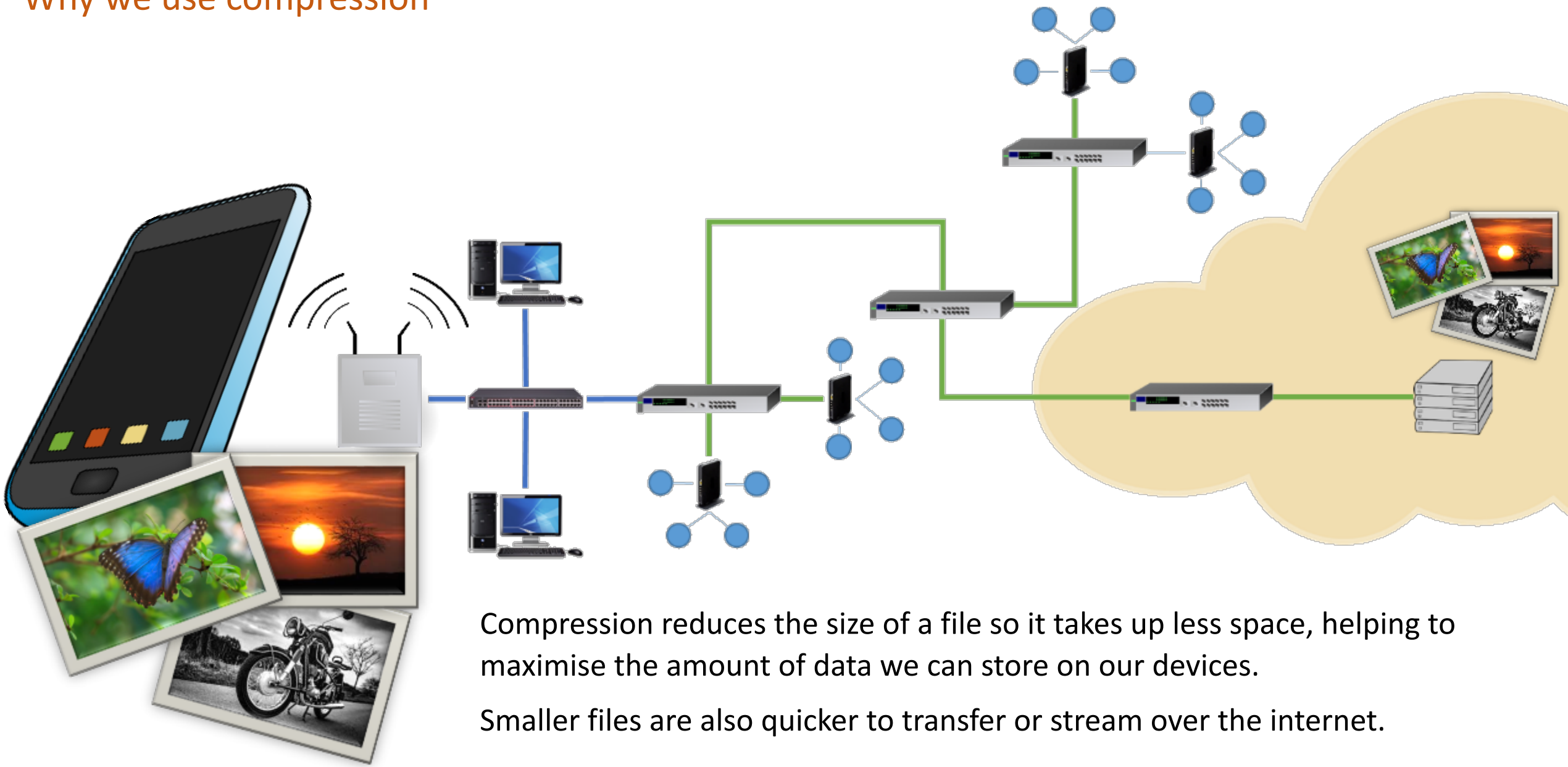
# 1.3 Text, sound and images

Compression

# Why we use compression

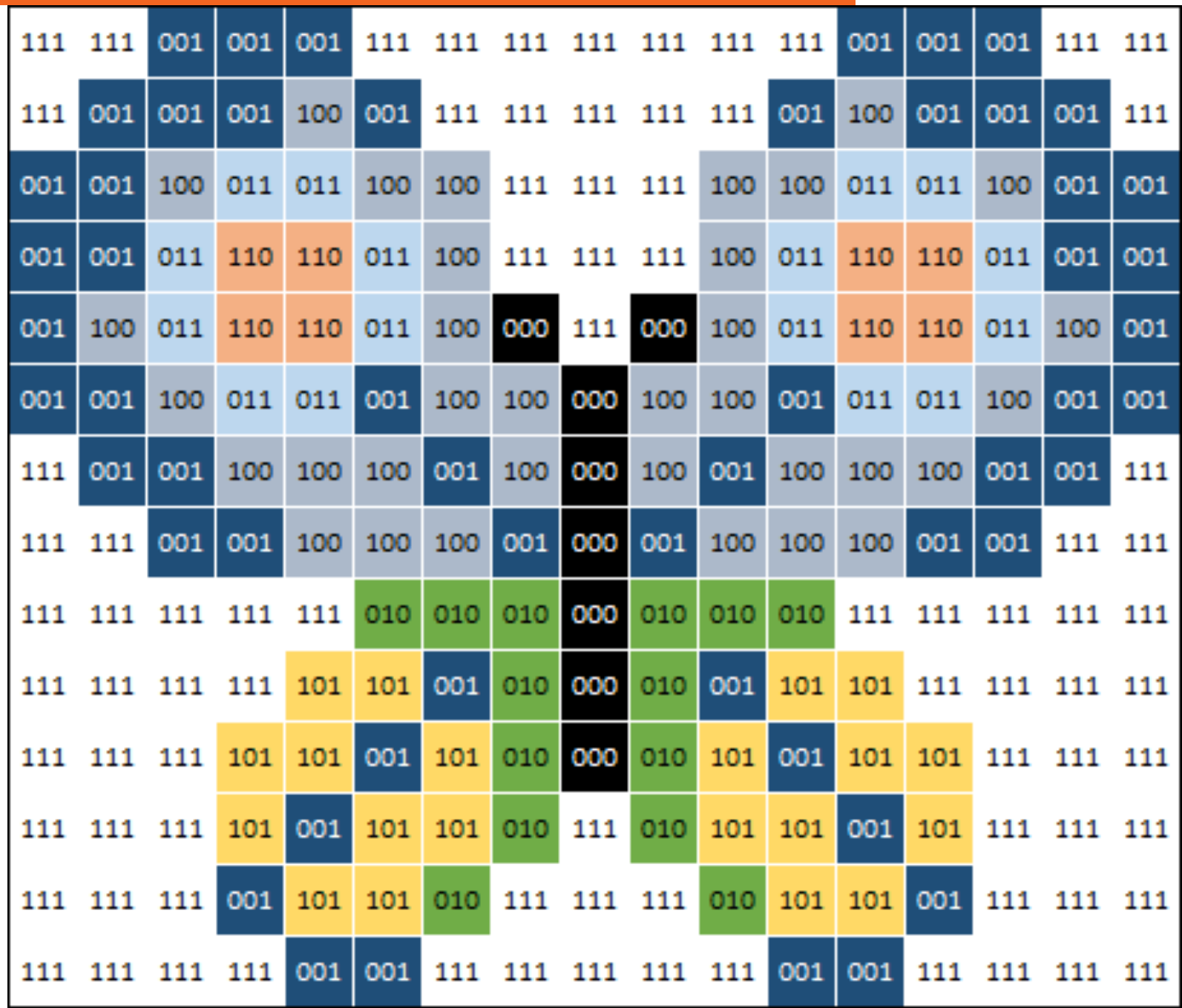


Compression reduces the size of a file so it takes up less space, helping to maximise the amount of data we can store on our devices.

Smaller files are also quicker to transfer or stream over the internet.

