INTRODUCTION TO
HP IMAGE/3000

Computer Museum

FILES (ON DISC):
CUSTOMER
OPEN ORDER
BACK ORDER
INVENTROY
SHIPPING
VEHICLE STATUS

ORDER ENTRY

HP2120 OR HP9830
BRANCH PROCESSOR

SALES BRANCH

ORDER ENTRY

INVENTORY CONTROL

WAREHOUSING AND INVOICING

CORPORATE HEADQUARTERS

HP2120 DOS—M/CCS
DATA CONCENTRATOR

HP3000
IMAGE
HP2100 FRONT END

ORDER ENTRY

REMOTE SALES OFFICES

ORDER ENTRY

- **FILES (ON DISC):**
- CUSTOMER
- OPEN ORDER
  BACK ORDER
- SHIPPING

ORDER ENTRY

FILES (ON DISC OR TAPE):
CUSTOMER
OPEN ORDER
BACK ORDER
CLOSED ORDER
INVENTORY
VENDOR
PURCHASE ORDER
INVOICE
SHIPPING
VEHICLE STATUS
RECEIVABLES
PAYABLES
TRANSACTIONS
BUDGETS

MARKETING

STATISTICIAN

WAREHOUSING

RECEIVING

INVENTORY CLERK

INVENTORY CONTROL

INVENTORY MANAGER

TRAFFIC/TRANSPORTATION

SHIPPING

DISPATCHER

ACCOUNTING

ACCOUNTS CLERK

LEDGER CLERK

PURCHASING

BUYER

DATA SYSTEMS
INDUSTRIAL MARKETING

HEWLETT hp PACKARD

INTRODUCTION

INTRODUCTION

Information management is becoming industry's most pressing concern — both from a cost-reduction point of view and an organizational efficiency standpoint. Hewlett-Packard has recognized, through its own sales experience and industry observations, that many automated information systems are not responsive to management's needs. The HP IMAGE/3000 has been especially developed to implement a successful, integrated information system.

Information flow is concerned with two main tasks: *data collection* and *data distribution*. Both these tasks depend upon individual conditions within a particular firm for their organizational solution. These conditions vary to an extra ordinary degree with the type of business, size of firm, and the firm's structure. This means that new technical developments are required to ensure more accurate and faster methods of data processing. Because of HP's recent advancements in applications technology, a *data base* has been structured which yields timely, accurate information to all levels of management. The HP IMAGE/3000 applies this new application technology to standard business functions, such as accounting and order processing, as well as to such strategic applications as inventory management and control.

Comprised of independent — but interrelated — subsystems, the IMAGE/3000 is based upon a logical approach for modular implementation. Collectively, these subsystems meet the information processing requirements of an entire organization. Developed on the *data base* concept of capturing data, and distributing that data to widely dispersed areas, the IMAGE/3000 system serves both *short term* and *long run* information management requirements. The HP IMAGE/3000 subsystems may be implemented on a logically sequenced priority basis to satisfy specific needs while at the same time building a foundation for follow-on subsystems. Not only does this yield immediate, tangible results, but it also builds a total system solution which reduces duplication of data flow.

This *preliminary* training manual is intended as an aid in training HP field sales personnel. The manual covers the basic concepts of HP IMAGE/3000 system development and the manner in which those concepts are implemented. The manual will be updated as more information becomes available. Whole sections may even be added as the need arises. In the meantime, if you have suggestions or contributions of your own, please let us know about them. Additional copies of this manual may be obtained from the *Data Systems Industrial Marketing Department.*

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

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THE DATA BASE

DEFINITION

THE TERM *DATA BASE* IS USED TO DESCRIBE A COLLECTION OF DATA (RECORDED ON A DISC) STRUCTURED IN SUCH A WAY THAT THERE EXIST METHODS TO CROSS-REFERENCE AND LINK THE DATA.

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DATA BASE MANAGEMENT
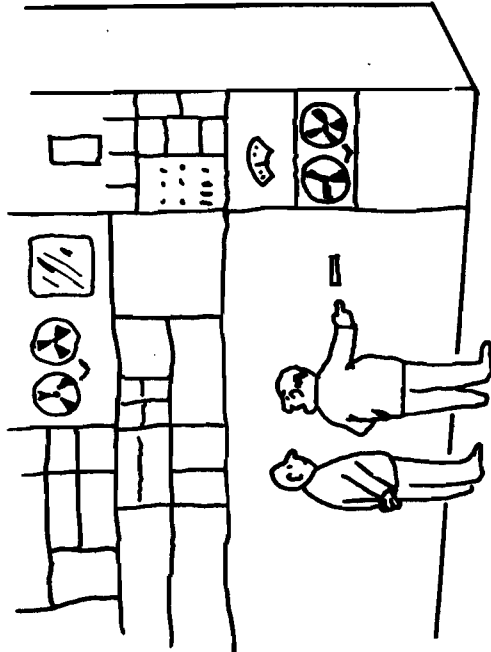
"THE MACHINE THEN SELECTS THE LIKELY EQUATIONS FROM A COMPLICATED PATTERN OF THEORETICAL PROBABLES. IT CALCULATES THESE, AND THE CORRECT ANSWER IS PRINTED ON A CARD. THEN OUR MISS SWENSON FILES THEM GOD KNOWS WHERE, AND WE CAN NEVER FIND THE DAMN THINGS AGAIN."

DATAMATION

DATA BASE MANAGEMENT

FILE STRUCTURE

DATA BASE

. . . .

RECORD N

SMITH PHOENIX
ARIZONA MALE

RECORD N+1

AZTOR PASADENA
CALIFORNIA FEMALE

RECORD N+2

LINDBERG SANTA CLARA
CALIFORNIA MALE

RECORD N+3

CONALLY PASADENA
CALIFORNIA FEMALE

. .

FILE STRUCTURE

4
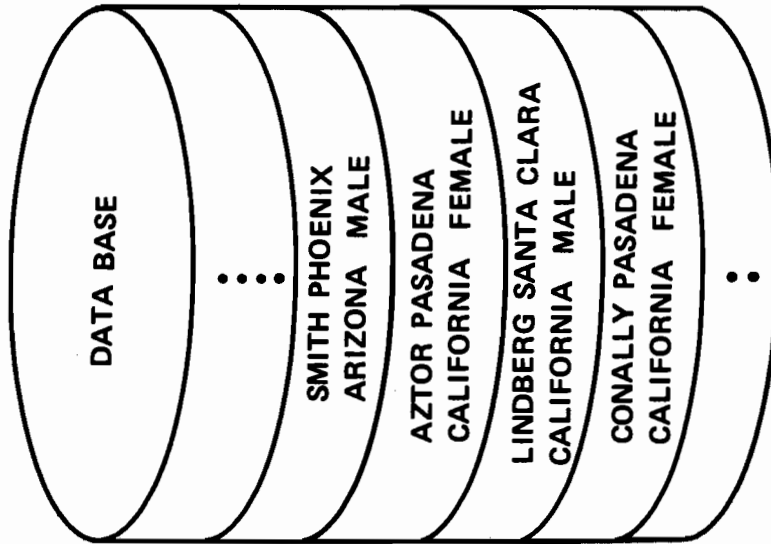
ATTRIBUTE-VALUE PAIRS

IMAGINE A DATA BASE CONTAINING INFORMATION ABOUT ALL U.S. CITIZENS. THE INFORMATION CONSISTS OF:

- NAME
- CITY
- STATE
- SEX

THE WORDS *NAME, CITY, STATE,* AND *SEX* ARE CALLED *ATTRIBUTES*.

THE ACTUAL DATA RECORDED IN THE DATA BASE ("SMITH", "PHOENIX", "ARIZONA", "MALE") ARE THE *VALUES*.

AN ATTRIBUTE AND ITS ASSOCIATED VALUES FORM *ATTRIBUTE-VALUE PAIRS*.

SOME EXAMPLES:

NAME — SMITH
CITY — PHOENIX
NAME — AZTOR
STATE — CALIFORNIA
STATE — ARIZONA
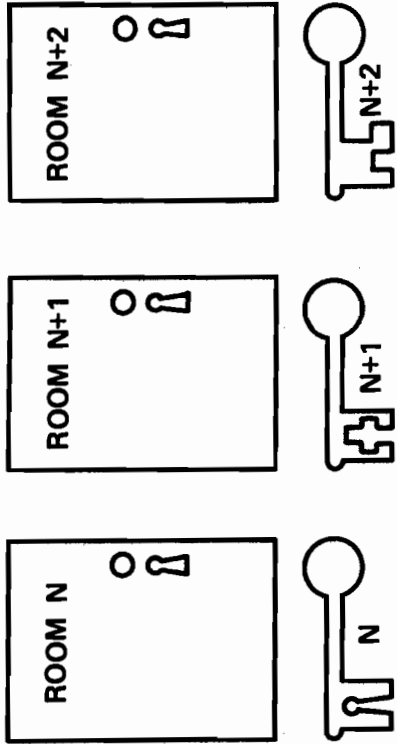
KEYS

RECORDS ARE ACCESSED BY USING SOME CONVENIENT ATTRIBUTE-VALUE
PAIRS. FOR EXAMPLE:

CITY — PASADENA
STATE — CALIFORNIA

SUCH ATTRIBUTE-VALUE PAIRS ARE CALLED *KEYS*.

LINKS

SOME *KEYS*, LIKE STATE – CALIFORNIA, QUALIFY MORE THAN ONE RECORD FOR ACCESS. ONE WAY TO FIND ALL QUALIFIED RECORDS IS TO SERIALLY SCAN THE DATA BASE AND EXAMINE EACH RECORD FOR THE OCCURENCE OF THE SPECIFIED KEY. THIS IS OBVIOUSLY NOT A FEASABLE METHOD.

