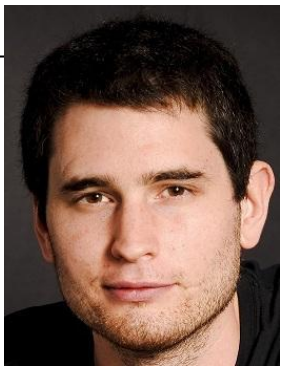
Expert Engineer – Optimizing Compilers



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Summary

10 years as compiler expert, including 5 years as tech lead. Mainly working around optimizations for performance on heterogeneous multiprocessor architectures: pipelining, vectorization, tiling, memory allocation for locality, custom code generation, message passing/shared memory model, static analyses, code instrumentation.
Complete IT background: SCM, code quality, CI/CD, IDE, tests, OS, network, sysadmin, code licencing, software architecture, computer architecture, UX, compilation, etc. Weaknesses (although knowledgeable): UI, security, crypto, databases. Strong communication (written & oral) and supervision skills.

Notice: most of the links in this document, if dead, have an equivalent, possibly old or outdated, on the Internet Archive (https://archive.org/). See my personal web page.

Work Experience

- Nov. 2019 – Jul. 2021, **Expert engineer** in the Askelys company in Rennes, France
  - Technical lead over the DataNavigator solution
    - Typescript library (Node.js & Webpack) for querying SPARQL endpoints
      - New query abstraction, code generation
    - Backend Node.js (Express.js, TypeORM, io-ts) & client API; Auth0 access management
      - Simple DB for managing user permissions
    - Supervising interns & dev team (VueJS / Typescript UI with UX designer directives)
  - Semantic elevation of SQL / CSV to SPARQL using Python / Javascript
  - Admin over several servers & DNS running at OVH
    - Jenkins + Sonarqube, NPM Registry (Verdaccio), OpenVPN, CodiMD, Production / Release Candidate servers, SPARQL (Virtuoso OSS/Jena Fuseki)

- Feb. 2017 – Nov. 2019, **Research engineer** in the VAADER team, at IETR / INSA Rennes, Rennes, France
  - Technical lead over the rapid prototyping software PREESM
    - Technical integration and support within CERBERO project (https://www.cerbero-h2020.eu/)
    - Complete redesign of the continuous integration system
    - Formal definition of the abstractions manipulated within the tool
    - Scheduling, memory allocation, task mapping targeting heterogeneous architectures
    - Distributed code generation with custom netcode (MPI-like send/receive/barrier over TCP)
    - Design architecture model and extend scheduling techniques for Kalray MPPA processor
    - Energy benchmark on Odroid boards (big.LITTLE Arm)
    - Extend architecture model for GPGPU
    - Setup SKA development environment for internship (docker + python)
    - Coordination of contributions from collaborators over Europe
  - Implementation of Float-to-Fix techniques within GeCoS

        - Part of the Artefact national project (http://artefact.insa-rennes.fr/)
        - Rewrite & implement patent algorithms POC
        - Use of statistic properties to speedup design space exploration
    - Writing and presentation of scientific publications, tutorials, documentation, etc.

- Jan. 2016 – Dec. 2016, **Expert engineer** in the Echoes-Labs (ex TOCEA) company in Rennes, France
    - Design and Implementation of Tools for Automated Software Modernization
        - Implementation within the RAPID project (https://echoes.fr/rapid/)
    - Migration from proprietary Java framework to Spring MVC
        - includes JavaScript to Java automatic migration
    - Software code audit of web applications (AngularJS, Spring, Hibernate)
    - Assisting the setup of a Software Factory (Jenkins, Redmine, Git)

