

the I.P. Sharp *newsletter*

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SHARP APL COMMUNICATIONS NETWORK

Geoff Lewis, Amsterdam

Local access to SHARP APL is now available in over 150 cities throughout Canada, the United States, Europe and Australia. The communications facility supporting this system consists of Sharp's own dedicated network - supplemented by the public carriers Dataroute in Canada, and Tymnet and Telenet in the US. Since 1973, Sharp has been introducing its own internally developed packet switching system, first of all in Europe and from 1976, worldwide. Today the system controls one of the largest and most advanced networks in the world.

The system has brought a number of significant and unrivalled benefits to the users of SHARP APL:

- 1) **High Reliability:** communication failures are much less frequent than with conventional multiplexing systems. Furthermore, users are always kept informed of the status of their connection with APL.
- 2) **Fast Response:** the system is optimized for interactive APL usage.
- 3) **Virtually Error Free Transmission:** transmission errors are automatically detected and corrected by the system.
- 4) **Terminal Flexibility:** varying terminal types and speeds may be connected.
- 5) **Low Connect Charges:** the efficient line utilization of the system enables relatively low APL connect charges. The location of the many local access points also reduces user dial-up costs.



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COMMUNICATIONS

Network Topology

The hardware behind the SHARP APL network consists of over 40 Computer Automation Alpha LSI-2/20 minicomputers located throughout the world. In their role as communications processors they are known as **concentrators**. Each concentrator forms a **node** in the network and is connected to one or more other nodes by highspeed synchronous lines. Two high capacity transatlantic cable lines link North-America and Europe. In the event of the failure of one line, the total traffic may be switched to the remaining line.

Users of SHARP APL need only dial in to their nearest node on normal low speed telephone lines to gain access to APL. This link or access to the computer is called a **port** and, at present, the APL system can simultaneously support over 200. The processing heart of the network, located in Toronto, Canada, consists of an Amdahl 470 V6-II and an IBM 360/75 operating in a dual CPU master-slave configuration. A number of IBM 3705s provide communications front-end processing and function as nodes in the network as well as providing extra facilities.

Elements of Packet Switching

All messages sent between APL and a terminal connected to the network are split into one or more fixed length **packets**. Along with the message itself, each packet contains destination information and error checking data. Having left the originating node, the packets travel independently through the network under the control of a protocol, being forwarded on from one node to the next until their destination node is reached. Only then are they reassembled into their correct order to form the original message.

Virtually error free transmission is possible because at each node through which a packet travels, the packet is checked for errors. If an error is detected then retransmission is requested from the previous node; otherwise the packet is forwarded on to the next node in its route. As well as ensuring the integrity of the transmitted data, the Sharp network protocol prevents possible breaches of security due to line failures.

The length of each packet in the SHARP APL network is optimized to give a fast response to the concise messages which arise with the normal pattern of interactive APL use.

Line Utilization

The efficient line utilization of the Sharp packet switching system is based on statistical multiplexing. Advantage is taken of the fact that not all terminals connected to the network operate simultaneously at full speed. This system makes possible relatively low APL connect charges.

In conventional systems such as time division multiplexing, a fixed bandwidth must be allocated for the duration of the terminal connection. Packet switching systems can achieve very high line utilization by freeing communications resources when they are not actually being used by a terminal, for example, when the user is thinking and no characters are being sent. As a typical example, ten 300 baud terminals may be serviced with ease on one 2400 baud line.

At times of overload, the Sharp concentrators can queue packets until a transmission slot is available. To the user this appears as slight inter-packet pauses.

Concentrator Intelligence

A high degree of intelligence is built into the concentrators. Line "hits" or failures may not result in disconnection of the user from APL if lines stabilize within 15 seconds. The concentrators are able at all times to reply to users, keeping them always aware of the status of their connection with APL.

Intelligence in the concentrator also enables the system to automatically recognise and adapt to the type of terminal being used (ASCII or BCD) and also its speed, for example 15 or 30 characters per second. To ensure an even response amongst users, packets arising from highspeed terminals running perhaps at 120 characters per second are given a lower transmission priority and extra buffering.

Concentrators may be installed in customer premises where several terminals are in use at the same location. This can give reduced dial-up costs and alleviate high-error rates on poor local telephone lines. Terminals may be hardwired into the concentrator to eliminate the need for extra modems.

The flexibility of the concentrator software also allows it to be modified for special purpose applications such as interfacing directly to customers' computer systems. As an example of a customized facility, the network is currently used to support a Telex facility involving a special-purpose concentrator that can automatically accept and store Telex messages.

Operational Convenience

The operational ease of the SHARP APL network is a major factor in its reliability. The network supports itself in the sense that the same communication lines are also used to load new or inactive nodes with a fresh copy of the concentrator software. Essentially, the whole of the network can be controlled and managed from any one node. Nodes may be configured and restarted without interrupting the operation of the intervening nodes. An error tracing facility also allows the software in a node to be inspected and modified remotely from another. The **down line load** facility coupled with the intrinsic reliability of the Alpha LSI hardware enables completely unattended operation of the concentrators except for maintenance.