A MORE EFFICIENT METHOD IS TO LINK TOGETHER RECORDS HAVING THE SAME KEYS.

STATE – CALIFORNIA   N+1

HEAD-OF-LIST

SMITH
PHOENIX
ARIZONA
MALE

RECORD N

LINDBERG
SANTA CLARA
CALIFORNIA
MALE   N+3

N+1

CONALLY
PASADENA
CALIFORNIA
FEMALE   0

N+2

AZTOR
PASADENA
CALIFORNIA
FEMALE   N+2

N+3
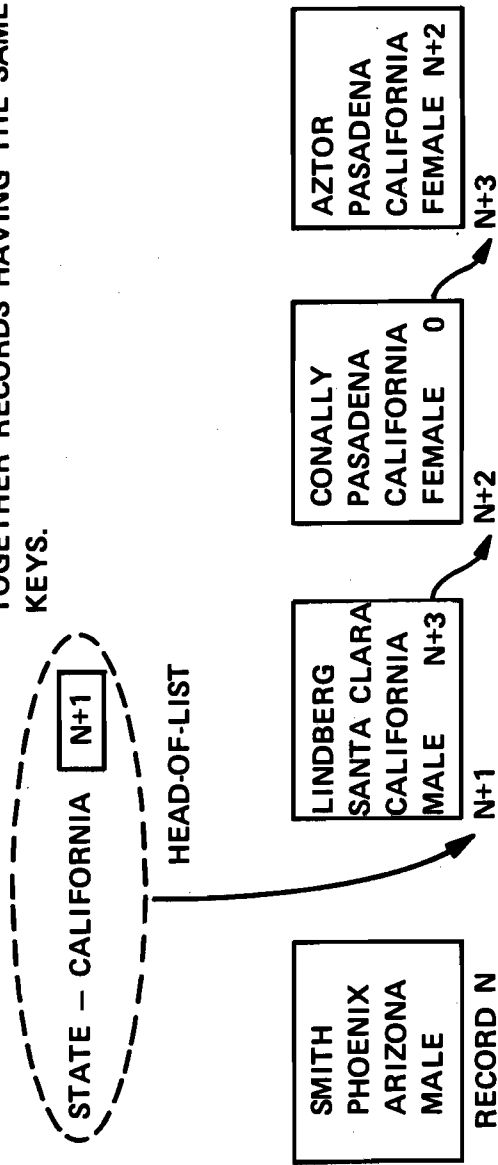
KEY DIRECTORY

A DATA RECORD MAY HAVE MORE THAN ONE *KEY* WHICH MEANS THAT IT MAY BE IN MORE THAN ONE LIST. SUPPOSE IT IS DESIRED TO ACCESS ALL RECORDS CONTAINING THE KEYS *CITY – PASADENA* AND *STATE – CALIFORNIA*.

STATE – CALIFORNIA | N+1
CITY – PASADENA | N+1
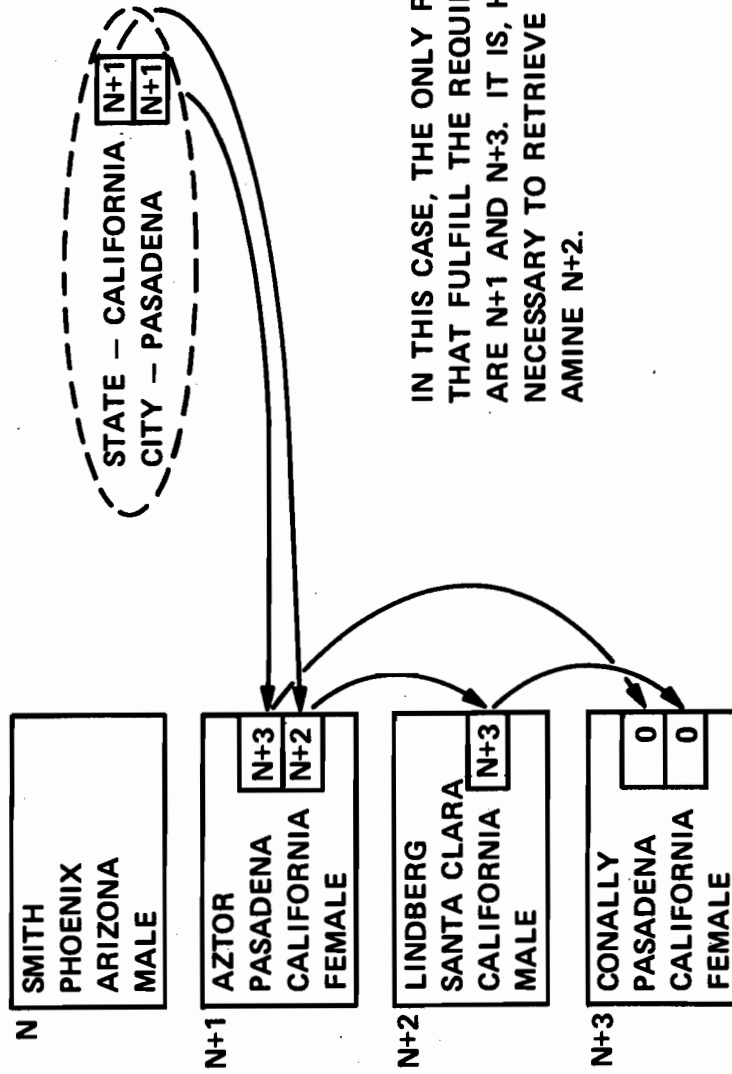
IN THIS CASE, THE ONLY RECORDS THAT FULFILL THE REQUIREMENTS ARE N+1 AND N+3. IT IS, HOWEVER, NECESSARY TO RETRIEVE AND EX-AMINE N+2.

N | SMITH
PHOENIX
ARIZONA
MALE

N+1 | AZTOR
PASADENA
CALIFORNIA
FEMALE | N+3
N+2

N+2 | LINDBERG
SANTA CLARA
CALIFORNIA
MALE | N+3

N+3 | CONALLY
PASADENA
CALIFORNIA
FEMALE | 0
0

KEY DIRECTORY (CON'T)

THE PROBLEM DESCRIBED ON THE PREVIOUS PAGE CAN BE OVERCOME USING A DIRECTORY CONTAINING ALL KEYS AND THEIR ASSOCIATED RECORD ADDRESSES.

STATE — CALIFORNIA: N+1, N+2, N+3

CITY — PASADENA: N+1, N+3
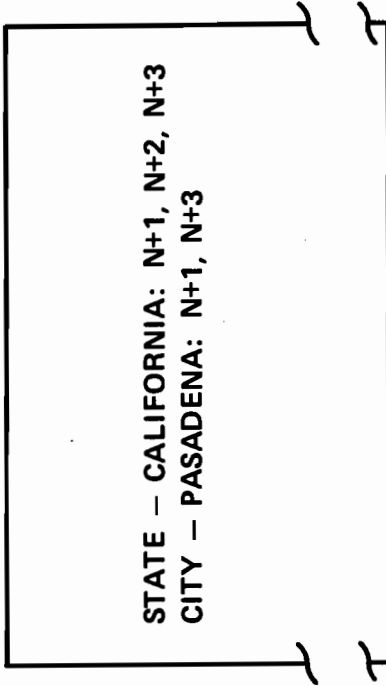
IT IS THEN QUITE EASY TO UPDATE AND RETRIEVE THE REQUIRED RECORDS. THIS ELIMINATES ANY UNNECESSARY RETRIEVING.

A *MASTER ENTRY* CONTAINS INFORMATION COMMON TO ALL OF ITS *DETAIL RECORDS*

MASTER ENTRY ITEMS (1 PER ORDER)

- CUSTOMER NAME
- CUSTOMER ADDRESS
- SHIP TO NAME
- SHIP TO ADDRESS
- CUSTOMER NUMBER
- SALESMAN NUMBER
- CUSTOMER TYPE
- TRC CODE
- DATE
- ORDER NUMBER

DETAIL ENTRY ITEMS (MULTIPLE PER ORDER)

- ITEM NUMBER
- MANUFACTURING DIVISION
- SUPPLYING DIVISION
- PRODUCT NUMBER
- OPTION NUMBER
- DESCRIPTION
- PRICE
- ORDER NUMBER

NOTICE THAT THE *ITEM* THAT TIES THE WHOLE THING TOGETHER IS *ORDER NO.* THIS IS CALLED THE *KEY* ITEM OR *CHAIN* ITEM.

HEWLETT PACKARD

%240805N0V9300332200
NEELY SALES DIVISION
3939 LANKERSHIM BLVD
NORTH HOLLYWOOD CALIF   91604

SAME

NEELY SALES DIVISION
3501 CAHUENGA
HOLLYWOOD   CALIF   90028

PLEASE CONTACT YOUR LOCAL HEWLETT-PACKARD SALES OFFICE FOR INSTRUCTIONS BEFORE RETURNING MATERIAL TO HEWLETT-PACKARD COMPANY.

CUSTOMER ORDER NUMBER   D-4325-16

24 08 00024 00 1000 34 0001100000
DEMO STOCK

351   YES

05NOV9   B/W - COL   240800103

NET 30

ITEM NO.	MFG DIV.	SUP DIV.	QUANTITY	B/V	PRODUCT NUMBER	DESCRIPTION	SUB/UNIT PRICE	UNIT PRICE	QUAN. SHIP	BAL. DUE
01	5	22 22	01		2761A	OPTICAL MARK READER	206250	206250	01	Ø
	5	22 22	01		4007	OPTN 200 CARDS	0000	0000		
02	5	22 22	01		12602A	PARALLEL INTERFACE	71250	71250	01	Ø

PRICES ARE LIST LESS 25%

RESALE

2775.

ENTRIES

DATA SETS

ORDER MASTER DATA SET

MASTER:

				A
1				A
2				A
3				A
4				A
5				A
6				A
7				A

CUSTOMER NAME.

