·O·U·G·

occam® user group · newsletter

For all users of occam and the transputer

No 9 Summer 1988

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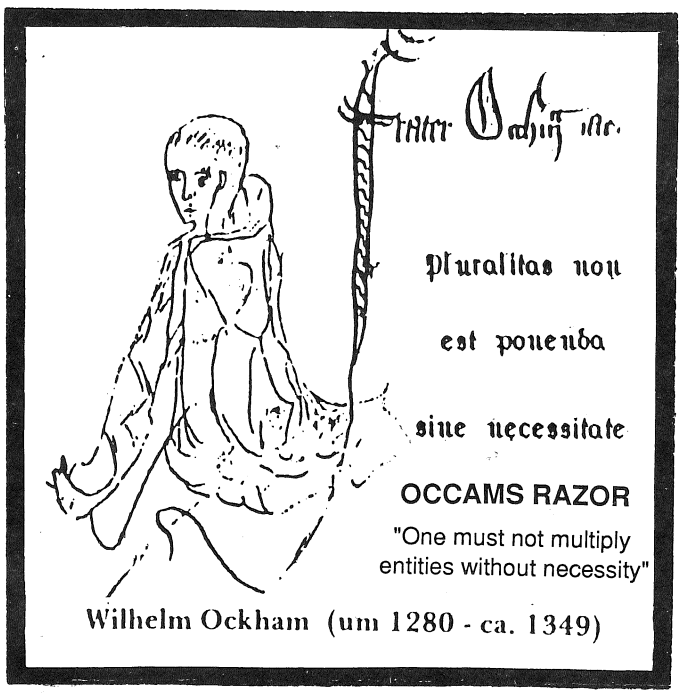

NEWS

From the Editor

Interest in and membership of the OCCAM User Group has continued to grow at an ever increasing rate. A large number of contributions were received for this Newsletter, particularly, from companies offering product news. The unfortunate lateness of the Newsletter is principally due to these contributions, most of which had to be abandoned because of unsuitable formats. However, the Newsletter contains a lot of very useful information and news.

Simple instructions are given in the following section for the format of contributions. If the guidelines are followed then the job of editing would be much easier than it has been in the past.

Because of an ever increasing work load and other pressing interests the Newsletter has lost the services of my co-editor, Mike Barton. His help was solely missed in the preparation of this Newsletter. I would like to thank him on behalf of the user group for the work that he put into editing Newsletters 6, 7 and 8.

Derek Paddon, August 1988.

Contributions to the Newsletter

To allow the efficient processing of submitted articles, news, etc., please use the following guidelines.

- Follow the style in this Newsletter.
- Camera ready material is acceptable, provided that it follows the general style of this Newsletter. Pay particular attention to page width and page length. The editor may have to cut and paste your layout to fit part-pages; please bear this in mind.
- email (derek@uk.ac.bristol.compsci) and PC floppy disc material: LaTeX preferred, following the style of this Newsletter, otherwise unformatted ASCII, again being sympathetic to the general style of this Newsletter.

Back Numbers

Copies of Issues 6, 7 and 8 of the Occam User Group Newsletter are available while stocks last on application to the secretary at INMOS.

Stocks of Issues 1, 2, 3, 4, and 5 are now exhausted.

The bibliography started in issue 1, and the list of members in issue 2. Both have been supplemented in each issue. A consolidated list of members and a complete bibliography will be produced soon and will be sent to all members.

INMOS do not intend to pay for any more reprints of old newsletters.

All enquiries concerning the Proceedings of OUG Technical Meetings should be addressed to Mr van Eijbergen at IOS, van Diemenstraat 94, 1013CN, Amsterdam, Netherlands or (in America) to IOS, PO Box 2848, Springfield VA, 22152-2848, USA.

The OUG Questionnaire

Analysis of OUG questionnaires received.

Michael Poole

The OUG questionnaire was returned by 988 members, about 60% of those sent out. The membership list used for this newsletter distribution and future distributions includes these 988 members, any new members since we introduced the new enrolment form and any "lapsed" members who return the yellow rejoining form. A brief analysis of the information received follows.

Question 1 asked for full name and address. The only analysis done on these is geographical. Countries with 6 or more members are: UK(627) USA(100) West Germany(40) France(37) Netherlands(25) Switzerland(15) Italy(13) Eire (11) Japan(11) Finland(10) Canada(8) Denmark(8) South Africa(8) Spain(8) Sweden(8) Australia(7) Belgium(7) and Austria(6). Other countries represented are Bulgaria, Chile, China, Greece, Hong Kong, Hungary, India, Israel, Korea, Kuwait, New Zealand, Norway, Oman, Papua New Guinea, Poland, Portugal, Saudi Arabia and Yugoslavia.

Electronic mail addresses were given by 363 members, although in some cases these were actually Telex numbers or Fax telephones.

Question 2 asked members what kind or organisation they belong to. Four categories were suggested, with an option to describe any other category desired. The responses were: Academic(478) Electronics industry(256) Government(88) Other industry(87) Others(78). The others included various kinds of consultancy, the software business and a variety of more obscure types.

Question 3 asked how many transputers members normally use. The responses were: 0(228) 1(150) 2-4(197) 5-16(250) 17-64(126) 65-256(22) and > 256(14).

Question 4 asked what development hosts are principally used. These were analysed by searching for some significant keywords: PC(482) VAX(236) SUN(99) Meiko(19) and Stride(10).

Question 5 asked if members were interested in any of the subject areas of the existing special interest groups, or to suggest possible subjects for new groups. Although the question allowed people to distinguish between an "active" and a "general" interest, this distinction has been lost in the analysis.

The existing groups in order of popularity are: Hardware(492) Graphics(483) Artificial Intelligence(404) Operating Systems(368) Networks(366) Numerical methods (285) Formal aspects(245) Unix(283) and Learning(187).

After a certain degree of massaging to merge similar subject areas the following possible new areas attracted at least 6 members: Image analysis and vision(60) Digital signal processing(36) Programming languages(25) Robots and control(20) Simulation(14) Databases(8) Neural nets(7) Scientific(7) Telecomms(7) and Fault tolerance(6).

Question 6 asked members to put the existing services of the group into an order of importance. Members thought the newsletter most important, followed by technical meetings followed by program exchange.

Question 7. Are there any further activities you would like to see the OUG get involved in?

Question 8. Do you have any other views on the OUG you would like the committee to be aware of?

The answers to these questions have been taken together for analysis. When messages asking for new SIGs were eliminated, 213 non-empty messages survive. The allocation of messages to groups is somewhat arbitrary.

35 messages concern publications; members want more of them, more often. We have already started to publish proceedings of our technical meetings. We intend to take steps to encourage the production of an appropriate journal by a professional publisher. As we do not intend to start charging for the Newsletter its scope is restriced by what one can reasonably ask a volunteer editor to do, it will remain primarily a vehicle for news. A consolidated list of members and bibliography will be produced in the near future. Stocks of the early newsletters are now exhausted.

27 messages concern meetings; members want meetings nearer to where they live and of particular relevance to their own interests. It is hoped that current initiatives in the USA will meet some of the needs expressed by members there. Local initiatives start locally; if anyone wants to have a list of names of members in their own or neighbouring countries, please ask me for it or send a news item to the newsletter editor. Several members asked for more notice of meetings so people in remote places can attend. We now try to fix the host and dates of meetings at least a year in advance, but do not send the invitation to attend until we know more about the program, etc. I suggest that remote members contact meeting organisers as soon as they are announced, if they want to be sure of attending.

