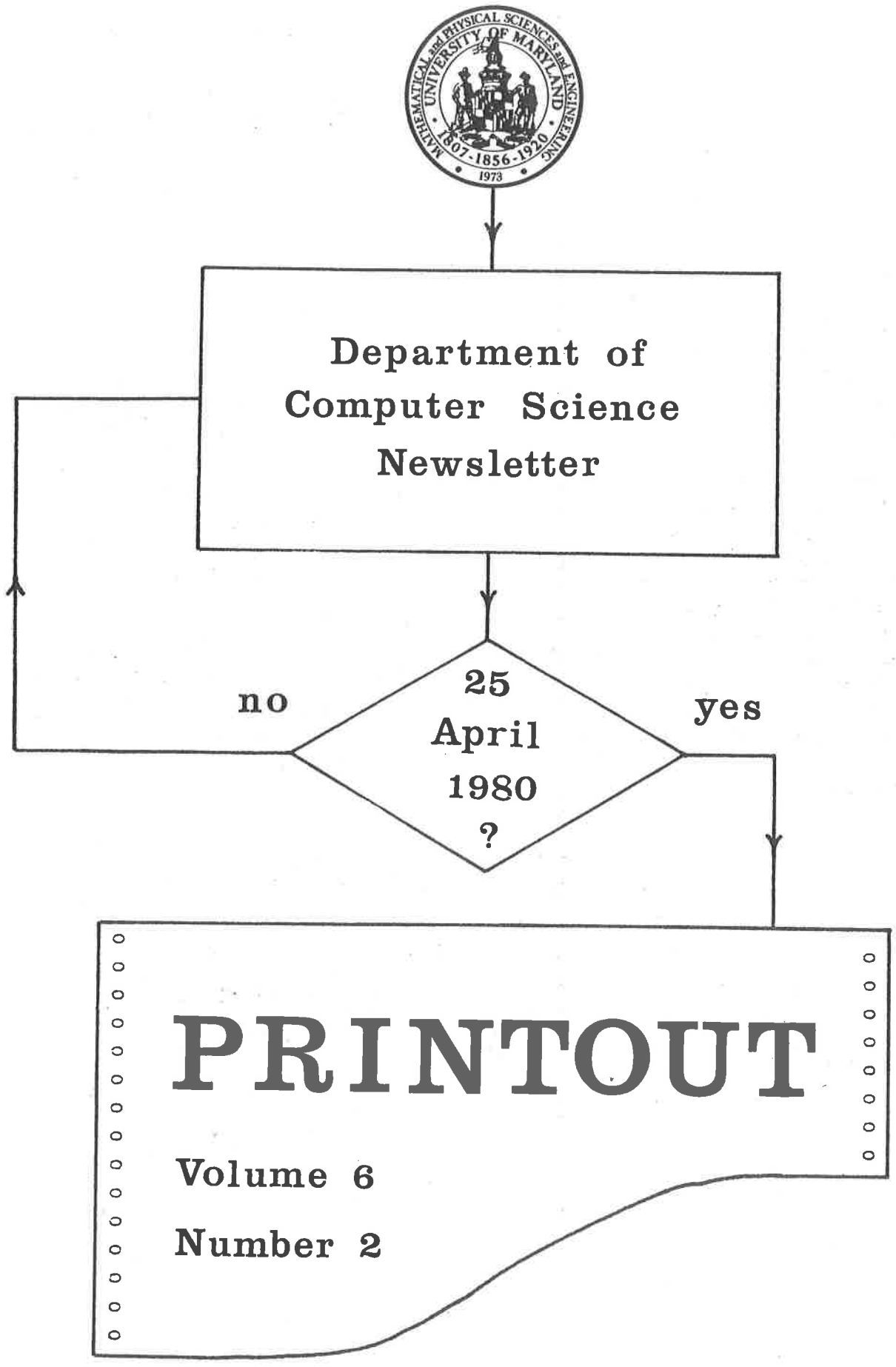

MATHEMATICAL and PHYSICAL SCIENCES and ENGINEERING
UNIVERSITY OF MARYLAND
1807-1856-1920
1973
Department of
Computer Science
Newsletter
no
25
April
1980
?
yes
PRINTOUT
Volume 6
Number 2

PRINTOUT, the newsletter of the Department of Computer Science of the University of Maryland at College Park, is published sporadically and distributed to faculty, staff, and students in the Department. Opinions expressed in signed articles may be those of the author, but no opinions represent the policy of the Department, or of the College Park Campus, or of the University.

