

Software Tools

COMMUNICATIONS

VOLUME 1 NUMBER 2

NOVEMBER 1979

--- MEETING IN JANUARY ---

The next meeting of the Software Tools Users Group will be held January 29th in Boulder, Colorado, again in tandem with the UNIX User's Group meeting. This time the presentations will emphasize the development of applications programs written in ratfor and using the tools concepts.

Speakers already scheduled include:

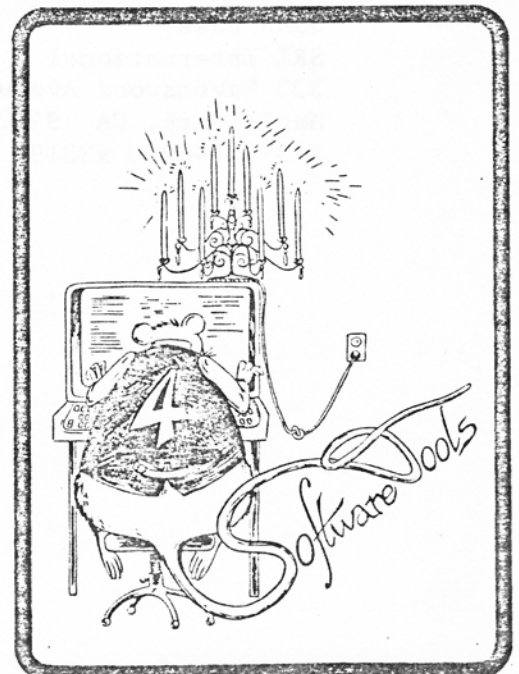
Allen Akin of the Georgia Institute of Technology will describe the networking research they are doing using the software tools as a basis.

Bob Calland of the Naval Ocean Systems Center will describe the Navy's use of ratfor and the tools.

John Chambliss of Bell Labs will describe their large scale analysis system written in ratfor. (Tentative)

Skip Egendorf, a consultant for the U. S. Geological Survey, will discuss the use of ratfor by the National Earthquake Information Service. Skip will also talk about his attempts at standardizing the software tools primitives.

Chris Fraser of the University of Arizona will describe in detail his series of editors written in ratfor. Chris has developed a display editor which uses the 'edit' tool as a back-end, a generalized editor capable of editing directories, binary files, and core itself, a display-oriented stream editor, and an edit-oriented debugger. (Tentative)



Dave Hanson of the University of Arizona will tell us more about ICON, his string processing language written in ratfor and derived from SNOBOL5. (Tentative)

Dick McLaughlin of Bell Labs maintains a large set of programs used by Western Electric for engineering design. He'll describe the role of ratfor in this effort.

Jim Stewart of the University of Maryland will be describing his crystallography package which is written in a dialect of ratfor/macro and which is being transported to numerous installations world-wide. Dr. Stewart will also discuss some of his portability problems and how they have been solved using macros.

Joe Sventek of Lawrence Berkeley Laboratory will describe LBL's development of a network access server based on the software tools and their primitives.

Debbie Scherrer of LBL will describe the basic distribution tape being developed.

Burton Leathers of Blue Sky Software, Ltd. will report on the activities of the ratfor special interest group.

Joe Sventek of LBL will report on the activities of the network special interest group.

As before, Brian Kernighan will be there to offer his god-fatherly advice and assistance. Others interested in participating in the meeting should contact:

Todd Kushner
1548 East West Highway
Silver Spring, MD 20910
301-588-1897

or

John Bass
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025
415-326-6200 x3819

DATE:

Tuesday, January 29, 1979. 9:00 AM - 5:00 PM

MEETING LOCATION:

Hilton Harvest House Convention Center
1345 - 28th Street
Boulder, Colorado 80302

REGISTRATION:

There may be a small registration fee this time, to cover expenses.

LODGING:

Reservations are handled directly by the hotel--mention Software Tools conference affiliation for quoted rates. To be eligible for conference rates, reservations must be made by January 8, 1980.

