

```
[root]# date
```

```
Sun Feb 24 17:11:46 CET 2013
```

```
[root]#
```

```
[root]# df -m
```

```
Filesystem      1M-blocks    Used Available Use% Mounted on
/dev/sda1        230123    6775  211659  4% /
none             400      97    304 25% /tmp
/dev/mapper/xyzcrypt2
                  102246  16610  80517 18% /mnt/tc2
```

```
[root]# mount
```

```
fusectl on /sys/fs/fuse/connections type fusectl (rw)
/dev/sda1 on / type ext2 (rw)
none on /proc type proc (rw)
none on /dev/pts type devpts (rw)
none on /tmp type tmpfs (rw,size=400M)
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)
xyzcrypt on /root/tmp/.xyzcrypt_aux_mnt1 type fuse.xyzcrypt (rw,nosuid,nodev,allow_other)
/dev/mapper/xyzcrypt2 on /mnt/tc2 type ext4 (rw)
```

```
[root]#
```

```
[root]# hdparm -t /dev/sda1
```

```
/dev/sda1:
```

```
Timing buffered disk reads: 340 MB in 3.01 seconds = 112.87 MB/sec
```

```
[root]# hdparm -t /dev/sda2
```

```
/dev/sda2:
```

```
Timing buffered disk reads: 280 MB in 3.01 seconds = 93.06 MB/sec
```

```
[root]# hdparm -t /dev/mapper/xyzcrypt2
```

```
/dev/mapper/xyzcrypt2:
```

```
Timing buffered disk reads: 66 MB in 3.04 seconds = 21.71 MB/sec
```

```
[root]#
```

```
[root]# ls -l /dev/mapper/
```

```
total 0
```

```
crw----- 1 root root 10, 236 Feb 24 14:46 control
```

```
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2_1 -> ../dm-0
```

```
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2_0 -> ../dm-1
```

```
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2 -> ../dm-2
```

```
drwxr-xr-x 2 root root 120 Feb 24 17:08 ./
```

```
drwxr-xr-x 19 root root 4140 Feb 24 17:08 ../
```

```

[root]# mkfs -q /dev/ram4 80000
[root]# umount /mnt/tc2
[root]# sync ; sync
[root]# df -m
Filesystem      1M-blocks    Used Available Use% Mounted on
/dev/sda1       230123      6775  211659  4% /
none            400         97    304 25% /tmp
[root]# flashcache_create -p back cached_sda2_at_ram4 /dev/ram4 /dev/mapper/xyzcrypt2
cachedev cached_sda2_at_ram4, ssd_devname /dev/ram4, disk_devname /dev/mapper/xyzcrypt2 cache
mode WRITE_BACK
block_size 8, md_block_size 8, cache_size 0
Flashcache metadata will use 1MB of your 3798MB main memory
[root]# ls -l /dev/mapper/
total 0
crw----- 1 root root 10, 236 Feb 24 14:46 control
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2_1 -> ../dm-0
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2_0 -> ../dm-1
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2 -> ../dm-2
drwxr-xr-x 19 root root 4160 Feb 24 17:12 ../
lrwxrwxrwx 1 root root 7 Feb 24 17:12 cached_sda2_at_ram4 -> ../dm-3
drwxr-xr-x 2 root root 140 Feb 24 17:12 ./
[root]# mount /dev/mapper/cached_sda2_at_ram4 /mnt/cache4
[root]# df -m
Filesystem      1M-blocks    Used Available Use% Mounted on
/dev/sda1       230123      6775  211659  4% /
none            400         97    304 25% /tmp
/dev/mapper/cached_sda2_at_ram4
                102246  16610  80517 18% /mnt/cache4
[root]#
[root]# hdparm -t /dev/sda1

/dev/sda1:
Timing buffered disk reads: 340 MB in 3.01 seconds = 112.80 MB/sec

[root]# icount=0 ; while [ $icount -lt 12 ] ; do hdparm -t /dev/mapper/cached_sda2_at_ram4 ;
sleep 3 ; let icount=icount+1 ; echo " " ; done

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 68 MB in 3.08 seconds = 22.08 MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 126 MB in 3.05 seconds = 41.30 MB/sec