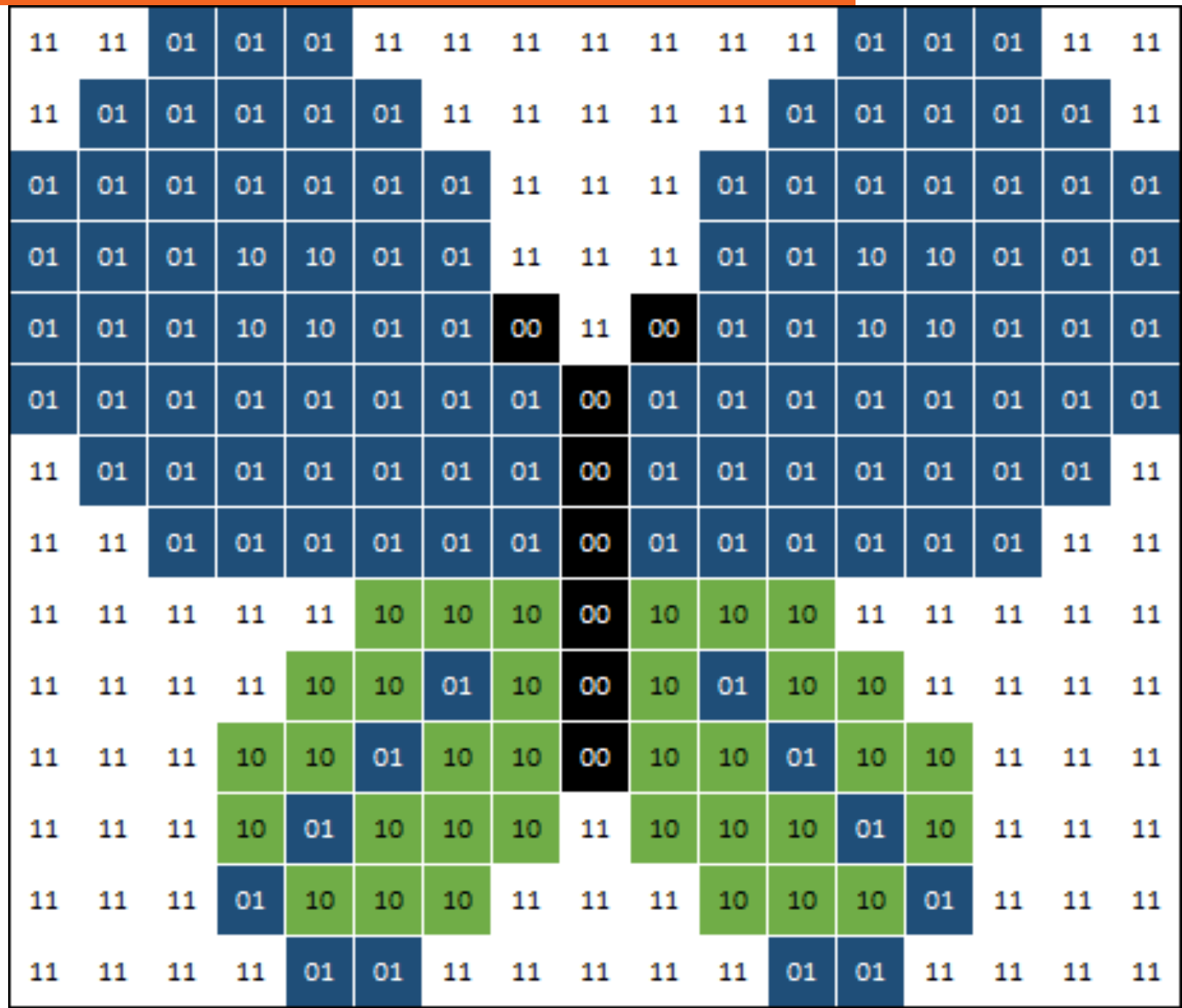
# Compression techniques

With an image, the number of colours increases the file size – this is because we need more bits per pixel to store a greater range of possible colours.



