INDEX			PRIME DATA AREA			
KEY (SEX/AGE)	ADDRESS		NAME	SEX	AGE	OTHER INFO
1 F18	114		101 ANNE	F	20	
2 F19	103		102 BETTY	F	21	
3 F19	104		103 CANDICE	F	19	
4 F19	113		104 CAROL	F	19	
5 F20	101		105 CHLOE	F	20	
6 F20	105		106 ELLEN	F	21	
7 F20	112		107 FRED	M	23	
8 F21	102		108 GEORGE	M	19	
9 F21	106		109 GERT	M	22	
10 F21	111		110 GRACIE	F	22	
11 F22	110		111 JUNE	F	21	
12 F22	115		112 LISA	F	20	
13 F22	116		113 MARY	F	19	
14 M19	108		114 NANCY	F	18	
15 M22	109		115 ROSEMARY	F	22	
16 M23	107		116 YVONNE	F	22	

Figure 6 An Index Based on a Composite Data Element

8. An attribute-value pair associated through the equal-comparison operator is
   called a _____ . Such an attribute-value association through any
   other comparison operator is called a _____ .

Answers: 1. hashing, indexing; 2. indexed, index; 3. T; 4. F; 5. F; 6. sequen-
tially, directly, sequentially; 7. T; 8. simple query, range query.

**Structure of ISAM
Implementation**

Many file and data base management systems for micro, mini, and mainframe
computers are commercially available. A majority make use of one or more in-
dexing techniques to facilitate access-by-content. By its design, the COBOL lan-
guage is suitable to interface with file management software that supports in-
dexed sequential organization. As we will see, it is possible to specify a file as
an indexed sequential file in a COBOL program; however, the manner in which
the intricacies of indexing are implemented is left to the underlying file man-
agement system, which significantly simplifies our programming efforts. De-
spite this, it is important that the application programmer have a good under-
standing of file management systems.

A variety of file management systems developed by different vendors support
the indexed sequential file organization. We briefly study two implementations,
ISAM (indexed sequential access method) and VSAM (virtual storage access
method). ISAM is significant because it was one of the earliest implementations