



Adaptive Cache Compression System

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a flexible cache compression system that dynamically adapts to the costs and benefits of compression.

Overview

The speed at which a computer executes its workload is constrained by the time it takes for data and instructions to be transferred from its memory to its processor. To reduce this “memory latency,” modern computers use cache memories, which are small, high-speed memories with high bandwidth connections to the processor, to hold data and instructions the processor will likely need.

Compressing data in the cache memory is one way to increase its effective storage capacity, although it slows access to the data because the data have to be decompressed before they are used by the processor. Whether compression increases the execution speed of a particular program depends on whether the time savings in reducing cache misses (where needed data are not in the cache) compares favorably with the time cost of cache decompression.

The Invention

UW-Madison researchers have developed a flexible cache compression system that dynamically adapts to the costs and benefits of compression. Data in a cache are selectively compressed based on predictions as to whether the benefit of compression in reducing cache misses exceeds the cost of decompressing the compressed data. The predictions are based on an assessment of actual costs and benefits for previous instruction cycles of the same program.

Applications

- Provides dynamic and concurrent adjustment of compression to maximize its benefits in a variety of applications
- Provides a simple method of evaluating historical data on the costs and benefits of compression and the effects of compression on memory latency

Key Benefits

- Superior performance as compared to systems that always or never compress cache data
- Uses a range of different compression techniques to optimize cache compression
- Sensitive to changes in the efficiency of compression during execution of the program

Tech Fields

- [Information Technology : Computing methods, software & machine learning](#)

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