

# Benchmark

## RAID Controller

The System Information

```
=====
Main Processor      : 500MHz
CPU ICache Size    : 32KB
CPU DCache Size    : 32KB
CPU SCache Size    : 0KB
System Memory      : 256MB/333MHz/ECC
Firmware Version   : V1.46 2008-08-06
BOOT ROM Version   : V1.45 2008-3-14
Controller Name    : ARC-1120
=====
```

## OS / Server

- Ubuntu Hardy 64-Bits 2.6.24-21-server
- 6GB DDR2 Ram
- Intel(R) Xeon(R) CPU 5110 @ 1.60GHz
- Areca ARC-1120 / ARC-1220

## Bonnie++

```
bonnie++ -d /mnt/test0 -s 20G -u root -x 3 -q
```

## Postmark

Dit is een benchmark tool van NetApp om filesystems en onderliggende storage mee te benchmarken.

```
set read 8192
set write 8192
set transactions 100000
set size 2048 1024000
set number 100000
set subdirectories 5000
set bias read 7
set bias create 3
set buffering false
```

## Mount opties / Filesystem

Op het block device wordt direct een XFS filesystem aangebracht, deze wordt met de "noatime" optie gemount.

## De opstelling

Worden allemaal uitgevoerd op een Areca 1120 / 1220 controller met Write-Back on. De stripe-size die wordt gebruikt is 4k, dit omdat we zoeken naar de beste oplossing voor kleine files.

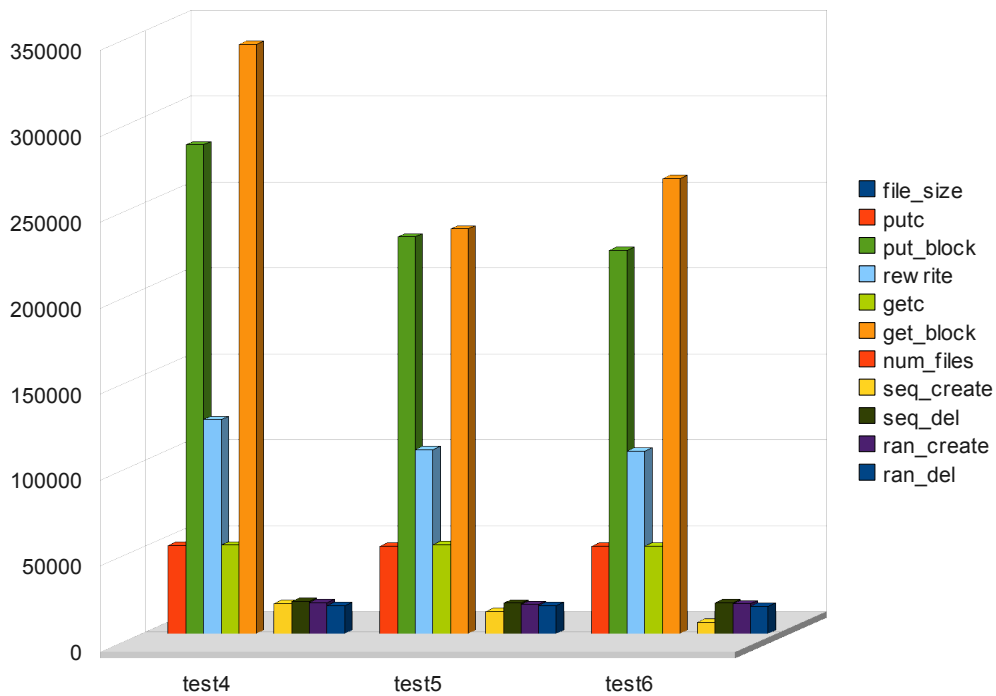
#	Type opslag	Aantal	RAID Level
1	MTron Pro 32GB SSD 3.5"	4	5
2	MTron Pro 32GB SSD 3.5"	4	10
3	MTron Pro 32GB SSD 3.5"	2	0
4	MTron Pro 32GB SSD 3.5"	4	0
5	WD Velociraptor 150GB	2	0
6	Seagate 7200.9 160GB	4	0
7	Seagate 7200.9 160GB	4	10
8	Seagate 7200.9 160GB	4	5

