

Exploration of Compiler Optimizations

Sumanth M Raviteja G

Abstract—This report states about the authors and their state of the art models in Compiler Optimizations.

I. INTRODUCTION

THIS section explains the introduction to compiler. A compiler is a computer application which converts a set of instructions scripted in (source-language) one computer language into (target-language) another computer language. Usage of compilers is not recent, it has been used for producing assembly language from high-level programming languages since 1950s. Developers have designed the compilers in such a way that it converts every part of the instruction in program to provide the optimized kind of it. Simultaneously, optimizing high-level programming languages (source-code) by hand is a long-winded task. In coming sections, we will discuss the authors who have worked on compiler optimizations in recent times since 2014.

II. AUTHORS AND THE STATE OF ART MODELS

- Amir Hossein Ashouri, Gianluca Palermo, and Cristina Silvano. An Evaluation of Autotuning Techniques for the Compiler Optimization Problems.

This paper has been published in Resource Awareness and Application Autotuning in Adaptive and Heterogeneous Computing (RES4ANT) 2016. In this paper, they discussed the problems of autotuning along with approaches to face the challenges of autotuning.

They mentioned the techniques like Design Space Exploration(DSE) and proposed an approach for Machine Learning framework. Both are helpful in solving the problems of selecting the best compiler optimizations and phase ordering.

- AmirH.Ashouri, Gianluca Palermo, John Cavazos and Cristina Silvano. Selecting the Best Compiler Optimizations:A Bayesian Network Approach.

This paper has been published in 2018. In this paper, they discussed An autotuning methodology based on machine learning to speed up application performance and to reduce the cost of the compiler optimization phases. It many concentrates on performance and cost. Their experiments are performed on GCC and ARM Embedded platform in consideration of benchmark suites which has 39 applications. It noted the performance speedup of up to (1.85 on average) 4.6 on Polybench and (1.54 on average) 3.1 on Cbench with respect to standardized optimization levels and in terms of exploration efficiency, it gave 4 and 3 speedup respectively on cBench and Polybench.

- A Survey on Compiler Autotuning using Machine Learning which has accepted in ACM Computing Surveys 2018. The authors of this survey are Gianluca Palermo, Cristina Silvano, Amir h. Ashouri, William Killian, John Cavazos.

In this survey, They have discussed the autotuning techniques in overview. They have mentioned Predictions which are helpful in problem solving as well as tackling the challenge. One can be benefited by going through this survey. Indeed, one can find Machine Learning Models in deep view. They just made an attempt of deep-learning models which will be helpful in selecting the best compiler optimizations in low computation time.

- Compiler Autotuning using Machine Learning Techniques by Amir H Ashouri. This was his PhD Thesis where we read some of the titles and got to know in deeper. This PhD thesis had been carried out at Politecnico di Milano University, Italy. One can get higher understanding of Machine Learning Concepts.

III. CONCLUSION

Our paper is with respect to above mentioned scholars who have shown excellence records in the field of Compiler Design. Our paper mainly discuss about Selecting the best compiler optimizations and the strategies for getting higher accuracy and low computation time.

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