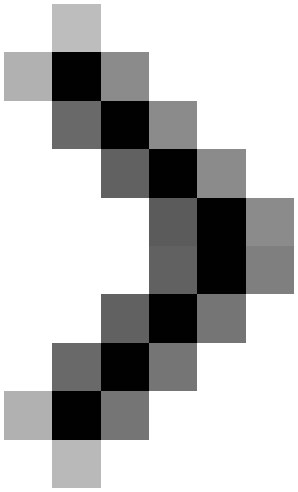
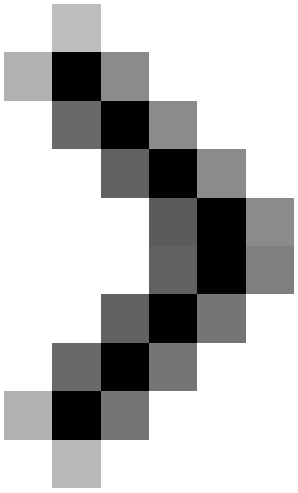
Hardware in OSI reference model: Grade 6

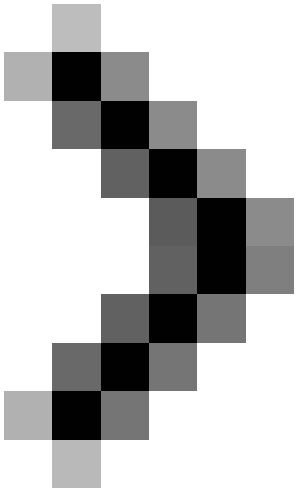
In this section, we will introduce you to the Presentation presentation layer, which is the first layer related to the transmission of data on the network at a more abstract level.



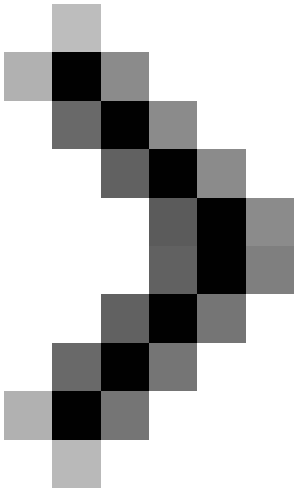
Hardware in OSI reference model: Grade 1



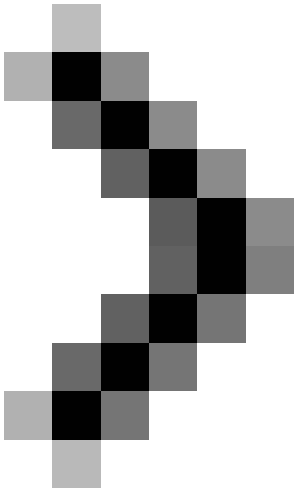
Hardware in OSI reference model: Layer 2



Hardware in OSI reference model: Grade 3



Hardware in OSI reference model: Grade 4



Hardware in OSI reference model: Grade 5

Russell Hitchcock

In this section, we will introduce you to the Presentation presentation layer, which is the first layer related to the transmission of data on the network at a more abstract level.

In the previous five sections of this series, we have introduced you to the five lower layers in the OSI reference model. In this section, we will introduce you to layer 6, the presentation layer, which is also the first layer related to the transmission of data on the network at a more abstract level than 0 and 1; for example when transmitting letters, how they are represented by 0 and 1 (or how they are represented in lower layers in the OSI reference model).

This function is referred to as interpreting and allowing different applications (usually different computational hardware) to communicate by common standards in translation, called transport syntax. . In addition to the transmission syntax, it is possible to express strings of numbers 0 and 1 and there are other transport syntaxes that can transmit more complex data, like objects in object-oriented programming languages. Extensible Markup Language (XML) is an example in this case.

Compression

Another important function of the presentation layer is compression. Compression is often used to maximize bandwidth usage efficiency, or to optimize disk space when storing data.

Compression does not lose data

There are two general types of compression: compression with loss of data and no loss of data, as the name implies, lossless compression is the way in which data decoding will return to the original state. when compressing; absolutely no loss of data. Lossless data compression effectively compresses not as large as data loss techniques and can consume more processing power when performing compression; therefore you must balance or calculate and consider which compression technique to choose.

Encrypted dictionary

The general way to do data compression is not lost, using a dictionary. This method is called an alternative encoder, which encodes the validity between the sent message and the messages received in the dictionary. For example, you can use a dictionary and when you want to compress the content of a book by replacing each word in it by a position of a word in the dictionary. The decompression of this compressed message is done in the opposite way, the positions are replaced with words in that location.

Alternative code sets can be much more complex than the above example. For example, the LZ77 and LZ78 algorithms work with a dictionary referenced as a sliding window. A sliding window dictionary is a dictionary that can be changed during compression. When using a browser window dictionary, the compressed data will need two values ??to identify the string. These two values ??are the position of the starting point of the substring and the length of the substring.

Run-length encryption

Another basic example of lossless code is Run-length code. This encryption algorithm replaces a small set of repeated data multiple times with a small set of data and some represent its number of iterations. An example of using this code very effectively is fax machines. Most fax machines are white board pages with black text. Therefore, the encryption scheme can take advantage of the lines and convey a code for white and the number of pixels, then code for the black and the number of pixels, etc. Because most faxes are white, the length of The message will be greatly reduced.

