

## ***Chapter 7 Other Software in the 1970's***

### ***7.1 ... Operating Systems***

Prior to the introduction of disk drives, software was developed to facilitate the loading or "booting" at startup. An example of this is the Motorola mini operating system for automatic loading called "Mikbug."

IBM developed the floppy disk drive in 1971 and the hard disk drive in 1973. Shugart Associates released their 8-inch floppy disk drive in 1973. With the availability of disk drives, many manufacturers released their own operating systems. However, the dominant system was CP/M from Digital Research.

#### ***Digital Research***

Gary A. Kildall received a Ph.D., in computer science from the University of Washington, founded Microcomputer Applications Associates (MAA) and became a professor at the Naval Postgraduate School in California in 1972. MAA was the predecessor to the founding of Intergalactic Digital Research by Kildall and his wife Dorothy McEwen, in 1976. The company name changed to Digital Research, Inc., in 1979.

In 1972, Kildall purchased an Intel 4004 microprocessor and developed emulator and assembler programs for it on an IBM System/360 computer at the naval school. While continuing to teach at the naval school, Kildall's MAA provided consulting services to Intel. This resulted in the development of an emulator for the Intel 8008 microprocessor to run on Intel's DEC PDP-10 time sharing system. Kildall also developed a new systems programming language called PL/M (Programming Language for Microcomputers) that was released in 1973. Around this time MAA made a proposal to Intel to develop a disk operating system for the 8000 series microprocessors.

Intel rejected the proposed operating system. However, Kildall continued working on the program and named the new operating system Control Program for

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Microprocessors (CP/M). Initially, it would form the basis for the resident programming of PL/M for 8080-based computers with 16K bytes of main memory and Shugart's new disk drive. This required the design of a disk controller and the assistance of a friend John Torode to get it working. The operating system had features such as commands and file naming conventions similar to those used on the DEC PDP-10 system. CP/M included a single-user file system, and used recoverable directory information to determine storage allocation, rather than a traditional linked-list organization. MAA completed CP/M in 1974 and retailed the program for \$70. It soon became successful as the dominant 8-bit operating system for microcomputers using the Intel 8000 and Zilog Z-80 series of microprocessors.

In the mid 1970's after several implementations on computer systems with different hardware interfaces, the CP/M software was restructured. CP/M was decomposed into two parts: an invariant part that was written in PL/M and a small variant part was written in assembly language. This small variant module for interfacing to various hardware platforms became known as the Basic Input/Output System (BIOS). Computer suppliers and end users could now create their own physical input/output drivers for CP/M.

In late 1979, Digital released an enhanced Version 2.0 of CP/M that sold for \$150. The program had been completely redesigned to support floppy disk drives and high-capacity Winchester disk drives. All disk parameters were moved from the invariant part to a table driven concept in the variant module.

Kildall also developed other programs for use with CP/M. Some of those were an assembly language, text editor and various utilities. Digital Research also developed a multi-terminal operating system called MP/M (Multi-Programming Monitor). It provided real-time processing with multiprogramming and multi-terminal features. The program was compatible with CP/M and sold for \$300.

***Apple Computer***

DOS (Disk Operating System) Version 3.1 was the operating system released with the Apple Disk II drive in June 1978. The disk had 35 tracks with thirteen 256 byte sectors on each track for a total storage capacity of 113K bytes. Earlier versions were not completely functional and therefore not released. Apple released a more stable version, DOS 3.2 in mid-1979.

DOS 3.3 evolved from the release of Apple Pascal programming language in 1979. This release changed the 35 track disk format to sixteen 256 byte sectors with a total disk storage capacity of 143K bytes. Apple developed a utility called Boot 13 to boot the 13-sector-per-track disks.

***Other Operating Systems***

Bill Levy developed PT-DOS for Process Technology around 1976/77. Radio Shack released TRSDOS for the TRS-80 Mini Disk System in the late 1970's. It was not compatible with CP/M.

**7.2 ... Programming Languages*****BASIC***

A history of the BASIC programming language is provided by Thomas E. Kurtz in *History of Programming Languages* [36], pp. 515-549 and by John G. Kemeny and Thomas E. Kurtz in *Back to BASIC* [115], pp. 1-23. A time chart depicting the evolution of BASIC is provided by Russ Lockwood in a periodical article entitled *The Genealogy of BASIC* [397]. Bill Gates of Microsoft has provided an interesting history of BASIC in a periodical article entitled *The 25th Birthday of BASIC* [394]. Reference Section 2.2 for the initial development of BASIC and Chapter 6 for the Microsoft development of BASIC interpreters for the Altair and other microcomputers.

