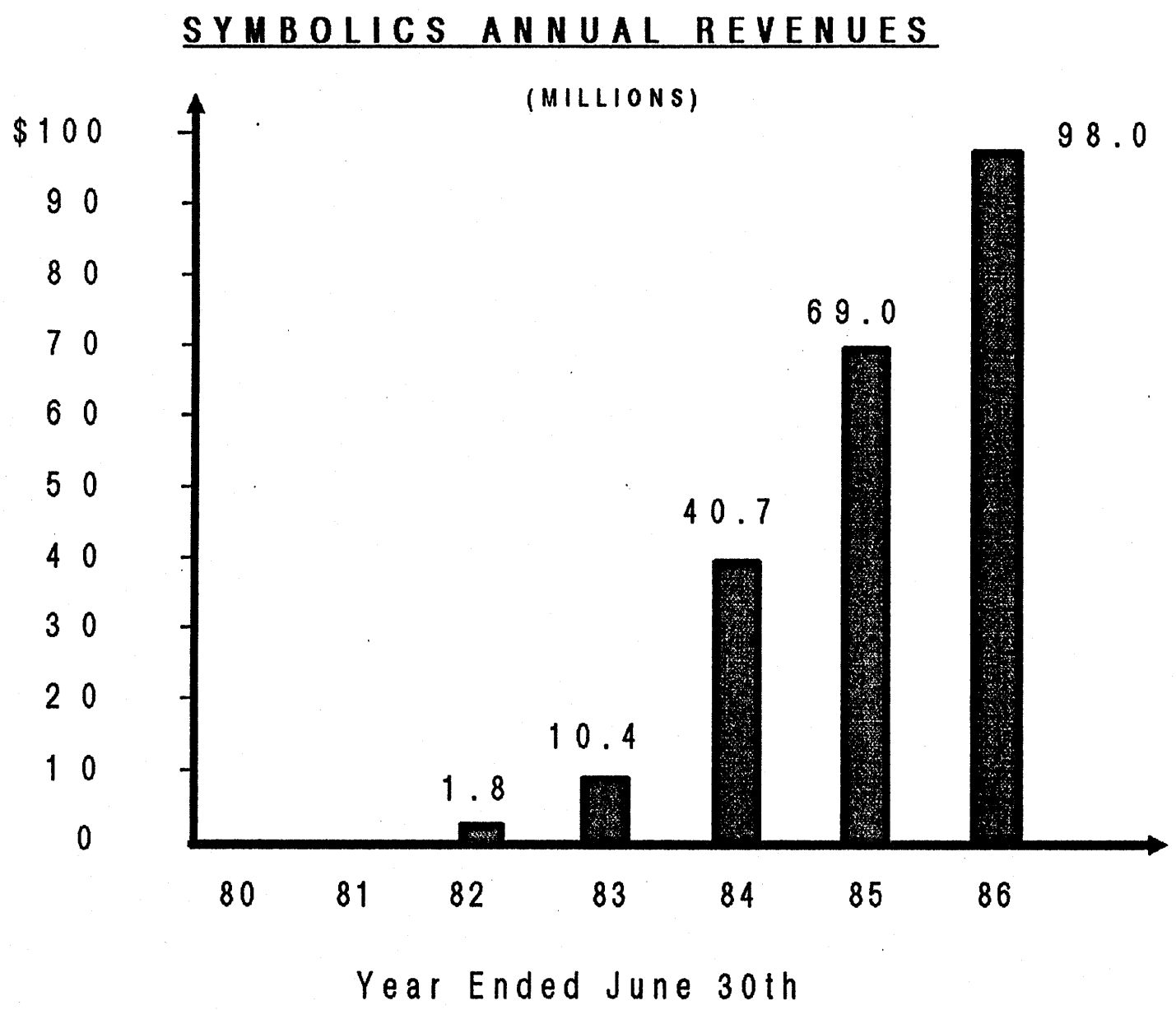
SYMBOLICS' HISTORY

- Origins at the MIT Artificial Intelligence Laboratory
- Incorporated in April of 1980 for the Commercialization of Lisp Machine Technology
- LM-2 in 1980
- 36 Bit Architectural Evolution 3600 in 1983
- Graphics Division Formed in 1983
- 3640 and 3670 in 1984
- Initial Public Offering, November of 1984
- 3645 and 3675 in 1985
- First VLSI Symbolic Processor 3610, 3620, and 3650 Genera Software in 1986