Contributions may be submitted to the editor, and unless they are obscene or seditious they will probably be used, but minor editing may be done. Complaints directed to the newsletter will be investigated and publicized when possible. It is well to keep in mind however that the Department is subordinate to higher levels of the administration, not the other way around; and, the Department does not provide computing service to the campus. Complaints in these areas are best directed to other publications.

## STAFF

editor
Dick Hamlet

photos
Fred Blonder

# PRINTOUT

Volume 6
Number 2

# CONTENTS

STUDENT ACTIVITIES
Diane Petruzzo 3

VAX Dick Hamlet 4

FACULTY NOTES 4

CONTENT-FREE LANGUAGES
Mark Weiser 4

PUBLICATIONS 5

TALKS 5

CARRIAGE CONTROL
Dick Hamlet 6

THE DO LOOP SONG
Warren Miller & David Hutchens
John Bailey 7

FORMAL AXIOMATIZATION OF THE LOST TURKEY PROBLEM
Ben Shneiderman 7

ACM PROGRAMMING CONTEST 8

WHAT IS IT? Pamela Zave 8

APRIL SHOWERS 8

# Student Activities

The CMSC Graduate Council, a newly formed student body, originated as a forum for voicing ideas and opinions. It seeks to eliminate artificial boundaries within the Department (RAs vs. TAs, faculty vs. students, etc.) through meetings, social events, and faculty/staff contacts. Seven meetings have been held this year. Some highlights:

- Dr. R. T. Yeh, Department chairman, addressed the council on the future of the Department.

- Representatives were chosen to serve on many faculty committees (Undergraduate Committee, Lab Committee, Budget Committee, etc.). The representatives have presented reports on committee progress and have contributed to the decision process.

- Proposals currently under discussion include a revised comphrehensive exam policy, various social events, and a student advisory board.

To realize the potential of our many resources takes student commitment to transform ideas into reality. Many Executive Council members will be leaving and replacements are needed. See Robert Borochoff for additional information or attend next month's meeting.

Another Department event worth mentioning is the "SCHMOOZE". Webster's (*NEWER World*) defines SCHMOOZE as an "event scheduled for paydays for which it is most fashionable to serve fresh vegetables, exotic wines, imported cheeses, the finest pastries and chips 'n dip."

SCHMOOZES are funded by both the Department and contributions. The SCHMOOZE Chairman, John Bane, is currently seeking a successor. John so immmersed himself in this activity that he often forgot to collect his paycheck. An informal survey of SCHMOOZEs rated them highly with only minor complaints (more beverages, more food, better wine, more dancing girls, etc.). Of course, these could all be provided with your increased $upport.

Before each SCHMOOZE, the Student Colloquium Series sponsors informal technical presentations. As few of us really know the full scope of Department research endeavors, these talks can help familiarize us with them. Recent presentations have included:

-Paul McMullin: "Debugging Programs with Axioms"

-Rick Thomas: "CS1100 - Workload Generator"

-Howard Kresin: "Why Johnny's Response Time is So Poor"

-Les Kitchen: "Corner Detection in Picture Processing"

And coming up:

-Bob Webber: "Formalizing Abstract Machines"

If technical presentations don't interest you, perhaps the Graduate Dinner Program might. Typically 15 - 20 students try to agree on cuisine, atmosphere, price range, and proximity (maybe this is why we've only had four dinners). Choices have ranged from Italian cuisine with a volcanic atmosphere and low prices to exotic

Ethiopian cuisine with shrunken heads (not on the menu) and no-tables-or-utensils atmosphere. Most agree they're great fun—look for future announcements.

We hope to continue these events over summer break if interest persists.

