Introduction
MSE5018 – Advanced Compilers & PLs

- Classes & web page
  - http://arcs.skku.edu/Courses/AdvancedCompilers

- Instructor: Hwansoo Han

- TA
  - Hyunjun Kim (#85565)
  - ARCS Lab (#85565)
Prerequisites

- Prerequisite Courses (undergrad courses)
  - Compilers
  - Computer Architectures
  - Programming Languages
Reference Books

- Compilers (2nd edition)
  - A. Aho, M. Lam, R. Sethi, J. Ullman

- Computer Architecture – a quantitative approach (4th ed.)
  - J. Hennessy, D. Patterson
Reference Books

- Advanced compiler design and implementation
  - S. Muchnick
- Optimizing compilers for modern architectures
  - R. Allen, K. Kennedy
- Parallel computer architectures
  - D. Culler, J.P. Singh, A. Gupta
Grading

- **Exams**
  - Midterm 30%
  - Final 30%

- **Term project** 30%
  - Programming projects

- **Participation** 10%
  - Quiz
  - Attendance
Topics

- Compiler front end
- Control/Data flow analysis
- Compiler optimizations
- Parallel architecture
- Parallel SW design
- Dependence analysis
- Loop transformation
- OpenMP & MPI
Term Project

- **Team**
  - 3~4 people in a team

- **List of candidate projects**
  - Optimization pass with DFA (implement in LLVM)
  - Instrumentation tool (valgrind – like)
  - Cache simulator based on instrumentation
  - Memory leak checker
  - Data race checker
  - Watermarking
  - Source code similarity checker
  - Dynamic parallelism (multi-process environment)
  - SIMDization (LLVM)
  - Optimizations in Java Virtual Machine
Term Project

1. Survey LLVM – due by Mar 19, noon
   - Internal intermediate representation of LLVM
   - Adding a new pass

2. Proposal (presentation) – due by Apr 2, noon
   - Topics for term project
   - Tool implementation/research topic using LLVM

3. Progress report (presentation) – due by May 7, noon
   - Presentation of term project progress

4. Final report (presentation) – due by Jun 11, noon
   - Final result presentation & demonstration

[NOTE] Use “google sites” for the above