Hilton Harvest House
\$31 single; \$38 double
(303) 443-3850

TRANSPORTATION:

Boulder is about 25 miles (45 minutes) northwest of Denver's Stapleton International Airport. Limousine service is available directly to the hotels. Buses makes stops at the corner of Baseline and Broadway (5-10 minute walk to hotel) and at the bus terminal in Boulder (9th and Canyon). Taxis are available at the bus terminal. Rental car agencies have maps to Boulder and the hotels if you are planning on renting a car.

LOCAL INFORMATION:

Skip Egdorf
Potomic Research
Box 226
Golden, Colorado 80401
303-234-6479

Boulder is a lovely place, and only a few hours away from the slopes. So get ' those edges in shape!

--- 'BASIC' TOOL BOX BEING CREATED ---

The University of Arizona and Lawrence Berkeley Laboratory are collaborating on the creation of a basic (standard?) software tools tape which will probably be distributed through the U. of Arizona. The first release is hoped to be the best of both packages. Later releases will include whatever changes or enhancements are suggested by the ratfor and text manipulation special interest groups.

We expect to have the tape available by the next software tools users group meeting.

Anyone with comments or suggestions regarding the tape and its contents should contact the following:

Dave Hanson
Department of Computer Science
University of Arizona
Tucson, AZ 85721
602-626-3617

Dennis Hall or Debbie Scherrer
Computer Science and Applied Mathematics Department
Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720
415-486-6053 or 415-486-5881

--- SUMMARY OF JUNE MEETING ---

The first software tools users meeting was held in June at the University of Toronto, in conjunction with the UNIX users group meeting. Evidently the popularity of the tools is spreading far and wide. There were over 100 attendees, half of which came for the tools meeting alone.

The most significant outcome of the meeting was the creation of special interest groups to deal with the four major aspects of the tools: the ratfor preprocessor, network applications, text processing, and text formatting. Reports from the preprocessor and network groups appear elsewhere in this newsletter. The text formatting and processing groups need further consultations before issuing reports. Both groups are also looking for persons willing to assume leadership of the groups. Anyone interested should contact Debbie Scherrer (address at end of newsletter).

Speakers at the meeting described enhancements they had made to the basic tool package, experiences they had had with transporting their code to other systems, and plans for future developments. Here is a brief summary:

1. Brian Kernighan of Bell Laboratories, Murray Hill, NJ

Dr. Kernighan described some in-house developments at Bell Labs that relate to the software tools movement. One of these is 'struct', a UNIX program capable of restructuring fortran programs into ratfor. 'Struct' is written in C and is not only useful for resurrecting old programs, but also pointing out bad control flow in them. 'Struct' is being distributed with version 7 Unix.

Dr. Kernighan also described Bell's EFL ('Extended Fortran Language'), a fortran language similar to ratfor but with many additions including data types (character strings, structures), readable output (comments are passed through), and complete diagnostics (available since EFL is a true compiler). EFL is big, slow, writes, and generates fortran code.

2. David Hanson of the University of Arizona, Tuscon, AZ.

Professor Hanson has implemented a number of new and enhanced tools on a PDP-10. These include:

a. Enhanced ratfor preprocessor -- addition of a hash table for looking up definitions, some additions to the syntax, and optimization of the gotos.

b. Editors -- Chris Fraser of the U. of Arizona has developed a screen editor with a small screen manager and the software tools editor as a back-end. Dr. Fraser also has a generalized editor which is capable of editing directories and disks, and an edit-oriented debugger.

c. Portable directory system -- Professor Hanson has implemented a simulation of the Unix hierarchical directory structure on top of a standard operating system file structure. The package uses the standard tools primitives and has no impact on file efficiency other than that of the standard primitives.

d. Languages -- Professor Hanson described RATSNO, a ratfor-style

preprocessor with a syntax similar to SNOBOL4, and ICON, another string processing language intended as a successor to SNOBOL5.

e. New and enhanced tools -- The U. of Arizona has enhanced roff, the editor, the archiver, macro, sort, and many of the smaller tools. They've also developed additional tools such as a tape archiver.

