

CS422A: Computer Architecture

Homework 1

Submitted By

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About the Analysis

Flow is such that a predicated call and a call are inserted **before every instruction**. These calls are placed with a check fast forward if clause. Terminate check and increase ins count is placed at **basic block level** to speed up analysis.

Depending on memory operands **exactly one** predicated call and regular call are inserted per instructions.

The basic block level of ins counts incur a cost of less than 10 extra instructions in 1 Billion instructions.

Used macro for fewer errors in repeated codes.

Note: Results of 403.gcc is deviating a lot

Time taken for execution

Machine used: image1.cse.iitk.ac.in

Spec Bench File	Time taken
400.perlbench diffmail.pl	25.46 minutes
401.bzip2 input.source	22.60 minutes
403.gcc cp-decl.i	13.71 minutes
429.mcf	30.68 minutes
450.soplex ref.mps	122.64 minutes
456.hmmer np3.hmm	17.73 minutes
471.omnetpp	7.34 minutes
483.xalancbmk	135.36 minutes

Pseudo instrumentation code

```
for BBL bbl in trace

    for INS ins in bbl

        INS_InsertIfCall(ins, IPOINT_BEFORE, (AFUNPTR)CheckFastForward, IARG_END);

        switch (memOperands)

            case 0:

                INS_InsertThenPredicatedCall(ins, PredicatedAnalysisMetrics);

            case 1:

                INS_InsertThenPredicatedCall(ins, PredicatedAnalysisMetrics1Mem);

            case 2:

                INS_InsertThenPredicatedCall(ins, PredicatedAnalysisMetrics2Mem);

            case 3:

                INS_InsertThenPredicatedCall(ins, PredicatedAnalysisMetrics3Mem);

            case 4:

                INS_InsertThenPredicatedCall(ins, PredicatedAnalysisMetrics4Mem);

            case 5:

                INS_InsertThenPredicatedCall(ins, PredicatedAnalysisMetrics5Mem);

        INS_InsertIfCall(ins, IPOINT_BEFORE, (AFUNPTR)CheckFastForward, IARG_END);

        INS_InsertThenCall(ins, IPOINT_BEFORE, (AFUNPTR)AnalysisMetrics);

BBL_InsertIfCall(bbl, IPOINT_BEFORE, (AFUNPTR)CheckTerminate, IARG_END);

BBL_InsertThenCall(bbl, IPOINT_BEFORE, (AFUNPTR)Terminate, IARG_END);

BBL_InsertCall(bbl, DoInsCount, IARG_UINT32, BBL_NumIns(bbl), IARG_END);
```

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Usage

```
# Build the tool
```

```
make TARGET=ia32 obj-ia32/HW1.so
```

```
# Run the tool on a benchmark
```

```
cd /path/to/spec_2006/400.perlbench/
```

```
pin -t /path/to/obj-ia32/HW1.so -f <FAST_FORWARD_VAL> -o executable..out --  
./executable exec_args
```

- `-f`` flag is used to specify the fast-forward instruction count in billions.
- `-o`` flag is used to specify the output file.
- `-t`` flag is used to specify the pin tool to be used.
- `--`` is used to separate the pin tool arguments from the application arguments.

Analysis of 400.perlbench diffmail.pl

=====

HW1 analysis results from perlbench.diffmail.out

Number of instructions: 208000000002

Fast forward at: 207000000000

Number of instructions after fast forward: 1000000002

=====PARTA=====

Number of loads:	355852889 (22.78%)
Number of stores:	206607674 (13.22%)
Number of nops:	988161 (0.06%)
Number of direct calls:	12937714 (0.83%)
Number of indirect calls:	2791121 (0.18%)
Number of returns:	15728836 (1.01%)
Number of unconditional branches:	30468305 (1.95%)
Number of conditional branches:	130115853 (8.33%)
Number of logical operations:	100587749 (6.44%)
Number of rotate/shift operations:	4249832 (0.27%)
Number of flag operations:	874435 (0.06%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	972740 (0.06%)
Number of other instructions:	700121868 (44.81%)

=====PARTB=====

CPI: 25.84

=====PARTC=====

Number of 32 bytes region for data 31702

Size of region is 1014464 bytes

Number of 32 bytes region for instructions 2827

Size of region is 90464 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 117798442

