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Transparent huge memory pages and Splunk performance

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Some distributions of Linux (for example, Red Hat, CentOS, and Ubuntu) have an advanced memory management scheme called Transparent Huge Pages (THP). THP acts as an abstraction layer that lets the memory management units (MMUs) in a Linux host work with huge memory pages. With THP, this work occurs without specific action on the behalf of the administrator or the software that runs on the host.

Every CPU in a modern host has an MMU. The MMU manages memory in pages, and huge pages are structures that let MMUs manage multiple gigabytes and terabytes of memory more efficiently.

THP has been associated with degradation of Splunk Enterprise performance in at least some Linux kernel versions (for example, the 2.6.32 kernel used in Red Hat Enterprise Linux 6). When enabled, THP can significantly degrade overall system performance on systems that run Splunk Enterprise because of several issues:

- The implementation is too aggressive at coalescing memory pages for short-lived processes (such as many Splunk searches)
- It can prevent the jemalloc memory allocation implementation from releasing memory back to the operating system after use. The jemalloc implementation is more scalable version of the malloc implementation and has been used in newer distributions of Linux.
- For some workloads, it can cause I/O regressions surrounding swapping of huge pages.

On systems with THP enabled, Splunk has observed a minimum of a 30% degradation in indexing and search performance, with a similar percentage increase in latency. For this reason, Splunk recommends that you disable THP in your Linux system configuration unless that system runs an application that requires THP.

In future versions of Linux, kernel engineers might find ways to improve the behavior of THP for the Splunk workload.

See the following pages for additional information about THP and how to disable it. Specific steps on disabling the feature are not shown here because the procedure differs on each distribution.
• "How do I disable Transparent Huge Pages (THP) and confirm that it is disabled?" (http://answers.splunk.com/answers/188875/how-do-i-disable-transparent-huge-pages-thp-a.html) on Splunk Answers.
• "Performance Issues with Transparent Huge Pages" (https://blogs.oracle.com/linux/entry/performance_issues_with_transparent_huge)
• "Update on Hugepages" (https://dbakerber.wordpress.com/2015/03/11/update-on-hugepages-rewrite-to-fix-formatting) on Andrew Kerber's Oracle DBA Weblog.
• Your Linux distribution documentation on memory management.