

Blktrace

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1 Article purpose

This article provides the basic information needed to start using the Linux® tool: **blktrace**^[1] (*block tracer*).





2 Introduction

The following table provides a brief description of the tool, as well as its availability depending on the software packages:

☑: this tool is either present (ready to use or to be activated), or can be integrated and activated on the software package.

☒: this tool is not present and cannot be integrated, or it is present but cannot be activated on the software package.

Tool			STM32MPU Embedded Software distribution			STM32MPU Embedded Software distribution for Android™		
Name	Category	Purpose	Starter Package	Developer Package	Distribution Package	Starter Package	Developer Package	Distribution Package

blktrace	Tracing tools	blktrace ^[1] generates traces of the I/O traffic on block devices (SD card, USB, eMMC...)				
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The blktrace tool is composed of three main components:

- a kernel
- a utility to record the I/O trace information from the kernel on the user space
- utilities to analyze and view the trace information.

blkparse^[2] is also associated to blktrace. It takes the raw output from the blktrace utility and converts it to a nicely formatted and easy-to-read form.

3 Installing the trace and debug tool on your target board

It consists of placing the **blktrace binary** in the rootfs, and modifying Linux[®] kernel configuration.

In order to use **blktrace**, the Linux[®] kernel configuration must activate CONFIG_BLK_DEV_IO_TRACE using the Linux[®] kernel Menuconfig tool ([Menuconfig](#) or [how to configure kernel](#)):

```
Symbol: BLK_DEV_IO_TRACE
Location:
  Kernel Hacking --->
    [*] Tracers --->
      [*] Support for tracing block I/O actions
```

3.1 Using the STM32MPU Embedded Software distribution

blktrace binary is available by default in all STM32MPU Embedded Software Packages:

```
Board $> which blktrace
/usr/bin/blktrace
```

It is integrated in weston image distribution through openembedded-core package: *openembedded-core/meta/recipes-core/packagegroups/packagegroup-core-tools-profile.bb*.

```
RRECOMMENDS_${PN} = "\
${PERF} \
trace-cmd \
blktrace \
${PROFILE_TOOLS_X} \
${PROFILE_TOOLS_SYSTEMD} \
"
```

3.1.1 Starter Package

Not applicable as Linux[®] kernel configuration cannot be updated.

3.1.2 Developer Package

To enable **CONFIG_BLK_DEV_IO_TRACE** in Linux[®] kernel configuration, please refer to the [Menuconfig or how to configure kernel](#). This article provides instructions for modifying the configuration and recompiling Linux[®] kernel image in the Developer Package context.

3.1.3 Distribution Package

To enable **CONFIG_BLK_DEV_IO_TRACE** in Linux[®] kernel configuration, please refer to the [Menuconfig or how to configure kernel](#). This article provides instructions for modifying the configuration and recompiling Linux[®] kernel image in the Distribution Package context.

3.2 Using the STM32MPU Embedded software for Android™



Coming soon

4 Getting started

To start with **blktrace**, trace I/O traffic on a mounted block device, that is `/usr/local`:

```
Board $> mount | grep mmcblk
/dev/mmcblk0p5 on / type ext4 (rw,relatime,data=ordered)
/dev/mmcblk0p4 on /boot type ext4 (rw,relatime,data=ordered)
/dev/mmcblk0p6 on /usr/local type ext4 (rw,relatime,data=ordered)
```

- Launch blktrace tool in background:

```
Board $> blktrace -d /dev/mmcblk0p6 &
```

- Read `/usr/local` content:

```
Board $> ls -la /usr/local
```

- Put blktrace activity in foreground and then stop it by pressing Ctrl+C:

```
Board $> fg
blktrace -d /dev/mmcblk0p6
Board $> <Ctrl-C>
^C=== mmcblk0p6 ===
CPU 0:                98 events,          5 KiB data
CPU 1:                79 events,          4 KiB data
Total:               177 events (dropped 0),  9 KiB data
```

