JouleSort: A Balanced Energy-Efficiency Benchmark

Suzanne Rivoire Mehul A. Shah Parthasarathy Ranganathan Christos Kozyrakis

Presenter: Brian Wongchaowart

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JouleSort

- The task is to sort a fixed number of randomly permuted 100-byte records with 10-byte keys.
- The input must start on nonvolatile storage and the output must be written to nonvolatile storage.
- Three scale categories: 10^8 records (10 GB), 10^9 records (100 GB), 10^{10} records (1 TB).
- The objective is to minimize total energy use (sorted records/joule).
- Latest results: `http://sortbenchmark.org`

Unoptimized Systems

System	Server 1
CPU	2.8 GHz Intel Xeon
Memory	2 GB DDR
Disks	2 $\times$ SCSI, 15,000 RPM, 36 GB
OS/FS	Linux, XFS
SRecs/J (10 GB)	1,203 $\pm$ 1
CPU utilization	26%
System	**Server 2**
CPU	2 GHz Intel Xeon
Memory	4 GB DDR2
Disks	12 $\times$ SATA, 7,200 RPM, 500 GB
OS/FS	Linux, XFS
SRecs/J (10 GB)	3,863 $\pm$ 19

Unoptimized Systems

System	Laptop
CPU	2 GHz Intel Core 2 Duo
Memory	3 GB DDR2
Disk	SATA, 7,200 RPM, 60 GB
OS/FS	Windows XP, NTFS
SRecs/J (10 GB)	3,479 $\pm$ 131
CPU utilization	1%

Winning System (Daytona, 2007)

System	CoolSort
CPU	2.33 GHz Intel Core 2 Duo
Memory	2 GB DDR2
Disks	13 $\times$ SATA, 5,400 RPM, 160 GB
OS/FS	Linux, XFS
SRecs/J (10 GB)	11,628 $\pm$ 41
CPU utilization	139%

Winning System (Daytona, 2007)

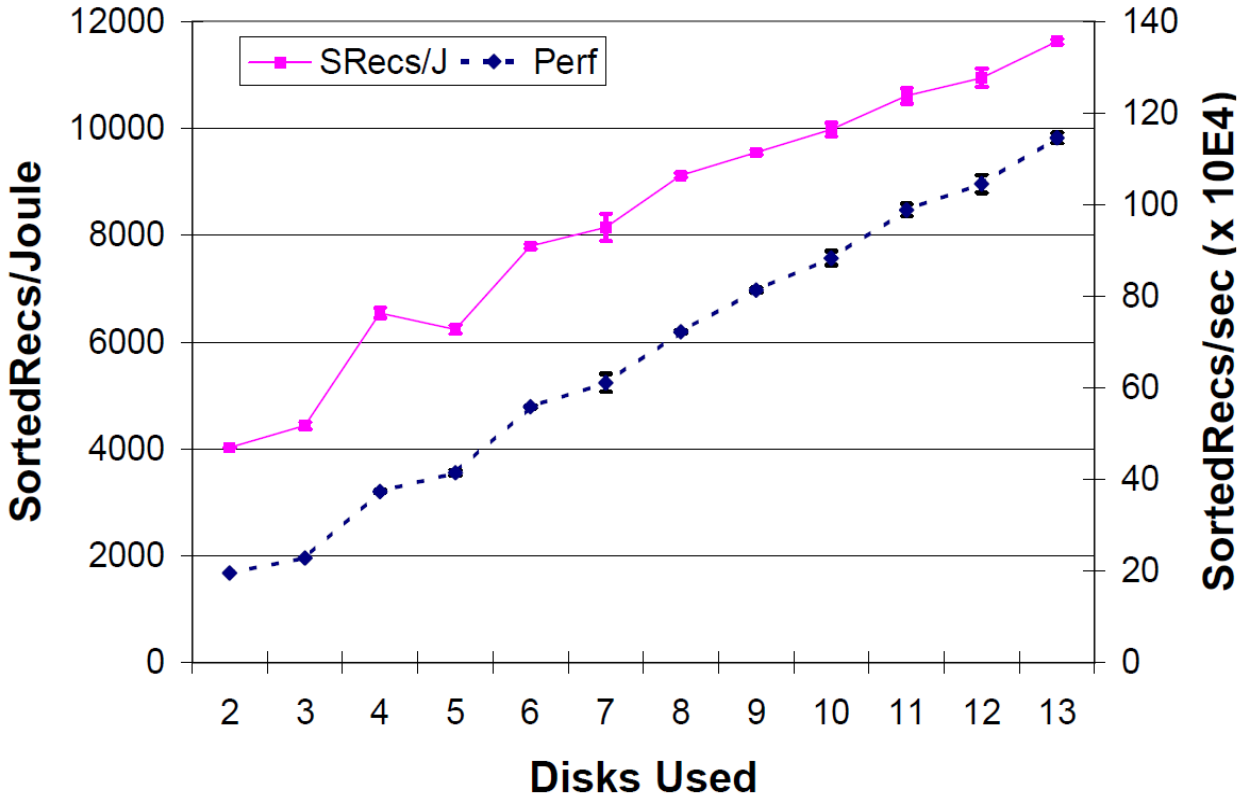

Figure: Energy efficiency as the number of disks varies.

Winning System (Daytona, 2010)

System	FlashSort
CPU	2.1 GHz Quad-Core AMD Opteron
Memory	16 GB DDR2
Disk	Fusion-io ioDrive, 80 GB
OS	Windows Server 2008
SRecs/J (10 GB)	24,755 $\pm$ 377

`http://sortbenchmark.org/flashsort_2010_Jan_01.pdf`

Winning System (Indy, 2010)

System	EcoSort
CPU	1.6 GHz Intel Atom 330
Memory	4 GB DDR2
Disks	4 $\times$ SuperTalent UltraDrive GX MLC, 256 GB
OS/FS	Linux, XFS
SRecs/J (10 GB)	35,453 $\pm$ 313

`http://sortbenchmark.org/ecosort_2010_Jan_01.pdf`

Questions/Comments