CONTENTS

Preface *xiii*

Index of Basic Concepts *xv*

PROLOGUE

1 Introduction *2*

2 Basic Terminology *8*

PART I LOGICAL ORGANIZATION

3 What is a Data Base? *22*

4 What Should Be the Objectives of a Data-Base Organization? *34*

5 Entities and Attributes *48*

6 Data Models: Schemas and Subschemas *60*

7 Data-Base Management Systems *82*

8 Tree Structures *96*

9 Plex Structures *110*

10 Data Description Languages 126

11 The CODASYL Data Description Language 139

12 IBM's Data Language/I 174

13 Relational Data Bases 202

14 Third Normal Form 231

15 Canonical Data Structures 248

16 Varieties of Data Independence 291

PART II PHYSICAL ORGANIZATION

17 Criteria Affecting Physical Organization 306

18 Differences Between Physical and Logical Organization 319

19 Addressing Techniques 332

20 Indexed Sequential Organizations 351

21 Hashing 376

22 Pointers 398

23 Chains and Ring Structures 407

24 Physical Representations of Tree Structures 430

25 Physical Representations of Plex Structures 451

26 Multiple-Key Retrieval 465

27 A Comparison of Multiple-Key Organizations 486

28 Separating Data and Relationships 501

29 Index Organization 513

30 Index-Searching Techniques 528

31 Inverted File Systems 558

32 Data Compaction 572

33 Virtual Memory and Storage Hierarchies 588

34 Volatile Files 618

35 Fast-Response Systems 631

36 Associative Memory 644

Appendix A The Mean Number of Probes in a Binary Search 653

Appendix B Sample Logical Data Descriptions 656

Class Questions 664

Glossary 683

Index 698