Recently, traditional software-product sales and license fees have declined, and product-company revenues have shifted to services such as annual maintenance payments that entitle users to patches, minor upgrades, and often technical support. This shift has been especially pronounced among enterprise-software vendors.

Although online-gaming service revenues are growing fast, product sales continue to account for most game-software revenues. Platform companies like Microsoft continue to generate enormous revenues from products. But even Microsoft reported that services accounted for about 3 percent of its fiscal year 2007 revenues; just a few years ago, Microsoft derived all its revenues from product sales.

TheChangingSoftwareBusiness:MovingfromProducts to Services
pp. 20-27
Michael A. Cusumano

As technology reaches the limits of CMOS and beyond, the physical realities of computing hardware could dictate how multicore processing evolves and what the dominant computer architecture will be.

The integration level for nanoscale electronic devices could eventually be in the range of $10^{10}$ to $10^{11}$ devices per square centimeter. At this level, long interconnects represent a significant challenge to operation, design, and manufacturing. Given these realities, future nanoscale technology could drive a migration to different information-processing and computing approaches, such as digital cellular automata.

An Assessment of Integrated Digital Cellular Automata Architectures
pp. 38-44
Victor Zhirnov, Ralph Cavin, Greg Leeming, and Kosmas Galatsis

Nearly 150 years ago, Charles Darwin explained how evolution and natural selection transformed the earliest life forms into the rich panoply of life seen today. Scientists estimate this process has been at work on Earth for at least 3.5 billion years.

In the world of computing, evolution helps humans solve complex problems in engineering and provides insight into the evolutionary process in nature. To design robust and resilient computational systems, we can take inspiration from nature. Living organisms have an amazing ability to adapt to changing environments, both in the short term through phenotypic plasticity and in the longer term through Darwinian evolution.

Harnessing Digital Evolution
pp. 54-63
Philip McKinley, Betty H.C. Cheng, Charles Ofria, David Knoester, Benjamin Beckmann, and Heather Goldsby

The dream of being able to move intuitively from “played-in” scenarios to running code, first addressed nine years ago, remains naggingly enticing. Quite a bit of work has been carried out since then, which, while still a far cry from justifying the replacement of a dream with a plan, now seems to offer some preliminary evidence of feasibility.

Can Programming Be Liberated, Period?
pp. 28-37
David Harel

Since the first attempt to automate pool in the late 1980s, researchers have developed several pool-playing robotic systems as well as a training system that has a computer vision component but doesn’t involve robotic actuation. Several research challenges must be addressed to advance the system further. The most difficult will emerge in competing against proficient human opponents.

Toward a Competitive Pool-Playing Robot
pp. 46-53
Michael Greenspan, Joseph Lam, Marc Godard, Imran Zaidi, Sam Jordan, Will Leckie, Ken Anderson, and Donna Dupuis

Applying a suite of tools from artificial intelligence and data mining to existing archaeological data from Monte Albán, a prehistoric urban center, offers the potential for building agent-based models of emergent ancient urban centers. Specifically, the authors examined the period of occupation associated with the emergence of this early site, seeking to generate a set of decision rules using data-mining techniques and then using the cultural algorithm toolkit to express the underlying social interaction between the initial inhabitants.

Future work will focus on how well the system can adjust the rules collectively to better predict terrace occupation.

Mining the Social Fabric of Archaic Urban Centers with Cultural Algorithms
pp. 64-72
Robert G. Reynolds, Mostafa Ali, and Thaer Jayyousi

The occupational history of this site offers the potential for a more nuanced understanding of how integrated, bi-directional change takes hold in social systems. By developing a platform to support the analysis of such data, the researchers hope to provide a new tool for understanding the complexities of human behavior.

Cultural Algorithms
pp. 54-63
Charles Ofria, David Knoester, Benjamin Beckmann, and Heather Goldsby

An Assessment of Integrated Digital Cellular Automata Architectures
pp. 38-44
Victor Zhirnov, Ralph Cavin, Greg Leeming, and Kosmas Galatsis

Harnessing Digital Evolution
pp. 54-63
Philip McKinley, Betty H.C. Cheng, Charles Ofria, David Knoester, Benjamin Beckmann, and Heather Goldsby

Can Programming Be Liberated, Period?
pp. 28-37
David Harel

Toward a Competitive Pool-Playing Robot
pp. 46-53
Michael Greenspan, Joseph Lam, Marc Godard, Imran Zaidi, Sam Jordan, Will Leckie, Ken Anderson, and Donna Dupuis

Mining the Social Fabric of Archaic Urban Centers with Cultural Algorithms
pp. 64-72
Robert G. Reynolds, Mostafa Ali, and Thaer Jayyousi

The Changing Software Business: Moving from Products to Services
pp. 20-27
Michael A. Cusumano