EDUCOM's 1992 Higher Education Software Awards

EDUCOM has announced the winners of the 1992 EDUCOM Higher Education Software Awards. The disciplinary categories in 1992 were Natural Sciences, Social Sciences, and Accounting.

We would especially like to congratulate Gerald Nelson, Wesley Seitz and Dana Lee Ling, all from the Department of Agricultural Economics for winning an award in the category of Distinguished Social Sciences Software. Their award was one of only eleven awards given by EDUCOM this year.

The names of all the winning applications, their authors and affiliations, are provided below.

**Natural Sciences**

**Best Natural Sciences Software (Physics) and Best Design**

*Relab*
Paul Horwitz, Wallace Feurzeig, William Barowy and Kerry Shetline (Bolt Beranek & Newman, Inc.) and Edwin Taylor (Boston University)

**Best Natural Sciences Software (Chemistry)**

*Organic Reaction Mechanisms*
Andrew F. Montana and Jeffrey R. Buell (California State University at Fullerton)

**Distinguished Natural Sciences Curriculum Innovation (Biology)**

*BioQUEST: Quality Undergraduate Educational Simulations and Tools in Biology*
John R. Jungck, Patti Soderberg (Beloit College), John N. Calley (University of Arizona), Nils S. Peterson (From the Heart Software), and James Stewart (University of Wisconsin-Madison).

**Distinguished Natural Sciences Curriculum Innovation (Biology)**

*Embryology Videodisc and HyperEmbryo Courseware*
Michael A. Kolitsky (California Lutheran University)

**Distinguished Natural Sciences Software Biology**

*MacRetina: A Simulated Experiment in Neuroscience*
Richard F. Olivo (Smith College)

**Distinguished Natural Sciences Software (Chemistry)**

*SpectraDeck / SpectraBook*
Paul F. Schatz (University of Wisconsin-Madison)

**Social Sciences**

**Best Social Sciences Software (Economics) and Best Instructional Innovation**

*SMITH TOWN*
Kalyani Raghavan, Robert Glaser, Valerie Shute, Jamie Schultz and Leona Schauble (University of Pittsburgh)
Best Social Sciences Curriculum Innovation (History)
Perseus 1.0: Interactive Sources and Studies on Ancient Greece
Gregory Crane, Elli Mylonas (Harvard University), Thomas Martin (Pomona College), Kenneth Morrell (St. Olaf College), and D. Neel Smith (Bowdoin College)

Distinguished Social Sciences Software (Economics)
AECOINTro: Computer Aided Instruction of Introductory Economics
Gerald C. Nelson, Wesley D. Seitz, and Dana Lee Ling (University of Illinois, Urbana-Champaign)

Distinguished Social Sciences Curriculum Innovation (Sociology)
Miami University Multi-Cultural Awareness Program: A National Model
Robert A. Vogel, Guy R. Moore, Gerri Susan Mosley-Howard, Ronald B. Scott and Raymond M. White, Jr. (Miami University)

Accounting
NCAIR Weston Vernon, Jr. Best Accounting Curriculum Innovation
Introduction of Audit Excellence, Phase II
Murray B. Hirsch, Brent C. Inman, Maria M. Sieber, Sean W. Wood (Coopers & Lybrand)

NeXT Public Archives

All of the software or documentation packages for the NeXT listed below are in the public domain and available from the Purdue FTP Archive Site (hostname: nova.cc.purdue.edu; IP address: 128.210.7.22).

Opener — Opener automatically decodes and opens compressed files when you double-click them in the Workspace. Files dropped on the Opener icon will be decoded. Opener supports files encoded with compress, tar, arc, binhix, StuffIt, uuencode, zip, lzh, and xilharc. By Michael Hawley

SegHoarker — A utility for examining and editing Mach-O files. SegHoarker presents the segments and sections of any Mach-O file in a standard NeXT browser. Users can open, edit, and reinsert any segment. By Garrick Toubassi

User Group Newsletters — Newsletters from the following user groups: ANuG, BaNG, BuzzNUG, CeNUG, FaNG, GUN, hAng, MiamiNUG, NeXus PNUUG, mNUG, SCaN, VaTNUG, and VNUS.

Technical Information — Documents include NeXT Technical Support Notes on advanced topics such as performance tuning and localization, and NeXTanswers, a Digital Librarian directory of hundreds of answers to technical questions.
Mac Systat Upgraded to Version 5.2

CCSO is pleased to officially announce the availability of the latest release of Systat for Apple Macintosh machines, Mac Systat v.5.2. This product was made available for site licensing to the campus in late spring of 1992; however, since it was never officially announced in this forum, you may be unaware of these developments.

CCSO maintains a campus site license for Systat for UIUC faculty, staff and students. The software is made available for licensing to all bonafide University faculty/staff/students at the CCSO Accounting and Distribution Office located in Room 1420 DCL, 1304 West Springfield Avenue, Urbana (phone 333-7752). You will be required to show proof of affiliation with the University, and will be asked to fill out a software end-user agreement. Payments may be made with either a valid University account number or with a personal check.

Mac Systat v.5.2 offers very significant improvements over v.5.1 — in terms of functionality, processing speed, and responsiveness of end-user interface. Menu choices are much refined for faster analysis of complex datasets, with fewer clicks of the mouse. Mac Systat 5.2 offers a very broad range of statistical analyses, including the most comprehensive implementation of general linear modeling available on the Apple Macintosh. Major statistical improvements have been made in the following areas: repeated measures analysis, hypothesis testing, means model coding, and handling of categorical data. Stepwise regression now has options for forward selection, backward elimination and interactive model building. Among some of the additional hypothesis tests are the following: a method for arbitrary contrasts of effects or means, and new post-hoc tests such as Scheffe, 1-sided and 2-sided Dunnett, Bonferroni, Fisher’s LSD, and Tukey-Kramer; moreover, it now automatically computes the Greenhouse-Geisser and Huynh-Feldt p-values.

Mac Systat v.5.2 includes many analytical improvements to its graphical capabilities. One may now draw global maps using spherical coordinates, and have error bars and control limits automatically calculated. In addition to standard graphs, plots, bar charts, histograms and scatter-plots, Systat now features dynamic color graphics, for instance, 3-dimensional rotation, contour plots, dimensional maps, triangular coordinate plots, nonlinear scatterplot smoothing, kernel density estimation plots, and Voroni tesselations.

Mac Systat v.5.2 supports the entire family of 680x0 processors. It requires a Macintosh with 2MB RAM, a hard-disk (minimum capacity of 10-15 MB is recommended), and System 6.0.2 or higher. It can take advantage of the graphic and data-display features of Apple’s QuickTime software extension, allowing one to manipulate time-based data like animation, video and sound. If one has access to QuickTime compatible system software, one can view a series of Systat plots or graphs as an animated “movie,” and watch how data change over time; one can actually display, copy and paste the movie file into other compatible Macintosh applications.

Mac Systat 5.2 is fully compatible with Macintosh System 7; its dynamic memory allocation enables it to take full advantage of System 7’s virtual memory and 32-bit addressing features, resulting in a markedly significant increase in the the size of problems that one can analyze. Please note that virtual memory is available if one’s Macintosh system has a PMMU (paged memory management unit) and 32-bit addressing is available if one’s Mac can operate in 32-bit mode.

The Mac Systat v.5.2 software comes bundled with a complete set of documentation composed of 4 shrink-wrapped paperback manuals called Getting Started, Data, Statistics and Graphics. The initial royalty/licensing/diskette and copying (and documentation) fees for a single copy of Mac Systat v.5.2 — through the U of I campus site license — is $240.00. (The academic list price of Mac Systat v.5.2 from Systat Inc, is $895/copy.) The software comes in one of 2 forms, for coprocessor equipped machines and for machines that do not have a floating-point math coprocessor installed; please specify which version you need. Upgrades from Systat v.5.1 and v.5.0 are $90 and $140 respectively; all upgrades include a completely new set of documentation. If you’re currently running a version of Mac Systat that is older than 5.2, please remember to upgrade at the earliest possible opportunity. Also, please recall that you are required to return all your current disks at the time of upgrade. Please contact the CCSO Accounting Office at 333-7752 or Anup Roy (U of I’s Systat coordinator) via e-mail to anuproy@uiuc.edu if you need any further details.
BMDP/386 Dynamic Available For Site Licensing

CCSO is pleased to officially announce the availability of the latest release of BMDP for IBM PC compatibles. This product was made available for site licensing to the campus in late spring of 1992; however, since it was never officially announced in this forum, you may not be aware of these developments.

CCSO maintains a campus site license for BMDP for UIUC faculty and staff. The BMDP/386 Dynamic license replaces the earlier DOS version of BMDP called PC-90. BMDP/386 Dynamic is made available for licensing to all bona fide University faculty and staff at the CCSO Accounting and Distribution Office located in Room 1420 DCL, 1304 West Springfield Avenue, Urbana (phone 333-7752). You will be required to show proof of affiliation with the University, and will be asked to fill out a software end-user agreement. Payments may be made with either a valid University account number or with a personal check.

BMDP/386 Dynamic is the highly sophisticated comprehensive BMDP statistical package from BMDP Statistical Software, Inc., compiled to run specifically on high-end 80386 and 80486 PCs. It is a DOS Extended Memory based statistical package that runs in 32-bit protected mode on 386 or 486-based machines. It eliminates the fixed RAM memory (the 640k DOS restrictions on matrix size and the 4MB/8MB restrictions of earlier BMDP/386 releases), hard disk partition size, and memory manager restrictions of earlier BMDP products. The program automatically accesses up to 16 megabytes of RAM by dynamically allocating as much computer memory as is available on one's machine.

BMDP/386 Dynamic is probably the most powerful statistical package available for PCs today. It provides you with BMDP's complete statistical library, long considered one of the most comprehensive collections of some of the most reliable and efficient statistical algorithms on the market. It also provides several useful utilities, such as a powerful high-resolution PLOT program, a professional Data Manager program to facilitate handling of non-rectangular or hierarchical data files, and a Data Entry program to perform complex data entry including cross-validation and verification.

BMDP/386 Dynamic requires an Intel 80386 (including an 80387 math coprocessor) or 80486 processor-based IBM PC or compatible, running PC-DOS or MS-DOS version 3.3 or later, with at least 640kB of base conventional RAM and at least 3 megabytes of extended memory. It uses the ERGO DOS extender to take advantage of the extended memory in one's 80386 or 80486 machine. The DOS extender resides in an executable file, and is loaded and removed from memory automatically as the executable file is bound to the BMDP/386 programs. The DOS extender and BMDP/386 coexist with most memory manager programs that conform to the EMS 3.2 (or later) or XMS standards. For instance, BMDP/386 Dynamic does NOT require a memory manager, but coexists with QEMM (v.5.0 or higher), HIMEM (v.2.60 or higher), and EMM386 (with or without HIMEM). It will use up to 16MB of extended memory, and will even augment actual computer memory with its virtual memory features. One need not disable one's disk cache program or RAM disk or memory manager to use BMDP/386 Dynamic; it is compatible with the disk cache program SMARTDRV and RAM disks RAMDRIVE and VDISK.

The complete BMDP/386 Dynamic package comes bundled with the complete BMDP documentation, and is licensed for a ONE-TIME fee of $650.00. (The academic list price for this software is $999.00 from BMDP Statistical Software, Inc.) There are NO yearly renewal or mandated maintenance/upgrade requirements. People who have licensed BMDP PC-90 (or BMDP-PC 1988) — either through the CCSO site license or directly from BMDP Statistical Software, Inc. — are eligible for upgrades at a cost of $250.00. Please contact the CCSO Accounting Office at 333-7752 or Anup Roy (U of I's BMDP Coordinator) via e-mail to anuproy@uiuc.edu for any further details.
Changes at CCSO Sites

Over the summer, many changes were made at the CCSO Sites. Various equipment was moved (or removed) and new equipment added; software was also, moved, deleted, or added. Following is a list of the CCSO Sites with each site’s hours, equipment, and available software. This information is also available on-line via gopher and as handout QR-0.5 CCSO Sites: Hours, Equipment & Software from the CCSO Resource Center, 1420 DCL.

**COMMERCE WEST — Room 70 Comm West (333-4500)**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am - midnight; Mon-Thurs</td>
<td>59 DOS systems; 6 Mac SE; 5 Mac SE/30</td>
</tr>
<tr>
<td>8:00 am - 10:00 pm; Fri-Sat</td>
<td>6 X-Terminals; 1 HP Laserjet; 7 IBM</td>
</tr>
<tr>
<td>12 noon - 10:00 pm; Sun</td>
<td>Proprinters; 4 Imagewriters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adobe Illustrator 1.93</th>
<th>Expressionist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldus Freehand 2.02</td>
<td>HyperCard</td>
</tr>
<tr>
<td>Apple File Exchange</td>
<td>MacDraw II v1.1</td>
</tr>
<tr>
<td>Cricket Graph 1.3.2</td>
<td>MacLabel Pro 1.02</td>
</tr>
<tr>
<td>AsEasyAs 3.01</td>
<td>Lotus 123 v2.2</td>
</tr>
<tr>
<td>Clarkson Telnet</td>
<td>Microsoft Word 5.0</td>
</tr>
<tr>
<td>dBase IV</td>
<td>Microstat</td>
</tr>
<tr>
<td>Lindo</td>
<td>Novanet</td>
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<table>
<thead>
<tr>
<th>Mac Software</th>
<th>PC Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacWrite II v1.1</td>
<td>Placement Office Data Disk</td>
</tr>
<tr>
<td>Microsoft Excel 2.2a</td>
<td>Rbase 5000 v1.01</td>
</tr>
<tr>
<td>Microsoft Word 4.0 &amp; 5.0</td>
<td>Turbo Basic 1.1</td>
</tr>
<tr>
<td>NCSA Telnet</td>
<td>Turbo C 2.01</td>
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<tr>
<td>PageMaker 4.0</td>
<td>Turbo Pascal 5.5</td>
</tr>
<tr>
<td>SuperPaint 2.0</td>
<td>WordPerfect 5.0 &amp; 5.1</td>
</tr>
<tr>
<td>UltraPaint 1.0</td>
<td>WriteNow!</td>
</tr>
<tr>
<td>Wingz Univ. Edition</td>
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</table>

**DIGITAL COMPUTER LAB — L410 DCL (333-1430)**

(Note: CS students have priority at this site.)

<table>
<thead>
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<th>Hours</th>
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<tbody>
<tr>
<td>8:00 am - 11:00 pm; Mon-Thurs</td>
<td>65 NeXT systems</td>
</tr>
<tr>
<td>8:00 am - 5:00 pm; Fri</td>
<td></td>
</tr>
<tr>
<td>12 noon - 5:00 pm; Sat</td>
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<tr>
<td>12 noon - 11:00 pm; Sun</td>
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</table>

<table>
<thead>
<tr>
<th>NeXT Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>C, C++</td>
</tr>
<tr>
<td>Objective Compiler</td>
</tr>
<tr>
<td>Diagram!</td>
</tr>
<tr>
<td>Mathematica</td>
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<tr>
<td>Schematik</td>
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<tr>
<td>WriteNow!</td>
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<table>
<thead>
<tr>
<th>TURNER HALL — N-120 Turner Hall (333-8170)</th>
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<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>8:00 am - 5:00 pm; Mon-Fri</td>
</tr>
<tr>
<td>7:00 pm - 10:00 pm; Mon-Thurs</td>
</tr>
<tr>
<td>Closed Saturday-Sunday</td>
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September 1992
### EVERITT LAB — 146 Everitt Lab (333-4936)

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<tbody>
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<tr>
<td>8:00 am - 10:00 pm; Mon-Thurs</td>
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</tr>
<tr>
<td>8:00 am - 5:00 pm; Fri</td>
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<tr>
<td>12 noon - 5:00 pm; Sat</td>
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<tr>
<td>Closed Sunday</td>
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<tbody>
<tr>
<td>Aldus Freehand 2.02</td>
<td>Expressionist</td>
</tr>
<tr>
<td>Arch 252 software</td>
<td>German 101/102 software</td>
</tr>
<tr>
<td>Circuit Tutor 1.0</td>
<td>HyperCard 2.0</td>
</tr>
<tr>
<td>Cricket Graph 1.3.2</td>
<td>Mac II-MatLab 1.2b</td>
</tr>
<tr>
<td>Edu-MatLab 1.0</td>
<td>MacDraw II v1.1</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
</tr>
<tr>
<td>Mac Software</td>
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</tr>
<tr>
<td>PSpice 5.0A &amp; 5.1</td>
<td></td>
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<tr>
<td>Qued 1.53</td>
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<tr>
<td>StatView II v1.03</td>
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<tr>
<td>SuperPaint 2.0a</td>
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<td>UltraPaint 1.0</td>
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<td>PC Software</td>
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<td>Harvard Graphics 2.30</td>
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<td>Lotus 123 v2.2</td>
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<td>MatLab</td>
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<td>Microsoft Windows 3.0</td>
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<td>Novanet</td>
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<td>Placement Office Data Disk</td>
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<td>Quattro Pro</td>
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<td>SPSS Statistics</td>
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<td>Turbo Basic 1.1</td>
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<td>Turbo C 2.01</td>
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<td>Turbo Pascal 5.5</td>
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<td>Tutsim</td>
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<td>WordPerfect 5.1</td>
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### ENGLISH — Room 8 English Bldg. (244-0386)

