File Handling

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Content has been taken mainly from the following books:

Operating Systems Concepts By Silberschatz & Galvin,
Operating Systems: Internals and Design Principles By William Stallings
www.os-book.com
www.cs.jhu.edu/~yairamir/cs418/os2/sld001.htm
www.personal.kent.edu/~rmuhamma/OpSystems/os.html
http://msdn.microsoft.com/en-us/library/ms685096(VS.85).aspx
http://www.computer.howsttuffworks.com/operating-system6.htm
http://williamstallings.com/OS/Animations.html
http://msdn.microsoft.com/en-us/library/aa450566.aspx
www.os-book.com
http://www.yolinux.com/TUTORIALS/ForkExecProcesses.html

Etc…

File Concept

- Contiguous *Logical Address Space*
- Types:
  - Data
    - numeric
    - character
    - Binary
  - Program

File Attributes

- Name – only information kept in human-readable form
- Identifier – Unique tag (number) identifies file within file system
- Type – Needed for systems that support different types
- Location – Pointer to file location on device
- Size – Current file size
- Protection – Controls who can do reading, writing, executing
- Time, Date, and user Identification – Data for protection, security, and usage monitoring
- Information about files are kept in the directory structure, which is maintained on the disk

File Operations

- Create
- Write
- Read
- Reposition within File
- Delete

- Open (F_i) – Search the directory structure on disk for entry F_i, and move the content of entry to memory

- Close (F_i) – Move the content of entry F_i in memory to directory structure on disk

- Several pieces of data are needed to manage open files:
  - *File Pointer*: Pointer to last read/write location, per process that has the file open
  - *File-open Count*: Counter of number of times a file is open – to allow removal of data from open-file table when last processes closes it
  - *Disk Location of the File*: cache of data access information
  - *Access Rights*: Per-process access mode information

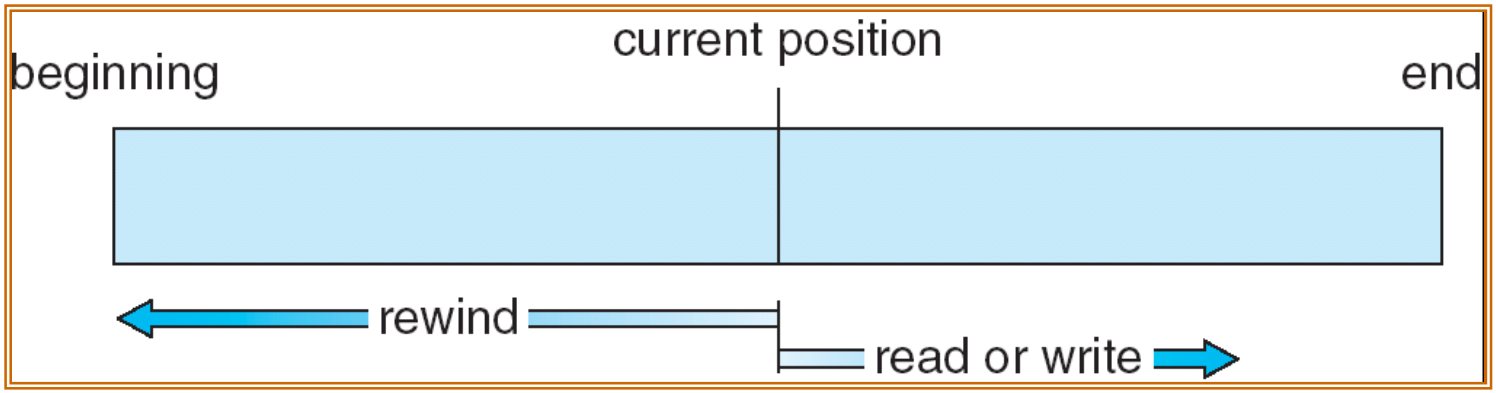
file type	usual extension	function
executable	exe, com, bin or none	ready-to-run machine-language program
object	obj, o	compiled, machine language, not linked
source code	c, cc, java, pas, asm, a	source code in various languages
batch	bat, sh	commands to the command interpreter
text	txt, doc	textual data, documents
word processor	wp, tex, rtf, doc	various word-processor formats
library	lib, a, so, dll	libraries of routines for programmers
print or view	ps, pdf, jpg	ASCII or binary file in a format for printing or viewing
archive	arc, zip, tar	related files grouped into one file, sometimes compressed, for archiving or storage
multimedia	mpeg, mov, rm, mp3, avi	binary file containing audio or A/V information