The network also utilizes itself for accumulating **monitoring** information on the performance of the system. Information such as error rates and traffic loads between each pair of connected nodes enables the isolation of potential bottle-necks and communication failures. This information is accumulated centrally and may be analysed directly from APL.

CANADIAN STOCK OPTION DATA

Marc Odho, Toronto

Canadian Stock Option Data (Calls) is now available on the Sharp system. This data base contains trading data for stock options traded in the Toronto, Montreal and Trans Canada exchanges. The available data items are high, low, close, volume, open interest, ask, bid, and dollar value traded. Data is available for 260 trading days and is updated at approximately 22:00 EST, subject to data availability. All options are identified by a unique symbol which is made up of the following: Exchange code, Underlying security symbol, Expiry month code, and Strike price code.

Access functions reside in library 51 *STOCKOPTIONS* and are similar to those used to access Financial Post stock data. Options data is supplied by the Computer Services Department of the Financial Post. Subscription to the data can be arranged by contacting your local Sharp representative.

AIDS (APL for Integrated Decision Systems)

NEW RELEASE CUTS FILE STORAGE REQUIREMENTS

Walter Keirstead, Montreal

Recent changes to methods of allocating file storage within AIDS are expected to give rise to significant reductions in storage costs for many users.

CREATE has been modified so as to no longer require specification of an initial set of Planning Variables and a "principal" timeframe. In prior versions of AIDS, execution of *CREATE* gave rise to the formation of a series of "Base Case" data sets (one per Division), with a string of zeroes for each Planning Variable corresponding to the length of the referenced timeframe. In the current version, storage is allocated automatically, as it is required, with the result that execution of *ALLOCATE* is no longer necessary.

CREATE now simply requires specification of a file name. The file name is placed in an AIDS file directory and an "empty" file is created. In a similar manner, execution of the commands *ADDTIME*, *ADDSUMMARY*, *ADDDIVISION*, *ADDCASE* or *ADDID* results only in updating of a file directory - no storage is actually allocated.

Storage allocation now takes place when data is actually written out to file. This occurs during execution of the following:

ALLOCATE, *TRANSFER*, *OVERRIDE*, *WRITE*, *WRITEAIDS*.

The changes described above will reduce the cost of data storage in that Planning Variables which are not active within a particular "Base Case" data set will no longer have assigned storage.

For more information, please refer to *AIDSNEWS* or contact your SHARP APL representative.

RELATIONAL DATA BASES

About a year ago we started an internal project with a view to implementing a Relational Data Base Management System in the APL environment. This write-up is in the nature of a progress report, since some of our users are aware of our interests and have been asking us embarrassing questions about the implementation schedule.

We regard this activity as a basic research project and on the basis of what has been accomplished to date, it is safe to assume that nothing will be available for commercial use for at least two and more likely three years.

After a year of study and analysis, we have almost completed the definition of the syntax of the Data Language. During the course of the next six months, this language will be implemented in the form of a model in APL. The model will be used for experimental work and no doubt will undergo numerous changes during the next year. Questions related to policing of data (for security reasons) and back-out (for integrity reasons) have not yet been seriously addressed.

The concept of data organized by relations fits well with the APL approach, but it is still too early to predict whether the project will be brought to a successful conclusion - or even if it is successful from a technical viewpoint, will it be commercially viable?

CHARTERED BANKS OF CANADA ANNUAL DATA BASE

Marc Odho

The Annual Banks data base now contains data for 1977 as compiled in the Chartered Banks Annual Statements. Data consists of the statement of assets and liabilities, statements of revenue, expenses, and undivided profits, accumulated appropriations for losses, rest account and per share data.

Fact 33 (Par Value per share) is now reported in cents to be consistent with the other per share items.

LINEAR PROGRAMMING

Phil Chastney, Gloucester.

Our small but enthusiastic band of linear programmers may be interested to know of a couple of recent changes to 43 *LINPROG*.

The first concerns an improved method of selecting the variable to leave the current basis. The routine can sometimes establish feasibility (or detect non-feasibility) in fewer iterations, especially where there is a preponderance of \geq constraints (i.e. the ones involving surplus variables). Forget the World Cup, forget the World Series - for sheer excitement it is hard to beat seeing the new routine establish feasibility on three rows simultaneously.

The second improvement concerns the method of pivoting. Having long held that matrix methods could conceal as much as they reveal, I was delighted to re-examine the problem from first principles, and then to discover that it was capable of elegant expression in APL. Hooray for APL as a notation, outside of its excellence as a programming language.

Three lines of code were replaced by three others, and as a result the whole routine goes faster. There is a saving in the number of CPU units required to solve all problems, and the percentage saved rises with problem size. On small test problems (less than 10 rows, say) the saving is measurable, but not significant. Savings reached as much as 50% in problems of up to 20 rows, and savings will be even greater in problems with more than 20 rows up to the (understated) maximum of 40 rows.

