William Blum

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▷ WORKING EXPERIENCE

2012–	**Microsoft**: Software Development Engineer, Windows Engineering Systems and Compatibility team
2009–2011	**Microsoft Canada**: Software Development Engineer, Windows Core Operating System Division
Jan.–Jul. 2008	**University of Edinburgh**: Research Assistant
Oct.-Dec. 2005	**University of Oxford**: Demonstrator on *Network & Operating Systems* practicals (Hilary 2005); tutoring *Specification* classes (Michaelmas 2005).
Jun.-Sep. 2003	**Franche-Comté University Computer Laboratory (LIFC)**, France, three-month internship: Modeling of the *Common Electronic Purse Specification* using B formal method.
Jun.-Aug. 2002	**Digital Surf**, Besançon (France) ten-week internship: development of a 3D display engine for the *Mountains* metrology surface analysis software.
Oct.-Dec. 2001	**French Health Ministry**, 35 study-day mission: development of a C API used by hospitals to access a proprietary database.

▷ EDUCATION

2005–2008	**University of Oxford** (United Kingdom), DPhil in Computer Science.
2003–2004	**University of Oxford** (United Kingdom), MSc in Computer Science obtained with Distinction.
2001–2003	**Institut d'Informatique d'Entreprise**, Évry (France), Postgraduate School in Computer Science affiliated to the *Conservatoire National des Arts et Métiers (CNAM)* for the training of computer scientists and engineers.
1999–2001	**Lycée Victor Hugo**, Besançon (France), Intensive preparation for the competitive nationwide entrance examination to French engineering schools ("*Grandes Écoles d'Ingénieurs*").
1999	**French Scientific Baccalauréat** (equivalent of British A-level) with special emphasis on Mathematics and Physics, obtained with distinction.

▷ SKILLS

Languages:

French: native, English: fluent, Italian: basic, Chinese: beginner.

Computer Technologies:

OS: Windows, Linux, Solaris; *Languages:* C#, Caml, OCaml, F#, C/C++, Prolog, Pascal, Visual Basic, Java, Fortran, Windev, x86 & 68k assembly, Perl, Matlab; *API:* Win32, .NET, ASP.NET, SSIS, SSRS, OpenGl, DirectX, ActiveX, MFC, COM, Corba; *Web:* HTML, PHP, SQL; *Protocol:* TCP, UDP, FTP, HTTP; *Formal method:* B, Z, Promela, CSP, NuSMV; *Others:* TEX, LATEX, CVS/SVN.

Research interests:

- Theoretical Computer Science (λ-calculus, game semantics, complexity theory, algorithms, formal verification, graph theory);
- Computer Graphics (3D rendering, lighting, shadow, surface representation, robot simulation).

▷ AWARDS & GRANTS

- **EPSRC grant** funding a 3-year DPhil course at the University of Oxford, Jan. 2005-Dec. 2007;

- **Domus Scholarship**, Linacre College, University of Oxford, 2005;
- Member of the French delegation at the *International Olympiad in Informatics (IOI)*, Turkey, 1999;
- Ranked $7th$ at the French national computer science contest *Prologin*, Paris 1999;
- **Jury Prize** and **High-school Prize** in the *Soft Qui Peut* contest in 1996 for the development of a pedagogical stock management software;

▷ PAPERS & TALKS

- *The Safe Lambda Calculus* with C.-H. L. Ong, In Logical Methods in Computer Science, Vol. 5, Issue 1 (2009);
- *A concrete presentation of Game Semantics*, talk, GALOP workshop 2008 and BCTCS 2008.
- *The Safe Lambda Calculus* with C.-H. L. Ong, In Proceedings of the 8th International Conference on Typed Lambda Calculi and Applications (TLCA) 2007, LNCS 4583;
- *The Safe Lambda Calculus*, talk, BCTCS 2007 (British Colloquium in Theoretical Computer Science);
- *Termination analysis of lambda calculus and a subset of core ML*, talk, BCTCS 2005.