# Compression techniques

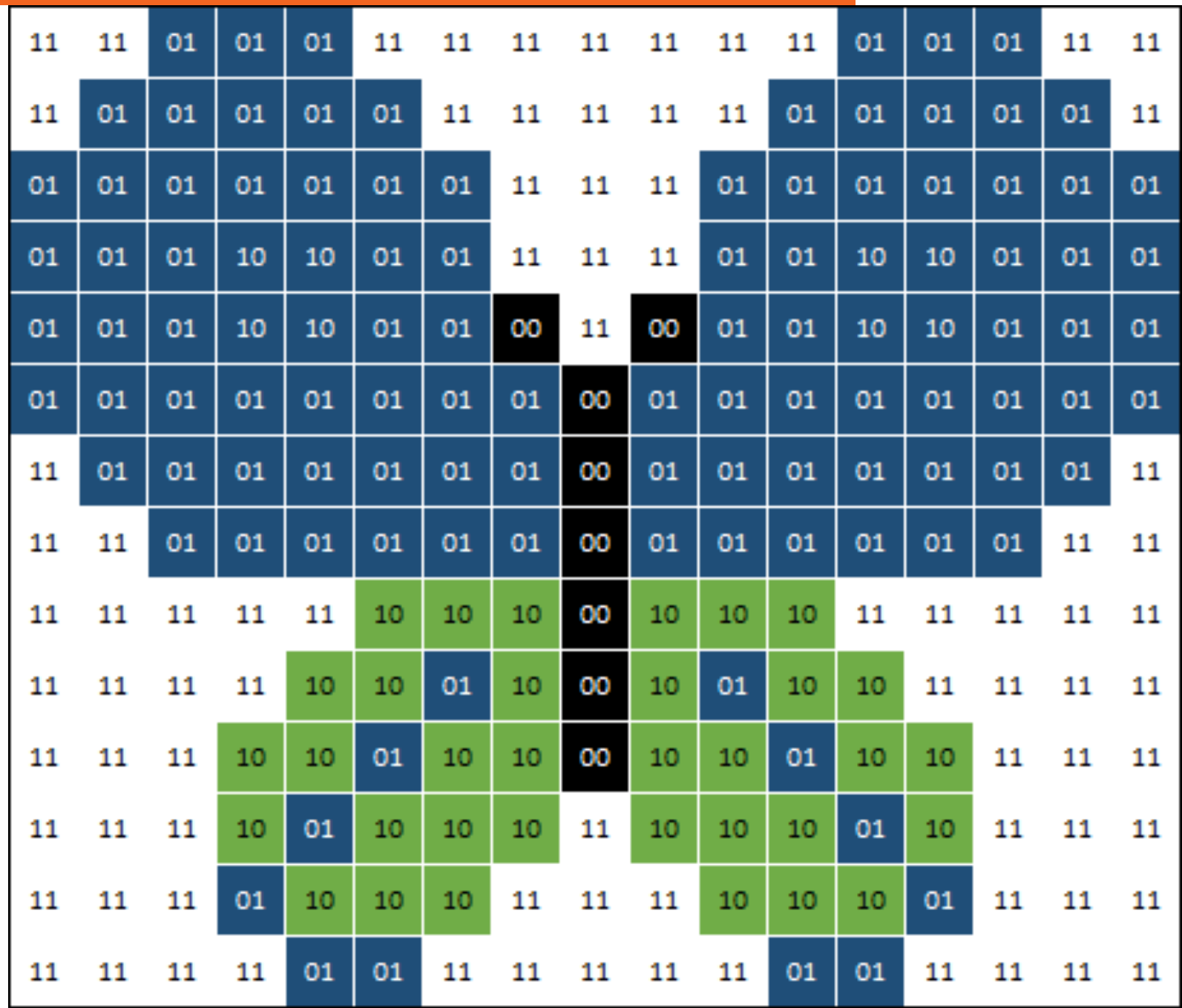
One way to make a file smaller would be to store a lower number of colours – alternatively, we can store larger areas of pixels as one colour.



