CORPORATE COMPUTING: A WORKING BLEND OF MAINFRAMES, MINICOMPUTERS AND MICROCOMPUTERS

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ABSTRACT

The arrival, rapid growth and subsequent blossoming of the microcomputer as a professional workstation had dynamically impacted corporate computing in ways never envisioned by the entrepreneurs who founded the microcomputer industry. The proper use - and potential abuse - of microcomputers in today's modern business and manufacturing environments is of vital concern to company executives as well as data processing managers. This presentation describes the working approach of large mainframe computing, specialized minicomputer applications and microcomputer power at a leading gas turbine engine manufacturer.

To set the proper prospective, this paper will first present a overview of Avco Lycoming Textron and its Electronic Data Processing (EDP) Systems. This will be followed by a quick review of Avco's Mainframe, Mini, and Microcomputer systems. Finally the author will present his visions of microcomputer use and abuse, and a crystal ball look into the future of the industry.

AVCO LYCOMING TEXTRON - OVERVIEW

Avco Lycoming a division of the Textron Corporation is located in Stratford, Connecticut. Avco is part of the Providence, Rhode Island based Textron corporation. In 1985, Textron listed $5.721 billion in revenue, with $251.8 million in sales. The book value was $39.88 per common share and Textron had a total of 56,000 employees. Textron was organized into three areas, Aerospace / Technology, Commercial Products, and Financial and other Services. Avco Lycoming is part of the Aerospace/Technology group along with other division such as Bell Helicopter, Avco Aerostructures, and HR Textron.

Avco Lycoming consists of three major plants located in Williamsport, Penn., Greer, South Carolina, and Stratford, Connecticut. Avco Lycoming builds gas turbine engines that area used in land, sea, and air applications. Several of the engine applications include, General Dynamics' Abrams M1 tanks, Bell Cobra Helicopters, Boeing Chinook Helicopters, Bell LCAC landing craft, and BAe 146 Airliners.

MAINFRAME

Figure 1, portrays the Computing World at Avco Lycoming. At the heart of the system is a IBM 3090-200. This system, running under MVS/XA & SNA uses three operating systems TSO, CICS, and IMS to drive 32 megabytes of memory and 32 gigabytes of disk storage. Attached to the system are over 900 terminals with more than 250 printers. In addition typical other devices such as plotters, tape drives, external communications, and high resolution graphics are also available. Besides the typical common languages (like COBOL, FORTRAN, ASSEMBLER, etc.) are user oriented tools and languages such as SAS, RAMIS II, DB2, TELL-A-GRAF, GDDM, and ETC.

MINICOMPUTERS

Besides the mainframe there are over 40 minicomputers made up of a large verity of models and manufactures (HP 1000's, DEC VAX 11/78x, DEC PDP, IBM B100's, IBM S/1, etc.) that total up to 37 megabytes of memory and 4.8 gigabytes of disk storage. Typical usage of minicomputers includes engineering applications, material testing, engine test cells, and CAD/M/T applications. These systems are also used as front ends, communications and data reduction devices for the mainframe computer.

MICROCOMPUTERS

A relative new comer to the computing world (less than 5 years old) are the 250 or more microcomputers at Avco Lycoming. Combined they represent over 175 megabytes of memory and 2.1 gigabytes of disk storage. Making up the microcomputer collection are a combination of IBM or IBM compatible machines. Examples are IBM PC's, IBM PC/XT's, IBM PC AT's, IBM 3270 PC's, IBM 3270 PC AT's, COMPAQ Portables, COMPAQ 286 Portables, COMPAQ Deskpro 386, and a few other units such as HP and Apple's.

The typical new configuration is an IBM PC AT, 640K+ of memory, HP Laserjet or Epson printer, EGA color monitor, and a IRMA board (when needed). Typical software includes, dBASE III Plus, IBM's Display/Write 4 (DW/4), Lotus 1-2-3 version 2.01, and DOS 3.2. If needed other packages are available such as PROLOG, LISP, PASCAL, CLIPPER, Freelance Plus, LAN's, etc.

Microcomputer applications range from wordprocessing to Artificial Intelligence. User departments include engineering, business, field sites and sales. In one application, industrial microcomputers are connect via a LAN to a Series I minicomputer which in turn is controlling NC equipment.

MICROCOMPUTER USE AND ABUSE

Like many companies, Avco Lycoming is concerned with the proper use and potential abuse that microcomputer technology gives. In the old days it was relatively easy to secure a mainframe or several minicomputer, but with 250 independent microcomputers around (one machine for every 20 people including shop workers) use and abuse is becoming an important issue.

