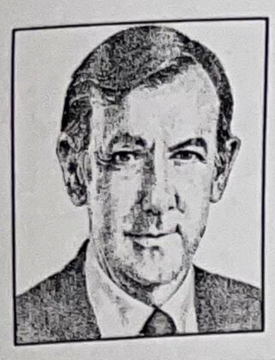
APPLIED INTELLIGENCE

Modeling Technology: Trends for the Late 1980s



JAMES MARTIN

James Martin describes the most significant current trends in computer hardware and software and ties these trends to future developments in technology.

Rapid advances in computer technology are providing significant opportunities to restructure your business and leapfrog your competition. These advances include the development of powerful new tools and life-cycle processes that can be used to build strategic information systems and improve all aspects of the application-development process.

Older application-development technologies such as third- and fourth-generation languages are being replaced by much more powerful techniques. The most promising new development technologies are: highly parallel computers; parallel inferencing techniques; high-speed optical fibers; optical disks; advanced microchip technology; neurocomputers; integrated CASE (I-CASE); information engineering; expert-system tools; advanced development methodologies; object-oriented languages; and textbase management systems

This series of columns, which began last week with "Modeling Technology: A guide to the Future" (Page 43, Oct. 17), examines the major changes that are likely to occur in a wide range of technologies over the next 35 years. Each column in the series focuses on developments expected within a five- or 10-year time span, extending to the year 2020. This one summarizes developments expected to occur in the late 1980s.

Future Implications

For years, I have used an informal model of future technology to track expected developments in individual components of computer technology and predict how the interactions between these individual strands will produce entirely new products. Recently, this information on the growth rates, trends and interactions between components of computer technology has been integrated into a formal model of future technology, whose primary function is to explore the implications of expected hardware and software technology.

Trends in Computer Hardware: By the end of the decade, widely used computer systems will operate in the following range of speeds: low-priced personal computers: 1 million instructions per second (mips); medium-priced personal computers: 3 mips; high-priced personal workstations: 10 mips; top-of-the-line mainframes: 80 mips; top-of-the-line supercomputers: 4 billion floating-point operations per second (bflops); and large artificial-intelligence inference engines: 50 thousand logical inferences per second (klips).

The accompanying illustration shows the expected increase in the speed of computers through the year 2020. In the next three years, microcomputers of 5 mips and RISC-architecture processor chips of 15 mips will come into use. CD ROM providing as much as 650M bytes of read-only memory will become widely available as a primary medium for the storage of large information bases.

Additional computer technology introduced during this period will include the first experimental neurocomputers, commercially attractive parallel computers, and highly parallel database machines.

Significant changes in software technology that are expected by the late 1980s include widespread distribution of integrated CASE tools, introduction of reverse-engineering tools and the routine integration of expert systems with the conventional information-systems environment.

Integrated CASE Tools: Integrated CASE workbenches will support all aspects of the application development process, including system planning, analysis, design, code generation, documentation generation, database generation and project management.

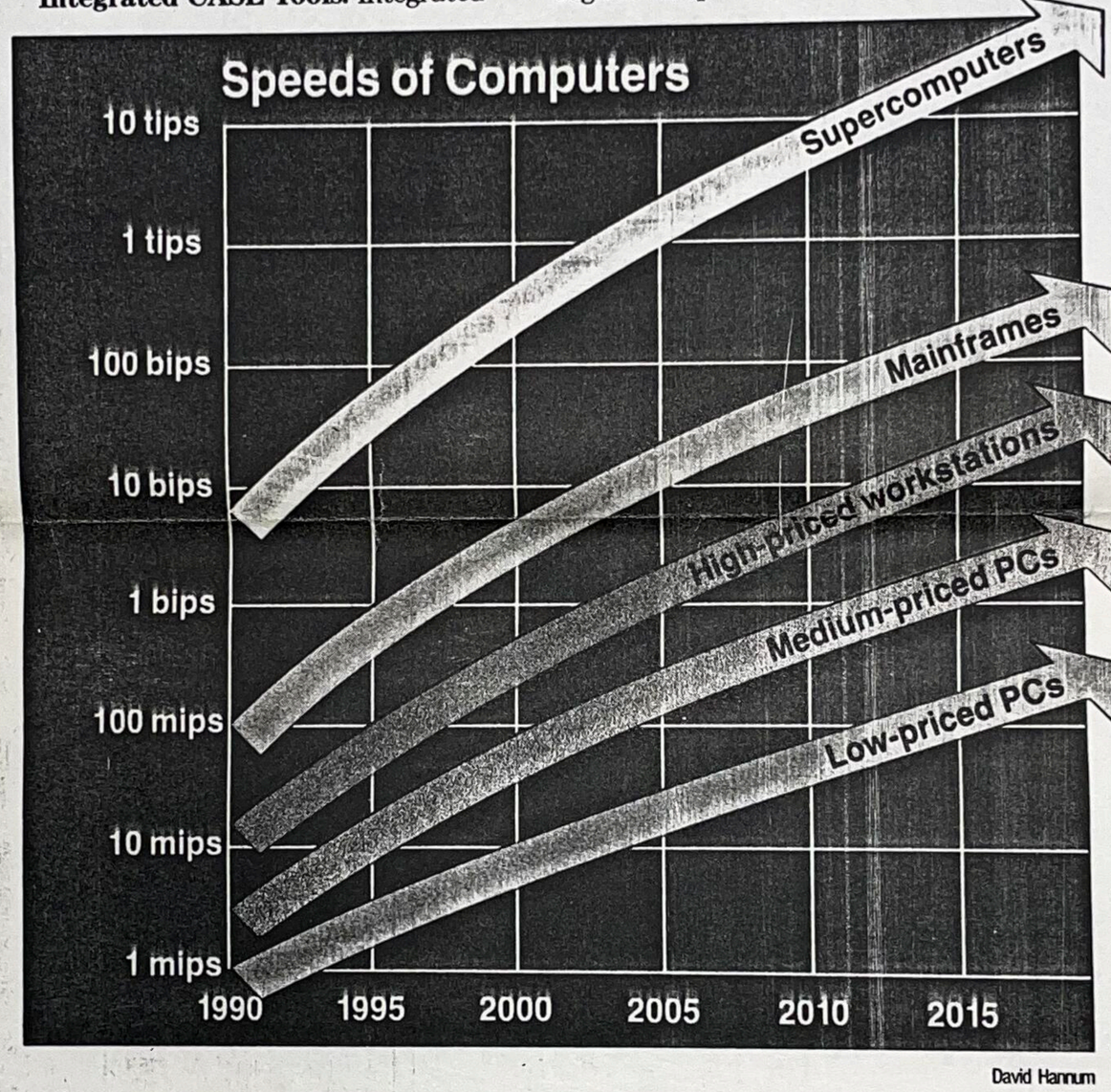
The front-end planning, analysis and design components of these products will be closely integrated with the back-end code, database and documentation-generation facilities.