# Resultaten

## Postmark

#	Totaal (sec)	Transactions p/s	Create p/s	Read p/s	Append p/s	Delete p/s	Read MB/s	Write MB/s
1	2232	71	58	50	21	58	16.45	31.50
2	2632	55	49	38	16	49	13.95	26.71
3	2517	57	51	39	17	51	14.59	27.93
4	1666	83	77	58	25	77	22.04	42.20
5	2296	61	56	42	18	56	16.00	30.62
6	7245	25	31	18	7	31	4.89	16.50
7	6689	19	19	13	5	19	5.49	10.51
8	7814	18	16	13	5	16	4.70	9.00

## Bonnie++



# Ruwe resultaten

## Postmark

#1

Time:

2232 seconds total  
1393 seconds of transactions (71 per second)

Files:

129819 created (58 per second)  
Creation alone: 100000 files (120 per second)  
Mixed with transactions: 29819 files (21 per second)  
69949 read (50 per second)  
30051 appended (21 per second)  
129819 deleted (58 per second)  
Deletion alone: 59638 files (7454 per second)  
Mixed with transactions: 70181 files (50 per second)

Data:

36726.74 megabytes read (16.45 megabytes per second)  
70305.07 megabytes written (31.50 megabytes per second)

#2

Time:

2632 seconds total  
1817 seconds of transactions (55 per second)

Files:

129819 created (49 per second)  
Creation alone: 100000 files (123 per second)  
Mixed with transactions: 29819 files (16 per second)  
69949 read (38 per second)  
30051 appended (16 per second)  
129819 deleted (49 per second)  
Deletion alone: 59638 files (8519 per second)  
Mixed with transactions: 70181 files (38 per second)

Data:

36726.74 megabytes read (13.95 megabytes per second)  
70305.07 megabytes written (26.71 megabytes per second)

#3

Time:

2517 seconds total  
1753 seconds of transactions (57 per second)

Files:

129819 created (51 per second)  
Creation alone: 100000 files (132 per second)  
Mixed with transactions: 29819 files (17 per second)  
69949 read (39 per second)  
30051 appended (17 per second)  
129819 deleted (51 per second)  
Deletion alone: 59638 files (5421 per second)  
Mixed with transactions: 70181 files (40 per second)

Data:

36726.74 megabytes read (14.59 megabytes per second)  
70305.07 megabytes written (27.93 megabytes per second)

#4

Time:

1666 seconds total  
1194 seconds of transactions (83 per second)

Files:

129819 created (77 per second)  
    Creation alone: 100000 files (215 per second)  
    Mixed with transactions: 29819 files (24 per second)  
69949 read (58 per second)  
30051 appended (25 per second)  
129819 deleted (77 per second)  
    Deletion alone: 59638 files (7454 per second)  
    Mixed with transactions: 70181 files (58 per second)

Data:

36726.74 megabytes read (22.04 megabytes per second)  
70305.07 megabytes written (42.20 megabytes per second)

#5

2296 seconds total  
1633 seconds of transactions (61 per second)

Files:

129819 created (56 per second)  
    Creation alone: 100000 files (153 per second)  
    Mixed with transactions: 29819 files (18 per second)  
69949 read (42 per second)  
30051 appended (18 per second)  
129819 deleted (56 per second)  
    Deletion alone: 59638 files (4587 per second)  
    Mixed with transactions: 70181 files (42 per second)

Data:

36726.74 megabytes read (16.00 megabytes per second)  
70305.07 megabytes written (30.62 megabytes per second)

#7

Time:

6689 seconds total  
5252 seconds of transactions (19 per second)

Files:

129819 created (19 per second)  
    Creation alone: 100000 files (71 per second)  
    Mixed with transactions: 29819 files (5 per second)  
69949 read (13 per second)  
30051 appended (5 per second)  
129819 deleted (19 per second)  
    Deletion alone: 59638 files (1386 per second)  
    Mixed with transactions: 70181 files (13 per second)

Data:

36726.74 megabytes read (5.49 megabytes per second)  
70305.07 megabytes written (10.51 megabytes per second)

#8

Time:

7814 seconds total  
5375 seconds of transactions (18 per second)

Files:

129819 created (16 per second)  
    Creation alone: 100000 files (42 per second)  
    Mixed with transactions: 29819 files (5 per second)  
69949 read (13 per second)  
30051 appended (5 per second)  
129819 deleted (16 per second)  
    Deletion alone: 59638 files (693 per second)  
    Mixed with transactions: 70181 files (13 per second)

Data:

36726.74 megabytes read (4.70 megabytes per second)  
70305.07 megabytes written (9.00 megabytes per second)

## Overige tests

### BM Flash

Geen relevante test omdat hier read en write niet gemixed wordt.

#### #4

Read Tests:

Block Size	1 thread		10 threads		40 threads	
	IOPS	BW	IOPS	BW	IOPS	BW
512B	9865	4.8M	39141	19.1M	36817	17.9M
1K	9511	9.2M	38466	37.5M	36289	35.4M
2K	8817	17.2M	37317	72.8M	35283	68.9M
4K	7697	30.0M	34127	133.3M	32982	128.8M
8K	7115	55.5M	22453	175.4M	22675	177.1M
16K	6258	97.7M	12223	190.9M	11778	184.0M
32K	4728	147.7M	8157	254.9M	8048	251.5M
64K	3135	195.9M	4809	300.5M	4753	297.0M
128K	1891	236.4M	2592	324.0M	2592	324.0M
256K	1064	266.0M	1355	338.7M	1355	338.9M
512K	562	281.3M	690	345.2M	695	347.9M
1M	305	305.8M	348	348.8M	351	351.3M
2M	160	320.5M	174	349.3M	176	353.7M
4M	83	332.3M	89	356.3M	90	363.5M
8M	41	332.0M	44	357.5M	47	377.5M
16M	19	307.1M	20	323.1M		

Write Tests:

Block Size	1 thread		10 threads		40 threads	
	IOPS	BW	IOPS	BW	IOPS	BW
512B	598	299.1K	684	342.0K	633	316.6K
1K	607	607.2K	658	658.0K	662	662.3K
2K	619	1239.5K	643	1286.0K	639	1279.5K
4K	643	2.5M	636	2.4M	642	2.5M
8K	665	5.2M	556	4.3M	464	3.6M
16K	341	5.3M	314	4.9M	291	4.5M
32K	161	5.0M	139	4.3M	86	2.7M
64K	40	2.5M	42	2.6M	45	2.8M
128K	19	2.4M	40	5.0M	48	6.0M

256K		33	8.2M		74	18.6M		146	36.5M
512K		96	48.0M		125	62.5M		146	73.4M
1M		89	89.5M		96	96.6M		109	109.5M
2M		73	147.3M		73	146.0M		81	163.1M
4M		47	190.3M		52	210.0M		54	218.0M
8M		29	236.0M		30	243.1M		27	223.1M
16M		15	251.1M		15	243.1M			

## #5

Read Tests:

Block Size	1 thread		10 threads		40 threads	
	IOPS	BW	IOPS	BW	IOPS	BW
512B	223	111.5K	685	342.6K	1076	538.0K
1K	216	216.7K	654	654.3K	1060	1060.7K
2K	212	425.0K	661	1323.1K	1049	2.0M
4K	210	843.1K	649	2.5M	1063	4.1M
8K	172	1380.0K	397	3.1M	563	4.4M
16K	171	2.6M	389	6.0M	554	8.6M
32K	168	5.2M	380	11.8M	548	17.1M
64K	165	10.3M	364	22.7M	499	31.2M
128K	153	19.1M	323	40.4M	449	56.2M
256K	141	35.2M	282	70.6M	355	88.9M
512K	112	56.2M	206	103.3M	244	122.1M
1M	85	85.3M	150	150.6M	157	157.0M
2M	56	113.0M	80	161.5M	83	167.5M
4M	36	144.7M	43	175.5M	47	188.7M
8M	20	167.1M	23	186.3M		
16M	11	185.5M	12	201.5M		