The factor limiting the maximum size of problem that can be accommodated was, and is, the space required during the pivoting operation. The new routine requires less space. It is with mild embarrassment that we report that the maximum problem size has increased even farther above the limits quoted in the on-line documentation (always somewhat conservative).

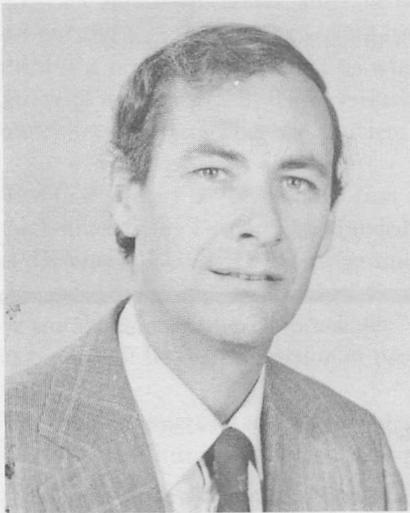
In view of the greater amounts of arithmetic involved in the larger problems, and the concomitant accumulated numerical error, the default values of the tolerances have been widened to $1E^{-6}$. This does not seem to have affected the optimum points of any real problems - but one problem containing a number of equality constraints needed the first tolerance value setting very nearly to unity if feasibility was to be established.

Improvements in the mathematical programming facilities will be announced as they become available, but it won't be every month that we can announce a doubling of the speed.

SHARP NEWS

SYDNEY, AUSTRALIA

Chris Sanderson



Chris Sanderson has joined Sharp and will be Branch Manager of our new office in Sydney. He is joining **Isaac Ehrlich** who has been in Sydney on a temporary basis since December, doing all the leg work.

"My first use of APL was in 1971 while on assignment in the U.S. from IBM Australia, where I had trained as a System Engineer. I rapidly became an APL 'nut' - and joined in the battle within IBM to make APLSV available to customers. After I returned to Australia in 1974, most of my time was spent doing APL missionary work both with customers and IBM internally. In 1976 I started an APL Users' Group in Sydney, shortly before leaving for a twelve-month stint with IBM Corporate Planning in Paris.

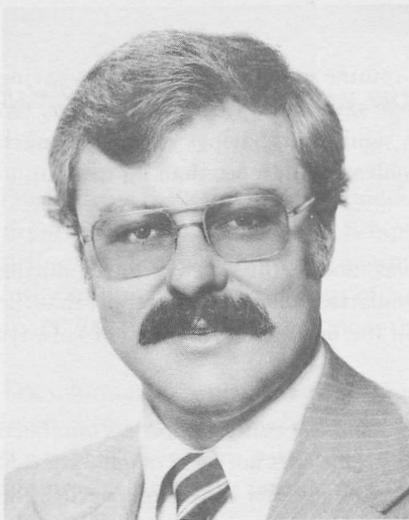
"I am very much looking forward to representing I.P. Sharp Associates in Australia. With all the changes expected in the Communications and DP industries, the next few years should be exciting. I think the combination of an international network, data bases, plus the availability of SHARP APL on in-house systems will make us attractive to many new customers - particularly multinationals."

The address: 175 Pitt St. - Suite 1342,
Sydney, N.S.W. 2000
(02) 232-5914

TWO NEW OFFICES IN THE UNITED STATES

CLEVELAND

Gerald Washburn



Gerald Washburn, formerly Regional Sales Manager based in Rochester, N.Y., has been appointed Branch Manager in Cleveland, Ohio. Jerry has been employed by I.P. Sharp Associates in marketing since 1975. He started out in engineering during the sixties and by 1974 he had accumulated experience in computer operations (as manager); in selling computer hardware and software; and had been supervisor of internal audit at two major companies. His experience in computers and finance has allowed him to specialize in computerized financial planning systems. The new office is at:

Suite 316
24200 Chagrin Blvd.
Cleveland, Ohio 44122
(216)464-3578

Technical Supplement – 15

*** CONTEST NO. 6 - WARI ***

The game of WARI, (also known as OWARE, MANAKA, MANCALA and KHALLA) is an ancient two-person board game which traces its roots back to Africa. It is believed by some to have been the forerunner of backgammon. Today the game is played primarily in the West Indies and the Philippines. As is the case with many primitive games, the number of variations in the mode of play is nearly as numerous as the number of dialects of the players. Presented below is one of the more commonly recognized versions of the game.

WARI is played on a twelve cell board consisting of two rows and six columns. At the game's outset, each cell contains four markers. (Note that all the markers on the board are identical. Also note the manner in which the cells have been numbered.)

Initial Board Configuration

<i>FIRST PLAYER'S CELLS</i>					
6	5	4	3	2	1
---+	---+	---+	---+	---+	---+
oo	oo	oo	oo	oo	oo
oo	oo	oo	oo	oo	oo
7	8	9	10	11	12
---+	---+	---+	---+	---+	---+
oo	oo	oo	oo	oo	oo
oo	oo	oo	oo	oo	oo
<i>SECOND PLAYER'S CELLS</i>					

A player's move consists of taking all the markers from one of his six cells and distributing them counterclockwise, one to a cell, beginning with the next cell.

