CS 314 Principles of Programming Languages

Lecture 26: Review for Final Exam

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Class Information

- Project 3 due today 12/12.
- Homework 8 deadline extended to 12/15.
- Final exam coverage:
  Lectures 1 - 21, hw 1-8, recitations 1-12, corresponding book chapters.
- Final exam: 12/19 4pm — 7pm at the lecture room.

Prepare for Final Exam

Suggested Review Order

- Midterm Exam

- Homework Problems

- Recitation

- Lecture

- Textbook

Practice Problems

- Midterm Exam
- Homework Problems
- Recitation
- Lecture
- Textbook

Some Practice Problems

- Lecture 2: recognizer for the "identifier" expression, pages 43-46.
- Lecture 3: NFA example for a(b|c)*, pages 19-28; subset construction, pages 31-44; leftmost derivation, pages 59-70.
- Lecture 4: rightmost derivation, pages 23-32; parse tree, page 51; ambiguous grammar (dangling else) example, pages 71-73; handling precedence in grammar, pages 94-98.
- Lecture 5: handling associativity, pages 18-20; left-linear/right-linear grammar, page 27; top-down parsing, pages 30-47.
- Lecture 6: top-down parsing example, pages 5-22; first/follow/predict sets, page 47; parse table, pages 48-50; recursive descent parser, pages 77-78.
- Lecture 7: parse table, page 20; first set, pages 34-36; first set (another example), pages 37-46; follow set, pages 51-61.
- Lecture 8: first set (repeated example as lec 7), 14-21; follow set (another example), page 27; predict set, page 57-58; parse table, page 59-61.
- Lecture 9: repeated examples in lecture 7 and lecture 8; top-down parsing (another example), pages 56-81; recursive descent parser (another example), pages 83-84; syntax directed translation, pages 85-99.

Some Practice Problems

- Lecture 10: issues with explicit control of heap, pages 75-84.
- Lecture 11: lexical scope, pages 22-29; dynamic scope, page 30; access link, control link, page 40; compile-time matching of declarations and occurrences, pages 43-53; compile-time code generation for non-local data access, pages 56-63.
- Lecture 12: lexical scope (another example), pages 7-12; use and maintain access link, pages 24-29; parameter passing, pages 39-42; aliasing, page 43.
- lecture 13, list (internal data representation), page 13; basic scheme functions, page 14-19, page 23-25.
- lecture 14, equality checking, pages 21-29; map, reduce, pages 35-38.
- Lecture 15, names and scope in scheme, pages 12-25; environment and closure, page 31.

Some Practice Problems

- Lecture 16: free and bound variables in lambda calculus, page 11; beta reduction, page 14; alpha reduction, page 17; encoding and manipulation of logical constants, page 20-24; encodings of natural numbers, page 29; encoding and manipulation of list, pages 25-28.

- Lecture 17: recursion in lambda calculus, pages 21-31.

- Lecture 18: statement level dependence graph, page 4; critical path, page 10; list scheduling, page 17; data space, iteration space, processor space, page 20; Bernstein condition for data dependence, page 21; simple dependence testing (type and distance), page 27, page 29.

- Lecture 19: affine function, page 10; lexicographical order, page 13; dependence testing as integer linear programming, page 16-17; statement level dependence graph, dependence type, page 18; dependence between different statement instances in a loop, page 23; dependence vector, page 28; synchronization free parallelism, page 31-34;

- Lecture 20: synchronization free parallelism, page 17; naive parallel code generation, page 27.

- Lecture 21: fourier-motzkin elimination, page 14-16; recalculating loop bounds after loop transformation, page 14-18; find overlapping polyhedron, page 22-26.

Some Practice Problems

- Exercise in recitation slides. Categorize them according to the topics such that you can have multiple practice problems of the same type.

- Homework problems

- Midterm exam

If these are not enough, check the examples in textbook (e.g., the text box annotated as EXAMPLE 3.5 nested scopes)!

Textbook Chapters

Scott 2.1, 2.2.1 - 2.2.3, 2.3.1 - 2.3.3, 2.4.1

- tokens and regular expressions
- context free grammars
- derivation and parse tree
- scanning and parsing
- syntax directed translation

Scott 3.1, 3.2.1 - 3.2.3, 3.3.1, 3.3.2, 3.3.6

- object life time and storage management
- scope rules
- implementing scope

Scott 9.1 - 9.3, 11.1 - 11.3, 11.6 - 11.7,
ALSU 11.1.1 - 11.1.3, 11.1.5, 11.3.1 - 11.3.3, 11.3.5 - 11.3.6, 11.6.1-11.6.2, 11.7.1-11.7.7

- loop level parallelism
- affine spaces
- synchronization free parallelism
- parallel code generation

Conceptual Questions

- A small percentage of the exam, e.g., the identification problems in midterm exam.

- You will need to have a deep understanding of *all* the materials.
  - Reading textbook
  - Ask (or check) good questions on Sakai (or in class)
  - Follow all lectures in the entire semester
  - Think critically!

Questions?