

File systems, databases, cloud storage

- **file: a sequence of bytes stored on a computer**
 - content is arbitrary (just bytes); any structure is imposed by the creator of the file, not by the operating system
- **file system: software that provides hierarchical storage and organization of files, usually on a single computer (or nearby)**
 - a significant part of the operating system
- **database: an integrated collection of logically related records**
 - data is organized and structured for efficient systematic access
 - may be distributed across lots of machines & geographically dispersed
- **database system: software that provides efficient access to information in a database**
 - not usually part of the operating system
- **cloud storage: the same thing, but on someone else's computer(s)**

File systems: managing stored information

- **logical structure: users and programs see a hierarchy of folders (or directories) and files**
 - a folder contains references to folder and files
 - "root" folder ultimately leads to all others
 - a file is just a sequence of bytes
 - contents determined and interpreted by programs, not the operating system
 - a folder is a special file that contains names of other folders & files plus other information like size, time of change, etc.
 - contents are completely controlled by the operating system
- **physical structure: disk drives operate in tracks, sectors, etc.**
 - other storage devices have other physical properties
- **the operating system converts between these two views**
 - does whatever is necessary to maintain the file/folder illusion
 - hides physical details so that programs don't depend on them
 - presents a uniform interface to disparate physical media
- **the "file system" is the part of the operating system that does this conversion**

How the file system converts logical to physical

- **disk is physically organized into sectors, or blocks of bytes**
 - each sector is a fixed number of bytes, like 512 or 1024 or ...)
 - reading and writing always happens in sector-sized blocks
- **each file occupies an integral number of blocks**
 - files **never** share a block
 - some space is wasted: a 1-byte file wastes all but 1 byte of the block
- **if a file is bigger than one block, it occupies several blocks**
 - the blocks are not necessarily adjacent on the disk
- **need a way to keep track of the blocks that make up the file**
- **this is usually done by a separate "file allocation table" that lists the blocks that make up each file**
 - this table is stored on disk too so it persists when machine is turned off
 - lots of ways to implement this

Converting logical to physical: directories

- a directory / folder is a file
 - stored in the same file system
 - uses the same mechanisms
- but it contains information about other files and directories
- the directory entry for a file tells where to find the blocks
IT DOES NOT CONTAIN THE DATA ITSELF
- the directory entry also contains other info about the file
 - name (e.g., midterm.doc)
 - size in bytes, date/time of changes, access permissions
 - whether it's an ordinary file or a directory
- the file system maintains the info in a directory
 - very important to keep directory info consistent
 - application programs can change it only indirectly / implicitly

File permissions

Upload files

Maximum file size allowed for upload: 95 MB

Please select files to upload to **/NAShomes/publichtmls/mycpanel/bwk/public_html**

No file selected.

Overwrite existing files:

Mode	User	Group	World
Read	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Write	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Execute	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permission	<input type="text" value="6"/>	<input type="text" value="4"/>	<input type="text" value="4"/>

What happens when you say "Open"?

- **search for file in sequence of directories as given by the components of its name**
 - report an error if any component can't be found
- **read blocks of file as needed**
 - using the location information in the file allocation table to find the blocks
 - store some of them in RAM

What happens when you say "Save"?

- make sure there's enough space (enough unused blocks)
 - don't want to run out while copying from RAM to disk
- create a temporary file with no bytes in it
- copy the bytes from RAM and/or existing file to temporary file:
 - while (there are still bytes to be copied) {
 - get a free block from the unused list
 - copy bytes to it until it's full or there are no more bytes to copy
 - link it in to the temporary file
 - }
- update the directory entry to point to the new file
- move the previous blocks (of old version) to the unused list
 - or to recycle bin / trash

Network file systems

- **the file system doesn't have to be local**
 - the data could be on some other computer
- **need software for accessing remote files across networks**
 - user programs access files and folders as if they are on the local machine
 - operating system converts these into requests to ship information to/from another machine across a network
- **there has to be a program on the other end to respond to requests**
 - "mapping a network drive" or "mounting your H: drive" sets up the connections
- **subsequent reads and writes go through the network instead of the local disk**

Cloud storage

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- **need software for accessing remote files across networks**
 - user programs access files and folders as if they are on the local machine
 - operating system converts these into requests to ship information to/from another machine across a network
- **there has to be a program on the other end to respond to requests**
 - connecting to Google Drive or Dropbox or iCloud or ... sets up the connections
- **subsequent reads and writes go through the network instead of the local disk**

51% Of People Think Stormy Weather Affects 'Cloud Computing'

Jay Yarow | Aug. 30, 2012, 12:14 PM | 🔥 4,345 | 💬 10

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If there's a buzzword that's more soporific/confusing than "cloud computing" we're not sure what it is.

A survey from Citrix confirms that we're not the only ones who feel this way.

It surveyed 1,000 people about cloud computing and found that 51 percent think bad weather affects cloud computing. Another 95 percent don't think they ever use cloud computing, even though they're actually doing a lot in the cloud.



Bad day for cloud computing?

Cloud computing

- **put data on computers that are somewhere else**
 - not on your laptop
 - access it via the Internet
- **do (most of) the actual computing on computers that are somewhere else**
 - not on your laptop
 - but owned by someone else
 - use the Internet to connect to the programs and the data
- **Amazon Web Services, Google Cloud Platform, Microsoft Azure, ...**
 - can rent processors, operating systems, data storage, ...
 - scales easily, easier to administer,
- **relies on virtual machines**
 - gives users the appearance of having their own hardware and systems

Browser as operating system

- a browser provides many of the services that an operating system does
 - can use "the cloud" for storage and computation
 - programs mostly run in cloud; browser is an interface
 - email, social networks, games, Google docs (and similar), ...
- how about a *computer* that only runs a browser?
 - Chromebook: runs Chrome OS (Linux-based operating system)
 - applications and data are in the cloud, not on computer itself
 - very little local storage and local apps

Samsung XE303C12 11.6" Chromebook, Samsung Exynos 5250 Dual Core, 16GB Solid State Drive, 2GB DDR3L, 2x2 802.11n, USB 3.0, HDMI, ChromeOS - (Scratch & Dent)

\$99.99

This product has not been reviewed yet.

Condition Refurbished - Scratch & Dent

Screen Size 11.6"

Quantity Limit 10 per customer

Shipping **Standard** - Estimated delivery Oct 17 - Oct 23
Free Standard shipping for Prime members