*—Diane M. Petruzzo*

# VAX

The Department is about to acquire a Digital Equipment Corporation VAX-11/780 computer system under an NSF research equipment grant. The machine is scheduled for delivery "at the end of April," to be installed in room 4364B. Its primary use will be in support of Departmental research, although it can also be used in support of small classes. The machine is far too small to permit it to be used for programming courses such as 120, 330, 420, etc.

***Why is it only right that the serial number of the VAX is 1379?***
***(answer: Because 1379 = 7 × 197.)***

Two software systems are available for the VAX: the DEC VMS system and the Bell Laboratories UNIX system. Although both will probably get some use, the Department must pick one for routine use, or run the risk of some very confused users. Those with first-hand knowledge of VMS and/or UNIX are urged to convey their opinions before it is too late. (At the moment UNIX had the edge because it is largely written in the high-level C and hence easier to maintain than VMS.)

***UNIX worshipers at old-style PDP-11 shrine***

*—Dick Hamlet*

# Faculty Notes

Laveen N. Kanal is general chairman and program chairman of the Working Conference on Pattern Recognition in Practice, to be held May 21-23 at Vrije University, Amsterdam. Sponsors include the Netherlands Government, European Economic Group, and the IEEE Computer Society. The National Science Foundation is providing partial travel support for some American scientists. Proceedings will be published by North-Holland.

Jack Minker is a member of the program committees for the 1980 SIGMOD Conference, and for the Fourth International Conference on Collective Phenomena, Moscow, 1980. He has been appointed Vice Chariman of the ACM Committee on Scientific Freedom and Human Rights.

# Content-free Languages

William Rounds at the University of Michigan used to amuse his students with stories about those fascinating gee-gaws, *content-free languages*. Having passed a qualifying exam on the subject, of course I have forgotten everything about it. What follows are a few bits and pieces I have reconstructed. This exciting new area of computer science is being added to daily (though its total length of course remains zero).

**Properties of Content-free Languages**

[] Recognizable by a finite control with write-only memory.

[] Helpful for constructing proofs at the blackboard (see this journal, v. 6 no. 1).

[] Can be isolated by intersecting the string closure of the alphabet with essay-exam answers, or with government documents.

[] Self-descriptive.

[] The *uw* theorem: if a language is content-free, two words say as little as one. Its two-dimensional corollary: a picture is worth any number of words you like.

[] The emptiness problem for content-free grammars is trivially solvable.

*—Mark Weiser*

# Publications

### Jack Minker

Answer and reason extraction, natural language and voice output for deductive relational databases (with P. B. Powell), in L. Bole, ed., *Natural Language based Computer Systems.*

A predicate calculus based semantic network for deductive searching (with J. R. McSkimin), in N. Findler, ed., *Associative Networks.*

### Azriel Rosenfeld

Cellular graph automata I and II (with A. Wu), *Inf. and Control* **42**, 305-329 and 330-353.

Cellular graph automata (with A. Wu) in V. Claus et al., eds., *Graph-Grammars and Their Application to Computer Science and Biology*, Springer, 1979, 464-475.

Digital topology, *Amer. Math. Monthly* **86**, 621-630.

Some experiments in variable thresholding (with Y. Nakagawa), *Pattern Recognition* **11**, 191-204.

A note on polygonal and elliptical approximation of mechanical parts (with Y. Nakagawa), *ibid*, 133-142.

Image processing and recognition, *Advances in Computers* **18**, 1-57.

Breaking substitution ciphers using a relaxation algorithm, (with S. Peleg), *CACM* **22**, 598-605.

Sequential and cellular graph automata (with A. Wu), *Information Sciences* **20**, 57-68.

A note on the use of (gray level, average gray level) space as an aid in threshold selection (with R. Kirby), *IEEETSMC* **9**, 859-864.

Discrete relaxation for matching relational structures (with L. Kitchen), *ibid*, 869-874.

Some experiments in point pattern matching (with D. J. Kahl and A Danker), *ibid* **10**, 105-116.

A relaxation method for multispectral pixel classification (with J. O. Eklundh and H. Hamamoto), *IEEETPAMI* **2**, 72-75.

