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Curriculum Vitæ

Education

1997   Ph.D. in Theoretical Physics. Universitat de Barcelona.
1992   Master's degree in Theoretical Physics. Universitat de Barcelona.
2010   Bachelor's degree in Computer Science. Universidad Nacional de Educación a Distancia. Madrid.

Professional Experience

April 11 – present   **Co-founder & CTO, BigML, Corvallis/Barcelona/Edinburgh**
BigML is a startup where we're trying to bring together machine learning and big data in fun and useful ways, and democratize AI/ML so that it is accessible to everyone. For the first time in my career, i joined the team as a co–founder, and i'm very active in everything related to software development. My focus has been the design and implementation of the distributed, cloud–agnostic back–end, responsible of the heavy lifting of scalable AI/ML algorithms and data transformations and implemented almost fully in Clojure. I've been also responsible of designing and implementing the two DSLs that are hallmarks of our platform (*Flatline* for data transformations and *WhizzML* for scalable ML workflows. As the CTO of the company, I've been also overseeing the overall design of the platform, trying to ensure we remain faithful to its initial vision (API–first, fully automatable, user–friendly), and ensuring our software development practices are up to a continuosly deployed, reliable system on the cloud that can also be installed on premise in very heterogeneous environments.
In 2020, we opened *BigML Alba Labs, Ltd*, our branch in the UK based in Edinburgh, where I live since as its director.

Aug 08 – March 11   **Software Engineer, Oblong Industries, Barcelona/Los Angeles**

Responsibilities: As part of Oblong's development team, I participated in the design and implementation of several of the libraries and frameworks constituting our platform, g-speak.

Technologies: At Oblong, I was finally fulfilling my dream of working on technologies with the potential of changing the way we use computers. As a software engineer participating in the development of the *g-speak* platform, I used programming languages ranging from C to Scheme, with a stress on C++; image and video processing libraries such as OpenGL or Gstreamer; and several in-house frameworks dealing with gestural interfaces and distributed computing, among other technologies. I also authored the Java version of our low-level networking protocols, and used them in a couple of Android demo apps.

In the end, it was clear that all the action was moving to Oblong LA, and i didn't want to move to Los Angeles. More importantly, it was also clear that the views on software design and development cherished by Oblong's founders were not always the ones that i favour. It was high time to make my own mistakes and become a co-founder of my own company.

Jul 07 – Jul 08   **Software Engineer, Google, Zürich**

Technologies: My work at Google revolved around the technologies underlying web search—that is, I became pretty well acquainted with technologies such as mapreduce, bigtable or the google file system—with an additional focus on quality issues (in the sense of providing automatic ways to assess the suitability of web contents for certain applications).

Professional Experience (continued)

After a year at Google, it was clear that having an impact, however small, in the company was really, really hard (at least to me). I also had the growing feeling that my vision of the future of computing and Google's were not really aligned. So, despite the many niceties associated with Google, I decided to go forward and pursue my dreams elsewhere.

Jun 05 – Jun 07   **Software Engineer, Institute of Space Studies of Catalonia (ICE/IEEC), Barcelona**

Project: LISA Pathfinder (NASA/ESA), a satellite-based experiment to assess the feasibility of LISA, a space-based gravitational wave detector.

Responsibilities: Design and implementation of two embedded control modules responsible of coordinating and monitoring the scientific instrumentation in the spaceship, as well as data acquisition. In addition, I've been in charge of writing and deployment of QA infrastructure (coding and testing standards, source control management tools, etc.).

Technologies: One of the modules runs on the bare metal, so it required the implementation of a small (soft) real-time kernel and drivers. The second one, having hard real-time constraints, is being implemented on top of RTEMS. Our hardware includes a MIL-STD-1553 communications bus and controller, a RISC processor (ERC32), and EDAC-protected memory chips.

Languages & tools: C for the main modules, Python and Elisp for test software and glue. *Cantata* for unit testing and coverage. The host environment is centered around Emacs running on Debian. Doxygen and LaTeX (with custom macros) for documentation. Bugzilla and GNU Arch for issue tracking and SCM. MoinMoin as knowledge-base and general coordination tool.

For more details, see this blog entry and my short review Mission-critical software development in LISA Pathfinder.

Some engineers at Google were reading my *programming musings* blog and liked it enough to contact me. After a bunch of interviews, I had an offer on the table to join Google's Zürich office which was difficult, if not impossible, to refuse.

Sep 03 – Sep 05   **Associate Professor of Computer Science, Autonomous University of Barcelona**

Teaching

Programming methods and technologies, full-year sophomore course.

Computer Networks, half-year graduate course.

Short (30–40 h) courses on GNU/Linux Server Administration and Java Cryptography.

In addition, I used WikiWikis as a teaching aid for the first time in that university. They are nowadays quite popular among other professors of the AUB, even as an evaluation tool.

Research on Mobile Agents and distributed systems, with a focus on security issues (see for instance this AAMAS 04 paper) and continuation-based code migration. This paper, written in colaboration with Apache Software Foundation's Torsten Curdt, gives a good overview of our work on the latter.

