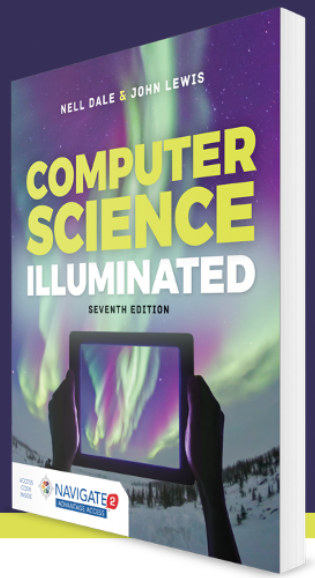


CHAPTER 11
LECTURE OUTLINE

Computer Science Illuminated, Seventh Edition

Nell Dale, PhD; John Lewis, PhD

File Systems and Directories

11.1 File Systems

- Text and Binary Files
- File Types
- File Operations
- File Access File
- Protection

11.2 Directories

- Directory Trees
- Path Names

11.3 Disk Scheduling

- First-Come, First-Served Disk Scheduling
- Shortest-Seek-Time-First Disk Scheduling
- SCAN Disk Scheduling

Credits

Nell Dell, PhD & John Lewis, PhD
Authors

Jones & Bartlett Learning
Publisher

Eric Pogue
Audio commentary plus slides with the grey backgrounds

Chapter Goals (1 of 2)

- Describe the purpose of files, file systems, and directories
- Distinguish between text and binary files
- Identify various file types by their extensions
- Explain how file types improve file usage
- Define the basic operations on a file

Chapter Goals (2 of 2)

- Compare and contrast sequential and direct file access
- Discuss the issues related to file protection
- Describe a directory tree
- Create absolute and relative paths for a directory tree
- Describe several disk-scheduling algorithms

File Systems

File

A named collection of related data, used for organizing secondary memory

File System

The operating system's logical view of the files it manages

Directory

A named group of files

Text and Binary Files (1 of 2)

Text File

A file that contains characters from the ASCII or Unicode character sets

Binary File

A file that contains data in a specific format, requiring special interpretation of its bits

Text and Binary Files (2 of 2)

The terms text file and binary file are somewhat misleading

Ultimately, all information on a computer is stored as binary digits

Text files are formatted as chunks of 8 or 16 bits, interpreted as characters

Binary files are formatted in some other special format

File Types (1 of 2)

File Type

The **kind** of information contained in a document

Most files, regardless of format, contain a specific type of information

File Extension

Part of a file name that indicates the type

File names are often in two parts:

File name . File Extension

File Types (2 of 2)

Extensions	File type
txt	text data file
mp3, au, wav	audio file
gif, tiff, jpg	image file
doc, wp3	word processing document
java, c, cpp	program source files

Some common file types and their extensions

What kinds of files are the following?

- `Chapter.doc`
- `Figure1.jpg`
- `Interview.wav`
- `MyFavorite.mp3`

What's the advantage of using the appropriate extension?

File Operations

What operations do you think you might want to perform on or with a file?

File Protection

File protection

The process of limiting file access

- In multiuser systems, file protection is of primary importance
- We don’t want one user to be able to access another user’s files unless the access is specifically allowed
- A file protection mechanism determines who can use a file and for what general purpose

