cations. I have been employed at USENIX since 2012.

2. I have been asked to confirm certain dates regarding the following article: Marc F. Pucci, "Configurable Data Manipulation in an Attached Multiprocessor," *Computing Systems*, Vol. 4 No. 3, Summer l991 ("the Pucci article"), a true and correct copy of which accompanies this declaration as Exhibit A. Additional true and correct excerpts from the issue of *Computing Systems*, Vol. 4 No. 3, Summer l991, in which the Pucci article appeared, are attached as Exhibit B.

3. My statements are based on my understanding of USENIX's general practices and procedures for publishing in the ordinary course of business, as well as any records available to me regarding USENIX's publishing activities.

4. I can confirm, based on the above, that USENIX arranged for publication of the Pucci article. The Pucci article was originally published in *Computing Systems* 1991, a quarterly publication of the USENIX Association. I have reviewed the Summer 1991 issue of *Computing Systems* (Vol. 4 No. 3), and have determined that the Pucci article was published in a paper version in the Summer of 1991.

5. Based on the above, I understand that it would have been USENIX's practice to distribute paper versions of the publication *Computing Systems* to at

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1991.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 19th day of September 2016.

Respectfully submitted

Michele Nelson

Michele Nelson

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EXHIBIT A

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Configurable Data Manipulation in an Attached Multiprocessor

Marc F. Pucci Bellcore

ABSTRACT: The ION Data Engine is a multiprocessor tasking system that provides data manipulation services for collections of workstations or other conventional computers. It is a back-end system, connecting to a workstation via the Small Computer Systems Interface (SCSI) disk interface. ION appears to the workstation as a large, high speed disk device, but with user extensible characteristics. By mapping an application's functionality into simple disk read and write accesses, ION achieves a high degree of application portability, while providing enhanced performance via dedicated processors closely positioned to I/O devices and a streamlined tasking system for device control.

The programming model for ION supports the notion of separation of control function from data transmission. Typically, a small list of data manipulation directives is transmitted from the workstation to the ION node, where data filtering or other forms of processing occur. Only results, as opposed to all data, need be returned to the workstation. In the extreme case, the ION system can acquire all input data and generate all output data, without any processing occurring in the workstation. An example application uses a simple set of directives to capture and digitize high quality stereo audio, mix it to monaural, rate adjust the digitized samples to ISDN rates, convert

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from binary to mulaw encoding, and transmit the result to a workstation.

ION is being used as an experimental platform for voice mail services in a userprogrammable telephone switch prototype, and as a tool for measuring the I/O performance of computer-disk interfaces. Applications under development include an automated camera positioning system and an object repository.

1. Introduction

The workstations that exploit the rapidly advancing state-of-the-art in processor technology can often be a bane to developers of applications that utilize dedicated special purpose hardware or that impose strict access requirements on conventional hardware. Such evolving systems can suffer from:

- Constantly porting hardware dependent components to new hardware.
- Being locked into a particular vendor to avoid major hardware disruptions.
- Forcing the use of high-end stations because entry-level stations are not easily expandable.
- Constantly upgrading local workstation based device drivers to coexist with operating system releases.
- Relying upon an operating system that is not appropriate for the system's functionality.
- Insufficient workstation capacity to support the hardware requirements of the application.

Applications tied to obsolete processor technology will soon suffer from comparative performance problems as newer workstation technology passes it by. However, interfacing new workstations to an existing hardware base is not simple. Initial workstation offerings often possess

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