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Editorial

Theresa Breckon
Real Time Systems Group

In 1979, Lawrence Berkeley Laboratory founded the Software Tools Users Group. The STUG effort, which included the creation and distribution of the first "Basic Tape", was funded by the U.S. Department of Energy as part of a research effort in portable programming environments. In late 1980, the project was declared a success and the research funding was ter-



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minated. The November 1980 **Software Tools Communications** contained an editorial by Debbie Scherrer calling on the Software Tools user community to take some action to keep STUG alive.

The response to this call was minimal and by late 1981 it seemed that STUG was in danger of disappearing. LBL had a large, internal Tools user base and one of its computer support organizations, the Real Time Systems Group, was still active in Tools development and maintenance. RTSG was working on a single, standard Tools system to replace the three Tools variants being used at LBL. We managed to convince the Laboratory that this effort should include support for STUG. We felt that wider standardization would result in more shared software which would benefit both LBL and the Tools community. In hindsight, it seems that we greatly underestimated the effort we would have to invest in STUG to arrive at a standard.

Feedback from Tools implementors had identified a number of problems in the original primitives. At the July, 1982 USENIX meeting in Boston, Debbie Scherrer distributed revised manual entries for the few primitives that had caused problems. She asked that these primitives be adopted as the new standard which we could then use to put together a new "basic tape" that would contain fixes for the numerous bugs reported in the original. It was suggested that the implementors be able to vote on the finalized set of primitives and routines that were to be accepted as the standard for the "basic tape".

After the Boston meeting, the standards effort ground to a halt. The STUG board was busy with incorporating STUG and releasing "Request For Proposals" to cover needed functions for the continued operation of STUG. This kept most of the board quite busy, and the standards effort was neglected.

Without the standardization effort, the funding that RTSG was able to secure to support STUG was in danger. We realized that time was running out for us and so we decided to try and get the standards effort rolling again. We put together a standards package which contained the primitives and routines proposed at the 1982 Boston meeting. This package was sent to STUG implementors for their acceptance or rejection and counter-proposals. In Nov, 1983 we hosted an implementors meeting to discuss the results of the first "ballot". A new ballot, containing the final proposals and counter-proposals for standardization, was to be distributed by the end of November. The results of this ballot was to become the STUG standard on which the new basic tape could be built.

Despite all of its good intentions STUG has not been able to put the finalized ballot together. In the meantime RTSG has nearly met its goal of constructing a

single, standard tools system to replace the variants being used at the laboratory. We can no longer defend our support for STUG and so our funding for Tools work has been cut. Unfortunately this means that we can no longer handle the STUG hotline, information requests, or newsletter. (The new hotline number, etc. is listed later on in this newsletter.)

RTSG would still like to see a STUG standard and will adhere to whatever standard is eventually decided upon by the STUG implementors. We have a number of portable tools which could be shared with the Tools community, but without a standard set of primitives and routines, this is very difficult. (The problems people have had trying to implement the code on the "Toys" tape has illustrated some of these difficulties.) The current "basic tape" is 5 years old. In order to continue attracting members, STUG must produce a new "basic tape" containing bug fixes and new submissions. This requires a STUG standard and new volunteers to help achieve the standard. If any implementors have some time to spend in helping STUG to achieve this standard, please contact Dave Martin.

New Address and Hot-Line

STUG now has a new office located in the Los Angeles area. Although we will continue to have our correspondence forwarded from the Menlo Park address, you will receive a faster response by addressing all your questions, orders and submissions to our new address:

Software Tools Users Group
140 Center St.
El Segundo, Calif. 90245
213-322-2574

New Board of Directors

At the Salt Lake City conference, the members in attendance voted the following new board by acclamation:

Theresa Breckon, Lawrence Berkeley Lab
Phil Davidson, Carousel Microtools
Neil Groundwater, Analytic Disciplines Inc.
Dave Martin, Hughes Aircraft Co.
Bill Meine, Sun Microsystems

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Description of our Tapes

There are two categories of tapes which we distribute: the Basic Tape and the machine-specific implementations of the Basic Tape.

The Basic Tape provides a complete set of tools, but no primitive set. There is a Cookbook Manual on the tape to assist in the implementation of these primitives for your particular system. This is the original version of the Software Tools which was produced five years ago.