All Professor Hanson's tools are written in ratfor and based on the software tools primitives and concepts.

3. Douglas Comer of Purdue University, West Lafayette, Indiana

Using a profiler, Dr. Comer determined that the definition look-up accounted for 60% of the execution time of the ratfor preprocessor. By using a hash table instead of a linear search, and by using native characters instead of mapping to internal ascii, Dr. Comer was able to reduce look-up to only 4% of the time. Dr. Comer's original experiment was done in Pascal, but he now has a ratfor-in-ratfor version.

4. Allen Akin, Perry Flinn, Daniel Forsyth of Georgia Institute of Technology, Atlanta, Georgia.

The group at Georgia Tech have implemented a complete set of tools on the Prime 400 running the PRIMOS operating system. They've implemented all the tools and most of the exercises in the book, plus have developed a screen editor much like the U. of Arizona one. They have also designed a command language interpreter based on the Unix shell but with some additional features:

- a. Multiple standard inputs and outputs are allowed
- b. Iterations for file names with small differences (e.g. file (1 2 3) for file1 file2 file3)
- c. Control structures such as 'case' and 'while' are available

5. Dennis Hall, Lawrence Berkeley Laboratory, Berkeley, CA

The LBL group has implemented and enhanced all the basic tools, plus developed a command language interpreter similar to the Unix shell but allowing script files to be filters and providing a mechanism for including program input in script files. Wild cards in file names are not supported because these are system dependent, and control structures haven't been implemented yet. The only additional primitive needed to bring up the shell on any machine is 'spawn' - a routine to cause execution of another task.

LBL is interested in using their shell to provide a common user interface across machines and operating systems on heterogeneous networks.

6. Joe Sventek, Lawrence Berkeley Laboratory, Berkeley, CA

Joe Sventek described LBL's research on user-machine interaction in a heterogeneous network. LBL hopes to establish a network where each machine will support the software tools and their primitives, and in addition will maintain a server which will establish direct links to servers on other hosts (e.g. through Arpanet). These servers will process commands and environments passed to them via an open connection maintained between machines. Remote hosts will be designated by extensions to the normal file/command names, e.g. /@host/path/path/.../file.

7. Robert Gordon -- Prime Research, Framingham, PA

Dr. Gordon described Prime's development of a 10Mhz network. He also commented that Prime is so pleased with the tools that they use them for in-house development.

8. Robert Munn, University of Maryland, College Park, MD

Professor Munn's primary interest is the development of x-ray crystallography software. To maximize the portability of this code, Professor Munn combined and extended the macro and ratfor capabilities. Macros are provided with the system which isolate and convey machine-dependent information. Using this hybrid he calls 'ratmac', Professor Munn is now distributing a very portable and trouble-free system of 90,000 lines of ratfor, written by 30 authors on 3 continents, to 230 labs using 14 different manufacturer's computers.

--- RATFOR SPECIAL INTEREST GROUP REPORT ---

Persons interested in development of the ratfor preprocessor met following the general meeting in June. A quick survey of background and interests showed that the group had had experience with installing and extending ratfor on some two dozen different systems. As the group included some of the speakers, we found that amongst ourselves we had produced most of the extensions proposed in the 'Software Tools' book and had added quite a few according to local needs. The subsequent discussion of needs and concerns focussed on three broad areas: the impact of Fortran '77, the definition of essential primitives, and the need (or non-need) for standardization of ratfor.

