Programming Practices and Techniques

File Handling

Objective

- Explain file organization
- Describe different types of files
- Explain the different file operations

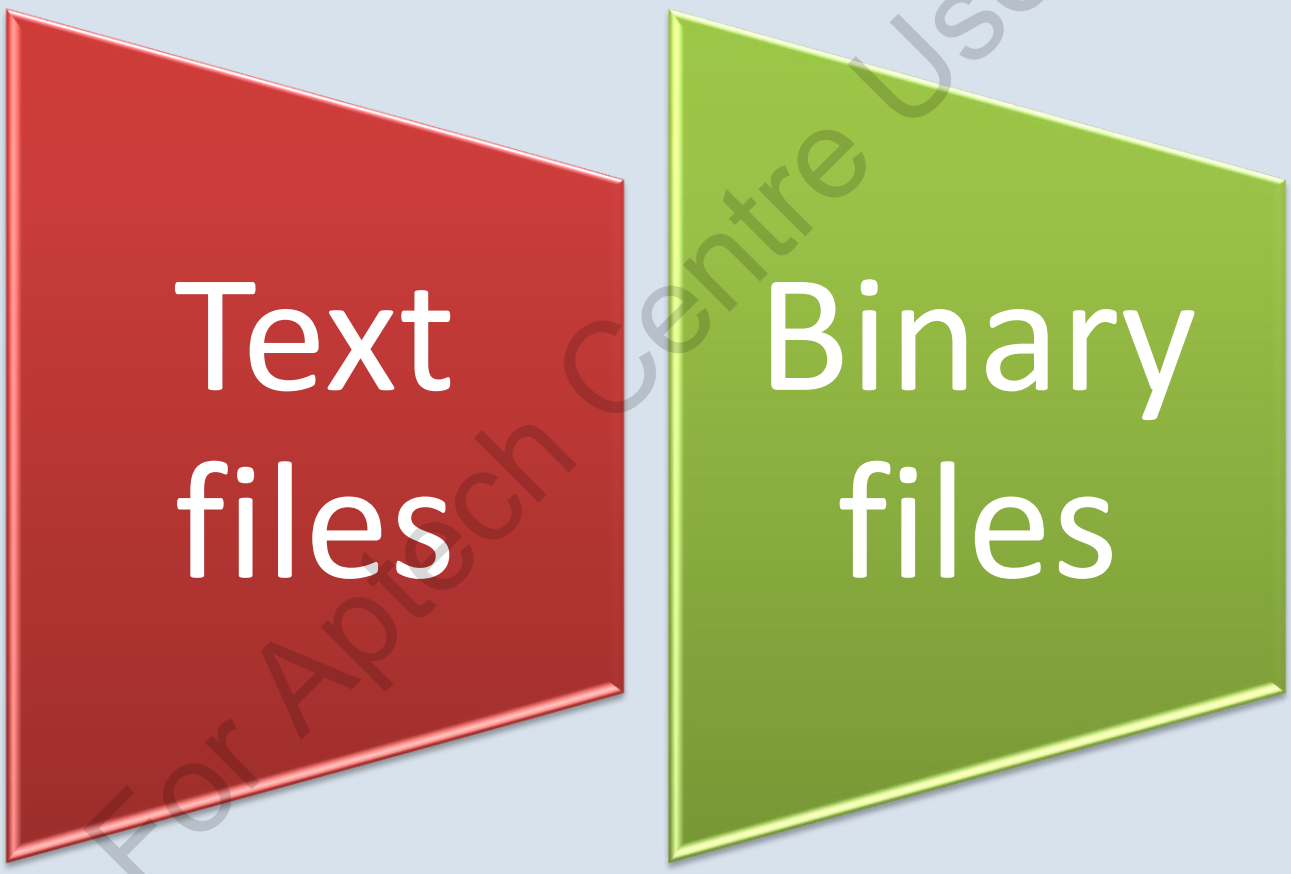
Introduction 1-2

- A File:
  - Is a collection of correlated data or bytes stored on a secondary storage device
  - Stores information permanently which can be retrieved by specific programs

