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### Files

- File sizes
- Transfer speeds
- File formats
- Compression

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## File Sizes

- Floppy disc 1.44MB
- Zip disc 100 MB or 250MB
- CD 700MB
- DVD 8GB
- Hard discs in MCS lab 40GB
- Typical modern pc 80GBhard disc

1 hour of video	8GB
3 minutes of video	400MB
8 seconds of video	32KB

times are for "home" videos

Note

 $1M = 1x10^6 = 1,000,000$ 

 $1G = 1x10^9$ 

5 page Word document (no illustrations) 30KB Mary Aylmer Files MCS2 3 Files

### Transfer

- Remember
  - Speed of data transmission is measured in *bits* (b)
  - amount of data is measured in *bytes* (B)
    - Reason: 1byte = 1 character so for a text file you have a rough idea of length.
- 8 bits = 1 byte in other words 8b = 1B
- Generally receiving speed is faster than sending speed.

# Transfer speeds

- Domestic modem 56kb/s (this is kilobits per second) This modem will receive at 56kb/s but send at 33kb/s.
- 1kB file (this is in kilobytes)

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4 Files

- 1KB contains approximately 1,000 Bytes (exactly 2<sup>10</sup>)
- 1MB contains approximately 1,000,000 Bytes
- 1GB contains approximately 1,000,000,000 Bytes
- So to receive 30 KByte file at 56 kilobits per second

$$\frac{30 \times 1000 \times 8}{56 \times 1000} = 4.3 \operatorname{sec}$$

4.3 secs in theory but in real life is slower due to sharing, queuing, request time etc. Mary Aylmer Files MCS2 5 Files

## Transfer Speeds 2

- Firewire speeds
  - capture at 20Mb/s
- ISDN
  - 128Kb/s
- Broadband
  - -2Mb/s

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## File Formats

- file formats for various uses
  - text txt, doc
  - scans tif
  - illustrations pdf, gif
  - photos jpeg
- all handle information differently

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### GIF- Graphics Interchange Format

- designed for on-line delivery
- handles graphics (logos, cartoons, drawings) well
- 256 (8-bit) colours maximum (so poor quality but quick for photos)
- interlacing available (image appears on web blocky initially and then full focus, rather than line by line)
- transparency and animation

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## GIF - Graphics Interchange Format 2

- Full colour original would be
  - mapped to the 8-bit Colour Look-Up Table (CLUT)
  - then compressed using Run Length Encoding (RLE)
  - not efficient if many changes across a line of pixels



#### Mary Aylmer Files MCS2 9 Files JPG/JPEG Joint Photographic Experts Group

- 16.7 (24-bit) million colours good for photos
- Artifacts (marks on the image, square blocks of the wrong colour, bleeding) caused by
  - multiple decompressions and recompressions
  - high compression factor
  - sharp edges, borders
- To compress
  - divides image up into blocks and averages colour
- High compression factors with little loss of quality often compressed file is acceptable quality and 20% of original size

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# JPG/JPEG Joint Photographic Experts Group 2

- Repeated decompression and recompression will result in poor quality.
  - Best to save at the end
  - avoid multiple compression and over compression

#### Mary Aylmer Files MCS2 11 Files **PNG - "ping"** Portable Network Graphics

- fully supported by Netscape 6 and partially supported by Explorer 5.5
- Lossless compression
- 8-bit, 24-bit or 32-bit colour
- Faster interlacing (previews once 1/64th is downloaded as opposed to 1/8th with GIF)
- alpha transparency
- more info at

http://www.webcolors.freeserve.co.uk/png/

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## MPEG Motion Picture Experts Group

- MPEG compression
  - spatial redundancy
    - same as JPG
  - temporal redundancy
    - frames vary little over 1-2 secs so full data then changes only for next 12 or more frames
  - Compression rates of 20:1 are possible

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## Compression

- Takes up less storage space
- Faster transfer of data
- Two types of compression ...

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# Lossless compression

- creates a smaller version of the file and on demand re-creates the original file **exactly**
- it works by
  - creating a table of essential elements
  - and a list of where and when the elements appear
- typical compression ratio is 50%
- examples zip, GIF (if original has less than 265 colours)

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## Lossy compression

- there will be some loss of quality
- typically compression of factor 10 is OK
- typical use JPEG, MPEG
- multiple decompressions and recompressions can lead to poor quality