The discussion of Fortran '77 was principally concerned with the effect of character variables on the operation of ratfor. A rather spirited discussion led to a consensus that three issues warrant study: how 'standard' ratfor deviates from the '77 standard, how it may be brought into conformity, and how Fortran '77 may be exploited with ratfor. Volunteering to head up work on this topic is:

Steven Jones
General Electric Company
SPCC - Bldg. 31EE
1285 Boston Avenue
Bridgeport, CT 06602

The concern with primitives arose from the discussion of standardization. Although there was no consensus on the virtue of general standardization, it was agreed that there was a strong need for a standard set of primitives. The members of the group who had worked on several different systems were most vocal in support of this view. Input on this subject should be directed to:

Skip Egdorf
Potomic Research
Box 226
Golden, CO 80401
303-234-6479

The subject which produced the most discussion and the least agreement was that of standardization. Notwithstanding the lack of agreement that a general standard should exist, there were several points of widespread agreement. The existing 'standard' ratfor as distributed by Addison-Wesley is far from portable and there is a need for a more portable standard ratfor subset. Given a standard, portable basic subset of ratfor, it would be highly desirable to have all extensions expressed in (or bootstrapped through) the standard subset. The team at Georgia Tech have agreed to co-ordinate the standardization effort:

Perry Flinn, Allen Akin, Dan Forsyth
School of Information and Computer Science
Georgia Institute of Technology
Atlanta, GA 30332
404-894-3187

General comments, inquiries, polemics, or learned treatises should be directed to the group's newsletter contact:

Robert Munn
Department of Chemistry, Box 42
University of Maryland
College Park, MD 20742
301-454-5425

Report submitted by
Burton Leathers, Acting Secretary

--- NETWORK SPECIAL INTEREST GROUP REPORT ---

An informal meeting of those interested in network extensions of the software tools ideas was held after the general meeting, with approximately 20 persons attending. Since this is the least well-explored area of application of the software tools principles, the discussions proceeded in a fairly random manner. Some of the topics touched upon included:

1. The need for a standard format for packets shipped across the network.
2. Problems in generating a unique name space for objects manipulated across the network.
3. What kinds of services should be offered over the network.

The LBL group described, in more detail, the network extensions currently implemented on their systems.

There has been intervening collaboration among attendees to this SIG concerning the topics described above. It is hoped that more concrete ideas along these and other lines will result from the coming meeting in Boulder. Any relevant comments may be addressed to:

Joe Sventek
Bldg. 50B, Rm. 3224
Lawrence Berkeley Laboratory
Berkeley, CA 94720
(415) 486-5205
FTS 451-5205
Sventek@LBL-UNIX

Anyone interested in joining the network special interest group should contact:

Frank Bradford
RKA Inc.
650 University Avenue, Suite 102
Sacramento, CA 95825
916-920-2595

Report submitted by Joe Sventek

--- NEW DEVELOPMENTS ---

Dr. Toshiaki Saisho of Toshiba Corporation in Japan is interested in developing support tools for the ratfor preprocessor. In particular, he would like to implement the following:

- 1) A syntax checker which analyzes a ratfor program, reports the static information about it, and saves all information about each module in a library.
- 2) A configuration checker which analyzes the module structure using module interface data produced by the syntax checker. Unnecessary or undefined modules are reported and a hierarchy of modules and their cross reference list is produced.
- 3) A module interface checker which analyzes the interface between modules using module interface data. Specific items to be checked are module type, number of arguments, type of arguments, and length of arguments.

Anyone who has already attempted such support tools, or who would like to comment on the project should contact:

Dr. Toshiaki Saisho
Toshiba Corporation
Management Information and Systems Division
72 Horikawa-cho, Saiwai-ku
Kawasaki, 210 JAPAN
044-522-2111

(This column will be a regular in the newsletters from now on. Anyone with new tools, enhancements, ideas, or whatever, may announce them by contacting the newsletter editor.)

--- PUBLICATIONS ---

Here's a partial list of reports and publications associated with the software tools effort:

Akin, T. Allen, P. Flinn, and D. Forsyth, Jr., 'A Prototype for an Advanced Command Language', Proceedings of the 16th Annual Southeast Regional ACM Conference, April 1978.

Akin, T. Allen, P. Flinn, and D. Forsyth, Jr., 'Software Tools Subsystem Reference Manual' Technical Report, School of Information and Computer Science, Georgia Institute of Technology, Atlanta, GA, April 1978.