Region representation: boundary codes from quadtrees (with C. R. Dyer and H. Samet), *CACM* **23**, 171-179.

Recent development in image and scene analysis, in W. E. Gardner, ed., *Machine-aided Image Analysis 1978*, Institute of Physics, London, 42-49.

# Talks

### Jack Minker

"Logical Inference as an Aid to Analysis in Large Databases," Energy Department Symposium on Computer-assisted Analysis and Model Simplification.

"Optimization in a Deductive Relational Database System," (with J. Grant), and "Database Integrity," (with G. Zanon) at Workshop on Formal Bases for Databases.

### Azriel Rosenfeld

"Texture Analysis," Optical Society of America.

"Iterative Methods in Image Anaysis," U. S. Air Force Academy, Brown University, Honeywell, Inc., University of Minnesota, and SUNY, Binghamton.

"Quadtrees" (with H. Samet), Auto-Carto IV.

"Project Status Report," "Cooperative Computation in Texture Analysis," "Levels of Representation in Cultural Feature Extraction," Image Understanding Workshop.

"Computer Vision," D. C. Chapter, Optical Society of America, Auburn University, and Akron Chapter, IEEE Computer Society.

"Mosaic Models for Images" (with N. Ahuja), IEEE Decision and Control Conference.

"Hierarchical Structures for Region and Image Processing," General Motors.

"Problems and Prospects in Image Understanding," Ford Motor Company.

# Carriage Control

This issue is the last I will edit (never mind that I said the same thing last year—this time I mean it), and it is a pleasure to announce that Pamela Zave is willing to take over next year. She, Marv Zelkowitz, and I have been the only steady contributers to this house organ; she has only to get out a single issue in 1980-81 to keep up the average Marv and I attained over the last two years.

This final issue was produced using the Mergenthaler 202 phototypesetter driven by an 1100 program named DPS. The machine itself sets a good font, as befits a product of the ancient and honorable Mergenthaler Linotype Corporation. (Sometimes the right serif on the Times Roman capital T breaks up.) Using a program written by Fred Blonder, it can even handle digitized pictures, like the one below. Because the smallest thing that can be printed in a 5-point period, the resolution isn't great, but you can easily make out that a bribe is changing hands in

front of an unidentified government building.

DPS is another kettle of fish. It's not that the program is terrible (it is, but Ben Cranston struggles with it and mostly wins), or that it is hard to use (it is, but most other document processors are worse), or that its hyphenation algorithm is laughable (look at it). No, it's that the document-processors of today are the assemblers of natural language. That is, they can only attain power at the cost of impossible low-level detail, and their only device for reducing complexity is the unstructured macro expander. (At a recent POPL conference, Brian Reid presented a paper for a kind of document compiler—perhaps the FORTRAN of the field.)

Maybe artificial intelligence can help. Commercial typesetters (the people who type into machines like the Mergenthaler from keyboards) are very good at putting in the necessary controls, for example to handle difficult mathematical symbols. They can mostly do this using a few simple rules (which they might be hard pressed to explain) even without the help of a copy editor. So what we need is a "smart" document processor that will take a text entirely *without* commands and controls, and have a shot at setting it *with* all the fancy italic, small caps, boldface, centering, etc. Such a program will make many mistakes, but perhaps a language for *correcting* the draft would be easier to use.

AI is disreputable (and dangerous) when no one understands how the program works (or *if* it does) and the results cannot be independently judged. For a smart typesetter, the human proofreader remains in control.

Working with editors and document processors has also suggested to me that the coming "word processor" revolution is likely to be bloody. A number of student theses, my own attempts to produce a textbook on the machine, and several technical papers I've reviewed indicate the Truth:

> *A competent person using a typewriter (or a pencil) will usually produce a better paper faster than the same person using a word processing system.*

(Which is not to say that you would be better off with a pencil—you may not be competent.)