For detailed guidelines on **blktrace** usage, refer to the man page ^[1] or to the help information:

```
Board $> blktrace --help
Usage: blktrace

-d <dev>                | --dev=<dev>
[ -r <debugfs path>    | --relay=<debugfs path> ]
[ -o <file>            | --output=<file>]
[ -D <dir>             | --output-dir=<dir>
[ -w                   | --stopwatch=]
[ -a <action field>    | --act-mask=<action field>]
[ -A <action mask>    | --set-mask=<action mask>]
[ -b <size>           | --buffer-size]
[ -n <number>         | --num-sub-buffers=<number>]
[ -l                  | --listen]
[ -h <hostname>       | --host=<hostname>]
[ -p <port number>    | --port=<port number>]
[ -s                  | --no-sendfile]
[ -I <devs file>      | --input-devs=<devs file>]
[ -v <version>        | --version]
[ -V <version>        | --version]
-d Use specified device. May also be given last after options
-r Path to mounted debugfs, defaults to /sys/kernel/debug
-o File(s) to send output to
-D Directory to prepend to output file names
-w Stop after defined time, in seconds
-a Only trace specified actions. See documentation
-A Give trace mask as a single value. See documentation
-b Sub buffer size in KiB (default 512)
-n Number of sub buffers (default 4)
-l Run in network listen mode (blktrace server)
-h Run in network client mode, connecting to the given host
-p Network port to use (default 8462)
-s Make the network client NOT use sendfile() to transfer data
-I Add devices found in <devs file>
-v Print program version info
-V Print program version info
```

To get started with **blktrace**, you can also refer to the Yocto Project wiki page for blktrace^[3], which provides additional details as well as an example.

