



Programming Logic and Design

Ninth Edition

Chapter 7

File Handling and Applications



Objectives

In this lecture, you will learn about:

- Computer files
- The data hierarchy
- Performing file operations

Understanding Computer Files

- **Computer file**
 - A collection of data stored on **permanent storage devices** such as your computer's hard drive, a hard drive on the cloud, DVDs, USB drives, and reels of magnetic tape
 - **Text files** (numbers, names, salaries) that can be read by a text editor
 - **Binary files** (images and music) not encoded as text

Understanding Computer Files

(continued -1)

- Computer files have:
 - A **filename** - an identifying name given to a computer file that frequently describes the contents
 - JanuaryPayroll
 - PreviousMonthSales
 - A **filename extension** - a group of characters added to the end of a filename that describes the type of the file
 - .txt
 - .dat
 - .docx

Understanding Computer Files

(continued -2)

- Computer files have:
 - A specific creation time and modification date
 - A file size measured in bytes
 - **byte** – one character
 - **kilobyte** – thousands of bytes
 - **megabyte** – millions of bytes
 - **gigabyte** – billions of bytes
 - **terabyte** – trillions of bytes

Understanding Computer Files

(continued -3)

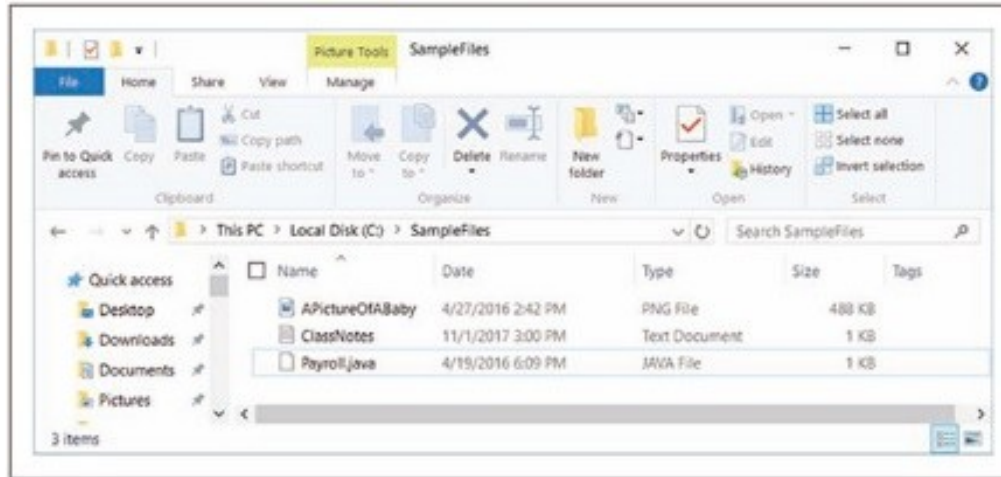


Figure 7-1 Three stored files showing their names, dates of modification, types, and sizes

Understanding Computer Files

(continued -4)

- **Organizing files**
 - **Directories and folders**
 - Organization units on storage devices
 - **Path**
 - Combination of disk drive plus the complete hierarchy of directories
 - Example: C:\Logic\SampleFiles\PayrollData.dat

