

Paul Biggar

CONTACT INFORMATION

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At a glance

OVERVIEW

Excellent generalist seeks interesting and challenging development position. I have a PhD (Compilers, optimization, scripting languages) and significant real-world experience, with broad practical knowledge, esp. related to performance.

PROFESSIONAL ACHIEVEMENTS

- **Google tech talk:** *Compiling and Optimizing Scripting Languages*
- Maintainer of *phc*, an open source PHP compiler.
- Accepted into *Y Combinator*, a startup incubator (2-3% acceptance rate)
- **Ph.D. Thesis:** *Design and Implementation of an Ahead-of-Time PHP Compiler*
- Accepted for Google Summer of Code 2006 (16% acceptance rate)
- PhD sponsorship provided by IRCSET (17% acceptance rate)
- **Undergraduate Thesis:** *Fast Sorting on Modern Computers*

MAJOR SKILLS

Specialist knowledge:

- *Language implementation:* Compilers, interpreters, JITs, garbage collection.
- *Scripting language research:* semantics, type systems, programming idioms, implementation techniques, static analysis.
- *Program Analysis:* Optimization, alias- and type-analysis, whole-program analysis, automated bug finding.
- *Data structures/algorithms:* Sorting, caches, branch prediction.

Programming languages:

- *Significant experience:* C++, Python, Javascript, C, Perl, PHP, Java, Bash
- *Other:* Ruby, Assembly, Lua, Calypso (Prolog dialect), OCaml/F#, Haskell

Detailed Information

EDUCATION

Ph.D. Computer Science
Dr. David Gregg

October 2005 - October 2009
Trinity College Dublin, Ireland

- **Title:** *Design and Implementation of an Ahead-of-Time Compiler for PHP*
- **Area of Study:** Compilers, Static Analysis, Optimization, Scripting Languages.
- Made novel contributions related to compilation and static analysis of scripting languages, particularly PHP. Created new algorithm for combined alias analysis, type inference and constant propagation. Investigated use of SSA with PHP.
- Wrote most of *phc*, a PHP compiler, including an advanced optimizer.
- Also worked on escape analysis for *gcc*.
- Sponsorship and stipend provided by IRCSET (17% acceptance rate).

B. A. (Mod.) Computer Science
School of Computer Science and Statistics

October 1999 - June 2004
Trinity College Dublin, Ireland

- 1st Class Honours Degree
- **Final Year Electives:** Advanced Compiler Design, Hardware Compilation
- **Undergraduate dissertation:** *Fast Sorting on Modern Computers:* Investigated the properties of sorting with respect to branch prediction and caches, including cache-optimized sorts. Work published in ACM journal. Made numerous novel discoveries:
 - More efficient means of updating heaps,
 - Method for doubling the speed of radixsort by halving cache misses,
 - Insertion sort has just one branch misprediction per key,
 - Relationship between the performance of quicksort and entropy of keys.

RECENT INDUSTRY EXPERIENCE	<p>Javascript engineer, Mozilla July 2010 - present</p> <ul style="list-style-type: none"> • Added features and fixed bugs related to: <ul style="list-style-type: none"> • just-in-time trace-compilation with TraceMonkey, • just-in-time method-compilation with JaegerMonkey, • implementation of interpreter and standard library, • memory allocation in object heap, • system-level memory allocation with jemalloc. • Expanded test automation suite and code coverage. • Helped expand team communication and beginner documentation, and reviewed patches from other team members. • Improved benchmark repeatability. <p>Co-founder & CEO, NewsLabs November 2009 - June 2010</p> <ul style="list-style-type: none"> • Secured funding from Y Combinator, an exclusive start-up programme run by Paul Graham. • Designed, co-created, and marketed scalable commenting system on Google App Engine. • Pivoted based on customer feedback to design NewsTilt, a product to allow journalists become "a TechCrunch for their niche". Designed and managed NewsTilt based on customer development from respected journalists. Marketed product to journalists, attracting 200 potential writers. Launched product with 25 journalists within two months of pivot. • Featured in TechCrunch and the Wall Street Journal, amongst many others.
OTHER PROFESSIONAL EXPERIENCE	<ul style="list-style-type: none"> • Wrote a Linux driver for Eyetoy for the PS2, in C (Sony), • Wrote a C++ UPnP client (Demonware), • Co-founded a security consulting company, mostly using Java and Perl, • Acted as a Telecoms Consultant on iMode (O2), • Developed banking software in Java (Credo), • Internet Support Technician (Eircom).
PUBLICATIONS (IN SUBMISSION) (CACHED)	<p>P. BIGGAR and D. GREGG, One Representation to Rule Them All, (Combining analyses on SSA with On-Demand SSA Construction), <i>PLDI '09 FIT Session</i> (June 2009). people.csail.mit.edu/rabbah/conferences/09/pldi/fit/papers/fit09-01-biggarpdf</p> <p>P. BIGGAR, E. DE VRIES and D. GREGG, A Practical Solution for Scripting Language Compilers, <i>SAC '09: ACM Symposium on Applied Computing (2009)</i> (March 2009). portal.acm.org/citation.cfm?id=1529282.1529709</p> <p>P. BIGGAR and D. GREGG, Sorting in the Presence of Branch Prediction and Caches, <i>Technical Report TR-CS-2005-57, Department of Computer Science, Trinity College Dublin</i> (2005). www.scss.tcd.ie/publications/tech-reports/reports.05/TCD-CS-2005-57.pdf</p> <p>P. BIGGAR, Patently Counter-productive, <i>Business and Finance, Issue 46</i> (November 2007). www.businessandfinance.ie/publications/GoldenSpidersSupp07/index.htm</p> <p>P. BIGGAR, N. NASH, K. WILLIAMS, and D. GREGG, An Experimental Study of Sorting and Branch Prediction, <i>ACM Journal of Experimental Algorithmics</i> (June 2008). portal.acm.org/citation.cfm?id=1227161.1370599</p>
TALKS	<p>P. BIGGAR, <i>Compilers and Interpreters and JITs, Oh My, StackOverflow DevDays San Francisco</i> (October 2011 (in preparation)). http://devdays.stackoverflow.com/san-francisco/</p>

P. BIGGAR, *How not to Design a Programming Language*,
StackOverflow DevDays London (October 2009).
stackoverflow.carsonified.com/events/london/

P. BIGGAR and D. GREGG, On the use of SSA with scripting languages,
Static Single-Assignment Form Seminar (April 2009).
www.prog.uni-saarland.de/ssasem/

P. BIGGAR and D. GREGG, Compiling and Optimizing Scripting Languages,
Google, Facebook, LLNL and OssBarCamp (March 2009).
youtube.com/watch?v=kKySEUrP7LA

INTERESTS

I program as a hobby outside of work. I worked on `phc` in my spare time for a year before researching using it for my Ph.D., and am currently `phc`'s maintainer. **Current side-projects** include a **build system in Python**, several Firefox extensions, a **Mercurial extension**, and a self-hosting Javascript JIT.

I infrequently write technology essays on my **blog**.

I also play poker, love to ski, and practice martial arts (including a Black Belt in Karate).

REFERENCES

David Gregg

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Relationship: Ph.D. supervisor; undergraduate dissertation supervisor

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