

## Course Outline

30 August 2011

1. Structure of optimizing compilers; JVM and its intermediate representation Abstractions of storage reference behavior.
2. Control flow and program call graphs; Depth-first spanning trees.
3. Overview of inter- and intra-procedural data flow optimization problems.
4. Problems solved over flow graphs: dominators.
5. Better dominators algorithm.
6. Dominance frontiers.
7. Control dependence; Computation of dominance frontiers.
8. Problems solved over flow graphs: intervals; Cocks-Allen intervals;
9. Schwartz-Sharir intervals.
10. Data flow frameworks.
11. Iterative solution of data flow problems.
12. Elimination solution of data flow problems.
13. Sparse data flow evaluation graphs.
14. Static single assignment form; Constant propagation.
15. Classical data flow problems and solutions.
16. Global value numbering.
17. Reduction in strength; Induction variable analysis.
18. Alias analysis.
19. Incremental data flow algorithms; Demand-driven data flow analysis.
20. Parallel languages.
21. Flow analysis of parallel programs.
22. Access anomalies.
23. Program dependence graphs; Program slicing
24. Vectorization; Loop distribution;
25. Direction vectors; Data dependence.
26. Parallelization.
27. Sequencing and privatization.
28. Loop Interchange.
29. Loop Reversal; Other transformations.
30. Data dependence decision algorithms.
31. Recurrences.
32. Storage management.