TRANSARC CORPORATION

NEW SOFTWARE COMPANY ANNOUNCES PLANS TO SPECIALIZE IN DISTRIBUTED SYSTEMS

For Immediate Release

PITTSBURGH, PENNSYLVANIA, May 17. . .The formation of a new software development company, Transarc Corporation, was announced today by the company's president, Alfred Z. Spector, former director of the Information Technology Center at Carnegie Mellon University (CMU) and associate professor in the university's ~~computer science department~~. *School of Computer Science*

Transarc will specialize in systems software for local- and wide-area networks of distributed computers. The company will be headquartered in the Gulf Tower in Pittsburgh, a growing center of software research and development in the United States.

The software products that Transarc is developing will enable a wide range of organizations with networks of computer users, such as banks, aerospace companies, and universities, to share their computer data and resources, even among geographically separate locations. Transarc's products will focus on Unix™-based systems, including the Advanced Interactive Executive® (AIX®), IBM's offering that has been submitted to the Open Software Foundation.

Through Transarc software, resource sharing will take place in a way that minimizes additional training and work at the application level. This will allow users to run the same programs they are familiar with, while drawing on a much wider pool of available information. In addition, it will significantly reduce the time and cost of information sharing and greatly improve the productivity of users.

Dr. Spector observed that as the use of computer networks increases in both U.S. and international businesses, systems that exploit computer connectivity will be integral to competitiveness in the global marketplace.

"Transarc Corporation brings together a talented staff with broad experience in developing leading-edge distributed systems software," said Dr. Spector.

Transarc's talent base includes software designers who created the Andrew File System (AFS), a shared file system that is the result of a CMU-IBM joint development project and that forms a

basis for Transarc's distributed file system products. AFS now links more than 8,000 CMU students, faculty members, and administrators to a broad range of state-of-the-art education, research, and administrative applications through one of the largest and most advanced computer networks in the world.

Transarc's staff also brings expertise from work on Camelot, a distributed transaction processing facility for CMU's Mach (Unix-like) operating system, that was developed by the university under contract with the U.S. Defense Advanced Research Projects Agency. Camelot simplifies the development of programs that speed transaction processing in multi-vendor networks, such as banking networks of automated teller machines.

"We formed Transarc because of the rapidly expanding use of large networks of Unix systems and the growing demand for software to facilitate the sharing of network data and resources," said Dr. Spector. "The best ideas from AFS and Camelot will be transferred to the highest-quality commercial software programs.

"We believe industry's greatest single challenge is in rapidly translating complex technology into workable systems," he said. "We are committed to developing software that will be portable to many types of computers and work seamlessly in multi-vendor environments."

The International Business Machines Corporation will have a significant equity interest in the new software firm. "We have had a long and productive relationship with Alfred Spector and the other members of the Transarc team while they were at Carnegie Mellon, and we are excited about their new venture," said Nicholas M. Donofrio, IBM vice president and president of the Advanced Workstation Division. "Transarc Corporation's products will complement IBM's support of AIX, and provide the industry with leading-edge software solutions."

For additional information:

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TRANSARC CORPORATION

TECHNOLOGY BACKGROUNDER

DISTRIBUTED FILE SYSTEMS

In the last decade, businesses, universities, and other organizations have come to realize that their most important asset is information. With the continuing decline in the cost of manipulating information (and the resulting proliferation of personal computers and workstations), organizations are looking for efficient and effective methods of sharing information.

Transarc Corporation's strategy is to provide customers with products that allow users to share information stored across the building or across the country as easily and cost-effectively as information stored at their desks.

Computers allow users to store information in a collection of "files," generally on a computer disk. This collection is called the computer's "file system." Computers are now being connected together to improve cooperation among individuals and organizations; "local-area networks" (LAN's) generally cover a few hundred yards, while wide-area networks (WAN's) may span continents or oceans. A "distributed file system" extends the file system concept to the collection of information available anywhere on the network, linking the file systems available to each machine.

Transarc's file systems products will facilitate such sharing and are based on technology developed for the Andrew File System (AFS) at the Information Technology Center, a joint project of Carnegie Mellon University (CMU) and IBM. With an initial charter to connect all of the computers on CMU's campus, AFS has been under development for more than six years. It has now been installed and is in constant use at CMU and growing use at several connected sites, including M.I.T. and the University of Michigan. The CMU portion of the network now has about 8,000 users.

To be truly useful, a distributed file system must be *transparent*: it must function identically to the file system on a user's own machine. Without any additional training, a user can then use a vastly expanded collection of information with the application software that is already familiar. This is a major advance from the explicit file transfer that was formerly required.

The system must be *fast*: no substantial difference should exist in the time required to use files

in the same room, in the next building, or across the country.

The system must be *secure*: to increase confidence in a system that allows widespread sharing of information, users or groups must also be able to protect their information in safe, yet flexible ways.

Finally, the system must be *heterogeneous*: it must connect machines from a variety of manufacturers and allow the use of software from a variety of suppliers.

Transarc's distributed file systems products will implement all of these principles in software that is also easy for administrators to configure and maintain. Transarc will focus on supporting Unix™ systems of many varieties, including the Advanced Interactive Executive® (AIX®), an IBM product that is the basis of the Open Software Foundation's operating system plans. (AFS itself runs on IBM, Sun Microsystems, and Digital Equipment Corporation hardware.)

