
Contents

PREFACE xv

SECTION I Basic Concepts

Chapter 1

THE DATA BASE ENVIRONMENT	2
Data Base Media, 4	
DASD, Tapes, and Main Storage, 6	
Optical Disk, 8	
Data Base Environments, 9	
The Operational Environment, 10	
Operational Online, 10	
Operational Environment—Batch, 13	
Operational Environment—Mixed Online/Batch, 16	
Operational Environments—Time-Sharing, 17	
Decision Support Environment, 17	
Decision Support Environment—Query, 19	
Decision Support Environment—Relational, 19	
Decision Support Environment—Inverted List, 20	
Operational to DSS Download, 20	
Questions, 21	
Exercises, 22	

Chapter 2

BASIC CONCEPTS AND BASIC OPERATIONS

23

- Data Transfer, 24
- Activity Types, 27
- Data Transfer to the Programmer, 28
- Storage and Transfer Trade-offs, 33
- KEYS, 34
- Encryption, 35
- Data Base Across Different Modes of Operation, 36
- Operational Mode of Operation, 36
- DSS Mode of Operation, 36
- Archival Mode of Operation, 37
- Development Mode of Operation, 37
- Data Base Practices, 37
- Truth Data Base Approach, 38
- Dual Data Base Approach, 39
- Summary, 40
- Questions, 41
- Exercises, 44

Chapter 3

DATA MANAGEMENT

45

- Randomization, 45
- DASD Space Available, 46
- Randomization: Other Factors, 48
- Randomization: Overflow, 51
- Average Record Size: Variations, 54
- Indexing, 56
- DBMS, 56
- Insertion/Deletion in an Indexed Data Base, 60
- Duplicate Index Entries, 63
- Hashed Indexes, 66
- Single Record Blocks, 66
- Alternate Indexing, 67
- Indexing Randomized Data, 69
- Summary, 69
- Questions, 70
- Exercises, 71

Chapter 4

DATA STRUCTURING

72

- Hierarchical Model, 73
- Inverted Data Structures, 74
- Network Structure, 77
- The Relational Model, 78

Addressing, 82
Direct Addressing, 82
Symbolic Addressing, 83
Combining Symbolic and Direct Pointers, 84
CONTENT ADDRESSABLE MEMORY, 85
Address Insertion, Deletion, 86
Higher Level Structuring, 87
Accessing Data, 89
Implied Ordering of Data Through Physical Structuring, 91
Summary, 94
Questions, 94
Exercises, 95

Chapter 5

PROGRAM EXECUTION

96

Batch Programs, 97
Online Execution of a Program, 102
Interactive Program Execution, 104
Data Base asnd Teleprocessing, 105
Online Usage of CRT, 106
Interactive Usage of CRT, 110
DEADLY EMBRACE, 116
Microprocessor Usage of CRT, 117
Syntax, 123
Data Manipulation Syntax, 123
Language and I/O, 124
Record/Set Retrievals, 124
Procedural Data Base Processing, 125
Data Definition Syntax, 130
Summary, 131
Questions, 132
Exercises, 133

Chapter 6

UTILITIES

136

Data Base Initialization, 136
Data Base Recovery, 137
Data Base Reorganization, 138
Data Base Monitoring, 141
UTILITIES: VENDOR OR INDEPENDENT SUPPLIED?, 142
The Reorganization/Recovery Environment, 143
Summary, 145
Questions, 145
Exercises, 146

Chapter 7

MISCELLANEOUS TOPICS

148

- Integrity, 151
- SELECTING A DBMS, 153
- Testing, 157
- Tuning, 160
- Data Dictionary, 160
- Questions, 161
- Exercises, 162