Number of Instruction of 2 bytes: 257010781

Number of Instruction of 3 bytes: 275099101

Number of Instruction of 4 bytes: 53026877

Number of Instruction of 5 bytes: 78577028

Number of Instruction of 6 bytes: 184531642

Number of Instruction of 7 bytes: 33956092

Number of Instruction of 8 bytes: 28

Number of Instruction of 10 bytes: 12

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 988161

Number of Instruction of 1 operands: 1073665

Number of Instruction of 2 operands: 520133114

Number of Instruction of 3 operands: 354989669

Number of Instruction of 4 operands: 103861755

Number of Instruction of 5 operands: 15730558

Number of Instruction of 6 operands: 3223081

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 10329040

Number of Instruction of 1 register read operands: 259517569

Number of Instruction of 2 register read operands: 538272747

Number of Instruction of 3 register read operands: 179201389

Number of Instruction of 4 register read operands: 6916870

Number of Instruction of 5 register read operands: 2539307

Number of Instruction of 6 register read operands: 3223081

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 136277241

Number of Instruction of 1 register write operands: 684662689

Number of Instruction of 2 register write operands: 175833154

Number of Instruction of 3 register write operands: 2374090

Number of Instruction of 4 register write operands: 852829

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 453366099

Number of Instruction of 1 memory operands: 531041855

Number of Instruction of 2 memory operands: 15428660

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 644911564

Number of Instruction of 1 memory read operands: 354072244

Number of Instruction of 2 memory read operands: 852806

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 793715295

Number of Instruction of 1 memory write operands: 206121319

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 3.74

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -2147483648

D10 Maximum and minimum values of the displacement field in a memory
instruction (Predicated Ins)

Maximum value of the displacement field: 135918104

Minimum value of the displacement field: -1408

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 25.46 minutes

Analysis of 401.bzip2 input.source

=====

HW1 analysis results from bzip2.source.out

Number of instructions: 302000000003

Fast forward at: 301000000000

Number of instructions after fast forward: 1000000003

=====PARTA=====

Number of loads:	452706169	(26.88%)
Number of stores:	231174043	(13.73%)
Number of nops:	36514	(0.00%)
Number of direct calls:	791607	(0.05%)
Number of indirect calls:	13	(0.00%)
Number of returns:	791616	(0.05%)
Number of unconditional branches:	21299203	(1.26%)
Number of conditional branches:	129923152	(7.72%)
Number of logical operations:	71000685	(4.22%)
Number of rotate/shift operations:	61831919	(3.67%)
Number of flag operations:	6130	(0.00%)
Number of vector operations:	0	(0.00%)
Number of conditional moves:	0	(0.00%)
Number of MMX/SSE operations:	0	(0.00%)
Number of system calls:	0	(0.00%)
Number of FP operations:	0	(0.00%)
Number of other instructions:	714315080	(42.42%)

=====PARTB=====

CPI: 29.02

=====PARTC=====

Number of 32 bytes region for data 2528518

Size of region is 80912576 bytes

Number of 32 bytes region for instructions 753

Size of region is 24096 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 38611255

Number of Instruction of 2 bytes: 219201451

Number of Instruction of 3 bytes: 436965469

Number of Instruction of 4 bytes: 75327025

Number of Instruction of 5 bytes: 22047550

Number of Instruction of 6 bytes: 141357419

Number of Instruction of 7 bytes: 51341593

Number of Instruction of 8 bytes: 15085632

Number of Instruction of 10 bytes: 62610

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 36514

Number of Instruction of 1 operands: 6147

Number of Instruction of 2 operands: 597647435

Number of Instruction of 3 operands: 382870418

Number of Instruction of 4 operands: 2693876

Number of Instruction of 5 operands: 14191406

Number of Instruction of 6 operands: 2554208

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 5189068

Number of Instruction of 1 register read operands: 183351630

Number of Instruction of 2 register read operands: 533608108

Number of Instruction of 3 register read operands: 215105854

Number of Instruction of 4 register read operands: 46791337

Number of Instruction of 5 register read operands: 13399799

Number of Instruction of 6 register read operands: 2554208

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 132331390

Number of Instruction of 1 register write operands: 712782513

Number of Instruction of 2 register write operands: 152331876

Number of Instruction of 3 register write operands: 2554225

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 399852492

Number of Instruction of 1 memory operands: 516406642

Number of Instruction of 2 memory operands: 83736785

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 547289750

Number of Instruction of 1 memory read operands: 452706169

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 768821876

Number of Instruction of 1 memory write operands: 231174043

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 3.49

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 1431655766

Minimum value of the immediate field: -858993459

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 135000192

Minimum value of the displacement field: -4848

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 22.60 minutes

Analysis of 403.gcc cp-decl.i

RUN 1

=====

HW1 analysis results from gcc.cp-decl.out

Number of instructions: 108000000000

Fast forward at: 107000000000

Number of instructions after fast forward: 1000000000

=====PARTA=====

Number of loads:	32759922 (2.28%)
Number of stores:	405867557 (28.21%)
Number of nops:	137576 (0.01%)
Number of direct calls:	1906245 (0.13%)
Number of indirect calls:	61521 (0.00%)
Number of returns:	1967764 (0.14%)
Number of unconditional branches:	2233859 (0.16%)
Number of conditional branches:	141327125 (9.82%)
Number of logical operations:	136690109 (9.50%)
Number of rotate/shift operations:	1174773 (0.08%)
Number of flag operations:	41566 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	286 (0.00%)

Number of other instructions: 714458848 (49.66%)