Dartmouth College made a significant upgrade to their BASIC compiler with the release of version six in September 1971. In 1974, the American National Standards Institute (ANSI) formed a committee to develop standards

for the BASIC programming language. This resulted in the release of a standard for Minimal BASIC in 1976 and its official approval in 1978. Work then proceeded on a standard for a "full" BASIC. Dartmouth released version seven of its BASIC compiler in 1979.

Various hardware manufacturers such as Apple Computer, Digital Group, IBM, PolyMorphic Systems and Processor Technology developed BASIC languages for their own computers. However, Tiny BASIC and the following are some of the more significant releases.

Dennis Allison who was a member of the computer science faculty at Stanford University developed Tiny BASIC. The initial version of Tiny BASIC developed by Allison was a simplified BASIC oriented to younger programmers. The program required less than 4K bytes of memory. The *PCC Newsletter* and the initial issue of *Dr. Dobb's Journal of Computer Calisthenics and Orthodontia* in January 1976 provided a detailed description of an extended version of the software. Other programmers such as Tom Pittman and Li-Chen Wang developed and distributed variations of the program for different computers [393].

Robert Uiterwyk developed SwTPC BASIC for the SwTPC 6800 microcomputer in 1975. SwTPC provided low-cost BASIC programs at \$1 per kilobyte. A 4K BASIC interpreter cost \$4, 8K \$8 and 12K \$12.

Gordon E. Eubanks developed E-BASIC while working on a masters degree in computer science at the Naval Postgraduate School in California. Eubanks was associated with Gary Kildall and E-BASIC became widely used with the CP/M operating system. Gordon Eubanks, associates Alan Cooper and Keith Parsons developed C-BASIC and founded Compiler Systems, Inc., to market the software. Eubanks subsequently sold the Compiler Systems company to Digital Research and became one of Digital's vice presidents. C-BASIC was a pseudocompiled language developed in 1977 for IMSAI and was included with the CP/M operating system in 1979.

Radio Shack released Level-I BASIC with the TRS-80 Model I computer in August 1977. Steven Leininger developed the interpreter by adapting it from Tiny BASIC. Radio Shack released Level II BASIC developed by

Microsoft for business and advance applications in 1978 and an enhanced Level III version in 1979.

## **C**

Dennis M. Ritchie created the C language at AT&T's Bell Laboratories in 1972. The language was designed to be portable, fast and compact. The UNIX operating system was later reprogrammed using the C language.

## ***FORTRAN***

Reference Section 1.4 for the initial development of FORTRAN. Microsoft developed a FORTRAN-80 compiler for the Intel 8080 microprocessor. They announced the program in April 1977 and sold it for \$500.

## ***Pascal***

Niklaus Wirth developed the Pascal language at the ETH (Eidgenossische Technische Hochschule) in Zurich Switzerland. Pascal evolved from the ALGOL 60 programming language. The main development principals were to provide a language suitable for structured programming and teaching. Wirth drafted a preliminary version in 1968 and the first compiler became operational in 1970.

Kenneth L. Bowles directed the development of UCSD Pascal at the University of California in San Diego. UCSD released the program to users in August 1977 as a complete interactive system for microcomputers and minicomputers. It was initially released for Digital Equipment Corporation (DEC) LSI-11 or other PDP-11 processors, 8080 and Z80 microprocessors. The software system cost \$200. Bill Atkinson of Apple Computer, adapted the UCSD Pascal for the Apple II computer in 1979.

### ***Other Languages***

Gary Kildall of Digital Research, developed PL/M (Programming Language for Microcomputers) for Intel in 1972. PL/M was a system programming language that developed to provide a simpler alternative to assembly language for the Intel 8000 series of 8-bit microprocessors. It was a refinement of the Stanford University XPL compiler writing language with elements from Burroughs Corporation's ALGOL and IBM's PL/I. Intel marketed the program for the 8000 series of microprocessors in 1973.

BCPL and MESA were systems programming languages developed at the Xerox PARC (Palo Alto Research Center) for the Alto personal computer in the early 1970's.

Alan Kay developed Smalltalk at the Learning Research Group (LRG) of Xerox PARC in 1972. It was the software part of the Dynabook concept and was created for the Alto computer. It is one of the first object-oriented languages and used interactive graphical concepts to create a user friendly environment.