Two observations about word-processor-produced papers that went wrong: (1) There is a continual sense of *deja vu*—when you are certain that you've seen a passage before, look back, and sure enough, you have. It was moved with the editor, and never deleted from its original place. (2) Successive drafts of a paper get *worse* as they progress toward the finished copy, both in content and in typography. Because the word processor can reproduce any and all text as a whole, and make the whole perfect-appearing, corrections are hard to locate in a new draft, and they tend to go wrong. The limitations of most processors cause hand-written material to be omitted by oversight. When the processor is too good, one is tempted to elaborate symbolism until it cannot be read.

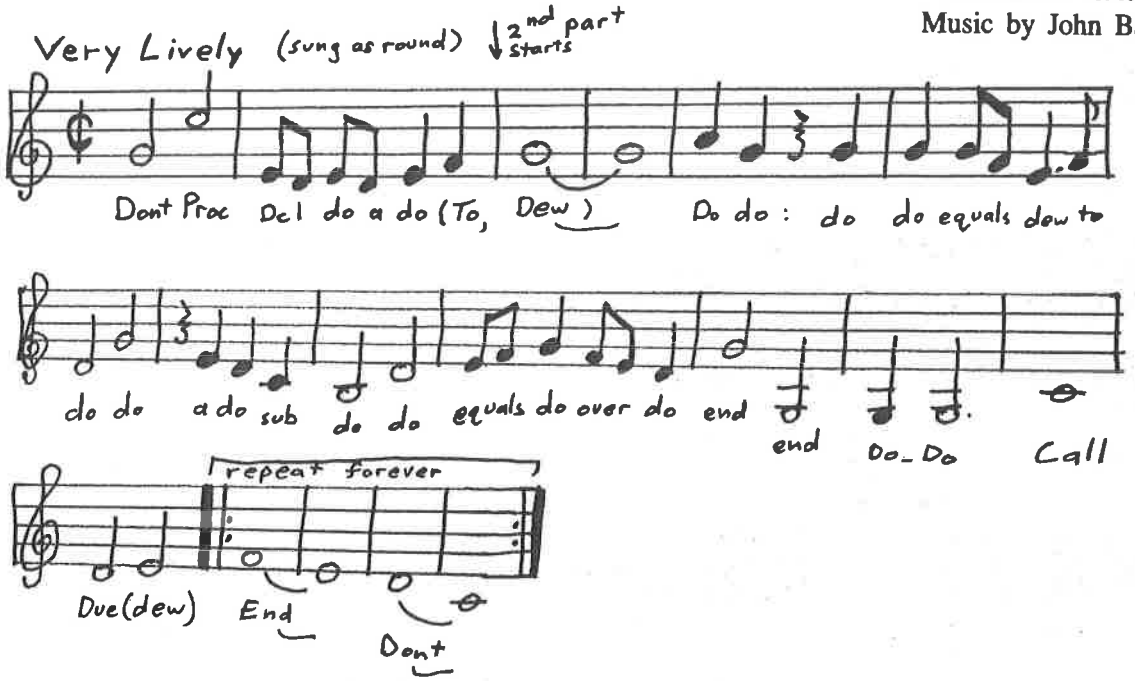
Word-processor uglies are probably caused by a wrong-headed pressure to *leave material in* (because it is so easy to type it out and fill perfect-appearing pages), instead of the salutory pressure (with a human typist) to *delete material.*

*—Dick Hamlet*

# The DO Loop Song

*Written in PL/1, but sung in C*

Lyrics by Warren Miller
and David Hutchens
Music by John Bailey




# Formal Axiomatization of the Lost Turkey Problem

Professor U. R. Pocahantas
Butterball University

**Theorem** There exists a finite turkey $T$ such that the function *CONSUME* is total. Before proving the main theorem we demonstrate a lemma.

**Lemma** Given an infinite yard or range $R$ with a finite number of hiding places $H$, such that

$$R \gg H,$$

the turkey can be *captured* iff the number of searchers is equivalent to the cardinality of $H$. We define *captured* as the state when the location of $T$ is the same as the location of one of the $|H|$ searchers. If the number of searchers is less than $|H|$ then there exists at least one hiding place containing no searcher; the turkey might be there. If to the contrary, the turkey has no place to hide and is said to be captured, thus demonstrating the lemma.