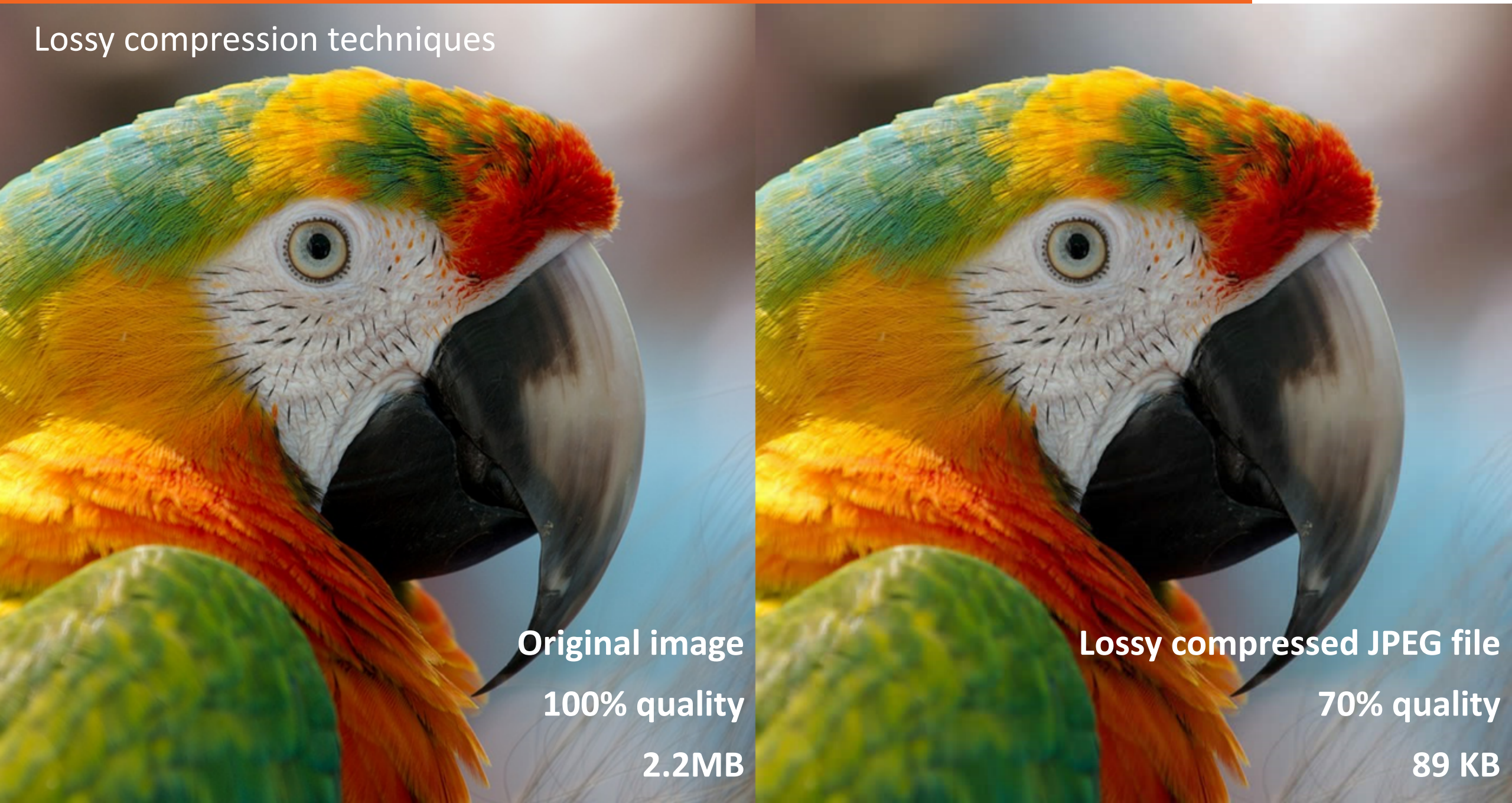
# Compression techniques

One way to make a file smaller would be to store a lower number of colours – alternatively, we can store larger areas of pixels as one colour.

Both techniques reduce the quality of the image, which is why they are referred to as **lossy** compression.

