

# Dyalog APL

## A Personal History by Peter Donnelly

### 1976: Dyadic Systems Limited

Dyadic Systems Limited was formed in 1976 by Ted Hare, Phil Goacher and David Crossley, who were working in the APL team at W.S. Atkins (Computing). They took with them several other Atkins employees, most notably Geoff Streeter (who was to become one of the core developers of Dyalog APL) and John Stembridge. Dyadic grew rapidly, supplying contract APL programmers to a number of multi-national clients, especially those who used the I.P. Sharp APL system. Among the first employees was Pauline Brand, who later played a major role in the development of the company and of Dyalog APL. I joined the company from W.H. Smith in 1980 and worked as an APL programmer/consultant at Rank Xerox, Beechams (now GlaxoSmithKline) and British Airways.

### 1981: The Birth of Dyalog APL

Dyalog APL was conceived in 1981 at a meeting between Dyadic and Pamela Geisler of Zilog (UK) Ltd. Zilog was about to announce its System 8000, one of the first of what would become a flood of 16-bit microcomputers running various forms of the UNIX operating system. The name "Dyalog" was formed from "Dya(dic)" and "(Zi)log". Dyadic recruited John Scholes as designer/chief programmer for Dyalog APL. John had left the APL team at W. S. Atkins to work as one of the key developers on an APL interpreter for the new ICL 2900. Geoff Streeter switched from working as an APL contractor to become a developer on the project, under the technical leadership of David Crossley.

### Fundamental Design Decisions

Two fundamental design decisions were made which proved to have far-reaching positive consequences, but which in the short-term proved near disastrous.

The first was the choice of UNIX as the Operating System and C as the programming language. This decision would ensure that Dyalog APL would be portable. It would not be restricted to just the Zilog S8000, but could be implemented on any number of other computer systems that supported the UNIX operating system. This decision proved critical to the long-term success of Dyalog but, because UNIX only began to flourish commercially 10 years after Dyalog APL was launched, the dependency on UNIX proved initially to be a major commercial handicap.

The second important design decision was to develop a second-generation nested-array APL, based upon the design of NARS (from STSC) and the preliminary announcements of IBM's APL2. This was also an excellent long-term decision, but nested arrays were initially seen as "scary"; this too proved to be an over-bold choice in the early years when the only discernable buying criterion was execution speed.

## 1983: Dyalog APL Launched

Dyalog was launched at the 1983 APL Conference in Washington. This conference hosted the largest ever commercial exhibition of APL vendors, and Dyadic found itself competing for attention with APL.68000, which was already available on dozens of 68000-based systems, and STSC's APL\*PLUS from STSC for the new IBM PC. The combination of what was seen as "new fangled" nested arrays and an unheard of (to the commercial world) Operating System and hardware platform proved a major obstacle to Dyalog's acceptance. Furthermore, the various compromises we had made to fit the Zilog architecture, deliver a small executable program and complete the implementation in just two years, were at the expense of execution speed, and the first version of Dyalog was comfortably out-performed by both APL.68000 and APL\*PLUS/PC. To say that the Dyalog launch fell flat would be an understatement.

## 1983-1990: The Lynwood Years

Soon after the Washington conference, Dyadic ran into financial difficulties. The APL consulting business was in the doldrums and our new product, Dyalog APL, was not the initial commercial success upon which the Directors had pinned their hopes. In October 1983 Dyadic Systems was purchased by Lynwood Scientific Developments Limited, a British manufacturer of intelligent computer terminals with whom I had developed a connection. The original Directors (Ted, Phil and David) left the company and I was appointed Operations Manager to run Dyadic as a subsidiary.

