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Implementation and Visualisation of the Contextual Analysis and Code Generation Phases of a Compiler

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Abstract

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Chapter 1

Introduction

1.1 Motivation

With increasing technological advances and furthering levels of software abstraction, some may consider compilation to be a slightly esoteric subject. In that, the specific knowledge acquired can be directly applied only to a small number of highly specialized industries. Yet, remaining at the cornerstone of a Computer Science curriculum at many schools and universities is the art of compiler construction, behavior and optimization.

Niklaus Wirth, the creator of the Pascal programming language and renowned lecturer of compiler design, stated that " knowledge about system surfaces alone is insufficient in computer science; what is needed is an understanding of contents" and "[compilers] constitute the bridge between software and hardware". Wirth's view is one that I share, in that, the most successful computer scientists must have more than a superficial understanding of which components to use in which situations, they must understand how and why components interact and behave the way they do, as this is the best and only way of making deeply informed technological decisions.

Compilation is the process of translating 'high-level' code into 'low-level' code. Typically, this means converting source code written in a programming language, such as C, Java or Haskell, into a lower language, .

1.2 First Section in Chapter

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog [1]. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

1.2.1 A subsection

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jumped over the lazy dog.

Chapter 2

The Fox and Dog

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2.1 The Fox Jumps Over

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2.2 The Lazy Dog

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The quick brown fox jumped over the lazy dog. The quick brown fox [4] jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

Appendices

Appendix A

Running the Programs

An example of running from the command line is as follows:

```
> java MaxClique BBMC1 brock200_1.clq 14400
```

This will apply $BBMC$ with $style = 1$ to the first brock200 DIMACS instance allowing 14400 seconds of cpu time.

Appendix B

Generating Random Graphs

We generate Erdós-Rënyi random graphs $G(n, p)$ where n is the number of vertices and each edge is included in the graph with probability p independent from every other edge. It produces a random graph in DIMACS format with vertices numbered 1 to n inclusive. It can be run from the command line as follows to produce a clq file

```
> java RandomGraph 100 0.9 > 100-90-00.clq
```

Bibliography

[1] DIMACS clique benchmark instances. ftp://dimacs.rutgers.edu/pub/challenge/graph/benchmarks/clique.

[2] Peter Cheeseman, Bob Kanefsky, and William M. Taylor. Where the really hard problems are. In *Proceedings IJCAI'91*, pages 331–337, 1991.

[3] Torsten Fahle. Simple and Fast: Improving a Branch-and-Bound Algorithm for Maximum Clique. In *Proceedings ESA 2002, LNCS 2461*, pages 485–498, 2002.

[4] Brian Hayes. Can't get no satisfaction. *American Scientist*, 85:108–112, 1997.