Access Methods

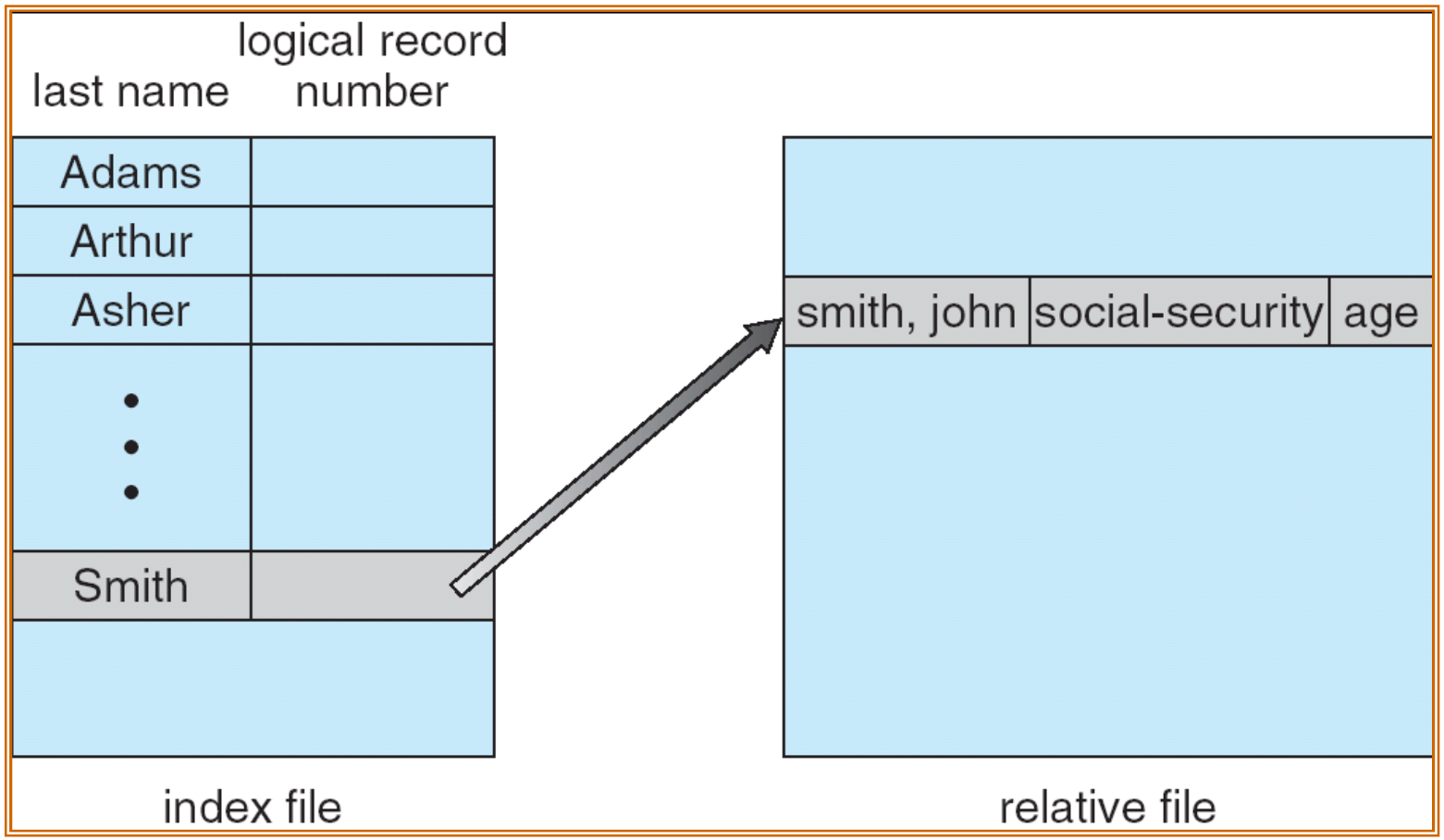
- *Sequential Access*
  - read next
  - write next
  - reset
  - no read after last write
    - (rewrite)
- *Direct Access*
  - read n
  - write n
  - position to n
    - read next
    - write next
  - rewrite n