ITEMS ⟩

ORDER NO.

ORDER DETAIL DATA SET

DETAIL:

				A
1				A
2				A
3				A
4				A
5				A
6				A

LINE NO.

ITEMS ⟩

ORDER NO.

THE ORDER SHOWN ON THE PREVIOUS PAGE IS AN ACCOUNTING DOCUMENT. IT HAS SEVERAL *ENTRIES*. IT HAS A *MASTER ENTRY* AND SEVERAL *DETAIL ENTRIES*. IN THIS CASE ALL OF THE *ENTRIES* ASSOCIATED WITH AN ORDER ARE LOGICALLY CONNECTED VIA THE *ORDER NUMBER (A)*. DISTINCT PIECES OF INFORMATION WITHIN ANY ENTRY ARE CALLED *ITEMS* (FIELDS). THEREFORE, ORDER NUMBER APPEARS AS AN *ITEM* WITHIN BOTH THE *MASTER* AND *DETAIL* ENTRIES.

A COLLECTION OF ENTRIES IS CALLED A *DATA SET*. THUS, THE COLLECTION OF ALL MASTER ENTRIES FOR ORDER ACCOUNTING RECORDS IS THE *ORDER MASTER DATA SET* WHILE ALL OF THE DETAIL ENTRIES COMPRISE THE *ORDER DETAIL DATA SET*.

ITEMS (FIELDS) HAVE THE FOLLOWING SIGNIFICANCE:

- STARTING LOCATION WITHIN THE ENTRY
- LENGTH IN BYTES OR WORDS
- TYPE OF INFORMATION
- NAME (SUCH AS ORDER NUMBER)
- VALUE (SUCH AS "A")

DATA SETS

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DETAIL DATA SET

SERIAL/DIRECT ACCESS

WHEN ENTRIES ARE PLACED ON THE DISC, IN AN IMAGE DATE SET, THEY ARE CALLED *RECORDS*. ITEMS ARE CALLED *FIELDS*. FOR ALL PRACTICAL PURPOSES, *ENTRY* AND *RECORD* ARE SYNONYMS AS ARE *ITEM* AND *FIELD*. FOR THE REMAINDER OF THIS DOCUMENT *ENTRY* AND *ITEM* ARE USED WHEN REFERENCING INFORMATION *EXTERNAL* TO THE COMPUTER SYSTEM WHILE *RECORD* AND *FIELD* ARE USED TO REFERENCE IMAGE DATA SETS ON THE *DISC*.

IMAGE DATA SETS CONSIST OF A RESERVED SPACE ON A DISC. THIS SPACE IS BROKEN INTO SMALLER SPACES EACH LARGE ENOUGH TO HOLD *ONE* RECORD. WITHIN AN IMAGE DATA SET, THERE ARE *N* SUCH RECORD SPACES.

RECORDS ARE ADDRESSED BY RECORD NUMBER: YOU MAY EITHER ADDRESS A PARTICULAR RECORD (DIRECT) OR YOU MAY ADDRESS THE ONE FOLLOWING THE LAST RECORD ACCESSED (SERIAL).

EXAMPLE:

DIRECT ACCESS TO RECORD 6. THE NEXT SERIAL ACCESS WOULD BE TO RECORD7.

RECORDS MAY BE CREATED, MODIFIED, OR REPLACED BY NUMBER.

DETAIL DATA SET

ENTRY (RECORD) NUMBER: 1 2 3 4 5 6 7 8

DATA ITEMS (FIELDS): N-5 N-4 N-3 N-2 N-1 N

CHAINED/SEQUENTIAL ACCESS

THE CHAIN (KEY) FIELD IN A DETAIL ENTRY DATA SET LINKS ALL RECORDS WITH AN IDENTICAL CHAIN FIELD VALUE.

THE SORT FIELD IS AN OPTIONAL SUBSIDIARY SORT KEY AND PROVIDES A LOGICAL SEQUENTIAL ORDER WITH LIKE VALUED CHAIN FIELDS. THE DATA SET SHOWN HAS THE FOLLOWING CHAINS:

```
A1  C4  D2  F1  G4  X3
A2  C6      F2      X7
A5          F3
A6
A8
```

IT IS POSSIBLE FOR ALL RECORDS TO HAVE THE SAME CHAIN FIELD VALUE. THE DATA SET WOULD THEN CONSIST OF ONE LONG CHAIN ORDERED BY THE SORT FIELD.

IF NO SORT FIELD EXISTS, THE CHAINS CONNECT RECORDS WITH IDENTICAL CHAIN ITEM VALUES IN A RANDOM ORDER.

DETAIL DATA SET

ENTRY (RECORD) NUMBER		SORT FIELD	CHAIN FIELD
1		6	C
2		6	A
3		2	D
4		1	F
5		5	A
6		7	X
7		2	F
8		4	G
N-5		8	A
N-4		3	X
N-3		3	F
N-2		4	C
N-1		1	A
N		2	A

DATA ITEMS (FIELDS)

MULTIPLE CHAINS

A DETAIL DATA SET MAY HAVE MULTIPLE CHAIN AND SORT FIELDS.

IN THE CASE OF THE DATA SET AT THE LEFT, THE FOLLOWING CHAINS WOULD BE CREATED:

CHAIN 1

A1 C4 D2 F1 G4 X3
A2 C6   F2   X7
A5   F3
A6
A8

CHAIN 2

•1 ••2 •••1
•1 ••3 •••1
•5 ••4 •••8
•6
•7
•7
•9

THUS — THE SAME DATA SET CAN BE ACCESSED IN DIFFERENT LOGICAL SEQUENCES

DETAIL DATA SET

ENTRY (RECORD) NUMBER	SORT 1 FIELD	CHAIN 1 FIELD		CHAIN 2 FIELD		SORT 2 FIELD
1	6	C	•	••	1
2	6	A	•••	••	8
3	2	D	•	••	7
4	1	F	•••	••	6
5	5	A	•	••	9
6	7	X	•	••	1
7	2	F	•••	••	1
8	4	G	••	••	3
N-5	8	A	••	••	2
N-4	3	X	•	••	5
N-3	3	F	•••	••	1
N-2	4	C	•	••	7
N-1	1	A	•	••	6
N	2	A	••	••	4

DATA ITEMS (FIELDS)

MASTER DATA SET

SERIAL/DIRECT/RANDOM ACCESS

MASTER DATA SET

RECORD (ENTRY) NUMBER	KEY FIELD	DATA ITEMS (FIELDS)		
1	A			
2	EMPTY			
3	C			
4	D			
5	EMPTY			
6	F			
7	G			
8	X			
9	EMPTY	→→→		
10				
11				
12				
13				
14				
15				
16	EMPTY			

MASTER ENTRY DATA SETS CAN BE ADDRESSED EITHER BY RECORD NUMBER OR BY THE VALUE OF THE KEY FIELD. RECORD NUMBER ADDRESSING IS SIMILAR TO THAT FOR DETAIL ENTRY DATA SETS.

WHEN A MASTER RECORD IS ADDRESSED BY A KEY FIELD VALUE, THE FOLLOWING HAPPENS:

KEY ITEM VALUE ⟶ [RANDOMIZING ALGORITHM] ⟶ RECORD ADDRESS

1→N

THUS – WHEN YOU ADDRESS A MASTER RECORD BY ORDER NUMBER, THE ORDER NUMBER IS CONVERTED TO A RECORD NUMBER FROM 1 TO N. FOR INSTANCE, LET'S SAY THAT THE RANDOMIZING ROUTINE FOR A ONE LETTER ORDER NUMBER IS THE BINARY VALUE OF THE LETTER MODULO FOR THE DATA SET SIZE. FOR A MASTER DATA SET OF SIZE 16, THE FOLLOWING WOULD BE THE RECORD NUMBER:

ORDER NO.	BINARY VALUE	MODULO 16
A	65	1
C	67	3
D	68	4
F	70	6
G	71	7
X	88	8

SERIAL/DIRECT/RANDOM ACCESS

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RANDOMIZING AND SYNONYMS

IN ANY RANDOMIZING ALGORITHM THERE IS A DANGER THAT MORE THAN ONE KEY FIELD VALUE WILL RANDOMIZE TO AN IDENTICAL RECORD NUMBER. A SET OF THESE KEY ITEM VALUES ARE CALLED SYNONYMS.

WHEN THIS HAPPENS, IMAGE 3000 LOOKS FOR THE NEXT AVAILABLE EMPTY SPACE AND ALLOCATES THAT RECORD SPACE TO THE SYNONYM. THE SYNONYMS ARE LINKED THROUGH A SYNONYM CHAIN.

CONSIDER THAT WE ADD THE FOLLOWING RECORDS TO THE PREVIOUS EXAMPLE:

ORDER NUMBER	BINARY VALUE	PRIMARY RECORD	ASSIGNED ADDRESS
H	72	8	9
J	74	10	10
Q	81	1	2

WHEN THESE RECORDS ARE ADDRESSED, IMAGE SEEKS TO THE PRIMARY ADDRESS FOR THE KEY ITEM VALUE AND THEN FOLLOWS THE CHAIN UNTIL THE IDENTICAL KEY VALUE IS FOUND. THUS — A, C, D, F, G, X AND J CAN BE FOUND WITH ONE ACCESS WHILE Q AND H MAY TAKE TWO.

MASTER DATA SET

RECORD (ENTRY) NUMBER	
1	A
2	Q
3	C
4	D
5	F
6	G
7	
8	X
9	H
10	J
11	
12	
13	
14	
15	
16	

KEY FIELD

DATA ITEMS (FIELDS)

COMPLICATIONS

WHEN SYNONYM CHAINS ALREADY EXIST, AND A NEW KEY FIELD VALUE MAPS INTO A PRIMARY LOCATION ALREADY OCCUPIED BY A SYNONYM OF ANOTHER CHAIN, THE SYNONYM MUST BE MOVED AND THE NEW RECORD LOCATED IN ITS PRIMARY LOCATION.

