1.3 EXCHANGING DATA · 1.3.1

Compression

Lossy vs lossless, plus **run length encoding** and **dictionary coding**. Spec 1.3.1(a)(b).

01 Lossy vs lossless

Lossy

Discards detail. **Irreversible**. Big savings. JPEG, MP3, video.

Lossless

Removes redundancy. **Reversible**, exact. Smaller savings. ZIP, PNG.

Rule	Text/code/spreadsheets → must be **lossless**.
Why compress	Less storage, faster transfer, less bandwidth.

02 Run length encoding (RLE)

Idea	Replace a run with count + value.
Example	WWWWWBBB → 5W3B
Decompress	3C3M4C → CCCMMMCCCC
Best for	Long runs (simple images).
Watch out	Little repetition → can grow the data.

03 Dictionary coding

Idea	Store each repeating pattern once in a **dictionary**; replace occurrences with a short code.
Example	"the cat sat" with 1=the, 2=at → "1 c2 s2" + dictionary.
Best for	Text (whole words repeat). The dictionary travels with the data.

FINAL PASS BEFORE THE EXAM

Rapid exam tips

Six slips on compression questions.

01

Anything that must be exact (text, code, spreadsheets) needs **lossless** — a common "explain why".

02

Lossy is the **right** choice for streaming/photos: big saving, small quality loss.

03

RLE = count + value. Practise compressing **and** decompressing (e.g. 3C3M4C).

04

RLE can **grow** data with little repetition — state this for full marks.

05

Dictionary coding must **store the dictionary** alongside the data.

06

RLE compresses **runs**; dictionary coding replaces **repeated patterns**. Don't mix them up.