The machine-specific implementations have been submitted by STUG implementors. There is no review committee for these tapes, so they may vary somewhat from the tools on the Basic Tape. These tapes include the Basic Tools, the primitive set implemented for the particular system, and some new tools which other tapes may not have.

Basic Tapes

LF Terminated, 2048 cpb
Card Image, 80 cpl, 40 lpb
Toys Tape (Card Image, LF Term, VMS)

Specific Implementations

VAX/VMS
RSX-11M
TOPS-20
UNIX 4.1 BSD
IBM/CMS
IBM/MVS
UNIVAC 1100
SEL MPX
HP 1000 RTE IVB + 6/VM

DECUS Conference

STUG has been participating in a technical way at the DECUS conferences. We are represented in the Languages and Tools SIG, and there are several people inside DEC who are interested in the group.

At past conferences, Dave Martin has given several Software Tools sessions. The next DECUS conference, Anaheim, Dec. 9-14 will prove to be an interesting one. This time Dave Martin will give a pre-symposium seminar on "Developing Portable Software & Rapid Prototypes on VAX/VMS Using the Software Tools VOS". (Sunday, Dec. 9) Dave will also be giving a ses-

sion on Friday 1:00 — 2:30 pm entitled "Software Tools Tutorial and Update".

Below is the abstract for the pre-symposium seminar:

The Software Tools Virtual Operating System (VOS) provides an excellent environment for the development of software, particularly software that must run on more than one CPU and/or operating system. The UNIX*-like package contains over 100 utilities and several hundred library routines which form a powerful toolbox for the developer engaged in rapid prototyping or production software development.

The seminar will provide a detailed look at the VAX/VMS implementation of the VOS and how it enhances that environment. The morning session will focus on the facilities provided by the VOS and how one installs it on a VAX/VMS system. The afternoon session will concentrate on the software development process using the VOS, with step-by-step examples of how one may construct portable programs quickly.

Topics to be covered include:

- The Virtual Operating System concept
- Software portability in theory and practice
- Software synergy and how to achieve it
- Rapid prototyping techniques
- Revision control and configuration management
- Electronic mail and teleconferencing

Prerequisites:

Attendees will be expected to have previous software development experience and a working knowledge of 'C', Ratfor or Pascal. Experience with VAX/VMS is also highly desirable.

The Standards Effort

Dave Martin will now be doing the Standards Effort. For those implementors who responded to the first ballot, and have been long waiting for the second ballot to appear, it will! It's not clear how long it will take Dave to get the mailing out, but it will happen soon.

The Software Tools

Conversion to C?

Debbie Scherrer

**Reprinted from Pico News, published by
PicoNet, Inc, a CP/M Users Group**

In the December issue of Pico News, two articles were published on the C (formerly BDS-C) Users' Group efforts to deal with the Software Tools. I have been watching these efforts with interest for quite a while now and would like to contribute some additional information and offer some suggestions.

Although the Kernighan-Plaughner book "Software Tools" provided the seed, the Software Tools movement represents much more than the original collection of little programs. Researchers at Lawrence Berkeley Laboratory, University of Arizona, Georgia Tech, and other universities took the Kernighan-Plaughner ideas and code and expanded and extended them into a powerful software development environment, implementable on virtually any machine. Many new Tools were added to the original set, most of the originals significantly enhanced, a Unix(tm)-like shell written, and the library and primitives expanded to represent a good fraction of the system services required of a good operating system. The Software Tools Users Group was formed by LBL to provide a forum for collection and evaluation of enhancements as well as setting of standards.

The primary goal of the Software Tools movement is to provide a uniform environment on virtually all machines. The Unix model was chosen because of its power, simplicity of approach, and obvious user popularity. The Tools Group reports the package has been implemented, to varying degrees of sophistication, on over 50 operating systems. The Tools Group distributes a Basic Tape containing agreed-upon versions of the Tools plus instructions on providing the framework to support them. Essentially, all the work being done by members of the Tools Group is in Ratfor, a C-like Fortran processor, because Fortran is still the most commonly available language on all machines (minis and micros). The C Users Group has been attempting to translate the Tools Group's Basic Tape into C.

However, having the source for the Tools from the Basic Tape, whether in Ratfor or C, does not immediately give you the Software Tools environment on your machine. Let me explain.