▷ CONFERENCES ATTENDED

Bonn Games Spring School 2005; BCTCS 2005; PAT 2005 (Program Analysis and Transformations); Marktoberdorf International Summer School 2005; CSL 2005 (Computer Science Logic); BCTCS 2007; TLCA 2007 (Typed Lambda Calculi and Applications); ETAPS 2008, GALOP workshop; BCTCS 2008.

▷ PROJECTS DESCRIPTIONS

Academic
- DPhil: My thesis is concerned with a syntactic restriction for higher-order programming languages called *safety*. This property has good algorithmic characterisations (in terms of pushdown automata) and lends itself well to software verification (the MSO logic on infinite trees generated by safe higher-order grammars is decidable with a complexity of n-EXPTIME for an order-n grammar). The thesis provides an analysis of *safety* under the view of language complexity and game semantics.
- Model checking tool in OCaml/C++: This is joint work with Matthew Hague and Luke Ong. We developed a SAT-based model checker in OCaml/C for verifying Linear Temporal Logic formulae on finite state machine programs expressed in the NuSMV specification language. Our approach combines McMillan's acceleration technique for the SAT-based Bounded Model Checking problem based on Craig interpolants, together with the use of Linear Weak Alternating Automata.
- HOG. An interactive research tool (developed using a preliminary version of F#) that illustrates the correspondence between higher-order recursion schemes and collapsible pushdown automata.
- MSc project thesis: I developed a termination analysis program in OCaml for Core ML programs based on the Size-Change Termination technique invented by Neil Jones *et al.*

Industrial
- **Univerty of Franche-Comté Computing Laboratory (France)**, 2003: I worked in the *Formal and Constraint Techniques* team which develops tools for validation and verification of critical software (lifc.univ-fcomte.fr). I produced a mathematical model of the *Common Electronic Purse Specification*–a 300-page specification–using the B formal method. The model allowed the team to find bugs and determine missing features in the tool.It is now used as a reference benchmark for the *BZTT* test generation tool.

- **Digital Surf**, 2002: Digital Surf (www.digitalsurf.fr) is a leader in surface metrology and image analysis technologies. The project consisted in modernising the surface visualisation features

of *Mountains*, the company's flagship product. I completely rewrote the out-dated 3D engine replacing it by an OpenGL-based engine featuring cutting-edge visualisation techniques (surface rendering, shadowing). I also changed the user interface to expose new features of the visualisation control. MCF was used for the user interface, and OpenGL for the graphics and Visual SourceSafe for source control management. I developed team work skills and learnt how to work on a pre-existing project with a substantial C++ code base. My contribution had a direct and visible impact on the company: it became a showstopper feature for the company's main product.

- **French Health Ministry**, 2001: Implementation of a C API for accessing and modifying a proprietary database designed by the Health Ministry to record surgical acts performed on patients at the hospital. Despite the particularly short time frame, I have managed to see the project through completion in due time while concurrently pursuing my studies. This API is now used by third-party companies to develop healthcare software for private and public hospitals.
- **Microsoft**: I work in the Core Operating System Division in the Application and Device Compatibility team. We design tools and in-box features to improve compatibility of future version of Windows with third-party software and hardware. Projects I worked on include application identification, telemetry reporting (data sent by Windows users), and the development of a framework used in lab to analyze daily builds and detect code changes that may break application compatibility.

Spare-time

- Developed two 3D rendering engines with software-based rendering pipeline (one written in Caml light and the other in C++;
- Hardware chip-card reader for user identification;
- Cracklock: a software utility for Windows performing useful Win32 Kernel API hooking;
- Contribution to SumatraPDF open-source PDF viewer: I have implemented LaTeX-related features (source synchronisation, automatic refresh, and other improvements)
- LaTeX compilation daemon tool: accelerates compilation of LaTeX documents by precompiling the document preamble and automatically recompiling the document core upon modification;
- Games written in C++/Visual Basic;
- Designing of a 3D animation sequence using a Silicon Graphics station at CNBDI in Angoulême (France).

▷ REFERENCES

Professor C.-H. Luke Ong
Dr Andrzej Murawski