

# Gabriel Radanne

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## Experience

- summer 2013 **The Eliom Language**, *Internship with Vincent BALAT. PHD thesis with Jérôme*  
2014/2017 **VOUILLON and Roberto DI COSMO**, PPS, IRIF, University Paris Diderot, Paris, France.  
Eliom is a framework for programming web sites and client/server web applications. Along with a rich library, it also contains a syntax extension that extends the OCaml language with tierless annotations. The goal of my phd thesis was to formalize and improve the language part of the eliom framework.  
I created novel formal semantics and type system for the core language as an extension of an ML language, along with an improved compilation scheme which lead to significant improvements to the existing implementation. I also extended the OCaml module system with tierless annotations and proposed a compilation scheme for tierless modules, including functors. Finally, I implemented this new language as an extension of the OCaml type checker and compiler.
- summer 2015 **Functoria**, *Internship with Thomas Gazagnaire*, OCaml Labs, Cambridge, UK.  
MirageOS is a library operating system that constructs unikernels. To enable flexible and declarative description of unikernels architecture, it uses a DSL to specify composition of unikernel components.  
During this internship, We improved the DSL and designed a new tool (**Functoria**) to support a more modular definition of unikernel components and provide better tooling for developers.
- summer 2014 **Synthesis of ranking functions using extremal counterexamples**, *Internship with David MONNIAUX and Laure GONNORD*, Verimag, Grenoble, France.  
Synthesis of ranking functions is a technique used to prove program termination. During this internship, we worked on an algorithm to synthesis ranking functions on programs in SSA form by an encoding in SMT problems.  
We created a tool (**Termite**) that implements this algorithm on top of LLVM, using the PAGAI tool to generate invariants and Z3 as an SMT solver. Our tool is competitive with the state of the art for checking termination of C programs.
- winter 2013 **Minimalistic type theory in sequent-calculus style**, *Internship with Jean Philippe BERNARDY*, Chalmers, Goteborg, Sweden.  
Dependent types are an active area of research as foundations of mathematics but also as a programming language. Most implementations so far use a core language based on “natural deduction”, which we argue is ill-suited for a type-checking backend. The goal of this internship was to propose a core language in sequent calculus style to solve those issues.
- summer 2012 **A compilation scheme for Links**, *Internship with Sam LINDLEY, James CHENEY and Philip WADLER*, University of Edinburgh, Scotland.  
Links is a functional programming language for creating web applications. From a single source program Links produces Javascript for the client, SQL for database access, and an interpreted intermediate language for the server. The goal of this internship was to add the support to generate SQL query into the existing prototype compiler.

## Publications

- APLAS 2016 **Eliom: A Core ML Language for Tierless Web Programming.**  
Gabriel Radanne, Jérôme Vouillon, Vincent Balat
- IFL 2016 **Eliom: Tierless Web programming from the ground up.**  
Gabriel Radanne, Vincent Balat, Jérôme Vouillon, Vasilis Papavasileiou
- PLDI 2015 **Synthesis of ranking functions using extremal counterexamples.**  
Laure Gonnord, David Monniaux, Gabriel Radanne
- PEPM 2014 **Effective Quotation: relating approaches to language-integrated query.**  
James Cheney, Sam Lindley, Gabriel Radanne, Philip Wadler

## Programming activities

- Contributor [OCaml](#), [Eliom](#), [Lwt](#), [Js\\_of\\_ocaml](#)
- Maintainer [Tyxml](#) (Typed manipulation of HTML and SVG documents)
- Author [Termite](#), [Functoria](#), [Tyre](#) (Typed Regular Expression), [Z3overlay](#) (Typed API for Z3), [Llvmgraph](#) (Graph view of LLVM IR), [LILiS](#) (Efficient L-system interpreter)

## Teaching

I have been a teaching assistant for various courses at University Paris Diderot, Paris, France.

- PF5 **Functional Programming**, *3rd year students*, with Michele Pagani.
- ADS4 **Lexing, Parsing and AST manipulation**, *2nd year students*, with Ralf Treinen .
- CI2 **Computer Science Concepts**, *1st year students*, with Jean-Baptiste Yunès.
- PI4 **Programming Project**, *2nd year students*, with Inès Klimann.
- IP-CPEI **Introduction to Programming in C**, *3rd year students*, with Vincent Padovani.
- EIDD-C **Introduction to Programming in C**, *1st year students*, with Roberto Amadio.

## Education

- 2013 **Master in Computer Science**, *École Normale Supérieure de Lyon – University of Lyon 1.*
- 2011 **Bachelor in Computer Science and Mathematics**, *École Normale Supérieure de Cachan, Brittany extension – University of Rennes 1.*

## Languages

- French **native**
- English **fluent**

## Computer skills

- Programming languages OCaml, Haskell, Java, Agda, Prolog, Coq, C.
- Software and libraries Linux, Git, Ocsigen, LLVM, Z3.