
WHAT'S NEXT?

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SLIDE 1

Your Next Memory System

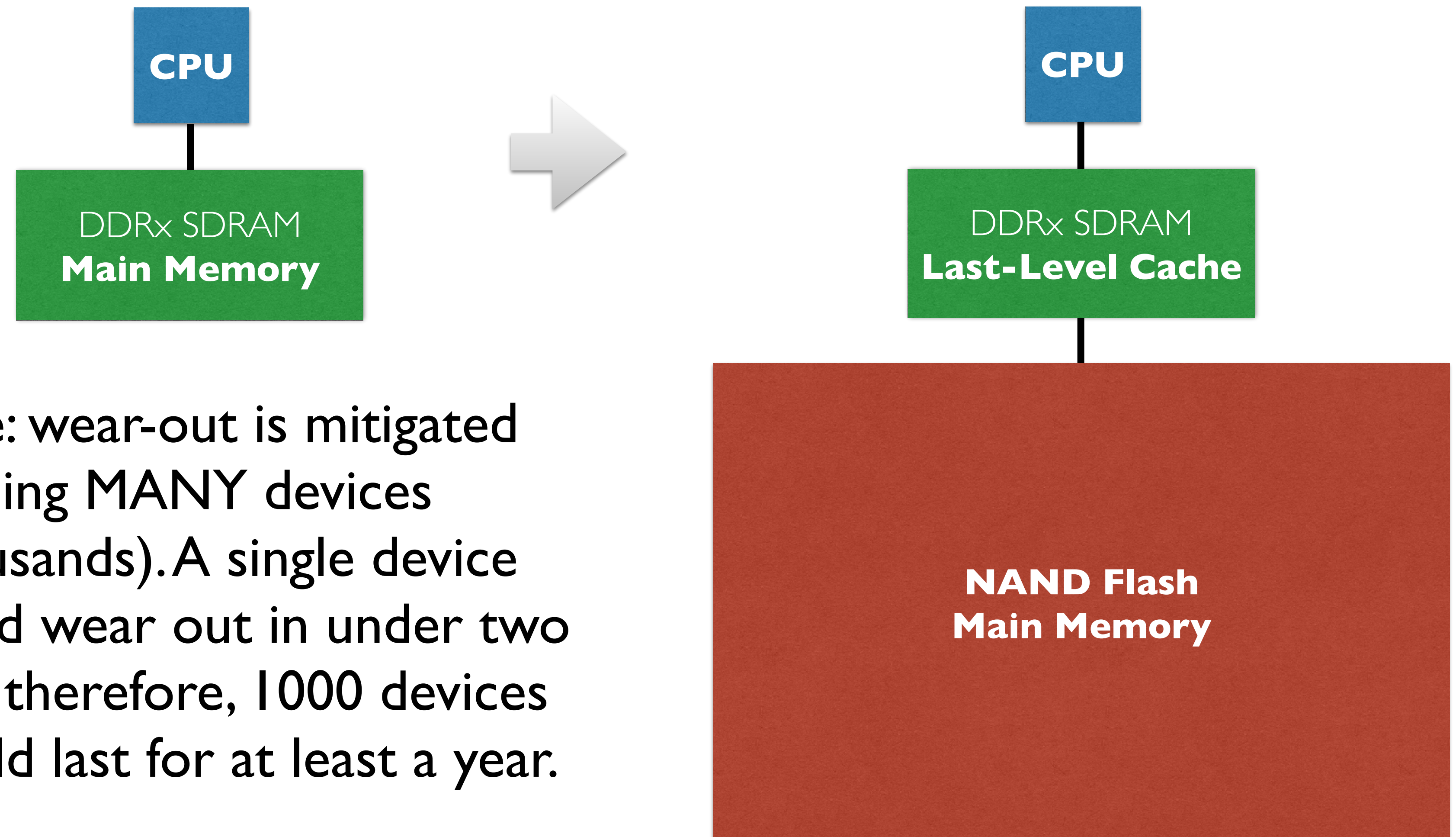
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PERSPECTIVE:

	Cost for 10 GB	Power for 10 GB	Power per GB/s
Off-Chip SRAM	\$1,000	0.4 W	0.2 W
DDR3 SDRAM	\$100	1 W	0.2 W
NAND Flash	\$10	0 W	3 W

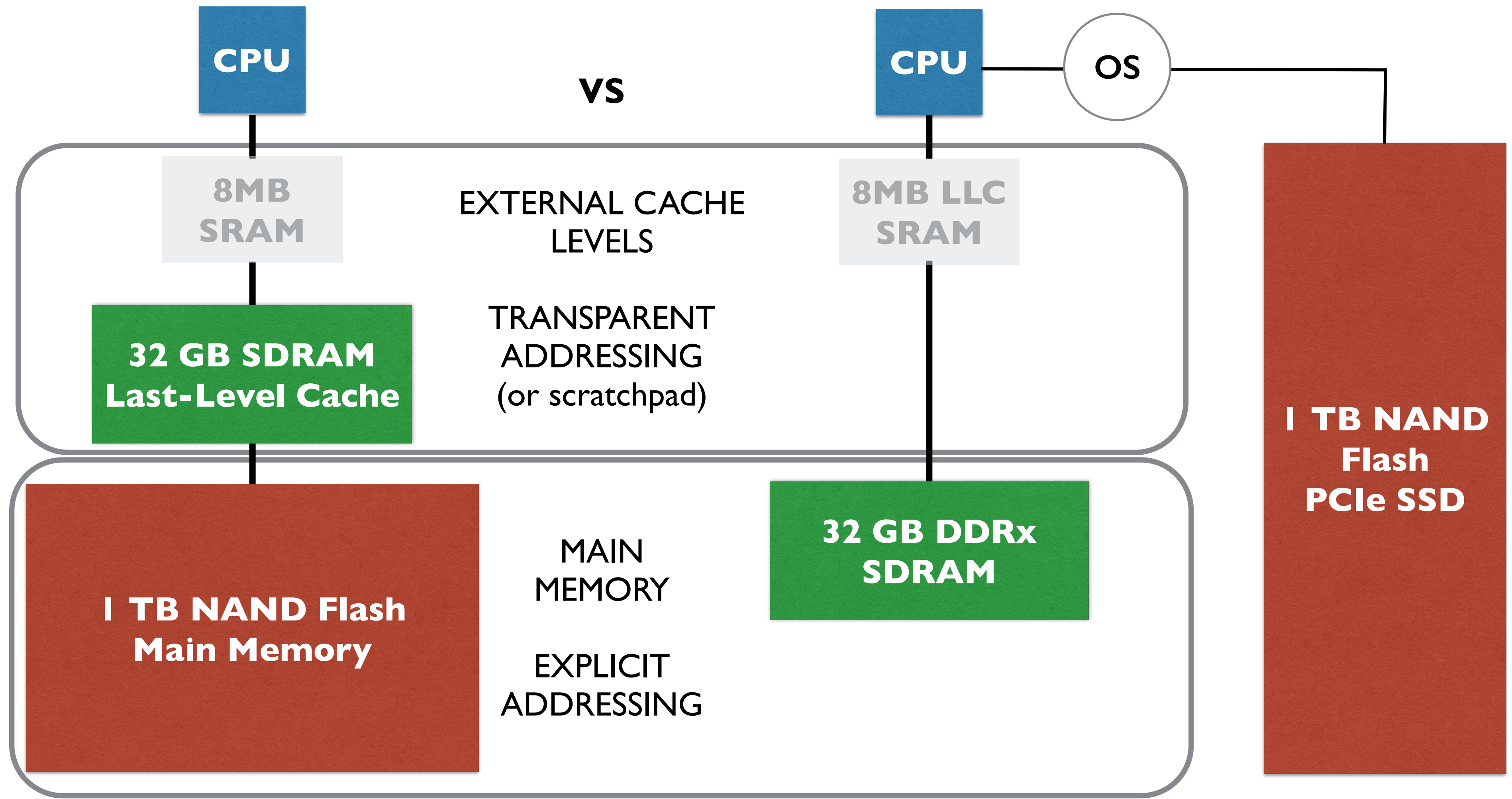


Flash-Based Main Memory



Note: wear-out is mitigated by using MANY devices (thousands). A single device would wear out in under two days; therefore, 1000 devices should last for at least a year. :)

