Summary
The Performance of Runtime Data Cache Prefetching in a Dynamic Optimization System

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1 To be completed before class

What are the problems solved by this paper? (50 words)
Traditional software controlled prefetching schemes are ineffective in applications such as indirect memory references, complicated control structures and recursive data structures due to the lack of cache miss addresses. Static prefetching schemes are conservative to avoid runtime overhead.

What are the approaches attempted by this paper? (50 words)
The dynamic optimization system monitors the performance of the binary and identifies the performance critical loops/traces with frequent data cache misses as program phases. It then re-optimizes the selected traces by inserting cache prefetch instructions, and patches the binary to redirect the subsequent execution to the optimized traces. The miss information is collected from the hardware performance monitors. They also provide a framework to feedback the cache miss information to the compiler.

What are the main conclusions of this paper? (50 words)
ADORE performs run-time data prefetching for delinquent loads and improves the performance by around 20% over static prefetching with 1-2% overhead. The phased detector is light weight (activated every 100 ms) and can adapt the size of its profile window. The implementation shows the profile guided prefetching improves the performance of applications at most by 9% and that dynamic run-time prefetching reduces the overall CPI. The authors identify that majority of speedup comes from prefetching for direct/indirect array references.

2 To be completed after class

Did this paper address an important issue? Explain. (100 words)

Are the proposed approaches valid? Describe its strength and weakness. (100 words)

Do the results support the conclusions? Explain. (100 words)
Describe the potential future works? (100 words)