FASTER ACCESS OF VIRTUAL MACHINE MEMORY BACKED BY A HOST COMPUTING DEVICE'S VIRTUAL MEMORY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of and priority to U.S. patent application Ser. No. 16/198,620 filed on Nov. 21, 2018 and entitled "Faster Computer Memory Access By Reducing SLAT Fragmentation" which application is expressly incorporated by reference in its entirety.

BACKGROUND

[0001] Modem computing devices operate by executing computer-executable instructions from high-speed volatile memory in the form of random access memory (RAM), and the execution of such computer executable instructions often entails the reading of data from RAM. Due to cost, physical size limitations, power requirements, and other like constraints, computing devices typically comprise less RAM than is required by the processes that are typically executed on such computing devices. To accommodate such constraints, virtual memory is utilized, whereby the memory that appears to be available to processes executing on a computing device is greater than the physical memory circuitry provides for. The relationship between virtual memory and physical memory is typically managed by one or more memory managers, which implement, maintain, and/or reference a"page table" whose information delineates the relationship between one or more virtual memory addresses and the locations of corresponding data, either in physical memory, or on some form of storage media. To accommodate the quantities of memory relevant to modern computing devices and the processes executed thereon, a modern page table is typically comprised of multiple hierarchical levels of tables, with a hierarchically higher-level table having entries that each identify a different hierarchically lower-level table, and with the hierarchically lowest-level table comprising entries that do not identify a still further table, but rather identify the memory addresses themselves.

[0002] Among the processes that can be executed by computing devices are processes that virtualize, or abstract, the underlying hardware of the computing device. Such processes include virtual machines, which can simulate a complete underlying computing device to processes executed within the virtualized computing context provided by such virtual machines. A hypervisor, or similar set of computer-executable instructions, can facilitate the provision of a virtual machine by virtualizing, or abstracting, the underlying hardware of a physical computing device hosting such a hypervisor. A hypervisor can maintain a Second Layer Address Table (SLAT) which can also be hierarchically arranged in a manner analogous to the aforementioned page tables. The SLAT can maintain information that delineates the relationship between one or more memory addresses that appeared to be physical memory locations to processes executing on top of the hypervisor,