Flash-Based Main Memory



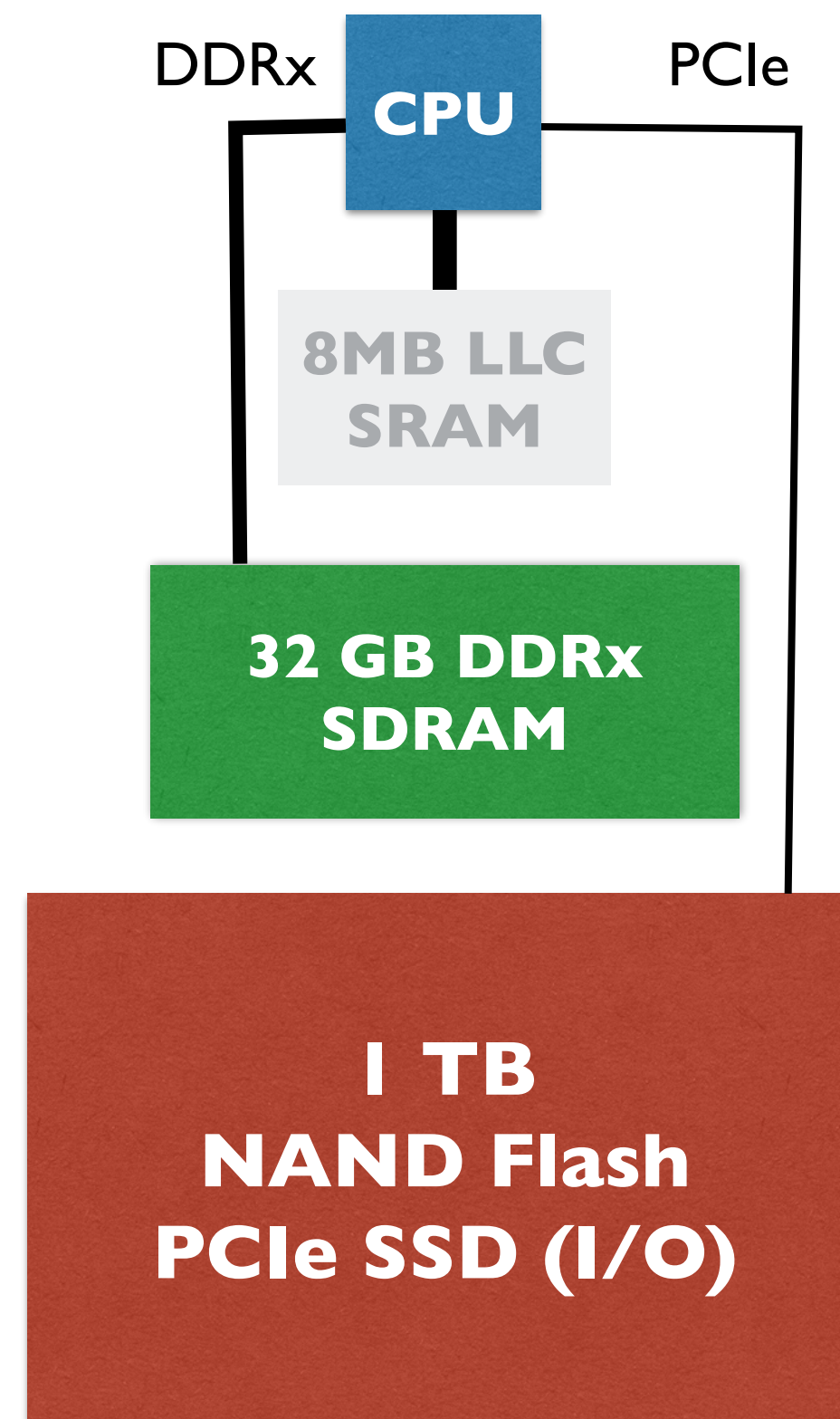