18 messages concern program exchange and related matters. We hope to do something to meet these needs now that occam 2 is properly defined and implemented. Any constructive suggestions in this area should be sent to Hugh Webber.

8 messages requested that more opportunities for training be created and 12 asked for better dissemination of technical information. 8 messages asked for better facilities for electronic mail communication.

Other subjects with more than 1 message included program conversion from other languages, influencing INMOS future products, new implementations of occam, problems of remote countries, improved publicity, possible collaboration with other bodies, collation of bug reports and language standardisation.

Some of the messages are more properly addressed to INMOS than to the OUG committee and these will be passed on.

I should like to take this opportunity to thank the many members who entered unsolicited message of thanks or general approval of the OUG's activities. These were greatly appreciated. A few people have suggested that the group's name should be changed so as not to put off those who wish to attempt to program their transputers without using occam. The committee have decided not to change the name at present as this might well introduce a different group of confusions with other similarly named groups.

Question 9 asked what possible annual fee (principally for the newsletter and administration) members might be prepared to pay. The answers were: none(117) 5(225) 10(429) 20(217). This information may be of use to the committee some day, but I am happy to report that INMOS are still prepared to stand all these costs at present.

The final question asked for permission to use the information supplied and to distribute names and addresses of members for various purposes. The four questions asked were essentially these:

(a) May name and address be published in newsletters or directory? (b) May answers to questions 1-5 also be so published? (c) May name and address be passed to third parties offering relevant products or sevices? (d) May all information be made available to anyone who wants it?

Any mark in the box opposite a question was interpreted as a YES (Y) answer. Absence of a mark was initially taken as a NO (N) answer. These questions are not independent and so anyone answering Y to (b) was deemed to have answered Y to (a), and anyone answering Y to (d) was deemed to have answered Y to all the questions.

This process classifies the responses into 7 classes: YYYY(620) YYYN(147) YYNN(51) YNYN(93) YNNN(43) NNYN(11) and NNNN(23). The four letters correspond in order to the four answers given.

Members in classes YYYY, YYYN, YYNN, YNYN and YNNN may have their name and address published in newsletters or a directory of members. Their names may also be passed to other members requesting selected lists of members in particular countries or with particular interests.

Only members in the first three of these classes will have answers to any of the other questions published in a directory.

Only names and addresses of members who have explicitly or implicitly answered Y to question (c) will be passed to third parties for marketing and related purposes. Anyone wanting to obtain such a file on a DOS disk should be prepared to make a donation to the expenses of a future technical meeting of the group and should approach me, preferably in writing.

If any possible new use of the names and addresses should emerge then only members who have answered Y to question (d) will have their names included.

Of course all members on the computer file held at INMOS will receive all Newsletters and other OUG mailings. Such mailings may include material supplied by third parties, who do not thereby get access to the complete name list. Inclusion of such material is currently charged to the supplier at a price which should cover the incremental cost to our mailing agents.

We trust that all members will agree that these policies do not contravene the spirit of the Data Protection Act. Thank you again to everyone who returned a completed questionnaire.

The OCCAM User Group

The User Group is an informal organisation run by its own members. Although its primary concern is the occam programming language the group is also concerned with INMOS transputers and all ways of programming these devices.

The main aim of the User Group is to act as a forum for the interchange of information among existing and potential users of these products and as a channel for communication with INMOS. These aims will be met by organising meetings, issuing a newsletter, and supporting the exchange of programs between members.

Membership is free upon submission of an enrolment form. The User Group is mainly dependent upon its own members to contribute to meetings, to provide material for the newsletter and to make their occam programs available to other members.

Occam User Group Newsletter

This is the main vehicle for communication between members and is sent out free of charge. It is issued approximately twice yearly in June and December. It includes supplements to the list of members and a bibliography of published work on occam and related subjects. It also includes names, addresses and telephone numbers of the members of the committee. Members are encouraged to submit short descriptions of their interest in and intended uses of occam. Please submit articles, letters, comments, enquiries on any occam or transputer-related subjects to the Editor: (address on the back cover)

Technical Meetings

These are held twice yearly, usually in September and March. Apart from any necessary business they include papers, presentations and demonstrations by members and by INMOS. The earlier meetings were informal and had no published proceedings. Recent meetings have included formal papers which it is expected will be published. If you are prepared to give a presentation or act as host to a future meeting, please inform the User Group Secretary or the meeting organiser (if known).

Special Interest Groups

There are special interest groups with the following areas of interest:

- Artificial intelligence,
- Formal aspects,
- Graphics,
- Hardware,
- Learning,
- Networks,
- Numerical methods,
- Operating systems and
- Unix

These groups hold meetings at the OUG technical meetings, and are also free to organise other activities amongst their members. Anyone wanting further information about any of these groups, or wanting to start a new one should communicate with the group chairman or the OUG secretary.

Program Exchange

The User Group does not provide a library but maintains a catalogue and, via the newsletter, allows members to publicise programs that they are willing to make available.

Contributors:- Please send a one page description to the coordinator of what your program does, its form (source/compiled etc), its hardware/operating system dependence, the exchange medium (type, format, etc.) and the name and address of the provider. It is advised that appropriate disclaimers be included.

Requestors:- Please make your request to the provider and not to the User Group. The User Group can itself provide no support for such programs nor can it accept any responsibility for problems that might arise due to their use.

The program exchange coordinator (to whom enquiries should be addressed) is identified on the back cover.

User Group Committee

The informal committee consists of a chairman, a secretary provided by INMOS, and members from a variety of user organisations. The full list of members is shown on the back cover.

Future meetings

The 10th Technical meeting of the Occam User Group will be held at Enschede, Netherlands, 3rd-5th April 1989. A call for papers for this meeting is enclosed with this newsletter. All enquiries should be addressed to Andy Bakkers at Twente University (+31-53 892790).

LETTER TO THE EDITOR

The Editor,

Occam User Group Newsletter,

Yesterday we were given a presentation and demonstration of the 'Stand Alone Toolkit' and 'Alien Compilers' for transputer application development, by Stephen Brain from Inmos. This came about because, although we have been developing new work in occam, we are likely to need to port existing processes written in other languages onto the transputer to incorporate as components of integrated systems.

There is a body of opinion here (composed of those who are not familiar with TDS), as elsewhere, that the Toolkit provides the best way forward. Personally, I disagree with this view, but accept the need to provide the development route required by the customer. TDS is clearly the best environment for developing occam applications, but where large amounts of existing code are to be ported onto the transputer, or programmers cannot be retrained to occam, it makes sense for the programmers to work in a familiar environment.

I have been disappointed that the folding editor was not to be part of the toolkit, and that Inmos have no plans to make it available independently. However, I was absolutely horrified to learn that there are no plans to provide any form of integration between the Toolkit and TDS. Surely, it would not be too difficult to provide the means to import units compiled using the Toolkit as SCs into TDS - or even make the 'alien' compilers available within TDS.

