# 50 & 25 YEARS AGO



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## **DECEMBER 1969**

In the early years, *Computer* was only published bimonthly. Therefore, we will have to skip our interesting and informative extractions for December 1969. More historical highlights can be found in upcoming 2020 issues.

## **DECEMBER 1994**

www.computer.org/csdl/mags/co/1994/12/index.html

### President's Message: A Year of Progress on a Global Scale

(p. 5) "One major change we are addressing is the shift to a more international membership—from approximately 25% in 1989 to 35% by July 1994. This demands that we quickly find better and faster ways to distribute technical information. ... This will mean that anyone, regardless of physical location, will have reasonable access to this information and will be able to participate in these activities as he or she wishes. To support this goal, we're just beginning cooperative experiments with our Internet node to increase its effective use on a worldwide basis." [Editor's note: This column shows that, very early on, the IEEE Computer Society recognized the importance of the Internet for the distribution of information and worldwide cooperation. This is something that, we often forget, was not at all a common approach in 1994.]

**Businesses Waking Up to Virtual Reality** (p. 8) "VR has undergone three stages of development. The first stage started within the military and scientific communities, especially NASA, which initially developed VR for warfare simulation and as a scientific analysis tool. The second stage of entertainment development and VR-based games at arcades brought the technology to the public's attention. In the third stage, which is just emerging, VR is becoming prominent in the commercial business arena and it promises to revolutionize commerce in the modern world. ...

Digital Object Identifier 10.1109/MC.2019.2940808 Date of current version: 22 November 2019 professionals will soon walk into a customer's office with a VR package such as Elysium and give an immersive presentation on the design of a new building or product rather than using engineering drawings. ... At a recent London VR trade show, the university demonstrated its Active Stereo Head, which provides a user with a stereoscopic view of an environment even if it is miles away." [Editor's note: The progress of virtual-reality (VR)-immersive applications has actually been slower than was projected in this article. The introduction of large, high-resolution screens with 3D visualizations eventually conquered quite a number of the applications envisioned for VR technology. Of course, recently, the game-oriented introduction of VR headsets may change that fact, as one of the issues, learning to handle the immersive environment, may be eased though gaming.]

Demonstration of an Interactive Multimedia Environment (p. 15) "We have implemented a prototype computer system that combines aspects of an online community with those of a virtual reality environment. We believe that interactive multimedia environments can support and enhance human collaboration and learning. Virtual reality environments in particular can provide an immersive quality that lets users explore many new learning experiences." (p. 16) "Unlike users in text-based online communities, users of the prototype communicate with each other and artificial agents through speech. (The artificial agents use speech recognition and generation technology.) ... Finally, unlike most current multimedia learning systems that use stored images, all images seen by our users are produced in real time through physically based animation. This gives the system more flexibility to respond to a user's actions." [Editor's note: The article covers many aspects of VR applications (actually 3D, not immersive) in natural language processing, intelligent agents, smart rooms, and others. Many now have moved into entertainment and serious games, processing support in industry and commerce, but also their linguistic aspects into information agents like Alexa, and others.

LAN and 1/0 Convergence: A Survey of the Issues

(p. 24) "Local area networks (LANs) and computer I/O are both interconnects that move information from one location to another. Despite this shared purpose, LANs have traditionally connected independent and widely separated computers. In contrast, computer I/O has traditionally connected a host to peripheral devices such as terminals, disks, and tape drives. ... We believe that LAN and I/O architectures are in fact converging, and that this convergence reflects significant changes in how—and where—computing resources are used. To illustrate this convergence and its implications, this article examines several modern LANs and channels." (p. 27) "Interconnect requirements are changing. Both LANs and channels have benefited from advances in fiberoptic technology that greatly extend the combination of bandwidth and interconnect distance. At the same time, the information modeldriven by multimedia applications using voice and video—is evolving to include information with very different character-

istics." (p. 29) "From an end-to-end viewpoint, interconnects can provide either connection-oriented or connectionless service. In connection-oriented service. data cannot be transmitted before establishing a connection between the source and destination. Connections deliver data in sequence; error control and flow control are provided as part of the service. In connectionless service, as the phrase implies, no connection is established between the source and destination. Instead. each unit of data contains the destination address and is transmitted independently." [Editor's note: The article correctly interprets the growing together of channel-based, LAN-based, and wide area network-based technologies. Today, with the Internet of Things coming into existence, those distinctions have actually blurred and are more an architectural choice than a predefined property.]

#### **Communication Styles for Paral-**

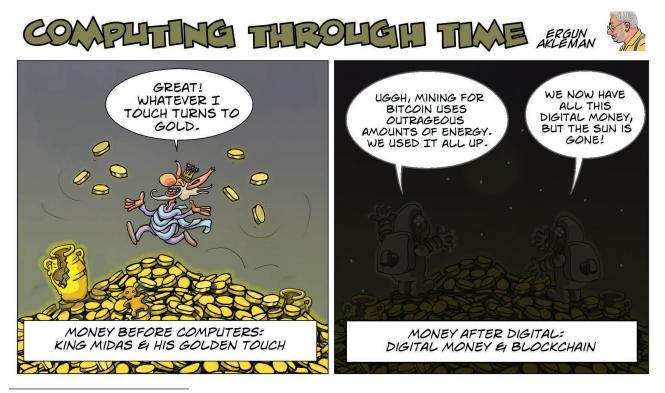
**lel Systems** (p. 34) "Communication style significantly impacts the way parallel systems use their resources. This article compares systolic and memory communication on the iWarp system. ... With systolic communication, a message is transmitted as it is generated. For example, the result computed by the multiplier is sent directly to the communication subsystem for transmission to another node. With memory communication, the complete message is generated and stored in memory, and then transmitted to its destination." (p. 43) "In summary, a parallel system that aims to support finegrained programs must identify how operands are supplied to functional units. Systolic communication requires a direct path from the communication system to the functional units. If data supplied by the communication system can be read or written independently of the memory system, then this operand source enables a higher degree of instruction-level parallelism." [Editor's note: This article is a very detailed study of the two communication modes employing Intel's iWarp system, using matrix multiplication as the quiding example.]