Teaching was an interesting experience, but the lack of interest of many of the students was a bit disheartening. After a couple of years I felt ready again to plunge into software development, and the offer to participate in LISA Pathfinder was anything but easy to refuse.

Sep 01 – Aug 03   **Software Responsible, Scytl Online World Security, Barcelona**

Professional Experience (continued)

Responsibilities: I was among the initial employees of this startup, focused on secure e-voting systems, and, as the senior software engineer, was in charge of organising and coordinating its whole development team (5-8 people). This covered the full gamut from development and QA standars to setting up our environment.

Project: As a developer, I was the technical leader of Pnyx, the company's main product. It consisted on a set of distributed, communicating processes, highly portable (Linux, FreeBSD and Windows were supported) and with stringent reliability, security and QOS requirements.

Technologies: State of the art cryptograhic protocols (built upon public key cryptography) were implemented with C++ as the main implementation language. Interprocess communication and network architectural patterns based on Schmidt's book and libraries (ACE) conformed the base of our development (together with Openssl). We also took the chance to learn and use template metaprogramming and get acquainted with the excellent *boost* library. Stroustroup, Alexandrescu, Sutter and Meyers were our references by then.

Languages & tools: C++, as mentioned, but also Java for early prototypes and client-side applets. Our main platform was GNU/Linux/Emacs and, our scripting language, Perl. LaTeXfor documentation, Mantis as BTS, CVS for SCM and Usemod as our knowledge-base.

See this paper I co-authored for more details on the kind of problems we were trying to solve.

Apr 00 – Sep 01   **Software Engineer, ISOCO, Barcelona**

Responsibilities: I joined ISOCO when it was a very young startup looking for investors. As a result, one of my first responsibilities was to help explaining venture capitalists our ideas on my area of *expertise*, namely, personalization. Actually, I was *learning* about it during this process (and far afterwards). ISOCO was an spin-off of a university institute devoted to AI research, and the initial ideas we had were to apply some AI techniques to webapps and other on-line services. Once we got our seven-digits investment (those were the times of the dot-com bubble), I went back to actual software development.

Project: I spent all the rest of my time at ISOCO devoted (first as a developer and eventually as its technical leader) to our personalisation project, *Alice*. An early prototype (for an American assurance company) consisted on a Bayesian decision tree applied to discovering the most adequate assurance policy for a given customer (based on her age, sex, income, and so on). Afterwards, we moved to providing a generic personalisation service for websites based on a forward-chaining rule engine. The main idea was to attach attributes to every clickable item in the site and follow the users navigation through the site's page. From that we obtained a profile and produced life recommendations via our rule engine.

Technologies: All our development was based on the Java standard and, to a lesser extent, Enterprise platform. We used servlets on the server-side and JSPs and tag libraries for the client-side. Swing was the base for our graphical database and rule editors. Being generic, the database attributes and relationships implementations were heavily based on metadata structures which were quite similar to the mechanisms one encounters these days in Apple's Core Data libraries. AI techniques included, as mentioned, Bayesian networks, rule engines (we used initially a home-brewed implementation based on CLIPS and updated later on to a commercial solution) and a bit of data mining.

The things I loved about ISOCO were its highly talented staff and their hacker culture. I learned a lot from them, and people were enthusiastic about making a dent in the web applications space. Unfortunately, when the big money came and the investors got an iron hand on the board of directors, this hacker culture was progressively diluted. After completing the first version of *Alice*, the project was closed (we wanted to add automatic learning capabilities for version 2) and I decided to look for greener pastures. Scytl was founded by a bunch of ISOCO trying to recover its initial, refreshing spirit.

Professional Experience (continued)

Jul 99 – Apr 00   **Software Responsible, Indra Espacio, Barcelona**
(Moving to new responsibilities inside Indra)

Responsibilities: After completing the development and deployment of *Arcanet* (my previous project at Indra, see below), I was assigned the role of Software Responsible for the development of the Earth station of ESA's EGNOS project (the Galileo precursor). As such, I wrote the development and coding standards for the project, wrote the Software Requirements and the Software Architecture, leaving the company after the project's CDR was successfully closed. I also played a very active role in reviewing and selecting the COTS to be used in the project.

Project: We were in charge of developing the Earth stations receiving the GPS signals and distributing them to central computers in the network. The software part was classified as safety critical (level B) by ESA and, therefore, we were under strict development standards and processes based on Civil Aviation's DO-178B and ESA's PSS 06. Our software ran on a commercial RTOS, with soft real time requirements.

Technologies: Most of all, in this project I learned about formal processes and QA methods in the context of a safety critical application development. We received training by TekSci on this kind of development, and, specially on a DO-178B-based software process.

Tools: Since I only worked on the project until the completion of the architectural design, the tools I used were only for requirements gathering (DOORS) and design (Aonix's Software Through Pictures). But I also reviewed candidates for our RTOS (I chose Lynx) and unit testing and coverage (Cantata).

