CS622A

Advanced Computer Architecture

Project Proposal

Evaluating Data Prefetching Techniques of DPC-3

GROUP 16

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1 Problem Statement

In this project, we aim to evaluate and contrast all the submissions of the **3rd Data Prefetching Championship** (DPC3). This will serve as a starting point for any future work (beyond the course) that we intend to do by identifying the key differences in all techniques. We aim to get necessary insights from the performance of various prefetching algorithms to aid us in our own research.

Apart from the original submissions, we also intend to evaluate the modified implementation of [2] and observe any performance improvements.

2 Expected Outcomes

The expected outcome would be an exhaustive analysis of all prefetching algorithms against the provided traces by the organizing commitee, as well some of our custom prepared traces using *Pin*.

We would also try to come up with an optimal duelling prefetcher scheme by selecting the best prefetcher for an optimal sliding window of instructions or an instruction pointer.

Stretch Goal: Study prefetching techniques for Database-centric architectures [1] and derive some insights as to how some of the unneccesary code misses in LLC can be reduced.

3 Tools to Use

1. **Champsim** An architectural simulator which was originally used for the Data Prefetching Champsionship 2 & 3. This will be our primary analysis tool.
2. **Pin 3.2** A binary instrumentation tool which will be used to create custom traces for evaluating prefetching algorithms.

References

[1] Sriraman, Akshitha et al. *SoftSKU: optimizing server architectures for microservice diversity @scale.* ISCA (2019).

[2] M. Chaudhuri, N. Deshmukh. *Sangam: A Multi-component Core Cache Prefetcher* Third Data Prefetching Championship Workshop, ISCA (2019).