**Innovation Delayed Is Innovation Denied** (p. 45) "Are we prepared to take advantage of the coming information revolution? In today's—and tomorrow's—marketplace, no information company will be able to stand intransigently in the path of change. To be rooted in one spot will be, inevitably, to



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become rooted in the past. And among all the trends, there is one inexorable shift that we ignore at our peril-the shift from monopoly to competition." (p. 46) "Some believe that, by the end of the decade, wireless telephone service could offer service for some customers at prices broadly competitive with traditional wire-line telephone companies. That change alone would bring additional competition into the local and long-distance telephone markets. ... We cannot return to the past, and we cannot go halfway. The market for computers exemplifies the advantages of competition-a high-technology product with increasing power and lower prices. ... By taking action now, states can demonstrate the inevitability of competition. That lesson is the most crucial of all. Competition in the local telephone exchanges is a fundamental component of competition in the information marketplace at large. We do not impose competition as a punishment on those companies that have been granted regulatory monopolies, whether in telephony or cable or anywhere else. Rather, we promote competition as an achievement in which they will be able to share." [Editor's note: The path of deregulation and competition was, of course, followed worldwide and led to the communication and information revolution we are living in today. However, it is worrisome that more and more of that competition is disappearing with the rise of "mega" corporations that, practically speaking, monopolize whole areas of that marketplace.]

Information Technologies in South Africa: Problems and Prospects (p. 48) "Development of South Africa's information technologies infrastructure has been skewed by apartheid and the constraints of past policies, but IT can be part of the solution." (p. 53) "IT's economic and social roles. South Africa has the most thoroughly developed infrastructure on the continent, making it a natural hub for the distribution of products and services, including IT, throughout southern Africa. Other countries in the region have already benefited from South Africa's technical assistance. ... However, IT's role in economic development, education, and change management should not be forgotten as the new government determines its priorities. ... Major questions on how to implement affirmative action programs in technical fields such as IT remain unanswered. Mandated quotas breed tokenism; in such an environment, newly hired employees often feel resented rather than welcomed. It will take decades to correct past educational inequities." (p. 55) "South Africans have many questions to answer. Can IT continue on its present course of development? If not, what must change and how important are these changes to economic growth and to the daily lives of most citizens? What is the role of the international community in supporting such development?" [Editor's note: The article describes the past and the 1994 present of politics and IT in South Africa. At that time, a wide range of the "educated" population was optimistic and enthusiastic about the changes

that were to happen. Unfortunately, as we all now know, much of it never took place, and the then-foreseen growing together of the population has not occurred. Today's version of capitalism (neoliberalism) is not prone to help in that respect, as the shrinking of the middle class even in developed countries amply demonstrates.]

Is the Patent Office Correctly Examining Computer-Related Patent Applications? (p. 78) "... were 'processed' in the US Patent Office for over 20 years; in contrast, an average US patent is processed for three to five years. This extended processing period arguably exploits the US patent system in a manner not originally intended by Congress and effectively extends the life of a US patent beyond the 17-year period by delaying the date that it's actually issued to the patent owner. ... Computer industry critics further complain that the Patent Office is not shouldering its share of the burden and may even be granting patents it knows are invalid. One frequent criticism is that the Patent Office is granting broad or powerful patents because it is unable to properly assess the merits of an invention in view of previously patented work, that is, prior-art developments." (p. 79) "Five months after the notice of allowance and two years after the application had originally been filed at the Patent Office, a US patent was issued to Elliot for his microprocessor-controlled device. During a final phone conversation, Rex congratulated Elliot: 'It looks like you've received a fair and thorough examination from the Patent Office'." [Editor's note: This last part explains the process via

a constructed example of the filer "Elliot." The complaints are somehow still valid today. The U.S. patent system allows patents to be granted even today that, if they ever went to court, would be invalidated. But the holder of such patents can challenge "violators," especially small competitors, and hope to drive them out of business before a court decision on the patent is actually achieved.]

The Open Channel: For Whom the Phone Rings (p. 120) "Here's how powerful the Information Revolution is: "the phone companies" may no longer be the bad guys. The companies that everyone just loves to hate no longer monopolize every call you make. True, it's still extremely difficult to complete a local call without going through the wires of one of the seven RBOCs (Regional Bell Operating Companies). ... Trying to cover all their bases, the RBOCs are establishing alliances with each other, with cable companies, with publishing empires, and any other entity that can help them survive the chaotic information market. ... If the competitive outcome does ride on customer service, the RBOCs will be going uphill. Their history ensures that despite their local loop monopolies, they probably will begin well behind their previously unregulated competitors." [Editor's note: Remember, when this was written in 1994, the Internet was in its beginning stages. As predicted here, the original regional Bell operating companies' power has diminished, replaced by companies that offer wired as well wireless communication together with many other services that we take for granted in our time.]

