



On Building a Successful Research Group

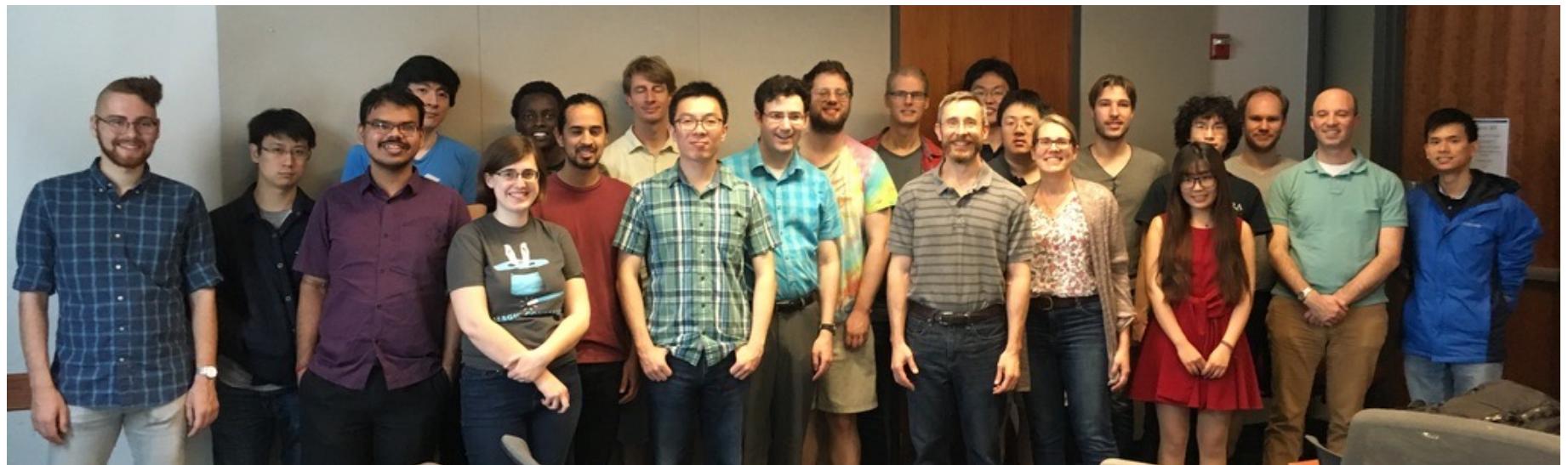
Stephanie Weirich
University of Pennsylvania

WHAT THIS TALK IS NOT ABOUT: how to fund and lead a large research lab, with 2-3 postdocs, 8-15 PhD students, and a bunch of undergrads. I don't know how to do that.

WHAT THIS TALK IS ABOUT: how to create an environment where professors, postdocs, PhD students, undergraduates can thrive together.



PL Club and friends



May 11, 2018

What is PL Club?

- Benjamin Pierce, Steve Zdancewic, Stephanie Weirich and friends
- Group of like-minded faculty, students, and researchers interested in *programming languages* (broadly construed)
- Venue for research talks & practice presentations
- *Sometimes* reading group
- Host for visitors
- Social organization for fun activities



PL Club Highlights

2002	Steve and I join Benjamin Pierce at Penn
2000-2004	ICFP Programming Competitions
2005	POPLMark Challenge
2007	Software Foundations textbook
2010	CIS 120 Redesign
2017	The Science of Deep Specifications
2020	Virtual ICFP
2023	REPL program



ICFP Programming Contest

The screenshot shows a web browser window with the title "ICFP Programming Contest 2000: PLClub". The URL in the address bar is "kb.ecei.tohoku.ac.jp...". The page content is as follows:

ICFP Programming Contest 2000: PLClub

This fall, we (Team PLClub) participated in the [Third Annual ICFP Programming Contest](#) and were lucky enough ([here](#)) about how we did it.

Who are we?

2000 – First Place!

In the second evening of [ICFP 2000](#), when [Greg Morrisett](#) announced the 1st prize winner, I could almost hear people wondering: "hey, I know [Camlle 'R' Ue](#) and [Galois Connections](#), but who in the world are PLClub?"