Symbolics


SYMBOLICS ANNUAL REVENUES
(MILLIONS)
$100
90
80
70
60
50
40
30
20
10
0
1.8
10.4
40.7
69.0
98.0
80
81
82
83
84
85
86
Year Ended June 30th

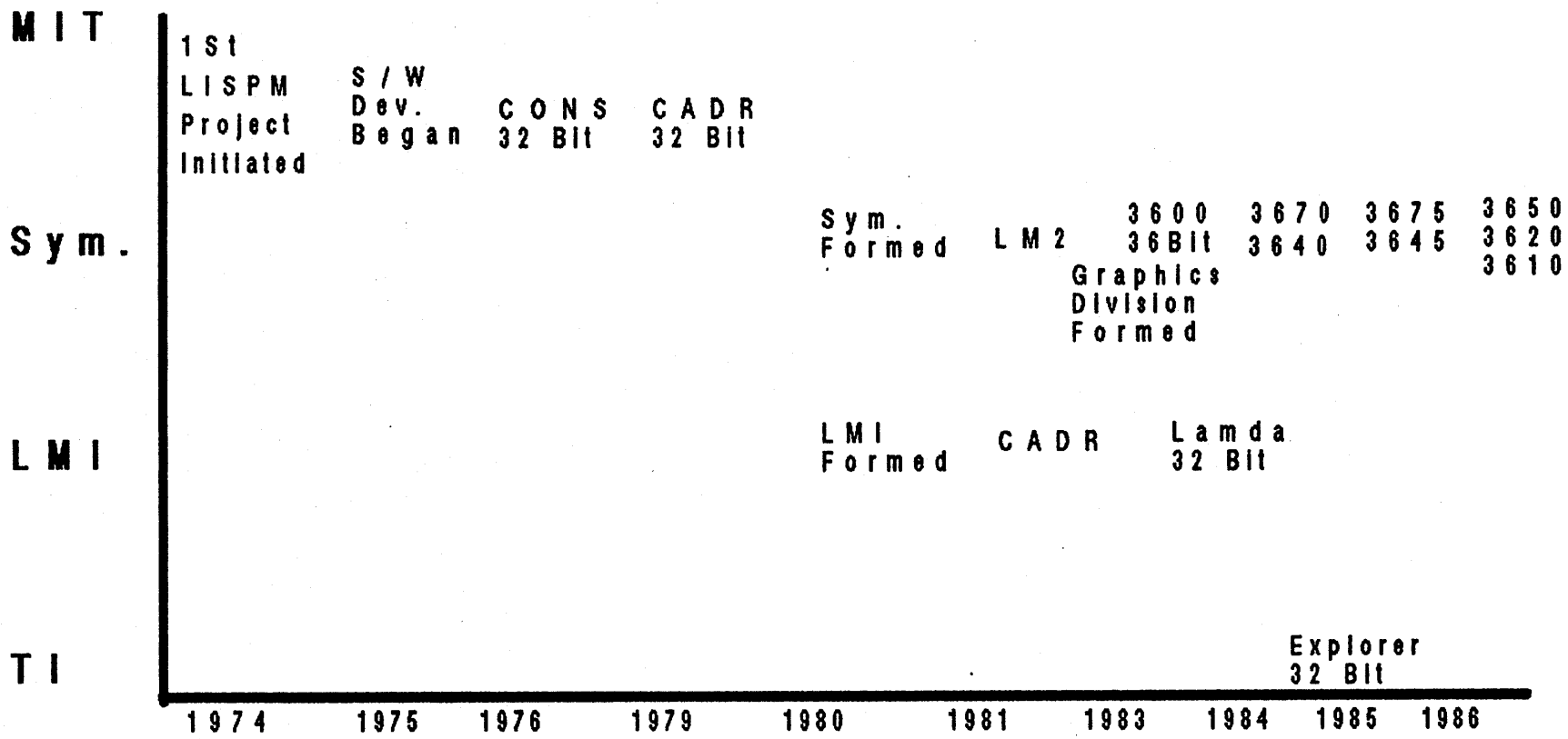
Symbolics

SYMBOLICS PRODUCT LINE

- Symbol Processing Computers
- Integrated Software Environment
  - GENERA Software Environment
  - Integrated Languages
    - Symbolics Common Lisp
    - Common Lisp
    - Prolog
    - Ada
    - Fortran - 77
    - Pascal
- Macsyma
- Color Graphics System