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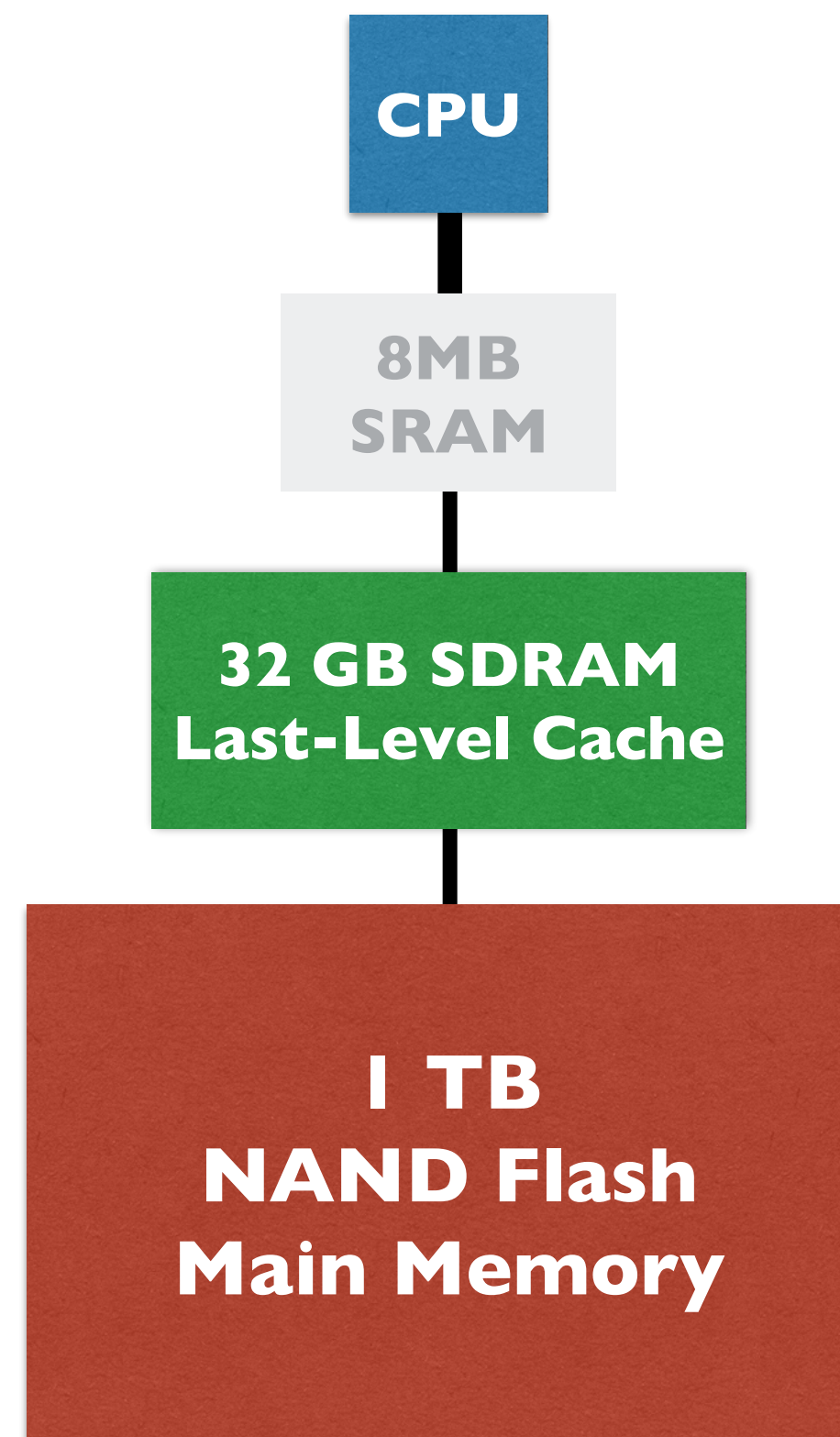
SLIDE 4