If the cell into which the last marker was placed is one of the opponent's cells **and** there are exactly two or three markers in that cell, then all the markers in that cell are removed from the board and are considered to be captured. The same rule is applied to the cell into which the second-last marker was placed, then the third-last, and so on, until a cell is reached for which the rule does not permit the removal of any markers.

With the foregoing by way of an introduction, we formally state the conditions of the next contest.

* * * * *

Required:	A dyadic explicit function of the form: $Z \leftarrow PN \text{ WARI } GD$	
Right Argument:	GD is a 15-element vector of game data consisting of four fields.	
Field 1:	$12 \uparrow GD$	is a representation of the board position immediately before the next move is to be made. Specifically, $6 \uparrow GD$ represents the first player's cells (i.e. cell numbers 1 through 6), while $6 \uparrow 6 \uparrow GD$ represents the second player's cells (i.e. cell numbers 7 through 12). The elements of the "board" field are the number of markers currently resident in each cell.
Field 2:	$1 \uparrow 12 \uparrow GD$	is a counter indicating the total number of markers which have been captured by the first player.
Field 3:	$1 \uparrow 13 \uparrow GD$	is a counter indicating the total number of markers which have been captured by the second player.
Field 4:	$1 \uparrow 14 \uparrow GD$	is the cell number from which your opponent's last move was made. This field is included for purposes of validation by a <i>SUPERVISOR</i> program - see below.
Left Argument:	PN	is an integer scalar indicating the player number whose turn it is to move. The value of PN will be either 1 or 2.
Result:	Z	is an updated version of GD . That is, Field 1 is the resulting board position after your move has been made. Fields 2 and 3 are the appropriately updated capture counts as a result of your move. Field 4 is the cell number from which your move was made.

Additional Notes

- The arguments which will be passed to *WARI* to indicate the start of a new game are:
 $PN \leftarrow 1$
 $GD \leftarrow 15 \uparrow 12 \rho 4$.
- If *WARI* is passed a left argument of 1, then the program is to assume the role of the first player. Any moves made by the first player must be from cell numbers 1 through 6 inclusive. Similarly, if the left argument is a 2, *WARI* will be playing the part of the second player, and its legal moves will be made from cell numbers 7 through 12 inclusive.
- If the **game data** vector GD which is passed to *WARI* is one which denies a countermove, then Field 4 of the result Z must be empty (i.e. $14 = \rho Z$).

In judging the contest entries, all the submissions will take part in a round-robin tournament which will be controlled by a *SUPERVISOR* program. The *SUPERVISOR* will match each program against all other programs twice so as to ensure no unfair advantage of first move. It will be the responsibility of the *SUPERVISOR* to validate all moves, pass arguments to the competing programs, record CPU times for each move, and decide the winner for each match. The *SUPERVISOR* will consider a game over when two consecutive result vectors of length 14 are validly returned (i.e. neither player can reach his opponent's side of the board).

One point will be awarded for each game won. The program awarded the most points will be declared the winner. In the event of a tie, the winner will be the program which consumed the least number of CPU units for the entire tournament.

Packaged contest submissions containing the WARI program as well as the entrant's name and address, should be appended to the file 999 *CONTEST* no later than midnight, May 31, 1978.

Questions and comments should be addressed to Jerry Cudeck in Toronto.

*** CONTEST NO. 5 - RESULTS ***

Shortly after the announcement of CONTEST 5, it was drawn to our attention that a letter to the editor of **APL QUOTE QUAD** (Volume 7.4) which concerned itself with the potential documentation hazards associated with the brevity of APL code, cited as an example, complete with solution, the problem posed in our last contest. Several of our dedicated contest followers who had seen the article chose not to enter. Others submitted solutions fully acknowledging their source.

We extend sincerest apologies to all concerned for the editorial oversight. In the interest of fairness, however, to those who participated and who were unaware of the QUOTE QUAD article, we present our contest results.

The *WRECK* participants and their entries were:

Bernie Levine	Vancouver	<i>WRECKΔBL1,2,...,11</i>
Yuen K. Wong	Treasury Board Secretariat, Ottawa	<i>WRECKΔYKW1,2,3,4</i>
Eric B. Iverson	IPSA, Toronto	<i>WRECKΔEBI</i>
Marv Mandelbaum	IPSA, Rochester	<i>WRECKΔMRM1,2,3,4</i>
Mike Powell	IPSA, Calgary	<i>WRECKΔPOW1,2,3</i>
Dinos Applá	IPSA, London (U.K.)	<i>WRECKΔDINO</i>
Keith Morris	Ministry of Economic Development, Victoria	<i>WRECKΔKMO1,2,3</i>
Uri Shamir	Rank Xerox, London (U.K.)	<i>WRECKΔURI</i>

All 28 entries were first tested for program correctness and each one of them was demonstrated to be complete to within the stated contest specifications. The programs were then ranked for speed of execution on input arguments of varying length. The results of the ranking for the 10 fastest programs are shown below:

Program	Ranked Execution Time
WRECKΔYKW3	1.000
WRECKΔYKW4	1.000
WRECKΔYKW2	1.696
WRECKΔDINO	1.696
WRECKΔYKW1	2.000
WRECKΔPOW2	20.692
WRECKΔPOW3	25.348
WRECKΔPOW1	27.870
WRECKΔBL1	32.783
WRECKΔKMO1	41.043

Tests were then performed to measure program stability with very long input arguments. Those programs which attacked the problem via vector methods fared much better than those which adopted matrix techniques - the latter requiring internal storage space proportional to the square of the length of the input arguments. Again *WRECKΔYKW3* and *WRECKΔDINO* showed themselves to be able to handle the largest volumes of input.

Thus on the basis of speed, minimality of internal storage requirements and overall elegance, our first prize winner is *** **Yuen K. Wong !!***. The best IPSA entry belongs to our second prize winner - *** **Dinos Appla !!***. Our winners will be contacted shortly and will receive a book prize of their choice. The winning submissions may be viewed in workspace 999 *CONTEST*.****

CHARACTER ACCOUNTING

Leigh Clayton, Toronto

Character accounting has been changed to more accurately reflect the characters actually sent to a user's terminal(s). The characters in a line of output are counted after the complete line has been sent. (Lines sent to Alpha users are therefore counted a few packets before they are printed.) This has two rather noticeable effects:

1. If you do `, 'I5' □FMT 19999` and then hit break, you will no longer be charged for the number of characters we managed to buffer, but for the number of characters that were printed (plus or minus a few, not a few thousand).
2. Lines like `CH←□AI[□IO+4] ◇ 'I3' □FMT ?5 5ρ100 ◇ □AI[□IO+4]-CH` will print the matrix, then '0' (in all likelihood,) because you formatted the whole matrix, put it into typewriter buffers and did the second `□AI[□IO+4]` before an entire line was printed. It only seems as if you got them free; you did not. If you insert a `□DL 100` between the `□FMT` and the second `□AI` you will get the character count. A more reliable way to print the actual character count is `□`, `□`, or `□ARBIN`, since they wait until the output is finished, then unlock the keyboard and wait until the user hits carriage return before they allow the second `□AI[□IO+4]`.

The second example was provided by Jerry Cudeck.

APPLICATION LIBRARY UPDATE

NEW	1	<i>DEMOS</i>	Information about demonstrations of SHARP APL systems.
	1	<i>REFERENCE</i>	Expanding on the information in the SHARP APL Reference Card.
CHANGED	34	<i>ANOVA</i>	New function <i>SCHEFFE</i> added.
	31	<i>PARAMETRIC</i>	New function <i>SCHEFFE</i> added.
	43	<i>LINPROG</i>	See page 5.
	51	<i>STOCKOPTIONS</i>	See page 3.
	94	<i>GAMES</i>	Three new games have been added: <i>MASTERMIND</i> , <i>QUADGT</i> , <i>WUMPUSHUNT</i> - instructions are in the workspace.
GONE	1	<i>DIAMOND</i>	
		<i>PERT</i>	All Library 42 <i>PERT SYSTEM</i> .
	81	<i>OECDUSAGE</i>	Data Base removed from the system - see page 9.

NEW SHARP DOCUMENTATION

Manuals	SHARP APL Text Editor (4 <i>EDIT</i>)
	Introduction to AIDS
	SHARP APL Graphics
	Bank of Canada Weekly Statistics Data Base
	SHARP APL in Financial Analysis
	Stock Options Data Base
Brochures	Report Formatting
	AIDS for Planning and Control Systems
	Financial Analysis
Fact Sheets	SHARP APL as a Distributed Program Product
	Public Data Bases
	Application Systems
	SHARP APL Public Libraries
	International Time-Sharing Price Schedule
	Canadian Economic Data
	System Security
	Getting Started with the SHARP APL System
	APL Keyboard
	Local Access Cities
	International Branch Offices

CAB Reference Card

An up-to-date list of all Sharp publications is on-line in workspace 1 *PUBLICLIBS*. Just type:

```
)LOAD 1 PUBLICLIBS
MANUALS
```

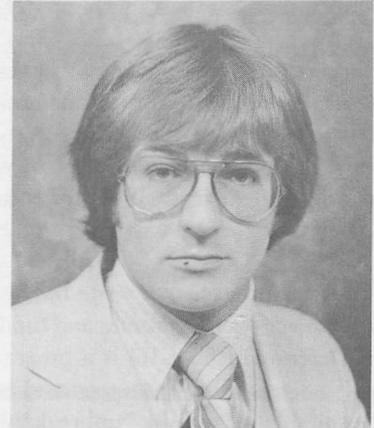
Please contact your local SHARP APL representative if you would like to order any of our publications. An order form is available on request.