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<td>Hours</td>
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<tr>
<td>8:00 am - midnight; Sun-Thurs</td>
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<td>8:00 am - 5:00 pm; Fri</td>
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<tr>
<td>12 noon - 5:00 pm; Sat</td>
<td></td>
</tr>
<tr>
<td>12 noon - midnight; Sun</td>
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<table>
<thead>
<tr>
<th>Equipment</th>
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<tbody>
<tr>
<td>Adobe Illustrator</td>
<td>Engr Equation Solver 2.6</td>
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<tr>
<td>Circuit Tutor</td>
<td>HyperCard 2.1</td>
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<tr>
<td>Cricket Graph 1.0</td>
<td>Macintosh Basics 4.0</td>
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<tr>
<td>CS101 software</td>
<td>MacDraw II v1.1</td>
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<tr>
<td>CS125 software</td>
<td>MacPaint 2.0</td>
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<td>Disinfectant 2.8</td>
<td>MacScheme</td>
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<td>Equipment</td>
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<tr>
<td>Mac Software</td>
<td></td>
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<td>PageMaker 4.0</td>
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<td>PSpice 4.05</td>
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<td>SuperPaint 2.0</td>
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<td>tn3270 2.3d8</td>
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<tr>
<td>UltraPaint 1.0</td>
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<td>Virex 3.51</td>
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### PSYCHOLOGY — 453 Psychology Bldg.
(Operated by Psychology)

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<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>8:00 am - 12 noon; Mon-Fri</td>
<td></td>
</tr>
<tr>
<td>1:00 pm - 5:00 pm; Mon-Fri</td>
<td></td>
</tr>
<tr>
<td>7:00 pm - 10:00 pm; Mon-Thurs</td>
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<table>
<thead>
<tr>
<th>Equipment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Tektronic 4105 Color Terminals;</td>
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</tr>
<tr>
<td>7 IBM 3179G terminals; 1 IBM 3262 printer;</td>
<td></td>
</tr>
<tr>
<td>2 Tektronic 4696 Color Printers</td>
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</table>

September 1992
### ILLINI HALL — 23 Illini Hall (244-7530)

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
<th>Mac Software</th>
<th>PC Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 hours; Mon- Thurs</td>
<td>10 DOS systems; 10 Mac IIsi; 9 NeXT;</td>
<td>Maple 5.01</td>
<td>PSpice 4.05 &amp; 5.0</td>
</tr>
<tr>
<td>midnight - 10:00 pm; Fri</td>
<td>1 NeXT laser printer; 2 Image writers;</td>
<td>Mathematica 1.2</td>
<td>Qued 1.53</td>
</tr>
<tr>
<td>10:00 am - 10:00 pm; Sat</td>
<td>2 Proprinters; 1 Apple LaserWriter;</td>
<td>MYSTAT</td>
<td>SPSS 4.04</td>
</tr>
<tr>
<td>12 noon - midnight; Sun</td>
<td>1 HP Laserjet</td>
<td>Microsoft Excel 3.0</td>
<td>StatView II v1.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Microsoft Word 4.0 &amp; 5.0</td>
<td>Stella II v2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NCISA Telnet</td>
<td>SuperPaint 2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Novananet</td>
<td>Vrex 3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PageMaker 4.2</td>
<td>Xferit 1.4b1</td>
</tr>
</tbody>
</table>

- **Adobe Illustrator 3.2**
- **Aldus Freehand 3.1**
- **Apple File Exchange**
- **Arch 252 software**
- **Circuit Tutor**
- **Cricket Graph 1.3.2**
- **Eudora**
- **Expressionist 2.07**
- **FileMaker Pro 1.0v1**
- **German 101/102 software**
- **HyperCard 2.0 & 2.1**
- **MacDraw II v1.1**
- **MacLin 1.0**
- **MacPaint 2.0**
- **MacScheme + TS**
- **MacWrite II v1.1**
- **Lotus 123 v2.2**
- **Microsoft Excel 3.0**
- **Microsoft Word 5.0**
- **Microsoft Windows 3.0**
- **MS Word for Windows 1.1**
- **Novananet**
- **PSpice**
- **QuickBASIC**
- **Systat**
- **Turbo Basic 1.1**
- **Turbo Pascal 5.5**
- **WordPerfect 5.1**

### ILLINI UNION — Basement of the Union (244-7935)

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
<th>Mac Software</th>
<th>PC Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am - midnight; Mon- Thurs</td>
<td>12 DOS systems; 23 Mac SE; 3 Mac SE/30;</td>
<td>MacWrite II v1.1</td>
<td>PageMaker 4.0</td>
</tr>
<tr>
<td>8:00 am - 10:00 pm; Fri</td>
<td>1 Mac II; 1 HP Laserjet; 3 Image writers;</td>
<td>Microsoft Excel 2.2a</td>
<td>UltraPaint 1.0</td>
</tr>
<tr>
<td>10:00 am - 10:00 pm; Sat</td>
<td>2 Epson dot matrix printers; 2 Apple LaserWriter; 1 Apple Scanner</td>
<td>Microsoft Word 4.0</td>
<td>Vrex 3.8</td>
</tr>
<tr>
<td>12 noon - midnight; Sun</td>
<td></td>
<td>NCISA Telnet</td>
<td>Wingz 1.1a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Aldus Freehand 2.02**
- **Apple File Exchange**
- **Circuit Tutor**
- **Cricket Graph 1.3.2**
- **Eudora**
- **Expressionist 2.07**
- **FileMaker II 1.1v2**
- **HyperCard 2.0**
- **MacDraw II 1.1v2**
- **Lotus 123 v2.2**
- **Microsoft Word 5.0**
- **Novananet**
- **Placement Office Data Disk**
- **Quattro Pro**
- **Turbo Basic 1.1**
- **Turbo C 2.01**
- **Turbo Pascal 5.5**
- **WordPerfect 5.1**

---

**September 1992**
### LINCOLN HALL — 200-202 Lincoln Hall (333-0309)

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am - 11:00 pm; Mon-Thurs</td>
<td>13 Mac IIs; 6 monochrome terminals and 6 color terminals connected to VMD</td>
</tr>
<tr>
<td>8:30 am - 5:00 pm; Fri</td>
<td>4 Imagewriters; a LaserWriter II</td>
</tr>
<tr>
<td>12 noon - 5:00 pm; Sat-Sun</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe Illustrator 3.2</td>
</tr>
<tr>
<td>Aldus Freehand 3.1</td>
</tr>
<tr>
<td>Apple File Exchange</td>
</tr>
<tr>
<td>Arch 252 software</td>
</tr>
<tr>
<td>Circuit Tutor</td>
</tr>
<tr>
<td>Cricket Graph 1.3.2</td>
</tr>
<tr>
<td>Eudora</td>
</tr>
<tr>
<td>Expressionist 2.07</td>
</tr>
<tr>
<td>Maple 5.01</td>
</tr>
<tr>
<td>Mathematica 1.2</td>
</tr>
<tr>
<td>MYSTAT</td>
</tr>
<tr>
<td>Microsoft Excel 3.0</td>
</tr>
<tr>
<td>Microsoft Word 4.0 &amp; 5.0</td>
</tr>
<tr>
<td>NCSA Telnet</td>
</tr>
<tr>
<td>Novanet</td>
</tr>
<tr>
<td>PageMaker 4.2</td>
</tr>
</tbody>
</table>

### OREGON — 901 W. Oregon (244-7513)

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am - midnight; Mon-Thurs</td>
<td>32 DOS systems; 19 Mac SE/30; 32 Mac Iic</td>
</tr>
<tr>
<td>8:00 am - 10:00 pm; Fri</td>
<td>8 Imagewriters; 5 Proprinters, 1 HP Laserjet</td>
</tr>
<tr>
<td>10:00 am - 10:00 pm; Sat</td>
<td>1 LaserWriter II</td>
</tr>
<tr>
<td>12 noon - midnight; Sun</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe Illustrator 3.2</td>
</tr>
<tr>
<td>Aldus Freehand 3.1</td>
</tr>
<tr>
<td>Apple File Exchange</td>
</tr>
<tr>
<td>Arch 252 software</td>
</tr>
<tr>
<td>Circuit Tutor</td>
</tr>
<tr>
<td>Cricket Graph 1.3.2</td>
</tr>
<tr>
<td>Disinfectant 2.7.1</td>
</tr>
<tr>
<td>Eudora</td>
</tr>
<tr>
<td>Maple 5.01</td>
</tr>
<tr>
<td>Microsoft Excel 3.0</td>
</tr>
<tr>
<td>Microsoft Word 5.0</td>
</tr>
<tr>
<td>Morgan 1.0 (Bio 351)</td>
</tr>
<tr>
<td>NCSA Telnet</td>
</tr>
<tr>
<td>PageMaker 4.2</td>
</tr>
<tr>
<td>Novanet</td>
</tr>
<tr>
<td>Placement Office Data Disk</td>
</tr>
<tr>
<td>Microsoft Windows 3.0</td>
</tr>
<tr>
<td>MS Excel for Windows 3.0</td>
</tr>
<tr>
<td>MS Word for Windows 1.1</td>
</tr>
<tr>
<td>PageMaker for Windows 3.01</td>
</tr>
<tr>
<td>Novanet</td>
</tr>
<tr>
<td>Lotus 123 v2.2</td>
</tr>
<tr>
<td>Microsoft Word 5.0</td>
</tr>
<tr>
<td>Quattro Pro 1.0</td>
</tr>
</tbody>
</table>

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September 1992
### SNACK BAR — 120 Snack Bar (333-1851)
*(NOTE: No site operator/consultant on duty.)*

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am - midnight; Mon-Thurs</td>
<td>10 Mac IIsi; 10 Mac SE/30; 4 Imagewriters</td>
</tr>
<tr>
<td>8:00 am - 10:00 pm; Fri</td>
<td></td>
</tr>
<tr>
<td>12 noon - 10:00 pm; Sat</td>
<td></td>
</tr>
<tr>
<td>12 noon - midnight; Sun</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe Illustrator 3.2</td>
</tr>
<tr>
<td>Aldus Freehand 3.1</td>
</tr>
<tr>
<td>Apple File Exchange</td>
</tr>
<tr>
<td>Arch 252 software</td>
</tr>
<tr>
<td>Circuit Tutor</td>
</tr>
<tr>
<td>Cricket Graph 1.3.2</td>
</tr>
<tr>
<td>Eudora</td>
</tr>
<tr>
<td>Expressionist 2.07</td>
</tr>
<tr>
<td>FileMaker Pro 1.0v1</td>
</tr>
<tr>
<td>German 101/102 software</td>
</tr>
<tr>
<td>HyperCard 2.0 &amp; 2.1</td>
</tr>
<tr>
<td>MacDraw II v1.1</td>
</tr>
<tr>
<td>MacLin 1.0</td>
</tr>
<tr>
<td>MacPaint 2.0</td>
</tr>
<tr>
<td>MacScheme + TS</td>
</tr>
<tr>
<td>MacWrite II v1.1</td>
</tr>
<tr>
<td>Maple 5.01</td>
</tr>
<tr>
<td>Mathematica 1.2</td>
</tr>
<tr>
<td>MYSTAT</td>
</tr>
<tr>
<td>Microsoft Excel 3.0</td>
</tr>
<tr>
<td>Microsoft Word 4.0 &amp; 5.0</td>
</tr>
<tr>
<td>NCSA Telnet</td>
</tr>
<tr>
<td>Novanet</td>
</tr>
<tr>
<td>PageMaker 4.2</td>
</tr>
<tr>
<td>PSpice 4.05 &amp; 5.0</td>
</tr>
<tr>
<td>Qued 1.53</td>
</tr>
<tr>
<td>SPSS 4.04</td>
</tr>
<tr>
<td>StatView II v1.03</td>
</tr>
<tr>
<td>Stella II v2.2</td>
</tr>
<tr>
<td>SuperPaint 2.0</td>
</tr>
<tr>
<td>Virex 3.8</td>
</tr>
<tr>
<td>XPerit 1.4b1</td>
</tr>
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</table>

### HYPERMEDIA LAB — 204 Lincoln Hall
*(Operated by Social Science)*

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am - 11:00 pm; Mon-Thurs</td>
<td>12 Mac II (color); 1 Apple Scanner;</td>
</tr>
<tr>
<td>8:30 am - 5:00 pm; Fri</td>
<td>1 Microtek 300 ZS Scanner (color);</td>
</tr>
<tr>
<td>12 noon - 5:00 pm; Sat-Sun</td>
<td>12 Pioneer LD-200 LaserDisc video disk</td>
</tr>
<tr>
<td></td>
<td>players (each with a Trinitron monitor)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe Photoshop</td>
</tr>
<tr>
<td>AppleScan</td>
</tr>
<tr>
<td>ColorStudio</td>
</tr>
<tr>
<td>HyperCard 2.1</td>
</tr>
<tr>
<td>HyperScan</td>
</tr>
<tr>
<td>ImageStudio</td>
</tr>
<tr>
<td>MacDraw Pro</td>
</tr>
<tr>
<td>MacPaint</td>
</tr>
<tr>
<td>MacWrite II</td>
</tr>
<tr>
<td>Mariah</td>
</tr>
<tr>
<td>Microsoft Word</td>
</tr>
<tr>
<td>NCSA Telnet</td>
</tr>
<tr>
<td>OmniPage</td>
</tr>
<tr>
<td>Stella II</td>
</tr>
<tr>
<td>SuperCard</td>
</tr>
<tr>
<td>SuperPaint</td>
</tr>
<tr>
<td>VideoWorks II</td>
</tr>
</tbody>
</table>

### REHABILITATION CENTER — 131a Rehab Center (333-4604)
*(Operated by Rehabilitation)*

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 am - 8:45 pm; Mon-Thurs</td>
<td>3 Mac systems with Headmaster pointer and trackball; 4 DOS systems with screen enlargement, voice output, scanner; 1 Apple LaserWriter</td>
</tr>
<tr>
<td>9:00 am - 5:00 pm; Fri</td>
<td></td>
</tr>
</tbody>
</table>

### UNDERGRADUATE LIBRARY — MEDIA CENTER (333-2667)
*(Operated by Library)*

<table>
<thead>
<tr>
<th>Hours</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am - 1:00 am; Mon-Thurs</td>
<td>24 DOS systems; 10 Mac SE; 6 Proprinters;</td>
</tr>
<tr>
<td>8:00 am - midnight; Fri</td>
<td>1 HP Laserjet; 1 Imagewriter</td>
</tr>
<tr>
<td>9:00 am - midnight; Sat</td>
<td></td>
</tr>
<tr>
<td>12 noon - 1:00 am; Sun</td>
<td></td>
</tr>
</tbody>
</table>
An Overview of Transporting SAS® Files Between Hosts

David Shinn and David Driggs

(Ed. note: Since the transporting of SAS files between hosts appears to be one of the major difficulties encountered by our users, we believed we should provide some help. The main SAS consultant on our staff was beginning to pull together some information on this topic when he saw the following article about transporting files in the the SAS technical journal: “David Shinn and David Driggs, Observations*, Volume 1, Number 4, 3rd Quarter 1992, Cary, NC: SAS Institute Inc., 1992”. We felt that it was an excellent article that would answer many of your questions and asked permission from SAS Institute, Inc., to reprint. They have graciously given us their permission to do so. We hope you will find it useful.)

David Shinn is a Technical Support Analyst at SAS Institute where he has worked for five years. David has a BS degree from Anderson-Broadus College and an MS degree from West Virginia University. He provides support for the base procedures.

David Driggs is a Technical Support Analyst at SAS Institute where he provides support for the display products. Davis has a BS degree from North Carolina State University. He has been using SAS software for over five years.

Abstract

The SAS System runs in many different host environments, often making it necessary to move SAS files from one host to another; this process is called transporting. This article provides an overview of transporting SAS files and includes numerous system-specific examples, a list of frequently encountered problem areas, and suggestions for avoiding difficulties.

Introduction

The process of moving SAS files from one host environment to another is called transporting. To move a SAS file from one host to another, you must convert the file to a format that can be recognized by the SAS System on other host systems. This format is called transport format. The transport process includes

- Exporting the SAS file (putting the file into transport format)
- Moving the transport file to another host environment via tape or communications software
- Importing the transport file (restoring the file to the format appropriate to the receiving host).

This article provides an overview of transporting SAS files. It provides numerous system-specific examples, a list of some common problem areas, and helpful tips for transporting. While this article discusses transporting under the MVS, CMS, VMS, DOS, and UNIX operating systems, much of the information also applies to other operating systems. Transporting is discussed under both Version 6 and Version 5 of the SAS System, however, more attention is devoted to transporting under Version 6.

Since this article is an overview, it does not attempt to provide exhaustive coverage of transporting SAS files or of the various SAS procedures that are discussed here. There are SAS software publications available that provide in-depth coverage of these areas. See the “Summary” section of this article for a list of useful SAS software publications.

General Information About Transporting

Transport format is necessary if you want to move a SAS file from one machine to another, where the two machines have a binary incompatibility such as different representations of floating-point numbers. When moving SAS files between machines where the two machines are running different operating systems (unless the files are moved between MVS and CMS), you should use transport format. If both the sending host and the receiving host are running the same operating system, you are not required to use transport format. Since both MVS and CMS run on the same hardware, transport format is not required when moving SAS files between these two operating systems.

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Transport files are sequential files containing SAS data sets, SAS catalogs, or a SAS data library in transport format. There are two specific types of transport format. You use one type only for transporting SAS data sets. For example, under Release 6.06, the XPORT engine (which is used on the LIBNAME statement) can be used to create or read a transport file containing this format. The other type of transport format is created by the CPORT procedure and must be read by the CIMPORT procedure; you must use this format for transporting SAS catalogs.