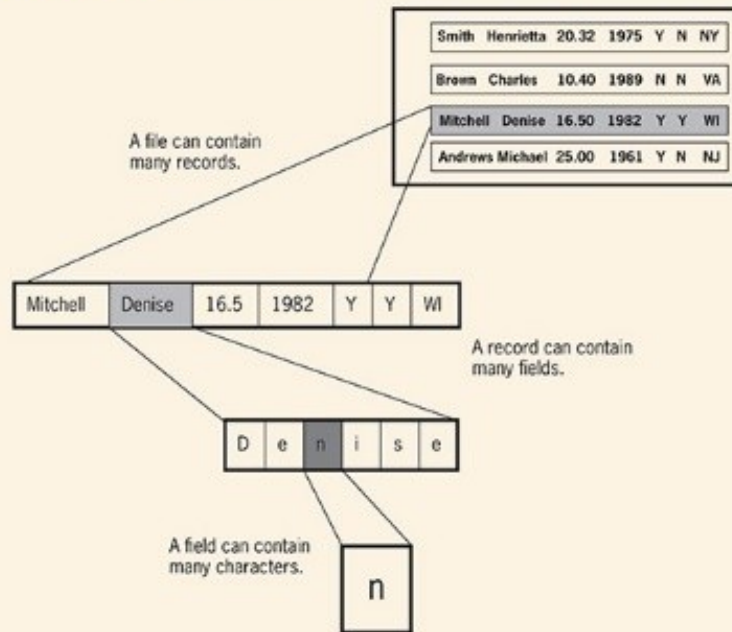
Understanding the Data Hierarchy

- **Data hierarchy**
 - Describes the relationships between data components
 - Consists of:
 - **Characters** – letters, numbers, and special symbols
 - **Fields** – data items representing a single attribute of a record
 - **Records** – groups of fields that go together for some logical reason
 - **Files** – groups of related records
 - **Database** – holds related file data in tables

Understanding the Data Hierarchy

(continued)

QUICK REFERENCE 7-1 The Components of the Data Hierarchy



Performing File Operations

- File operations to use data files in your programs
 - Declare a file identifier

```
InputFile employeeData
OutputFile updatedData
```
 - **Open the file**

```
open employeeData "EmployeeData.dat"
```
 - **Reading from a file** and processing the data

```
input name from employeeData
input address from employeeData
input payRate from employeeData
```

Performing File Operations

(continued -1)

- **Reading from a file** and processing the data
 - Programming languages have different ways of determining how much data to input
 - In many languages, a **delimiter** such as a comma, semicolon, or tab character is stored between data fields

Performing File Operations

(continued -2)

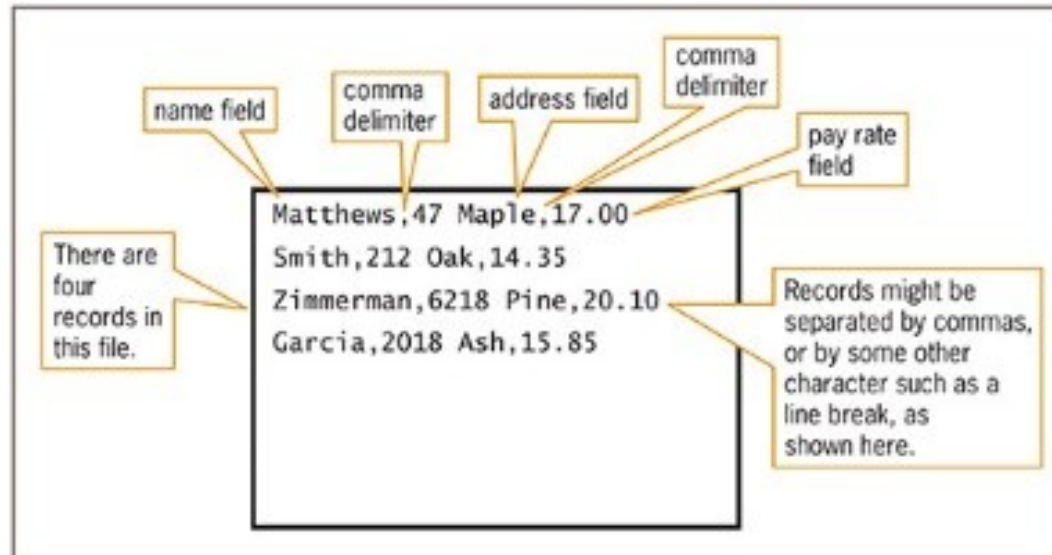


Figure 7-2 How employee data in a readable comma-delimited file might appear in a text reader

Performing File Operations

(continued -3)

