PhD and Engineer in Computer Science and Applied Mathematics

Sebastien Mondet

Contact

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Work Experience

Nov. 2018 – Present: Software Engineer

Obsidian Systems, then TQ Tezos (from Sep. 2019), then Oxhead Alpha (since Jul. 2021), New York City & Remote

Full-stack (including Smart-Contracts and WebUIs) Software development working within the Tezos and Avalanche ecosystems.

- Participated in the core development — "Merge Team" — of Octez, the main implementation of the Tezos blockchain: OCaml, C, Rust.
- Architected, maintained, and/or contributed to many ecosystem/developer tools: Flextesa, TZComet, Merbocop, SmartPy, and reference implementations of Smart Contracts: OCaml, Javascript, ReScript, Python (through SmartPy).
- Consulted for industrial partners and audited their smart-contracts.
- Gave talks at the OCaml NYC Meetup and the OCaml Workshop.
- Contributed to modernization projects for the Department of Motor Vehicles of the State Of California: Electronic Vehicle Titles and Mobile Drivers Licenses. Using TypeScript, Solidity, Kubernetes, Verified Credentials.

Apr. 2014 – Nov. 2018: Computer Scientist

Icahn School of Medicine, Department of Genetics and Genomic Science, at The Mount Sinai Health System

Software Engineer at the Hammer Lab.

- *Computational Workflow Management:* Developed software to manage heavy and complex computational workflows for biomedical applications.
  - Made 99% "in the open" (Apache 2.0 license).
  - Written in OCaml including a WebUI based-on `js_of_ocaml` and TyXML.
  - Used for the NCT02721043 clinical trial and various other studies.
  - Includes Ketrew, Coclobas, Biokepi, Epidisco, and related smaller projects.
- *Development Operations & System Administration:* Developed tools for users to manage their own deployments on various platforms as well as general maintenance of local computing resources.
  - Enabled the Lab's work on Google Cloud (Compute and Container *Engines*), AWS (EC2, ECS, S3, Batch), a local Hadoop cluster, and a local LSF cluster.
  - Wrote the stratocumulus, and then Secotrec suite of tools, and the more generic Genspio library.
- *Outreach:*
  - Presented the projects and advances at the OCaml 2015 and 2017 conferences and at the 2015 and 2017 Compose conferences.
  - Attended biology/bioinformatics conferences (e.g. the Intelligent Systems for Molecular Biology conference, the Bioinformatics Open Source Conference and Hackathon).
  - Contributed to the Lab's blog.
  - Co-wrote a more formal research paper on the Lab's computational workflow management stack, preprint available on BioRxiv.
- *Technology Watch:* Kept up to date on computer science research, formal methods in industry/open-source, and general cryptography and security. Shared with the team through regular written reports, and periodic presentations a.k.a. "lunch & learn" talks.

Part of an HPC/Bioinformatics/Infrastructure/Data-Science Consulting Group within the Icahn School of Medicine.

- Advise research groups on their computational requirements.
- Setup infrastructure for researchers (e.g. access to semi-public databases, Docker development environments, etc.).
- Help with the hiring process for data-scientists and software engineers.

Sept. 2011 – Mar. 2014: Software Engineer

Center for Genomics and Systems Biology, Biology Department, New York University

Associate Research Scientist responsible for all computational aspects of the Genomics Sequencing Core Facility (GenCore).

- Architected, developed, deployed, documented, and maintained *HITSCORE*: production-quality, fault-tolerant, high-performance laboratory information management system and preliminary analysis pipeline for Next Generation DNA sequencing.
- Full software platform, dealing with jobs running on HPC clusters, servers, tracking meta-data about samples and the facility, managing the genomic data of the sequencers; while providing a dynamic web-application for administration, monitoring, and delivering results to the clients.
- Based on discussions with bioinformaticians and users, HITSCORE was a key contributor to the facility's CSPro Certification by Illumina.
- Applied *type-theory* and functional programming advanced techniques with OCaml, PBS/Torque, PostgreSQL, Jane St Core suite, the Ocisgen web-framework (with Js_of_ocaml).
- Maintained Linux-based servers (Puppet, CentOS).
- Participated, initiated, and maintained open-source projects(see for instance Biocaml).
- Assist bioinformaticians/biologists with Unix and HPC matters.

- Attended conferences (IFCP 2012, OCaml CUFP 2012 and 2013, IBM Programming Languages Day 2012) and the 2013 International Summer School on HPC Challenges in Computational Sciences.

