

# Difference between vm.dirty\_ratio and vm.dirty\_background\_ratio?

I'm currently experimenting with the kernel parameters found in `/proc/sys/vm`, especially `dirty_ratio` and `dirty_background_ratio`.

The kernel doc has the following explanations for both:

## `dirty_background_ratio`

Contains, as a percentage of total available memory that contains free pages and reclaimable pages, the number of pages at which the background kernel flusher threads will start writing out dirty data.

and

## `dirty_ratio`

Contains, as a percentage of total available memory that contains free pages and reclaimable pages, the number of pages at which a process which is generating disk writes will itself start writing out dirty data.

On my linux system `dirty_background_ratio` is 10 and `dirty_ratio` is 20. I understand that the difference is, who the dirty data writes. So if my used memory reaches 10% the kernel starts writing back and 20% should never be reached.

My question now is: Has the higher value of `dirty_background_ratio` and `dirty_ratio` any meaning or is it just a matter of "what is the lower value and who has it"?

[linux](#)[performance](#)[linux-kernel](#)

edited Mar 22 '15 at 11:34



Alexander Azarov

10.2k 1 38 43

asked Jan 12 '15 at 10:47



happyMOOyear

500 1 6 13

## 2 Answers

Has the higher value of `dirty_background_ratio` and `dirty_ratio` any meaning or is it just a matter of "what is the lower value and who has it"?

In more simpler words:

**vm.dirty\_background\_ratio** is the percentage of system memory which when dirty then system can start writing data to the disks.

**vm.dirty\_ratio** is percentage of system memory which when dirty, the process doing writes would block and write out dirty pages to the disks.

This tunable depends on what your system running, if you run large database its recommend to keep these values low to avoid I/O bottle-necks and when the system load increases.

ex:

```
vm.dirty_background_ratio=10
vm.dirty_ratio=15
```

In this example when the dirty pages exceed `vm.dirty_background_ratio=10` I/O starts, i.e they start getting flushed / written to the disk. When total number of dirty pages exceed `vm.dirty_ratio=15` all writes get blocked until some of the dirty pages get written to disk. You can think of the `vm.dirty_ratio=15` as the upper limit.

edited Dec 30 '16 at 22:04



Mark Lakata

14k 4 76 93

answered Jan 12 '15 at 12:34



askb

4,145 14 31

- 
- 2 So let me rephrase that, just to see if I understood correctly. If the `dirty_background_ratio` is reached, the kernel starts doing the writebacks in the background but applications can still write to the page cache without blocking. If `dirty_ratio` is reached, applications block on writing until `dirty_ratio` is no longer reached. Is that correct? – happyMOOyear Jan 12 '15 at 12:48
- 
- 1 yes, I have also updated an use case if it helps. – askb Jan 12 '15 at 13:41
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- I accepted your answer because it answers my question and helped me a lot. Thank you! Just one extra question: Is there some place where this behavior is documented? – happyMOOyear Jan 12 '15 at 13:59
- 
- 2 "vm.dirty\_ratio is the value that represents the percentage of MemTotal that can consume dirty pages before all processes must write dirty buffers back to disk and when this value is reached all I/O is blocked for any new writes until dirty pages have been flushed." [sysxperits.com/home/announce/...](http://sysxperits.com/home/announce/...) ... you can also verify this behaviour from the code. – askb Jan 12 '15 at 14:17
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- Shouldn't "... vm.dirty\_ratio=10 as the upper limit" be "... vm.dirty\_ratio=15 as the upper limit" ? – hbogert Jun 22 '16 at 7:31
- 

I have been intrigued by this very question and so experimented a bit on my Debian 7.10 system running Linux 3.2.0-4-amd64 using [sysbench](http://sysbench) 0.4.12, modifying:

- `/proc/sys/vm/dirty_ratio`
- `/proc/sys/vm/dirty_background_ratio`

These settings are a way to delay writing to disk. They are useful as long as you have applications that write infrequently or in small chunks (e.g. web browser). If there is only one application on the system that is just generating data at a rate greater than the maximum supported by the disk then no settings matter. The writing will take as much time as it has to.

**Dirty Ratio (DR)** results in the process that caused the number of dirty pages to cross the threshold to block. **Dirty Background Ratio (DBR)** controls writing dirty pages in the background. So, if you have a low DBR, higher DR and all of your processes write in small chunks never in total crossing the supported write speed of the disk (e.g. 50 MB/s) then you will find a system that is pretty responsive. This is impressive when we bear in mind the fact that writing to RAM is usually 100 times faster (5 GB/s)! This is the importance of DBR.

Configuration parameters are useful when you are bothered about applications that write infrequently. You don't want a process writing a byte or reading a few KB to stall for 20 seconds because there is too much dirty data. This is the importance of not having a too high DR. It also ensures that some memory is available to cache recently used data.

edited Jun 5 '16 at 7:18

answered Jun 4 '16 at 13:55



pdp

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