Akin, T. Allen, P. B. Flinn, 'Software Tools Subsystem User's Guide', Technical Report GIT-ICS-78/02, School of Information and Computer Science, Georgia Institute of Technology, Atlanta, GA, August 1978.

Comer, Douglas, 'MOUSE4: An Improved Implementation of the RATFOR Preprocessor', Software - Experience and Practice, Vol. 8 (Jan-Feb 78), pp. 35-40.

Fraser, Christopher W., 'A Compact, Portable CRT-based Text Editor', Software - Experience and Practice, Vol. 9 (Feb 79), pp. 121-125.

Gallagher, Joe H., 'Documentation and Manual for XVM/Ratmac (RNA...) under XVM/R SX V13 (Multiaccess)', Technical Note DSC-TN 79-02, Department of Scientific Computing, Cleveland Clinic Foundation, Cleveland, OH, June 1979.

Griswold, Ralph E., D. Hanson, and J. T. Korb, 'The ICON Programming Language - An Overview', SIGPLAN Notices, Vol. 14 (April 79), pp. 18-31.

Griswold, Ralph E., 's Manual for the ICON Programming Language', Technical Report TR 78-14, Department of Computer Science, The University of Arizona, Tucson, AZ, Sept. 29, 1978.

Hall, D., D. Scherrer, and J. Sventek, 'A Portable Program Development Environment', in preparation.

Hall, D., D. Scherrer, and J. Sventek, 'The Software Tools Programmers Manual', Technical Report LBID 097, Computer Science and Applied Mathematics Department, Lawrence Berkeley Laboratory, Berkeley, CA.

Hanson, David R., 'A Portable File Directory System', Technical Report TR 79-3, Department of Computer Science, The University of Arizona, Tucson, AZ, February 1979.

Hanson, David R., 'RATSNO - An Experiment in Software Adaptability', Software - Practice and Experience, Vol. 7 (1977), pp. 625-630.

Hanson, David R., 'Software Tools Programmer's Manual', Technical Report TR 79-15, Department of Computer Science, The University of Arizona, Tucson, AZ, August 1979.

Kernighan, Brian W., 'Ratfor - a Preprocessor for a Rational Fortran,' Software - Practice and Experience, Vol. 5 (1975), pp. 395-406.

Kernighan, Brian W. and P. J. Plauger, Software Tools, Addison-Wesley Publishing Company, Reading, MA, 1976.

Munn, Robert and J. M. Stewart, 'RATMAC: Kernighan and Plauger's Structured Fortran Programming Language', Technical Report TR 675, Department of Chemistry, University of Maryland, College Park, MD.

Munn, Robert and J. M. Stewart, 'RATMAC Primer', Technical Report TR 804, Department of Chemistry, University of Maryland, College Park, MD.

Munn, Robert and J. M. Stewart, 'RATMAC: A Program for Writing Transportable Scientific Software', in preparation.

Scherrer, D. 'COOKBOOK, Instructions for Implementing the LBL Software Tools Package', Technical Report LBID 098, Department of Computer Science and Applied Mathematics, Lawrence Berkeley Laboratory, Berkeley, CA.

Snow, C. R., 'The Software Tools Project,' Software - Practice and Experience, Vol. 8 (1978), pp. 585-599.

Sventek, Joseph, 'A Portable Network Kernel', in preparation.

Systems Consultants, Inc., 'Level 2 Text Editor User's Manual', report prepared for Naval Ocean Systems Center, San Diego, CA, April 1979.

--- CALL FOR HELP ---

LBL has been very pleased to start the ball rolling for this organization by preparing newsletters and arranging meetings. But now it's time for you folks out there to keep it going. We need help preparing newsletters. Someone will also be needed to coordinate the next meeting after the one in January. Since the meetings and newsletters are closely associated, perhaps an installation could handle both for six months, and then pass the job on to another.

The text editing and text formatting special interest groups could also use some brilliant and energetic leaders.

