

Conversions from DPD/GBCD to BCD without Table Lookup

Reconsidering the Combination Field Encoding

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Current Combination Field

Consider the 64-bit case. The goal is to encode 1 (leading) digit d_0 together with a biased exponent E .

$$0 \leq d_0 \leq 9, \quad 0 \leq E \leq 3 \times 2^8 - 1$$

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Break E into e_{hi} and e_{lo} , and

$$E = 2^8 \times e_{hi} + e_{lo}, \quad e_{hi} \leq 2, \quad e_{lo} \leq 2^8 - 1.$$

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- Allow easy NaN initialization
- Exponent field and digit field non-contiguous
- Unordered

An Alternative Combination Field

Case of $0 \leq d_0 \leq 7$

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binary code $8E + d_0$



note two msb never 11

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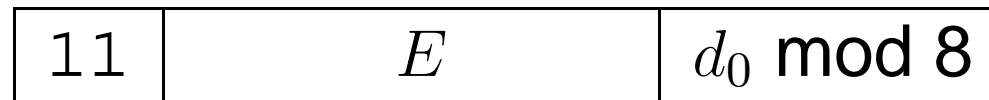
binary code $8E + d_0$



note two msb never 11

Case of $8 \leq d_0 \leq 9$

binary code $3 \times 2^{11} + 2E + d_0 \bmod 8$



An Alternative Combination Field

Case of $0 \leq d_0 \leq 7$, binary code $8E + d_0$

Case of $8 \leq d_0 \leq 9$, binary code $3 \times 2^{11} + 2E + d_0 \bmod 8$

An Alternative Combination Field

Case of $0 \leq d_0 \leq 7$, binary code $8E + d_0$

Case of $8 \leq d_0 \leq 9$, binary code $3 \times 2^{11} + 2E + d_0 \bmod 8$

- Easy initialization of NaN
- Contiguous exponent and digit fields
- Some ordering
- Allow exploitation of binary FP hardware