

15 April 1991

AARNET PROJECT SUBMISSION

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UTS
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Mr T J Mullarvey
Deputy Secretary
Australian Vice-Chancellors' Committee
GPO Box 1142
CANBERRA ACT 2601

Dear John,

AARNET PROJECT FUNDING

Further to your memorandum of 22 March, 1991 with regard to proposals requesting funding under the abovementioned scheme, attached please find a submission for a 'Transparent User Network Interface for Transputer Development System' submitted on behalf of Associate Professor T. Hintz of the School of Computing Sciences.

This proposal has the University's support for submission to the AVCC for consideration.

Yours sincerely,



Colin R. Phillips
Pro Vice-Chancellor (Research)

Att.

17 APR 1991

Campuses
Balmain
Broadway
Haymarket
Kuring-gai
North Shore

Transparent User Network Interface for Transputer Development System

BACKGROUND

Transputer-based research and development in Australia has grown and spread since 1985^{1,2}. The high initial cost of a development system is a factor which has limited the adoption of the Transputer in Australia. Once the initial cost is met, the next factor is often that a geographically dispersed group of researchers and developers⁴ working on the same project need to pool their expensive resources. Various approaches have been trialed^{5,6,7} to provide, at a remote site, the same functionality of a multi-Transputer development system that would normally be sitting on the desk of a developer.

As a result of the success of these initial ventures, SGS-Thomson Microelectronics P/L, Parallel Systems Research P/L and the Key Centre for Advanced Computing Sciences at the University of Technology, Sydney have established a large Transputer resource at the Key Centre. This

¹Hintz, T, *Parallel Graphics Architecture Third Australian Conference on Computer Graphics* Brisbane, Australia, August 1985.

²Hintz, T, *Transputer - New building blocks for computers Australian Computing*, February 1987.

³The Transputer is clearly gaining ground in the world marketplace now that it has the considerable backing of SGS-Thomson. It is currently by far the largest selling RISC microprocessor in the world, having sold around 400,000 units worldwide.

⁴Jones, D and Hintz, T, *Implementation of a Parallel Prolog on Transputers Second Australian Transputer and OCCAM Conference*, Melbourne, July 1989.

⁵Hulskamp, J and Hintz, T, *Transputer-Based Research and Development in Australia: Current Research and Future Prospects*, in *Applications of Transputers I*, edited by L. Freeman and Chris Phillips, IOS Press, 1990.

⁶Hintz, T, Hulskamp, J and Moore, W, *Remote Access to Parallel Computer Systems*, in *Transputer Research and Applications*, edited by J.A. Board, IOS Press, 1990.

⁷Hintz, T, Hulskamp, J and Moore, W, *Remote Access Parallel Computing Education and Training for Australian Conditions*, *UNESCO Conference on Parallel Computing and Engineering Education*, Paris Oct 1990.

complements the existing resources and enables the Key Centre to be promoted as the *Australian Transputer Centre*, for industrial and academic use in Australia.

The Transputer installation has sixteen T800 Transputers equipped with a total of 22 Mbytes of memory. This system will be capable of a peak 240 mips and 32 Mflops and consists of:

	network access to SUN3/260 server	}	
1	ITEM Rack	}	
2	IMS B012 Motherboard	}	provided by UTS
1	IMS B407 TRAM	}	
2	2 Mbyte, T800 TRAM	}	provided by
6	1 Mbyte, T800 TRAM	}	Parallel Systems
1	IMS B012 Motherboard		
1	IMS B417-5 TRAM	}	
1	IMS B404-3 TRAM		provided by
6	IMS B411-3 TRAM		SGS-Thomson
1			IMS D5214 SUN3 ANSI C }
1			IMS D5205 SUN3 OCCAM }

The estimated value of the facility is about \$100,000.

The resource is made available to various *users* under the following conditions:

- A Steering Committee includes a representative of each of the three contributors and an industrial representative. They regularly review and direct the use of this resource.
- Day to day management is under the control of the Key Centre.
- Any industrial project requirements has priority over academic projects. Projects which have funding sponsorship will have priority over unfunded projects.
- Research users which have no sponsor may be given access when the system is not fully used. This will be on a time available basis.
- The School of Computing Sciences maintains the server where the host Transputer resides. In addition, UTS provides system management resources and makes the system widely available⁸ from AARNet.
- The Key Centre plans to make the resource self-financing regarding operator, technician requirements and interfacing to the communications gateways.