Sept. 2009 – Jun. 2011: Post-doctoral Researcher

*Distributed Multimedia Systems (*DMMS*) group, University of Oslo, Norway*

Research within the SIRIUS Project: *Sensing, Adapting and Protecting Pervasive Information Spaces*.

- Co-advised PhD and Master students on Quality of Information, Distributed Complex Events Processing, and Anomaly Detection, within Sparse Mobile Ad-Hoc Networks, and Resource-Constrained Devices.
- Worked on protection middleware with focus on *safety and security of implementations* through meta-programming and formal methods (see Sec'2011 article and the Promiwag project).
- Participated in the teaching, supervising, and hiring activities of the research group.

Oct. 2006 – Jun. 2009: PhD in Computer Science

IRIT (Computer Science Research Institute of Toulouse), University of Toulouse, France

Simulation of large 3D natural scenes: modeling and adaptive streaming.

- *Supervision:* Prof. Mathias Paulin, Geraldine Morin, Romulus Grigoras (Vortex group).
- *Research focus:* Server resources optimization, multi-resolution content packetization, compression and progressive modeling of plant models, network measurements, mobile computing, distributed systems.
- *Software realizations: Wadis*, a framework for 3D streaming experimentation over IP networks, *LibGenCyl*, a library for progressive compression of plant models, and OMAN , a network measurements and capture tool. Also involved in the development of "NatSim" a visualization tool for natural scenes (Python, OpenGL/GLSL).
- *Co-Advising:* Master and Engineering students working on 3D streaming for mobile devices.
- *Internship:* Three months (2008) at the National University of Singapore, under the supervision of Dr. Wei Tsang Ooi.
- *Teaching:* Assistant at INP-ENSEEIHT (the "Monitorat" French program), labs in C Programming, Geometric Modeling, 3D Rendering, Operating Systems, Data-Bases, Multimedia.
- *Training:* Communication, Advanced English, Basic First Aid Techniques.
- *Dissertation: Adaptive Modeling and Distribution of Large Natural Scenes*, PhD thesis reviewed by Pr. Stefanie Hahmann and Pr.Eckehard Steinbach, and defended on June 8th, 2009.
- The thesis received the Léopold Escande Award 2009 of the University of Toulouse.

Jul. 2005 – Sept. 2006: Embedded Software Engineer

Avionics Department, Atos Origin Integration (Toulouse, France)

- Developed for Airbus (EYY) embedded air/ground communication software qualified under the DO-178B standard (HOOD design, ANSI C, LynxOS, RTRT).
- Developed for Airbus (EYT) avionic networks testing software (ARINC 429, AFDX, UML, C++, wxWidgets).

Feb. – Jun. 2005: Master Internship

Computer Vision Team, IRIT - UMR 5505 (Toulouse, France)

Streaming of large point-based 3D scenes, adaptation to resources and navigation.

- Implemented a streaming client-server system over HTTP, TCP and DCCP; C++ with Qt/OpenGL on GNU/Linux.
- *Keywords:* Point based 3D, Compression, Adaptive Streaming.
- *Advisors:* Geraldine Morin and Romulus Grigoras.

Jun. – Jul. 2004: Engineering Internship

Dassault Aviation, (Biarritz, France)

Processing and visualization module for numerical data measured during polymerization in autoclaves.

- Wrote technical specifications.
- Developed a C++ application for MS-Windows, and Shell/C scripts for AIX/RS6000.

2000 – 2003: Various summer jobs

Bayonne, France

Math and Spanish private lessons, municipal city cleaning, etc.

Publications

International Journals

- W. Cheng, W. T. Ooi, S. Mondet, G. Morin, and R. Grigoraș; *Modeling Progressive Mesh Streaming: Does Data Dependency Matter?* ACM Transactions on Multimedia Computing, Communications, and Applications (TOMCCAP) Volume 7, Issue 2, 2011 [URL].
- S. Mondet, W. Cheng, G. Morin, R. Grigoraș, F. Boudon, and W. T. Ooi; *Compact and progressive plant models for streaming in networked virtual environments.* ACM Transactions on Multimedia Computing, Communications, and Applications (TOMCCAP) Volume 5, Issue 3, 2009 [URL].