Hector Brown and Andrew Schryver, who owned Lynwood, probably bought the company for its UNIX expertise rather than from any belief in the future of Dyalog APL. Lynwood's chief accountant was initially bemused (his first visit to our office in Farnborough coincided with a "funny-sock" competition day, and his second a "funny-tie" day) but he became positively hostile when the financial burden became apparent to him. In fact, Dyadic didn't achieve a single profitable month in the seven years that Lynwood owned Dyadic. Although they made some efforts to steer us away from APL (Martin Tann and Dave Gordon being the only significant casualties), Hector and Andrew generously continued to fund the project despite the ongoing losses. Quite why, I will probably never know!

During the early years, sales of Dyalog APL were very slow and to a highly specialised market. In collaboration with the French company CISI, Dyalog was ported to various Bull UNIX systems and supplied to the EEC. The first real commercial breakthrough, which was to prove absolutely critical for the company, occurred in 1985 when Simcorp chose Dyalog APL under UNIX as the platform for a Treasury Management system for the newly de-regulated British Building Societies. This system came to dominate the UK Building Society market and, as every Building Society had its own favoured hardware supplier, Dyalog was ported to an ever-growing range of UNIX systems. The company made more money by charging "porting fees" than from licence sales.

## 1986: The Hardware Business

In 1986, to provide a complete package for a departmental APL system, Dyadic started to sell UNIX hardware and in July 1986 was one of the first to sign up as a reseller of IBM's first UNIX offering, the IBM 6150.

Pauline Brand took control of the hardware business and, due to her efforts, Dyadic became a supplier of IBM UNIX systems to British Airways, a business that started with a small APL application but grew substantially when British Airways adopted a UNIX strategy. In July 1987 Andy Cooke joined the company as Sales Manager and Andy Shiers as a Customer Support Analyst.

## 1987: Dyalog APL an IBM Vendor Logo Product

In 1987, IBM EMEA announced Dyalog APL as a "Vendor-Logo" product for the IBM 6150 (IBM RT in the USA). This was supported by an official IBM brochure, and Dyalog APL licences could be ordered from IBM and IBM re-sellers. I seem to remember that IBM's own APL2 development team were not amused. Dyadic also introduced an entry-level hardware/software solution based on the Opus 32 coprocessor board for the IBM PC, providing a concurrent DOS and multi-user APL/UNIX environment on an IBM PC or compatible.

## 1990: Pete, John and Pauline

In June 1988, Lynwood became part of the Hunting plc group of companies, and Dyadic found itself a very small fish in a very large pond.

The following year, STSC made an informal approach to buy Dyadic Systems from Hunting. The approach was refused but sowed a seed in our minds. With some trepidation, and our houses on the line, John Scholes, Pauline Brand and I put together a comparable offer, and in March 1990 we succeeded in buying the company.

That summer Dyadic launched Dyalog APL/X Version 6 for Sun and IBM RS/6000 and we started to gain significant sales to New York US financial institutions who were major users of these platforms. I also made personal contact with Security APL, who had quietly developed a substantial financial application on the basis of a couple of 8-user licences on IBM RS/6000, which had been sold to them by our somewhat inattentive US distributor. Security APL would become part of CheckFree Corporation, which itself later became FiServ. This in due course led to a long-term support and development contract with CheckFree, the beginning of a commercial model that would sustain the company in the future.

## 1991: John Daintree

In 1991 we decided to develop a version of Dyalog APL for Windows and to recruit a new APL programmer. We had the most profound good fortune to find John Daintree, who is simply a genius. I can still remember the "interview" in which he dazzled John, Pauline and me by showing us programs that he had written. We took the difficult but (as it transpired) wise decision to put our character-based `□SM` interface to one side and to replace it with a genuine graphical user interface (`□WC`). Apart from John Daintree, none of us had any significant experience with graphical user interfaces, although as the author of a minority-interest Motif Auxiliary Processor for Dyalog APL, I had a little more than the others.