In addition to the XPORT engine, you can use other tools to create or read transport files that contain data sets in transport format. However, these tools vary among different releases of the SAS System (and, under Release 5.18, vary among different operating systems). Table 1 summarizes the tools that are available for creating and reading transport files containing SAS data sets.

<table>
<thead>
<tr>
<th>If you are using...</th>
<th>Then use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release 6.06 or later</td>
<td>the XPORT engine</td>
</tr>
<tr>
<td>Release 6.04</td>
<td>the SASV5XPT engine</td>
</tr>
<tr>
<td>Release 5.18 (under MVS, CMS, or VSE)</td>
<td>the XCOPY procedure</td>
</tr>
<tr>
<td>Release 5.18 (under VMS, AOS/VS, or PRIMOS)</td>
<td>The COPY procedure (with the EXPORT and IMPORT options) or the TRANSPORT = data set option</td>
</tr>
</tbody>
</table>

Table 1 SAS Tools for Creating and Reading Transport Files Containing SAS Data Sets

The transport format for SAS data sets (created by the XPORT or SASV5XPT engine, or the COPY or XCOPY procedure) is the same for all SAS releases in all host environments. Therefore, you can move a transport file containing this format to any release of the SAS System on any host. For example, if you create a transport file with Release 6.06 using the XPORT engine, you can import it with Release 5.18 under CMS using PROC XCOPY, or with Release 6.04 using the SASV5XPT engine.

The transport format created by PROC CPORT can be recognized by the release on which it was produced or by a later release, but it will not be recognized by an earlier release. For example, if you use PROC CPORT to create a transport file on Release 6.06, you cannot import this file on Release 5.18.

Transporting with Release 6.06 or Later

In Release 6.06 or later, the XPORT engine provides a convenient means for transporting SAS data sets. The XPORT engine is the recommended tool when only SAS data sets are transported.

The XPORT engine is generally used in conjunction with PROC COPY; using this approach makes it easy to create or read a transport file that contains one or more data sets from a SAS data library. Another approach is to use the SAS DATA step to create or read a transport file; specify the XPORT engine on the LIBNAME statement for the transport file and then create or read the file as you would a SAS data set.

In release 6.06 or later you can use the CPORT procedure, coupled with PROC CIMPORT, to transport SAS catalogs, SAS data sets, and SAS data libraries. These procedures are the only tools available for creating and reading transport files containing SAS catalogs.
Transporting with Release 5.18

The basic approach for transporting SAS data sets with Release 5.18 (under MVS, CMS, and VSE) is to use PROC XCOPY with the EXPORT option to create a transport file, and the IMPORT option to read a transport file. With Release 5.18 under VMS, AOS/VS, and PRIMOS, use PROC COPY with the EXPORT option or the IMPORT option.

When transporting full-screen catalogs with Release 5.18 (under MVS, CMS, VMS, AOS/VS, and PRIMOS), use PROC CPORTE to create a transport file and PROC CIMPORT to import. With Release 5.18, PROC CPORTE and PROC CIMPORT are used only for transporting full-screen catalogs. Graphics catalogs and user-written formats and informats cannot be transported between hosts using Release 5.18. However, if you have Release 6.06 or later running on both the sending and receiving hosts, you can use the V5TOV6 procedure to convert these files to Version 6 on the sending host and then transport them.

Transporting in the MVS Environment

This section provides some system-specific examples of transporting under MVS as well as some common problems that users encounter. In addition to the problems listed here, refer to “Guidelines for Avoiding Problems” at the end of this article.

Some Common Problems

The most common problem when creating or importing a transport file under MVS is failure to specify the correct DCB (Data Control Block) characteristics. The following DCB characteristics must be specified when referencing a transport file:

LRECL = 80, BLKSIZE = 8000, RECFM = FB

These characteristics are necessary when using the XPORT engine, PROC CPORTE, PROC CIMPORT, and PROC XCOPY.

Another common problem can occur if you use communications software to move the file from another host to MVS. (In this article, the term communications software is used to refer to software that is used for sending or receiving data files.) Occasionally, the transport file does not have the proper DCB characteristics when it arrives on MVS. If the communications software does not allow you to specify file characteristics, try the following approach:

1. Create a file on MVS with the correct DCB specifications.
2. Move the transport file from the other host to the newly created file on MVS using binary transfer.

Transporting with Release 6.06 or Later

The following examples demonstrate transporting SAS data sets and SAS catalogs with Release 6.06 under MVS. The COPY procedure is used with the XPORT engine for transporting SAS data sets, and the CPORTE and CIMPORT procedures are used for transporting SAS catalogs.

The following example writes a transport file to tape. This program copies all SAS data sets in the SAS data library referenced by the libref OLD to the file referenced by the libref TRAN. Note the DCB characteristics that are used for the output file, TRAN. Also note that a nonlabeled tape is specified.

```
//EXAMP1 job (,X101), 'SMITH,B.', TIME=(0,5)
// EXEC SAS606
```
The next example imports a transport file from tape. The program copies all SAS data sets, except DEPT10 and DEPT12, from the transport file to the library referenced by the libref NEW. Again, note the DCB characteristics that are used for the TRAN file.

```
//EXAMP2 JOB (,X101), 'SMITH,B.', TIME=(0,5)
// EXEC SAS606
// TRAN DD DISP=OLD, UNIT=TAPE,
// VOL=SER=TRAN02, LABEL=(1, NL),
// DCB=(RECFM=FB, LRECL=80, BLKSIZE=8000)
// NEW DD DSN=ACTXYZ.EMPLOYEE.SASDATA,
// DISP=(NEW, CATLG), UNIT=SYSDA, SPACE=(TRK, (20, 5))
// SYSIN DD *
libname tran xport;

proc copy in=tran out=new;
   exclude dept10 dept12;
run;
/*
```

The next example uses the CPORTE procedure to create a transport file containing SAS catalogs. This program copies all SAS catalogs from the SAS data library referenced by the libref OLD to the file referenced by the fileref PORTFILE. Note that if the METYPE=CATALOG option is removed, all catalogs and data sets in the SAS data library are copied to the transport file. When creating a transport file on tape, you must include the TAPE option in the PROC CPORTE statement. The CPORTE procedure also requires correct DCB characteristics for the transport file.

```
//EXAMP3 JOB (,X101), 'SMITH,B.', TIME=(0,5)
// EXEC SAS606
// PORTFILE DD DISP=NEW, UNIT=TAPE,
// VOL=SER=TRAN11, LABEL=(1, NL),
// DCB=(RECFM=FB, LRECL=80, BLKSIZE=8000)
// SYSIN DD *
libname old 'actxyz.mylib.sascat';

proc cport library=old file=portfile memtype=catalog tape;
run;
/*
```

The following example imports a transport file that contains SAS catalogs. The file must be created by PROC CPORTE; otherwise, PROC CIMPORT cannot read it. This program copies all SAS files from the transport file referenced by the fileref PORTFILE to the library referenced by the libref NEW. When importing from tape, you must include the TAPE option in the PROC CIMPORT statement.

```
//EXAMP4 JOB ('X101'), 'SMITH,B.', TIME=(0,5)
// EXEC SAS606
// PORTFILE DD DISP=OLD,UNIT=TAPE,
// VOL=SER=TRAN12, LABEL=(1, NL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
// NEW DD DSN=ACTXYZ.NEWLIB.SASDATA, DISP=(NEW, CATLG),
// UNIT=SYSDA, SPACE=(TRK,(30,5))
// SYSIN DD *

proc cimport library=new infile=portfile tape;
run;

/*
Transporting with Release 5.18

The next example, using Release 5.18 under MVS, creates a transport file containing SAS data sets. Only the data sets JAN91, FEB91, and MAR91 are copied. The JCL is the same as that in the previous example of exporting SAS data sets with Release 6.06 under MVS, except that Release 5.18 of the SAS System is invoked rather than Release 6.06. The XPORT engine is not available in Release 5.18, so we use the XCOPY procedure. You must include the EXPORT option in the PROC XCOPY statement.

libname old 'actxyz.sales91.sasdata';

proc xcopy in=old out=tran export;
    select jan91 feb91 mar91;
run;

The following code imports a transport file containing SAS data sets. All data sets are imported. The JCL is the same as that in the previous example of importing SAS data sets using Release 6.06 under MVS, except that Release 5.18 of the SAS System is invoked rather than Release 6.06. You must use the IMPORT option in the PROC XCOPY statement.

proc xcopy in=tran out=new import;
run;

When transporting full-screen catalogs with Release 5.18 under MVS, use PROC CPORT to create a transport file and PROC CIMPORT to read one. In Release 5.18 the CIMPORT procedure cannot read a transport file that was created by a release later than Release 5.18.

Transporting in the VMS Environment

This section provides system-specific examples of transporting under VMS as well as some common problems that users encounter. In addition to the problems listed here, refer to "Guidelines for Avoiding Problems" at the end of this article.

Some Common Problems

Several problems can prevent a transport file from being imported or exported correctly under VMS. When exporting or importing via tape, one common problem is mounting the tape without specifying the /BLOCKSIZE=8000 option in the MOUNT command.

If a transport file is created on disk with Release 6.06 under VMS, it has a record attribute of Carriage Return Carriage Control (but the file does not contain carriage control characters). A problem can occur when you move the file via communications software. Some communications software facilities actually insert a carriage control
character after each record; this corrupts the file so that it cannot be imported by the SAS System on the receiving host. For example, if you send a transport file to a personal computer or to the UNIX environment, the problem could occur. If you get the following error message on a personal computer when trying to import a transport file that was created under VMS, then the VMS Carriage Return Carriage Control attribute is probably the cause:

```
ERROR: Member or library unavailable for use in file libref.******.data
```

To determine if this file has a record attribute of Carriage Return Carriage Control on VMS, issue the following VMS command, where `tran-file` is your transport file name:

```
$ dir/full tran-file
```

This command lists the attributes of your transport file.

If the record attribute of Carriage Return Carriage Control causes problems for you, use the following approach to change the record attribute to NONE:

1. Issue the following statement, where `TRANS.DAT` is the transport file. This statement creates an FDL file called `TRANS.FDL`.

```
$ analyze/rms_file/fdl trans.dat
```

2. Edit the `TRANS.FDL` file, by issuing the following statement:

```
$ edit/fdl trans.fdl
```

This statement invokes a menu. On the menu, select MODIFY. Under Current Primary Attributes, type RECORD. Under Secondary Primary Attributes, type CARRIAGE, press the ENTER key, then type NONE. This changes the Carriage Control attribute to NONE. Exit from this menu, saving the changes.

3. Issue the following statement to create a new file called `TRANS.NEW` with the correct attributes:

```
$ convert/fdl=trans.fdl trans.dat trans.new
```

4. Issue the following command to confirm that the record attribute has been changed to NONE.

```
$ dir/full trans.new
```

When a transport file is moved to VMS via communications software, the file attributes may become incorrect (for example, incorrect block size or variable-length records rather than fixed-length records). If you are unable to obtain a transport file with the correct attributes, the reblocking program in “Guidelines for Avoiding Problems” (at the end of this article) may be helpful.

When running Release 5.18 of the SAS System under VMS, the record format must be fixed with a record size of 80. In Release 6.06 or later under VMS, although the record format still must be fixed, the record size can be 80 or 512.

**Transporting with Release 6.06 or Later**

When exporting SAS data sets to tape under VMS, use the following approach:

1. Issue the appropriate command at your site to make a tape drive available to your session.

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2. Issue the following DCL commands to mount the tape. You must substitute your tape device name in place of $2$S$MUA0:

```
$ define tranfl $2$S$mua0:
$ allocate tranfl
$ mount/foreign/blocksize=8000 tranfl
```

3. Execute the following program. The name TRANFL in the LIBNAME statement refers to the logical name that is associated with the tape drive.

```
libname tport xport 'tranfl';
libname old ['actxyz.oldlib'];

proc copy in=old out=tport memtype=data;
run;
```

The next program illustrates using the SAS DATA step to read a transport file. This approach is particularly useful if you want to select a subset of records from a data set that is in transport format. This program imports only 20 observations of a very large data set:

```
libname tport xport 'tranfl';

data sample;
  set tport.big1 (obs=20);
run;
```

The following program creates a transport file containing all catalog entries in the SAS catalog OLD.MYCAT. Mount the tape as described in the previous example. The name TRANFL in the FILENAME statement is the logical name associated with the tape drive. You must use the TAPE option in the PROC CPORT statement when creating a transport file on tape.

```
filename tport 'tranfl';
libname old ['actxyz.oldlib'];

proc cport catalog=old.myCat file=tport tape;
run;
```

The next program reads a transport file containing SAS catalogs. All SAS files are imported from tape.

```
filename tport 'tranfl';
libname new ['actxyz.newlib'];

proc cimport library=new infile=tport tape;
run;
```

**Transporting with Release 5.18**

When transporting SAS data sets with Release 5.18 under VMS, use PROC COPY with the EXPORT or IMPORT option. You must use the IXTAPE fileref with Release 5.18 under VMS when referencing a transport file on tape.

Use the following approach to write a data set transport file to tape:

1. Issue the appropriate command at your site to make a tape drive available to your session.
2. Mount the tape with the following commands, substituting your tape device name for $2$MUA0:

\begin{verbatim}
$ define ixtape $2$mua0:
$ allocate ixtape
$ mount/foreign/blocksize=8000 ixtape
\end{verbatim}

3. Execute the following program. Only APR91, MAY91 and JUN91 are copied from the library OLD to the transport file on tape. When exporting SAS data sets, you must include the EXPORT option in the PROC COPY statement.

\begin{verbatim}
libname old '[actxyz.newlib]';

proc copy in=old out=ixtape export;
    select apr91 may91 jun91;
run;
\end{verbatim}

When transporting full-screen catalogs with Release 5.18 under VMS, use PROC CPORIT to create a transport file and PROC CIMPORT to read a transport file. The CIMPORT procedure in Release 5.18 cannot read a transport file that was created by a SAS release later than Release 5.18.

**Transporting in the CMS Environment**

This section provides system-specific examples of transporting under CMS as well as some common problems that users encounter. In addition to the problems listed here, refer to "Guidelines for Avoiding Problems" at the end of this article.

**Some Common Problems**

The most common problem when creating or importing a transport file under CMS is not specifying the correct DCB (Data Control Block) characteristics. The following DCB characteristics must be specified when referencing a transport file:

\begin{verbatim}
LRECL 80, BLKSIZE 8000, RECFM FB
\end{verbatim}

You can easily check the record format and record size of a file by using the FILELIST command.

When a transport file is moved via communications software, it is sometimes difficult to move the file so that it retains the correct DCB characteristics under CMS. You may have more success if you log onto CMS, connect to the other host, and pull the file from the other host, rather than logging onto the other host and sending the file to CMS. Also, check the documentation for your communications software to see if there are options that you can set for the DCB characteristics.

Sometimes, when a transport file is moved to CMS via communications software, the file’s record length may be changed. If you find that it is not possible, with your communications software, to move the file without changing the file attributes, then the reblocking program described in "Guidelines for Avoiding Problems" (at the end of this article) may be helpful.

**Transporting with Release 6.06 or Later**

Often, the most trouble free method for transporting SAS files is to use a tape. You can use the following method to transport SAS data sets to tape in CMS:

1. Mount the tape using the appropriate command at your site. The tape should be nonlabeled.
2. Execute the following program, where 'b' in the LIBNAME statement is the minidisk where your library resides. Only the data sets SEPT91 and OCT91 are copied to the transport file on tape. tap1 is the tape device associated with your session. Be sure to substitute your tape device name in place of tap1.

```plaintext
cms filedef tran tap1 nl
     (recfm fb lrecl 80 blksize 8000;
run;

libname tran xport;
libname sales91 'b';

proc copy in=sales91 out=tran;
   select sept91 oct91;
run;
```

The next program reads a transport file from tape containing SAS data sets:

```plaintext
cms filedef tran tap1 nl
     (recfm fb lrecl 80 blksize 8000;
run;

libname tran xport;
libname mylib 'a';

proc copy in=tran out=mylib;
run;
```

To export SAS catalogs to tape, you can use the following approach. You must include the TAPE option in the PROC CPORT statement.

```plaintext
filename tran tape 'tap1' lrecl=80 blksize=8000
     recfm=fb label=nl;
libname dept12 'a';

proc cport library=dept12 file=tran memtype=catalog tape;
run;
```

In this example, the FILENAME statement is used to specify the attributes of the fileref TRAN. Another approach for specifying the attributes of TRAN is to use the CMS FILEDEF statement.

### Transporting with Release 5.18

When running Release 5.18 under CMS, use the XCOPY procedure to create a transport file containing SAS data sets. The next program creates a transport file on tape. All data sets, except OCT89, NOV89 and DEC89, are copied from the SAS library SALES89. You must include the EXPORT option in the PROC XCOPY statement.