This policy on the part of Inmos appears to leave no reasonable development route to those of us who will need to produce most of out applications in occam and who wish to use TDS, but who also need to import some existing functions written in 'alien' languages. We will, of course, be able to use TDS to develop our occam code for perhaps 30 transputers in the usual way. But if we wish to include, say, FORTRAN processes for just two or three transputers, we will be forced to export our occam code to an ASCII file and then compile and build using the Toolkit. This does not seem a reasonable level of support for those of

us who have been using and promoting TDS, but is rather, in our opinion, a significantly retrograde step.

Dr S J Oldham.

Ferranti Computer Systems, Bird Hall Lane, Cheadle Heath, Stockport, SK3 0XQ.

June 24, 1988.

MEETING REPORTS

Report on the 8th Occam Users Group Meeting

Oliver J. Miles, University of Bristol

The meeting was held at Sheffield City Polytechnic on Monday 28 March and Tuesday 29 March, organised by Jon Kerridge. The Special Interest Groups met from 7.15pm to 10.00pm (!) on the Tuesday in 1-hour sessions. The Formal Dinner was help on the Monday evening. For a change, there was no no after-dinner speaker. This perhaps was not a bad thing.

250 delegates attended, 165 arriving Sunday night. The numbers attending the SIGS are:

A.I.	44
Operating Systems	53
Numerical Methods	12
Networking	41
Formal Techniques	27
Unix	32
Learning	23
Graphics & Images	65
Hardware	63

The Meeting was unusual in that copies of the Proceedings were supplied to all delegates. Further copies can be obtained from the publishers 'in due course'. Because of this, this report will concentrate on the panel sessions and SIGS.

The papers presented were:

- A Comparison of Two Notations for Programming Image Processing Applications on Transputers- P J Morrow et al
- Dynamic Processes in Occam- I A Horton and S J Turner
- Parallel Programming Toolkit for 3L - C, Fortan and Pascal- C P Winder
- PIX : NeWS for Parallel Computers- P Goward and W Leler

- Occam and Transputers for Industrial Applications- H A M Hendrikx and R J Hacking
- Transputer Instrumentation Applied to Electrostatic Powder Flow Measurement- E Mills and B C O'Neill
- A Talking Bee on the Transputer- D Ellison and L Natanson
- Surface Tracking within Three Dimensional Datasets using a Generalised Message - Passing System- M G Norman and R B Fisher
- 3D Medical Graphics - Using the T800 Transputer- A C Tan, R Richards and A D Linney
- Transputer Implementation of a Graphics Pipeline for Octree Encoded Objects- B W Heal
- Multi-transputer based Parallel Implementation of Feature Extraction for Object Recognition- D W Downing and I B Bennet
- A Medium Grained Parallel Computer for Image Processing- R Cok
- Real-time Processing of Large Volume Data from Photographic Plate Measurments- W A Cormak et al
- Adaptive Routing Techniques in Simulated Computer Networks- M C Bowler, M J Morse and N Frydas
- Switching Networks for Transputer Links – see note below- D A Nicole, E K Lloyd and J S Ward
- Using Transputers in an Ethernet Environment- R M A Peel
- Implementation of Back-propagation on a Transputer Array- G Richards
- Concurrency in Database Management System Design and Implementation- M E C Hull and F J Bell
- Cellular Automaton Lattice Gas Hydrodynamics on a Concurrent Supercomputer- B Wylie

NB Errata - Switching Networks for Transputer Links - Nicole et al p 161 remove all down to and including ... the group containing A it has and insert this block on p162 between ... If we consider the outer and ... colour and which is unused at A

Panel Session - chairman Peter Welch

The panel consisted of:

Peter Welch	University of Kent
Bob Gustafson	Digital, Chicago
Robert Stallard	Racal-Milgo
Duncan Roweth	Meiko
David May	(didn't say where he was from!!!!!)
Denis Nicole	University of Southampton

Q1. Is Occam dead? What is the future of Occam vs C and Fortan? Should the OUG not face reality and become the TUG?

- DN - Occam is the best introduction for students studying concurrent programming eg an X-25 pad as a student final year project.
- DR - We provide all and suggest Occam as a communication Harness
- RS - Opportunity to use Occam came too late - they use extended Fortran
- BG - The U.S. perspective - Interest has waned - Floating Point Systems were doing OK until it was evident that Occam was being used. There is no editorial comment on Inmos from trade journals. On the other hand Motorola and Intel products are very heavily advertised.
- PW - Occam must be sold on the line of Program Security (Formal Methods)
- DM - Transputer was designed for reliable embedded systems - this was the largest market forcasted - dominated by the Z80 & 6502. There is growing interest - there are 300 Occam users in Japan. At present Transputers are being used in Laser printers and Video-phones. It is expected that Occam will be the first of hundreds of parallel programming languages. 'C' has been around for 20 years and the standard has still to be agreed.
- DN - Electrical Engineering students are being asked for CORAL and ADA for embedded systems.

Q2. What future developments are to take place with TDS?

- PW - TDS is a poor environment for large project teams. Inmos are now providing an 'unbundled' TDS
- DR - TDS was a step in the right direction but things happened in the wrong order. Full interfaces to the utilities etc. will be made available as a technical note to the July release of TDS.

The remainder of the session dealt with future Inmos software and hardware which is mentioned below.

Inmos Product Update - Chris Followell

Inmos was the fastest growing Semiconductor Company in 1987. Last month (Feb 88) it made a profit (applause!) and now has 250 sales outlets. Software: Symbolic debugger now available. 'runtime locate' will now access source lines even in a library. Values of variables can be accessed and which Transputer it is on. The states of the channels and processor can be examined and the debugger can generate memory maps and debug at Transputer

Instruction Set level The Occam Stand Alone Toolkit will be available providing mixed compilation from the command line.

TDS	Toolset
-	2000 pounds
integrated environment	disint. environment - uses command line
debugger	- not yet
folding editor	none
	VAX & SUN simulator available - this interprets the T-code generated by the Inmos' compilers.

A transputer card for the VME bus - the B011 - will be available. Coming soon will be a full size Sun motherboard for 32 TRAMS (TRAnsputer ModuleS).

	HOST	compiler:	C	Fortran	Pascal
	SUN	D511	D512	D513	
New compilers :	VAX		D611	D612	D613
	PC		D711	D712	D713
	NEC PC		D811	D812	D813

All compilers support ANSI standard (where applicable) Inmos is currently trying to automate the notification of new software releases to customers - registration cards will be sent out with future releases.

	T800C	(current)	17-20MHz
New Transputers :	T800D	(end of 1988)	25MHz
	T800E	(early 1989)	30MHz

The T801 will replace the multiplexed data and address busses with separate busses in a new 100 pin package with 2 cycle memory access (4Mbytes/sec).

The T222 will be a T212 (16 bit) with 4K on chip.

The T425 will be a T800 without the floating point unit.

It was pointed out that a T800-17 with 160nS memory will be faster in memory acces than a T800-20, as the 20MHz version will be 'too fast' and have to wait for 4 (20 MHz) cycles for an access instead of 3 (17MHz) cycles. Faster can mean slower !

The technical notes are now up to 37, the latest being 'High Performance Graphics'. Prentice-Hall now publish all technical notes in bound volumes.

The latest transputer module systems for the IBM PC range are TRAMS, consisting of a B012 motherboard with a C004 link configurer to hold up to 10 transputer modules.

Special Interest Groups:

Hardware SIG - Chairman Tony Gore

(I attended the hardware SIG, a brief summary follows, O.J.M)

A hardware SIG newsletter is available as a separate item - contact Tony Gore of Inmos.

