Storage

The smallest piece of data that a computer can deal with is a single signal which is either on or off. This signal, called a bit, obviously can't hold too much information, so bits are usually grouped together in larger chunks, called bytes. A byte, which is comprised of 8 bits, is the basis for storing computer data. What makes the byte so popular is that by using various on/off combinations of the bits in a byte, we can hold up to 256 different combinations, which is plenty sufficient to allow us to have a unique combination for each of the letters, numbers, punctuation marks, etc. that we commonly use.

When talking about how big a file is, we usually need bigger units to describe it than bytes. Some of the more common ones are:

• A kilobyte (abbreviated 'KB') is 2^{10}, or just over a thousand, bytes (1024 to be exact).

• A megabyte (or just 'MB') is 2^{20} bytes which is 1024 kilobytes or 1048576 bytes.

• A gigabyte ('GB') is a billion (2^{30}) bytes.

• A terabyte (yes...'TB') is a *trillion* (2^{40}) bytes.

To get an idea of the amount of information that exists around us, let us do a few 'back of the envelope' calculations:

• A full page of single-spaced text, it is roughly 400 words at 5 letters per word. This is a total of 2,000 bytes, or a little less than 2 KB.

• A ten second sound sample using the built-in NeXT command 'sndrecord' takes up about 80 KB.

• A high-density 3.5 inch disk can hold 1440 KB or 1.44 MB.

• The Bible is 4.4 megabytes.

• A compact disc records music at 44,100 samples per second, with each sample composed of 16 bits. Therefore, a recording of Beethoven's Ninth Symphony which lasts 66 minutes 40 seconds equals 2,822,400,000 bits or 352,800,000 bytes or 344,531 KB or 336 MB of information.

• A floptical disk (a floppy disk for a NeXT that is somewhat similar to a CD) can store 512 megabytes of data.

• Firestone library has roughly 4 million volumes at 500 pages per volume at 400 words per page at 5 letters per word equalling a total of 4 trillion bytes or 3,906,250,000 kilobytes or 3,814,697 megs which is the equivalent of 7,451 floptical disks. Since each disk costs around $175, it would take $1,303,925 to store it all (however, we could probably get a bulk rate :-)). For a typist who can type 100 words per minute to convert all of the information into electronic form, it would take 15,210 years of typing 24 hours a day, 7 days a week, 365.25 days a year.