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cache_ext: Customizing the Page Cache with eBPF

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The page cache is central to the performance of many applications. However, its one-size-fits-all eviction policy may perform poorly for many workloads. While the systems community has experimented with new and adaptive eviction policies in non-kernel settings (e.g., key-value stores, CDNs), it is very difficult to implement such policies in the kernel. We design a flexible eBPF-based framework for the Linux page cache, called cache_ext that allows developers to customize the page cache without modifying the kernel.

We demonstrate the flexibility of cache_ext's interface by using it to implement eight different policies, including sophisticated eviction algorithms. Our evaluation finds that it is indeed beneficial for applications to customize the page cache to match their workloads' unique properties, and that they can achieve up to 70% higher throughput and 58% lower tail latency.

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