

Franck Binard, Ph.D

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Bilingual (French/English), legally entitled to work in Europe and in Canada (dual citizenship France/Canada)

Overview

Programming Languages: C/C++, Perl, OCaml/F#, JavaScript, VBA, Prolog, Scheme, ActionScript, Assembly, Java

Other Languages: HTML, SQL, First and second order logic, λ -calculi (untyped, typed, polymorphically typed), Hoare Triple Logic

IDE's: NetBeans, Microsoft Visual Studio

Version Control Systems: Subversion

Libraries and Tools: STL, OpenGL, MFC, L^AT_EX, GCC, MSVC, Visio

Other Interests: Parallel computing, General-purpose computing on graphics processing units, Financial modeling, Cognitive science, Behavioral economics

Education

PhD in Computer Science 2003 – 2008

Ottawa-Carleton Institute for Computer Science, advised by Amy Felty

Thesis title: “*Abstraction-Based Genetic Programming*”

Research: Evolutionary Computation. Invented and implemented Abstraction-Based Genetic Programming (ABGP), a Genetic Programming system that uses System F, a polymorphically typed λ -calculus, to represent its evolved organisms. In ABGP, evolved computer programs are grouped in species and are assembled from genes. Each species is a second-order logic proof, linked to the organisms that belong to it via the Curry-Howard isomorphism. Genes are types and the computational blocks (alleles) that are used to assemble organism are typed System F terms. Implementation in OCaml (see project section for code location).

M.C.S. in Computer Science 2000 – 2002

University of Ottawa

Thesis title: “*Proving Properties of Programs Using Automatically Generated Models*”

Research: Formal Verification. Construction of a first-order logic type language complete enough to express all the properties of a defined subset of the C language. Defined and implemented an algorithm to translate programs written C into sets of expressions in the aboved mentioned first-order language. Built a Perl implementation of the algorithm. Showed how the output of the implementation could be fed into the ACL2 theorem prover to generate property proofs of the program. See Nivea in project section for code.

B.Sc. in Computer Science 1998 – 2000

University of Ottawa

(Magna Cum Laude)

B.Sc. in Mathematics 1994 – 1998

University of Ottawa

**Employement
History**

Parks Canada Agency (National Office)

Gatineau, Quebec

Requirement gathering, user interface design, data modeling

Business Analyst
February 2009 – Current

Logic and Foundations of Computing Group

Ottawa, Canada

Applications of category theory to machine learning

Research Assistant
January 2007 – December 2008

Parks Canada Agency (National Office)

Gatineau, Quebec

Requirement gathering, user interface design, data modeling

Business Analyst
April 2006 – January 2007

Parks Canada Agency (Gulf Island National Park)

Sidney, British Columbia

This very enjoyable project had me building flash presentation features for the Gulf Island National Park of Canada. The tools I used were Flash and ActionScript. I approached the project from a 3D simulation in a virtual environment perspective. The project itself gave me the opportunity to work with satellite imagery and mapping systems, movies, multimedia and wildlife in a preserved state. The people involved were park wardens, biologists and elders from first nations. It gave me the opportunity to see salmon paths, to learn about and model a geothermal-based energy system and it gave me talk access to an architect who specializes in buildings that produce energy rather than consume it. Please see the project section below for a short description of the work I did while at GINP.

Flash Developer
May 2005 – April 2006

Parks Canada Agency (National Office)

Gatineau, Quebec

Requirement gathering, user interface design, data modeling

Business Analyst
July 2003 – May 2005

Federal Government of Canada

Canada

Paid training program (HR, Finance, work and class component)

Management Trainee
2002-2003

Decision Academic Graphics

Ottawa, Ontario

Perl programing, scripting, automation

Programmer
Summer 2001

VIVA Research Laboratories

Ottawa, Ontario

Short term projects in Visual C++ with OpenGL:

- Wrote 3D Object Matrix Projection Libraries
- Implemented a 3D navigation system for dynamically render3ed 3D model built from data collected via real-time video feed

Research Assistant
Summer 2000

Various Short Term Employment

Canada

During these two years I also completed a second undergraduate degree in computer science.

