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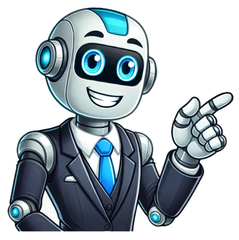

You can’t perform that action at this time. You can’t perform that action at this time. What is this tool good for: Learn about how the Linux page cache works, and what syscalls exist to interfere with its normal operation. Learn what hacks are necessary to intercept syscalls via their libc wrappers. What this tool is not good for: Controlling how your page cache is used Why do you think some random tool you found on GitHub can do better than the Linux Kernel? Defending against cache thrashing Use cgroups to bound the amount of memory a process has. See below or search the internet, this is widely known, works reliably, and does not introduce performance penalties or potentially dangerous behavior like this tool does. Making a binary run faster nocache intercepts a bunch of syscalls and does lots of speculative work; it will slow down your binary. So then why does this tool exist? It was written in 2012, when cgroups, containerization etc. were all new things. A decade+ on, they aren’t any more. Do this if you e.g. want to run a backup but don’t want your system to slow down due to page cache thrashing. If your distro uses systemd, this is very easy. Systemd allows to run a process (and its subprocesses) in a “scope”, which is a cgroup, and you can specify parameters that get translated to cgroup limits. When I run my backups, I do: $ systemd-run --scope --property=MemoryLimit=500M -- backup command The effect is that cache space stays bounded by an additional max 500MiB: Before: $ free -h total used free shared buff/cache available Mem: 7.5G 2.4G 1.3G 1.0G 3.7G 3.7G Swap: 9.7G 23M 9.7G During (notice how buff/cache only goes up by ~300MiB): free -h total used free shared buff/cache available Mem: 7.5G 2.5G 1.0G 1.1G 4.0G 3.6G Swap: 9.7G 23M 9.7G Use systemd-cgls to list the cgroups systemd creates. On my system, the above command creates a group called run-u467.scope in the system.slice parent group; you can inspect its memory settings like this: $ mount | grep cgroup | grep memory cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec latime,memory) $ cat /sys/fs/cgroup/memory/system.slice/run-u467.scope/memory.limit_in_bytes 524288000 Install cgroup-tools and be prepared to enter your root password to initially create cgroups. sudo env ppid=$$ sh -c ' cgcreate -g memory:backup ; echo 500M > /sys/fs/cgroup/memory/backup/memory.limit_in_bytes ; echo $ppid > /sys/fs/cgroup/memory/backup/tasks ; ' After entering this, your shell is a member of that cgroup, and any new process spawned will belong to that cgroup, too, and inherit the memory limit. The cgroups created like this won’t be cleaned up automatically. More info: The nocache tool tries to minimize the effect an application has on the Linux file system cache. This is done by intercepting the open and close system calls and calling posix_fadvise with the POSIX_FADV_DONTNEED parameter. Because the library remembers which pages (ie., 4K-blocks of the file) were already in file system cache when the file was opened, these will not be marked as "don't need", because other applications might need that, although they are not actively used (think: hot standby). Just type make. Then, prepend ./nocache to your command: ./nocache cp -a ~/ /mnt/backup/home-$(hostname) The command make install will install the shared library, man pages and the nocache, cachestats and cachedel commands under /usr/local. You can specify an alternate prefix by using make install PREFIX=/usr. Debian packages are available, see . Please note that nocache will only build on a system that has support for the posix_fadvise syscall and exposes it, too. This should be the case on most modern Unices, but kfreebsd notably has no support for this as of now. For testing purposes, I included two small tools: cachedel calls posix_fadvise(fd, 0, 0, POSIX_FADV_DONTNEED) on the file argument. Thus, if the file is not accessed by any other application, the pages will be eradicated from the fs cache. Specifying -n will repeat the syscall the given number of times which can be useful in some circumstances (see below). cachestats has three modes: In quiet mode (-q), the exit status is 0 (success) if the file is fully cached. In normal mode, the number of cached vs. not-cached pages is printed. In verbose mode (-v), an actual map is printed out, where each page that is present in the cache is marked with x. It looks like this: $ cachestats -v ~/somefile.mp3 pages in cache: 85/114 (74.6%) [filesize=453.5K, pagesize=4K] cache map: 0: |x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x| 32: |x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x| 64: |x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x| 96: |x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x|x| Also, you can use vmstat 1 to view cache statistics. For debugging purposes, you can specify a filename that nocache should log debugging messages to via the -D command line switch, e.g. use nocache -D /tmp/nocache.log …. Note that for simple testing the file /dev/stderr might be a good choice. Without nocache, the file will be fully cached when you copy it somewhere: $ ./cachestats ~/file.mp3 pages in cache: 154/1945 (7.9%) [filesize=7776.2K, pagesize=4K] $ cp ~/file.mp3 /tmp $ ./cachestats ~/file.mp3 