

MEMOREX DISC SUBSYSTEM STRATEGY

- 1. IBM PRODUCT LINE EVOLUTION**
- 2. MEMOREX PRODUCT PLAN**

IBM Has Historically Increased System Performance by Alternately Improving CPU and Disc Drive Performance...

IBM CPU and Disc Drive PRODUCT LINE EVOLUTION

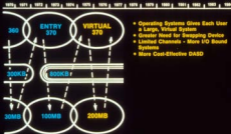


IBM CPU AND DISC DRIVE PRODUCT LINE EVOLUTION

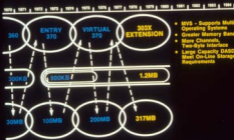


- Operating System Supports More Users
- Upward Compatibility of Programs
- Block Multiplexer Channels
- New, High-Speed Tape and DASD

IBM
CPU AND DISC DRIVE
PRODUCT LINE EVOLUTION



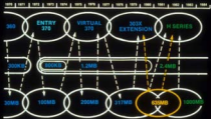
IBM CPU AND DISC DRIVE PRODUCT LINE EVOLUTION



LARGE CPU AND DISC DRIVE PRODUCT LINE EVOLUTION



LARGE CPU AND DISC DRIVE PRODUCT LINE EVOLUTION



IBM PRODUCTS

IBM FACES EXTENSIVE S/370-COMPATIBLE COMPETITION



IBM PRODUCTS
THE 303X SERIES IS A BRIDGE TO S/380



SEEN AS

- **PRICE CUT TO MEET COMPETITION**
- **ENCOURAGE MOVE TO MYS**

IBM PRODUCTS

A 3350 UPGRADE WOULD EXTEND THE LIFE OF S/370 ARCHITECTURE



IBM AND EQUIVALENT CPU INSTALLED BASE (UNITED STATES)

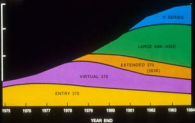
NUMBER OF CPUs

20,000

15,000

10,000

5,000

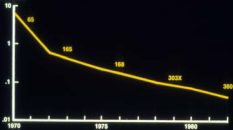


PROJECTED S/380 CAPABILITIES

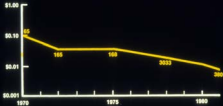
- A. SUPPORT MULTIPROCESSING ENVIRONMENTS
- B. REDUCES APPARENT COMPLEXITY
- C. PROVIDE DYNAMIC ADAPTATION

MEMORY PRICE PER MEGABYTE

\$ MILLIONS

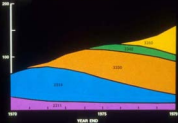


CPU MONTHLY RENTAL PRICE PER MIPS



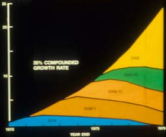
INSTALLED DISC SPINDLES (UNITED STATES)

THOUSANDS OF UNITS

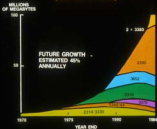


INSTALLED DISC MEGABYTES (UNITED STATES)

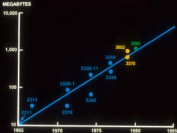
BILLIONS OF MEGABYTES



PROJECTION OF INSTALLED DISC MEGABYTES (UNITED STATES)

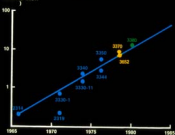


CAPACITY PER SPINDLE



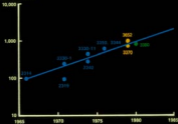
AREAL DENSITY

BITS PER SQUARE INCH



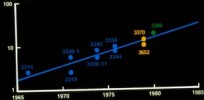
TRACK DENSITY

TRACKS PER INCH



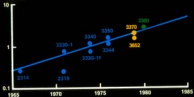
BIT DENSITY

BITS PER INCH
(THOUSANDS)



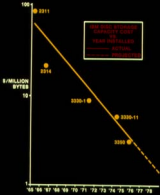
DATA TRANSFER RATE

MEGABYTES
PER SECOND



IBM DISK STORAGE
CAPACITY COST
vs.
YEAR INSTALLED

———— ACTUAL
———— PROJECTED



DISC STORAGE SUBSYSTEM PERFORMANCE IMPROVEMENTS

	IBM	SONY	HP	IBM	SONY
SECTOR OVERLAP	X	X	X	X	X
CHANNEL SWITCHING	X	X	X	X	X
ROTATIONAL POSITION SENSING		X	X	X	X
STRING SWITCHING		X	X	X	X
WRITE FORMAT RELEASE		+	X	X	X
FIXED HEADS				X	X
MULTIPLE PORT		+	+	+	X
MULTIPLE ACTUATORS					X
SOLID STATE CACHE		+	+	+	X

DISC STORAGE SUBSYSTEM PERFORMANCE IMPROVEMENTS

	IBM	IBM-1	IBM-11	IBM	IBM
SEEK OVERLAP	X	X	X	X	X
CHANNEL SWITCHING	X	X	X	X	X
ROTATIONAL POSITION SENSING		X	X	X	X
STRING SWITCHING		X	X	X	X
WRITE FORMAT RELEASE			X	X	X
FIXED HEADS				X	X
MULTIPLE PORT					X
MULTIPLE ACTUATORS					X
SOLID STATE CACHE					X