- Local Area Networking
- Educational Services
- Support Services
- Leasing

Symbolics

Evolution of Symbolic Processors

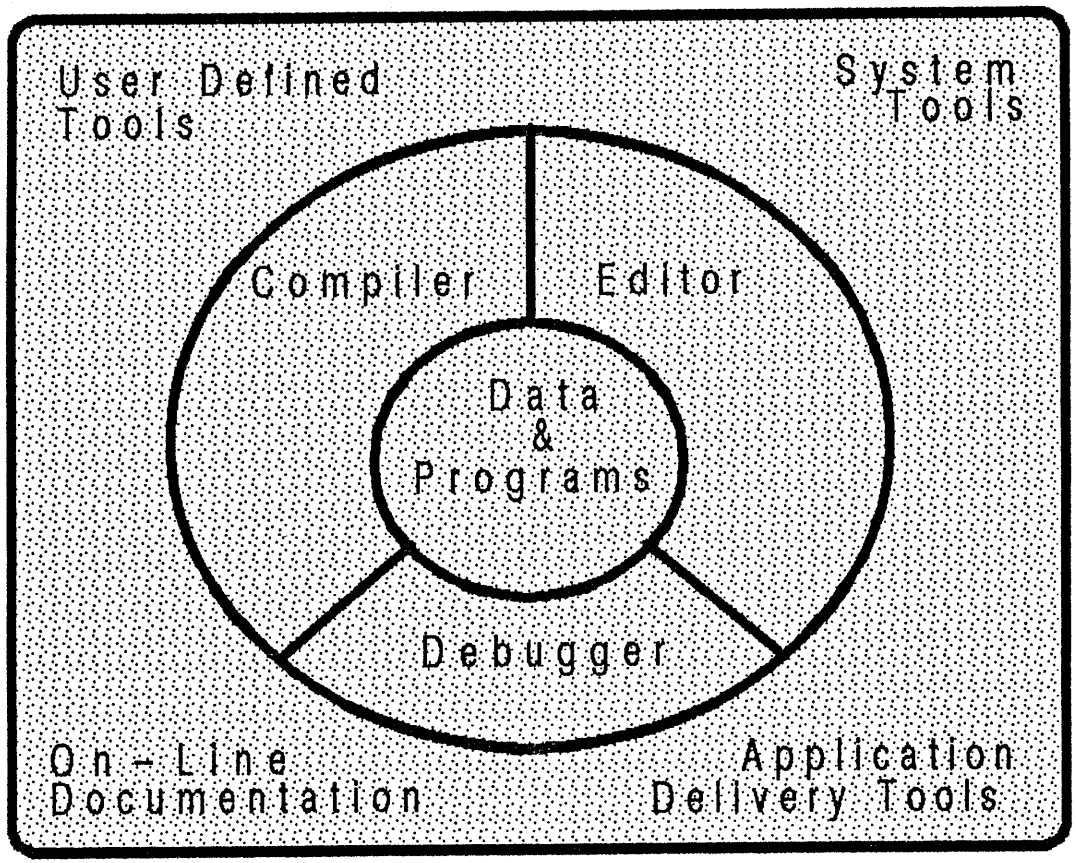


* The CONS, CADR, and LM2 are based on microcode emulator architectures. The LISP instruction set is emulated by microcode. (32 bit architectures)

** The 3600 replaced microcode emulators with special hardware to support high speed symbolic and numeric computation and expanded virtual memory to 1 Gbyte.