A Tale of 3 Memory Systems



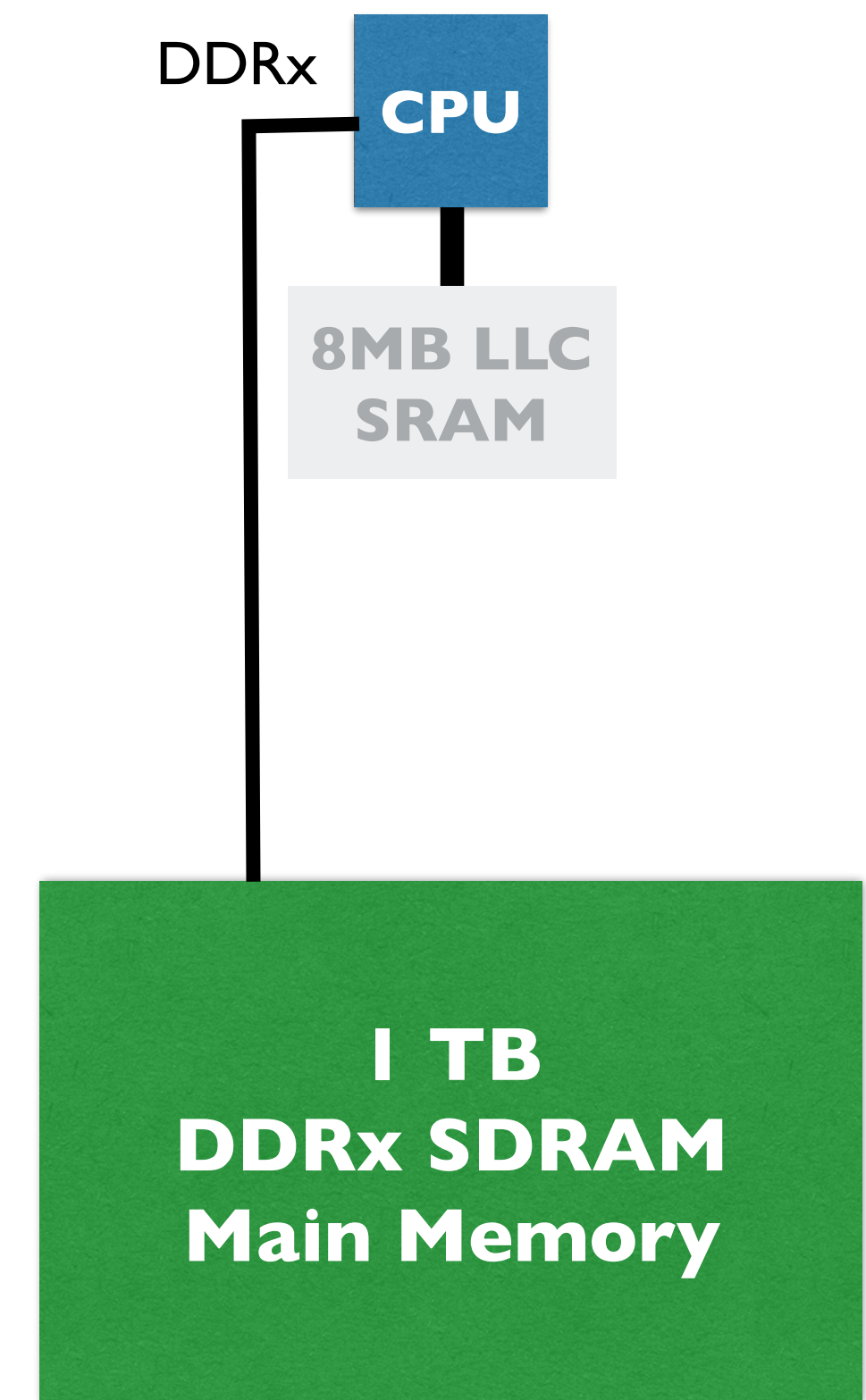
SSD

\$500 – 10W



Hybrid

\$500 – 10s of W



Ideal

\$10,000 – 100W

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