=====PARTB=====

CPI: 22.04

=====PARTC=====

Number of 32 bytes region for data 210228

Size of region is 6727296 bytes

Number of 32 bytes region for instructions 1273

Size of region is 40736 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 142777487

Number of Instruction of 2 bytes: 671833758

Number of Instruction of 3 bytes: 31318450

Number of Instruction of 4 bytes: 136630225

Number of Instruction of 5 bytes: 5912111

Number of Instruction of 6 bytes: 8520775

Number of Instruction of 7 bytes: 2967764

Number of Instruction of 8 bytes: 39434

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 137576

Number of Instruction of 1 operands: 207215

Number of Instruction of 2 operands: 306260352

Number of Instruction of 3 operands: 420894245

Number of Instruction of 4 operands: 12765748

Number of Instruction of 5 operands: 259734868

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 1025756

Number of Instruction of 1 register read operands: 155474939

Number of Instruction of 2 register read operands: 437399843

Number of Instruction of 3 register read operands: 18636971

Number of Instruction of 4 register read operands: 129645033

Number of Instruction of 5 register read operands: 257817462

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 140344509

Number of Instruction of 1 register write operands: 324535635

Number of Instruction of 2 register write operands: 534990147

Number of Instruction of 3 register write operands: 129713

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 562156961

Number of Instruction of 1 memory operands: 437057943

Number of Instruction of 2 memory operands: 784768

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 967239750

Number of Instruction of 1 memory read operands: 32759922

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 594132115

Number of Instruction of 1 memory write operands: 405867557

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 3.97

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 1759218605

Minimum value of the immediate field: -2147483587

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 138633392

Minimum value of the displacement field: -1744

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 13.71 minutes

RUN 2

=====

HW1 analysis results from gcc.cp-decl.out

Number of instructions: 108000000009

Fast forward at: 107000000000

Number of instructions after fast forward: 1000000009

=====PARTA=====

Number of loads:	138454922 (9.25%)
Number of stores:	359090974 (23.98%)
Number of nops:	188989 (0.01%)
Number of direct calls:	4590076 (0.31%)
Number of indirect calls:	501642 (0.03%)
Number of returns:	5091717 (0.34%)
Number of unconditional branches:	4938722 (0.33%)
Number of conditional branches:	133491384 (8.91%)
Number of logical operations:	131928715 (8.81%)
Number of rotate/shift operations:	2380266 (0.16%)
Number of flag operations:	184898 (0.01%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)

Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	5 (0.00%)
Number of other instructions:	716635191 (47.86%)

=====PARTB=====

CPI: 23.93

=====PARTC=====

Number of 32 bytes region for data 1140864

Size of region is 36507648 bytes

Number of 32 bytes region for instructions 2952

Size of region is 94464 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 129780138

Number of Instruction of 2 bytes: 591466180

Number of Instruction of 3 bytes: 125080059

Number of Instruction of 4 bytes: 115937313

Number of Instruction of 5 bytes: 11224337

Number of Instruction of 6 bytes: 15672608

Number of Instruction of 7 bytes: 10781057

Number of Instruction of 8 bytes: 58319

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 188989
Number of Instruction of 1 operands: 4594630
Number of Instruction of 2 operands: 349542174
Number of Instruction of 3 operands: 403949652
Number of Instruction of 4 operands: 33840508
Number of Instruction of 5 operands: 203628775
Number of Instruction of 6 operands: 4255283

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 2144126
Number of Instruction of 1 register read operands: 169015345
Number of Instruction of 2 register read operands: 472470435
Number of Instruction of 3 register read operands: 62658383
Number of Instruction of 4 register read operands: 90419138
Number of Instruction of 5 register read operands: 199037301
Number of Instruction of 6 register read operands: 4255283

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 125720562
Number of Instruction of 1 register write operands: 418945425
Number of Instruction of 2 register write operands: 450935974
Number of Instruction of 3 register write operands: 4398050

D5 Distribution of the number of memory operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory operands: 518787523

Number of Instruction of 1 memory operands: 464742271

Number of Instruction of 2 memory operands: 16401811

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 861476686

Number of Instruction of 1 memory read operands: 138454919

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 640840631

Number of Instruction of 1 memory write operands: 359090974

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 3.96

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 1073741823

Minimum value of the immediate field: -2147483587

D10 Maximum and minimum values of the displacement field in a memory instruction(Predicated Ins)

Maximum value of the displacement field: 138634432

Minimum value of the displacement field: -1744

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

RUN 3

=====

HW1 analysis results from gcc.cp-decl.out

Number of instructions: 108000000002

Fast forward at: 107000000000

Number of instructions after fast forward: 1000000002

=====PARTA=====

Number of loads:	337250612 (22.26%)
------------------	--------------------

Number of stores:	177719751 (11.73%)
-------------------	--------------------

Number of nops:	3577082 (0.24%)
-----------------	------------------

Number of direct calls:	28678076 (1.89%)
-------------------------	-------------------

