Compression

What is Compression

Compression is **the process of encoding information using less data than its original representation**. The act of compressing data is referred to as encoding while the act of decompressing data is referred to as decoding. Traditionally there exists two classes of compression algorithms: lossy and lossless. Lossy compression allows data to be lost in the compression / decompression process while lossless compression does not. This library provides **lossless compression algorithms exclusively,** since lossy algorithms are not generally applicable.

> http://ijcsi.org/papers/IJCSI-9-6-3-53-59.pdf (http://ijcsi.org/papers/IJCSI-9-6-3-53-59.pdf)

👉 WARNING

Data **compression is a classic example of space-time trade-off**. This effectively means that compression results in decreased space/bandwidth at the cost of increased processing time.

How to use Compression

Assume that we have a large buffer with serialized objects that we need to send to another remote computer. If we are naive we could send the buffer in its uncompressed form. Usually we can do better and **use compression to drastically reduce the required bandwidth** of the operation.

```
// We first define a buffer to seraialize into
PacketBuffer buffer(1024);

// ...

// In a real environment, we would pack all our objects into the buffer here

// ...

// We compress the buffer with a Compressor and a select Compression algorithm (LZ4)
var compressedBuffer = Compressor.Compress(buffer, buffer.Length, Compressor.Algorithm.LZ
4);

// In a real environment, we could send the compressed buffer to the remote computer here
```

☞ WARNING

Not all compression algorithms are effective at compressing all types of data. This means that **the choice of compression algorithm can play a significant role**. Either experiment with multiple algorithms or do your research before settling for a compression algorithm. If you are unsure, LZ4 / ZSTD are usually acceptable choices with respect to trade-offs.

☞ WARNING

Since compression algorithms operate by eliminating statistical redundancy they can be very **effective for large data sets**. On the other hand, compression **may not be particularly useful in situations where data sets are small**..

ⓘ NOTE

It is required to **use the same compression algorithm when encoding as when decoding**.