

# Rizo Isrof

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## Summary

I am a computer scientist and software engineer specialized in design and development of large-scale systems for data processing. My passion lies in applying theoretical research ideas to real world problems to generate value for people and businesses. I have extensive experience in software architecture, functional programming, databases and operating systems. I am also a polyglot programmer with practical knowledge of OCaml, D, C/C++, Haskell, Clojure, Scala, Python, R, SQL, among other languages. I am naturally curious, entrepreneurial and tenacious with a focused discipline in learning while also enjoying teaching and helping others.

## Experience

### Senior Data Science Engineer at Movvo

*Jan 2016–Present*

Was part of the Research & Development department and worked as a technical lead in numerous analytics-related projects in which I:

- Designed, implemented and tested a distributed computation workflow for efficient computation of *Key Performance Indicators* which are the core component of the Movvo's business.
- Contributed to the modelling and implementation of a *PostgreSQL* database used as a backend for the analytics API and dashboard.
- Implemented a data storage system in *OCaml* that worked as cache service for a *Cassandra* cluster and then completely replaced it handling dozens of terabytes of raw data.
- Trained the members of my team on advanced functional programming concepts, algorithms design and analysis, system programming, distributed systems and *Unix* platforms.
- Produced technical documentation and specification for all the *KPIs* within the *Analytics Platform*.
- Worked closely with the executive and management teams to define the future releases of the Movvo's products having a key participation in the all the technical decisions.

### Head of Data Analysis at Movvo

*Dec 2014–Jan 2016*

Responding to the growing needs of the company I led the creation and managed the Data Analysis department. I managed 10 projects within the team composed of very talented computer scientist and developers with whom I built flexible data oriented products which were successfully delivered to the customers. During this period I:

- Designed and implemented a scalable system for data analysis. Used *Spark* as a computation engine with *Cassandra* connector and *Clojure* interface to process raw sensor data.
- Introduced functional programming in the company by showing practical benefits of immutability, composability and type safety.
- Improved the overall performance of the *Analytics Platform* by the average factor of 20x by reimplementing the metrics engine in *OCaml* drastically reducing the hardware resources and helping the delivery team to meet the tight deadlines imposed by some customers.
- Instituted *Extreme Programming* agile methodology within the Data Analysis team promoting test-driven development, code review and pair programming.
- Provided support and maintenance for the product batch pipelines working closely with the project managers and the customers.

I joined a hardware startup with three engineers where I made core contributions to the *Minimum Viable Product* which allowed the company to grow and attract investment. I participated in the development of all the technology layers:

- Studied the behaviour of RF signal and implemented an indoor positioning system that became a key component of the company's business for dozens of clients. Used R and Python for experiments and Python/Numpy for the final implementation.
- Worked on a firmware for real-time WiFi scanning and processing that was deployed on thousands of sensor nodes across hundreds of locations. Used OpenWRT to build the firmware, the services were implemented in C and the communication was done over the MQTT protocol.
- Started the creation of a distributed infrastructure based on CoreOS and Docker for service management and monitoring. The services were implemented in Python, Go and D.

**Research Assistant** at LIACC (Artificial Intelligence and Computer Science Laboratory) May 2009–Nov 2013

I implemented an interactive environment for manipulation and processing of models of computation, like *Finite Automata*, *Regular Expressions*, *Transducers* and *Turing Machines*. I used *Cocoa* and *Objective-C* to build the user interface that supported efficient rendering of graphs with more than 100k nodes, with automatic layout computation. I also created a protocol (with *Python*, *C* and *Nanomsg*) for incremental manipulation of automata by interfacing with the *FAdo* processing engine.

**System Administrator** at UPP Nonprofit Organization

Apr 2009–Jan 2014

This position helped me to gain a deep understanding of Unix systems with regards to administration, configuration and security. I single-handedly managed all IT-related tasks:

- Provided administration and support for Debian GNU/Linux systems including server and workstation upgrades, backups and failure monitoring, user account setup and security administration.
- Integrated *Kerberos* authentication protocol across all the services inside the network.
- Configured and managed a distributed data storage system based on *OpenAFS* with several hundred video interviews for the *Memories of Work* project.

**Independent Consultant** at Ministry of Environmental Protection of Tajikistan

Jul 2010–Oct 2010

I consulted for the Ministry of Environmental Protection of Tajikistan on a project presented on the opening day of the National Museum in which I developed an embedded dashboard to control an interactive 3D map. The hardware communication service was written in C (and some Assembly) and run on FreeBSD and the touch user interface was designed with the Qt4 graphics toolkit in C++.

## Education

**University of Porto**, Candidate for Bachelor of Computer Science

2009–2013

## Publications

Rizo Isrof, Nelma Moreira, and Rogério Reis. *GUITAR: Graphical User Interface Tool for Automata Representation*. In Actas do IJUP, 2012.

## Skills

I enjoy studying programming languages, their history and theory, actively promoting strongly-typed functional languages for not forcing me to choose between correctness, performance and simplicity. I have industrial experience with modern SQL & NoSQL databases, Unix-based operating systems and shell scripting for data analysis. Here is a list of the skills I used in at least one nontrivial project and the programming and natural languages I know:

<b>Operating Systems</b>	OS X	FreeBSD	Linux	Plan 9	NixOS
<b>Databases</b>	PostgreSQL	SQLite	Cassandra	Redis	Irmin
<b>Tools</b>	Vim	Git	Docker	L <sup>A</sup> T <sub>E</sub> X	Nix
<b>Programming Languages</b>	OCaml	C	Python	Julia	Javascript
	Haskell	D	Lua	Elixir	Bash
	Clojure	C++	Ruby	Objective-C	Awk
	Scala	Rust	R	Java	Go
<b>Natural Languages</b>	English (C1)	Portuguese (C2)	Russian (C2)	Ukrainian (C2)	Persian (A2)

## Projects

### 🔗 Fold Programming Language

*Fold* is an ongoing effort to build a functional programming language built on top of the *OCaml* compiler toolkit inspired by *Elm*, *Clojure* and *APL*. It is a *Lisp* dialect with regular user-friendly syntax featuring powerful metaprogramming primitives (similar to templates in *D* and *C++*). It is particularly well suited for designing DSLs because of its dynamic and flexible parser.

### 🔗 Dataflow

My personal research of flow-based programming led me to discover the complexities and trade-offs involved in diverse streaming models, such as *iteratees*, *coroutine generators*, Haskell's *pipes*, Clojure's *transducers*, etc. My goal with *Dataflow* is to create a functional and secure streaming abstraction for efficient data processing in *OCaml* and *Fold*.

### 🔗 Swarmsence

I co-founded a working group whose mission is to build a platform for agriculture that enables metric analysis and provides actionable insights based on continuous crop monitoring via a dashboard. I developed an embedded service suite for a *Raspberry Pi* in *C* and *OCaml* that interfaced with *ZeroMQ*, stored data messages from a local *6LoWPAN* network with sensor nodes into a *SQLite* database and exposed the historical and real-time data for filtering over a *HTTP* and *WebSocket* interfaces.

### 🔗 Others

I created and maintained other software projects that can be found on my GitHub (🔗 <http://github.com/rizo>).

## Interests

*Category Theory*, *Types*, *Machine Learning*, *Formal Languages and Automata Theory*, *Mathematical Logic*, *Ontologies*, *Microservices*, *Distributed Systems*, *Space Exploration*, *Quantum Physics*, *Hiking*, *Graphic Design*, *Typography*, *Mechanical Keyboards*, *Music (guitar performance)*, *Classic Literature*, *History and Philosophy*.