Although EGNOS was a pretty interesting and challenging project, it involved an enormous documentation and QA practices overhead. I realised I was spending most of my time writing and reviewing documentation and, due to my being in charge of coordinating the software development, the situation was not likely to change. I love programming and wanted to keep learning about programming. In addition, ISOCO offered a way out the rigid corporate culture of Indra. So there I went.

Oct 97 – Jul 99   **Software Engineer, Indra Espacio, Barcelona**

Responsibilities: *Arcanet* was my first serious project as a developer. It consisted of a satellite-based telephony system deployed by EUTELSAT, our contractor. A series of central stations connected with regular telephone trunk lines provided access to voice and data services to mobile, portable remote terminals. EUTELSAT satellites mediated in the communication between central stations and remote terminals, using CDMA channels. Indra developed both the hardware and the software for EUTELSAT. I was in charge of developing all the software controlling the central stations. I also took a very active role in the deployment of the final system, spending about forty days at Larnaca's Satellite Station in Cyprus.

Project: Each central station used two redundant computers running Windows NT. The software consisted on a set of intercommunicating, redundant processes providing call processing, PSTN connection, and HW/SW monitoring and control services.

Technologies: Our solution was based on multithreaded processes communicating via UDP messages in a local network. QOS and availability requirements implied strong separation of concerns and special processes dedicated to monitoring (via, e.g., heartbeats) the whole station's software. Some years after finishing my implementation I would realise that I had reinvented many of well known network architectural patterns, creating essentially a poor-man's version of the ACE library (which we used extensively at Scytl).

Languages & tools: C++ was the main language, with Visual C++ 4.5 and 5. SQL Server was used as our database, with much of the business logic for satellite resource management and customer accounting programmed as stored procedures.

Professional Experience (continued)

Although I was the only developer of the programs mentioned above, I learned a lot during this project by actually hands-on work and, of course, lots of reading (cover-to-cover C/C++ Users Journal was my favourite those days). Participating in the acceptance tests run by our contractor and in the deployment of our hardware and software in a real satellite station, although only tangentially related to software development, was also quite enriching.

Non-professional Experience

During all these years as a professional programmer, I've devoted much of my free time to learn more about computers and computer programming, specially in those areas that were absent in my daytime jobs. Thus, I'm a long time user of GNU/Linux systems and always keep a Debian machine near me. I have also developed a passion for everything related to programming languages.

GNU MDK   GNU MIX Development Kit has been my vehicle to learn about Free Software tools and processes, as I kept adding new features and using new development tools in each release.

MDK is a development environment emulating Donald Knuth's MIX computer, including a virtual machine, a bytecode compiler, a debugger, graphical interfaces and (my favourite feature) extensibility via Guile.

MDK became an official GNU package by the end of 2000 and its Users Manual (which I authored) was published in printed form by the GNU Press in 2003.

FUEL   Factor is a stack-based programming language in the Forth tradition, with very powerful introspection capabilities and an awesome development environment. I took advantage of those capabilities to implement an Emacs interaction mode providing functionalities typical of Lisp environments such as Slime, and some nice refactoring add-ons.

The system is called FUEL, and is part of Factor's distribution. See this blog entry by Factor's creator for a summary of FUEL, including a screencast.

Geiser   After finishing FUEL, I had a lot of generic Elisp code dealing with interactive development. That code, my love for Scheme, and a sane dose of Slime-envy gave rise to Geiser, an enhanced Emacs-Scheme interaction mode aiming at providing a FUEL-like environment as powerful as Slime for CL, supporting a variety of Scheme implementations. Right now, Geiser provides support for Guile and MzScheme, together with a good subset of the functionality that it aims at. Good enough, in my opinion, to be the best Scheme interactive environment for the supported implementations (at least for Emacs aficionados).

Xmobar   xmobar is a nice text-based status bar originally designed and implemented (in Haskell) by Andrea Rossato. In December 2010, I accepted Andrea's kind offer to become ¡nop¿xmobar's maintainer, after having contributed a bunch of patches.

Lightweight status monitors have always been a must-have in my desktop, and over the years i've used many of them (¡nop¿xload in the olden days, gkrellm, conky...), so I guess it was only natural that I ended up maintaining one. That xmobar is written in Haskell is a big plus in my book.

Snippets   Other contributions to existing projects:

I wrote the original version of the *diagram browser* included in Dia.
Various contributions to Tom Lord's Hackerlab library.
Contributions to the Scheme interpreters/compilers Pika and Guile.
A handful of Emacs packages and extensions in Elisp.
See also my codeberg.org page.

Non-professional Experience (continued)

Languages   My appreciation of (and eventually passion for) functional/dynamically typed languages began while reading SICP and *The little/seasoned Schemer* books. I fell in love with Scheme and, after reading *On Lisp* and playing with Slime, with Common Lisp. I've written many short programs in Lisp since then, and Conjure was my first serious attempt at doing serious stuff. I've also gained an appreciation for the ML-family of languages, specially Haskell, but I have yet to learn it well. I have also certain familiarity with more theoretical aspects of programming languages, including category theory.

Some of my experiences and thoughts on this field are covered in my Programming Musings blog (the links above point to some of my entries in there).

Publications

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