Introduction to Compiler Construction

Compilation: Preliminaries

Outline

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Examples (target language): Intel x86 instructions, JVM instructions, Marvin Machine instructions

A programming language specification consists of

- Syntax of tokens
- Syntax of constructs such as classes, methods, statements, and expressions
- Semantics (ie, meaning) of the constructs

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Examples

- Intel x86
- Java Virtual Machine (JVM)
- Marvin Machine

Interpreters

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Examples: Bash, Python

Phases of Compilation

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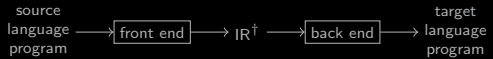
A compiler can be broken into a front end and a back end



† Intermediate Representation

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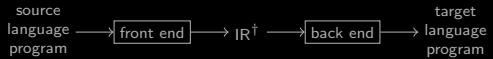
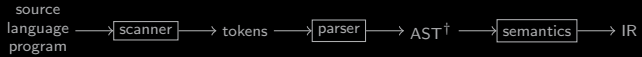


† Intermediate Representation

Separating the front end from the back end enables code re-use

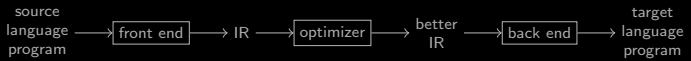
The front end can be decomposed into a sequence of analysis phases



† Abstract Syntax Tree

The back end can be decomposed into a sequence of synthesis phases

A compiler sometimes has an optimizer between the front end and the back end



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- Compiler writing is a case study in software engineering
- Compilers are programs and writing programs is fun