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Fibre Channel Development Final Report CRADA No. TC-0340-92-A

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Fibre Channel Development

Project Accomplishments Summary (Attachment II)

CRADA No. TC-0340-92

Date: July 1997

Revision: 1

A. Parties

The project is a relationship between the Lawrence Livermore National Laboratory (LLNL) and industrial partners: Hewlett-Packard Company, (HP), International Business Machines, (IBM), Jaycor Corp (Jaycor), and Sun Microsystems, (Sun).

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Lawrence Livermore National Laboratory
P.O. Box 808, L-795
Livermore, CA 94550

Hewlett-Packard Company, (HP)
19420 Holmstead Road,
Cupertino, CA 95014-9810
Attn: Suhas Badve, M/S 43LN

International Business Machines, (IBM);
Advanced Workstation Development (AWD)
11400 Burnett Rd.
Austin, TX 78758
Attn: Craig Cook, M/S 1169

Jaycor
P.O. Box 85154
San Diego, CA. 92138-5154
Attn: Terry Flanagan

Sun Microsystems, (Sun)
2550 Garcia Ave.
Mountain View, CA. 94043
Attn: Bob Williamsen, M/S MPK12-203

B. Background

In 1992, Fibre Channel (FC) was an emerging American National Standards Institute (ANSI) standard for next generation computer networking and peripheral I/O. Industry had only a few prototype implementations of Fibre Channel products. FC testing centers had yet to exist. Competing standards existed for high speed networking (e.g. ATM) and alternative standards for peripheral channels and/or

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clustering interconnects (e.g. SCSI, IPI, IEEE 1394 Serial Bus and IEEE 1596 SCI) had many computer systems manufacturers and end-users in search of better methods for connecting larger and faster storage systems to computers and networks.

This project was intended to give the principal US. participants a one- to two-year lead in developing heterogeneous high-speed computer networks and high-speed peripheral channels using this new FC standard.

LLNL had key principal members who helped originate the concept of Fibre Channel and who were then members of the ANSI committee for Fibre Channel, (then X3T9). LLNL also had needs for this emerging technology as it was envisioned that it would enhance LLNL's ability to build larger and faster computer systems to then contribute to the scientific programs' abilities to achieve their goals, such as stockpile stewardship. LLNL could also serve industry in this effort by being a neutral site for testing and ANSI standards committee negotiations, should that be necessary to resolve conflicts in standards interpretation.

C. Description

The Fibre Channel (FC) Development project was designed to enhance US. industrial competitiveness by accelerating the standardization and subsequent industrial acceptance of the ANSI Fibre Channel Standard (now X3T11). The project was proposed to benefit US. industry as these high performance computing methods became generally available. In 1992-93, during the initial project phases, Fibre Channel (FC) was emerging as a new ANSI standard. It was envisioned as becoming the mechanism for data transfer between the next generation of computers, and between these computers and their peripherals. Using this channel standard, US. computer vendors were expecting to be able to provide high-speed interoperability between heterogeneous computers and their storage devices, with data transfer rates greater than a GBit/sec.

The industrial participants were developing individual FC interfaces to operate with their platform products. LLNL's role was to be a neutral testing site and a facilitator for helping to resolve conflicting interpretations of the embryonic Fibre Channel specification. LLNL anticipated that conflicts in the interpretation of such a standard would arise and require neutral resolution and that such resolutions would best be achieved in cooperation with the ANSI FC Working Group.

The LLNL FC test bed was established in May 93 and operated until December 1996. During this project time frame, LLNL constructed the test bed and developed testing methodologies and test suites as proposed. LLNL assisted participants in testing their FC implementations and resolving interoperability issues. LLNL also collaborated with participants to demonstrate their new technologies to the open market at conferences and industry trade shows. These events (e.g., InterOP,

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SuperComputing, HPCN) were key to achieving interoperability and accelerating time-to-market and in gaining market acceptance and visibility.

D. Expected Economic Impact

Results of this effort are being witnessed today with the establishment of Fibre Channel as the method of choice for future high-speed channels and as the successor to SCSI as the peripheral attachment method of choice. Leading US companies are now producing FC computer host adapters and/or FC storage systems and the market for FC products is projected to grow. US companies are now enjoying a lead in time-to-market for FC products over foreign competitors.

E. Benefits to DOE

Computer simulation and modeling form the cornerstone of the DOE ASCI program's efforts to shift from nuclear test-based methods to compute-based methods for maintaining the safety, reliability and performance of the nuclear stockpile. This modeling and simulation requires advanced data communications and storage capabilities with high transfer rates for rapidly accessing modeling data and running the necessary simulation codes. Fibre Channel is becoming a method of choice for providing this high-speed access.

LLNL core competence has been enhanced through our participation with industry and the ANSI committees including the insights we have gained into the technical aspects of FC and FC product utilization. This knowledge will benefit internal LLNL networks and computing and storage facilities.

F. Industry Area

Areas of industry which are benefiting from Fibre Channel include electronics components manufacturers, computer system manufacturers and integrators, data communications and networking companies, mass storage manufacturers, test equipment manufacturers, cabling and connector providers.

G. Project Status

This project is complete.

H. LLNL Point of Contact for Project Information

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(510) 423-2492 (FAX)
Internet: timvoss@llnl.gov

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I. Company Size and Point(s) of Contract

This CRADA has multiple industrial participant companies. Current contacts are:

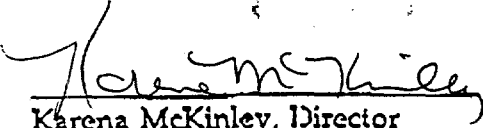
HP:	Gary Wermuth (916) 785-4520
IBM:	Craig Cook (512) 823-0000
Jaycor:	Terry Flanagan (619) 392-6580
Sun Microsystems:	Bob Williamsen (415) 786-6490

J. Project Examples

This project constructed a test bed for testing industrial partners' products. Results were reports of technical operation relevant to the product(s) being tested. After project conclusion, the test bed was dismantled and member's equipment was returned to them. Project notes, test software and results have been archived to off-line storage.

K Release of Information

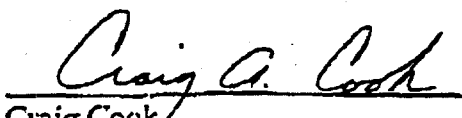
I certify that all information contained in this report is accurate and releasable to the best of my knowledge.


Karen McKinley, Director
Industrial Partnerships
and Commercialization

3/20/00
Date

RELEASE OF INFORMATION

I have reviewed the attached Project Accomplishment Summary prepared by Lawrence Livermore National Laboratory and agree that the information about our CRADA may be released for external distribution.


Craig Cook
International Business Machines

2-15-00
Date

11/10/98

JAN 24 2000 16:33

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