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Towards Programmable Memory Management with eBPF

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The increase in memory capacity in datacenters, coupled with the proliferation of memory-intensive applications, has made memory management a significant performance bottleneck. This issue is poised to worsen due to several factors, such as the inherent hardware limits of TLB scaling and the advent of terabyte-scale memory capacity through technologies like CXL.

In this talk, I will present our vision of a programmable memory management interface with eBPF that can provide a pliable solution. Specifically, the discussion will cover our ongoing work on (a) ensuring contiguity for larger translations, such as huge pages, and (b) introducing learned virtual memory management, a novel solution based on lightweight machine learning, that can effectively address the bottleneck of address translation.

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