FOR INSTANCE, CONSIDER THAT ORDER NUMBER "I" IS ADDED TO THE MASTER DATA SET:

I   MAPS TO RECORD ADDRESS 9

9   IS ALREADY OCCUPIED BY H (A SYNONYM OF X)

H   IS MOVED TO 11 (THE NEXT AVAILABLE ADDRESS)

X   IS CHAINED TO THE NEW H AT 11

I   IS PLACED IN 9

THIS APPROACH ASSURES THAT AS MANY KEY VALUES AS POSSIBLE ARE LOCATED AT THEIR PRIMARY ADDRESSES, AND THAT WITHIN THIS CRITERIA THEIR SYNONYMS ARE LOCATED AS CLOSE TO THEIR PRIMARY AS POSSIBLE.

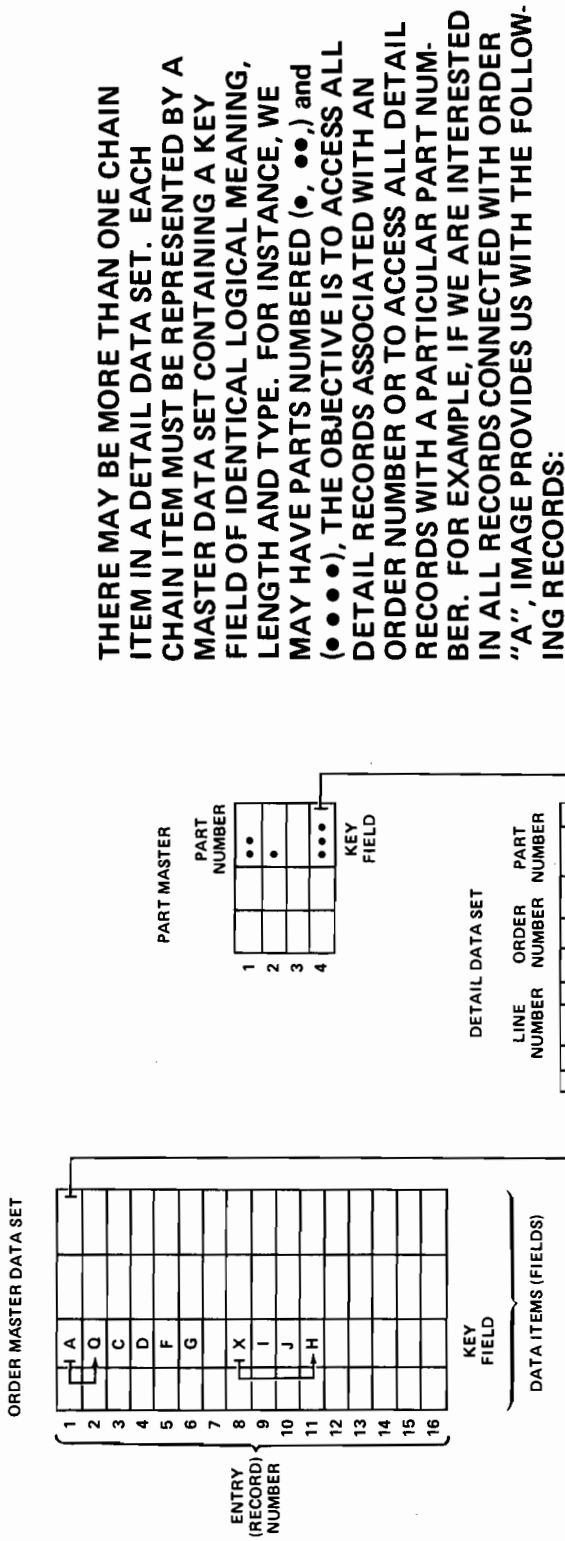| RECORD (ENTRY) NUMBER	KEY ITEM	DATA ITEMS (FIELDS)		
1	A			
2	Q			
3	C			
4	D			
5	F			
6	G			
7				
8	X			
9	I			
10	J			
11	H			
12				
13				
14				
15				
16				

DATA SET
RELATIONSHIPS

SINGLE MASTER/SINGLE DETAIL
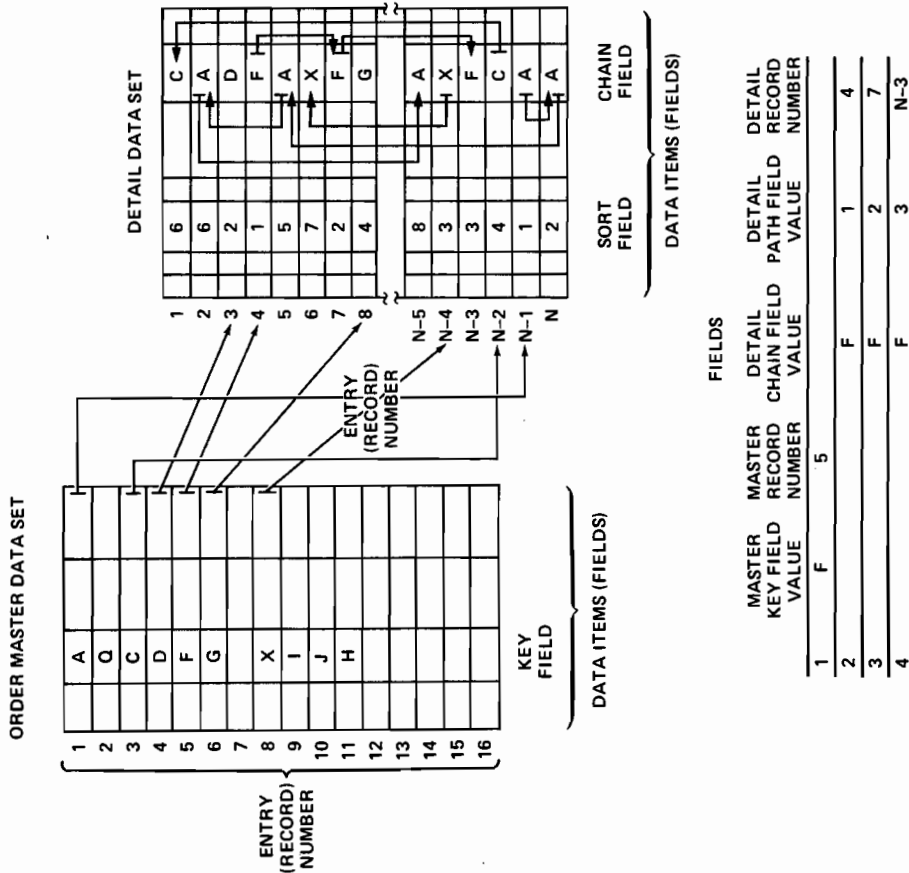
A DETAIL DATA SET CONSISTS OF SUBSETS OF RECORDS WITH IDENTICAL CHAIN FIELD VALUES CHAINED TOGETHER IN ORDER OF PATH FIELD VALUES OR, IF NO SORT FIELD EXISTS, IN RANDOM ORDER. THE FIRST DETAIL RECORD IN SUCH A CHAIN IS CALLED THE *HEAD OF CHAIN RECORD*. IN ORDER TO GET TO THE HEAD OF CHAIN RECORD, THE USER MUST GO THROUGH A MASTER DATA SET. IN FACT, *EACH DETAIL DATA SET MUST HAVE AT LEAST ONE MASTER DATA SET.* THE CHAIN FIELD OF THE DETAIL MUST HAVE THE SAME MEANING, LENGTH AND TYPE AS THE KEY FIELD OF ITS MASTER DATA SET (ALTHOUGH IT MAY BE NAMED DIFFERENTLY). FOR INSTANCE, IF YOU WISH TO ACCESS ALL OF THE MASTER AND DETAIL RECORDS ASSOCIATED WITH ORDER NUMBER "F", IMAGE FIRST ACCESSES THE MASTER RECORD FOR F. THIS RECORD POINTS TO THE HEAD OF THE "F" CHAIN IN THE DETAIL SET. THIS CHAIN IS FOLLOWED UNTIL ITS END.

ORDER MASTER DATA SET

ENTRY (RECORD) NUMBER	KEY FIELD
1	A
2	Q
3	C
4	D
5	F
6	G
7	
8	X
9	I
10	J
11	H
12	
13	
14	
15	
16	

DATA ITEMS (FIELDS)

DETAIL DATA SET

ENTRY (RECORD) NUMBER	SORT FIELD	CHAIN FIELD
1	6	C
2	6	A
3	2	D
4	1	F
5	5	A
6	7	X
7	2	F
8	4	G
N-5	8	A
N-4	3	X
N-3	3	F
N-2	4	C
N-1	1	A
N	2	A

DATA ITEMS (FIELDS)