Symbolics

INTEGRATED GENERA ENVIRONMENT



The Integrity of the GENERA Environment Significantly Advances Software Engineering Methodologies. By Minimizing the Time and Details of Editing, Compiling, and Debugging, Programmers can Spend more Time on the Creative Aspects of Software Development.

Symbolics

SYMBOLICS GENERA

Productivity Tools for SOFTWARE DEVELOPMENT

- Symbolics Common Lisp
- Multiple Languages
- Incremental Compilation
- Dynamic Linking
- Peek System
- Data Structure Inspector
- Object Oriented Programming Flavor Examiner
- Zmacs Editor with Extensions
- Symbolic Debugger
- Comprehensive On - Line Documentation
- Dynamic Windows
- Metering Tools

Symbolics

SYMBOLICS SOFTWARE RELEASE 7.0

- Large Virtual Display
- Horizontal and Vertical Scrolling in All Windows
- Mouse, Context Sensitivity for text in a Window
- Uniformity in Syntax, Commands and Functions
- Complete Implementation of Common Lisp
- Table Management System
- Improved Debugging Tools
- New Flavors
- File Protection
- World Optimization
- Application Delivery Features

  Frame – Up Layout Designer

  Firewall (Layered Product)

Symbolics

3600 FAMILY ARCHITECTURE

- 36-Bit Custom Proprietary Design
- Tagged Architecture with runtime Data Type Checking
- Stack Orientated with Stack and Data Caches
- Large Virtual Address Space (up to 1 Gigabyte)
- Hardware assisted Ephemeral Object Garbage Collector for Memory Efficiency
- Interactive, High Resolution Display with Bit Mapped Graphics
- Single and Double Precision Floating Point Accelerator options
- Front End Processor (MC68000)
- Multi-Tasking in a Single Address Space
- 2 Micron CMOS VLSI Gate Array Technology
- 44 Bit Memory with Double Bit Error Detection and Single Bit Error Correction

Symbolics

3600 FAMILY
3610

Compact, Cost Effective Software Environment for Delivering Symbolic Processing Applications

Standard Equipment:

3610 Processor

190 MByte Fixed Disk

4 MBytes Memory

Monochrome Console

GENERA Runtime Software

Options Include:

Ethernet Interface

Cartridge Tape Drive

Floating Point Accelerator

Printer

Symbolics

3600 FAMILY
3620

Compact, Cost Effective Entry–Level Development or Expandable Delivery Environment

Standard Equipment:

3620 Processor

190 MByte Fixed Disk

Ethernet Interface

GENERA Software Environment

Options Include:

Monochrome Console (required)

4 – 16 MBytes Memory
(4 MByte minimum required)

Additional 190 MByte Fixed Disk

Cartridge Tape Drive

Floating Point Accelerator

Printer

Symbolics

3600 FAMILY
3650

Mid-range Development System, High Performance Delivery System, or Small Network File Server

Standard Equipment:

3650 Processor

368 MByte Fixed Disk

Ethernet Interface

GENERA Software Environment

Options Include:

Monochrome Console (required)

4 - 60 MBytes Memory
(4 MByte minimum required)

Additional 368 MByte Fixed Disk

All Color Systems

9 Track Reel-to-Reel Tape Drive

Cartridge Tape Drive

Floating Point Accelerator

Printer

Symbolics

3600 FAMILY
3675

Most Powerful Development System, High Performance File Server

Standard Equipment:

3675 Processor

515 MByte Fixed Disk, or
300 MByte Removeable Disk

Ethernet Interface

GENERA Software Environment

Options Include:

Monochrome Console (required)

4 – 28 MBytes Memory
(4 MByte minimum required)

Maximum of 8 Disk Drives

All Color Systems

9 Track Reel-to-Reel Tape Drive

Cartridge Tape Drive

Floating Point Accelerator

Printer

Symbolics

3600 FAMILY
3640/3645 "PLUS" SYSTEMS

Mid-range Development or Delivery Systems
Available now thru 9/30/86

Standard Equipment:

3640/3645 Processor

190 MByte Fixed Disk (3640),
368 Mbyte Fixed Disk (3645)

Monochrome Console

4 MBytes Memory

Ethernet Interface

GENERA Software Environment

Options Include:

4 - 28 MBytes Memory

Additional 190 MByte Fixed Disk (3640)

