CS-683 Project Presentation

Check Point 1 Update for Course Project

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Problem statement

- Dead page in TLB or dead block in cache:
    1. Entries with no hits before eviction
- Predicting and bypassing dead entries:
    1. Reduces capacity misses
    2. Efficient TLB and Cache usage
- Aim: Explore and enhance dead page and dead block predictors for STLB and LLC

  Baseline: “Dead Page and Dead Block Predictors: Cleaning TLBs and Caches Together” HPCA,2021
    1. Dead-on-arrival page predictor (STLB)
    2. Page-correlated dead block predictor (LLC)
- Idea: Dynamic dead block predictor
    1. Selects between cbPred and standalone dead block predictor
    2. Possibility to improve performance across diverse workloads

Prior Works

Paper-1(Baseline): C. Mazumdar, P. Mitra and A. Basu, "Dead Page and Dead Block Predictors: Cleaning TLBs and Caches Together," *2021 IEEE International Symposium on High-Performance Computer Architecture (HPCA)*, Seoul, Korea (South), 2021, pp. 507-519, doi: 10.1109/HPCA51647.2021.00050

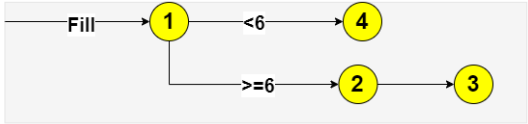
Paper-2: Carole-Jean Wu, Aamer Jaleel, Will Hasenplaugh, Margaret Martonosi, Simon C. Steely, and Joel Emer. 2011. SHiP: signature-based hit predictor for high performance caching. In Proceedings of the 44th Annual IEEE/ACM International Symposium on Microarchitecture (MICRO-44). Association for Computing Machinery, New York, NY, USA, 430–441. https://doi.org/10.1145/2155620.2155671

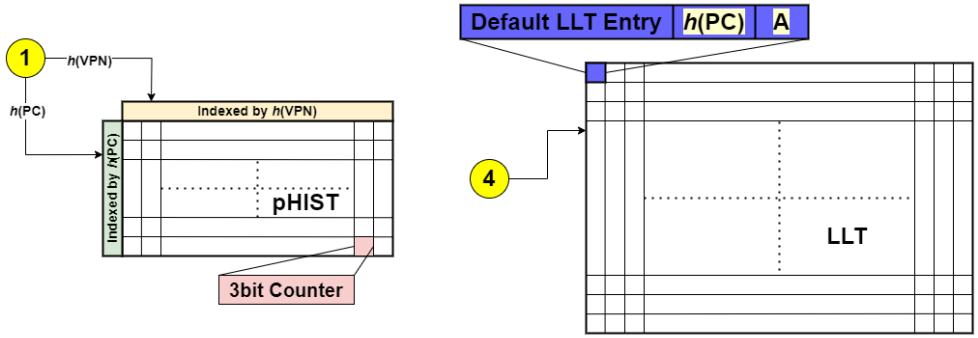
Paper-3: Abhishek Bhattacharjee. 2017. Translation-Triggered Prefetching. In Proceedings of the Twenty-Second International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '17). Association for Computing Machinery, New York, NY, USA, 63–76. https://doi.org/10.1145/3037697.3037705

Goal of the Project

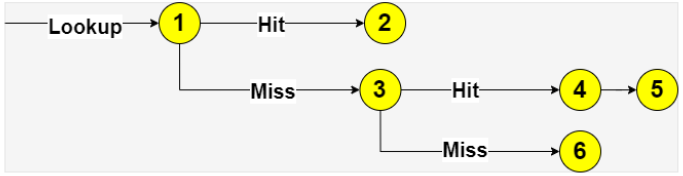
- Literature survey of dead block and dead page predictors, focusing on Paper-1 as our baseline.
- Evaluating the baseline and outline our approach for implementing the proposed improvement to the baseline.
- Implement and evaluate our proposed improvement and compare it against the baseline.

