AT&T INNOVATION BRIEFS

The briefs in this section are summaries of recent discoveries and developments within AT&T Bell Laboratories. AT&T readers who would like to contribute future items, and readers who would like further information as well, are encouraged to contact the AT&T Technical Journal *editor.*

Recent Advances in Text-to-Speech Synthesis

Text-to-speech (TTS) synthesis systems are now being used in a number of commercial applications, including text previewers, e-mail-to-voice converters, and student registration systems at several universities. Although the intelligibility of the synthetic speech is quite good, the perceived quality is still significantly below that of natural speech. To increase the naturalness of TTS systems, AT&T Bell Laboratories researchers have improved the speech prosodics by introducing statistical models of sound duration and pitch as a function of word context. To increase the range of utility of TTS systems, the researchers have created versions of TTS in 11 dialects of 9 languages, including Mexican Spanish, Castilian Spanish, Mandarin Chinese, Tiawanese, Japanese, Russian, German, French, Italian, English, and Navajo. Finally, they have added a face synthesis module that provides a talking head model whose articulators move in concert with the articulatory characteristics of the sounds being produced. The resulting TTS system provides improved quality synthetic speech, and will help create new multimedia applications. (*See related paper, "Multimedia: Technology Dimensions and Challenges," pp. 14-33.*)

A Real-Time Transient Simulator for the AT&T Network

The AT&T Network Flight Simulator is a unique tool that has been designed to simulate in near real time the transient behavior of the entire AT&T network and its services. Achieving this objective required overcoming two major technical obstacles. First, detailed models for the AT&T network elements and services needed to be formulated and integrated. Second, novel parallel processing solutions had to be devised so that the simulations could run in near real time. The AT&T Network Flight Simulator is important because it permits network engineers to study the functional behavior and the performance impact of new services, adjuncts, switches, and transport within an accuracy of a few milliseconds. This results in more efficient engineering and faster design cycles. The Network Flight Simulator also can serve as a network management training tool that reveals the impact of failures and congestions in the network and the utility of the control and management strategies employed to contain them.

Alef: Language as Middleware

Alef, a new programming language designed at Bell Laboratories, provides network-transparent support for distributed systems. It encourages concise and portable implementations of complex systems through language-level concurrency. Alef is designed for implementing traditionally concurrent applications such as window systems. It has also proved itself in embedded systems like network switch control software because its language facilities provide understandable interfaces to mechanisms often supplied only as more primitive operating system calls. Alef is based on C, but it adds currency (multiprocessing) and an integrated mechanism for communication through typed channels that pass values between processes on the same remote machines. Complicated data objects can be sent between programs running on platforms of varying architecture, and the same semantics govern both local and remote communication. Alef also provides polymorphic objects whose actual types are determined at runtime, a simple form of abstract data types with associated operations, and static type inheritance.