Transarc's file systems products will be implemented in two major components:
- the *client* software is system-level software for use by each workstation that accesses the file system;

- the *server* software will run on each machine that provides file services: that is, each machine that maintains a portion of the collection of files that comprises the distributed file system.

A local collection of client and server machines is called a "cell" (corresponding, for example, to one company location). Cells may be linked transparently to produce a geographically distributed file system (for the whole company, for example).

The advantages of Transarc's distributed file systems products will extend those of AFS, including:
- an environment that fosters true collaboration, even over large distances. Projects may easily call on distant resources that were not previously available, producing improved results.

- the ability for users to employ the system as they would a local system, facilitating cooperation and resulting in collaborative efforts with reduced turnaround time, higher quality, and greater productivity.

- permitting users who must travel to multiple locations to access exactly the same files at each site. Travel is therefore removed as an impediment to productivity.

- simplified system administration, operation, and configuration, reducing training and operation costs, and an excellent backup mechanism to protect user data in the event of a failure.

- incorporation of state-of-the-art techniques for efficient communication, which reduce network traffic without sacrificing system speed. This results in more cost-effective network use and permits more computers to be connected to the file system.

Transarc expects that its products in the areas of distributed file systems will be useful to many organizations; the products will provide a backbone that supports the the profitable use of an organization's information resources, and provide new potential for widespread collaboration.

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TECHNOLOGY BACKGROUNDER

DISTRIBUTED TRANSACTION PROCESSING

For the last decade, the trend in computers has been towards machines that are smaller, faster, and less expensive, making possible widespread availability of computing resources. The increased power and speed of computers will allow general purpose systems, such as Unix™ systems, to perform many types of computing in a very cost-effective fashion. One of Transarc's major goals is to support Unix-based transaction processing in distributed, or networked, environments.

Transaction processing is the activity of maintaining information, usually shared information. Transaction processing is the critical activity in organizations such as banks, airlines, and telecommunications companies, and indeed in any organization whose operations are information-intensive. The term "distributed transaction processing" applies when either the information or its users, or both, reside in more than one location, or on more than one computer system.

The collection of small- to medium-size computers now available in many organizations affords a substantial opportunity for transaction processing: each computer is considered a member of an "army" of computing "specialists," each charged with a particular task, or with custody of a particular collection of data.

For example, in a bank's computer network, one group of machines might be charged with tracking customer accounts in one city, while another tracks customers in another city. The system must nevertheless function as a reliable whole.

This is accomplished in two parts: first, each machine is assigned a specific task or set of tasks. Second, a coordination method must be provided to ensure that the specialists operate productively together.

A system called Camelot that was based on these premises was developed at Carnegie Mellon University; the knowledge and software principles resulting from that system are the basis for Transarc Corporation's distributed transaction processing software.

Transarc's distributed transaction processing product line will consist of software that facilitates

the creation of distributed transaction processing applications. Using this set of tools, software can easily be constructed for any information application that must function on a computer network. The software writer can then focus on the specific issues of the application, relying on Transarc software to address the issues of distributed operation.

Any distributed transaction processing system must be *efficient*: that is, the overhead introduced by cooperation among several machines must be low. Otherwise, the benefits of distributed operation are lost.

Distributed operation must be *transparent*: users should not need to know whether their requests are being serviced locally or elsewhere on the network.

Since maintenance of consistent data is critical to organizations, a distributed system must be *reliable*. Specifically, no differences in the apparent behavior of the system can be permitted to arise from the fact that operation is distributed.

Software engineering and reliability principles dictate that transaction processing be *modular*: each program should have a well-defined function and set of services that it provides to other programs on the network.

Efficient and reliable *logging*, the act of recording operations in case of machine failure, must be supported by a transaction processing system.

Finally, the system must make it simple to develop the transaction processing applications that actually support a customer's business or operations.

Transarc's distributed transaction processing product line will implement all of these principles in software that allows application implementors to concentrate on the specifics of the application and that allows network administrators to easily configure the services available on each machine. The initial product line will be for use with computers using Unix™ and Unix-like operating systems, such as IBM's Advanced Interactive Executive® (AIX®) products.

Transarc software will use the *client/server* model, in which clients request operations and servers perform them. This is the simplest and safest method for implementing distributed programs.

The advantages of Transarc's distributed transaction processing software are as follows.
- Through distributed transaction processing, an organization may connect many machines of varying sizes together to gain added performance, and reliability. The system expansion path is also more flexible and therefore more cost-effective.
- In the case of machine failure, only a small portion of the system will fail, as

opposed to the full system failure that would be experienced with a single large machine. System availability is therefore greatly improved.

- Reliability is the most important principle of Transarc software. State-of-the-art techniques and network protocols are incorporated to virtually eliminate the potential problems that can arise in transaction processing systems.

- Transarc software is efficient. Distributed transaction processing can be used to balance the load on the available machines, reducing the costs of the required equipment. Techniques are also used to reduce network traffic, allowing better throughput and response time to users, and increasing productivity.

- From the application developer's viewpoint, the Transarc library makes distributed transaction processing software easy and cost-effective to create. The application implementor need only be concerned with his area of expertise: the specific application. Development, debugging, and testing time are thereby greatly reduced, resulting in more reliable software with a shorter development cycle.

Transarc's distributed transaction processing software forms the basis of the efficient, reliable distributed applications that are critical to any organization that manages information.

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