- June 2013 – Nov. 2014, **Research engineer** in the CAIRN Team, at University of Rennes 1, France
    - Technical Leader over the GeCoS (Generic Compiler Suite) tool
        - GeCoS : http://gecos.gforge.inria.fr/
        - Developing, testing, documenting, and integrating 500k+ lines of Eclipse/Java/C
        - Technical integration for the ALMA European project (http://www.alma-project.eu/)
        - Compiling Scilab for heterogeneous multicore reconfigurable architectures
        - Automatic Loop Vectorization with Hardware Specifications as input
        - Automatic Loop Tiling using polyhedral model representation
        - Loop generation for High Level Synthesis using polyhedral model
        - Unachieved work on automatic prefetch insertion
    - Support on parallelizing radio propagation algorithm on GPGPU using polyhedral tool (PPCG

- Oct. 2009 – Dec. 2012, **Research engineer (PhD)** in the CAIRN Team, at INRIA Rennes, France
    - Nano 2012 project S2S4HLS with STMicroelectronics
    - Source-to-source for High-Level Synthesis toolbox within GeCoS
        - Implement classic compiler optimisations, driven by custom #pragmas : unroll, inline, dead code elimination, constant propagation
        - Exhibit efficient code structures and memory layouts in compute kernels using high level mathematical abstraction: the polyhedral model
    - Implementation of `ompVerify` with Colorado State University (see IWOMP'11 publication)
        - Part of the LRS joint team (http://polyweb.irisa.fr/LRS/)
        - Automatic verification of OpenMP #pragma on for parallel loops
    - Automatic C to Alphabets (system of equations: https://www.cs.colostate.edu/AlphaZ/)
    - Improve applicability of nested loop pipelining (see dissertation, FPT'13 and IEEE publications)
    - Implementation of a source-to-source transformation for applying superscalar processor pipeline stalling techniques for High-Level Synthesis (see DAC2013 publication)
    - Teaching: Introduction to Object Oriented Programming using Java for first year students (2010)
    - Internal training on CUDA

- Feb. – Aug. 2009, **Research engineer (internship)** in the CAIRN Team, at University of Rennes 1, France
    - Design and implementation of a FSM generator for scanning loops represented as polyhedra

Education

- Ph.D. in Computer Science, at École Normale Supérieure de Cachan - antenne de Bretagne, 2009-2013
    - Topic: *Synthesis of pipelined architectures using the polyhedral model*

    - Advisors: Patrice Quinton and Steven Derrien
- Master's Degree in Computer Science at the University of Rennes 1, France, 2007-2009
    - Head of the student project "TaskMapper": Graphical interface for manual hardware/software partitioning, coupled with a linker and a compiler for automatic generation of the tasks and communication on hardware resources (processors, hardware accelerators).
        - https://www.irisa.fr/prive/Antoine.Morvan/taskmapper/
- Bachelor's Degree in Computer Science at the University of Rennes 1, France, 2006-2007
- DUT (Technical university degree) in Computer Science at the IUT of Lannion, France, 2004-2006
    - CowMet project (2005-2006): Linux live distribution developed on top of Slackware.

Publications

- **Journal**
    - Daniel Madroñal, Florian Arrestier, Jaime Sancho, Antoine Morvan, Raquel Lazcano, Karol Desnos, Ruben Salvador, Daniel Menard, Eduardo Juarez, Cesar Sanz. *PAPIFY: Automatic Instrumentation and Monitoring of Dynamic Dataflow Applications Based on PAPI,* IEEE Access, August 2019
    - Antoine Morvan, Steven Derrien, Patrice Quinton. *Polyhedral Bubble Insertion: A Method to Improve Nested Loop Pipelining for High-Level Synthesis,* IEEE Transactions on Computer-Aided Design, March 2013
- **International Conferences**
    - Francesca Palumbo, Tiziana Fanni, Carlo Sau, Alfonso Rodriguez, Daniel Madroñal, Karol Desnos, Antoine Morvan, Maxime Pelcat, Claudio Rubattu, Raquel Lazcano, Luigi Raffo, Eduardo de la Torre, Eduardo Juárez, César Sanz, Pablo Sanchez de Rojas. *Hardware/Software Self-adaptation in CPS: The CERBERO Project Approach.* The 2019 International Conference on Embedded Computer Systems: Architectures, Modeling, and Simulation (SAMOS'19), July 2019
    - Daniel Madroñal, Antoine Morvan, Raquel Lazcano, Rubén Salvador, Karol Desnos, Eduardo Juárez Martínez, César Sanz. *Automatic instrumentation of dataflow applications using PAPI*. ACM International Conference on Computing Frontiers 2018 (CF'18), May 2018
    - Tomofumi Yuki, Antoine Morvan, Steven Derrien. *Derivation of efficient FSM from loop nests*, The 2013 International Conference on Field-Programmable Technology (FPT'13), December 2013
    - Mythri Alle, Antoine Morvan, Steven Derrien. *Runtime Dependency Analysis for Loop Pipelining in High-Level Synthesis*, ACM / EDAC / IEEE 50th Design Automation Conference (DAC2013), June 2013
    - Antoine Morvan, Steven Derrien, Patrice Quinton. *Efficient Nested Loop Pipelining in High Level Synthesis using Polyhedral Bubble Insertion*, The 2011 International Conference on Field-Programmable Technology (FPT'11), December 2011