Why is file protection important?
Give two examples

File Protection

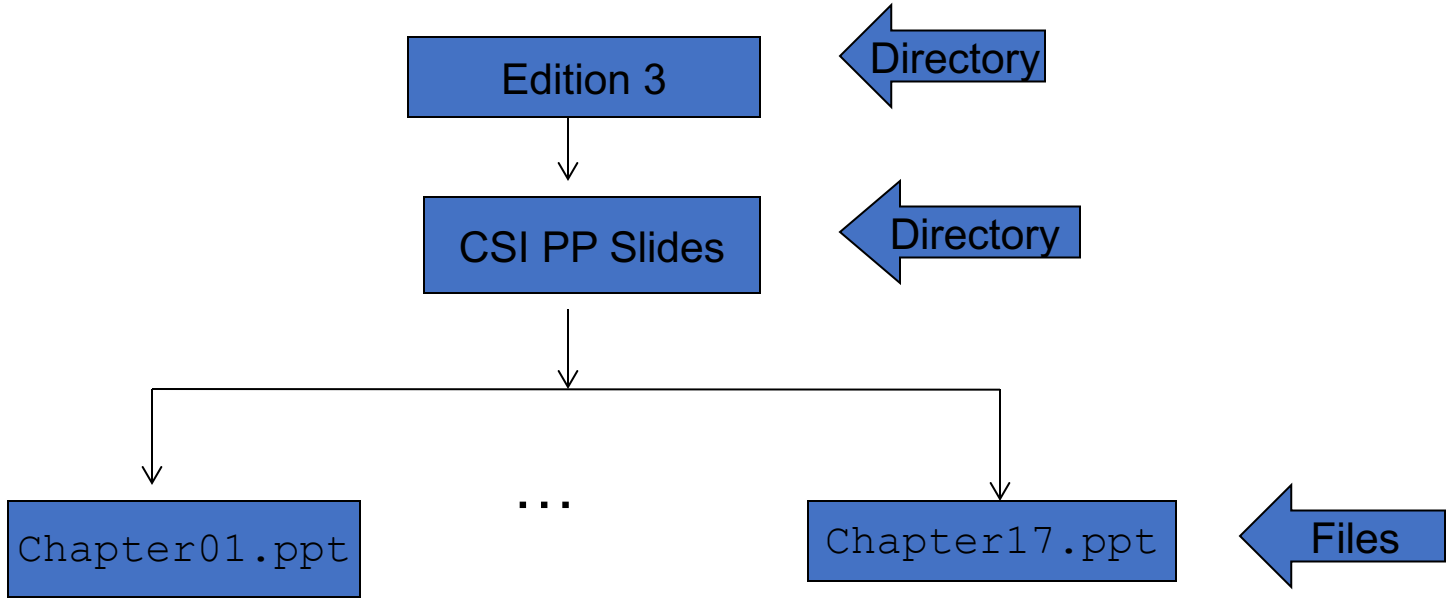
An example of a file protection scheme is the file settings in the UNIX operating system, which are divided into three categories

	Read	Write/Delete	Execute
Owner	Yes	Yes	No
Group	Yes	No	No
World	No	No	No

Directory Trees (1 of 4)

Recall that a directory is a named group of files

A directory can be contained within another directory



Directory Trees (2 of 4)