All Color Systems (Except 24 Bit)

Enhanced Performance Options (3640)

Cartridge Tape Drive

Floating Point Accelerator

Printer

Symbolics

SYMBOLICS "PLUS" SYSTEMS PROMOTIONAL PRICING

"PLUS" PACKAGES AVAILABLE UNTIL 9/30/86

	"PLUS" PRICE	REGULAR PRICE	CUSTOMER SAVES
3640-190Plus	$39,900	$57,000	$18,000
3640-368Plus	$45,900	$63,900	$18,000
3645-190Plus	$51,900	$68,900	$17,000
3645-368Plus	$56,900	$74,900	$18,000

Each "PLUS" System is Configured with Disk and:

- 4 MBytes of Memory
- Monochrome Console
- Ethernet Interface

Symbolics

3600 FAMILY
Generic Networking

The Generic Networking System Supports Multiple Protocols, which are Selected Automatically by the System to Give Users Transparent Access to the Network

Ethernet

TCP/IP

DECNet

Chaosnet

RS - 232

SNA - Facility

Symbolics

3600 FAMILY
COLOR GRAPHICS SYSTEM

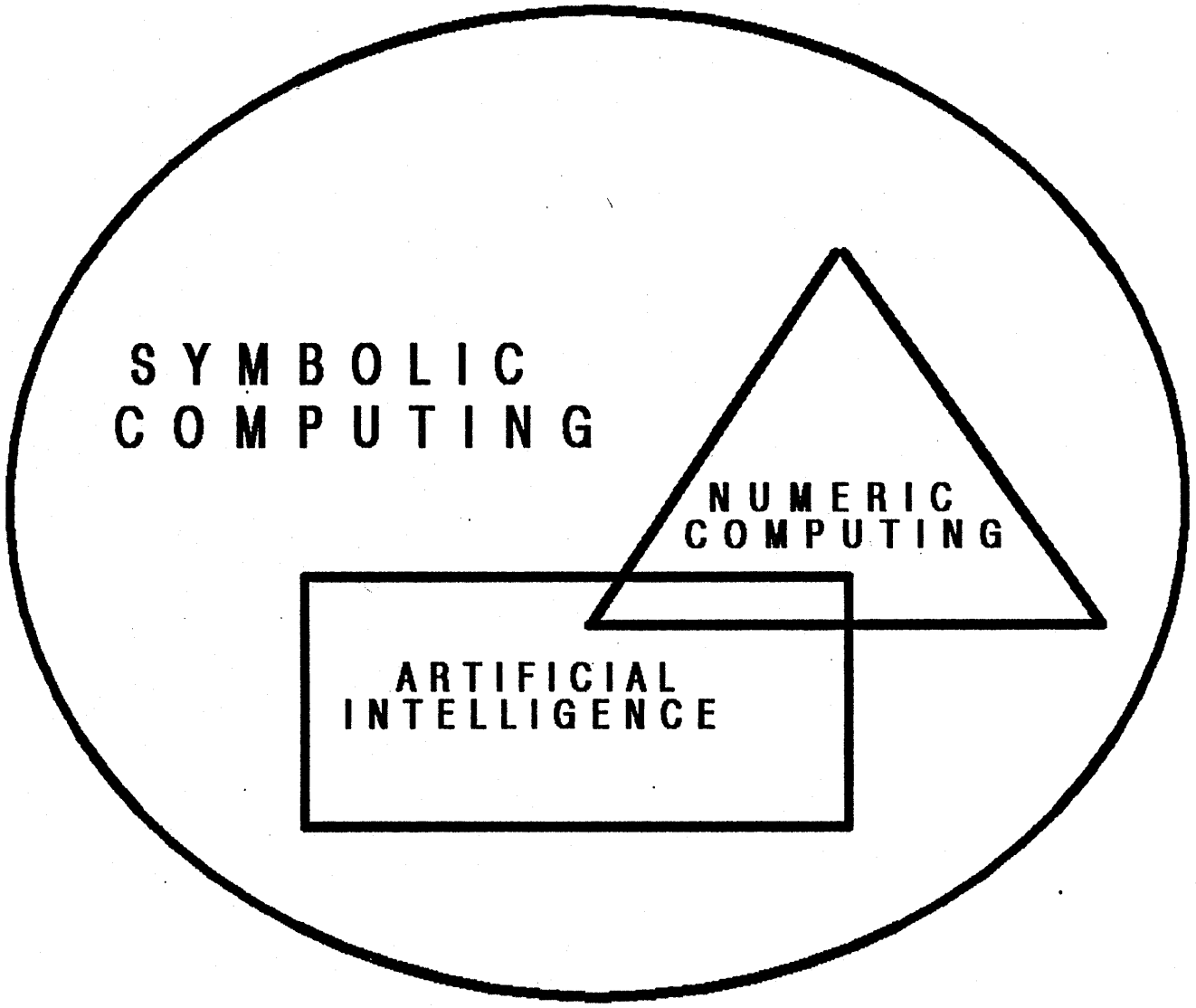
- Complete Hardware and Software for Full 2 and 3 Dimensional Images
- Easy to Use Mouse or Tablet Selected Display Menus
- 256 - 16 Million Colors
- Interactive, Display Oriented, Color Editor
- User Selectable Display Screen Resolution up to 1280 x 1024 Pixels
- Color memory is mapped directly into 3600 Address Space
- Integrated entirely with the Lisp Window System
- Programmable Sync. Generator
- Variety of Character Fonts
- Variety of Frame Buffers for various Application Specific Requirements