Any program, to be useful, will need to access certain services provided by the local operating system. These include such functionality as file manipulation, I/O, process control, and memory allocation. Each

operating system invariably provides a different set of services, often more engineered toward their hardware than the user's needs. The key to writing a program which can be ported to multiple operating systems is the clear, appropriate, and uniform definition of the system services interfaced. And, in fact, the definition of this system interface has and is continuing to be the primary project of the Software Tools movement. The Tools interface routines are commonly called "primitives" and it is these primitives which must be implemented for each machine expecting to support the Software Tools environment. This can be a non-trivial task. To provide a complete and optimized version may take many months. The length of time necessary for writing the primitives depends on how closely the existing system services match the world view of the Tools environment. Thus providing the primitives for the UNIX system was relatively quick, but writing them for CP/M or MS-DOS was an arduous task. These primitives must be developed whether the Tools source is in C, Ratfor, Pascal, or any other language.

Although I have been one of the primary proponents of the translate-the-tools-to-C movement, as time has passed I have begun to reassess the project. My involvement with Carousel MicroTools, a company which develops and distributes versions of the Tools on micros, has dramatically shown me the tremendous efforts involved in not only porting the Tools to micros, but especially in providing an efficient and optimized version of the primitives. However, to suggest any alternatives to the C translation project requires understanding the goals of that effort.

It appears to me that the primary goal of translating the Tools into C is to have the environment available on CP/M and other micro systems. The functionality of these UNIX-like utilities is well known and well proved. As a program development environment they are unsurpassed and, once you have become accustomed to having them, working a system without them seems almost archaic. The shell's ability to combine Tools in pipelines and in script files allows one to create new utilities from existing ones, and to experiment with solving needs without having to resort to writing a line of code. The Tools are even more important in the micro environment, where operating systems generally provide only the barest essentials.

The second advantage of having the Tools in C is having the body of source code on which to build. Not only is it desirable to have the source for debugging up upgrading a utility, but having a package of code from which you can draw bits and pieces significantly optimizes development time of new utilities. The original book emphasized construction of new Tools from parts of previous ones. A body of well-written, debugged routines which can easily be incorporated into new pro-

jects can significantly reduce the need for constantly "re-inventing the wheel".

A third advantage of seeing the Tools in C is their educational value. The original book was written as a text of good programming style, using the Tools source as example. C has become the language of choice for micros, and most of the programmers are newcomers to the field. The Tools could provide a large body of well-written code to serve as a self-teaching aid and to help set the style for the emerging C community.

A fourth advantage is the possible improvement in speed and space efficiency the C version might have over the Ratfor version. In larger machine environments, highly optimized Fortran compilers are thought to provide greater efficiency than existent C compilers. This, coupled with C being more appropriate toward text processing and other aspects required of a program development environment, might give a C version of the Tools some reasonable improvement in efficiency over the Ratfor version. However, in tests reported by members of the Tools Group, it was found that improvements in the algorithms, especially in the primitives, resulted in greater improvements in efficiency than changing the source language. Since all Tools access resources (I/O, etc.) through the primitives, optimization there is shared by all Tools. Most Tools implementors do put considerable efforts into the optimization of their primitives, even writing them in assembler should that prove necessary. Thus, assuming an optimized version of the primitives, it is unclear whether a C version of the Tools would provide any significant increase in efficiency over the Ratfor version.

Given the obvious advantages of the Tools in C, why then would I suggest a reconsideration of the translation project. There are several reasons: when the project first began, some two years ago, there were no implementations of the Tools on micros. Thus the need was critical. However, now the environment does exist. Carousel MicroTools, Inc. has implemented the primitives for CP/M, MS-DOS, and has plans for others. Approximately three man-years of effort were put into optimizing the primitives, debugging and rewriting the Basic Tape Tools (many of which were originally too large for the micro environment), and developing a new shell since the Tools Group shell would not work in the single-process CP/M environment. The Carousel packages include all the Tools Group, meet STUG standards, and include twenty or so additional tools and enhancements currently under consideration by STUG. They also offer additional Unix-like tools such as "make" (MS-DOS only), which the Tools Group does not provide. Carousel has also significantly improved the manual, rewriting all sections, adding examples, and including several new tutorials. Thus

even though the source is still in Ratfor, the binary Tools package from Carousel provides the entire environment. The only disadvantage of the Carousel product is that it is not being distributed free of charge.