Parent Directory

The containing directory

Subdirectory

The directory being contained

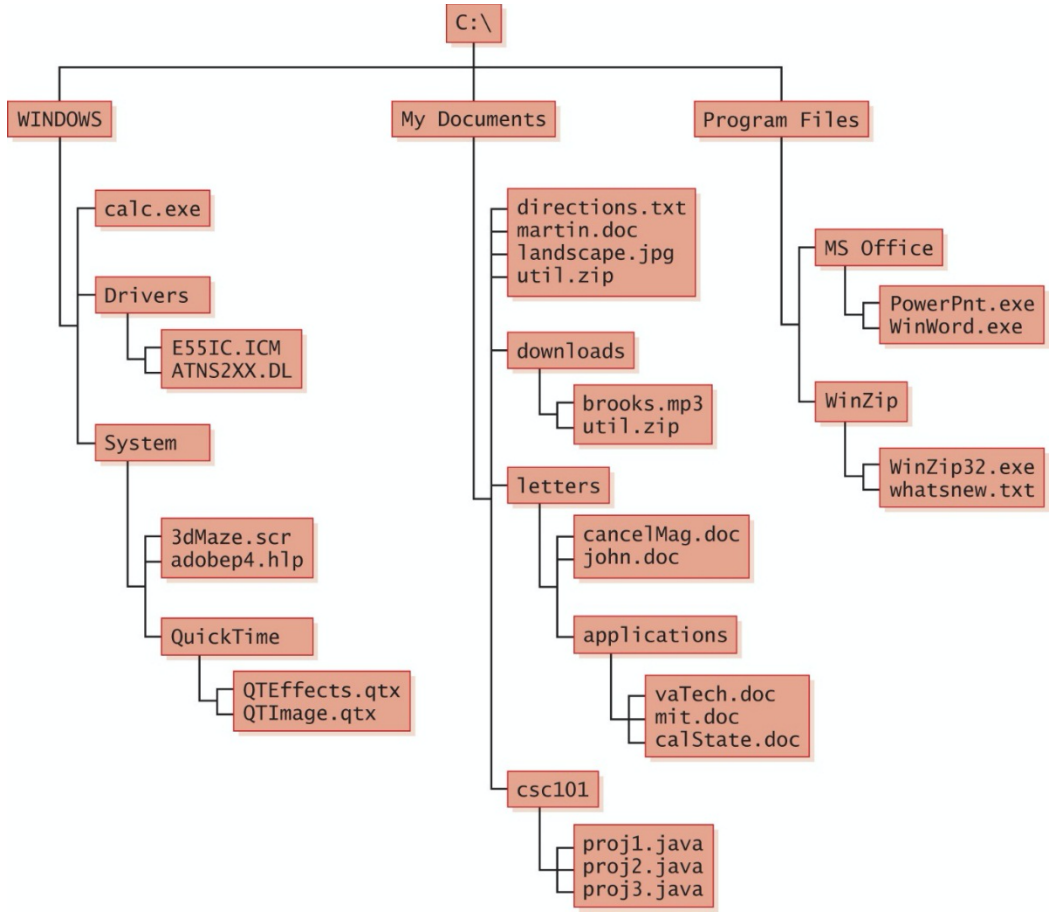
Directory Tree

A logical view of a file system; a structure showing the nested directory organization of a file system

Root Directory

The directory at the highest level

Directory Trees (3 of 4)



