Carlos Miguel Soto, Researcher & Software Engineer

languages: Spanish (native)   English (fluid)   Portuguese (intermediate)

webpage: carlos-soto.dev   **github:** @miguelsotocarlos   **email:** miguelsotocarlos@gmail.com

Education

- **MS in Computer Science** at *University of Buenos Aires* (Expected Graduation: 2025)
- **MS in Mathematics** at *University of Buenos Aires* (Expected Graduation: 2025)

Research

Kapow Group at *University of Buenos Aires*

- Optimal minimum discrepancy bounds for de Bruijn sequences and efficient generation thereof
- Ring-theoretic methods for counting 2-factors of de Bruijn graph generated by affine methods
  - Published in Discrete Applied Mathematics: `https://arxiv.org/abs/2308.16257`

Lorel Group at *University of Buenos Aires*

- Correspondence between linear maps and a computationally equivalent programs in linear logic
- Characterization of semimodules arising from denotational semantics of linear lambda calculi

Work Experience

Cryptography Researcher & Engineer at *Muun*, Nov 2024 – present

- Designed an airthmetization-friendly high-level turing-complete language for specifying arbitrary NP problems
- Developed a compiler from said language into efficient polynomial equations, leading to 3x faster zero-knowledge proofs
- Optimized cryptographic primitives for use in zero-knowledge circuits, improving proving performace two-fold
- Architectured cryptographic protocol for safe key transmission, validation and storage
- Deployed compute-intensive time-sensitive job system for computation of cryptographic proofs

Lead Backend Engineer at *Modo* (via *Toptal*), 2021 – 2024

- Developed media aggregation platform for email and cloud storage providers with `Golang` + `MongoDB` + `MySQL`
- Benchmarked critical user-facing APIs and improved their latency by 15x
- Implemented migration protocols for more efficient feature addition
- Created cohesive tooling repo used across the company to improve development experience and onboarding

Informatics Olympiads, 2019 – present

- Managed onsite and online contests for the Argentinian high-school Informatics Olympiad with 300+ concurrent contestants
- Developed the Argentinian Online Judge based on the IOI Contest Management System
- Standardized problemset preparation and automated problemset upload, reducing contest preparation time by several hours
- Coached the 2023 and 2024 Argentina Team for the International Olympiad in Informatics
- Selected and prepared tasks as part of the 2025 International Olympiad in Informatics Scientific Committee

Awards

- **International Olympiad in Informatics:** Gold Medal (2018), Silver Medal (2019)
- **International Mathematics Olympiads:** Honourable Mention (2016), Bronze Medal (2019)
- **International Collegiate Programming Contest:** World Finals Bronze Medallist (2023)
- **International Collegiate Programming Contest:** World Finals Latin American Champion (2020, 2023, 2024)

Technical Experience

- **Languages:** `C++` (5 years), `Golang` (3 years), `Python` (3 years), `Rust` (6 months), `Java` (6 months)
- **Databases:** `PostgreSQL` (4 years), `MongoDB` (2 years), `MySQL` (2 years)
- **Standards:** `IMAP` (2 years), `OAuth` (2 years)