International Conferences

- S. Mondet, I. Alberdi, and T. Plagemann; *Generating Optimised and Formally Checked Packet Parsing Code.* IFIP SEC, 2011 [URL].
- M. Zhu, S. Mondet, G. Morin, W. T. Ooi, and W. Cheng; *Towards peer-assisted rendering in networked virtual environments.* ACM MM'11, 2011 [URL].
- P. Kamisiński, S. Mondet, V. Goebel, and T. Plagemann; *Resource-Aware Complex Event Processing for Mobile Ubiquitous Environments.* UbiComp'10; OPPORTUNITY Workshop, 2010 [URL].

- W. Cheng, S. Mondet, W. T. Ooi, R. Grigoraș, and G. Morin; *Network-Aware Streaming of Partially Ordered Media.* IEEE COMSOC MMTC E-letter Volume 5, Number 6, 2010 [URL].
- A. Doran, S. Mondet, R. Grigoraș, G. Morin, W. T. Ooi, and F. Boudon; *A demonstration of MobiTree: progressive 3D tree models streaming on mobile clients.* ACM Multimedia (Technical Demonstration), 2009 [URL].
- S. Mondet, W. Cheng, G. Morin, R. Grigoraș, F. Boudon, and W. T. Ooi; *Streaming of Plants in Distributed Virtual Environments.* 16th ACM international conference on Multimedia, 2008 (**Best Paper Award**) [URL].
- W. Cheng, W. T. Ooi, S. Mondet, G. Morin, and R. Grigoraș; *An Analytical Model for Progressive Mesh Streaming.* 15th ACM international conference on Multimedia, 2007 [URL].

Pre-prints

- A. Rubinsteyn, J. Kodysh, I. Hodes, S. Mondet, B. A. Aksoy, J. P. Finnigan, N. Bhardwaj, and J. Hammerbacher; *Computational pipeline for the PGV-001 neoantigen vaccine trial.* BioRxiv Preprint, 2017 [URL].
- S. Mondet, B. A. Aksoy, I. Hodes, L. Rozenberg, and J. Hammerbacher; *Bioinformatics Workflow Management With The Wobidisco Ecosystem.* BioRxiv Preprint, 2017 [URL].

PhD Thesis

- S. Mondet; *Adaptive Modeling and Distribution of Large Natural Scenes.* PhD Thesis of the University of Toulouse, 2009 (Defended on June 8, 2009; awarded of the Léopold Escande Price 2009) [URL].

Master Thesis

- S. Mondet; *Mise en ligne de modèles 3D echelonables basés points.* Master Thesis of the INP Toulouse, 2005.

Research Activities

Reviewed for various high-impact computer-science journals and conferences including the ACM Multimedia 2009, 2010, 2011; the ACM Transactions on Multimedia Computing, Communications and Applications; NOSSDAV 2010 (Network and Operating Systems Support for Digital Audio and Video); and the Springer/ACM Multi-Media Systems Journal. Also reviewed grant applications for The Polish Science Foundation and was part of PhD recruitment committees at the University of Oslo.

Education

2006 – 2009: Philosophiæ Doctor in Computer Science

University of Toulouse, France

Thesis: *"Adaptive Modeling and Distribution of Large Natural Scenes"*

2002 – 2005: Master Degree in Computer Science and Applied Mathematics

ENSEEIHT (National Polytechnic Institute of Engineering in Electrotechnics, Electronics, Computer Science, Hydraulics and Telecommunications), Toulouse, France

- Engineer Diploma (French system).
- Research-oriented Master's degree on Software Safety and High-Performance Computing.

2000 – 2002: CPGE Math-Physics

CPGE Louis Barthou, Pau, France

"Classes Préparatoires aux Grandes Écoles," previously known as "Math sup/spé." Undergraduate 2 years prestigious program for competitive entrance exams into national engineering schools; *speciality* "Mathematics and Physics".

Human Languages

- *French:* native speaker.
- *Spanish:* native speaker.
- *English:* very fluent.
- *German and Norwegian:* basic knowledge.

Personal Activities

Music

Classical/Electric/Bass guitars and drums.

Have played in and/or initiated various bands, in various styles: *Rock*, *Blues*, *Hard rock*, *Funk*, *Electro-jazz*, and *Tribal Grind Core*.

See NI3 Dance, House Of Creation, Cheia De Soul, Death Is A Business.

Sports

Cycling, Running, Hiking, Cross-country skiing.

Hobbies

Juggling, DIY Projects, Music-making Software, Reinventing `org-mode` over and over (in OCaml).

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