2002 – First Place again!

So who are we? In short, we are graduate students of [University of Pennsylvania](#) in [Philadelphia](#), Pennsylvania, though we all have somewhat complex status.

Jerome Vouillon
is originally from France. He is a post-doc researcher at Penn and almost finished his PhD at [INRIA](#). He was the team leader and the main programmer. He wrote most of the code.

Haruo Hosoya
is originally from Japan. He is also a post-doc researcher at Penn and almost finishing his PhD at [U-Tokyo](#).

Eijiro Sumii
is also originally from Japan. He is a visiting scholar at Penn and (administratively) a PhD student at [U-Tokyo](#). He was the sub programmer. He wrote this document. Forgive me for my poor English...

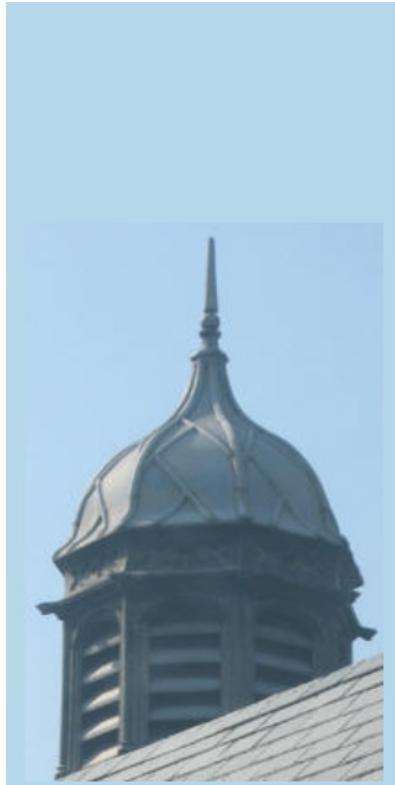
Vladimir Gapeyev
is originally from Kazakhstan. He's a PhD student at Penn. Actually, he is the only real Penn "student" (in the narrow sense) in our team.

pauillac.inria.fr/~xleroy/

ICFP Programming Contest

2004 – Hosts!

The screenshot shows a web browser window for the URL cis.upenn.edu/~piclub/contest/. The page has a green header bar with the text "The Seventh Annual ICFP Programming Contest". On the left, there's a yellow box containing the text "2004 – Hosts!". Below the header is a brown banner with the letters "cfp" and the year "2004". To the right of the banner, the text "The results are in!" is displayed above a grid-based simulation environment. The simulation shows several ants (represented by small red and green shapes) moving on a grid. Some ants are carrying food (red and green dots). In the center of the grid, the letters "ICFP" are formed by the ants. The bottom of the page features a sidebar with links: Main, Introduction, News, Dates, FAQ, Rules, Results, Task, Lists, Team, and History. At the very bottom, there's a W3C HTML 4.01 validation logo and a footer note: "\$Id: index.php,v 1.3 2004/09/23 21:52:18 jnfoster Exp \$".



PEOPLE

- Benjamin Pierce
- Stephanie Weirich
- Steve Zdancewic

PUBLICATIONS

- All PLClub publications

SEMINARS AND COURSES

Programming Languages Research at Penn

RESEARCH PROJECTS

- Synchronization
 - Unison
 - Harmony
- Language support for XML
 - XDuce
 - Xtatic
- Security-oriented languages
- Type-directed programming
 - Extensible intensional type analysis
 - Type-directed Java
- POPLmark (formerly Mechanized Metatheory for the Masses!)

POPL mark

navigation

- [The POPLmark Challenge](#)
- [Community portal](#)
- [Current events](#)
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- [9 Acknowledgement](#)

The POPLmark team:

- University of Pennsylvania: [Brian E. Aydemir](#), [Aaron Bohannon](#), [Nate Foster](#), [Benjamin Pierce](#), [Jeff Vaughan](#), [Dimitris Vytiniotis](#), [Geoff Washburn](#), [Stephanie Weirich](#), [Steve Zdancewic](#)
- University of Cambridge: [Matthew Fairbairn](#), [Peter Sewell](#)

POPLmark Challenge (2005)