Number of indirect calls:	400742 (0.03%)
---------------------------	-----------------

Number of returns:	29078814 (1.92%)
--------------------	-------------------

Number of unconditional branches:	30392361 (2.01%)
-----------------------------------	-------------------

Number of conditional branches:	145368048 (9.60%)
---------------------------------	--------------------

Number of logical operations:	58404635 (3.86%)
Number of rotate/shift operations:	1396377 (0.09%)
Number of flag operations:	49367 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	0 (0.00%)
Number of other instructions:	702633959 (46.38%)

=====PARTB=====

CPI: 24.45

=====PARTC=====

Number of 32 bytes region for data 848089

Size of region is 27138848 bytes

Number of 32 bytes region for instructions 1781

Size of region is 56992 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 174134383

Number of Instruction of 2 bytes: 314255884

Number of Instruction of 3 bytes: 284582984

Number of Instruction of 4 bytes: 85671454

Number of Instruction of 5 bytes: 52624518

Number of Instruction of 6 bytes: 74016097

Number of Instruction of 7 bytes: 14703957

Number of Instruction of 8 bytes: 10728

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 3577082

Number of Instruction of 1 operands: 2422832

Number of Instruction of 2 operands: 428641931

Number of Instruction of 3 operands: 363204375

Number of Instruction of 4 operands: 164394792

Number of Instruction of 5 operands: 37556818

Number of Instruction of 6 operands: 202175

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 7213747

Number of Instruction of 1 register read operands: 306701547

Number of Instruction of 2 register read operands: 486525818

Number of Instruction of 3 register read operands: 186880532

Number of Instruction of 4 register read operands: 3598847

Number of Instruction of 5 register read operands: 8877339

Number of Instruction of 6 register read operands: 202175

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 70379627

Number of Instruction of 1 register write operands: 717955310

Number of Instruction of 2 register write operands: 211449722

Number of Instruction of 3 register write operands: 215346

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 491268226

Number of Instruction of 1 memory operands: 502452107

Number of Instruction of 2 memory operands: 6259128

D6 Distribution of the number of memory read operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory read operands: 662728849

Number of Instruction of 1 memory read operands: 337250612

D7 Distribution of the number of memory write operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory write operands: 822259710

Number of Instruction of 1 memory write operands: 177719751

D8 Maximum and average number of memory bytes touched by any memory instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 3.77

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 1073741823

Minimum value of the immediate field: -2147483587

D10 Maximum and minimum values of the displacement field in a memory instruction(Predicated Ins)

Maximum value of the displacement field: 138634432

Minimum value of the displacement field: -244

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 13.96 minutes

Analysis of 429.mcf

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HW1 analysis results from mcf.out

Number of instructions: 378000000001

Fast forward at: 377000000000

Number of instructions after fast forward: 1000000001

=====PARTA=====

Number of loads:	415211920 (27.22%)
Number of stores:	110040674 (7.21%)
Number of nops:	1477639 (0.10%)
Number of direct calls:	12555925 (0.82%)
Number of indirect calls:	0 (0.00%)
Number of returns:	12555925 (0.82%)
Number of unconditional branches:	8314820 (0.55%)
Number of conditional branches:	178243364 (11.69%)
Number of logical operations:	75119491 (4.93%)
Number of rotate/shift operations:	3516374 (0.23%)
Number of flag operations:	0 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	0 (0.00%)
Number of other instructions:	708216465 (46.43%)

=====PARTB=====

CPI: 24.76

=====PARTC=====

Number of 32 bytes region for data 11672480

Size of region is 373519360 bytes

Number of 32 bytes region for instructions 65

Size of region is 2080 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 80626868

Number of Instruction of 2 bytes: 485391917

Number of Instruction of 3 bytes: 315525572

Number of Instruction of 4 bytes: 50530497

Number of Instruction of 5 bytes: 22077259

Number of Instruction of 6 bytes: 5249642

Number of Instruction of 7 bytes: 40598248

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 1477639

Number of Instruction of 2 operands: 484786163

Number of Instruction of 3 operands: 457347306

Number of Instruction of 4 operands: 43832970

Number of Instruction of 5 operands: 12555925

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 3760020

Number of Instruction of 1 register read operands: 148512803

Number of Instruction of 2 register read operands: 677526614

Number of Instruction of 3 register read operands: 170200566

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 70907275

Number of Instruction of 1 register write operands: 770284482

Number of Instruction of 2 register write operands: 158769735

Number of Instruction of 3 register write operands: 38511

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 487183255

Number of Instruction of 1 memory operands: 500380902

Number of Instruction of 2 memory operands: 12435846

D6 Distribution of the number of memory read operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory read operands: 584788083

Number of Instruction of 1 memory read operands: 415211920

D7 Distribution of the number of memory write operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory write operands: 889959329

Number of Instruction of 1 memory write operands: 110040674

D8 Maximum and average number of memory bytes touched by any memory instruction (Predicated Ins)