- **National Conferences, International Workshops, Posters**
    - Antoine Floc'h, Tomofumi Yuki, Ali El-Moussawi, Antoine Morvan, Kevin Martin, Maxime Naullet, Mythri Alle, Ludovic L'Hours, Nicolas Simon, Steven Derrien, Francois Charot, Christophe Wolinski and Olivier Sentieys. *GeCoS: A Framework for Prototyping Custom Hardware Design Flows*, 13th IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM'13), September 2013
    - Vamshi Basupalli, Tomofumi Yuki, Sanjay Rajopadhye, Antoine Morvan, Steven Derrien, Patrice Quinton, David Wonnacott. *ompVerify: Polyhedral analysis for the OpenMP Programmer*, 7th International Workshop on OpenMP (IWOMP'11), June 2011
    - Antoine Morvan, Amit Kumar, Antoine Floc'h, Steven Derrien. *GeCoS : a source to source optimizing compiler for the automatic synthesis of parallel hardware accelerators*, Designing for Embedded Parallel Computing Platforms at DATE, March 2011

- **Dissertation**
  - Antoine Morvan. *Utilisation du modèle polyédrique pour la synthèse d'architectures pipelinées (Synthesis of pipelined architectures using the polyhedral model)*, Thèse de doctorat, École Normale Supérieure de Cachan - antenne de Bretagne, June 2013

Skill List

IDE & tools	Eclipse**,** Git, VSCode, Docker, SVN, Make, CMake, Gradle, Maven, Jenkins, Travis CI, Github, Sonarqube, Redmine, Nexus, vi, Codi/HackMD, EMF/Ecore, Node.js/NPM, Webpack, Auth0, Express.js, TypeORM, io-ts
Programing paradigms	Imperative, procedural, object oriented, promises, functional, structural, logic, constraint, parallel (memory shared, transactional), query
Programing languages	Java, C, C++, scripts bash & shell, Latex, Javascript, Typescript, Python, Markdown, Groovy, PHP/HTML/SQL, Tom/Gom, Xtend, Xtext, YACC/Lex (bison/flex)
Servers	LAMP, SSH, DNS, DHCP, OpenVPN, IPTABLE, Squid, SFTP, Tomcat
OS	UNIX / **Linux** (Ubuntu, Debian, ArchLinux), Windows

Languages

- French: Native
- English: Full professional proficiency
- German: Notions

References

- Dr. Romain Thomas, CEO at Askelys: romain.thomas@askelys.com / +33 6 76 79 41 22
- Dr. Marc Éluard, COO at Askelys: marc.eluard@askelys.com / +33 6 71 10 42 92
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- Pr. Sanjay Rajopadhye, Colorado State University: svr@cs.colostate.edu / (970) 491-7323
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- Dr. Erven Rohou, member of my Ph.D. committee: erven.rohou@inria.fr / +33 2 99 84 74 93