```

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 184 MB in 3.10 seconds = 59.42 MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 244 MB in 3.11 seconds = 78.53 MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 300 MB in 3.07 seconds = 97.70 MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 354 MB in 3.08 seconds = 115.07 MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 402 MB in 3.04 seconds = **132.35** MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 422 MB in 3.02 seconds = **139.54** MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 400 MB in 3.02 seconds = **132.52** MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 424 MB in 3.02 seconds = **140.39** MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 398 MB in 3.02 seconds = **131.90** MB/sec

/dev/mapper/cached_sda2_at_ram4:
Timing buffered disk reads: 422 MB in 3.03 seconds = **139.19** MB/sec

[root]# **dmsetup status**

cached_sda2_at_ram4: 0 209714688 flashcache stats:

reads(1168496), writes(1)
read hits(979293), read hit percent(83)
write hits(1) write hit percent(100)
dirty write hits(0) dirty write hit percent(0)
replacement(89873), write replacement(0)
write invalidates(0), read invalidates(1)
pending enqueues(0), pending inval(0)
metadata dirties(1), metadata cleans(0)
metadata batch(0) metadata ssd writes(1)

```
cleanings(0) fallow cleanings(0)
no room(0) front merge(0) back merge(0)
disk reads(189203), disk writes(0) ssd reads(979293) ssd writes(189204)
uncached reads(1), uncached writes(0), uncached IO requeue(0)
disk read errors(0), disk write errors(0) ssd read errors(0) ssd write errors(0)
uncached sequential reads(0), uncached sequential writes(0)
pid_adds(0), pid_dels(0), pid_drops(0) pid_expiry(0)
```

```
xyzcrypt2: 0 209714688 crypt
xyzcrypt2_1: 0 209714688 crypt
xyzcrypt2_0: 0 209714688 crypt
```

```
[root]#
```

```
[root]# sync ; sync
```

```
[root]# umount /mnt/cache4
```

```
[root]# sync ; sync
```

```
[root]# df -m
```

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
/dev/sda1	230123	6775	211659	4%	/
none	400	97	304	25%	/tmp

```
[root]# dmsetup remove cached_sda2_at_ram4
```

```
[root]# sync ; sync
```

```
[root]# ls /dev/mapper
```

```
total 0
```

```
crw----- 1 root root 10, 236 Feb 24 14:46 control
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2_1 -> ../dm-0
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2_0 -> ../dm-1
lrwxrwxrwx 1 root root 7 Feb 24 16:37 xyzcrypt2 -> ../dm-2
drwxr-xr-x 2 root root 120 Feb 24 17:14 ./
drwxr-xr-x 19 root root 4140 Feb 24 17:14 ../
```

```
[root]#
```

```
[root]# df -m
```

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
/dev/sda1	230123	6775	211659	4%	/
none	400	97	304	25%	/tmp

```
[root]# e2fsck -fpv /dev/mapper/xyzcrypt2
```

```
51992 inodes used (0.79%)
```

```
156 non-contiguous files (0.3%)
```

```
84 non-contiguous directories (0.2%)
```

```
# of inodes with ind/dind/tind blocks: 0/0/0
```

```
Extent depth histogram: 51981/3
```

```
4291519 blocks used (16.37%)
```

```
0 bad blocks
```

2 large files

49655 regular files

2328 directories

0 character device files

0 block device files

0 fifos

0 links

0 symbolic links (0 fast symbolic links)

0 sockets

51983 files

[root]# **sync ; sync**

[root]# **mount /dev/mapper/xyzcrypt2 /mnt/tc2**

[root]# **df -m**

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
/dev/sda1	230123	6775	211659	4%	/
none	400	97	304	25%	/tmp
/dev/mapper/xyzcrypt2					
	102246	16610	80517	18%	/mnt/tc2

[root]#

[root]#

After some use, the encrypted device achieved a sustained throughput 20% greater than the unencrypted Linux OS device.

The improvement that was observed in the above test is clearly attributed to its caching to the ssd device.

**You may be interested to read accompanying file
flashcache-instructions-to-read.pdf
for the basic theory, installation and use
of the flashcache block cache kernel module.**