Symbolics

SYMBOLIC PROCESSING

COMPUTING WITH
DATA STRUCTURES
THAT MORE CLOSELY MODEL
A PERSONS THINKING
THAN THOSE USED IN
NUMERIC PROCESSING

COMPUTING WITH
DATA STRUCTURES
THAT ARE APPROPRIATE TO
THE PROBLEM BEING SOLVED
RATHER THAN STRICTLY
NUMBERS


SYMBOLIC
COMPUTING
NUMERIC
COMPUTING
ARTIFICIAL
INTELLIGENCE

Symbolics

NUMERIC COMPUTING

- Focus on Calculation
- Captures the Quantitative Aspects of a Problem Domain
- Analytical Modeling

SYMBOLIC COMPUTING

- Focus on Decision Making
- Captures the Qualitative Aspects
- Manages Concepts and their Relationships and Properties
- Supports Models at a High Level of Abstraction
- Advanced Programming Technology where Programs can be Manipulated as Data Objects

ARTIFICIAL INTELLIGENCE

- Embedding Intelligent Behavior in Machines by:
- Knowledge Representation and Acquisition
  Reasoning About Circumstances
- Can Mimic Human Expertise in a Well Defined Problem Domain
- Symbolic Processing at the Limits of Complexity

Symbolics

TYPICAL APPLICATIONS FOR SYMBOLIC PROCESSING

COMPLEX PROBLEMS WHICH REQUIRE THE MANIPULATION OF KNOWLEDGE AS WELL AS NUMBERS

- Rapid Prototyping
- Software Design and Development
- Expert Systems for:
  - Fault Diagnostics
  - Seismic Analysis
  - Signal Interpretation
  - Corporate Financial Analysis
  - Operations Planning
  - Mathematics, Calculus, Algebra
- Artificial Intelligence Research
- CAD/CAE/CIM
- Image Processing
- Vision / Speech / Robotics
- Training
- Simulation
- Process Control
- Natural Language
- C^3I
- Animation

SYSTEM REQUIREMENTS

SYMBOLIC COMPUTING

- Large Efficient Memory
  (Both Physical and Virtual)
- Efficient Storage Reclamation
- Tagged Data Architecture

COMPLEX APPLICATIONS

- Object – Oriented Programming
- Run – Time Robustness
  (Error Recovery)
- Highly Effective User Interface
- Integrated, Interactive Environment
- Comprehensive Tools and Facilities

Symbolics

SYMBOLICS GENERA

Symbolics Wheels: Productivity Tools for APPLICATIONS DELIVERY

- User Interface Features
  - Frame Up – Layout Designer
  - SemantiCue Enhanced Interaction System
  - Showcase Display Facilities
- Smartstore Storage Management Facilities
  - Table Management System
  - Ephemeral – Object Garbage Collector
  - World Optimization
- Application Construction Tools
- Incremental Source Modification