At Avco we are working to develop sound answers to typical questions such as. How do you control unauthorized access and usage? How do you ensure proper backup especially on systems that lack connections to a host or a LAN ? How do you perform traditional DP auditing on user controlled and operated computers ? How do you ensure proper and common documentation ? How do your provided adequate cross training and disaster recover procedures ? How do you insure data and information integrity ? How do you promote traditional data processing capability like System Analysis, Software Engineering, and production turnover for large and repetitive user developed systems ? How do you limit reproduction of data, and promote data sharing ? And how do you ensure that management usage beneficial and cost effective ? Hopefully by future SUGI conferences we will be able to provide working solutions to many of these concerns.

CRYSTAL BALL COMMENTS

Size, speed, and costs will have the major influence in the next generation of micros. Once additional materials (such as amorphous materials) join the PC production environment, the physical size will be reduced, additional increases in speed and power, and the reduction in cost be scene. At the same time, sales will increase not by higher cost as todays machine are generating, but instead by wider distribution and larger usage. Figure 2 presents a trend comparison of computer weight, volume, floor space, memory costs, disk cost, capacity, and MIPS from the early 1970's IBM 360/30 to the latest IBM PC AT's of today. Take a look at it, it is an interesting chart.

The elimination of the conventional minicomputer is slowly taking place today. COMPAQ's Deskpro 386 is a good example. Running under a UNIX operating system with several dumb terminals hanging off it, the 386 can support multiple users and multiple process. Wasn't that way the mini's were developed in the first place? At the other end, we are also seeing introductions of smaller mainframes like IBM's 9370, a cut down of the System 370 family. A common question asked is what will this do to the traditional minicomputer manufactures with the mainframes and microcomputers eating away in their market.

Integrated software shells and future DOS will have limited similarity to traditional one user one application microcomputers that we know of today. The new CPU processors are getting faster every day, along with a general increase of I/O devices. The old wait for 10 minutes while the spread sheet loads, is no longer a good solution for todays data intensive industries. Multi-application, if not also multi-user, systems with data sharing are needed to support current domains and to allow the CPU to fully utilize it's potential.

If yesterdays buzz word was microcomputers, then todays is Artificial Intelligence. In actuality it is both that will enable each others field grow into the future. Both microprocessors and AI theory need each other.

The most important area of tomorrow will be in concept of professional workstations. Engineers for years have seen the productivity gains from workstations. It is now time to spread this concept to the rest of the computer user base. If we are going to run our organizations on data, then accurate, timely, available data is needed. It is going to be the workstations that will pull it all together.

CONCLUSION

In conclusion, I would like to leave you with three separate quotes. I believe they are very appropriate in this day and age, even though one of them was written a long time ago.

"A tool is but an extension of a man's hand and a machine is but a complex tool; and he that invents a machine augments the power of man and the well-being of mankind" Henry Ward Beecher (1813-1887)

"A computer represents two important additions to one's life. The first is the gift of education ... and the second ... the gift of something money cannot usually purchase: An additional time for living." Michael Rogers, Senior Editor Personal Computing 1983

THE DRIVER OF PRODUCTIVITY IS THE USE OF TECHNOLOGY

Thankyou, Jeff.

ABOUT THE AUTHOR

E. Jeffrey Hutchinson is a Senior Materiels Systems Automation Specialist for Avco Lycoming Textron. He started his career at General Dynamics, Data Systems Division, Eastern Center. Starting as a COBOL programmer he worked his way into the user support / Information Center environment. At Avco, Jeff supported the Information Service Center, before going the Materiels department as a Senior staff manager for the Vice President. Jeff has overall automation responsibility for the procurement and material's organizations. His educational background consists of an MBA from the University of New Haven, and MS in Computer Science from RPI, he is currently working on his PHd in Computer Science at Polytechnic University in New York, and is a adjunct Instructor for the University of New Haven Graduate School computer science department. Jeff is also this years Microcomputer Section Chairperson. Jeff may be reached at ...