5 To go further

5.1 blkparse usage

In addition to displaying information for the user on the console, blktrace also creates trace files (one per CPU), which can be viewed using **blkparse**. These files are stored under the current path directory.

```
Board $> blkparse mmcblk0p6
Input file mmcblk0p6.blktrace.0 added
Input file mmcblk0p6.blktrace.1 added
179,6 0 1 0.000000000 99 P N [jbd2/mmcblk0p5-]
179,6 0 0 0.000337792 0 m N cfq99SN insert_request
179,6 0 0 0.000344292 0 m N cfq99SN add_to_rr
179,6 0 0 0.000366250 0 m N cfq99SN insert_request
179,6 0 0 0.000374792 0 m N cfq99SN insert_request
179,6 0 0 0.000382458 0 m N cfq99SN insert_request
179,6 0 0 0.000390167 0 m N cfq99SN insert_request
179,6 0 2 0.000396625 99 U N [jbd2/mmcblk0p5-] 5
179,6 0 0 0.000452542 0 m N cfq workload slice:150000000
179,6 0 0 0.000460750 0 m N cfq99SN set_active wl_class:0 wl_type:1
179,6 0 0 0.000469083 0 m N cfq99SN dispatch_insert
179,6 0 0 0.000478500 0 m N cfq99SN dispatched a request
179,6 0 0 0.000484583 0 m N cfq99SN activate rq, drv=1
179,6 0 0 0.000747292 0 m N cfq99SN dispatch_insert
179,6 0 0 0.000755042 0 m N cfq99SN dispatched a request
179,6 0 0 0.000759708 0 m N cfq99SN activate rq, drv=2
179,6 0 0 0.004197583 0 m N cfq99SN complete rqnoidle 1
179,6 0 0 0.004206958 0 m N cfq99SN set_slice=120000000
179,6 0 0 0.004231917 0 m N cfq99SN dispatch_insert
179,6 0 0 0.004239208 0 m N cfq99SN dispatched a request
179,6 0 0 0.004243958 0 m N cfq99SN activate rq, drv=2
179,6 0 0 0.006287958 0 m N cfq99SN complete rqnoidle 1
179,6 0 0 0.006305208 0 m N cfq99SN dispatch_insert
179,6 0 0 0.006310542 0 m N cfq99SN dispatched a request
179,6 0 0 0.006315417 0 m N cfq99SN activate rq, drv=2
179,6 0 0 0.008340833 0 m N cfq99SN complete rqnoidle 1
179,6 0 0 0.008359000 0 m N cfq99SN dispatch_insert
179,6 0 0 0.008365083 0 m N cfq99SN dispatched a request
179,6 0 0 0.008370000 0 m N cfq99SN activate rq, drv=2
179,6 0 0 0.011504375 0 m N cfq99SN complete rqnoidle 1
179,6 0 0 0.014671667 0 m N cfq99SN insert_request
179,6 0 0 0.014727458 0 m N cfq99SN complete rqnoidle 1
179,6 0 0 0.014731250 0 m N cfq schedule dispatch
179,6 0 0 0.014808000 0 m N cfq99SN dispatch_insert
179,6 0 0 0.014813875 0 m N cfq99SN dispatched a request
179,6 0 0 0.014819958 0 m N cfq99SN activate rq, drv=1
179,6 0 0 0.017068708 0 m N cfq99SN complete rqnoidle 1
179,6 0 0 0.017078375 0 m N cfq schedule dispatch
179,0 0 3 5.759777419 193 A WS 1706892 + 2 <- (179,6) 32778
179,6 0 4 5.759784878 193 Q WS 1706892 + 2 [jbd2/mmcblk0p6-]
179,6 0 5 5.759849336 193 G WS 1706892 + 2 [jbd2/mmcblk0p6-]
179,6 0 6 5.759854253 193 P N [jbd2/mmcblk0p6-]
179,6 1 1 5.759855044 99 P N [jbd2/mmcblk0p5-]
179,0 0 7 5.759887628 193 A WS 1706894 + 2 <- (179,6) 32780
179,6 0 8 5.759893919 193 Q WS 1706894 + 2 [jbd2/mmcblk0p6-]
179,6 0 9 5.759947753 193 G WS 1706894 + 2 [jbd2/mmcblk0p6-]
179,6 1 0 5.759975503 0 m N cfq99SN insert_request
179,6 1 0 5.759990336 0 m N cfq99SN insert_request
179,6 1 2 5.759999253 99 U N [jbd2/mmcblk0p5-] 2
179,6 0 10 5.760024669 193 I WS 1706892 + 2 [jbd2/mmcblk0p6-]
179,6 0 0 5.760035461 0 m N cfq193SN insert_request
179,6 0 0 5.760041711 0 m N cfq193SN add_to_rr
```

```

179,6 0 0 5.760053169 0 m N cfq193SN preempt
179,6 0 0 5.760059253 0 m N cfq99SN slice expired t=1
179,6 0 0 5.760066503 0 m N cfq99SN resid=-5635859836
179,6 0 0 5.760081503 0 m N cfq99SN sl_used=120000000 disp=6 charge=1