MIAMI

Brian Oliver, the Manager of the new office in the south, joined Sharp in December 1976 and now has seven years of APL experience. He is a graduate of the University of Toronto, and was Support Manager for the Toronto branch before moving to Miami. The office is located in Miami Lakes, an industrial-residential community in north-west Miami, with close access to the international airport, Coral Gables Industrial park, Fort Lauderdale, and (45 minutes by air) to Orlando. The office will provide complete SHARP APL services to the business community.

The address: Suite D - Kennedy Bldg.
14560 N.W. 60th Ave.
Miami Lakes, Fl 33014
(305)556-0577

Brian Oliver



HANOVER, GERMANY - I.P. Sharp GmbH in Duesseldorf will be demonstrating SHARP APL at the **Hanover Fair** which takes place from April 19 to 27. Sharp will be collaborating again with COMKO, the distributor of Anderson-Jacobsen in Germany. **See APL at work** at the COMKO stand:

Halle 1 CEBIT,
Dachebene, Apt. 1610,
Hanover, Germany.

Correction: EDMONTON - **Frank Arthur** is alive and well and does indeed live in Edmonton. Please accept our apologies for incorrectly stating (in the January/February issue) that Frank was in Calgary.

Sharp Special Systems

SHARP IN SECURITY

Hugh O'Rourke, Toronto

Of the two major aspects of EDP - the manipulation of data at high speeds and the storage of vast quantities of information for instant retrieval - it is the second which in this decade has become computing's "dark side". As more and more applications are automated by both governments and the private sector, increasing amounts of government, business and personal information are being captured.

Public concern over this aspect of computing is evidenced by the amount of legislation regarding the security and privacy of information. In fact, this whole issue - particularly with respect to personal data - is largely responsible for the general public's growing awareness of the impact that computers are really having on our day-to-day lives - much more so than the computer-produced billings and bank statements we have all been receiving for years.

Concern over personal data breaks down into three distinct areas: what information should be accumulated, its accuracy and completeness, and how to guarantee controlled access to the information. The first is a matter for public debate and legislation. The second is the responsibility of those who design, build and use computer systems. The third is a problem for those of us who build hardware and software tools for automation. SHARP APL users are aware of the many facilities for ensuring the integrity of each customer's programs and data. Two projects currently under way are attacking the problem from very different angles.

The first project is to write the first compiler for the language EUCLID - a joint venture between Sharp and the University of Toronto, and funded by ARPA (The Advanced Research Projects Agency of the U.S. Department of Defense). EUCLID is a programming language designed specifically for software that must be verified. What this means is that code produced by the EUCLID compiler will be certifiably correct and thus the language will be suitable for writing "unbreakable" security modules or kernels for computer systems. The ultimate object of this exercise will be the production of provably secure system-level software.

The second project attacks the problem of an insecure computer system from the outside rather than the inside and involves retrofitting secure front-end and back-end computers to an existing computer system. In this "bracketing" scheme, the front end handles data between the user terminals and the system, and the back end handles the interface between the stored data and the computer system. One feature of this scheme is the provision of a direct link between the front-end and the back-end computers. The link is for control purposes, perhaps verifying that the requests are legitimate, or that the user really did want what was requested. It is a control channel and not a data channel.

This is a very simplistic overview of the two projects, both of which are in the very early stages of development. You'll be hearing more about them as they progress.

RUNNING AN AIRPORT ON MINIS

Laurie Howard, Amsterdam

Intersystems B.V., the Dutch subsidiary of I.P. Sharp Associates, has installed one of the world's most sophisticated airport information systems at Schiphol Airport, Amsterdam. The Schiphol Flight Information System provides airline travellers with up-to-the-minute information on aircraft movements, and also provides for the more comprehensive information requirements of airport personnel. The system, which is based on a network of minicomputers, drives 200 video displays and more than 10,000 "split-flap" display units.

The information system has an on-line connection to the SARP Aircraft Traffic Control System (with which system Intersystems was also involved), so that the moment an aircraft touches down at Schiphol, the pilot can be informed of where to off-load his passengers, and the airline, airport, customs, police, health and fire services can all be alerted and provided with the information that they need.

The Schiphol system is operational 24 hours per day, 365 days per year. Maintenance on the computer, communications and display systems is provided by service engineers from Intersystem's Technical Services Division, which undertakes round-the-clock service for the systems of this kind.

SYSTEM BACKUP CYCLES

Katy Gormley, Toronto

SHARP APL files and workspaces are backed up to tape regularly, according to the following schedule:

FILES

Daily File Incremental Dump, which contains any file components which have been appended or replaced since the most recent File System Full Dump. This dump is performed after the APL system shutdown every day. The retention cycle is 90 days.

BSS Weekly File Full Dump, which is taken every Friday (except the first Friday of every month) after the APL system shutdown. The retention cycle is 90 days. Copies taken monthly (see below) are kept on-site for two years.

BSS Monthly File Full Dump, which is taken after the APL system shutdown on the first Friday of every month. The original FDUMP tapes are copied in order to produce a second set. The original tapes are stored in an off-site vault for a four-year period. The copied tapes form part of the BSS weekly FDUMP cycle for two years.