Maximum number of memory bytes touched: 4

Average number of memory bytes touched: 4.00

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 1374389535

Minimum value of the immediate field: -100000000

D10 Maximum and minimum values of the displacement field in a memory instruction(Predicated Ins)

Maximum value of the displacement field: 134957120

Minimum value of the displacement field: -76

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For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 30.68 minutes

Analysis of 450.soplex ref.mps

=====

HW1 analysis results from soplex.ref.out

Number of instructions: 365000000000

Fast forward at: 364000000000

Number of instructions after fast forward: 1000000000

=====PARTA=====

Number of loads:	546825630 (33.20%)
Number of stores:	100072050 (6.08%)
Number of nops:	7974 (0.00%)
Number of direct calls:	3194683 (0.19%)
Number of indirect calls:	126 (0.00%)
Number of returns:	3194803 (0.19%)
Number of unconditional branches:	12973394 (0.79%)
Number of conditional branches:	103134889 (6.26%)
Number of logical operations:	13878279 (0.84%)
Number of rotate/shift operations:	10421467 (0.63%)
Number of flag operations:	23126112 (1.40%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	308051047 (18.70%)
Number of other instructions:	522017229 (31.70%)

=====PARTB=====

CPI: 28.10

=====PARTC=====

Number of 32 bytes region for data 5677486

Size of region is 181679552 bytes

Number of 32 bytes region for instructions 1049

Size of region is 33568 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 77371500

Number of Instruction of 2 bytes: 441847327

Number of Instruction of 3 bytes: 399365731

Number of Instruction of 4 bytes: 16290587

Number of Instruction of 5 bytes: 3265471

Number of Instruction of 6 bytes: 40374749

Number of Instruction of 7 bytes: 17547725

Number of Instruction of 8 bytes: 3936913

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 7974

Number of Instruction of 1 operands: 16

Number of Instruction of 2 operands: 413956661

Number of Instruction of 3 operands: 395345446

Number of Instruction of 4 operands: 187458879

Number of Instruction of 5 operands: 3231027

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 23329004

Number of Instruction of 1 register read operands: 216167193

Number of Instruction of 2 register read operands: 577713101

Number of Instruction of 3 register read operands: 139318800

Number of Instruction of 4 register read operands: 43435582

Number of Instruction of 5 register read operands: 36323

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 68995999

Number of Instruction of 1 register write operands: 764813809

Number of Instruction of 2 register write operands: 166190195

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 530764408

Number of Instruction of 1 memory operands: 439460968

Number of Instruction of 2 memory operands: 29774627

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 583204511

Number of Instruction of 1 memory read operands: 416795492

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 917785273

Number of Instruction of 1 memory write operands: 82214730

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 5.26

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -1074790400

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 135855532

Minimum value of the displacement field: -344

=====

Time elapsed: 122.64 minutes

Analysis of 456.hmmmer np3.hmm

=====

HW1 analysis results from hmmmer.nph3.out

Number of instructions: 265000000003

Fast forward at: 264000000000

Number of instructions after fast forward: 1000000003

=====PARTA=====

Number of loads:	547670738 (33.74%)
Number of stores:	75698961 (4.66%)
Number of nops:	34317 (0.00%)
Number of direct calls:	144578 (0.01%)
Number of indirect calls:	937 (0.00%)
Number of returns:	145515 (0.01%)
Number of unconditional branches:	205820 (0.01%)
Number of conditional branches:	144361290 (8.89%)
Number of logical operations:	1158481 (0.07%)
Number of rotate/shift operations:	294092 (0.02%)
Number of flag operations:	5648 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	40212 (0.00%)
Number of other instructions:	853608151 (52.58%)

=====PARTB=====

CPI: 27.50

=====PARTC=====

Number of 32 bytes region for data 85332

Size of region is 2730624 bytes

Number of 32 bytes region for instructions 459

Size of region is 14688 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 25077992

