

An Alternative Career Path: A Glimpse at Opportunities at the National Laboratories

Judith C. Hill
Scientific Computing Group
National Center for Computational Science
Oak Ridge National Laboratory

Most computing professionals gravitate toward a career in industry, be it as a software developer, a network or system administrator, an information technology coordinator, or any of the plethora of career choices available to those with computing backgrounds. A select few post-doctorates may also choose to follow in their advisor's footsteps and join the ranks of academia. However, relatively few computing professionals consider a career path in a government research laboratory, such as those sponsored by the Departments of Energy (DOE) or Defense (DOD). This is surprising, given the variety of opportunities and the attractive work-life balance that are generally available in this sector.

The general purpose of the DOE laboratories is to advance science and technology such that we ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges. While the research and development at these facilities is a mixture of both basic, fundamental science and other much more applied efforts, the commonality between most of the projects is the multidisciplinary composition of the project teams. Further, the scope of research can often only be accomplished at the facilities offered at these laboratories. This is especially true in the areas of high performance computing and computational science research; few companies can offer computing facilities at the scale found in the laboratories and only a few similar facilities are available at universities in the United States.

In the remainder of this article, I'll discuss the myriad career paths available in the laboratories for computing professionals, my perspective on the opportunities to maintain a healthy work-life balance that the laboratories have afforded me, the support networks specifically for women available at various laboratories, and potential avenues for students, both undergraduate and graduate, and others to visit a laboratory for a research experience.

Career Opportunities in the Laboratories

In many respects, a government research laboratory is similar in organizational structure to a large corporation. As with any company, there is basic information technology (IT) services necessary to the daily business, where in this case the business of a laboratory is research and development toward a defined government mission. Thus, desktop computing professionals are needed to support administrative computers, network administrators configure routers and switches to enable the local area network, Tier-1 user support interfaces with researchers and their support staff to resolve immediate issues,

and cybersecurity experts are vigilant in their efforts to protect the entire cyber-infrastructure from any vulnerabilities.

However, many government laboratories are unique in the leading edge computing facilities that they provide. These high performance computing facilities, be it some of the largest parallel machines available in the world or large data analysis facilities, require specific expertise to architect, maintain, and effectively use. The complexity of fielding these world-class resources requires a large human infrastructure with a variety of computing expertise and experience. At the most base level, system and network administrators “keep the lights on”, providing and supporting the basic infrastructure and daily operations of the machine. Computer scientists and software developers provide a myriad of tools, such as the operating system, compilers, debuggers, and scientific libraries. Computational scientists, such as myself, are generally trained in an application domain, mathematics, and computer science and they are the end-users of the resource. All of the above neglects the myriad of electrical and computer engineers required by the computer vendor and its subcontractors to architect and design the computer based on its mission.

One benefit of working at a national laboratory is the many career options that it provides. Although I have described primarily technical roles for those with a computing background, the entire scientific enterprise requires a variety of people with technical specialties as well as people with differing personality strengths. Fortunately, those of us with an engineering or computing background are well-suited to fulfill many of those roles. For example, program managers at the laboratory, those who are responsible for representing the technical work of researchers to funding sponsors, are generally technically competent but also possess the skill of communicating a broad range of scientific work to a layperson. Similarly, technical managers, those who oversee the work of a group of people, again must have a technical understanding of their group’s work but also must mediate when there are disagreements. In my career in the laboratory system, I’ve always felt as though I had options to redirect my career path when I felt stagnant or unchallenged. Because there are many roles for computing professionals within this ecosystem, my career has been exciting and ever changing.

Work-Life Balance in the Laboratories

A topic of common discussion, whether your career takes you to industry, academia, or to a government laboratory, is often the work-life balance that is afforded by the chosen career path and the particular employer. These discussions are not unique to women. As more women are entering and staying in the workforce, both men and women are looking for a healthy work-life balance. I would assert that there is no correct or “one-size-fits-all” answer as to what is “healthy”, but that each person’s healthy balance is his/her own personal choice.

I chose a career path at a national laboratory because of the good work-life balance and my research experiences at another laboratory during summer internships. I wanted a career that focused on scientific research in algorithms and high performance computing. I also enjoyed closely interacting with my colleagues, post-doctoral associates, and graduate and

undergraduate students in a collegial environment. And, because of my research interests, I wanted access to the best computing resources available in the nation. The natural choice for me was a career in the laboratories because it met all of my desires for career opportunity.

As a side benefit, the work-life balance afforded to me at the laboratory fits with my model of what is healthy for me. In particular, we don't operate on a tenure clock, and there are upsides (reduced pressure early in your career) and downsides (perceived job insecurity relative to those in academia) to this. Our maternity leave policies, though varying between laboratories, are often more generous than corporations, but perhaps not as liberal as those in academia.

It has been my experience that while an institution can influence your work-life balance, my choices have dictated that balance even more. When my life has been out of balance in the past, it was because I chose to focus entirely on a project that was of extreme interest to me at that moment in time. Luckily, once recognized, I was able to redirect my work and personal priorities such that I was better balanced.

