HEALTHCARE (p. 4) “While computer technology offers a unique resource for containing costs and improving the quality and availability of care, many government officials, health research planners, concerned citizens, and even computer professionals claim that medical computing has increased costs while offering insufficient proof of improved health care. They are skeptical of the positive contributions information technology can make to cost containment and cite poor performances by computer designers over the last decade, who overestimated the power of the technology and underestimated the complexity of health care systems.”

AMBULATORY PATIENTS (p. 9) “For the past decade the Laboratory of Computer Science of the Massachusetts General Hospital has been involved in the development and implementation of a computer-based medical information system, COSTAR (for computer-stored ambulatory record). Designed to perform the data management functions needed by a group practice in the care of ambulatory patients, COSTAR supplements or replaces the traditional paper-based patient medical record with an integrated information system. COSTAR data management meets the medical, administrative and financial needs of ambulatory group practice, and can be adapted to meet the requirements of other group practices. COSTAR systems are now operational or being installed in over a dozen practices in the United States or abroad.”

HOSPITAL MANAGEMENT (p. 28) “MATRIX … is an on-line data base management system designed to allow hospitals to develop customized information systems for areas such as the ordering of medications and tests and the updating of patient records. The objectives of MATRIX … are to improve the quality and lower the cost of patient care. It is designed to provide sufficient flexibility to support applications unique to health care institutions and to evolve with changes in medicine and technology.”

CLINICAL DATA BANKS (p. 34) “… Current data storage and retrieval technology should permit the development of large data banks representing collected clinical experience. These will aid the physician by linking specific treatments to health and medical processes and to patient outcome. ARAMIS, the American Rheumatism Association Medical Information System, is a national data bank for rheumatic diseases, a prototype for such systems. Its software (the Time-Oriented Databank System, or TOD) also supports national data banks in stroke and coma as well as smaller data bases in other specialties.”

ONCOLOGY MANAGEMENT (p. 42) “The Johns Hopkins Oncology Center is one of 21 Comprehensive Cancer Centers established as part of the National Cancer Plan initiated by the Cancer Act of 1971. The center has major programs in laboratory and clinical research, education, and collaborative activities with community physicians. … At any one time, there are 1500 patients being treated under one or more of several hundred formally established treatment plans called protocols. This article describes a clinical information system which assists in the management and care of these patients.”

COMPUTING IN CHINA (p. 60) “A question frequently asked is ‘How long will it take the Chinese to catch up with the industrialized nations?’ In view of China’s late arrival in the industrial age, the 10-year educational and managerial gap created by the Cultural Revolution, and the economic handicaps bedeviling the country, I believe the gap between China and the industrialized West could take as long as 30 years to close. China will make tremendous strides, but there is simply so much catching up to do that a significant closing of the gap will not come quickly. Thirty years, however, should give China time to become a formidable rival to the other industrialized nations of the world.”

TELECONFERENCING (p. 62) “… The combination of a CAD system data file and graphic terminal obviously offers yet another means for interpersonal communication. By using an appropriate command language, interactive graphics teleconferencing by computer is possible. When combined with a dial-up voice connection, an audio/graphics teleconferencing arrangement can offer participants both the ability to view the highest quality of drawings and the opportunity to discuss, edit, or exchange them.”

RELIABILITY TOOLS (p. 77) “The gap between DP hardware and software is taking on the dimensions of a canyon as hardware becomes cheaper, faster, and more reliable, and software becomes more expensive, cumbersome, and error-ridden. One of the reasons for the difference lies in the retention, in software design and development, of concepts and methodologies rooted in a dead past. So-called reliability tools are among the worst offenders in this regard.”

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DEPENDABILITY (p. 5) “The implications for the future directions of software are interesting. There will be increased emphasis on fault-tolerant and highly available systems. Diagnosis and delivery of software fixes on line (from your car’s electronic computers to upgrades for your ISDN phone service and modem) will come into vogue. … New products consisting of ‘middleware’ between the operating system and application software will be created to ensure that applications and data don’t crash or fail in a way that compromises use. Parallel databases, fault tolerant servers and networks, and self-healing computers will become the platforms necessary to deliver software.”

PERFORMANCE TOOLS (p. 21) “The primary motivation for using parallel computer systems is their high performance potential, but that potential is notoriously difficult to realize, and users often must analyze and tune parallel program performance. Parallel systems can be instrumented to provide ample feedback on program behavior, but because of the volume and complexity of the resulting performance data, interpreting these systems can be extremely difficult. Hence, performance tools are needed to help bridge the gap between raw performance data and significant performance improvements.”

PERFORMANCE PREDICTION (p. 47) “Other problems, such as perturbation of the program’s behavior and generation of vast seas of (mostly useless) data that require a performance expert to interpret, make performance analysis a tedious, error-prone, and time-consuming task. Performance prediction tools can significantly expedite this task by providing fast and accurate information to guide the programmer toward efficient data distribution strategies and/or profitable program transformations that will increase performance.”

EVENT TRACING (p. 57) “Just as a logic analyzer lets a hardware designer study signal transitions, software event tracing provides the raw performance data needed to understand all possible spatial and temporal interactions of parallel tasks. However, on parallel systems with hundreds of processors, application instrumentation of procedure calls, message passing, and input/output can quickly generate a large amount of performance data. …”

WWW SERVERS (p. 68) “To support continued growth, WWW servers must manage a multigigabyte (in some instances a multiterabyte) database of multimedia information while concurrently serving multiple request streams. This places demands on the servers’ underlying operating systems and file systems that lie far outside today’s normal operating regime. Simply put, WWW servers must become more adaptive and intelligent. The first step on this path is understanding extant access patterns and responses. …”

NETWORK AS COMPUTER (p. 81) “Having usurped much of the mini and mainframe domain, the PC now faces a serious challenge to its dominance on the desktop computing scene. Larry Ellison, CEO of Oracle Corp., has referred to the PC as ‘a ridiculous device’ and is not alone in viewing the Internet as a rising star that will push the PC out of the spotlight and into a supporting role. Sun Microsystems, which has long maintained that ‘the network is the computer,’ has thrown down the gauntlet by developing a product that can only accelerate this trend: a network programming language called Java.”

BACKFIRING (p. 87) “The availability of empirical data from projects that use both function-point and lines-of-code metrics has led to a useful technique called ‘backfiring.’ Backfiring is the direct mathematical conversion of LOC data into equivalent function-point data. Because the backfiring equations are bidirectional, they also provide a powerful way of sizing, or predicting, source-code volume for any known programming language or combination of languages.”

A NEW STANDARD (p. 89) “… While software has been established as an integral part of scientific and business disciplines, environments for developing and managing software have proliferated without a common, uniform framework for the software life cycle. This standard provides such a framework, so that software practitioners can ‘speak the same language’ when they create and manage software. Practitioners can use the framework to acquire, supply, develop, operate, and maintain software.”

MUSIC (p. 91) “Since 1992, the IEEE Computer Society has supported the establishment of a Technical Committee on Computer-Generated Music. This vast interdisciplinary area of computer science and electrical engineering stretches from artistic music composed or played with computers to audio signal processing. CGM offers new possibilities for research and practice, and as the IEEE CS has argued, this signifies CGM’s greater importance in science and technology—not to mention music itself.”

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