Code monkey, Internet designer, Network admin
1998-2000

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| Awards | University of Ottawa IT Fair Poster Competition | 2008 |
| | University of Ottawa Graduate student scholarship winner for the poster titled : “ <i>Towards an automated biological programming tool</i> ”. | |
| | Canada’s Millennium Bursary of Excellence Scholarship | 2000–2001 |
| | Canada Awarded for demonstrating capacity for leadership and commitment to the pursuit of academic excellence and innovation. | |
| Publications | University of Ottawa Dean of Engineering ’s honor list | 1999–2000, 2000–2001 |
| | University of Ottawa Awarded for grade point average of 8.5 or better. | |
| | YW-YMCA Community Achievement Medal | 1995 |
| Ottawa Awarded for YMCA volunteer work in fitness and wellness | | |
| Publications | Genetic Programming with Polymorphic Types and Higher-Order Functions | |
| | <i>Proceedings of the Tenth Genetic and Evolutionary Computation Conference</i> Franck Binard and Amy Felty, July 2008 | |
| Publications | An Abstraction-Based Genetic Programming System | |
| | Genetic and Evolutionary Computation Conference: Late Breaking Papers Franck Binard and Amy Felty, July 2007 | |
| Classes Taught | Éléments de Programmation pour la Gestion | Fall 2007 |
| | University of Ottawa About 160 students. Load included supervision of two teaching assistants. | |
| | Conception et analyse des algorithmes I | Automne 2006 |
| | University of Ottawa Algorithm class. | |
| | C++ Concepts Laboratory | Summer 2006 |
| | University of Ottawa Received letter of congratulation for excellence of teaching. | |
| Classes Taught | Concepts de Programmation C++ | Automne 2003, Automne 2004 |
| | University of Ottawa French version of C++ class | |
| | Numerical Analysis | Winter 2001 |
| Algonquin College | | |
| Other Projects | An Abstraction-Based Genetic Programing System | 2008 |
| | <i>Google Code (svn) : gene-centered-ecosystem-framework-gp</i> Written in OCaml, this is a genetic programming system in which the genotype search space is partitioned by the proofs to which each program is linked via the Curry-Howard isomorphism. The proofs act as species for organisms by specifying a pattern in which typed genes (expressed in System F [Girard, Reynolds] can be plugged in. Organisms are arrangements of gene as | |

specified by the species to which they belong. Each gene is a closed computational block that may be combined with other blocks to form an organism.

Multimedia Flash Visitor Experience Projects 2006

http://www.pc.gc.ca/pn-np/bc/gulf/default.asp

Principal for the following web features for the Gulf Islands National Park Reserve of Canada. Responsible for content, concept and production, including programming and content gathering (Flash, Actionscript 2.0, HTML):

- The Gulf Island National Park Reserve (GINPR) Operations Centre, one of the most advanced environmentally sustainable buildings in Canada.
- Lyall Creek (Saturna Island). The creek is home to sea-run cutthroat trout, chum and coho salmon.
- The Gulf Islands first nations languages.

Typed Emergent Behavior Evolution System 2004

Google Code (svn) : cpp-cooperation-evolution-gp

Written in C++, this GP system evolves cooperative behaviour to optimize the collection of resources in a featureless topology. A typed program specifies the behaviour of each individual in a family and it is the behavioural program that is the species differentiator.

A Polymorphically-Typed Genetic Programming System 2003

Google Code (svn) : polymorphically-typed-representation-gp

Written in C++, this is a library for typed genetic programming systems. Its particularity its support for type quantifiers. By adding type variables to a GP's type representation system, it becomes (theoretically) possible to represent all data types using type abstractions. Objects typed polymorphically support anonymous recursion (for example, a list may be applied to map, iter or fold functions), but limited so as to guarantee termination.

Nivea, a Program Correctness System 2000

Google Code (svn) : nivea

Nivea is a set of tools written in Perl that can be used to derive logic theories from C programs. These theories can in turn be used as input for the ACL2 theorem prover from Texas U. The user is then able to use the theorem prover to prove correctness properties on these programs. Nivea is meant to be a (semi) automatic replacement to Hoare Triple Logic correctness deductions.

Google Query Evolution System 2000

Google Code (svn) : google-genetic-query

Genetic algorithm implementation in Perl in which the genotypes are character strings and the selection pressure is generated as a function of the number of hits the use of the string as a google search query returns. Uses the older (and first) google API.

My Game of Life 1999

Google Code (svn) : my-game-of-life

A graphical interface and set of tools (all in C++, windows platform) for the super-fast-cell-automata library (see below).

Super Fast Cellular Automata Engine 1998

Google Code (svn) : super-fast-cell-automata

This is fast lightweight library in C++ for 2D cellular automata generation (for example, Conway's game of life). Built to be fast and to use minimal memory footprint.

Volunteering

Computer Science Graduate Student Association

2001 – 2002

University of Ottawa

In this capacity I:

- Coordinated the Computer Science Graduate Student Association meetings,
- Addressed issues impacting the csi graduate student body,
- Acted as liaison between the administration of the engineering faculty and the csi graduate student body,
- Sat on the University of Ottawa Graduate Student Counsel

Nostalgica Café

2001 – 2002

University of Ottawa

The Nostalgica is a student owned campus eatery. In this capacity, my role was to propose and vote on activities related to the management of the Nostalgica Café.

Computer Science Undergraduate Student Association

1999 – 2000

University of Ottawa

- Organized computer science 1999 Frosh Week (volunteer recruitment and training, budget management)
- Organized activities for the undergraduate student body throughout the year.

Computer Science Graduate Student Association

1998 – 1999

University of Ottawa

Mathematics Student Association

1996 – 1997

University of Ottawa

YW-YMCA Ottawa Main Branch

1993 - 1997

Ottawa, Ontario

Supervised exercise rooms and introduced new customers to the YMCA facilities and exercise equipment on a per appointment basis.