WORKSPACES

Daily Incremental Dump of all workspaces which have been *SAVED* since the most recent Workspace Full Dump. The Incremental Dump is performed while the system is up - normally immediately after start-up. The retention cycle is 90 days.

Monthly Full Workspace Dump is taken after system shutdown on the Saturday immediately following the BSS monthly dump. The original workspace dump tapes are copied to produce a second set of dump tapes. The original tapes are stored in an off-site vault for a four-year period. The copied tapes form the on-site workspace dump cycle and are retained for two years.

Dump	Occurrence	Retention Period
File Incremental Dump	Daily	90 days
File Weekly Full Dump	Friday	90 days
File Monthly Full Dump	First Friday of Month	4 years
WS Incremental Dump	Daily	90 days
WS Monthly Full Dump	Saturday after first Friday.	4 years

NOTE: The backup procedures will be changing quite a bit in a few months to accommodate service in Australia. At that time a SATN with considerable detail of backup, and in particular the new procedures, will be released.

OECD DATA BASE DROPPED

Brian Daly, Ottawa

With effect from January 1, 1978, we have decided to remove the **OECD** (Organization for Economic Cooperation and Development) data base from the SHARP APL set of publicly available data bases. The reason for the removal is quite simply lack of use: approximately 50 accesses to the data base over the past 12 months. The reasons for the lack of use however are not quite so clear. It is our suspicion that it relates to the lack of an up-to-date series index and an inconsistency of time series across countries for particular series identifiers. If you feel strongly about losing this data base, please contact your local SHARP APL support representative or write to the system librarian at the Toronto office.

SHARP APL COURSES

	MAR	APR	MAY	JUN	JUL
Introduction to APL:					
AMSTERDAM (in Dutch)	15-17				
CALGARY (5 sessions)	7,8,15,22,29				
MINNEAPOLIS	14-16	18-20	09-11	13-15	18-20
(6 half-day sessions)	21-23	25-27	16-18	20-22	25-27
MONTREAL (6 sessions once a week at 5-7pm)					
OTTAWA	06-10	03-07	01-05	05-09	03-07
ROCHESTER	20-24	17-21	15-19	19-23	17-21
SEATTLE	21-23				
TORONTO	28-30	17-19	08-10	19-21	
			29-31		
U.K. (LONDON)	13-15	10-12	15-17		
WINNIPEG			23,24,30,31	26-29	
Intermediate:					
SEATTLE	April 11-12				
TORONTO (2 days)	March 13,14		May 22,23		
WINNIPEG	April 25-27				
Advanced:					
MINNEAPOLIS 'Advanced Techniques in APL'			Apr. 11-13 (3 half-days)		
TORONTO 'Advanced APL Techniques'			On request		
U.K. 'APL System Design'			Mar. 9-10		
WINNIPEG			On request		
Seminars:					
EDMONTON 'Regression Analysis in APL'			Feb. 17		
MINNEAPOLIS 'APL in Financial Modelling'			On request		
			On request		
SEATTLE 'MAGIC'			Feb. 23-24		
TORONTO 'MAGIC for Time Series Analysis'			Feb. 16	Apr. 6	Jun. 8
			On request		
			On request		
			Feb. 28	Apr. 25	Jun. 27
			On request		
			Apr. 3		
			On request		
			On request		
			Apr. 25	Jun. 15	
U.K. (LONDON) 'MAGIC for Time Series Analysis'			On request		
			On request		
			On request		
VANCOUVER 'Introduction to the SHARP APL system'			On request		
WINNIPEG 'APL Users' Seminars'			Monthly		
			On request, as are other		
			topics - please contact		
			Winnipeg office		

AVIATION DATA BASE USER SEMINAR

On February 7th, the I.P. Sharp Associates Newport Beach office hosted an airline analysts' users conference. Papers were presented by several users of the Sharp Aviation Data Base, and covered a variety of subjects including:

- The Sharp Aviation Data Base History and Future
- Economic Modelling and Fleet Planning
- Profitabilities by the Flight Segment
- Some Pitfalls of CAB Cost Comparison
- The Use of CAB Form 41's by the Air Line Pilots Association
- The Advantage of APL in Developing a Traffic Forecasting Model
- Applications of T6 Charter Traffic Data

Despite the severe snowstorm which closed several Eastern U.S. airports, the conference was well attended, with over 100 people on hand. We would like to thank all those who attended and participated. Proceedings will be published by the end of March, and will be sent out to all who were there. Those who were unable to come and who would like a copy may obtain one from their local Sharp office, or from the Newport Beach office.