n = relative block number

Sequential Access

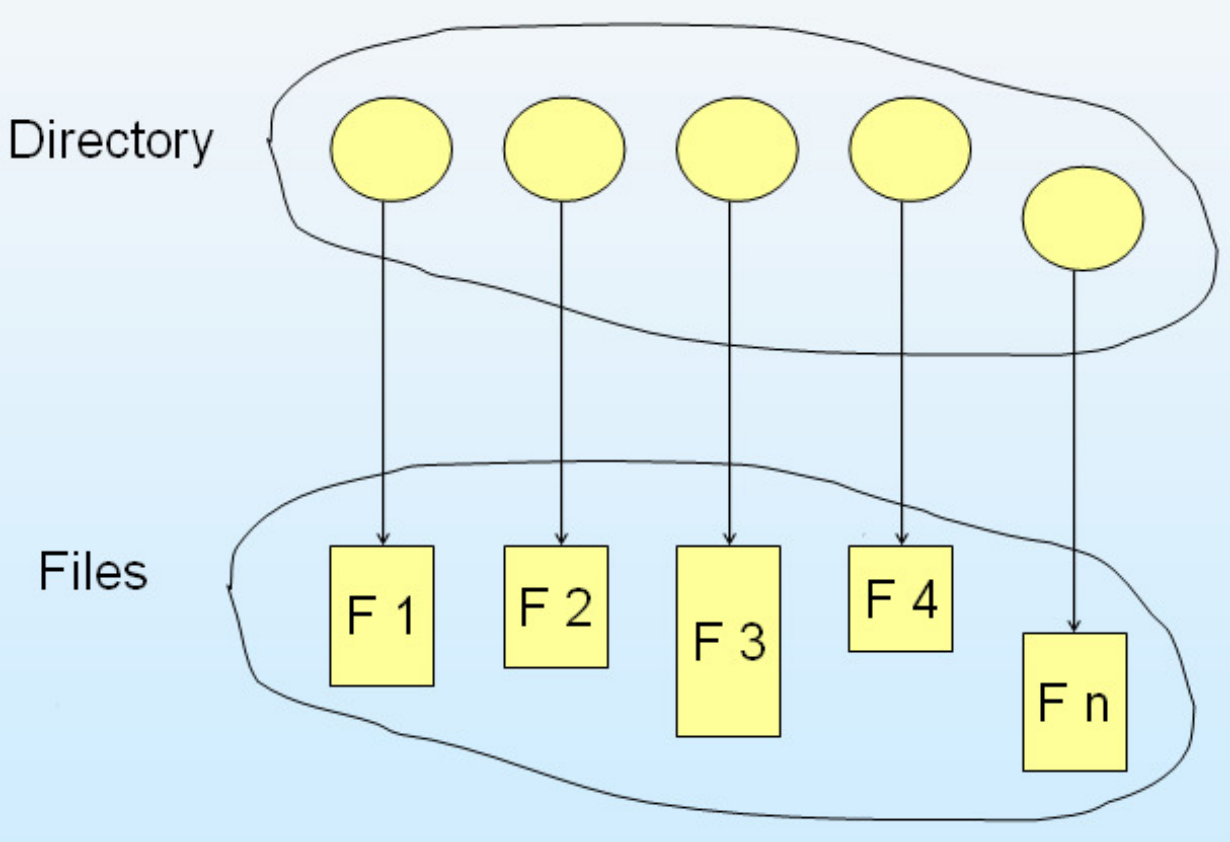


Index & Relative Files

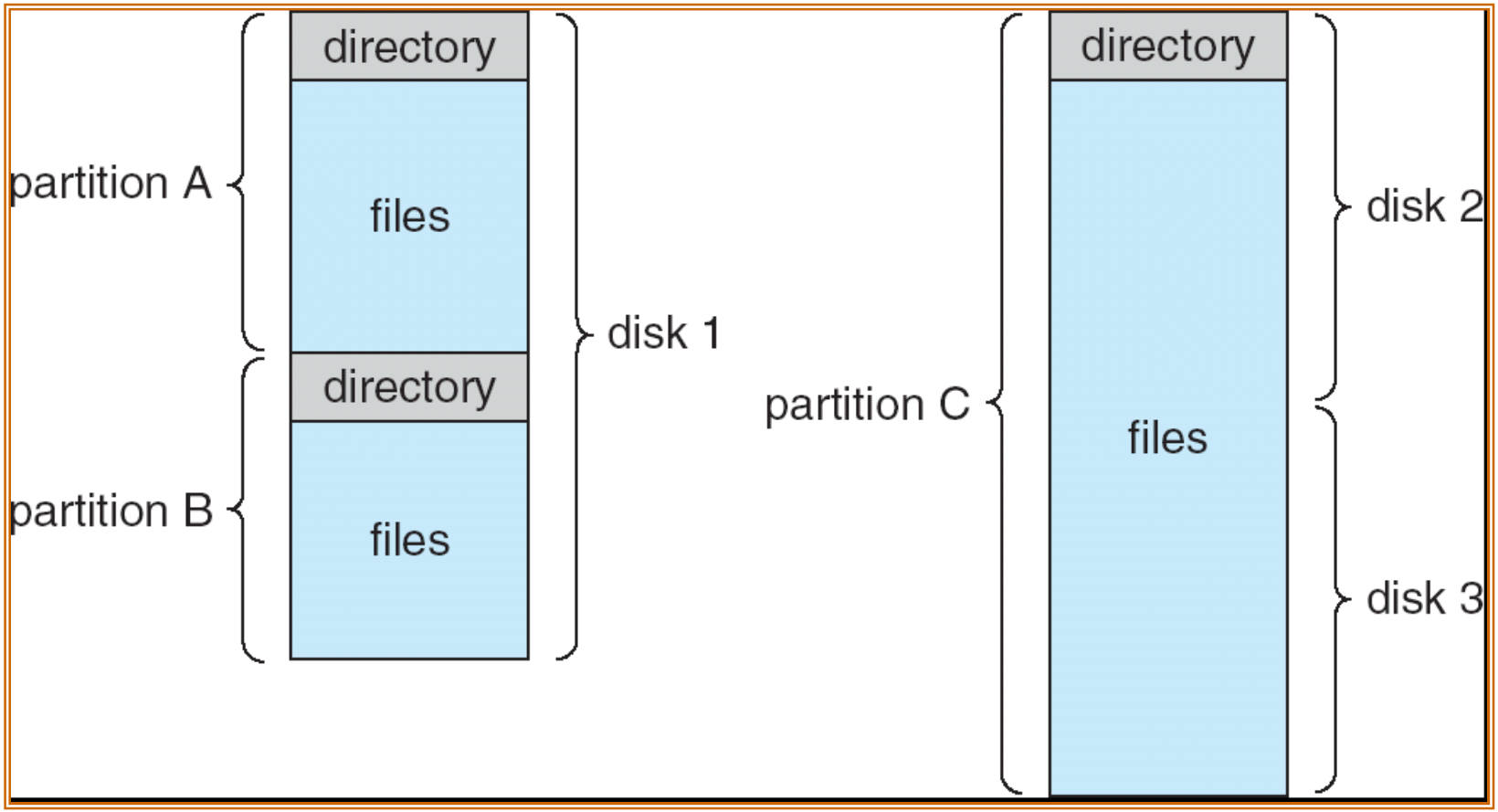


Directory Structure

- A collection of nodes containing information about all files



File System Organization



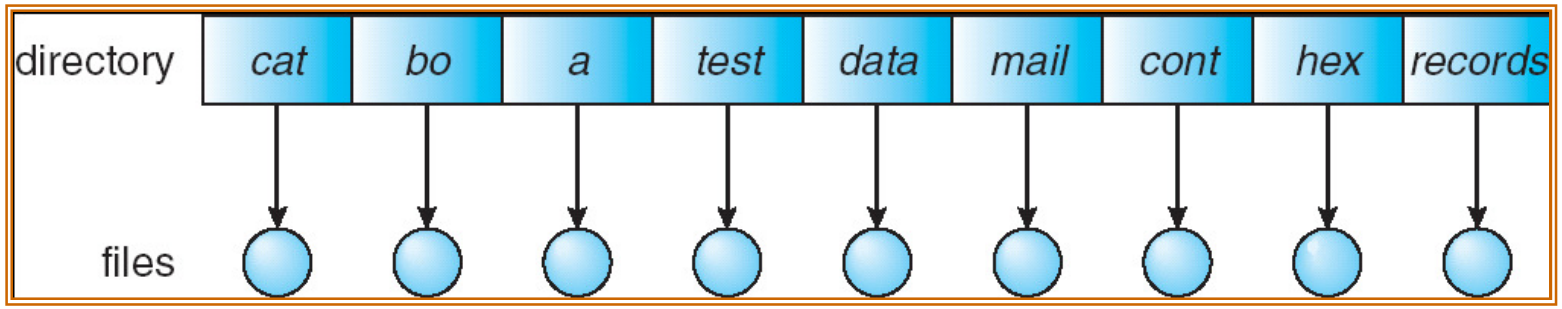
Operations performed on Directory

- Search for a File
- Create a File
- Delete a File