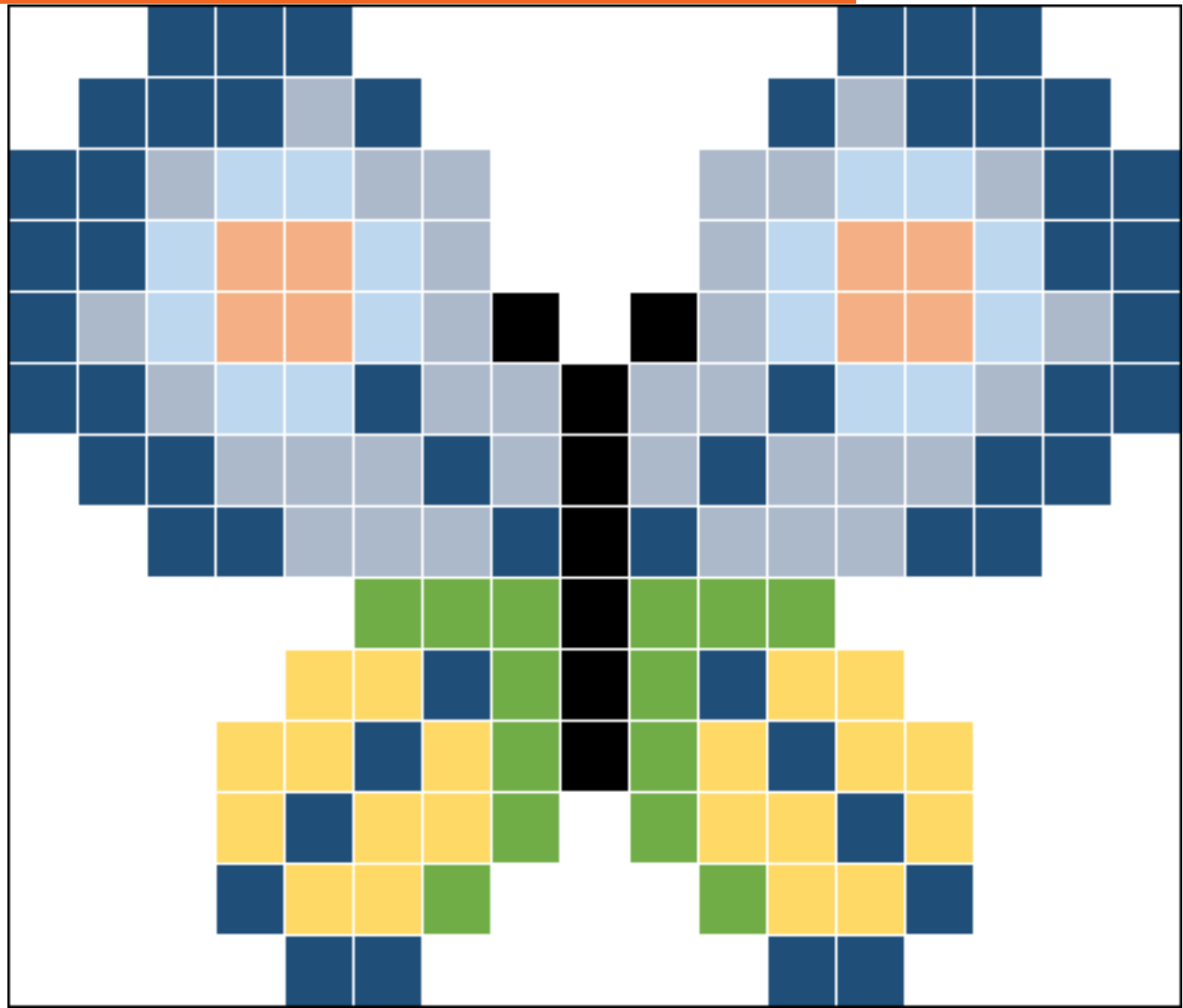


# Lossy compression techniques



## Lossless compression

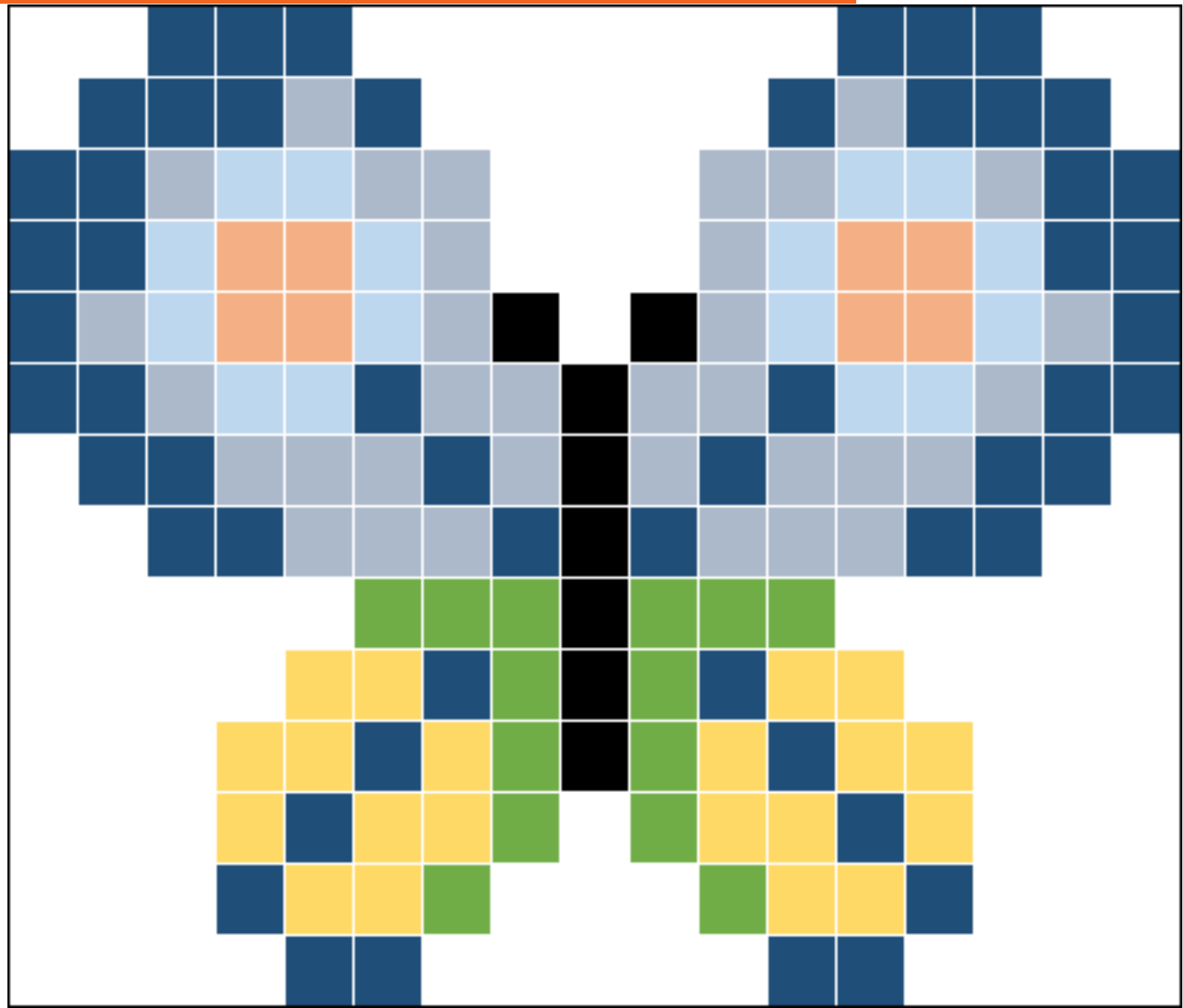
As the name suggests, **lossless** compression does not cause any data to be lost during the process.



# Lossless compression

As the name suggests, **lossless** compression does not cause any data to be lost during the process.

In this image, there are large areas of white pixels. Instead of storing every pixel with the same binary pattern, we could store the binary for *white* followed by the number of contiguous white pixels in a row.