Symbolics

SYMBOLICS GENERA

POWERFUL TOOLS FOR SOFTWARE DEVELOPMENT AND APPLICATIONS DELIVERY

Transforms the Software Development Process by:

- Enhancing Programmer Productivity
- Harnessing Creativity
- Insuring Orderly Development

Smooths Application Implementation by Building In:

- Deliverability
- Flexibility
- User Friendliness
- Application Performance
- Application Maintainability

Symbolics

3600 FAMILY COLOR SYSTEM

8 – BIT CAD BUFFER

Standard Features:

Programmable Resolution up to 1024 x 1024

Integrated Color Graphics Software

1 MByte of Pixel Memory

128 KBytes of Overlay Memory for Independent Color Overlays

Options Include:

Color Monitor

Graphics Tablet

Symbolics

3600 FAMILY COLOR SYSTEM

32 BIT BROADCAST NTSC RESOLUTION FRAME BUFFER

Standard Features:

Programmable Resolution up to 864 x 582

Integrated Color Graphics Software

Hardware Pan and Zoom

RS-343A, NTSC, and PAL Video Formats

Options Include:

Color Monitor

Genlock Paddle Card (Synchronizes to External Video Signal or Sync)

Digitizing Frame Grabber
Accepts analog RGB (RS-170(A))
640 x 480 Pixels
24 Bits Deep

Graphics Tablet

Symbolics

3600 FAMILY
COLOR SYSTEM

HIGH RESOLUTION
24 BIT FRAME BUFFER

Standard Features:

Programmable Resolution up to
1280 x 1024

Integrated Color Graphics Software

Hardware Pan and Zoom

8, 16, or 24 Bits Deep (Upgradable)

RS-343A, NTSC, and PAL Video
Formats

Options Include:

Color Monitor

Genlock Paddle Card (Synchronizes
to External Video Signal or Sync)

Digitizing Frame Grabber
Accepts analog RGB (RS-170(A)
640 x 480 Pixels
24 Bits Deep

Graphics Tablet

Symbolics

SYMBOLICS EDUCATIONAL SERVICES

- Two Locations
  - San Francisco, CA
  - Cambridge, MA
- Total Staff: 20 People
- 4 Full Time Instructors Each Location
- 25 Symbolic Processors Each Location
- Courses:
  - Site Administration, 3 Days
  - Common Lisp 1, 5 Days
  - Common Lisp 2, 5 Days
  - Windows and Flavors, 5 Days
- Workbook: Using Your Symbolics Computer

