Ronald D. Levine, Ph.D.
Career Summary

March 2007 – present
Dynamic Graphics, Inc., Senior Engineer

Design and development of interactive modeling, simulation, and data visualization and analysis applications for the geosciences, for a client base of petroleum geologists. Emphasis on 3D/4D computational geometry and computational geomechanics. Have led the company's program to introduce multi-core, many-core, and GPU accelerator parallelization into legacy code base and new developments.

January 1985 – March 2000 and August 2004 – February 2007
Self-employed independent consultant.

Technical foci: Computational sciences, in particular computational geometry, modeling and simulation, supercomputing, distributed and parallel computing, 3D graphics technology, geometry and physics engines for immersive 3D games. Parallel computing on vector supercomputers, clusters, multi-core CPUs.

Client list includes:

National Aeronautics and Space Administration, General Electric Company, Digital Equipment Corporation, Kubota Pacific Computer, Inc., Stanford Linear Accelerator Center, Clorox Company, Midway/Atari Games, Accolade, Mindscape, 3Dfx Interactive, Virgin Interactive Entertainment, Autodesk, Ampex Corporation, Grumman Data Systems, PathScale.

Assignments have included:

Development: Application software design and development, systems software and systems engineering for supercomputers, application development work in computational sciences, scientific visualization, and other graphics-oriented application areas; graphics API development; interactive game development projects, both real time engines and tools. Wrote the game engine with the best collision detection of any published game c. 1998.

Writing and training: Authoring technical marketing literature, such as technical overviews, white papers and trade journal articles, particularly in 3D graphics technology and networking. Development and delivery of training programs for engineers in 3D graphics theory, software, and technology.

Planning: Technology assessment and planning, proposal writing and strategy consulting.

March 2000 – August 2004
NextBus Information Systems, Senior Scientist

Software development and management of software developers; responsible for modeling and predictive engine, geographic tools, data mining and analytical tools. The project is a Web-based real-time passenger information system for public transit, involving tracking of transit vehicles by GPS and other sensors, predicting vehicle arrival times at passenger stops based on the real-time tracking, distribution of the predictions to riders via multiple communication channels, and management of and analysis of the tracking data for the benefit of transit system operations management.

1982-1984

Participated in two very small mechanical CAD/CAM software startup companies, involved in earliest stages of planning, raising financing, design and development.

1980-1982

NASA/Ames Institute for Advanced Computation, (employed by contractor Technology Development of California, Inc.) on supercomputing applications, in particular, computational fluid dynamics, first on ILLIAC 4, then was key member of technical evaluation team for NASA's first commercial supercomputer acquisition (Cray 1S).

1969-1978

Associate Professor of Mathematics, Humboldt State University. Three years as department chairman. Especially active in interdisciplinary teaching projects. Research in mathematical applications and computational modeling in life sciences and environmental sciences.

Software development skills and experience

Currently sharpened skills and interests:

- Sharp language/platform skills in:
  C/C++, Boost, CUDA, OpenGL, WebGL
- Expert in Python for data wrangling; Jupyter Notebook enthusiast
- Full development cycle on Windows and Linux.
- Current intense interest in machine learning, scikit-learn, TensorFlow

Experiences of special interest

- Parallel/distributed computing in four different contexts: vector Fortran for pipelined vector machines (Crays), SMP shared memory with OpenMP, attached GPU acceleration with CUDA, and distributed memory with MPI.
- Computational geometry scientific visualization, and games, using OpenGL, Direct3D. Development of graphics APIs.
- Development of interactive scientific visualization and analysis tools for users of very large geophysical data sets.

General experience

- Programming about three decades, beginning as an undergraduate physics major. I've mastered all the important programming languages and a few interesting oddball ones, and used each to construct major projects. A long period of various sorts of scientific applications in Fortran and assembler. My dissertation project for the mathematics PhD was a unique application of discrete computational techniques to a problem in pure mathematics. A long period of C-based applications in 3D graphics, scientific visualization and geometric modeling. Five years of video game development, all in C++. Recent intensive use of STL, Boost, OpenMP, CUDA, and Python tools
- I've had the satisfaction of solving interesting problems in a variety of different software development contexts, from algorithmic research for fluid dynamical simulations on supercomputers, to production of shrink-wrapped game software for PCs and game consoles, to maintenance of a large Web-based real-time service business based on massive accumulation of real-time data.
- I've effectively managed small teams of programmers on the full software life cycle.

Publications

"Supercomputers", *Scientific American*, January, 1982. (Featured cover article).

"Scientific Visualization", *Scientific American*, May, 1989, (a commissioned mini-article to dress up a special advertising section)

"Visualization Barriers", *Computer Graphics World*, August, 1988. (This article won an award from the American Society of Business Press Editors).

"High-Speed Connections to Supercomputers", Proceedings of Workshop on Supercomputing Environments, NASA, 1986 , (Invited Paper) .

"Volume Rendering with the Kubota System", *Digital Technical Review*, 1994.

"Stress Arching and its Impact on 4D Seismic Amplitudes and Travel Times", (co-author), *The Leading Edge*, Society of Exploration Geophysicists, Vol 36, No 11, November, 2017.

"Modelling the Impact of Overburden Stress Arching on 4D Seismic Amplitude Changes," (co-author), conference presentation, Society of Exploration Geophysicists, 2017.

Education

A.B. in Physics with Honors,
M.A. in Physics,
Ph.D. in Mathematics,
all from University of California, Berkeley.

Academic honors include Phi Beta Kappa, Woodrow Wilson Fellowship.

My Ph.D. thesis, "The Compact Euclidean Space Forms of Dimension Four", was a novel application of discrete computational methods to a problem in pure mathematics, being a special case of Hilbert's 18th problem. Can be thought of as a classification of crystal symmetries in four dimensions.

During graduate and undergraduate studies, had substantial work experiences in scientific research (experimental particle physics, cosmic ray physics, pure mathematics), scientific computing, and teaching, at Lawrence Berkeley Laboratory, NASA Jet Propulsion Laboratory, Stanford Linear Accelerator Center, University of California Departments of Physics and Mathematics, and Space Science Laboratory.

Senior Visitor, Department of Applied Mathematics and Theoretical Physics, Cambridge University, 1975 (Visiting in Stephen Hawking's group).

European Summer School on Quantitative Methods in Ecology, 1976

Santa Fe Science Writers Workshop, 2005

Linux Clusters Institute Workshop, 2006

Acceleware course in CUDA programming 2011

Non-professional accomplishments of which I’m proud

Accomplished singled-handed sailor, with transoceanic voyages.

Avid bicyclist, riding hundreds of miles per year in hilly Bay Area terrain.

Bilingual--Learned, as an adult, to speak, understand, read and write very good French.

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