Improving Performance by Branch Reordering

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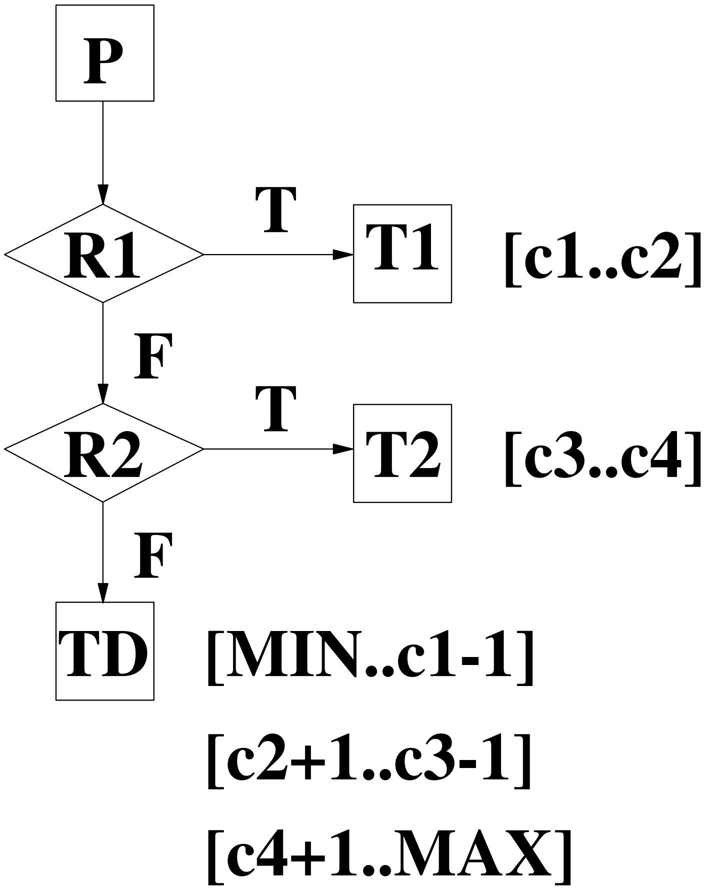
Outline of Presentation

- Motivation
- Detecting a Reorderable Sequence
- Selecting the Sequence Ordering
- Applying the Transformation
- Results
- Future Work

Explicit and Default Ranges

- An ***explicit range*** is a range that is checked by a range condition.
- A ***default range*** is a range that is not checked by a range condition.



Selecting the Sequence Ordering

- We need to select one of *t* targets as the default.
- A potential default target having *m* ranges could have 2^m-1 combinations of ranges that do not have to be explicitly checked.
- We used the ordering p1/c1 ≥ ... ≥ pm/cm to select the lowest cost from only *m* combinations of default range conditions for each target.

  {Rm}, {Rm-1,Rm}, ..., {R1, ..., Rm}

- The minimum cost among the *t* targets is selected.
- Only the cost of *n* sequences are considered, where *n* is the total number of ranges for all of the targets.

Dynamic Frequency Measurements

Switch Translation Heuristics	Program	Original	Reordered	
		Insts	Insts	Branches
Set I	awk	13,611,150	-2.02%	-4.19%
	cb	17,100,927	-7.65%	-15.46%
	cpp	18,883,104	-0.13%	-0.19%
	ctags	71,889,513	-9.10%	-14.72%
	deroff	15,460,307	-1.53%	-2.63%
	grep	9,256,749	-3.60%	-8.31%
	hyphen	18,059,010	+3.42%	+3.40%
	join	3,552,801	-1.68%	-2.12%
	lex	10,005,018	-4.56%	-10.39%
	nroff	25,307,809	-2.48%	-6.35%
	pr	73,051,342	-16.25%	-29.96%
	ptx	20,059,901	-9.18%	-13.28%
	sdiff	14,558,535	-16.09%	-37.03%
	sed	14,229,310	-1.16%	-2.03%
	sort	23,146,400	-47.20%	-57.38%
	wc	25,818,199	-15.05%	-26.26%
	yacc	25,127,817	-0.25%	-0.44%
	average	23,477,465	-7.91%	-13.37%
Set II	average	23,510,571	-8.37%	-14.30%
Set III	average	24,556,842	-12.72%	-20.75%

Future Work

- Using Binary Search Instead of Linear Search
- Contrasting Various Semi-static Search Methods
  — Linear Search
  — Binary Search
  — Jump Table
  — Combinations of Methods
- Reordering Branches with a Common Successor