FIELDS

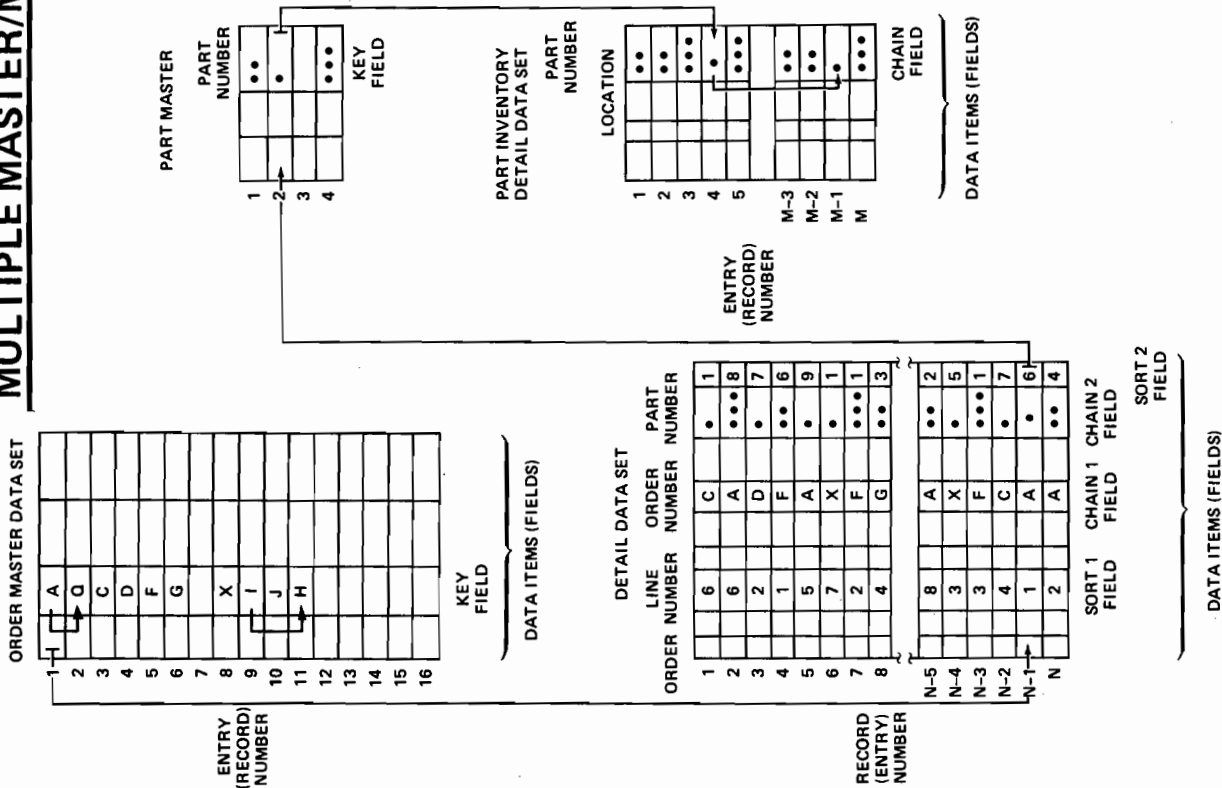| MASTER KEY FIELD VALUE	MASTER RECORD NUMBER	DETAIL CHAIN FIELD VALUE	DETAIL PATH FIELD VALUE	DETAIL RECORD NUMBER
1	F	5			
2			F	1	4
3			F	2	7
4			F	3	N-3

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MULTIPLE MASTER/SINGLE DETAIL

THERE MAY BE MORE THAN ONE CHAIN ITEM IN A DETAIL DATA SET. EACH CHAIN ITEM MUST BE REPRESENTED BY A MASTER DATA SET CONTAINING A KEY FIELD OF IDENTICAL LOGICAL MEANING, LENGTH AND TYPE. FOR INSTANCE, WE MAY HAVE PARTS NUMBERED (●, ●●,) and (●●●), THE OBJECTIVE IS TO ACCESS ALL DETAIL RECORDS ASSOCIATED WITH AN ORDER NUMBER OR TO ACCESS ALL DETAIL RECORDS WITH A PARTICULAR PART NUMBER. FOR EXAMPLE, IF WE ARE INTERESTED IN ALL RECORDS CONNECTED WITH ORDER "A", IMAGE PROVIDES US WITH THE FOLLOWING RECORDS:

ORDER MASTER RECORD	1	A
DETAIL RECORD	N-1	A1
DETAIL RECORD	N	A2
DETAIL RECORD	5	A5
DETAIL RECORD	2	A6
DETAIL RECORD	N-5	A8

IF WE ARE INTERESTED IN PART NUMBER (●●●) WHICH RANDOMIZES INTO ENTRY 4, IMAGE PROVIDES:

PART MASTER RECORD	4	●●●
DETAIL RECORD	7	●●● 1
DETAIL RECORD	N-3	●●● 1
DETAIL RECORD	2	●●● 8

PART MASTER

PART NUMBER

1	●●
2	●
3	
4	●●●

KEY FIELD

DETAIL DATA SET

LINE NUMBER	ORDER NUMBER	PART NUMBER
1	C	1
2	A	8
3	D	7
4	F	6
5	A	9
6	X	1
7	F	1
8	G	3
N-5	A	2
N-4	X	5
N-3	F	1
N-2	C	7
N-1	A	6
N	A	4

RECORD (ENTRY) NUMBER

SORT 1 FIELD   CHAIN 1 FIELD   CHAIN 2 FIELD   SORT 2 FIELD

DATA ITEMS (FIELDS)

ORDER MASTER DATA SET

ENTRY (RECORD) NUMBER	
1	A
2	Q
3	C
4	D
5	F
6	G
7	
8	X
9	I
10	
11	J
12	H
13	
14	
15	
16	

KEY FIELD

DATA ITEMS (FIELDS)

MULTIPLE MASTER/MULTIPLE DETAIL

IT IS POSSIBLE TO HAVE MORE THAN ONE DETAIL DATA SET FOR EACH MASTER DATA SET. THIS MULTIPLE DETAIL/MULTIPLE MASTER SCHEME OPENS UP AN INFINITE VARIETY OF PATHS THROUGH A DATA BASE. CONSIDER THE DATA BASE SHOWN.

HERE'S WHAT IMAGE WILL HELP YOU DO:

— IMAGE FINDS THE "A" MASTER AT LOCATION 1 OF THE ORDER MASTER.

— IMAGE WILL THEN LINK TO THE FIRST LINE NUMBER IN THE ORDER DETAIL (ENTRY N–1).

— THIS DETAIL ENTRY CONTAINS THE PART NUMBER (●) WHICH ENABLES IMAGE TO SEEK DIRECTLY INTO THE PART MASTER TO LOCATION 2.

— FROM THIS POINT, IMAGE CAN LINK TO THE PART DETAIL HEAD OF CHAIN (LOCATION 4). THE PHYSICAL LOCATION OF THE PARTS NECESSARY TO FILL THE REQUIREMENTS OF ORDER "A" CAN NOW BE DETERMINED.

DATA SCHEMA

DATA BASE SYSTEM

A COLLECTION OF RELATED DATA SETS IS A *DATA BASE*. AN EXAMPLE OF A DATA BASE MIGHT BE AN INVENTORY DATA BASE AS SHOWN ON THE PRE-VIOUS PAGES.

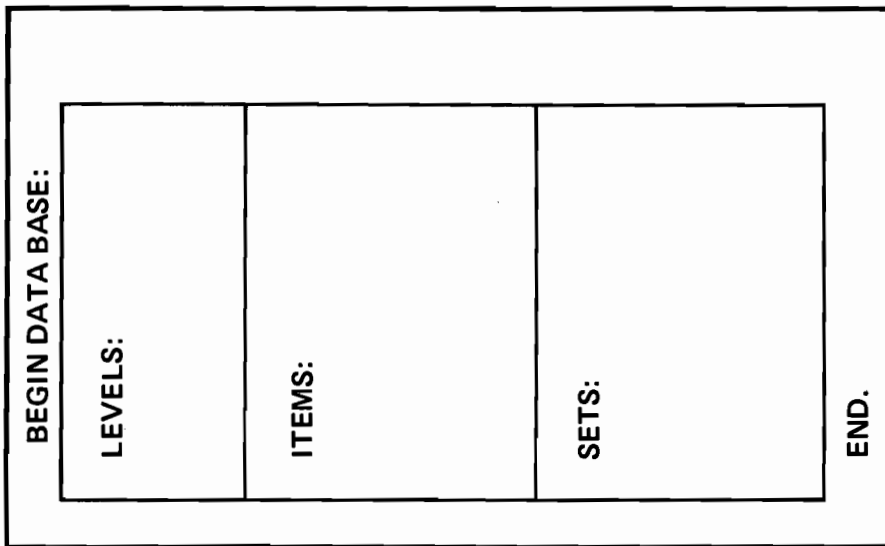SOME OF THE DATA SETS INCLUDED IN THE INVEN-TORY DATA BASE ARE:

    ORDER MASTER
    PART MASTER
    ORDER DETAIL
    PART DETAIL

THE FIELDS, RECORDS, AND DATA SETS COMPRISING A DATA BASE ARE DEFINED TO IMAGE VIA A *DATA SCHEMA*.

A DATA SCHEMA CONSISTS OF THREE MAIN SECTIONS: *LEVELS, ITEMS* AND *SETS*. LEVELS HAVE TO DO WITH *PRIVACY* WHICH IS NOT DISCUSSED HERE.

IN THE *ITEMS* SECTION; THE USER DEFINES THE NAME, LENGTH AND TYPE OF EACH FIELD IN HIS DATA BASE. A FIELD NEED ONLY BE DEFINED ONCE EVEN THOUGH IT MIGHT APPEAR IN SEVERAL DATA SETS WITHIN THE BASE.

IN THE *SETS* SECTION, EACH SET IS DEFINED IN TERMS OF THE TYPE OF DATA SET, THE FIELDS INCLUDED, AND THE RELATION TO OTHER DATA SETS.

BEGIN DATA BASE:

LEVELS:

ITEMS:

SETS:

END.

ITEMS

EACH LOGICAL ITEM TO BE INCLUDED IN AN IMAGE 3000 DATA BASE IS DEFINED IN THE DATA SCHEMA. SUBSEQUENTLY, THESE ITEMS ARE INCLUDED IN THE DEFINITIONS OF MASTER AND DETAIL DATA SETS. SUCH A REFERENCE TO AN ITEM NAME CALLS OUT THE DEFINITION OF THE ITEM AND PLACES THAT ITEM AS A FIELD IN MASTER AND DETAIL RECORDS. ITEMS ARE DEFINED IN TERMS OF:

- NUMBER OF SUB-ITEMS WITHIN THE ITEM. FOR INSTANCE, THERE MAY BE THREE FLOATING POINT WORDS OR TWO ASCII STRINGS OF TEN BYTES EACH.

