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Special Message (p. 6) “Each technical committee [of the 3I] is composed of anywhere from 50 to 1,000 people interested in a particular subject, for example, software engineering or personal computing. Each [technical committee] conducts a variety of activities to exchange information and thereby keep abreast of technological advances within its special area of interest.”

Introduction (p. 9) “This special issue describes a US Department of Defense [DoD] effort to enhance software technology supporting the development of adaptable, reliable systems. Although it evolved primarily from a defense establishment need, the STARS [software technology for adaptable, reliable systems] program is highly relevant to the entire software community. Thus the concentrated attention of the academic and industrial sectors is critical in both the planning and conduct of the program. We hope that this special issue will help stimulate this much-needed attention.”

STARS Context (p. 14) “Opportunities in the development of new technology and its efficient management are ripe. The DoD can again assume a strong, aggressive role in computer technology and accelerate efforts to sustain the US’s solid position of strength and leadership in this area. This position is vital to US defense strategy because planning is based on having superior technology rather than matching adversaries one for one in equipment and manpower.”

STARS Overview (p. 21) “The goal of the STARS program is to improve productivity while achieving greater system reliability and adaptability. The driving need is to be able to produce more powerful, reliable, and adaptable systems through software development and in-service support processes that are more responsive, predictable, and cost-effective.”

STARS Evolution (p. 30) “The central question we address in this article is how to achieve a state-of-practice in the 1990s where we can build embedded computer system software with adequate levels of productivity, adaptability, and reliability [PAR]—that is, what will it take to achieve PAR by 1990?”

Beyond STARS (p. 39) “This article is devoted to the longer term, higher payoff, and higher risk task of shifting from the current informal, person-based software paradigm to a formalized, computer-assisted software paradigm.”

Measuring STARS (p. 47) “This article reviews measurement and modeling activities: resource expenditures, software and system reliability, system performance, and user performance. It then describes the measurement activities in the STARS program, which are designed to further advance the technology of measurement and to facilitate its widespread use.”

Managing STARS (p. 56) “Project management is concerned with the entire software life cycle. It plans, controls, coordinates, and leads all activities required to provide needed software, involving both the buyer and the producer of that software. The three major objectives of project management for the STARS program reflect this broad scope.”

Human STARS (p. 65) “The DoD competes both with industry and academia for available talent in this area, and unless steps are taken to improve the productivity of the current and future software work force, the demand for software-literate personnel in the US will outstrip supply through the next decade.”

STARS Systems (p. 71) “This article presents an overview of responsibilities in the STARS systems area. The first section describes the general scope, objectives, and strategy. Following this overview, we describe in more detail the three major phases—consolidation of existing technology, enhancement, and transition to a new technological base.”

Reusing STARS (p. 78) “Incorporating facilities for avoiding constant reprogramming is part of the approach to application-specific programming in the STARS program. The reusability problem is magnified and complicated for government software by several contractual and program
management constraints. ... The STARS program provides a context for attacking this problem.”

Usable STARS (p. 86) “This article discusses several key issues related to the human engineering of computer systems and recommends several general types of activities to help ensure the design of highly usable systems.”

Supporting STARS (p. 97) “In this article, we present a technical activities strategy, not an implementation strategy. We identify the work that needs to be done, not the form of the particular projects that will undertake that work nor the organizations in which the work will be accomplished.”

Summer Olympics (p. 113) “Two AT&T units, Western Electric and Teletype Corporation, have demonstrated their Electronic Messaging System, which was developed especially for the 1984 Summer Olympics in Los Angeles.”

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Storing Data I (p. 10) “Because of the growing popularity of small data-handling devices, vendors are developing tiny, inexpensive, high-capacity storage systems that can fit inside handheld computers, smart phones, and digital cameras.”

Storing Data II (p. 12) “In the near future, observers say, magnetic-based hard drives will continue to serve the bulk of industry needs and to be the subject of considerable research.”

Lip Reading (p. 18) “A researcher has developed technology that ‘reads’ lips to improve speech-recognition software’s performance in noisy environments.”

Circuit Design (p. 25) “The converging factors of lower supply voltages and thinner oxides—as little as a few atomic layers thick—will present challenges to further shrinking the CMOS process.”

Interview (p. 34) “A legend in the computer architecture community, John Cocke has been involved in the design of several machines that have made a tremendous impact on current processor design, including the IBM Stretch; the Advanced Computer System; and the 801, RS/6000, and PowerPC processors.”

Introduction (p. 45) “Nanometer technologies are having and will continue to have a profound effect on test. Test methods must change dramatically if the industry is to deliver these very complex chips at reasonable cost. We hope that the articles in this special issue help you understand the challenges inherent in nanometer technologies.”

Nanometer Fault Models (p. 46) “The effects associated with fault models can be as simple as replacing a subcircuit function with a constant value, or they can be so complex as to require a Spice simulation evaluation. The choice of fault model depends on its intended use—for example, test generation, prediction of manufacturing quality, defect diagnosis, or characterization for defect tolerance.”

Nanometer Defects (p. 52) “Why are these [test equipment] costs so high and how are they affected by nanometer technologies? To understand, you need to know about the defects that occur in semiconductor manufacturing.”

Test Automation (p. 58) “In the past two decades, various test development automation tools have attempted to address this problem and reduce the bottleneck in the product’s time to market. These tools, which automate dozens of tasks essential for developing adequate tests, generally fall into four categories: design for testability, test pattern generation, pattern-grading, and test program development and debugging. The focus in this article is on automatic test-pattern-generation tools.”

Design for Testing (p. 66) “Robust design for testability in very deep-submicron technologies is essential to volume manufacturing. A key to cost control is detecting defective chips early while meeting test time limits (say two seconds per chip) before they become integrated into boards and systems.”

Electronic Design Automation (p. 79) “The following discussion outlines the most prominent areas of work in [electronic design automation], taking a top-down approach to the design process. Although we describe the steps from upstream conception to downstream physical implementation, in practice these tasks are interrelated.”

Style Sheets (p. 123) “Style sheets, which specify how documents are presented to users, are expected to play a critical role in the Web’s architecture. Through the use of style sheets, future Web documents will be easier to author and will be accessible everywhere. ... Unfortunately, the current standards appear to impede this grand vision of the Web.”

Knowledge Management (p. 135) “Is [knowledge management] worthwhile? A sound idea in principle, in practice spending large sums on a ‘knowledge management system’ seems dumb. Technology can never fix a broken or poorly performing organization—only people can.”

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