The meeting started with a presentation of NETBUS by Adrian Lawrence of the Microprocessor Unit, Oxford University. Netbus is a 'set of power lines, 63 transputer links and system services, its purpose being to link together circuit boards via 2 stackable 96 pin DIN connectors arranged in a 'Tee' on each board in a simple, cheap and standardised fashion. Copies of a draft description were handed out which gave details of the system services implemented, message passing, command set, pin allocation and geometry. A discussion followed. It was pointed out that the power supply pins may well be insufficient to provide a clean supply to boards not directly connected to the power supply. A better arrangement would be to use separate high current connectors as well. My own thoughts on this are that even 192 pins can take an awful lot of separating, there being no facility for extraction levers.

The next presentation was by Tim Normanton, of Smith Industries, of a graphics board which interfaces a 34010 graphics chip to a T212-20 transputer. The frame store is 1M of 4 or 8 bits, software configurable, and gives a resolution of 768 x 576. The frame stores can be chained to increase the image area.

Tony Gore mentioned some points about the hardware SIG. On CIX there is topic 'Occam Hardware' which is the new bulletin board for this SIG. The new number is 01-399-5252. There is also a Transputer Users Group (not connected with Inmos or the OUG - subscription is $5 per month and is currently being used by Atari and VAX developers. He also mentioned that Inmos were enthusiastic about a simple subsystem bus for connecting up transputers to other (non-transputer) systems. He congratulated Adrian Lawrence on coming up with a reasonable proposal.

Operating Systems - chairman Gordon Manson

Current operating systems in use are:

TDS	
Helios	Trent Polytechnic
Hobbes	Transoft
Trillium	Cornell University
ERIX	Meiko / Edinburgh University (UNIX)
Mercury	Howard Oakley

Report on Formal Techniques SIG

Bob Stallard

Racal Milgo Ltd., Bartley House, Station Road, Hook, Hampshire, RG27 9PE.

At the Sheffield OUG meeting a select few attended the Formal Techniques SIG. There was some good news, Michael Goldsmith of Oxford University, P.R.G. has circulated a draft description of his occam transformation system. This system runs on a SUN workstation and allow users to interactively transform their source occam programs according to the rich set of transformation laws of the language. Correct semantics are always maintained by the system. The system makes use of the 'ML' notation to perform the specify the rules. The group is currently working on an occam 2 version, which should be ready in the summer. Jon Kerridge, our host at Sheffield, reported that a version of ML has now been ported onto a Transputer, and that it runs impressively fast.

I did my best to stimulate new areas of potential FT effort for occam by running through a 'Wish List'. This included the design of a mechanism to translate other source languages into (sequential) occam. This was so that sceptical software managers who complain about the 'software rewrite' costs could be convinced of the wisdom of the change. Everyone seemed to think this was a long way off, and that even the 'simple' step of translating occam 1 to occam 2 is not that easy.

What would help is a specification language that maps nicely onto occam. It was suggested that dataflow approaches, such as SSADM and Petri nets are good candidates. There is of course C.C.S. and C.S.P. as well, but there is a dearth of tools in this area. Perhaps a 'higher' level language such as a process oriented language (I.B.M.'s NIL) or an object oriented language (Smalltalk) could act as a bridge between levels.

As always deadlock analysis was mentioned as a part of every new user's 'occam culture shock'. The experts suggested that a form of templating or algorithm 'idioms' can be successfully applied to guarantee absence of deadlock, but with commensurate loss of efficiency.

Discussion then strayed into the provision of tools to embark on impossible errands. For example, it is not possible in general to test an arbitrary program for deadlock. Many of the algorithms in the area of formal methods have exponential complexity measures (they take forever) and cannot solve arbitrary input problems. I feel strongly that, just because a method can not be applied in all cases, the method is not altogether useless. Most tools would be able to reach a definite yes/no answer for straightforward (well structured) programs, in other cases a 'maybe' or 'don't know' answer will have to do, but this may be better than nothing.

There was a general high regard of the TDS from the formal technique point of view, making good use of some of occam's neat semantics. It was hoped that the general unbundling of the TDS will enable software houses to integrate some useful tools to manipulate occam programs. Let me know if you know of any such plans.

Finally, the meeting, by way of a theatrical interpretation of occam program execution demonstrated a reported problem with PRI ALT on a Transputer. This concerns the case of more than two input guards on a PRI ALT construct, at least one of which represents an external channel. If timings conspire against it, it is possible for a later, higher priority (external) input event to overtake an earlier, lower priority input event. From personal chagrin, the implementation of ALT is an extremely tricky affair, quite apart from the study of the tricky formal semantics of nondeterministic choice. At that stage the meeting reached its end.

There is hope that there will be another session at the Southampton meeting, let me know if there is any news to be circulated there.

26th April 1988

ARTICLE

Useful Titbits

Alan Chalmers, Dept. of Computer Science, University of Natal, Pietermaritzburg, South Africa

Solving Subtle Deadlock

Termination of occam processes typically consists of the "passing on" of a close down message. On receipt of the message, the process first passes it on before finishing.

A process of this form would look like:

```
SEQ
  busy := TRUE
  WHILE busy
    PRI ALT
      interupt.in ? busy  -busy is set to FALSE
        interupt.out ! FALSE
      ... other alternatives
```

This is not sufficient if the communication is bi-directional. Any attempt by process A to notify the next process, process B, of the shut down will result in Deadlock if that process is currently waiting to communicate with process A.

Process A therefore has to "clear" any outstanding communication with B prior to passing on the interupt.

```
SEQ
```

```
busy := TRUE
WHILE busy
  PRI ALT
    interupt.in ? busy
      SEQ
        from.B ? x          -clear the channel
          interupt.out ! FALSE  -tell B to terminate
    ... other alternatives
```

Despite this added precaution, the above code is still not sufficient to avoid deadlock. The cause of the deadlock is the very nature of the parallel execution of occam processes. The moment process A executes the input process "from.B ? x", process B is once again free to continue its parallel progress. Thus before process A can output the close down message to process B on the interupt.out channel, process B may have: checked its interupt.in channel; assured itself that there is none; and proceeded to output to process A. When process A finally performs "interupt.out ! FALSE", it will be too late. Exactly the situation process A had tried to avoid by clearing the channel will still exist.

To avoid this subtle deadlock it is necessary to introduce a "third party" running at the highest priority within process A to perform the communication.

```
SEQ
  busy := TRUE
  WHILE busy
    PRI ALT
      interupt.in ? busy
        SEQ
          special code
          CHAN OF ANY comm :
          PRI PAR
            BOOL going :
            SEQ
              comm ? going
              interupt.out ! going  -close down process B
            SEQ
              comm ! FALSE
              from.B ? x          -clear the channel
      ... other alternatives
```

The use of the PRI PAR construct ensures that process B, even if it is running on a separate transputer, will not have checked its interupt.in channel before process A has output the "close down" message on this channel.

Round-robin selection of alternatives

Should more than one channel be in a ready state within an ALT or replicated ALT construct, the selection is made: "in an arbitrary and implementation dependant fashion"

[Pountain 86]. In the version of the software I have been working on, IMS D700C of April 1987, this means the following:

(1) Selection in the ALT construct is "from the bottom up"

ie. in the following construct:

```
ALT
  chan1 ? x
    ... action 1
  chan2 ? y
    ... action 2
  chan3 ? z
    ... action 3
```

if all the channels: chan1, chan2 and chan3, are always in the ready state then only action 3 will ever be selected.

