



NETWORKING

Getting It All Together

If you haven't heard of networking, you will. It may be just the thing to undo the damage that resulted when all the folk at your school wanted to do their own computing thing.

Biology got an Apple; secretarial science got Radio Shacks; administration went for IBM. By the time the consequences of incompatibility began to be felt, it was too late.

And when two requests for hard disks and five requests for high-speed printers hit the treasurer's office, the whole idea of personal computers began to take on a sour flavor.

How Can a Network Help?

Networks weren't invented to clear up such quagmires, but they often do a very effective job. Basically, a network ties all of your personal computers together and allows them to share major disk storage and printers. I'm not going to get into the various topologies (how they're wired together), except to say that each personal computer plugs into one or more wires that ultimately connect it with the network server.

The network server is another computer, whose primary function is to route individual computer requests to network printers and the network hard disk without getting confused. Even computers that use different languages, such as LOGO, BASIC, and FORTRAN can be tied together by a network.

That's only the beginning. The two requests for hard disks (and

all those secretarial requests for floppy disk drives) become one request for a network server and one bigger disk drive that will handle everybody's needs. Those three requests for high-speed printers can become one request for a really high-speed laser printer. Incompatibility hasn't totally gone away, but now all of the personal computers from the various manufacturers are able to share whichever files were set up to be shared.

And what about files that mustn't be shared? Files and even whole subdirectories can be set up that are invisible to unauthorized users. For example, students in biology and chemistry classes can access information in a file on metric conversions, but when one of those students tries to access his grades or change the entries on the library look-up software, the computer flashes a message NOT FOUND for grade records, and READ ONLY for library catalog information, thereby thwarting unauthorized access.

Extra Benefits

Two bonuses you might not expect when you network are increased speed and printer spooling. You might think that by hooking up all your computers to one disk drive you would experience a slowdown in overall operation. Precisely the opposite takes place (at least if your network software has hashing and caching features).*

We tested identical software on identical systems, one with a net-

work, the other without. The program required heavy disk access, which is very time-consuming. We had 13 users on the network when we ran the test. The network program ran seven times faster than an independent personal computer with the same size hard-disk drive.

Another advantage of networking—printer spooling—can free up your computer to do other things when you ask for a lengthy print-out. Instead of your personal computer talking directly to a printer at 30 to 400 characters per second, it talks to the network computer at many thousands of characters per second. The network server then divvies out the report to the printer at the normal speed, during and after you've sent the entire report to the print spooler. Reports that used to tie up your computer for hours are now out of it in minutes. The printer, unfortunately, is still tied up for hours (unless you have a high-speed laser printer—that's the topic for another column), but during this time you and other users can still send additional

(To page 34)

*Hashing—the disk directory is copied into computer random access memory (RAM). Thus, finding out where a particular piece of information is located on the disk is a memory search, not a disk search. Memory searches are hundreds of times faster than disk searches.

Caching—the server loads several records into random access memory in the computer when a request for one record is made. If the next request happens to be one of the records already in memory, a significant time savings occurs.

Coming Events

FEBRUARY-AUGUST, 1986

Alternative Programs for Learning Enrichment (APLE) (Washington, D.C.)	February 13
National Association of Secondary School Principals (Orlando, Florida)	February 14-18
Christian Home Week	February 15-22
NAD Kindergarten Materials Steering Committee	February 17-19
NAD Science-Health Steering Committee (Miami, Florida)	February 20-26
American Association of School Administrators (San Francisco, California)	February 21-24
American Association of Colleges for Teacher Education (Chicago, Illinois)	February 26-March 1
Association for Supervision and Curriculum Development (San Francisco, California)	March 1-4
Association of SDA Higher Education Administrators	March 12
American Association for Higher Education (Washington, D.C.)	March 12-15
GC Spring Meeting (Washington, D.C.)	April 2-3
International Reading Association Convention (Philadelphia, Pennsylvania)	April 13-17
National Association of Elementary School Principals (Las Vegas, Nevada)	April 14-18
American Association of Collegiate Registrars and Admissions Officers (Baltimore, Maryland)	April 20-25
Educational Day-Elementary School Offering	April 26
Reading, Science/Health In-Service	May 8
NAD Union Education Elementary Associates	May 9
NAD Curriculum Committee	May 12-15
NAD Commission on Secondary Education (Orlando, Florida)	May 16, 19-21
NAD Elementary Bible Steering Committee (Loma Linda, California)	May 29-June 4
Language Arts Summer Workshop (Collegedale, Tennessee)	June 9-27
NAD Academic Deans (College Heights, Alberta)	June 11
Art K-12 Curriculum Guide Workshop (South Lancaster, Massachusetts)	June 11-July 1
National Education Association (Louisville, Kentucky)	July 1-6
NAD Education Task Force	July 7-8
NAD Board of Education, K-12	July 9
NAD Board of Higher Education (College Heights, Alberta)	July 10
NAD Commission on Accreditation (Washington, D.C.)	August 6