We must use this compression method carefully. If there is not much repetition in the content of the data, this method can increase the size of the file.

Data loss compression

Obviously, it is not always possible to use a lossless compression technique. In some cases, lossy compression methods will not compress enough data, but in some cases, lossy compression techniques consume too much power for compression and resolution. code. Figure 1 below is a chart of compression speeds.

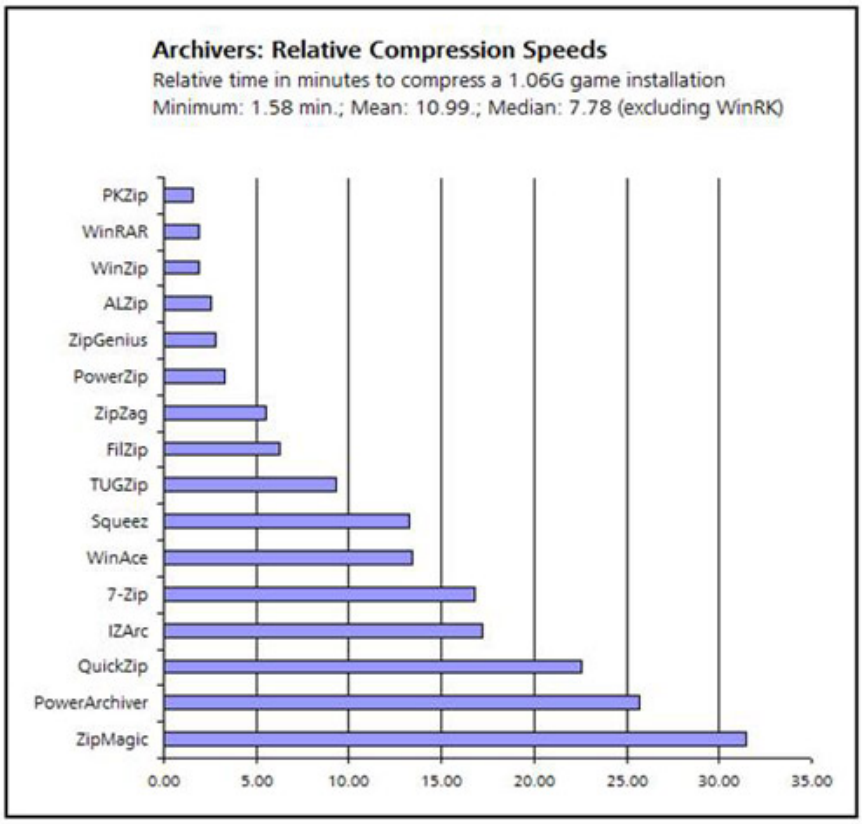


Figure 1: Chart of compression speed

Compress digital photos

The compression of digital images should be carefully chosen when using whether to use lossy compression or loss of data. Usually this choice is based on the compressed image. Images like medical images, which need to be finely detailed, will require compression without loss of data. White images on family tours can use data loss compression to reduce the size of the image file.

In the case of family photos, choosing a lossy compression method does not mean you will suffer from poor quality photos. In fact, many data loss compression methods for digital images can take advantage of the human eye characteristics, which are more sensitive to brightness than color variations. This means that the compression method will save the same colors with the same color while saving the brightness data under the data loss method. This is called chromatographic sampling.

Digital audio compression

Another example of lossy compression methods can be useful in digital audio compression. Lossless digital audio compression techniques take advantage of a field of study known as psychoacoustics. Psychoacoustics is basically a study of how people hear and recognize sounds.

One aspect of psychoacoustics that involves digital audio compression is that people can only hear sounds in the frequency range from 20Hz to 20kHz. Therefore many audio compression techniques have used this aspect and do not save much information related to frequencies outside the upper band.

Also related to the frequency range that people can hear, the sounds must be adjusted to be more audible at all higher frequencies. This means that lossy compression techniques can sample low-intensity audio at much more stringent frequencies to avoid losing data. It also means that designers of these compression techniques can hide the noise created in these high frequencies (the frequency they cannot recognize).

Another aspect of psychoacoustics is widely used in lossless audio compression in effects called masking. This is the point where a loud sound will make a quieter sound appear at the same time being overwhelmed. This may be called the jamming phenomenon.

One area of ??lossless digital audio compression that can be used is digital storage. Audio engineers and customers who want to save an exact copy of their audio files are switching to lossless audio compression. One reason for this is because the cost of digital storage is declining and people can afford large storage space.

Despite the low cost of digital archives, loss of digital audio compression is still widely used when it comes to portable music players. For example, the iPod uses lossy digital audio compression because when you bring your music player with you, then a lot of your data is saved on it; Using data loss compression now will allow you to carry more songs. Another area where this compression method is still the king is audio streaming. Although the cost of bandwidth has decreased significantly in recent years, there is a need to reduce the bandwidth used by many applications. Therefore, everything from online radio to VoIP applications tends to use lossy compression techniques.