- List a Directory
- Rename a File
- Traverse the File System

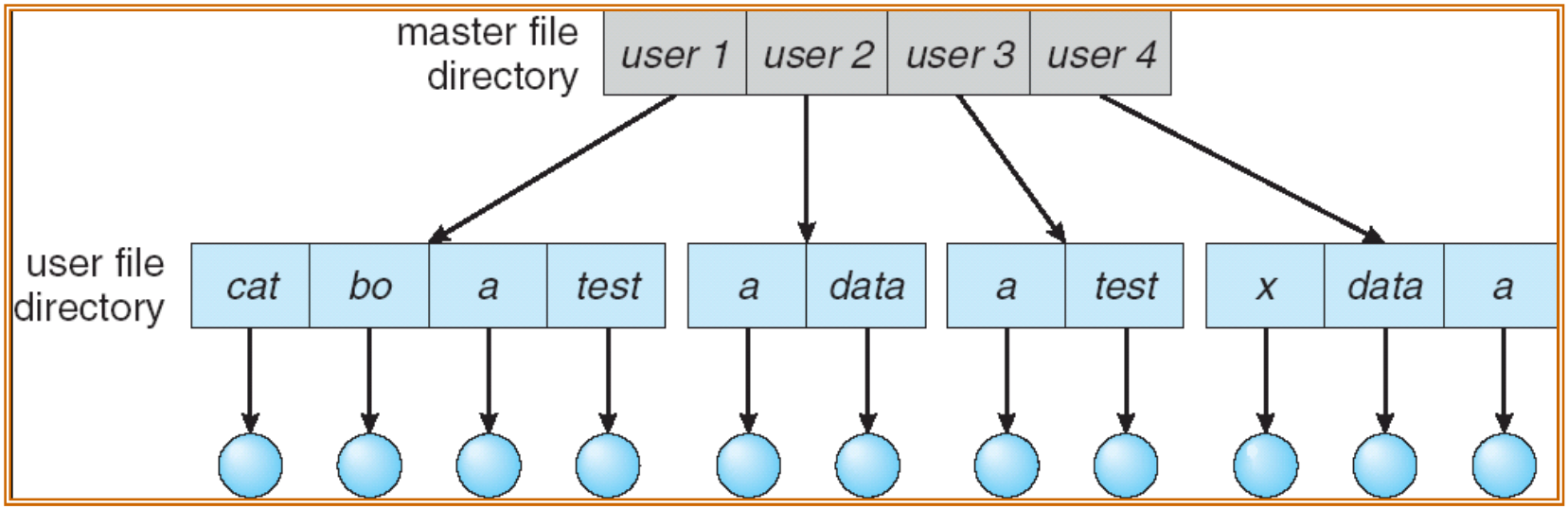
Organize directory to obtain

- Efficiency – Locating a file quickly
- Naming – Convenient to users
  - Two users can have same name for different files
  - The same file can have several different names
- Grouping – Logical grouping of files by properties, (e.g., all Java programs, all games, …)

