

Midterm Review

CSC324 Winter 2004

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## Introduction

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- What is a PL?
- fetch-execute cycle
- Von Neumann bottleneck
- Compilation vs. Interpretation
- Language Paradigms
- What makes a good PL?

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## Formal Language Specification

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- Specification vs. Implementation
- Specification
  - Syntax (formal)
  - Semantics (informal)
- Properties of Good Syntax
- Lexical Rules
- Syntactic Structure
- Grammars
- Chomsky Hierarchy
- Regular Languages - Regular Expressions
- Context-Free Grammars (CFGs)
- Limitations of each
- BNF
- EBNF
- Parse Trees and Derivations
- Syntactic Ambiguity (grammar, sentence wrt grammar)
  - change language (e.g., delimiters)
  - change grammar (e.g., associativity, precedence)
- Dealing w/ Ambiguity
  - change language (e.g., delimiters)
  - change grammar (e.g., associativity, precedence)
- Implementation
- Parsing Techniques
- Other Applications

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## Functional Programming

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- Pure functional languages:
  - Referential transparency
  - No assignment
  - No iteration, only recursion
  - Implicit storage management (garbage collection)
  - Functions are values
- $\lambda$ -calculus
- LISP, Common LISP, Scheme
- Built-In Procedures
- Lists (cons cells, proper/improper)
- Read-eval-print loop
- Inhibiting + Activating evaluation (quote, eval)
- Procedure definition and lambda expressions
- Conditionals (if, cond)
- Equality Checking (eq?, =, equal?, eqv?)
- Recursion (practice, practice)
- Efficiency Concerns
  - helper procedures
  - let, let\*, ...
  - accumulators
- Higher-order functions (map, apply, reduce)
- Passing Procedures, Returning Procedures
- Anonymous Procedures
- Syntactic Forms and Lazy Evaluation

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## Parameter Passing

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See class note