Number of Instruction of 2 bytes: 302860482

Number of Instruction of 3 bytes: 296150665

Number of Instruction of 4 bytes: 270389370

Number of Instruction of 5 bytes: 24861173

Number of Instruction of 6 bytes: 68360483

Number of Instruction of 7 bytes: 416472

Number of Instruction of 8 bytes: 11883367

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 34887

Number of Instruction of 1 operands: 3491

Number of Instruction of 2 operands: 566127548

Number of Instruction of 3 operands: 432938119

Number of Instruction of 4 operands: 712697

Number of Instruction of 5 operands: 159485

Number of Instruction of 6 operands: 23777

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 610916

Number of Instruction of 1 register read operands: 75619849

Number of Instruction of 2 register read operands: 562398610

Number of Instruction of 3 register read operands: 281425975

Number of Instruction of 4 register read operands: 79905970

Number of Instruction of 5 register read operands: 14907

Number of Instruction of 6 register read operands: 23777

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 75149699

Number of Instruction of 1 register write operands: 755279830

Number of Instruction of 2 register write operands: 169546698

Number of Instruction of 3 register write operands: 23777

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 376807873

Number of Instruction of 1 memory operands: 623025156

Number of Instruction of 2 memory operands: 166012

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 452336186

Number of Instruction of 1 memory read operands: 547662855

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 924304716

Number of Instruction of 1 memory write operands: 75694325

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 4.00

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -987654321

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 135294312

Minimum value of the displacement field: -580

=====

Time elapsed: 17.73 minutes

Analysis of 471.omnetpp

=====

HW1 analysis results from omnetpp.out

Number of instructions: 44000000008

Fast forward at: 43000000000

Number of instructions after fast forward: 1000000008

=====PARTA=====

Number of loads:	371234959 (23.19%)
Number of stores:	229793822 (14.35%)
Number of nops:	802441 (0.05%)
Number of direct calls:	21327948 (1.33%)
Number of indirect calls:	3689214 (0.23%)
Number of returns:	25017161 (1.56%)
Number of unconditional branches:	22189460 (1.39%)
Number of conditional branches:	117334368 (7.33%)
Number of logical operations:	60009498 (3.75%)
Number of rotate/shift operations:	7139640 (0.45%)
Number of flag operations:	20159546 (1.26%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	96963384 (6.06%)
Number of other instructions:	625367355 (39.06%)

=====PARTB=====

CPI: 26.90

=====PARTC=====

Number of 32 bytes region for data 528736

Size of region is 16919552 bytes

Number of 32 bytes region for instructions 890

Size of region is 28480 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 154578966

Number of Instruction of 2 bytes: 308549842

Number of Instruction of 3 bytes: 382075664

Number of Instruction of 4 bytes: 34347978

Number of Instruction of 5 bytes: 45117290

Number of Instruction of 6 bytes: 48822927

Number of Instruction of 7 bytes: 26506927

Number of Instruction of 10 bytes: 421

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 802441

Number of Instruction of 1 operands: 225858

Number of Instruction of 2 operands: 518294502

Number of Instruction of 3 operands: 281742813

Number of Instruction of 4 operands: 172764838

Number of Instruction of 5 operands: 25030753

Number of Instruction of 6 operands: 1138810

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 28999921

Number of Instruction of 1 register read operands: 197518533

Number of Instruction of 2 register read operands: 540431430

Number of Instruction of 3 register read operands: 219767246

Number of Instruction of 4 register read operands: 8457508

Number of Instruction of 5 register read operands: 3686567

Number of Instruction of 6 register read operands: 1138810

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 165351618

Number of Instruction of 1 register write operands: 665540144

Number of Instruction of 2 register write operands: 167593437

Number of Instruction of 3 register write operands: 376006

Number of Instruction of 4 register write operands: 1138810

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 449247911

Number of Instruction of 1 memory operands: 542987095

Number of Instruction of 2 memory operands: 7765009

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 661701041

Number of Instruction of 1 memory read operands: 337160164

Number of Instruction of 2 memory read operands: 1138810

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 780920686

Number of Instruction of 1 memory write operands: 219079329

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 4.22

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -2092037281

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 136090116

Minimum value of the displacement field: -104

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 7.34 minutes

Analysis of 483.xalancbmk

=====

HW1 analysis results from xalancbmk.out

Number of instructions: 1332000000007

Fast forward at: 1331000000000

Number of instructions after fast forward: 1000000007

=====PARTA=====

Number of loads:	364988267 (23.84%)
Number of stores:	166206491 (10.86%)
Number of nops:	23088189 (1.51%)
Number of direct calls:	12835377 (0.84%)
Number of indirect calls:	8921754 (0.58%)
Number of returns:	21758832 (1.42%)
Number of unconditional branches:	8379261 (0.55%)
Number of conditional branches:	181082401 (11.83%)
Number of logical operations:	36764970 (2.40%)
Number of rotate/shift operations:	5463671 (0.36%)
Number of flag operations:	1615832 (0.11%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	7053748 (0.46%)
Number of other instructions:	692576296 (45.24%)

=====PARTB=====

CPI: 24.94

=====PARTC=====

Number of 32 bytes region for data 818551

Size of region is 26193632 bytes

Number of 32 bytes region for instructions 2273

Size of region is 72736 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 145121031

Number of Instruction of 2 bytes: 323723642

Number of Instruction of 3 bytes: 445791523

Number of Instruction of 4 bytes: 31048795

Number of Instruction of 5 bytes: 23461133

Number of Instruction of 6 bytes: 23047648

Number of Instruction of 7 bytes: 7425447

Number of Instruction of 8 bytes: 254880

Number of Instruction of 9 bytes: 60170

Number of Instruction of 10 bytes: 65740

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 23088189
Number of Instruction of 1 operands: 722315
Number of Instruction of 2 operands: 419676166
Number of Instruction of 3 operands: 417332856
Number of Instruction of 4 operands: 99514249
Number of Instruction of 5 operands: 23651083
Number of Instruction of 6 operands: 16015151