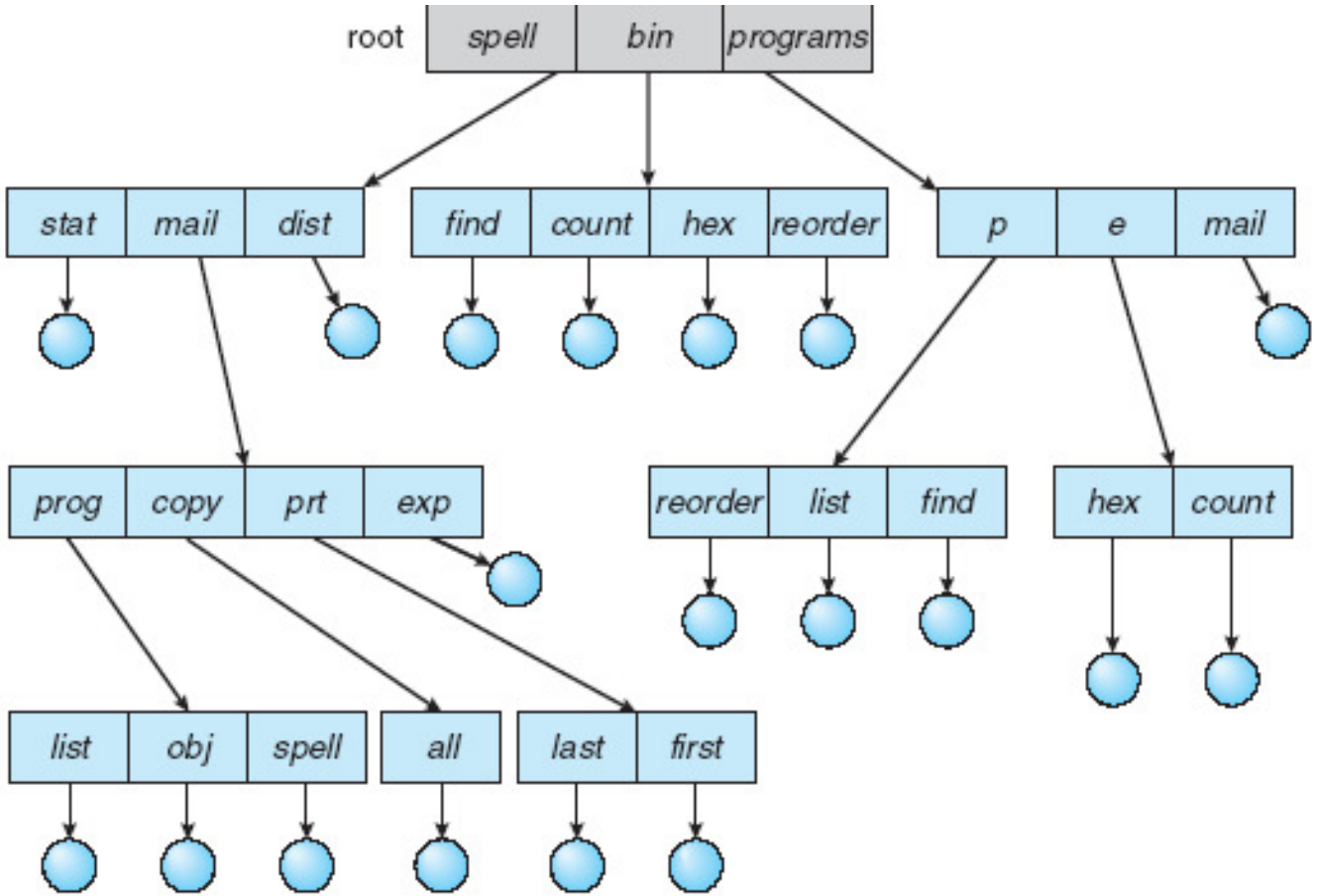
Single-level Directory



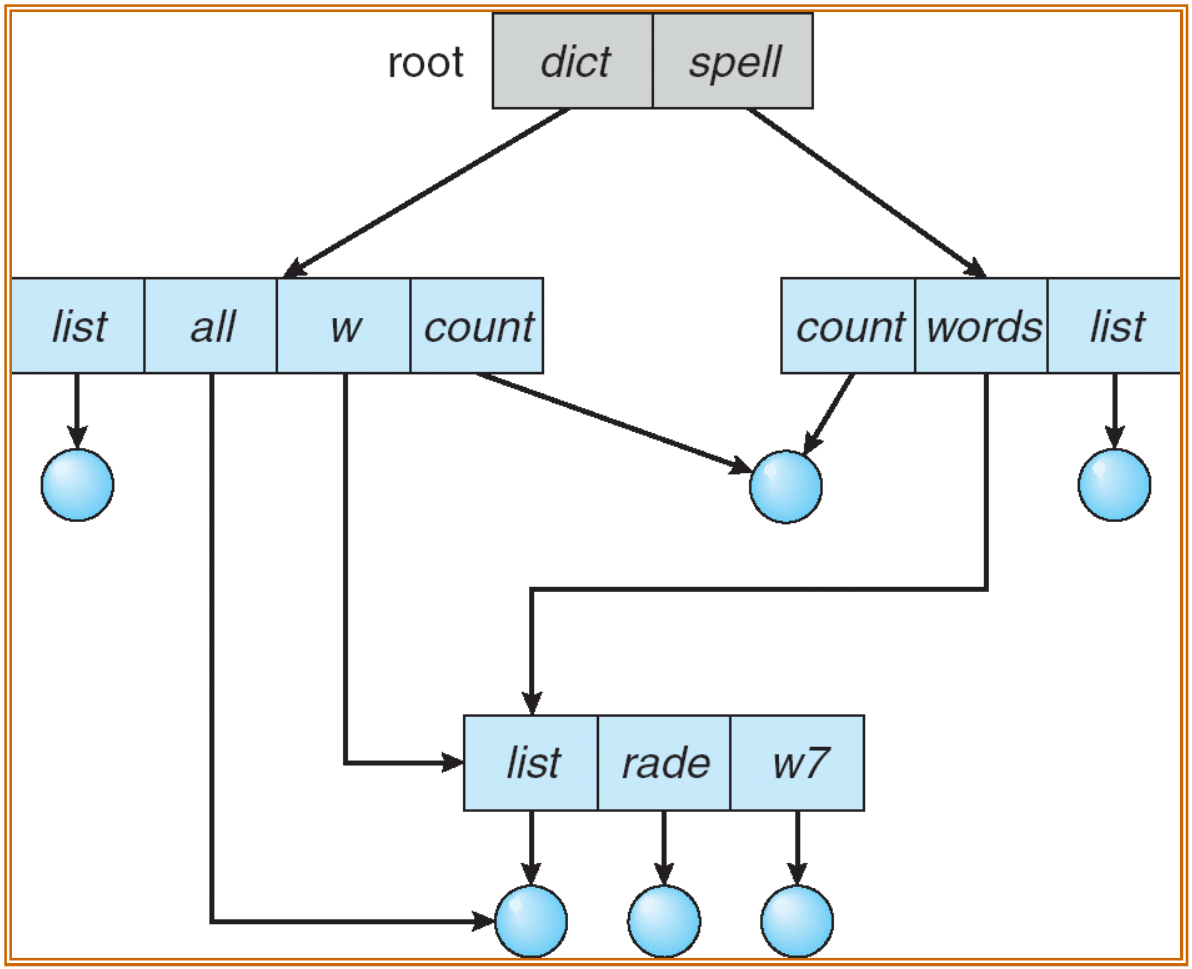