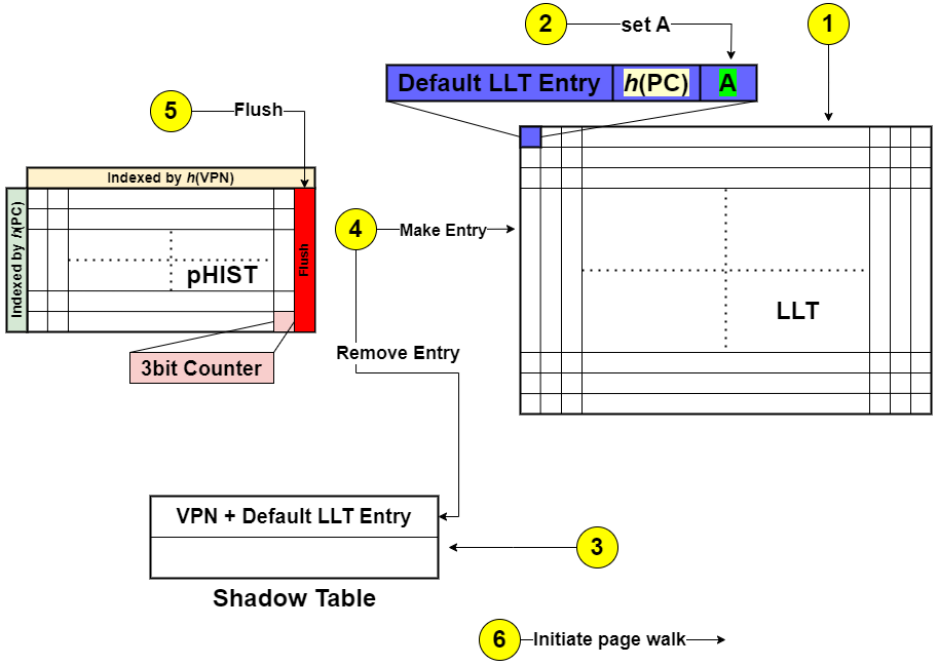
Work done so far : Literature Survey on Baseline dead page Predictor(dpPred): **Fill**



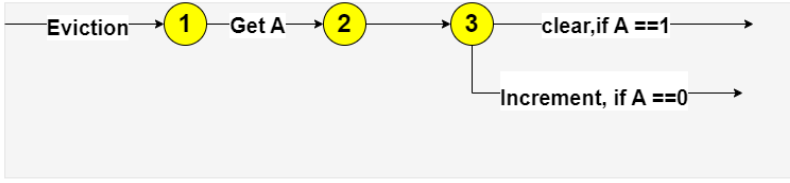


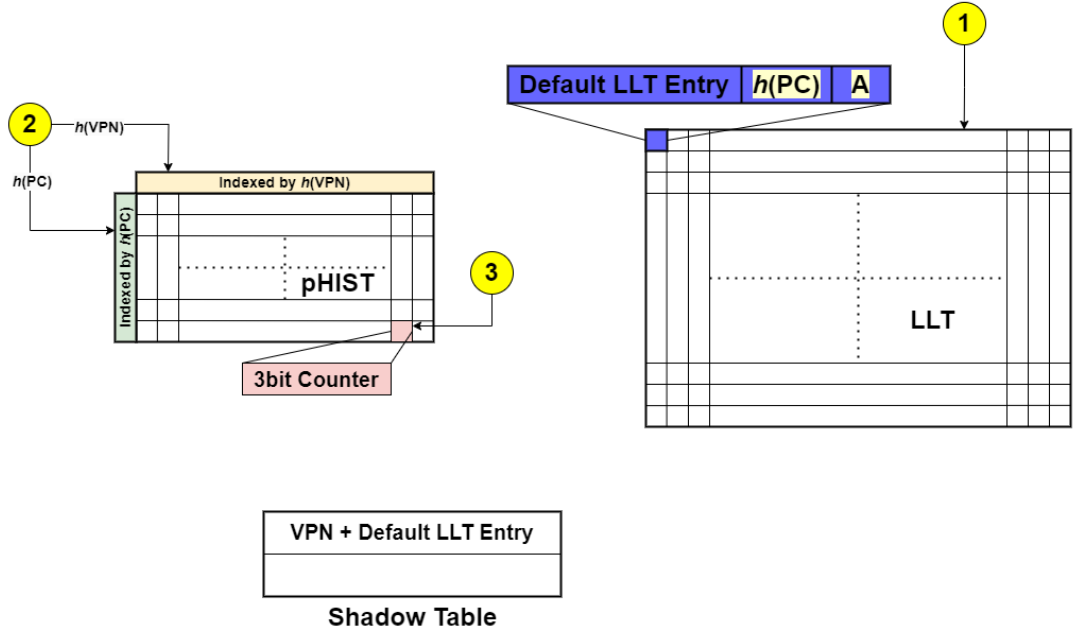
Work done so far : Literature Survey on Baseline dead page Predictor(dpPred): **Lookup**