Symbolics

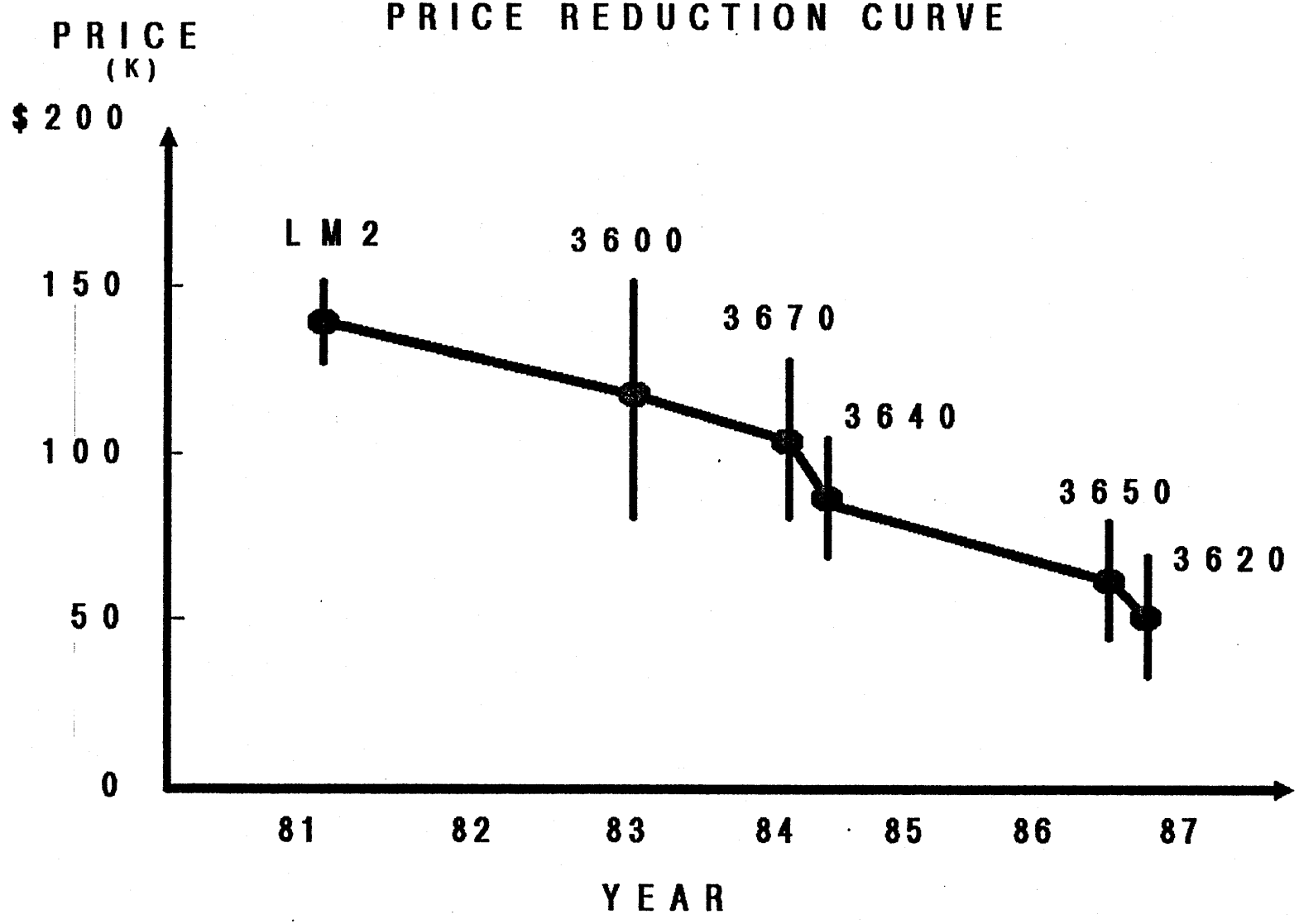
SYMBOLICS CUSTOMER SERVICE

(AS OF JULY 1, 1986)

- 34 Sites in the U.S.A.
  - Average 4 – 5 CSE's / Site
  - Spare Parts at Sites
  - 800 # for Hardware and Software Support
- Palo Alto
  - John Ashley, Manager
  - 6 Customer Service Egrs.
- International Offices
  - West Germany
  - London, England
  - Japan
  - Canada
  - Finland
  - France
  - Italy
  - Israel

SYMBOLICS

PRICE REDUCTION CURVE



Symbolics Installed Accounts

NORTHWEST AREA

LOCKHEED
SYTEK
AIR FORCE
UC S.F.
CALMA
UC BER.
INTEL
CLOROX
LITTON
XEROX
ANALOG DEVICES
VARIAN

SCHLUMBERGER
TEKNOWLEDGE
INTELLICORP
NELSON ANAL.
REASONING
KESTREL
ROCKWELL
MARTIN MARIETTA
U. of COLORADO
U. of WASH.
BOEING
PYRAMID

IBM
H P
FMC
AMI
ADS
AMD
GE
SRI
GTE
ESL
MAD
TRW

LAWRENCE LIVERMORE LABS
SANDIA NATIONAL LABS
UC S. C.
NASA
LUCID
FORD AERO.
ARMY
STANFORD
INFERENCE

Symbolics

WHY SYMBOLICS

- Best Price / Performance Symbolic Processors
- Widest Range of Processors for Software Development and Delivery
- Fastest LISP Execution
- GENERA Integrated Software Development Environment
- Widest Variety of Applications Tools
- Leader in Third Party Software
- Extensive Industry Standard Networking
- High Quality Education and Service