Two-level Directory



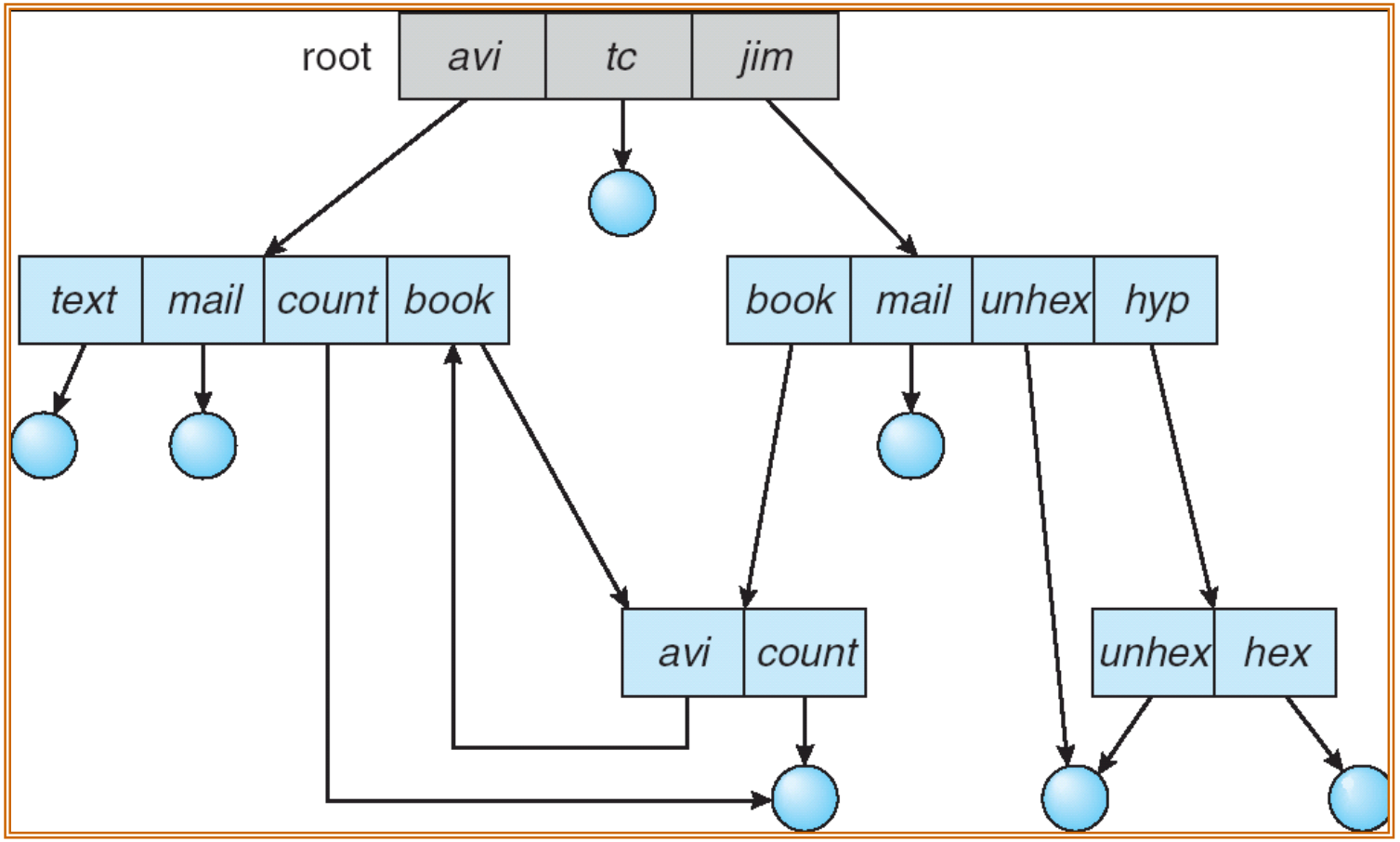
Tree Structured Directory



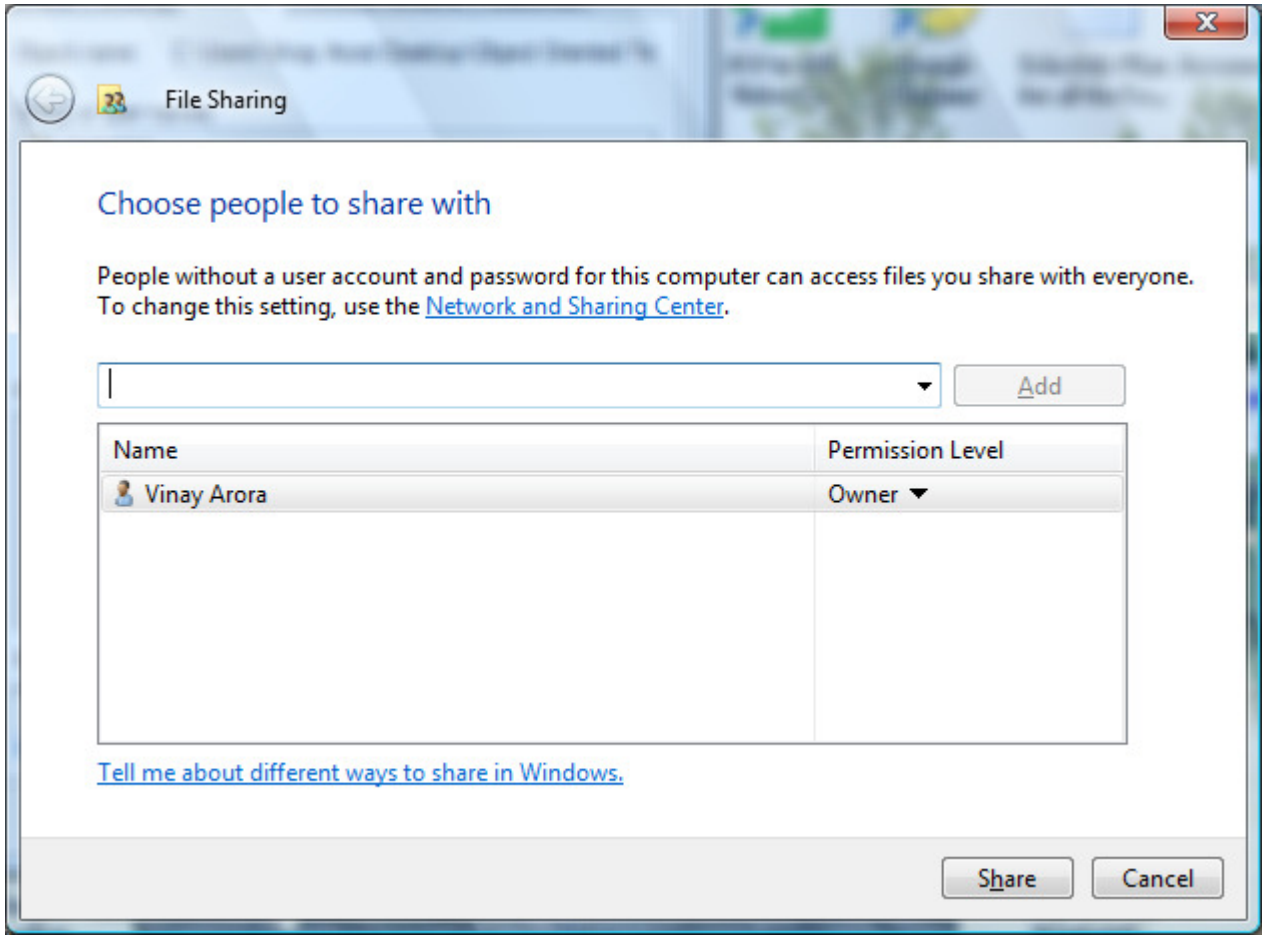