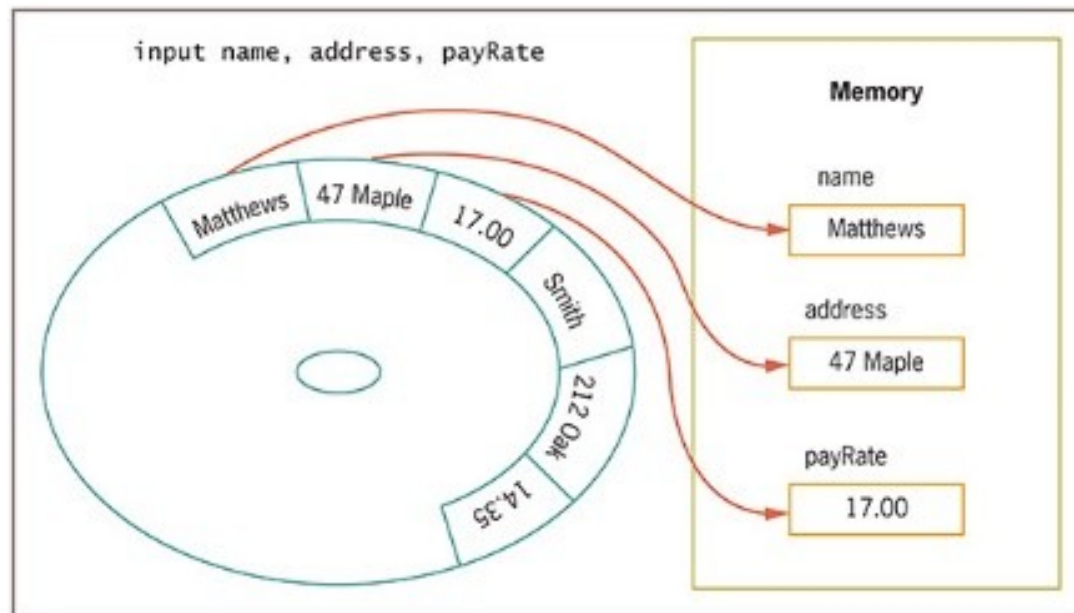


Figure 7-3 Reading three data items from a storage device into memory

Performing File Operations

(continued -4)

- **Sequential file**

- Program reads all the records in this file from beginning to end, processing them one at a time

- **Sorting**

- The process of placing records in order by the value in a specific field or fields
 - **Ascending order** – records sorted in order from lowest to highest values
 - **Descending order** – records sorted in order from highest to lowest values

Performing File Operations

(continued -5)

- Writing data to a file
 - When you store data in a computer file on a persistent storage device, you **write to the file**
 - output name, address, payRate to employeeData
- **Closing a file**
 - When you finish using a file, the program should **close the file**
 - Always close every file you open
- **Default input and output devices**
(keyboard and monitor) do not require opening or closing

A Program that Performs File Operations

- **Backup file**

- a copy kept in case values need to be restored to their original state
- The backup copy is called a **parent file**
- The newly revised copy is a **child file**

A Program that Performs File Operations

(continued -1)