# Lossless compression

Works well with images that have large areas of contiguous colour

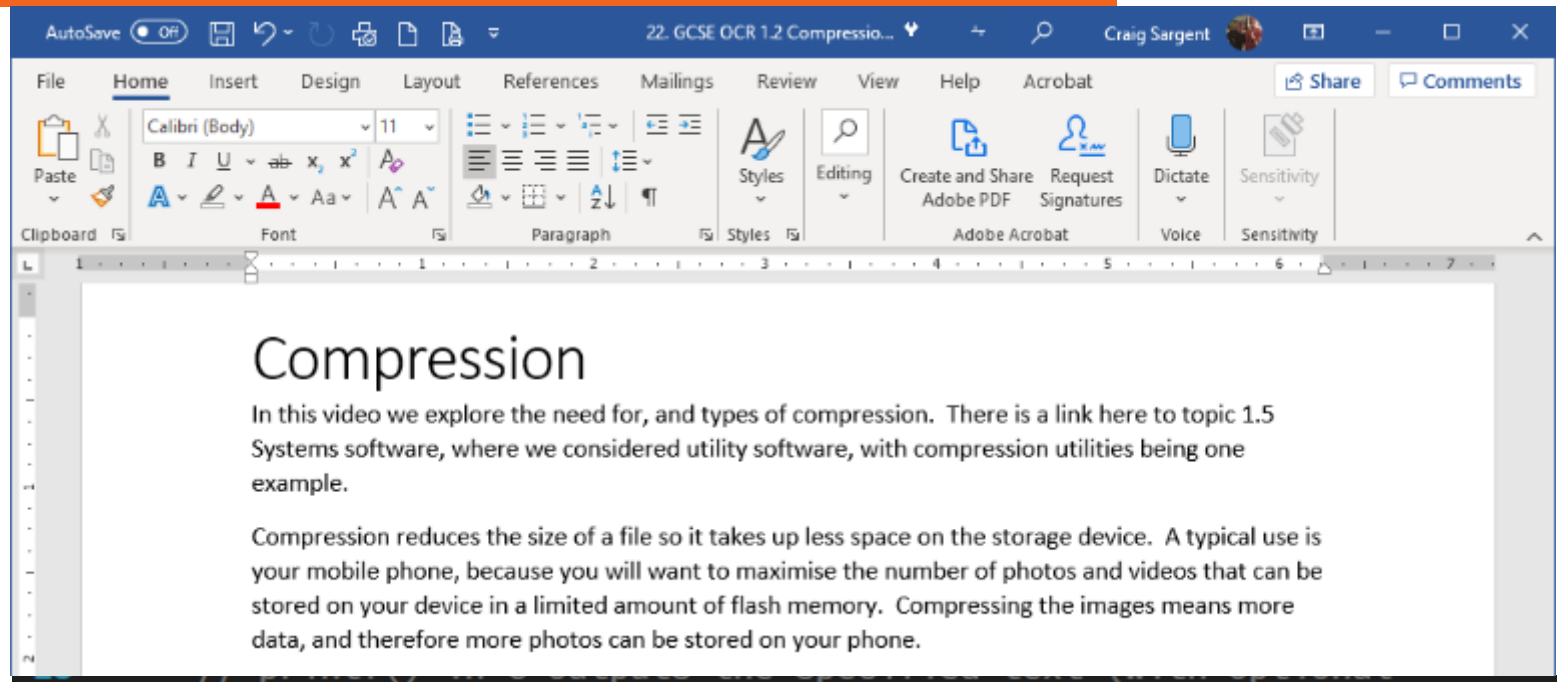
Does not work well with full colour photographs

# Suitability of lossy and lossless compression

Some types of files are not suitable for **lossy** compression.

Text documents and executable code **must** be compressed in their entirety to avoid losing essential data.

For these file types, we must use **lossless** compression so we can revert the file back to its original state.




```
14      // formatting options) when invoked.
15      printf("Hello, world!\n");
16  }
17
18  /*
19   * This is a "main function". The compiled program will run the code
20   * defined here.
21   */
22  int main(void)
23  {
24      // Invoke the sayHello() function.
25      sayHello();
26      return 0;
27  }
```

# Why we use compression

Compression is used to reduce the size of a file so it requires less:

- Bandwidth
- Storage space
- Transmission time

**Lossy compression:**

- Some data is lost and cannot be recovered.
- Greatly reduces file size.
- Reduces the quality of images/sound.
- Suitable for images, sound and video.
- Cannot be used with text or executable files.

**Lossless compression:**

- No data is lost, just encoded differently.
- Files are recovered to their original state.
- Can be used with all types of data.
- Less effective at reducing file size.
- Most suitable for text documents and executable files.

# 1.3 Data storage and compression | Compression