

Tests sur stockage Dell R730XD à base disques 6TB

Rencontres LCG-France / France Grilles – IPNO – 17-19/06/2015

Caractéristiques principales des disques

Caractéristiques principales (données constructeur)	2TB	3TB	6TB
Modèle	ST32000444SS	ST33000650SS	ST6000NM0034*
Disk rotation speed	7200	7200	7200
cache (MB)	16	64	128
MTBF (heures)	1 200 000	1 200 000	2 000 000*
AFR (%)	0,73	0,73	0,44
Load - Unload Cycles / Year	250	250	600000
Nonrecoverable Read Errors per Bits Read	1 sector per 10E15	1 sector per 10E15	1 sector per 10E15
Max transfert (MB/s)	150	155	226
Average Read/Write (ms)	8.5 / 9.5	8.5 / 9.5	4,16*
Idle Power, Average (W)	7,26	7,4	8,43
Power Random Read (W)	10,43	11,3	12,13
*Max operating temp (°C)	60	60	60

*: 2 sources d'information contradictoires

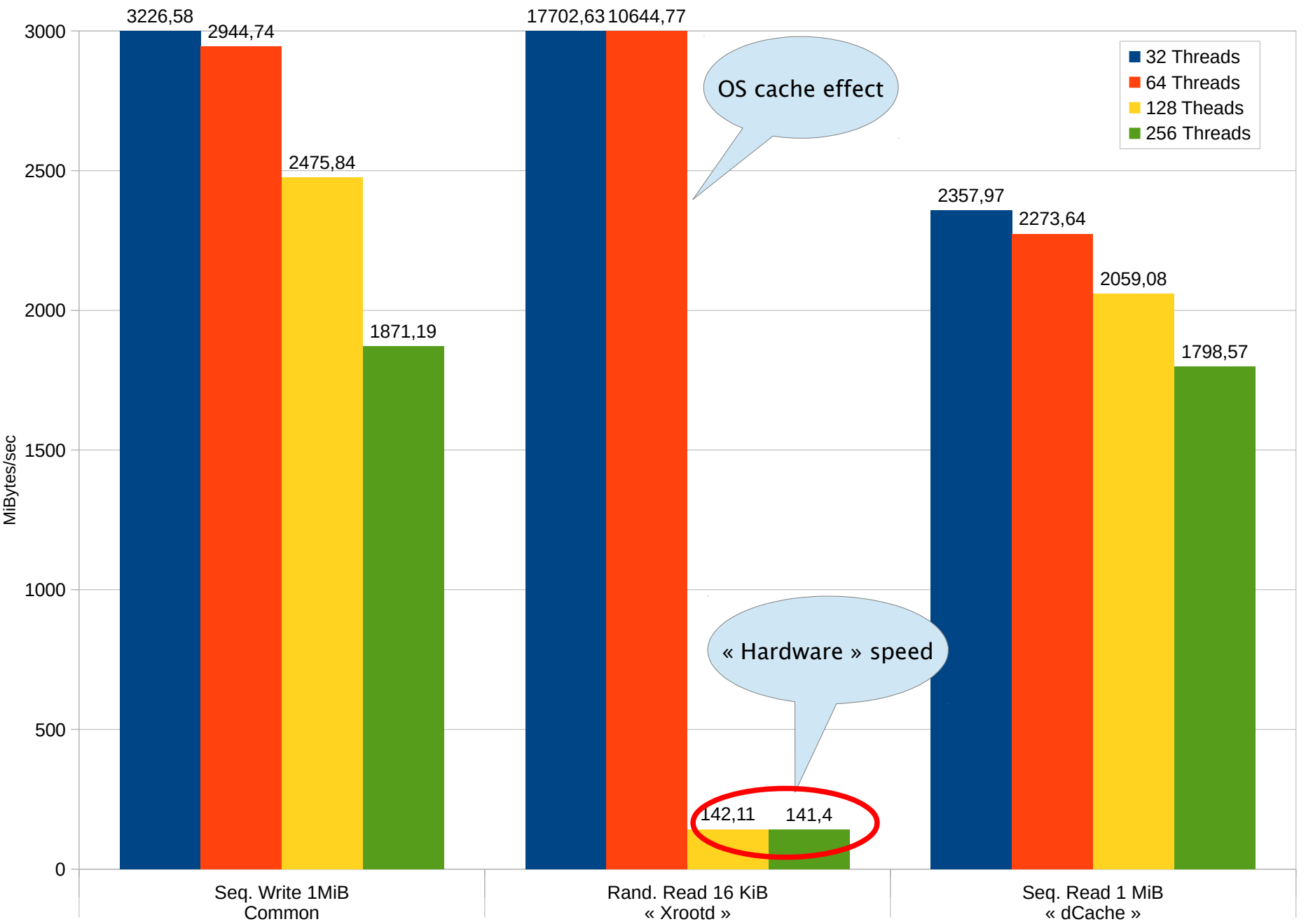
Configurations choisies

	IPNL	CC-IN2P3
CPU	1 * E5-2609	2 * E5-2609
RAM	32Go	32Go
Connexion	10-Gbits Intel X540-AT2 (2 ports cuivre)	10 Gbits Intel X520 (2 ports fibre)
RAID interne	PERC H730P Mini (2Go cache)	PERC H730 Mini (1Go cache)
Disques Internes	16 * 6TB	12 * 6TB
Stockage Externe	N/A	PERC H830 (2 ports SAS 12 Gbits & 2 Go de cache)
Extension disque	N/A	MD1400 (12*6TB NL-SAS)
RAIDs	2 RAID-6 6D+2P	2 RAID-6 10D+2P
Capacité utile	72TB	120TB

Données CC-IN₂P₃

Config CC-IN2P3

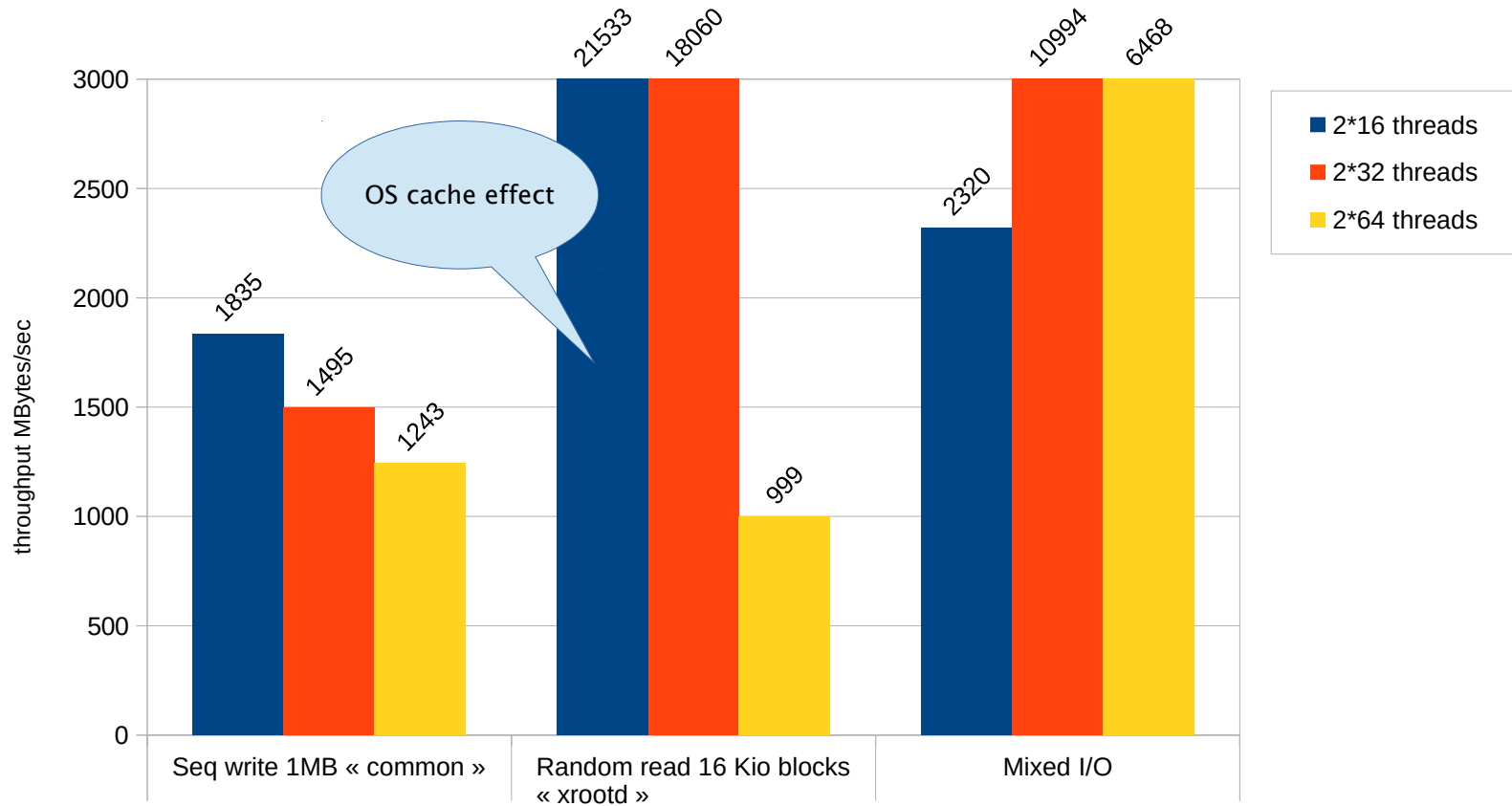
Dell R730xd disk throughput (30 minutes runs, all threads doing I/O continuously)