(2) Selection in the replicated ALT construct is "from the top down"

ie. in the following construct:

```
ALT i = 0 FOR 3
  chan[i] ? x[i]
    ... action[i]
```

if all the channels: chan[0], chan[1] and chan[2], are always in the ready state then only the action corresponding to chan[0] will ever be executed.

This is unsatisfactory as it results in the "starvation" of the processes attached to the other channels.

By limited use of inline code via the GUY construct in conjunction with guards on the alternatives, round-robin, random and several other methods of selection are possible.

The code for the round-robin method of selection is given below:

```
VAL choices IS 3 :  -no of incoming channels
[choices] BOOL selected :  -used as the guards
INT round.robin
SEQ
  round.robin := 0  -this could be a random starting point
  busy := TRUE
  WHILE busy
    SEQ
```

```
- select an available channel
[choices] INT available :
INT how.many :
SEQ
  -- initialise variables
  SEQ lc = 0 FOR choices
    PAR
      available[lc] := (-1)
      selected[lc]  := FALSE
  - see what channels are available
  PROC chan.available(CHAN OF ANY chan, INT a, VAL INT no)
    SEQ
      GUY
        MINT
        LDL chan
        XOR
        CJ .end   -channel not ready
        LDL no    -channel ready
        STL a
        :end
  :
  PAR i = 0 FOR choices
    chan.available(input[i], available[i], i)
  - choose one of these via round-robin
  how.many := 0
  SEQ lc = 0 FOR choices   -compact those available
    IF
      available[lc] < > (-1)
        SEQ
          available[how.many] := available[lc]
          how.many := how.many + 1
      TRUE
        SKIP
  IF
    how.many = 0  -no channel yet available
      SEQ i = 0 FOR choices
        selected[i] := TRUE  -all possible
    TRUE
      sample IS round.robin :
      SEQ
        sample := sample + 1
        IF
          sample  >  (how.many-1)
            sample := 0
          TRUE
            SKIP
        selected[available[sample]] := TRUE
- now select the appropriate channel
ALT i = 0 FOR choices
```

```
    selected[i] & input[i] ? x[i]
      ... action[i]
```

The random or other methods of selection can be achieved in a similar manner.

These methods of selection may also be used in conjunction with a PRI ALT construct where one channel, say the interupt.in channel, must have the highest priority, while the other channels can be dealt with in some fair manner.

```
- select the interupt or the appropriate channel
PRI ALT
  interupt.in ? busy
    ... close down
  ALT i = 0 FOR choices
    selected[i] & input[i] ? x[i]
      ... action[i]
```

or

```
- select the interupt or the appropriate channel
PRI ALT
  interupt.in ? busy
    ... close down
  ALT
    selected[0] & chan1 ? x
      ... action 1
    selected[1] & chan2 ? y
      ... action 2
    selected[2] & chan3 ? z
      ... action 3
```

Reference

[Pountain 86] 1986 D Pountain and D May, "A tutorial introduction to occam programming", documentation supplied with the D700c compiler, August 1986.

Comments to Alan Chalmers or to the editor of the newsletter please.

BOOK AND ARTICLE REVIEWS

The Editor welcome the contribution of books and articles for consideration in this section.

An introduction of OCCAM 2 Programming

by: K.C. Bowler, R.D. Kenway, G.S. Pawley, D. Roweth. Published by Chartwell-Bratt, 1987, at £6.95

This inexpensive book was recommended by myself to undergraduates during the last academic session. OCCAM 2 is quite well described, together with some implementation, in about 40 pages of text. My students found this section of the book easy to follow and very helpful during the first two or three weeks of their course. Unfortunately, the remainder of the book is a little disappointing. It starts with a chapter on Cellular Automata followed by a chapter on simple Parallel Algorithms and a very simplistic chapter on Parallel Architectures. The topics in the three chapters were too briefly dealt with, to make them worthwhile.

The final sections on the OCCAM programming system and the TDS were again found to be very useful.

On the whole, this book is a good buy, but it is a pity that the authors did not stick to programming with perhaps some more detailed examples.

(Derek Paddon)

Parallel Processing, The Transputer and OCCAM

by: Alison Carling. Published by Sigma Press, 1988, at £12.95

Only the last third of the book deals with the Transputer and OCCAM, whilst the first two thirds gives a simple overview of parallelism in its broadest sense.

Most of the major computer architectures are described: Systolic architectures, array processors, data flow computers, multiple processor systems, vector processors, etc. The languages for many of these systems are also briefly described. Is this a useful introductory text book on Parallel Processing? I do not think so. A book published in 1988 should mention some of the latest systems. The Illiac IV is briefly described and so is the MPP, but why not the Mini DAP or the connection machine in detail. The powerful and recent Japanese supercomputers are not mentioned.

There is nothing in the two chapters on Transputer and OCCAM to excite us, in fact, the description of the language is as short and as simple as we have often seen in early Inmos product literature.

I find it difficult to judge the readership for which this book is intended. It is too simple for a college text and too out of date even for a general readership; OCCAM 2 not being mentioned attests to this assertion.

(Paul Chapman)

Parallel Programming

by: R.H. Perrott. Published by Addison-Wesley, 1986, at £14.95

Ron Perrott's work is well known to OUG members. Parallel Programming is a well-polished exposition which considers languages that are semantically as far apart as Modula-2 and CRAY FORTRAN.

The book is divided into four parts - 1. History and development. 2. Asynchronous parallel programming. 3. Synchronous parallel programming. 4. Data flow programming. OUG members will, of course, find part two the most interesting section. Here, the author deals with Process Synchronisation, Message Passing Primitives, Modula-2, Pascal Plus, Ada and finally OCCAM.

Although, little theoretical basis is given for any of the languages, each is adequately motivated and described with examples derived from a variety of problems. Parallel programming can be recommended, particularly, if the reader wishes to understand the relationships between languages and styles of parallel programming. Do not expect the text to show you how to solve your problems in parallel programming, but it will aid the reader to develop a better understanding of programming languages and parallelism.

(Derek Paddon)

Book Received - Neural and Massively Parallel Computers - The Sixth Generation

by: Branko Soucek and Marina Soucek. Published by Wiley, 1988, at £45.

This book was received in August and will be reviewed in the next newsletter. At first appraisal it appears to be an excellent book.

PRODUCTS AND SERVICES

The National Transputer Support Centre

The National Transputer Support Centre opened officially on March 7th. The Centre is based in the Science Park, Sheffield. Besides holding a range of equipment and application examples the Centre will act as the UK library for public domain transputer software. The Centre is currently arranging a series of courses and some demonstration projects. Full details of these can be obtained from any of the centre staff, temporarily at:

196-198 West Steet, Sheffield, S1 4ET, tel (0742) 768740.

The centre will also act as the North-East UK Regional Support Centre.

Roger England, Centre Manager.

BIRA (The Belgian Institute of Automatic Control)

Seminar

Transputers for Industrial Applications, October 18, 1988, Switel Hotel, Antwerp, Belgium

Objectives:

This seminar shows some of the industrial applications of transputer systems, both in the presentations and in the accompanying exhibition.

