

PSnAP: Accurate Synthetic Address Streams Through Memory Profiles

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Abstract: Memory address traces are an important information source; they drive memory simulations for performance modeling, systems design and application tuning. For long running applications, the direct use of an address trace is complicated by its size. Previous attempts to reduce trace size incurred a substantial penalty with respect to trace accuracy. We propose a novel method of memory profiling that enables the generation of highly accurate synthetic traces with space requirements typically under 1% of the original traces. We demonstrate the synthetic trace accuracy in terms of cache hit rates, spatial-temporal locality scores and locality surfaces. Simulated cache hit rates from synthetic traces are within 3.5% of observed and on average are within 1.0% for L1 cache. Our profiles are on average 60 times smaller than compressed traces. The combination of small profile sizes and high similarity to original traces makes our technique uniquely applicable to performance modeling and trace driven simulation of large-scale parallel scientific applications.

Reference: `@article{olschanowsky-psnap, title={{PSnAP: Accurate Synthetic Address Streams Through Memory Profiles}}, author={Olschanowsky, C.M. and Tikir, M.M. and Carrington, L. and Snaveley, A.} }`