ANNOUNCEMENT RENTAL PRICE PER SPINDLE

DOLLARS PER MONTH

\$1000

\$500

2011

2014

2008-5

2010

2012

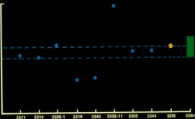
2009-11

2008

2014

2010

2009



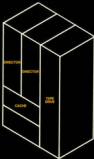
ANNOUNCED AND
ANTICIPATED CHARACTERISTICS
OF THE
IBM 3090-1

- TWO DIRECTORS PER SCU
- NEW LSI CIRCUITRY
- LESS MICROPROCESSOR FUNCTION
 - SAME 200 ns CYCLE TIME
 - NARROW CONTROL STORE WORD
 - LIMITED DRIVE CONFIGURATIONS
- WILL NOT SUPPORT 3080



ANTICIPATED CHARACTERISTICS OF THE IBM 3090-2

- TWO DIRECTORS PER SCU
- SAME CIRCUITRY AS 3090-1
- ONLY SCU TO SUPPORT 3089
- ADDITIONAL FEATURES
 - SUBSYSTEM CACHE
 - SUPPORTS SECOND DISC PATH
 - CONTROLS DEDICATED TAPE DRIVE FOR OFFLINE FAST DUMP/RESTORE
- SUBSTANTIAL UPGRADE FROM 3090-1



**ANNOUNCED AND
ANTICIPATED CHARACTERISTICS
OF THE IBM 3390**

1. COST-REDUCED IBM
2. 265.5 MB PER ACTUATOR, 571 MB PER SPINDLE
3. \$600 PER MONTH ON TWO-YEAR LEASE FOR 3390-81 MODULE
4. SUPPORTED BY 3860-1 ON 43XX AND BY 3860-2 ON H-SERIES
5. 1.80 MB DATA RATE RESTRICTS ATTACHMENT TO 43XX & H-SERIES
6. HEADS ARE THIN-FILM (SEMICONDUCTOR)
7. DISCS ARE PARTICULATE
8. TWO INDEPENDENT ACTUATORS
9. ONE SET R/W AND LOGIC ELECTRONICS

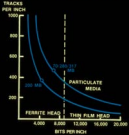


ANTICIPATED CHARACTERISTICS
OF THE
IBM 3380 (9H/HTM/F)

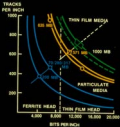
1. 1000-1000 MB PER SPINDLE
2. \$600-\$700 PER MONTH ON TWO-YEAR LEASE FOR 3380-B1 MODULE
3. SUPPORTED ONLY BY 3864-2 ON H-SERIES
4. 2.4 MB DATA RATE RESTRICTS ATTACHMENT TO H-SERIES
5. HEADS ARE THIN-FILM (SEMICONDUCTOR)
6. DISCS ARE SPATTERED, CONTINUOUS FILM
7. FOUR INDEPENDENT ACTUATORS, OPERATING IN PAIR
8. EACH PAIR HAS ACCESS TO ALL DATA TRACKS ON ONE LOGICAL VOLUME
9. ONE ACTUATOR FROM EACH PAIR SHARES ONE OF TWO SETS OF I/O AND LOGIC ELECTRONICS



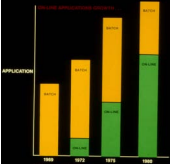
PARAMETERS OF CURRENT DISC PRODUCTS



EXPECTED PARAMETERS OF FUTURE DISC PRODUCTS



ON-LINE APPLICATIONS GROWTH



- GREATER RESOURCE DEMANDS
- DATA IS NOW AN ASSET

STAR GAZING PROGRESS IN 1500 YEARS...

1. PTOLEMY — 49 AD

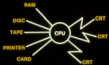


2. COPERNICUS — 1543 AD



DP GAZING PROGRESS IN JUST 12 YEARS....

1. WATSON — 1965 AD



2. LUTYAK — 1977 AD

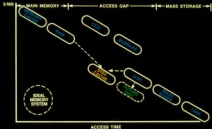


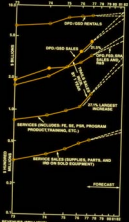
- **Data Management Requires More Knowledgeable People.**



- **Users are Turning More to Automated DBMS**
 1. **Systems Today are Inefficient**
 2. **Systems Today Require More Resources**

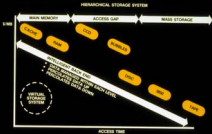
LARGE SYSTEM STORAGE HIERARCHY





TOTAL REVENUE (BILLIONS)

- New Memory Technologies are Developing to Help Solve Problems, but the Need for efficient Data Management SSM Remains to be Solved



String Switch

1. Alternate path around Channels/SCU Busy or Failure.

String Switch

1. Alternate path around Channels/SCU Busy or Failure.
2. Limited to one Read/Write per string.

String Switch

1. Alternate path around Channels/SCU Busy or Failure.
2. Limited to one Read/Write per string.
3. SC failure non-redundant.

MEMOREX

MEMOR EXC

MEMOR EXCE

MEMOR EXCEL

MEMOR EXCELL

MEMOR EXCELLE

MEMOR EXCELLEN

MEMOR EXCELLENC

MEMORY EXCELLENCE