

# Compilers

## Spring 2009

Overview of Class Material for the Final Exam (aka Second Test)

**No *Cheat-Sheet* is allowed in this second test.**

### 1. Intermediate Code Generation

- What are three-address instructions and how to generate code for expressions.
- Code generation for conditional control structures: if-then-else and loops.
- Short-circuit evaluation and code generation of predicates.
- Back-patching and why it is used.

### 2. Run-Time Environments and Storage Allocation

- What is an activation record (AR) and what information is stored in it.
- How are the AR organized in memory: the stack, heap and static memory regions.
- How to access non-local memory: access links and ARP links.
- Organization of local variables in an AR for fixed and variable length sized variables.

### 3. Register Allocation

- Local methods: bottom-up and top-down algorithms and their limitations.
- Live ranges webs and interference.
- Global method: interference graphs and graph coloring.

### 4. Control-Flow Analysis

- Control-Flow Graphs and Basic Blocks.
- Paths in the control-flow graph and dominators; dominator tree.
- Back edges and Natural loops.

### 5. Loop Optimizations

- Loop invariant code motion: transformation and requirements