Who should attend? This seminar is invaluable for developers of high-speed or fault-tolerant systems, programmers who want to exploit parallel processing techniques and people who have applications that demand a very high performance, such as image and signal processing, computer graphics, real-time simulation and animation, number crunching, embedded controllers, adaptive filtering, pattern recognition, robotics, telecommunications, databases, molecular modelling, artificial intelligence and expert systems.

This seminar will benefit both project managers, developers and technically aware management, as the presentations will be of a high-level and are given by experts in their field.

Why should you attend? This seminar is almost unique of its sort, because of the emphasis on the industrial applications of the transputer.

Together with this seminar, we organize a specialized exhibition in which several manufacturers of hardware and software for the transputer demonstrate their products and applications. With more than 15 companies represented, it is one of the largest exhibitions of transputer technology there has ever been.

Prof. dr. ir. L. Boullart, Chairman BIRA-DTCS.

ir, P. van Renterghem, Seminar coordinator.

Programme:

- Transputer and Occam Tutorial, - Dr David May, Inmos Ltd., U.K.
- Transputers for Industrial Applications, - ir. Patrick Van Renterghem, Automatic Control Lab/The Transputer Lab, State University of Ghent, Belgium
- A Transputer Sonogram Display System - Mr. Andrew Holman, Topexpress Ltd., U.K.
- The Helios Operating System, - Dr Tim King, Perihelion Software Ltd., U.K.

- Fault-tolerant, Self-repairing Transputer Arrays, - dr. Richard Armstrong, Smith Associates Ltd., U.K.
- Neural Controllers and Transputers, - Prof. Andre Bakkers, University of Twente, Enschede, The Netherlands

Contributors to the exhibition:

- Apollo,
- Arcobel (Parsytec),
- Caplin Cybernetics Corporation (C3),
- Inmos,
- Intelligent Systems International (CSA),
- Inducom Systems (Definicon and Protheus),
- Lemni (Microway),
- Meiko,
- Niche Technology Ltd, (Niche Technology, 3L)
- Parsec Developments,
- Prentice-Hall books,
- Quintek Ltd,
- Sension,
- Sheldonberry Electronics.

North American Transputer User Group

What is NATUG?

NATUG is currently an INMOS-sponsored association of Transputer users that is moving towards becoming an independent organisation. The group periodically holds national meetings. In the near future the group intends to publish a newsletter.

Membership of the group is free (at the moment), details can be obtained from Tom Rethard, Storage Tek, MS 9174, 2270 S 88th Street Louisville, CO 80028-9174.

INMOS Product Update

The full OCCAM 2 product compiler is here!

The long awaited IMS D700D Transputer Development System (TDS) due to be shipped to distributors in July 1988. This product contains:

- The full product occam 2 compiler
- The *NEW* symbolic debugger
- Extensive library routines

as well as a linker, network configurer, memory configuration program, file conversion utilities, and a comprehensive set of example programs and tutorial files. The arrival of the new compiler is significant in many respects, especially in that it produces code that utilises the transputer's on chip RAM more effectively, allowing many applications to run as much as twice as fast as was previously possible.

Current INMOS TDS customers may purchase an update to their version of the TDS from their INMOS distributor for a nominal media charge. Only one update may be purchased per copy of the TDS owned, and proof of origonal purchase may be required. All updates must be purchased via an official INMOS franchised distributor. There is already considerable interest being shown in this product, and you would be well advised to place an order with your distributor as soon as possible. It is first come first served, and low cost updates will be available for a limited period only.

The IMS D700D will also be available as part of a bundled hardware and software package, the IMS D701-5 and IMS D701-6, which contains the TDS software and a TRAM module and motherboard hardware solution (inc. IMS B008, IMS B404-3, IMS B401-3). More information on this and other H/W & S/W packages can be obtained from INMOS and its franchised distributors.

The INMOS IBM PC Toolset - IMS D705A

The INMOS Toolset for the IBM PC is currently available from all INMOS distribution outlets (POA). The Toolset is designed as an alternative development system for

1 Users who wish to compile code using any of the INMOS transputer compilers (ie. FORTRAN, Pascal, or C), and/or

2 Those users who prefer to develop their software within a conventional or existing development framework.

A promotional pamphlet which explains the differences between the Toolset and the TDS is available from all distribution outlets.

New products on the horizon....

A new range of software products is currently under development, and is likely to be available nearer the end of this year. These products are based on the highly successful PC Toolset (see above), and support software development on the VAX (running under VMS) and the SUN (running under VMS). Both the VAX Toolset (IMS D605) and the SUN Toolset (IMS D505) will allow users to compile full occam 2 for the transputer either on the host, or using a faster transputer based compiler which will run on an attached transputer board. Both toolsets will have multiuser facilities and will interface to other language compilers (eg C) which should be available from INMOS at about the same time. Please watch this space for further information on these and other new products.

PROMOTIONS AND DISCOUNTS!

The *NEW* Parallel Processing Starter Kit - IMS D101-1

This limited period promotion offers a D700C (or D700D when available) plus a B004-4 PC add-in card plus a B003-2 four-transputer board, all at a considerable discount. The package allows users to build and test parallel systems running on transputers, and contains example programs and teaching material (eg. the books 'OCCAM 2 Reference Manual' and 'A Tutorial Introduction To OCCAM' are included). Please ask your local distributor for information and pricing. Available only while stocks last.

ITEM Promotion

The current range of INMOS ITEMs (ie ITEM 300, 400 and 4000) are all being offered at a **discount of 20%** to all educational establishments. Available for a limited period only!

For further information on any of the above, please contact your local INMOS franchised distributor.

QT0 is a high performance MicroVAX/transputer interface on a dual-height Q-bus board. It provides four independent transputer links each with full subsystem control, and is supplied with device-driver software which makes each link available to the system as a standard VMS device. High-speed DMA is achieved via dual-ported buffers supervised by an on-board T212 transputer. QT0 is designed to control up to four separate multi-transputer systems, and is ideal for use with other products and software in the QT series.

Processor	IMST212 transputer (dedicated to system management)
Memory	2kbytes dual-ported SRAM 2kbytes SRAM on T212 4kbytes EPROM
Parity Error	Q-bus parity checked
MicroVAX Interface	Q-bus loading: 2.9 ac loads, 1.0 dc loads Power: 5V dc @ 1.6A max, from MicroVAX
Transputer Interface	External Links: 4 Subsystem Ctrl: Fully independent on each link Connections: Via standard Link and Reset cables Link speeds: 5, 10 or 20 Mb/s, user-configurable
Throughput	Block data rate: 1 Mbyte/s to or from the Q-bus
Expansion	Multiple QT0s supported Direct connection to QT4 MicroVAX transputer boards Link access to any other transputer-based system
Size	Standard dual-height Q-bus module: 226 x 132 x 12.7 mm (8.9 x 5.2 x 0.5 in)
Environment	Temperature: 0 - 66°C storage, 5 - 60°C operating Humidity: 10% – 95% noncondensing

QTdriver Device Driver Software supplied with unit:

SQI O Functions	IO$_READxBLK	IO$_WRITExBLK
	IO$_SENSEMODE	IO$_SETMODE
Modifiers	IO$M_TIMED	IO$M_WORD

QT4 is a MicroVAX-resident transputer board designed for use with the QT0 interface. It is a dual-height Q-bus module containing an array of up to four IMST414 or IMST800 32-bit transputers, with 1Mbyte of DRAM per transputer. QT4 uses the Q-bus for power only, and provides edge-connector access to transputer links and subsystem control lines so that transputer arrays of unlimited size can be constructed. QT4 may be linked to any other transputer system, and uses the same topology as the Inmos B003 board.