**proof** (of the main theorem). When $T$ is captured, there exists at least one transformation of $T$ which is acceptable. Certainly, the nondeterministic control of the turkey $T$ can be transformed into a deterministic control by the Breadcrumb (or Wild Rice) Theorem. To simplify the system, we can remove feathers without loss of generality, so long as they are not both head and tail feathers. We perform an insertion with $t = 350$ degrees, and effect a covering of $T$ using the basting function. Finally, we form a partition into equivalence classes and apply distributivity for the group. From here it is obvious that *CONSUME* will be total. *Q.E.D.*

Received November, 1978
Revised November, 1979

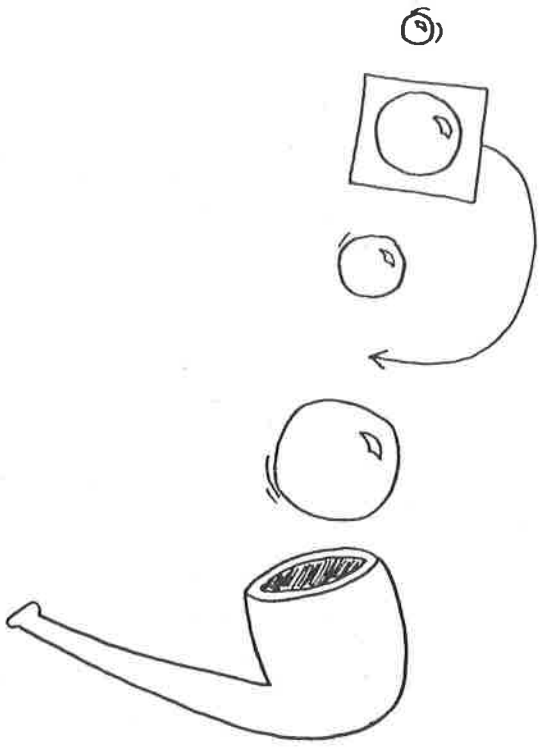
*—Ben Shneiderman*

# ACM Programming Contest

The Maryland team of Fred Blonder, Phil Dondes, Karl Ginter, and Paul McMullin (Hanan Samet is the faculty sponsor) won the Capital Region contest, but finished near the middle of the pack in the national finals.

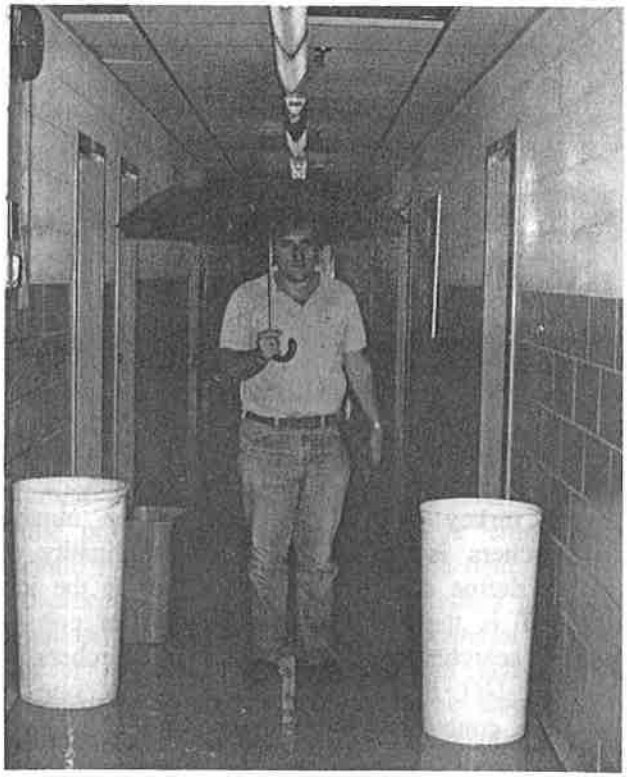
***Left to right: Samet, McMullin, Blonder, Dondes, Ginter***

# What Is It?



(Hint: See Knuth, v. 3)

*—Pamela Zave*



# April Showers