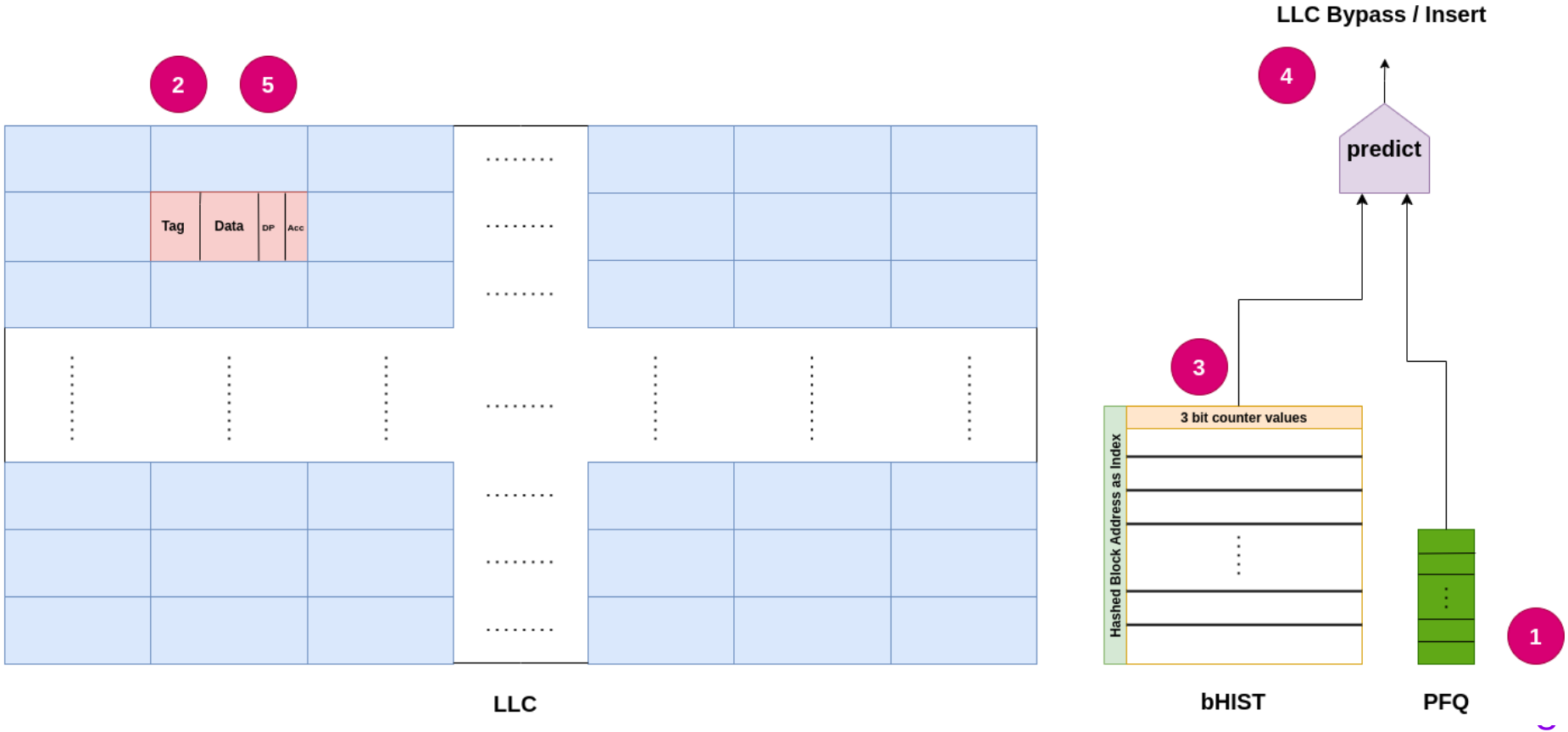


Work done so far : Literature Survey on Baseline dead page Predictor(dpPred): **Eviction**