Chapter 8

DATA BASE DESIGN

164

- Different Levels of Modeling, 168
- Components of Modeling, 168
- Scope of Integration, 169
- Dimension, 170
- Data Views, 171
- Entities and Relationships, 172
- Definitions, 174
- Midlevel Modeling, 175
- Physical Model, 176
- NORMALIZATION, 180
- Marrying the Physical Data Model and the Process Model, 183
- Using the Blueprint, 183
- Physical Data Base Design, 183
- General Physical Issues, 185
- Operational Data Base Design, 186
- Online Data Base Design, 187
- Performance, 188
- Online Transaction Design, 188
- Data Base Design for Online Performance, 190
- Data Occurrences, 190
- Control Data Bases, 194
- DESIGN REVIEW, 198
- Application Blocking of Data, 200
- General Structural Overhead, 204
- Data Driven Processes, 205
- General Misuse of a DBMS, 207
- Proper Use of an Alternate Index, 208
- Data Base Design for Availability, 208
- DSS Data Base Design, 209
- DSS Systems: Data Sources, 210
- Information Systems Architecture and DSS Data Base Design, 211
- Some DSS Specific Design Practices, 212
- Summary, 213
- Questions, 213
- Exercises, 216

Chapter 9

DATA BASE MACHINES

218

- Conventional DBMS Architecture, 219
- The Communications Processor Analogy, 226
- Data Base Machine DBMS Architecture, 227
- Data Base Management Processor, 229
- Associative Data Processor, 241
- Questions, 241

Chapter 10

DISTRIBUTED DATA BASES

243

- Distributed Data Base Defined, 245
- Reasons for Distributing Data, 248
- Scope of Distribution, 249
- Terminology, 249
- Inquiry Processing, 254
- Update Processing, 257
- Questions, 260

SECTION II

Specific DBMS Examples

Chapter 11

PRODUCTION SYSTEMS: IMS

264

- Hierarchical Structures, 264
- Data Base Records, 265
- Segments, 267
- Pointers, 270
- FAST PATH, 270
- Overflow, 271
- Block Location, 271
- Explicit Relationships, 272
- DBDGEN, 274
- Anatomy of a Data Base Call, 276
- Call Syntax, 277
- Segment Search Arguments, 279
- Data Base Calls, 279
- Modes of Operation, 284
- Online Concepts, 286

Chapter 12

INVERTED FILE SYSTEM: MODEL 204	287
Table Level, 287	
Record/Page Level, 289	
Index Level, 290	
Model 204 Design Options, 293	
Updating in Model 204, 298	
Building a Model 204 Data Base, 298	
Model 204 Language Facilities, 302	
Other Language Features, 307	
Model 204 Systems Considerations, 307	

Chapter 13

DECISION SUPPORT SYSTEMS: SQL	308
Physical Implementation, 308	
Relational Operators, 312	
User Views, 319	
Physical Underpinnings of Relational Operators, 319	
SQL at the System Level, 322	

Chapter 14

FOURTH-GENERATION SYSTEMS: FOCUS	323
Data Base Manager, 324	
Query/Update Language, 328	
Report Writing and Graphics, 329	
Decision Support Functions, 330	

Chapter 15

DISTRIBUTED DATA BASE SYSTEMS: CICS/ISC R*	333
CICS/ISC, 333	
R*, 337	

Chapter 16

dBASE II: A DBMS BY ASHTON-TATE FOR MICROPROCESSORS	340
Differences, 340	
Similarities, 342	
Using dBASE II, 342	

SECTION III

Data Base Tutorial

Chapter 17

TUTORIAL DESCRIPTION	346
The Production Control/Shipping Interface Problem, 346	
Functions, 348	
Initial Load, 350	
Data Insertion, 352	
Data Manipulation, 354	
Reports, 356	
Data Integrity, 356	
Archival Data, 357	

Chapter 18

IMS TUTORIAL	358
Environmental Definition, 358	
Data Base Identification, 359	
Data Base Definition, 360	
Transaction Definition, 362	
BMP, 363	
Batch Processing, 363	
Implementation and Integration, 363	

Chapter 19

MODEL 204 TUTORIAL	364
---------------------------	------------

Chapter 20

SQL TUTORIAL	367
---------------------	------------

Chapter 21

FOCUS TUTORIAL	370
-----------------------	------------

BIBLIOGRAPHY	372
A General Data Base Bibliography, 372	
Data Base Machines, 373	
Relational Systems, 373	
Model 204, 373	
IMS, 374	
DATA BASE GLOSSARY	375
IMS Terms, 386	
Model 204 Terms, 386	
INDEX	389