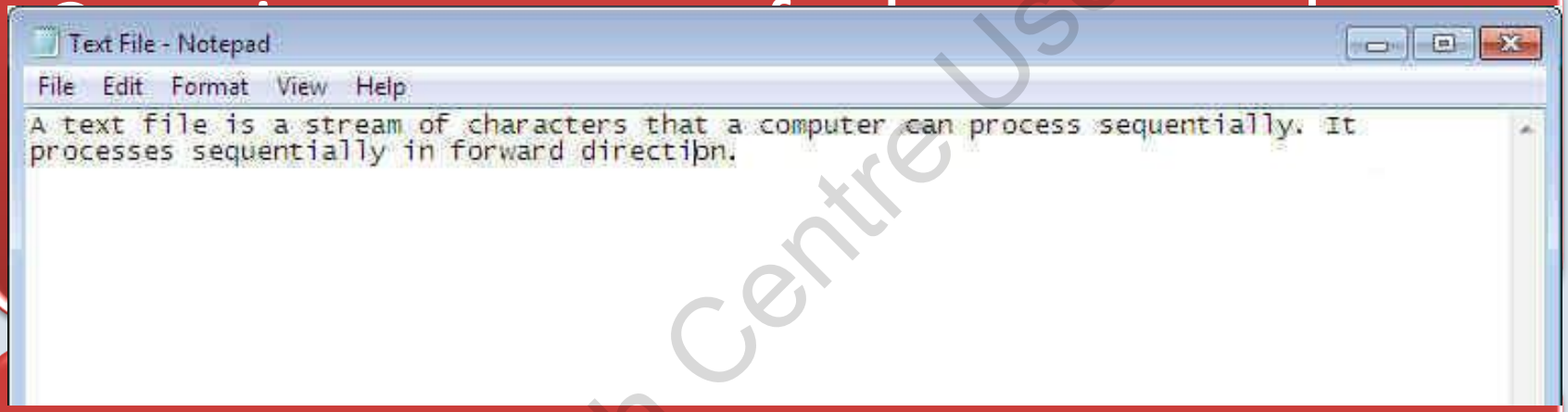
- The collection of bytes can be interpreted as:
  - Words
  - Characters
  - Lines
  - Paragraphs and pages from a textual document
  - Fields
  - Records belonging to a database
  - Pixels from a graphical image

Introduction 2-2

- There are two kinds of files and they are as follows:

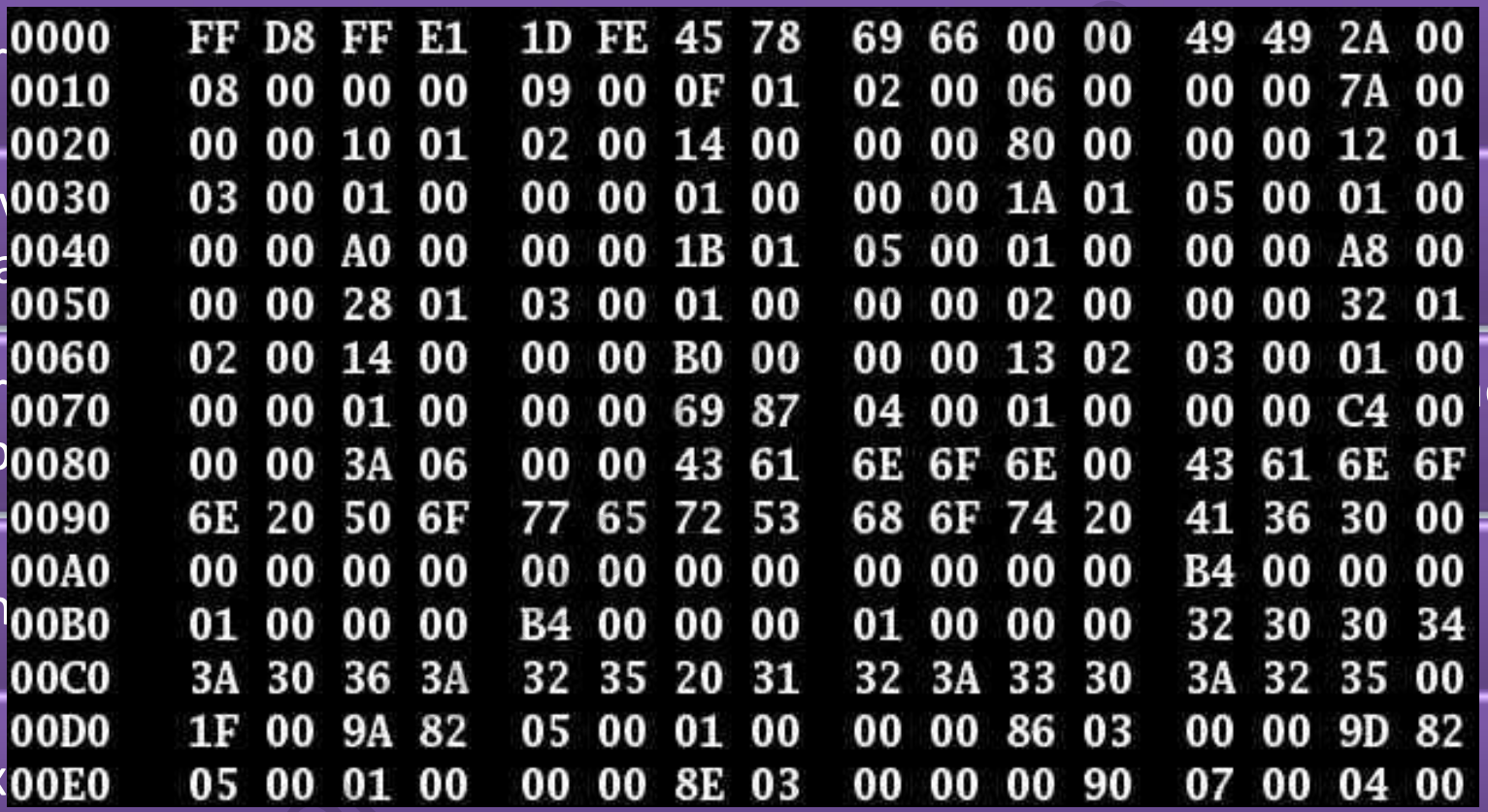


Text Files



Opened only for a single operation, such as reading, writing, or appending

Binary Files



```
0000    FF D8 FF E1  1D FE 45 78  69 66 00 00  49 49 2A 00
0010    08 00 00 00  09 00 0F 01  02 00 06 00  00 00 7A 00
0020    00 00 10 01  02 00 14 00  00 00 80 00  00 00 12 01
0030    03 00 01 00  00 00 01 00  00 00 1A 01  05 00 01 00
0040    00 00 A0 00  00 00 1B 01  05 00 01 00  00 00 A8 00
0050    00 00 28 01  03 00 01 00  00 00 02 00  00 00 32 01
0060    02 00 14 00  00 00 B0 00  00 00 13 02  03 00 01 00
0070    00 00 01 00  00 00 69 87  04 00 01 00  00 00 C4 00
0080    00 00 3A 06  00 00 43 61  6E 6F 6E 00  43 61 6E 6F
0090    6E 20 50 6F  77 65 72 53  68 6F 74 20  41 36 30 00
00A0    00 00 00 00  00 00 00 00  00 00 00 00  B4 00 00 00
00B0    01 00 00 00  B4 00 00 00  01 00 00 00  32 30 30 34
00C0    3A 30 36 3A  32 35 20 31  32 3A 33 30  3A 32 35 00
00D0    1F 00 9A 82  05 00 01 00  00 00 86 03  00 00 9D 82
00E0    05 00 01 00  00 00 8E 03  00 00 00 90  07 00 04 00
```

File Organization

- Refers to the relationship between the key field of the record and the physical location of that record in the computer file
- The objective of file organization is as follows:
  - Ease of file creation and maintenance
  - Efficient means of storing and retrieving information
- Can either be:
  - Physical file - A physical file is a physical unit, such as magnetic tape or a disk
  - Logical file - A logical file is a complete set of records for a specific application

File Organization Methods 1-2

- The three file organization methods are as follows:

Sequential access

Direct access

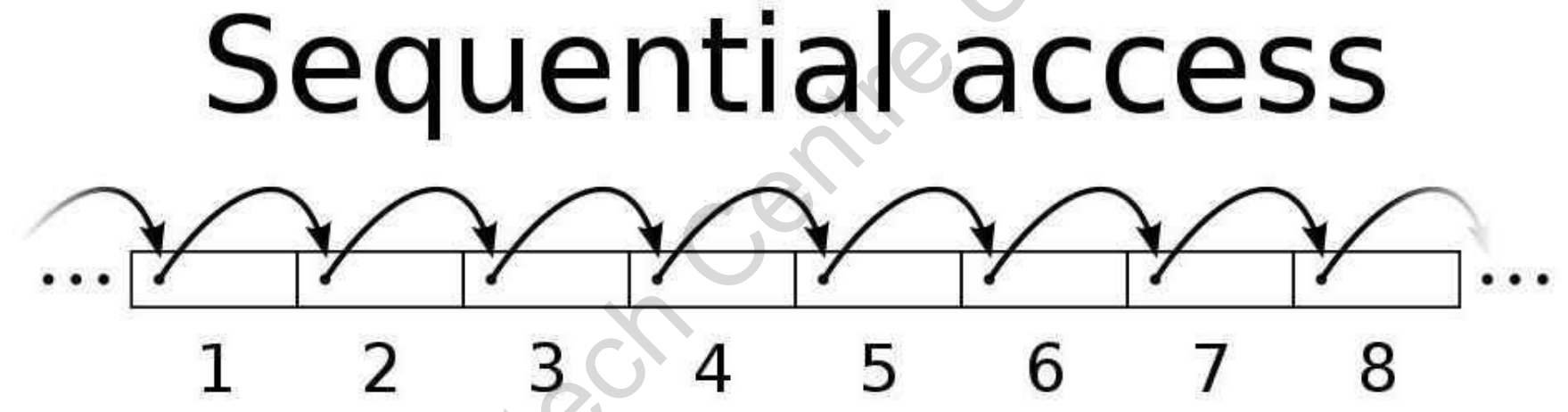
Indexed sequential access

File Organization Methods 2-2

- The selection of a particular method depends on:
  - Type of application
  - Method of processing
  - Size of the file
  - File inquiry capabilities
  - File volatility
  - The response time

Sequential Access 1-2

- Sequential access files:
  - Records are arranged in the ascending, descending, or



  - Are used in applications like payroll management where each file in the record is processed

Sequential Access 2-2

- Disadvantages of sequential access are as follows:

To get specific information, the entire file must be processed

It stores very low activity rate

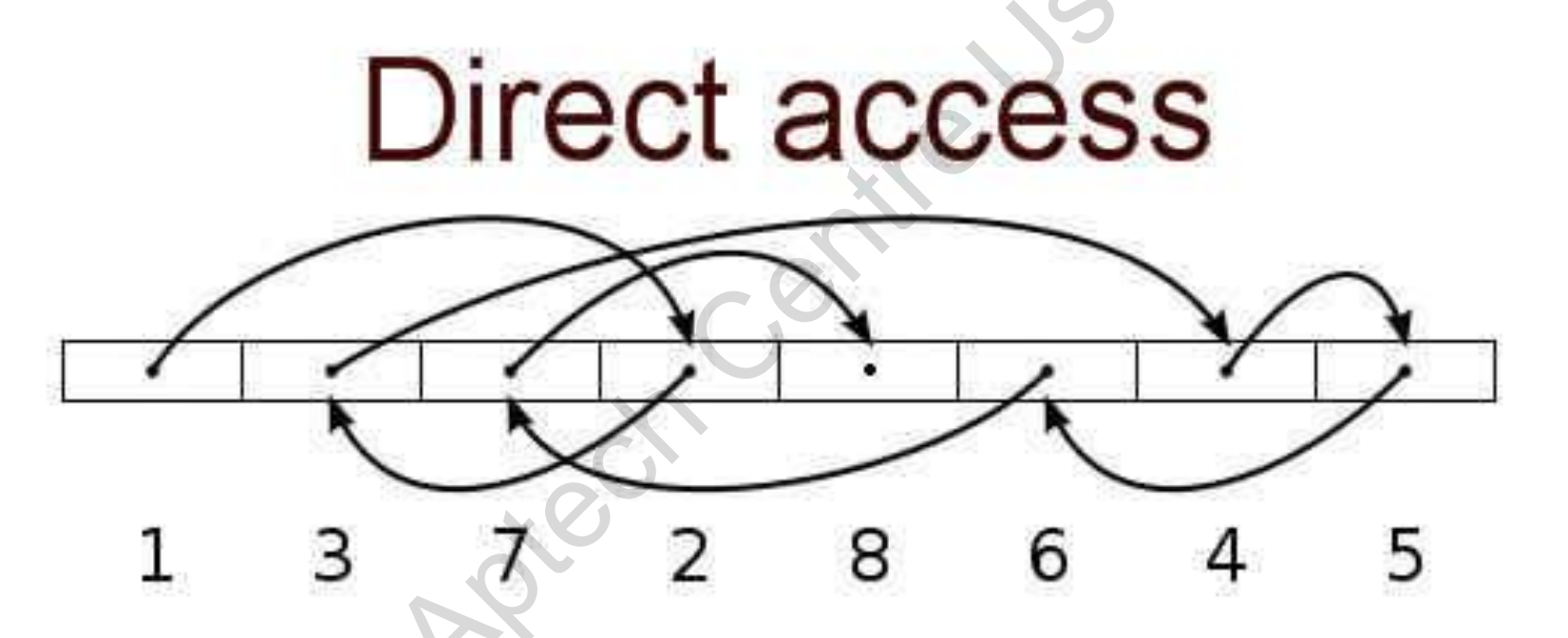
Transactions are required to be placed and stored in a sequence prior to processing

Data redundancy increases, as same data can be stored at different places with different keys

Random enquiries are impossible to handle

Direct Access 1-2

- The files are stored in direct access storage devices, using an identifying key



- In the online system, the response and updation are fast

Direct Access 2-2

- Disadvantages of direct access are as follows:
  - Data may be accidentally erased or over written unless special precautions are taken
  - Risk of loss of accuracy and breach of security. Special backup and reconstruction procedures must be established
  - Less efficient use of storage space
  - Expensive hardware and software are required
  - High complexity in programming
  - File updation is more difficult when compared to that of sequential method

Indexed Sequential Access 1-2

- The records are stored sequentially on a direct access device and the data is accessible randomly and sequentially
- It covers the positive features of both sequential and direct access files
- This type of file organization is appropriate for batch processing and online processing
- Indexing permits access to selected records without searching the entire file

Indexed Sequential Access 2-2

- Disadvantages of indexed sequential access are as follows:

  - Slow retrieval, when compared to other methods
  - Does not use the storage space efficiently
  - Hardware and software used are relatively expensive

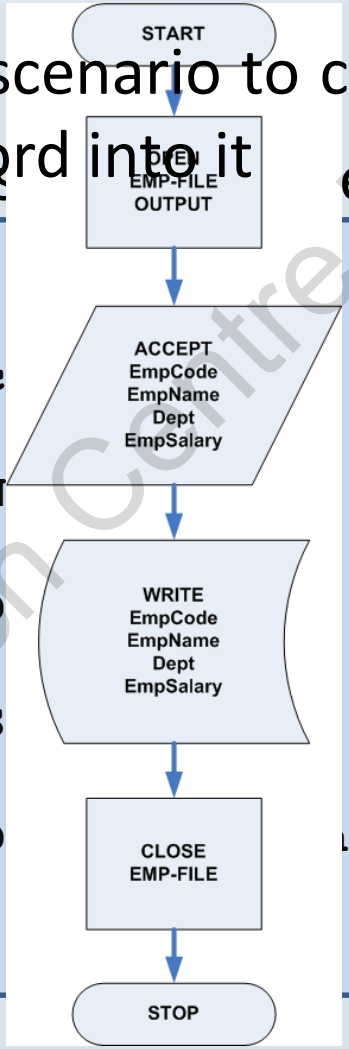
Different File Operations 1-2

- Operations that can be performed on files are as follows:
  - Creating a file
  - Writing a file
  - Reading a file
  - Repositioning within a file
  - Deleting a file
  - Truncating a file