Acyclic Graph Directory



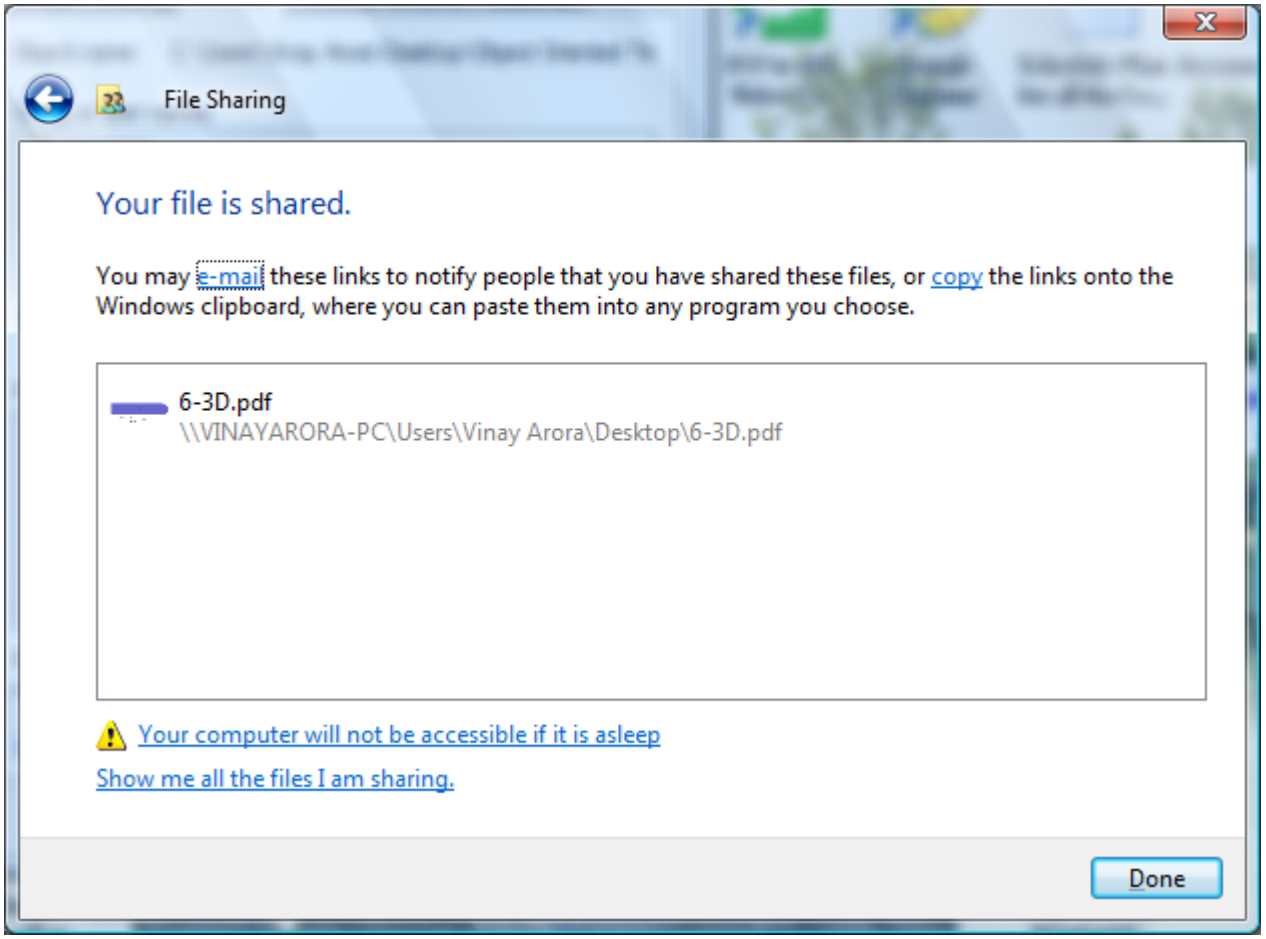
General Graph Directory