- TYPE OF DATA: FLOATING, FIXED CHARACTER STRING, ETC.

- NUMBER OF UNITS WITHIN A SUB-ITEM.

ITEMS

FIELD NAME

EXAMPLES: DATE
ORDER
CUSTOMER

FIELD SPECIFICATIONS

SOME POSSIBLE FIELD TYPES ARE:

    I — BINARY NUMBER (WORD)
    K — LOGICAL (WORD)
    R — FLOATING POINT (WORD)
    X — ASCII CHARACTER (BYTE)
    Z — ZONED DECIMAL (BYTE)
    P — PACKED DECIMAL (HALF BYTE)

EXAMPLES:

    I — SINGLE 16-BIT BINARY NUMBER
    I2 — SINGLE 32-BIT BINARY NUMBER
    2I2 — TWO 32-BIT BINARY NUMBERS
    3P8 — THREE 8-DIGIT PACKED DECIMAL NUMBERS

ILLUSTRATIVE ITEMS

    DATE, 3I;
    ORDER, X8;
    CUSTOMER, X30;

MASTER DATA SETS

MASTER SETS

NAME: NAME OF THE DATA SET.

ENTRY: NAME(S) OF FIELD(S) INCLUDED IN THE DATA SET. ONE OF THESE FIELDS IS THE FIELD ON WHICH THE MASTER IS ORGANIZED (HASHED). THE FORMAT OF SUCH A KEY FIELD IS:

NAME OF THE FIELD (N), WHERE (N) IS THE NUMBER OF DETAIL FIELDS WITHIN THE DATA BASE WHICH TIE BACK TO THE MASTER KEY FIELD.

STORAGE: NUMBER OF RECORD SPACES IN THE DATA SET.

ILLUSTRATIVE MASTER SETS:

1 {
NAME: ORDER.MSTR,MANUAL;
ENTRY: CUSTOMER,ADDRESS,SALESMAN,ORDER.
NUMBER(2);
STORAGE: 1000;
}

2 {
NAME: PART.MSTR,AUTOMATIC;
ENTRY: PART.NO(1);
STORAGE: 2500;
}

THERE ARE TWO TYPES OF MASTER DATA SETS: *MANUAL* AND *AUTOMATIC. A MANUAL MASTER* CONSISTS OF A KEY FIELD AND A NUMBER OF OTHER FIELDS. RECORD ENTRIES TO MANUAL MASTER DATA SETS ARE MADE BY THE APPLICATIONS PROGRAM. BEFORE DETAIL RECORDS (TYING BACK TO A MASTER RECORD) CAN BE PUT IN A DETAIL DATA SET, THE MASTER RECORD MUST HAVE BEEN PUT IN THE MASTER DATA SET.

AN *AUTOMATIC MASTER*, ON THE OTHER HAND, MAY CONSIST OF ONLY ONE FIELD AND THAT MUST BE A KEY FIELD. WHEN A DETAIL RECORD IS ADDED TO A DETAIL DATA SET (WHICH TIES BACK TO AN AUTOMATIC MASTER), AN ENTRY TO THE MASTER REFLECTING THE NEW DETAIL RECORD IS AUTOMATICALLY ADDED TO THE MASTER. IN THIS REGARD, AN AUTOMATIC MASTER FUNCTIONS AS AN AUTOMATICALLY UPDATED *HASH* INDEX TO ONE OR MORE DETAIL DATA SETS.

DETAIL DATA SETS

NAME   DATA SET NAME, DETAIL;

ENTRY   ITEM NAME (TIE BACK TO MASTER (S));

STORAGE   NUMBER OF RECORD SPACES;

ANY OR ALL OF THE FIELDS IN A DETAIL DATA SET MAY TIE BACK TO A MASTER. MULTIPLE FIELDS IN A DETAIL MAY TIE BACK TO THE SAME MASTER OR A SINGLE FIELD MAY TIE BACK TO MULTIPLE MASTERS. NOTE THAT THE TIE BACK IS TO A *MASTER DATA SET NAME* AND NOT A MASTER FIELD NAME. THE KEY FIELD IN THE MASTER MUST AGREE IN SPECIFICATION TO THE DETAIL FIELD ALTHOUGH THEY NEED NOT BE THE SAME ITEM.

ILLUSTRATIVE DETAIL SETS

NAME   ORDER. LINES, DETAIL

ENTRY   ORDER (ORDER. MSTR), PART.
        PART. NUMBER (PART. MSTR),
        QUANTITY, OPTION;

STORAGE   7500;

THE FIELD SPECIFICATIONS OF A DETAIL DATA SET ARE THE MOST CONCEPTUALLY COMPLEX OF ANY IN THE DATA SCHEMA. THIS IS BECAUSE OF THE POSSIBILITY OF A DETAIL FIELD TYING BACK TO ONE OR MORE MASTERS AND HAVING SUBSIDIARY SORT FIELDS. THE FORMAT FOR THIS SPECIFICATION IS:

MASTER DATA SET (SUBSIDIARY SORT KEY);

EXAMPLES:

(A)   TIES BACK TO A (NO SORT FIELD)

(A, (B))   TIES BACK TO A, SORT CHAINED ON B

BEGIN DATA BASE

ITEMS
CUSTOMER,U30;
ADDRESS,U35;
SALESMAN,U20;
ORDER.NUMBER,U7;
PART.NUMBER,U6;
QUANTITY.DES,I;
LOCATION,3I;
QUANTITY.ON.H,I2;
LINE.ITEM,U3;

SETS

NAME   ORDER.MSTR,MANUAL;
ENTRY   CUSTOMER, ADDRESS, SALESMAN, ORDER.NUMBER (1);

STORAGE 8;

NAME   PARTS.MSTR, AUTOMATIC;
ENTRY   PART.NUMBER (1);

STORAGE 10;

NAME   ORDER.LINE, DETAIL;
ENTRY   LINE.ITEM, PART.NUMBER ORDER.NUMBER (ORDER.MSTR (LINE.ITEM)), QUANTITY.DES;

STORAGE 15;

NAME   PARTS, DETAIL;
ENTRY   PART, NUMBER (PARTS.MSTR (LOCATION)), LOCATION, QUANTITY.ON.H;

STORAGE 15;

PARTS.MSTR
DETAIL LINK
SYNONYM LINK
PART NUMBER

/ OR \ = LINKING FIELDS
0 = SORT KEYS

ORDER.MSTR
CUSTOMER ADDRESS SALESMAN ORDER.NUMBER
SYNONYM LINK – 2 WORDS
DETAIL LINK FRONT AND
BACK END OF CHAIN – 5 WORDS

ITEMS
CUSTOMER   30 ASCII BYTES
ADDRESS   35 ASCII BYTES
SALESMAN   20 ASCII BYTES
ORDER.NUMBER   7 ASC. BYTES
PART.NUMBER   6 ASC. BYTES
QUANTITY.DES   16 BITS
LOCATION   98 BITS
QUANTITY.ON.H   32 BITS
LINE.ITEM   24 BITS

PARTS
PART. NUMBER   LOCATION   QUANTITY. ON.H
SUBSIDIARY SORT

ORDER. LINE
SUBSIDIARY SORT LINK – 3 WORDS
LINE. STEM   PART. NUMBER   ORDER NUMBER   QUANTITY DESIRED

DATA BASE INTRINSICS

SUBROUTINES

DBOPEN (PARAMETERS)   ALLOWS ACCESS TO A DATA BASE WITH SPECIFIED READ/WRITE CAPABILITIES.

DBCLOSE ( )   STOPS ACCESS TO A DATA BASE OR TO A DATA SET WITHIN THE DATA BASE.

DBGET ( )   RETRIEVES DATA FROM A DATA SET.

DBPUT ( )   STORES DATA INTO A DATA SET.

DBDEL ( )   DELETES ONE ENTRY (OR ONE CHAINED GROUP OF ENTRIES) FROM A DATA SET.

DBFIND ( )   FINDS THE HEAD OF A CHAIN OF ENTRIES.

DBINFO ( )   RETURNS INFORMATION ABOUT A DATA BASE SUCH AS NUMBER OF DATA SETS, ACCESS CAPABILITIES, ETC.