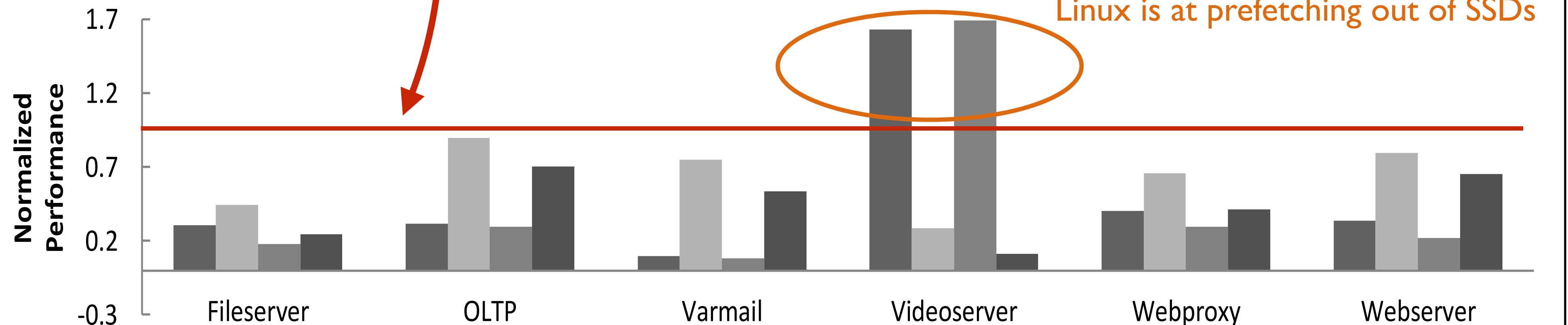
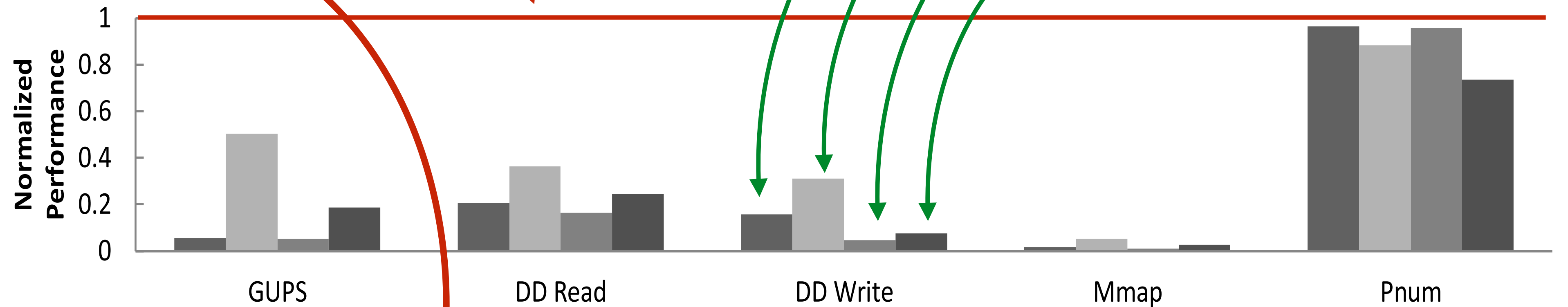
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SLIDE 5

Performance

“Ideal”