Write Tests:

Block Size	1 thread		10 threads		40 threads	
	IOPS	BW	IOPS	BW	IOPS	BW
512B	1062	531.2K	1151	575.7K	1146	573.0K
1K	1062	1062.5K	1123	1123.3K	1157	1157.5K
2K	1049	2.0M	1140	2.2M	1103	2.1M
4K	1060	4.1M	1110	4.3M	1116	4.3M
8K	1079	8.4M	785	6.1M	595	4.6M
16K	585	9.1M	589	9.2M	568	8.8M
32K	282	8.8M	293	9.1M	398	12.4M
64K	287	17.9M	462	28.9M	543	33.9M
128K	329	41.1M	491	61.4M	493	61.6M
256K	327	81.9M	417	104.3M	399	99.9M
512K	243	121.8M	241	120.8M	271	135.5M
1M	171	171.8M	159	159.8M	169	169.0M
2M	87	174.3M	89	179.5M	95	191.7M
4M	46	184.0M	48	194.3M	51	207.5M
8M	24	196.0M	25	206.3M	26	212.0M
16M	13	209.5M	13	212.7M		

## #6

Read Tests:

Block Size	1 thread		10 threads		40 threads	
	IOPS	BW	IOPS	BW	IOPS	BW

512B	148	74.2K	591	295.6K	907	453.7K
1K	148	148.0K	566	566.0K	902	902.3K
2K	148	297.0K	569	1139.7K	897	1795.5K
4K	145	583.5K	560	2.1M	898	3.5M
8K	122	978.3K	333	2.6M	487	3.8M
16K	106	1710.3K	193	3.0M	266	4.1M
32K	106	3.3M	192	6.0M	265	8.2M
64K	104	6.5M	188	11.7M	262	16.3M
128K	102	12.8M	184	23.0M	248	31.0M
256K	96	24.1M	166	41.6M	224	56.0M
512K	87	43.5M	144	72.0M	183	91.5M
1M	76	76.2M	121	121.6M	133	133.0M
2M	60	120.3M	83	166.3M	86	173.5M
4M	40	162.0M	52	208.0M	55	223.1M
8M	24	197.5M	28	226.3M	31	252.7M
16M	13	208.0M	13	219.1M		

#### Write Tests:

Block Size	1 thread		10 threads		40 threads	
	IOPS	BW	IOPS	BW	IOPS	BW
512B	1137	568.9K	1239	619.7K	1180	590.0K
1K	1220	1220.0K	1248	1248.3K	1128	1128.1K
2K	1230	2.4M	1185	2.3M	1124	2.1M
4K	1028	4.0M	986	3.8M	899	3.5M
8K	1077	8.4M	643	5.0M	587	4.5M
16K	557	8.7M	566	8.8M	397	6.2M
32K	161	5.0M	171	5.3M	161	5.0M
64K	72	4.5M	125	7.8M	160	10.0M
128K	126	15.8M	187	23.3M	225	28.1M
256K	131	32.9M	190	47.6M	196	49.0M
512K	77	38.8M	126	63.1M	134	67.3M
1M	60	60.5M	74	74.6M	80	80.5M
2M	37	75.1M	44	89.3M	51	102.1M
4M	31	124.7M	34	137.5M	41	164.3M
8M	21	172.7M	22	178.3M		
16M	12	195.1M	11	179.1M		

### hdparm

Puur sequentieel lezen, niet echt spannend maar een leuke referentie.

#### #4

/dev/sdd:

Timing cached reads: 5444 MB in 2.00 seconds = 2724.64 MB/sec

Timing buffered disk reads: 1010 MB in 3.00 seconds = 336.38 MB/sec

#### #5

/dev/sdb:

Timing cached reads: 5752 MB in 2.00 seconds = 2878.83 MB/sec

Timing buffered disk reads: 704 MB in 3.00 seconds = 234.63 MB/sec

#### #6

/dev/sdc:

Timing cached reads: 5398 MB in 2.00 seconds = 2701.17 MB/sec

Timing buffered disk reads: 788 MB in 3.00 seconds = 262.62 MB/sec