179,6 0 11 5.760087294 193 I WS 1706894 + 2 [jbd2/mmcblk0p6-]
179,6 0 0 5.760091586 0 m N cfq193SN insert_request
179,6 0 12 5.760096294 193 U N [jbd2/mmcblk0p6-] 2
179,6 1 0 5.760111211 0 m N cfq workload slice:300000000
179,6 1 0 5.760118086 0 m N cfq193SN set_active wl_class:0 wl_type:1
179,6 1 0 5.760125669 0 m N cfq193SN dispatch_insert
179,6 1 0 5.760133128 0 m N cfq193SN dispatched a request
179,6 1 0 5.760137711 0 m N cfq193SN activate rq, drv=1
179,6 1 3 5.760145253 80 D WS 1706892 + 2 [mmcqd/0]
179,6 1 0 5.760393003 0 m N cfq193SN dispatch_insert
179,6 1 0 5.760399961 0 m N cfq193SN dispatched a request
179,6 1 0 5.760404128 0 m N cfq193SN activate rq, drv=2
179,6 1 4 5.760408211 80 D WS 1706894 + 2 [mmcqd/0]
179,6 1 5 5.764367836 80 C WS 1706892 + 2 [0]
179,6 1 0 5.764403128 0 m N cfq193SN complete rqnoidle 1
179,6 1 0 5.764412461 0 m N cfq193SN set_slice=120000000
179,6 1 0 5.764439169 0 m N cfq193SN slice expired t=0
179,6 1 0 5.764450253 0 m N cfq193SN sl_used=33750 disp=2 charge=3375
179,6 1 0 5.764456836 0 m N cfq193SN del_from_rr
179,6 1 0 5.764464711 0 m N cfq99SN set_active wl_class:0 wl_type:1
179,6 1 0 5.764470211 0 m N cfq99SN dispatch_insert
179,6 1 0 5.764475669 0 m N cfq99SN dispatched a request
179,6 1 0 5.764479378 0 m N cfq99SN activate rq, drv=2
179,6 1 6 5.767516794 80 C WS 1706894 + 2 [0]
179,6 1 0 5.767546961 0 m N cfq193SN complete rqnoidle 1
179,6 1 0 5.767564836 0 m N cfq99SN dispatch_insert
179,6 1 0 5.767571086 0 m N cfq99SN dispatched a request
179,6 1 0 5.767575628 0 m N cfq99SN activate rq, drv=2
179,0 0 13 5.767654378 193 A FWFS 1706896 + 2 <- (179,6) 32782
179,6 0 14 5.767662669 193 Q WS 1706896 + 2 [jbd2/mmcblk0p6-]
179,6 0 15 5.767726461 193 G WS 1706896 + 2 [jbd2/mmcblk0p6-]
179,6 0 16 5.767734169 193 I WS 1706896 + 2 [jbd2/mmcblk0p6-]
179,6 0 0 5.767744003 0 m N cfq193SN insert_request
179,6 0 0 5.767750253 0 m N cfq193SN add_to_rr
179,6 0 0 5.767760628 0 m N cfq193SN preempt
179,6 0 0 5.767764336 0 m N cfq99SN slice expired t=1
179,6 0 0 5.767770044 0 m N cfq99SN resid=120000000
179,6 0 0 5.767781378 0 m N cfq99SN sl_used=10000000 disp=2 charge=10
179,6 0 0 5.767784378 0 m N cfq99SN del_from_rr
179,6 1 0 5.772038836 0 m N cfq99SN complete rqnoidle 1
179,6 1 0 5.772064253 0 m N cfq193SN set_active wl_class:0 wl_type:1
179,6 1 0 5.772070878 0 m N cfq193SN dispatch_insert
179,6 1 0 5.772077044 0 m N cfq193SN dispatched a request
179,6 1 0 5.772081878 0 m N cfq193SN activate rq, drv=2
179,6 1 7 5.772085086 80 D WS 1706896 + 2 [mmcqd/0]
179,6 1 0 5.774473336 0 m N cfq99SN insert_request
179,6 1 0 5.774481419 0 m N cfq99SN add_to_rr
179,6 1 0 5.774490461 0 m N cfq99SN preempt
179,6 1 0 5.774496211 0 m N cfq193SN slice expired t=1
179,6 1 0 5.774502586 0 m N cfq193SN resid=120000000
179,6 1 0 5.774515044 0 m N cfq193SN sl_used=10000000 disp=1 charge=1
179,6 1 0 5.774519128 0 m N cfq193SN del_from_rr
179,6 1 0 5.774558711 0 m N cfq99SN complete rqnoidle 1
179,6 1 0 5.774577211 0 m N cfq99SN set_active wl_class:0 wl_type:1
179,6 1 0 5.774583919 0 m N cfq99SN dispatch_insert
179,6 1 0 5.774590253 0 m N cfq99SN dispatched a request
179,6 1 0 5.774595086 0 m N cfq99SN activate rq, drv=2
179,6 1 8 5.777926544 80 C WS 1706896 + 2 [0]
179,6 1 0 5.777956461 0 m N cfq193SN complete rqnoidle 1
179,6 1 0 5.782932794 0 m N cfq99SN complete rqnoidle 1
179,6 1 0 5.782943419 0 m N cfq99SN set_slice=120000000
179,6 1 0 5.782949919 0 m N cfq schedule dispatch
CPU0 (mmcblk0p6):