Affinity Groups for Women in the Laboratories

It is generally observed that there is a dearth of women in the science, engineering and computing professions; unfortunately, the national laboratories are not an exception. However, many, if not all, of the laboratories are sensitive to this problem and are seeking to both recruit qualified female employees and subsequently provide a working environment which promotes retention. For example, at ORNL we have a Women in Computing group that provides both networking opportunities to all computing professionals at the laboratory as well as mentoring opportunities for junior (post-masters, post-doctorates and early career) staff. We also have a Committee for Women, supported by laboratory management, that is charged with (i) promoting the achievements of women in science and engineering at the laboratory and (ii) identifying and communicating concerns with respect to laboratory policies to senior management. Other laboratories, such as Brookhaven, Livermore and Argonne, have similar groups.^{1,2,3}

The DOE and its laboratories are also heavily involved in promoting STEM careers to young women and girls nationwide. For example, the DOE recently launched the "DOE Women @ Energy" initiative⁴, which highlights the careers of women who are role models from across the Department and the laboratories. Many of the laboratories, such as Pacific Northwest and Argonne National Laboratories, offer STEM programs that are targeted to younger women.^{5 6}

Opportunities for Research Experiences at the Laboratories

Often the best opportunity to decide whether a career at a laboratory is a good fit is through a short-term research experience. Most of the laboratories host summer internships, either directly through the laboratory or through the Department of Energy. The best places to find out about opportunities are to either (i) check with the laboratories'

websites directly or (ii) look at the DOE Workforce Development for Teachers and Scientists (WDTS) website⁷. The DOE/WDTS office hosts the most popular undergraduate summer internship program, Science Undergraduate Laboratory Internships (SULI), and a program for professors develop collaborations with a laboratory, the Visiting Faculty Program (VFP).

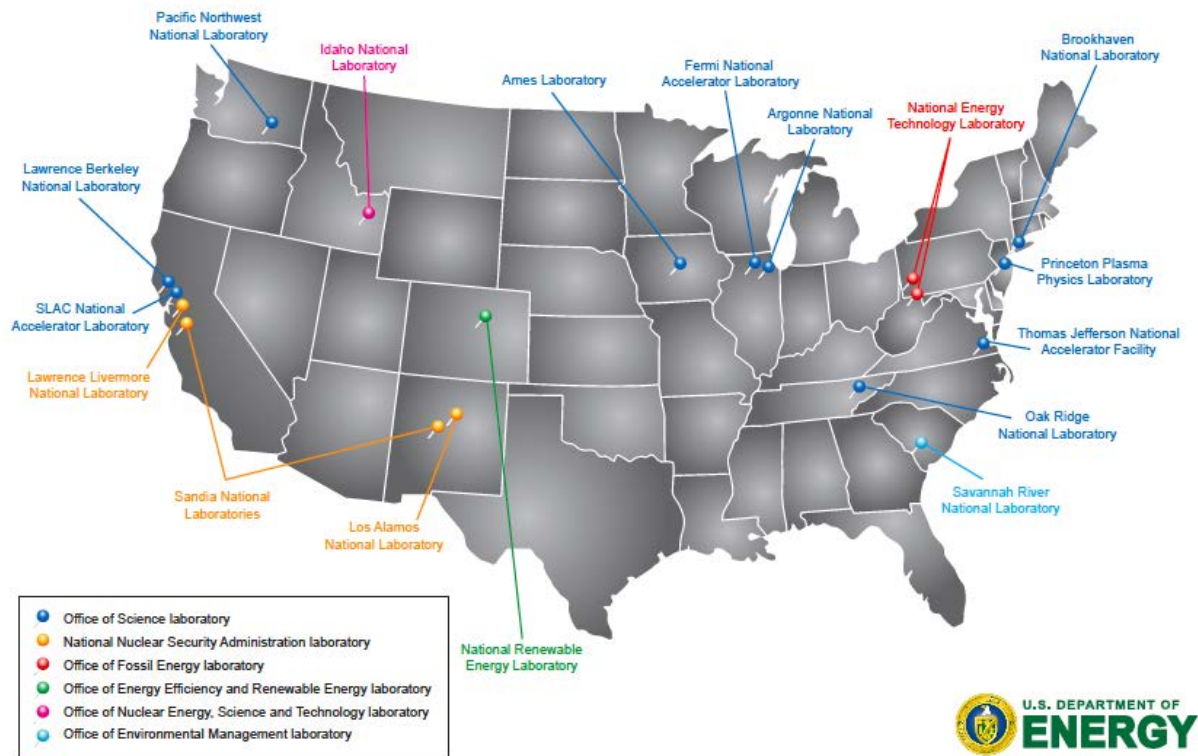


Figure 1. The current Department of Energy National Laboratories. Image courtesy of the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://techportal.eere.energy.gov/commercialization/information_resources/national_laboratories. (NOTE: EERE website content appears to be open domain with appropriate citation)

¹ Argonne Women in Science and Technology Group (<https://blogs.anl.gov/wist/>)

² Brookhaven Women in Science Group (<http://www.bnl.gov/bwis/>)

³ Lawrence Livermore Women's Association
<https://diversity.llnl.gov/php/activities.php#women>

⁴ DOE Women @ Energy (<http://energy.gov/diversity/listings/women-energy>)

⁵ ANL Science Careers in Search of Women (<http://students.ne.anl.gov/schools/scsw.php>)

⁶ PNNL Young Women in Science (YWIS) Program
(<http://science-ed.pnnl.gov/students/precollege/ywis.stm>)

⁷ <http://science.energy.gov/wdts/>