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Attainment of Reliable Digital Systems through Redundancy (p. 2) “The primary thesis of this paper is that the complex tasks of modern ultrareliable computing systems can only be accomplished through the judicious use of redundancy. First, a point of view is presented that partitions the field into the various technical topics of interest. Then, reference is made to specific, selected articles that have been published, or are otherwise available to the researcher, and brief comments are made that relate their contribution to the technology. Finally, the referenced documents themselves are listed in the form of an extensive bibliography that provides a source list for anyone wishing to delve further into the details of the particular approaches to the attainment of reliable digital structures through redundancy.”

Hybrid Computers (p. 18) “Both analog and digital computers have become indispensable in many scientific and engineering disciplines. Each offers some unique advantages that cannot readily be achieved in the other. Digital computers are better for generating multi-variable functions. Analog computers are better (in most cases) for work that requires direct interface with external analog for work equipment. ... Fortunately, the two machines can be combined to form a hybrid system which takes advantage of the best features of both. Simulation, which implies that there is a math model of the system, device, or phenomenon and that parameters of this model relate to certain important real variables of that system, is probably the major application for hybrid systems.”

Standardization of Nondiagrammatic Presentation of Digital Logic (p. 25) “To achieve standardization we need to know how equations or their equivalent are being used to represent digital logic. You can help us by answering this questionnaire and returning it to us at the address listed at the end of this form.”

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Processor Reconfiguration through Instruction-Set Metamorphosis (p. 11) “Computationally intensive applications typically spend most of their execution time within a small portion of the executable code. A general-purpose machine can substantially improve its performance in many of these applications by adapting the processor’s configuration and fundamental operations to these frequently accessed portions of code. ... To keep the processing platforms general purpose, RAM-based field-programmable gate arrays (FPGAs) provided the mechanism for implementing the augmented instructions. ... [In the] PRISM approach, a configuration compiler is specialized to accept a program as input and produce both a hardware and a software image as output.”

Adapting, Correcting, and Perfecting Software Estimates (p. 20) “Continuous software estimation models are needed that can constantly evaluate costs and schedules. This article proposes a hybrid estimation model and demonstrates how to use it. ... According to Boehm, ‘Good software cost estimation is not an end in itself but rather a means toward more effective software lifecycle management’. Indeed, without a reliable software estimation capability, effective project planning and control is next to impossible.” [Editor’s note: The article discussed various models for cost and time estimation of software projects. Unfortunately, the frequent cost and time overruns in today’s software projects demonstrate that such models are still lacking.]

Concurrent Runtime Monitoring of Formally Specified Programs (p. 32) “Anna (Annotated Ada) is an Ada language extension to include facilities for formally specifying the intended behavior of Ada programs. ... Anna is based on first-order logic, and its syntax is a straightforward extension of the Ada syntax. Anna constructs appear as formal comments within the Ada source text (within the Ada comment
framework)." [Editor’s note: Ada didn’t become as successful as envisioned and the formal extension technique hasn’t transferred to other languages. In my mind, this would help in today’s climate of power-programming, in which we seem to rely more on customer-based debugging than on formal verification.]

Constrained-Latency Storage Access (p. 44) “Multimedia applications that require real-time access to large amounts of storage are forcing designers to take new approaches to the structure and function of storage systems. ... We use the term constrained-latency storage access (CLSA) for applications that have strict deadlines for the completion of some secondary storage accesses.” [Editor’s note: Many other techniques have been developed over time, some of them realized in streaming data applications.]

Object-Oriented Intelligent Computer-Integrated Design, Process Planning, and Inspection (p. 54) “An integrated manufacturing environment includes a computer-aided design [CAD] system, a computer-aided manufacturing [CAM] system, and a vision system. The CAD system is used to design the part, the CAM system to automatically generate a process plan and detailed instructions for machining the part, and the vision system to inspect the finished parts and monitor the execution of operations. An automated, flexible, and intelligent computer-integrated manufacturing (CIM) system might not be as inconceivable as once believed.” [Editor’s note: This research used mostly constraint-based programming techniques and thus is only somewhat “intelligent”; for example, no machine learning approaches were applied. Large applications for intelligent CAD/CAM systems haven’t yet been developed, but the challenges resulting from 3D printing might provide new impetus.]

Layoffs in the Computer Industry (p. 66) “The current slump in the computer industry has long-term implications that will affect future employment. Many jobs lost during the downturn are likely to have gone forever. ... The computer manufacturing industry is in turmoil that goes deeper than the general economic recession, and this turmoil is reflected in severe job cuts.” [Editor’s note: Since 1993, we’ve gone through a number of “restructurings,” for example, the 2001 Dot-com bubble. In other instances, companies once considered safe laid off workers by the thousands, most recently in 2016 and 2017.]

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