Engineer Software

Vendored a QR encoder in 522 lines

Vendored a QR encoder — Reed-Solomon over GF(256), fixed module layout, eight mask patterns — in 522 lines rather than take a third runtime dependency, and verified it by reading the finished matrix back with an independently written decoder.

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522

lines of QR encoder, rather than a third dependency

Situation. The documents needed a QR code linking to the online version. Every available library does this, and taking one would have added a third runtime dependency to a project that had deliberately held itself to two — a template engine and a PDF renderer — on the argument that a document generator should still install years from now.

Task. Either accept the dependency or implement the format, and the implementation had to be verified as correct rather than merely producing something square and black.

Action. The encoder is 522 lines and implements the parts of the specification the use actually needs: byte-mode encoding, Reed-Solomon error correction over the Galois field of 256 elements with the generator polynomial built at the required degree, the fixed module layout with its finder patterns, timing patterns and alignment patterns, format and version information, and all eight data mask patterns evaluated against the specification's four penalty rules so the lowest-scoring mask is chosen rather than a fixed one. The verification is the part that made it defensible. Testing an encoder against its own logic proves nothing, so the finished module matrix is read back by a decoder written independently from the specification's reading order, and the test asserts that the decoded string equals the input. That turns "it produces a plausible image" into "it produces a code that decodes to the right URL", and it is checked on every run rather than once by eye with a phone.

Result. The runtime dependency count stayed at two, and the encoder is the only vendored component in the project. It should be said plainly that this is not a general-purpose implementation — it supports the modes and versions the documents use and nothing else, and the honest justification is the dependency budget rather than any claim that the result is better than a mature library.

Bring this experience to your project

Use “Vendored a QR encoder in 522 lines” as a starting point for a similar challenge in your organisation. The services behind this work are available for your project. The shape of a system worked out on paper first, so the parts fit and the cost is known before anyone writes code.

Explore our services Get in touch →

Look behind the result

Read the situation, decisions and result in this example. We can discuss which parts transfer to your constraints and which need another approach. Vendored a QR encoder in 522 lines — 522 lines of QR encoder, rather than a third dependency

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Want fewer dependencies you have to trust?

Talk through your project with the engineer responsible for delivery. We agree the scope, price basis and handover in writing before work begins.

Role context: Python Engineer. It draws on Backend Engineering, Performance Tuning, Testing & QA, Python and Documentation. And while you are here, we are rather good at Platform & Solution Architecture and Backend & API Development.

Get in touch Explore our services

One piece of **a longer record** — and it is all on this site.

Every entry is written the same way: the situation, the task, what we did and what changed.

See the whole record

Define the improvement you need

Describe the workflow, the existing interfaces and the users who need the change. We can define a testable delivery and a handover that lets your team maintain it.

See what it costs Get in touch →

Want fewer dependencies you have to trust?

Ask about the decisions behind “Vendored a QR encoder in 522 lines”. You will speak with the people who can explain the work and assess your own project.

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