Research on CAT

Simone Campanoni
simonec@eecs.northwestern.edu
From our class to the state-of-the-art

• Improvements

• Value-based CAT

• Empirical model-based CAT

• Specialized CAT

• Better compiler structures
Improvements of our algorithms

• Alias analysis with
  • higher accuracy
  • Faster
  • Less memory consumption

• Better heuristics for
  • When to inline
  • When to unroll/peel/etc...
  • When to apply transformation X

• Better inter-procedural CAT
  • Better summary nodes
  • Better contexts
Value-based CAT

• Static value range CAT

• Profile-guided CAT
  • Use training inputs

• Dynamic CAT
Empirical model-based CAT

• Automatically tuning CAT

• Superoptimizers
Specialized CAT

- Domain-specific CAT
- Hardware-specific CAT
  - Parallelism extractions
- Programming language-specific CAT
- Hardware-software co-designed CAT
Better compiler structures

- Better compiler constructions
  - LTO
  - Better PassManager

- Certifying compilers

- Better IRs