```plaintext
cms filedef tran tap1 nl (recfm fb lrecl 80 blksize 8000;
run;

libname sales89 'c';

proc xcopy in=sales89 out=tran export;
   exclude oct89 nov89 dec89;
run;
```
When transporting full-screen catalogs with Release 5.18 under CMS, use PROC CPORT to create a transport file and PROC CIMPORT to read a transport file. The CIMPORT procedure in Release 5.18 cannot read a transport file that was created by a SAS release later than Release 5.18.

Transporting in the DOS Environment

This section provides information about transporting on a personal computer running Release 6.04 of the SAS System under DOS. In addition to the common problems listed here, refer to "Guidelines for Avoiding Problems" at the end of this article.

Some Common Problems

When transporting to DOS via communication software, carriage control characters are sometimes inserted after each record; this causes the file to become corrupted so that it cannot be imported, because it changes the file's original attributes. If you view the transport file in hexadecimal format, you can determine if carriage return characters have been inserted. In hexadecimal, a carriage return is represented by 0D and a line feed is represented by 0A. The following illustration shows the first 96 bytes of a transport file in hexadecimal:

```
48 45 41 44 45 52 20 52 45 43 4F 52 44 2A 2A 2A HEADER R ECORD***
2A 2A 2A 2A 4C 49 42 52 41 52 59 20 48 45 41 44 ****LIBR ARY HEAD
45 52 20 52 45 43 4F 52 44 21 21 21 21 ER RECOR D ! ! ! ! ! ! !
30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 00000000 00000000
30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 20 20 00000000 00000000
0D 0A 53 41 53 20 20 20 20 20 20 20 20 ..SAS SAS
```

A carriage control character (followed by a line feed character) is inserted after each record in this file. Note the 0D 0A in the lower-left corner (bytes 81 and 82).

Under DOS, if you attempt to read a transport file that contains carriage return characters, the following error message is normally generated:

```
ERROR: Member or library unavailable
for use in file libref.*******data
```

If you get this error message when reading a transport file that was moved from VMS to the PC, refer to "Transporting in the VMS Environment" earlier in this article.

Examples of Transporting in the DOS Environment

Under DOS, the SASV5XPT engine provides a convenient means for creating or reading SAS data sets in transport format. You can use the CPORT and CIMPORT procedures to transport SAS catalogs created by SAS/AF® and SAS/FSP® and to transport SAS data sets.

The following program causes all data sets in the library referenced by the libref OLD to be copied in transport format to the file on disk (transpt.dat), which is referenced by the libref TRAN:

```
libname tran sasv5xpt 'c:\workdir\transpt.dat';
libname old 'c:\olddir';
proc copy in=old out=tran;
run;
```

The next program creates a transport file containing SAS catalogs:
filename portfil 'a:\mydir\tran1.dat';
libname old 'a:\olddir';

proc cport library=old file=portfil memtype=catalog;
run;

**Transporting in the UNIX Environment and Derivatives**

Under UNIX, you can experience difficulty importing a transport file directly from tape. Often, you can solve the problem by using the UNIX DD command (with the BS=8000 option) to block the file while copying it from tape to disk. Then, import the file from disk. The following example copies the file from a tape device to TRAN.DAT, specifying a block size of 8000:

```
  dd if=/dev/tape1 of=tran.dat bs=8000
```

Using Release 6.07 of the SAS System, the following program creates a data set transport file on tape. Only one data set, JUL91, is copied. In this example, /dev/tape1 is the tape device name. You must substitute your tape device name for /dev/tape1.

```
libname tran xport 'dev/tape1';
libname old 'users/myid';

proc copy in=old out=tran;
  select jul91;
run;
```

Using Release 6.07 of the SAS System, the following program selects the catalog entries MENU1.PROGRAM and MENU2.PROGRAM from the SAS catalog OLD.CUSTOMER, and writes them to the transport file PORTFILE. The transport file is written to disk.

```
libname old '/users/myid/mydir';
filename portfile '/users/myid/trans1.dat';

proc cport catalog=old.customer
  file=portfile
  select=(menu1.program menu2.program);
run;
```

**An Alternate Approach for Transporting: Use SAS/CONNECT™ Software**

Another approach for transporting SAS files is to use SAS/CONNECT software (Release 6.06 or later) or the micro-to-host link (Release 6.04 or 5.18). For more information about these products, refer to *SAS/CONNECT Software: Usage and Reference, Version 6, First Edition* and the *SAS Guide to the Micro-to-Host Link, Version 6, First Edition*.

**Guidelines for Avoiding Problems**

There are certain guidelines that you must follow when exporting or importing SAS files on any operating system. This section offers suggestions for avoiding potential transporting problems. These suggestions apply to transporting on most operating systems.

- When transporting a file via communications software, always use BINARY (sometimes called IMAGE) format. The file must be moved byte-for-byte without modification.
• When transporting a file via tape, always use a nonlabeled tape. It may be possible to use a standard labeled tape, but it usually requires extra work to read the file on the receiving host.
• You cannot import a transport file with PROC CIMPORT unless the file was created by PROC CPORT.
• A carriage control (or any other) character inserted in a transport file corrupts the file so that it cannot be imported. Some communications software or COPY utilities can insert a carriage control character at the end of each record.
• Do not modify a file’s record length, block size, or record format when the file is copied or moved via communications software or via a COPY utility.
• If your communications software changes the file’s record length, block size, or record type, consult your communications software documentation. There is probably an option that permits you to specify a record length of 80, block size of 8000, and fixed-length records.
• When moving a file via communications software, you may be more successful invoking the facility from the receiving host rather than from the sending host. For example, when moving a transport file from VMS to CMS, you may be more successful if you log onto CMS and invoke the communications software there.
• If the receiving host cannot import the transport file, try importing the file on the same host that created it. If the original host cannot import a file that it created, the transport file was created incorrectly. It is a good habit to always test a transport file by importing it on the host that created it; if there is a problem, it is important to recognize it immediately.
• If a transport file on the receiving host has an incorrect block size and you are unable to obtain a correct transport file, try using the following program to reblock the file. The resulting output file contains 80-byte, fixed-length records. This program creates a copy of the transport file that often can be imported, unless the original transport file is corrupted.