Different File Operations 2-4

- Creating a file
  - The following code shows a scenario to create employee record file and to write a record into it
  - Space in the file sys… e found for the file

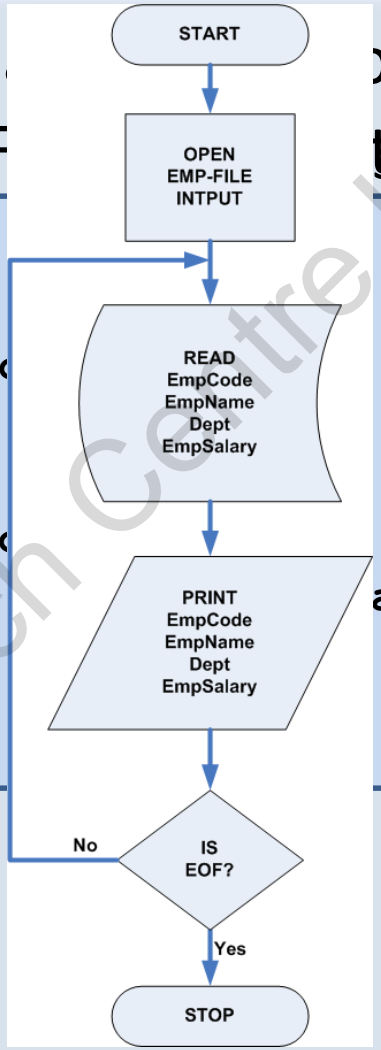
```
START
OPEN EMP-FILE FOR OUTPUT
DISPLAY "Enter Employee c
ACCEPT EmpCode
DISPLAY "Enter Employee N
ACCEPT EmpName
DISPLAY "Enter Employee D
ACCEPT Dept
DISPLAY "Enter Employee S
ACCEPT EmpSalary
WRITE EmpCode, EmpName, D                    ary
CLOSE EMP-FILE
STOP
```



Different File Operations 3-4

- Reading a file
  - Reading code shows ... to read the employee records from EMP-F... it
    - To read from a file, ... is made that specifies the

```
START
OPEN EMP-FILE FOR INPUT
READ EMP-FILE INTO EmpC...                    Dept, EmpSalary
WHILE not EOF
DO
READ EMP_FILE INTO EmpC...                    Dept, EmpSalary
PRINT EmpCode, EmpName, ...                   ary
END DO
STOP
```



Different File Operations 4-4

- Repositioning within a file
  - The directory is searched for the appropriate entry, and the current file position pointer is repositioned to a given value
  - Repositioning within a file need not involve any actual I/O
- Deleting a file
  - To delete a file, search the directory for the named file
- Truncating a file
  - The user can erase the contents of a file, but keep its attributes
  - Rather than forcing the user to delete the file, and then recreate it, this function allows all attributes to remain unchanged

Sequential Files and Control Break Logic

- Sequential files
  - Provides a straightforward way to read and write files
  - Easy portability to other programming languages and computers
  - Used as the common denominator of data processing
- Sequential files with control break:
  - A control break occurs when there is a change in the value of a single key on which a file is sorted for some added processing
  - Control break processing is used when writing report programs manually

Summary 1-2

- A file is a collection of correlated data or collection of bytes stored on a secondary storage device, such as hard disk drive, a pen drive, and so on
- A text file is a stream of characters that a computer can process sequentially
- A programming language does not place constructs on the file, and it is read, or written, in a method selected by the programmer
- File organization refers to the relationship of the key of the record to the physical location of that record in the computer file

Summary 2-2

- There are three types of file organization methods, they are as follows:
  - Sequential
  - Relative
  - Indexed
- In sequential access searching the records are arranged in the ascending, descending, or chronological order of a key field which can be numeric or both
- In a computer program, a control break occurs when there is a change in the value of a single key on which a file is sorted for some added processing