-> C interface and implemented the low-level connection between Java calls and native C calls. We called this the 'SNI', or 'Simple Native Interface'.
  • Designed and implemented a suite of 'core libraries' and 'core services', collectively the Java Core, to ensure robust base functionality and a device that could satisfy most use-cases without the need for VAR programming.
  • Provided support to other Java developers primarily in identifying performance bottlenecks and designing improved solutions.

• Provided support and training to Iridium stakeholders and engineers throughout the project:

  • Represented MetOcean by delivering several Keynote presentations highlighting progress and capabilities of Edge Pro.
  • Recorded a series of instructional videos (screen casts) that were delivered to Iridium with each release.
  • Traveled outside of Canada providing technical training to Iridium VPs, GMs and developers.

Spiri Robotics

Software Engineer / Systems Administrator

Halifax, NS. July 2018 – April 2020 (PART TIME)

- Created a web-based simulator for "Le Concours Envol", a robot programming competition for high school students in Montreal:
  - Created a containerized simulator for the company's robot using Docker, ROS (Robot Operating System), OpenCV, WebGL, and Shellinabox.
  - Developed a node.js backend that would handle contestant registration and authentication, allowing students to spin up a private simulator instance on-demand.
  - Connected the node.js backend to AWS using an appropriately provisioned IAM user to deploy a Fargate launch instance of the container stored in ECR and return the instance information to the frontend for display to the student.
  - Created a job to tear down simulator instances that had been inactive for a predetermined period of time.

- Configured and managed internal company resources:
  - Set up self-hosted instances of GitLab, OwnCloud, Mayan EDMS and Bookstack with cron jobs to create local and deduplicated offsite backups. Offsite backups were client-side encrypted and stored in Amazon S3.
  - Configured VirtualBox to run as a systemd service and run various Windows VMs for mechanical and finance teams.
  - Set up and LDAP authentication server and configured OpenVPN to allow connections from LDAP users within the organization.