```
data _null_;   /* Note: the INFILE and FILE statements must */   /* be modified. Substitute your file names. */   infile 'your_transport.dat' eof=wrapup;   file 'new_transport.dat' recfm=f lrecl=80;   length inrec $16 outrec $80 nullrec $80;   retain count 1 outrec nullrec;   input inrec $char16. @@;   substr(outrec, count, 16)=inrec;   count=16;   if (count>80) then do   put outrec $char80.;   count=1;   end;   return;
wrapup:   file log;   nullrec=repeat('00'x,80);   if outrec=nullrec then do;   put 'WARNING: Null characters may have been'   ' added at the end of transport file by'   ' communications software or by a copy'   ' utility. For a data set transport file,'   ' this could result in extra null'   ' observations being added at the end'   ' of the last data set. ;'   end;   run;
```
In this example, the record format of the original transport file is fixed and the record length is evenly divisible by 16. If the record format is fixed and the record length of your transport file is not evenly divisible by 16, determine the greatest common denominator that divides into both 80 and the file record length, then substitute this number for all occurrences of 16 in the program. For example, if your transport file has a record length of 99, then 1 is the largest number that divides evenly into both 80 and 99. If your transport file has variable-length records, then use 1 as the greatest common denominator instead of 16.

Note that sometimes, when you move a file via communications software, extra null characters are written at the end of the file to pad the remainder of the last record. When you use this reblocking program, any extra null characters in the resulting output file may cause extra observations (all zero values) to be added to the end of the last data set in the library. This can occur when importing a transport file containing SAS data sets (using the XPORT engine, for example).

- Problems may occur during importing if your transport file spans more than one tape. Rather than using multivolume tapes, you should split the original library into two or more libraries and create a separate tape for each one. You can restore the original library on the receiving host.
- It is often helpful to view a transport file in hexadecimal format after it has been transported. If the file has been corrupted, it may be possible to determine this by examining the hexadecimal characters.

You can use the following method to inspect your file:
1. Create a sample transport file (that is known to be correct) on the receiving host.
2. Examine the sample file, checking for the correct syntax in hexadecimal.
3. Examine the other transport file (the one in question) to see if the syntax of the hexadecimal code corresponds to that in the correct file. If the other transport file has been corrupted, it may be obvious.

Summary

This article has provided an overview of transporting SAS files. Many of the transporting problems that users encounter tend to fall into the categories discussed here. If you follow the guidelines as suggested, your transporting experience should be a successful one.


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September 1992
What's New in the CCSO Resource Center

The CCSO Resource Center is located in room 1420 DCL. Students, faculty and staff may drop in and browse through the latest literature, or may test and evaluate equipment and software before making a purchasing decision.

As usual, we are continually working to build our collections and update the resources available to our patrons. Here are the highlights of what we've been working with since the last issue of CCSO Updates.

SUBSCRIPTIONS

Macintosh Ratings Report
Macintosh Ratings Report, Volume 5, issue 3, examines remote access communications programs from Farallon Computing and Microcom. These products give users the ability to control and access Macintosh computers from a remote computer using a modem. Timbuktu from Farallon was rated slightly higher than Microcom's Carbon Copy, but both products performed well. Timbuktu is strong in controlling and observing the host computer; however, Carbon Copy is much faster in line transfers. Each program offers sophisticated safeguards against unauthorized entry into the host system, and both packages can act as either host or remote. High speed modems are recommended for these products due to unacceptable screen refresh times which occur at 2400 bps or lower.

Boston Computer Society
The CCSO Resource Center receives a number of different newsletters each month from the Boston Computer Society. The topics of these newsletters are varied, ranging from technical instruction to tips for professionals. The Boston Computer Society is one of the world's largest personal computer organizations, and these newsletters reflect current trends in personal computing.

DEMONSTRATION DISKS

Accounting System
Lawson Software has provided a demonstration sampler of their Accounting System. The PC-based Accounting System includes General Ledger, Project Accounting, Accounts Payable, Accounts Receivable, and Fixed Assets. Because Lawson's program was designed by accountants, it should prove to be a valuable asset to anyone interested in an accounting program. Please ask a Resource Center staff member to assist you should you be interested in using the sampler.

OnTime
Campbell Services Inc. has sent the Resource Center a demonstration package of OnTime, a PC-based time management program which combines an appointment book, a to-do list, a pocket secretary, a desktop planner, and an alarm clock all in one program. OnTime has been reviewed as being easy to use due to the intuitive nature of its commands. Campbell Services has been producing time-management packages for many years so OnTime reflects this experience in its user-friendly interface.

CD-ROMS

NetNews
The MRC has added the May 23-June 5 NetNews CD-ROM to its collection. Since its introduction in 1979, millions of people have exchanged information through the Net, and there are currently over three-thousand different newsgroups. The CD-ROM collection of the NetNews is valuable because most sites are forced to delete news after a relatively short time and/or limit the number of newsgroups to make space for the incoming news. This problem is overcome with the CD archive of the NetNews. The Resource Center has the NetNews CDs starting from March 23, 1992.

Computer Select
The August 1992 issue of the Computer Select Stand Alone Version CD is now available in the MRC. The Computer Select CD provides quick accessibility to information such as Hardware Product Specifications, Software Product Specifications, and Computer Industry Company Profiles. The Computer Select CD is a great product to use when conducting a search for information contained in a computer periodical.

Desktop Library
The Walnut Creek Desktop Library CD features over a thousand books, including classic literature, historical documents, and reference works. The texts of the books are in plain-text ASCII, so the disk can be used on Macintosh, DOS, or Unix machines. The
books can either be viewed through the included file viewer or through a word processor. The CD is indexed for easy access to the works. Included in the Desktop Library are ancient Greek comedies, the complete works of Shakespeare, the Supreme Court decisions from 1989-1991, and the 1991 CIA world fact book. When the mrcnxt's CD-ROM is not otherwise being used in the Resource Center, this CD-ROM is available via anonymous ftp from mrcnext.cso.uiuc.edu:/Desktop Lib1.

HARDWARE

Sears Cumulus
The Sears 386 Cumulus system has been returned to Sears. It is possible that another Cumulus will be in the Resource Center in the future should Sears be as generous as it has in the past.

Quadra Video Equipment
The Macintosh Quadra 700 in the Resource Center has been equipped with a variety of video equipment for the purpose of making QuickTime movies. The Quadra is equipped with a video camera, a video cassette player, a video disc player, and the VideoSpigot NuBus. The Video Spigot allows video input to be converted into digital data so that it can be stored on ordinary storage devices such as a hard drive, and fully manipulated as digital data as well. The software available on the Quadra for movie production includes ScreenPlay, Simple Player, and Movie Recorder. For QuickTime sound and video editing the Adobe Premiere software package is also installed on the Quadra. For those who have not made a QuickTime movie before, it can be a very entertaining and eye-opening experience. Several QuickTime movies are already on the Quadra for viewing purposes, including one featuring the Simpsons and another featuring Dan Quayle during some of his finest public speaking moments.

John Elson
Site License for VIRUSCAN Expired: Site License for F-PROT Anti-Virus Software Obtained

CCSO's site license for the McAfee Software VIRUSCAN (including CLEAN, VSHIELD, and NETSCAN) has expired. A new site license has been obtained for the Skulason anti-virus software called F-PROT instead. This software can be copied at the CCSO Resource Center (the compressed version will fit on one disk) in 1420 DCL, or it may be downloaded from ux1 in the directory /pc/virus/fp-206.zip (note that this filename will change as new versions come out; e.g., for the next version, the filename may be fp-207.zip). A description of F-PROT is provided below.

As always, we strongly recommend that PC owners (and also all other personal computer owners of Macintoshes, etc.) update their anti-virus software regularly, since only the latest versions of such software can detect the latest viruses.

F-PROT Description

F-PROT is an anti-virus program - version 2 is similar to version 1, yet fundamentally different. The earlier version could best be classified as a collection of various anti-virus utilities, often with overlapping functions. The latest revision is F-PROT version 2.06

In version 2, many of the programs were combined into one, and the user-interface was totally redesigned. Instead of having to specify various command-line options, the user is now presented with a menu-driven interface. Anyone who prefers to use command-line options can still do so; however, see COMMAND.DOC for details.

The package consists of several files, which are:

VIRSTOP.EXE the virus-intercepting program.
F-PROT.EXE the main program
SIGN.DEF virus signatures
*.TX0 language files for various languages
VIR-HELP.* virus information in various languages
*.DOC information about viruses and the package

The function of VIRSTOP.EXE is to intercept known viruses - it will prevent the execution of any program infected with any of the viruses it recognizes. See VIRSTOP.DOC for a description of this program.

The other program, F-PROT.EXE, provides virus scanning, disinfection and information. To run it, just give the command

F-PROT

followed by a carriage return.
If F-PROT.EXE is run from a diskette it might appear rather slow, but then it is safe from being infected by a virus - provided the diskette is write-protected, of course.

F-PROT first performs a self-test, to see if it has been infected with a virus, and then it loads the virus signatures into memory. The next step is to search for viruses in memory, but this can be disabled with the /NOMEM command-line switch.

You will then be greeted by a screen which shows the following available functions: Scan, Install, Viruses, Program, Quit.

As a detailed description of some of the functions is provided in separate .DOC files, they are only described briefly here.

Scan (see SCAN.DOC): Searches for viruses, using a large (and growing) set of virus signatures. The user can select where to search, and choose between three different search modes.

Install (see INSTALL.DOC): When this option is selected, a new menu will appear where it is possible to select which language to use. It also provides some configuration of the program, as well as installation of VIRSTOP.EXE.

Viruses: When this function is selected, a new menu appears with a couple of virus-related functions. One is 'Information', which provides information on viruses - a description of their size, behaviour, origin and other facts which may be of interest. The second option allows the user to enter a search pattern for a new virus. This should only be necessary between the discovery of a totally new virus and the arrival of an updated version of F-PROT.

Program: Answers to some common questions, such as how to obtain updates and how to contact the author. Also an attempt to answer the persistent question of how many viruses F-PROT will detect.

Quit: Exit from the program.

Version 2.06: Problems Found and Corrected

Some false positives have been fixed. For example, if BACKUP.EXE was compressed with PKLITE, F-PROT 2.05 would report the "Stanco" virus.

Joke programs, such as BUGSRES.COM no longer increase the "Infected" counter.

Version 2.05 did not display the "Scanning memory" box.

Previous versions of the program were sometimes unable to remove the Form virus from hard disks.

Version 2.06: Minor Improvements

The /RENAME command-line switch was added, but using it is equivalent to selecting "Action: Rename" in interactive mode. It is also possible to use /AUTO together with /RENAME.

Identification of infected .SYS files has been improved - previously they were just reported as "New or modified variant of ...".

The /NOWRAP switch can now be used with interactive mode, and the report scrolled horizontally.

The /EXT= command-line switch was added to allow the user to determine which file extensions to search.

VIRSTOP did not stop compressed viruses such as Cvirus or Stano. This has now been added.

The report produced by F-PROT includes the volume label(s) of the disk(s) scanned.

If the user presses ESC or Ctrl-C during scanning, the program will ask if it should stop scanning.

Version 2.06: New Viruses

One hundred fifteen new viruses can now be detected and removed.

The following new viruses can be detected but not removed, only deleted. This is because they overwrite infected files, or damage them irreversibly. These are: Budo; Burger-Twin Peaks; Gyro; Leprosy (FVHS and Wake); Milan (Sabrina, Naziskin, Naziskin 2) [non-working garbage]; Trivial-31B.

The following 10 new viruses can be detected but not yet removed. AstraSYS (498, 510 and 521), Cannabis-B, Como, Joshi-B, Necros, Otto-415, and Yankee (2505 and XPEH-5856).
Gopher at the University of Illinois

Gopher is a valuable tool with uses for almost everyone. Without exception every gopher demonstration that we have done evokes a "Wow! I wish I had known about this sooner!". A service like this is a unique opportunity for a campus to get more information to more people, more conveniently and more effectively. This document describes gopher, its capabilities, and how to take advantage of them.

What is Gopher?

Gopher distributes information electronically. It is a central "place" to store and present information in a convenient way suitable for beginning computer users. Gopher software presents data hierarchically in menus. This organization of the information makes it easy for the user to choose items of interest and save them locally, or e-mail the information to yourself or someone else. Gopher allows indexed information so that you can find what you want just by typing in a related word.

Gopher doesn't just distribute and index documents. It is also a "bridge" to many other network services. For example, on our local campus, gopher provides direct access to the Library Computer System. The user simply looks at the "U of Illinois Library" menu, and there, along with helpful library information is a choice to connect to the Library Computer System. Another example is our campus phone book, "PH". Inside gopher, you can look up names and numbers in PH via the menu, "Phone books (PH)". Gopher enables the use of other services such as these in an easy way, and since these services are available through gopher, the user doesn't have to learn a dozen procedures to connect to a dozen network services. Just learn gopher, and you automatically will know how to access many other services.

Gopher is everywhere. There are more than 170 organizations throughout the world that put information into gopher, with over 30 in Europe, 12 in the Pacific, 3 in South America, and most of the rest here in North America. Gopher is less than two years old, and in the last year has become one of the most used services on the Internet. Its use is sure to increase dramatically as it becomes more powerful and more well-known. Gopher has caught on in a big way in some parts of this campus. Users read a file or look at a menu on our local gopher service over 50,000 times a week. This number is increasing as more users become aware of gopher.
Gopher is a client-server system. This means that when you run gopher, you are actually running two different programs: a client program, and a server program. A server runs on the machine where the data is entered. Here at the U of Illinois, the gopher server runs on a machine at CCISO in the Digital Computer Lab. The client program runs from the computer that you use. The client program speaks the server's language so that you don't have to. The client program asks the server for certain information, gets the answer in "gopherese," and then presents it to you on your screen so that you can read and manipulate it.

There are many different kinds of client programs. The client program runs on the computer you use. For example, if you use a Macintosh, the client program must be a Macintosh program. Client programs look and act differently on each type of machine; e.g., the Macintosh client looks and acts differently than the IBM PC client and Unix client. This is significant when you have problems with gopher. It is important to specify which client program you are using when you report problems so that we can better determine the cause of the problem.

**What Information Is Now in Gopher?**

Because the gopher database is constantly expanding and changing, any written description of what is in the U of Illinois gopher server is incomplete and out-of-date. Our gopher server is updated every day, including updating old information and adding new categories of data. The slash (/) at the end of an entry means that it is a directory -- in other words, that particular menu entry has a submenu. The menu/submenu structure that you see in the U of I gopher took several months and a great deal of thought to come up with a structure that we felt was logical, would be able to encompass future additions, and yet, not require the user to "go down" too many levels to access information. For example, the "Campus Services and Facilities" submenu includes services such as Health-McKinley Services, Counseling Services, Student Legal Aid, Illini Union Travel Services, etc. -- those services, as opposed to academic departments, on campus that are available to students or faculty/staff. If you wish to know more about McKinley Health Services, for example, go to the submenu under "Campus Services and Facilities" and find the entry for McKinley. Then go to that submenu where you can pick and choose among the items of information offered.

Here is a sampling of what some of the menus and submenus contain:

**Main Menu**

1. Welcome to the U of Illinois Gopher
2. Special Campus Announcements/
3. What's New?
4. Information about Gopher/
5. Keyword search of Gopher Menus <?>
6. U of Illinois Campus Information/
7. Champaign-Urbana Regional Information/
8. Computer Documentation/
9. Libraries/
10. Newspapers, Newsletters, and Weather/
11. Other Gopher and Information Servers/
12. Phone Books (PH)/
13. Internet File Server (ftp) Sites/

6. U of Illinois Campus Information

   About U of Illinois Campus Information
   Engineering Placement Office/

October 1992
Financial Aid and Student Employment/
Course Timetables/
Academic Calendar
Daily Illini Newspaper/
Inside Illinois, the Faculty-Staff Newspaper/
Campus Safety and Crime Bulletins/
Departmental Information/
Lectures and Seminars/
Campus Services and Facilities/
Entertainment and the Arts/
Sports and Recreation/
Student Organizations/
Faculty and Staff Organizations/
Consumer News/
Illinois Weather/
Administrative Manuals/
Facts About the University/

7. Champaign-Urbana Regional Information

Champaign-Urbana Consumer Information Word Search <?>/
Entertainment and the Arts/
Area Sports and Recreation/
Illinois Weather/

8. Computer Documentation

CCSO Fall 1992 Short Courses-Courses
CCSO's Navigator Information
CCSO's Quick Reference Guides
CCSO's UIUCnet Newsletter
CICNet Resource Guide
Frequently Asked Questions on the Network
Keyword Search of RFCs (Internet Standards)
Keyword Search of Unix Manuals
Miscellaneous Technical Documents
Unix Manuals

10. Newspapers, Newsletters, and Weather

Daily Illini Newspaper/
Inside Illinois, the Faculty-Staff Newspaper/
Campus Crime Bulletin/
ACM Banks of the Boneyard/
National Weather Service/
Consumer News/
Volunteer Opportunities/
North of Green, Engineering College/
Ways to Access Gopher

There are many different ways to access gopher. The best for you depends on what kind of access you have to computers and the network.

1. If you have an account on a mainframe or a workstation.

   Gopher is already installed on CCSO's mainframes: UX1, UXH, UXA, UX4 and VMD. Gopher is also installed on the machines in all the engineering workstation labs. If you have an account on a CCSO workstation or mainframe, type `gopher` at your prompt.

   If you are using a non-CCSO workstation or mainframe, try typing `gopher` at the prompt. If it doesn't work, ask your computer administrator to install the gopher client. He or she can find the gopher source at the anonymous ftp site `boombox.micro.umn.edu` (134.84.132.2) in the directory `/pub/gopher`.

   - Unix Curses & Emacs: `/pub/gopher/Unix/gopher1.03.tar.Z`
   - Xwindows: `/pub/gopher/Unix/xgopher1.1a.tar.Z`

2. If you have a personal computer on the network.

   As mentioned before, there is a client program for many different kinds of personal computers. If you have a personal computer on the network, you can get one of these programs and use gopher from your desk.

   If you don't know how to use "ftp" to get programs, ask your computer administrator or one of the CCSO Microcomputer Consultants in 1420 DCL (244-0608) to help you. When you retrieve programs, you often have to "uncompress" or "un-binhex" them on your computer before you can run them (again, ask if you need help).

   There are clients for the following systems. The directory following the name is the location of the client on the anonymous ftp site `boombox.micro.umn.edu` (134.84.132.2) in the directory `/pub/gopher`.

   - Macintosh Hypercard: `/pub/gopher/Mac_client/
   - Macintosh Application: `/pub/gopher/Macintosh-TurboGopher`
   - DOS w/ Clarkson Driver: `/pub/gopher/PC_client/
   - NeXTstep: `/pub/gopher/NeXT/
   - VM/CMS: `/pub/gopher/Rice_CMS/ or /pub/gopher/Vienna_CMS/
   - VMS: `/pub/gopher/VMS/

   A Macintosh application, MacGopher, is available via anonymous ftp from `ftp.cc.utah.edu`:

   - Macintosh Application: `/pub/gopher/Macintosh/MacGopher`

   Another Macintosh application, GopherApp, is available via anonymous ftp from `ftp.bio.indiana.edu`:

   - Macintosh Application: `/util/gopher/gopherapp`

   The UNIX curses client, modified for DOS with PC/TCP, is available via anonymous ftp from `oac.hsc.uth.tmc.edu`:

   - DOS w/ PC/TCP: `/public/dos/misc/dosgofer.exe`
A beta version of the PC Gopher client for Novell's LAN Workplace for DOS is available from lennon.itn.med.umich.edu:

LWP for DOS: /gopher

You will need to change some of the settings of the gopher client. The client software initially will connect you to gopher servers at other organizations. When you first run a client program that you have acquired, it will not connect you to the U of I gopher server as the default. You need to change it so that the default server is the U of I gopher server, called gopher.uiuc.edu. The procedure is different for each client, but in general, choose “configure” or “preferences” from the menu, and look for a way to change the server; i.e., replace the name of the default server with gopher.uiuc.edu.

3. CCSO's public sites.

At CCSO's sites, gopher is installed on all the Macintosh and NeXT machines. Look for an icon that looks like a gopher and double-click on it. Anyone can go to these CCSO's public sites and use the computers.

Here is a list of CCSO's public sites:

COMMERCE WEST -- Room 70 Comm West (333-4500)
DIGITAL COMPUTER LAB -- L410 DCL (333-1430)
ELECT & COMP ENGR -- 146 Everitt Lab (333-4936)
ENGLISH -- Room 8 English Bldg. (244-0386)
ILLINI HALL -- Room 23 Illini Hall (244-7530)
ILLINI UNION -- Basement (244-7935)
LINCOLN HALL -- 200-202 Lincoln Hall (333-0309)
OREGON -- 901 W. Oregon (244-7513)
SNACK BAR -- 120 Snack Bar (333-1851)
TURNER HALL -- N-120 Turner Hall (333-8170)

4. If you have access to the network but don’t have a gopher client program.

