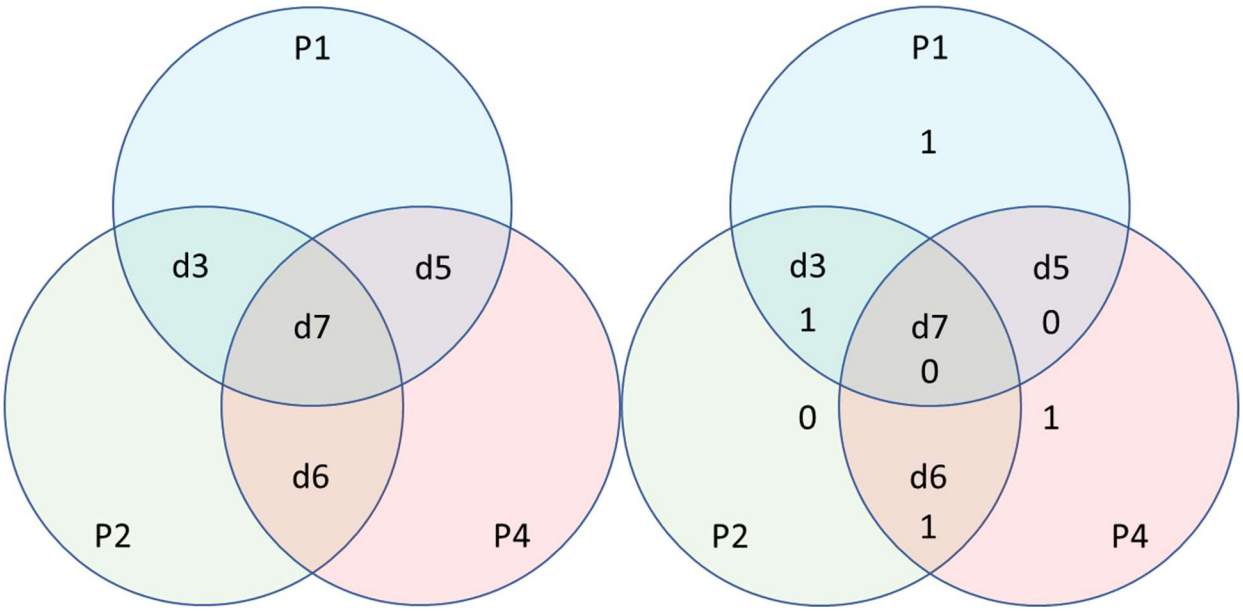

P1 = d3 d5 d7

P2 = d3 d6 d7

P4 = d5 d6 d7

Using powers of 2 - 1, 2, 4 yields P1 P2 d3 P4 d5 d6 d7 or 1 0 0 0 0 1 1

	P1	P2	d3	P4	d5	d6	d7
P1	?		x		x		x
P2		?	x			x	x
P4				?	x	x	x

Starting with itself, parity bits follow these rules:

P1, check 1, skip 1 - P2, check 2, skip 2 - P4, check 4, skip 4 - P8, check 8, skip 8

Given the following data: 1 0 1 0, the full 7 bit data stream would be 1011010

	P1	P2	d3	P4	d5	d6	d7
P1	1		1		0		0
P2		0	1			1	0
P4				1	0	1	0

Given 15 bits, with 11 bits of data and 4 parity bits, the following would apply:

P1, P2, d3, P4, d5, d6, d7, P8, d9, d10, d11, d12, d13, d14, d15

P1 = d3, d5, d7, d9, d11, d13, d15

P2 = d3, d6, d7, d10, d11, d14, d15

P4 = d5, d6, d7, d12, d13, d14, d15

P8 = d9, d10, d11, d12, d13, d14, d15

	P1	P2	d3	P4	d5	d6	d7	P8	d9	d10	d11	d12	d13	d14	d15
P1	?		x		x		x		x		x		x		x
P2		?	x			x	x			x	x			x	x
P4				?	x	x	x					x	x	x	x
P8								?	x	x	x	x	x	x	x

Two or more parity bits will be incorrect, and wherever they intersect is where the error is. The sum of their position markers indicates the data bit in error. If the parity bit is the one that is flipped, then no other bits will be wrong, and the index of the parity indicates which parity bit is wrong.

An example data transmission:

	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1
	P1	P2	d3	P4	d5	d6	d7	P8	d9	d10	d11	d12	d13	d14	d15
P1	0		1		0		0		0		1		1		1
P2		1	1			1	0			1	1			0	1
P4				1	0	1	0					0	1	0	1
P8								0	0	1	1	0	1	0	1

An example data transmission with an incorrect data bit:

	0	1	1	1	0	1	0	0	0	1	1	0	1	1	1
	P1	P2	d3	P4	d5	d6	d7	P8	d9	d10	d11	d12	d13	d14	d15
P1	0		1		0		0		0		1		1		1
P2		1	1			1	0			1	1			1	1
P4				1	0	1	0					0	1	1	1
P8								0	0	1	1	0	1	1	1

Bit d14 has been flipped and is now incorrect. P2, P4, and P8 will all fail their parity checks. Adding up the indexes of the parity bits that are incorrect, we see 2 + 4 + 8 = 14, so the 14^{th} bit is the one that is wrong.

https://www.youtube.com/watch?v=373FUw-2U2k

https://www.khanacademy.org/computing/computer-science/informationtheory/moderninfotheory/v/testtest

https://www.youtube.com/watch?v=goOa3DGezUA