All generous offers of assistance should be directed to:

Debbie Scherrer
Computer Science and Applied Mathematics Department
Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720
415-486-5881
FTS 451-5881
Scherrer@LBL-UNIX

--- TOOLS TRIVIA ---

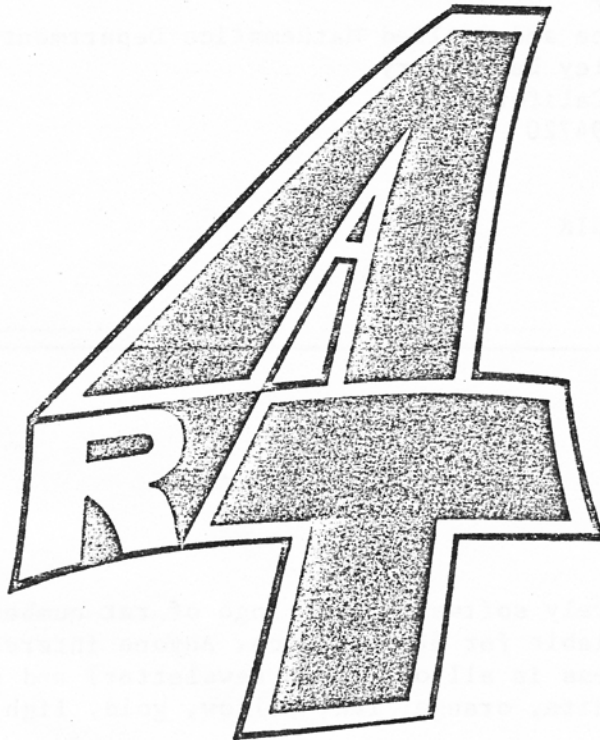
T-shirts bearing that lovely software tools logo of rat number 4 composing software at a terminal are available for \$6.50 apiece. Anyone interested, please send check to Debbie Scherrer (address is all over this newsletter) and specify size (S, M, L, X-L) and color (beige, white, orange, red, yellow, gold, light blue).

Walter Dixon--if you're out there somewhere--I've lost your address. Please give me a call.

Debbie Scherrer

--- SURVEY FORM ---

Many people are interested in contacting other installations running the tools, and especially those with operating systems similar to their own. To facilitate an exchange of information, we've prepared a survey form to gather data about various tools implementations. This information will be added to the membership list (unless requested otherwise) and distributed to any members interested. Please complete and return the attached survey if you would like to be part of this exchange.



Illustrations by George Kapus of Lawrence Berkeley Laboratory.

This issue of the Software Tools Communications was produced by Debbie Scherrer of Lawrence Berkeley Laboratory.

--- SOFTWARE TOOLS SURVEY ---

November 1979

Name: _____

Address: _____

Phone: _____

Network Mailbox: _____

Tools you have implemented:

| | | | |
|-------|---|-------|----------|
| _____ | Ratfor preprocessor | _____ | Editor |
| _____ | Formatter (roff) | _____ | Archiver |
| _____ | Most of the smaller tools (find, change, cat, etc.) | | |

New tools you've developed (besides the original Addison-Wesley set):

Machines on which the tools are running:

| <u>Machine</u> | <u>Operating System</u> |
|----------------|-------------------------|
|----------------|-------------------------|

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |

Where did you get the original source code?

| | |
|-------|---|
| _____ | Addison-Wesley tape (or copied from the book) |
| _____ | Lawrence Berkeley Lab. tape |
| _____ | U. of Arizona tape |
| _____ | Georgia Tech. tape |
| _____ | Robert Munn's RATHAC tape |
| _____ | Doug Comer's MOUSE4 tape |
| _____ | Other (_____) |

Please return to:

Shirley Cassinelli
Computer Science and Applied Mathematics Department
Lawrence Berkeley Laboratory
Berkeley, CA 94720

_____ Check here if you do not wish the above information (including your name and address) published in the software tools users group membership list.

Shirley Cassinelli
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