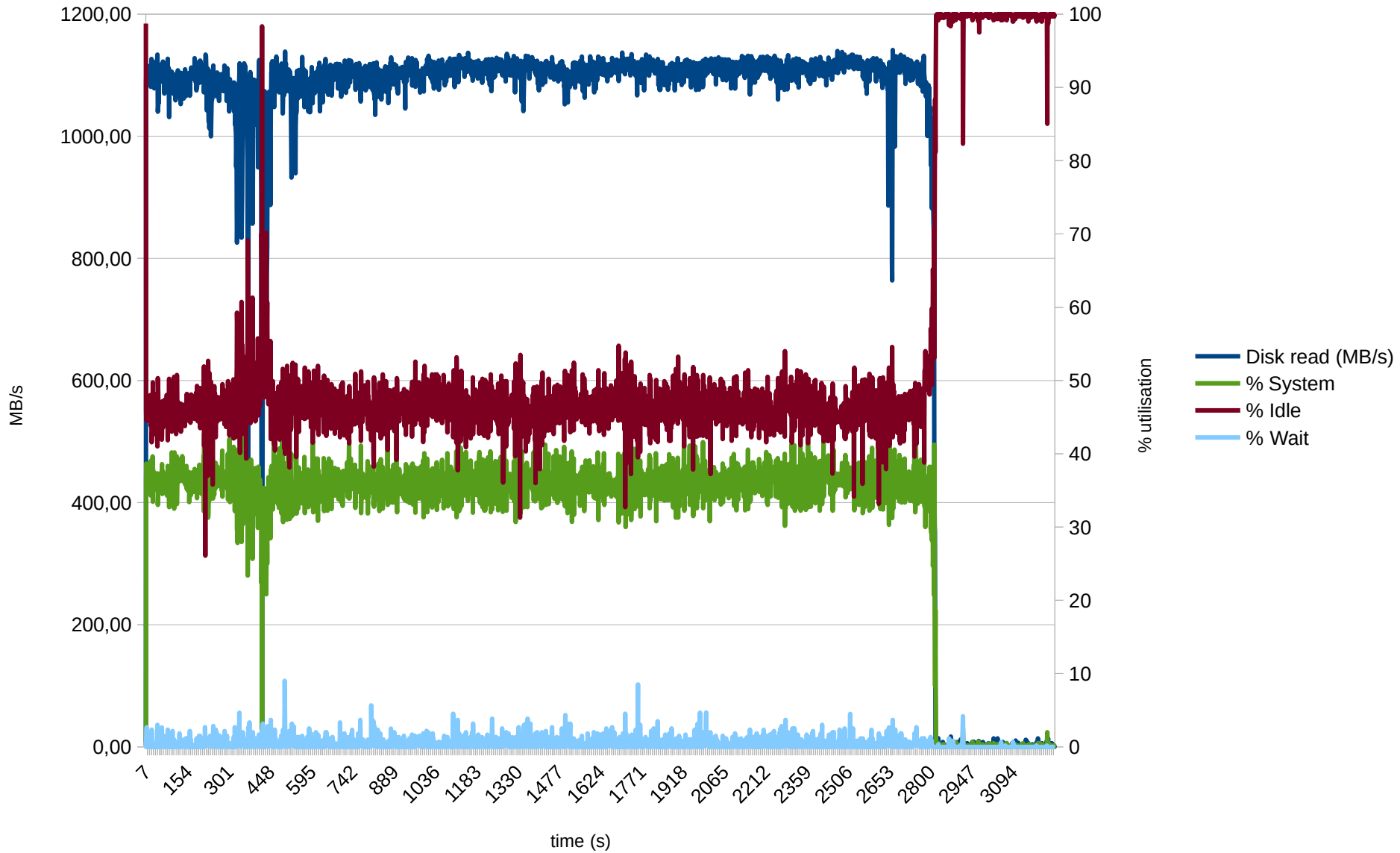
Données IPNL

Config IPNL

Dell R730xd disk throughput (30 minutes runs, all threads doing I/O continuously)