### ***7.3 ... Word Processors***

Bravo was a word processing program developed by Butler Lampson and Charles Simonyi for the Xerox Alto personal computer in the early 1970's. It was one of the earliest word processors to feature What-You-See-Is-What-You-Get (WYSIWYG) text display on the terminal screen. Between 1976 and 1978 improvements were incorporated by Simonyi in a new version of the word processor called BravoX. During this time Tim Mott and Larry Tesler developed a text editor called Gypsy that included a new cut-and-paste feature.

The Electric Pencil evolved from a public domain software package called Software Package One (SP-1). The package was distributed by the Southern California Computer Society (SCCS) in the fall of 1975. Michael Shraye improved the editor portion of the package and called it Extended Software Package 1 (ESP-1). A further upgrade of ESP-1 was called Executer. ESP-1 and Executer were the basis for the first word processor for a

microcomputer. Shroyer named it "The Electric Pencil" and it became available in December 1976. The first version was written for the MITS Altair microcomputer. Shroyer founded the Michael Shroyer Software company and other versions of the program were developed for various microcomputers. An improved version, The Electric Pencil II was announced in early 1978.

Seymour Rubinstein was the director of marketing for IMSAI when he left to start his own company, MicroPro International Corporation in late 1978. He hired Bob Barnaby, a programmer who had also worked at IMSAI and created a program called NED (New Editor). Barnaby extended this program into a full-scale word processor for microcomputers. Barnaby developed two programs, a video text editor named Word-Master and a sort/merge program named Super-Sort. MicroPro released Word-Master at a price of \$150 in August 1978 and then an improved version named Word-Star at a price of \$495 in June 1979. Word-Star was a success and became a dominant word processor used on early CP/M microcomputers.

Apple Writer was created for the Apple II computer by Paul Lutus, at a mountain cabin in the wilderness of Oregon in 1978. Lutus sold the program to Apple Computer for a flat fee of \$7,500. Apple Computer released the program that sold for \$75 in 1979. It featured automatic search and replacement of words or phrases, justification of text and uppercase and lowercase type.

John Draper developed EasyWriter for the Apple II computer in 1978. Shortly after, Draper met Bill Baker of Information Unlimited Software (IUS) at the third West Coast Computer Faire in the spring of 1979. This meeting resulted in an agreement being reached for IUS to market the program.

Magic Wand was introduced as an easy-to-use word processor in late 1979 by Small Business Applications, Inc.

## 7.4 ... *Spreadsheets*

Daniel S. Bricklin conceived the concept for a spreadsheet during his studies for an MBA at the Harvard Business School in the spring of 1978. Bricklin already had a degree in electrical and computer science from MIT. He had also been a software engineer at Digital Equipment Corporation (DEC). The impetus for this concept was the desire to find a way of utilizing a computer to facilitate the financial analysis of varied business situations. A prototype of the program was written in BASIC and called *Calculatedger*, a combination of calculator and ledger.

It was at MIT that Bricklin had become friends with Robert Frankston who would co-develop the software for the spreadsheet program. Frankston had done some programming for Daniel Fylstra of Personal Software, who loaned Bricklin and Frankston an Apple II computer to develop the software.

Bricklin and Frankston formed their own company called Software Arts, Inc., in January 1979 to complete the development of the spreadsheet software. The program was now called *VisiCalc*, that is an acronym for Visible Calculator. Bricklin developed many of the concepts, data structures, documentation and specifications. Frankston did most of the program coding using assembler language and macros. Assembler was used to improve the speed and to allow the program to run on a 24K byte Apple II computer, 32K bytes with a disk. The limited memory restricted the spreadsheet to 63 columns by 254 rows and reduced the number of features incorporated. Recalculation was limited to across rows or down columns, column widths could be varied, but had to be the same and text could not span columns.

Fylstra offered to sell the program to Apple Computer in January 1979 for \$1 million. However Steven Jobs and Mike Markkula rejected the offer. Bill Gates of Microsoft is also reported to have rejected an offer to purchase the program. However, subsequently Arthur Rock and Venrock Associates assisted in financing Personal Software and the new program.

Software Arts signed an agreement with Fylstra of Personal Software, Inc., to market VisiCalc in April 1979. VisiCalc was introduced at the West Coast Computer Faire in May, demonstrated at the National Computer Conference in June, advertised in the September issue of *Byte* (page 51) and released in October for the Apple II computer. VisiCalc was priced at \$99.50 then quickly increased to \$150 after sales increased dramatically. One limitation was that it could not run on the CP/M operating system, however it was an instant success. The term "killer application" has been credited to the success of VisiCalc. It also became a significant factor in helping to sell Apple II computers.

