

- Barcodes
  - Barcodes have limited to no error correction
  - Barcodes have limited error detection
  - They are simpler
- Module
  - It's a pixel in a QR code
  - This represents some data in the QR code
  - The QR code is a matrix of these modules
- Finder Patterns
  - These are used to triangulate the QR code
  - They are also used to correctly orient the QR code
    - It can be scanned at any rotated angle without ambiguity
  - 7 Modules Wide
  - There is a 1 module quiet zone around it
- Alignment Patterns
  - Used to additionally read the QR code.
  - There may be multiple of them in the QR code
  - Added to the newer version for easier scanning
  - Anchors the bottom right corner of the matrix
  - Doesn't cause ambiguity in the correct orientation to scan
    - Benefit over QR code
  - No quiet zone
- Timing patterns
  - The dashed line between the finder patterns on the matrix
  - Allow for the program to properly look through the QR code
  - Form the matrix
- Margin
  - The quiet zone should be at least 4 modules wide
  - This is the standard makes it easier to scan
  - Barcodes do have a solid advantage in ease of use
    - All of these things are required to get the QR code to scan properly
- Version Information
  - Stores the information about the barcode for internal use
  - More overhead required
- Data
  - Uses all the space it can
  - Typical 8 bit encoding using rectangular blocks
  - Interleaved Blocks Example
  - Splits the encoding for maximum safety
  - Uses far more confusing encoding system, but still 8 bit

- Error Correction
  - Levels
    - Level L (Low) 7%
    - Level M (Medium) 15%
    - Level Q (Quartile) 25%
    - Level H (High) 30%
  - Uses Reed-Solomon Encoding
    - Masking examples
    - Masks break up the patterns that could confuse the scanner
  - Broken Up
    - Blocks are split into sub 15 sizes
    - This keeps the algorithms simpler
  - Example with interleaved blocks of 13
- Version X
  - $\text{width} = 4 * \text{version \#} + 17$
- Version 1
  - Smallest Practical Use
  - No alignment patterns
- Version 2
  - 1 alignment pattern
  - Common
- Version 3
  - Just bigger
- Version 4
  - Just bigger
- Version 10
  - Multiple alignment patterns
- Version 25
  - 22 Alignment patterns
- Version 40
  - Largest QR code
  - I found it to be one of the easiest ones to scan
- Micro QR Code
  - It's tiny!
  - Singular finder pattern
  - About the size of 3 Alignment Patterns
  - Information Sizes
- Model 1 vs Model 2
  - Model 1 refers to the specific qr code design on the left
  - Model 2 is a standard that applies to all QR codes between version 1 to 40

- Future
  - Multi-color QR codes
  - Size is a problem, increase the color density
  - No longer just Black vs White
  - Now we need color channels
  - Not widely used
- Barcodes (Again)
  - Cheaper
  - Less problems to scan
  - Can be human readable
  - Still in widespread use to this day

## References

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