## KPS and Adaytum

At the same time, we began co-operating with George Kunzle to convert his corporate modelling system FREGI from the IBM mainframe onto Dyalog APL for the PC; a project that would grow into the hugely successful KPS (Kunzle Planning System) under the direction of Guy Haddleton and Morten Kromberg. Guy initially wanted Dyadic to become his "software factory" and I eventually got him off my back by telling him to "go and talk to Morten". In a sense, this was one of the least sensible financial decisions I have ever made, but one that probably saved Dyadic from disaster. It is still a puzzle to me how we managed to make so little money (if any) out of KPS. I imagine that Guy laughed all the way to the bank.

## The Dyalog Duck

In July 1989 we launched Dyalog APL for DOS/386, our first 32-bit version for DOS. As part of this product we supplied an Auxiliary Processor interface to the DOS/386 graphics library GSS\*CGI. Faced with preparing a talk to the British APL Association on the new graphical capabilities, I bought a book entitled *Introduction to the Graphical Kernel System (GKS)* which I shamelessly plagiarised, converting some of the examples from FORTRAN into APL. See <http://www.chilton-computing.org.uk/acd/literature/books/gks/p002.htm>.

From this beginning I constructed a graphical tutorial workspace which in different guises has graced (nearly) every version of Dyalog APL ever since.

Furthermore, I failed to resist the childish tendency to use the Dyalog duck to demonstrate new features of Dyalog APL whenever the need arose. I can remember an OLE duck, my "bouncing ducks" demo to illustrate multithreading, and a number of .NET ducks. Various colleagues, most notably John Daintree, shared the same childish tendency and, before we knew it, the duck had established itself as the company's emblem, an integral part of the annual Vendor Forum presentation and later the annual Dyalog Conference.

## 1995: SIGAPL Award

At APL95 in San Antonio, John Scholes and I were jointly awarded the 1995 SIGAPL Award for Distinguished Achievement in APL for our work on the Dyalog APL product line. The award ceremony was notable in that I accepted my award wearing shorts (it gets hot in San Antonio), and John's name on his plaque was misspelled.

## 2001: Dyalog .NET

Every software company owner dreams of taking a call from Microsoft, and in 2000 it happened to me. After quickly dispelling my dreams of getting rich quick, the man from Microsoft invited us to join a secret project "X" which was to become Microsoft .NET. We were invited to join the project right at the beginning and tasked to develop a .NET-compatible version of Dyalog APL that would be launched along with the launch of Microsoft .NET itself.

This opportunity to work with Microsoft provided enormous benefits, both technical and commercial. John Daintree spent a large part of his time working alongside Microsoft software engineers and I spent a large part of my time exploiting the kudos gained by being chosen by Microsoft to become part of the project.

In July 2001 John Daintree received the British APL Association's award for outstanding achievement, largely for his ground-breaking work on Dyalog.NET.

## Hardware versus Software

Under Pauline's leadership, the hardware division went from strength to strength and by the year 2000 it had reached an annual turnover in excess of £10m with 10 dedicated staff, about double the number working on Dyalog APL. The APL business was in the doldrums. Despite the growing dominance of Dyalog APL for Windows in the APL market, the business was dependent on sales of new licences and I struggled to generate appropriate levels of revenue from this source alone. I blame myself for not developing the APL business towards a more support-oriented model, but my focus as Managing Director was diverted by the huge success and demands of the hardware business.

## 2003: The Parting of the Ways

Although we had a number of other important customers, Dyadic's hardware business was very dependent on its relationship with British Airways and on a special pricing agreement between Dyadic, B.A. and IBM that was under growing pressure. It became apparent to us that Dyadic could not compete forever in a marketplace that was becoming dominated by much larger IBM dealers. In 2002 we decided to sell the hardware division of the company. This was achieved by transferring Dyalog APL to a new company, Dyalog Limited, leaving the hardware division with Dyadic Systems which, on 1 March 2003, was sold to Syan Limited. Thankfully, the hardware business continued to develop and thrive, but that is another story...