### **7.5 ... Databases**

Lyall Morill developed a simple database program for microcomputers called WHATSIT? in 1977. WHATSIT? is an acronym for "Wow! How'd All That Stuff get In There?" Morill improved WHATSIT? and Information Unlimited Software (IUS) introduced the program at the second West Coast Computer Faire in the spring of 1978. Bill Baker had previously founded IUS while attending college.

C. Wayne Ratliff was an engineer who adapted a NASA Jet Propulsion Laboratory mainframe database to his IMSAI 8080 microcomputer in his spare time. On completion of the software in August 1979, he named it Vulcan. The software was marketed by Software Consultation Design and Production (SCDP) company and advertised in the *Byte* magazine at a price of \$490 without success. The software was subsequently marketed by Ashton-Tate who changed the name to dBASE II in 1981.

Other early database programs were Condor, FMS 80 and Selector.

## 7.6 ... *Miscellaneous*

### **Games**

Various games had been developed for use on larger computers in the 1950's and 1960's as described in Sections 1.4 and 2.6. Then in the early 1970's video games that used dedicated processors were introduced and became very popular. Most of these video games used high resolution graphics and sound effects that would subsequently be implemented on more powerful microcomputers.

Nolan K. Bushnell developed the first commercial video game called Computer Space in 1970. It evolved from his interest in games and his previous exposure to the Space Wars game at the University of Utah. Bushnell subsequently founded Atari Corporation (see Section 4.6). This led to Stephen Wozniak developing an Apple Computer version of a game called Breakout that he and Steven Jobs had worked on for Atari. Also released at Apple Computer was a program called Lunar Lander developed by Bob Bishop. Bill Budge also developed a number of game programs, such as Penny Arcade, that he sold to Apple Computer in 1979.

In the early 1970's, Will Crowther developed a non-graphic fantasy game that was set in a cavern world with hidden treasure and challenging features such as dragons, flying horses and trolls. Crowther released the game on the ARPANET. The program was then refined by Don Woods and became known as the Adventure game. It became highly popular and formed the basis for personal computer Adventure games by Adventureland International and Microsoft.

Adventure Land was one of the earliest text adventure games for personal computers. Scott Adams developed the program for the Radio Shack TRS-80 computer in 1978. Adventure Land required a player to search through a magic realm that had wild animals, perils and mysteries to locate treasures. Adams founded Adventure International in 1978 to produce, be a distributor and publisher of other computer games. The game was adapted for the Apple II and other games such

as Laser Ball, Fire Copter and Pirate Adventure followed.

Peter R. Jennings developed Microchess initially, for the MOS Technology KIM-1 microcomputer in 1976. Jennings sold the source code for \$15. Shortly after, Daniel Fylstra and Jennings founded Personal Software, Inc. to market Microchess and other game programs.

Another chess playing program was SARGON, that was released around 1978. It was developed by Dan and Kathe Spracklen.

Toru Iwatani designed the Pac-Man game at a Japanese company called Namco Limited. It was first introduced in Japan in the late 1970's. Atari licensed the rights for Pac-Man and it became very successful in North America.

### ***Other Software***

Radio Shack issued a variety of software in the late 1970's for their TRS-80 systems. Some of the programs were: General Ledger, Inventory Control System, Real Estate, Statistical Analysis and various computer games. The programs were provided on cassettes and 5-inch floppy disks.

Stephen Wozniak developed SWEET16 in 1977 as an interpreter program that was contained in the initial Apple II ROM memory chip. Wozniak called it a 16-bit "metaprocessor" [402]. It was used to manipulate 16-bit pointer data and its arithmetic on the 8-bit Apple II computer.

Mitchell Kapor developed Tiny Troll in 1978/79 with help from Eric Rosenfeld of MIT. The program displayed line charts, multiple regressions, statistical analysis information and had a text editor. The software formed the basis for the later development of VisiPlot and VisiTrend programs.

**Conclusion**

In the 1970's, software had developed in conjunction with personal computer technology. Initially it had focused on programming languages such as BASIC, and operating systems such as CP/M to support disk drive technology. However in the late 1970's a change in user orientation from the technical enthusiast to the mass market consumer occurred. This was supported by the release of application software such as the VisiCalc spreadsheet.