

why RAID?

performance, reliability, capacity

RAID 0: striping

RAID 1: mirror

RAID 2: hamming code

RAID 3: parity code + byte-level striping

RAID 4: parity code + block-level ...

RAID 5: rotating parity

RAID 01, 10, 6, ...

	RAID-0	RAID-1	RAID-4	RAID-5
Capacity	N	$N/2$	$N - 1$	$N - 1$
Reliability	0	1 (for sure) $\frac{N}{2}$ (if lucky)	1	1
Throughput				
Sequential Read	$N \cdot S$	$(N/2) \cdot S$	$(N - 1) \cdot S$	$(N - 1) \cdot S$
Sequential Write	$N \cdot S$	$(N/2) \cdot S$	$(N - 1) \cdot S$	$(N - 1) \cdot S$
Random Read	$N \cdot R$	$N \cdot R$	$(N - 1) \cdot R$	$N \cdot R$
Random Write	$N \cdot R$	$(N/2) \cdot R$	$\frac{1}{2} \cdot R$	$\frac{N}{4} R$
Latency				
Read	D	D	D	D
Write	D	D	$2D$	$2D$