

PHANTOM WORKS: A MATHEMATICAL INTERNSHIP AT BOEING

During the summer of 2000, I spent a two month internship working at Phantom Works, the “advanced research and development unit” of the Boeing Company. Phantom Works is a center of mathematicians and mathematically inclined scientists working on mathematical problems connected with Boeing’s products.

The opportunity for the exchange was funded by the NSF VIGRE grant administered jointly by the Departments of Mathematics, Applied Mathematics and Statistics. The idea of the exchange is to allow a graduate student to work closely with a mathematics group within Phantom Works, preferably on a project deep enough to enhance the student’s professional training, valuable enough to be of use to the Boeing Company, and yet self-contained enough to allow a significant portion to be completed in two months of full-time work.

My work was done within the Geometry and Optimization group where I met half a dozen graduate alumni of the University of Washington, including two from our own Mathematics Department.

My project was to develop an industrial standard, C language software library capable of generating accurate representations of the efficient frontier or trade-off surface in Multi-Objective Nonlinear Pareto Optimization problems. My program (written in C) uses as its computational core existing single-objective optimizers (written in Fortran) that were already part of Boeing’s collection of internally developed advanced mathematical software.

At the end of the summer’s work, I had successfully completed the software library and had it documented according to Boeing’s internal software library specifications. The code I developed will be part of the Optimization Group’s “beta release” of the larger “Design Explorer” project later this year.

A few reflections on the experience:

1. One doesn’t need to be a “software developer” to develop industrial quality mathematical software. I found that willingness to work hard and to attend carefully to details plus, of course, a reasonable familiarity with the language, is sufficient.

2. An internship like this is an invaluable opportunity to get a low-stress, morale-boosting experience in an industrially oriented mathematical research and development setting. At lunch, around the coffee pots, and at seminars, the mathematicians at Phantom Works were willing to open up windows into their work and its place within the larger context of the Boeing Company. This glimpse into a mathematical world outside academia was to me undoubtedly the most valuable part of it.

3. For those curious: a Masters degree and experience akin to such an internship gets a salary starting at about \$60K doing the kind of work I was doing.

If you’d like to hear more about my internship, drop by to chat or contact me by e-mail.



Assad E.K. Ebrahim
Graduate Student, Mathematics
ebrahim@math.washington.edu

UNIVERSITY OF WASHINGTON AWARDED NSF-CSEMS GRANT

The University of Washington is one of a select number of institutions to receive funding from the National Science Foundation for Computer Science, Engineering, and Mathematics Scholarships (CSEMS). The grant of \$220,000 provides funding for approximately 80 one-year scholarships of \$2,500 to talented, low-income undergraduates in the College of Engineering, the departments of Computer Science and Mathematics, and the Applied and Computational Mathematical Science (ACMS) program. The grant is administered through the College of Engineering and supervised by Professors Edward Lazowska, Department of Computer Science & Engineering and Tom Duchamp, Department of Mathematics.

All recipients of CSEMS awards formally enroll in the job placement program run by the Engineering Co-op Program of College of Engineering. Co-op placement includes an industry mentor for every student, with follow-up by Co-op staff. In addition, all recipient receive a scholarship for membership in a professional society of their choice and participate in quarterly seminars and panel discussions related to professional development, applying to graduate school, and exploring professional careers.

MATHDAY

The eleventh annual Mathday will be held on the campus of the University of Washington on March 19, 2001. On that day 1200 high school students from around the state will attend lectures and panel discussions, participate in hands-on activities, and go on field trips to labs on the campus. This year the plenary speaker will be Cliff Mass from the Department of Atmospheric Sciences. Guest lecturers will include speakers from the Mathematics, Statistics, Computer Science, and Public Health Departments as well as from local companies including Zymogenetics and Microsoft. There will also be field trips to Fisheries, Aeronautics, the HIT lab and activities involving puzzles and geometric models. Undergraduate students, graduate students, staff, and faculty contribute to the success of this exciting, educational day in which students learn about the uses of mathematics in academic and industrial research and development.

DEPARTMENT RECEIVES GIFTS OF BOOKS

We gratefully received a large box of books donated by Dr. Elizabeth (Vaughan) Holmes. Elizabeth received her B.Sc. in Mathematics from us in 1931, and thereafter a PhD in Statistics from Stanford University in 1955. Of special interest to us were seven books by former professors of our Department, E.T. Bell, Z.W.Birnbaum, R.E.Moritz and R.M.Winger. These books are being used to begin a Departmental collection of books written by our faculty. If you have any books written by former UW math professors and would like to donate them to our collection, look for the list of needed books soon to be posted on our department web page, <http://www.math.washington.edu>.

A second gift of books—seven boxes—was provided by a friend of the department, Dorothy Johnson. These books were passed on to the University Library for its use.

We do appreciate these gifts from our alumni and friends.