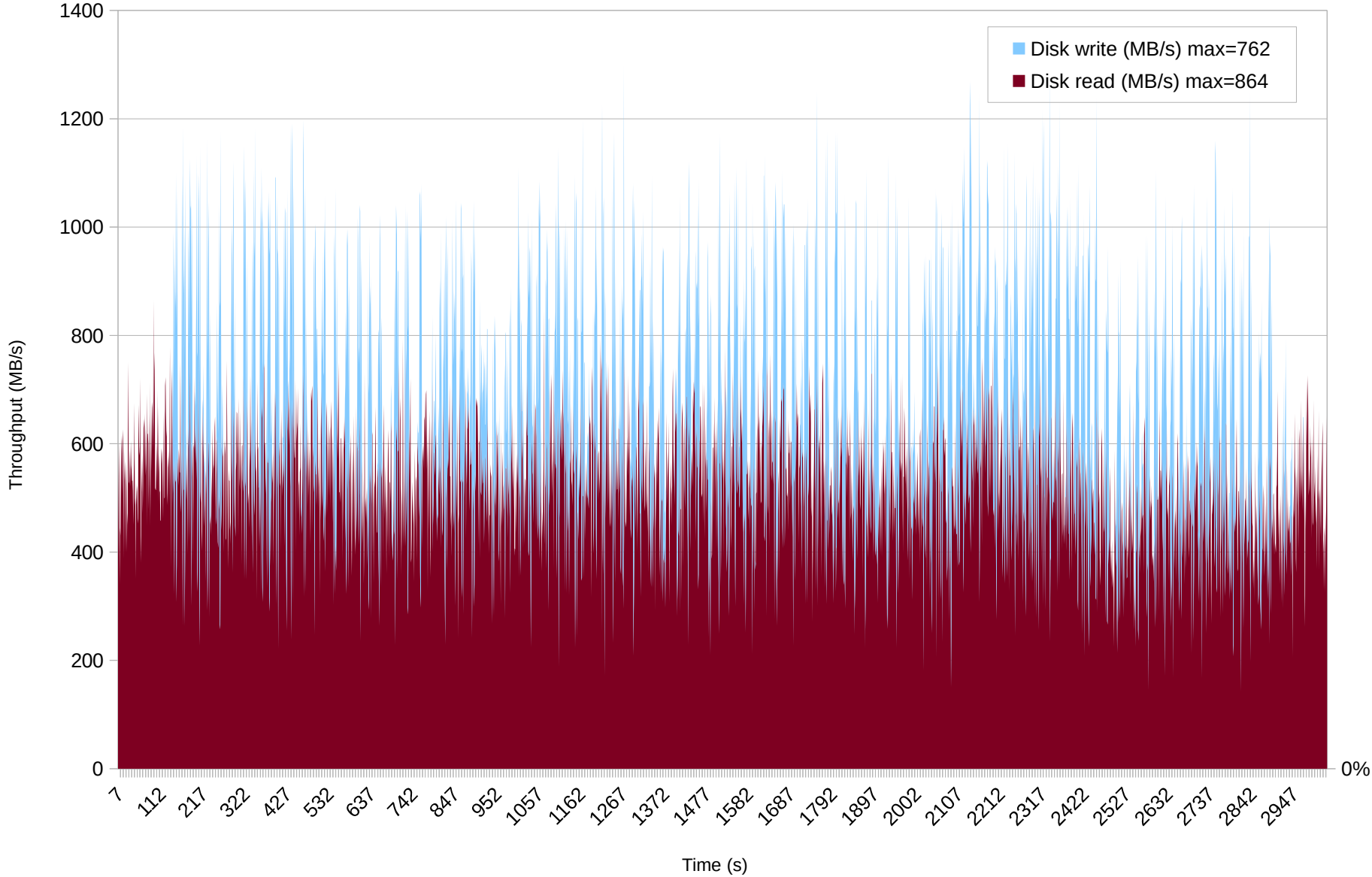


Débit de lecture dpm-drain



Config IPNL

Thoughtput Disk I/O (cumulated) :
- Read = 100 jobs * 100 random xrootd files
- Write = rfio writes