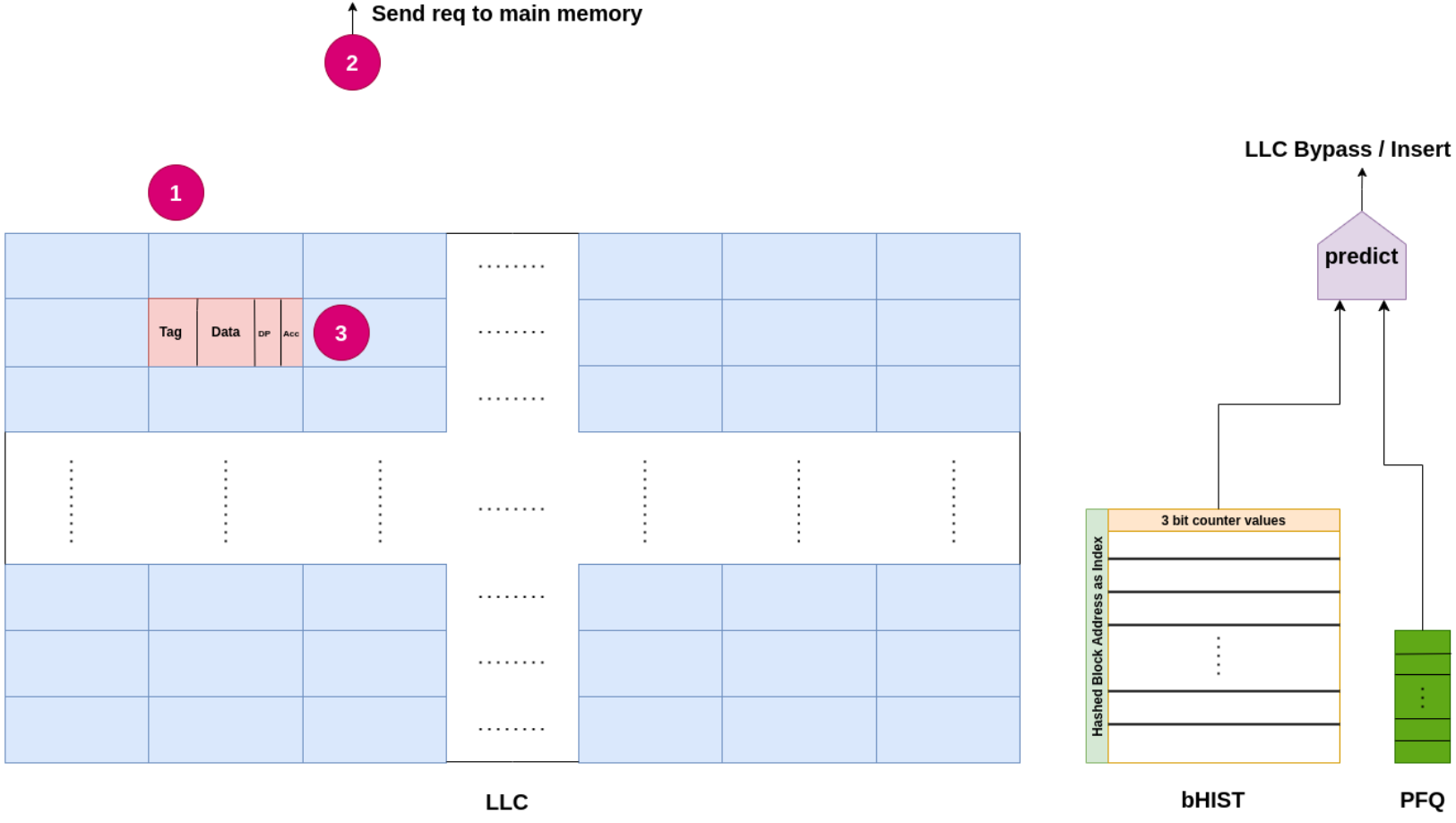




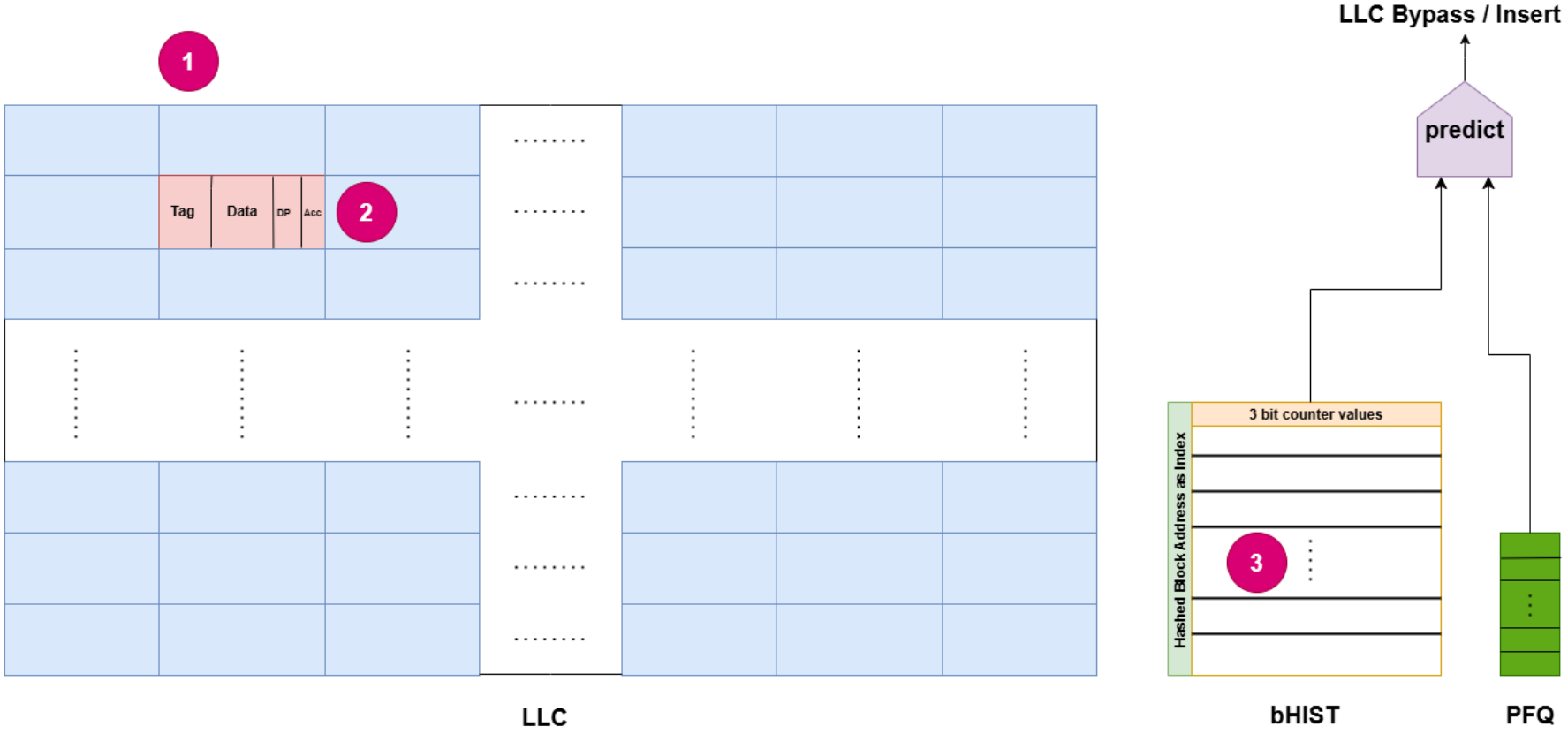
Work done so far : Literature Survey on Baseline correlating dead block Predictor(cbPred):**Fill**



Work done so far : Literature Survey on Baseline correlating dead block Predictor(cbPred):**Lookup**



Work done so far : Literature Survey on Baseline correlating dead block Predictor(cbPred):**Eviction**



Results (Legible fonts in plots please)

- No results yet

Plan for checkpoint-II

- **Checkpoint-2:** We will evaluate the baseline and outline our approach for implementing the proposed improvements/additions to the baseline.

- **Division of Labor:** Will divide the baseline evaluation equally based on the benchmarks and propose improvement/additions as group

Github link

https://github.com/sankenaresh/CS683_Project_godspeed_Cache.git

Thank You