pages in cache: 1945/1945 (100.0%) [filesize=7776.2K, pagesize=4K] With nocache, the original caching state will be preserved. $ ./cachestats ~/file.mp3 pages in cache: 154/1945 (7.9%) [filesize=7776.2K, pagesize=4K] $ ./nocache cp ~/file.mp3 /tmp $ ./cachestats ~/file.mp3 pages in cache: 154/1945 (7.9%) [filesize=7776.2K, pagesize=4K] The pre-loaded library tries really hard to catch all system calls that open or close a file. This happens by "hijacking" the libc functions that wrap the actual system calls. In some cases, this may fail, for example because the application does some clever wrapping. (That is the reason why __openat_2 is defined: GNU tar uses this instead of a regular openat.) However, since the actual fadvise calls are performed right before the file descriptor is closed, this may not happen if they are left open when the application exits, although the destructor tries to do that. There are timing issues to consider, as well. If you consider nocache cat , in most (all?) cases the cache will not be restored. For discussion and possible solutions see . My experience showed that in many cases you could "fix" this by doing the posix_fadvise call twice. For both tools nocache and cachedel you can specify the number using -n, like so: $ nocache -n 2 cat ~/file.mp3 This actually only sets the environment variable NOCACHE_NR_FADVISE to the specified value, and the shared library reads out this value. If test number 3 in t/basic.t fails, then try increasing this number until it works, e.g.: $ env NOCACHE_NR_FADVISE=2 make test One could also consider that the fact pages are kept mean the kernel considers they are hot, and decide the overhead of allocating one byte per page for mincore and the actual mincore calls are not worth it when the kernel actually does keep some pages when it wants to. In this case you can either run nocache with -f or set the NOCACHE_FLUSHALL environment variable to 1, e.g.: $ nocache -f cat ~/file.mp3 $ env NOCACHE_FLUSHALL=1 make test By default nocache will only keep track of file descriptors less than 2^20 that are opened by your application, in order to bound its memory consumption. If you want to change this threshold, you can supply the environment variable NOCACHE_MAX_FDS and set it to a higher (or lower) value. It should specify a value one greater than the maximum file descriptor that will be handled by nocache. Most of the application logic is from Tobias Oetiker's patch for rsync . Note however, that rsync uses sockets, so if you try a nocache rsync, only the local process will be intercepted. The CACHE option specifies that the blocks retrieved for the table are placed at the most recently used end of the LRU list in the buffer cache when a FULL table scan is performed. The NOCACHE option specifies that the blocks retrieved for the table are placed at the least recently used end of the LRU list in the buffer cache when a FULL table scan is performed. This will cause the blocks read with a full table scan to be immediately flushed from the buffer cache. You would normally CACHE a table when it was VERY small, one or two data buffers but frequently used, lookup tables may fit this. In this scenario you may find that unindexed full table scan from the SGA is faster than an index, so you want the table to stay in the SGA. For most full table scans, you do NOT want the data kept, you want the current SGA to remain as unchanged as possible, so NOCACHE is the default. I tried to remain child-like, all I acheived was childish. You may also use this keyword when creating sequences. This means that no values are buffered in memory for future requests. Regards, Dima Thanks for the answers. Jimbo, you mentioned a "look up table." What do you mean by that? Is that a faster way of doing SELECT * from table_name? Thanks Generally speaking, lookup tables are reference tables. They are small in size and are predominently used to do cade lookups. Because they are small in size it's better to cash them. Hope this helps. Anand. Many of the Apps I use have a master table with such parameters as: modules I own, the language my users speak, the next PO number to assign to a PO, etc. small tables but frequently accessed, and often very static. Forcing them to stay in the SGA can speed up routine actions (every form may check the user's language) You may also have lookup tables that remember Oracle anonoumus Keys this regular code becomes that overtime code this temporary Foreman code become that overtime temporary foreman code (my table like this only has 12 rows, it all fits in one data block, when an employee goes over 40 hours I lookup his new pay code) I tried to remain child-like, all I acheived was childish. The Cache-Control header is used to specify directives for caching mechanisms in both HTTP requests and responses. A typical header looks like this Cache-Control: public, max-age=10 public Indicates that the response may be cached by any cache. private Indicates that the response is intended for a single user and must not be stored by a shared cache. A private cache may store the response. no-cache Forces caches to submit the request to the origin server for validation before releasing a cached copy. The max-age=N response directive indicates that the response remains fresh until N seconds after the response is generated. Cache-Control: max-age=604800 Indicates that caches can store this response and reuse it for subsequent requests while it's fresh. Note that max-age is not the elapsed time since the response was received; it is the elapsed time since the response was generated on the origin server. So if the other cache(s) — on the network route taken by the response — store the response for 100 seconds (indicated using the Age response header field), the browser cache would deduct 100 seconds from its freshness lifetime. If the max-age value is negative (for example, -1) or isn't an integer (for example, 3599.99), then the caching behavior is unspecified. Caches are encouraged to treat the value as if it were 0 (this is noted in the Calculating Freshness Lifetime section of the HTTP specification). Cache-Control: max-age=604800 Age: 100 s-maxage The s-maxage response directive indicates how long the response remains fresh in a shared cache. The s-maxage directive is ignored by private caches, and overrides the value specified by the max-age directive or the Expires header for shared caches, if they are present. Cache-Control: s-maxage=604800 no-cache The no-cache response directive indicates that the response can be stored in caches, but the response must be validated with the origin server before each reuse, even when the cache is disconnected from the origin server. If you want caches to always check for content updates while reusing stored content, no-cache is the directive to use. It does this by requiring caches to revalidate each request with the origin server. Note that no-cache does not mean "don't cache". no-cache allows caches to store a response but requires them to revalidate it before reuse. If the sense of "don't cache" that you want is actually "don't store", then no-store is the directive to use. The must-revalidate response directive indicates that the response can be stored in caches and can be reused while fresh. If the response becomes stale, it must be validated with the origin server before reuse. Typically, must-revalidate is used with max-age. Cache-Control: max-age=604800, must-revalidate HTTP allows caches to reuse stale responses when they are disconnected from the origin server. must-revalidate is a way to prevent this from happening - either the stored response is revalidated with the origin server or a 504 (Gateway Timeout) response is generated. The proxy-revalidate response directive is the equivalent of must-revalidate, but specifically for shared caches only. no-store The no-store response directive indicates that any caches of any kind (private or shared) should not store this response. private The private response directive indicates that the response can be stored only in a private cache (e.g., local caches in browsers). You should add the private directive for user-personalized content, especially for responses received after login and for sessions managed via cookies. If you forget to add private to a response with personalized content, then that response can be stored in a shared cache and end up being reused for multiple users, which can cause personal information to leak. public The public response directive indicates that the response can be stored in a shared cache. Responses for requests with Authorization header fields must not be stored in a shared cache; however, the public directive will cause such responses to be stored in a shared cache. In general, when pages are under Basic Auth or Digest Auth, the browser sends requests with the Authorization header. This means that the response is access-controlled for restricted users (who have accounts), and it's fundamentally not shared-cacheable, even if it has max-age. You can use the public directive to unlock that restriction. Cache-Control: public, max-age=604800 Note that s-maxage or must-revalidate also unlock that restriction. If a request doesn't have an Authorization header, or you are already using s-maxage or must-revalidate in the response, then you don't need to use public. must-understand The must-understand response directive indicates that a cache should store the response only if it understands the requirements for caching based on status code. must-understand should be coupled with no-store for fallback behavior. Cache-Control: must-understand, no-store If a cache doesn't support must-understand, it will be ignored. If no-store is also present, the response isn't stored. If a cache supports must-understand, it stores the response with an understanding of cache requirements based on its status code. no-transform Some intermediaries transform content for various reasons. For example, some convert images to reduce transfer size. In some cases, this is undesirable for the content provider. no-transform indicates that any intermediary (regardless of whether it implements a cache) shouldn't transform the response contents. immutable The immutable response directive indicates that the response will not be updated while it's fresh. Cache-Control: public, max-age=604800, immutable A modern best practice for static resources is to include version/hashes in their URLs, while never modifying the resources — but instead, when necessary, updating the resources with newer versions that have new version-numbers/hashes, so that their URLs are different. That's called the cache-busting pattern.