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I.P. Sharp Associates Head Office: 145 King Street West, Toronto, Canada M5H 1J8 (416) 364-5361

International Branch Offices

Amsterdam

Intersystems B.V.
Herengracht 244
1016 BT Amsterdam
The Netherlands
(020) 24 40 50

Birmingham

I.P. Sharp Associates Limited
2nd Floor, Radio House
79/81 Aston Rd. North
Birmingham B6 4BX
England
021-359-6964

Boston

I.P. Sharp Associates, Inc.
Suite 812
148 State St.
Boston, Mass. 02109
(617) 523-2506

Brussels

I.P. Sharp Europe S.A.
Ave. General de Gaulle, 39
1050 Bruxelles, Belgium
(02) 649 99 77

Calgary

I.P. Sharp Associates Limited
Suite 2660, Scotia Centre
700-2nd St. S.W.
Calgary, Alberta T2P 2W2
(403) 265-7730

Chicago

I.P. Sharp Associates, Inc.
2 North Riverside Plaza
Room 1746
Chicago, Illinois 60606
(312) 648-1730

Cleveland

I.P. Sharp Associates, Inc.
Suite 316, 24200 Chagrin Blvd.
Cleveland, Ohio 44122
(216) 464-3578

Copenhagen

I.P. Sharp ApS
Ostergade 24B
1100 Copenhagen K
Denmark
(01) 112 434

Dallas

I.P. Sharp Associates, Inc.
Suite 1148, Campbell Center
8350 Northcentral Expressway
Dallas, Texas 75206
(214) 369-1131

Düsseldorf

I.P. Sharp GmbH
Leostrasse 62A
4000 Düsseldorf 11
West Germany
(0211) 57 50 16

Edmonton

I.P. Sharp Associates Limited
Suite 505, 10065 Jasper Ave.
Edmonton, Alberta T5J 3B1
(403) 428-6744

Gloucester

I.P. Sharp Associates Limited
29 Northgate St.
Gloucester, England
0452 28106

Houston

I.P. Sharp Associates, Inc.
Suite 405, One Corporate Square
2600 Southwest Freeway
Houston, Texas 77098
(713) 526-5275

London, Canada

I.P. Sharp Associates Limited
Suite 510, 220 Dundas St.
London, Ontario N6A 1H3
(519) 434-2426

London, England

I.P. Sharp Associates Limited
132 Buckingham Palace Rd.
London SW1W 9SA
England
(01) 730-0361

Miami Lakes

I.P. Sharp Associates, Inc.
Suite D, Kennedy Bldg.
14560 N.W. 60th Avenue
Miami Lakes, Florida 33014
(305) 556-0577

Minneapolis

I.P. Sharp Associates, Inc.
Suite 1371, 1 Appletree Square
Bloomington, Minn. 55420
(612) 854-3405

Montreal

I.P. Sharp Associates Limited
Suite 1610,
555 Dorchester Blvd. W.
Montreal, Quebec H2Z 1B1
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New York City

I.P. Sharp Associates, Inc.
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Pan Am Bldg.
New York, N.Y. 10017
(212) 986-3366

Newport Beach

I.P. Sharp Associates, Inc.
Suite 1135, 610 Newport Center Dr.
Newport Beach, Ca. 92660
(714) 644-5112

Ottawa

I.P. Sharp Associates Limited
Suite 600, 265 Carling Ave.
Ottawa, Ontario K1S 2E1
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Palo Alto

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Palo Alto, Ca. 94306
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Philadelphia

I.P. Sharp Associates, Inc.
Suite 407, 1420 Walnut Street
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Rochester

I.P. Sharp Associates, Inc.
Suite 1150, 183 Main St. E.
Rochester, N.Y. 14604
(716) 546-7270

San Francisco

I.P. Sharp Associates, Inc.
Suite C409, 900 North Point St.
San Francisco, Ca. 94109
(415) 673-4930

Seattle

I.P. Sharp Associates, Inc.
Suite 217, Executive Plaza East
12835 Bellevue-Redmond Rd.
Bellevue, Wa. 98005
(206) 453-1661

Stockholm

I.P. Sharp AB
Kungsgatan 65
S111 22 Stockholm, Sweden
(08) 21 10 19

Sydney

I.P. Sharp Associates Pty. Ltd.
Suite 1342, 175 Pitt Street
Sydney, N.S.W., Australia 2000
(02) 232-5914

Toronto

I.P. Sharp Associates Limited
145 King Street West
Toronto, Ontario M5H 1J8
(416) 364-5361

Vancouver

I.P. Sharp Associates Limited
Suite 604, 1112 West Pender St.
Vancouver, B.C. V6E 2S1
(604) 682-7158

Vienna

I.P. Sharp GmbH
Rechte Wienzeile 5/II
3 Wien, Austria
(222) 576-571

Warrington

I.P. Sharp Associates Limited
48A Horsemarket Street
Warrington, Cheshire
England
(020) 55342

Washington

I.P. Sharp Associates, Inc.
Suite 307, 1730 K Street N.W.
Washington, D.C. 20006
(202) 293-2915

Winnipeg

I.P. Sharp Associates Limited
Suite 909, 213 Notre Dame Ave.
Winnipeg, Manitoba R3B 1N3
(204) 947-1241

Zürich

I.P. Sharp A.G.
Badenerstrasse 141
8004 Zürich
Switzerland
241 52 42

SHARP APL Communications Network: Local Access Cities

APL OPERATOR VOICE (416) 363-2051

COMMUNICATIONS (416) 363-1832

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