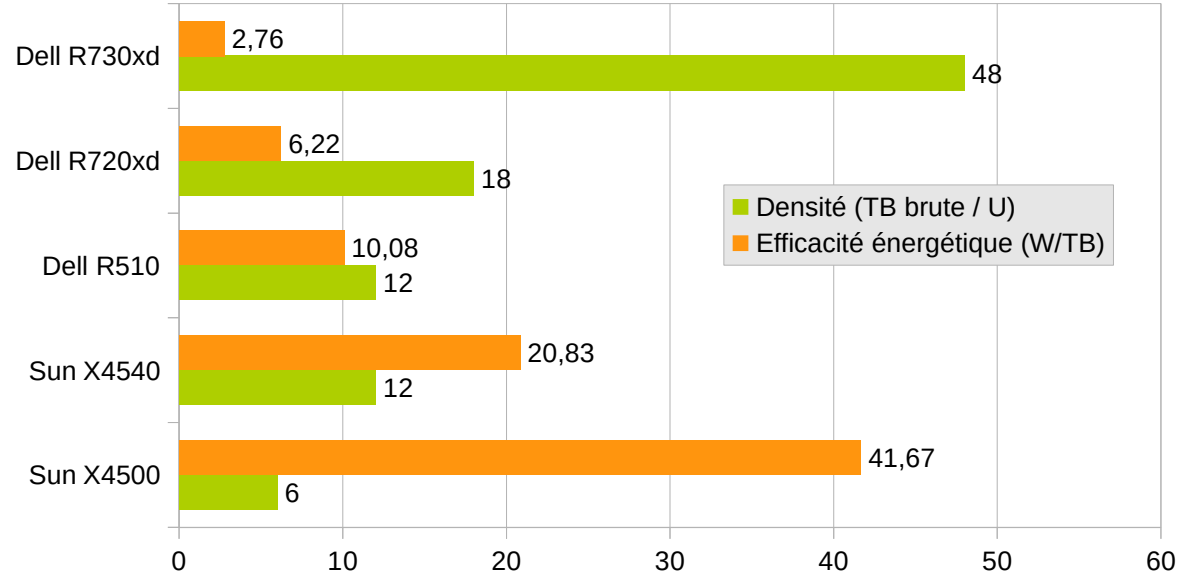


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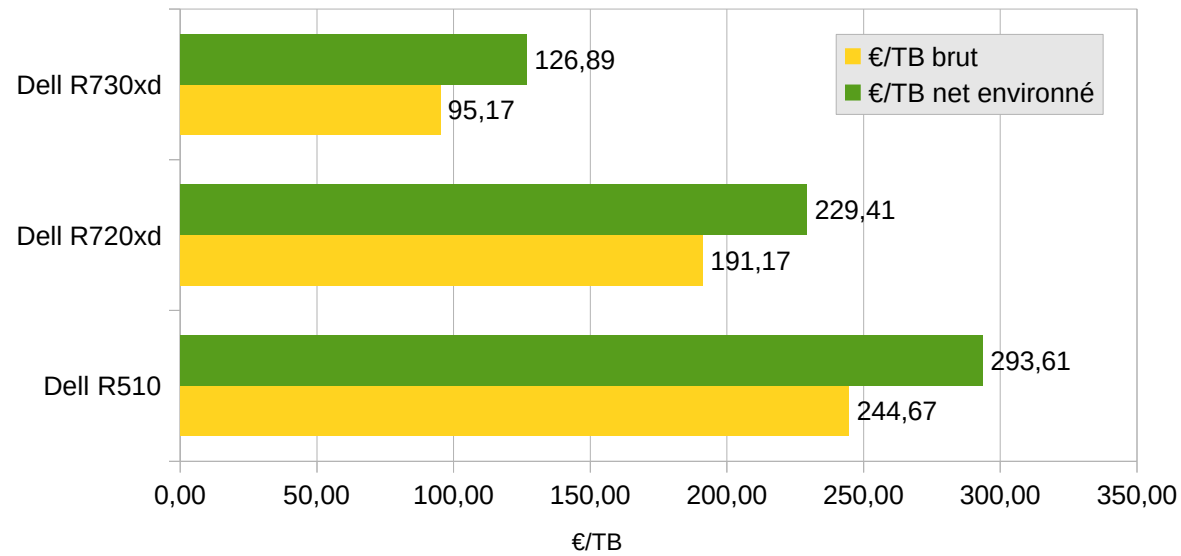
Etude comparative stockage sur 7 années

Server type	Sun X4500	Sun X4540	Dell R510	Dell R720xd	Dell R730xd
Année achat	2007 (CC)	2008 (CC)	2010 (IPNL)	2012 (IPNL)	2014 (IPNL)
CPU	2 x AMD 285	2 x AMD-2356	2 x E5620	2 x E5-2603	1 x E5-2609v3
RAM (GB)	16	32	16	16	32
Eth (gb/s)	1	1	1	10	10
nb U	4	4	2	2	2
Nb disques	48	48	12	12	16
Capacité 1 disque (TB)	0,5	1	2	3	6
Capacité brute totale (TB)	24	48	24	36	96
Capacité net configurée (TB)	20,9	36	20	30	72
Densité (TB brute / U)	6	12	12	18	48
Conso (W)	1000	1000	242	224	265
Efficacité énergétique (W/TB)	41,67	20,83	10,08	6,22	2,76
Coût environnement (IPNL)	Contacter les auteurs pour avoir les chiffres				
Coût environné					
€/TB brut					
€/TB net environné		536,43	293,61	229,41	126,89

Densité et efficacité énergétique



Coût stockage (IPNL)



Biblio et questions

Bibliographie

Tech specs 6TB HDD :

<http://www.seagate.com/www-content/product-content/enterprise-hdd-fam/enterprise-capacity-3-5-hdd/constellation-es-4/fr/docs/enterprise-capacity-3-5-hdd-ds1791-8-1410fr.pdf>

<http://www.seagate.com/www-content/product-content/enterprise-hdd-fam/enterprise-capacity-3-5-hdd/constellation-es-4/en-us/docs/enterprise-capacity-3-5-hdd-v4-ds1791-3-1403us.pdf>

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Benchmarks & performance des infrastructures de stockage disque, Loïc Tortay, LCG-France, 23/11/2010

<https://indico.in2p3.fr/event/4340/session/2/contribution/3/material/slides/0.pdf>

Questions ?