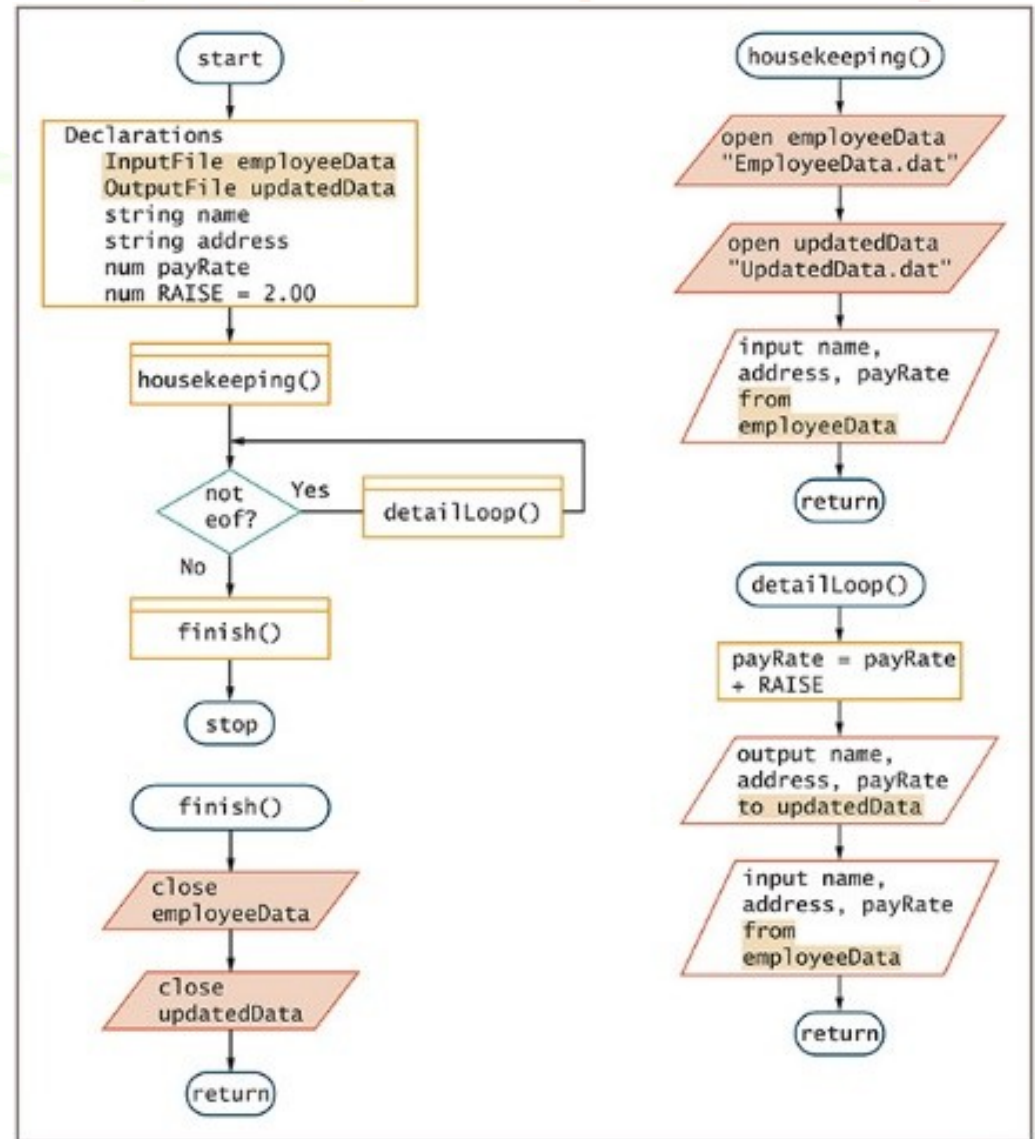


Figure 7-4 Flowchart and pseudocode for program that uses files (continues)

A Program that Performs File Operations

(continued -2)

(continued)

```
start
  Declarations
    InputFile employeeData
    OutputFile updatedData
    string name
    string address
    num payRate
    num RAISE = 2.00
  housekeeping()
  while not eof
    detailLoop()
  endwhile
  finish()
stop

housekeeping()
  open employeeData "EmployeeData.dat"
  open updatedData "UpdatedData.dat"
  input name, address, payRate from employeeData
  return

detailLoop()
  payRate = payRate + RAISE
  output name, address, payRate to updatedData
  input name, address, payRate from employeeData
  return

finish()
  close employeeData
  close updatedData
  return
```

Figure 7-4 Flowchart and pseudocode for program that uses files



Summary

- Computer file
 - A collection of data stored on a nonvolatile device in a computer system
- Data items are stored in a hierarchy
- To use a data file you must declare, open, read, write, and close the file
- Sequential file: records stored one after another in some order