Chapter 2
Basic Computer System Terms
: The Five-Minute Rule

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The Five-Minute Rule

"Pages referenced every five minutes should be memory resident"

The Five-Minute Rule

$$\frac{PagesPerMBofDRAM}{AccessesPerSecondPerDisk} \times \frac{PricePerDisk}{PricePerMBofDRAM}$$

Technology Cost **Economic Cost**

The Five-Minute Rule in 2020

	DRAM	SATA SSD	NVMe SSD	NVDIMM-N	Optane DCPMM
Price ($)	32	200	400	900	600
Capacity (GB)	8	256	1024	16	128
Random Read IOPS (k)	-	10	15	1782	5534
Random Write IOPS (k)	-	36	55	1582	885
Break-even point (read)	-	21 min	29 min	33 sec	7 sec
Break-even point (write)	-	6 min	8 min	37 sec	44 sec

* IOPS measured using MLC on different servers (1 thread) and will be updated soon.
* SATA SSD: 850 Pro, NVMe SSD: 970 Pro, NVDIMM-N : HPE

References

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[7] Optane DCPMM : https://lenovopress.com/lp1085.pdf