A USER'S APPLICATION PROGRAM CAN ACCESS AND MAINTAIN A *DATA BASE* USING THE INTRINSICS (SUBROUTINES) SHOWN ABOVE. A TYPICAL PROGRAM OUTLINE IS AS FOLLOWS:

1) OPEN THE DATA BASE — (DBOPEN)

2) MANIPULATE THE DATA — (DBFIND, DBGET, DBPUT, DBDEL)

3) CLOSE THE DATA BASE — (DBCLOSE)
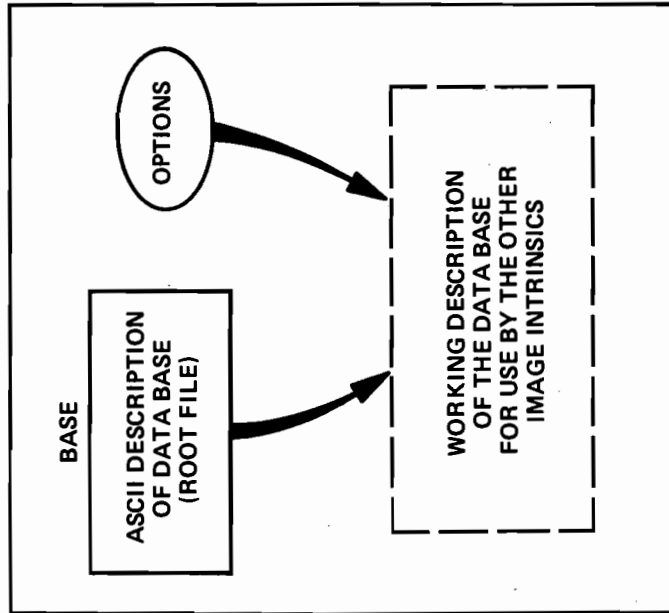
DBOPEN

DBOPEN (BASE, STATUS, OPTIONS, PASSWORD)

THE PURPOSE OF THIS INTRINSIC IS TO TRANSFORM A DESCRIPTION OF THE DATA BASE IN ASCII CHARACTERS INTO A WORKING DESCRIPTION FOR THE INTERNAL USE OF THE OTHER INTRINSICS. BASE IS THE MPE FILE NAME CONTAINING THE DATA BASE DESCRIPTION.
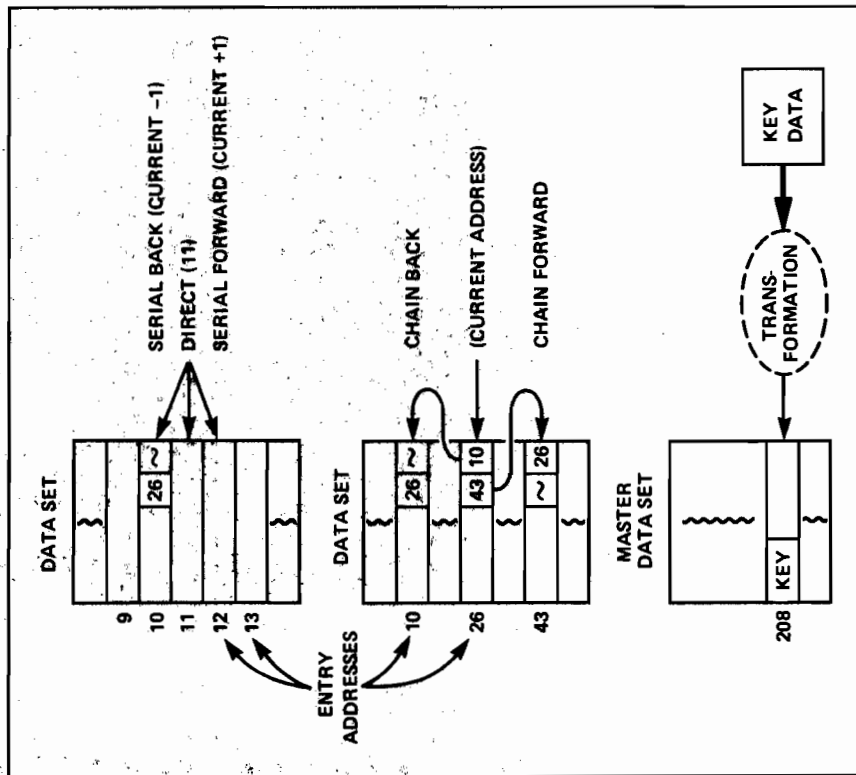
AT THE TIME OF OPENING THE DATA BASE, OPTIONS WILL SPECIFY WHICH ACCESS CAPABILITY IS REQUIRED. THE AVAILABLE CAPABILITIES ARE:

OPTIONS	ACCESS CAPABILITIES	
1	INPUT, SHARED	
2	INPUT, READ SHARED	} READ ONLY
3	INPUT, EXCLUSIVE	
4	OUTPUT, SHARED	} READ
5	OUTPUT, READ SHARED	AND
6	OUTPUT, EXCLUSIVE	WRITE

IF THE USER INTENDS TO ADD OR DELETE ENTRIES, OR TO MODIFY KEY VALUES (ALL OF WHICH REQUIRE LINKAGE MAINTENANCE) THEN HE MUST SPECIFY OPTION 6.

BASE

ASCII DESCRIPTION
OF DATA BASE
(ROOT FILE)

OPTIONS

WORKING DESCRIPTION
OF THE DATA BASE
FOR USE BY THE OTHER
IMAGE INTRINSICS

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DBGET

DBGET (BASE, STATUS, MODE, SET, KEY, ITEMS, BUFFER)

THE *RETRIEVAL OF DATA* IS ACCOMPLISHED THROUGH THE USE OF ONE (OR MORE) OF THE ACCESS MODES IN THE DBGET INTRINSIC. THE DATA *BASE* AND DATA *SET* NAMES ARE SPECIFIED. *KEY* SPECIFIES THE DESIRED ENTRY ADDRESS, AND *ITEMS* IS A LIST OF THE DATA ITEMS TO BE CONCATENATED AND RETURNED IN THE DATA *BUFFER*. THE *MODE'S* OF ADDRESS SELECTION ILLUSTRATED ARE LISTED BELOW.

ADDRESS SELECTION

MODE	
0	RE-READ THE CURRENT ENTRY.
1	DIRECT READ (KEY = RECORD NO.).
2	SERIAL READ FORWARD (CURRENT +1).
3	SERIAL READ BACK (CURRENT -1).
4	CHAIN READ FORWARD
5	CHAIN READ BACK
6	KEYED READ (TRANSFORMATION, RETRIEVAL, AND COMPARISON CHECK)
7	KEYED READ PRIMARY (TRANSFORMATION AND RETRIEVAL).
8	KEYED READ AUXILIARY (RESTRICTED USE BY PRIVACY LEVELS).
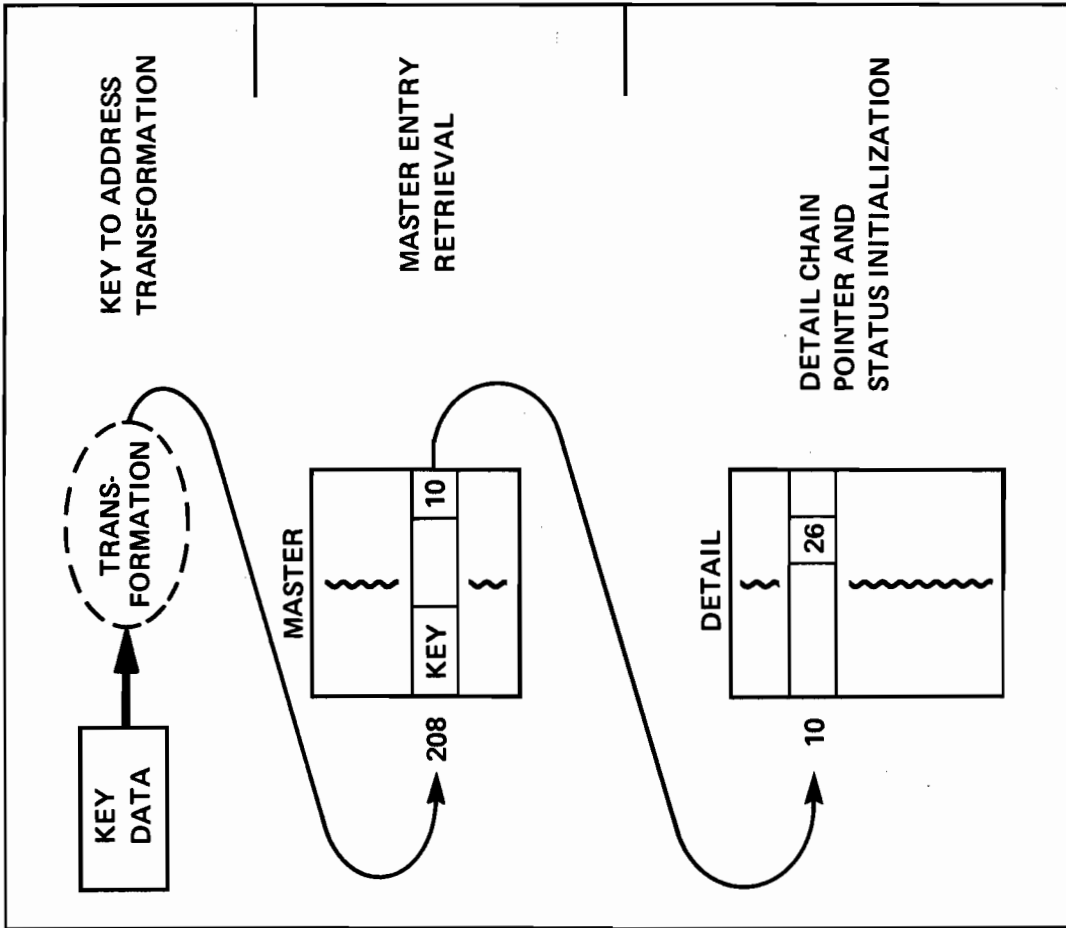
DBFIND (BASE, STATUS, MODE, MASTER, KEY, DETAIL, ITEM)

THE PURPOSE OF THIS INTRINSIC IS TO INITIALIZE *CHAIN POINTERS* IN A DETAIL DATA SET. NO DATA TRANSFER TO THE USER OCCURS. IT IS SIMILAR TO THE KEYED READ MODE OF DBGET, EXCEPT THAT *POINTERS* ARE RETRIEVED INSTEAD OF DATA. DBFIND *MUST* BE PERFORMED BEFORE A SEQUENCE OF READS OR DELETES CAN OCCUR ON CHAINED DETAIL ENTRIES.

BASE, MASTER, AND DETAIL SPECIFY THE DESIRED DATA BASE AND DATA SETS. KEY SPECIFIES THE MASTER ENTRY, AND ITEM SPECIFIES WHICH ONE OF SEVERAL POSSIBLE CHAIN PATHS IS TO BE FOLLOWED. (SEVERAL DETAIL ITEM CHAINS CAN EXIST IN THE SAME DATA SET).