⁸These include

- system programmer support for installation of Transputer software
- System programmer support for creation of user accounts on *ultima*.

- The Key Centre undertakes to promote the resource via articles in newsletters, seminars and technical reports.

- The **Australian Transputer Centre** will provide support to companies and other bodies to investigate how high speed yet inexpensive parallel processors can be cost effective when applied to many and varied tasks.

- Access to the Transputer resource is 24 hours per day, 7 days per week via remote login to the SUN 3/260 server known as *ultima*. Access by other universities and certain research establishments is via AARNet. Access is dependent on the hours of operation at those facilities, but potentially would be available any time. At their discretion, universities participating may wish to provide dial-in access via modems to their hosts connected to AARNet.

- SGS-Thomson will provide one SUN or VAX software product to academic institutions teaching a course that includes a significant section on the concepts and programming of the Transputer architecture and its applications. Further copies will be available at a 50% discount

- The parallel processing group in the Key Centre provides help to new users to allow them use of the facility. This includes information about login procedures, general directory structure, and pointers to documentation.

TECHNICAL BACKGROUND

The Transputer system at UTS is presently being accessed by users at RMIT(Melbourne), Charles Sturt University - Mitchell (Bathurst) and CSIRO (North Sydney) via AARNet. However, at present these users must remotely login to *ultima* then edit, compile, link and execute directly on *ultima*. [It is of course possible to transfer any of the intermediate files using *ftp* and continue working on *ultima* from that point.]

Cross compilers for the Transputer Toolset for both PCs and SUNs produce the same Transputer object code, in the same format, to be run on the Transputers hosted in those machines. The PC Server and SUN Server provide an interface to programs run on the Transputers which reside on their respective buses. After transferring a file in "bootable Transputer format" from a remote machine to *ultima*, the program could then be executed.

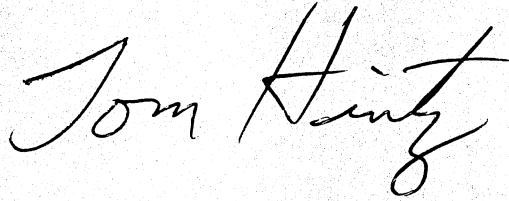
PROPOSAL

The proposal is to develop a new "Transputer Server." This would reside remotely in either a PC or SUN along with an appropriate interface program for *ultima*. Users could edit, compile and link and then boot the

Transputer on *ultima*.all from their local machines. This means that some of the functionality of a scarce resource could then be distributed to users sites. *ultima* is then merely required to be a "compute server." The feasibility of a similar proposal has already been investigated in undergraduate projects on SUN 386i workstations. However, since it was necessary to develop a driver for the Transputer boards the project was not completed.. The development of a driver will not be required for this proposal as it is already supplied in source code for the SUN 3.

BUDGET

The amount requested is \$14,000 for salary (including on-costs) for a part time programmer.

A handwritten signature in cursive script, reading "Tom Hinz". The signature is written in dark ink and is positioned in the upper right quadrant of the page.

Resume of
Tom Hintz
School of Computing Sciences
University of Technology, Sydney
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Broadway, NSW 2007
Phone: +61 2 218 9508
e-mail: tom@ultima.socs.uts.edu

Qualifications

Education

BS EE University of Texas, Austin, Texas 1966.
MS EE New Mexico State University, Las Cruces, New Mexico, 1968.
D.Sc. (EE) New Mexico State University, Las Cruces, New Mexico, 1971.

Experience

School of Computing Sciences
University of Technology, Sydney
Associate Professor & Deputy Head of School June 1988 to present
Associate Professor & Head,
Department of Computer Science January 1984 to present

INMOS, Corp.
PO Box 16000
Colorado Springs, CO 80934-6000
USA
Visiting Scientist January 1988 to June 1988

Department of Computer Science
New Mexico Institute of Mining and Technology
Socorro, New Mexico 87801 USA
Visiting Assistant Professor November 1978 to October 1979
Associate Professor January 1981 to May 1981
Associate Professor and Chairman May 1981 to January 1984

Department of Mathematics and Computing
Capricornia Institute of Advanced Education
Rockhampton, Queensland 4700
Lecturer January 1975 to December 1980

Bell Laboratories
Whippany, New Jersey USA
Specialist Member Technical Staff January 1972 to January 1975

Department of Electrical Engineering
New Mexico State University
Las Cruces, New Mexico USA
Graduate Assistant June 1967 to December 1971

Professional Organizations

I am a member of the Australian Computer Society, Association for Computing Machinery, Institute of Electrical and Electronics Engineers, and Australian Computer Graphics Society.

