Introduction

1987 Rochester Forth Conference on Comparative Computer Architectures

For the seventh year the Rochester Forth Applications Conference has been held at the University of Rochester in cooperation with the College of Engineering and Applied Science, the IEEE Computer Society and the Institute for Applied Forth Research, Inc. We were also sponsored by the law firm of Boylan, Brown, Code, Fowler, Randall and Wilson, in Rochester, New York with the help of Mr. Robert Brown; the Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland with the support of Mr. Thomas Zaremba; the NASA Goddard Spaceflight Center, in Greenbelt, Maryland, with assistance from Mr. James Rash; the Oak Ridge National Laboratory, Instruments and Controls Divison in Oak Ridge, Tennesee, through the efforts of Dr. William Dress; and the Rochester Chapter of the IEEE Computer Society, with help from Mr. Paul Conaway. These sponsors allow us to underwrite student attendance, produce the Conference Proceedings, and maintain a high quality guest lecturer program as part of the Conference.

Many times Forth applications require the maximum possible performance from a minimum of computational resources, often in restricted environments on land, under the sea or in space. Hence, many of us have stretched the application envelope of conventional computers. Using their experience with conventional and unconventional computer architectures supporting Forth, our guest lecturers focused on the conference theme. Their work clearly shows that Forth applications and implementations are at the cutting edge of computing technology. Specifically, our guest lecturers explored VLSI implementations, multi-stack architectures, parallel processing and biological computing.

Three of our lecturers: Dr. Robert Dixon, Wright State University, Dayton Ohio, Messrs. John Hayes and Martin Fraeman, Johns Hopkins Applied Physics Laboratory; and Mr. Philip Koopman, Wisc Technologies, La Honda CA, looked at multi-stack Forth machines. All three are 32 bit wide processors, and two, the Wright State and APL designs, have been implemented in VLSI. The third has been realized as a commercially available board level product. Interestingly, none of these processors were viewed solely as Forth machines, but rather as high level language engines.

Dr. John Dorband, of the NASA Goddard Space Flight Center, discussed the Massively Parallel Processor which can execute Forth in parallel over its 16,384 processors. He has used MPP Forth to port LISP and program computer graphics using ray tracing. Our last invited speaker, Dr. Iben Browning, discussed aspects of biological computing, that is, the brain, and cautioned us as intelligence moves from *in vivo* to *in silico.* Given the growth of artificial intelligence and the rapidly emerging interest in neural networks, coupled with the growing use of Forth in these fields, his comments are timely: and for once, not too late.

The comparative computer architectures theme continued with Forth implementations for the TMS 32020 by Tracy of Forth, Inc. and the Intel 80386 by Lecky, with Control Automation. Parallel computation was also addressed in four papers by Bardin and Ting, both from Lockheed, and Butler from Oak Ridge National Laboratory. Butler's work supports a Forth-based OPS/5 for expert systems.

Other speaker's interested in AI included Park, with Wright Patterson Air Force Base, with an update on an expert system for their carbon-fiber curing oven which was first presented last year, Dress, of Oak Ridge National Laboratory, on neural network simulation and Brown, from Elijah Laboratories, on committee networks. Watson, of the University of Saskatchewan, added probabilistic reasoning to an early version of Park's expert system. Carr, of the University of Utah, and Hand, of the Florida Institute of Technology, both looked at writing LISP in Forth. Odette, from Applied Expert Systems, Inc., examined Smalltalk and Prolog ports and Rash, of NASA Goddard Space Flight Center, ported OPS/5 to a Forth environment. Alternative programming to expert systems for medical diagnosis was discussed by Luke.

Forth's use in education was discussed by Breeden, of Ohio State University and Sargent, of the University of Saskatchewan. Unfortunately we are unable to reproduce Breeden's striking slides here. Interest in object oriented programming continued with papers by Lewis, of the University of Southern California, and by Davis. We added an entrepreneurial talk to the regular sessions with an extended session on Saturday by Brown, a practicing attorney. Although the working groups were restricted to a single session, the following groups' reports appear here: Esperanto Engine, FIG Chapters, Forth Standards, Forth Workstations, NC4000 User's Group, Neural Networks, and Parallel Computing.

Each year I choose one theme for the Conference and another one emerges. Two year's ago during the Conference on Software Productivity the emergent theme was artificial intelligence and Forth. During last year's Conference on Real-Time Artificial Intelligence, Forth machines emerged. This year we seem to have remained close to the chosen subject with interest revolving around parallel computation and neural networks. What will next year's Conference bring? We'll see.

A Conference can't run without the people behind the scenes. I wish to thank Julie Deister, Conference Coordinator, for an excellent job of running the Conference and organizing the Proceedings, and Alex Silvestros for keeping the flow of people and computers moving during the Conference. Sally Allison, of Wilson Commons, orchestrated University services and Steve Soeffing, of Soeffing Design, handled artwork. Ann Stunden, of the Computing Center, arranged for the loan of computers. The Conference Proceedings was prepared by Thomas Hess and Rob Rusick of Cargo Cult Studios, Inc.. Other people helping with the Conference, or stealing scenes, were: Paul Conaway, Emily Forsley, Glen Haydon, Lisa Kenas, Janice Malay, Hans Nieuwenhuÿzen, Diane Rannochia-Boni (who has previously coordinated two of these Conferences) and Abraham de Veer.

Theoretical physicist Steve Craxton did an admirable job, for the third (though not consecutive) year of describing the Laboratory for Laser Energetics (LLE) and its programs. My thanks also go to the LLE tour guides: Ken Carpenter, Doug Dykaar, Bob Keck, Lisa Kenas, Craig Kikka, Larry Kingsley, Brian Ohlmsted and Donna Strickland.

Finally, I am indebted to John Soures, LLE Experimental Division Director, Robert McCrory, LLE Director, and Bruce Arden, Dean of the College of Engineering and Applied Science, for their continued support of these Conferences.

Lawrence Forsley
Conference Chairman