

More speed. Less energy.



CIO Forum

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San Jose, CA

Green SSD

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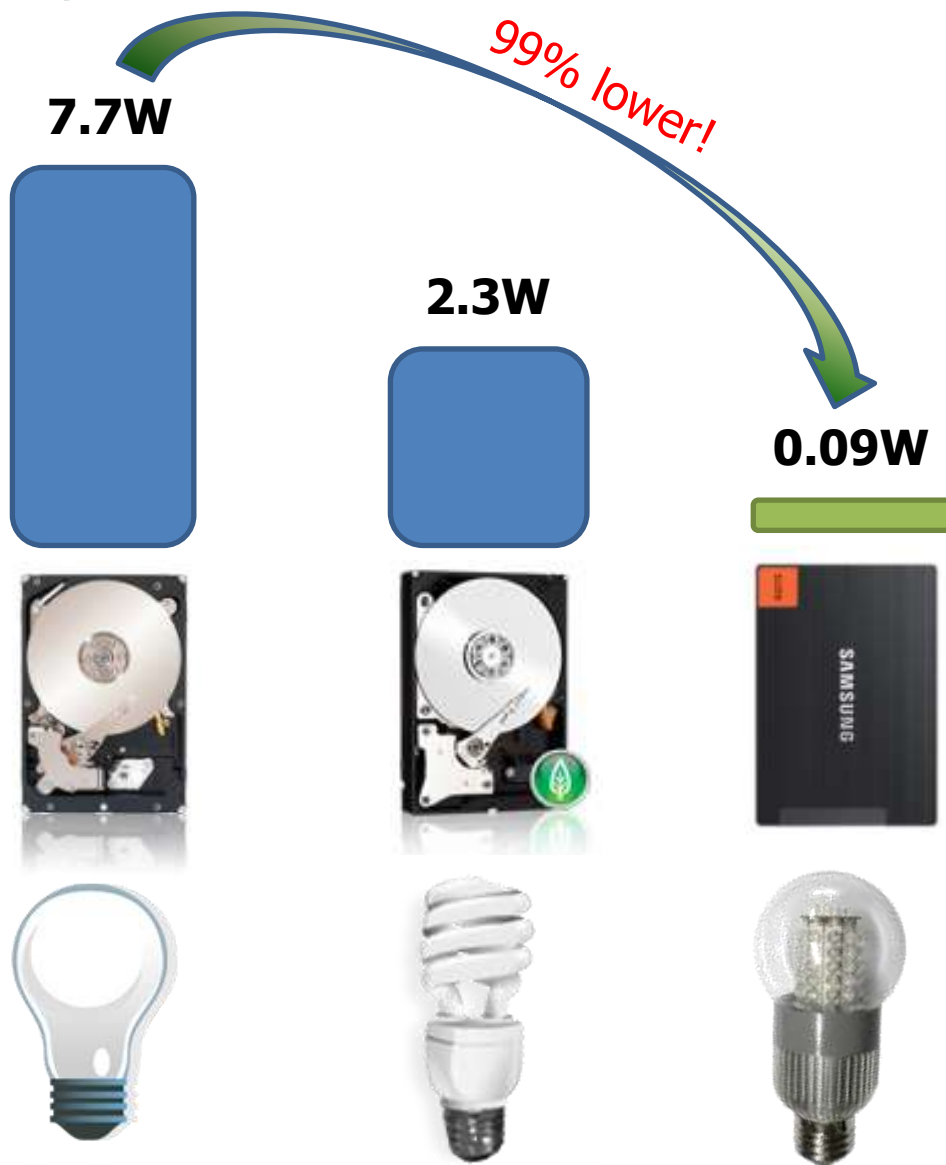
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Boot Drives



- Most of the time, the drive is idle



Boot Drives



- Translate to dollars (TCO)
- Datacenter buying 25K servers/year
- Save 7.61W per drive by moving to SSD
- Servers are powered 24/7
- Savings below does not consider cooling

\$1 Watt / Year

1KWh = \$0.114
1Wh = \$0.000114
1Wh x 24h x 365days

1 Year Savings

$\$7.61 \times 25,000$

\$190,250

5 Year Savings

$\$7.61 \times 25,000 \times 5$

\$951,250

\$38/drive

These savings assume 100% idle and do not include any savings due to decreased cooling costs



- **Are SSDs a cheaper, greener, option for your boot drive?**

HDD

\$65 HDD + \$38 more power

\$103

SSD

64GB = Definitely
128GB = Getting there

<\$103

- **Oh, and did I mention SSDs happen to be faster?**

TCO Calculations on Drive



	15K 2.5" HDD	MLC SSD	E-MLC SSD
IOPS	400 / 400	57,000 / 1,800	35,000 / 10,000
Active Power	7.92 W	4.16 W	2.06 W
Capacity	300GB	128GB	200GB
Cost	\$440*	\$122**	\$999*
\$ / IOPS	\$1.10 / \$1.10	\$0.002 / \$0.07	\$0.03 / \$0.10
IOPS / \$	0.9 / 0.9	467 / 15	35 / 10
IOPS / GB	1.3 / 1.3	445 / 14	175 / 50
IOPS / Watt	50 / 50	13,701 / 437	16,990 / 4,854
Watt / IOP	20 mW	0.07 mW / 2.3 mW	0.06 mW / 0.21 mW
Watt / GB	26 mW	32 mW	10 mW
Total Cost	\$480	\$142	\$1,010
Total Cost / Day	\$0.26	\$0.08	\$0.55
Cost/Day (Norm GB)	\$0.26	\$0.17	\$0.83

Decisions that affect power



- **Faster performance doesn't necessarily mean more power**
 - **If you are transferring same amount of data, faster performing drive will get to 'idle' faster**

	1s	2s	3s	4s	Average
3W Drive	3W	3W	3W	3W	3W
5W Drive	5W	5W	80mW	80mW	2.5W

17% Savings!

- **Capacity of drive**

Capacity	Power	1TB Power
256G	3.7W	14.8W (4 drives)
512G	5.1W	10.2W (2 drives)

31% Savings!

- **Slot tax**

- **To go to the next incremental solution capacity, do you have to add another enclosure?**

- More power, more cooling, more cost! \$2,000 versus \$83?



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20nm class **DDR3** and **SSD**

Thank you

SAMSUNG