KEY TO ADDRESS
TRANSFORMATION

MASTER ENTRY
RETRIEVAL

DETAIL CHAIN
POINTER AND
STATUS INITIALIZATION

KEY
DATA

TRANS-
FORMATION

MASTER

KEY | 10

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DETAIL

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SYSTEM OVERVIEW

SYSTEM DESCRIPTION

IMAGE/3000 PROVIDES THE CAPABILITY TO *DEFINE* AND *ACCESS* DATA BASES. THIS CAPABIL-ITY UTILIZES THE MPE FILE SYSTEM AND AS SUCH EXTENDS THE BASIC CAPABILITIES EVEN FURTHER. ALL HP–SUPPLIED LANGUAGES (SPL, BASIC, FORTRAN AND COBOL) CAN USE IMAGE/3000.

IMAGE/3000 PROVIDES A TOTAL CAPABILITY FOR *DEFINING* A DATA BASE, CONTROLLING *ACCESS* TO THE DATA BASE, *RETRIEVING* AND *UPDATING* INFORMATION IN THE DATA BASE, AND *MAINTAINING* AND *BACKING UP* THE DATA BASE.

PRODUCT DESCRIPTION

IMAGE/3000 IS COMPOSED OF THREE MAJOR PARTS:

1) DATA BASE DEFINITION SYSTEM (DBDS)

THE DBDS PROVIDES A *DATA BASE* DEFINITION LANGUAGE (DBDL) FOR A *DATA BASE DE-SIGNER* TO DEFINE A DATA BASE. THE DESIGNER *DEFINES* ITEMS (FIELDS), SECURITY, STORAGE NEEDED, DATA SETS (FILES) AND RELATIONSHIPS BETWEEN DATA SETS.

2) DATA BASE UTILITY SYSTEM (DBUS)

THE DBUS PROVIDES THE CAPABILITY FOR *DUMPING* AND *RESTORING* A DATA BASE (RESTRUCTURING THE DATA BASE AS REQUIREMENTS CHANGE).

3) DATA BASE MANAGEMENT SYSTEM (DBMS)

THE DBMS PROVIDES A METHOD FOR MANAGING DATA IN THE DATA BASE VIA THE DATA BASE MANAGEMENT LANGUAGE (DBML). THE DBML IS USED BY AN APPLICATIONS PRO-GRAMMER, VIA THE *CALL* STATEMENT, TO TRANSFER DATA BETWEEN HIS PROGRAM AND THE DATA BASE.

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KEY FEATURES

- MULTIPLE FILES IN A DATA BASE

- MASTER-DETAIL RELATIONSHIPS

- DATA BASE DEFINITION LANGUAGE (DBDL)

- SECURITY AT THE DATA BASE, FILE AND INDIVIDUAL ITEM (FIELD) LEVELS

- NETWORK STRUCTURE ALLOWS RELATING A MASTER RECORD TO MANY DETAIL RECORDS,
  AND RELATING A DETAIL RECORD TO MANY MASTER RECORDS

- DATA BASE ACCESSABLE BY ALL LANGUAGES

- DATA RETRIEVAL AND UPDATING AS LOW AS THE ITEM (FIELD) LEVEL

- RANDOM ACCESS, VIA A *HASHING* ALGORITHM, TO MASTER RECORDS BY A UNIQUE KEY
  (E.G., PART NUMBER)

- CHAINED ACCESS TO DETAILED RECORDS VIA A LINK THROUGH A MASTER RECORD

- SERIAL ACCESS TO BOTH MASTER AND DETAILED RECORDS

- SYSTEM DUMP AND RECOVERY

- DATA BASE RESTRUCTURING

- CONCURRENT ACCESS AND UPDATE

- AUTOMATIC SPACE RE-USABILITY FOR DELETED RECORDS

APPLICATIONS/ADVANTAGES

IMAGE/3000 PROVIDES THE MECHANISM WHICH ALLOWS A PROGRAMMER TO CONCENTRATE ON THE PROBLEM HE MUST SOLVE AND NOT BE CONCERNED WITH THE INTRICATE DETAILS OF STRUCTURING FILES AND FILE RELATIONSHIPS. EXAMPLE APPLICATIONS ARE:

1) SCHOOL INFORMATION SYSTEMS
2) BILL OF MATERIAL PROCESSORS
3) INVENTORY CONTROL SYSTEMS
4) GOVERNMENT INFORMATION SYSTEMS
5) PERSONNEL SYSTEMS

IMAGE/3000 ADVANTAGES ARE:

1) DATA CAN BE CONTROLLED SO THAT ONLY ONE COPY OF THE DATA EXISTS

2) AN ADMINISTRATOR CAN DEFINE WHAT PIECES OF DATA CAN BE LOOKED AT AND WHICH DATA CAN BE MODIFIED, PROVIDING PRIVACY WHERE NEEDED

3) THERE IS A CONSISTENT WAY OF DEFINING NEEDED RELATIONSHIPS AMONG DATA (E.G., THE RELATIONSHIP OF A LINE ITEM TO A PURCHASE ORDER). THUS HIGHLY VOLATILE AND VARIABLE LENGTH RECORDS ARE EASILY HANDLED

4) EACH PROGRAMMER IS CONCERNED ONLY WITH THOSE PIECES OF DATA WHICH ARE OF INTEREST TO HIM. A GREAT DEGREE OF RECORD INDEPENDENCE IS ACHIEVED. A DATA BASE CAN BE MODIFIED WITHOUT HAVING TO REPROGRAM EXISTING APPLICATIONS

5) FILE LINKING RELATIONSHIPS ARE TOTALLY SYSTEM MAINTAINED AND DO NOT NEED TO CONCERN EACH PROGRAMMER.

PERFORMANCE CHARACTERISTICS

SYSTEM MAXIMUM

255 ITEMS (FIELDS) PER DATA BASE

99 DATA SETS (FILES) PER DATA BASE

15 CHARACTERS PER ITEM (FIELD) NAME

1020 WORDS PER ITEM (FIELD) LENGTH

8,388,607 RECORDS PER DATA SET

STORAGE SPACE GUIDELINES

MASTER DATA SETS

A RECOMMENDED SPACE UTILIZATION FOR MASTER DATA SETS, WHICH ARE ORGAN-
IZED RANDOMLY, IS NO MORE THAN 80% OF SPACE UTILIZATION IN ORDER TO KEEP
ACCESS TIME TO A MINIMUM.

DETAIL DATA SETS

100% SPACE UTILIZATION CAN BE USED

RECORD SIZES

MASTER RECORDS

5 WORDS FOR SYNONYM LINK

5 WORDS FOR EACH DETAIL RELATIONSHIP (PATH SPECIFICATION LINK)

THE TOTAL NUMBER OF WORDS IN ALL OF THE ITEMS (FIELDS) IN THE MASTER RECORD

PERFORMANCE CHARACTERISTICS

PERFORMANCE CHARACTERISTICS (CON'T)

DETAIL RECORDS

5 WORDS FOR EACH RELATIONSHIP (PATH SPECIFICATION) TO A MASTER RECORD

THE TOTAL NUMBER OF WORDS IN ALL OF THE ITEMS (FIELDS) IN THE DETAIL RECORD

DISC ACCESSES

1) RETRIEVE A MASTER RECORD BASED ON A KEY (I.E., PART NUMBER): 1.2 ACCESSES (AVERAGE)

2) RETRIEVE A MASTER OR DETAIL RECORD SERIALLY: 1 ACCESS

3) RETRIEVE A DETAIL RECORD ONCE A MASTER RECORD HAS BEEN LOCATED: 1 ACCESS TO ACCESS EITHER THE FIRST OR LAST DETAIL RECORD IN THE CHAIN

4) ADD A NEW MASTER RECORD: 2.4 ACCESSES (AVERAGE)

5) ADD A DETAIL RECORD TO AN EXISTING DETAIL CHAIN (NON-SORTED DETAILS): 7 ACCESSES (AVERAGE) FOR EACH MASTER RECORD RELATED TO THIS DETAIL RECORD.

ALL ACCESS TIMES ARE AVERAGE TIMES AND MAY BE:

SEEK PLUS READ

SEEK PLUS WRITE

ASSUMES ALL FILES HAVE BEEN OPENED

THE COMPETITION

1) *TOTAL* – DATA BASE MANAGEMENT SYSTEM SUPPLIED BY CINCOM. RUNS ON IBM 360/370 AND HONEYWELL 200 AND 2000 SERIES DOS AND OS. BATCH ONLY. PROVIDES ESSENTIALLY THE SAME FUNCTIONS AS IMAGE/3000. CAN RUN IN A PARTITION AS SMALL AS 8K, BUT TYPICALLY REQUIRES 40K BYTES.
   PRICE: $750–$950/mo.

2) *MARK IV* – DATA BASE MANAGEMENT SYSTEM SUPPLIED BY INFORMATICS. RUNS ON 360/370 BUT PROVIDES NO INTERFACE TO USER LANGUAGES. PRODUCES REPORT IN BATCH MODE ONLY.
   PRICE: $500–$2400/mo.

3) *GIS* – GENERALIZED INFORMATION SYSTEM SUPPLIED BY IBM. MINIMUM CONFIGURATION 196K-512K BYTES OF CORE. NO LANGUAGE INTERFACE. DL/1 QUERY FEATURE PROVIDES A LANGUAGE INTERFACE FOR AN EXTRA $150/mo.
   PRICE: $450–$1400/mo.

4) *IMS V2* – INFORMATION MANAGEMENT SUPPLIED BY IBM.

   MINIMUM SYSTEM CONFIGURATION:

BATCH	128–256K BYTES
COMMUNICATIONS	256–512K BYTES
ON-LINE QUERY	256–512K BYTES

   PRICE:

BASIC DATA BASE CAPABILITY	$550/mo.
ABILITY TO WRITE TERMINAL APPLICATIONS	$625/mo.
ON-LINE QUERY	$300/mo.