Escuela Politécnica Nacional

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Código de Hamming 16-32

El código de Hamming es un tipo de código de corrección de errores utilizado en sistemas de comunicación y corrección de datos y almacenamiento de datos para detectar y corregir errores.

Con 16 bits.

Debemos agregar bits de paridad para permitir la corrección de errores. necesitamos k bits de paridad tal que $2^k \geq k+n+1$

entonces

Para $n=16 \rightarrow$ Si $k=5$, $2^5 = 32$ y $5+16+1 = 22$ $(32 \geq 22)$

01000	00111	00110	00101	00100	00011	00010	00001
C_5	D_{11}	D_3	D_2	C_4	D_1	C_2	C_1
10000	01111	01110	01001	01100	01011	01010	01001
C_{16}	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5
			10101	10100	10011	10010	10001
			D_{16}	D_{15}	D_{14}	D_{13}	D_{12}

$$C_1 = D_1 \oplus D_2 \oplus D_4 \oplus D_5 \oplus D_7 \oplus D_9 \oplus D_{11} \oplus D_{12} \oplus D_{14} \oplus D_{16}$$

$$C_2 = D_1 \oplus D_3 \oplus D_4 \oplus D_6 \oplus D_7 \oplus D_{10} \oplus D_{11} \oplus D_{13} \oplus D_{14}$$

$$C_4 = D_1 \oplus D_3 \oplus D_4 \oplus D_9 \oplus D_9 \oplus D_{11} \oplus D_{10} \oplus D_{15} \oplus D_{16}$$

$$C_8 = D_5 \oplus D_6 \oplus D_7 \oplus D_8 \oplus D_9 \oplus D_{10} \oplus D_{11}$$

$$C_{16} = D_{12} \oplus D_{13} \oplus D_{14} \oplus D_{15} \oplus D_{16}$$

Para 32 bits.

000110	000101	000100	000011	000010	000001
B_3	D_2	C_4	D_1	C_2	C_1
001100	001011	001010	001001	001000	000111
D_8	D_7	D_6	D_5	C_8	D_4
010010	010001	010000	001111	001110	001101
D_{13}	D_{12}	C_{16}	D_{11}	D_{10}	D_9
011000	010111	010110	010101	010100	010011
D_{19}	D_{18}	D_{17}	D_{16}	D_{15}	D_{14}
011110	011101	011100	011011	011010	011001
D_{25}	D_{24}	D_{23}	D_{22}	D_{21}	D_{20}
100100	100011	100010	100001	100000	011111
D_{30}	D_{29}	D_{28}	D_{27}	C_3	D_{26}
				100110	100101
				D_{32}	P_{31}

C_1: $D_1 \oplus D_2 \oplus D_5 \oplus D_7 \oplus D_9 \oplus D_{11} \oplus D_{12} \oplus D_{14}$
$\oplus D_{16} \oplus D_{18} \oplus D_{20} \oplus D_{22} \oplus D_{24} \oplus D_{26} \oplus D_{27}$
$\oplus D_{25} \oplus D_{31}$

C_2: $D_1 \oplus B_3 \oplus D_4 \oplus D_6 \oplus D_7 \oplus D_{10} \oplus D_{11} \oplus D_{13} \oplus D_{14} \oplus D_{17}$
$\oplus D_{18} \oplus D_{21} \oplus D_{22} \oplus D_{25} \oplus D_{26} \oplus D_{28} \oplus D_{29} \oplus D_{32}$

C_4: $D_2 \oplus D_3 \oplus D_4 \oplus D_8 \oplus D_9 \oplus D_{10} \oplus D_{11} \oplus D_{15} \oplus D_{16} \oplus D_{17} \oplus D_{18}$
$\oplus D_{23} \oplus D_{24} \oplus D_{25} \oplus D_{26} \oplus D_{30} \oplus D_{31} \oplus D_{32}$

C_8: $D_5 \oplus D_6 \oplus D_7 \oplus D_8 \oplus D_9 \oplus D_{10} \oplus D_{11} \oplus D_{19} \oplus D_{20} \oplus D_{21} \oplus D_{22}$
$\oplus D_{23} \oplus D_{24} \oplus D_{25} \oplus D_{26}$

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C_{16} : $D_{12} \oplus D_{13} \oplus D_{14} \oplus D_{15} \oplus D_{16} \oplus D_{17} \oplus D_{18} \oplus D_{19} \oplus D_{20}$
$\oplus D_{21} \oplus D_{22} \oplus D_{23} \oplus D_{24} \oplus D_{25} \oplus D_{26} \oplus$

C_{32} : $D_{27} \oplus D_{28} \oplus D_{29} \oplus D_{30} \oplus D_{31} \oplus D_{32}$