Another problem with the translation project is the large amount of time and effort involved. Of the forty or so Basic Tape tools, only a portion have been translated to date. In addition, a shell will have to be written from scratch since the Tools Group shell assumes a multiprocessing environment. In the meantime, the Tools Group has gone ahead with new utilities: an SCCS-like text control system, versions of YACC and LEX, a mail system, and so on. The translation project is lagging farther and farther behind and is not able to take advantage of new offerings as they are developed. The Tools Group is wide-spread and active, with many sites developing and sharing new utilities. Typically, new Tools are exchanged early in their development phase for evaluation, experimentation, debugging, and enhancement. Translating a Tool into C requires breaking into this chain at some point and extracting a particular version for recoding, thus making it difficult to incorporate later changes and enhancements back into the C version. And, since the translation project is being done by volunteers with presumably limited time resources, these noble souls are putting their efforts into reinventing what has already been done, rather than investing their time in more productive and innovative efforts.

Thus I would like to suggest a compromise or alternate route for the project:

- 1) Provide the Tools environment on CP/M and MS-DOS by purchasing the Carousel binary product (special pricing is available, see notice at the end of this article). Rely on Carousel to provide bug fixes, upgrades, extensions, and enhancements as they are announced by the Tools Group.

- 2) Translate into C only the programming library and system interface. Much of the valuable code from the utilities themselves has been extracted by the Tools Group into a general-purpose library. Functionality includes symbol table manipulation, etc. Having the C library would provide a base upon which new Tools could be written by the C community. The library, and especially the primitives, should be adjusted to achieve a C-like interface and to conform to the UNIX usage as much as possible since it is the functionality that is important, not the syntax. Those participants in the library conversion effort should work very closely with the STUG Implementors Group, for these people have considerable experience and expertise in defining interfaces appropriate to solving portability problems.

- 3) Working closely with STUG, initiate a program to develop enhancements in C, for both new utilities

and library extensions. These communication lines are very important and necessary to avoid duplication of efforts.

4) Buy the Kernighan-Plaucher book, either the Ratfor or Pascal version; read and understand it. The book contains a wealth of knowledge not specific to any one programming language. Apply the lessons to all your programming tasks...you owe it to yourself to do the job right.

Editor's Note: When MicroSoft published an erroneous announcement that STUG was distributing the Tools in C, the landslide of mail that began to pour in was overwhelming. Obviously, the need, the interest and the volunteers willing to pursue this area are out there. STUG and the Software Tools Communications provide the forum for development.

Micro Tools in Pascal

Stephen Lewis
ihnp4!zehntel!stephen
Zehntel
2625 Shadelands Dr.
Walnut Creek, CA 94509

I have been trying to use the Software Tools on small machines and found it necessary to begin with the Pascal version because some machines lack a Fortran compiler. In particular, the hp9816 (alias model 200). HP does supply a version of Pascal and (used to) claim that they support the UCSD primitives. Unfortunately, they do not support the compiler directives and they have "extended" the Language in weird and wonderful ways. All I got from the extensions was name conflicts.

I have a working set of primitives and tested several Tools including "echo", "translit", "include" and "edit" from a simple shell with I/O redirection only.

While doing this I was bringing Modula-2 up on my own LSI-11 so I translated the (Pascal) Tools into Modula-2 and wrote the VOS primitives in terms of Wirth's Streams module (which in turn runs under RT11). This too is working for all the Tools I have tried including "macro" and "edit". It is not particularly fast but seems solid.

As I read your newsletter, I cannot help but notice that almost all the implementations are mainframes and there are comments that micro users are not implementing the Tools. Well, no wonder! No-one with a mass reduced micro has a 9-track drive and Fortran is not the most popular language. How can anyone get the Tools on a popular small machine? They certainly

run slower and they do use a lot of space (if each Tool runs a stand-alone program) but they are so much more powerful than the typical "tools" (?) available to small machine users.

What is the policy of STUG in regard to the Pascal distribution from Addison Wesley and will there ever be a "Basic Tape" of the Pascal Tools? Please consider the possibility of a new distribution in a new language and that small systems don't have tape drives. I am willing to share my HP primitives and my Modula-2 implementation with anyone who is interested but if I understand the submission form neither are eligible for submission to STUG.

If anyone is interested in any of this work, please let me know at ihnp4!zehntel!stephen.