- Brian E. Aydemir, Aaron Bohannon, Matthew Fairbairn, J. Nathan Foster, Benjamin C. Pierce, Peter Sewell, Dimitrios Vytiniotis, Geoffrey Washburn, Stephanie Weirich, and Steve Zdancewic. **Mechanized Metatheory for the Masses: The POPLmark Challenge**. In *The 18th International Conference on Theorem Proving in Higher Order Logics (TPHOLs)*, pages 50--65, Oxford, UK, August 2005.
- Workshop on Mechanizing Metatheory (2006-2010)
- POPL 2008 tutorial
- Brian Aydemir, Arthur Charguéraud, Benjamin C. Pierce, Randy Pollack, and Stephanie Weirich. **Engineering Formal Metatheory**. In *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL)*, pages 3--15, January 2008.
- Benjamin C. Pierce and Stephanie Weirich. **Preface to Special Issue on the POPLMark Challenge**. *J. Autom. Reasoning*, 49(3):301--302, 2012.

Software Foundations (2)

(** * Software Foundations, Formally
Benjamin C. Pierce
Version of 9/4/2007

Before handing in this file with your homework solutions,
please fill in the names of all members of your group:

FILL IN HERE

*)

(* ===== *)
(** * LECTURE 1 *)

(** This file develops basic concepts of functional programming,
logic, operational semantics, lambda-calculus, and
static type systems, using the Coq proof assistant. It
is intended to be "read" in an interactive session with
Coq under a development environment -- either CoqIDE or
Proof General.

*)

Software Foundations

Benjamin C. Pierce
Arthur Azevedo de Amorim
Chris Casinghino
Marco Gaboardi
Michael Greenberg
Cătălin Hrițcu
Vilhelm Sjöberg
Brent Yorgey

with Loris D'Antoni, Andrew W. Appel, Arthur
Chargueraud, Anthony Cowley, Jeffrey Foster, Dmitri
Garbuзов, Michael Hicks, Ranjit Jhala, Greg Morrisett,
Jennifer Paykin, Mukund Raghothaman, Chung-chieh
Shan, Leonid Spesivtsev, Andrew Tolmach, Stephanie
Weirich, and Steve Zdancewic

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Version 4.2 (Spring, 2017)

CIS 120 Redesign (Fall 2010)

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CIS 1xx Resources

CIS 120 Resources

Homework

Labs

Lectures

Exams

**CIS 120 (Spring 2011)
Towne 100 MWF 11:00 - noon**

Description

The goal of CIS 120 is to introduce students to computer science by emphasizing the *design* aspects of programming. Students taking CIS120 will learn how to design programs, including:

- test-driven development
- data types and data representation
- abstraction, interfaces, and modularity
- programming patterns (recursion, iteration, events, call-backs, collections, map-reduce, GUIs, ...)
- functional programming
- how and when to use mutable state
- inheritance and object-oriented programming.

The material in CIS120 was revamped during Fall 2010. Spring 2011 is the first semester that the new material will be offered to all students.

New CIS120 vs. old CIS120

How do the two versions compare?

- Both versions of the course cover the same fundamental concept. The old course placed greater emphasis on the details of the Java language. The new course also teaches Java, but with a greater emphasis on functional programming (OCaml) during the first several weeks to expose students to a different way of thinking. The new material does not include Python.
- To give you an idea of how the course content breaks down by platform, we used Java for approximately 24 lectures and then moved to Python. We now use OCaml for approximately 18 lectures and then moves to Java again. Both versions prepare students for the rest of the CIS curriculum.
- The prerequisites remain the same. The difficulty level between the two versions of the course will be similar.
- We believe that the new material for CIS120 (combined with the new material for CIS110) will produce stronger Java programmers than the old material, by starting students with functional programming concepts.

 **Harshal S Chhaya**
@hschhaya

My son's intro CS class at Penn a few years back was in OCaml.

I was really glad.

He learned a whole new way to think. And I learned a lot too.