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 30372599
Number of Instruction of 1 register read operands: 238858156
Number of Instruction of 2 register read operands: 454615856
Number of Instruction of 3 register read operands: 250150488
Number of Instruction of 4 register read operands: 1180781
Number of Instruction of 5 register read operands: 8806978
Number of Instruction of 6 register read operands: 16015151

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 112567256
Number of Instruction of 1 register write operands: 687321577
Number of Instruction of 2 register write operands: 184094548
Number of Instruction of 3 register write operands: 16016628

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 499155117

Number of Instruction of 1 memory operands: 472934992

Number of Instruction of 2 memory operands: 27450222

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 636809824

Number of Instruction of 1 memory read operands: 362730507

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 834435402

Number of Instruction of 1 memory write operands: 165104929

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 4.16

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -1431655765

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 139655605

Minimum value of the displacement field: -1392

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 135.36 minutes

Optional Analysis of 437.leslie3d

=====

HW1 analysis results from leslie3d.out

Number of instructions: 2347000000065

Fast forward at: 2346000000000

Number of instructions after fast forward: 10000000065

=====PARTA=====

Number of loads:	736426206 (38.01%)
Number of stores:	201007500 (10.37%)
Number of nops:	83321 (0.00%)
Number of direct calls:	913 (0.00%)
Number of indirect calls:	17 (0.00%)
Number of returns:	930 (0.00%)
Number of unconditional branches:	169181 (0.01%)
Number of conditional branches:	41549300 (2.14%)
Number of logical operations:	435798 (0.02%)
Number of rotate/shift operations:	5168434 (0.27%)
Number of flag operations:	32 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	394808143 (20.38%)
Number of other instructions:	557784008 (28.79%)

=====PARTB=====

CPI: 34.39

=====PARTC=====

Number of 32 bytes region for data 2476189

Size of region is 79238048 bytes

Number of 32 bytes region for instructions 2631

Size of region is 84192 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 34716289

Number of Instruction of 2 bytes: 503707307

Number of Instruction of 3 bytes: 58913012

Number of Instruction of 4 bytes: 82555

Number of Instruction of 5 bytes: 412264

Number of Instruction of 6 bytes: 400346856

Number of Instruction of 7 bytes: 1821778

Number of Instruction of 10 bytes: 18

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 83321

Number of Instruction of 1 operands: 33

Number of Instruction of 2 operands: 317860910

Number of Instruction of 3 operands: 492867962

Number of Instruction of 4 operands: 189186817

Number of Instruction of 5 operands: 992

Number of Instruction of 6 operands: 44

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 357048

Number of Instruction of 1 register read operands: 58705826

Number of Instruction of 2 register read operands: 653895048

Number of Instruction of 3 register read operands: 270600139

Number of Instruction of 4 register read operands: 16441902

Number of Instruction of 5 register read operands: 72

Number of Instruction of 6 register read operands: 44

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 68909625

Number of Instruction of 1 register write operands: 735960026

Number of Instruction of 2 register write operands: 195130270

Number of Instruction of 3 register write operands: 158

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 378021828

Number of Instruction of 1 memory operands: 548828670

Number of Instruction of 2 memory operands: 73149579

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 446851412

Number of Instruction of 1 memory read operands: 553148665

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 858020914

Number of Instruction of 1 memory write operands: 141979163

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 10

Average number of memory bytes touched: 5.56

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -2147483648

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 135182404

Minimum value of the displacement field: -1760

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 234.58 minutes

Optional Analysis of 462.libquantum

=====

HW1 analysis results from libquantum.out

Number of instructions: 3606000000007

Fast forward at: 3605000000000

Number of instructions after fast forward: 1000000007

=====PARTA=====

Number of loads:	279866883 (19.86%)
Number of stores:	129203358 (9.17%)
Number of nops:	0 (0.00%)
Number of direct calls:	556666 (0.04%)
Number of indirect calls:	0 (0.00%)
Number of returns:	556667 (0.04%)
Number of unconditional branches:	834558 (0.06%)
Number of conditional branches:	157417340 (11.17%)
Number of logical operations:	146293215 (10.38%)
Number of rotate/shift operations:	107083353 (7.60%)
Number of flag operations:	0 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	0 (0.00%)
Number of other instructions:	587258211 (41.68%)

=====PARTB=====

CPI: 21.03

=====PARTC=====

Number of 32 bytes region for data 1048592

Size of region is 33554944 bytes

Number of 32 bytes region for instructions 67

Size of region is 2144 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 61187379

Number of Instruction of 2 bytes: 442809967

Number of Instruction of 3 bytes: 437560024

Number of Instruction of 4 bytes: 51733074

Number of Instruction of 5 bytes: 834761

Number of Instruction of 6 bytes: 1113150

Number of Instruction of 7 bytes: 4761655

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 2 operands: 467945145

Number of Instruction of 3 operands: 476703761

Number of Instruction of 4 operands: 54794438

Number of Instruction of 5 operands: 556666

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 1 register read operands: 314502833