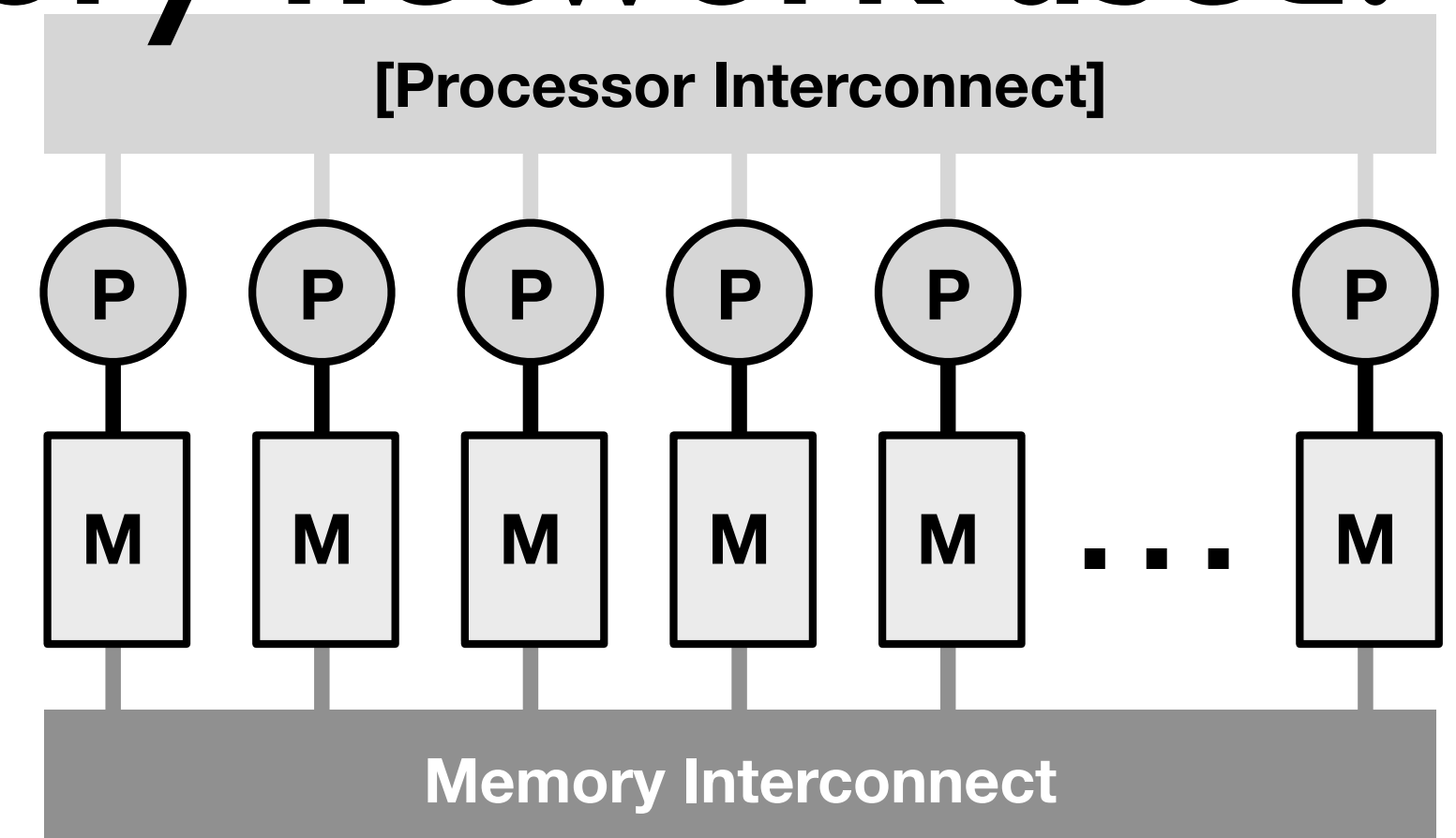
Less Easily Quantified Stuff

Out of the box:

- **Journalled main memory**
built-in checkpoint/repair (*flash side-effect*)
- **No VM or TLB needed** (flash maps self)

If HMC-type intra-memory network used:

- **Global physical space**
- **... even virtual**





Bottom Line

Your future is non-volatile ... and BIG

- **Less expensive**
- **Lower power**
- **Performance approaching that of DRAM**

Global address space for free

Checkpoint/repair built-in

What we need from you: BIG benchmarks