Editor's Note: Sorry that we omitted your letter in the last newsletter, Stephen. Although STUG currently maintains and accepts only Ratfor submissions, there is still a great deal of interest among the membership for "non-standard" implementations and developments. Remember, STUG is a non-profit organization relying on its members to develop and share their software. STUG is not a software development house. Thanks for your input.

Pascal Pretty-Print

Rich Drescher
3M Company
51 Ballantyne Road
Rochester, NY 14623
(716)458-2920

Limited Distribution

In the event that someone may be interested, I have the Pascal Pretty-print Program from the book *PASCAL WITH STYLE* by Ledgard, Nagin and Hueras working rather well. While this is copywritten material, I have written permission from Hayden Book Company to make five reproductions, which may well satisfy the world demand.

The program as published did not prettyprint my test programs. This version has been modified to the point of overkill, i.e., I'm creating more problems than I fix! It is in 'standard' Pascal (I think) with a few HP-1000 calls for filenames, user controlled abort, etc., and would require system modification.

Due to the copyright status of the program, I can only make it available to a few individuals for non-commercial, non-profit use and not for re-distribution.

European Unix Users Group

Nancy Travis

The European Unix Users Group (EUUG) is currently distributing the Software Tools tapes. EUUG is an organization which is a parallel group to USENIX and STUG, i.e., the function and goals are similar although membership in one group does not constitute membership in another. Some STUG members may find EUUG membership to be useful considering the delay of shipping tapes overseas. The EUUG has a number of tape distributions available which can be ordered from:

EUUG Distributions
Centrum voor Wiskunde en Informatica
Kruislaan 413
1098 SJ Amsterdam
The Netherlands
tel: (20) 592-4127
decvax!mcvax!teus

The EUUG also has a professional Secretariat which acts as a central coordinator of the User Group's various activities, and which can always be approached with initial inquiries on any Group business. The Secretariat channels inquiries to the relevant source when it is unable to provide the information itself, and is responsible for the organization of meetings, conferences, and the publication of a beautiful and well-written quarterly newsletter. The address and phone are:

EUUG Secretariat
Owles Hall
Buntingford
Herts SG9 9PL
ENGLAND
tel: +44 763 71209

Membership Renewals

If you are uncertain as to when your membership expires, check the current expiration date on the address label of this newsletter. 3Q85 for example, means your membership is good until the third quarter of 1985. Yearly memberships extend one year from the quarter you applied, instead of for a fiscal or calendar year.

Wanted

The STUG Hot-line has generated inquiries for specific implementations and tools which are not yet available for distribution. On the chance that any of STUG's members have expertise or have improved tools to offer, we have been publishing requests. If you have any requests for the next issue write a short note c/o STUG.

SPELL

Last issue we printed a 'wanted' item for an improved SPELL tool (not the current script) with UNIX-like capabilities.

A new SPELL tool has been submitted by
Ken Poulton at Hewlett-Packard

Statistical Software

We have attempted to locate a statistical software package for use on the DEC PDP-11/23+ with the UNIX operating system. The first edition of the PDP-11 Software Source Book listed SPSS-11 from SPSS, Inc., and Minitab from MINITAB Project, as being available for the PDP-11/23+. Contacts with each of these organizations indicate that the products are not available for the PDP-11/23+ running UNIX. Does anyone have knowledge of a Statistical package of the SPSS-11 or Minitab type which will run on this operating system?

If you can assist, please write or call:

Tony Barros
Bldg. 2105
NSTL, MS 39529
Phone: (601) 688-1265

Data General MAIL

I am interested in contacting anyone who has successfully implemented the Software Tools MAIL on Data General machine. I also plan to implement the tools on a Prime computer and would appreciate hearing from anyone with experience using MAIL on the Prime.

Phil Julian
(919) 467-8000
mcnc!ecsvax!julian

Implementors List

The list of Implementors continues to grow as more new members are successful in bringing the Software Tools up on a variety of operating systems. Although we receive many applications from veteran implementors, the majority of applicants are simultaneously ordering the Basic Tape and have not yet gotten their fingers into implementation.

We would like to hear from you after you have installed the tools. Please take a moment to send us your name and the machine(s) on which you have implemented the tools or call the STUG Hotline (particularly if you have broken ground on an obscure machine!).

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Microsoft Corp.
10700 Northup Way
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decvax!microsoft!allena
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+CDC Cyber 18/20 under ITOS 2.0

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416-978-5396
+UNIX Version 7

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