Number of Instruction of 2 register read operands: 461095445

Number of Instruction of 3 register read operands: 223845196

Number of Instruction of 4 register read operands: 556536

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 101552897

Number of Instruction of 1 register write operands: 655482251

Number of Instruction of 2 register write operands: 242408582

Number of Instruction of 3 register write operands: 556280

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 616075335

Number of Instruction of 1 memory operands: 358779109

Number of Instruction of 2 memory operands: 25145566

D6 Distribution of the number of memory read operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory read operands: 720133127

Number of Instruction of 1 memory read operands: 279866883

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 870796652

Number of Instruction of 1 memory write operands: 129203358

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 4

Average number of memory bytes touched: 3.60

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 124

Minimum value of the immediate field: -1

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 134982404

Minimum value of the displacement field: -64

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 208.28 minutes

Optional Analysis of 470.lbm

=====

HW1 analysis results from lbm.out

Number of instructions: 831000000113

Fast forward at: 830000000000

Number of instructions after fast forward: 1000000113

=====PARTA=====

Number of loads:	709934705 (35.99%)
Number of stores:	262839485 (13.32%)
Number of nops:	14 (0.00%)
Number of direct calls:	163 (0.00%)
Number of indirect calls:	16 (0.00%)
Number of returns:	179 (0.00%)
Number of unconditional branches:	4766482 (0.24%)
Number of conditional branches:	7787479 (0.39%)
Number of logical operations:	5058555 (0.26%)
Number of rotate/shift operations:	196 (0.00%)
Number of flag operations:	76561 (0.00%)
Number of vector operations:	0 (0.00%)
Number of conditional moves:	0 (0.00%)
Number of MMX/SSE operations:	0 (0.00%)
Number of system calls:	0 (0.00%)
Number of FP operations:	965351517 (48.93%)
Number of other instructions:	16958999 (0.86%)

=====PARTB=====

CPI: 35.02

=====PARTC=====

Number of 32 bytes region for data 13121299

Size of region is 419881568 bytes

Number of 32 bytes region for instructions 380

Size of region is 12160 bytes

=====PARTD=====

D1 Distribution of instruction length (All Ins)

Number of Instruction of 1 bytes: 103135

Number of Instruction of 2 bytes: 487558326

Number of Instruction of 3 bytes: 179608474

Number of Instruction of 4 bytes: 891

Number of Instruction of 5 bytes: 7578429

Number of Instruction of 6 bytes: 324480980

Number of Instruction of 7 bytes: 645484

Number of Instruction of 10 bytes: 24442

D2 Distribution of the number of operands in an instruction (All Ins)

Number of Instruction of 0 operands: 14

Number of Instruction of 1 operands: 19

Number of Instruction of 2 operands: 13356410

Number of Instruction of 3 operands: 457056103

Number of Instruction of 4 operands: 529587408

Number of Instruction of 5 operands: 179

Number of Instruction of 6 operands: 28

D3 Distribution of the number of register read operands in an instruction (All Ins)

Number of Instruction of 0 register read operands: 44826385

Number of Instruction of 1 register read operands: 133976253

Number of Instruction of 2 register read operands: 604383950

Number of Instruction of 3 register read operands: 216813390

Number of Instruction of 4 register read operands: 139

Number of Instruction of 5 register read operands: 16

Number of Instruction of 6 register read operands: 28

D4 Distribution of the number of register write operands in an instruction (All Ins)

Number of Instruction of 0 register write operands: 131899219

Number of Instruction of 1 register write operands: 822012168

Number of Instruction of 2 register write operands: 46088619

Number of Instruction of 3 register write operands: 155

D5 Distribution of the number of memory operands in an instruction (Predicated Ins)

Number of Instruction of 0 memory operands: 510671982

Number of Instruction of 1 memory operands: 489303544

Number of Instruction of 2 memory operands: 24635

D6 Distribution of the number of memory read operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory read operands: 642495392

Number of Instruction of 1 memory read operands: 357504769

D7 Distribution of the number of memory write operands in an instruction
(Predicated Ins)

Number of Instruction of 0 memory write operands: 868152116

Number of Instruction of 1 memory write operands: 131848045

D8 Maximum and average number of memory bytes touched by any memory
instruction (Predicated Ins)

Maximum number of memory bytes touched: 8

Average number of memory bytes touched: 7.95

D9 Maximum and minimum values of the immediate field in an instruction.

Maximum value of the immediate field: 2147483647

Minimum value of the immediate field: -1672357186

D10 Maximum and minimum values of the displacement field in a memory
instruction(Predicated Ins)

Maximum value of the displacement field: 3216104

Minimum value of the displacement field: -16080

=====

For General max-min:

INT32_MAX = 2147483647

INT32_MIN = -2147483648

Time elapsed: 112.42 minutes