```

```

Reads Queued:          0,          0KiB  Writes Queued:          3,          3KiB
Read Dispatches:       0,          0KiB  Write Dispatches:       0,          0KiB
Reads Requeued:        0           Writes Requeued:        0
Reads Completed:       0,          0KiB  Writes Completed:       0,          0KiB
Read Merges:           0,          0KiB  Write Merges:           0,          0KiB
Read depth:            0           Write depth:            2
IO unplugs:            2           Timer unplugs:          0
CPU1 (mmcblk0p6):
Reads Queued:          0,          0KiB  Writes Queued:          0,          0KiB
Read Dispatches:       0,          0KiB  Write Dispatches:       3,          3KiB
Reads Requeued:        0           Writes Requeued:        0
Reads Completed:       0,          0KiB  Writes Completed:       3,          3KiB
Read Merges:           0,          0KiB  Write Merges:           0,          0KiB
Read depth:            0           Write depth:            2
IO unplugs:            1           Timer unplugs:          0

Total (mmcblk0p6):
Reads Queued:          0,          0KiB  Writes Queued:          3,          3KiB
Read Dispatches:       0,          0KiB  Write Dispatches:       3,          3KiB
Reads Requeued:        0           Writes Requeued:        0
Reads Completed:       0,          0KiB  Writes Completed:       3,          3KiB
Read Merges:           0,          0KiB  Write Merges:           0,          0KiB
IO unplugs:            3           Timer unplugs:          0

Throughput (R/W): 0KiB/s / 0KiB/s
Events (mmcblk0p6): 118 entries
Skips: 0 forward (0 - 0.0%)