A Windows directory tree

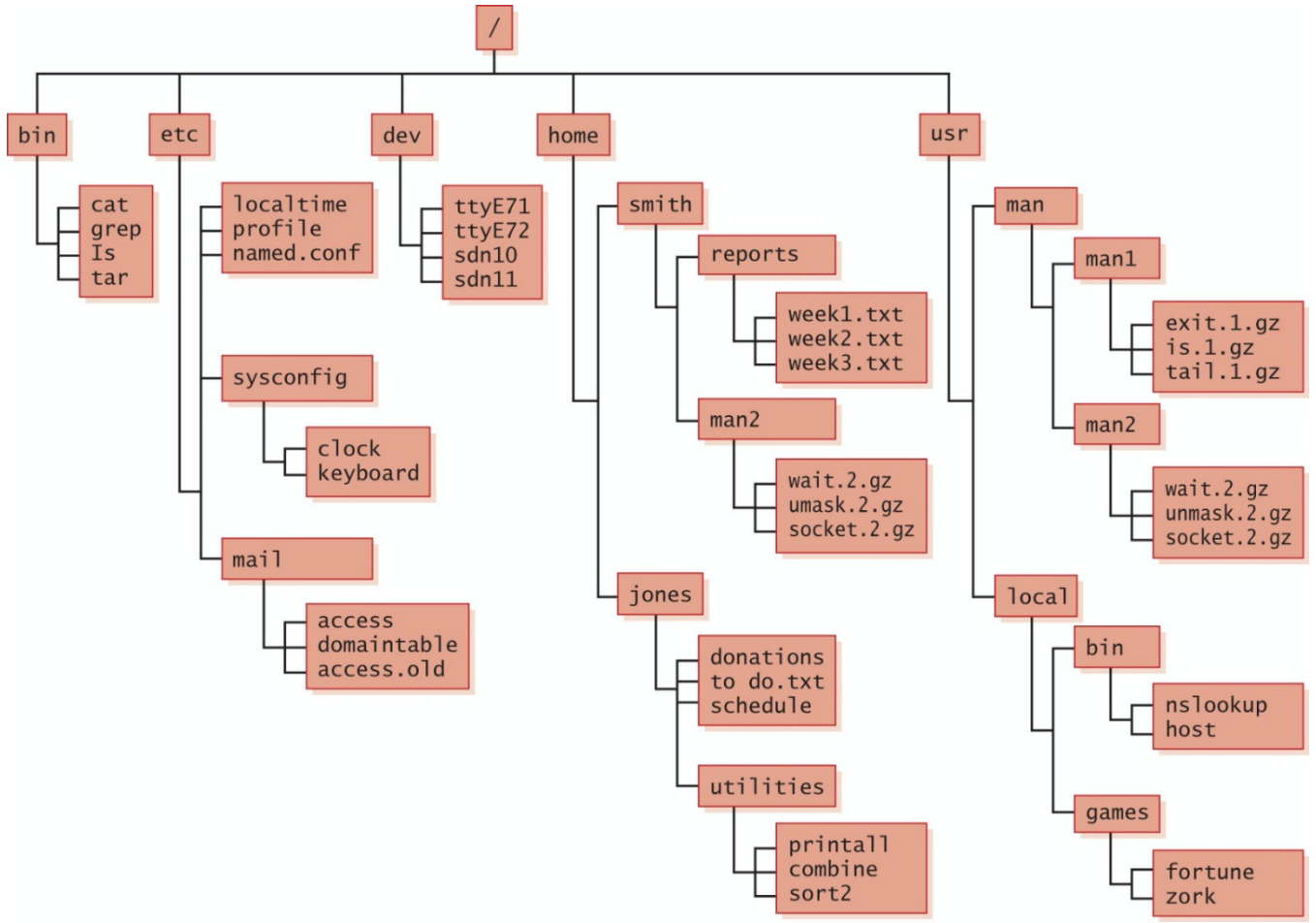
Directory Trees (4 of 4)

At any point in time, you can be thought of as working in a particular location (that is, a particular subdirectory)

Working Directory

The subdirectory in which you are working

A Unix Directory Tree



A UNIX directory tree

Path Names (1 of 2)

Path

A text designation of the location of a file or subdirectory in a file system

Absolute Path

A path that begins at the root and includes all successive subdirectories

Relative Path

A path name that begins at the current working directory

Path Names (2 of 2)

Absolute Paths

```
C:\Program Files\MS Office\WinWord.exe
C:\My
  Documents\letters\applications\vaTech.doc
C:\Windows\System\QuickTime
```

If current working directory is:

```
C:\My Documents\letters
```

Relative Paths

```
cancelMag.doc
applications\calState.doc
```

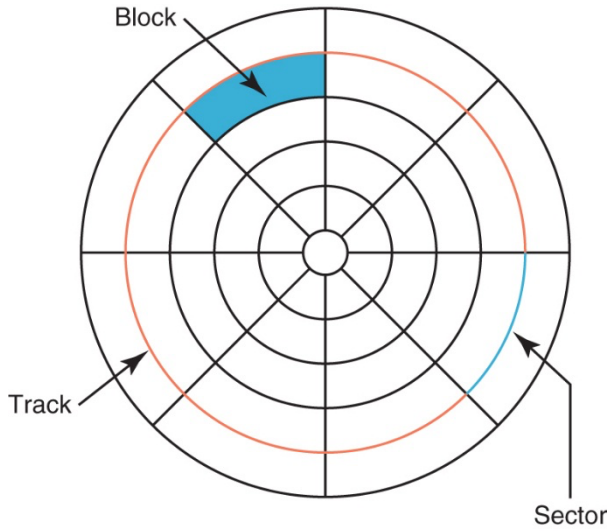
Disk Scheduling (1 of 6)