If you can telnet, you can use gopher. Telnet to the machine gopher.uiuc.edu and login as gopher. No password is needed. This anonymous login gives you access to a limited version of the Unix gopher client. This service should be used only as a demonstration because the functionality is limited; you can only look at information, not save it or e-mail it.

This limited client can also be used if you have a personal computer and a modem at home or the office. Using your modem, you can dial one of CCSO's “terminal servers.” A terminal server is basically a computer with access to the network that can talk to a modem on the telephone. The number to dial is 333-4000. You will get a prompt that looks like one of the following: mossberg>, term1>, or term2>. At this prompt, type, gopher. You will get a “login:” prompt. Type gopher again, and you are connected to the gopher client mentioned above.

How Do I Use Gopher to Distribute My Information?

Does your department or club have information that you would like many people to have convenient access to? Do you have manuals, special announcements, or fact sheets that you would like people to know about and read? If so, we would like to add your information to our database. Thousands of people connect to our gopher server each week, so it is an excellent outlet for useful information.
Two issues are involved: formatting the information and getting the information to us. Unless the information is only a page or two, we need it to be in electronic form. This means that it is already on a computer, perhaps in a database or word processor. Once it is in electronic form, it needs to be formatted as "text only" (straight ASCII). Gopher only can distribute files of this type. The files cannot have tabs, underlines, bold, or other types of formatting. In a word processor, this usually requires that you save the data as "Text only", or "Text only, with line-breaks." If you had a formatting in the document originally, and then took it out by saving it as "text only", sometimes it can look pretty ugly. It may need to be doctored up (using only ASCII characters) to be more readable. CCSO has considerable experience doing this, and we are willing to help you make your document be more readable in ASCII form.

There are several different ways to get your information into gopher. We are available for consultation to help you determine what is the best way for you to do this. The following are the main ways:

1. **E-mail**

   Send e-mail to gopher@uiuc.edu or c-bilger@uiuc.edu containing the data you want to enter, what it should be called, and where it should be located if it isn't obvious. State how you are related to the information; e.g. that you are an expert or state your source.

2. **Give us the information on floppy disks.**

   You can send us a disk with your information. Write on the disk what kind of personal computer the disk works in. Also let us know where in the gopher database it should go, and what your relationship to the information is.

   Send it to: Lynn Bilger or Paul Gibbs
   CCSO
   1120 DCL
   MC-256

3. **Give paper copies.**

   Send a paper copy of the data you want to enter. This is acceptable if the data is just a few pages or less. Someone will have to type or scan it in, so the Chicago phone book is not a good candidate for this.

   Send it to: Lynn Bilger or Paul Gibbs
   CCSO
   1120 DCL
   MC-256

4. **Set up your own server.**

   If you have your own gopher server, you can have complete control over your information, make it look like you want when you want, and restrict it as you see fit.

   This requires a workstation (such as a NeXT, Sun, RS6000), mainframe, or Mac Quaddra. Extra disk may be needed if a large amount of information is to be "gopherized". An administrator is needed who knows or can learn technical skills like compiling software and manipulating files.

**Coordination of campus servers.** -- As departments on campus set up their own servers, coordination will be needed to avoid confusion to users and duplication of efforts. Here are some guidelines toward that purpose:
1. A choice on the main menu of a departmental server must provide access (link) to our main campus server on the computer gopher.uiuc.edu.

2. A file in the main menu of a departmental server should describe what the server is for and who maintains it. It should be clear to the user that the server belongs to a particular department, who the contact person is, and how to contact that person.

5. Update your own information on our server.

In special cases, we will allow users to update their own information on our main server. They will get a login on our server machine. They can then transmit their files to the machine and enter them into the gopher database without our intervention. This generally requires us to write a special program to help them enter the files into the gopher database that is easy to use and specific to their operations.

We will generally only allow this if:

1. The users aren’t on the network and don’t have access to machines on the network. They will need a modem.

2. The users don’t have a suitable machine to act as a server, or cannot afford to “tie-up” a machine for this purpose.

3. They don’t have the expertise required to maintain their own server.

4. They have a large amount of information to enter, and it requires updating often. If they don’t have a large amount, we would prefer they send it by e-mail and have us enter it into the gopher database. If it isn’t updated often, then it probably isn’t worth training someone to enter the information once a semester.

Those are the basic ways to get information into gopher. Please note that the system is flexible, and can bend to suit individual cases and needs. We want more information in gopher, and are willing to go out of our way to help interested departments or organizations in every way that we can.

What Next?

We hope that you have an idea now of how powerful gopher is, and how exciting the idea of the whole campus contributing information is. It is an opportunity to have one standard place for the campus that people look for information. Gopher makes it possible to have one program that everyone knows how to use that allows them to access information from all university departments as well as from outside the university. All departments need efficient information distribution and everyone, students, faculty and staff, benefits from it when it happens.

If your department or group wants to be a part of this, we would encourage you to pursue it. Take a look at the needs of your organization. What kinds of information do you need to get out? Is it in electronic form, or could we get it there? If you think putting information into gopher would benefit you, please contact us. We are very excited to see new information go into gopher, and to be a part of its growth.

Paul Gibbs  
CCSO  
1441 Digital Computer Lab  
Campus Mail MC-256  
244-5905  
gopher@uiuc.edu

Lynn Bilger  
CCSO  
1515 Digital Computer Lab  
Campus Mail MC-256  
333-6236  
c-bilger@uiuc.edu
What's New in the CCSO Resource Center

The CCSO Resource Center is located in room 1420 DCL. Students, faculty and staff may drop in and browse through the latest literature, or may test and evaluate equipment and software before making a purchasing decision.

As usual, we are continually working to build our collections and update the resources available to our patrons. Here are the highlights of what we've been working with since the last issue of CCSO Updates.

SUBSCRIPTIONS

Software Digest Ratings Report

Volume 9, Number 4 - compares Microsoft Windows 3.1 versus IBM OS/2 2.0. Both use a graphical user interface (GUI) and both can operate DOS and Windows software. Both products also require substantial memory and hardware capabilities. The products were judged on the ease of learning, the ease of use, and compatibility with other software products. Windows was rated somewhat higher than OS/2, mainly because there are numerous Windows applications on the market, and Windows runs Windows software better than OS/2. OS/2 was cited as operating DOS applications better than Windows. For PC aficionados, this is a comparison that has been going on ever since these two products hit the market and it is the subject of endless editorials in PC periodicals, and the decision by Software Digest that Windows is better than OS/2 is not going to settle the debate. Considering that DOS users still represent the majority of PC users and many do not plan on switching to Windows, it is a somewhat arbitrary decision that Windows applications are better than DOS applications. There are interesting points made in the review.

Volume 9, Number 5 - compares desktop publishing platforms. Reviewed are FrameMaker, Ventura Publisher, Interleaf5, QuarkXPress, and Pagemaker. FrameMaker is recommended as a good general-purpose publishing tool, QuarkXPress for design intense and color critical applications, Pagemaker for excellent interface and documentation, and Interleaf5 for structured document creation capabilities. For authoring FrameMaker received the highest rating, for design QuarkXPress, for specialized needs Interleaf5, and for environment FrameMaker was the best. Ventura Publisher received low marks in all categories.

Volume 9, Number 6 - compares advanced Word Processors for Windows. Products reviewed are Lotus Ami Pro, Microsoft Word, and WordPerfect for Windows. The word processors were evaluated on the basis of performance, quality, versatility, ease of learning, ease of use, memory requirement, and price. Ami Pro received the highest rating, followed by Microsoft Word and in a distant third WordPerfect for Windows. WordPerfect received low marks for performance, ease of learning, and ease of use. All three products have the same retail price.

NEW HARDWARE

Standard Computer Corp. 486/33 DX
A Standard Computer Corporation 486/33 DX Workstation now has a new home in the Resource Center. The Standard features a 256K Cache, 16Mb of RAM, a Maxtor 5335Mb hard drive, a Focus keyboard, Teac 1.2Mb 5.25" and 1.4Mb 3.5" floppy drives, a NEC CDR83J internal CD-ROM drive, an I/O controller with 2 Serial ports, one parallel and one game port, an IDE controller, an ATI Graphics Ultra with 1.5 VRAM, a Mag 17" SVGA monitor, and a multimedia kit which includes an ATI Stereo F/X card and Labtec 3" stereo speakers.

Installed on the Standard are OS/2 2.0, DOS 5.0, Windows 3.1, and the Norton Desktop. The Autodesk Multimedia Explorer software package accompanies the Standard, and includes the Autodesk Animator, the Autodesk Animation Player, and the Autodesk Animator Clips CD-ROM. The Multimedia Explorer allows one to create and edit animations and sound on the PC. Also accompanying the Standard is a Sherlock Holmes CD-ROM interactive detective game, where the player joins forces with the deductive sleuth to tackle some perplexing cases.

Other CDs included with the Standard are the Toolworks Reference Library and the Software Toolworks Multimedia Encyclopedia. The Reference Library is a comprehensive reference tool including a dictionary, a thesaurus, an alphabetical quotation dictionary, a desk reference of facts, figures, and resources, a 20th-century history dictionary, a business directory of 100,000 corporations, a legal/corporate form generator, and a concise writing advisor.
The Multimedia Encyclopedia includes all 21 volumes of Grolier's Academic American Encyclopedia, along with 3,000 pictures, over 250 maps, over 50 video clips, and over 30 minutes of sounds.

The Standard is intended to provide patrons with exposure to high-end PCs, and specifically with exposure to UNIX and X-Windows possibilities for the PC. For those PC users who have not experienced the speed and performance of a 486 CPU, a trip to the Resource Center might be a very worthwhile experience.

Demonstration Disks

ISYS
 Odyssey Development has sent the Resource Center a demo copy of ISYS, a high-speed text retrieval program for the PC. ISYS is capable of searching one million documents and up to two billion words. Searches can be conducted with a variety of different specifications, including searches for all tenses of a verb, searches with Boolean operators, proximity searches, wildcard suffix searches, and searches for synonyms of a word. ISYS is fully menu-driven and can also search through compressed data files. ISYS supports all popular word processing and text formats.

FoxBase and FoxPro
 Microsoft, who recently acquired Fox Software, has sent the Resource Center demo copies of FoxPro for Windows and FoxBase+ for the Mac. FoxPro is "the state-of-the-art database engine in innovation, power, and speed." It features a GUI, a fourth-generation language, the ability to create custom interfaces, a multi-faceted browse window, and a relational query. A manual accompanies the demo. FoxBase+ is a database management program which combines a GUI with a procedural language, enabling both beginners and professionals to find it useful. The demo includes a crippled version of FoxBase+, a demo manual, and a collection of sample programs. All demo disks are located at the Resource Information Desk and are available for evaluation.

John Eson

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OnTime for Windows Available for Review, But Only For Sixty Days

For a limited time the Resource Center will have Campbell Service's OnTime for Windows, a time-organizing software package for the PC. OnTime is "the calendar that means business," and features an appointment book, a to-do list, a pocket secretary, a desktop planner, a tickler file, and an alarm clock. OnTime uses the Windows interface to graphically illustrate one's available and allocated time, so it is easy to see potential conflicts in scheduling. Things to-do roll over automatically until marked as done, and recurring events are projected into the future once they are initially entered. OnTime's alarms can reach into any program to remind one of important appointments. OnTime's organizational capabilities are not limited to the screen, for it can print detailed itineraries and calendars for any day, week, month, or year specified. It can also print lists of things to do or lists of important dates, such as birthdays and anniversaries. Campbell Services believes OnTime is the optimum combination of power and ease-of-use in an organizational program. The Resource Center will only have OnTime for Windows for sixty days, so anyone interested in evaluating this package should make it a point to do so immediately.
Change Your Password Often!

Once again we would like to emphasize the importance of protecting your computer account by changing your password often. When you select a password, it can consist of any combination of alphabetical and/or numerical characters. Special characters can be used, but you must be careful not to use any special characters reserved by the system you are using. If you do not know which special characters these are, it is better to just avoid using any of them. It is usually recommended that passwords be 7 to 10 characters in length.

Your password should be unique and difficult for anyone else to figure out, and it should never be written down (especially where others may see it).

DO NOT base your password on personal information such as the name of your girlfriend or boyfriend, your dog’s name, your telephone number, your high school, home town, and so forth. DO NOT use the name of a project you are working on (or anything related to that project), a course you are taking, or your major. Essentially, you should not use names of any kind.

There are several password cracking programs available now that employ various schemes, such as checking through a dictionary. So, we recommend the following technique for choosing your password:

Make up an easy-to-remember nonsense sentence like “John’s new goat plays frisbee every morning.” Then use the initial letters to make up the password (mixing upper and lower case letters) — in this case, jnGpFEm. As you can see, it would be hard for someone else to figure out this password — just make sure you pick a sentence that YOU can remember!

To change your password on IBM/CMS, enter the PASSWORD command and follow the prompts. To change your password on one of the UNIX systems, enter the passwd command and follow the prompts. Remember to change your password often to protect your account and your data!
GAMS Optimization Package Installed on uxh and ux2

The GAMS optimization package has been installed on the CCSO Convex (uxh) and on the RS 6000-540 (ux2). On each system it is accessed via the gams command, and man gams provides information on running the program.

GAMS is also installed on some of the workstations in the College of Engineering Workstation Labs for use by classes. Our license for GAMS permits the RS 6000 version to be used anywhere on campus. For many RS 6000 users, the necessary files can be imported from ux2.cso.uiuc.edu/usr/local/lib. (See Stan Kerr, stkerr@uiuc.edu, if you need help with this.)

GAMS provides a simple algebraic language for describing linear and nonlinear (including integer) optimization problems, so that a problem described with GAMS can be solved with any of several solvers that are available through GAMS. The package translates the problem description to whatever input form is required by a particular solver. Knowledge of Fortran or other programming languages is not required; this could be a drawback in some cases, as not all problems can be fully described using only the GAMS language. A model described using GAMS is generally more comprehensible than its description by Fortran or other means, and is also more easily maintained and updated through its GAMS description.

The solvers available with GAMS on the Convex are:

<table>
<thead>
<tr>
<th>Solver</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDMLP</td>
<td>a solver for linear programming problems without integer variables</td>
</tr>
<tr>
<td>MINOS</td>
<td>a solver for linear and nonlinear programming problems without integer variables</td>
</tr>
<tr>
<td>ZOOM</td>
<td>a solver for mixed integer linear programs</td>
</tr>
</tbody>
</table>

The solvers available with GAMS on ux2 are:

<table>
<thead>
<tr>
<th>Solver</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDMLP</td>
<td>a solver for linear programming problems without integer variables</td>
</tr>
<tr>
<td>MINOS</td>
<td>a solver for linear and nonlinear programming problems without integer variables</td>
</tr>
<tr>
<td>ZOOM</td>
<td>a solver for mixed integer linear programs</td>
</tr>
<tr>
<td>CSL</td>
<td>IBM's Optimization Subroutine Library, for linear and mixed integer programs</td>
</tr>
</tbody>
</table>

The manual for GAMS is titled GAMS - A User's Guide and is available from:

The Scientific Press,
651 Gateway Boulevard, Suite 1100,
South San Francisco, CA 94080-7014,
(415) 583 8840.
MacX 1.2 Updates Available

Apple Inc. has released version 1.2 of MacX, their X Windows server for the Macintosh. MacX permits a network-connected Macintosh user to remotely access services that display X Windows graphics, including simple login sessions. The advantage over simple Telnet is that the software permits remote programs to display complex graphics on the Macintosh through the MacX server.

CCSO has had a license for the past year to distribute version 1.1.7 of MacX. We have been distributing it for $40 per single copy, or $40 plus $35 per additional system for a multi-machine license; one set of installation disks is provided. Apple is asking a very large fee to permit us to distribute 1.2 in the same way, so we will probably not convert the site license to version 1.2, but will continue to distribute 1.1.7. Users wishing to upgrade to version 1.2 can purchase an upgrade product, available through Central Stores, as follows:

M1197LL/B MacX 1.2 Update Product — $38 includes software to update
M8103LL/A MacX Right-To-Update License — $25 for EACH additional user

The numbers on the left are the Apple part numbers. The Right-to-Update license doesn’t include software, just the right to update from the Update Product. Someone must order at least one Update Product, so people have something to copy from; this has been ordered by CCSO staff (Stan Kerr), with whom you can make arrangements to borrow or copy media. The Update Product does not consist of a complete copy of MacX 1.2, just the files needed to update previous versions.

CCSO may take the option of purchasing a number of the right-to-update licenses, so people can come to the Resource Center in DCL and buy one without delays. At the time of this writing, a decision has not been made on this; please call CCSO Distribution at 333-7752 or send e-mail to Stan Kerr at stankerr@uiuc.edu to find out.

Below is some information abstracted from Apple’s press release on MacX 1.2.

“In addition to supporting System 7.1, MacX 1.2 adds a key X Window System functionality. The new software provides industry-standard Backing Store and Save Under capability, allowing users to regulate the frequency of screen updates. This improves both the accuracy and performance of client window displays. Several default settings have been changed with version 1.2 to improve application compatibility and user convenience.

“MacX 1.2, like its predecessor, implements the X Window System Version 11, Release 4 standard, ICCCM window management and XLFD font control. It also offers open system networking, supporting all major networking protocols for the Macintosh, including AppleTalk, TCP/IP and DECnet. MacX requires a minimum of 2 megabytes of RAM, although Apple recommends 5 megabytes.

“A/UX 3.0 customers who are already using MacX 1.1.7 can choose to upgrade to MacX 1.2 by purchasing the MacX Update Product. The next version of A/UX will incorporate MacX 1.2. (MacX has been included in A/UX since March 1991.)”

Stan Kerr

IMSL Library Version 2.0 available for DOS

CCSO has received version 2.0 of the IMSL Subroutine Libraries for PC’s with Microsoft Fortran. It can be obtained through the Distribution desk at the CCSO Resource Center in 1420 DCL for $175.

Those who have purchased the previous version of the library within the last year can obtain the new one by making arrangements to copy the media for the new version; see Stan Kerr (phone 333-5217, e-mail stankerr@uiuc.edu). If the previous version was purchased before November 1991, then an update fee may be required; this hasn’t been decided at this writing.

November 1992
The IMSL Subroutine Library is one of several products available through a general distribution agreement with IMSL Inc. General information about the products can be obtained from the license coordinator Stan Kerr (e-mail stankerr@uiuc.edu) or through the Gopher facility by following these menus:

\[\text{Internet File Server (ftp) Sites/}
\text{FTP.CSO: University of Illinois CCSO's Main}
\text{FTP Server/}
\text{math/}
\text{imsl/}
\]

Or, you can use anonymous ftp to access ftp.cso.uiuc.edu, and see directory math/imsl.

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Software Educational Discounts

Some software companies, including Microsoft, Lotus and Borland, have educational marketing programs which offer large discounts to students, faculty and staff at colleges and universities. Discounts vary by product, but can be as high as 80% for those satisfying eligibility requirements. The resulting prices are usually the lowest available anywhere.

Educational marketing programs typically require the involvement of a dealer. While Central Stores serves in this capacity for internal university purchases, individuals buying privately must find a participating commercial vendor.

The software vendors listed below participate in the educational marketing program of at least two software manufacturers. If you know of others, let us know and we will add them to the list. (Contact Lynn Bilger, 333-6236; e-mail to c-bilger@uiuc.edu.)

Visit or call a dealer to determine if he carries the product that interests you. Since the vendor might sell the same product at a much higher price through normal marketing programs, be sure to mention that you are interested in special prices for students, faculty and staff.

Some local vendors make catalogs available at the Micro Order Center in the basement of the Illini Union. Finally, the CCSO Resource Center in 1420 DCL maintains a file of the product catalogs of the vendors listed below. These may be examined at the Center.

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LOCAL DEALERS:

- APEX<Systems
  47 East Green (in University Center)
  Champaign, IL 61820
  Phone: (217) 337-0022

- Custom Computer Services, Inc.
  1808 Woodfield Drive
  Savoy, IL 61874
  Phone: (217) 356-2274

- T.I.S. Bookstore
  707 South Sixth Street
  Champaign, IL 61820-5726
  Phone: (217) 337-4900

MAIL ORDER DEALERS:

- CIC/Campus Technology
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Revisions of Mainframe Information:
November 9, 1992