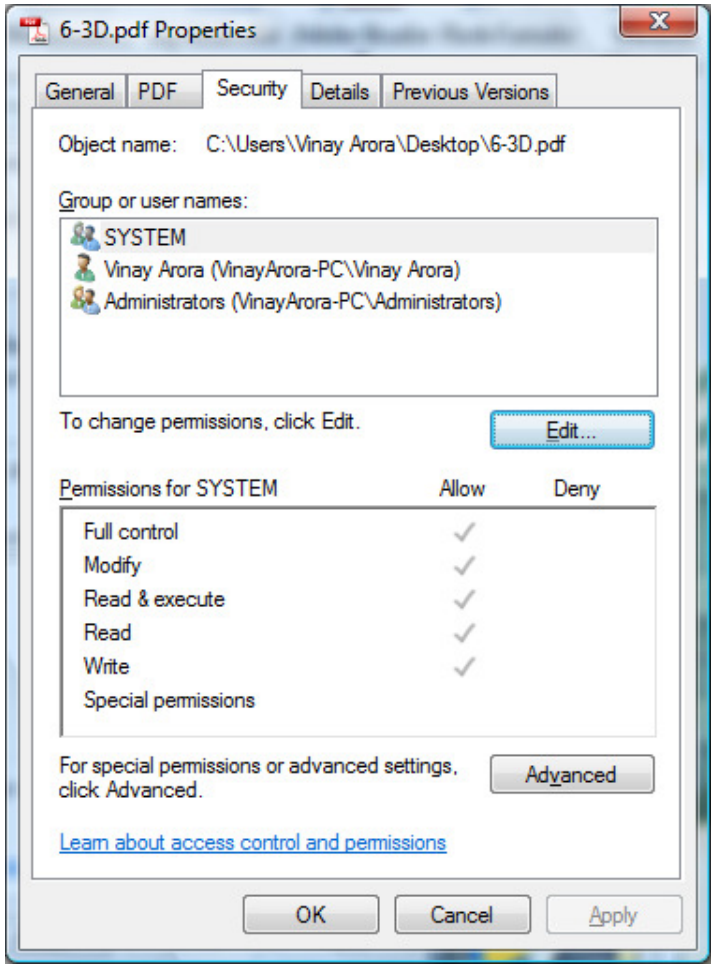
File Sharing

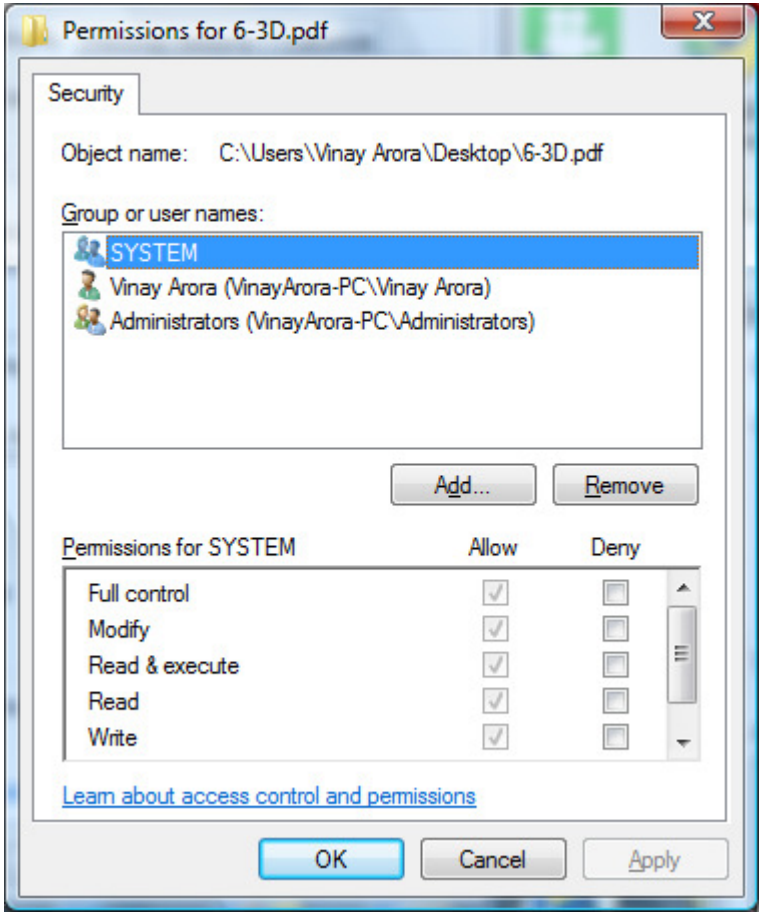


File Sharing



File Security





Thnx…