Grants Received

1988, 89, 90 Australian Research Grants Scheme (with Dr. M Wise)	A\$98,127
1986,87, 88, 89 Transputer operating system project in Key Centre	A\$34,000
1887 INMOS (software)	A\$3,400
1985 New South Wales Alumni Association	A\$100
1985 New South Wales Institute of Technology	A\$3,870
1983 Hewlett-Packard	\$275,000
1982 New Mexico Department of Minerals and Energy	\$9,770
1981 Australian Research Grants Scheme	\$5,000

Professional Consulting

1988	INMOS Corp.
1986-87	Hawk Electronics
1986	The Overseas Telecommunications Commission
1985	PR1ME Computer
1984	Royal Botanical Gardens
1984	Concise Data Systems
1978-79	Theise Dampier Mitsiu
1971	NASA
Summer 1970	ARF Products, Inc.

Publications not cited in the research Proposal

- Digital Simulation Study of a Phase-lock Loop Demodulator New Mexico State University Master's thesis 1966
- The FDM Demodulating Characteristics of Non-Linear Phase-Lock Loops *National Telemetry Conference Record* 1968
- Frequency Domain Verification of Time Domain Simulation *Southwest IEEE Convention Record*, 1970
- Signal Parameter Considerations for Tandem Phase-Lock Loops *Southwest IEEE Convention Record*, 1971
- Adaptive Threshold Gate Convergence Using a Noisy Training Sequence *Third Annual Houston Conference on Computers and Systems*, 1971
- Unified Design of Coherent FM Communications Systems Containing Phase-Lock Loops, *National Telemetry Conference Record*, 1973
- Model of Signature Formation for System Performance Prediction, *BTL Memorandum* MF73-6221-54, June 1973
- An Investigation of Operator Response to Supervenier Auto-Alert, *BTL Memorandum* MF73-6221-58 September 1973
- SLOTS: System Localization and Tracking Simulation, *BTL Memorandum* MF74-6235-21 December 1974
- Analysis of PGD-ORI Grams, *BTL Memorandum* MF72-6221-41 July 1976
- Embedded System Dynamics Models 1976 *Applied Mathematics Conference* Jindabyne, Australia 1976
- Teaching Computer Subjects Externally Mathematics Education Research Group Convention Record Melbourne, Australia 1977.
- TPM Mine Planning *CIAE Report* February 1977.
- System Design Specification for Automation of C.I.A.E. Circulation System *CIAE Report* October 1977.
- Progress Report on Computer Automation of the C.I.A.E. Library *CIAE Report*, November 1977.
- Off Line Input of Original Cataloging Information in MARC Format *Australian Computer Conference* 1978
- An Integrated Academic Information System 1979 Winter Meeting of Rio Grande Chapter of ACM, January 1979.
- External Computing Subjects- Five Years Later *Colleges of Advanced Education Computing Conference* Brisbane, Australia 1980
- Universally Adaptable Man Machine Interface for Text Editors *National Microcomputer Conference*, 1980.
- Teaching Operating Systems Using Computer Aided Instruction *Colleges of Advanced Education Conference* Perth, Western Australia 1982.
- Microcomputers at New Mexico Tech 1982 spring meeting of the Rio Grande Chapter of the ACM, El Paso, Texas.
- Database Machine Architecture NSW IT School of Computing Sciences Seminar Series, May 1986.
- Software Inventory NSW IT School of Computing Sciences, June 1986
- Computer Systems 1 Lecture Notes NSW IT School of Computing Sciences January 1986
- UNIX, Lecture Notes NSW IT School of Computing Sciences, February 1985.
- Parallel Architecture Graphics Processor *School of Computing Sciences Technical Report* 85.5 June 1985.
- A Tutorial Introduction to Occam [with J Cady] INMOS, February 1988.
- A Dynamic Distributed Operating System for Message Passing Systems [with M Phillips], *North American Transputer Conference*, Santa Clara, CA April 1990.