CCSO often gets requests for mainframe information from faculty applying for grants. We are publishing the latest information here in hopes that it will be useful to our users. This information will also be accessible via gopher under the CCSO entry in "Departmental Information."

**VMD — IBM 3081 KX6**
- 2 processors; 64MB Memory
- Operating System: VM/XA
- 50GB of disk storage
- Four 6250/1600 BPI tape drives
- Two 1600/800 BPI tape drives
- Six 38K BPI tape drives
- Uses: Free student accounts, statistical programs, high-speed printing, general purpose computing of all types, instructional computing.

**ux1 — Sequent Symmetry**
- 10 processors; 128MB Memory
- Operating System: DYNIX (UNIX)
- 7.2GB of disk storage
- Two 6250/1600/800 BPI tape drives
- Two 8mm high density tape drives
- Uses: General computing (mail, editing, text processing, etc). Network server distribution software, instructional computing.

**uxh — Convex C240**
- 4 processors; 512MB of Memory
- Operating System: ConvexOS (UNIX)
- 12GB of disk storage
- Two 6250/1600/800 BPI tape drives
- Uses: High speed computation, heavy vectorized computation. Large memory applications.

**ux2 — IBM RS6000/540**
- Single RISC processor; 256MB Memory
- Operating System: AIX (UNIX)
- 6GB of disk storage, 38mm high density tape drives.
- Uses: Large memory applications, heavy scalar computation.

**uxa — Sequent Symmetry**
- 8 processors; 80MB of Memory
- Operating System: DYNIX (UNIX)
- 6GB of disk storage.
- Uses: Free student accounts.

**ux4 — Sun 690 MP**
- 4 processors; 128MB of Memory
- Operating System: SunOS (UNIX)
- 4GB of disk storage
- Uses: Free student accounts.
Ask Dr. Micro: Understanding Macintosh Fonts

The following three articles (with some local modifications) are reprints of articles by Seth Novogrodsky which appeared in the Berkeley newsletter, Berkeley Computing, October 1992, Volume 2, Number 7. We thought they would be of interest and helpful to our users, and we thank Berkeley for permission to reprint them here.

DEAR DR. MICRO: I have a Macintosh, and I am confused by the different types of fonts. Could you please explain the differences between PostScript fonts, TrueType fonts, bitmap fonts, screen fonts, and so forth? —Typographer

DEAR TYPOGRAPHER: There are a number of reasons for your confusion. The terminology used to describe fonts is often confusing, and the terminology used to describe Macintosh fonts is not always the same as the terminology that typographers use. The term font has a number of different meanings depending on the type of font and the context in which it is being discussed.

To further complicate matters, there is not always a direct one-to-one correspondence between the fonts installed on your Macintosh and the list of fonts that appears in the Font menu of a Macintosh application. When you select a font in an application, it is usually not obvious what sort of font you have selected, since a single font name can refer to a bitmap font, a TrueType font, or a PostScript font, all of which can be present on the same Macintosh.

Terminology

The term font is often used as a synonym for typeface. A typeface is generally defined as a set of characters that have a unified design and purpose, such as Times, Palatino, or Helvetica. (See Figure 1.)

The character set of a typeface most often consists of letters, numbers, punctuation marks, and special symbols, although some character sets consist entirely of symbols. The characters of a typeface can appear in a variety of styles such as bold or italic. (See Figure 2.)

The “styled” versions of the characters in a typeface are generally based on but designed separately from the “plain” or “roman” version; the styled versions (such as Times Roman, Times Bold, Times Italic, and Times Bold Italic) are still considered to be part of the same typeface. A type family or a font family is the complete typeface in all of the weights and styles.

When referring to Macintosh fonts, the definition of font is usually more specific; typically, font refers to a set of characters in the same typeface, style, and, sometimes, size. The size of a font is normally measured in points, and there are 72 points to an inch. Font designers tend to design fonts in a way that makes them smaller than the font’s actual point size; the maximum height of a character, including any ascenders or descenders, is normally a bit smaller than its point size would indicate. (See Figure 3.) Also, because the letterforms are shaped differently in each typeface, different typefaces in the same point size often have characters that are different sizes.

When you select a “font” from the Font menu in a Macintosh application, you are usually selecting a typeface rather than a font per se, since point size and styles are selected separately.

Figure 1: Different typefaces are characterized by letterforms of different shapes.

Figure 2: Typefaces can appear in a variety of different styles.
Lazy dogs and brown foxes

Figure 3: This figure illustrates some basic typographic terminology.

Figure 4: Bitmap fonts such as these were the first fonts to be used with the Macintosh. All styles for these fonts were derived from the plain text versions.

Figure 5: True italics have changes to the shapes of the letterforms in addition to being slanted.

Figure 6: Bitmap fonts can appear "jagged" when scaled to large sizes.
Classifications of Macintosh Fonts

Fonts can be classified in a number of different ways. For example, fonts can be classified by how the characters are defined (whether by patterns of dots or by geometric outlines) or by how the fonts are used (“screen fonts” and “printer fonts”). These classifications tend to overlap; “outline” fonts are ultimately represented by patterns of dots on the screen or printer, and “screen” fonts can be used as “printer” fonts. For the purposes of learning about Macintosh fonts, here are the types of fonts that would be good for you to understand:

**Bitmap fonts.** Bitmap fonts are fonts that represent characters as two-dimensional grids of dots. (These fonts are called bitmap fonts because each dot can be represented by a binary digit, or bit, that is either on or off—one or zero.)

Bitmap fonts were the original Macintosh fonts, and they were designed to look good on the Macintosh screen and on the original Apple ImageWriter dot-matrix printer. Bitmap fonts are often referred to as “screen fonts,” although other types of fonts can be displayed on the screen as well. The original Macintosh bitmap fonts were named after cities—Athens, Cairo, Chicago, Geneva, London, Los Angeles, Mobile, Monaco, New York, San Francisco, and Venice. (See Figure 4.) Because a different pattern of dots is needed to display characters in different sizes, a bitmap font always has a number after its name indicating its point size—for example, New York 10 or Geneva 12.

Originally, styles (bold, italic, and so forth) for all Macintosh fonts were derived as needed from the plain (or roman) version of the bitmap font by QuickDraw, which is the part of the basic operating software built into the Macintosh that draws text and pictures on the screen. For example, “italic” characters were derived by slanting the Roman characters. (Technically, these characters should be referred to as “oblique” rather than italic. See Figure 5.) Likewise, bold characters were derived by thickening the plain characters. Deriving fonts in this way saved disk space, but resulted in poor quality on high-resolution output devices such as laser printers. Today, styles are still commonly derived from the plain version for display on the screen; often a specially designed bold or italic font may be substituted at print time, as described in the article “How the Macintosh Manages Fonts” below. There are also some bitmap fonts available that come with specially designed versions for the various styles.

Most of the original Macintosh bitmap fonts came in point sizes of 9, 10, 12, 14, 18, and 24. If a bitmap font in a certain point size were not available on the Macintosh, a bitmap font in the closest point size available would be scaled up or down; bitmap fonts scaled in this way usually appeared jagged or hard to read on the Macintosh screen or printer. (See Figure 6.)

**PostScript fonts.** PostScript fonts are designed to be used on PostScript printers, such as Apple’s LaserWriter and LaserWriter Plus; LaserWriter IINT, IINTX, Iif, and Iig; and the Personal LaserWriters NT and NTR. (PostScript is a page description language developed by Adobe Systems, Inc., of Mountain View.)

The original Apple LaserWriter had only 13 fonts built into its read-only memory (ROM): Times Roman, Times Bold, Times Italic, Times Bold Italic; Helvetica, Helvetica Bold, Helvetica Oblique, Helvetica Bold Oblique; Courier, Courier Bold, Courier Oblique, Courier Bold Oblique; and Symbol.

Today most PostScript printers have 35 fonts, including the 13 original LaserWriter fonts plus the following fonts: Avant Garde Gothic Book, Avant Garde Gothic Demi, Avant Garde Gothic Oblique, Avant Garde Gothic Demi Oblique; Bookman Light, Bookman Demi, Bookman Light Italic, Bookman Demi Italic; Helvetica Narrow, Helvetica Narrow Bold, Helvetica Narrow Oblique, Helvetica Narrow Bold Oblique; New Century Schoolbook, New Century Schoolbook Bold, New Century Schoolbook Italic, New Century Schoolbook Bold Italic; Palatino, Palatino Bold, Palatino Italic, Palatino Bold Italic; Zapf Chancery Medium Italic, and Zapf Dingbats. (See Figure 7.)

PostScript fonts are often referred to as outline fonts, because each character is usually represented by a mathematical formula (normally cubic Bezier curves that define the “outlines” or inner and outer curves of the characters) rather than patterns of dots. (See Figure 8 - A.) As a result, characters can be scaled to virtually any size with no loss in quality. Not all PostScript fonts are defined by outlines; some are bitmaps, which cannot be scaled as freely.
<table>
<thead>
<tr>
<th>Font Style</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Times Roman</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Times Bold</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Times Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Times Bold Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Bold</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Bold Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Courier</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Courier Bold</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Courier Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Courier Bold Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Symbol</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Avant Garde Book</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Avant Garde Gothic Demi</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Avant Garde Gothic Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Avant Garde Gothic Demi Obliques</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Bookman Light</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Bookman Demi</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Bookman Light Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Bookman Demi Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Narrow</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Narrow Bold</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Narrow Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Helvetica Narrow Bold Oblique</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>New Century Schoolbook Roman</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>New Century Schoolbook Bold</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>New Century Schoolbook Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>New Century Schoolbook Bold Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Palatino</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Palatino Bold</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Palatino Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Palatino Bold Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Zapf Chancery Medium Italic</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
<tr>
<td>Zapf Dingbats</td>
<td>ABCDEFGHabcdefg12345()*%&amp;#!?</td>
</tr>
</tbody>
</table>

Figure 7: These are the standard 35 fonts built into most PostScript printers. Styles such as outline, underline, and shadow can be derived in some Macintosh applications.

November 1992
Figure 8: Bezier curves are used to represent character outlines for both PostScript and True Type fonts. (A) PostScript outlines are represented by cubic Bezier curves, and (B) True Type outlines are represented by quadratic Bezier curves.

On a typical 300 dot-per-inch (dpi) laser printer, PostScript fonts can be scaled from about four points on up. The lower limit is determined by the resolution of the printer. In small point sizes, characters printed at 300 dpi tend to become hard to read because the size of the dots becomes proportionally large compared to widths of the strokes that make up the characters. A technique called hinting is used in PostScript fonts to make characters easier to read in small point sizes. See Figure 9. (Both very large and very small characters tend to have strokes that appear too thin or too thick because of the way the human eye interprets images; a technique called optical scaling can be used to deal with this problem. The technology for optical scaling is not yet commonly used with Macintosh fonts.)

There are two commonly used types of PostScript fonts: Type 1 and Type 3. The fonts built into the ROM of a PostScript printer are Type 1. PostScript printers are optimized to print Type 1 fonts quickly, and Type 1 fonts are normally hinted. Although Type 3 fonts may be hinted as well, they often are not. The technical differences between Type 1 and Type 3 fonts are of concern mainly to font designers.

For each PostScript font, there must be a corresponding screen font with the same name. These screen fonts are ordinary bitmap fonts, although they were designed specifically to provide accurate representations on the screen of how the font will appear when printed on a PostScript printer. These fonts can be printed on an ImageWriter, although the results may not be as good as with bitmap fonts that were designed for the ImageWriter.

Because there are a limited number of bitmap fonts, often a bitmap font has to be scaled to the requested size. As mentioned above, scaled bitmap fonts tend to look ugly. To deal with the problem of accurately displaying a PostScript font in any size on the screen, Adobe has introduced a software product called Adobe Type Manager (ATM) that effectively creates a screen font from the PostScript font in the size that the user requests. ATM works only with Type 1 fonts, and it can print to both PostScript and non-PostScript printers. (A corresponding TrueType font, discussed below, could also be used in place of a scaled bitmap font on the screen. See the article "How the Macintosh Manages Fonts" in this issue for more information.)

TrueType fonts. Like PostScript fonts, TrueType fonts are scalable outline fonts that can be hinted. Unlike PostScript fonts, however, TrueType fonts can be scaled directly on the screen without the need for an add-on product such as Adobe Type Manager. TrueType fonts can be printed directly to both PostScript and non-PostScript printers. (Future ver-
sions of the Macintosh system software are likely to have ATM functionality built-in to support the scaling of Type 1 PostScript fonts on the screen as well. Mathematical formulas in the form of quadratic Bézier curves are used to represent TrueType characters. (See Figure 8-B.)

For each of the standard 35 PostScript fonts and some of the original Macintosh bitmap fonts, there is a corresponding TrueType font with the same name. The TrueType fonts generally come in plain, bold, italic, and bold-italic styles. These fonts are similar to but not identical to the corresponding bitmap or PostScript font.

The ability to use TrueType fonts is built into System 7. If you want to use TrueType fonts and you are running System 6, you will need to install the TrueType INIT and a printer driver that supports TrueType for the type of printer that you are using. The TrueType INIT requires System 6.0.7 or System 6.0.8 and one megabyte of RAM. (According to Apple, the TrueType INIT will run under System 6.0.5, but has not been thoroughly tested. Apple recommends using System 6.0.7 or System 6.0.8 instead.)

Although any application that is "System 7-compatible" (and virtually all Macintosh software being sold today) fully supports TrueType fonts, some older software packages are not compatible with TrueType. If you need to use such a package and you are unable to get an upgrade for it, you might want to remove the TrueType fonts from your Macintosh or use a commercial utility such as Suitcase or MasterJuggler to allow you to switch easily among different sets of fonts.

Where Fonts are Stored

Where fonts are stored on a Macintosh depends on whether the font is a PostScript font or a TrueType or bitmap font.

PostScript fonts. In System 7, PostScript printer fonts are kept in the Extensions folder, which is located inside the System Folder. In System 6, PostScript fonts are stored in the System Folder itself. PostScript fonts can be added or removed just by dragging the fonts to or from the Extensions folder or System Folder.

(Some older software, such as older versions of Adobe Type Manager, look for fonts in the System Folder even if you are running System 7. If you need to use one of these older programs, you can move your PostScript fonts from your Extensions folder into your System Folder, although it would probably be a better idea to get a more recent version of the software.)

If the PostScript font that you wish to use is resident on the PostScript printer that you are using, then you do not need to have the PostScript font in your Extensions folder or System Folder, although you will need to have the corresponding screen font (bitmap or TrueType) installed on your Macintosh. (You will need to have the PostScript font if you are using Adobe Type Manager and wish to display it on the screen.)

Bitmap and TrueType fonts. For all versions of the Macintosh system software up to 7.0.1, all fonts designed to be displayed on the screen—bitmap and TrueType—reside in the System file, which is located in the System Folder; see Figure 10. [If you use a commercial product such as Suitcase or MasterJuggler, fonts can be stored in separate folders instead of in the System file. Also, according to Apple, System 7.1, which is expected to be released before the end of the year, will store fonts in a separate font folder in the System Folder.]

Figure 10: The System 7.0 or 7.0.1 System file icon (left) can be opened like a folder to add or remove fonts. The Font/DA mover (right) is used to add or remove fonts from a System 6 System file (middle).

In versions of the Macintosh system software prior to System 7.0, you had to use an application called the Font/DA Mover to add or remove bitmap or TrueType fonts (see Figure 11). With System 7.0 and 7.0.1, you can add or remove fonts by opening the System file as though it were a folder (by double-clicking on it, for instance) and dragging fonts to or from the System file. When you open up the System file, you will be able to see all of the fonts installed on your Macintosh except for a few reserved fonts required by the Finder that are invisible (Geneva 9, Geneva 12, Chicago 12,
and Monaco 9). You can also install fonts just by dragging the fonts onto the icon of the System Folder or into the System 7 System file icon, which looks like a suitcase. You won’t be able to make any changes to the System file (such as adding or removing fonts) if any applications other than the Finder are running.

System 6.0.7 and System 6.0.8 come with the following bitmap fonts in various sizes on the System Additions (1.4 MB) or Utilities 2 (800K) disk: Athens, Cairo, Courier, Geneva, Helvetica, London, Los Angeles, Mobile, New York, San Francisco, Symbol, Times, and Venice. System 7.0.1 comes with all of these fonts on the Fonts (1.4 MB) disk except Mobile, but also includes Palatino as well as TrueType versions of Chicago, Courier, Geneva, Helvetica, Monaco, New York, Symbol, and Times. Bitmap versions of these fonts are also included with System 7. Some of the TrueType fonts are available in specially designed bold, italic, and bold-italic styles. Note that not all fonts are installed automatically when you install the system software on your machine.

Bitmap and TrueType fonts come in “suitcases” as shown in Figure 12. If you double-click on a font suitcase in System 6, the Font/DA Mover application will start. In System 7, if you double-click on a font suitcase, it will open up just like a folder and you will be able to see what fonts are in it. A font suitcase can contain both TrueType and bitmap fonts and fonts from more than one family (see Figure 13).

In your System file, it’s fairly easy to tell bitmap and TrueType fonts apart. Bitmap fonts have numbers indicating point sizes after their names and TrueType fonts do not. Also, in either of the icon views in System 7, the TrueType font icons are different from the bitmap font icons. A bitmap font icon has a single, stylized capital “A” on it, whereas a TrueType font icon has three capital A’s, each a different size. The icons for PostScript fonts vary depending on the supplier of the font. (See Figure 14.)

Figure 11: The Font/DA mover, which is used with System 6, allows you to install or remove bitmap or True Type fonts. (Versions of the Font/DA Mover prior to 4.1 can’t use True Type fonts.)

Figure 12: Fonts come in “suitcases” such as these.

Figure 13: This is the contents of the Times suitcase supplied on the Fonts disk of System 7.0.1. It contains both bitmap and True Type versions of Times.

Figure 14: On the left is the icon for the bitmap font for 12-point times. In the middle is the icon for True Type Times. On the right is the icon for the PostScript times font.
In System 7, you can see what the characters in a given TrueType or bitmap font look like just by double-clicking on the font icon.

If you have any questions, feel free to contact the CCSO Microcomputer Consultants in 1420 DCL (244-0608).

How the Macintosh Manages Fonts

When you open a document in a Macintosh application, the type of font that will be displayed on the screen or sent to the printer depends on a number of different factors. The Macintosh document itself keeps track of the names of the fonts used, the styles, and the point sizes; it does not know what type of font will be used when it is displayed on the screen or sent to the printer, since the same font name can refer to a bitmap font, a PostScript font, or a TrueType font.

The Macintosh Font Manager, which is part of the Macintosh system software, will determine what type of font (bitmap, PostScript, or TrueType) to use. The type of font displayed on the screen is not necessarily the type of font that will be used by the printer.

(For information on the types of Macintosh fonts, please see the article “Ask Dr. Micro: Understanding Macintosh Fonts” above.)
Fonts on the Screen

The Font Manager will normally apply the following set of rules, in the order listed, to determine which font to display on the screen (when a document is opened or when the user chooses a font from a Font menu in a Macintosh application):

1. If a bitmap font is available in the size specified, use that font.

2. Look for a corresponding TrueType font and scale it to the proper size.

3. If there is no corresponding TrueType font installed and Adobe Type Manager is available, look for a corresponding PostScript font and scale it to the proper size.

4. Look for a bitmap font that is double or half the specified size and scale it to the proper size.

5. Look for a corresponding bitmap font closest to the specified size and scale it to the proper size.

6. If there is no corresponding bitmap font at all, use the default application font (normally Geneva), and scale it to the proper size.

7. Use the default system font (normally Chicago) and scale it to size.

Note that it is possible for an application to tell the Font Manager to give preference specifically to TrueType fonts. In that case, the Font Manager would first look for a corresponding TrueType font before looking for a corresponding bitmap font.

Fonts on the Printer

The rules for determining which fonts the Macintosh uses when printing are different from the rules for displaying characters on the screen and are different for different kinds of printers. Printers used with the Macintosh normally fall into one of two categories: QuickDraw printers and PostScript printers.

QuickDraw is the graphics software "engine" that the Macintosh uses to display text and graphics on the screen. When QuickDraw is applied to printing, the internal QuickDraw format is converted to whatever format is required by the printer. For QuickDraw printers, this is usually a set of commands to print dots on the page. For PostScript printers, the QuickDraw output is converted into the PostScript page description language.