## 2004: Consolidation

After the sale to Syan, Dyalog moved to offices in Basingstoke. The company then consisted of just 5 employees – John Scholes, Peter Donnelly, John Daintree, Geoff Streeter and Vincent Chan, although Pauline remained as a Shareholder/Director. Our accountant (who had 14 years experience with the company) had some initial doubts about the viability of the APL business, but I am proud to report that we never once failed to make a monthly profit, and a decent one at that! Nevertheless, John, Pauline and I felt that we should find a way to bow out. I was particularly keen to retire and acutely aware that that new blood was needed to drive the company forward.

## 2005: End of an Era

So John and I began to plot and scheme. Out of all the contacts we had in the APL world, we both had great respect for Morten and Gitte Kromberg and at the 2004 APL Conference in Naples Beach, Florida, I approached them with the idea that they should take over, backed by a consortium of customers. In the end, Simcorp and APL Italiana provided the backing and Morten and Gitte took over the reins on 7 April 1005. The rest is history!

## Dyalog APL Time-Line

Date	Version	Implementations	Key Features	Misc
1983	1	Zilog S8000		
1984	2	Bleasdale BDC680 Cadmus 9000 Fortune 32:16 ICL Perq Gould SEL Hewlett-Packard HP9000 Perkin-Elmer DEC Vax		
1985	3.0	DEC Microvax 2 Whitechapel MG1 IBM PC AT (Xenix)	<ul style="list-style-type: none"> <li>• Performance Improvements</li> <li>• Rectangular display of arrays</li> <li>• Session Manager</li> </ul>	BASF
Jan 1986		Apollo Domain		
Apr 1986		Opus 32 NS32000 Coprocessor IBM 6150 (PC RT)	<ul style="list-style-type: none"> <li>• SQL Interface (IBM 6150)</li> </ul>	
July 1986				IBM 6150 dealer Altos dealer
Oct 1986	4.0		<ul style="list-style-type: none"> <li>• User-defined operators</li> <li>• Function assignment</li> <li>• □MONITOR</li> <li>• Twice as fast!</li> </ul>	
April 1987	5.0	IBM 6150	<ul style="list-style-type: none"> <li>• Even faster!</li> <li>• Nested Array Editor</li> </ul>	IBM EMEA announces Dyalog APL as a vendor-logo product for the IBM 6150.

Date	Version	Implementations	Key Features	Misc
Oct 1987		Dyalog APL/386 for Xenix for 80386-based IBM PC and compatible		
Apr 1988	5.1		<ul style="list-style-type: none"> <li>User-defined input/output tables</li> </ul>	
Jul 1988		Hewlett-Packard HP9000-800 Sun-4 Sun 386i Unisys 5000		
Jan 1989		□SM / □SR	<ul style="list-style-type: none"> <li>Oracle Interface</li> </ul>	
July 1989		Dyalog APL for DOS/386	<ul style="list-style-type: none"> <li>Multi-"window" function-editor/tracer</li> <li>Interface to GSS/CGI (ducks)</li> </ul>	
Jan 1990	5.2	Sequent	<ul style="list-style-type: none"> <li>Naked trace</li> </ul>	
Apr 1990	6.0	IBM RS/6000		
Jul 1990		Dyalog APL/X	<ul style="list-style-type: none"> <li>Genuine window-based GUI</li> <li>Auxiliary processor interface for Xlib and Motif</li> </ul>	
Oct 1990	6.1		<ul style="list-style-type: none"> <li>Display/edit variables in separate "windows"</li> <li>□ED</li> </ul>	
Oct 1991		HP900-700 Series		Dyalog APL for Windows 3.0 previewed at APL91
3 July 1992	6.2.1	Dyalog APL/W for Windows 3	<ul style="list-style-type: none"> <li>Windows interface using □WC, □DQ, etc.</li> <li>DDE via shared variables.</li> <li>WDESIGN workspace.</li> </ul>	
Sep 1992				APL/W launched at APL92 St Petersburg
April 1993	6.3.1	Dyalog APL/W	<ul style="list-style-type: none"> <li>□NA</li> <li>Built-in graphical, clipboard and printer objects</li> <li>ARACHNID workspace</li> </ul>	
April 1993	6.2		<ul style="list-style-type: none"> <li>Dyalog APL/X for Sun and RS/6000</li> </ul>	

