CS 1622: Final Review

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Semantic Analysis
- Scope
  - Static vs Dynamic
- Tracking Static Scope
- Environments
- Symbol Tables
  - Data Structures
  - Hashtables
  - Trees

IR & Control Flow
- Three-address Code
  - Quadruples
  - Triples
  - Static Single Assignment (SSA) basic idea
  - Control flow graphs and basic blocks

Code Generation
- Arrays
  - Row major order
  - Column major order
- Boolean Expressions
- Control Flow

Register Allocation
- What are we trying to do? Why?
- Liveness calculation
  - Defs and Uses
- Interference Graph
- K-Coloring Algorithm
  - Build
  - Simplify
  - Spill
  - Select
  - Coalescing/Spill Coalescing
  - Precolored nodes
  - Calling Convention

Objects
- Record types
- Data (single) inheritance
- Methods
- Static data
- This
- Instanceof
Garbage Collection

- Manual Allocation and memory leaks
- How to define garbage
- Reachability

Algorithms:
- Reference Counting
- Mark and Sweep
- Stop and Copy (Semispace)
- Generational

Optimization

- What is it?
- Why is it a bad name?
- Dataflow optimizations
  - Constant propagation
  - Copy propagation
  - Common Subexpression Elimination
  - Dead code elimination
- Loop optimizations
  - Loop unrolling
  - Strength reduction
- Method Optimizations
  - Inlining
  - Tail recursion elimination
- Adaptive Optimization