```

5.2 ftrace usage

As soon as the Linux[®] kernel configuration **CONFIG_BLK_DEV_IO_TRACE** is active, the block layer action can be traced by using [ftrace](#):

- In this case, only the "blk" tracer may be configured for ftrace, as shown by the results of the following command:

```

Board $> mount -t tracefs nodev /sys/kernel/tracing
Board $> cat /sys/kernel/tracing/available_tracers
blk nop

```

- To get more ftrace tracers (e.g. "function"), additional Linux[®] kernel configuration options must be activated through the Distribution Package, as explained in the [ftrace](#) article.

By taking previous example on /usr/local read content (mount point to mmcblk0p6):

```

Board $> echo 1 > /sys/block/mmcblk0/mmcblk0p6/trace/enable
Board $> echo blk > /sys/kernel/tracing/current_tracer
Board $> ls -la /usr/local
Board $> cat /sys/kernel/tracing/trace_pipe

```

```

jbd2/mmcblk0p5--97 [001] ...1 100.412943: 179,0 A WS 415902 + 2 <- (179,5) 27865
jbd2/mmcblk0p6--196 [000] ...1 100.412943: 179,0 A WS 1706892 + 2 <- (179,6) 3277
jbd2/mmcblk0p5--97 [001] ...1 100.412974: 179,0 Q WS 415902 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p6--196 [000] ...1 100.412987: 179,0 Q WS 1706892 + 2 [jbd2/mmcblk0p6
jbd2/mmcblk0p5--97 [001] ...1 100.413012: 179,0 G WS 415902 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p6--196 [000] ...1 100.413012: 179,0 G WS 1706892 + 2 [jbd2/mmcblk0p6