Reverse Engineering: The successful introduction of forward/reverse engineering tools promises to revolutionize the CASE market. Forward/reverse engineering tools will provide an integrated solution for the maintenance of existing applications, as well as the development of new ones.

Although traditional CASE tools address only the portion of the IS effort toward development of new applications, they fundamentally change future maintenance costs by building systems that are easy to modify.

Reverse-engineering tools are designed to convert low-level data definitions and unstructured, spaghettilike code into high-level structures. These high-level data and process structures can then be used in a forward-engineering process to generate normalized data definitions and structured code for the same or a different environment.

Currently, tools exist that can restructure spaghetti code, but do not generate high-level specifications of the code. Other available tools can convert data definition language (DDL) statements into high-level data structures, but do not restructure process code. In the near future, tools will be available that convert both low-level data definitions and process code into high-level structures that can then be used to regenerate the application or maintain the application at a high level. Current CASE tools provide only a portion of this future capability.



David Hannum

Expected by 1990 is the widespread distribution of CASE tools and the routine integration of expert systems with conventional IS.

Expert-Systems Integration: In the next three years, expert systems will have completed the transition to full integration with the conventional business processing environment. Early expert-system tools were expensive; they ran on non-standard environments such as LISP machines, and they required specialized skills in knowledge engineering.

Current expert-system tools are inexpensive, run on personal computers and are easy to use. They interface closely with conventional operating systems and TP monitors, access corporate databases and integrate cleanly with the business processing environment. Expert systems are becoming a standard component of data-processing applications.

Standards: The movement toward standard computer-system environments is accelerating. SQL will become a widely used standard for access to relational databases. The introduction of IBM's System Application Architecture (SAA) will provide standard ways for application software to access databases and networks and will support standard forms of user access to computers.

Information-systems professionals may use the Presentation Manager and Communication Manager components of OS/2 to impose controls and standards on distributed networks of PCs.

For many organizations, the rapid proliferation of personal computers has resulted in chaotic management of PC resources and lost control of distributed PC networks by professional IS management.

OS/2 offers both end users and IS managers the opportunity to control the operation of distributed PC networks within a professional, well-supported environment. Users will be asked to operate within the constraints and standards enforced by OS/2 and SAA. In return, users will receive professional management of file servers and communication interfaces, as well as controlled access to corporate databases and distributed communication networks. The appropriate application of standards provides both end users and IS managers with a win-win situation.

Strategic Business Systems: In the near future, organizations will increasingly regard computers and information systems as a strategic weapon. Applications will be sought that enable a corporation to use computer systems to gain a strategic advantage.

The term "mission-critical" is used to describe on-line strategic systems which integrate critical aspects of the operation of an enterprise. If the system fails, a vital portion of the enterprise stops functioning until the system is back in operation. Mission-critical systems require highly reliable computers, including networks and databases which operate continuously. ■

The James Martin Productivity Series, an information service updated quarterly, is available through High Productivity Software Inc., of Marblehead, Mass. (617) 639-1958. For information on seminars, please contact (in the United States and Canada) Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402 (213) 394-8305. In Europe, contact Savant, 2 New St., Carnforth, Lancs., LA5 9BX United Kingdom (0524) 734 505.