

PhD and Engineer in Computer Science and Applied Mathematics

Sebastien Mondet

Contact / Personal Information

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Work Experience

Jul. 2024 – Present: Software Engineering Contractor

New York City

Software development, training, and “dev-ops” consulting.

- ▷ Helped with an LLM-based conversation agent for deployment in production (Python, LangChain, DSPy, Django).

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, including [Flextesa](#), [TZComet](#), [Mer-bocop](#), [SmartPy](#), and reference [implementations](#) of Smart Contracts. Using OCaml, Javascript, ReScript, Haskell, Rust, 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, ReScript, and 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 \(Gen-Core\)](#).

- ▷ 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 CUPF 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-ENSEEIH (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) avionics 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. Grigoras; *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. Grigoras, 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. Grigoraş, 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. Grigoraş, 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. Grigoraş, 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. Grigoraş; *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 échelonables 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

*ENSEEIH*T (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, lived in New York City for more than 10 years.
- ▷ *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 including electric-guitar building.

Personal Programming Projects

- ▷ Music-production Software, mostly in OCaml: presented first at [OCaml'2018](#) and [FARM'2018](#).
- ▷ Reinventions of `org-mode` using OCaml, HTML micro-formats; partially open-sourced and blogged about [\[1\]](#), [\[2\]](#).