Rules for QuickDraw printers. In the case of QuickDraw printers, QuickDraw will scale its output using specific algorithms to match the resolution of the output device. QuickDraw assumes the resolution of the Macintosh screen to be 72 dots per inch, and QuickDraw printers have resolutions that are exactly or approximately some multiple of 72 dpi:

<table>
<thead>
<tr>
<th>Printer</th>
<th>Resolution (dpi)</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hewlett-Packard DeskWriter</td>
<td>300</td>
<td>4</td>
</tr>
<tr>
<td>ImageWriter</td>
<td>144</td>
<td>2</td>
</tr>
<tr>
<td>ImageWriter II</td>
<td>144</td>
<td>2</td>
</tr>
<tr>
<td>ImageWriter LQ</td>
<td>216</td>
<td>3</td>
</tr>
<tr>
<td>LaserWriter LISC</td>
<td>300</td>
<td>4</td>
</tr>
<tr>
<td>Personal LaserWriter SC</td>
<td>300</td>
<td>4</td>
</tr>
<tr>
<td>Personal LaserWriter LS</td>
<td>300</td>
<td>4</td>
</tr>
<tr>
<td>StyleWriter</td>
<td>360</td>
<td>5</td>
</tr>
</tbody>
</table>

Note that the resolution of the QuickDraw LaserWriters and the Hewlett-Packard DeskWriter is not an exact multiple of 72 (300 divided by 72 is 4 1/6, not four exactly). As a result, when printing to these printers, the output is slightly smaller (by about four percent) than the same output sent to other types of Macintosh printers.

Here is the sequence of rules that the Font Manager applies when sending output to a QuickDraw printer:

1. If the corresponding TrueType font is available, use the TrueType font and scale it to the right size.

2. If Adobe Type Manager is installed, look for a corresponding PostScript font and scale it to the proper size.

3. Look for a bitmap font that is the multiple of the point size that corresponds to the ratio of the resolution of the output device to the screen, and, if found, use that font. For example, if the output device is an ImageWriter and the text to be printed is in 12 point, the Font Manager will look for a 24-point bitmap font (although when printed it will actually be 12 point in size).

4. If available, use the bitmap font of the same size requested and scale it up to the resolution of the printer.
5. If no bitmap font of the same size is available, use the corresponding bitmap font nearest in size and scale it to the appropriate size.

6. If there is no corresponding bitmap font at all, use the default application font and scale it to the proper size.

7. Otherwise, use the default system font and scale it to the appropriate size.

**Rules for PostScript printers.** Here are the rules, in order, that the Font Manager uses when sending output to a PostScript printer:

1. Look for the corresponding PostScript font resident in the printer’s ROM, RAM, or hard disk (if present), and scale it to the proper size.

2. Look for the corresponding PostScript font in the Extensions folder in the System Folder (or in the System Folder itself), download the font to the printer’s RAM, and scale it to the proper size.

3. Look for a corresponding TrueType font, and download the font and TrueType scaler to the printer’s RAM and scale the font to the proper size.

4. Look for a bitmap font of the same size as the font requested and scale it up to match the resolution of the printer.

5. Look for the bitmap font closest in size to the requested font and scale it to match the resolution of the printer.

6. Look for the default application font and scale it to the proper size.

7. Use the default system font and scale it to the proper size.

Note that there is an option in the Page Setup dialog box (normally available through the File menu) in Macintosh applications called Font Substitution. If this option is turned on, the Font Manager will substitute PostScript fonts for certain ImageWriter fonts. Specifically, the Font Manager will substitute Times for New York, Helvetica for Geneva, and Courier for Monaco.

**Why These Rules are Important**

You generally need to concern yourself with these rules only when something goes wrong. As always, if you have any questions, please feel free to contact the CCSO Microcomputer Consultants, 1420 DCL (244-0608).

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**How to Choose the Right Macintosh Fonts**

Normally, you won’t need to worry about which type of Macintosh font to use. The Macintosh Font Manager, which is part of the basic system software that runs on all Macintoshes, will decide for you which type of font to use based on the specific fonts that you have installed on your computer and on whether the fonts will be displayed on the screen or sent to a printer.

When problems do arise, however, you may find it necessary to concern yourself with which type of font to use. The types of problems that may occur include characters that appear jagged, darker than normal, or hard to read; improper spacing between words or characters within a word; poor alignment in right-justified text; and page-breaks or line-breaks different than expected.

The articles “Ask Dr. Micro: Understanding Macintosh Fonts” and “How the Macintosh Manages Fonts” provide some background that can help you determine what type or types of fonts to use on your Macintosh. In addition to the considerations mentioned in those articles, here is some additional information that can help you in resolving font problems.

**Missing Fonts**

Print quality problems with fonts often result when the Font Manager cannot locate a good match for the font in the size and style selected and must derive the font from the closest matching bitmap font using the rules described in “How the Macintosh Manages Fonts.” In particular, enlarging bitmap fonts can
result in jagged-looking characters and making bitmap fonts smaller can result in hard-to-read characters. Scaling bitmap characters in certain sizes on QuickDraw printers (such as the Apple StyleWriter and Personal LaserWriter LS) can result in characters that are darker or heavier than expected. Adding derived styles tends to compound these problems. If the Font Manager cannot find a matching font at all, a completely different font will be used, often resulting in improper line breaks.

You can avoid these sorts of problems by making sure that you have the fonts that you need installed on your Macintosh. Just looking in the Font menu of a Macintosh application will not tell you if you have the right fonts installed for the best possible output on the screen or on the printer. To see which fonts you have installed, you will have to use the Font/DA Mover (if you are running System 6) or open up the System file (if you are running System 7.0 or System 7.0.1), as described in “Ask Dr. Micro: Understanding Macintosh Fonts” above.

If you are missing some fonts, you may find that the fonts that you need are on the Fonts or Utilities 2 disk of your Macintosh system software or on a disk that was included with your printer.

Page Setup Options, Spacing Differences, and Transferring Documents among Macintoshes

If you transfer documents among Macintoshes, you may notice differences in printouts that were printed by different machines. Some of the differences may be due to the use of different kinds of printers, since different printers may have different resolutions and since different fonts may be printed depending on whether a QuickDraw or PostScript printer is being used.

Other differences may be caused by having different sets of fonts installed on the different Macintoshes. Such differences can arise when moving documents between Macintoshes running System 6 (without TrueType) and System 7. In particular, if you use character sizes for which a bitmap font is unavailable (such as 11 point or 57 point), you are likely to notice differences in line-breaks and page-breaks, especially in long documents. Also, different versions of the same application may produce different output. You can help prevent these sorts of differences by making sure that the same fonts are installed on the different computers and that you are running identical software.

These sorts of differences in spacing can have other causes as well, and you may experience spacing problems even if you are not transferring documents between Macintoshes. Problems with spacing or print quality often occur because of options that may or may not be selected in the Page Setup dialog box in a Macintosh application (see Figure 1). For example, the “Text Smoothing” option, available in the Page Setup dialog box when using a PostScript printer, can significantly improve the appearance of bitmap fonts.

In addition, as discussed in “How the Macintosh Manages Fonts,” the QuickDraw-based LaserWriters produce output that is slightly smaller than output from PostScript-based LaserWriters; in some cases, these differences can be significant. One way to minimize this particular difference is to use the “Precision Bitmap Alignment (4% reduction)” option under Options in the Page Setup dialog box when using a PostScript printer (see Figure 2).

Two Page Setup options that directly affect spacing are Font Substitution (discussed in “How the Macintosh Manages Fonts”) and Fractional Widths. When available in an application, Fractional Widths can improve the spacing between words and characters to improve the appearance of the printed document. However, Fractional Widths can change line-breaks and pagination, and, with some typefaces, can make the text on the screen very hard to read. The effect of Fractional Widths depends on the specific application and the fonts that are being used. Problems with Fractional Widths can result in characters that overlap, odd spacing between and within words, and poor alignment in justified text.

You may have to do some experimenting to figure out the Page Setup options that provide the best output for you. In any case, you should always select “Page Setup” and click on the “OK” button in this dialog box before printing any document that was last modified on a Macintosh that had a different kind of printer selected.

Suggestions

Which fonts you should use depends on a number of different factors, including the specific applications that you are using and the type of printer that you have. If you are running System 7, you will normally have both bitmap and TrueType fonts installed on your computer. For most users, having this combination of fonts presents no problems. For others, it may
Figure 1: The Page Setup dialog box, normally available by selecting "Page Setup" from the File menu in a Macintosh application, allows you to select options that will change the appearance of documents when they are printed. The options available will vary depending on the type of printer you have selected and the application that you are using.

Figure 2: The LaserWriter Options dialog box, available from the LaserWriter Page Setup dialog box, provides additional choices that can affect the appearance of documents when they are printed.

make sense to use one type of font exclusively. For example, if you are using Adobe Type Manager, there is probably no reason for you to have TrueType fonts installed on your machine (and the TrueType fonts could cause problems in some circumstances). You may need to do some experimenting to find the combination that works best for you, particularly if you are using your computer for desktop publishing or graphics-intensive work.

If it turns out that one type of font works better for your application than another, it is even possible to convert TrueType fonts to PostScript fonts and vice versa using commercial software packages such as FontMonger, Fontographer, FontStudio, Metamorphosis Pro, and Type Designer.

QuickDraw printer considerations. TrueType provides the most advantages for users of the Apple StyleWriter, Personal LaserWriter LS, and other QuickDraw printers such as the Hewlett-Packard DeskWriter by eliminating "jaggies" when scaling fonts, both on the screen and on the printed page. TrueType also takes care of problems resulting from derived styles, since there are specially designed bold, italic, and bold-italic versions for most of the standard TrueType fonts.

When TrueType was first introduced, there were a variety of problems resulting from incompatible applications and printer drivers. If you are using TrueType fonts, you should make sure that you have the latest printer driver and that you are using relatively current applications. If you are using System 6, you will also need to use the TrueType INIT.
PostScript printer considerations. If you are printing to a PostScript printer such as a LaserWriter IIf or a Personal LaserWriter NT, the main advantage of using TrueType is that "jaggies" will be eliminated from the screen if you are using non-standard point sizes. Adobe Type Manager also provides a solution to this problem. (Users of QuickDraw printers who are not using TrueType may also benefit from Adobe Type Manager.) TrueType fonts with the same names as PostScript fonts may not correspond exactly, so depending on the application that you are running, using bitmap fonts on the screen rather than TrueType fonts may result in a more accurate representation of the output that the printer will actually produce.

In addition, Adobe Systems has released a set of bitmap screen fonts for the standard 35 PostScript fonts that come in bold, italic, and bold-italic (in addition to roman or "plain"). According to Adobe, these screen fonts will provide more accurate representations of the actual font widths and intercharacter spacing than using the Apple-supplied LaserWriter screen fonts in derived styles. These Adobe bitmap fonts are available on the Freeware & Shareware volume of Cornucopia in "Fonts:Adobe LaserWriter Screen Fonts."

Normally, when you print a document containing TrueType fonts on a PostScript printer, the corresponding PostScript font will be substituted. If there is no corresponding PostScript font, the TrueType font will be used. The TrueType output should look fine, but TrueType fonts take longer to print than PostScript fonts on PostScript printers. (Apple's Personal LaserWriter NT, unlike Apple's other PostScript printers, does have support for TrueType built-in.)

For More Information

Although Macintosh fonts may seem needlessly complex, most font problems can be solved fairly easily once you understand what is going on. The handling of fonts should be simpler in future releases of the Macintosh system software, although the rapid advance of font technology may introduce new complications. If you would like more information about Macintosh fonts, please feel free to contact the CCSO Microcomputer Consultants in 1420 DCL (244-0608).
What’s New in the CCSO Resource Center

The CCSO Resource Center is located in room 1420 DCL. Students, faculty and staff may drop in and browse through the latest literature, or may test and evaluate equipment and software before making a purchasing decision.

As usual, we are continually working to build our collections and update the resources available to our patrons. Here are the highlights of what we’ve been working with since the last issue of CCSO Updates.

SUBSCRIPTIONS

Ratings Report

Volume 6, Number 8, "Peripherals Reporter" compares four high resolution postscript printers. The QMS-PS 815MR, the LaserMaster Unity 1000, the Lexmark IBM LaserPrinter 10P, and the Xante AccelWriter 8000 participated in the comparison, with rankings descending in this order. These products are expensive, ranging in price from four to seven thousand dollars. All of these printers provide acceptable text and graphic output, but performance varies with different applications.

Volume 6, Number 9, "Peripherals Reporter" examines twenty-four bit color scanners. Compared were the Hewlett-Packard ScanJet IIc, the AVR 3000/CL Plus, the Epson ES-300C, the XRS OmniMedia 6c, the Mustek MFS-3000c, the UMAX UC 630, and the SIIG AV800. Rankings descend in this order, with the HP ScanJet rated much higher than the rest of the scanners. All scanners use 24-bit technology with a minimum scanning resolution of 300 dpi. All products include some type of image acquisition software, with the most popular being Micrografix's Picture Publisher. The most common deficiency among the seven scanners was the performance rating. The HP was the only scanner rated with good performance, while all of the others had somewhat meager performance ratings.

Volume 6, Number 10, "Peripherals Reporter" compares wireless LANs. Wireless LANs are local area networks that operate without the cabling method as a means of transporting data. Most wireless LANs use radio frequencies for transmission, but some use microwave or infrared waves. Currently, Ethernet wireless LANs dominate the market. The NCR WaveLAN and the BICC InfralAN received the highest marks. The Telesystems ARLAN 600 and the Proxim RangeLAN both received significantly lower ratings.

Boardwatch

The Resource Center now subscribes to "Boardwatch Magazine," a periodical devoted to on-line information services and electronic bulletin boards. "Boardwatch" differs from other communications magazines in that it focuses on the end user, rather than on the communications professional. Each month "Boardwatch" features include communication software and modem reviews, special interest bbs reviews, internet news, and a national list of selected bulletin boards.

Boston Computer Society

The Boston Computer Society is the largest personal computer user group in the United States, and publishes numerous newsletters and magazines. The Resource Center currently receives several of these periodicals, including those focusing on artificial intelligence, Macintosh, Amiga, PC, and computer professionals. We have renewed our membership with the BCS and hope that patrons will make use of the wealth of user information available from this organization.

COMMERCIAL SOFTWARE

Microsoft Works 3.0

Microsoft Works for the Macintosh is an integrated software package which features a word processor, a database with reporting capability, a spreadsheet with charting, a drawing application, and a communications application. An impressive feature of this package is that data can be linked between the different applications, so that when a number is changed in the spreadsheet the corresponding file in the database also changes. New features in Works 3.0 include a floating tool palette, automatic mailing labels, built-in templates, 256 colors, customizable tools, an improved spelling checker, and improved mail merges. Integrated packages such as Works are a good choice for novice software shoppers interested in acquiring a comprehensive software collection, or for the shopper who wants to have a wide variety of applications at a reasonable price. The limited num-
number of functions available in the different applications might be a bonus to new users, but more experienced computer users may find the capabilities of such packages to be limited.

Canvas 3.0
Canvas, a graphics program for the Macintosh, is an advanced application with a long list of capabilities. Some of Canvas’ features include an unlimited number of layers, TrueType and PostScript font conversion to Bezier curves, freehand Bezier curves, 16.7 million colors per drawing, fractional kerning, text wrapping around irregular shapes, and automatic tracing of scanned images to smooth line art. Canvas is a high-end product suitable for professional design and engineering, and according to product literature is “the most significant advancement in computer graphics software since the advent of the Macintosh itself.”

BOOKS

OS/2 in the Corporate Environment
For PC users interested in the history, development, application, and future of OS/2, this is an interesting work concerning the operating system. Although the book has an MIS focus, it serves as a good overall introduction to OS/2 (albeit with IBM propaganda). Chapters such as “OS/2 and UNIX” and “OS/2 and Programming” were especially interesting to an OS/2 novice such as myself.

101 Success Stories of Information Technology in Higher Education: The Joe Wyatt Challenge
In 1989, EDUCOM Trustee Joe B. Wyatt challenged EDUCOM to identify 100 successful uses of information technology in higher education, in order to help institutions all over the U.S. understand how information technology can be used to improve education. The result of this challenge is “101 Success Stories.” The University of Illinois has several chapters in the book. In the Engineering department, projects as CircuitTutor and Interactive Microcomputer Graphics for Engineering Graphics Instruction are cited. The Mathematics, Computer Science, and Statistics department is cited for its Calculus&Mathematica project, and the Physical Sciences department is cited for its Interactive Video Learning Center for Chemistry. EDUCOM believes that this book will benefit a wide range of professionals in colleges and universities.

DEMOS

COMLAB
COMLAB is a serial communications protocol analyzer made by RealTime Control, Inc. With COMLAB, a PC is transformed into a powerful protocol analyzer which allows one to break the serial path between two devices. This allows non-intrusive investigation of their protocol without documentation being necessary for such an operation. COMLAB buffers both data lines and lets one send data in either direction while monitoring communications traffic. COMLAB can also be used to simulate one end of a serial control link. COMLAB allows one to write C programs to analyze and generate communications over the serial data line, and includes a prototype compiling function available for testing before actual implementation. Product information was also enclosed with the demo about an RTX485 board which allows one to use an existing COM1 and/or COM2 ports to communicate using the RS-485 and RS-422 standards.

CD-ROMS

Microsoft Support Professional Technical Information
A powerful new tool in the Resource Center is the Microsoft Technical Information CD-ROM. This CD contains both the “Smart Pages” user interface to the Technical Information databases and the databases themselves. The Smart Pages lets one search for up-to-date information from Microsoft on a variety of products, many which are not exclusively Microsoft products, such as OS/2. The following databases are on this CD-ROM: Knowledge Base, which is a resource for technical information about Microsoft products, Infobase, which provides quick access to product information, Consulting, which provides information about Microsoft and third party consultants, Demos, which has numerous demo programs, MS Press, which provides MS Press information, Product Support Services, which gives information about Microsoft’s Product Support Services, Products, which contains application notes, technical reports, white papers, and macros, Public Relations, which contains key press releases from Microsoft in the last twelve months, Strategy, which has Microsoft product and system strategy information, Technical Information, and Training, which has training information from Microsoft. Perhaps one of the most useful aspects of this CD is the inclusion of bug reports and patches. This CD uses the Windows interface.
MacWorld Resource CD
The MacWorld Resource CD is an information system designed specifically for resellers. The CD is divided into four main sections: Tech Report, which uses QuickTime movies in a newscast format to deliver reports on the latest technologies and trends, ProductWorld, which provides detailed information on products, trial software, demos, and printable materials, ShowRoom, which is a special interactive version of ProductWorld, and Directory, which is a database of Macintosh hardware and software products. This MacWorld CD has a special feature on the Claris Corporation, and contains demos of the Claris products ClarisWorks, FileMaker Pro, MacDraw II, MacDraw Pro, MacWrite II, MacWrite Pro, Claris Resolve, HyperCard, Hollywood for Windows, MacProject II, and Claris CAD. Also included are demos of the Aldus products PageMaker, FreeHand, Persuasion, SuperPaint, Gallery Effects, and Digital Darkroom. The Fractal Design Corporation's Design Painter for Macintosh and for Windows are included, and also PSI Integration's COMstation One, Two, Three, Four, Five, PowerModem, and PowerModem 10/42. These trial demos can be copied and used at home, and the only difference between the demos and the real product is that the "save" function is disabled.

On-Line Resource Center Holdings
Many of the Resource Center's software and literature holdings are listed on ux1 in the /pub/mrc directory, and also can be found in Gopher under the "computer documentation" heading. Included in this directory are the commercial software list, the demo program list, the book list, the CD-ROM list, and the magazine subscription list. A "readme" file is included in the directory for further explanation. These listings are updated frequently and accurately reflect our holdings.

John Elson

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