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COMPUTING WORLD OF AVCO LYCOMING

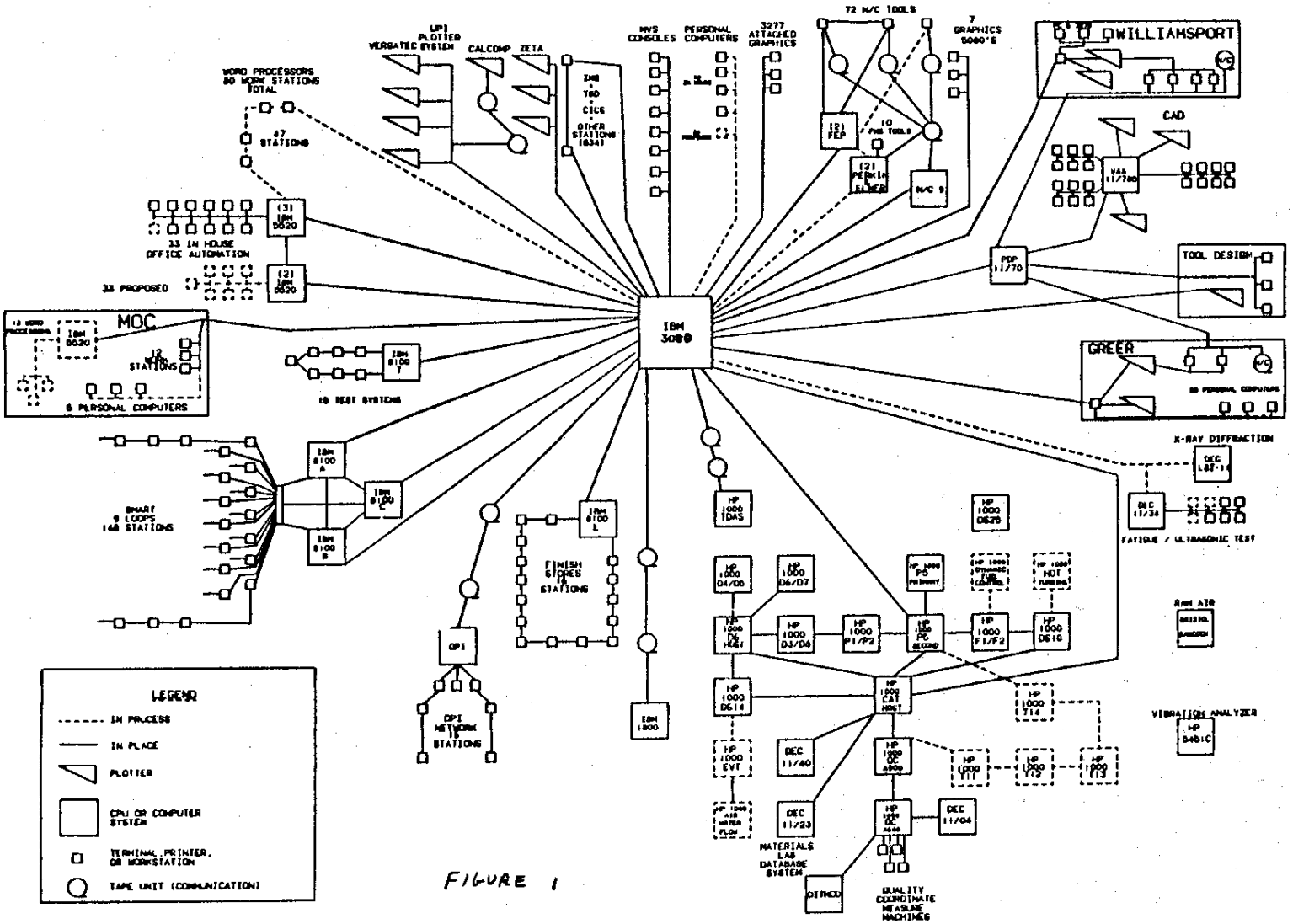

FIGURE 1

TRENDS IN COMPUTING

YEAR	1970	1982	1984	1985	RATIO
UNIT	360/30	PC	PC/AT	PC/AT+	
CPU WEIGHT (LBS)	1,700	25	21	21	-81:1
VOLUME (CUBIC FEET)	75.5	1.02	1.02	1.02	-75:1
FLOOR SPACE (SQ.FT.)	15.1	2.2	2.2	2.2	-7:1
MEMORY COST (64KB)	$10,000	$344	$125	$60	-475:1
DISK COST (MB)	$33,000	$450	$80	$40	-2,450:1
CAPACITY (KB)	64	1,000	3,000	16,000	250:1
MIPS	.03	.27	.81	1.0	33:1

(cost based on 1971 constant dollars)

FIGURE 2