Processors	Type:	IMST414 @ 15 or 20 MHz IMST800 @ 17.5 or 20 MHz
	Number:	Up to 4
Memory	Type:	DRAM
	Size:	1 MB per transputer
	Cycle Time:	Selectable down to 200nS
	Type:	SRAM (zero wait state)
	Size:	2 kB per T414 or 4 kB per T800
MicroVAX Interface	Q-bus:	via QT0 interface board
	Power:	5V dc @ 2A max, from MicroVAX
Transputer Interface	Links:	8 uncommitted, 4 hardwired
	Connections:	Via standard Link and Reset cables
	Link speeds:	5, 10 or 20 Mb/s, user-configurable
Expansion	Multiple QT4s supported Link access to any other transputer-based system Compatible with Inmos "B00X" evaluation cards	
Size	Standard dual-height Q-bus module: 226 x 132 x 12.7mm (8.9 x 5.2 x 0.5 in)	
Environment	Temperature:	0 - 66°C storage, 5 - 60°C operating
	Humidity:	10% – 95% noncondensing

Software

QTdriver VMS Device Driver supplied free with QT0.

MicroVAX Transputer Development Software and occam Toolset available separately.

Transputer-based compilers are available for Fortran, Pascal, C, and other popular languages.

Gemini
Computer Systems Limited

MORE POWER, MORE SPEED WITH GEMINI PLUG-IN TRANSPUTER BOARD

The GM8100 series of Inmos-based transputer boards from Gemini Computer Systems continues the commitment to British-developed 32-Bit parallel processors and follows the launch of the British designed and built Gemini AT.

As plug-in parallel co-processors for the Gemini AT, IBM PCs and compatibles, the GM8101 transputer board offers users the selection of 4Mb or 8Mb of memory and configurations for more powerful T800 processors and D-RAM speed options of 80nS, 100nS, 120nS or 150nS.

Total flexibility is achieved with simple link changes; a low-specification board can be upgraded to one of higher specification, giving the board longer life. This simple task can be carried out by users themselves, or the boards can be sent to Gemini for upgrading.

Having recently formed an alliance for the design and development of transputer systems with Glasgow University's Computational Chemistry Group, Gemini is keen to further the development of user applications. Software houses with portable software can apply to Gemini for joint participation in transputer development projects.

Prices:

From £2,200.00 for a minimum board up to £4,350.00 for a board with 8M byte of high speed D-RAM memory and a 20MHz T800 processor.

Springfield Road, Chesham, Bucks HP5 1PW.
Telephone: (0494) 791010. Telex: 837788

Perihelion Transputer FarmCards

Product description

Overview

- *Perihelion FarmCards contain up to four INMOS Transputers*
- *Each Transputer has its own dedicated RAM*
- *Any system that has a spare INMOS link interface can benefit from FarmCard expansion*
- *There is no theoretical limit to the number of FarmCards that can be interconnected*
- *Special cards are available with various processor and memory configurations*

Processors

- Perihelion FarmCards can be supplied with either T414 or T800 processors
- All processors run at 20 MHz
- Each card can host up to four processors
- Each processor can be accompanied by up to 16 Mb of memory

Links

- Each processor has four serial links for 20 Mbit/s communication between processors
- The link configuration is substantially user-selectable
- Uncommitted links may be switched electronically on a 42-way edge connector via C004 crossbar switches
- Alternatively, links may be patched manually via on-board five-pin connectors

Memory

- Each processor's RAM is organised as a linear memory map with the processor on-chip memory at the bottom of the address range
- Off-chip memory cycles at 200 nS, which is equivalent to 4 Transputer cycles

Diagnostics

- Processor status is indicated by LEDs for diagnostic and debugging purposes
- The built-in proprietary diagnostic bus permits users to reset one or all processors
- The diagnostic bus also facilitates remote processor analysis
- The bus feeds a pin-header and a 42-way link connector for daisy-chaining further FarmCards
- Each processor can be independently controlled regardless of the number of active FarmCards

Physical

- FarmCards are 125mm wide by 340mm long and fit the Atari Transputer Workstation (ATW) expansion plane
- FarmCards also fit the Perihelion expansion box with integral psu for stand-alone use
- Each fully-populated FarmCard typically consumes 12 W

About Perihelion Ltd

Perihelion was founded in 1987 in response to growing demand for fast and powerful graphics workstations. Directed by Jack Lang and Richard Miller, Perihelion specialises in the rapid design and development of innovative computer systems; it has successfully completed contracts for several major microcomputer manufacturers.

Cambridge CB2 1UW

Product		Price in £ sterling excluding V.A.T.
	Transputer Farm Card	
F101	1 x T800 + 1 Mbyte DRAM	995
F102	2 x T800 + 1 Mbyte DRAM each	1795
F103	3 x T800 + 1 Mbyte DRAM each	2250
F104	4 x T800 + 1 Mbyte DRAM each	2995

PERIHELION LIMITED · 33 BRIDGE STREET · CAMBRIDGE CB2 1UW · TELEPHONE (0223) 356555 · FAX 311475

The NT1000 provides the professional software developer and end user with modular extendable computing power. In combination with the Sun Microsystems hosts, the system offers both flexibility and outstanding performance which can be adapted to the evolving needs of the user.

Plugs directly into a standard Sun/3 or Sun/4 chassis.

Provides both a multiprocessing and parallel processing capability utilising a number of user upgradable computing modules.

The functionality and performance of the platform may be increased incrementally by plugging in more compute modules. The user can choose from a comprehensive range of autonomous compute and application-specific modules.

A single platform offers a modular computing performance of up to 320MIPS or 48MFLOPS. A single Sun 12-slot chassis can accommodate up to 8 platforms thereby providing a massive 2.5GIPS or 384MFLOPS of computing power.

Operates under the Sun's standard UNIX operating system, with interfaces to the graphics, windowing, and I/O capabilities of the host.

Each platform is supplied with a full set of device drivers and system management utilities.

A full range of scientific language compilers are available combined with a comprehensive development system for concurrent processing.

The platform can be utilised as a high performance multiple gateway to other microprocessor based systems.

The NT1000 Advanced Computing Platform offers the unrivalled price/performance capabilities of a modular parallel processor operating within the Sun environment.

A comprehensive library of system calls, analysis and configuration tools, and a powerful software development environment combine to produce a total solution for users wishing to develop and/or execute end-user applications requiring hundreds of MIPs while maintaining the user-friendly environment provided by the SunOS[1] UNIX[2] operating system.

By making the full capabilities of the Sun environment accessible to NT1000 users, including NFS,[3] NeWS[4]/X.11, and SunView,[5] as well as the main UNIX System V/BSD 4.2 services, Niche provides a professional multi-user parallel processing platform.

A comprehensive suite of both industry-standard and user-defined interfaces may be accessed via standard Niche "servers", enabling users to exploit applications which either reside entirely on the NT1000 processor array, or use the parallel processing power purely for accelerating compute - intensive portions of large software suites resident on the Sun. Existing applications can be quickly modified using Niche's software tools to exploit the orders of magnitude increase in speed offered by the ACP.

