A Time-predictable Branch Predictor

Long pipelines need good branch predictors to keep the pipeline running. Current branch predictors are optimized for the average case, which might not be a good fit for real-time systems and worst-case execution time analysis. This paper presents a time-predictable branch predictor co-designed with the associated worst-case execution time analysis. The branch predictor uses a fully-associative cache to track branch outcomes and destination addresses. The fully-associative cache avoids any false sharing of entries between branches. Therefore, we can analyze program scopes that contain a number of branches lower than or equal to the number of branches in the prediction table. Experimental results show that the worst-case execution time bounds of programs using the proposed predictor are lower than using static branch predictors at a moderate hardware cost.

General information
Publication status: Published
Organisations: Department of Applied Mathematics and Computer Science, Embedded Systems Engineering, Institut National de Recherche en Informatique et en Automatique
Contributors: Schoeberl, M., Rouxel, B., Puaut, I.
Number of pages: 10
Pages: 607-616
Publication date: 2019

Host publication information
Title of host publication: Proceedings of the ACM Symposium on Applied Computing
Volume: F147772
Publisher: Association for Computing Machinery
ISBN (Print): 9781450359337
Keywords: Real-time systems, Worst-case execution time
DOIs: 10.1145/3297280.3297337
Source: Scopus
Source ID: 85065662370
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2019 › Research › peer-review