```

jbd2/mmcblk0p6--196	[000]	...1	100.413018:	179,0	P	N [jbd2/mmcblk0p6-]
jbd2/mmcblk0p5--97	[001]	...1	100.413019:	179,0	P	N [jbd2/mmcblk0p5-]
jbd2/mmcblk0p5--97	[001]	...1	100.413034:	179,0	A	WS 415904 + 2 <- (179,5) 27865
jbd2/mmcblk0p6--196	[000]	...1	100.413034:	179,0	A	WS 1706894 + 2 <- (179,6) 3278
jbd2/mmcblk0p5--97	[001]	...1	100.413040:	179,0	Q	WS 415904 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p6--196	[000]	...1	100.413040:	179,0	Q	WS 1706894 + 2 [jbd2/mmcblk0p6-
jbd2/mmcblk0p5--97	[001]	...1	100.413054:	179,0	G	WS 415904 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p6--196	[000]	...1	100.413056:	179,0	G	WS 1706894 + 2 [jbd2/mmcblk0p6-
jbd2/mmcblk0p6--196	[000]	...2	100.413071:	179,0	I	WS 1706892 + 2 [jbd2/mmcblk0p6-
jbd2/mmcblk0p6--196	[000]	...1	100.413092:	179,0	m	N cfq196SN insert_request
jbd2/mmcblk0p6--196	[000]	...2	100.413104:	179,0	I	WS 1706894 + 2 [jbd2/mmcblk0p6-
jbd2/mmcblk0p6--196	[000]	...1	100.413111:	179,0	m	N cfq196SN insert_request
jbd2/mmcblk0p6--196	[000]	...2	100.413118:	179,0	U	N [jbd2/mmcblk0p6-] 2
jbd2/mmcblk0p5--97	[001]	...2	100.413135:	179,0	I	WS 415902 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p5--97	[001]	...1	100.413144:	179,0	m	N cfq97SN insert_request
jbd2/mmcblk0p5--97	[001]	...1	100.413151:	179,0	m	N cfq97SN add_to_rr
jbd2/mmcblk0p5--97	[001]	...1	100.413162:	179,0	m	N cfq97SN preempt
jbd2/mmcblk0p5--97	[001]	...1	100.413168:	179,0	m	N cfq196SN slice expired t=1
jbd2/mmcblk0p5--97	[001]	...1	100.413176:	179,0	m	N cfq196SN resid=-32494149849
jbd2/mmcblk0p5--97	[001]	...1	100.413191:	179,0	m	N cfq196SN sl_used=120000000
jbd2/mmcblk0p5--97	[001]	...2	100.413199:	179,0	I	WS 415904 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p5--97	[001]	...1	100.413205:	179,0	m	N cfq97SN insert_request
jbd2/mmcblk0p5--97	[001]	...2	100.413211:	179,0	U	N [jbd2/mmcblk0p5-] 2
mmcqd/0-80	[000]	...1	100.413224:	179,0	m	N cfq workload slice:20000000
mmcqd/0-80	[000]	...1	100.413232:	179,0	m	N cfq97SN set_active wl_class
mmcqd/0-80	[000]	...1	100.413241:	179,0	m	N cfq97SN dispatch_insert
mmcqd/0-80	[000]	...1	100.413250:	179,0	m	N cfq97SN dispatched a request
mmcqd/0-80	[000]	...1	100.413256:	179,0	m	N cfq97SN activate rq, drv=1
mmcqd/0-80	[000]	...2	100.413261:	179,0	D	WS 415902 + 2 [mmcqd/0]
mmcqd/0-80	[000]	...1	100.413515:	179,0	m	N cfq97SN dispatch_insert
mmcqd/0-80	[000]	...1	100.413524:	179,0	m	N cfq97SN dispatched a request
mmcqd/0-80	[000]	...1	100.413530:	179,0	m	N cfq97SN activate rq, drv=2
mmcqd/0-80	[000]	...2	100.413534:	179,0	D	WS 415904 + 2 [mmcqd/0]
mmcqd/0-80	[000]	...1	100.417441:	179,0	C	WS 415902 + 2 [0]
mmcqd/0-80	[000]	...1	100.417482:	179,0	m	N cfq97SN complete rqnoidle 1
mmcqd/0-80	[000]	...1	100.417494:	179,0	m	N cfq97SN set_slice=120000000
mmcqd/0-80	[000]	...1	100.417526:	179,0	m	N cfq97SN slice expired t=0
mmcqd/0-80	[000]	...1	100.417539:	179,0	m	N cfq97SN sl_used=40584 disp=
mmcqd/0-80	[000]	...1	100.417545:	179,0	m	N cfq97SN del_from_rr
mmcqd/0-80	[000]	...1	100.417555:	179,0	m	N cfq196SN set_active wl_class
mmcqd/0-80	[000]	...1	100.417561:	179,0	m	N cfq196SN dispatch_insert
mmcqd/0-80	[000]	...1	100.417569:	179,0	m	N cfq196SN dispatched a request
mmcqd/0-80	[000]	...1	100.417575:	179,0	m	N cfq196SN activate rq, drv=2
mmcqd/0-80	[000]	...2	100.417579:	179,0	D	WS 1706892 + 2 [mmcqd/0]
mmcqd/0-80	[000]	...1	100.419353:	179,0	C	WS 415904 + 2 [0]
mmcqd/0-80	[000]	...1	100.419380:	179,0	m	N cfq97SN complete rqnoidle 1
mmcqd/0-80	[000]	...1	100.419393:	179,0	m	N cfq196SN dispatch_insert
mmcqd/0-80	[000]	...1	100.419400:	179,0	m	N cfq196SN dispatched a request
mmcqd/0-80	[000]	...1	100.419405:	179,0	m	N cfq196SN activate rq, drv=2
mmcqd/0-80	[000]	...2	100.419409:	179,0	D	WS 1706894 + 2 [mmcqd/0]
jbd2/mmcblk0p5--97	[001]	...1	100.419431:	179,0	A	FWFS 415906 + 2 <- (179,5) 2786
jbd2/mmcblk0p5--97	[001]	...1	100.419440:	179,0	Q	WS 415906 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p5--97	[001]	...1	100.419465:	179,0	G	WS 415906 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p5--97	[001]	...2	100.419475:	179,0	I	WS 415906 + 2 [jbd2/mmcblk0p5-
jbd2/mmcblk0p5--97	[001]	...1	100.419484:	179,0	m	N cfq97SN insert_request
jbd2/mmcblk0p5--97	[001]	...1	100.419491:	179,0	m	N cfq97SN add_to_rr
jbd2/mmcblk0p5--97	[001]	...1	100.419502:	179,0	m	N cfq97SN preempt
jbd2/mmcblk0p5--97	[001]	...1	100.419507:	179,0	m	N cfq196SN slice expired t=1
jbd2/mmcblk0p5--97	[001]	...1	100.419514:	179,0	m	N cfq196SN resid=120000000
jbd2/mmcblk0p5--97	[001]	...1	100.419526:	179,0	m	N cfq196SN sl_used=100000000 d
jbd2/mmcblk0p5--97	[001]	...1	100.419530:	179,0	m	N cfq196SN del_from_rr
mmcqd/0-80	[000]	...1	100.424339:	179,0	C	WS 1706892 + 2 [0]
mmcqd/0-80	[000]	...1	100.424367:	179,0	m	N cfq196SN complete rqnoidle
mmcqd/0-80	[000]	...1	100.424388:	179,0	m	N cfq97SN set_active wl_class
mmcqd/0-80	[000]	...1	100.424396:	179,0	m	N cfq97SN dispatch_insert
mmcqd/0-80	[000]	...1	100.424404:	179,0	m	N cfq97SN dispatched a request
mmcqd/0-80	[000]	...1	100.424409:	179,0	m	N cfq97SN activate rq, drv=2