[1]SunOS, [3]NFS, [4]SunView and [5]NeWS are trademarks of Sun Microsystems Inc.
[2]UNIX is a trademark of Bell Laboratories.

The NT1000 is a systems motherboard which plugs directly into the Sun/3 VME bus, offering a range of I/O interfaces, plus sites for up to 32 computing modules.

One intelligent high-speed multiport controller, and five low-cost medium-speed ports are made available and together exploit the high performance of the 32-bit VME backplane, and the 20 Mbit/sec serial links offered by the transputer architecture.

An extensive range of plug-in compute modules is available. Each module consists of a high performance 32-bit microprocessor (10MIPS/1.5MFLOPS transputer) combined with up to 16Mbytes of fast local memory.

The transputer networks are software-configurable, enabling the computing resource to function either as a single large multi-processor array, or a multi-tasking array of single processors, or any mix of the two.

Also, the finely-tuned device drivers integrated into the host operating system enable transparent multi-board capability, while edge connectors provide interfaces to a wide range of external equipment, if required.

TRANSTECH DEVICES LTD

NEW TRANSPUTER TRAM MODULES AND MOTHERBOARDS

A new complete range of Transputer Modules and Motherboards has been announced by Transtech Devices. The whole range is compatible with the published "TRAM" standard and includes the following module options.

TRAM Modules	Processor	Memory Upgrade	Memory Bytes	SRAM/ DRAM	Module Size No of slots	Equivalent Inmos Part	Price 1 Off
TTM1-4	T4		32k	S	1	B401-2	505
TTM1-8	T8		32k	S	1	B401-3	705
TTM2-4	T4		128k	S	1		675
TTM2-8	T8		128k	S	1		875
TTM4-4	T4		1M	D	4	B403-2	950
TTM4-8	T8		1M	D	4	B403-3	1150
TTM5-4	T4	4M	1M	D	2		1095
TTM5-8	T8	4M	1M	D	2		1295
TTM6-4	T4		2M	D	2		1375
TTM6-8	T8		2M	D	2	B404-3	1595
TTM8-4	T4		4M	D	2		2250
TTM8-8	T8		4M	D	2		2450
TTM9-4	T4	8M	4M	D	4		2550
TTM9-8	T8	8M	4M	D	4		2750
TTM10-4	T4		8M	D	4		4050
TTM10-8	T8		8M	D	4	B405-3	4250

Prices shown include 1 year's on-site maintenance costs.

All the processors run at 20 MHz, and all T4 modules are upgradable to T800's. Where indicated the modules are upgradable to a larger memory capacity.

There are also 4 motherboard options.

Part No.	Format	No. of Module Slots	Price 1 Off
TMB08	IBM PC	10	750
TMB12	Double Extended Eurocard	16	1050
TMB08D	Double Height IBM PC	20	1250
TSB05-1	IBM PC 20MB Winchester Board	4	995

TRAM MODULE SYSTEMS

Part No.	Description	Price
TDS701-5	Occam TDS + TMB08 + TMM6-8 + TMM1-8	3495
TDS725-1	Occam Toolset + TMB08 + TMM6-8 + TMM1-8	3495
TDS735-1	3L Parallel Fortran + TMB08 + TMM4-8	2495
TDS 745-1	3L Parallel C + TMB08 + TMM4-8	2495

The TMB08 can be functionally equivalent to the Inmos IMSB008 TRAM module motherboard and fits into a standard PC AT/XT slot. However, Transtech have added some extra enhancements which make the board more flexible. The 10 TRAM module sites have their links 1 and 2 hardwired in a pipeline, with the remaining links taken to a C004 link crossbar switch giving the capability to electronically reconfigure the topology of the network. The C004 is normally controlled by a 16 bit T212 transputer resident on the motherboard, which also allows multiple boards to be cascaded and have their network reconfiguration controlled by a single program. An optional extra link adaptor on the board will allow the C004 to be programmed directly from a batch file run on the PC. Transtech have also added an optional EPROM mapped into the PC memory map, which can hold boot code to be run on power up.

The TMB12 is similar in principle to the TMB08 except it has 16 TRAM module sites on a double extended eurocard, with two C004 link crossbar switches controlled by the T212 transputer. The TMB12 is compatible with the Transtech TRANSRACK which provides a power supply and cooling.

The TMB08D is a double height version of the TMB08 with 20 TRAM module sites and two C004 link crossbar switches. The TMB08D is compatible with the Transtech PC TOWER which provides power supply and cooling.

TSB05-1 is a transputer hard disk card with M212 transputer disk processor, a winchester disk and 4 TRAM module sites. This board can be configured to be a host transputer development board, using Transtech's TRAM compatible modules. The board is also supplied with a software package to enable the fast access of the winchester to be used with the TDS and also to be incorporated into application programs.

PHONE NO:- 0494 464303

Inmos Toolset Courses

From September, Inmos are expanding their range of technical courses for users of non-occam languages and the toolset. The two existing courses - one on occam and one on the transputer - are both run in the TDS environment. The three new courses will use the latest release of the Inmos Toolset, allowing delegates to use their own editor and programming environment.

The "Transputer and Non-Occam Languages" course will cover the toolset and the minimum occam needed to allow C, Fortran and Pascal programmers to run their code on transputer networks. The "Occam and the Toolset"course will be an introduction to occam. The "Transputer and the Toolset" will present the system designers' Transputer Toolset and also cover the topics in the existing Transputer course.

The courses all have a high proportion of hands-on and use the latest Inmos software. Each course will take four days and will normally be run in Bristol, although on-site courses can be arranged.

Alan Pinder 15/6/88

SUPERCOMPUTING REVIEW

THE COMPLETE GUIDE TO HIGH PERFORMANCE COMPUTING

Supercomputing Review 2420 University Avenue San Diego California 92104. Tel: 619 293 3377. Fax: 619 296 3713
33/41 Dallington St, London EC1V 0BB. Tel: 01-251 0823. Fax: 01-253 6873

Ranging in price from the tens of millions to the tens of thousands there are now at least 50 models of supercomputers and mini-supercomputers. Making an informed decision has never been more difficult. High performance computing is expanding and changing more rapidly than any other sector in the computer industry. Articles on supercomputing in computer magazines are relatively infrequent and tend to lack depth. The business press offers headlines and personalities, but does not supply the necessary detail.

There is now a real solution. Supercomputing Review is the first authoritative, comprehensive, up-to-date guide to every aspect of high performance computing;

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POSTECH PARALLEL PROCESSOR PROJECT

POSTDOCTORAL POSITIONS IN TRANSPUTER RESEARCH

Applicants are invited for postdoctoral positions to work on a large scale Transputer research project. According to the qualification, visiting and tenure-track faculty positions can be considered. The starting time of each position is negotiable. Visitors at graduate student level are also invited.

The project aims to implement large scale transputer based parallel computer and to develop related system software, scientific and industrial applications. A prototype machine with 256 or more T800 Transputers will be built during 1989. We are currently running B004, B003 based Transputer Development Systems (TDS), and a Transputer array including 64 T800's will be available during the third quarter of this year.

Possible research areas are

1. Development of hardware and system software for dynamically allocating Transputer resources.
2. Applications in the area of physics, chemistry, finite element method, neural network and artificial intelligence, robotics, industrial applications including image processing and real-time control, etc.

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Applications should be sent to

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