Date	Version	Implementations	Key Features	Misc
Jul 1993	6.3.1	Dyalog APL/W		FREGI (KPS), GDDME (Lingo Allegro) SQAPL (Insight Systems) Adrian Smith Graphics
Jul 1993	6.2	Dec Alpha		
Oct 1993	6.3		<ul style="list-style-type: none"> <li>• Cross-platform (PC and UNIX) binary compatibility of workspaces and component files.</li> </ul>	
Aug 1994	7.0.1	APL/W	<ul style="list-style-type: none"> <li>• Namespaces</li> <li>• Grid Object</li> <li>• VBX support</li> <li>• MDI</li> <li>• ODBC StatusBar, interfaceToolBar, TabBar</li> </ul>	
May 1995	7.1	APL/W	<ul style="list-style-type: none"> <li>• Greater APL2 compatibility</li> <li>• Drag-and-drop editing</li> <li>• GUI objects as namespaces</li> <li>• □CS</li> </ul>	
May 1996	8.0	APL/W for Windows 95 and NT (32-bit)	<ul style="list-style-type: none"> <li>• ListView, ProgressBar, PropertySheet, RichEdit, Spinner, TrackBar, Treeview objects</li> <li>• Drag/drop</li> <li>• Native File system</li> <li>• Control structures</li> <li>• □PATH</li> <li>• OLE controls</li> </ul>	
July 1996	8.0	UNIX (CDE) on IBM RS.6000 and Sun SPARC		
Jan 1998			<ul style="list-style-type: none"> <li>• Grid comments</li> <li>• : For</li> <li>• Patch system</li> </ul>	
March 1997	8.1	APL/W	<ul style="list-style-type: none"> <li>• OLE client/server, TCPSocket object, Dynamic Functions, syntax colouring</li> </ul>	
April 1998			<ul style="list-style-type: none"> <li>• Automatic tie numbers</li> <li>• Namespace instancing</li> </ul>	

Date	Version	Implementations	Key Features	Misc
Jan 1999	8.2	APL/W	<ul style="list-style-type: none"> <li>• Multi-threading</li> <li>• ActiveXControl object</li> <li>• :With</li> <li>• More APL2 compatibility</li> <li>• CoolBar, Splitter, Calendar, TabControl, ToolControl, PNG and GIF support</li> </ul>	
1999	8.2	UNIX platforms		
Sep 2000	9.0	APL/W	<ul style="list-style-type: none"> <li>• Integrated IDE</li> <li>• Docking</li> <li>• Namespace references</li> <li>• Animation</li> <li>• BrowseBox, ComboEx, DateTimePicker, SysTrayItem</li> </ul>	
Jan 2001	9.0.1	Linux Pocket APL		
Jul 2001				John Daintree receives BAA award for outstanding achievement.
Jan 2002	9.0.2	Dyalog APL/Net	<ul style="list-style-type: none"> <li>• .NET Support</li> </ul>	
Mar 2003	10.0		<ul style="list-style-type: none"> <li>• Idiom recognition</li> <li>• .NET support built-in</li> <li>• Hash tables</li> <li>• Mapped files</li> <li>• Run-time workspace as .exe</li> <li>• Auto-completion</li> </ul>	
???	10.1		<ul style="list-style-type: none"> <li>• Thread tokens</li> <li>• 64-bit component files</li> <li>• Value Tips</li> </ul>	
2006	11.0		<ul style="list-style-type: none"> <li>• Object Orientation</li> <li>• 64-bit version</li> <li>• Power Operator, Squad Indexing, Lowest Common Multiple and Greatest Common Divisor</li> </ul>	