**Branch Prediction policies and performance comparisons**

**Team members:**

1. Bhavana Kurra
2. Teja Sree Sai Durga Vallabhaneni
3. Vijaysimha Reddy Bheemireddy
4. Rohan Somisetty
5. Rohit Reddy Venna

**Key Research paper URL:** [https://ieeexplore-ieee-org.aurarialibrary.idm.oclc.org/document/830391](https://ieeexplore-ieee-org.aurarialibrary.idm.oclc.org/document/8303913)

**Objective:**

The objective of our research presentation is to understand the various branch prediction policies and comparison of their performance in terms of storage budgets. Initially, we advocate the necessity and importance of branch prediction policies. Later, we elucidate various types of branch prediction policies with their advantages and disadvantages. We conclude by describing the metrics that we use for the comparison of these branch prediction policies and their performance.

GShare predictor, local history based two level predictor, perceptron predictor, LTAGE predictor, ISL-TAGE predictor are the branch predictors that are part of our study. All these predictors are part of the Championship Branch Prediction-2(CBP-2) benchmark [2] and are designed for a fixed storage budget. We study and understand the performance of all the five branch prediction policies over the different storage budgets (2KB, 4KB, 8KB, 16KB, 32KB, 64KB) [1]. Mis-prediction Per Kilo Instructions (MPKI) and Latency plots are used as the metrics for comparison.

**Roles and Responsibilities:**

|  |  |
| --- | --- |
| **Name** | **Roles and Responsibilities** |
| Bhavana Kurra | Studying and understanding the GShare predictor |
| Teja Sree Sai Durga Vallabhaneni | Studying and understanding the local history based two level predictor |
| Vijaysimha Reddy Bheemireddy | Studying and understanding the perceptron predictor |
| Rohan Somisetty | Studying and understanding the LTAGE predictor |
| Rohit Reddy Verma | Studying and understanding the ISL-TAGE predictor |

After researching all the predictors as a team, we discuss and understand the usage, implementation, advantages, and disadvantages of each predictor. Based on this, we understand the performance of each predictor over the different storage budgets.

**References:**

[1] M. Das, A. Banerjee and B. Sardar, "An empirical study on performance of branch predictors with varying storage budgets," *2017 7th International Symposium on Embedded Computing and System Design (ISED)*, 2017, pp. 1-5, doi: 10.1109/ISED.2017.8303913.

[2] C. B. P. (CBP-2). 2nd jilp workshop on computer architecture competitions. https://www.jilp.org/jwac-2/