trying to stall compliance with such laws? Probably he hopes that, considering the current advanced age of the present Supreme Court justices, one or more will retire and subsequent Reagan appointees could reverse the unwanted "shared-time" decisions. In addition, Bennett and those who side with him are probably hoping to goad Congress into passing alternatives to these controversial programs—tuition tax credits for parents or direct payments to students (vouchers) that could be spent in either private or parochial schools. Bennett has introduced legislation calling for both of these programs. Public claims that they defy current appetites for tax simplification and deficit reduction are met with arguments of fairness, a tactic that may work.

The secretary offers students one more thing: a public school punctuated with religion. He would accomplish this by allowing the posting of the Ten Commandments in classrooms and encouraging the recitation of "voluntary prayers." Such observances would promote primarily a Judeo-Christian ethic, ignoring the pluralistic nature of American society. They might deny citizens the right to worship and pray—or to choose not to—in whatever way their consciences dictate, without interference or pressure from government or school officials.

All of this compromises the secularity of the public order to too great an extent. I respect our public servants, but Secretary Bennett's policies trouble me. □

Computing With Class

(Continued from page 28)

reports to the network spooler, which will save them until the printer is free.

Are There Any Problems?

The only drawbacks to networking are in the areas of programming and installation. For optimum processing, one computer station will be tied up with the task of networking. If that unit does regular programming while it controls the networking, a bug in its local program could shut down the entire network.

Perhaps you are thinking that two different stations might try to access the same information at the same time. What then? And suppose two people attempt to make changes in the same record at precisely the same instant. Which change will the system acknowledge?

Fortunately, networks provide record, file, and transaction locking mechanisms that protect you from these kinds of problems. However, you will have to incorporate these locking routines into programs that will run simultaneously.

Installation consists of running cables throughout your building(s) to tie all of your computers together. Distance limitations usually run in the 4,000-foot to one-mile ranges.

Costs for a network can add \$5,000 to \$10,000 to your system, depending on how extensive your installation is and how large a hard disk you need. However, once the networking system is in place, you can expand the number of units accessing it almost indefinitely.

How to Get Started

Several hundred network software packages are available that provide interface among a variety of computer models. For additional information, contact a local computer store and ask them to supply you with back issues of computer magazines such as *Byte* and *Personal Computing* that

feature articles on networking.

Networking can make your personal computers perform like a big system without the big price tag and without giving up the advantages of personal computers.—
Dave Ruskjer. □

The author is publisher of *The Journal of AMCA (Adventist Microcomputer Concepts and Applications)*.

Survey

(Continued from page 21)

courses, and 15 percent required two courses.

Of SDA principals, 60 percent perceived limited supplies and equipment as the major barrier to outstanding industrial arts programs.

Ninety-one percent of all SDA schools had industrial arts programs, contrasted with 76 percent of the public schools. Seventh-day Adventist industrial arts departments spent more per student on equipment (\$43.02 compared to \$16.79) and supplies (\$47.64 versus \$29.61) than did public school industrial arts departments. However, the greater expenditure may indicate simply that the public schools were able to purchase supplies more economically.

Conclusions

The evidence seems to indicate that SDA industrial arts programs are not following the latest curriculum developments in the area of industrial arts and technology education. The trend in curriculum and program development is toward consolidation of courses. A survey of the courses to be added and deleted within the next five years indicates that SDA industrial arts chairmen as a group are planning to diversify their course offerings, but the types of courses to be
(To page 36)