



# Lossy compression 1

Why might a developer choose a lossy method for file compression?

- ☐ The file contains data that is made up of simple sequences of letters and numbers.
- ☐ The file contains data that has no commercial value.
- ☐ The file contains data of which an approximation of the original is good enough.
- ☐ The file contains data that has lots of repeated patterns.

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# Lossless compression 1

Which **two** of the following statements describe lossless compression methods?

- ☐ A method where blocks of pixels are approximated to a single value.
- ☐ A method where a run of binary codes is replaced by a single code and the number of repetitions of the code in the run.
- ☐ A method where binary patterns are identified and replaced with codes, and a dictionary of the codes is also stored.
- ☐ A method where information that is not useful to humans is discarded.

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# Lossy or lossless? 2

Complete this table by matching the correct compression type (lossy or lossless) to each scenario.

Scenario	Compression type
A photographer who works for a magazine wants to compress some images before sending them to the editor for checking. The editor just needs to check the images are suitable, so image quality is not important.	<div></div>
A music producer wants to compress some audio files so that they can be uploaded to a website for fans to download and listen to. The producer doesn't want the download to take too long.	<div></div>
A bank wants to compress some customer banking records before they are sent to a branch. The banking records will include customer account numbers and details.	<div></div>

Items:

Lossy

Lossless

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# Compression recommendation

LLM marked question

The choice between lossy and lossless compression depends on the nature of the data being compressed and the reason why you need to compress the data.

Identify which compression method is the most suitable when compressing a text file and justify why you have chosen this method.

**[2 marks]**

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# Calculate compression ratios

Three files have been compressed. Calculate the compression ratio for each file and then put them in order with the greatest compression achieved at the top and the lowest at the bottom.

## Available items

Size before compression = 820kB

Size after compression = 164kB

Size before compression = 1800kB

Size after compression = 180kB

Size before compression = 220kB

Size after compression = 55kB

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# RLE applied to bitmap 2

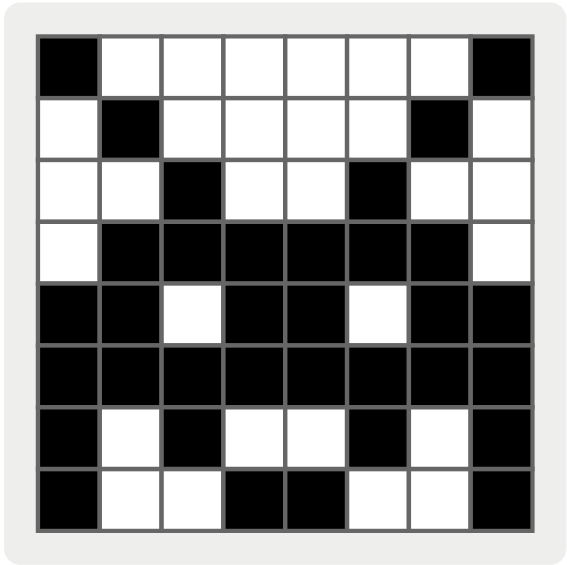
Challenge 1



Black and white pixels are used to show a bitmap image of a Space Invader.

Run length encoding (RLE) is used to compress the image.

In the encoded data, white is represented with by the code W and black is represented by the code B.



Move the encoded lines shown below into the correct order so that each line represents the equivalent line of the bitmap image.

Available items

W1, B1, W4, B1, W1

B2, W1, B2, W1, B2

B8

B1, W6, B1

B1, W1, B1, W2, B1, W1, B1

W2, B1, W2, B1, W2

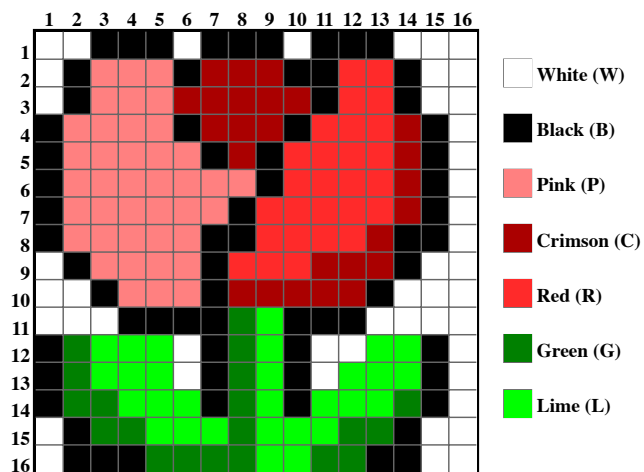
B1, W2, B2, W2, B1

W1, B6, W1



# RLE applied to bitmap 3

The bitmap image below will be compressed using run length encoding (RLE).



Bitmap image

Row 6 is compressed as B1, P7, B1, R4, C1, B1, W1

How will row 11 be compressed? **Type your answer in the same format as that shown in the example**, with the 'colour letter' followed by the number, and each letter/number pair separated by commas.

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# RLE suitability



A shady corner

Why is an image of a real-life subject not suitable for compression using run length encoding (RLE)?

- ☐ The image is not a bitmap.
- ☐ The image has too much detail.
- ☐ The image is too large.
- ☐ The image doesn't have enough different colours.

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# RLE applied to sound samples

Ultrasound machines are used in the medical field for diagnosis. During a medical examination, part of the sound captured by the ultrasound machine was digitised and converted into the following binary pattern:

0000 0011 1111 1000 0000 0000 0111 1111

This data is compressed using RLE and stored using one bit for the data bit followed by four bits to hold the number of consecutive repetitions of that data. Which of the following options would be the correct result of the compression?

- ☐ 0 0110 1 0111 0 1100 1 0111
- ☐ 0 0100 0 0010 1 0010 1 0100 1 0001 0 0011  
0 0100 0 0100 0 0001 1 0011 1 0100
- ☐ 0 010010 1 01110

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# Dictionary compression

Consider the following passage of text from *The Picture of Dorian Gray* by Oscar Wilde.

*The artist is the creator of beautiful things. To reveal art and conceal the artist is art's aim. The critic is he who can translate into another manner or a new material his impression of beautiful things. The highest as the lowest form of criticism is a mode of autobiography. Those who find ugly meanings in beautiful things are corrupt without being charming. This is a fault. Those who find beautiful meanings in beautiful things are the cultivated. For these there is hope. They are the elect to whom beautiful things mean only Beauty. There is no such thing as a moral or an immoral book. Books are well written, or badly written. That is all.*

The passage is encoded in standard 16-bit Unicode and compressed using a simple dictionary-based method, where each word is replaced by an 8-bit code.

## Part A   Uncompressed storage

How many **bytes** are needed to store the word **Beauty** in uncompressed form?

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## Part B   Compressed storage

Using a simple dictionary-based method, where each word is replaced by an 8-bit code, how many bytes are needed to store the word **Beauty** in compressed form?

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## Part C Impact of compression

Which of the following words from the passage will have the biggest impact on reducing file size?

- ☐ autobiography
- ☐ beautiful
- ☐ the

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