Compiler Design
Fall 2018

Midterm Exam Review Sheet

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Overview

Our midterm exam date & time has been announced on YSEC.

Material covered in the midterm exam:

- Exercises similar to Homework 1, exercise 1—6.
- Assignment 1
- Everything mentioned on the following pages...

- Please make sure you use the most recent slides for your preparations:
  - CCu-L00-CourseIntro_v2.pdf
  - CCu-L01-LexicalAnalysis_v3.pdf
  - CCu_SubsetConstructionAlgorithmAnimation.pdf
  - TableDrivenVsHandcrafted.pdf

Course Introduction

- Machine code, assembly language, high-level languages
  - Advantages of assembly language over machine code
  - Advantages of high-level languages over assembly languages
- Structure of a compiler
  - Frontend/backend, analysis/synthesis
  - Know purpose of all different phases, be able to explain and provide examples of what is done in each phase
    - Semantic analysis: difference between static and dynamic semantic checks.
    - How is a dynamic semantic check conducted?
  - Lexical error versus syntax error versus semantic error

Lexical Analysis

- Character stream from source code, tokens, lexemes
- Regular expressions
  - Patterns
  - Language of a regular expression
  - Examples
    - composing a RE from a textual description
    - describing the language defined by a RE
- Scanners and scanner generators
  - Understand/describe the big picture (RE specs → scanner generator → scanner)
  - Principle of longest match (give example)
- NFAs, DFAs
  - Differences
  - Be able to tell if a given FA is deterministic or non-deterministic

Lexical Analysis

- Understand the principles of NFA→DFA→minimal DFA construction
- Thompson's construction
- Subset construction
  - have a look at the Algorithm animation!
- DFA minimization
- Scanner implementation techniques
  - Table-driven, hand-crafted
  - Why is a table-driven scanner (in principle) less efficient on a conventional CPU than a direct-coded (e.g., hand-written) scanner that uses a **`switch()`** statement?
- Specification of scanners for scanner generators
  - Be able to understand JLex scanner spec input files (like the one from the lecture) and the rules to disambiguate between multiple matching patterns.
- Limitations of regular languages

- The lecture on **syntax analysis** will not be covered in the midterm exam.