As a computer deals with multiple processes over a period of time, a list of requests to access the disk builds up

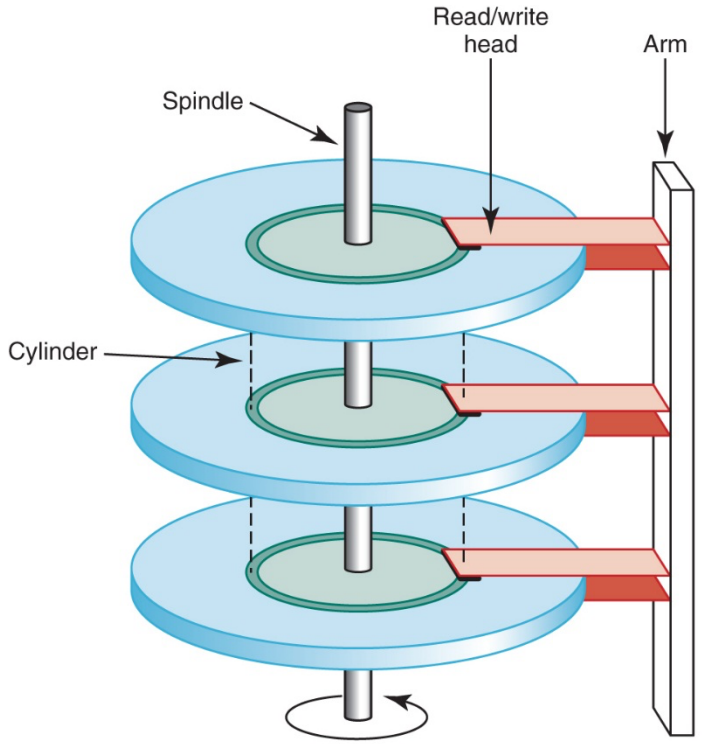
Disk Scheduling

The technique that the operating system uses to determine which requests to satisfy first

Disk Scheduling (2 of 6)



(a) A single disk



(b) A hard disk drive

A magnetic disk drive

Remember seek time and latency?

Disk Scheduling (3 of 6)

First-Come, First-Served (FCFS)

Requests are serviced in the order they arrive, without regard to the current position of the heads

Shortest-Seek-Time-First (SSTF)

Disk heads are moved the minimum amount possible to satisfy a pending request

Scan

Disk heads continuously move in and out servicing requests as they are encountered

Disk Scheduling (4 of 6)

Ordered cylinder requests: 49, 91, 22, 61, 7, 62, 33, 35

Read/write heads at cylinder 26

In what order are they serviced if no more requests arrive?

FCFS:

SSTF:

Disk Scheduling (5 of 6)

SCAN disk scheduling works like an elevator:

- An elevator is designed to visit floors that have people waiting. In general, an elevator moves from one extreme to the other (say, the top of the building to the bottom), servicing requests as appropriate.
- The SCAN disk-scheduling algorithm works in a similar way, except instead of moving up and down, the read/write heads move in toward the spindle, then out toward the platter edge, then back toward the spindle, and so forth

Disk Scheduling (6 of 6)

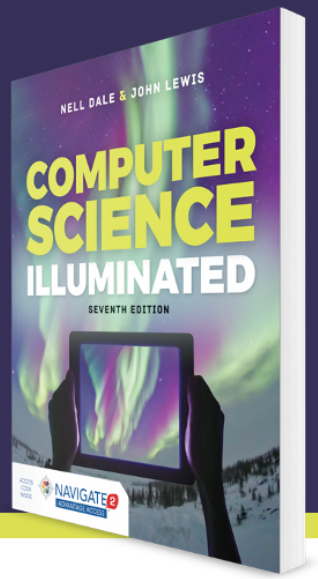
Ordered cylinder requests: 49, 91, 22, 61, 7, 62, 33, 35

Read/write heads at cylinder 26 moving toward cylinder 1

In what order are they serviced if no more requests arrive?

SCAN

Summary



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