Introduction (p. 4) “For a better understanding of Japan’s computer technology, this issue assembles a number of articles to report on some important aspects of three national projects—the fifth-generation computer project, the supercomputer project, and the robotics projects—and areas of Japanese computer research and development, as well as the working environments where they take place. These articles reveal the Japanese to be most willing to share their experiences.”

Generation 5 (p. 6) “As observers of this project, we conjecture that the computers of the next decade will be used increasingly for nonnumeric data processing such as symbol manipulation and applied artificial intelligence. In this article, we discuss the current directions and eventual goals of the [Fifth-Generation Computer Systems] project, the structure of the research, and some of the accomplishments since the project’s beginning.”

Approaching R&D (p. 14) “Government coordination of industrial R&D has permitted rapid progress in Japanese electronics industries. [In this interview with Computer, two] Japanese research directors assess this development and its possibilities for US industry.”

Robots (p. 19) “The Japanese Ministry of International Trade and Industry, or MITI, began a project in the early part of 1983 to develop robots capable of operating in environments that might be intolerable or unsafe to humans. This article previews the Japanese project, presenting an overview of the next generation of robots and outlining the various subsidiary research projects that have been scheduled for completion in the 1990s.”

Computer Research (p. 26) “A summer visit to Japan’s computer centers provided some surprising insights into research and recent developments there. It showed particularly that methods in the US and Japan were quite different, though results were comparable in the importance of problems attacked, problem solving innovations, and the value of the results obtained. So it was less the results than the divergent approaches—especially in academic research—that merit attention.”

The Software Industry (p. 35) “This article describes the Japanese software industry from the inside, focusing on Hitachi Software Engineering (popularly known as HSK) and revealing a Japanese viewpoint affected by the philosophies, ways of living, and environments of both user and manufacturer.”

Future Computers (p. 47) “After examining each of [four] potential candidates for the future computer [architecture], we will attempt to determine the ‘ideal’ choice or combination of choices that will allow us both computational control and system flexibility.”

Supercomputers (p. 62) “Current supercomputers are still not adequate for solving continuous field problems. There are, however, a number of supercomputer architectures that would be suitable for such applications.”

Finding Faults (p. 76) “CRIB, or computer retrieval incidence bank, is one of a small number of expert systems designed for computer fault diagnosis. Although it possesses little of the structural or functional knowledge common in more advanced expert systems, this system is a highly flexible, user-friendly, and pattern-directed inference system that is adequate for both hardware and software fault diagnosis.”

Creature Computers (p. 87) “In addition to a life force and accumulative knowledge, living creatures form a model of the problem in their heads and get enjoyment out of solving a problem. If we could incorporate these qualities of the creature into future computers, we would be able to achieve a more lifelike machine and perhaps a more humanized robot.”

Security (p. 98) “This Kaish Circuit Lockout system ... will prevent any microprocessor-controlled product from operating after it is tampered with, removed from its installed location, or disconnected from its power source.”
MARCH 2000

www.computer.org/csdl/mags/co/2000/03/index.html

Editorial (p. 4) “As the interests and priorities of Computer Society members change, so too will the content of Computer. We value the letters, email, and other feedback we receive from our readers and hope that together we can ensure that Computer remains a trusted resource for computer professionals.”

User Control (p. 8) “Should we design software to empower end users or for control to reside solely in the hands of experts? We advocate the former and criticize XSL [Extensible Style Sheet Language] for not supporting the client-side style control that end users require.”

Embedded Databases (p. 16) “These small databases can now be found in a growing number of portable computing devices, including ‘smart’ cellular phones with Internet access, PDAs (personal digital assistants), laptops, and embedded systems.”

The New Networks (p. 20) “As networks have become increasingly optical, it has become clear that the switches, routers, and other elements of the traditional electronic network’s infrastructure cannot handle the huge volume of fast-moving traffic that fiber carries.”

Golden Domains (p. 26) “The fast growth of e-commerce has spawned a new industry and a new way to make money in the computer industry. Internet domain name brokers that have registered potentially popular domain names for $70 each are selling or auctioning them off for millions of dollars in some cases.”

Software Patents? (p. 30) “The entire intellectual property system is a social artifact. As such, any part of it might be considered good or bad to some degree. Not only is it reasonable that an interested party examine the ethics and morality of any branch of the legal system, but professionals in relevant areas have a social duty to do so.”

Geospatial Information (p. 35) “Specifically, we sought to develop a GIS [geographic information system] that would assist the US Marine Corps with mission preparation and rehearsal and also provide onsite awareness during actual field operations in urban areas.”

Introduction (p. 40) “Binary translation—a set of techniques that directly translate compiled code—could help break the innovation-strangling relation between ISAs [instruction-set architectures] and their software base. We focus in this special issue on ... the software methods that let you translate at runtime or while offline.”

Biometric Testing (p. 54) “The Binary-translation Optimized Architecture, an implementation of the IBM Power PC family, combines binary translation with dynamic optimization. We use these techniques to simplify the hardware by bridging a semantic gap between the PowerPC RISC [reduced-instruction-set computer] instruction set and even simpler hardware primitives.”

Low Cost Adaptability (p. 60) “We describe the UQBT [University of Queensland Binary Translator] framework and discuss our observations while using it to instantiate six different translators across Sun Sparc, Intel Pentium, and Java virtual-machine architectures.”

Distributed Applications (p. 68) “At the University of Cambridge, in the Computer Laboratory’s Opera Research Group, we have developed middleware extensions to address these problems: the Cambridge Event Architecture for asynchronous operation and Oasis, an open architecture for secure interoperating services.”

Gadget Software (p. 78) “How can we handle the diversity and complexity of embedded software at an increasing production speed? We believe that the answer lies in the use and reuse of software components that work within an explicit software architecture.”

Computer Society Courses (p. 86) “The University of Strathclyde, the New Jersey Institute of Technology, Southern Polytechnic State University, the Oregon Graduate Institute, and California State University, Sacramento—all institutions accredited to teach computer engineering—have each agreed to offer at least 4 of 12 courses outlined by the Computer Society over the course of the year.”

A Codesign Approach (p. 110) “We believe that modeling and simulation, using the Discrete-Event System Specification modeling and simulation framework, are the most suitable vehicles to study the complexities associated with developing distributed-object computing systems.”

Goodbye Waterfalls (p. 114) “By the early 1980s, we and other companies realized that the waterfall model was ineffective for developing user-interactive systems, in which prototypes rather than exhaustive processing specifications proved more effective in determining the most appropriate product characteristics.”