



SUN MICROSYSTEMS LABORATORIES

Sun Labs People

Sun Labs world-wide family of staff and researchers includes 14 researchers who are Sun Distinguished Engineers, recognized by their peers as leaders in a company already world-renowned for engineering excellence. Five of the thirteen Sun Fellows, the highest recognition that Sun awards to technology leaders and innovators, are members of the Sun Labs staff.

Well-known technology luminaries currently working at Sun Labs include:

- Whitfield Diffie – Inventor of public key cryptography
- Bob Sproull – Pioneer in computer graphics and circuit design
- Guy Steele – Co-author of *The Java™ Language Specification*
- Ivan Sutherland – One of the founding fathers of computer graphics and Alan Turing award winner
- Sheueling Chang-Shantz – Developer of stronger, faster, smaller next-generation security solutions
- Dan Ingalls – Principal architect of five generations of Smalltalk and inventor of BitBlt
- Susan Landau – National leader in issues of cryptography and security policy
- Radia Perlman – Inventor of the Spanning-tree algorithm

At Sun, research and development is an important business function that differentiates us from our competitors. Execution is important but innovation is key.

Over the past four years, Sun has spent almost \$8 billion on R&D and that investment continues to grow. Inside Sun, Sun Microsystems Laboratories (Sun Labs) is the sole organization that is devoted exclusively to research.

Sun Labs' primary mission is to be the eyes and ears for Sun and to develop new technical options for Sun. We work to create innovative solutions, demonstrate the viability of the solutions by developing prototypes, and then transfer the technology, including the people who developed the solutions, to the product units.

Our secondary mission is to ask the “unthinkable” questions: What replaces SPARC®, what replaces Solaris™ and what replaces Java™? The answers may be nothing, or may be that we contribute to incremental improvement, or that we develop something to replace SPARC, Solaris or Java.

Innovate . . .

Sun Labs researchers look for novel approaches and methodologies, and can take on projects with high risk or uncertainty. However, Sun Labs research is not done just for the sake of exploration, but to develop technologies that will someday play a significant role in the evolution of technology and society. Current Sun Labs research projects include explorations into:

- Next Generation distributed systems and system software
- Highly distributed, scalable, automatic file storing system
- Security for the Network and the Internet
- Advanced Search for documents, music and speech
- Open Source, royalty-free Digital Rights Management
- Wireless sensors/actuators— Project Sun SPOT
- Expansion of the Java™ Technology Platform on large and small devices
- High-speed circuit design and Proximity Communication
- Next Generation clients and hardware platforms
- High Productivity Computing
- Programming Languages of the future

- Web Programming
- Hardware and software to support scalable, concurrent computing
- Scalable, fault tolerant system for delivery of online content

Sun Labs recognizes the value of collaborations, and actively pursues cooperative research programs with universities, research institutions and independent teams. Sun Labs regularly engages with researchers around the world through collaborative research agreements, visiting research positions, invited lecture series and an active Intern program with between 30 and 50 Interns working on research projects every year: <http://research.sun.com/internships/>.

Demonstrate . . .

Whether hardware or software, an important part of development of a new technology is the creation of a research prototype to demonstrate the capabilities and possibilities of the technology. The Sun Labs' annual Open House provides an opportunity every year for researchers to showcase their innovations to the rest of the Sun engineering community. Sun Labs researchers regularly make technology available for download on various Open Source sites as well as on the Sun Labs download site — research.sun.com/download.

Transfer . . .

Sun Labs research projects typically span one- to five-year time periods and involve small, focused teams, usually 3 to 5 researchers. At project culmination, the technology developed is typically transferred to a Sun product division, and may involve transfer of Labs researchers as well as technical information and/or product prototype.

Since its inception in 1991, Sun Labs has been responsible for many of Sun's technology advancements and inventions, maintaining one of the highest rates of technology transfer in the industry,

earning over \$4B for Sun. The long list of Sun products that have originated in Sun Labs or incorporate Sun Labs technology includes:

- Java™ and Java™ KVM
- SPARC® V9 Architecture
- Elliptic Curve Crypto Libraries
- JFluid
- Electric CAE Design Tool
- Honeycomb Storage System
- Java™ Speech API, FreeTTS (speech recognition), Sphinx IV (speech synthesis)
- Sun Ray™ 1
- Sun Cluster™ 3.0

Sun Labs researchers also transfer technology to the wider scientific and technical community by publishing in industry, academic and technical journals and at equivalent level conferences. The Sun Labs web site — research.sun.com — contains archives of technical papers and abstracts covering research conducted by Sun Labs staff.

Sun Labs researchers are recognized by their peers as leaders in their fields. Recognition of this excellence has come in the form of national awards for ground-breaking technologies, individual innovation, and best papers at conferences. A list of the Sun Labs award-winning researchers is available at: research.sun.com/awards/.

Sun Labs is also a prolific generator of US patents. Although Sun Labs researchers are a small percentage of Sun Microsystems' total engineering staff, they account for approximately 12 percent of the yearly patents awarded to Sun.

Research doesn't come free . . .

Sun Labs is supported directly from Sun's operating budget, not by the individual Sun business units. This insures that Labs has the freedom to take a risk on a project which appears, at first glance, to have no direct relevance to Sun's business. For example, in the early 1990's very few

people thought the world needed a new object-oriented software technology, but the Java language has emerged as an industry standard for "Write Once, Run Anywhere™" software.

Sun Labs Organizations

Based at Sun headquarters in Menlo Park, CA, Sun Labs also has a research center in Burlington, Massachusetts, and individual researchers work from remote locations all over the world. The geographic spread allows Sun Labs to take advantage of a tremendous pool of scientific and engineering talent and enables Labs people to collaborate with other researchers from a wide range of industries and universities.

Sun Labs is directed by Robert F. Sproull, a Sun Fellow and Vice President. Bob founded and led the Massachusetts branch of Sun Microsystems Laboratories for over ten years. Since undergraduate days, he has been building hardware and software for computer graphics: clipping hardware, an early device-independent graphics package, page description languages, laser printing software, and window systems. He has also been involved in VLSI design, especially of asynchronous circuits and systems.

Before joining Sun in 1990, he was a principal with Sutherland, Sproull & Associates, an associate professor at Carnegie Mellon University and a member of the Xerox Palo Alto Research Center. He is a coauthor with William Newman of the early text, *Principles of Interactive Computer Graphics*, and an author of *Logical Effort*, which deals with designing fast CMOS circuits. He is a member of the National Academy of Engineering, a Fellow of the American Academy of Arts and Sciences, and has served on the US Air Force Scientific Advisory Board. Bob holds a PhD and a MS in Computer Science from Stanford University, and a BA in Physics from Harvard College.