6:36 PM · Jan 10, 2024 · 163 Views

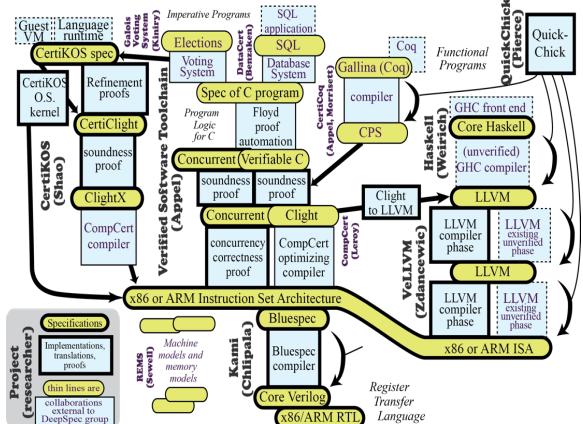
1 Comment

4 Likes

Bookmark

Share

Science of Deep Specification (2017)



Appel
Princeton



Chlipala
MIT



Pierce
U. Penn



Shao
Yale



Weirich
U. Penn



Zdancewic
Princeton

- PL Club:**
- QuickChick
 - hs2coq
 - Vellvm
 - interaction trees
 - verified web server

Virtual ICFP 2020



Thu 20 - Fri 28 August 2020
Online Conference

Attending ▾

Program ▾

Tracks ▾

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Research Experiences for undergraduates in Programming Languages (2023-?)

- NSF supported multi-year REU program
- Driving force Ph.D. student: Joey Velez-Ginorio
- PL Club's emphasis on community



The screenshot shows the REPL website's header with the logo and navigation links: Home, People, Research, PLClub+, and Apply. Below the header is a photograph of seven students standing in front of the ENIAC computer at the University of Pennsylvania. The background includes the ENIAC machine and a sign that reads "THE WORLD'S FIRST ELECTRONIC GENERAL-PURPOSE DIGITAL COMPUTER". The Penn Engineering logo is visible in the bottom right corner of the photo.

What is REPL?

REPL (Research Experiences for Undergraduates in Programming Languages) is a summer program designed to expose students to research in programming languages and prepare them for graduate study in the field. Over the course of 10 weeks, REPL participants will conduct research with faculty and graduate students from [PLClub](#), Penn's research group in programming languages. Students will also attend [PLClub+](#): a series of activities, seminars, and workshops intended to give them the tools they need to succeed in programming languages research.

What makes PL Club Special?

- Supportive, friendly, inquisitive environment
- High standards of academic rigor
- Ambitious impact
- Fun!





What makes
it all work?

Respect everyone

- Your students work **with** you not **for** you
 - Your job is to guide them to success
 - Their success makes **you** look good
-
- Recruit students that are smarter than you
 - Demonstrate respect: listen to their ideas

Collaborate widely

- I couldn't have PL Club without Steve and Benjamin
- Students need someone else (besides you) to talk to
- Students need someone else (besides you) to listen to/learn from
- Look for collaborators even if across locations and areas



Develop Community

- Develop shared interests and vision
 - Get excited about new ideas together!
-
- Get everyone together at least once a week
 - Engage with the group
 - Ask students to contribute to the community so that they will value it (i.e. organize seminars, host visitors, give talks, volunteer at conferences)



NEW JERSEY
PROGRAMMING LANGUAGES AND SYSTEMS
SEMINAR

May 19, 2023
University of Pennsylvania

Build Trust

- Research requires risk. If you knew what you were doing, it wouldn't be research
- **Students** need to trust **you** enough to bring their problems to you (i.e. research means failing fast)
- **You** need to trust **your students** enough to give good notes

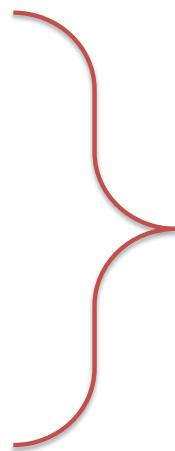
Support

- Happy people do their best work
- Check in on your student's non-academic needs
- Give them time and space to solve problems
- Encourage social connections (board games, etc.)



Successful Research Group

- Respect
- Collaboration
- Community
- Trust
- Support



None of this is difficult
But you have to think about it
And it is worth doing



On Building a Successful Research Group

Stephanie Weirich
University of Pennsylvania