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mmcqd/0-80 [000] ...2 100.424413: 179,0 D WS 415906 + 2 [mmcqd/0]
mmcqd/0-80 [000] ...1 100.427349: 179,0 C WS 1706894 + 2 [0]
mmcqd/0-80 [000] ...1 100.427382: 179,0 m N cfq196SN complete rqnoidle
jbd2/mmcblk0p6--196 [000] ...1 100.427441: 179,0 A FWFS 1706896 + 2 <- (179,6) 327
jbd2/mmcblk0p6--196 [000] ...1 100.427458: 179,0 Q WS 1706896 + 2 [jbd2/mmcblk0p6
jbd2/mmcblk0p6--196 [000] ...1 100.427482: 179,0 G WS 1706896 + 2 [jbd2/mmcblk0p6
jbd2/mmcblk0p6--196 [000] ...2 100.427492: 179,0 I WS 1706896 + 2 [jbd2/mmcblk0p6
jbd2/mmcblk0p6--196 [000] ...1 100.427499: 179,0 m N cfq196SN insert_request
jbd2/mmcblk0p6--196 [000] ...1 100.427505: 179,0 m N cfq196SN add_to_rr
jbd2/mmcblk0p6--196 [000] ...1 100.427516: 179,0 m N cfq196SN preempt
jbd2/mmcblk0p6--196 [000] ...1 100.427521: 179,0 m N cfq97SN slice expired t=1
jbd2/mmcblk0p6--196 [000] ...1 100.427528: 179,0 m N cfq97SN resid=120000000
jbd2/mmcblk0p6--196 [000] ...1 100.427545: 179,0 m N cfq97SN sl_used=10000000 di
jbd2/mmcblk0p6--196 [000] ...1 100.427550: 179,0 m N cfq97SN del_from_rr
mmcqd/0-80 [000] ...1 100.427598: 179,0 m N cfq196SN set_active wl_clas
mmcqd/0-80 [000] ...1 100.427605: 179,0 m N cfq196SN dispatch_insert
mmcqd/0-80 [000] ...1 100.427612: 179,0 m N cfq196SN dispatched a requ
mmcqd/0-80 [000] ...1 100.427618: 179,0 m N cfq196SN activate rq, drv=2
mmcqd/0-80 [000] ...2 100.427622: 179,0 D WS 1706896 + 2 [mmcqd/0]
mmcqd/0-80 [000] ...1 100.431133: 179,0 C WS 415906 + 2 [0]
mmcqd/0-80 [000] ...1 100.431164: 179,0 m N cfq97SN complete rqnoidle 1
mmcqd/0-80 [000] ...1 100.434921: 179,0 C WS 1706896 + 2 [0]
mmcqd/0-80 [000] ...1 100.434951: 179,0 m N cfq196SN complete rqnoidle
mmcqd/0-80 [000] ...1 100.434962: 179,0 m N cfq196SN set_slice=12000000
mmcqd/0-80 [000] ...1 100.434969: 179,0 m N cfq schedule dispatch
kworker/u4:1-65 [001] ...1 101.612916: 179,0 A WM 137922 + 2 <- (179,5) 672
kworker/u4:1-65 [001] ...1 101.612949: 179,0 Q WM 137922 + 2 [kworker/u4:1]
kworker/u4:1-65 [001] ...1 101.613001: 179,0 G WM 137922 + 2 [kworker/u4:1]
kworker/u4:1-65 [001] ...1 101.613012: 179,0 P N [kworker/u4:1]
kworker/u4:1-65 [001] ...1 101.613071: 179,0 A WM 1674662 + 2 <- (179,6) 548
kworker/u4:1-65 [001] ...1 101.613077: 179,0 Q WM 1674662 + 2 [kworker/u4:1]
kworker/u4:1-65 [001] ...1 101.613093: 179,0 G WM 1674662 + 2 [kworker/u4:1]
kworker/u4:1-65 [001] ...2 101.613119: 179,0 I WM 137922 + 2 [kworker/u4:1]
kworker/u4:1-65 [001] ...1 101.613131: 179,0 m N cfq200A insert_request
kworker/u4:1-65 [001] ...1 101.613139: 179,0 m N cfq200A add_to_rr
kworker/u4:1-65 [001] ...1 101.613152: 179,0 m N cfq200A preempt
kworker/u4:1-65 [001] ...1 101.613157: 179,0 m N cfq196SN slice expired t=1
kworker/u4:1-65 [001] ...1 101.613164: 179,0 m N cfq196SN resid=-1058203000
kworker/u4:1-65 [001] ...1 101.613179: 179,0 m N cfq196SN sl_used=120000000
kworker/u4:1-65 [001] ...1 101.613185: 179,0 m N cfq196SN del_from_rr
kworker/u4:1-65 [001] ...2 101.613198: 179,0 I WM 1674662 + 2 [kworker/u4:1]
kworker/u4:1-65 [001] ...1 101.613206: 179,0 m N cfq200A insert_request
kworker/u4:1-65 [001] ...2 101.613214: 179,0 U N [kworker/u4:1] 2
mmcqd/0-80 [000] ...1 101.613238: 179,0 m N cfq workload slice:40000000
mmcqd/0-80 [000] ...1 101.613248: 179,0 m N cfq200A set_active wl_clas
mmcqd/0-80 [000] ...1 101.613258: 179,0 m N cfq200A dispatch_insert
mmcqd/0-80 [000] ...1 101.613267: 179,0 m N cfq200A dispatched a requ
mmcqd/0-80 [000] ...1 101.613274: 179,0 m N cfq200A activate rq, drv=1
mmcqd/0-80 [000] ...2 101.613280: 179,0 D WM 1674662 + 2 [mmcqd/0]
mmcqd/0-80 [000] ...1 101.613511: 179,0 m N cfq200A dispatch_insert
mmcqd/0-80 [000] ...1 101.613520: 179,0 m N cfq200A dispatched a requ
mmcqd/0-80 [000] ...1 101.613525: 179,0 m N cfq200A activate rq, drv=2
mmcqd/0-80 [000] ...2 101.613529: 179,0 D WM 137922 + 2 [mmcqd/0]
mmcqd/0-80 [000] ...1 101.618520: 179,0 C WM 1674662 + 2 [0]
mmcqd/0-80 [000] ...1 101.618576: 179,0 m N cfq200A complete rqnoidle
mmcqd/0-80 [000] ...1 101.618586: 179,0 m N cfq200A set_slice=40000000
mmcqd/0-80 [000] ...1 101.623185: 179,0 C WM 137922 + 2 [0]
mmcqd/0-80 [000] ...1 101.623215: 179,0 m N cfq200A complete rqnoidle
mmcqd/0-80 [000] ...1 101.623221: 179,0 m N cfq schedule dispatch

```

6 References

1. ↑ [1.01.11.2 https://linux.die.net/man/8/blktrace](https://linux.die.net/man/8/blktrace)

2. ↑ <https://linux.die.net/man/1/blkparse>
3. ↑ https://wiki.yoctoproject.org/wiki/Tracing_and_Profiling#blktrace

■ Useful external links

Document link	Document Type	Description
blktrace tool source code including userspace tool	Sources	blktrace sources git
blktrace Presentation	Presentation	Presentation by Alan D. Brunelle
SD memory card (https://www.sdcard.org) - NEW		
former spelling for e•MMC ('e' in italic)		
input/output		
Central processing unit		
Debug File System (See https://en.wikipedia.org/wiki/Debugfs for more details)		